

Clutch

Specifications

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Clutch Master Cylinder Bolts	4.5 N•m	40 lb in
Clutch Actuator Cylinder Bolts		
D16 (MFH, MXP)	8 N•m	71 lb in
F17 (M26, MEM)	5 N•m	44 lb in
M20 (MZ7) and M32 (MZ4)	6 N•m	53 lb in
Y4M SHD (MX3)	8 N•m	71 lb in
Clutch Actuator Cylinder Pipe Fitting	14 N•m	124 lb in
Clutch Pedal Position Sensor Bolt	3 N•m	27 lb in
Clutch Pressure Plate-to-Flywheel Bolts		
1.2L (LDC, LWD) and 1.4L (L2I, L2N, LDD)– F17 (M26)	15 N•m	11 lb ft
1.4L (LCU) and 1.5L (L2B)– Y4M SHD (MX3)	28 N•m	21 lb ft
1.4L (LUV)– M32 (MZ4)	28 N•m	21 lb ft
1.6L (LDE, LED, LFJ)– D16 (MFH, MXP)	15 N•m	11 lb ft
1.3L Diesel (LDV, LSF)– F17 (M26, MEM)	14 N•m	124 lb in
1.3L Diesel (LSF)– M20 (MZ7)	14 N•m	124 lb in

General Specifications

Application	Specification	
	Metric	English
Fluid	Use only GM approved brake fluid from a clean, sealed brake fluid container	
Inside Diameter		
1.2L LCD, LWD (F17 Manual Transmission)	134 mm	5.276 in
1.4L L2I, L2N, LDD (F17 Manual Transmission)	145 mm	5.276 in
1.4L LCU (Y4M SHD Manual Transmission)	145 mm	5.709 in
1.5L L2B (Y4M SHD Manual Transmission)	145 mm	5.709 in
1.6L LDE, LED, LFJ (D16 Manual Transmission)	145 mm	5.709 in
1.3L LDV,LSF (F17 Manual Transmission)	146 mm	5.748 in
1.3L LSF (M20 Manual Transmission)	146 mm	5.748 in
1.4L LUV (M32 Manual Transmission)	146 mm	5.748 in
Outside Diameter		
1.2L LCD, LWD (F17 Manual Transmission)	200 mm	7.874 in
1.4L L2I, L2N, LDD (F17 Manual Transmission)	200 mm	7.874 in
1.4L LCU (Y4M SHD Manual Transmission)	215 mm	8.465 in
1.5L L2B (Y4M SHD Manual Transmission)	215 mm	8.465 in
1.6L LDE, LED, LFJ (D16 Manual Transmission)	215 mm	8.465 in
1.3L LDV,LSF (F17 Manual Transmission)	216 mm	8.504 in
1.3L LSF (M20 Manual Transmission)	216 mm	8.504 in
1.4L LUV (M32 Manual Transmission)	216 mm	8.504 in

General Specifications (cont'd)

Application	Specification	
	Metric	English
Thickness		
1.2L LCD, LWD (F17 Manual Transmission)	8.55 mm (at without load)	0.337 in (at without load)
1.4L L2I, L2N, LDD (F17 Manual Transmission)	8.55 mm (at without load)	0.337 in (at without load)
1.4L LCU (Y4M SHD Manual Transmission)	8.40 mm (at without load)	0.331 in (at without load)
1.5L L2B (Y4M SHD Manual Transmission)	8.40 mm (at without load)	0.331 in (at without load)
1.6L LDE, LED, LFJ (D16 Manual Transmission)	8.40 mm (at without load)	0.331 in (at without load)
1.3L LDV,LSF (F17 Manual Transmission)	7.95 mm (at without load)	0.313 in (at without load)
1.3L LSF (M20 Manual Transmission)	7.95 mm (at without load)	0.313 in (at without load)
1.4L LUV (M32 Manual Transmission)	7.95 mm (at without load)	0.313 in (at without load)
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 on page 17-402*
- *Clutch Grabbing on page 17-403*
- *Clutch Rattle on page 17-404*
- *Release Bearing Noisy with Clutch Engaged on page 17-405*
- *Clutch Noisy on page 17-405*
- *Clutch Pedal Hard to Push on page 17-405.*

