

2007 Hummer H3
2007 TRANSMISSION Clutch - H3

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Clutch - H3

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Clutch Actuator Cylinder Bolt	8 N.m	71 lb in
Clutch Pedal Assembly Nut	20 N.m	15 lb ft
Clutch Pressure Plate Bolt		
• First Pass	20 N.m	15 lb ft
• Final Pass	45 degrees	

SEALERS AND LUBRICANTS

Sealers and Lubricants

Application	Type of Material	GM Part Number	
		United States	Canada
Clutch Hydraulic Fluid	DOT 3 Hydraulic Fluid	12345347	992667

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - CLUTCH

Reviewing the **Clutch System Description and Operation** will help you determine the correct 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 master cylinder 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.

Intermittent

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

Symptom List

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

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.	

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Review the **Symptoms - Clutch** and perform the necessary inspections.

Pedal blocked from full travel	<ol style="list-style-type: none">1. Inspect for obstacles that prevent the pedal from going to the floor.2. Clear any obstacles from under the pedal area, such as floor mats or interior panels.
Excessive travel between pedal and clutch master cylinder	<ol style="list-style-type: none">1. Inspect the pedal for worn bushings.2. Replace the pedal if the bushings are worn. Refer to <u>Clutch Pedal Replacement</u>.
Clutch pedal mounting loose	<ol style="list-style-type: none">1. Inspect the clutch pedal mounting bracket for loose or missing fasteners.2. Replace or repair the fasteners. Refer to <u>Clutch Pedal Replacement</u>.
Linkage at pedal worn or damaged	<ol style="list-style-type: none">1. Inspect the linkage at the pedal for excessive wear.2. Repair or replace the linkage, as required. Refer to <u>Clutch Master Cylinder Replacement</u>.
Clutch master cylinder seized or binding	<ol style="list-style-type: none">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 <u>Clutch Master Cylinder Replacement</u>.
Air in the clutch hydraulic system	Bleed the clutch hydraulic system. Refer to <u>Hydraulic Clutch Bleeding</u> .
Clutch actuator cylinder seized or binding	<ol style="list-style-type: none">1. Inspect the clutch actuator piston for moving freely.2. Replace the clutch actuator cylinder if the piston is binding. Refer to <u>Clutch Actuator Cylinder Replacement</u>.
Clutch master cylinder leaking internally	<ol style="list-style-type: none">1. Inspect for proper pedal reserve. Refer to <u>Clutch System Description and Operation</u>.

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	<ol style="list-style-type: none">2. Replace the clutch master cylinder if it will not hold pedal reserve. Refer to <u>Clutch Master Cylinder Replacement</u>.
Damaged clutch assembly components	<ol style="list-style-type: none">1. Remove the clutch assembly.2. Inspect the following clutch assembly components for damage:<ul style="list-style-type: none">• Damaged clutch disc hub splines• Bent clutch disc• Bent drive straps• Broken or warped pressure plate3. Replace the clutch assembly if any of the above damage is found. Refer to <u>Clutch Assembly Replacement</u>.
Excessive side loading on the release bearing	<ol style="list-style-type: none">1. Inspect the following clutch system components:<ul style="list-style-type: none">• Worn or damaged pilot bearing• Excessive flywheel runout• Excessive engine to transmission misalignment2. Repair or replace any faulty components.
Faulty pilot bearing	Replace the pilot bearing. Refer to <u>Clutch Pilot Bearing Replacement</u> .
Transmission input shaft splines worn or damaged	Replace the transmission input shaft. Refer to <u>Transmission Disassemble</u> .
Tight or contaminated clutch disc splines	<ol style="list-style-type: none">1. Clean the clutch disc and input shaft splines.2. If the clutch disc will not clean, replace the clutch assembly. Refer to <u>Clutch Assembly Replacement</u>.
Flywheel housing, engine block to clutch housing or transmission front case excessively misaligned	<ol style="list-style-type: none">1. Inspect the transmission front case for being faulty.2. Replace the transmission clutch housing. Refer to <u>Transmission Disassemble</u> .

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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 Assembly Replacement**.

CLUTCH SLIPPING

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 <u>Symptoms - Clutch</u> and perform the necessary inspections.	
Incorrect clutch pedal height, not allowing the clutch master cylinder to return	Adjust the clutch release switch. Refer to <u>Clutch Pedal Cruise Control Release Switch Adjustment</u> .
Clutch pedal binding or sticking	<ol style="list-style-type: none">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 <u>Clutch Pedal Replacement</u>.
Clutch master cylinder binding or seized	Replace the clutch master cylinder. Refer to <u>Clutch Master Cylinder Replacement</u> .
Clutch actuator cylinder binding or seized	Replace the clutch actuator cylinder. Refer to <u>Clutch Actuator Cylinder Replacement</u> .
Kinked or damaged clutch hydraulic hose	<ol style="list-style-type: none">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.

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	<ol style="list-style-type: none">4. Repair or replace faulty engine mounts. Refer to <u>Engine Mount Replacement - Left Side</u> and <u>Engine Mount Replacement - Right Side</u> .5. Repair or replace the clutch hydraulic hose if it is damaged. Refer to <u>Clutch Master Cylinder Replacement</u>.
Grease or oil contamination of the clutch disc	<ol style="list-style-type: none">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 contaminants cannot be removed, replace the clutch assembly. Refer to <u>Clutch Assembly Replacement</u>.
Worn or damaged flywheel	Replace the engine flywheel. Refer to <u>Engine Flywheel Replacement (w/Automatic Transmission)</u> .
Worn clutch disc facing	Replace the clutch assembly. Refer to <u>Clutch Assembly Replacement</u> .
Burnt or glazed clutch discs	Replace the clutch assembly. Refer to <u>Clutch Assembly Replacement</u> .
Input shaft splines worn	Replace the input shaft. Refer to <u>Transmission Disassemble</u> .
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 <u>Engine Flywheel Replacement (w/Automatic Transmission)</u> .

CLUTCH GRABBING

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 <u>Symptoms - Clutch</u> and perform the necessary inspections.	

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Grease or oil contamination on the clutch facings	<ol style="list-style-type: none">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 <u>Clutch Assembly Replacement</u>.
Loose or faulty engine mounts	<ol style="list-style-type: none">1. Inspect the engine mounts for being loose or faulty. Refer to <u>Engine Mount Inspection</u> .2. Repair or replace the engine mounts, as required. Refer to <u>Engine Mount Replacement - Left Side</u> and <u>Engine Mount Replacement - Right Side</u> .
Clutch pedal sticking	<ol style="list-style-type: none">1. Inspect the clutch pedal for correct operation.2. Replace the clutch pedal if it is faulty. Refer to <u>Clutch Pedal Replacement</u>.
Clutch actuator cylinder binding	<ol style="list-style-type: none">1. Inspect the clutch actuator cylinder for the piston seals binding or sticking on the hub.2. Replace the clutch actuator cylinder if it is binding. Refer to <u>Clutch Actuator Cylinder Replacement</u>.
Clutch master cylinder binding	<ol style="list-style-type: none">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 <u>Clutch Master Cylinder Replacement</u>.
Improper clutch installation	<ol style="list-style-type: none">1. Inspect for the following conditions:<ul style="list-style-type: none">• The pressure plate for distortion caused by improperly tightening the pressure plate bolts• The clutch disc for a bent hub caused by forcing the installation

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	<p>of the transmission</p> <ul style="list-style-type: none">• The correct clutch disc• The clutch disc for being installed backwards <p>2. Replace the clutch assembly if it is damaged or if the wrong components were installed. Refer to <u>Clutch Assembly Replacement</u>.</p>
Clutch disc binding on the input shaft	<p>1. Inspect for the following conditions:</p> <ul style="list-style-type: none">• The input shaft for rust dirt or debris• The clutch disc for a bent hub• The input shaft for excessive wear on the splines, causing the clutch disc to bind <p>2. Repair or replace the following components if found faulty.</p> <ul style="list-style-type: none">• Clean and lubricate the input shaft.• Replace the clutch assembly if the clutch disc is faulty. Refer to <u>Clutch Assembly Replacement</u>.• Replace the transmission input shaft if it is worn. Refer to <u>Transmission Disassemble</u> .
Clutch pressure plate damaged	<p>1. Inspect the pressure plate for bent drive straps caused by improper vehicle use.</p> <p>2. Replace the clutch assembly if the clutch pressure plate is damaged. Inform the customer. Refer to <u>Clutch Assembly Replacement</u>.</p>
Flywheel improperly machined	<p>1. Inspect the flywheel for being machined and causing interference with the clutch disc.</p> <p>2. Replace the flywheel if it has been machined. Refer to <u>Engine Flywheel Replacement (w/Automatic</u></p>

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	<u>Transmission</u> .
Flywheel uneven	<ol style="list-style-type: none">1. Inspect the flywheel surface for being warped or uneven.2. Replace the flywheel if it is faulty. Refer to <u>Engine Flywheel Replacement (w/Automatic Transmission)</u> .

CLUTCH RATTLE

Clutch Rattle

Cause	Action
DEFINITION: A rattle noise coming from the clutch components with the clutch disengaged or engaged. Review the <u>Symptoms - Clutch</u> and perform the necessary inspections.	
Idle rattle clutch engaged	Replace the clutch disc, due to faulty dampener springs. Refer to <u>Clutch Assembly Replacement</u> .
Clutch is improperly installed	Remove the clutch and install it correctly. Refer to <u>Clutch Assembly Replacement</u> .
Clutch disc dampener worn or damaged	<ol style="list-style-type: none">1. Inspect the clutch disc for a broken or worn dampener.2. Replace the clutch assembly. Refer to <u>Clutch Assembly Replacement</u>.
Clutch disc splines and input shaft splines worn	<ol style="list-style-type: none">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 <u>Clutch Assembly Replacement</u>.3. Replace the input shaft. Refer to <u>Transmission Disassemble</u> .

CLUTCH NOISY

Clutch Noisy

Cause	Action
DEFINITION: A growl or whine noise is coming from the clutch when engaged or disengaged.	

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Review the **Symptoms - Clutch** and perform the necessary inspections.

Pilot bearing worn or damaged	Replace the pilot bearing. Refer to <u>Clutch Pilot Bearing Replacement</u> .
Release bearing worn or damaged	Replace the release bearing. Refer to <u>Clutch Actuator Cylinder Release Bearing Replacement</u> .

CLUTCH PEDAL SPONGY LOW PEDAL EFFORT

Clutch Pedal Spongy Low Pedal Effort

Cause	Action
DEFINITION: The clutch pedal may feel spongy or it requires very little effort to operate. Review <u>Symptoms - Clutch</u> and perform the necessary inspections.	
Air in the hydraulic system	Bleed the clutch hydraulic system. Refer to <u>Hydraulic Clutch Bleeding</u> .
Master cylinder fluid level low	<ol style="list-style-type: none">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	<ol style="list-style-type: none">1. Inspect the pedal for full return.2. Clear any obstacles that may interfere with the pedal operation.3. Adjust the clutch release switch. Refer to <u>Clutch Pedal Cruise Control Release Switch Adjustment</u> .
Clutch incorrectly installed	Remove the clutch and install it correctly. Refer to <u>Clutch Assembly Replacement</u> .
Clutch mounting bolts loose or broken	<ol style="list-style-type: none">1. Remove the broken bolts.2. Replace the broken or loose bolts and tighten. Refer to <u>Clutch Assembly Replacement</u>.
Release bearing worn or damaged	Replace the release bearing. Refer to <u>Clutch Actuator Cylinder Release Bearing Replacement</u> .
Contaminated hydraulic fluid	<ol style="list-style-type: none">1. Inspect for the following conditions:

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- The clutch hydraulic fluid for contamination of water
 - The reservoir cap for being faulty if water is present
 - The clutch hydraulic fluid for dirt or debris
2. Flush and bleed the clutch hydraulic system if the above conditions are found. Refer to **Hydraulic Clutch Bleeding**.

CLUTCH PEDAL HARD TO PUSH

Clutch Pedal Hard to Push

Cause	Action
DEFINITION: The clutch pedal requires high effort to operate. Review the <u>Symptoms - Clutch</u> and perform the necessary inspections.	
Incorrect hydraulic fluid	<ol style="list-style-type: none">1. Inspect for the correct fluid in the master cylinder. Refer to <u>Hydraulic Clutch Bleeding</u>.2. Flush the hydraulic system and fill with the correct fluid.
Contaminated hydraulic fluid	<ol style="list-style-type: none">1. Inspect the hydraulic fluid for water.2. Inspect the hydraulic fluid for dirt or debris.3. Flush the hydraulic system and fill with the correct fluid. Refer to <u>Hydraulic Clutch Bleeding</u>.
Clutch pedal binding	<ol style="list-style-type: none">1. Inspect the pedal for binding.2. Repair or replace the pedal. Refer to <u>Clutch Pedal Replacement</u>.
Kinked or damaged clutch hydraulic pipe	<ol style="list-style-type: none">1. Inspect for a kinked or damaged hydraulic hose.2. Repair or replace the clutch hydraulic hose. Refer to <u>Clutch Master Cylinder Replacement</u>.
Clutch disc worn too thin	Replace the clutch assembly. Refer to <u>Clutch</u>

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Assembly Replacement.

CLUTCH VIBRATION

Clutch Vibration

Cause	Action
DEFINITION: Vibration from the clutch components during disengagement or engagement. Review the <u>Symptoms - Clutch</u> and perform the necessary inspections.	
Excessive driveline torsional activity	Review the <u>Vibration Analysis - Driveline</u> .
Clutch incorrectly installed	Remove the clutch and install it correctly. Refer to <u>Clutch Assembly Replacement.</u>
Pilot bearing worn or damaged	<ol style="list-style-type: none">1. Replace the pilot bearing. Refer to <u>Clutch Pilot Bearing Replacement.</u>2. Inspect the input shaft pilot bearing journal for wear or damage.3. Replace the input shaft if damaged or worn. Refer to <u>Transmission Disassemble</u> .
Transmission input splines worn or damaged	<ol style="list-style-type: none">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 <u>Transmission Disassemble</u> .
Clutch disc facings damaged	Replace the clutch assembly. Refer to <u>Clutch Assembly Replacement.</u>
Flywheel housing to clutch housing excessively misaligned	Replace the faulty transmission front case. Refer to <u>Transmission Disassemble</u> .
Clutch out of balance	Replace the clutch assembly. Refer to <u>Clutch Assembly Replacement.</u>

REPAIR INSTRUCTIONS

CLUTCH PEDAL REPLACEMENT

Removal Procedure

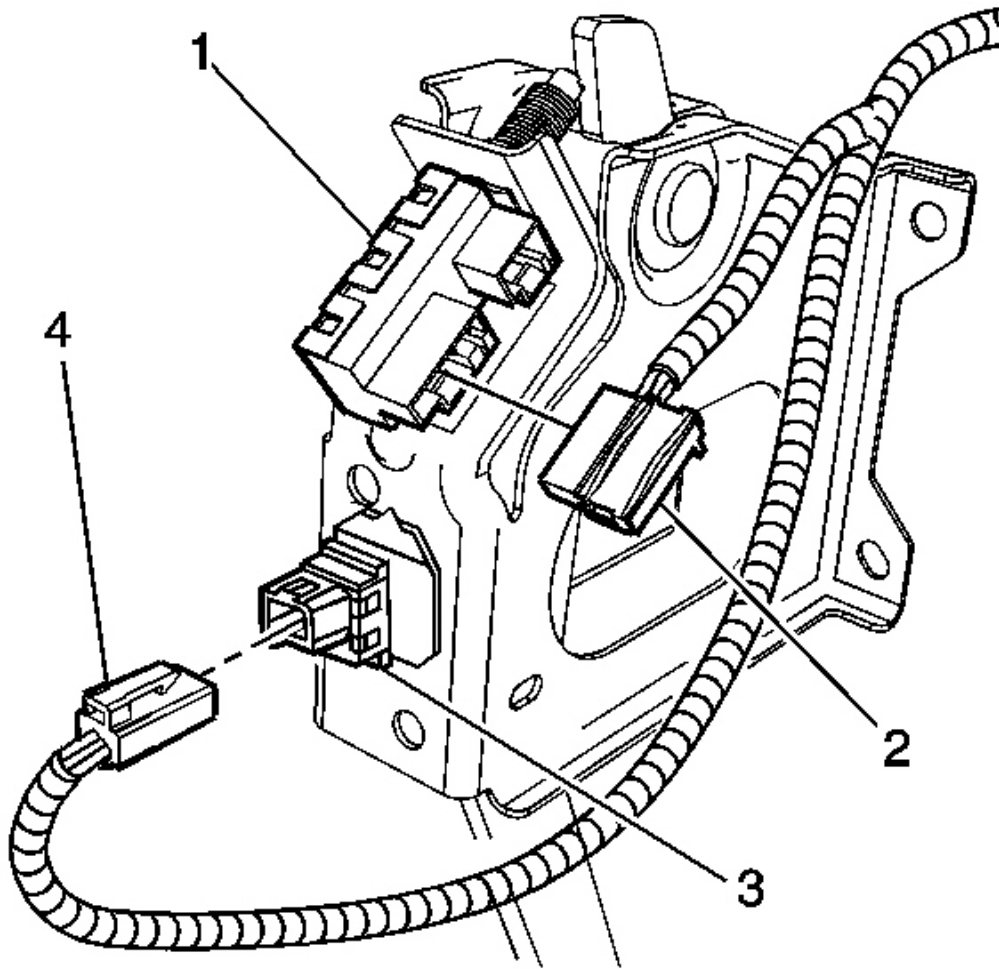


Fig. 1: View Of Clutch Release Switch Electrical Connector
Courtesy of GENERAL MOTORS CORP.

