

2017 TRANSMISSION**Clutch - Encore, Trax****SPECIFICATIONS****FASTENER SPECIFICATIONS****Reusable Threaded Fastener Tightening Specifications****NOTE:**

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

Application	Specification
	Metric (English)
Brake Pressure Modulator Valve Bracket Nut	22 N.m (17 lb ft)
Clutch Actuator Cylinder Bolts D16	8 N.m (71 lb in)
Clutch Actuator Cylinder Bolts M20/32	6 N.m (53 lb in)
Clutch Master Cylinder Bolts	4.5 N.m (40 lb in)
Clutch Pressure Plate-to-Flywheel Bolts - D16	15 N.m (11 lb ft)
Clutch Pressure Plate-to-Flywheel Bolts - M20/32	28 N.m (21 lb ft)
Clutch Pedal Position Sensor	3 N.m (27 lb in)

GENERAL SPECIFICATIONS

Application	Specification	
	Metric	English
Fluid	Use only GM approved brake fluid from a clean, sealed brake fluid container	
Inside Diameter		
• 1.4L LUJ (M32 Manual Transmission)	150 mm	5.91 in
• 1.6L LDE (D16 Manual Transmission)	145 mm	5.71 in
• 1.8L 2H0 (D16 Manual Transmission)	145 mm	5.71 in
• 1.7L Diesel LUD (M32 Manual Transmission)	155 mm	6.10 in
Outside Diameter		
• 1.4L LUJ (M32 Manual Transmission)	228 mm	8.98 in
• 1.6L LDE (D16 Manual Transmission)	225 mm	8.86 in
• 1.8L 2H0 (D16 Manual Transmission)	225 mm	8.86 in
• 1.7L Diesel LUD (M32 Manual Transmission)	239 mm	9.41 in
Thickness		

Application	Specification	
	Metric	English
• 1.4L LUJ (M32 Manual Transmission)	8.40 mm (at load of 6'200 N)	0.33 in (at load of 6'200 N)
• 1.6L LDE (D16 Manual Transmission)	7.65 mm (at load of 4'900 N)	0.30 in (at load of 4'900 N)
• 1.8L 2H0 (D16 Manual Transmission)	7.65 mm (at load of 4'900 N)	0.30 in (at load of 4'900 N)
• 1.7L Diesel LUD (M32 Manual Transmission)	7.80 mm (at load of 8'800 N)	0.31 in (at load of 8'800 N)
Type	Single Dry Plate	

DIAGNOSTIC INFORMATION AND PROCEDURES

SYMPTOMS - CLUTCH

Symptom List

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

- [Clutch Slipping](#)
- [Clutch Grabbing](#)
- [Clutch Rattle](#)
- [Release Bearing Noisy with Clutch Engaged](#)
- [Clutch Noisy](#)
- [Clutch Pedal Hard to Push](#)

WARNING: For vehicles equipped with push button start in which a clutch malfunction is suspected, always sit in the driver's seat and firmly apply the brake before starting the vehicle. Do not press the "start" button for any reason from outside the vehicle. A vehicle with a malfunctioning clutch could immediately move when started, which could cause personal injury or property damage.

CLUTCH DOES NOT DISENGAGE

Cause	Actions
DEFINITION: When the pedal is pressed to the floor, the shift lever does not move freely in and out of reverse gear.	
Damaged clutch disc.	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) .
Clutch disc hub binding on the input shaft splines.	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) .
Warped or bent clutch disc.	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) .
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.

Cause	Actions
Too much travel between pedal and hydraulic clutch master cylinder.	1. Inspect the pedal for worn bushings. 2. Replace the pedal bushings if worn.
Hydraulic 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. Replace the clutch master cylinder as required. Refer to Clutch Master Cylinder Replacement.
Air in the hydraulic clutch system.	Bleed the hydraulic clutch system. Refer to Hydraulic Clutch System Bleeding .
Hydraulic 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 Actuator Cylinder Replacement (D16)Clutch Actuator Cylinder Replacement (M20/M32).
Hydraulic 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.

CLUTCH SLIPPING

Cause	Actions
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 Actuator Cylinder Replacement (D16) Clutch Actuator Cylinder Replacement (M20/M32) .

Cause	Actions
Kinked or damaged clutch actuator cylinder front pipe.	1. Inspect for the correct routing of the clutch actuator cylinder front pipe. 2. Route the clutch actuator cylinder front pipe properly. 3. Inspect for loose or faulty engine mounts that may allow the clutch actuator cylinder front pipe to be kinked or pinched. 4. Repair or replace faulty engine mounts. 5. Replace the clutch actuator cylinder front pipe if it is damaged. Refer to Clutch Actuator Cylinder Front 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 contaminants cannot be removed, 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).
Oil-soaked clutch disc.	Correct the leak at its source and install a new clutch disc.
Weak diaphragm spring.	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) .
Driven plate that is not seated.	Start the engine 30 - 40 times. Do not overheat the engine.
Driven plate is overheated.	Allow the driven plate to cool.
Worn or damaged flywheel.	Replace the engine flywheel.
Worn clutch disc facing.	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) .
Burnt or glazed clutch discs.	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) .
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.

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. WARNING: For vehicles equipped with push button start in which a clutch malfunction is suspected, always sit in the driver's seat and firmly apply the brake before starting the vehicle. Do not press the "start" button for any reason from outside the vehicle. A vehicle with a malfunctioning clutch could immediately move when started, which could cause personal injury or property damage.	

Cause	Action
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 (1.4L)Clutch Pressure and Driven Plate Replacement (1.6L and 1.8L).
Loose or faulty engine mounts	1. Inspect the engine mounts for being loose or faulty. 2. Repair or replace the engine/transmission mounts as required.
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 Actuator Cylinder Replacement (D16)Clutch Actuator Cylinder Replacement (M20/M32).
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. WARNING: For vehicles equipped with push button start in which a clutch malfunction is suspected, always sit in the driver's seat and firmly apply the brake before starting the vehicle. Do not press the "start" button for any reason from outside the vehicle. A vehicle with a malfunctioning clutch could immediately move when started, which could cause personal injury or property damage.
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 (1.4L)Clutch Pressure and Driven Plate Replacement (1.6L and 1.8L).

Cause	Action
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 (1.4L) Clutch Pressure and Driven Plate Replacement (1.6L and 1.8L).
Clutch disc binding on the input shaft	1. Inspect the input shaft for rust dirt or debris. NOTE: Do not use mineral or paraffin based oil to lubricate the splines. 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 (1.4L) Clutch Pressure and Driven Plate Replacement (1.6L and 1.8L). 5. Inspect the input shaft for excessive wear on the splines, causing the clutch disc to bind. 6. Replace the transmission if input shaft is worn.
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 (1.4L) Clutch Pressure and Driven Plate Replacement (1.6L and 1.8L).
Flywheel improperly machined	1. Inspect the flywheel for being improperly machined, and causing interference with the clutch disc. 2. Replace the flywheel if it has been improperly machined.
Flywheel uneven	1. Inspect the flywheel surface for being warped or uneven. 2. Replace the flywheel if it is faulty.

CLUTCH RATTLE

Cause	Actions

Cause	Actions
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 (1.4L) Clutch Pressure and Driven Plate Replacement (1.6L and 1.8L) .
Clutch is improperly installed	Remove the clutch and install it correctly. Refer to Clutch Pressure and Driven Plate Replacement (1.4L) Clutch Pressure and Driven Plate Replacement (1.6L and 1.8L) .
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 (1.4L)Clutch Pressure and Driven Plate Replacement (1.6L and 1.8L).
Oil in the driven plate damper	Correct the cause of the oil leak and 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) .
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 (1.4L)Clutch Pressure and Driven Plate Replacement (1.6L and 1.8L).

RELEASE BEARING NOISY WITH CLUTCH ENGAGED

Checks	Actions
Check for a binding clutch actuator cylinder.	Clean and re-lubricate the clutch actuator cylinder. Inspect the clutch actuator cylinder for burrs and nicks.

CLUTCH NOISY

Cause	Actions
Clutch actuator cylinder damaged or worn.	Replace the clutch actuator cylinder. Refer to Clutch Actuator Cylinder Replacement (D16) Clutch Actuator Cylinder Replacement (M20/M32) .

CLUTCH PEDAL HARD TO PUSH

Cause	Actions
DEFINITION: The clutch pedal requires high effort to operate. Review the Symptoms - Clutch and perform the necessary inspections.	
WARNING: For vehicles equipped with push button start in which a clutch malfunction is suspected, always sit in the driver's seat and firmly apply the brake before starting the vehicle. Do not press the "start" button for any reason from outside the vehicle. A vehicle with a malfunctioning clutch could immediately move when started, which could cause personal injury or property damage.	

Cause	Actions
Incorrect hydraulic fluid.	1. Inspect for the correct fluid in the master cylinder. Refer to Hydraulic Clutch System 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 System 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 System Bleeding.
Clutch pedal binding.	Inspect the pedal for binding.
Clutch pedal spring worn.	Inspect the clutch pedal spring for wear.
Kinked or damaged clutch actuator cylinder front pipe.	1. Inspect for a kinked or damaged clutch actuator cylinder front pipe. 2. Replace the clutch actuator cylinder front pipe. Refer to Clutch Actuator Cylinder Front Pipe Replacement.
Clutch disc worn too thin.	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) .

REPAIR INSTRUCTIONS

CLUTCH PEDAL REPLACEMENT

NOTE: The clutch pedal is part of the brake, accelerator, and clutch pedal assembly and cannot be serviced separately.

To replace the brake, accelerator and clutch pedal assembly, refer to [Brake, Accelerator, and Clutch Pedal Replacement](#).

CLUTCH PEDAL RETURN SPRING REPLACEMENT (D16)

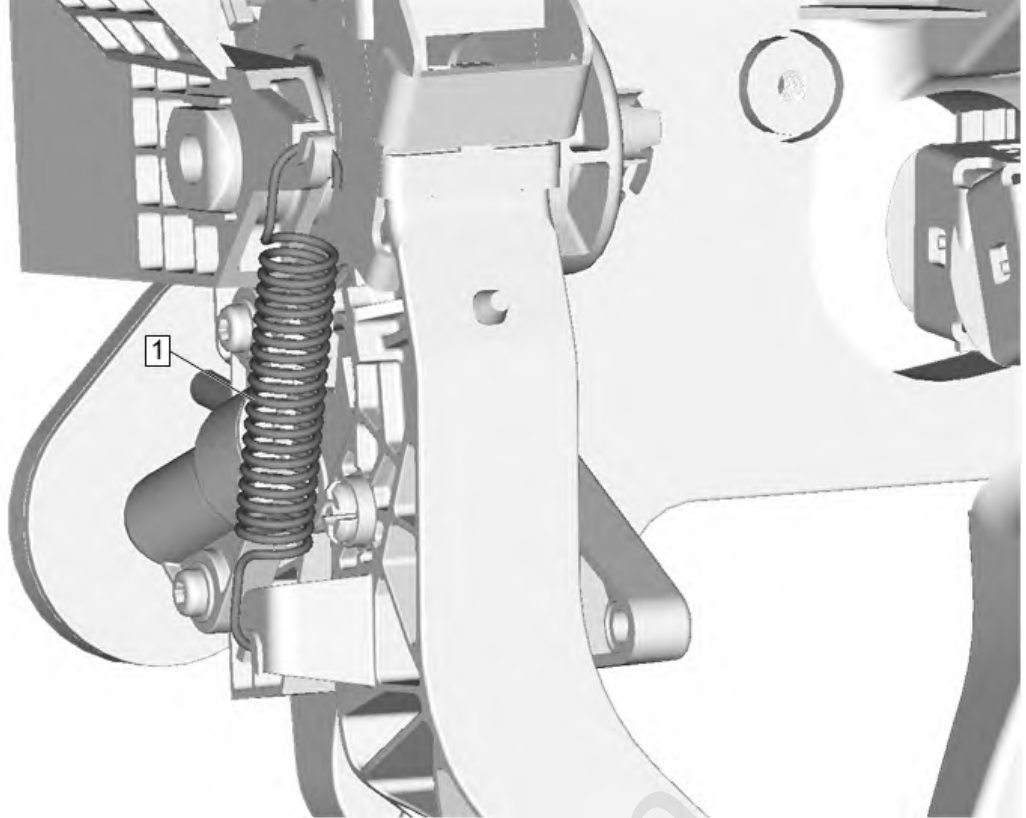


Fig. 1: Clutch Pedal Return Spring.(D16)
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Clutch Pedal Return Spring

CLUTCH PEDAL RETURN SPRING REPLACEMENT (M20/32)

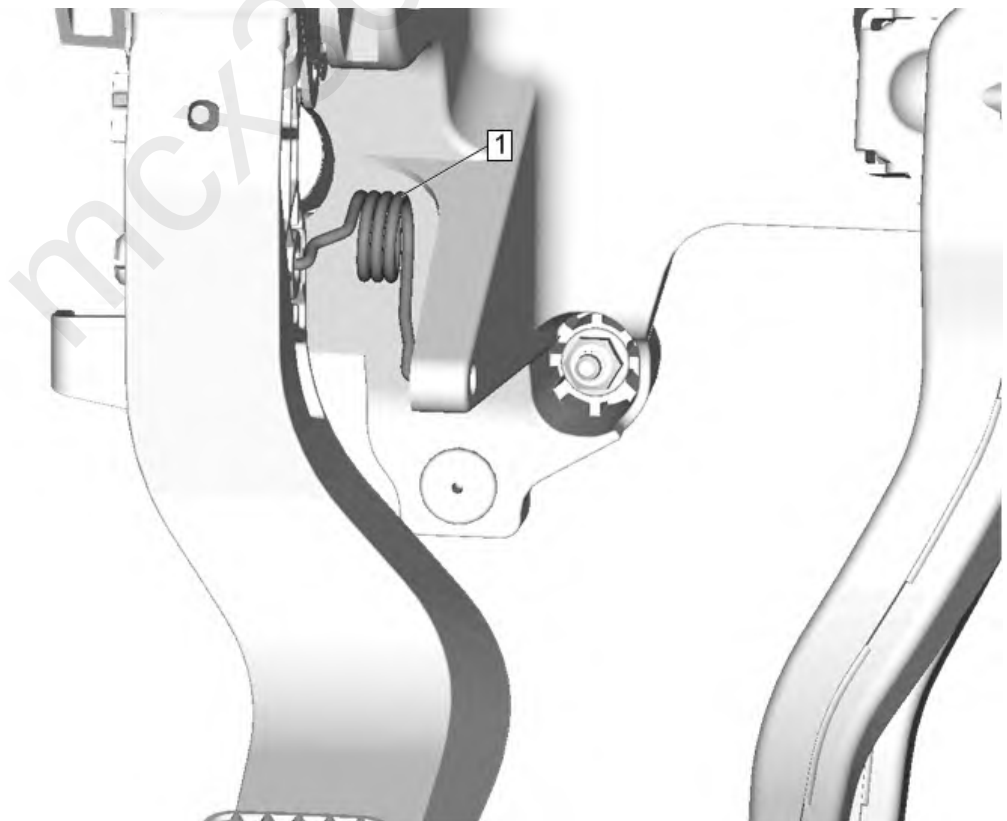


Fig. 2: Clutch Pedal Return Spring.(M20/32)
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Clutch Pedal Return Spring

CLUTCH MASTER CYLINDER RESERVOIR HOSE REPLACEMENT

Removal Procedure

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

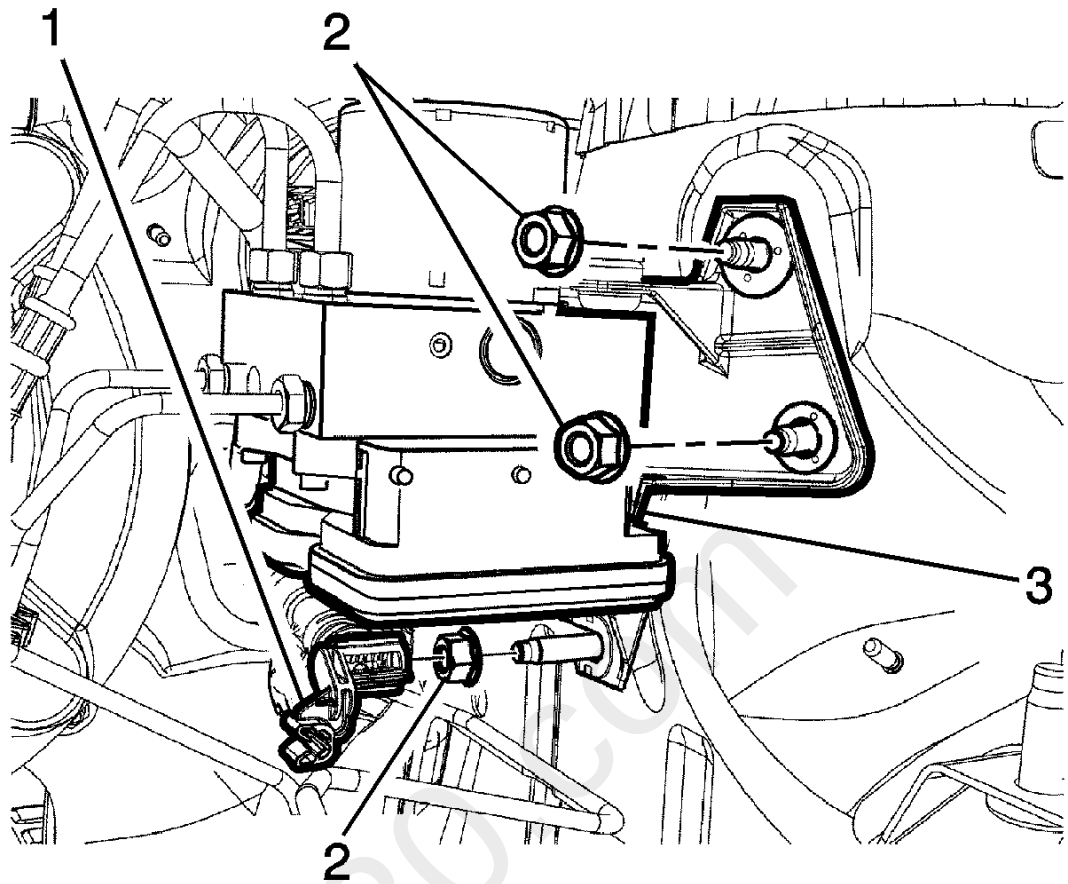


Fig. 3: BPMV Bracket Assembly.

Courtesy of GENERAL MOTORS COMPANY

2. Remove the clutch actuator cylinder pipe retainer (1).
3. Remove the 3 BPMV bracket assembly nuts (2) and loosen the BPMV bracket assembly (3) from the vehicle.

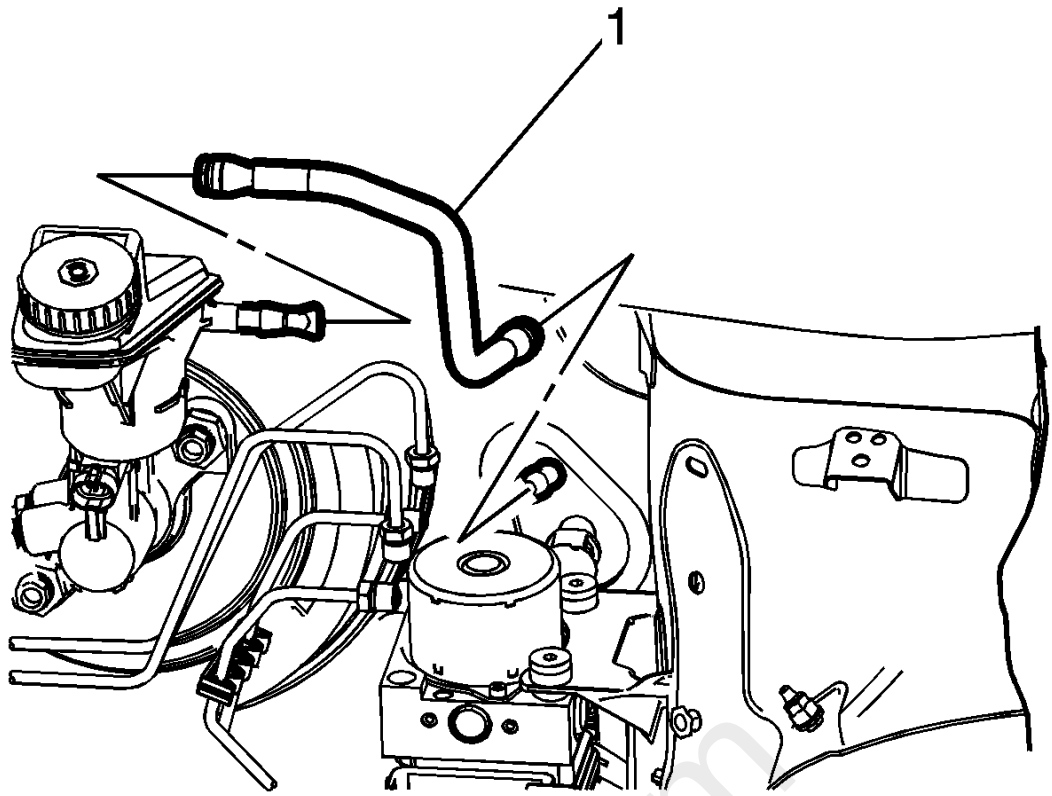


Fig. 4: Clutch Master Cylinder Reservoir Hose

Courtesy of GENERAL MOTORS COMPANY

NOTE: Before disconnecting the reservoir tank hose, remove the clutch/brake fluid from the reservoir tank.

4. Remove the clutch master cylinder reservoir hose (1) from the reservoir tank.
5. Remove the clutch master cylinder reservoir hose from the clutch master cylinder.

Installation Procedure

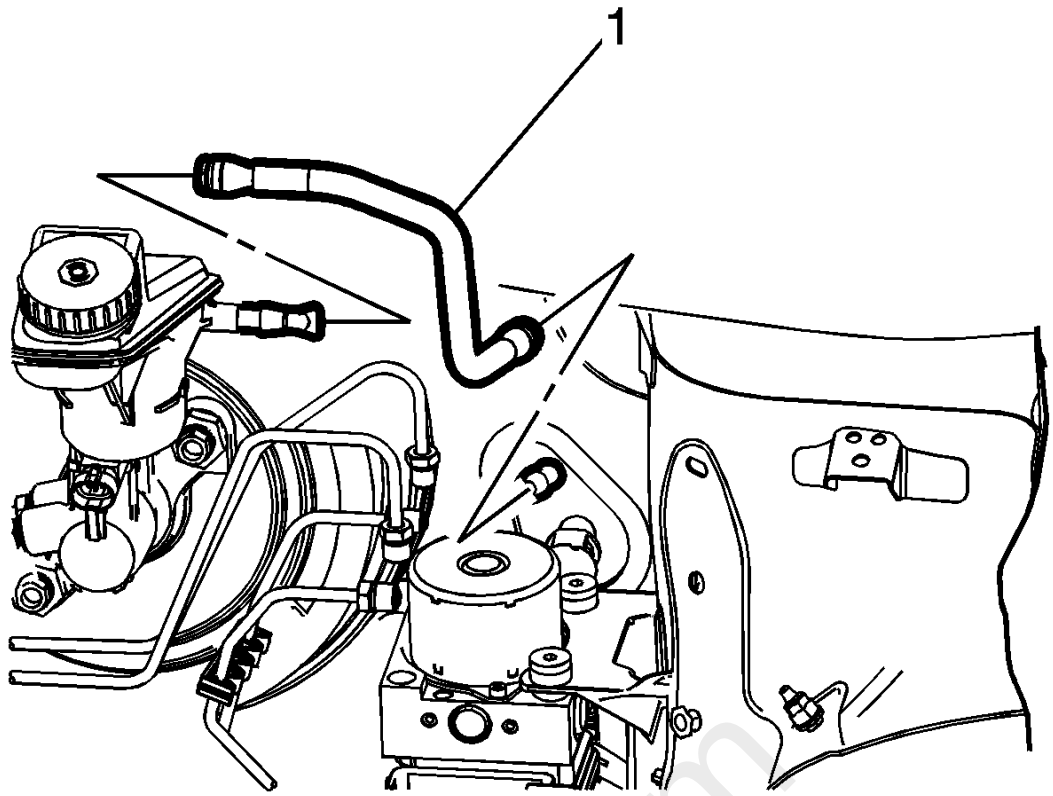


Fig. 5: Clutch Master Cylinder Reservoir Hose

Courtesy of GENERAL MOTORS COMPANY

1. Install the clutch master cylinder reservoir hose (1) to the reservoir tank and the master cylinder.

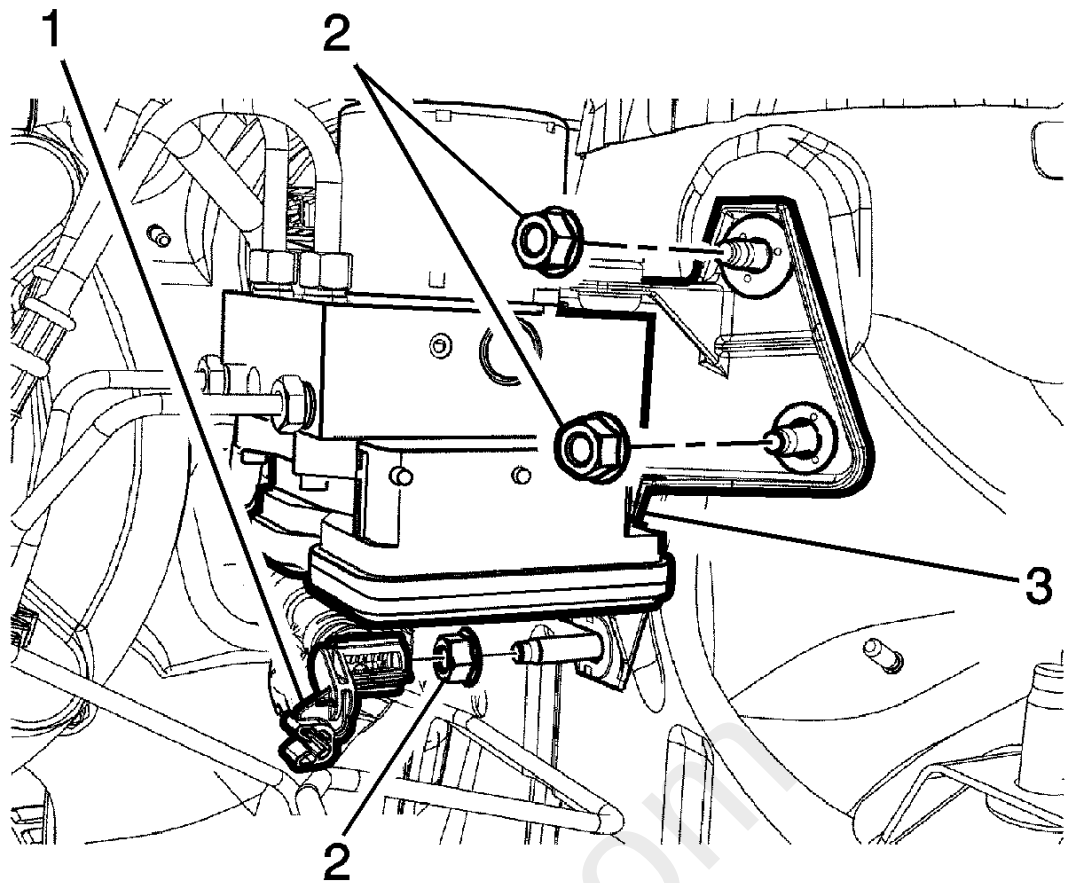


Fig. 6: BPMV Bracket Assembly.

Courtesy of GENERAL MOTORS COMPANY

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

2. Install the 3 BPMV bracket assembly nuts (2) to the vehicle and tighten to 17 N.m (12 lb ft).
3. Install the clutch actuator cylinder pipe retainer (1).
4. Bleed the hydraulic clutch system. Refer to [Hydraulic Clutch System Bleeding](#).
5. Install the battery tray. Refer to [Battery Tray Replacement](#) .
6. Fill the reservoir with GM approved brake fluid from a clean, sealed brake fluid container up to the MAX level.

CLUTCH MASTER CYLINDER REPLACEMENT

Removal Procedure

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

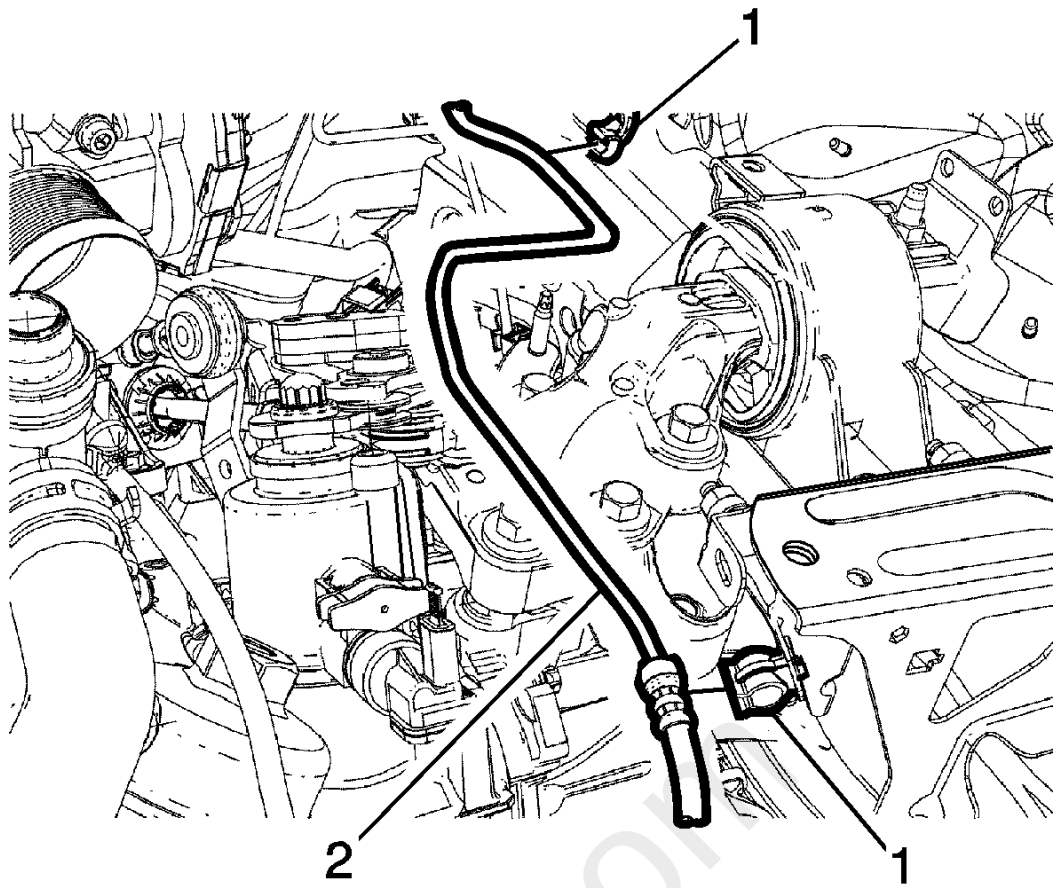


Fig. 7: Clutch Actuator Cylinder Front Pipe
Courtesy of GENERAL MOTORS COMPANY

2. Unclip the clutch actuator cylinder front pipe from the 2 retainers (1).

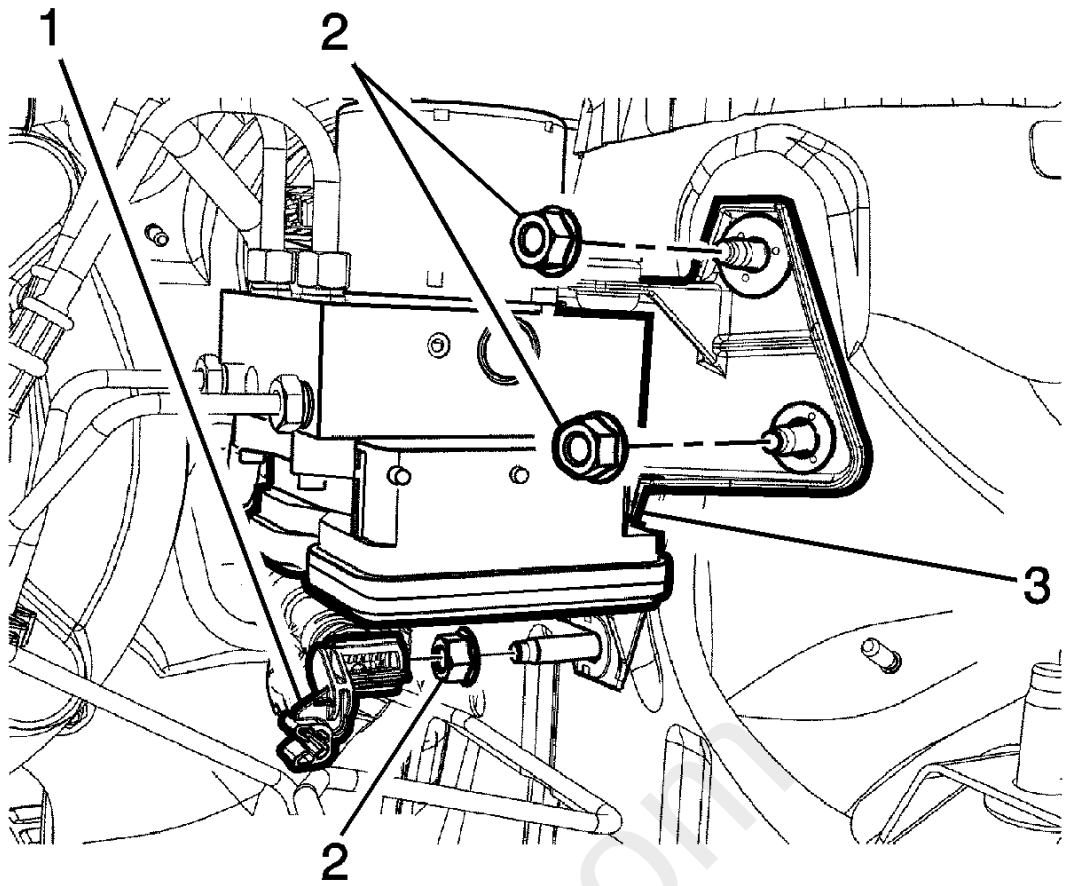


Fig. 8: BPMV Bracket Assembly.

Courtesy of GENERAL MOTORS COMPANY

3. Remove the clutch actuator cylinder pipe retainer (1).
4. Remove the 3 BPMV bracket assembly nuts (2) and loosen the BPMV bracket assembly (3) from the vehicle.

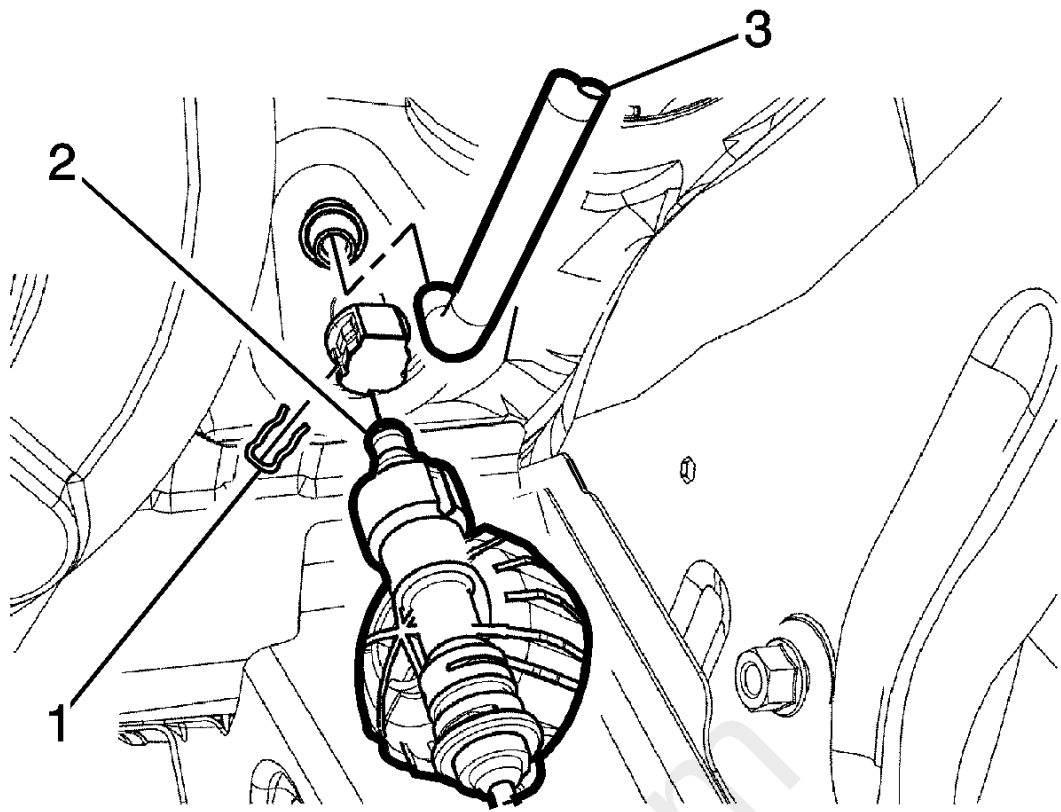


Fig. 9: Clutch Actuator Cylinder Front Pipe
Courtesy of GENERAL MOTORS COMPANY

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

5. Remove the retaining clip (1).
6. Disconnect the clutch actuator cylinder front pipe (2) from the clutch master cylinder.
7. Remove the clutch master cylinder reservoir hose (3) from the master cylinder. Refer to [Clutch Master Cylinder Reservoir Hose Replacement](#).
8. Remove the brake pedal assembly. Refer to [Brake, Accelerator, and Clutch Pedal Replacement](#).