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 <i>Clutch Pressure and Driven Plate Replacement (1.4L) on page 17-416</i> or <i>Clutch Pressure and Driven Plate Replacement (1.8L) on page 17-419.</i>
Clutch disc hub binding on the input shaft splines.	Replace the clutch assembly. Refer to <i>Clutch Pressure and Driven Plate Replacement (1.4L) on page 17-416</i> or <i>Clutch Pressure and Driven Plate Replacement (1.8L) on page 17-419.</i>
Warped or bent clutch disc.	Replace the clutch assembly. Refer to <i>Clutch Pressure and Driven Plate Replacement (1.4L) on page 17-416</i> or <i>Clutch Pressure and Driven Plate Replacement (1.8L) on page 17-419.</i>
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.

Clutch Does Not Disengage (cont'd)

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 <i>Clutch Master Cylinder Replacement</i> on page 17-408.
Air in the hydraulic clutch system.	Bleed the hydraulic clutch system. Refer to <i>Hydraulic Clutch System Bleeding</i> on page 17-415.
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 <i>Clutch Actuator Cylinder Replacement (F17)</i> on page 17-422 or <i>Clutch Actuator Cylinder Replacement (M20/32)</i> on page 17-423.
Hydraulic clutch master cylinder leaking internally.	1. Inspect for proper pedal reserve. 1.1. Let up halfway on pedal. 1.2. Apply the pedal a few times. 1.3. 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 <i>Clutch Master Cylinder Replacement</i> on page 17-408.

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 <i>Symptoms - Clutch</i> on page 17-401 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 <i>Clutch Pedal Position Sensor Replacement</i> on page 17-415.
The clutch pedal return spring is broken or missing.	Replace the clutch pedal return spring, if equipped. Refer to <i>Clutch Pedal Replacement</i> on page 17-405.
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 <i>Clutch Pedal Replacement</i> on page 17-405.
Clutch master cylinder binding or seized.	Replace the clutch master cylinder. Refer to <i>Clutch Master Cylinder Replacement</i> on page 17-408.
Clutch actuator cylinder binding or seized.	Replace the clutch actuator cylinder. Refer to <i>Clutch Actuator Cylinder Replacement (F17)</i> on page 17-422 or <i>Clutch Actuator Cylinder Replacement (M20/32)</i> on page 17-423.
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 <i>Clutch Actuator Cylinder Front Pipe Replacement</i> on page 17-410.
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 <i>Clutch Pressure and Driven Plate Replacement (1.4L)</i> on page 17-416 or <i>Clutch Pressure and Driven Plate Replacement (1.8L)</i> on page 17-419.
Oil-soaked clutch disc.	Correct the leak at its source and install a new clutch disc.

Clutch Slipping (cont'd)

Cause	Actions
Weak diaphragm spring.	Replace the clutch assembly. Refer to <i>Clutch Pressure and Driven Plate Replacement (1.4L)</i> on page 17-416 or <i>Clutch Pressure and Driven Plate Replacement (1.8L)</i> on page 17-419.
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 <i>Clutch Pressure and Driven Plate Replacement (1.4L)</i> on page 17-416 or <i>Clutch Pressure and Driven Plate Replacement (1.8L)</i> on page 17-419.
Burnt or glazed clutch discs.	Replace the clutch assembly. Refer to <i>Clutch Pressure and Driven Plate Replacement (1.4L)</i> on page 17-416 or <i>Clutch Pressure and Driven Plate Replacement (1.8L)</i> on page 17-419.
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 <i>Symptoms - Clutch</i> on page 17-401 and perform the necessary inspections.	
Grease or oil contamination on the clutch facings	1. Repair the cause of the oil leak or grease contamination. 2. Clean the clutch facings. 3. Replace the clutch components if they will not clean. Refer to <i>Clutch Pressure and Driven Plate Replacement (1.4L)</i> on page 17-416 or <i>Clutch Pressure and Driven Plate Replacement (1.8L)</i> on page 17-419.
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 <i>Clutch Pedal Replacement</i> on page 17-405.
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 <i>Clutch Actuator Cylinder Replacement (F17)</i> on page 17-422 or <i>Clutch Actuator Cylinder Replacement (M20/32)</i> on page 17-423.
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 <i>Clutch Master Cylinder Replacement</i> on page 17-408.
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 <i>Clutch Pressure and Driven Plate Replacement (1.4L)</i> on page 17-416 or <i>Clutch Pressure and Driven Plate Replacement (1.8L)</i> on page 17-419.
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.