1. Disconnect the electrical connectors (2, 4) from the following components:
 - The clutch pedal position switch (1)
 - The cruise control release switch (3)

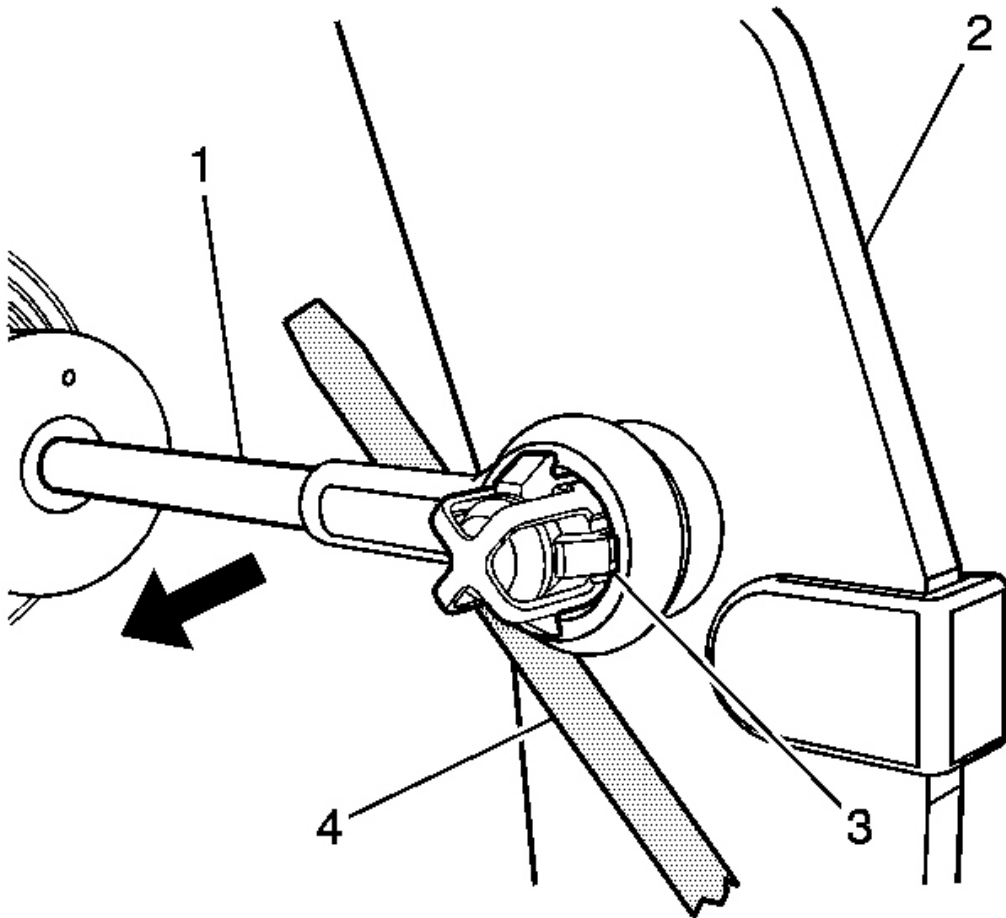


Fig. 2: View Of Clutch Pedal & Clutch Master Cylinder Push Rod
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: A new retainer (3) is required after removal.

2. Complete the following in order to disengage the retainer (3) from the clutch pedal pin.
 1. Insert a flat-bladed tool (4) between the clutch master cylinder push rod (1) and the clutch pedal (2).
 2. Pry the clutch master cylinder push rod (1) away from the clutch pedal assembly (2).

Discard the retainer (3).

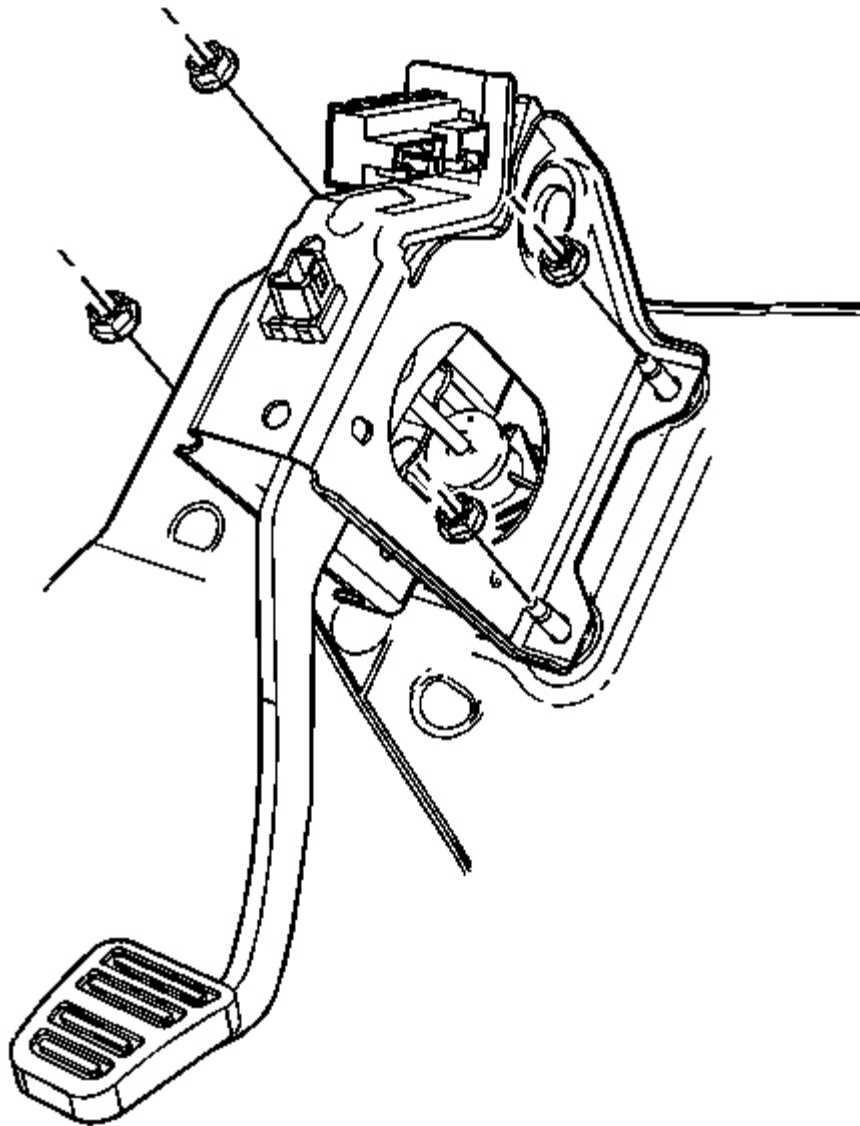


Fig. 3: View Of Clutch Pedal Assembly
Courtesy of GENERAL MOTORS CORP.

3. Remove the 4 nuts securing the clutch pedal assembly to the cowl.
4. Remove the clutch pedal assembly from the vehicle.

Installation Procedure

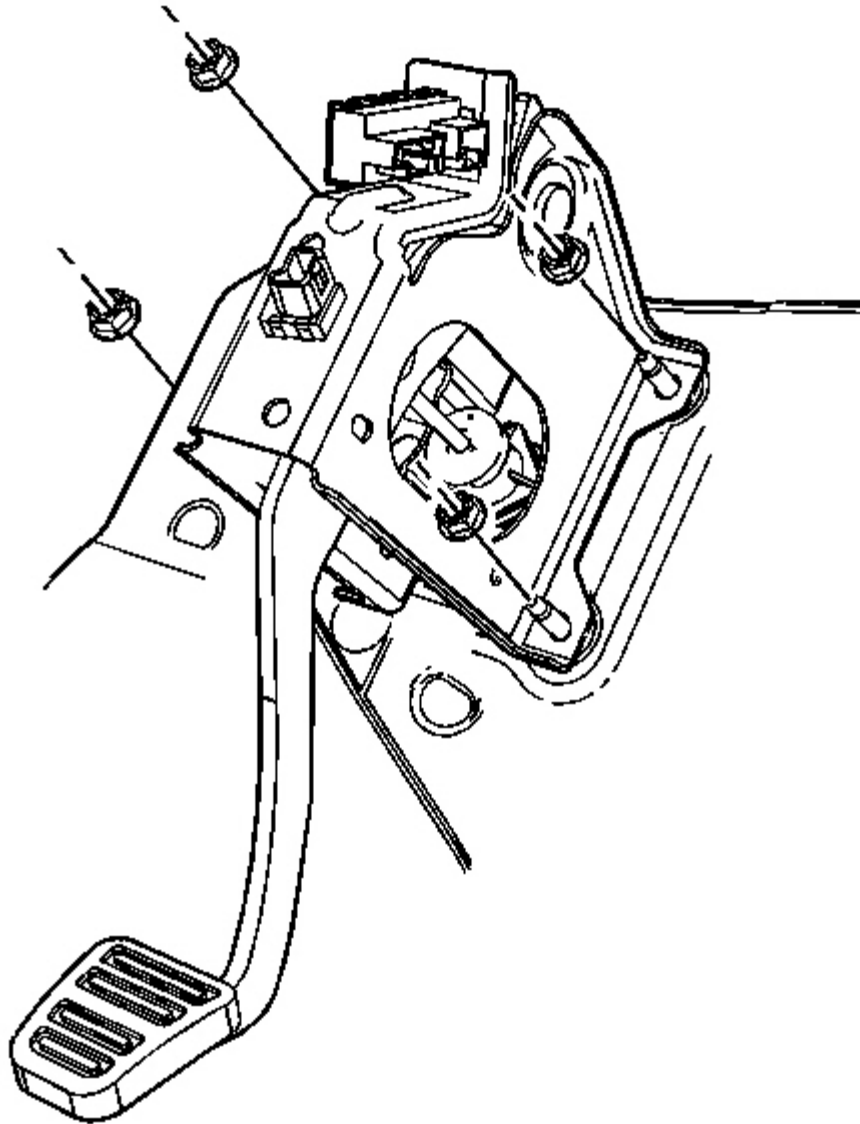


Fig. 4: View Of Clutch Pedal Assembly
Courtesy of GENERAL MOTORS CORP.

1. Position the clutch pedal assembly over the studs.

NOTE: Refer to Fastener Notice .

2. Install the clutch pedal assembly nuts.

Tighten: Tighten the clutch pedal assembly nuts to 20 N.m (15 lb ft).

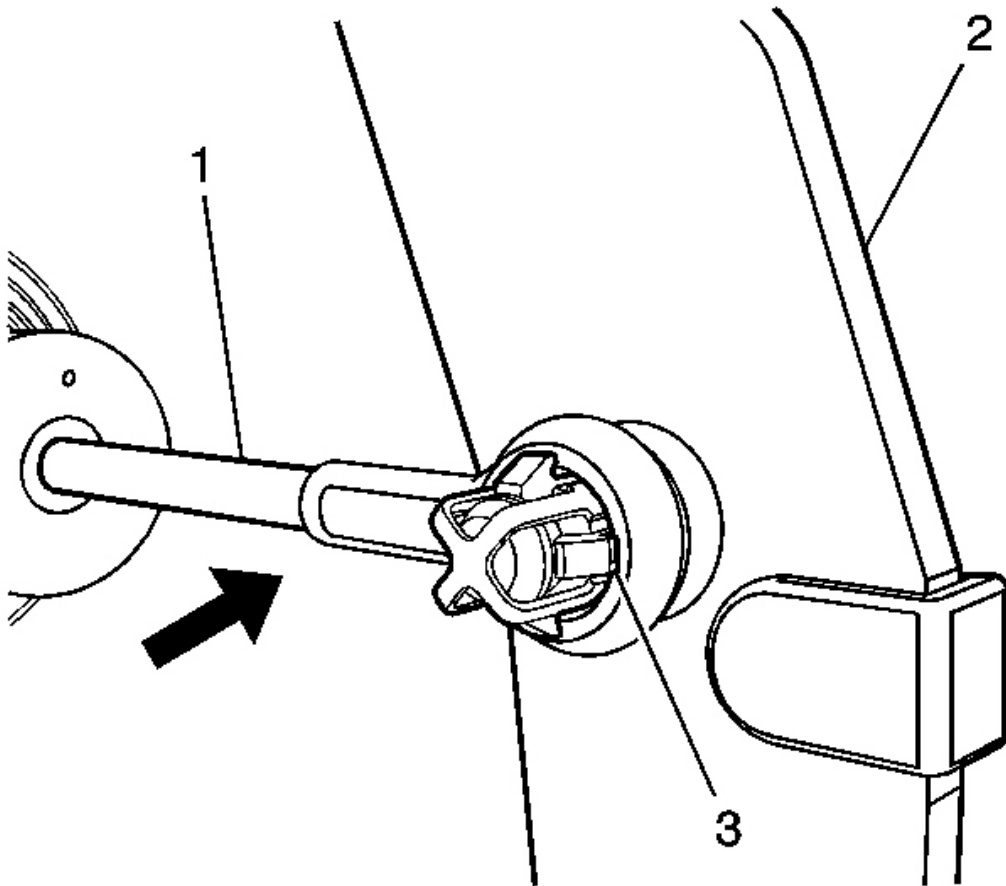


Fig. 5: Installing Retainer Into Clutch Master Cylinder Push Rod
Courtesy of GENERAL MOTORS CORP.

3. Insert a new retainer (3) into the clutch master cylinder push rod (1).
4. Push the clutch master cylinder push rod (1) onto the clutch pedal pin to secure.

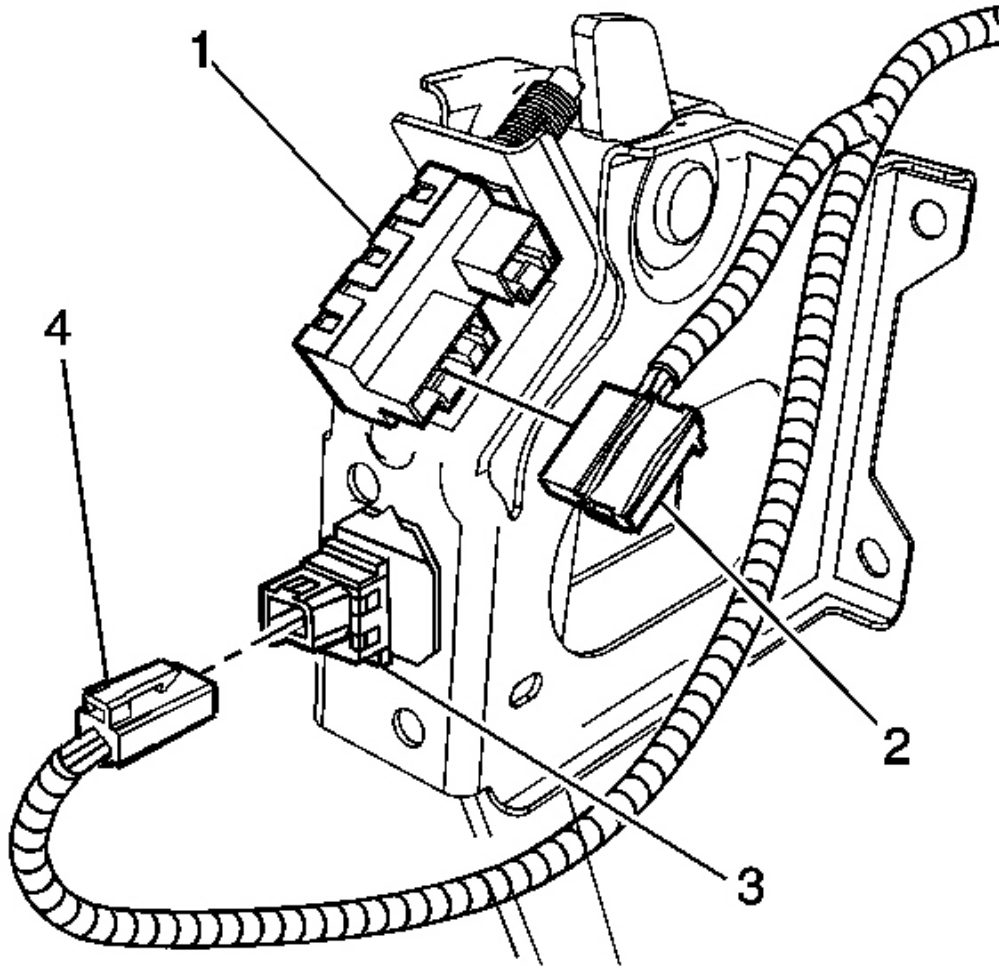


Fig. 6: View Of Clutch Release Switch Electrical Connector
Courtesy of GENERAL MOTORS CORP.

5. Connect the electrical connectors (2, 4) to the following components:
 - The clutch pedal position switch (1)
 - The cruise control release switch (3)
6. Adjust the clutch release switch. Refer to **Clutch Pedal Cruise Control Release Switch Adjustment** .
7. Adjust the clutch pedal position switch. Refer to **Clutch Pedal Position Switch Replacement**.

8. Check for proper clutch pedal movement and operation.

CLUTCH MASTER CYLINDER REPLACEMENT

Tools Required

J 42371 Hydraulic Clutch Line Separator. See Special Tools.