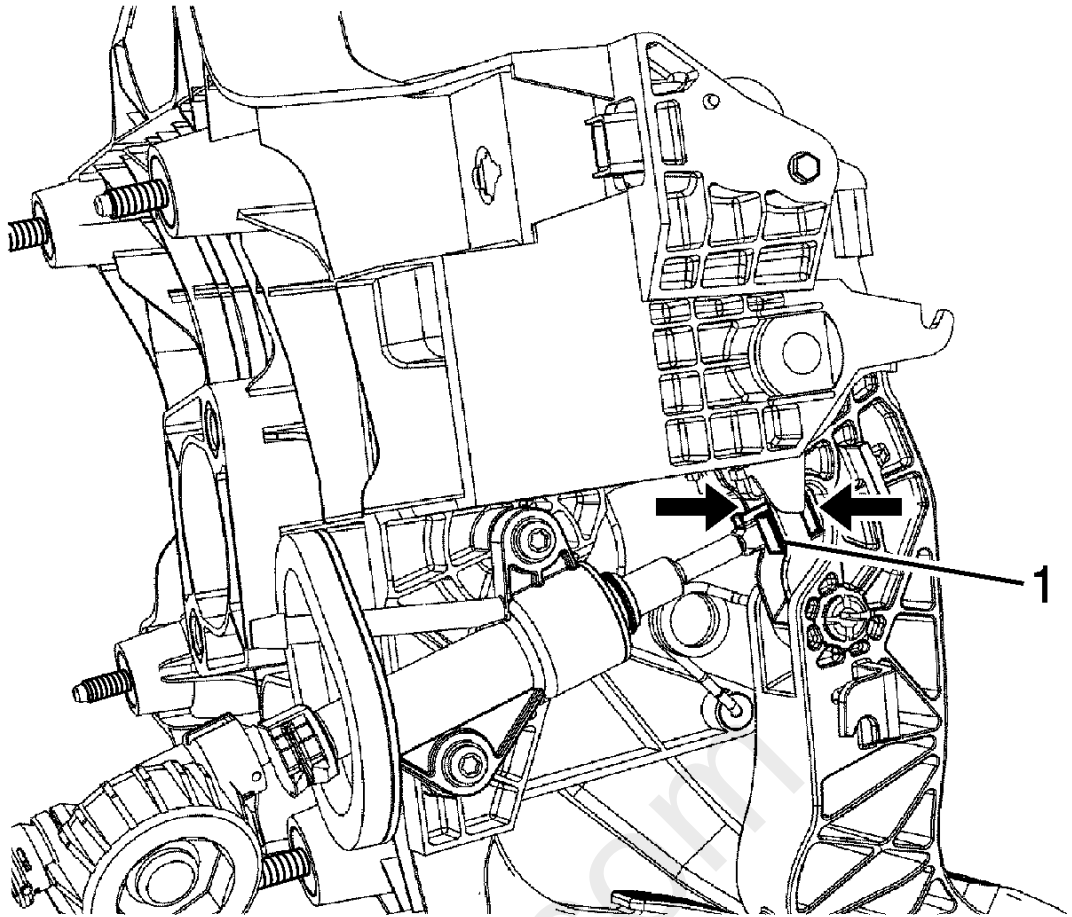


Fig. 10: Clutch Pedal Push Rod Retainer

Courtesy of GENERAL MOTORS COMPANY

NOTE: Press the 2 latches (arrows) together.

9. Disconnect the push rod retainer (1) from the clutch pedal.

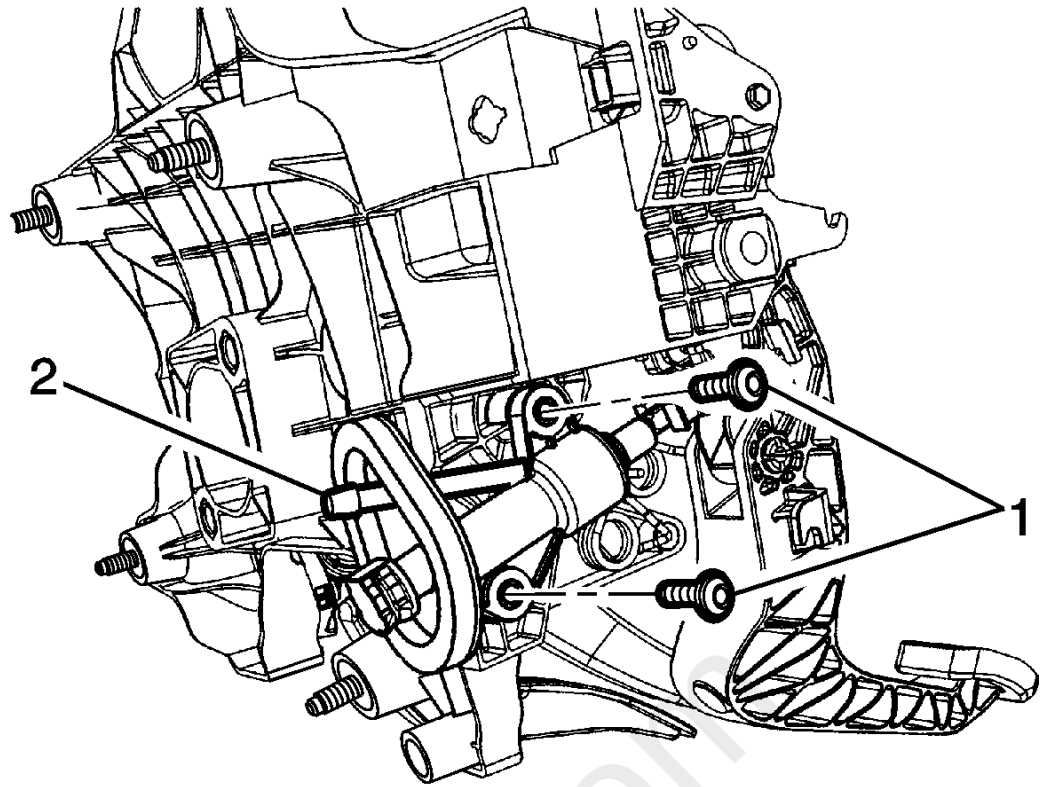


Fig. 11: Clutch Master Cylinder And Mount
Courtesy of GENERAL MOTORS COMPANY

10. Remove the 2 clutch master cylinder mount fasteners (1).
11. Remove the clutch master cylinder (2) from the brake pedal assembly.

Installation Procedure

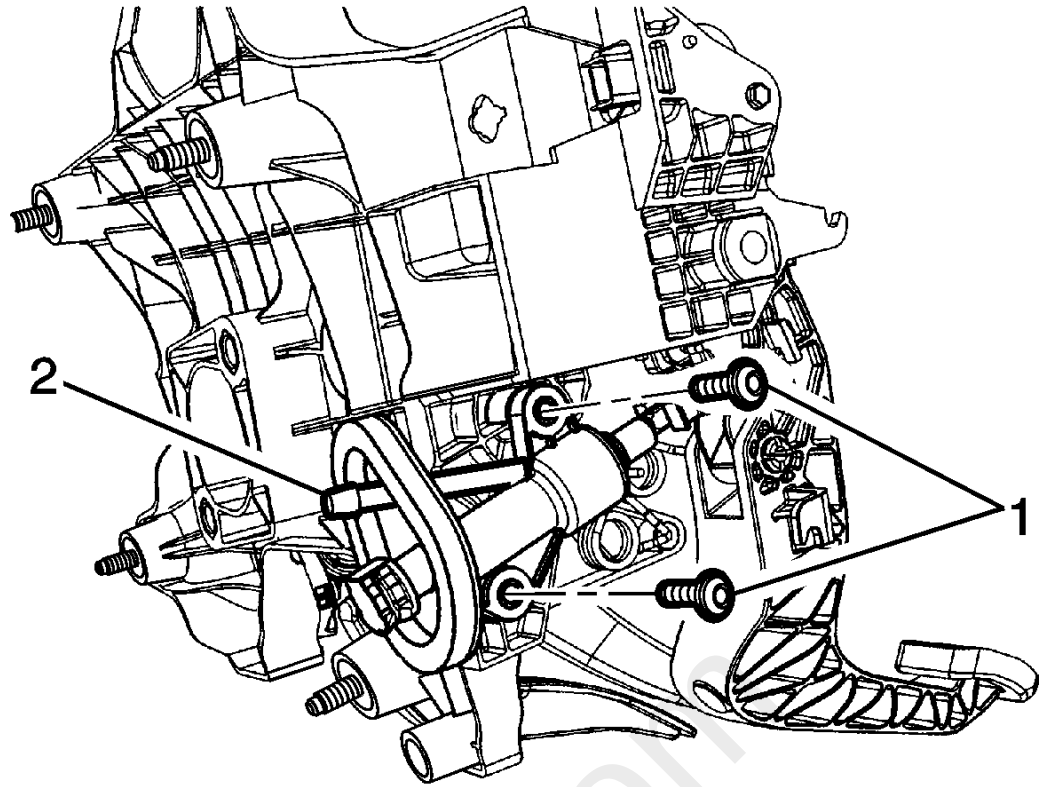


Fig. 12: Clutch Master Cylinder And Mount
Courtesy of GENERAL MOTORS COMPANY

1. Install the clutch master cylinder (2) into the brake pedal assembly.

CAUTION: Refer to **Fastener Caution** .

2. Install the 2 clutch master cylinder mount fasteners (1) and tighten to 4.5 N.m (40 lb in).

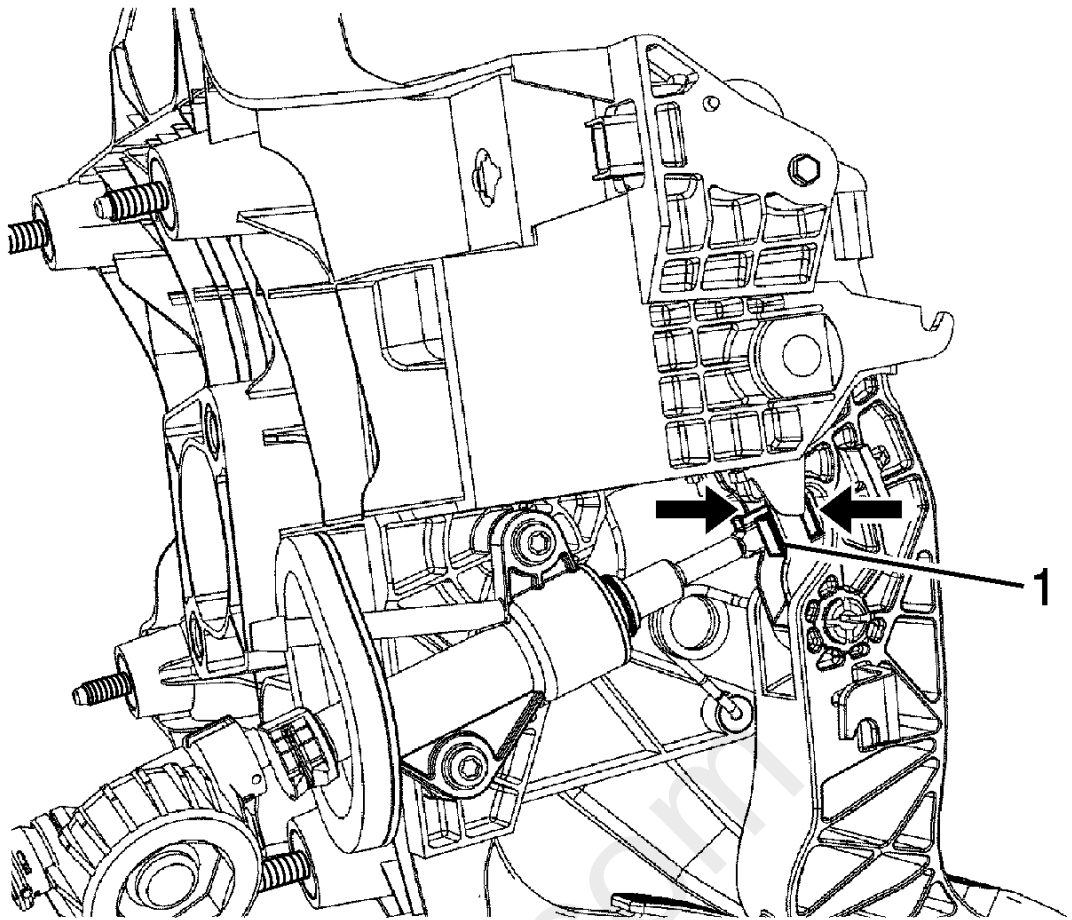


Fig. 13: Clutch Pedal Push Rod Retainer

Courtesy of GENERAL MOTORS COMPANY

NOTE: An audible click will be heard when the clip is correctly seated.

3. Connect the push rod retainer (1) to the clutch pedal.
4. Install the brake pedal assembly. Refer to [Brake, Accelerator, and Clutch Pedal Replacement](#) .

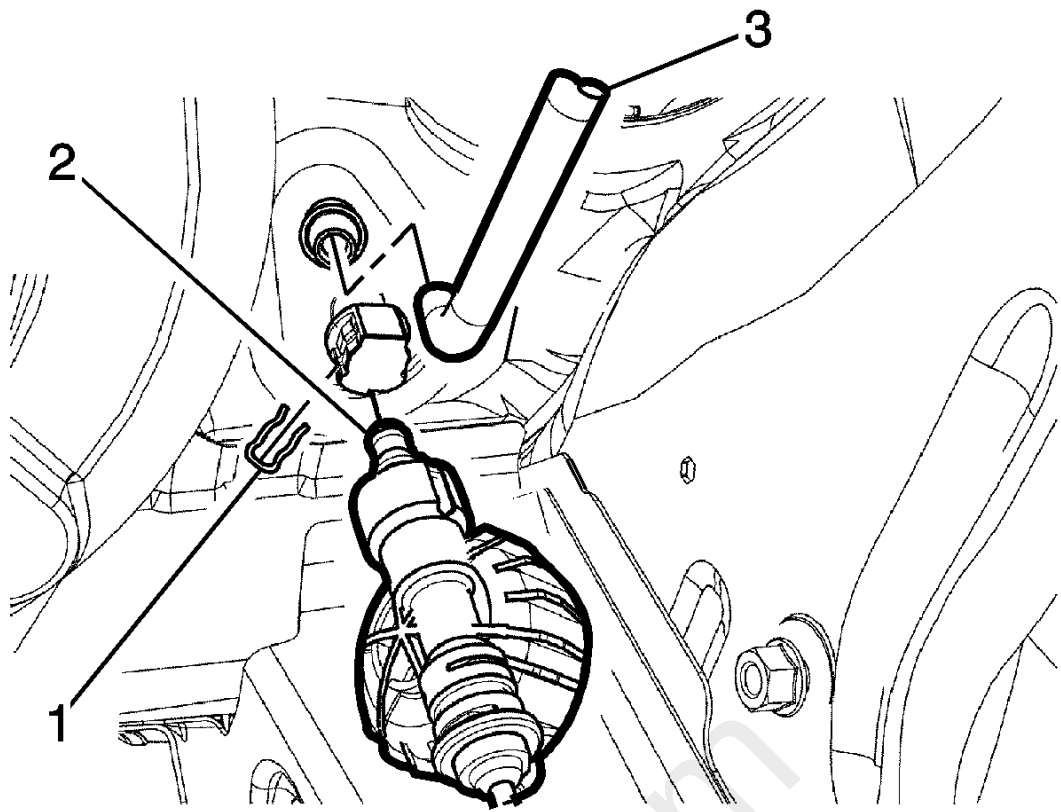


Fig. 14: Clutch Actuator Cylinder Front Pipe
Courtesy of GENERAL MOTORS COMPANY

5. Connect the clutch actuator cylinder front pipe (2) to the clutch master cylinder.
6. Install the retaining clip (1).
7. Install the clutch master cylinder reservoir hose (3) to the master cylinder. Refer to [Clutch Master Cylinder Reservoir Hose Replacement](#).

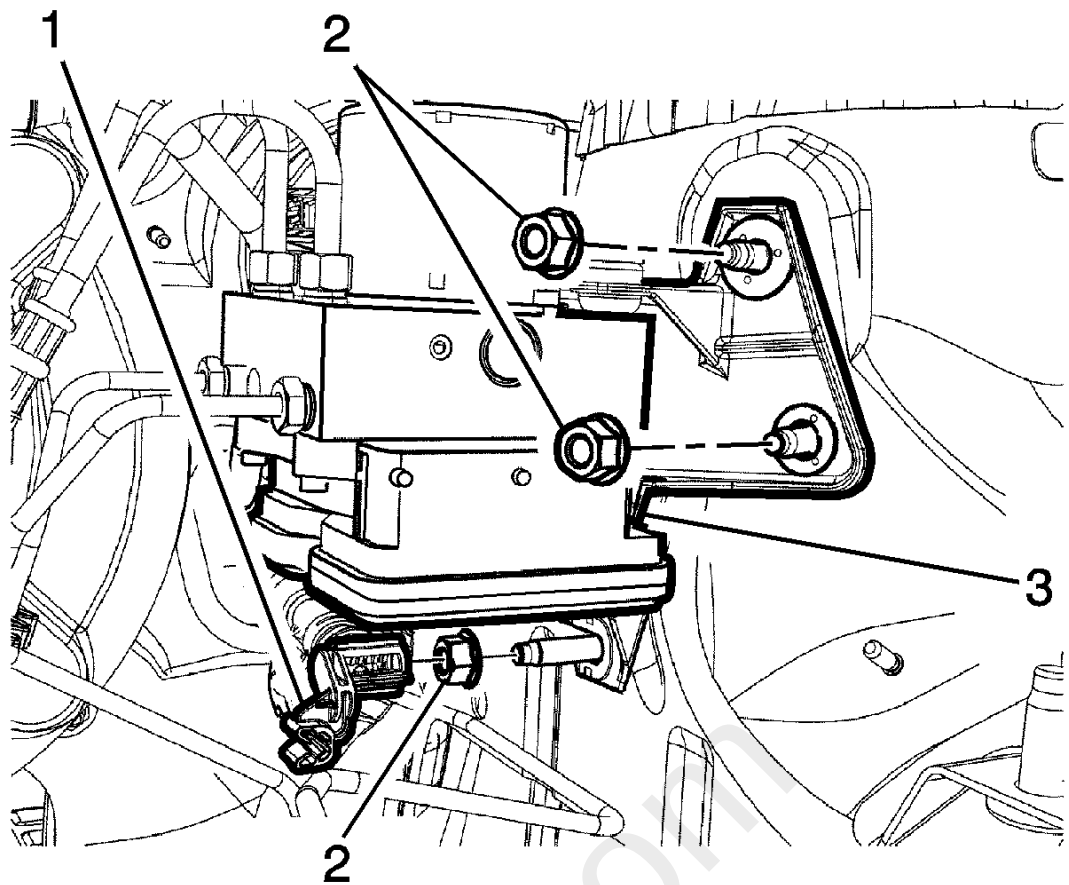


Fig. 15: BPMV Bracket Assembly.

Courtesy of GENERAL MOTORS COMPANY

8. Install the 3 BPMV bracket assembly nuts (2) to the vehicle and tighten to 17 N.m (12 lb ft).
9. Install the clutch actuator cylinder pipe retainer (1).

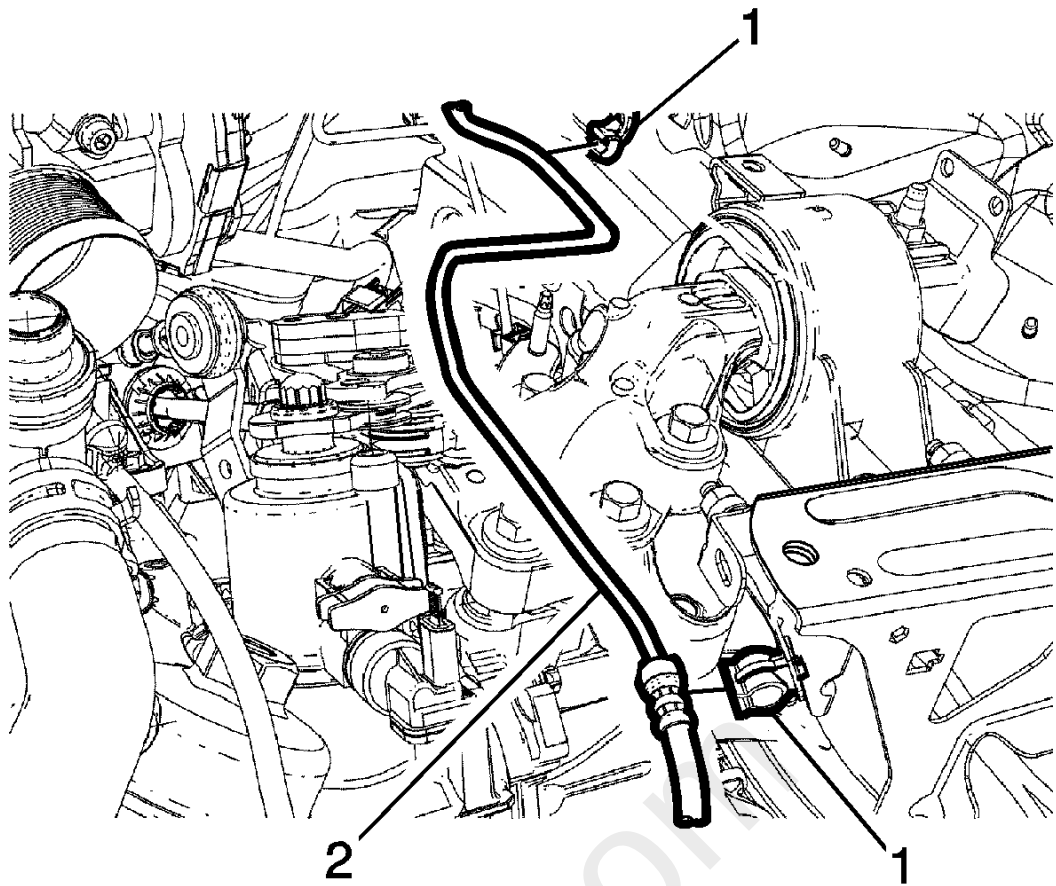


Fig. 16: Clutch Actuator Cylinder Front Pipe
Courtesy of GENERAL MOTORS COMPANY

10. Clip the clutch actuator cylinder front pipe (2) into the 2 retainers (1).
11. Bleed the hydraulic clutch system. Refer to [Hydraulic Clutch System Bleeding](#).
12. Install the battery tray. Refer to [Battery Tray Replacement](#).
13. Fill the reservoir with GM approved brake fluid from a clean, sealed brake fluid container up to the MAX level.

CLUTCH ACTUATOR CYLINDER FRONT PIPE REPLACEMENT

Removal Procedure

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

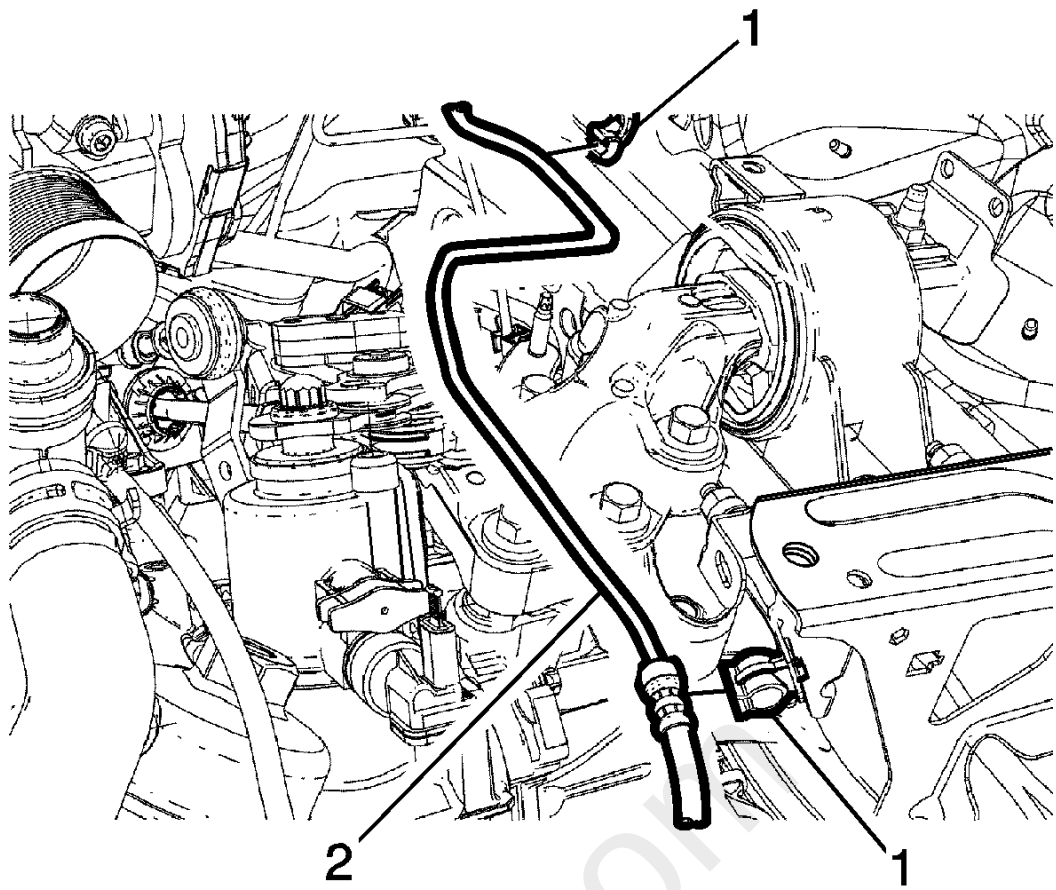


Fig. 17: Clutch Actuator Cylinder Front Pipe
Courtesy of GENERAL MOTORS COMPANY

2. Unclip the clutch actuator cylinder front pipe from the 2 retainers (1).

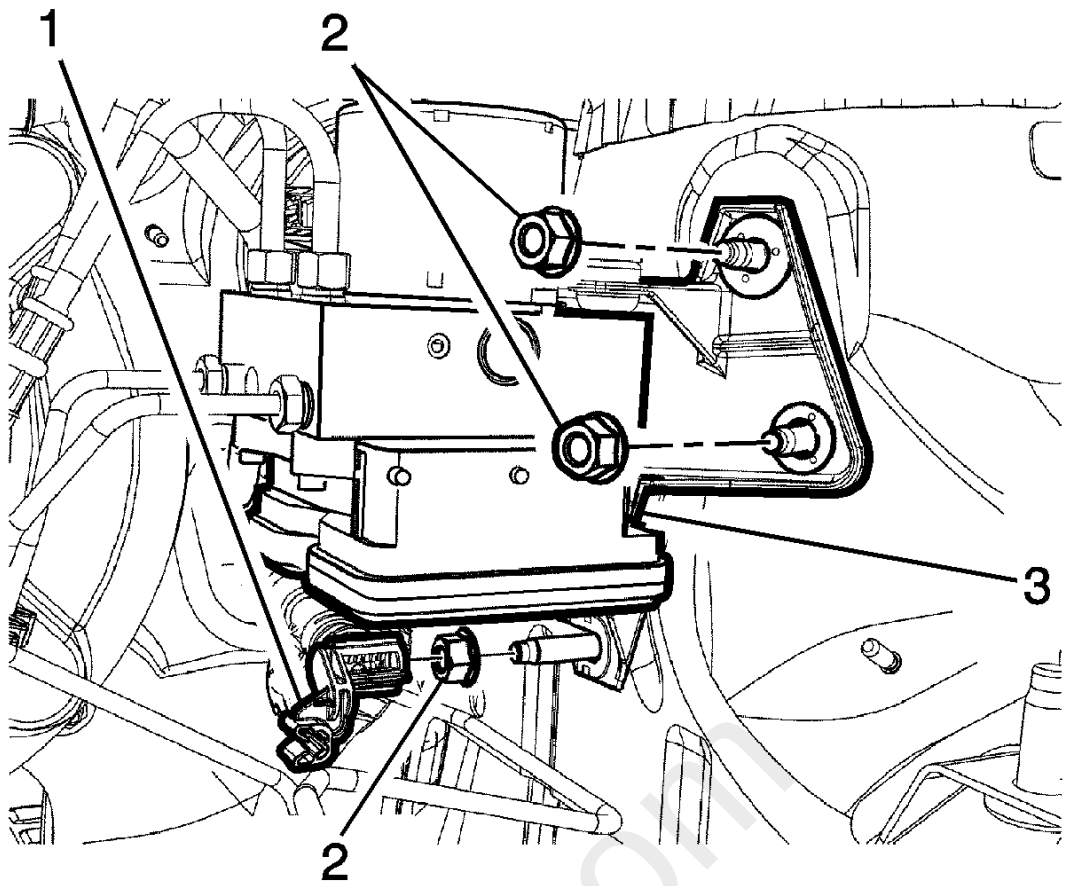


Fig. 18: BPMV Bracket Assembly.

Courtesy of GENERAL MOTORS COMPANY

3. Remove the clutch actuator cylinder pipe retainer (1).
4. Remove the 3 BPMV bracket assembly nuts (2) and loosen the BPMV bracket assembly (3) from the vehicle.

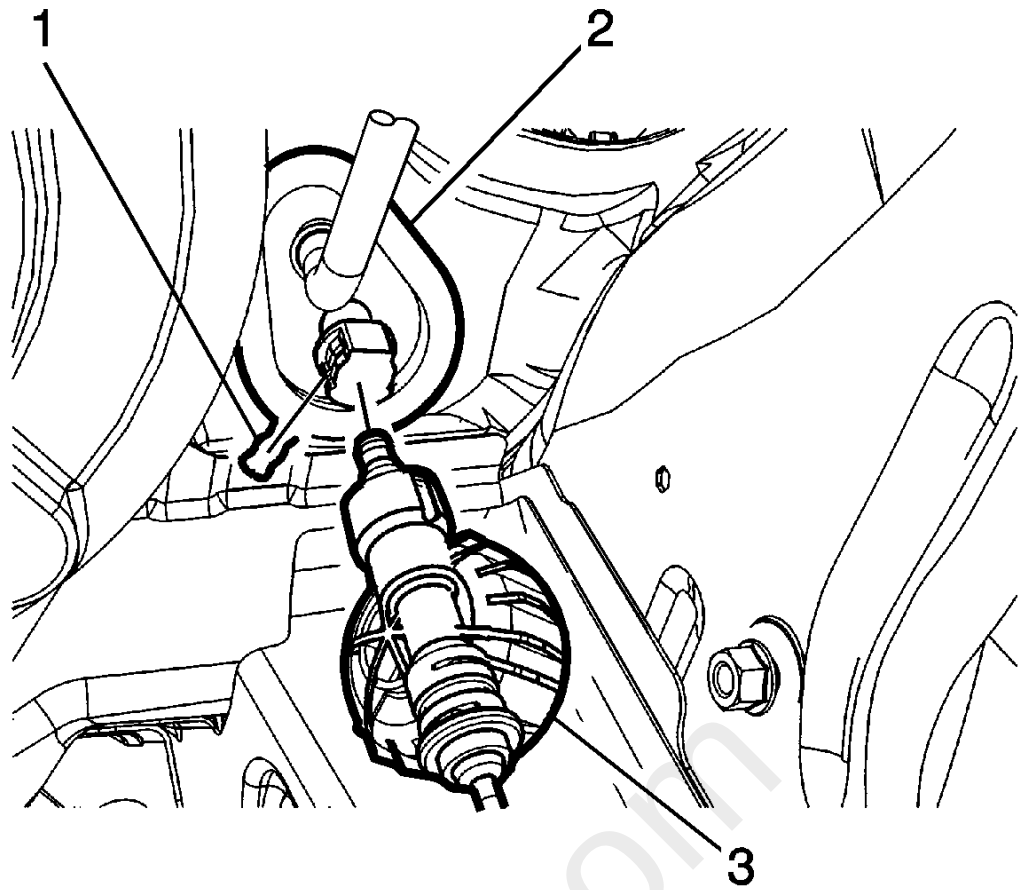


Fig. 19: Clutch Actuator Cylinder Front Pipe
Courtesy of GENERAL MOTORS COMPANY

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

5. Remove the retaining clip (1).
6. Disconnect clutch actuator cylinder front pipe (3) from the clutch master cylinder (2).

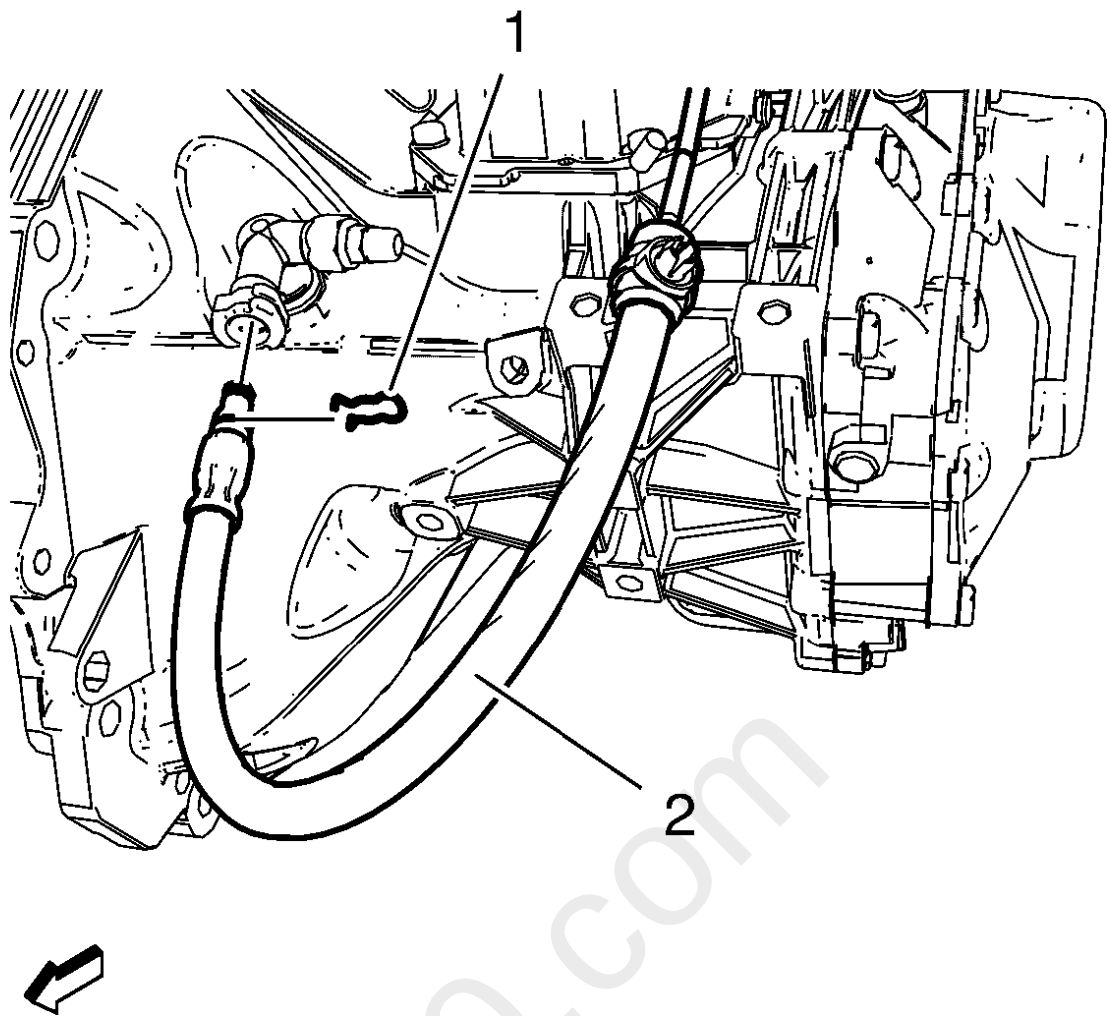


Fig. 20: Clutch Actuator Cylinder Front Pipe Retainer
Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

1. Install the clutch actuator cylinder front pipe in the vehicle.

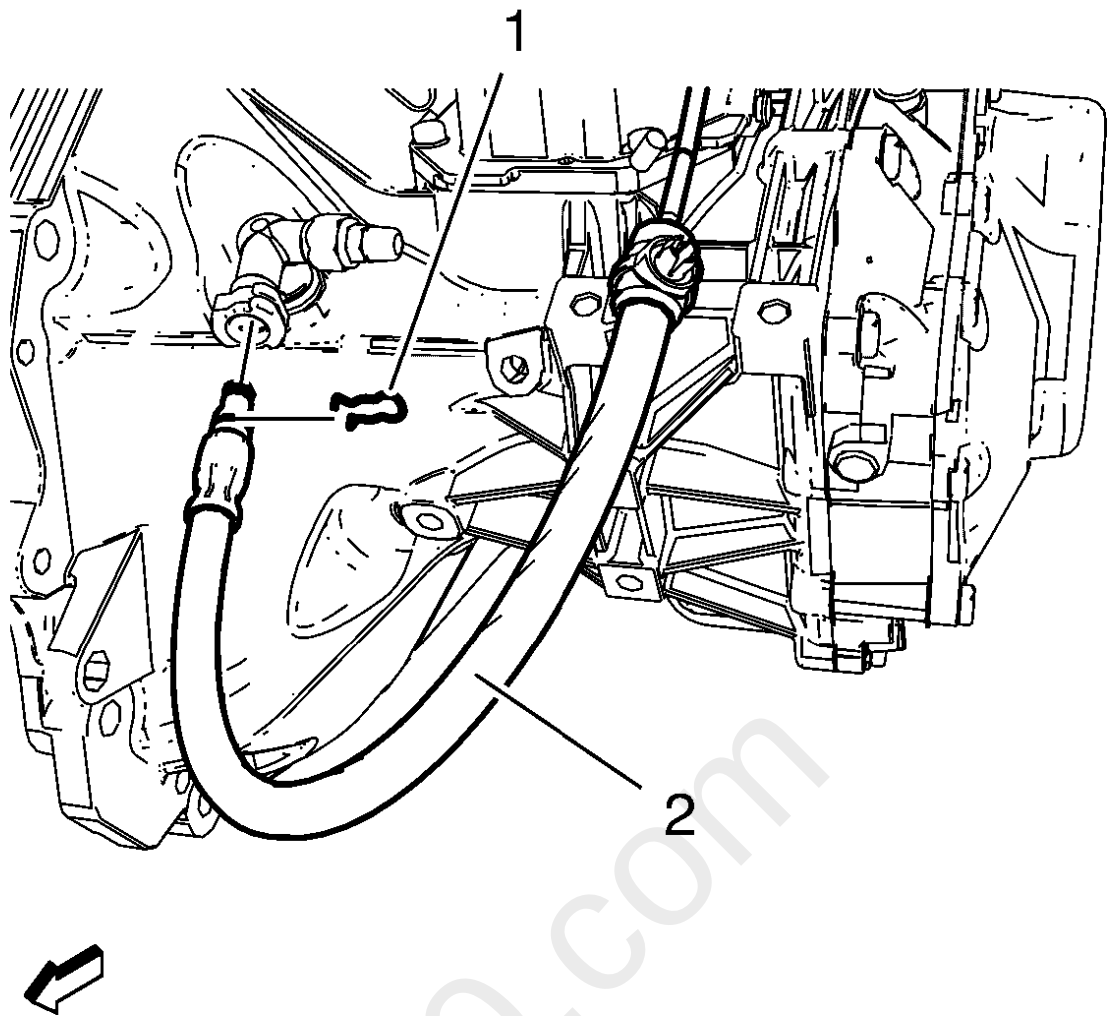


Fig. 21: Clutch Actuator Cylinder Front Pipe Retainer
Courtesy of GENERAL MOTORS COMPANY

2. Connect the clutch actuator cylinder front pipe (2) to the clutch actuator cylinder pipe elbow.
3. Install the retaining clip (1).