Clutch Grabbing (cont'd)

Cause	Action
	- Inspect the clutch disc for being installed backwards. - Replace the clutch assembly if it is damaged or the wrong components were installed. Refer to <i>Clutch Pressure and Driven Plate Replacement (1.4L)</i> on page 17-416 or <i>Clutch Pressure and Driven Plate Replacement (1.8L)</i> on page 17-419.
Clutch disc binding on the input shaft	- Inspect the input shaft for rust dirt or debris. Note: Do not use mineral or paraffin based oil to lubricate the splines. - Clean and lubricate the input shaft. - Inspect the clutch disc for a bent hub. - Replace the clutch assembly if the clutch disc is faulty. Refer to <i>Clutch Pressure and Driven Plate Replacement (1.4L)</i> on page 17-416 or <i>Clutch Pressure and Driven Plate Replacement (1.8L)</i> on page 17-419. - Inspect the input shaft for excessive wear on the splines, causing the clutch disc to bind. - Replace the transmission if input shaft is worn.
Clutch pressure plate damaged	- Inspect the pressure plate for bent drive straps caused by improper vehicle use. - Replace the clutch assembly if the clutch pressure plate is damaged. Inform the customer. Refer to <i>Clutch Pressure and Driven Plate Replacement (1.4L)</i> on page 17-416 or <i>Clutch Pressure and Driven Plate Replacement (1.8L)</i> on page 17-419.
Flywheel improperly machined	- Inspect the flywheel for being improperly machined, and causing interference with the clutch disc. - Replace the flywheel if it has been improperly machined.
Flywheel uneven	- Inspect the flywheel surface for being warped or uneven. - Replace the flywheel if it is faulty.

Clutch Rattle

Cause	Actions
DEFINITION: A rattle noise coming from the clutch components with the clutch disengaged or engaged. Review the <i>Symptoms - Clutch</i> on page 17-401 and perform the necessary inspections.	
Idle rattle clutch engaged	Replace the clutch disc, due to faulty damper springs. Refer to <i>Clutch Pressure and Driven Plate Replacement (1.4L)</i> on page 17-416 or <i>Clutch Pressure and Driven Plate Replacement (1.8L)</i> on page 17-419.
Clutch is improperly installed	Remove the clutch and install it correctly. Refer to <i>Clutch Pressure and Driven Plate Replacement (1.4L)</i> on page 17-416 or <i>Clutch Pressure and Driven Plate Replacement (1.8L)</i> on page 17-419.
Clutch disc damper worn or damaged	- Inspect the clutch disc for a broken or worn damper. - Replace the clutch assembly. Refer to <i>Clutch Pressure and Driven Plate Replacement (1.4L)</i> on page 17-416 or <i>Clutch Pressure and Driven Plate Replacement (1.8L)</i> on page 17-419.
Oil in the driven plate damper	Correct the cause of the oil leak and replace the clutch assembly. Refer to <i>Clutch Pressure and Driven Plate Replacement (1.4L)</i> on page 17-416 or <i>Clutch Pressure and Driven Plate Replacement (1.8L)</i> on page 17-419.
Clutch disc splines and input shaft splines worn	- Inspect the clutch disc hub to input shaft splines for excessive clearance. - Replace the clutch assembly if the clutch splines are worn. Refer to <i>Clutch Pressure and Driven Plate Replacement (1.4L)</i> on page 17-416 or <i>Clutch Pressure and Driven Plate Replacement (1.8L)</i> on page 17-419.