Removal Procedure

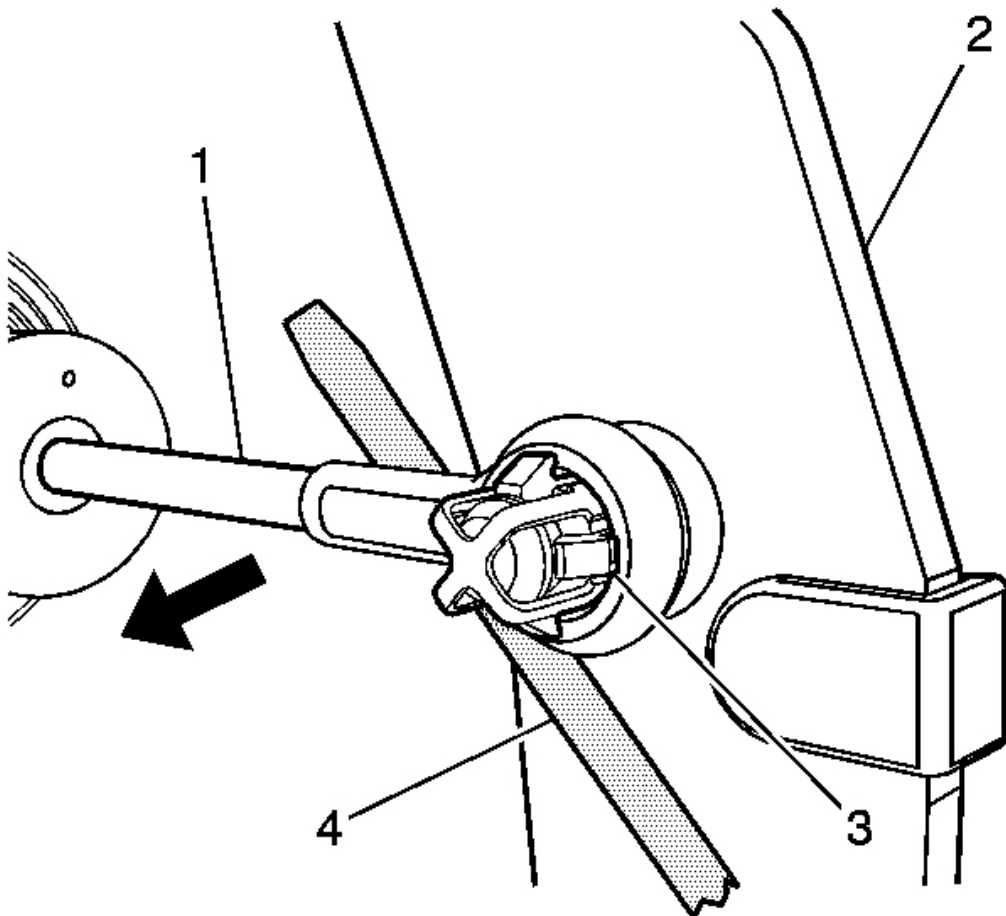


Fig. 7: View Of Clutch Pedal & Clutch Master Cylinder Push Rod
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: A new retainer (3) is required after removal.

1. Complete the following in order to disengage the retainer (3) from the clutch pedal pin.
 1. Insert a flat bladed tool (4) between the clutch master cylinder push rod (1) and the clutch pedal (2).
 2. Pry the clutch master cylinder push rod (1) away from the clutch pedal assembly (2).

Discard the retainer (3).

2. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .

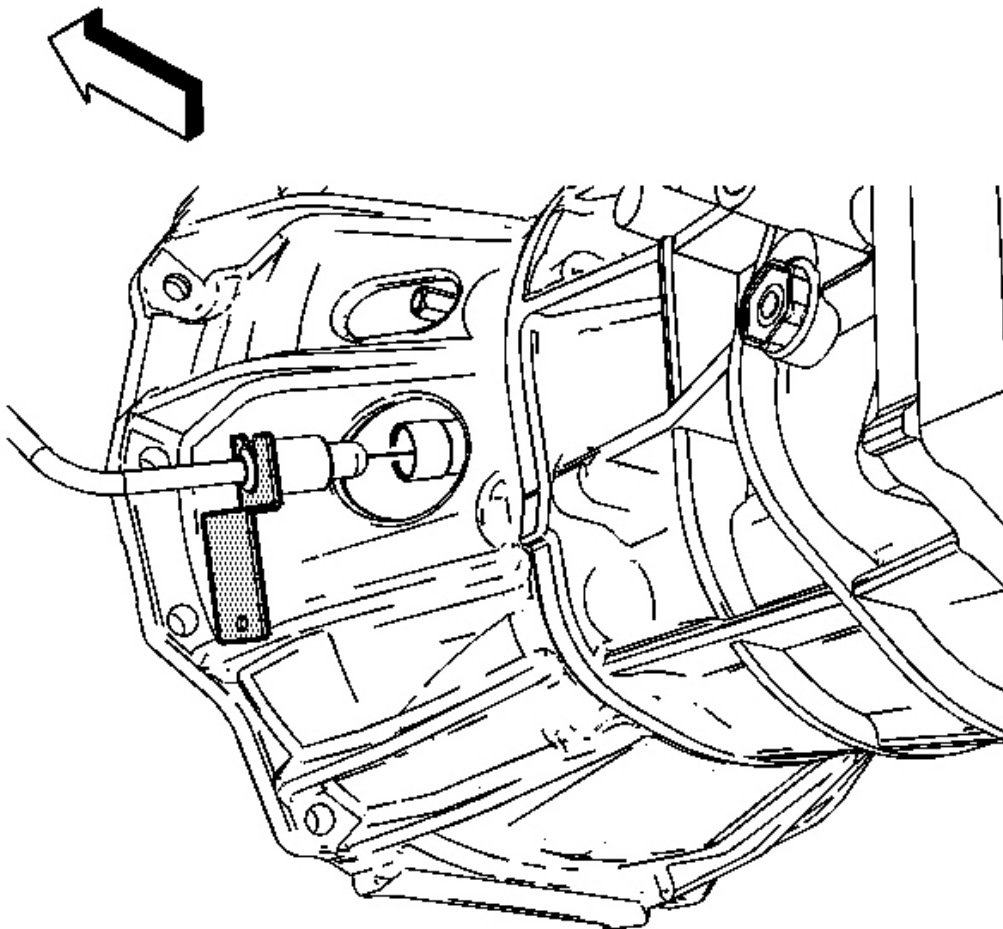


Fig. 8: Using J 42371 To Separate Hydraulic Clutch Line From The Clutch Actuator Quick Connect

Courtesy of GENERAL MOTORS CORP.

3. Using the **J 42371** , push back the white plastic sleeve on the quick connect in order to separate the hydraulic clutch hose from the clutch actuator quick connect. See **Special Tools**.

It is not necessary to plug the lower hose end or slave cylinder fitting as they are equipped with check valves, only minimal fluid loss may be experienced.

4. Disconnect the clutch hydraulic hose retainer from the inner fender.
5. Lower the vehicle.

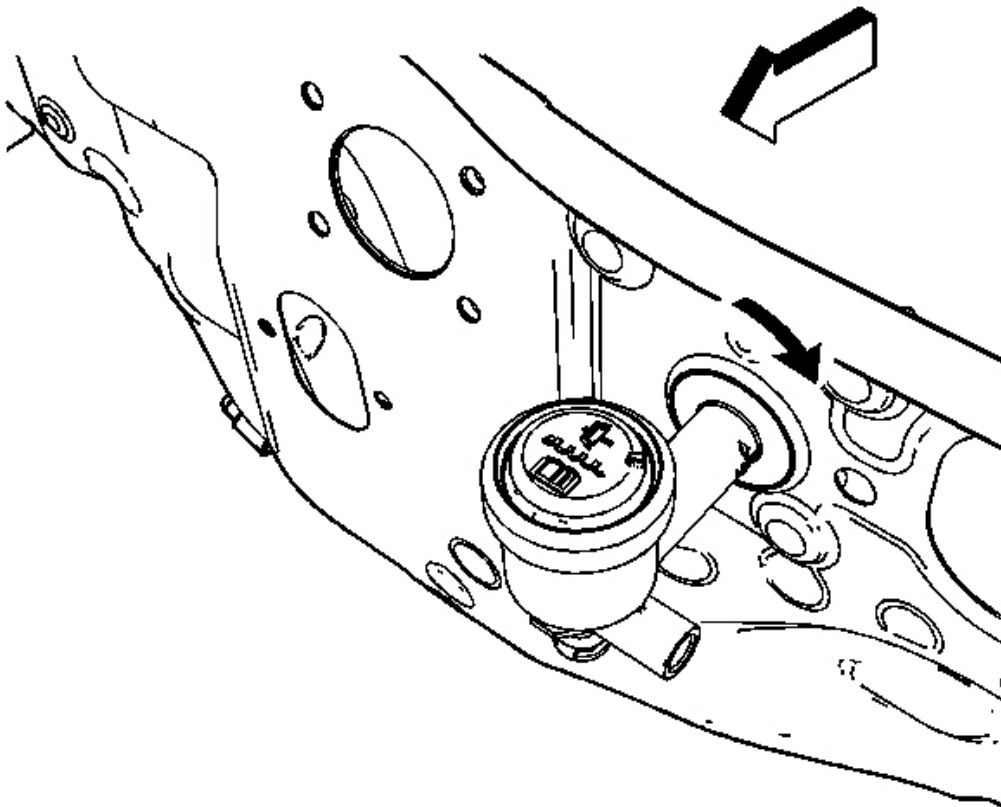


Fig. 9: Rotating Clutch Master Cylinder Clockwise

Courtesy of GENERAL MOTORS CORP.

6. Rotate the clutch master cylinder clockwise 1/8 turn.

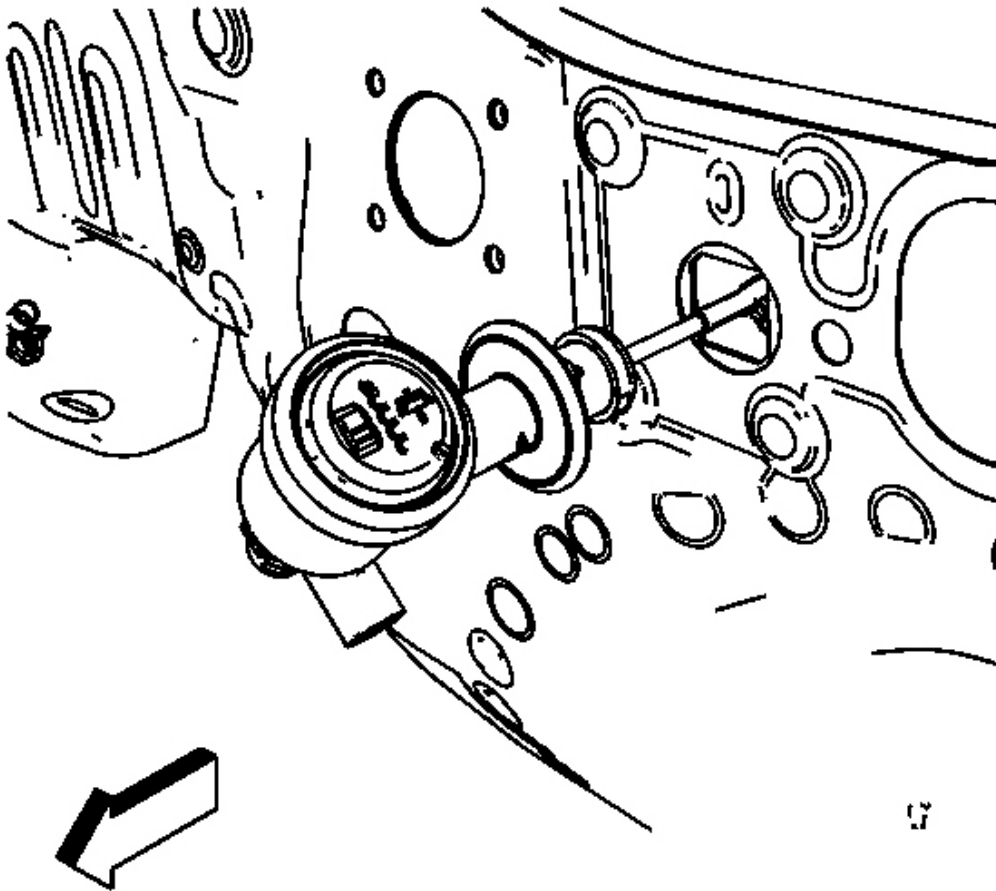


Fig. 10: View Of Clutch Master Cylinder With Hydraulic Hose
Courtesy of GENERAL MOTORS CORP.

7. Remove the clutch master cylinder with hydraulic hose from the cowl.

Installation Procedure

1. Route the clutch hydraulic hose with master cylinder under the brake booster.

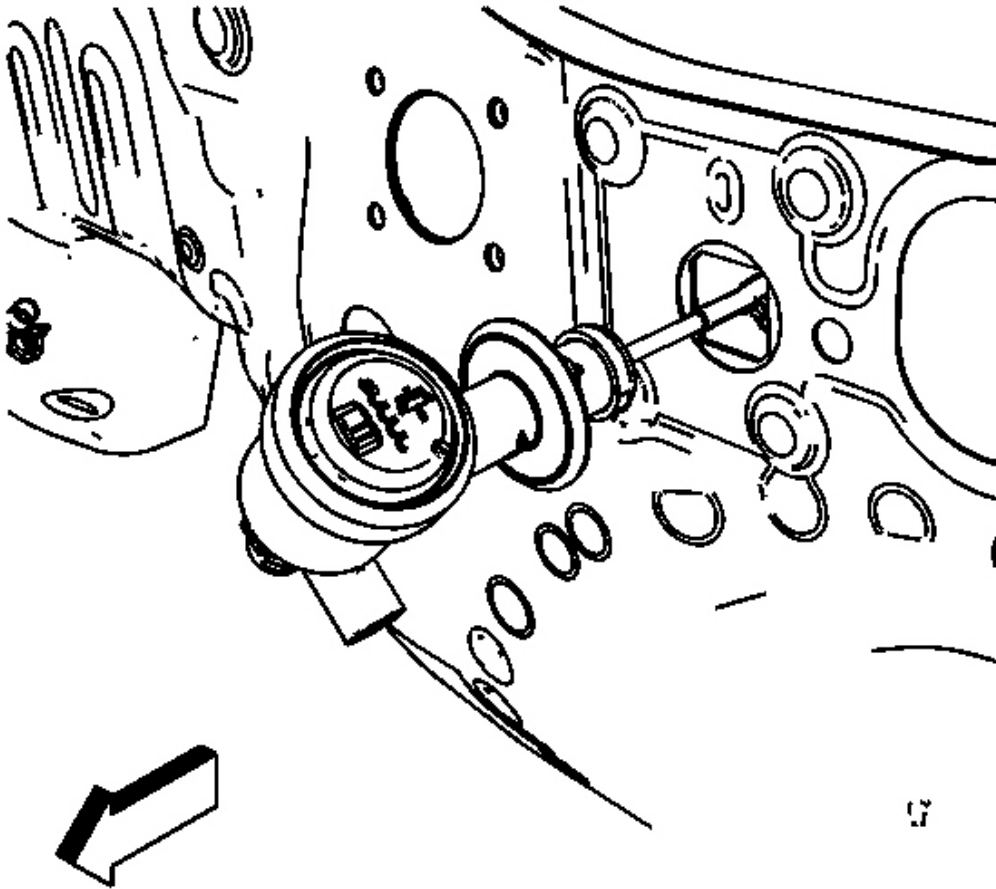


Fig. 11: View Of Clutch Master Cylinder With Hydraulic Hose
Courtesy of GENERAL MOTORS CORP.

2. With the clutch fluid reservoir cap at the 1:30 position. Insert the clutch master cylinder into the cowl.

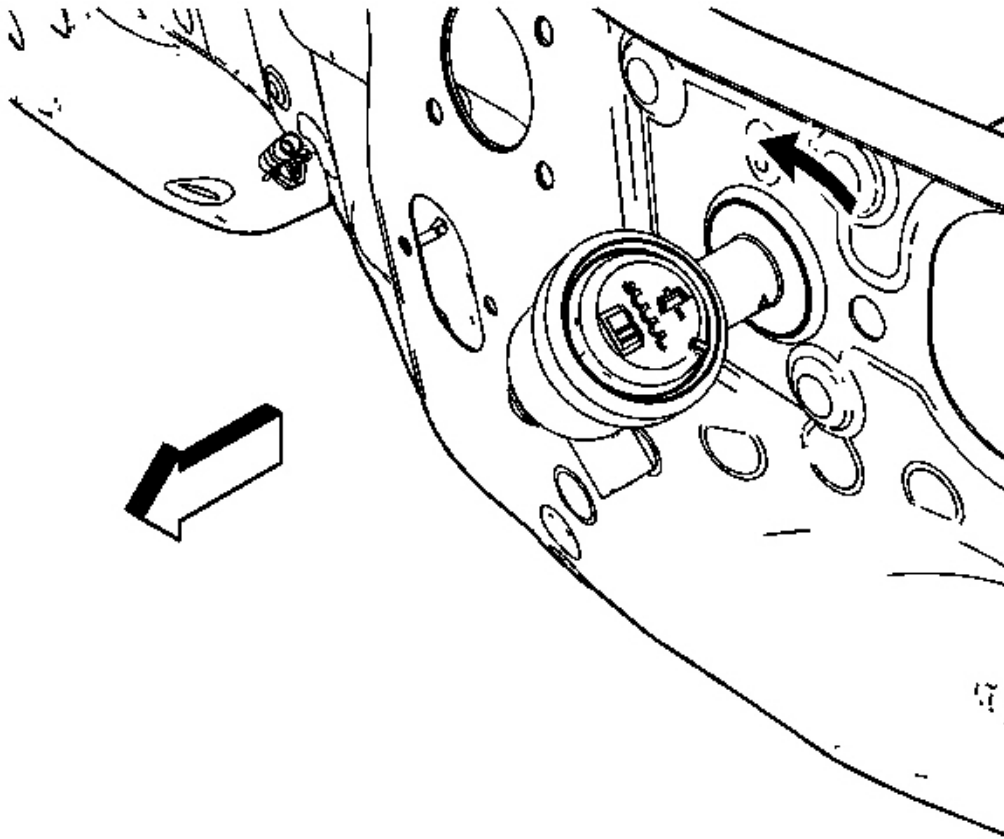


Fig. 12: Rotating Clutch Master Cylinder Counter-Clockwise
Courtesy of GENERAL MOTORS CORP.