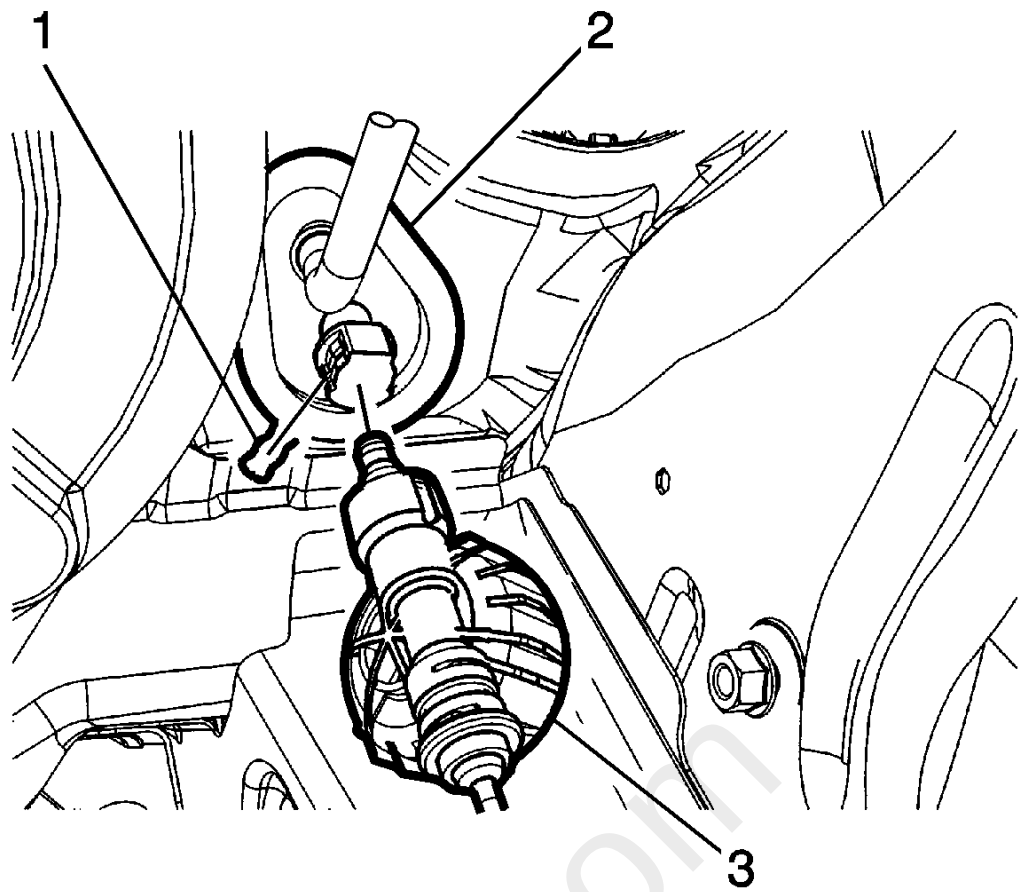


Fig. 22: Clutch Actuator Cylinder Front Pipe
Courtesy of GENERAL MOTORS COMPANY

4. Connect clutch actuator cylinder front pipe (3) to the clutch master cylinder (2).
5. Install the retaining clip (1).

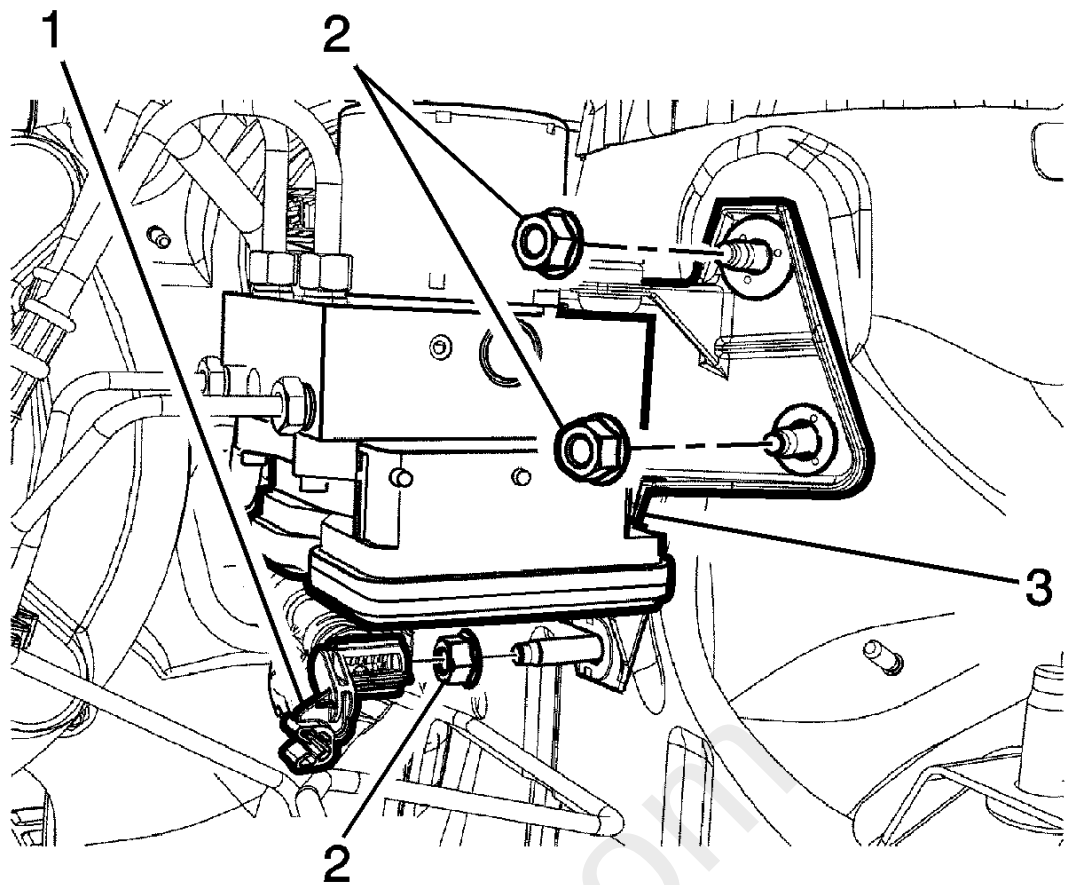


Fig. 23: BPMV Bracket Assembly.

Courtesy of GENERAL MOTORS COMPANY

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

6. Install the 3 BPMV bracket assembly nuts (2) to the vehicle and tighten to 17 N.m (12 lb ft).
7. Install the clutch actuator cylinder pipe retainer (1).

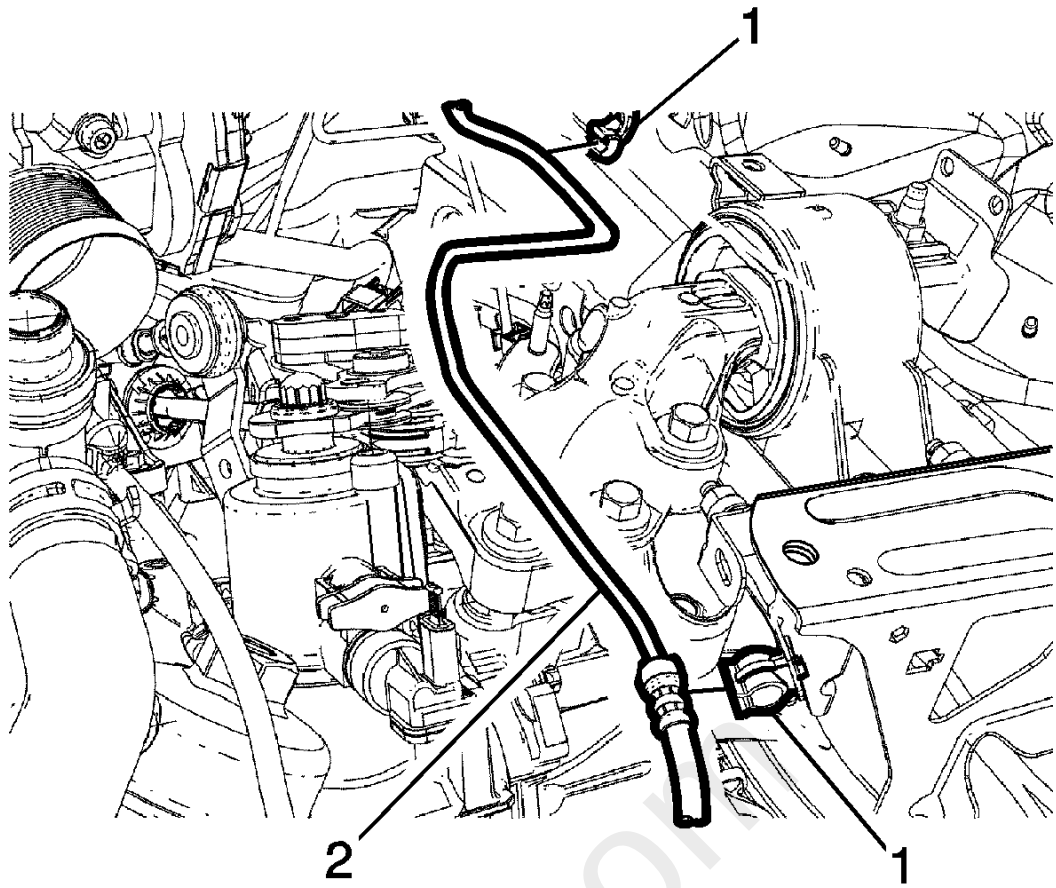


Fig. 24: Clutch Actuator Cylinder Front Pipe
Courtesy of GENERAL MOTORS COMPANY

8. Clip the clutch actuator cylinder front pipe into the 2 retainers (1).
9. Bleed the hydraulic clutch system. Refer to [Hydraulic Clutch System Bleeding](#).
10. Install the battery tray. Refer to [Battery Tray Replacement](#).
11. Fill the reservoir with GM approved brake fluid from a clean, sealed brake fluid container up to the MAX level.

CLUTCH ACTUATOR CYLINDER PIPE REPLACEMENT (D16)

Removal Procedure

1. Remove the transmission. Refer to [Transmission Replacement](#).

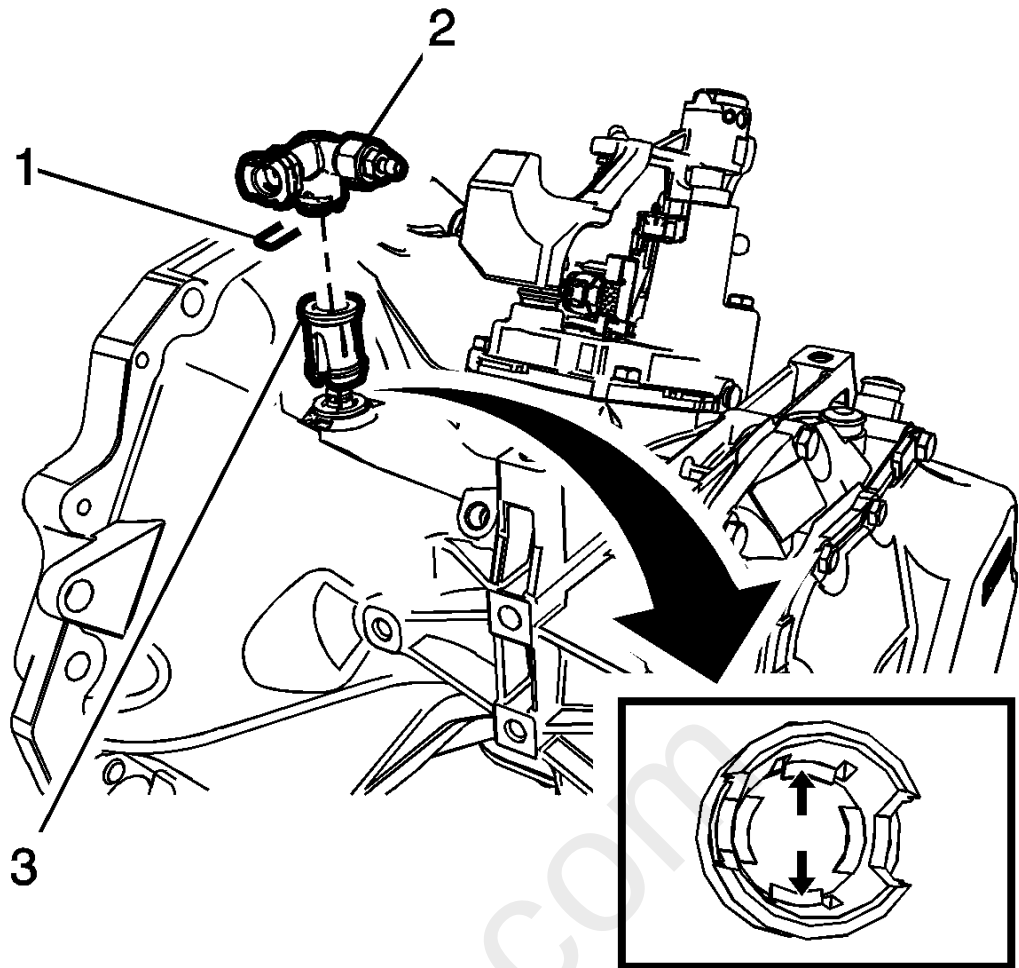


Fig. 25: Actuator Cylinder Pipe Connector Elbow And Clip
Courtesy of GENERAL MOTORS COMPANY

2. Remove the clutch actuator cylinder pipe connector elbow clip (1) from the clutch actuator elbow.
3. Remove the connector elbow (2) from the clutch actuator cylinder pipe end.

NOTE: Release the fastening sleeve key (arrows) using a screwdriver or equivalent to remove the fastening sleeve.

4. Remove the fastening sleeve (3) from the transmission housing and clutch actuator cylinder pipe.

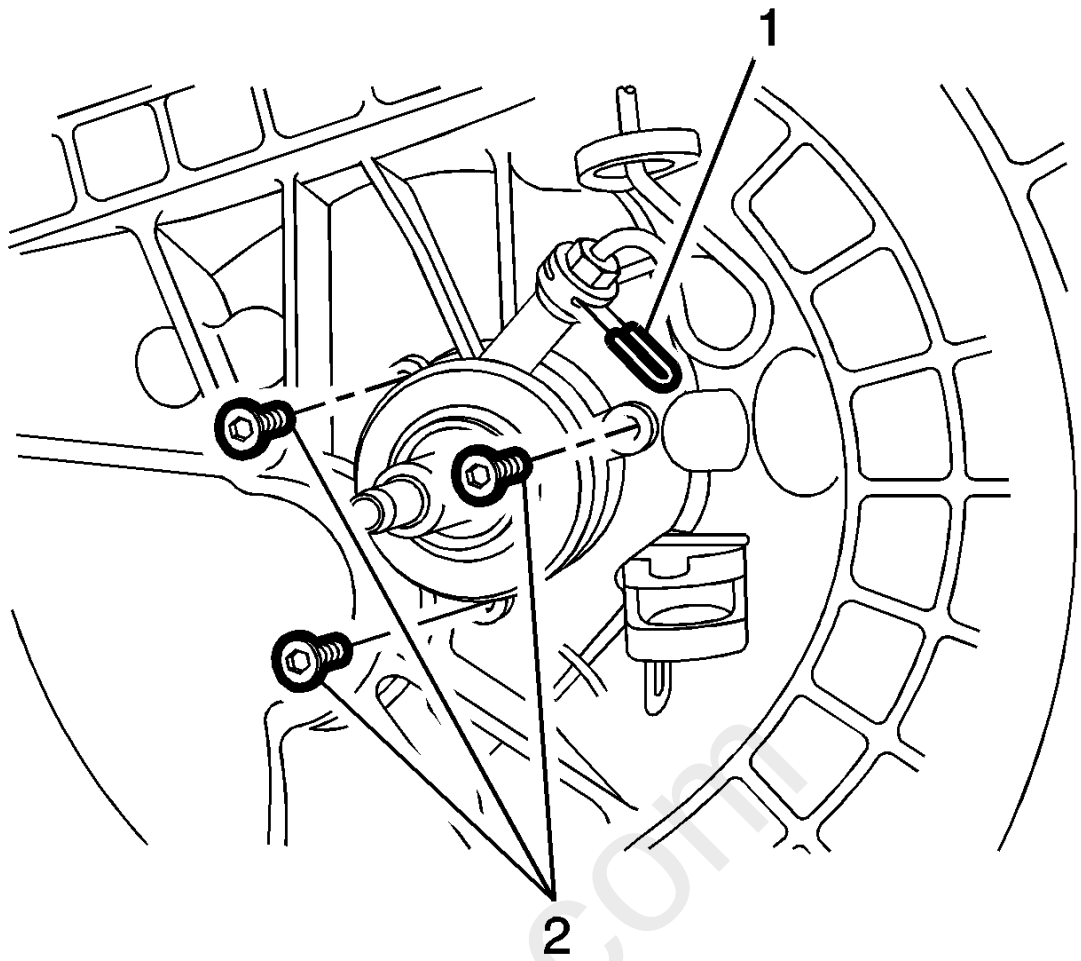


Fig. 26: Clutch Actuator Cylinder And Bolts

Courtesy of GENERAL MOTORS COMPANY

5. Remove the clutch actuator cylinder pipe clip (1).
6. Remove the 3 clutch actuator cylinder bolts (2).

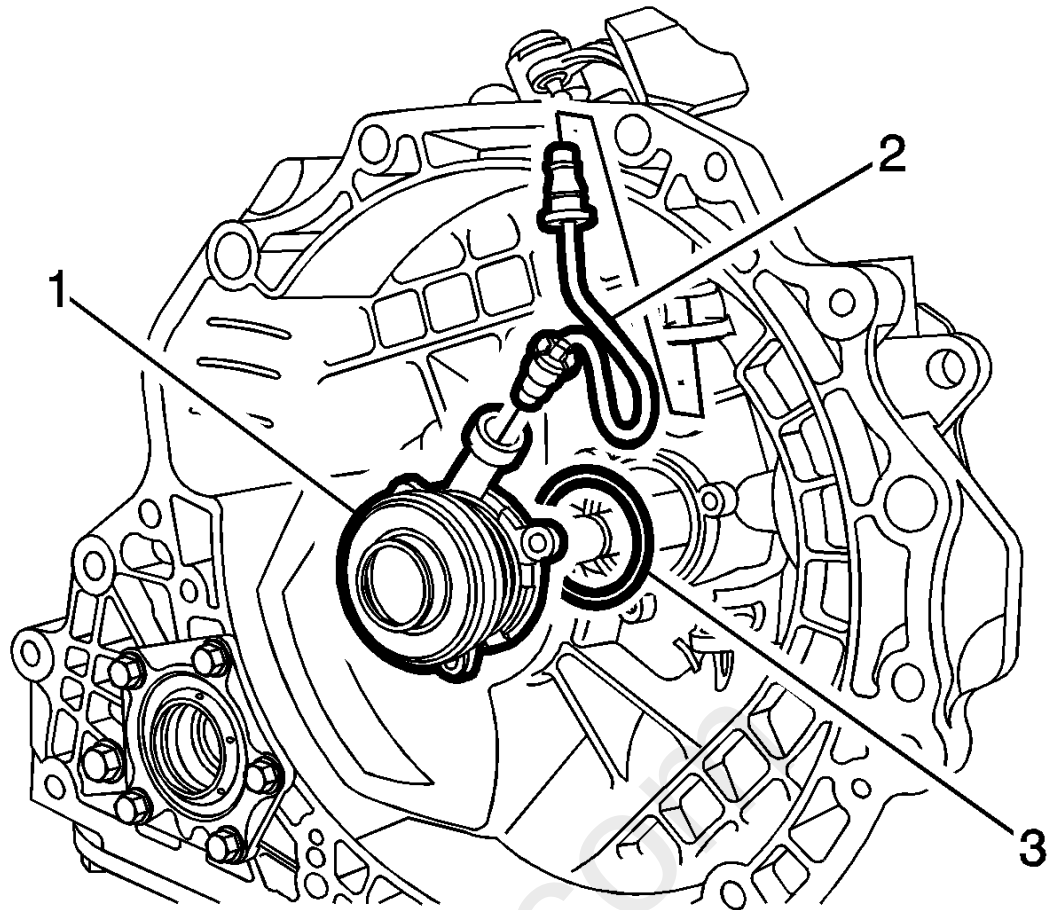


Fig. 27: Clutch Actuator Cylinder And Pipe
Courtesy of GENERAL MOTORS COMPANY

7. Remove the clutch actuator cylinder (1) and the clutch actuator cylinder pipe (2) at the same time.

NOTE: Discard the clutch actuator cylinder seal.

8. Remove the seal (3).

Installation Procedure

1. Clean the 3 clutch actuator cylinder threaded holes in the transmission housing.

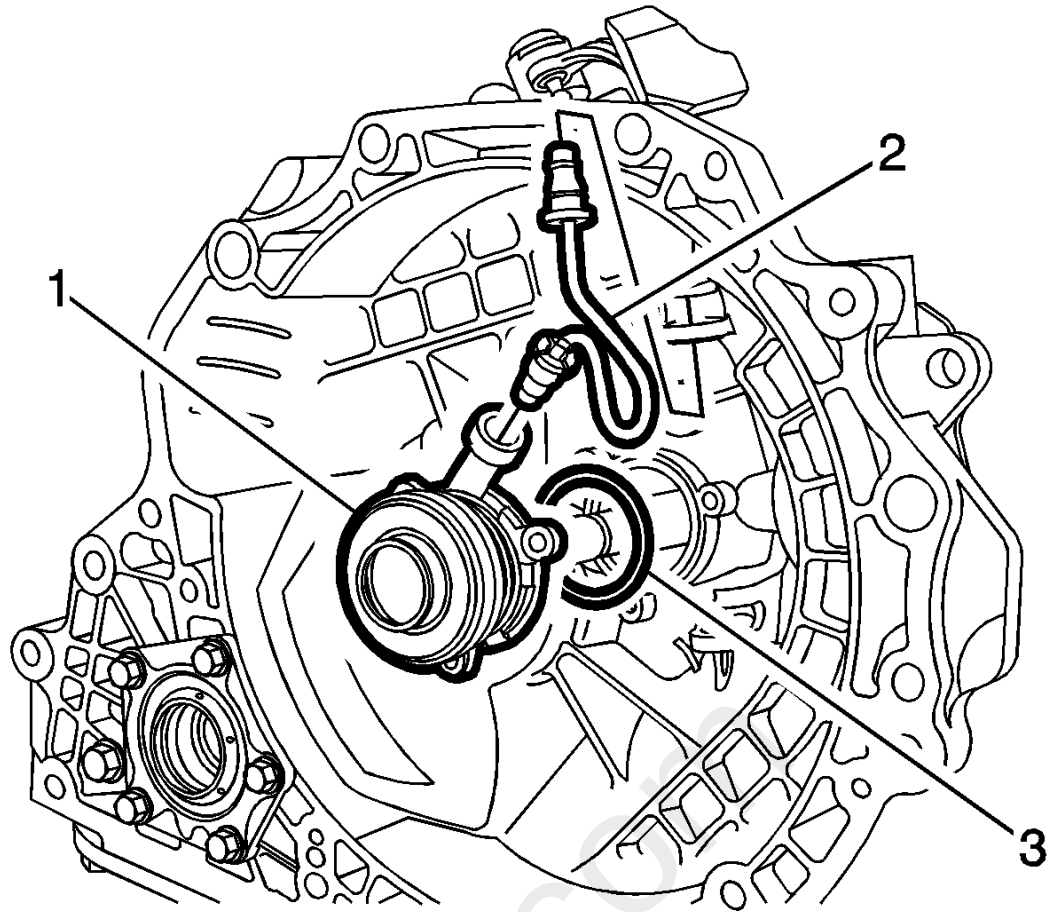


Fig. 28: Clutch Actuator Cylinder And Pipe
Courtesy of GENERAL MOTORS COMPANY

2. Install a NEW clutch actuator cylinder seal (3).
3. Install the clutch actuator cylinder (1) and clutch actuator cylinder pipe (2).

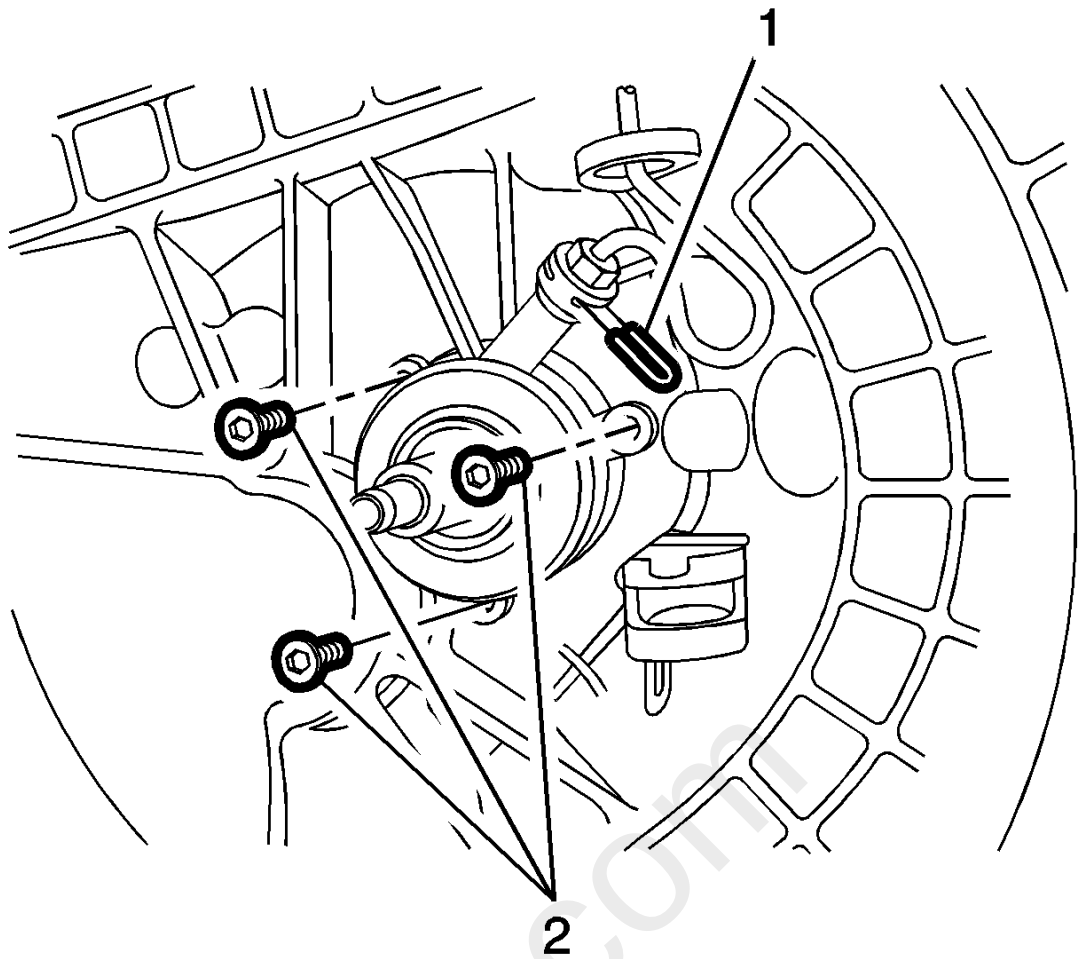


Fig. 29: Clutch Actuator Cylinder And Bolts

Courtesy of GENERAL MOTORS COMPANY

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

4. Install the 3 clutch actuator cylinder bolts (2) and tighten to 8 N.m (71 lb in).
5. Install the clutch actuator cylinder pipe clip (1).

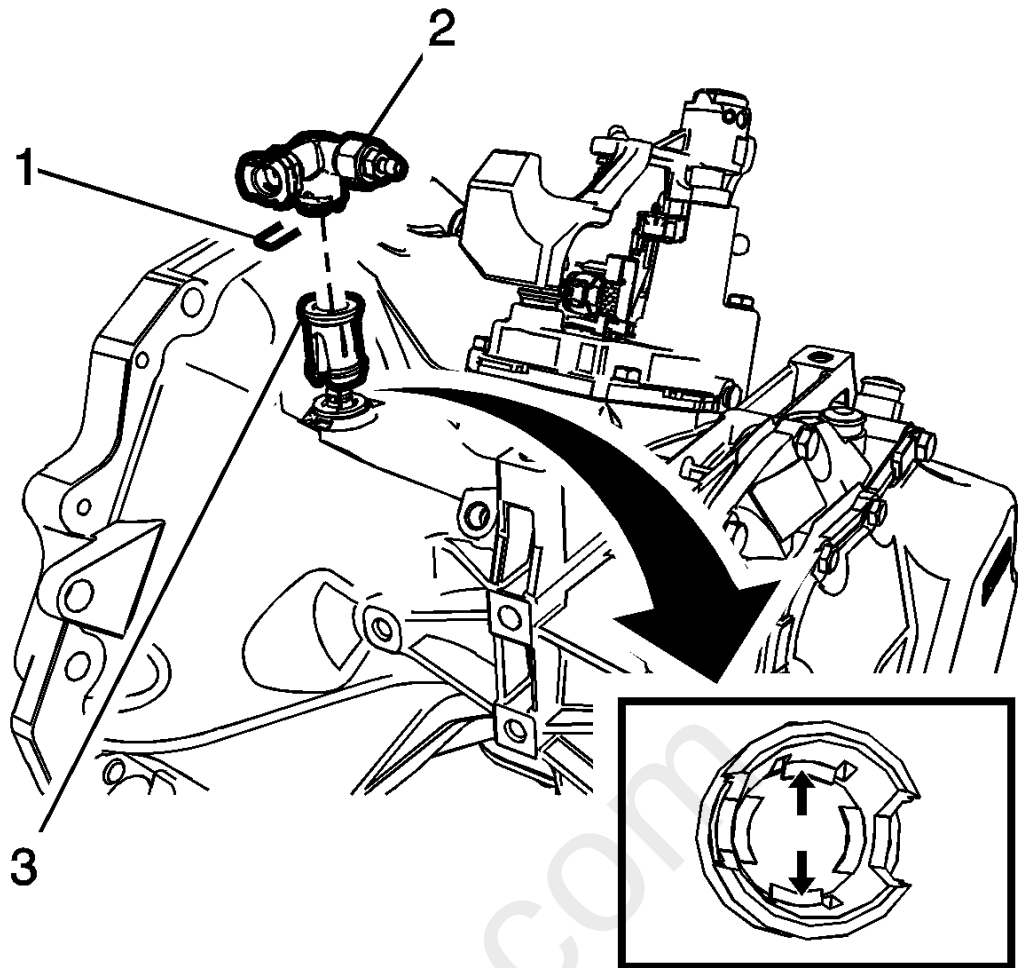


Fig. 30: Actuator Cylinder Pipe Connector Elbow And Clip
Courtesy of GENERAL MOTORS COMPANY

6. Install the fastening sleeve (3) to the transmission housing and clutch actuator cylinder pipe.
7. Install the clutch actuator cylinder pipe connector elbow (2) to the clutch actuator cylinder pipe end.
8. Install the connector elbow clip (1).
9. Install the transmission. Refer to [Transmission Replacement](#) .

CLUTCH ACTUATOR CYLINDER PIPE REPLACEMENT (M20/M32)

Removal Procedure

1. Remove the transmission. Refer to [Transmission Replacement](#) .

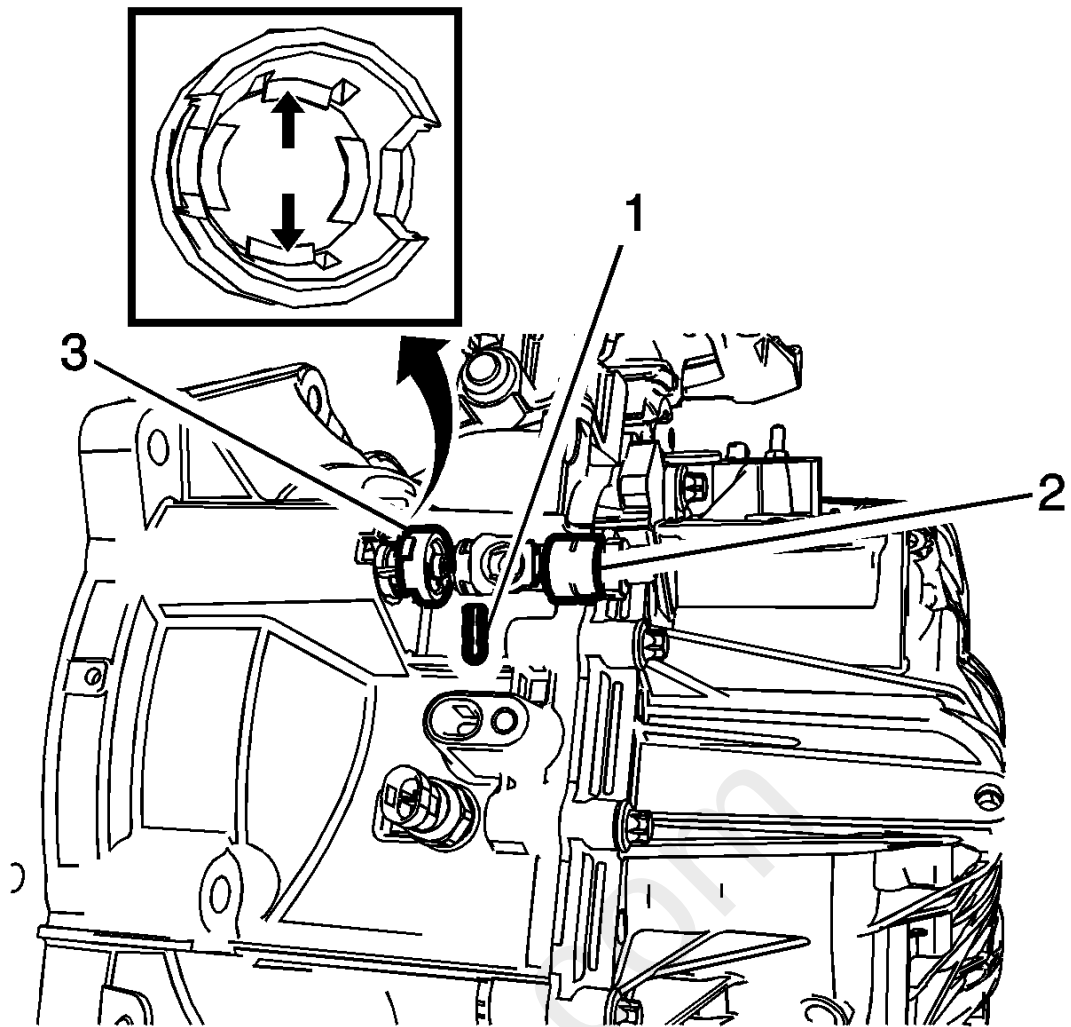


Fig.31: Clutch Actuator Cylinder Pipe Connector Elbow, Clip & Fastening Sleeve
Courtesy of GENERAL MOTORS COMPANY

2. Remove the clutch actuator cylinder pipe connector elbow clip (1) from the clutch actuator elbow.
3. Remove the connector elbow (2) from the clutch actuator cylinder pipe end.

NOTE: Release the fastening sleeve key (arrows) using a screwdriver or equivalent to remove the fastening sleeve.