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

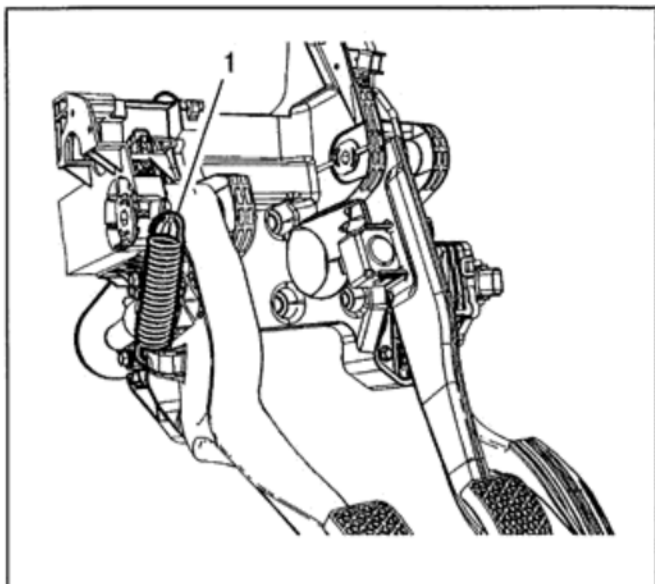
Cause	Actions
Clutch actuator cylinder damaged or worn.	Replace the clutch actuator cylinder. Refer to <i>Clutch Actuator Cylinder Replacement (F17)</i> on page 17-422 or <i>Clutch Actuator Cylinder Replacement (M20/32)</i> on page 17-423.

Clutch Pedal Hard to Push

Cause	Actions
DEFINITION: The clutch pedal requires high effort to operate. Review the <i>Symptoms - Clutch</i> on page 17-401 and perform the necessary inspections.	
Incorrect hydraulic fluid.	1. Inspect for the correct fluid in the master cylinder. Refer to <i>Hydraulic Clutch System Bleeding</i> on page 17-415. 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 <i>Clutch Master Cylinder Replacement</i> on page 17-408 and <i>Hydraulic Clutch System Bleeding</i> on page 17-415.
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 <i>Clutch Master Cylinder Replacement</i> on page 17-408. 4. Flush the hydraulic system and fill with the correct fluid. Refer to <i>Hydraulic Clutch System Bleeding</i> on page 17-415.
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 <i>Clutch Actuator Cylinder Front Pipe Replacement</i> on page 17-410.
Clutch disc worn too thin.	Replace the clutch assembly. Refer to <i>Clutch Pressure and Driven Plate Replacement (1.4L)</i> on page 17-416 or <i>Clutch Pressure and Driven Plate Replacement (1.8L)</i> on page 17-419.

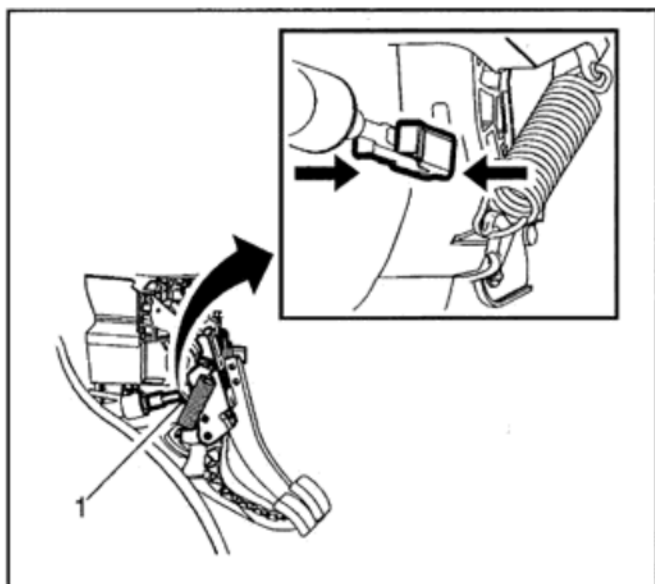
Repair Instructions**Clutch Pedal Replacement****Removal Procedure**

1. Remove the instrument panel lower trim panel cover. Refer to *Instrument Panel Lower Trim Pad Cover Replacement (Without AAL)* on page 2-40 or *Instrument Panel Lower Trim Pad Cover Replacement (With AAL)* on page 2-41.