3. Rotate the clutch master cylinder counter clockwise 1/8 turn until fully seated.

The clutch fluid reservoir cap will be vertical at the 12:00 position when the clutch master cylinder is properly installed.

4. Raise the vehicle.

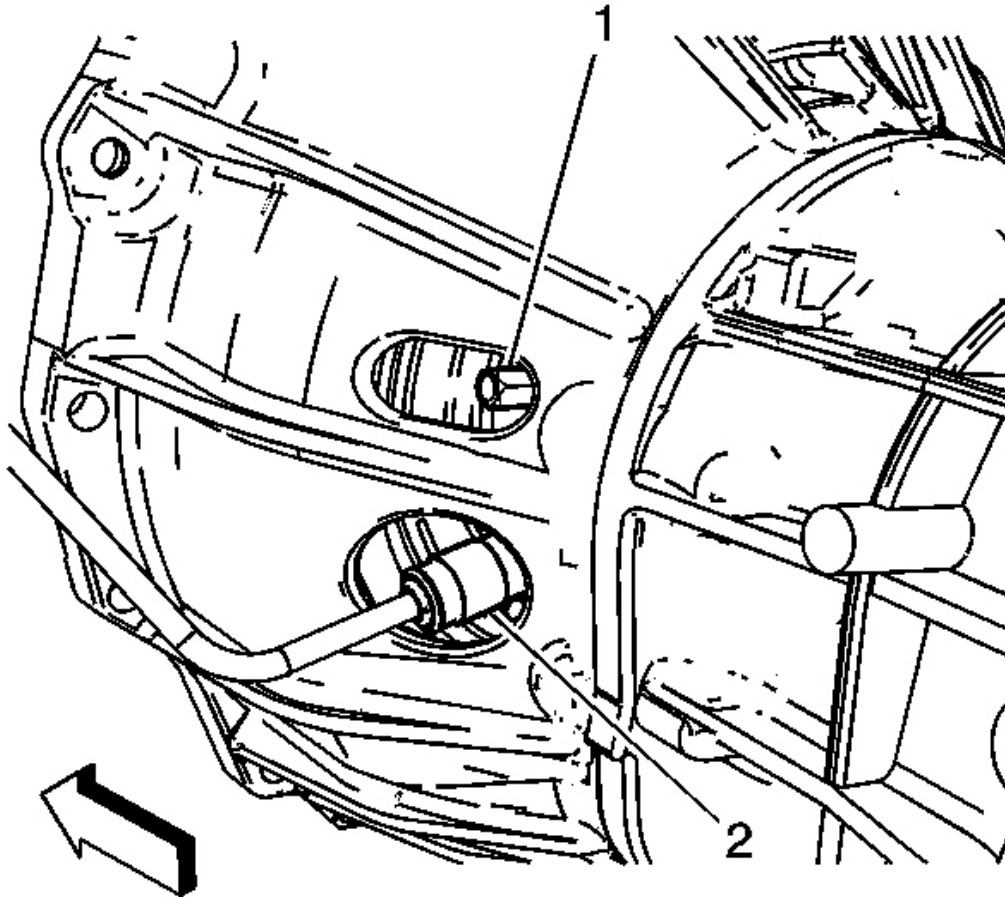


Fig. 13: View Of Clutch Hydraulic Hose Quick Connect Fitting
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Ensure the clutch hydraulic hose does not come in contact with any sharp or potentially hot surfaces.

5. Push the clutch hydraulic hose quick connect fitting (2) into the clutch slave cylinder, until a "click" is heard.
6. Tug gently on the clutch hydraulic hose to ensure proper retention into the clutch slave cylinder.
7. Connect the clutch hydraulic hose retainer to the inner fender.
8. Lower the vehicle.

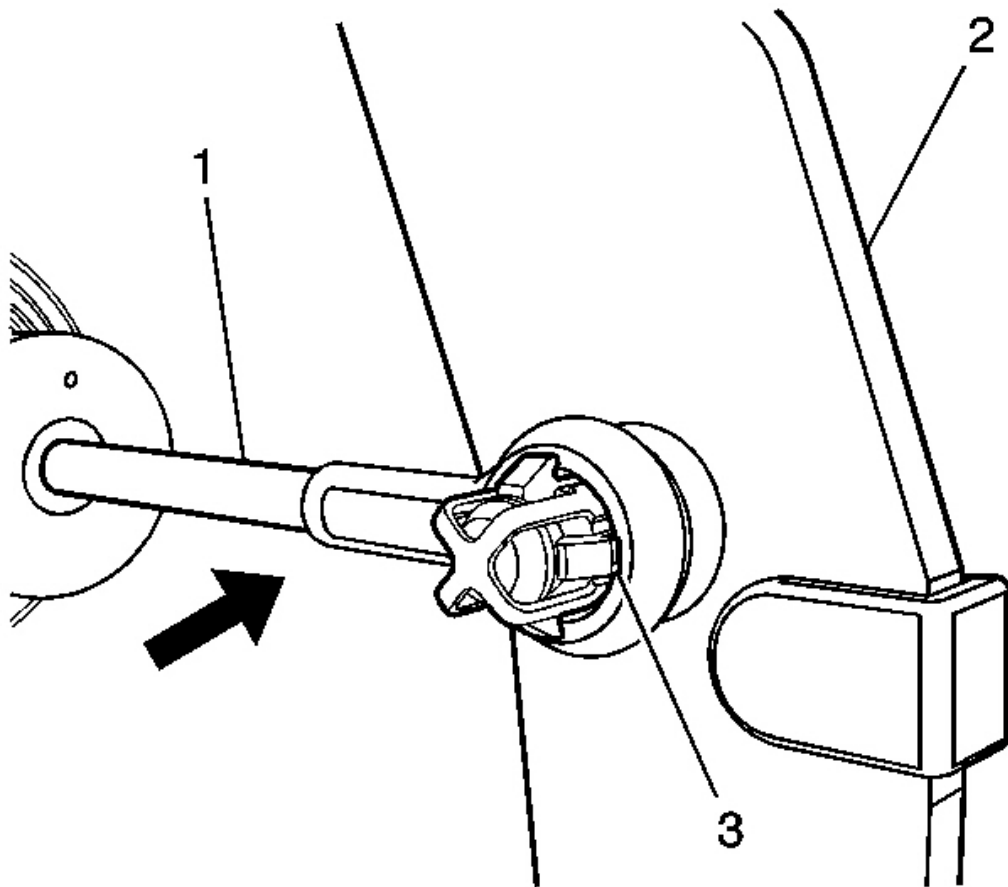


Fig. 14: Installing Retainer Into Clutch Master Cylinder Push Rod
Courtesy of GENERAL MOTORS CORP.

9. Insert a new retainer (3) into the clutch master cylinder push rod (1).
10. Push the clutch master cylinder push rod (1) onto the clutch pedal pin to secure.
11. Adjust the clutch release switch. Refer to **Clutch Pedal Cruise Control Release Switch Adjustment** .
12. Adjust the clutch pedal position switch. Refer to **Clutch Pedal Position Switch Replacement**.
13. Bleed the clutch hydraulic system, only if necessary. Refer to **Hydraulic Clutch Bleeding**.

NOTE: **DO NOT** use fluid which has been bled from a hydraulic clutch system, in order to fill the clutch master cylinder reservoir, due to the possibility that the fluid may be aerated, have too much moisture content or be contaminated and may cause system or vehicle damage.

Perform the hydraulic clutch bleeding procedure with the aid of an assistant.

1. Ensure the reservoir is filled to the fill line with new hydraulic fluid. Add fluid if required from a clean sealed container. Refer to **Sealers and Lubricants** for the correct hydraulic fluid type.
2. Stroke the clutch pedal from the up stop to the down stop position at least 15 times.

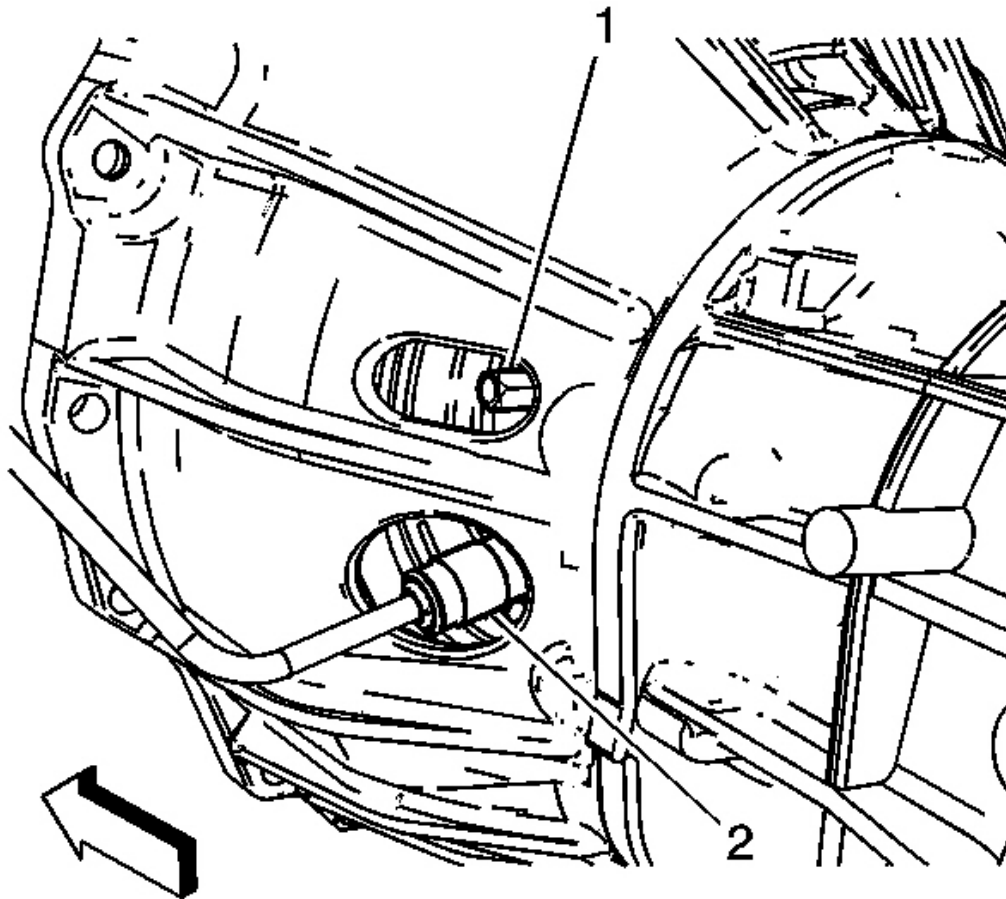


Fig. 15: View Of Clutch Hydraulic Hose Quick Connect Fitting
Courtesy of GENERAL MOTORS CORP.

3. With the pedal in the down stop position. Open the bleeder valve (1) to release the trapped air.
4. Close the bleeder valve (1) and slowly return the clutch pedal to the up stop position.
5. Open the bleeder valve (1) and slowly depress the clutch pedal from the up stop to the down stop position until fluid escapes through the bleeder.
6. Close the bleeder valve (1).
7. Return the clutch pedal to the up stop position.
8. Depress the clutch pedal from the up stop to the down stop position.

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9. Open the bleeder valve (1) and allow fluid with air bubbles to escape through the bleeder valve.
10. Close the bleeder valve (1).

IMPORTANT: Always make sure that the clutch fluid reservoir remains filled with new clean hydraulic fluid.

11. Repeat steps 7-10 until fluid without air bubbles escapes through the bleeder valve.

CLUTCH PEDAL POSITION SWITCH REPLACEMENT

Removal Procedure

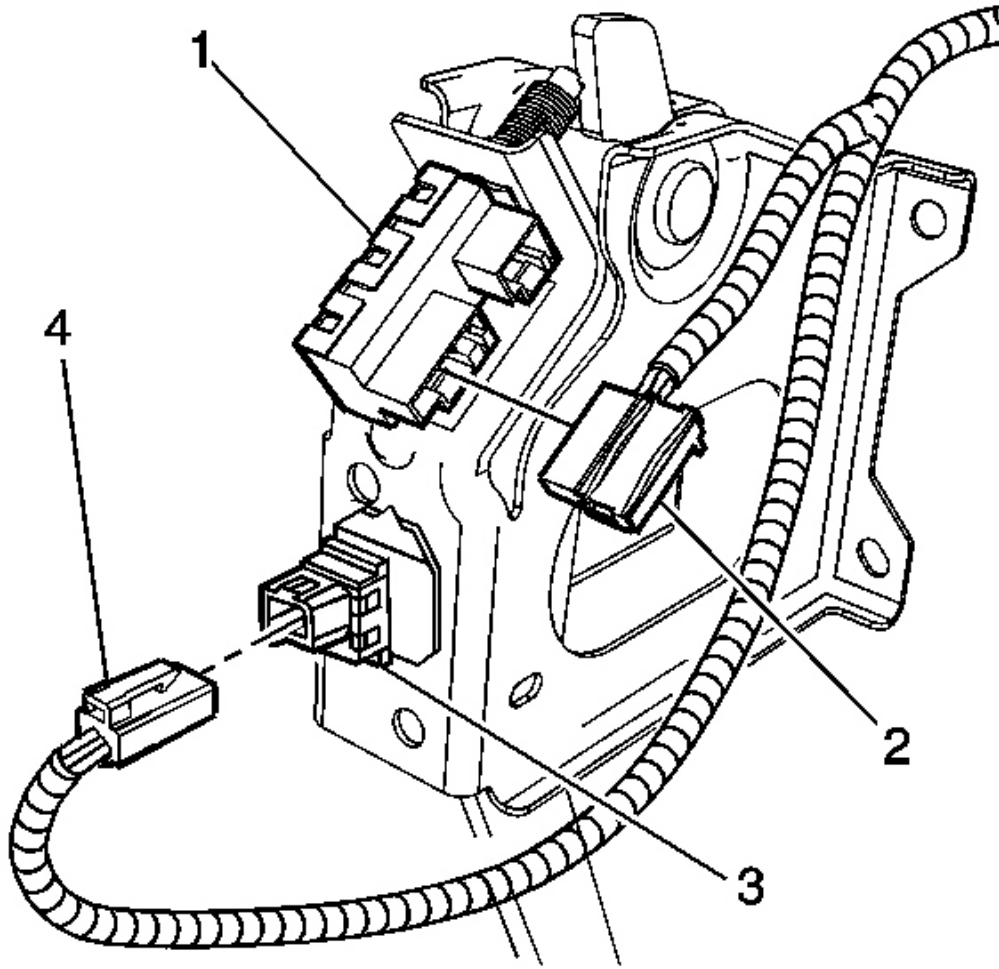


Fig. 16: View Of Clutch Release Switch Electrical Connector
Courtesy of GENERAL MOTORS CORP.