4. Remove the fastening sleeve (3) from the transmission housing and clutch actuator cylinder pipe.

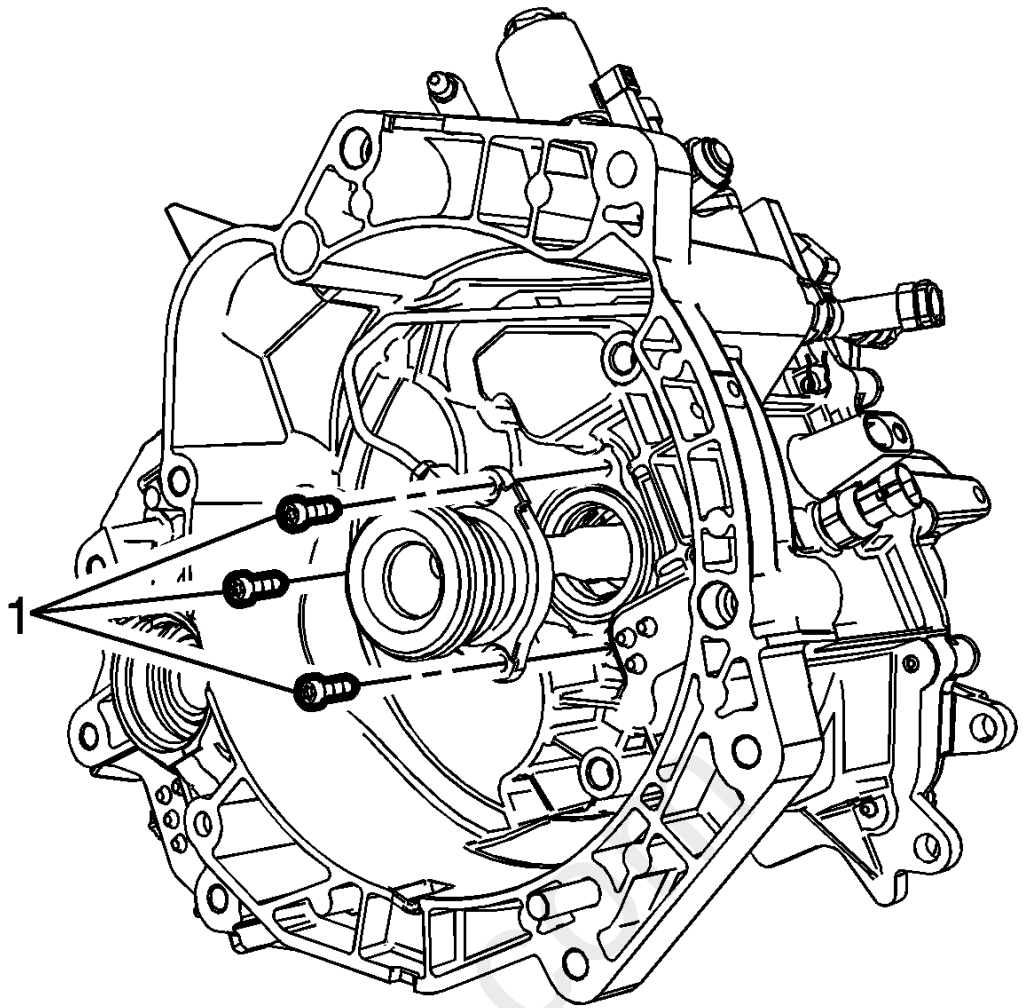


Fig.32: Clutch Actuator Cylinder Bolts
Courtesy of GENERAL MOTORS COMPANY

5. Remove the 3 clutch actuator cylinder bolts (1).

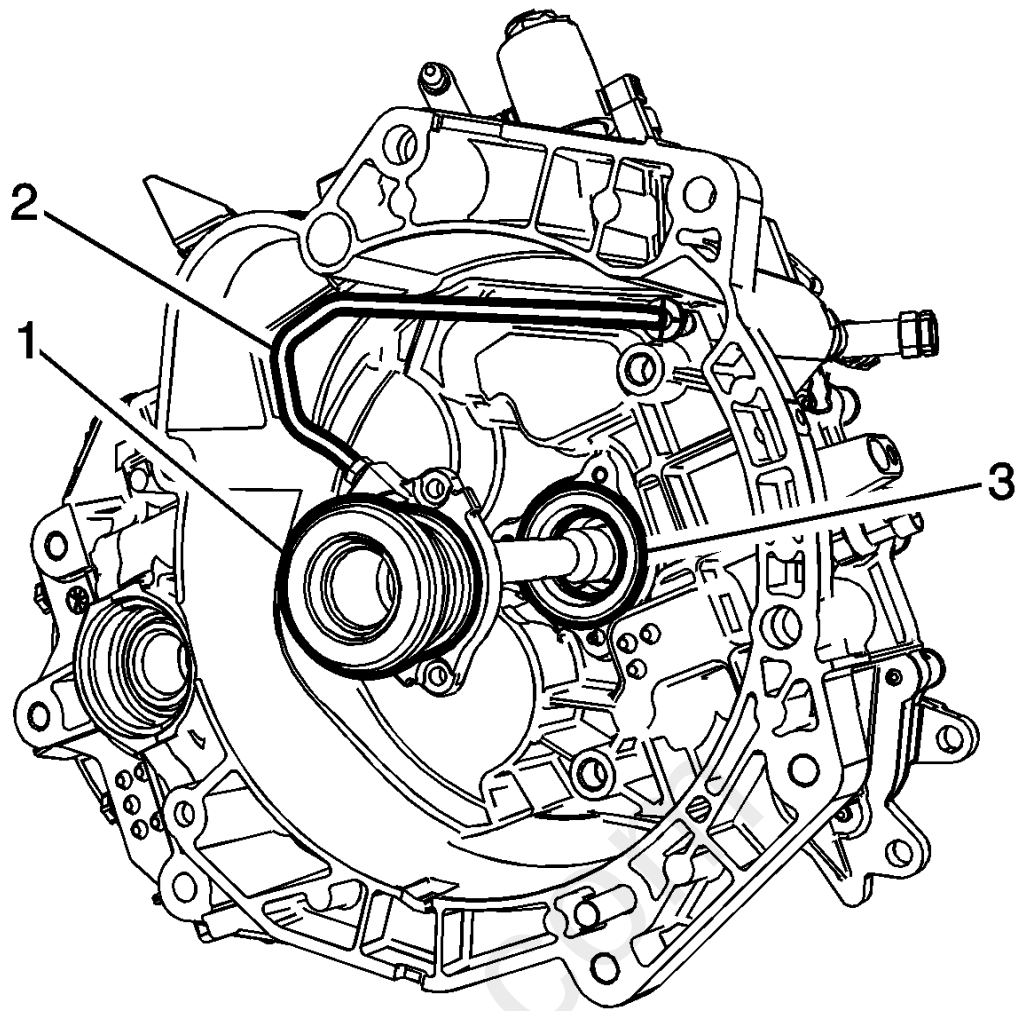


Fig. 33: Clutch Actuator Cylinder, Pipe & Seal
Courtesy of GENERAL MOTORS COMPANY

6. Remove the clutch actuator cylinder (1) and the clutch actuator cylinder pipe (2) at the same time.

NOTE: Discard the clutch actuator cylinder seal.

7. Remove the seal (3).

Installation Procedure

1. Clean the 3 clutch actuator cylinder threaded holes in the transmission housing.

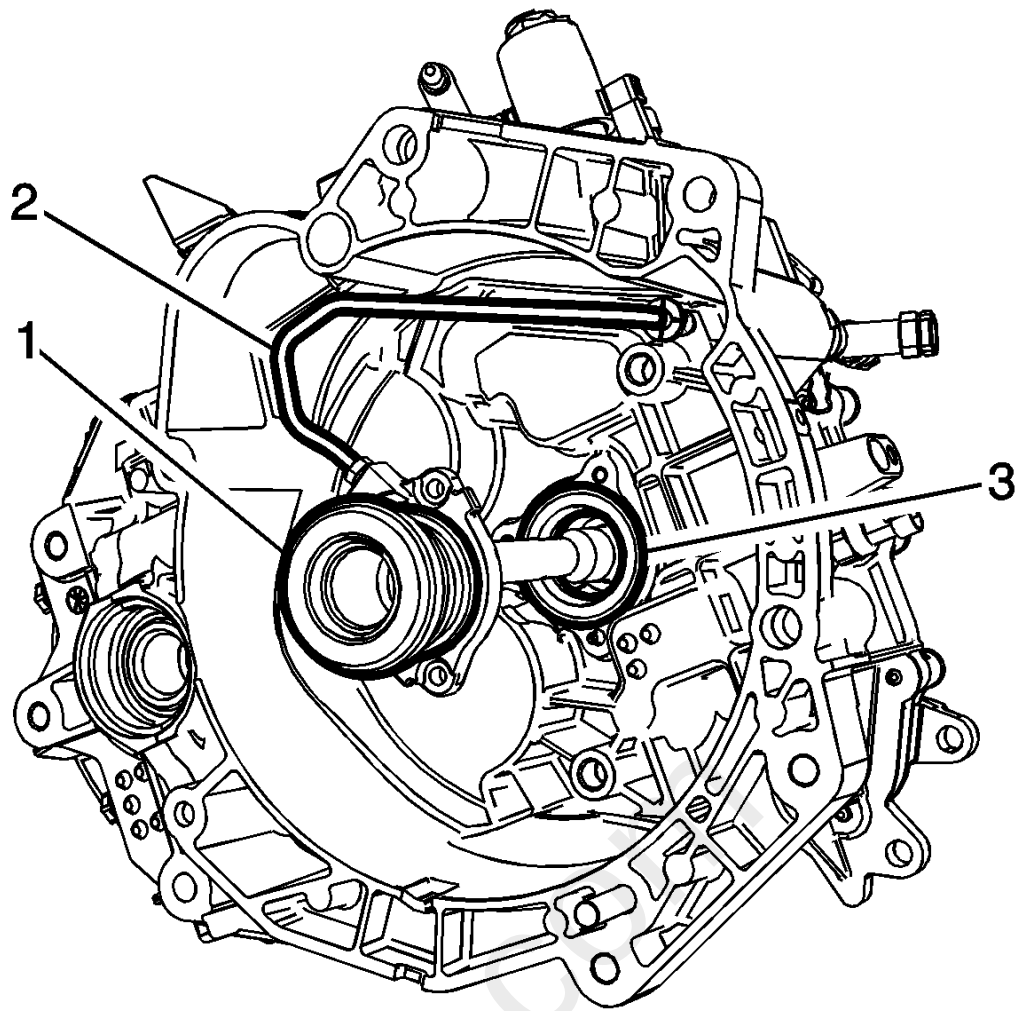


Fig. 34: Clutch Actuator Cylinder, Pipe & Seal
Courtesy of GENERAL MOTORS COMPANY

2. Install a NEW clutch actuator cylinder seal (3).
3. Install the clutch actuator cylinder (1) and clutch actuator cylinder pipe (2).

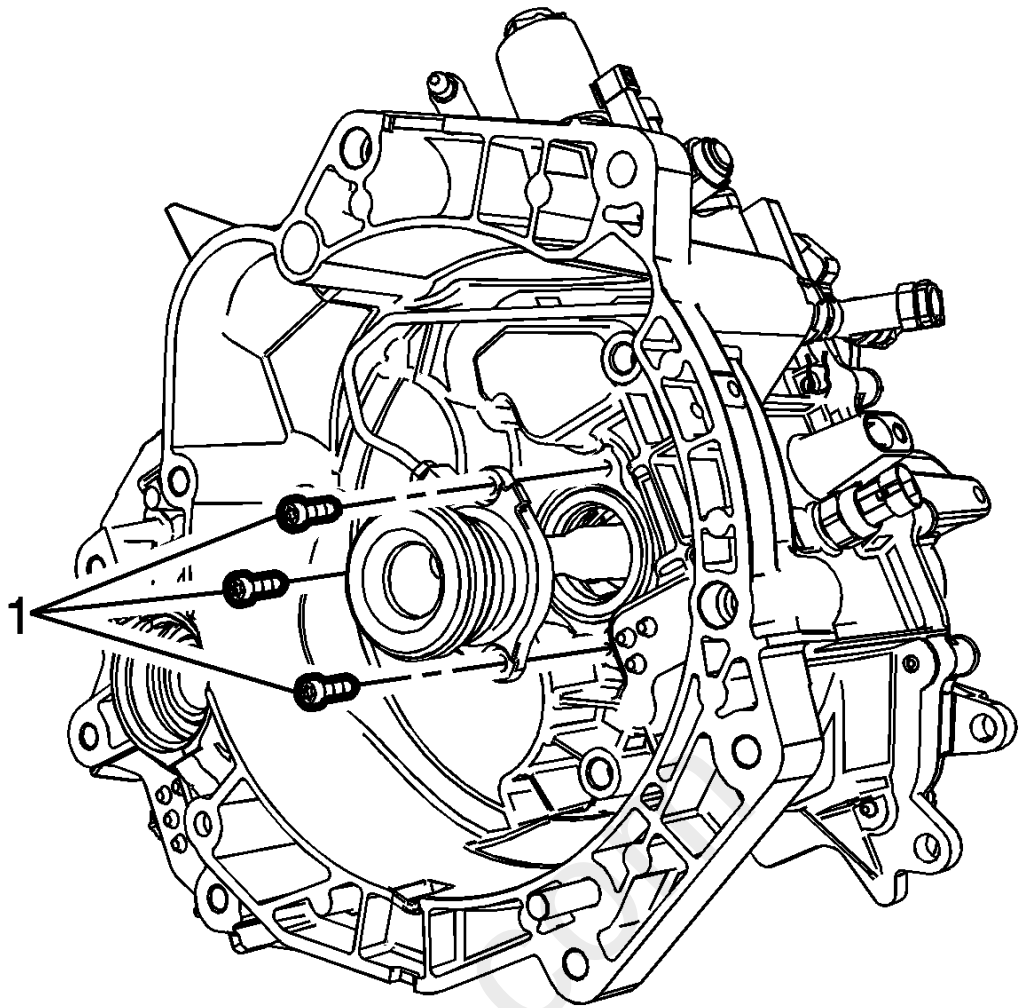


Fig.35: Clutch Actuator Cylinder Bolts
Courtesy of GENERAL MOTORS COMPANY

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

4. Install the 3 clutch actuator cylinder bolts (1) and tighten to 6 N.m (53 lb in).

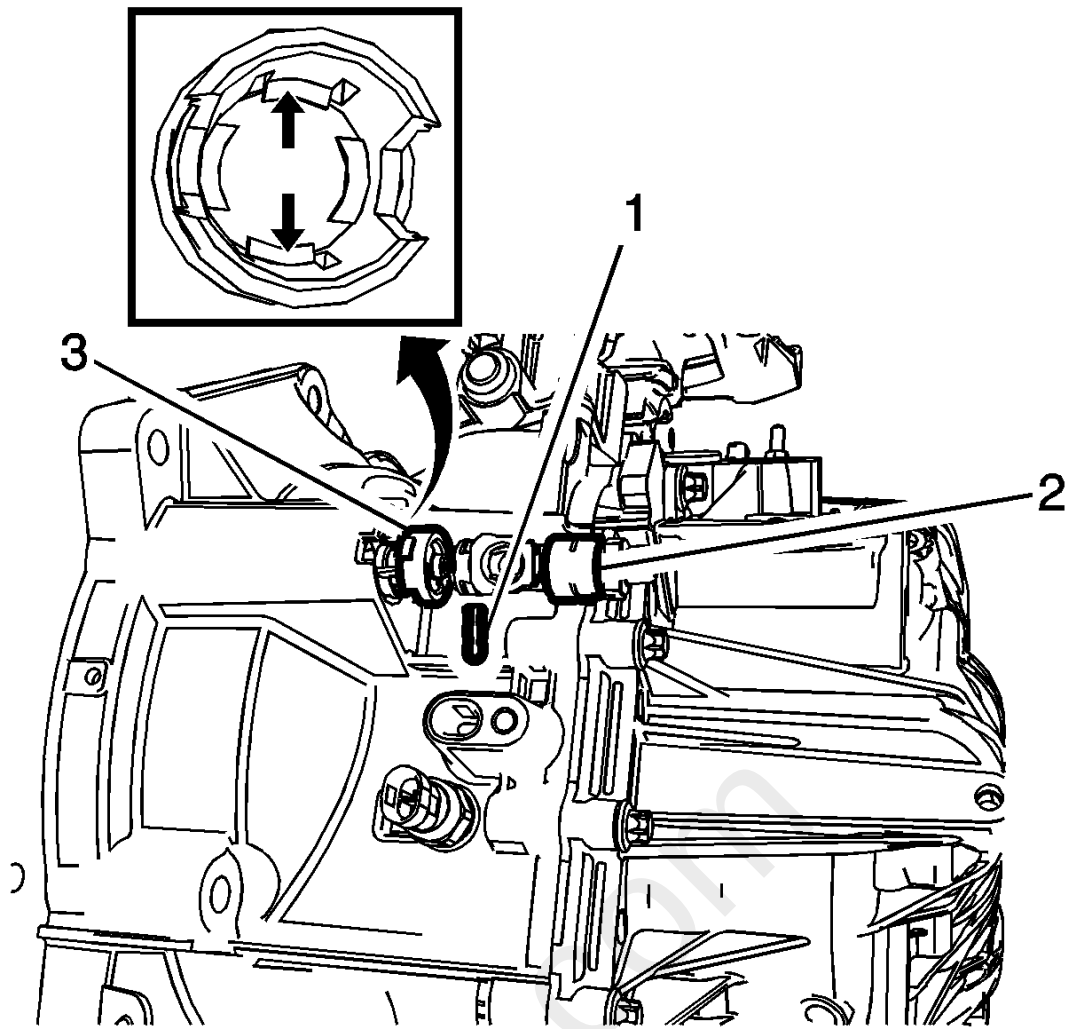


Fig. 36: Clutch Actuator Cylinder Pipe Connector Elbow, Clip & Fastening Sleeve
Courtesy of GENERAL MOTORS COMPANY

5. Install the fastening sleeve (3) to the transmission housing and clutch actuator cylinder pipe.
6. Install the clutch actuator cylinder pipe connector elbow (2) to the clutch actuator cylinder pipe end.
7. Install the connector elbow clip (1).
8. Install the transmission. Refer to [Transmission Replacement](#) .

CLUTCH ACTUATOR CYLINDER PIPE ELBOW REPLACEMENT (D16)

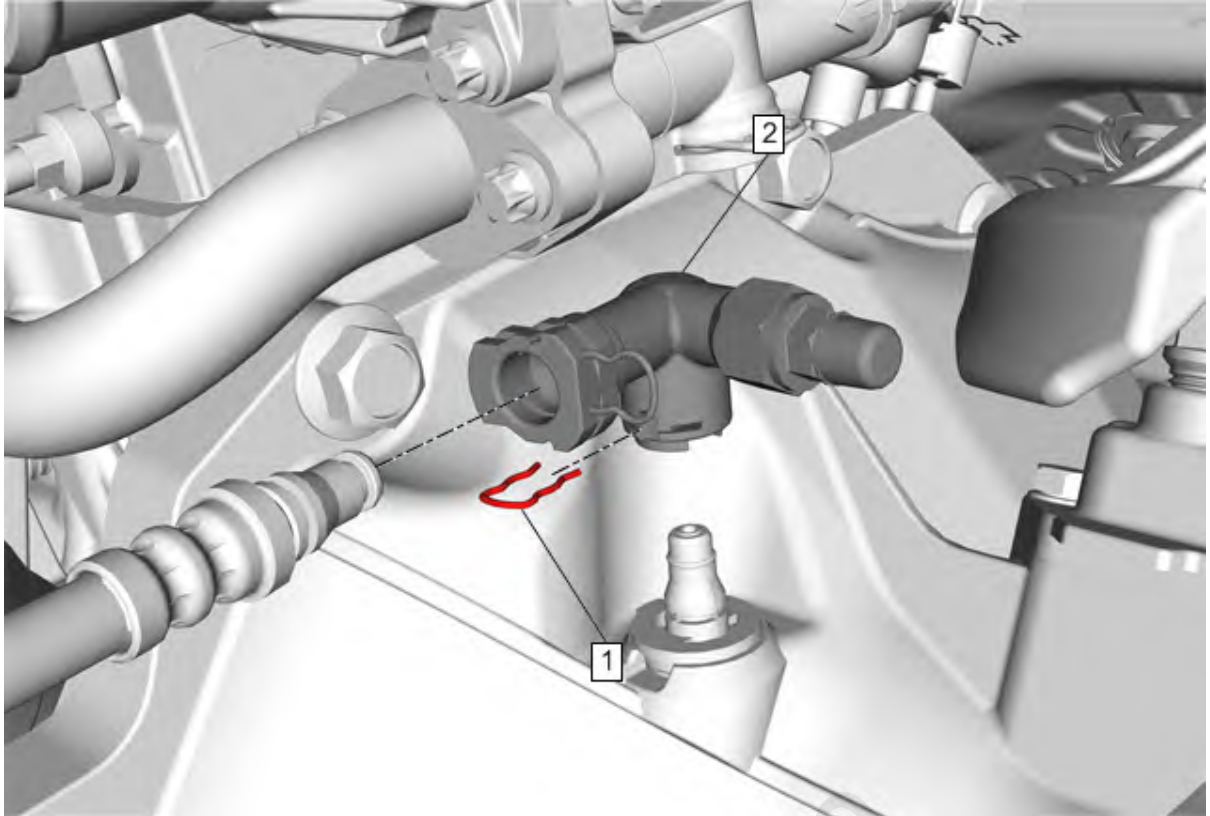


Fig. 37: Clutch Actuator Cylinder Pipe Elbow
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
WARNING: <u>Brake Fluid Irritant Warning</u>	
CAUTION: <u>Brake Fluid Effects on Paint and Electrical Components Caution</u>	
Preliminary Procedure Disconnect the clutch actuator cylinder front pipe from the clutch actuator cylinder pipe elbow. <u>Clutch Actuator Cylinder Front Pipe Replacement</u>	
1	Clutch Actuator Cylinder Pipe Elbow Retainer
2	Clutch Actuator Cylinder Pipe Elbow
Procedure <u>Hydraulic Clutch System Bleeding</u>	

CLUTCH ACTUATOR CYLINDER PIPE ELBOW REPLACEMENT (M32)

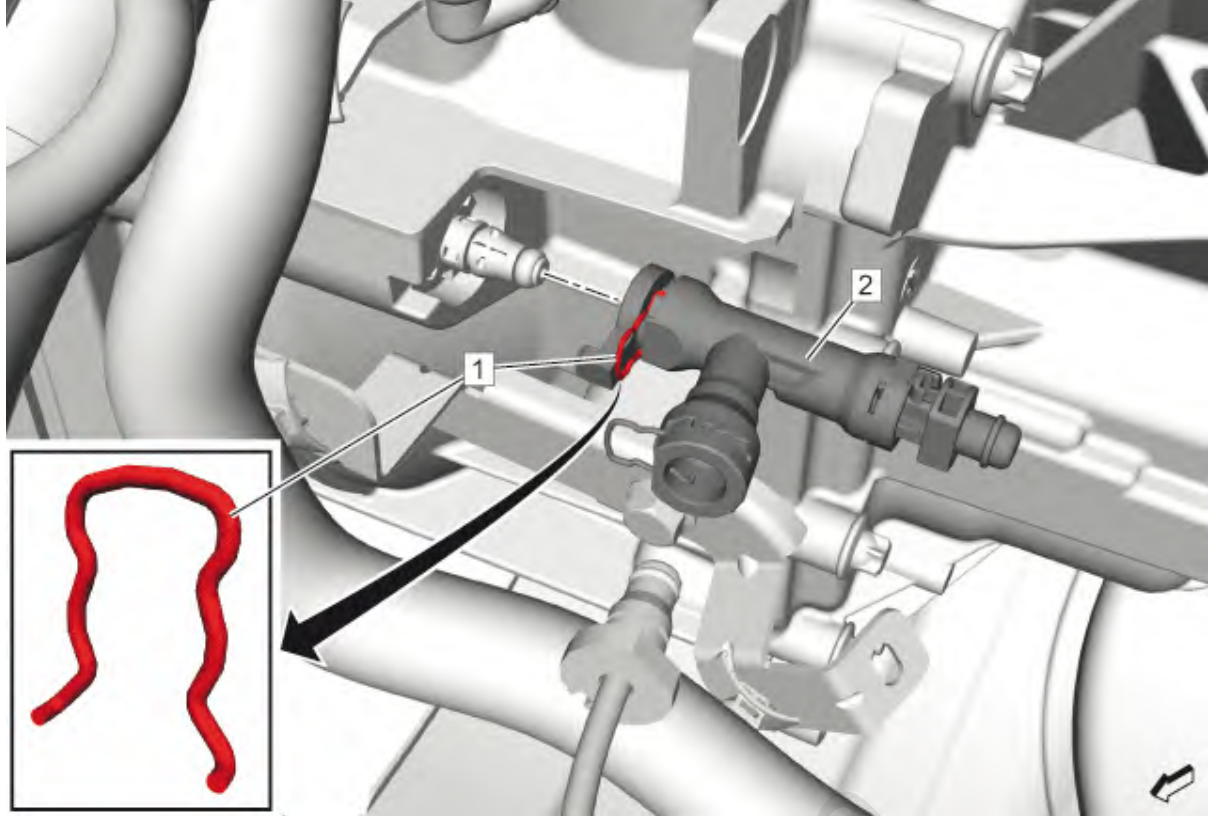


Fig. 38: Clutch Actuator Cylinder Pipe Elbow
 Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
WARNING: <u>Brake Fluid Irritant Warning</u>	
CAUTION: <u>Brake Fluid Effects on Paint and Electrical Components Caution</u>	
Preliminary Procedures - Without draining the coolant and without disconnecting the hoses, remove and position aside the radiator surge tank. <u>Radiator Surge Tank Replacement (LUV, 2H0) Radiator Surge Tank Replacement (LE2)</u>. - Without disconnecting the electrical connector, remove the engine control module and hang aside. - Disconnect the clutch actuator cylinder front pipe from the clutch actuator cylinder pipe elbow. <u>Clutch Actuator Cylinder Front Pipe Replacement</u>	
1	Clutch Actuator Cylinder Pipe Elbow Retainer
2	Clutch Actuator Cylinder Pipe Elbow
Procedure <u>Hydraulic Clutch System Bleeding</u>	

HYDRAULIC CLUTCH SYSTEM BLEEDING

WARNING: Refer to Brake Fluid Irritant Warning .

CAUTION: Brake fluid must not come in contact with mineral oils and greases. The smallest amount of such could lead to malfunction or breakdown of the clutch.

CAUTION: Refer to Brake Fluid Effects on Paint and Electrical Components Caution .

NOTE: The hydraulic clutch actuation must only be bled from "below", i.e. from the bleeder valve.

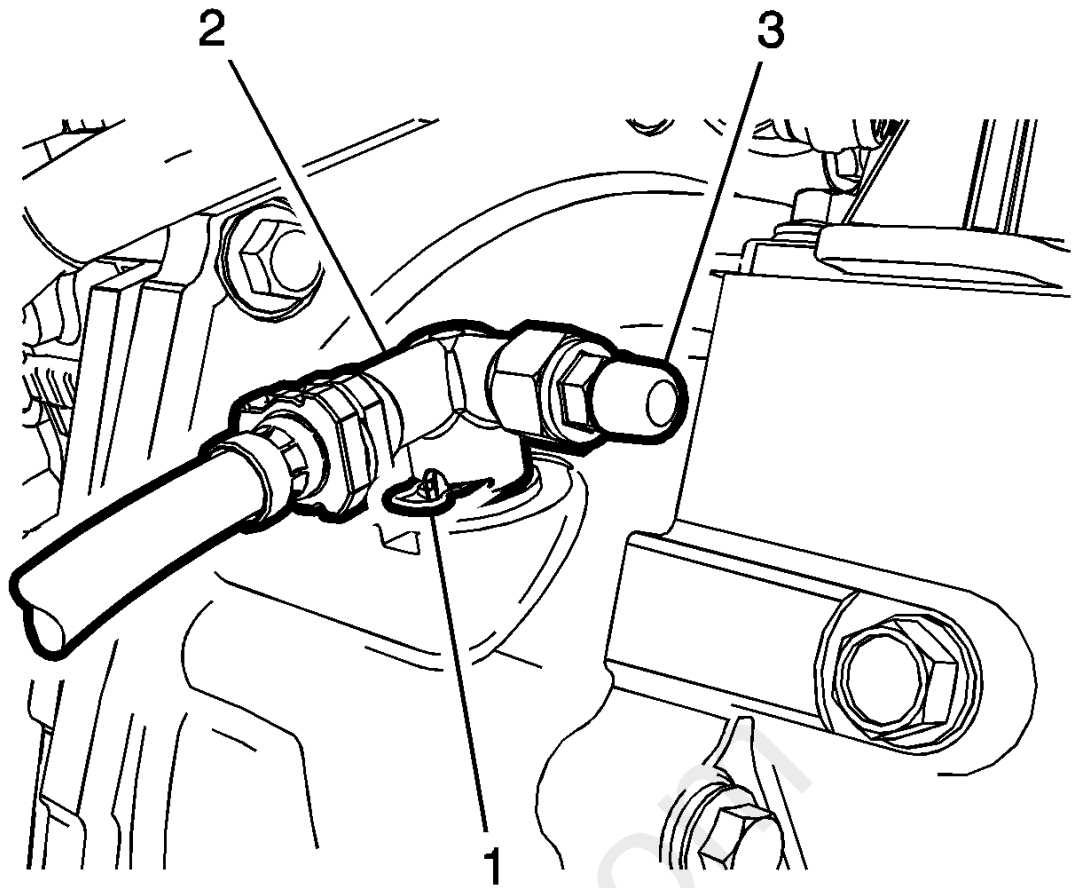


Fig. 39: Valve Cap And Bleeder Valve
Courtesy of GENERAL MOTORS COMPANY

NOTE: The following operational stages must be undertaken to fill the pressure line between the master cylinder and the clutch actuator cylinder. When bleeding, ensure that the brake fluid reservoir is always full and does not run dry.

1. Bleed pressure line between the clutch master cylinder and the clutch actuator cylinder using the following procedure:
 1. Remove the valve cap (3) from the bleeder valve.
 2. Fill brake fluid reservoir up to "MAX" marking.
 3. Press and hold clutch pedal.
 4. Open bleeder valve until air or air/brake fluid mixture emerges.
- NOTE:** Do not close the bleeder valve too fast.
5. Close the bleeder valve.
 6. Release the clutch pedal slowly.
 7. Wait approximately 5 seconds.
 8. Repeat this bleeding process 4 times.
 9. Tighten bleeder valve.
 10. Push valve cap on to bleeder valve to protect the bleeder valve.
2. Check shifting for ease of movement with vehicle stationary, with engine running and with clutch disengaged.
3. Ensure that the fluid reservoir is at the correct level.
4. Road test the vehicle to ensure proper operation.

Undertake road test using varying RPM ranges and frequent gear changes, bring vehicle to operating temperature during this process. Ensure the brake and clutch system is operating correctly.

CLUTCH PEDAL POSITION SENSOR REPLACEMENT

Removal Procedure

1. Remove the instrument panel knee bolster. Refer to [Instrument Panel Knee Bolster Replacement \(Buick\)](#), [Instrument Panel Knee Bolster Replacement \(Chevrolet\)](#).

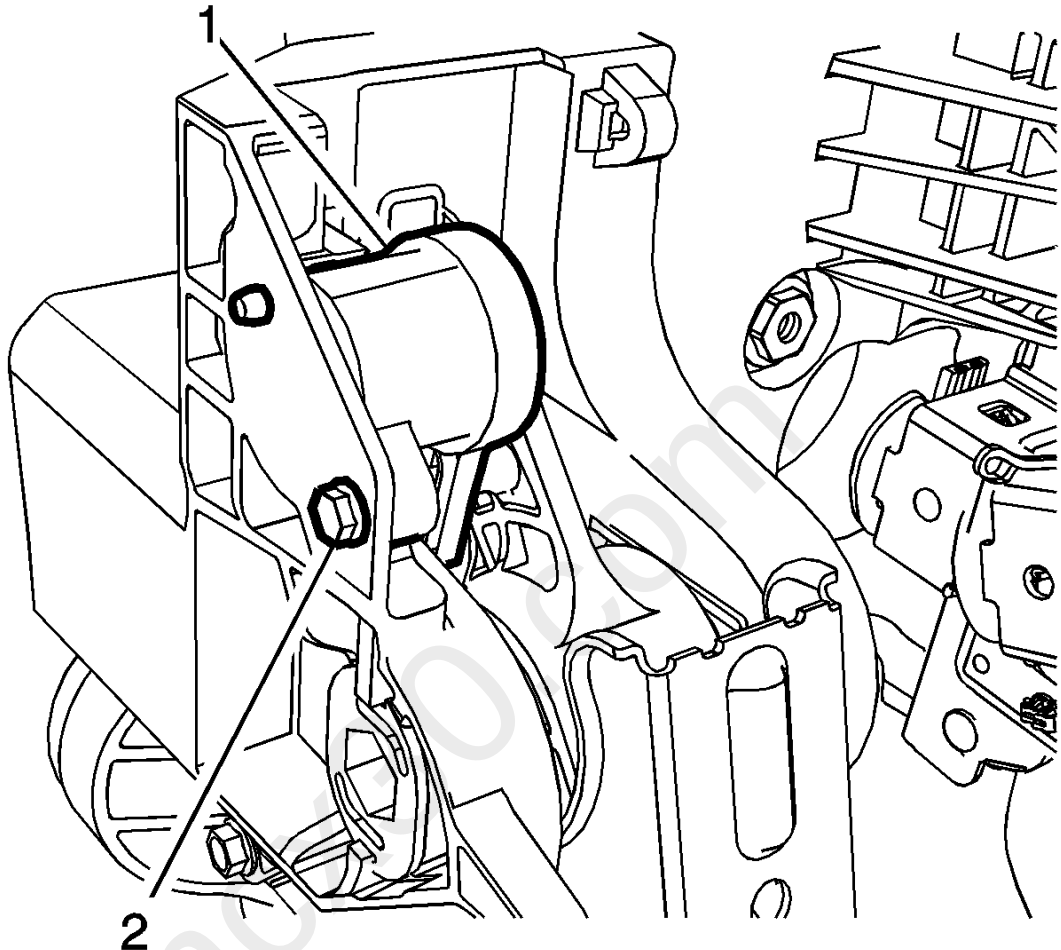


Fig. 40: Clutch Pedal Position Sensor & Bolt
Courtesy of GENERAL MOTORS COMPANY

2. Remove the clutch pedal position sensor bolt (2).
3. Remove the clutch pedal position sensor (1).
4. Disconnect the clutch pedal position sensor wiring harness connector.

Installation Procedure

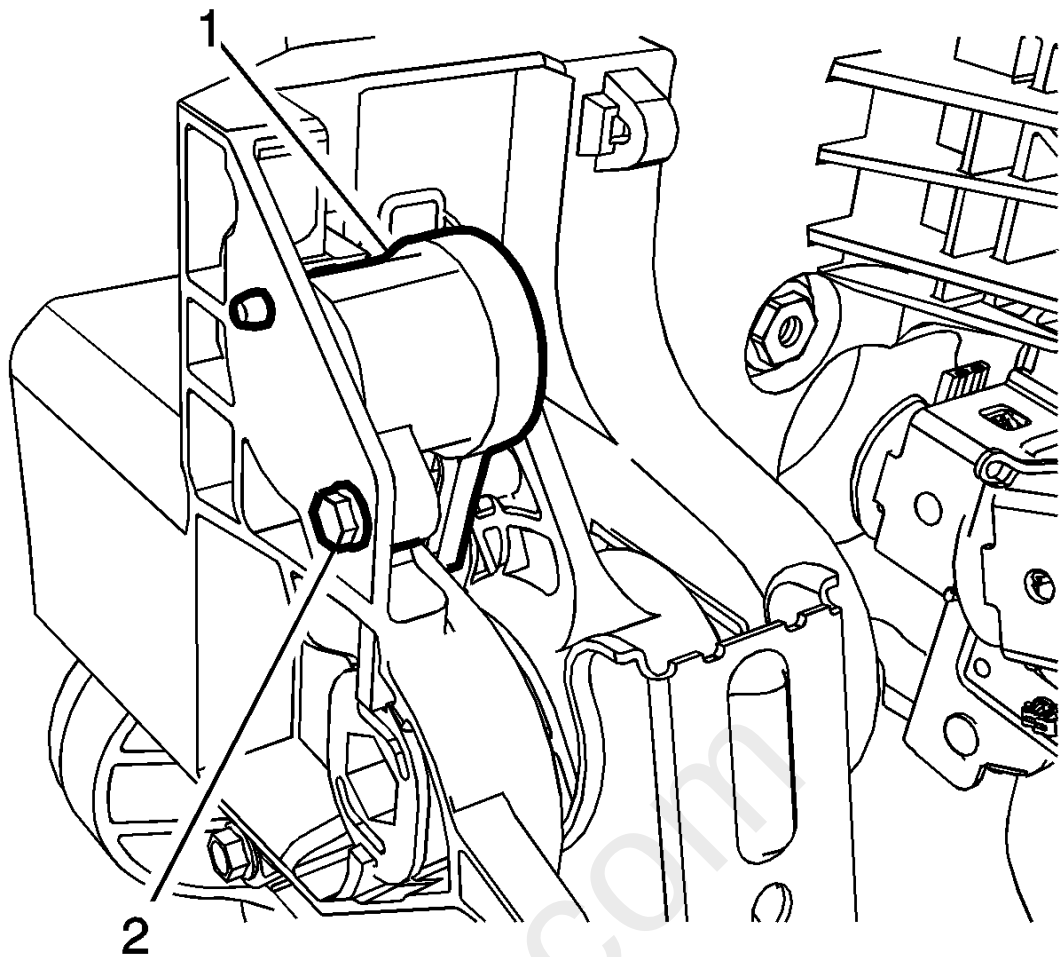


Fig. 41: Clutch Pedal Position Sensor & Bolt
Courtesy of GENERAL MOTORS COMPANY

1. Connect the clutch pedal position sensor wiring harness connector.
2. Install the clutch pedal position sensor (1).

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

3. Install the clutch pedal position sensor bolt (2) and tighten to 3 N.m (27 lb in).
4. Install the instrument panel knee bolster. Refer to [Instrument Panel Knee Bolster Replacement \(Buick\)](#) [Instrument Panel Knee Bolster Replacement \(Chevrolet\)](#) .
5. Learn clutch pedal position sensor.

CLUTCH PRESSURE AND DRIVEN PLATE REPLACEMENT (1.4L)

Special Tools

- DT-6263 Remover/Installer Kit
- DT-6263-28 Clutch Center Guide
- EN-652 Flywheel Holder

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

Removal Procedure

NOTE:

- To prevent damage to the spring fangs of pressure plate use DT-6263 remover/installer to remove and install clutch pressure plate.
- Note the different lengths of the brackets for attaching DT-6263 remover/installer to lower engine block.