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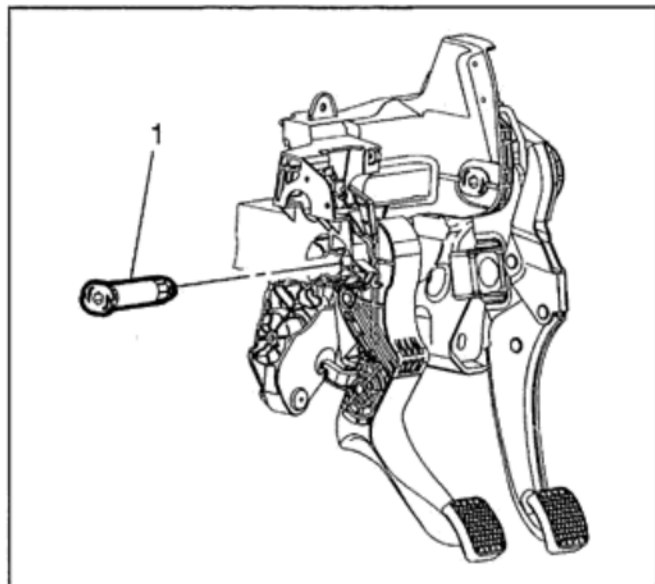
2. Remove the clutch pedal return spring (1).



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Note: Press the 2 latches (arrows) together.

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

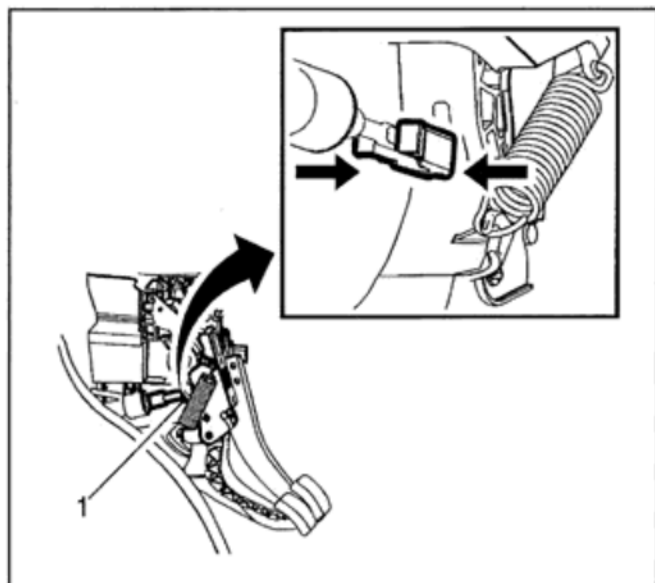


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4. Using a 10 mm (3/8 in) allen wrench, remove the clutch pedal pivot (1) by rotating the pin 1/4 turn counterclockwise.
5. Remove the clutch pedal assembly.

Installation Procedure

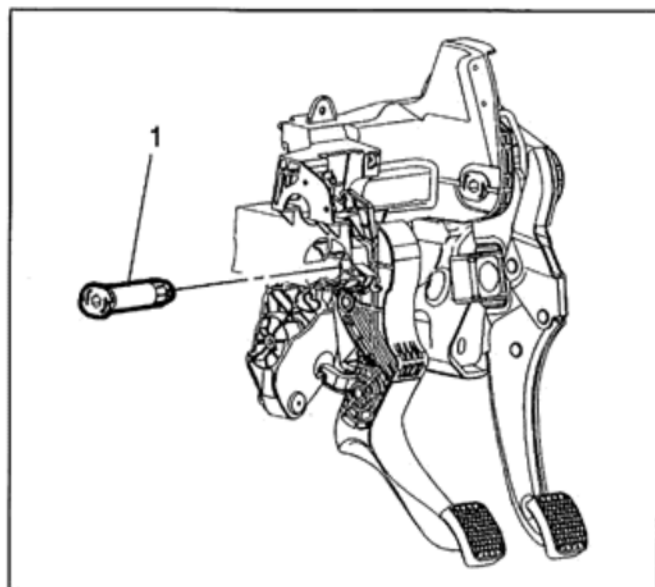
1. Install the clutch pedal assembly.



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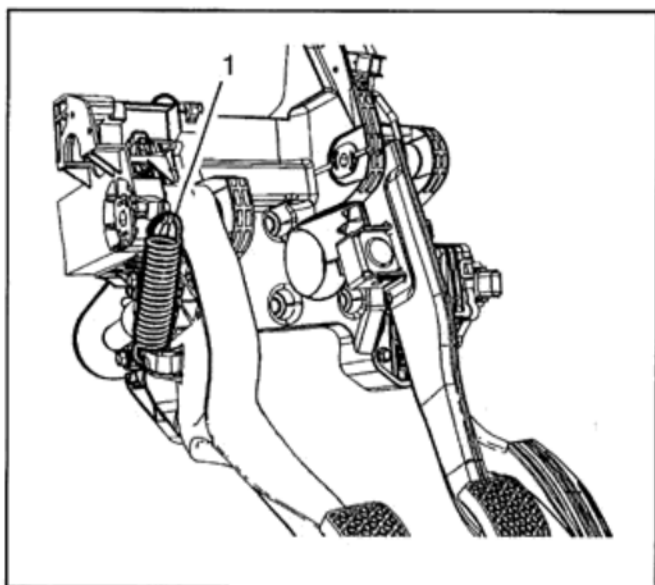
Note: An audible click will be heard when the clip is correctly seated.