1. Disconnect the electrical connector (2) from the clutch pedal position switch (1).

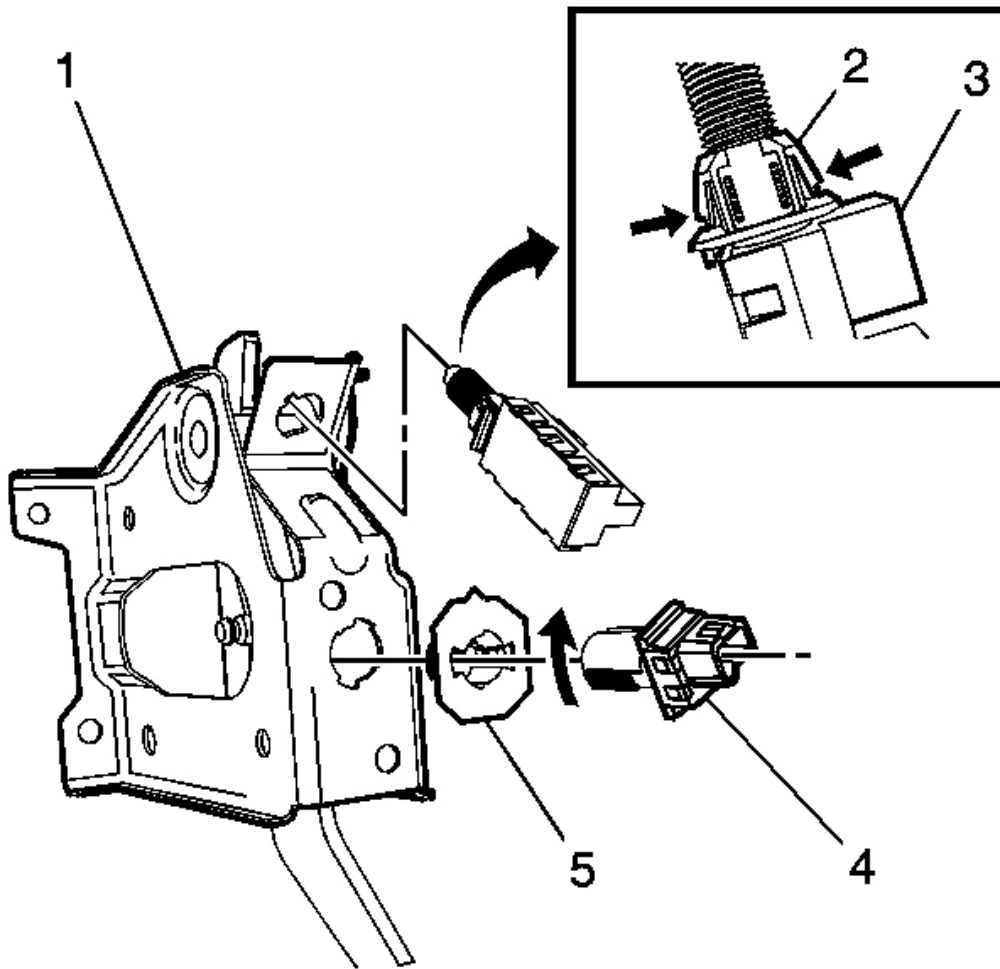


Fig. 17: Exploded View Of Clutch Release Switch
Courtesy of GENERAL MOTORS CORP.

2. Push the clutch pedal position switch retaining plate locking tabs (2) inward toward each other to release.
3. Remove the clutch pedal position switch (3) from the clutch pedal assembly (1).

Installation Procedure

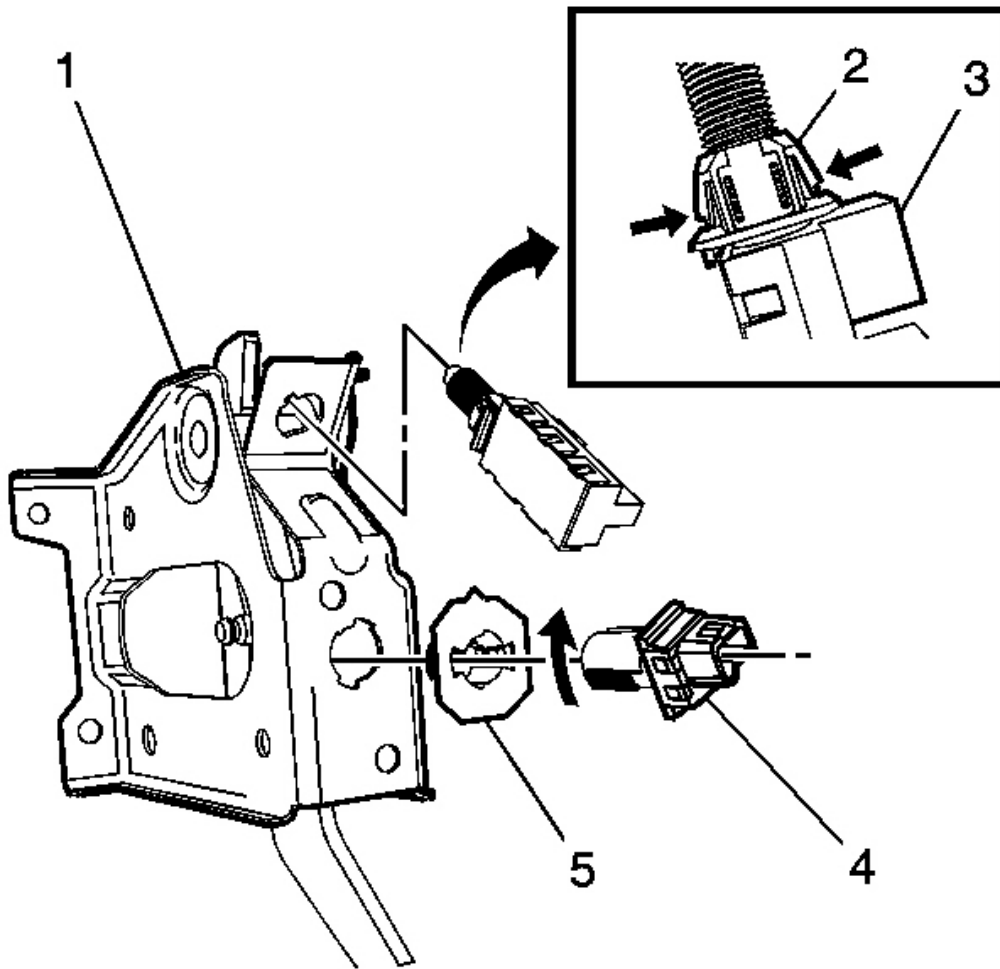


Fig. 18: Exploded View Of Clutch Release Switch
Courtesy of GENERAL MOTORS CORP.

1. Slide the clutch pedal position switch (3) with retaining plate (2) into the clutch pedal bracket (1), until the locking tabs (2) are fully engaged.

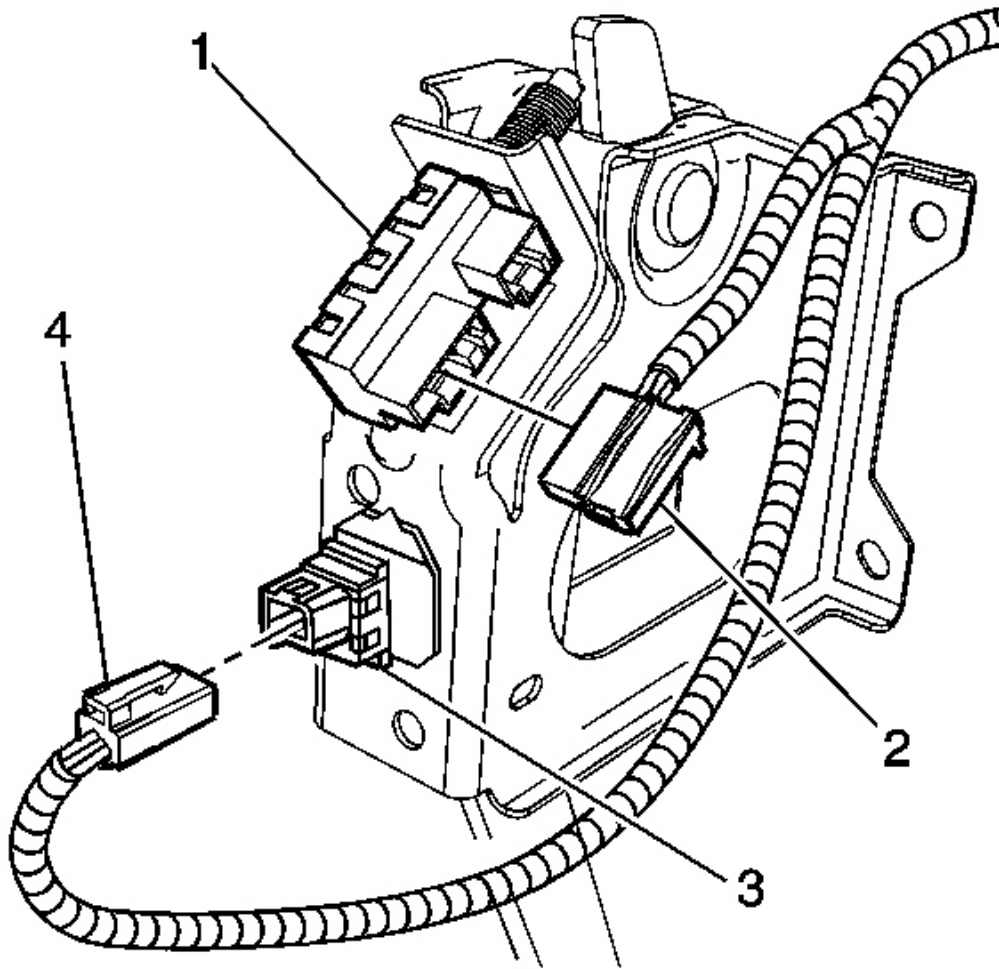


Fig. 19: View Of Clutch Release Switch Electrical Connector
Courtesy of GENERAL MOTORS CORP.

2. Connect the electrical connector (2) to the clutch pedal position switch (1).
3. Complete the following in order to adjust the clutch pedal position switch (1).
 1. Push the switch fully into the bracket, allowing the switch to ratchet in the retaining plate.
 2. Depress the clutch pedal all the way to the floor.

2007 Hummer H3

2007 TRANSMISSION Clutch - H3

Tools Required

- **J 43276** Clutch Pilot Bearing Remover
- **J 45949** Pilot Bearing and Flywheel Locator Installer

Removal Procedure

NOTE: When using the J 43276 Clutch Pilot Bearing Remover, always secure the J 43276-1 Clutch Pilot Bearing Remover tool body using a wrench. Do not allow the J 43276-1 tool body to rotate. Failing to do so causes damage to the J 43276-1 tool body.

1. Remove the Flywheel. Refer to **Engine Flywheel Replacement (w/Automatic Transmission)** .

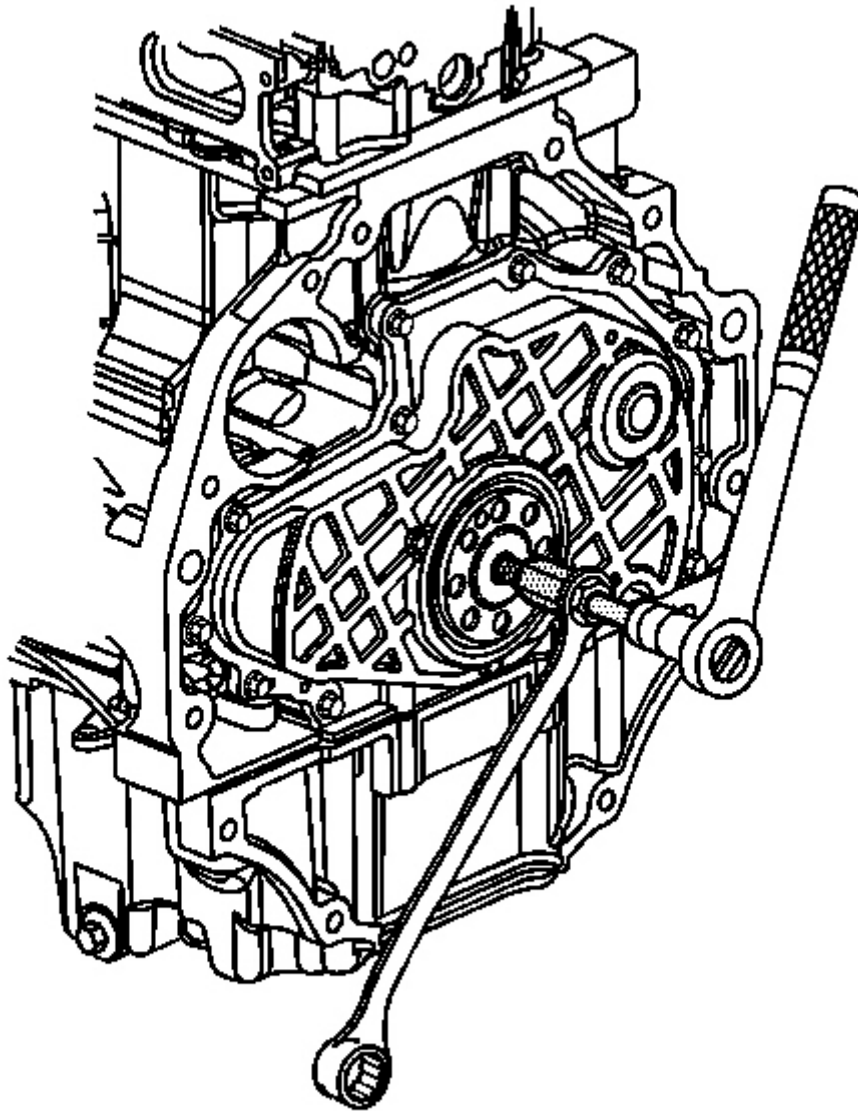


Fig. 20: Removing Clutch Pilot Bearing
Courtesy of GENERAL MOTORS CORP.

2. Using the **J 43276** perform the following in order to remove the clutch pilot bearing:
 1. Install the J 43276-1 into the clutch pilot bearing.
 2. Using a wrench, secure the J 43276-1.

3. Insert the J 43276-2 into the J 43276-1.
 4. Rotate the J 43276-2 clockwise into the J 43276-1 until the clutch pilot bearing is completely removed from the crankshaft.
 5. Rotate the J 43276-2 counterclockwise to remove the J 43276-2 from the J 43276-1.
 6. Remove the J 43276-1 from the tool body.
3. Discard the old clutch pilot bearing.

Installation Procedure

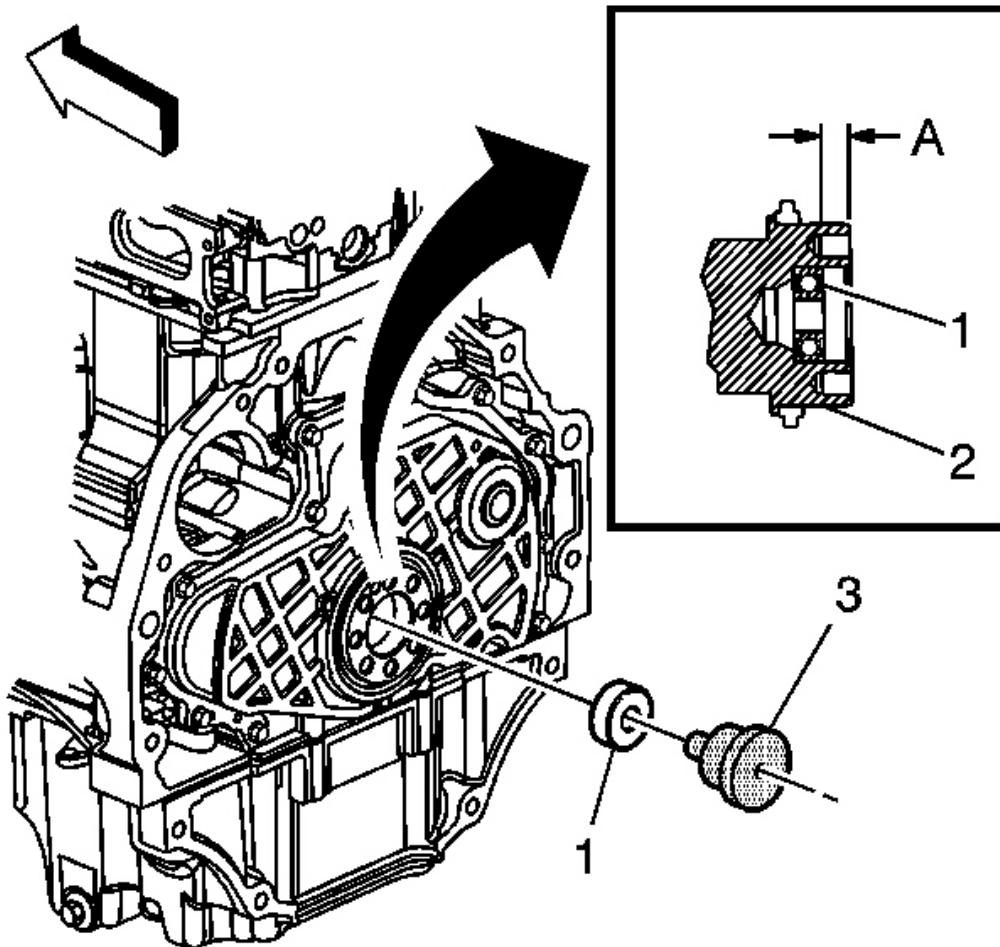


Fig. 21: Installing Clutch Pilot Bearing
Courtesy of GENERAL MOTORS CORP.

2007 Hummer H3

2007 TRANSMISSION Clutch - H3

1. Install the **J 45949** (3) into the clutch pilot bearing (1).
2. Install the clutch pilot bearing (1) into the crankshaft (2).

The **J 45949** (3) will install the pilot bearing (1) to the proper depth of 11.6 mm (0.457 in) (a).

3. Remove the **J 45949** (3).
4. Install the Flywheel. Refer to **Engine Flywheel Replacement (w/Automatic Transmission)** .