1. Remove the transmission. Refer to [Transmission Replacement](#) .

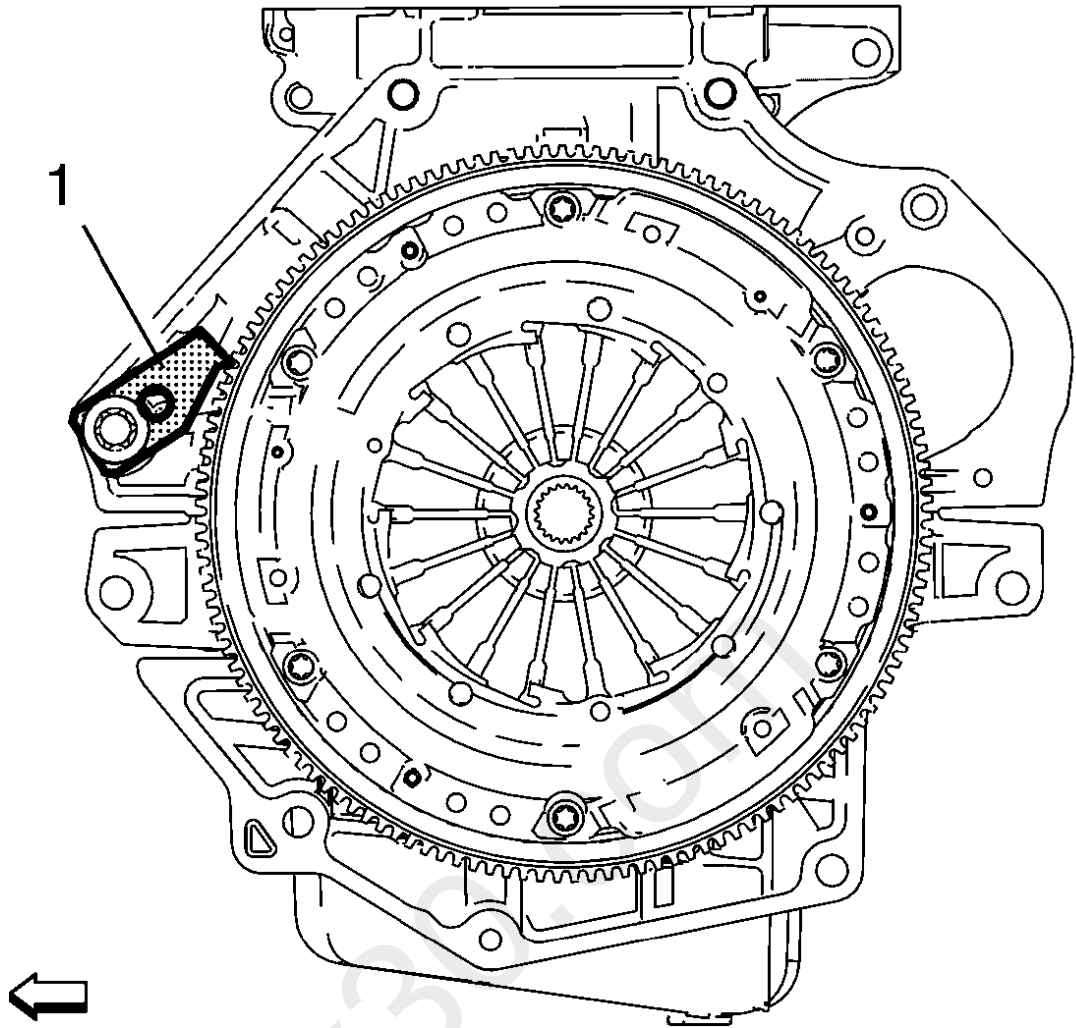


Fig. 42: Flywheel Holder Tool

Courtesy of GENERAL MOTORS COMPANY

2. Install the **EN-652** holder (1) to the engine block.

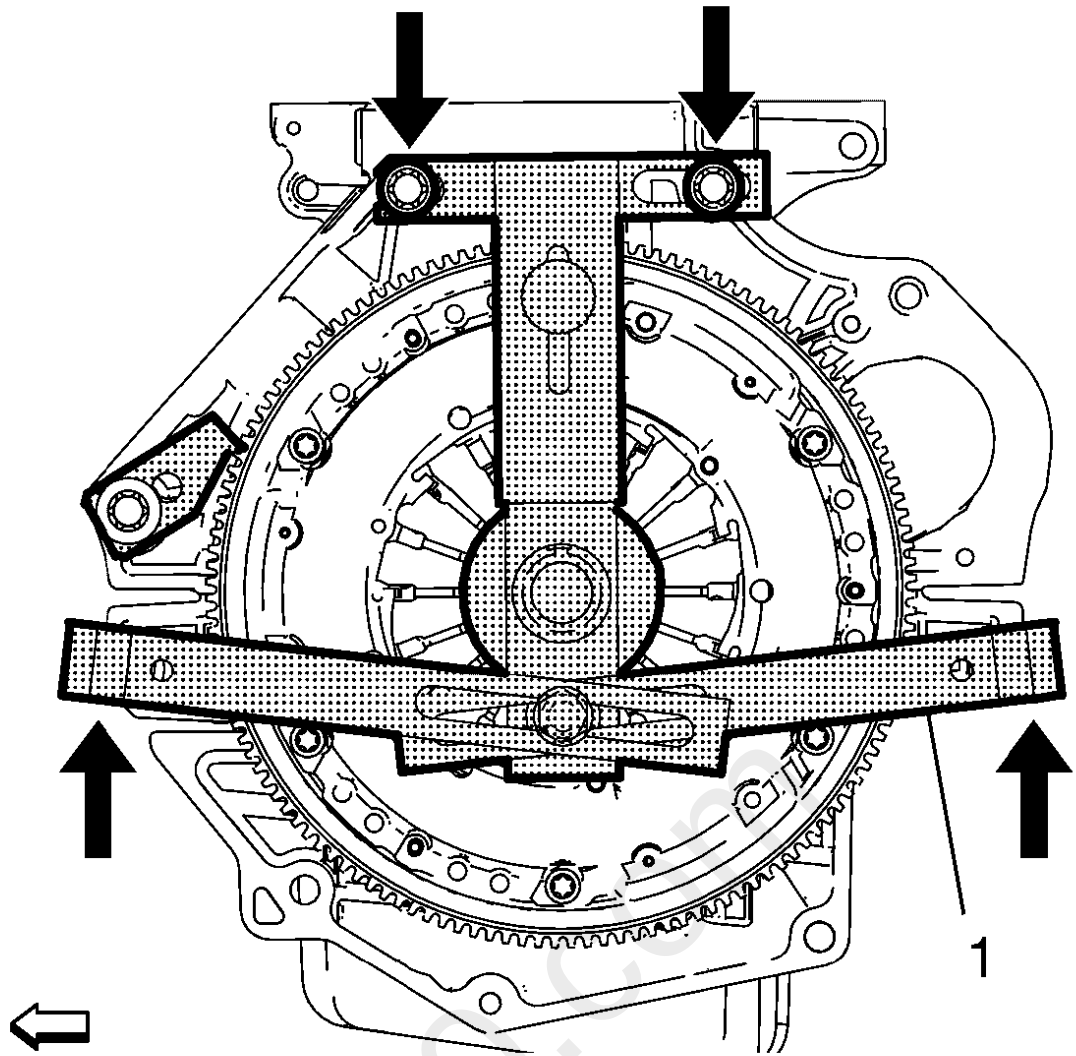


Fig. 43: Special Engine Block Brace Tool

Courtesy of GENERAL MOTORS COMPANY

3. Attach the **DT-6263** remover/installer (1) in conjunction with the **DT-6263-1** brace to the engine block.
4. Install the 4 bolts (arrows) to the engine block, but do not tighten yet.

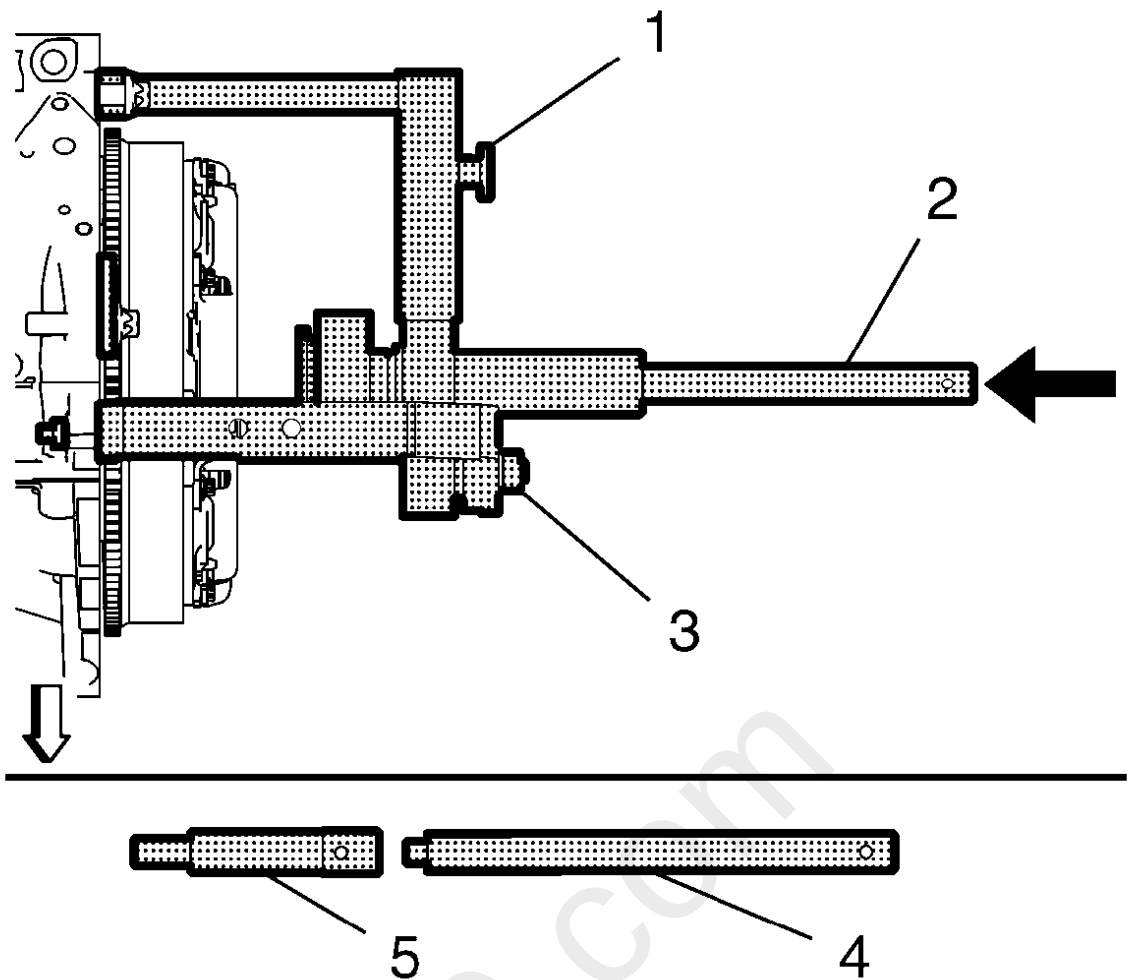


Fig. 44: Special Tools

Courtesy of GENERAL MOTORS COMPANY

5. Attach the **DT-6263-28** guide to the **DT-6263-30** drift (4).
6. Fasten the **DT-6263** remover/installer.
 1. Align the **DT-6263-30** centering drift (2) in conjunction with the clutch center guide through the **DT-6263** remover/installer into the clutch driven plate and crankshaft center (arrow).
 2. Tighten the knurled wheel (1).
 3. Tighten the bolt (3).
 4. Tighten the 4 bolts installing the **DT-6263** remover/installer to the engine block.

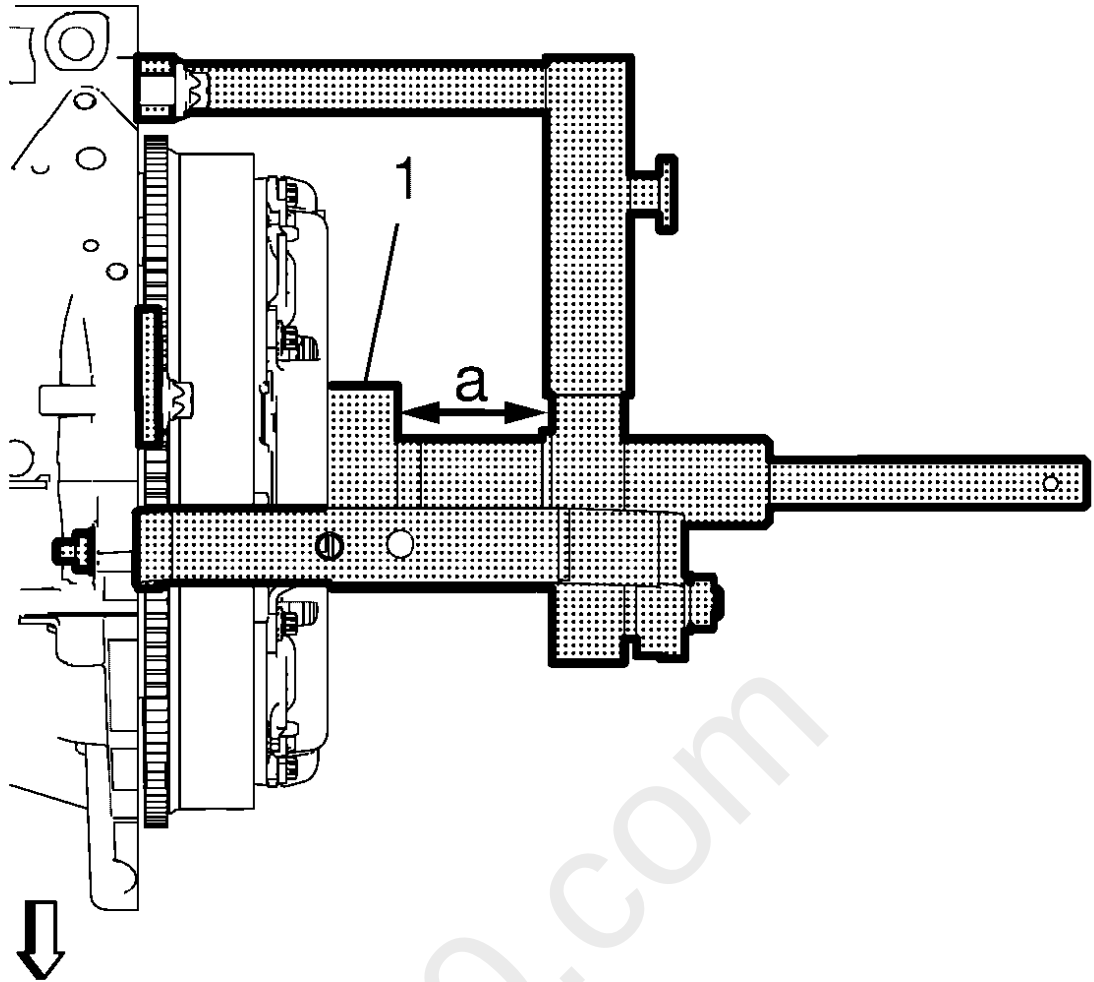


Fig. 45: Clutch Removal/Installation Tool

Courtesy of GENERAL MOTORS COMPANY

7. Preload the clutch springs, using the **DT-6263** remover/installer.
 1. Turn the threaded rod (1) until it rests against the spring tangs of the clutch pressure plate.
 2. Measure the distance a.

NOTE: Do NOT turn further than necessary to gain free movement of the clutch disc.

 3. Turn the threaded rod clockwise until the distance a is extended by approximate 8 mm (0.31 in).
 4. Check for free movement of the clutch disc.

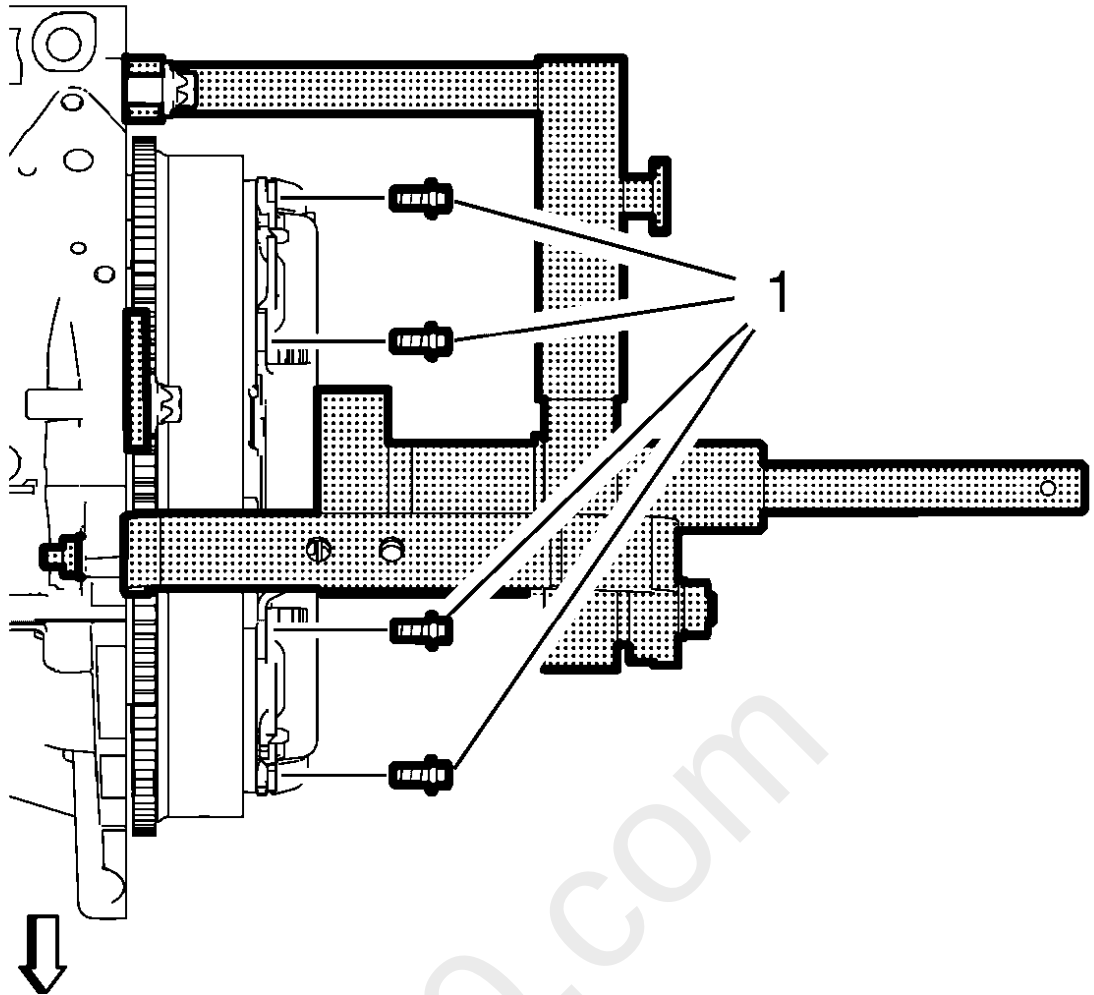


Fig. 46: Clutch Pressure Plate Bolts

Courtesy of GENERAL MOTORS COMPANY

NOTE: Ascertain if bolt was assembled with thread lock agent.

8. Remove and DISCARD the 6 clutch pressure plate bolts (1).

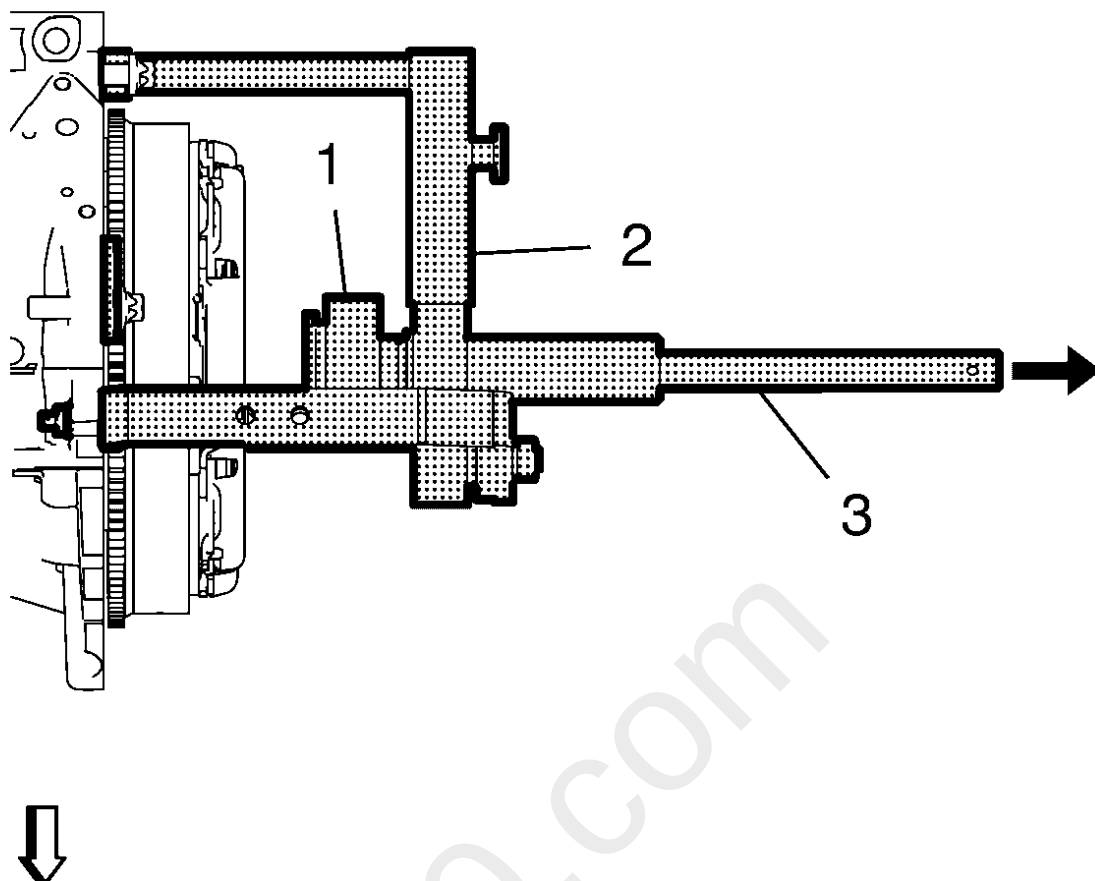


Fig. 47: Special Remover/Installer Tools

Courtesy of GENERAL MOTORS COMPANY

9. Release the **DT-6263** remover/installer (2).
 1. Turn the threaded rod (1) of the **DT-6263** remover/installer counterclockwise to the stop.
 2. Remove the **DT-6263-30** centering drift (3) in conjunction with the clutch center guide (arrow).

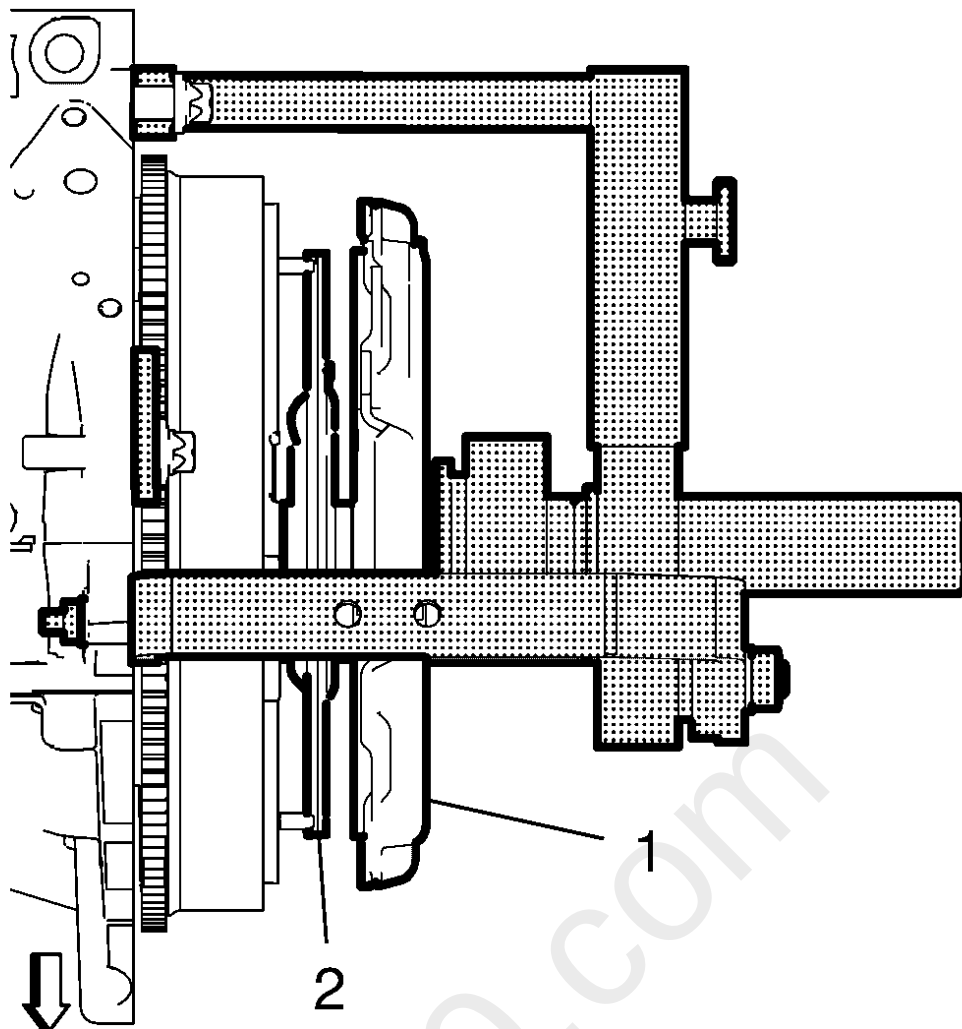


Fig. 48: Clutch Pressure Plate And Driven Plate
Courtesy of GENERAL MOTORS COMPANY

10. Remove the clutch pressure plate (1) and the driven plate (2).

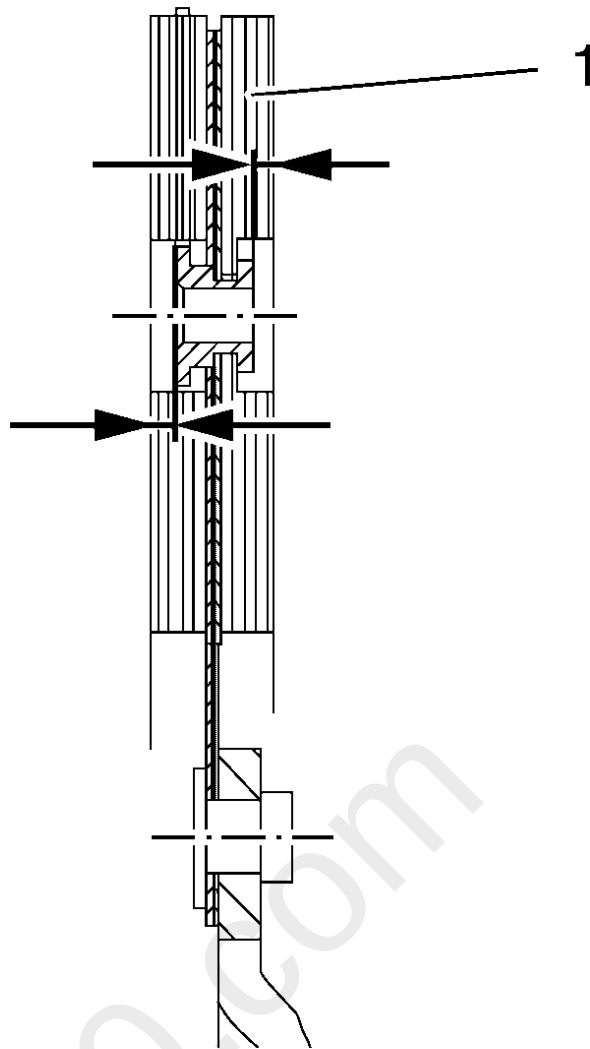


Fig. 49: Clutch Pressure Plate And Driven Plate Inspection Points

Courtesy of GENERAL MOTORS COMPANY

NOTE: Clutch pressure plate and driven plate contaminated by foreign bodies (oil, cleaning agent etc.) have to be replaced. Check clutch driven plate for damage and friction rust in the hub profile and replace if necessary. Do not clean clutch pressure plate and driven plate with a high pressure cleaner or component washing machine.

11. Inspect the clutch pressure plate and the driven plate (1) and replace, if necessary.

Inspect for:

- Excessive wear
- Burned friction surface
- Oil on friction surface
- Damaged spline hub
- Damaged springs

NOTE: The clutch driven plate has to be replaced if the lining projection is less than 0.5 mm (0.020 in) (arrows).

12. Inspect the projection of lining at the clutch lining rivets.

13. Slide the clutch pressure plate onto the transmission input shaft and check for easy movement.

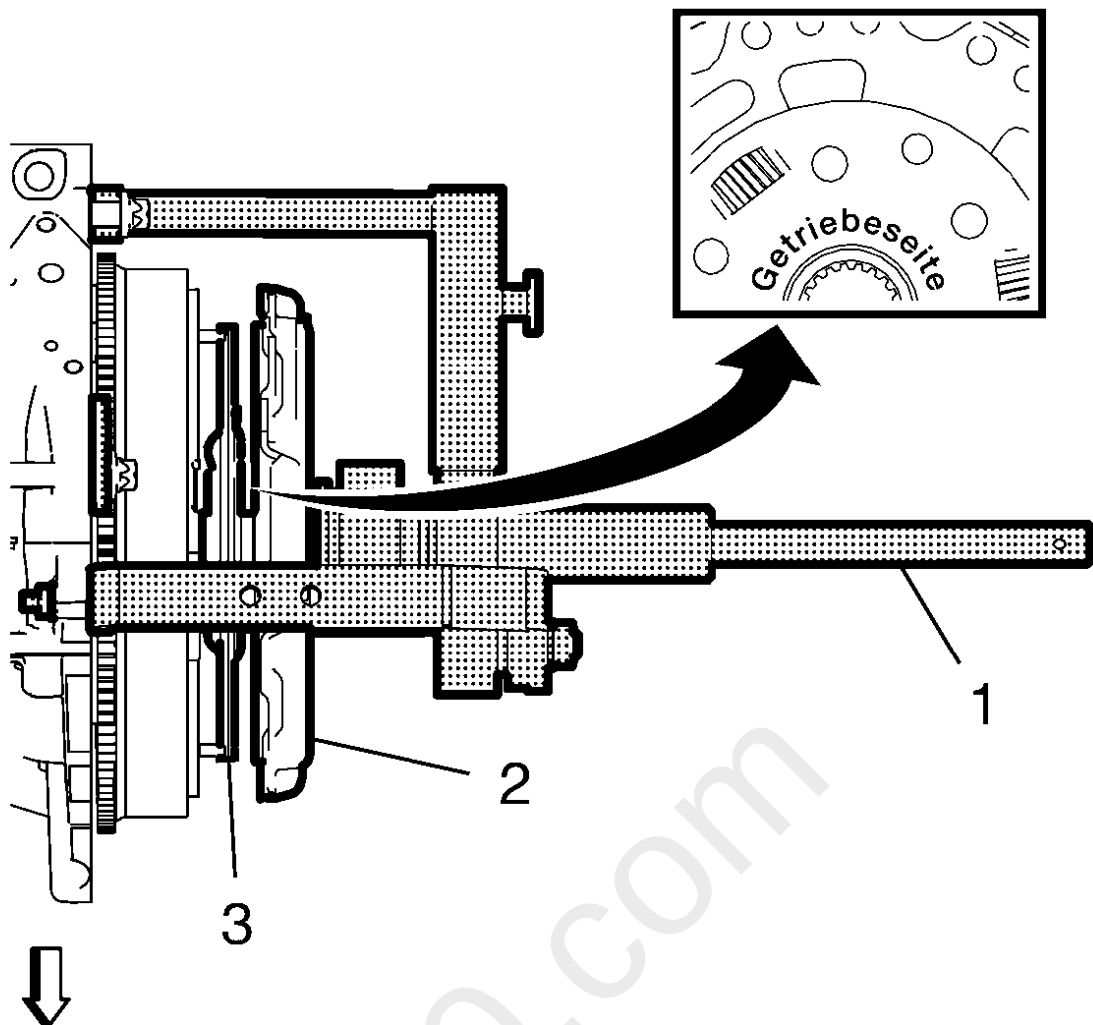


Fig. 50: Clutch Drive Plate

Courtesy of GENERAL MOTORS COMPANY

NOTE: The clutch drive plate must be installed so that the German lettering "Getriebe-seite" (means Gearbox-side) on the plate is orientated towards the transmission.

1. Install the clutch driven plate (3) and the clutch pressure plate (2).

Center the clutch driven plate, using the **DT-6263-30** centering drift (1) in conjunction with the clutch center guide.

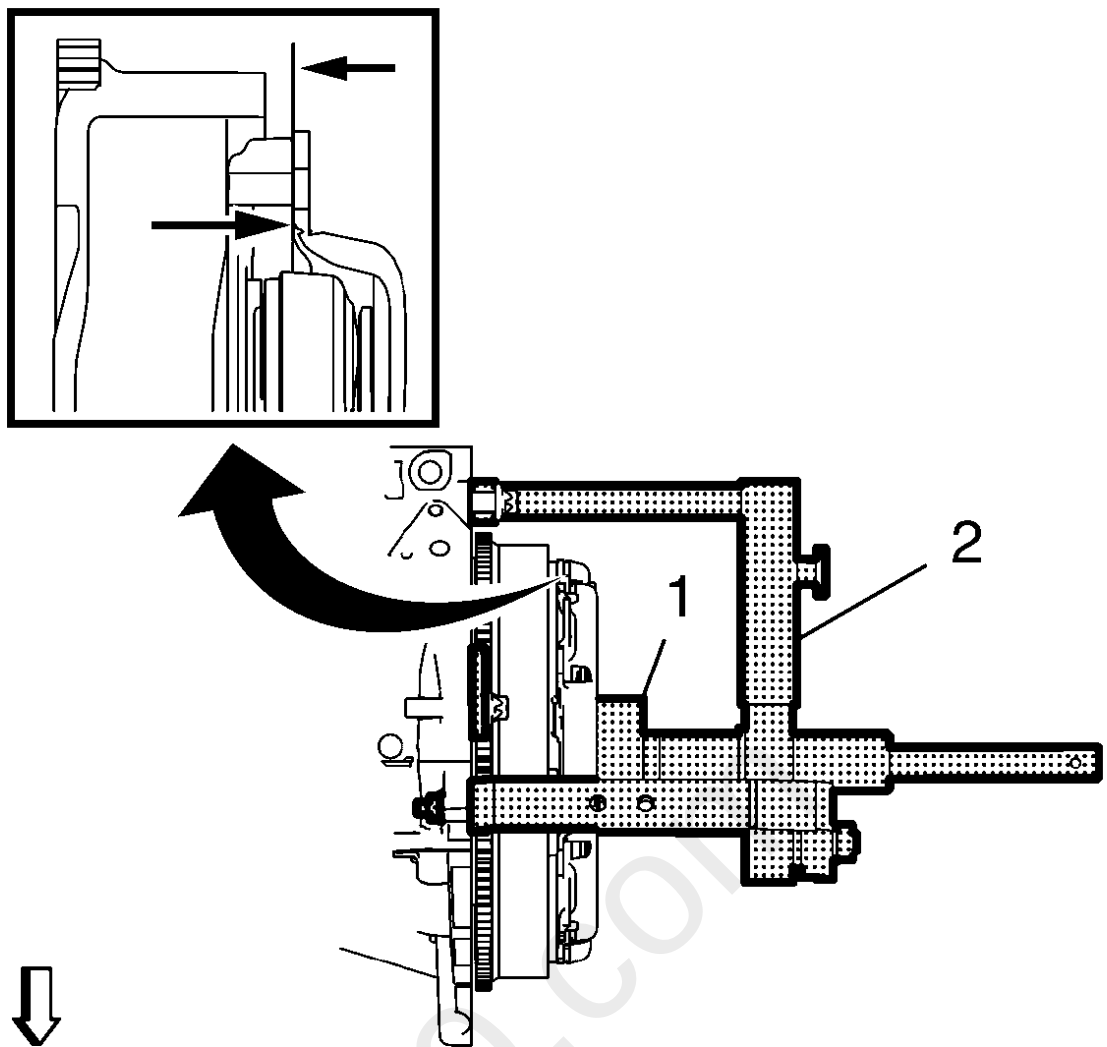


Fig. 51: Preload The Clutch Springs Using Special Tools
Courtesy of GENERAL MOTORS COMPANY

NOTE: Do NOT turn further than necessary.

2. Preload the clutch springs, using the **DT-6263** remover/installer (2).

Turn the threaded rod (1) clockwise until the pressure plate contacts the flywheel (arrows).

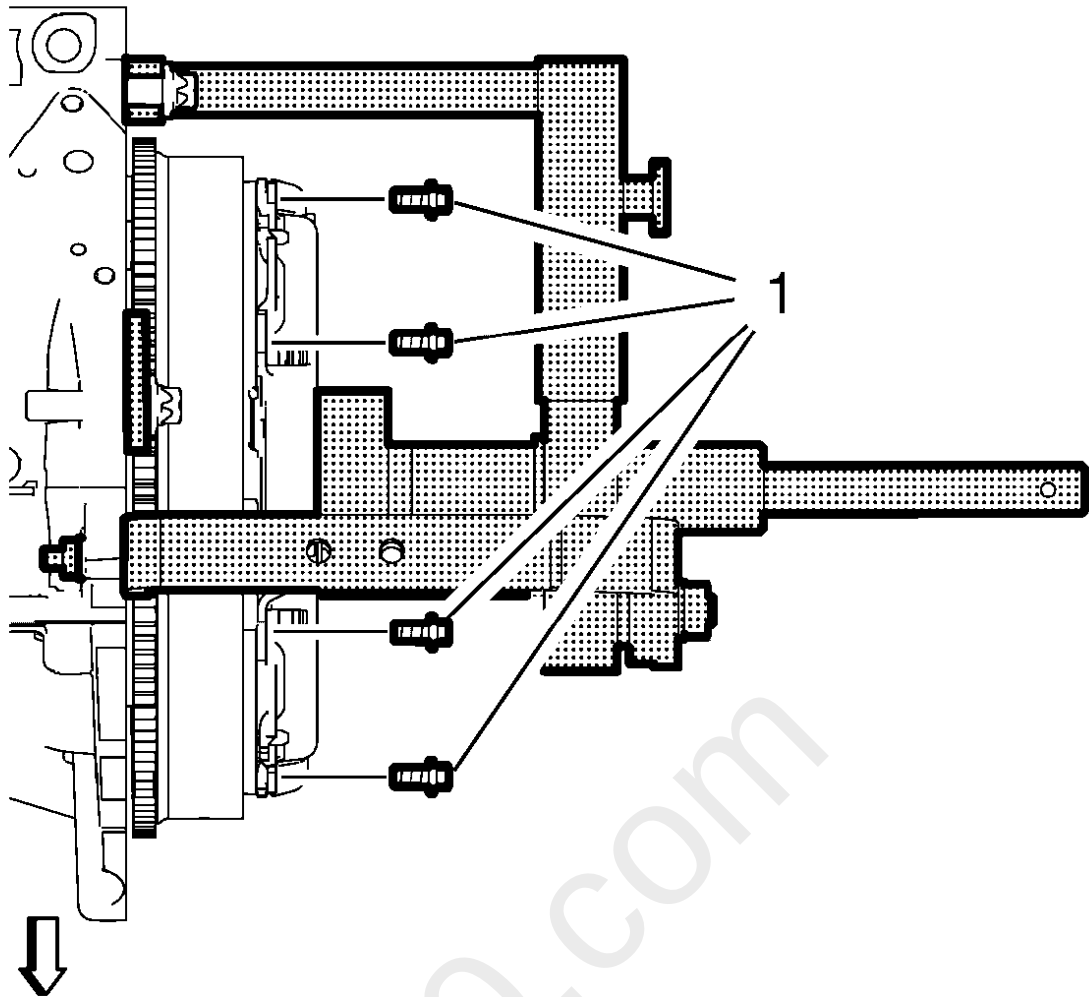


Fig. 52: Clutch Pressure Plate Bolts

Courtesy of GENERAL MOTORS COMPANY

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

NOTE: In the case that the clutch pressure plate bolts were assembled with thread lock agent: Service may offer bolts that are not microencapsulated. If this is the case apply thread lock agent to the bolt. If fastener is microencapsulated, install NEW clutch pressure plate bolts. DO NOT reuse the old bolt.