2. Connect the push rod retainer (1) to the clutch pedal.



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3. Using a 10 mm (3/8 in) allen wrench, install the clutch pedal pivot (1) by rotating the pin 1/4 turn clockwise until the pivot pin locks in place.

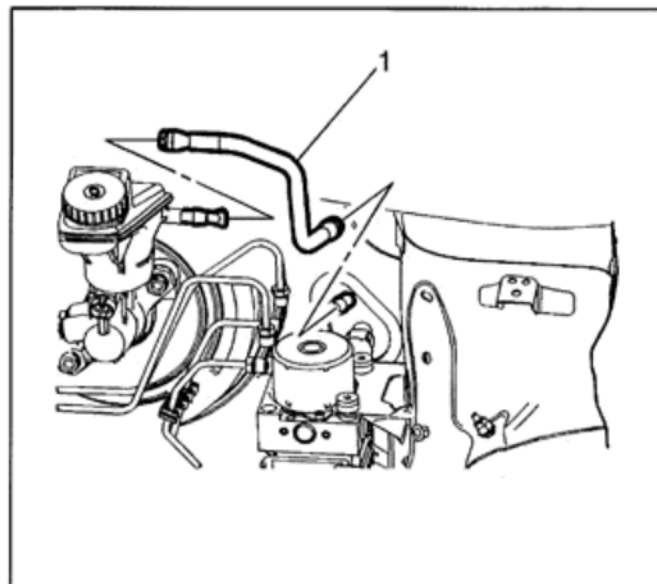


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4. Install the clutch pedal return spring (1).
5. Install the instrument panel lower trim panel cover. Refer to *Instrument Panel Lower Trim Pad Cover Replacement (Without AAL)* on page 2-40 or *Instrument Panel Lower Trim Pad Cover Replacement (With AAL)* on page 2-41.

Clutch Master Cylinder Reservoir Hose Replacement

Removal Procedure

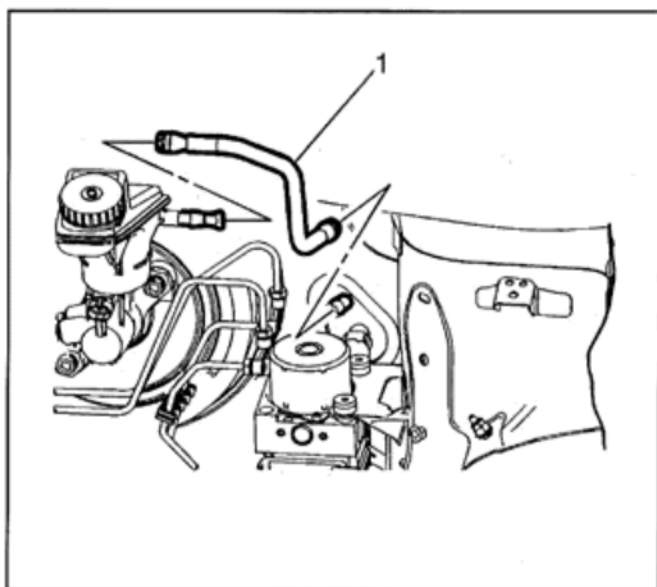


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Note: Before disconnecting the reservoir tank hose, remove the clutch/brake fluid from the reservoir tank.