CLUTCH ASSEMBLY REPLACEMENT

Tools Required

J 36660-A Torque Angle Meter

Removal Procedure

1. Remove the transmission. Refer to **Transmission Replacement** .

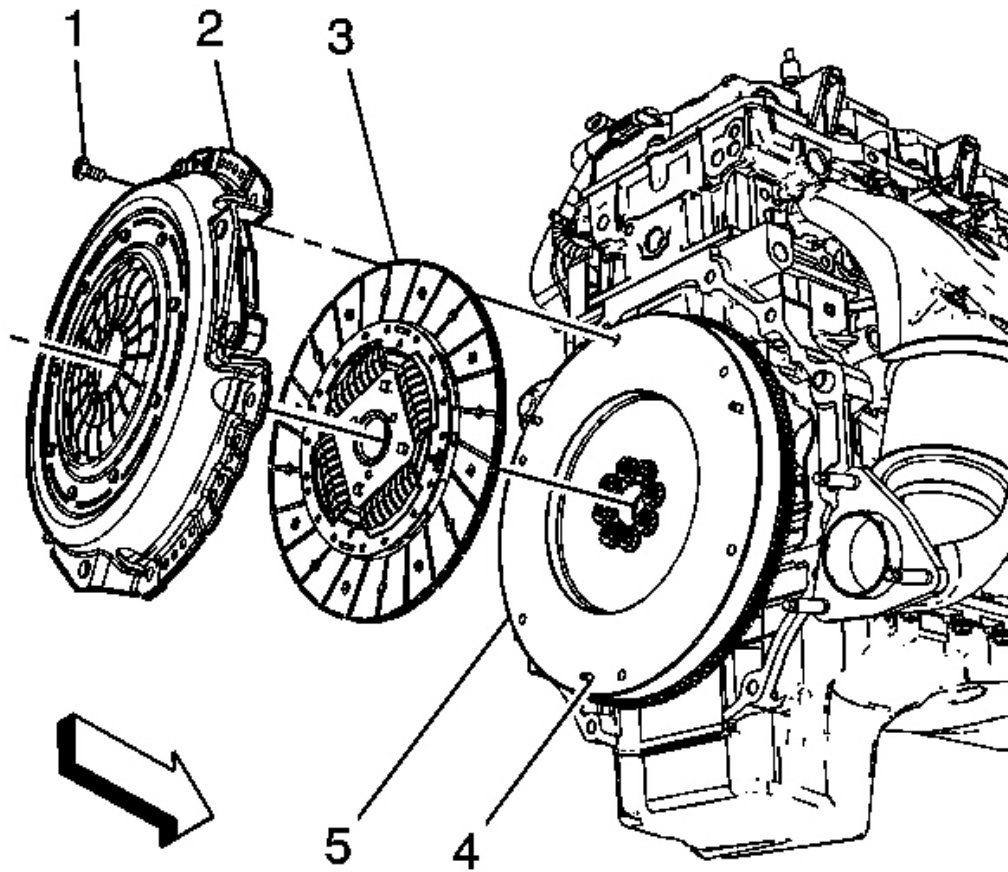


Fig. 22: Exploded View Of Clutch Assembly
Courtesy of GENERAL MOTORS CORP.

2. Remove the clutch pressure plate bolts (1).

Discard the bolts.

3. Remove the clutch pressure plate (2) and driven disc (3) from the dowel pins (4) on the flywheel (5).

Installation Procedure

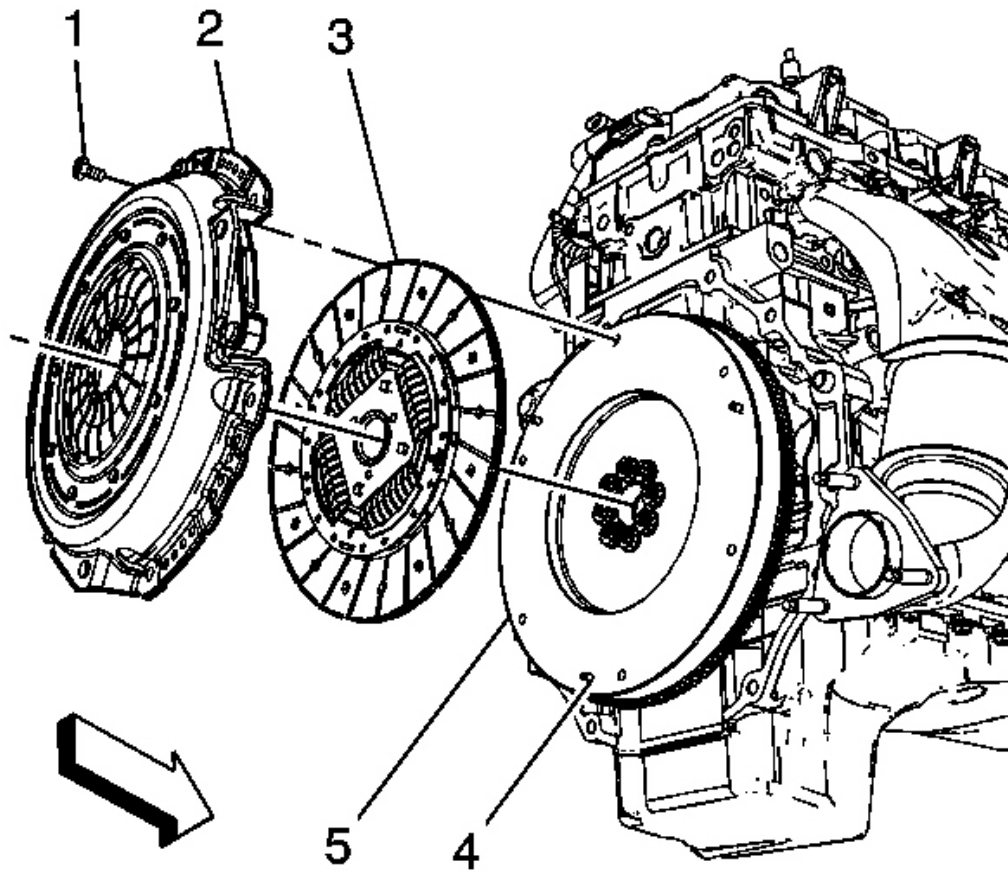


Fig. 23: Exploded View Of Clutch Assembly
Courtesy of GENERAL MOTORS CORP.

1. Install the clutch pressure plate (2) and driven plate (3) to the dowel pins (4) on the flywheel (5).
2. Install the clutch pressure plate bolts (1) finger tight.
3. Use the Snap-On A145 Clutch Aligner Set or equivalent, to align the clutch driven plate (3) to the clutch pilot bearing.

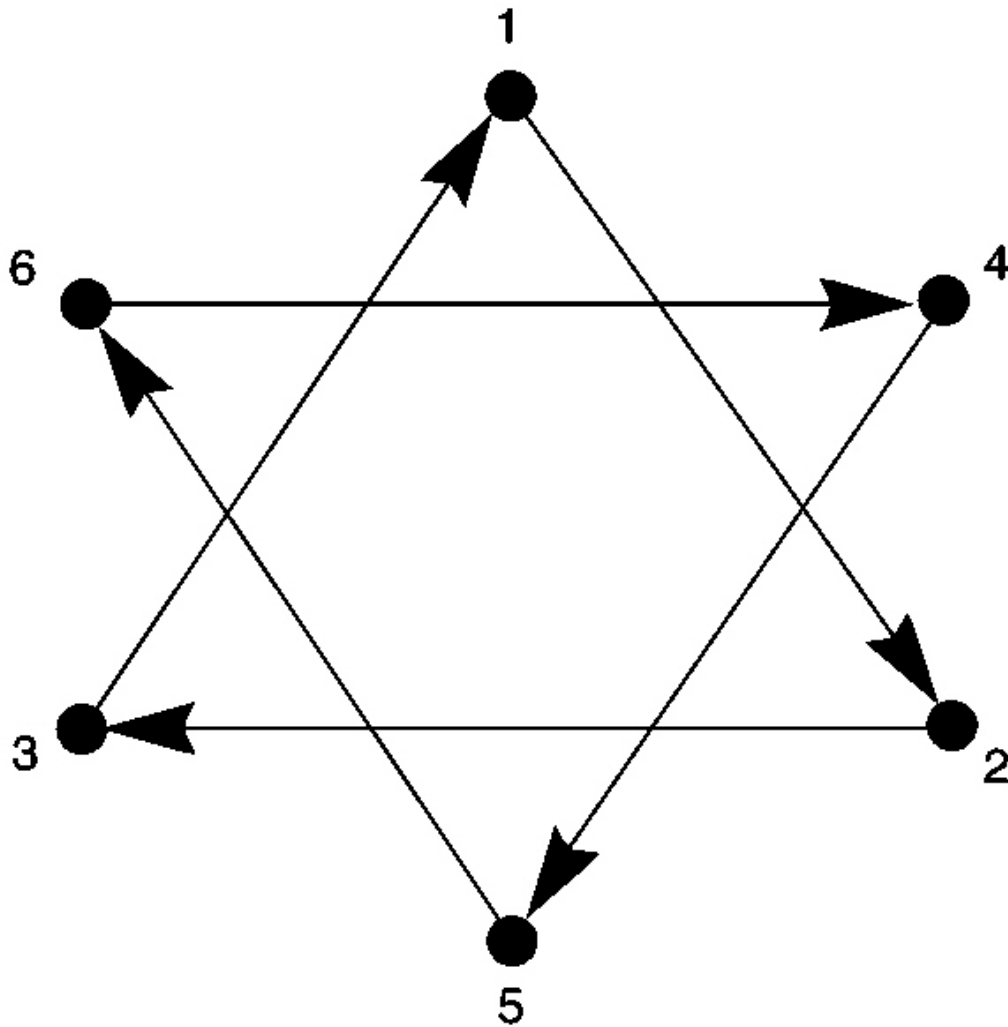


Fig. 24: Clutch Pressure Plate Bolts Tightening Sequence
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

4. Tighten the NEW clutch pressure plate bolts in the sequence shown.

Tighten:

1. Tighten the clutch pressure plate bolts in sequence to 20 N.m (15 lb ft).

2. Use the **J 36660-A** in order to tighten the clutch pressure plate bolts in sequence an additional 45 degrees.
5. Install the transmission. Refer to **Transmission Replacement** .

CLUTCH ACTUATOR CYLINDER RELEASE BEARING REPLACEMENT

Removal Procedure

1. Remove the transmission. Refer to **Transmission Replacement** .

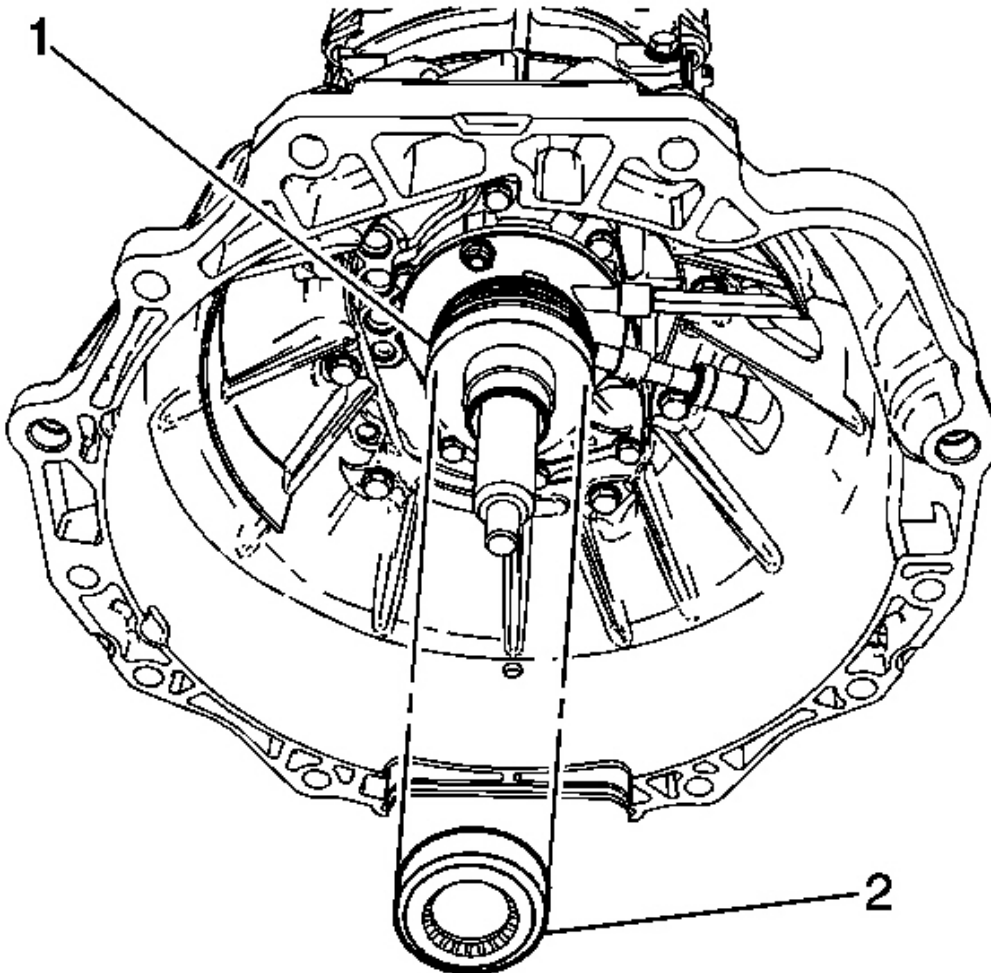


Fig. 25: View Of Clutch Actuator Cylinder Dust Cover & Clutch Actuator Cylinder Release Bearing
Courtesy of GENERAL MOTORS CORP.

2. Pull the clutch actuator cylinder release bearing (2) from the clutch actuator cylinder dust cover (1).

Installation Procedure

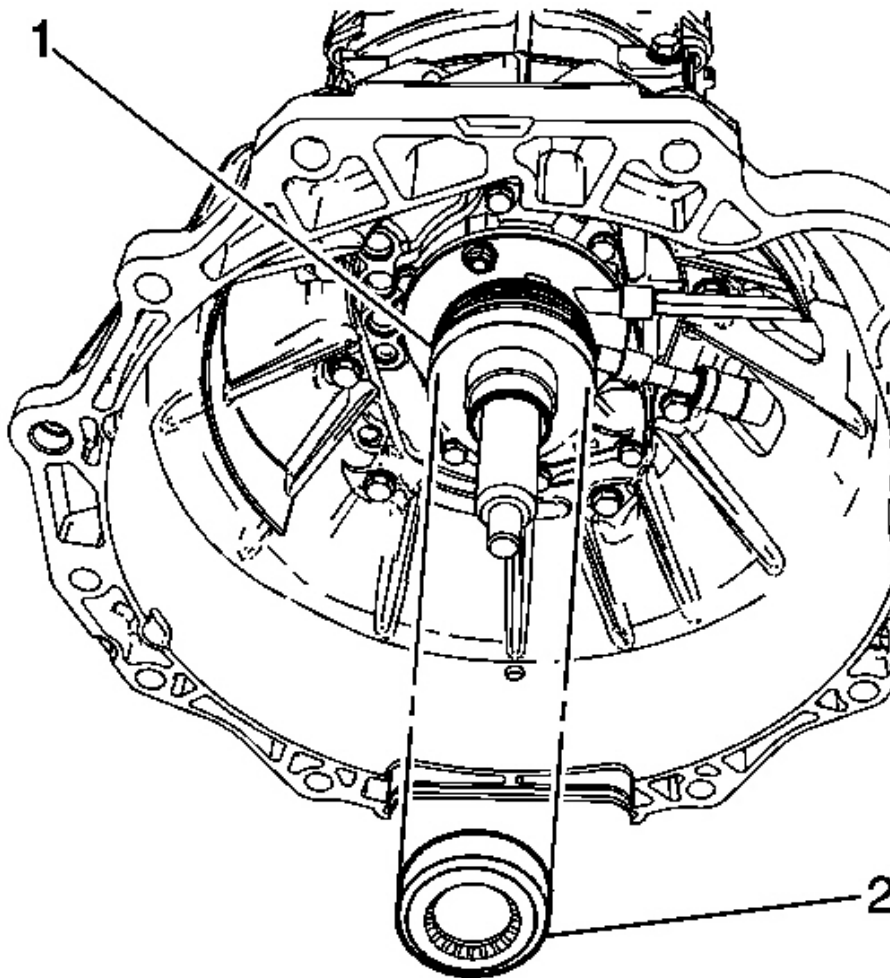


Fig. 26: View Of Clutch Actuator Cylinder Dust Cover & Clutch Actuator Cylinder Release Bearing

Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Do not allow the release bearing to become damaged, replace if dropped or damaged.

1. Install the clutch actuator cylinder release bearing (2) over the clutch actuator cylinder dust cover (1).
2. Install the transmission. Refer to **Transmission Replacement** .