3. Install the 6 NEW clutch pressure plate bolts (1). For the correct bolts refer to the electronic parts catalog.
4. Tighten the clutch pressure plate bolts to 28 N.m (21 lb ft).

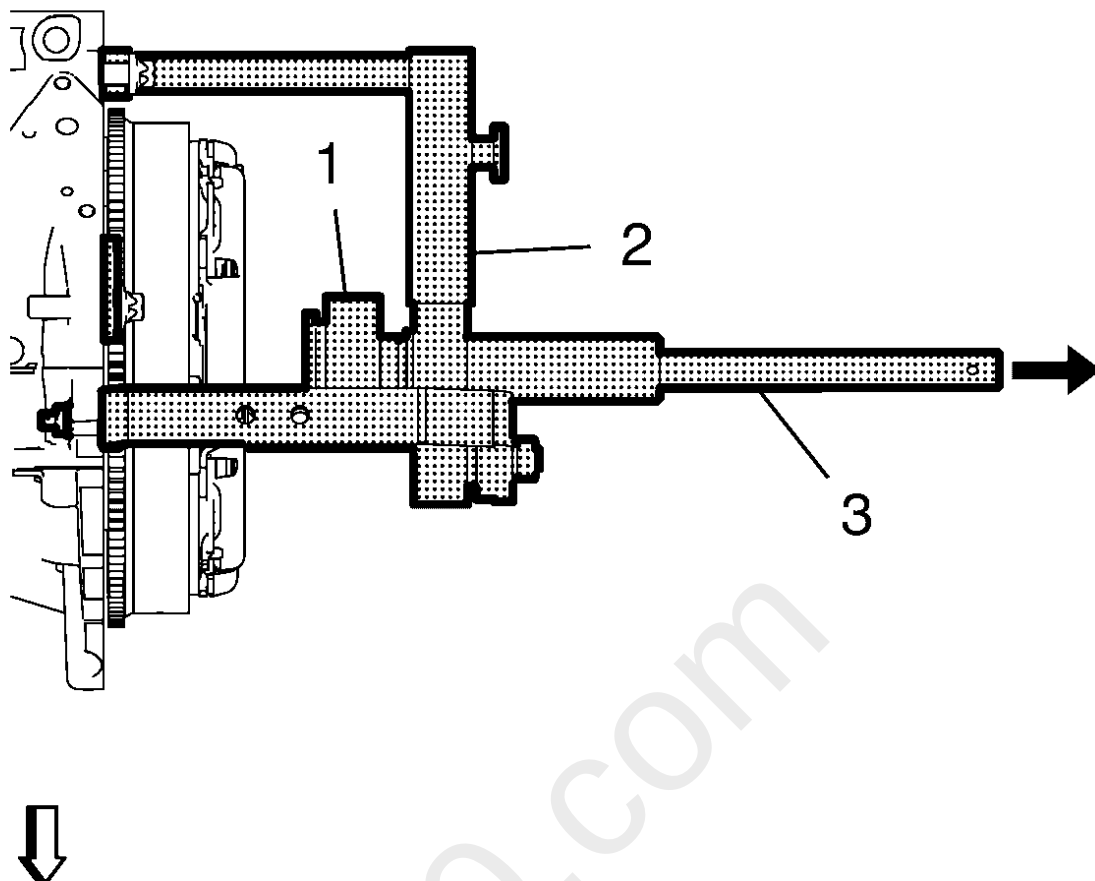


Fig. 53: Special Remover/Installer Tools

Courtesy of GENERAL MOTORS COMPANY

5. Remove the **DT-6263** remover/installer (2) from the engine block.
 1. Turn the threaded rod (1) of the **DT-6263** remover/installer counterclockwise to the stop.
 2. Remove the **DT-6263-30** centering drift (3) in conjunction with the clutch center guide (arrow).
 3. Remove the 4 bolts installing the **DT-6263** remover/installer to the engine block.

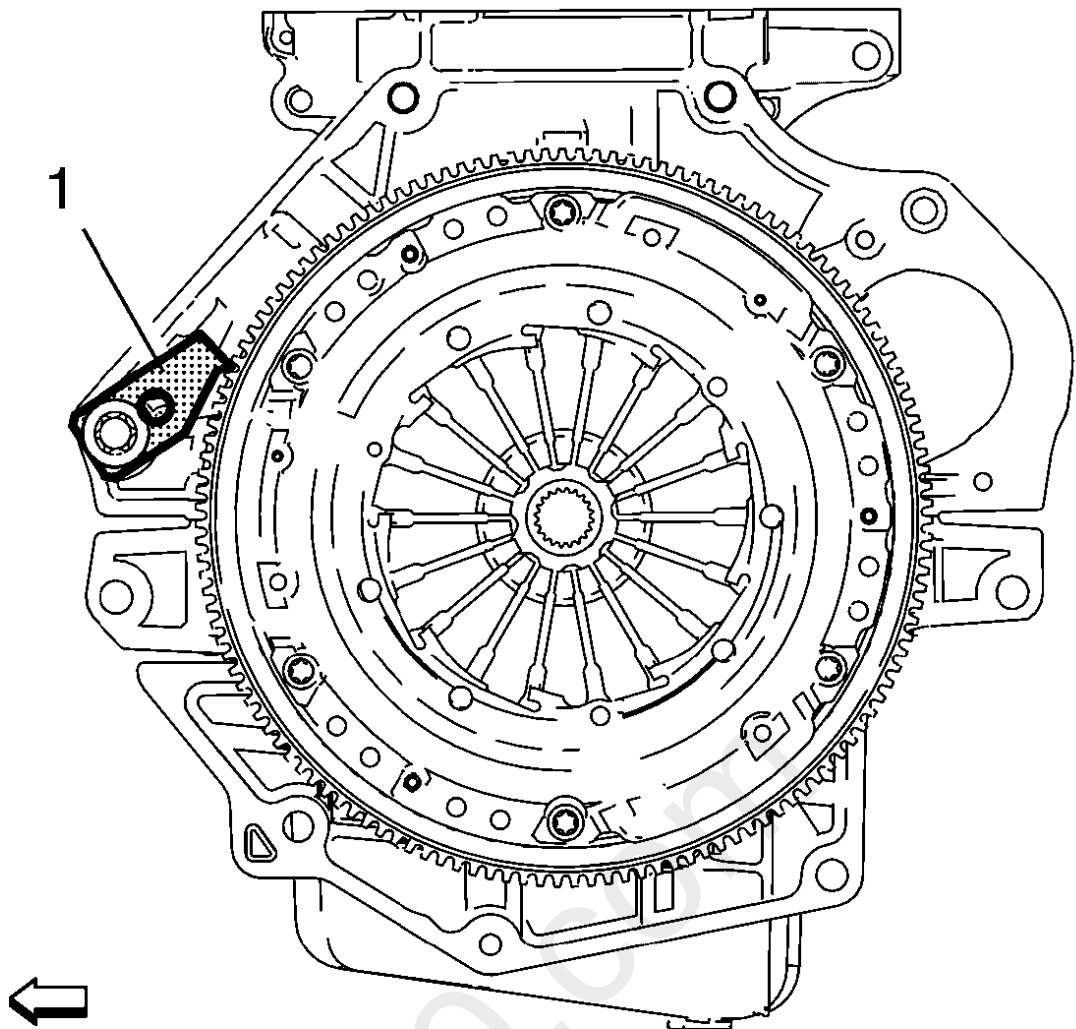


Fig. 54: Flywheel Holder Tool

Courtesy of GENERAL MOTORS COMPANY

6. Remove the EN-652 holder (1) from the engine block.
7. Install the transmission. Refer to [Transmission Replacement](#).

CLUTCH PRESSURE AND DRIVEN PLATE REPLACEMENT (1.6L AND 1.8L)

Special Tools

- DT-6263 Remover/Installer Kit
- DT-6263-32 Clutch Center Guide
- EN-652 Flywheel Holder

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

Removal Procedure

NOTE:

- To prevent damage to the spring fangs of pressure plate use the DT-6263 remover/installer to remove and install the clutch pressure plate.
- Note the different lengths of the brackets for attaching the DT-6263 remover/installer to the lower engine block.

1. Remove the transmission. Refer to [Transmission Replacement](#).

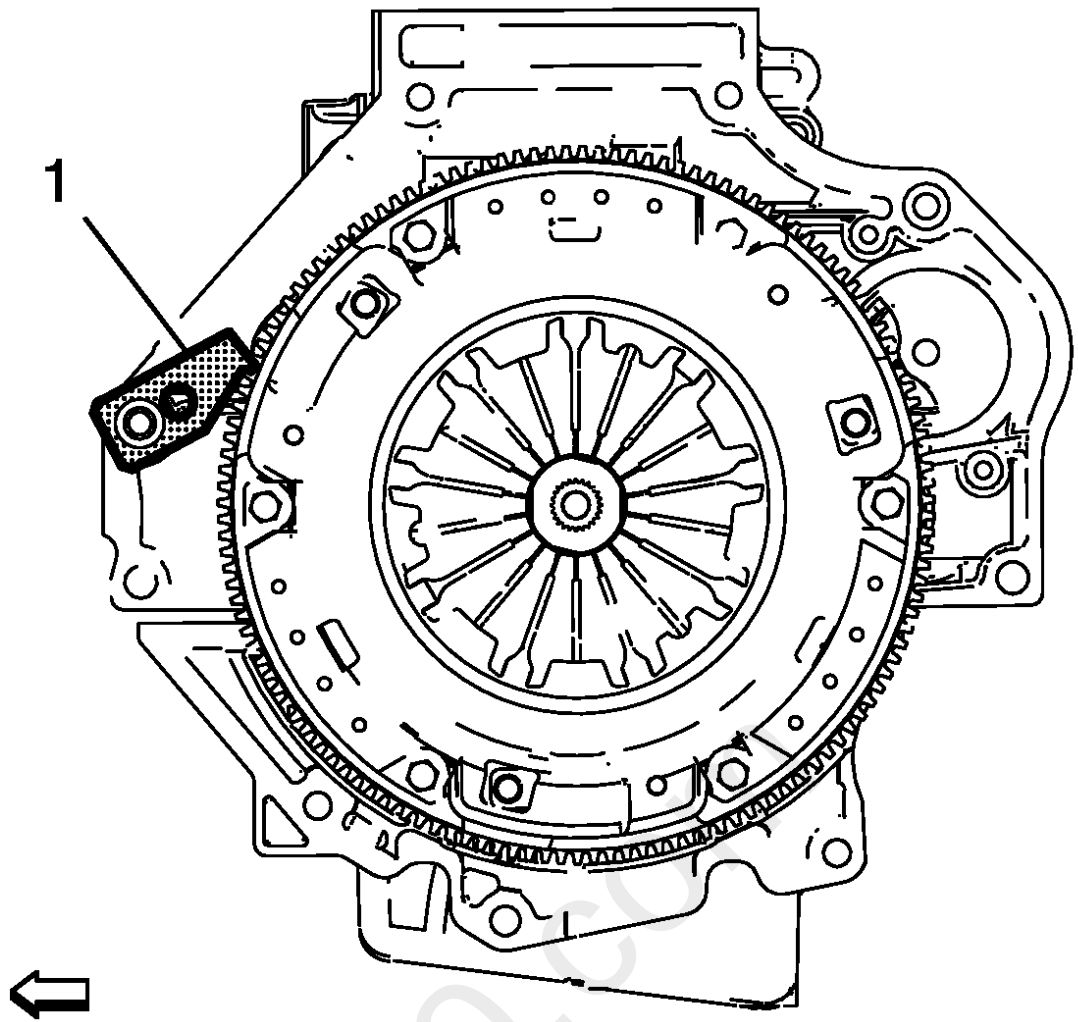


Fig. 55: Flywheel Holding Tool

Courtesy of GENERAL MOTORS COMPANY

2. Install the **EN-652** holder (1) to the engine block.

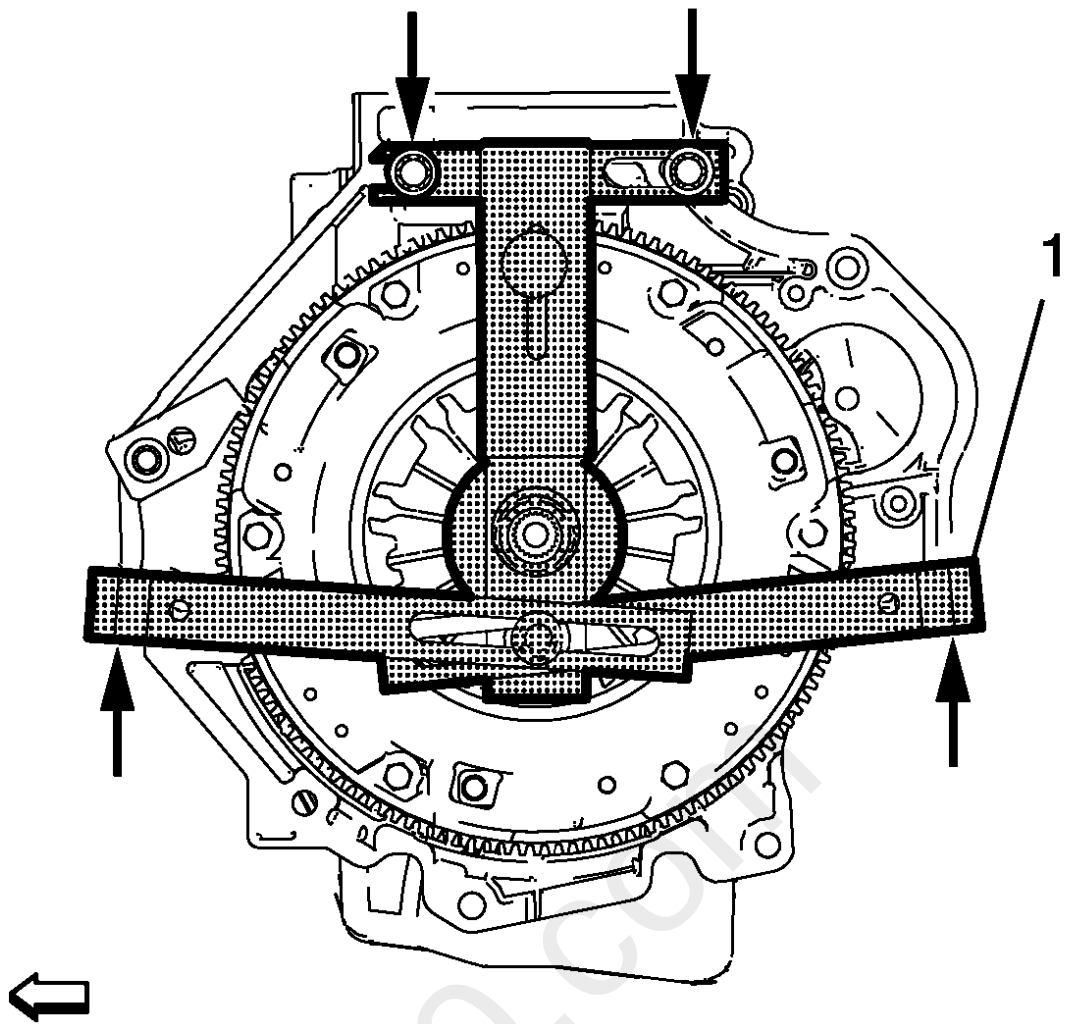


Fig. 56: Engine Support Brace

Courtesy of GENERAL MOTORS COMPANY

3. Attach the **DT-6263** remover/installer (1) in conjunction with the **DT-6263-1** brace to the engine block.
4. Install the 4 bolts (arrows) to the engine block, but do not tighten yet.

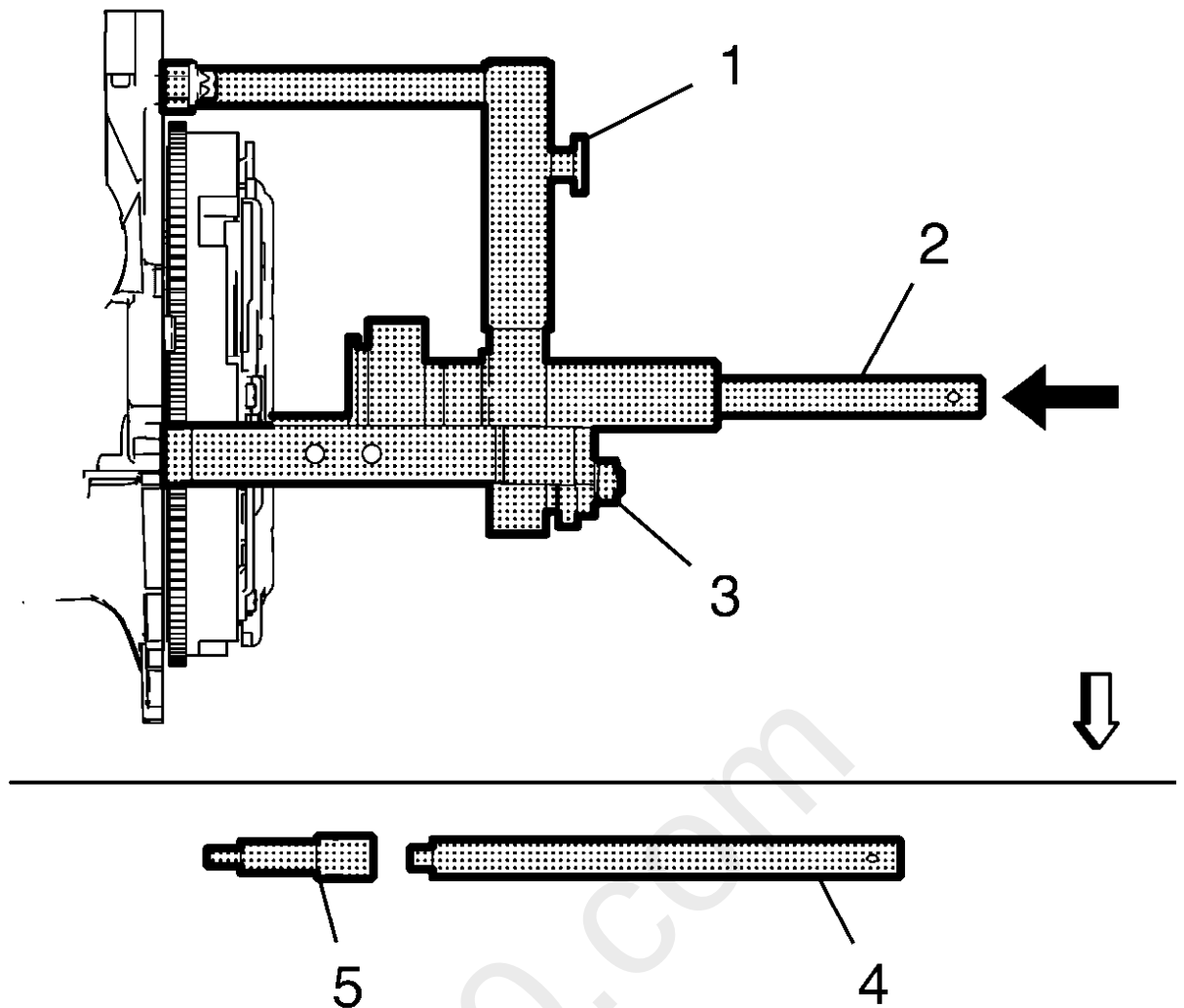


Fig.57: Center Guide And Drift

Courtesy of GENERAL MOTORS COMPANY

5. Attach the **DT-6263-32** guide (5) to the **DT-6263-30** drift (4).
6. Fasten the **DT-6263** remover/installer.
 1. Align the **DT-6263-30** centering drift (2) in conjunction with the clutch center guide through the **DT-6263** remover/installer into the clutch pressure plate and the crankshaft center (arrow).
 2. Tighten the knurled wheel (1).
 3. Tighten the bolt (3).
 4. Tighten the 4 bolts installing the **DT-6263** remover/installer to the engine block.

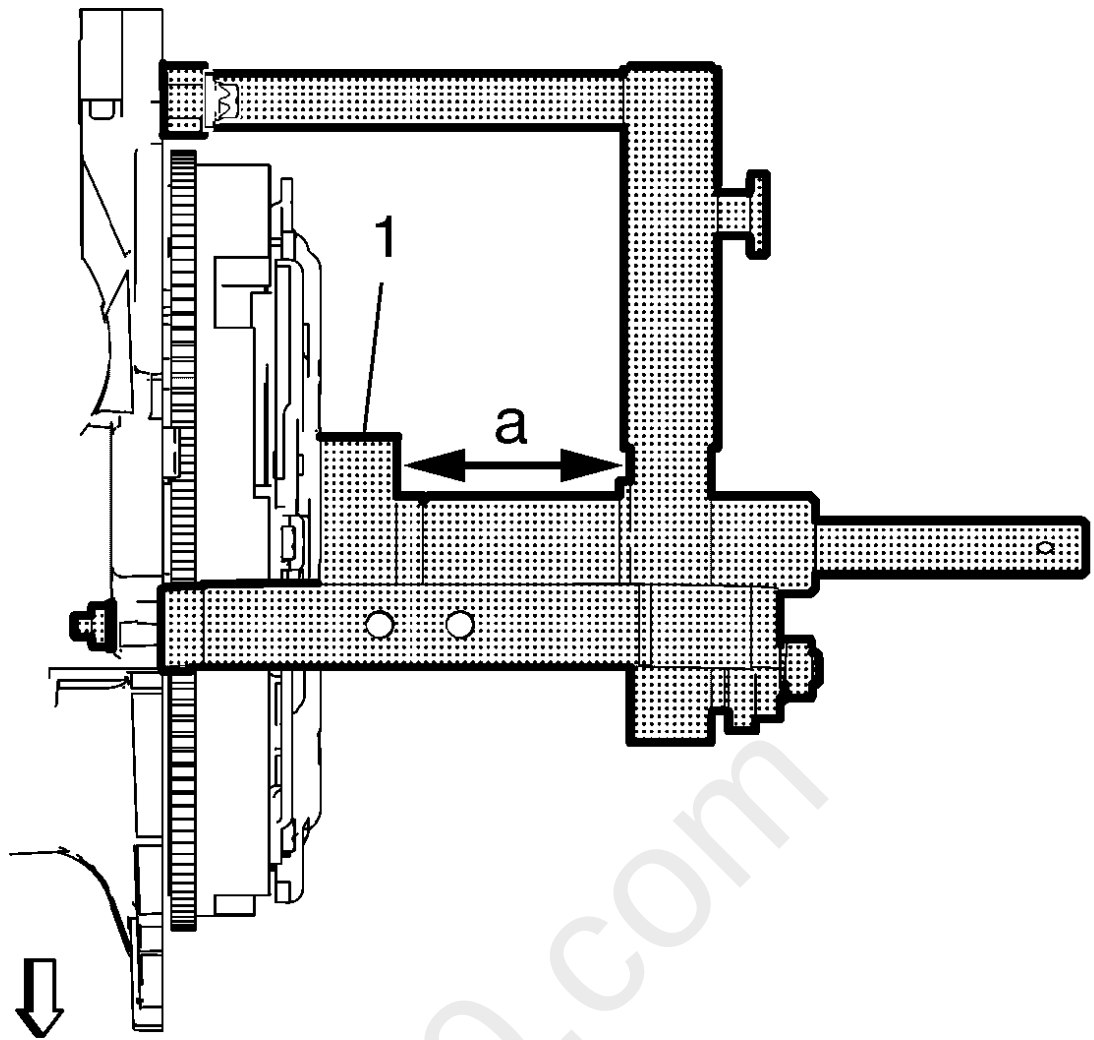


Fig. 58: Measuring Distance "a"

Courtesy of GENERAL MOTORS COMPANY

7. Preload the clutch springs, using the **DT-6263** remover/installer.
 1. Turn the threaded rod (1) until it rests against the spring tangs of the clutch pressure plate.
 2. Measure the distance a.

NOTE: **DO NOT** turn further than necessary to gain free movement of the clutch disc.

3. Turn the threaded rod clockwise until the distance a is extended by approximate 8 mm (0.31 lb in).
4. Check for free movement of the clutch disc.

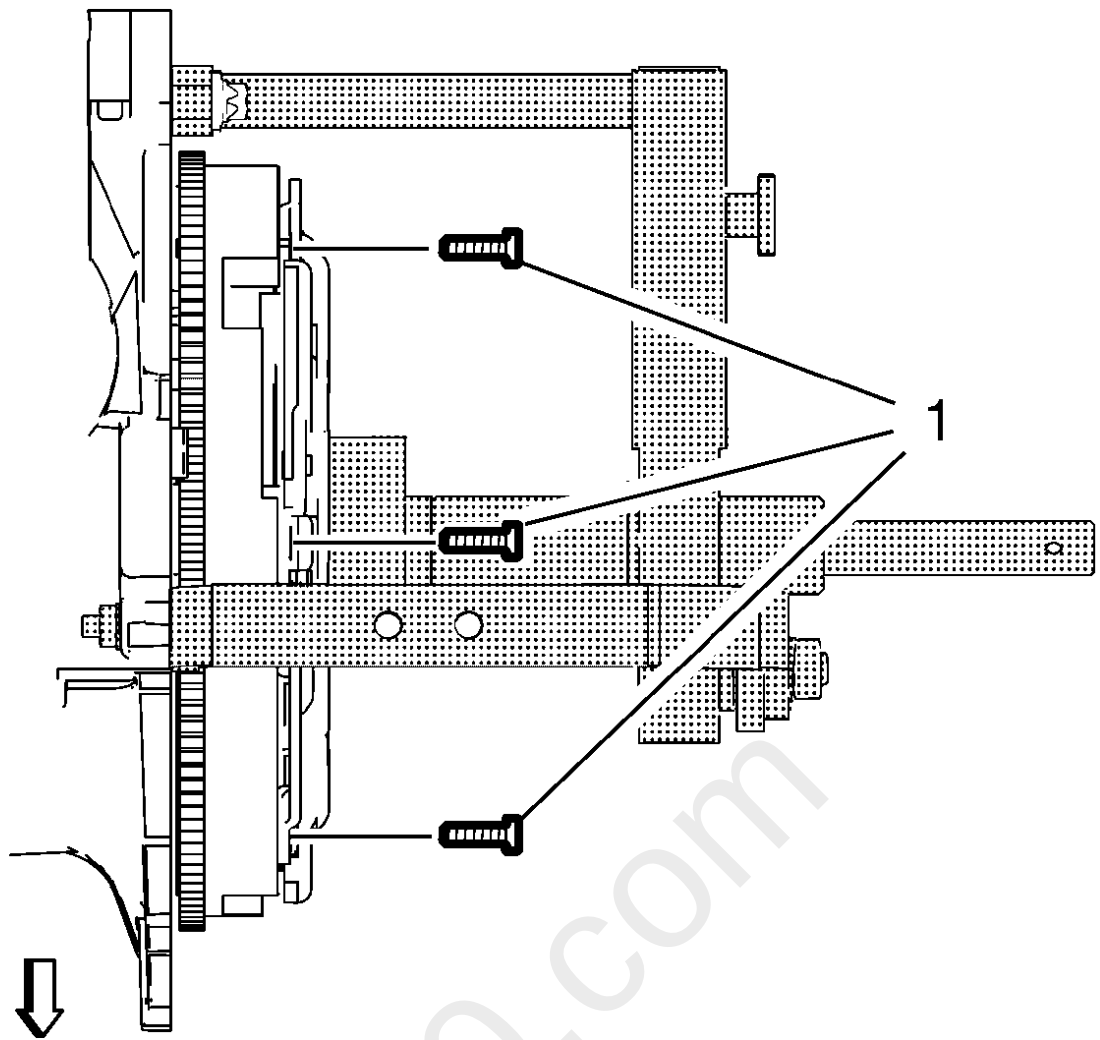


Fig. 59: Clutch Pressure Plate Bolts

Courtesy of GENERAL MOTORS COMPANY

NOTE: Ascertain if bolt was assembled with thread lock agent.

8. Remove and DISCARD the 6 clutch pressure plate bolts (1).

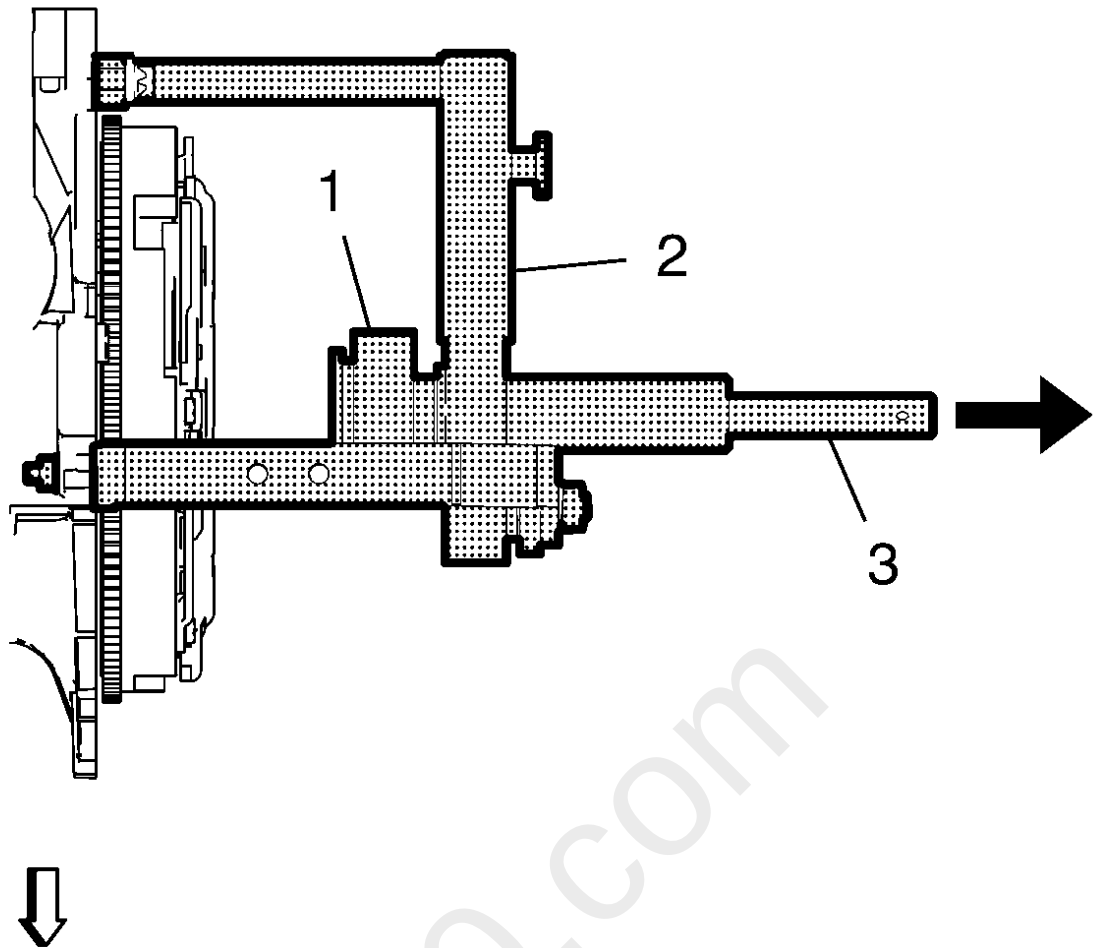


Fig. 60: Centering Drift And Clutch Center Guide
Courtesy of GENERAL MOTORS COMPANY

9. Release the **DT-6263** remover/installer (2).
 1. Turn the threaded rod (1) of the **DT-6263** remover/installer counterclockwise to the stop.
 2. Remove the **DT-6263-30** centering drift (3) in conjunction with the clutch center guide (arrow).

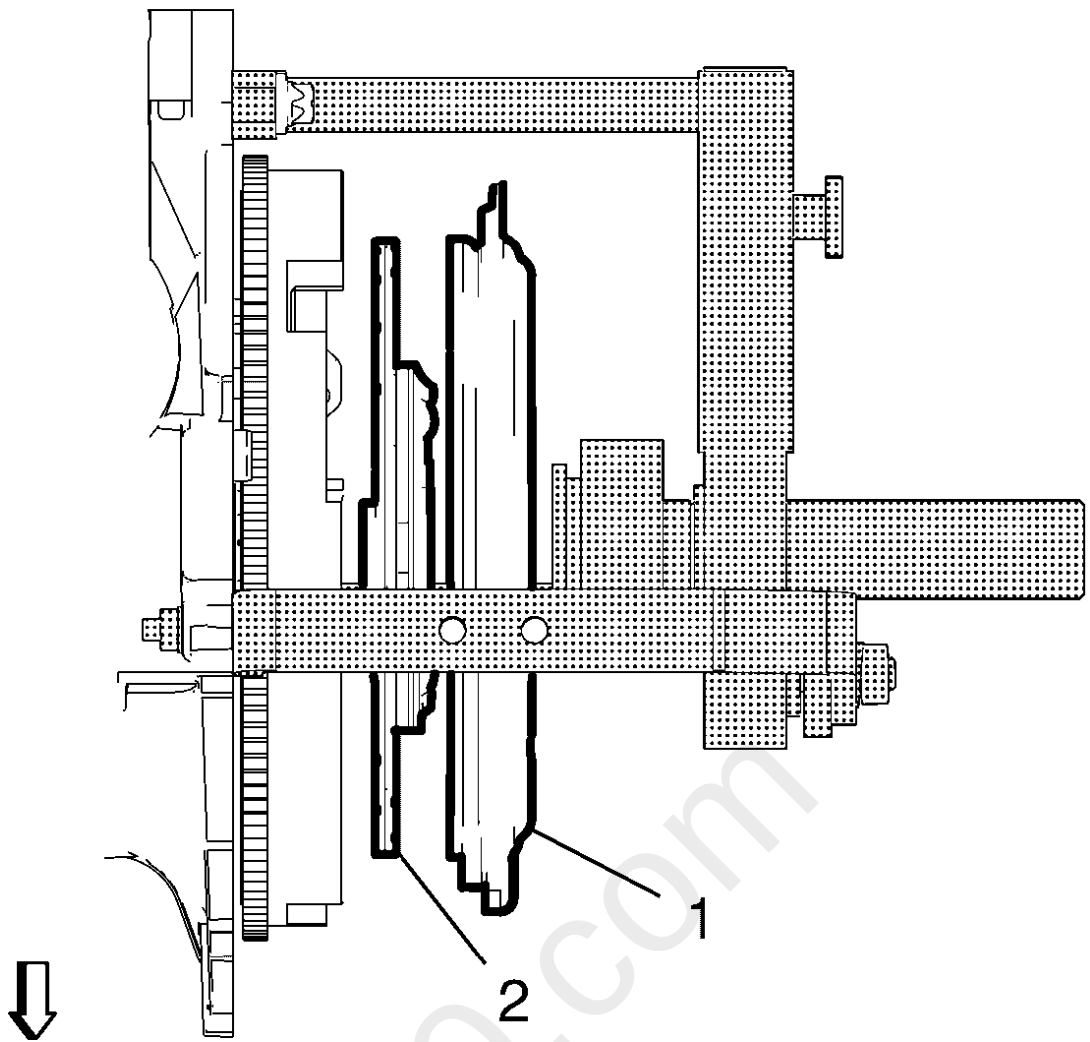


Fig. 61: Clutch Pressure Plate And Driven Plate
Courtesy of GENERAL MOTORS COMPANY

10. Remove the clutch pressure plate (1) and the driven plate (2).

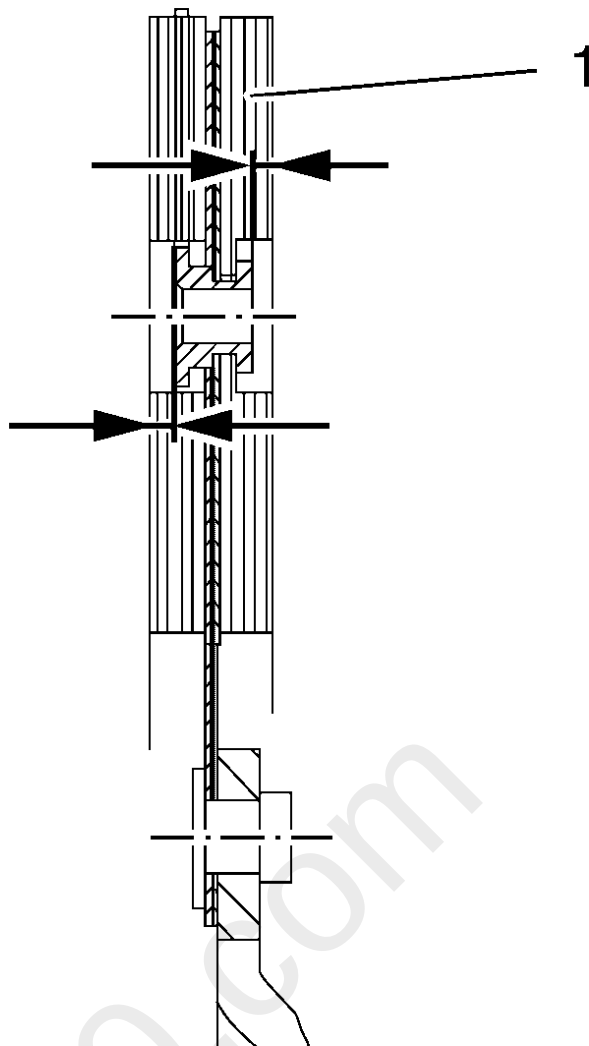


Fig. 62: Clutch Pressure Plate And Driven Plate Inspection Points

Courtesy of GENERAL MOTORS COMPANY

NOTE: Clutch pressure plate and driven plate contaminated by foreign bodies (oil, cleaning agent etc.) have to be replaced. Check the clutch driven plate for damage and friction rust in the hub profile and replace it if necessary. **DO NOT** clean the clutch pressure plate and the driven plate with a high pressure cleaner or component washing machine.