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

Installation Procedure



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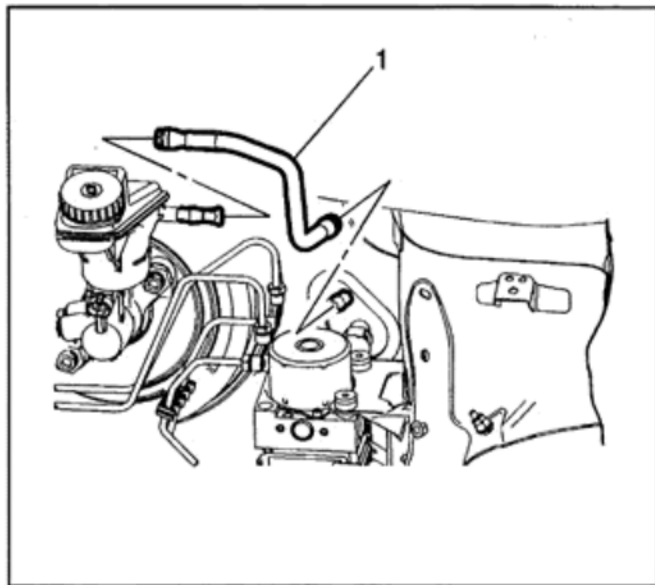
1. Install the clutch master cylinder reservoir hose (1) to the reservoir tank and the master cylinder.
2. Bleed The hydraulic clutch system. Refer to *Hydraulic Clutch System Bleeding* on page 17-415.

3. Fill the reservoir with GM approved brake fluid from a clean, sealed brake fluid container up to the MAX level.

Clutch Master Cylinder Replacement

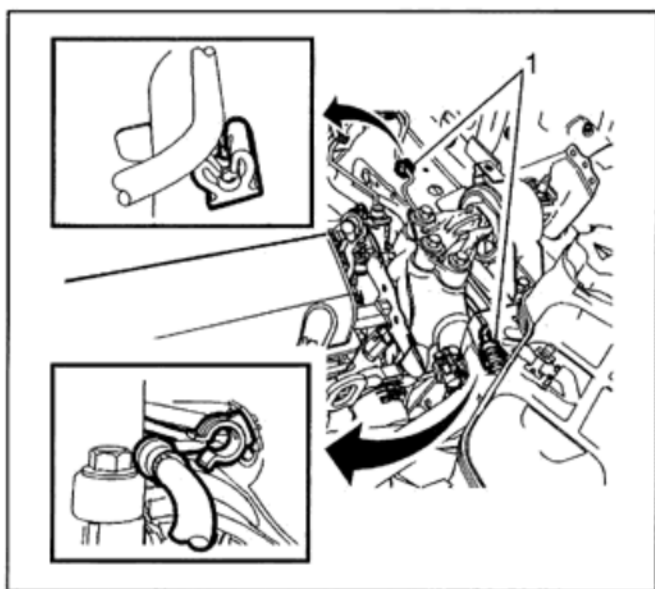
Removal Procedure

1. Remove the battery tray. Refer to *Battery Tray Replacement* on page 9-721.
2. Remove as much brake fluid out of brake fluid reservoir as possible.



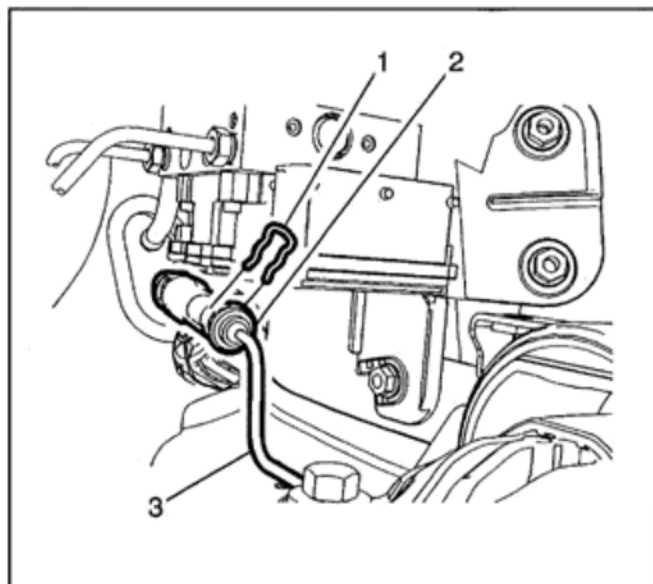
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3. Remove the clutch master cylinder reservoir hose (1) from the clutch master cylinder.