CLUTCH ACTUATOR CYLINDER REPLACEMENT

Removal Procedure

1. Remove the transmission. Refer to **Transmission Replacement** .

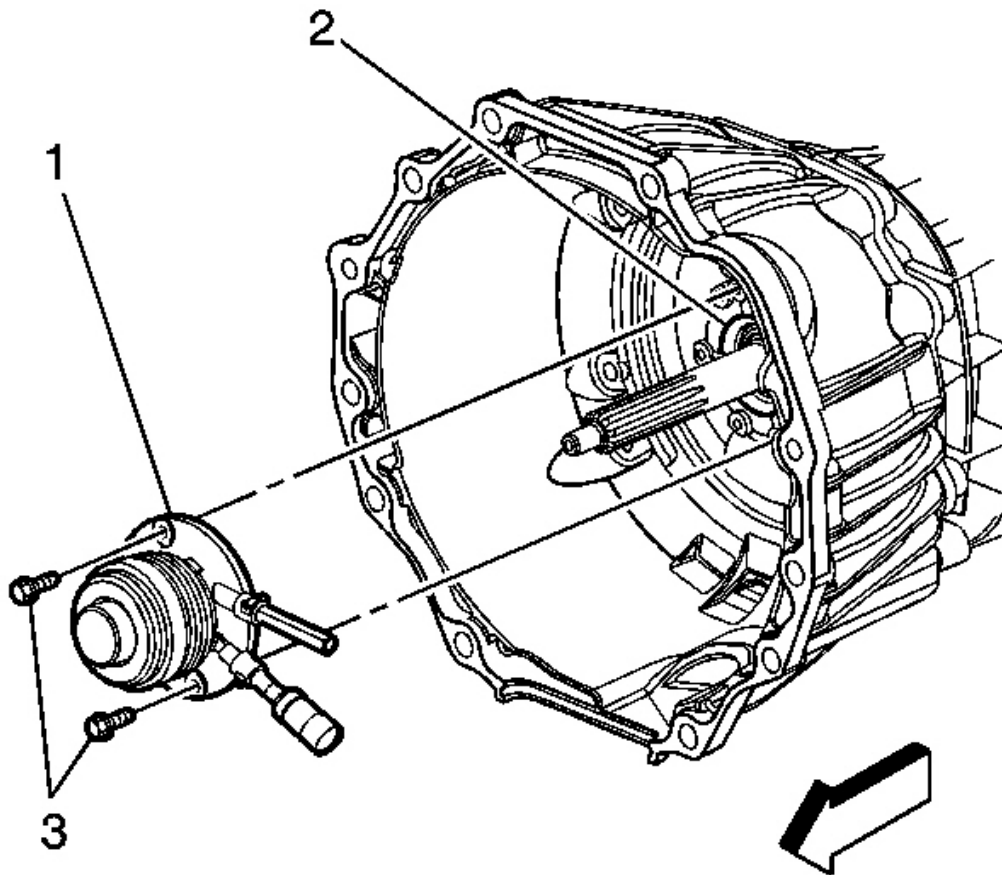


Fig. 27: View Of Clutch Actuator Cylinder
Courtesy of GENERAL MOTORS CORP.

2. Remove the 2 clutch actuator cylinder bolts (3).
3. Remove the clutch actuator cylinder (1) from the input shaft bearing retainer (2).

Installation Procedure

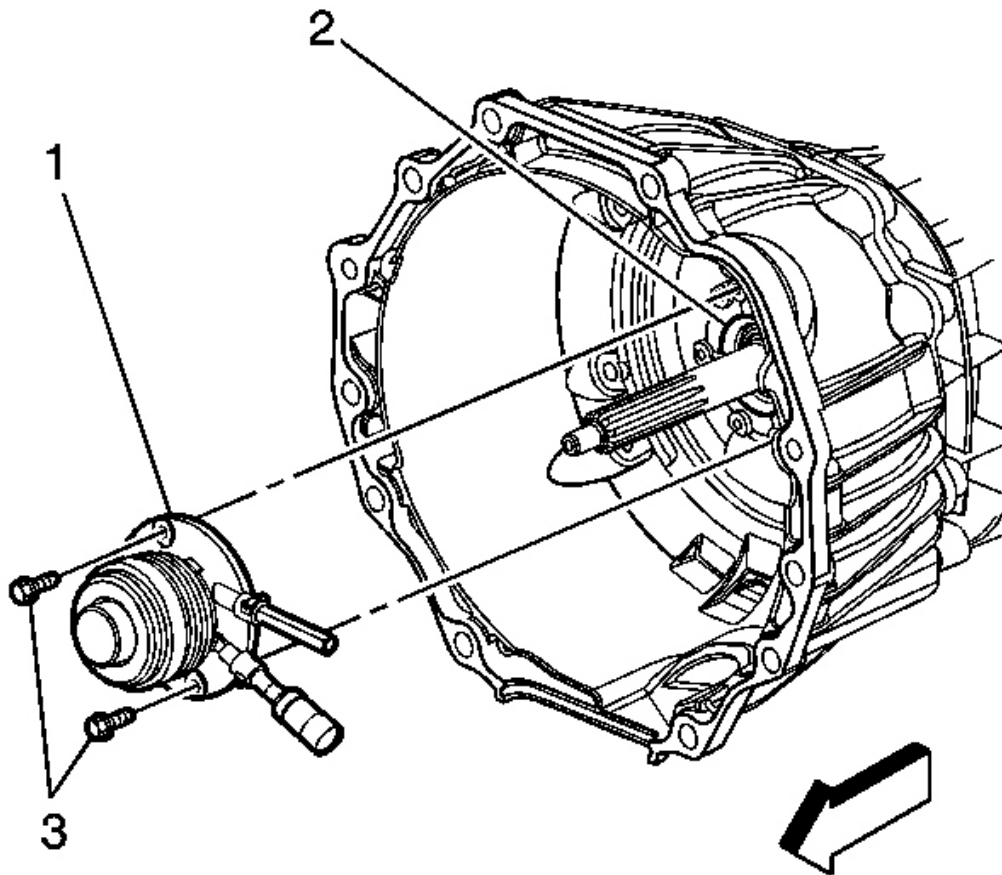


Fig. 28: View Of Clutch Actuator Cylinder
Courtesy of GENERAL MOTORS CORP.

1. Position the clutch actuator cylinder (1) to the input shaft bearing retainer (2).

NOTE: Refer to Fastener Notice .

2. Install the 2 clutch actuator cylinder bolts (3).

Tighten: Tighten the clutch actuator cylinder bolts to 8 N.m (71 lb in).

3. Install the transmission. Refer to Transmission Replacement .

DESCRIPTION AND OPERATION

CLUTCH SYSTEM DESCRIPTION AND OPERATION

The Hummer H3 vehicle uses the 3.7L (LLR) clutch.

The 3.7L (LLR) clutch system is described as the following:

- Size - 265 mm (10.4 in)
- Clutch pressure plate - Diaphragm spring plate, non-self adjusting
- Clutch disc - Dampener spring style
- Hydraulic system

Clutch System Components

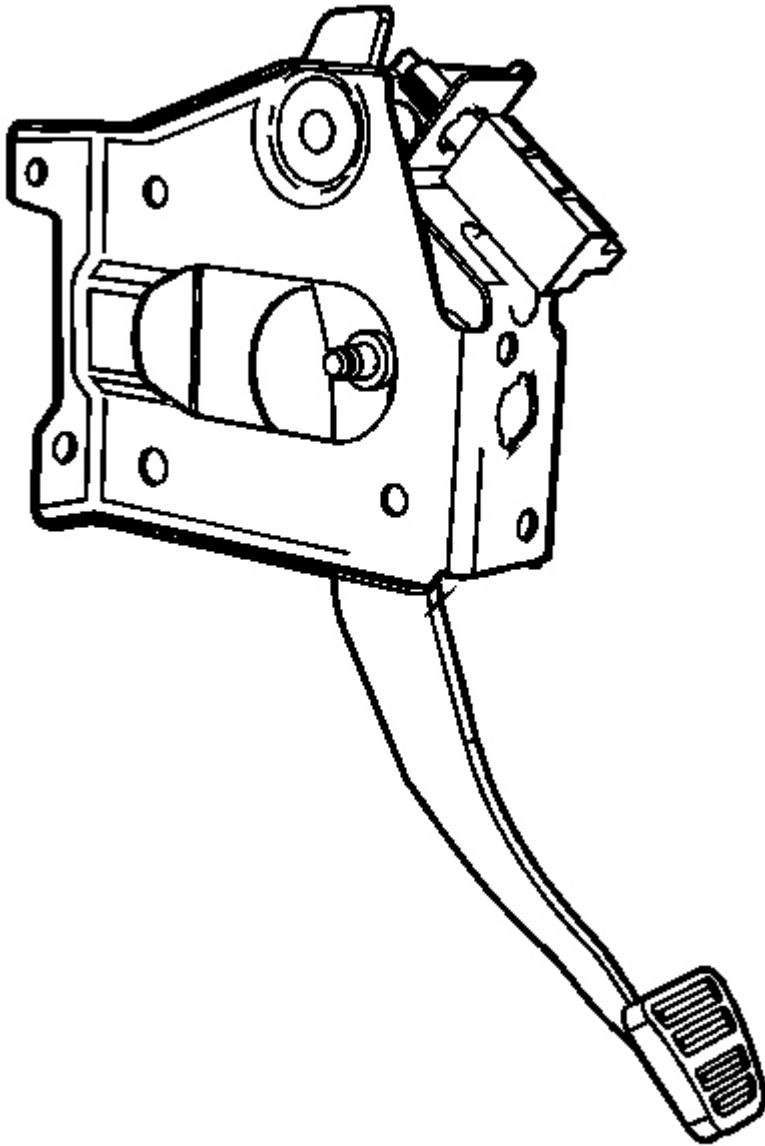


Fig. 29: Clutch Pedal

Courtesy of GENERAL MOTORS CORP.

The clutch pedal, mounted on the engine cowl, is designed to compress the clutch hydraulic fluid with little driver effort. The pedal swivels on bushings. The clutch master cylinder pushrod connects to a pin on the pedal. A spring, located inside of the clutch master cylinder, returns the

pedal to the correct position after depressing.

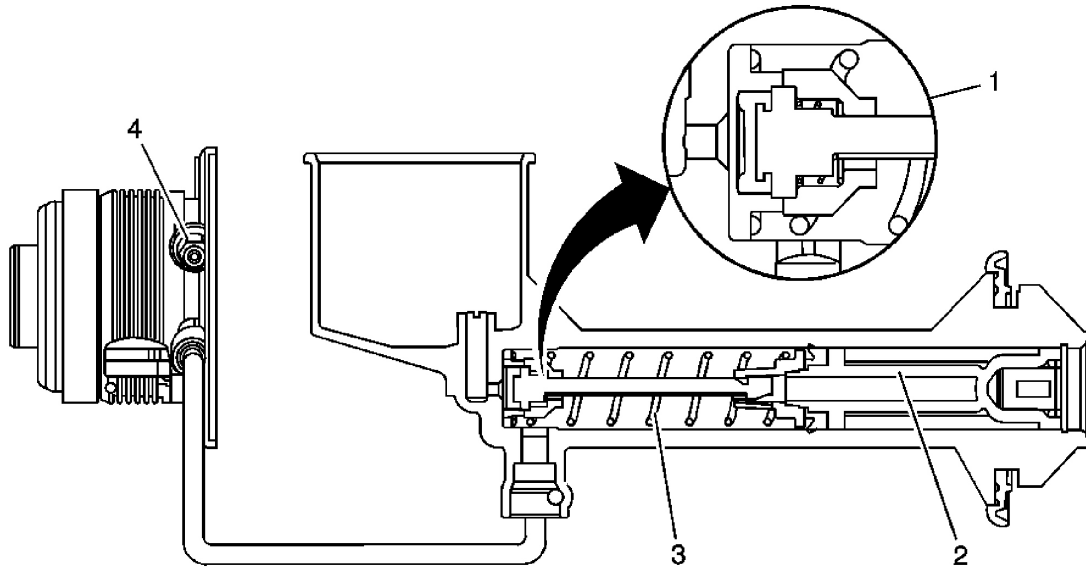


Fig. 30: 5 Speed Transmission Hydraulic Clutch System
Courtesy of GENERAL MOTORS CORP.

The reservoir, which is part of the master cylinder, supplies the fluid at the front of the master cylinder through the center feed port (1). The center feed port allows the flow of fluid from the reservoir to the cylinder when the pedal is in the complete returned position. The master cylinder uses a spring (3) to return the piston (2) to the clutch engagement position. When the clutch pedal is depressed, the piston moves forward in the cylinder, compressing the fluid. The compressed fluid travels through a hose to the clutch actuator cylinder. A bleeder screw (4) is located at the clutch actuator cylinder for bleeding the hydraulic system.

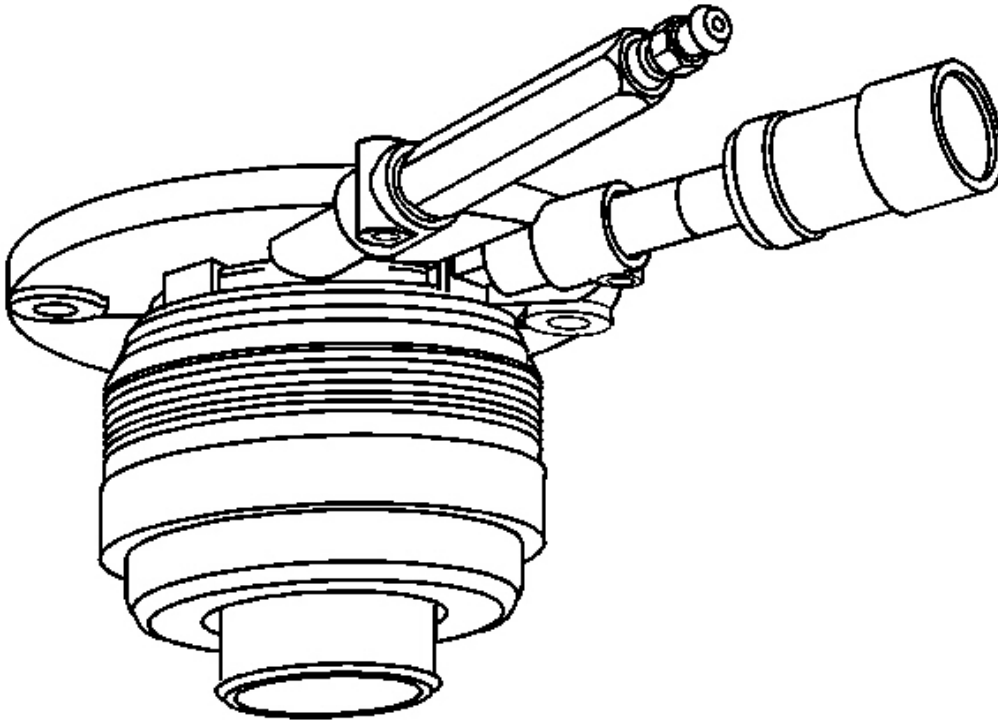


Fig. 31: View Of Clutch Actuator Cylinder & Release Bearing
Courtesy of GENERAL MOTORS CORP.

The clutch control actuator cylinder disengages the clutch, using the pressurized fluid from the clutch master cylinder. The clutch control actuator cylinder is fastened to the front of the transmission. The clutch release bearing is attached to the control actuator cylinder. The control actuator cylinder has a piston, which has seals that slide on the housing assembly. There is a spring between the piston and the housing to keep the piston at the extended position, allowing the release bearing to be in constant contact with the pressure plate fingers. The movement of the piston, by the pressurized fluid, pushes the release bearing against the tips of the clutch pressure plate fingers, to disengage the clutch.

As the clutch wears, the piston or release bearing, moves toward the transmission. The piston is at the furthest position from the transmission with a new clutch.

The clutch control actuator cylinder has a bleeder, for bleeding the air out of the hydraulic system.

Ball bearings enable the release bearing to turn, while applying pressure to the pressure plate fingers. Using an angular contact style bearing allows the release bearing to be in constant contact with the pressure plate fingers.

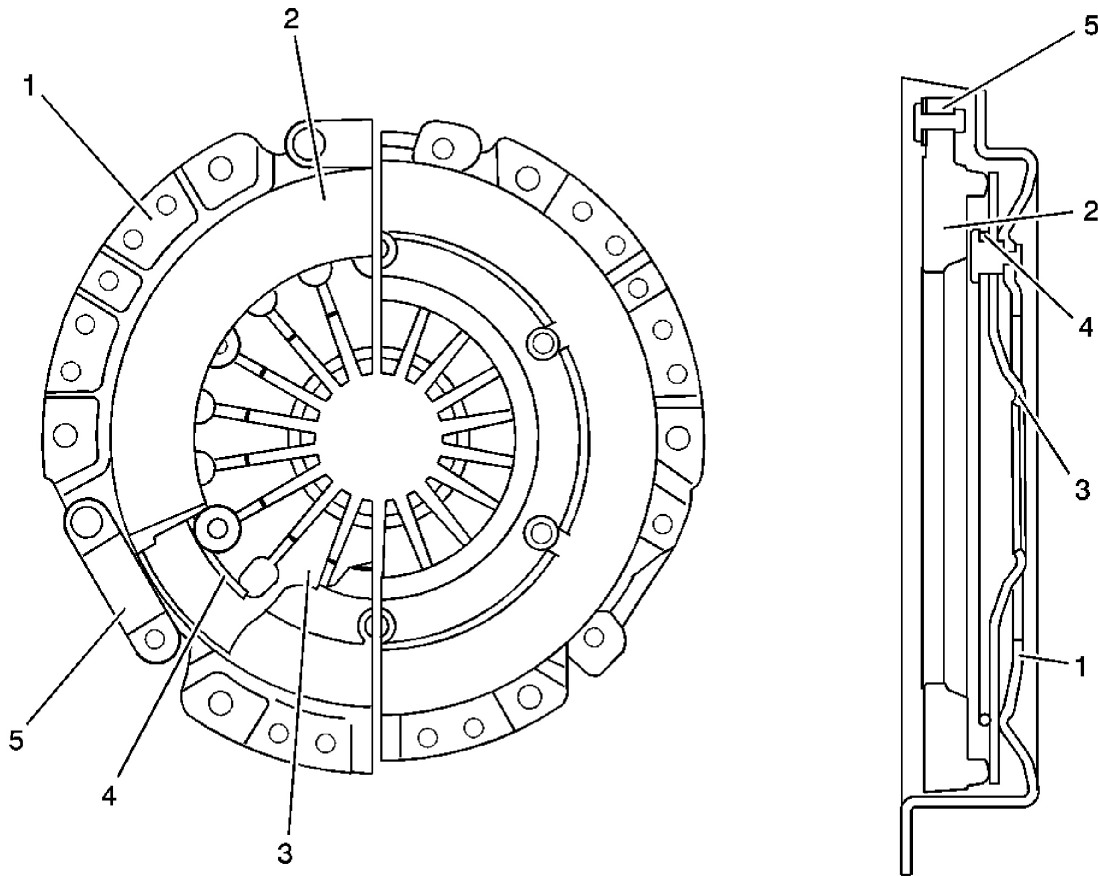


Fig. 32: View Of Pressure Plate Assembly
Courtesy of GENERAL MOTORS CORP.