11. Inspect the clutch pressure plate and the driven plate (1) and replace it, if necessary.

Inspect for:

- Excessive wear
- Burned friction surface
- Oil on friction surface
- Damaged spline hub
- Damaged springs

NOTE: The clutch driven plate has to be replaced if the lining projection is less than 0.5 mm (0.020 in) (arrows).

12. Inspect the projection of the lining at the clutch lining rivets.

13. Slide the clutch pressure plate onto the transmission input shaft and check for easy movement.

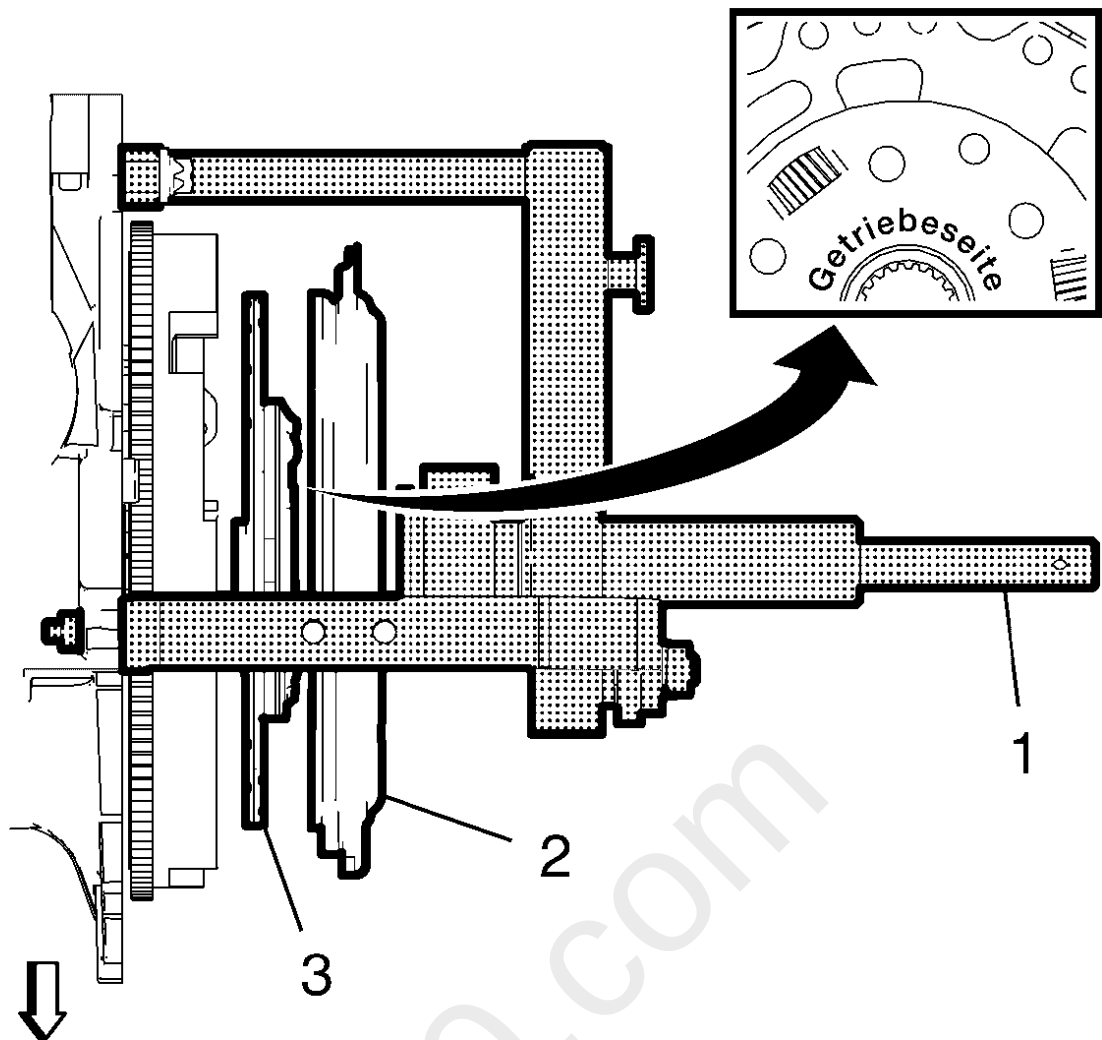


Fig. 63: Installing Bolts To Correct Site

Courtesy of GENERAL MOTORS COMPANY

NOTE: The clutch driven plate must be installed so that the German lettering "Getriebe-seite" (means Gearbox-side) on the plate is orientated towards the transmission.

1. Install the clutch driven plate (3) and the clutch pressure plate (2).

Center the clutch driven plate, using the **DT-6263-30** centering drift (1) in conjunction with the clutch center guide.

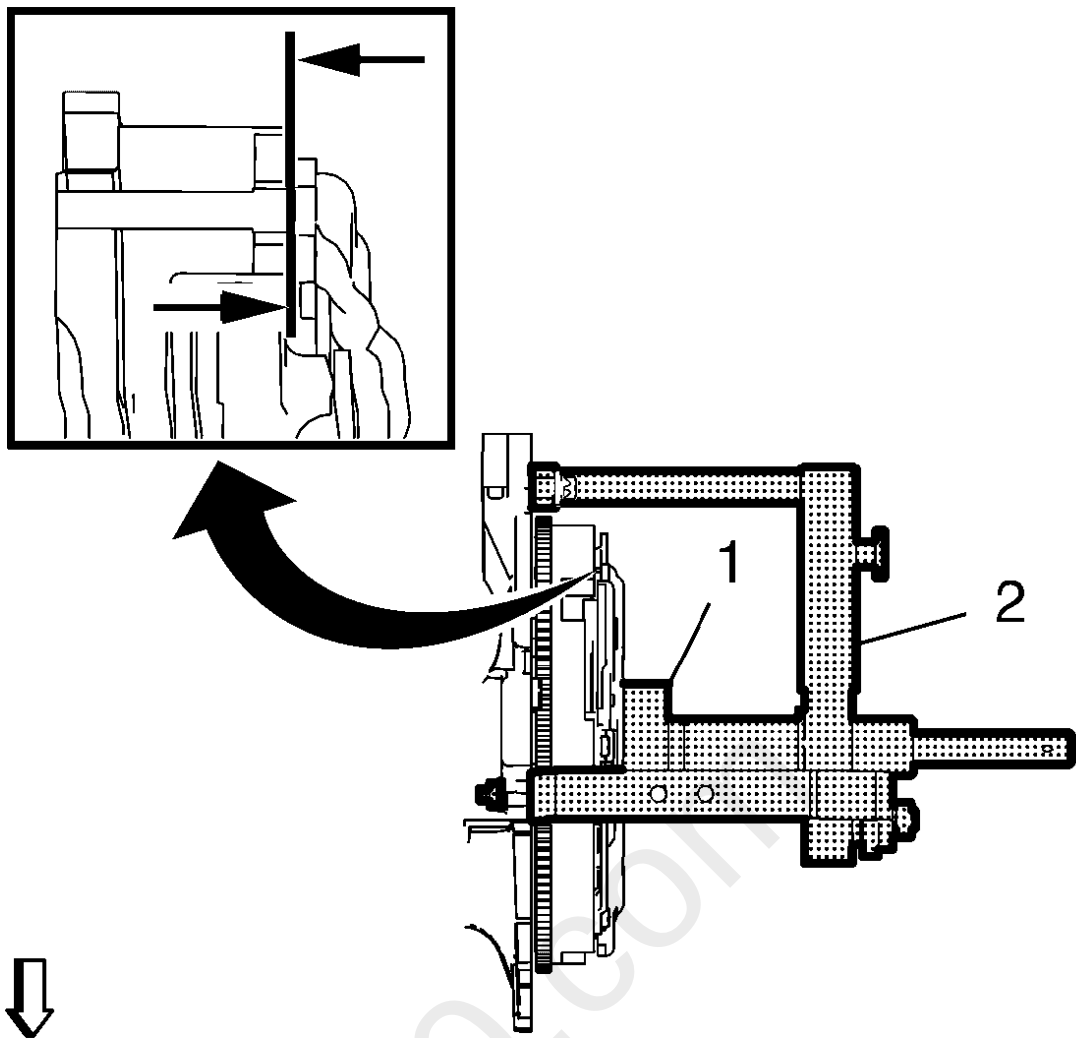


Fig. 64: Preloading Clutch Springs Using Special Tool
Courtesy of GENERAL MOTORS COMPANY

NOTE: DO NOT turn further than necessary.

2. Preload the clutch springs, using the **DT-6263** remover/installer (2).

Turn the threaded rod (1) clockwise until flywheel and pressure plate align (arrows).

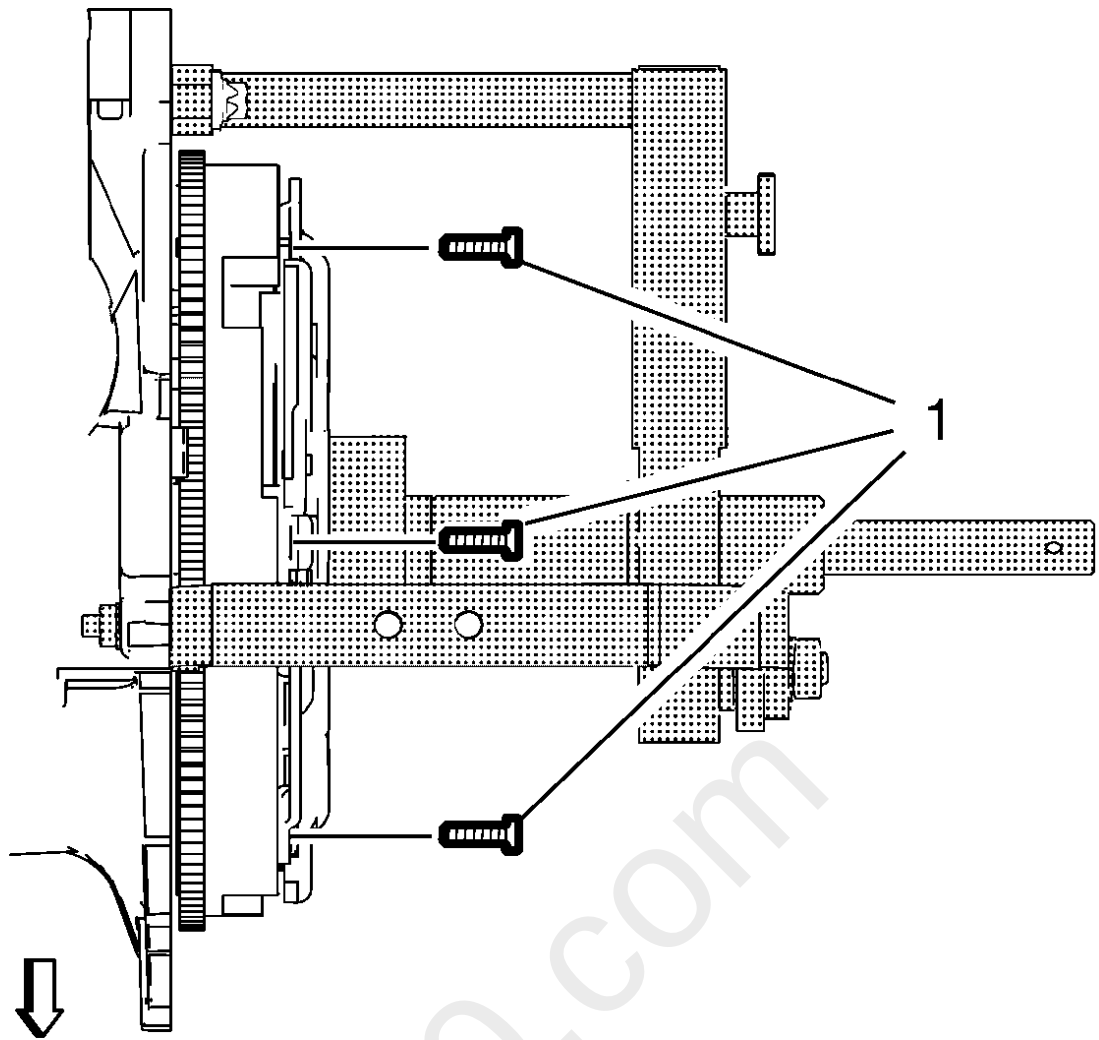


Fig. 65: Clutch Pressure Plate Bolts

Courtesy of GENERAL MOTORS COMPANY

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

NOTE: In the case that the clutch pressure plate bolts were assembled with thread lock agent: Service may offer bolts that are not microencapsulated. If this is the case apply thread lock agent to the bolt. If the fastener is microencapsulated, install NEW clutch pressure plate bolts. DO NOT reuse the old bolts.

3. Install the 6 NEW clutch pressure plate bolts (1). For the correct bolts refer to the electronic parts catalog.
4. Tighten the clutch pressure plate bolts to 15 N.m (11 lb ft).

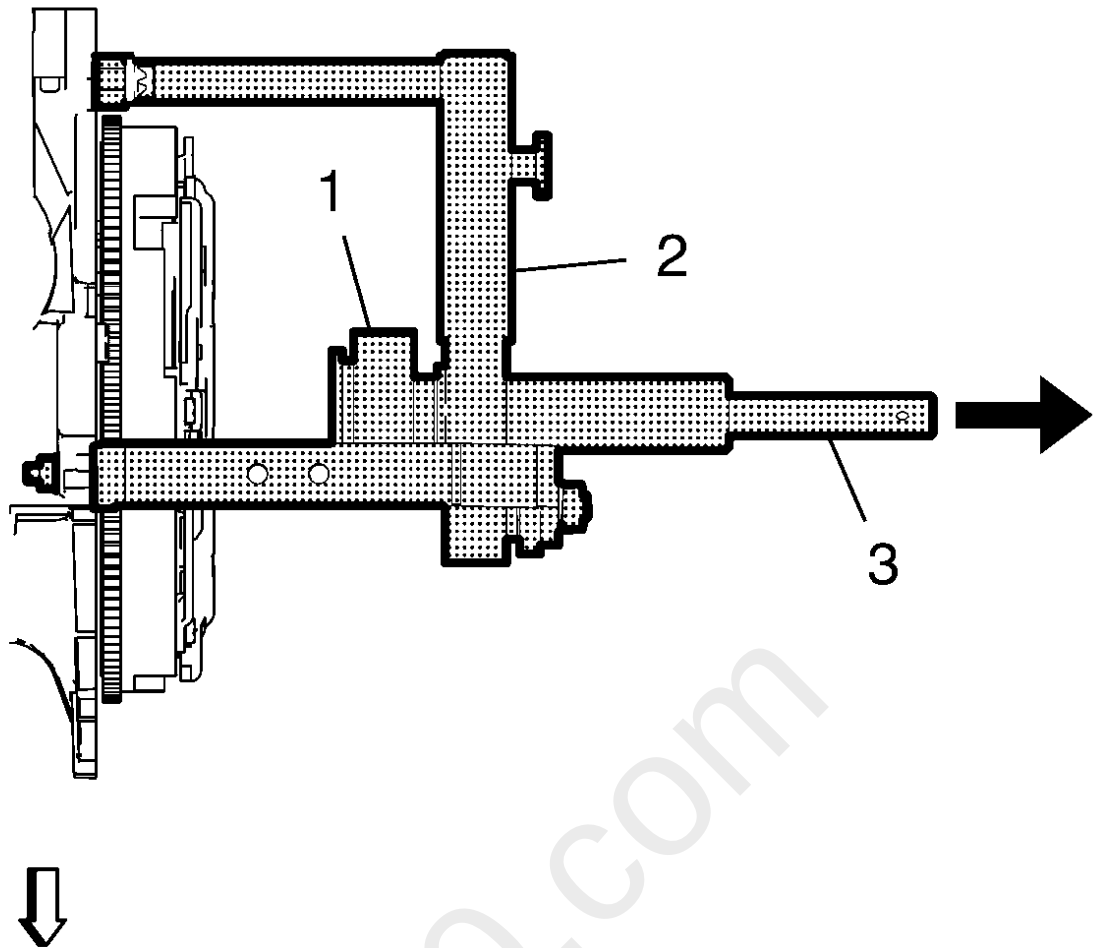


Fig. 66: Centering Drift And Clutch Center Guide
Courtesy of GENERAL MOTORS COMPANY

5. Remove the **DT-6263** remover/installer (2) from the engine block.
 1. Turn the threaded rod (1) of the **DT-6263** remover/installer counterclockwise to the stop.
 2. Remove the **DT-6263-30** centering drift (3) in conjunction with the clutch center guide (arrow).
 3. Remove the 4 bolts installing the **DT-6263** remover/installer to the engine block.

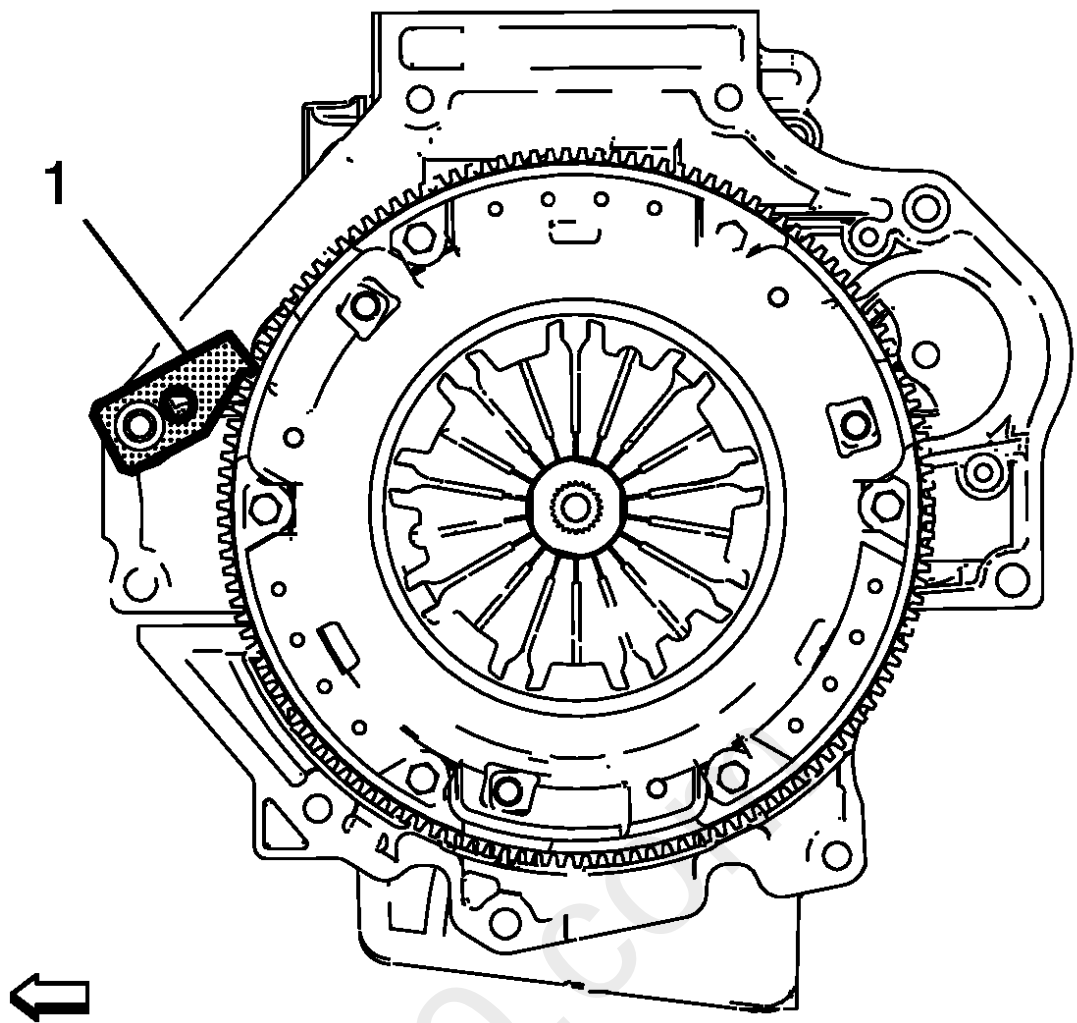


Fig. 67: Flywheel Holding Tool

Courtesy of GENERAL MOTORS COMPANY

6. Remove the EN-652 holder (1) from the engine block.
7. Install the transmission. Refer to [Transmission Replacement](#).

CLUTCH ACTUATOR CYLINDER REPLACEMENT (D16)

Removal Procedure

1. Remove the transmission. Refer to [Transmission Replacement](#).

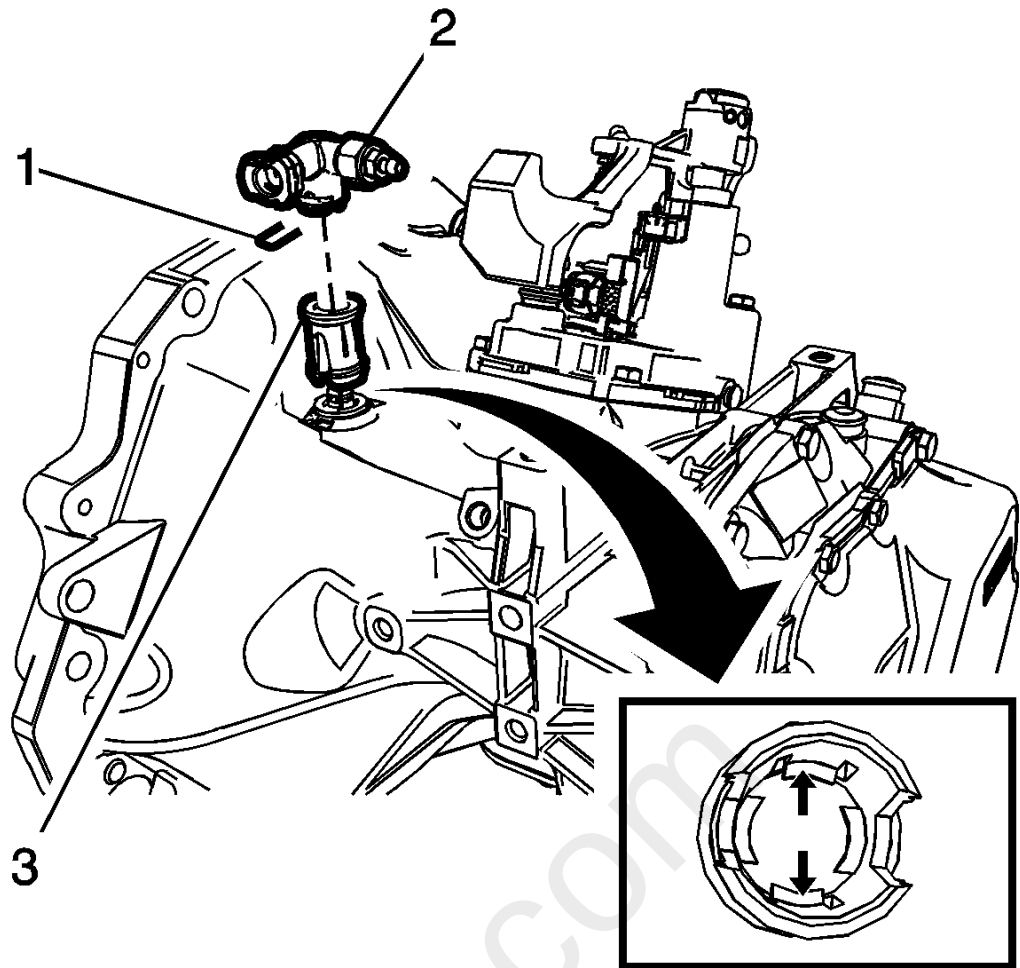


Fig. 68: Actuator Cylinder Pipe Connector Elbow And Clip
Courtesy of GENERAL MOTORS COMPANY

2. Remove the clutch actuator cylinder pipe connector elbow clip (1) from the clutch actuator elbow.
3. Remove the connector elbow (2) from the clutch actuator cylinder pipe end.

NOTE: Release the fastening sleeve key (arrows) using a screwdriver or equivalent to remove the fastening sleeve.

4. Remove the fastening sleeve (3) from the transmission housing and clutch actuator cylinder pipe.

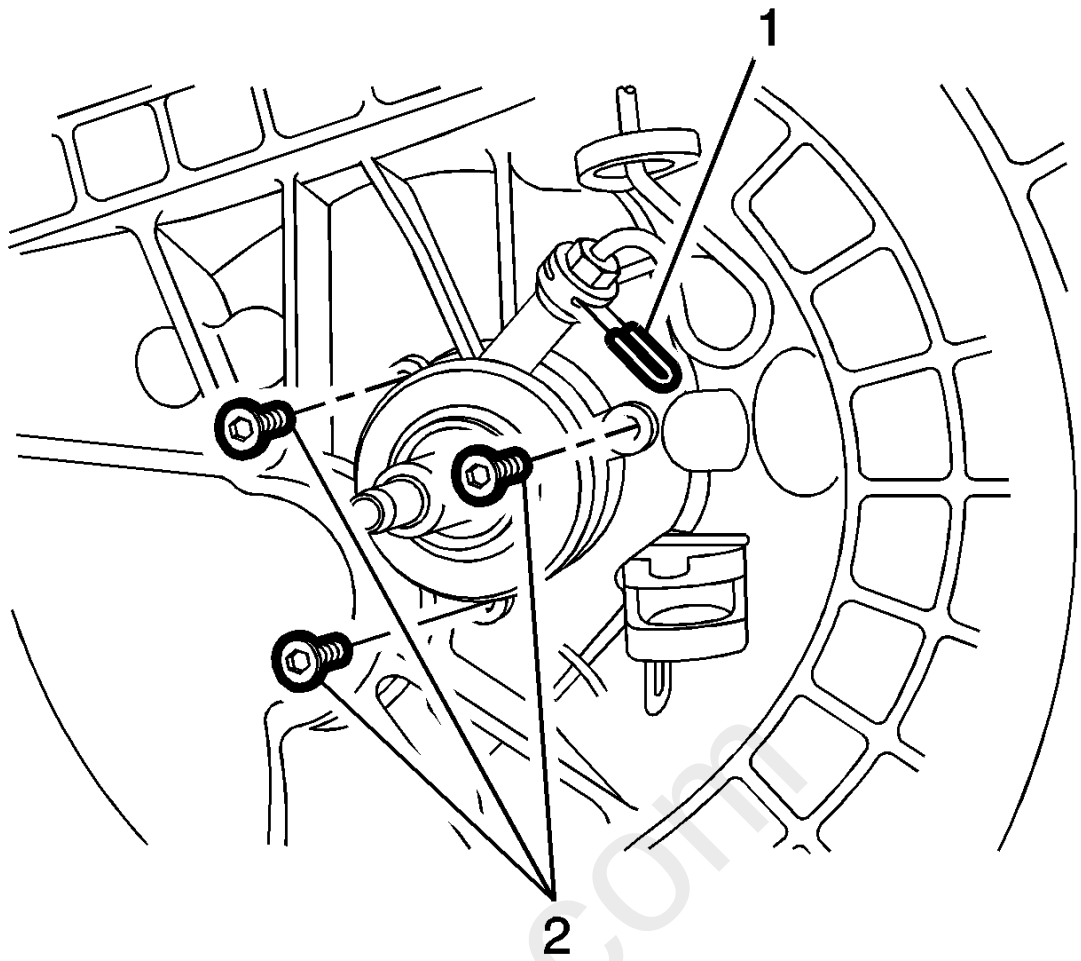


Fig. 69: Clutch Actuator Cylinder And Bolts

Courtesy of GENERAL MOTORS COMPANY

5. Remove the clutch actuator cylinder pipe clip (1).
6. Remove the 3 clutch actuator cylinder bolts (2).

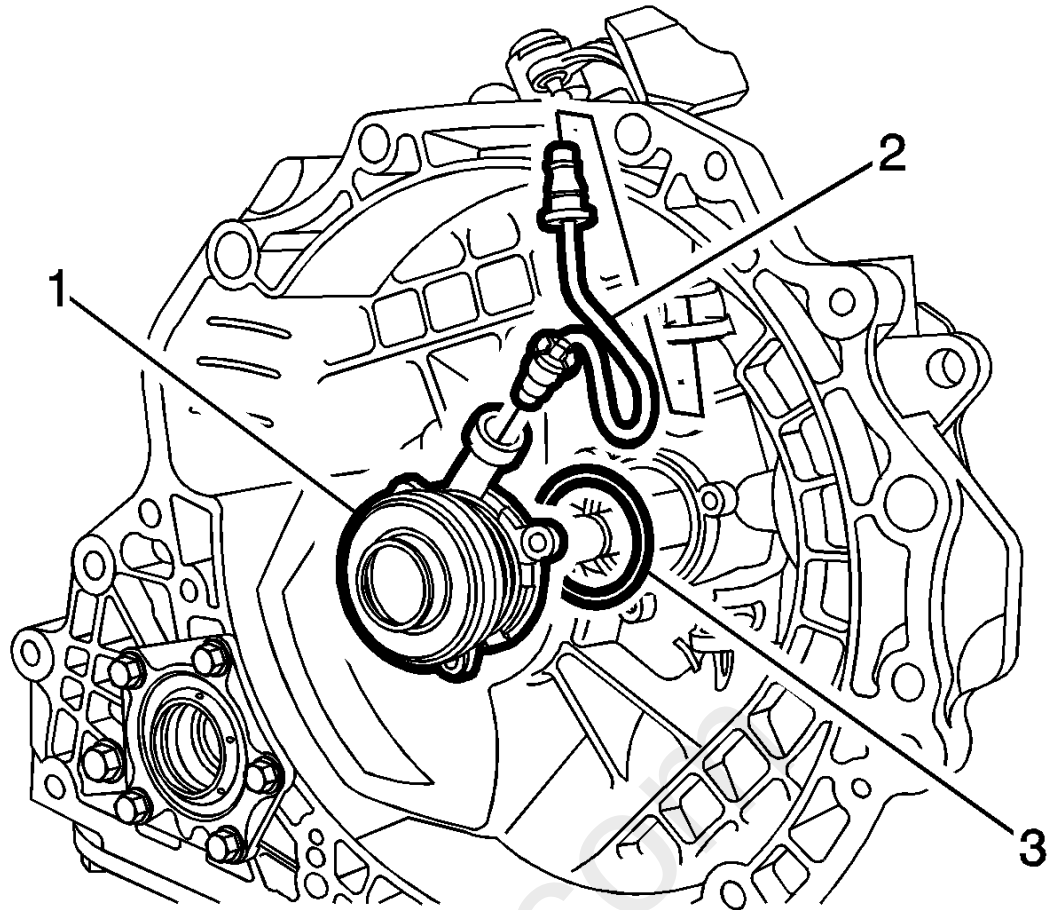


Fig. 70: Clutch Actuator Cylinder And Pipe
Courtesy of GENERAL MOTORS COMPANY

7. Remove the clutch actuator cylinder (1) and the clutch actuator cylinder pipe (2) at the same time.

NOTE: Discard the clutch actuator cylinder seal.

8. Remove the seal (3).

Installation Procedure

1. Clean the 3 clutch actuator cylinder threaded holes in the transmission housing.

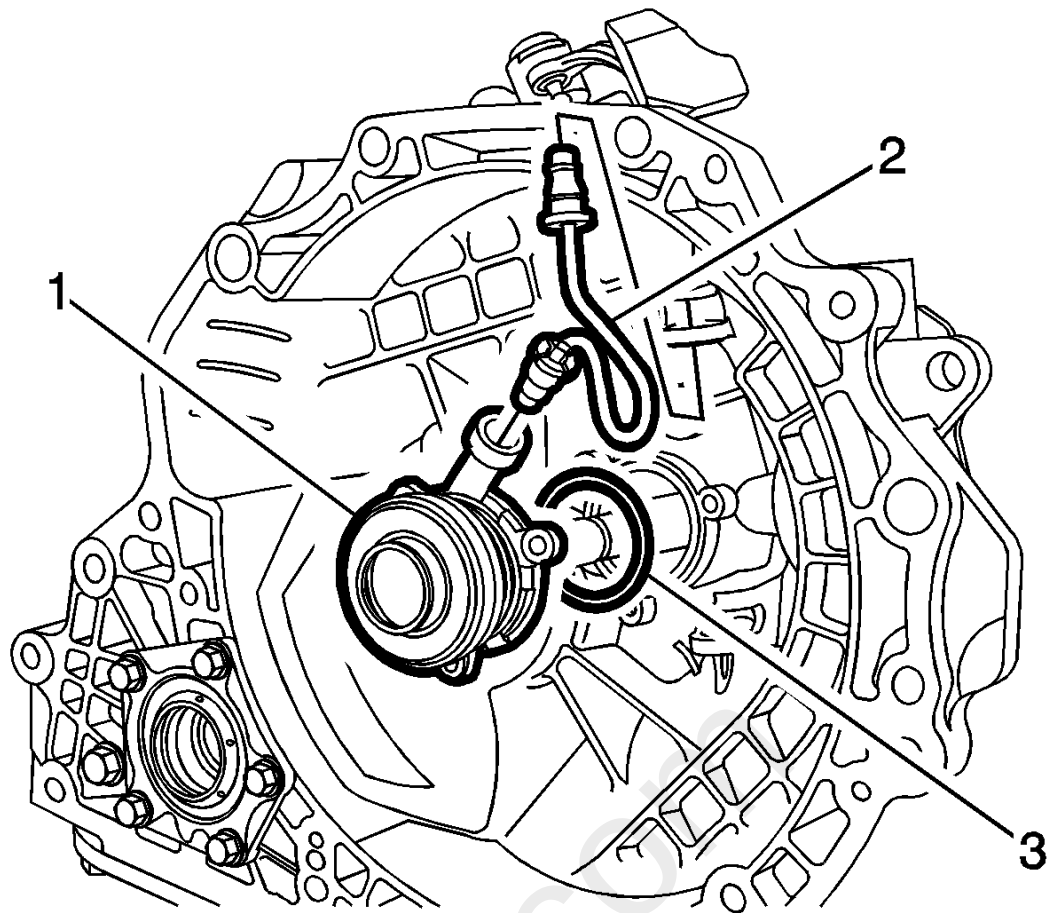


Fig. 71: Clutch Actuator Cylinder And Pipe

Courtesy of GENERAL MOTORS COMPANY

2. Install a NEW clutch actuator cylinder seal (3).
3. Install the clutch actuator cylinder (1) and clutch actuator cylinder pipe (2).

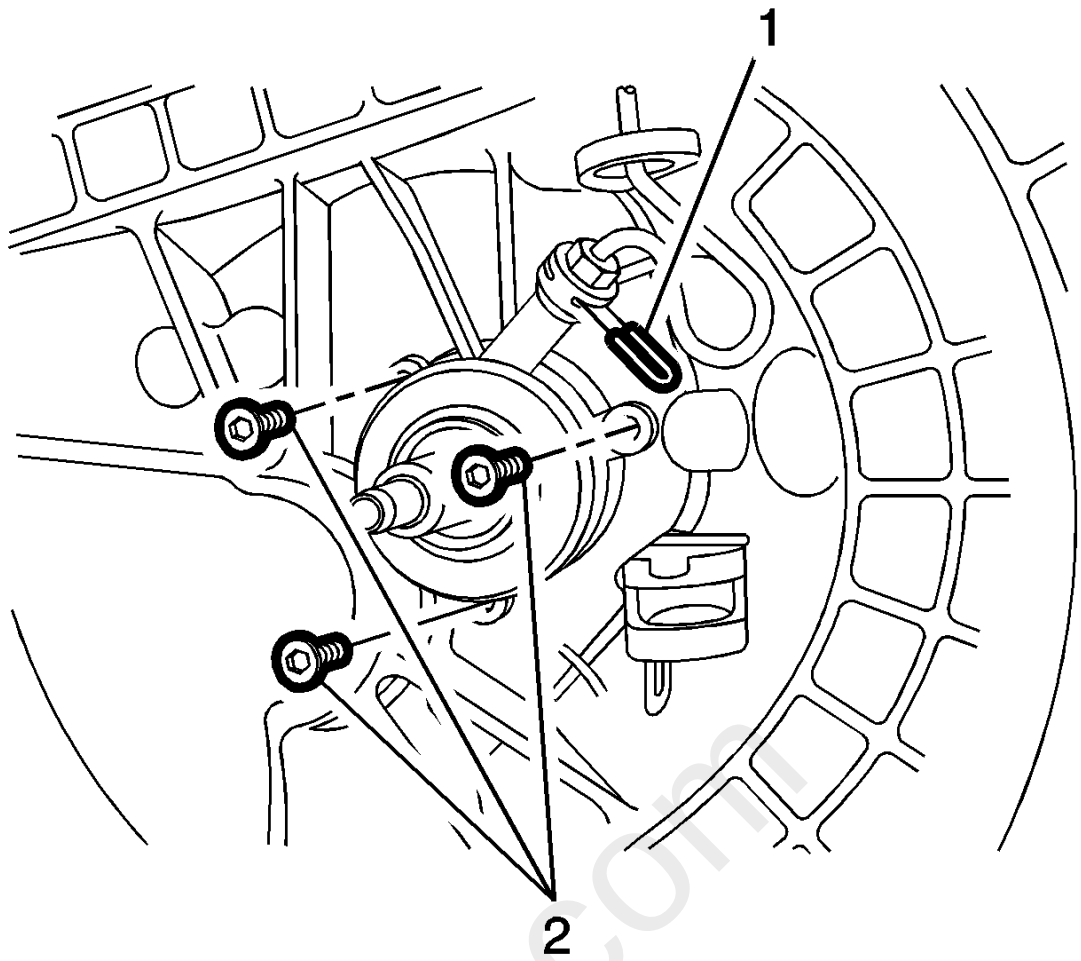


Fig. 72: Clutch Actuator Cylinder And Bolts

Courtesy of GENERAL MOTORS COMPANY

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

4. Install the 3 clutch actuator cylinder bolts (2) and tighten to 8 N.m (71 lb in).
5. Install the clutch actuator cylinder pipe clip (1).