The diaphragm spring clutch consists of a pressure plate (2), a diaphragm spring (3), a pivot ring (4), drive straps (5) and a cover (1). When the release bearing contacts the tips of the diaphragm spring fingers, it moves them toward the flywheel. The outside diameter of the diaphragm spring pivots on a pivot ring inside the cover. This action lifts the pressure plate off the flywheel through the drive straps, which connect the cover to the pressure plate. As the clutch wears, there is an increase in pedal effort.

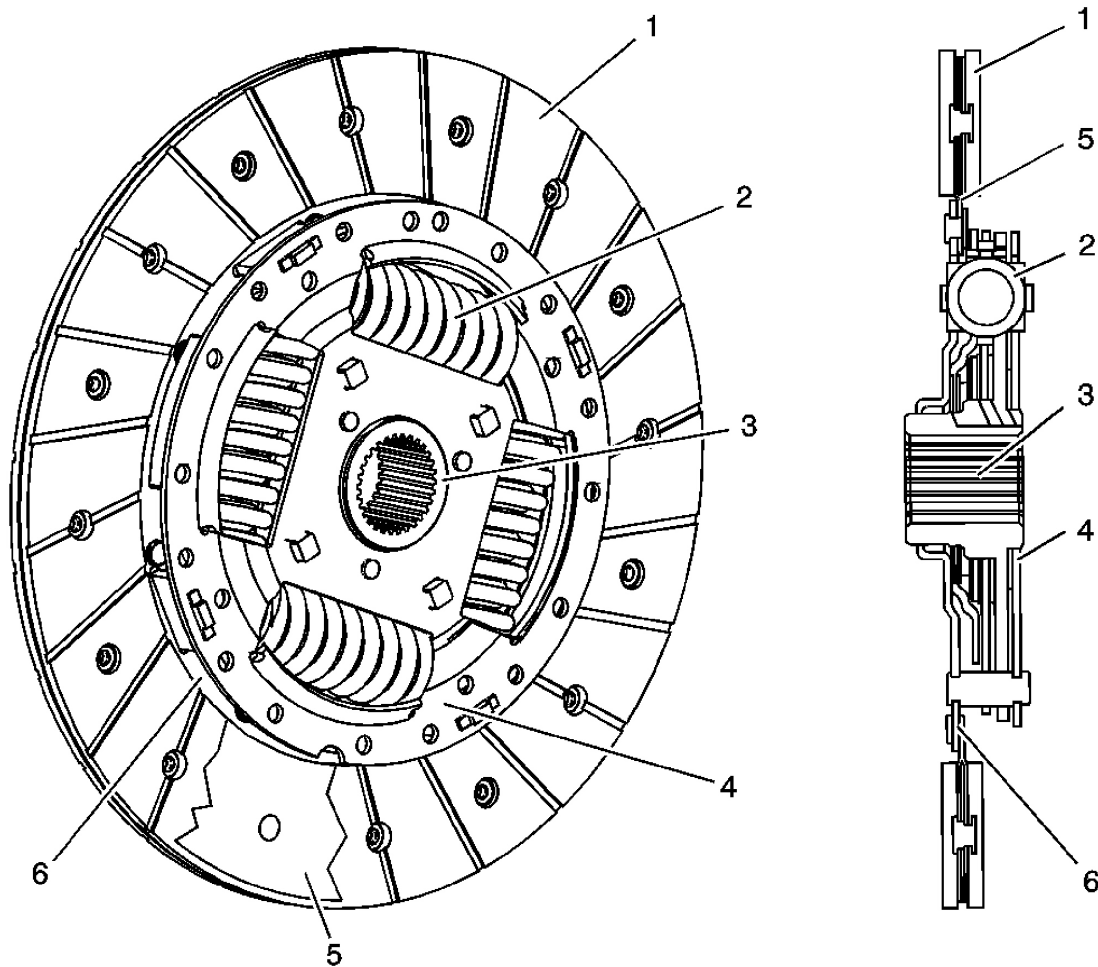


Fig. 33: View Of Clutch Disc
Courtesy of GENERAL MOTORS CORP.

The clutch disc or driven member, is a critical component in the service life of the clutch system. The disc provides smooth engagement and dampens engine vibrations. Mounted to the transmission input shaft, between the flywheel and the clutch pressure plate, the disc slides on the input shaft forward and backward. The disc is splined to the input shaft and cannot rotate without rotating the input shaft. The critical parts of the clutch disc are the hub flange (3) and the torsion springs (2). The hub flange (3) is located between the cover plate (4) and a retainer plate (6) and splined to fit the input shaft. The torsion springs (2), in the dampener assembly, smooth the engagement and dampen vibrations. Friction material (1) is riveted to numerous components, called marcells or cushion segments (5). Waves in marcells soften engagement.

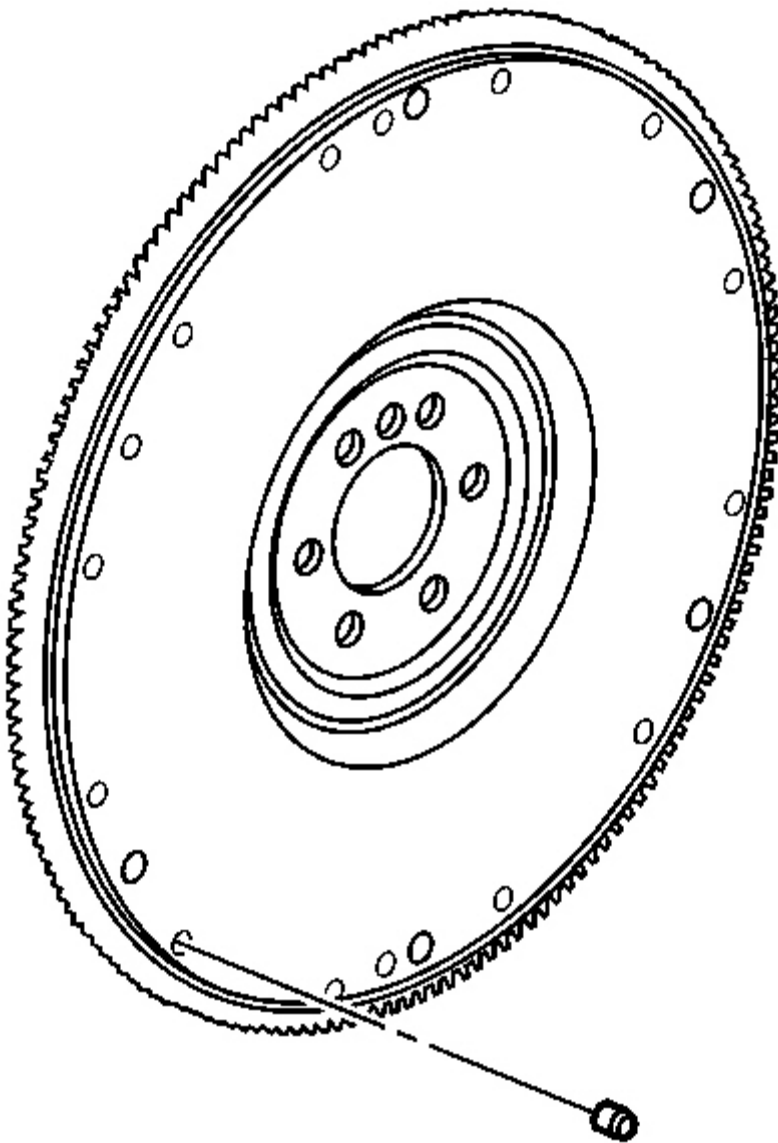


Fig. 34: Locating Flywheel Weights (Manual Transmission)
Courtesy of GENERAL MOTORS CORP.

Bolted to the end of the crankshaft, the flywheel provides the mounting surface for the clutch. During engagement, the disc is clamped against the flywheel by the pressure plate. The flywheel acts as a heat sink, dissipating heat and moving it away from the clutch pressure plate and disc

friction material. The flywheel must provide a smooth, flat surface in order for the clutch to operate properly.

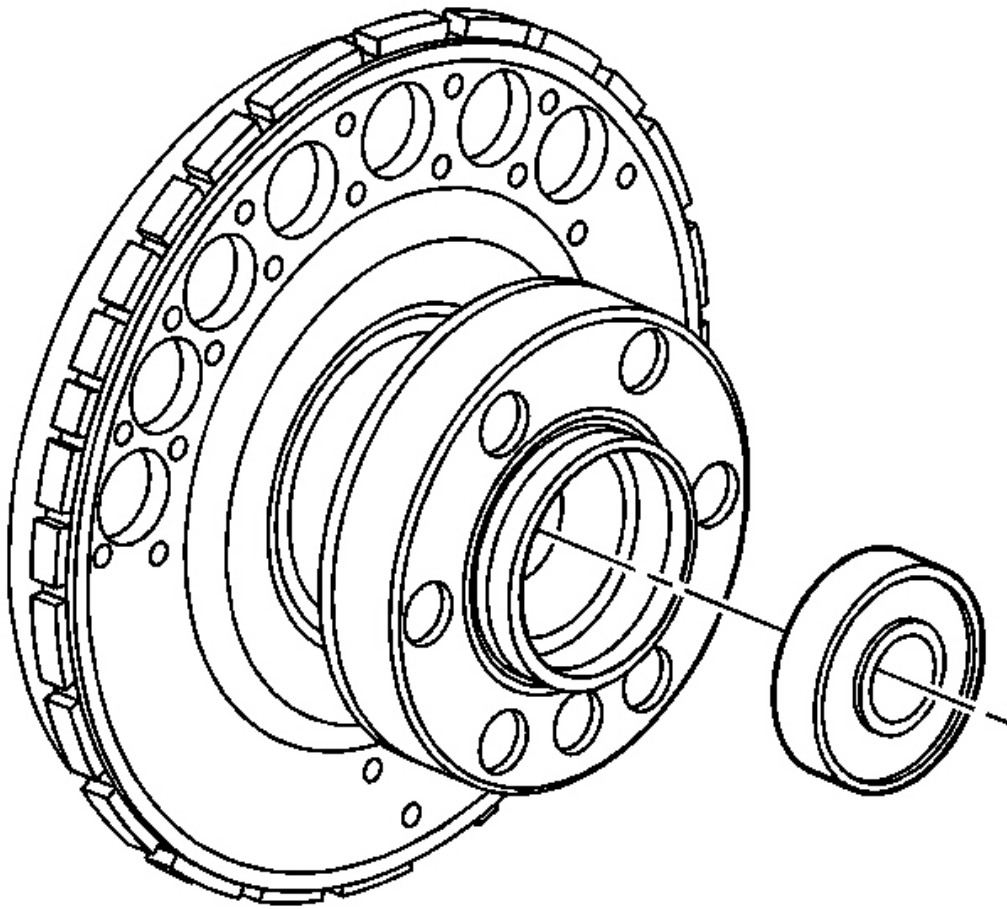


Fig. 35: View Of Pilot Bearing/Bushing
Courtesy of GENERAL MOTORS CORP.

A pilot bearing or bushing, is located in the end of the crankshaft. The pilot bearing supports the end of the input shaft and centers the disc on the flywheel. The pilot bearing is a sintered bronze bushing. A small and relatively inexpensive component, the pilot bearing or bushing should always be replaced during clutch installation. The variety of conditions caused by a worn or defective bearing or bushing is not worth the risk of having to remove the bell housing and transmission to replace this small part.

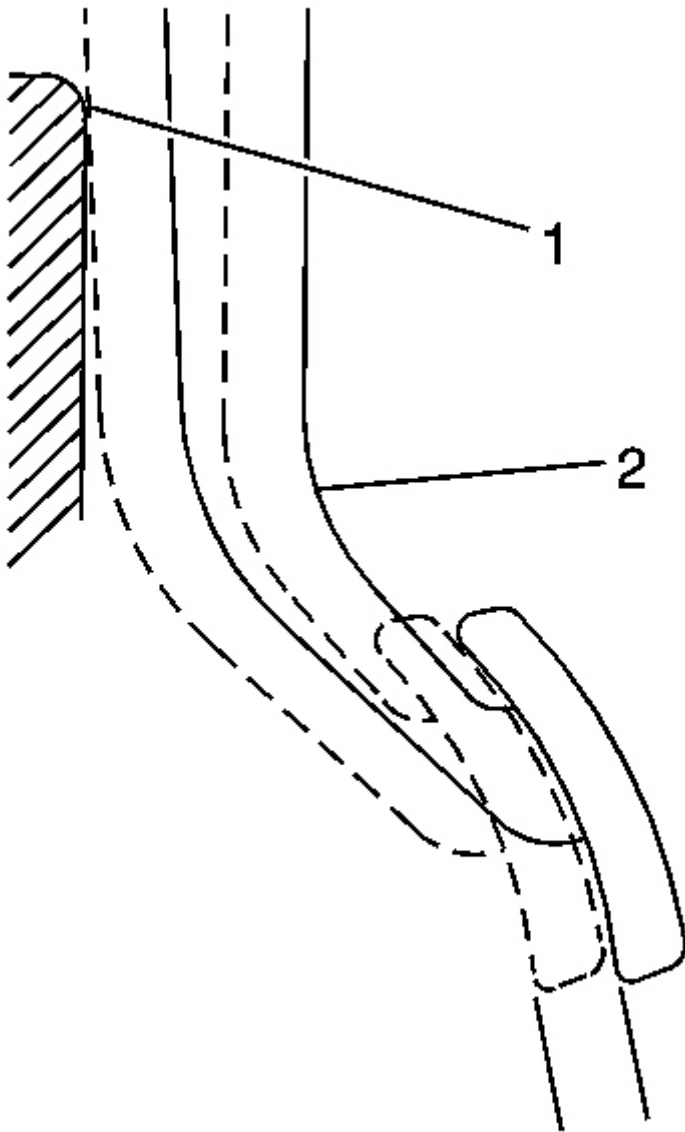


Fig. 36: View Of Clutch Pedal Reserve
Courtesy of GENERAL MOTORS CORP.

In order for the clutch to be completely disengaged and allow proper shifting of the transmission, clutch pedal reserve is required. Clutch pedal reserve is the movement of the pedal from the down stop or the floor (1), to where the clutch begins transmitting torque (2); it should be a minimum

of 25 mm (1 in). Inspect for clutch pedal reserve by depressing the clutch pedal. Allow the clutch disc to quit spinning and let up on the clutch pedal while listening for the clutch disc to start spinning. The distance the pedal moved from the floor, before the clutch disc started to spin, is the pedal reserve.

In order to determine if the clutch is properly releasing and the hydraulic system is functioning properly:

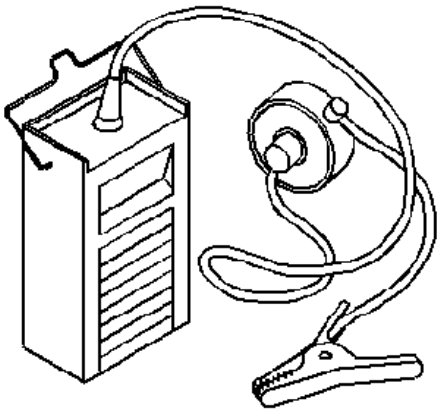
1. Depress the clutch pedal fully to disengage the clutch.
2. Shift into a low gear, either 1st or REVERSE.
3. Slowly shift out of the gear, only to disengage the synchronizer sleeve from the speed gear engagement teeth.
4. Let up on the pedal, to engage the clutch.
5. Depress the clutch pedal and shift back into gear.

If the clutch pedal is releasing properly, you should be able to engage the gear without grinding after 4-5 seconds, which is the time for the clutch disc to quit spinning.

SPECIAL TOOLS AND EQUIPMENT

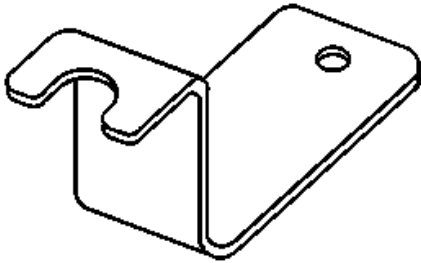
SPECIAL TOOLS

Special Tools

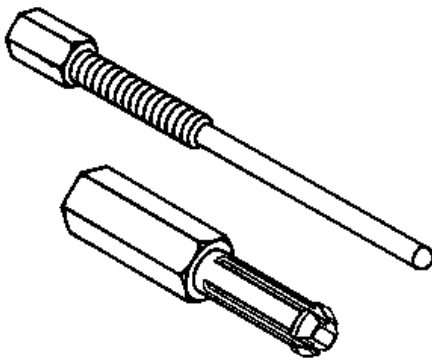
Illustration	Tool Number/Description
	<p>J 36660-A Torque Angle Meter</p>

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2007 TRANSMISSION Clutch - H3



J 42371
Hydraulic Clutch Line Separator



J 43276
Clutch Pilot Bearing Remover

J 45949
Pilot Bearing and Flywheel Locator Installer

2007 Hummer H3

2007 TRANSMISSION Clutch - H3