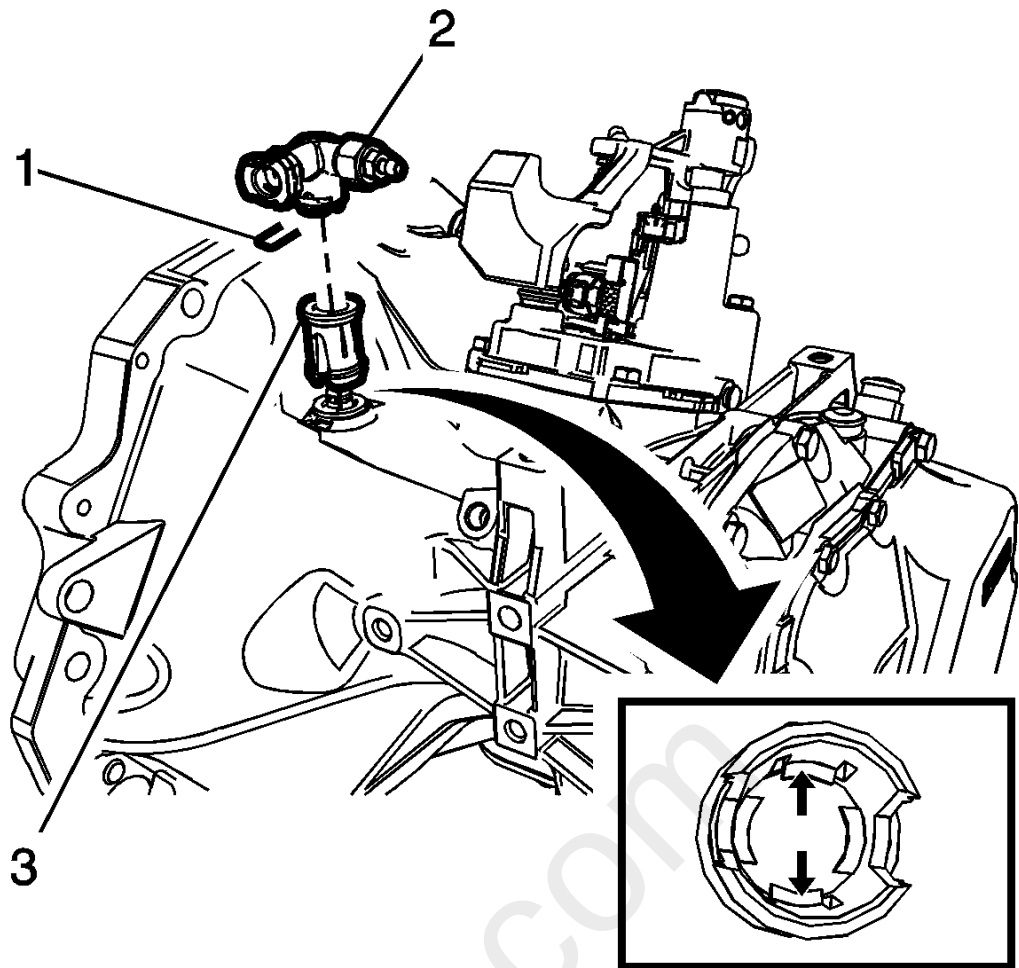


Fig. 73: Actuator Cylinder Pipe Connector Elbow And Clip
Courtesy of GENERAL MOTORS COMPANY

6. Install the fastening sleeve (3) to the transmission housing and clutch actuator cylinder pipe.
7. Install the clutch actuator cylinder pipe connector elbow (2) to the clutch actuator cylinder pipe end.
8. Install the connector elbow clip (1).
9. Install the transmission. Refer to [Transmission Replacement](#) .

CLUTCH ACTUATOR CYLINDER REPLACEMENT (M20/M32)

Removal Procedure

1. Remove the transmission. Refer to [Transmission Replacement](#) .

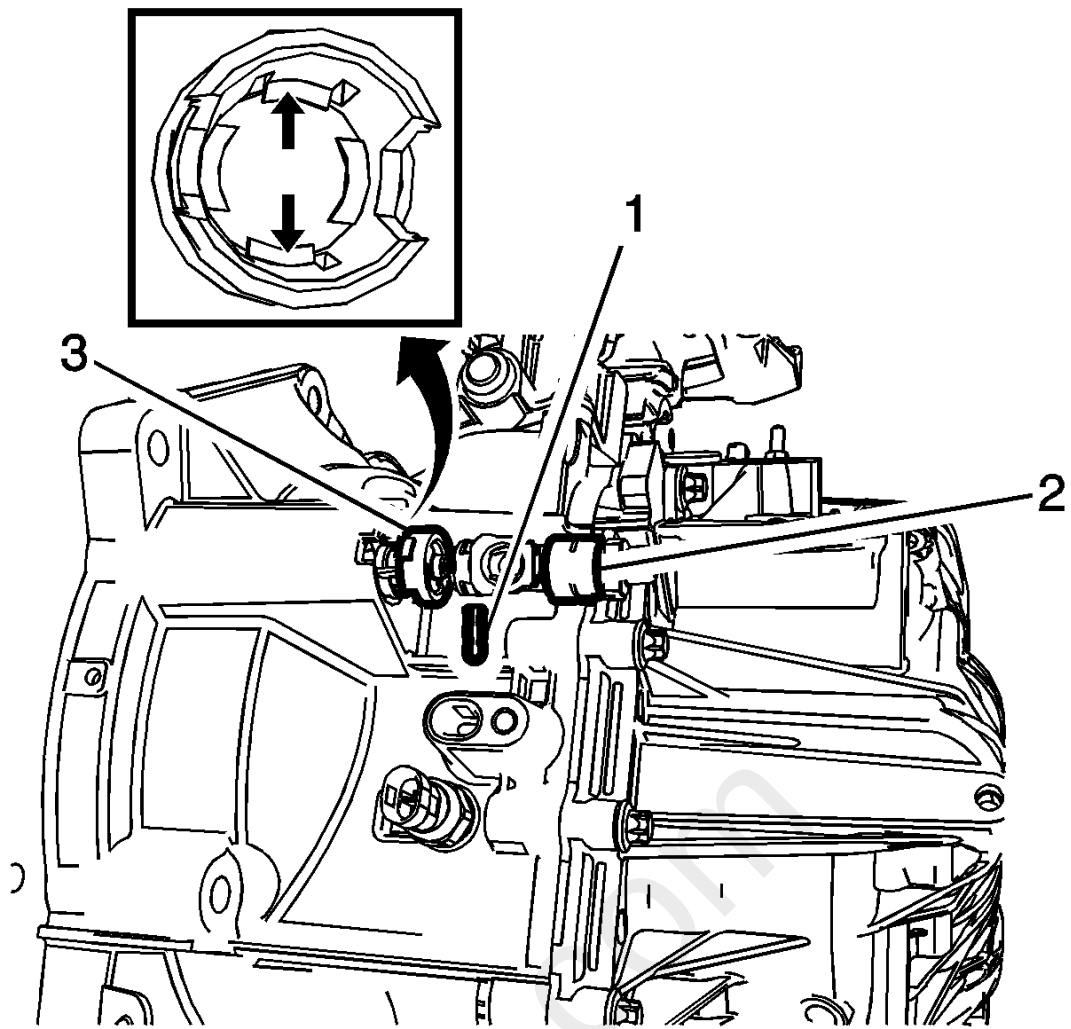


Fig. 74: Clutch Actuator Cylinder Pipe Connector Elbow, Clip & Fastening Sleeve
Courtesy of GENERAL MOTORS COMPANY

2. Remove the clutch actuator cylinder pipe connector elbow clip (1) from the clutch actuator elbow.
3. Remove the connector elbow (2) from the clutch actuator cylinder pipe end.

NOTE: Release the fastening sleeve key (arrows) using a screwdriver or equivalent to remove the fastening sleeve.

4. Remove the fastening sleeve (3) from the transmission housing and clutch actuator cylinder pipe.

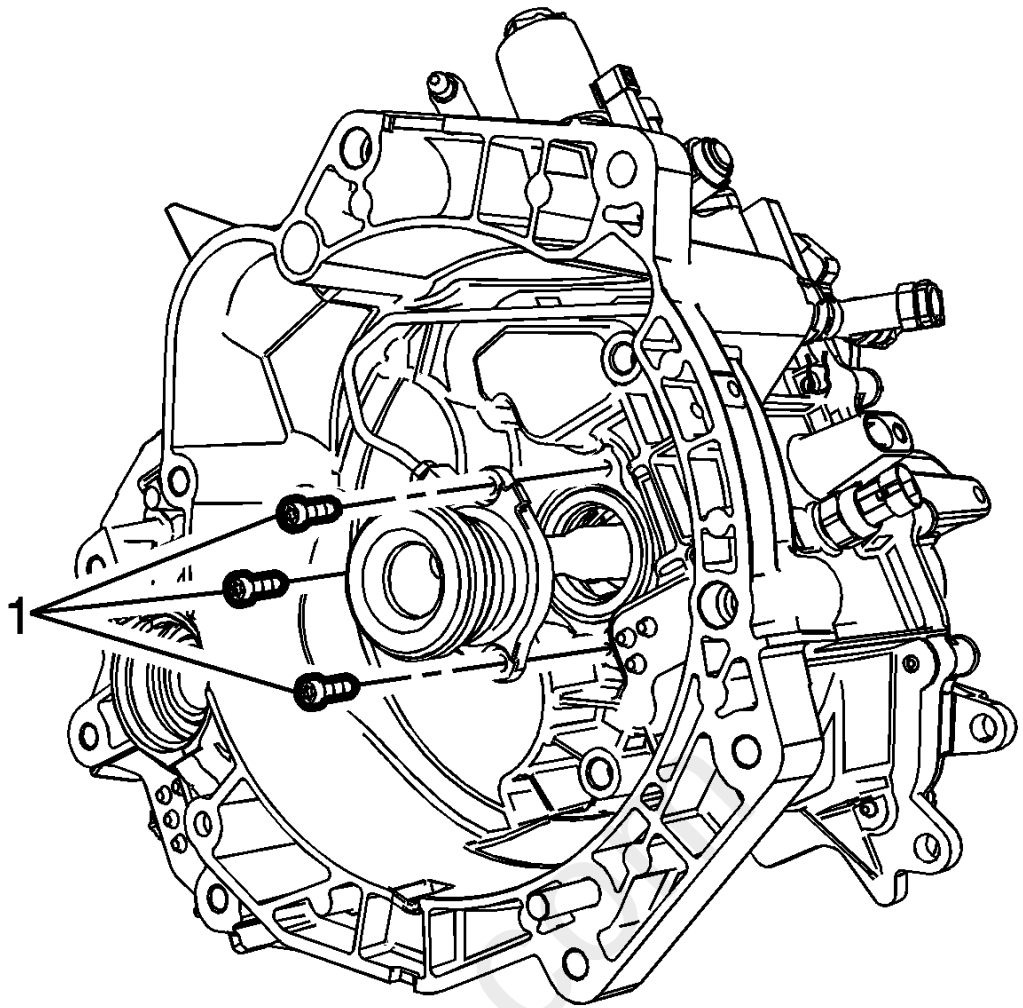


Fig. 75: Clutch Actuator Cylinder Bolts
Courtesy of GENERAL MOTORS COMPANY

5. Remove the 3 clutch actuator cylinder bolts (1).

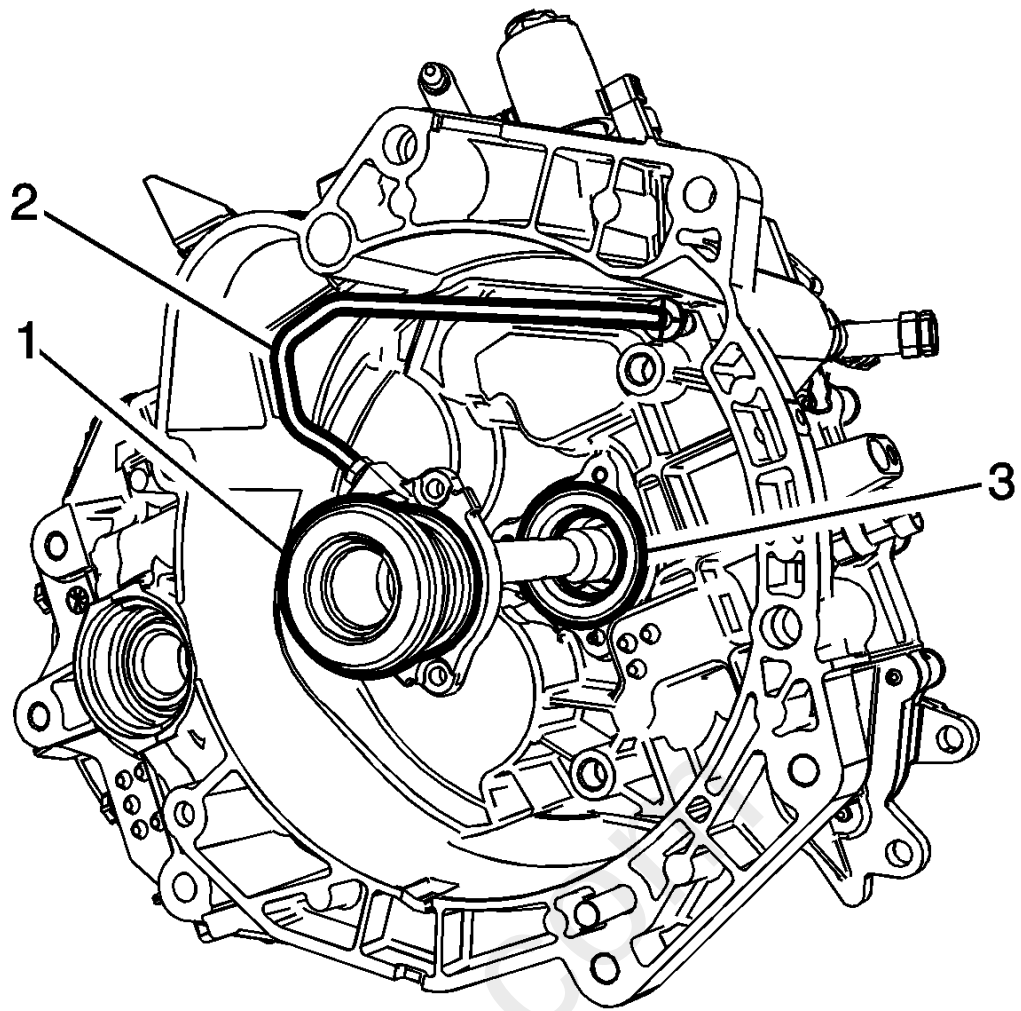


Fig. 76: Clutch Actuator Cylinder, Pipe & Seal
Courtesy of GENERAL MOTORS COMPANY

6. Remove the clutch actuator cylinder (1) and the clutch actuator cylinder pipe (2) at the same time.

NOTE: Discard the clutch actuator cylinder seal.

7. Remove the seal (3).

Installation Procedure

1. Clean the 3 clutch actuator cylinder threaded holes in the transmission housing.

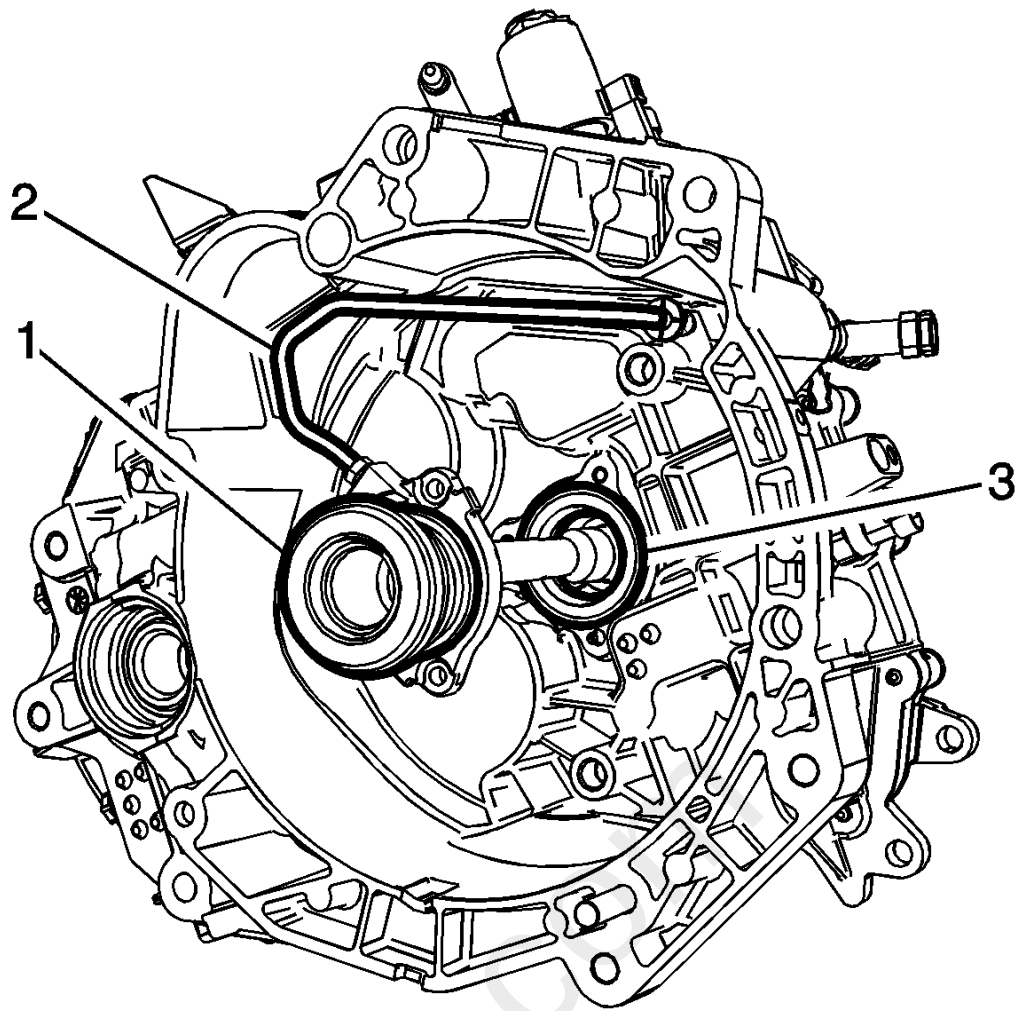


Fig. 77: Clutch Actuator Cylinder, Pipe & Seal
Courtesy of GENERAL MOTORS COMPANY

2. Install a NEW clutch actuator cylinder seal (3).
3. Install the clutch actuator cylinder (1) and clutch actuator cylinder pipe (2).

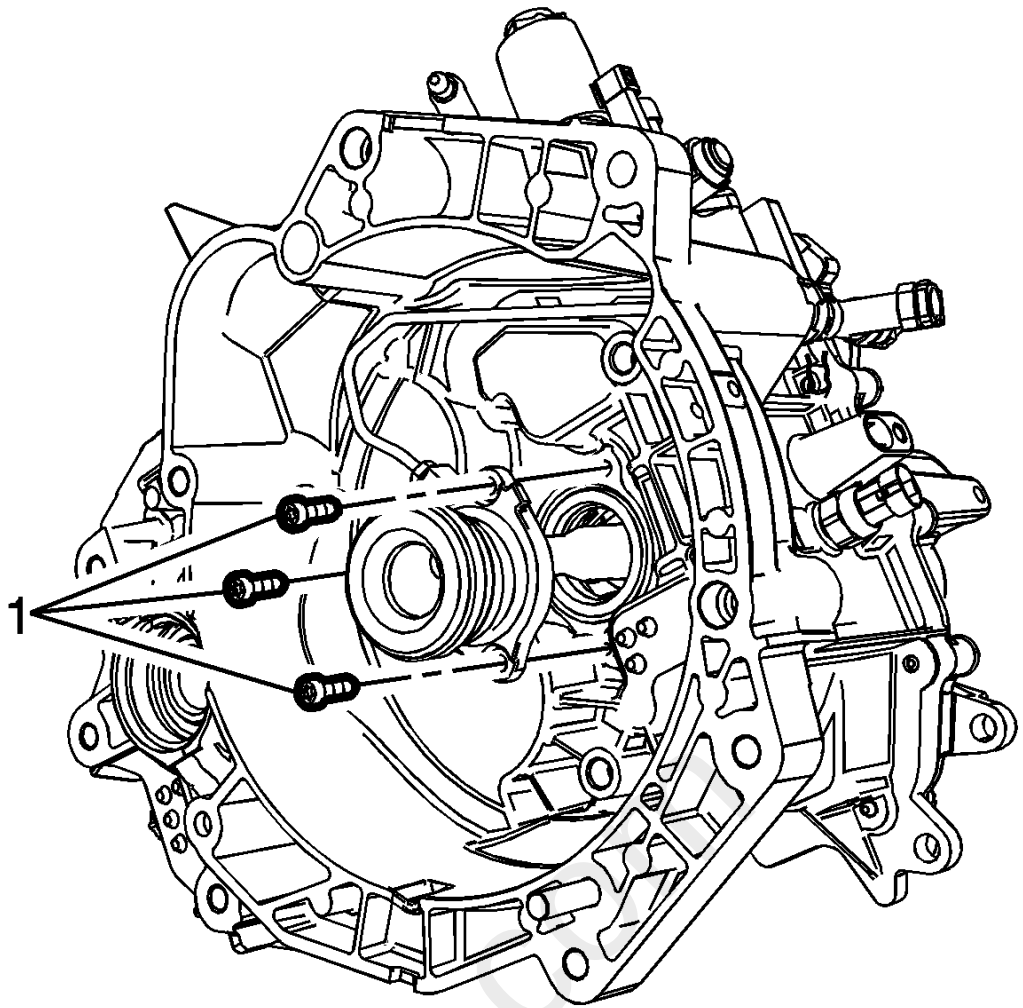


Fig. 78: Clutch Actuator Cylinder Bolts

Courtesy of GENERAL MOTORS COMPANY

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

4. Install the 3 clutch actuator cylinder bolts (1) and tighten to 6 N.m (53 lb in).

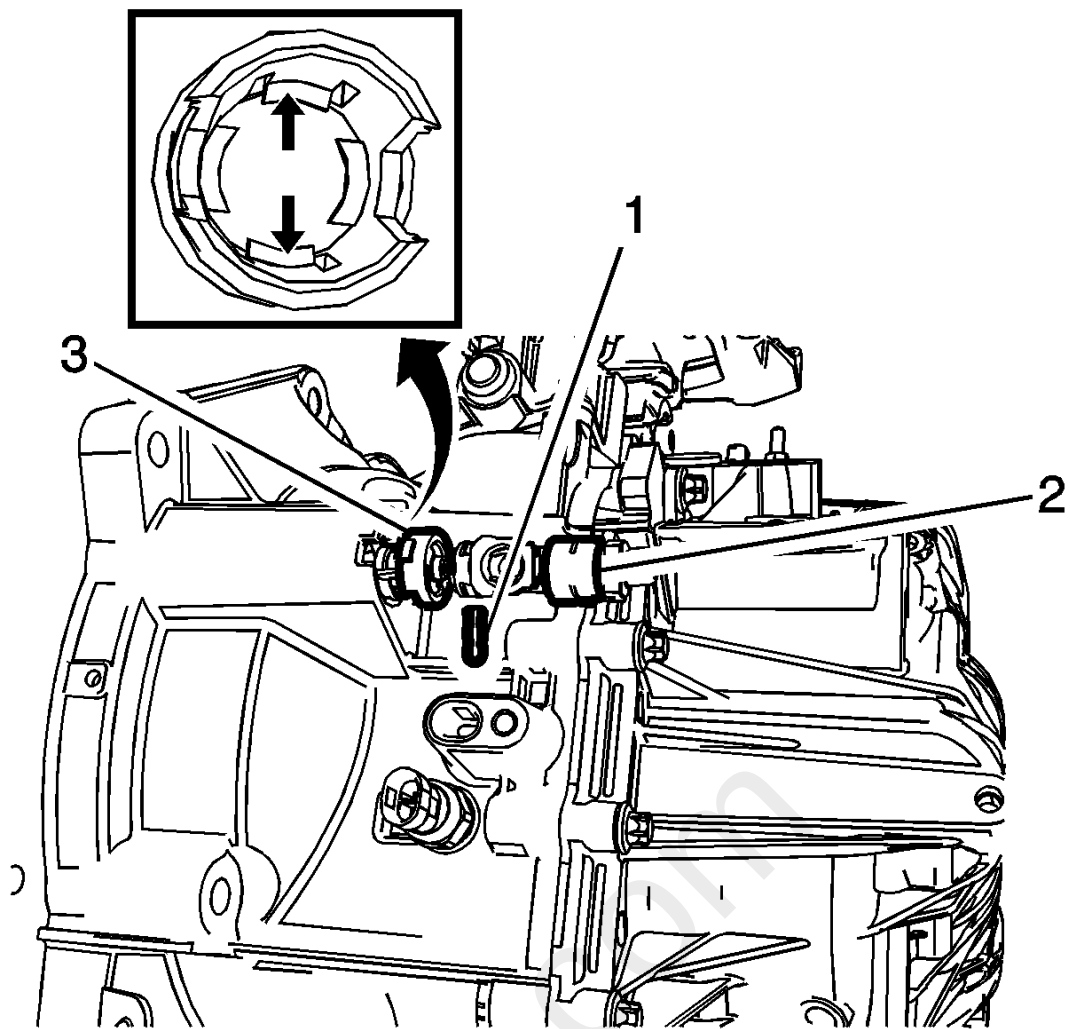


Fig. 79: Clutch Actuator Cylinder Pipe Connector Elbow, Clip & Fastening Sleeve
 Courtesy of GENERAL MOTORS COMPANY

5. Install the fastening sleeve (3) to the transmission housing and clutch actuator cylinder pipe.
6. Install the clutch actuator cylinder pipe connector elbow (2) to the clutch actuator cylinder pipe end.
7. Install the connector elbow clip (1).
8. Install the transmission. Refer to [Transmission Replacement](#).

DESCRIPTION AND OPERATION

CLUTCH SYSTEM DESCRIPTION AND OPERATION

Clutch Spin Down Time

Inspect the clutch spin down time as follows:

WARNING: For vehicles equipped with push button start in which a clutch malfunction is suspected, always sit in the driver's seat and firmly apply the brake before starting the vehicle. Do not press the "start" button for any reason from outside the vehicle. A vehicle with a malfunctioning clutch could immediately move when started, which could cause personal injury or property damage.

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:

WARNING: For vehicles equipped with push button start in which a clutch malfunction is suspected, always sit in the driver's seat and firmly apply the brake before starting the vehicle. Do not press the "start" button for any reason from outside the vehicle. A vehicle with a malfunctioning clutch could immediately move when started, which could cause personal injury or property damage.

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

Clutch Driven Members

WARNING: For vehicles equipped with push button start in which a clutch malfunction is suspected, always sit in the driver's seat and firmly apply the brake before starting the vehicle. Do not press the "start" button for any reason from outside the vehicle. A vehicle with a malfunctioning clutch could immediately move when started, which could cause personal injury or property damage.

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

CAUTION: 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

WARNING: For vehicles equipped with push button start in which a clutch malfunction is suspected, always sit in the driver's seat and firmly apply the brake before starting the vehicle. Do not press the "start" button for any reason from outside the vehicle. A vehicle with a malfunctioning clutch could immediately move when started, which could cause personal injury or property damage.

The clutch system consists of the following components:

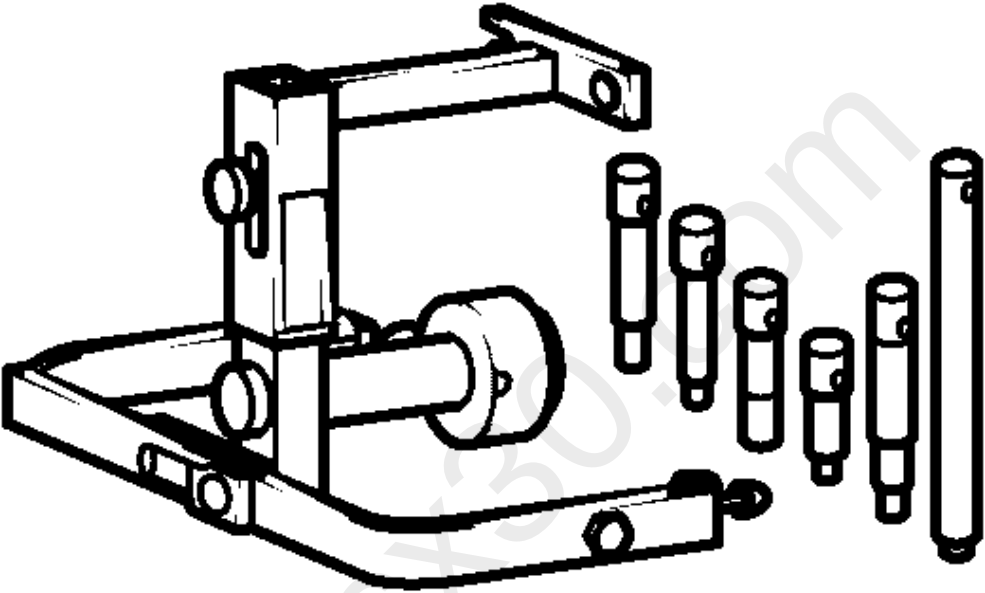
- A master cylinder with a remote reservoir and with the clutch actuator cylinder front pipe
- A clutch pedal position sensor
- An clutch actuator cylinder
- The clutch pressure plate
- The clutch cover
- The diaphragm spring
- The clutch driven plate
- The torsional springs

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 clutch actuator cylinder. The clutch actuator cylinder then pushes the release bearing into the diaphragm spring to disengage the clutch. A hole in the bulkhead accommodates the master cylinder. A quick connect coupling attaches the clutch actuator cylinder front pipe assembly to the actuator cylinder. The actuator cylinder is inside the transmission and on the input bearing retainer. The master cylinder and clutch actuator cylinder front pipe 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 clutch pedal position sensor on the clutch pedal/bracket assembly has 2 functions. One function (if equipped) 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.

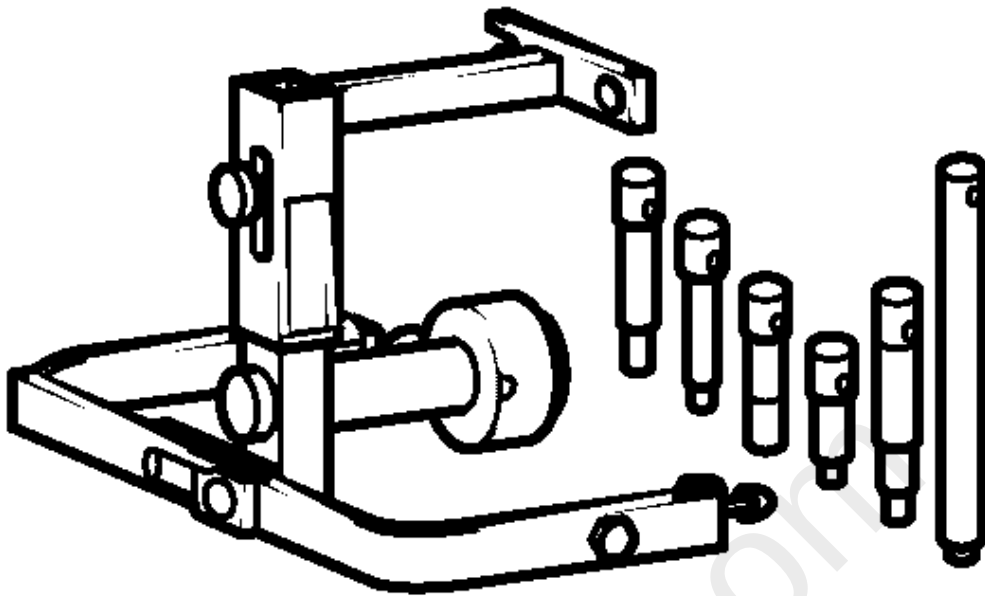
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/ Description
	DT-6263 KM-6263 Remover/Installer

Illustration

Tool Number/ Description



DT-6263-1
KM-6263-1
Brace, Part of
DT-6263

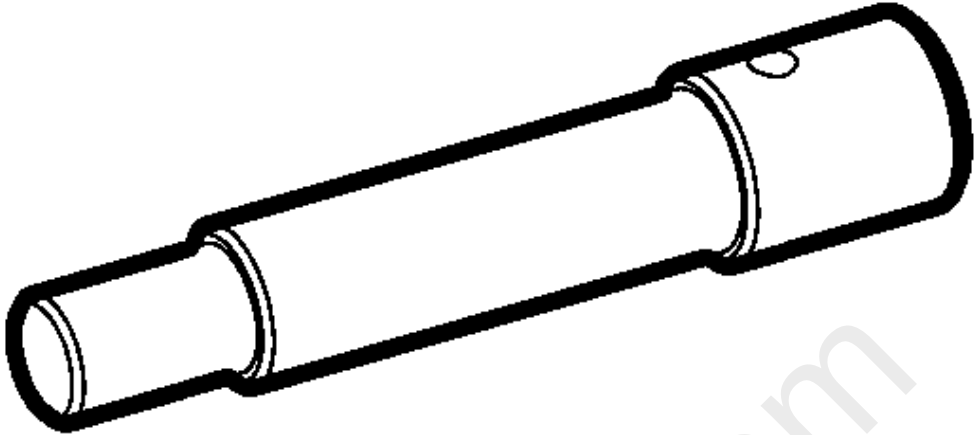
Illustration	Tool Number/ Description
 A technical line drawing of a center guide tool. It consists of a long, cylindrical body. One end has a smaller diameter section, and the other end has a larger diameter section. There are two distinct steps or changes in diameter along the length of the tool. A small circular feature is visible on the larger diameter section near the right end. The drawing is oriented diagonally from the bottom-left towards the top-right.	DT-6263-28 KM-6263-28 Center Guide

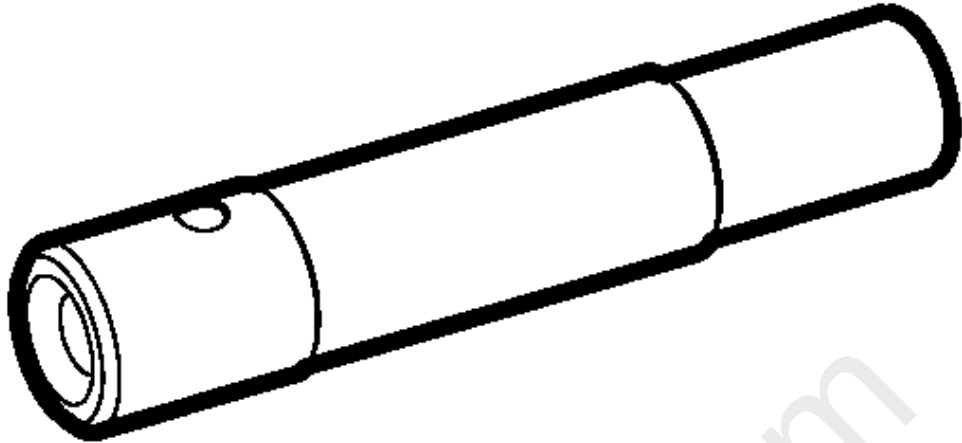
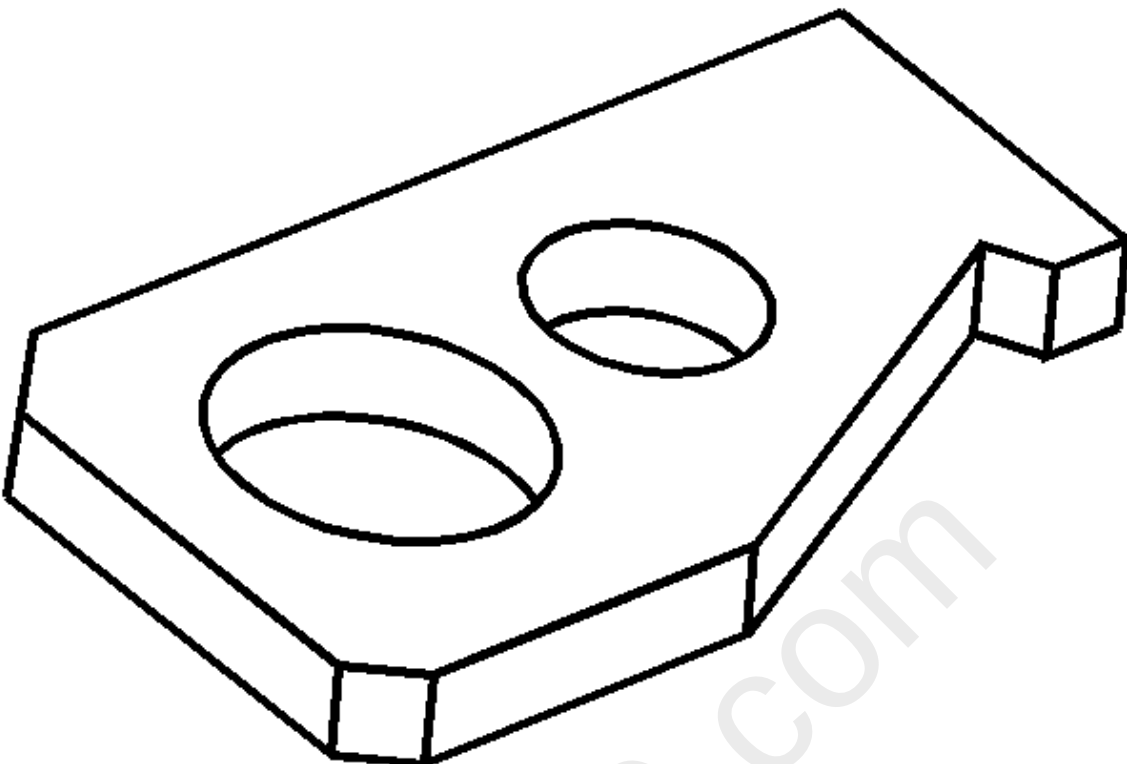
Illustration	Tool Number/ Description
	DT-6263-30 KM-6263-30 Center Guide

Illustration	Tool Number/ Description
	EN-652 KM-652 Flywheel Holder