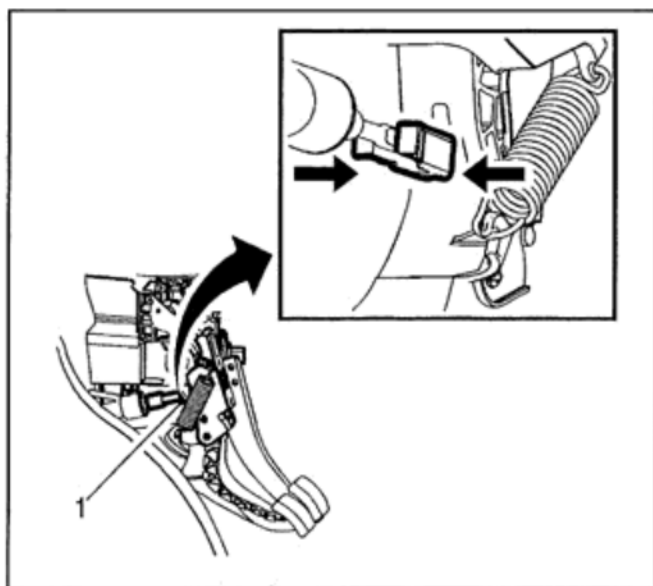
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4. Unclip the clutch actuator cylinder front pipe from the 2 retainers (1).



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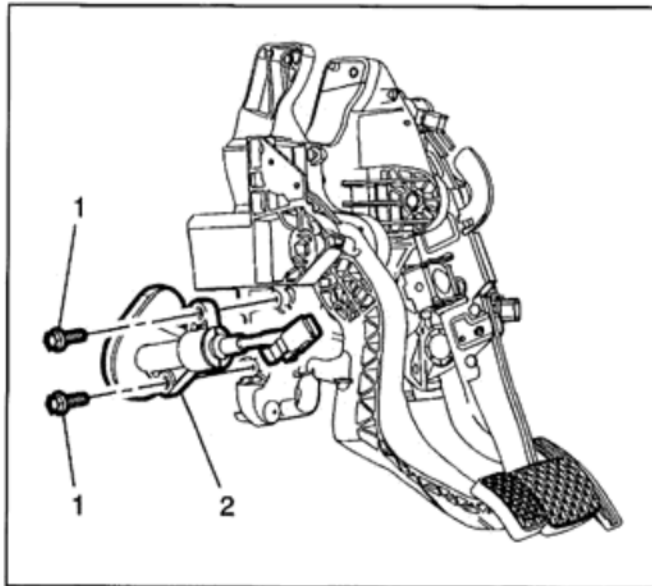
5. Remove the retaining clip (1).
6. Disconnect the clutch actuator cylinder front pipe (3) from the clutch master cylinder (2).
7. Remove the brake pedal assembly. Refer to *Brake Pedal Assembly Replacement* on page 5-151.



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Note: Press the 2 latches (arrows) together.

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

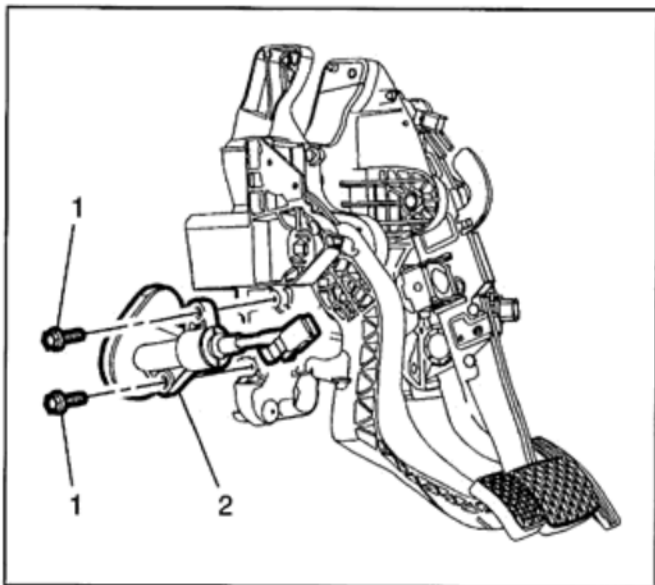


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9. Remove the 2 clutch master cylinder fasteners (1).
10. Remove the clutch master cylinder from the brake pedal assembly.

Installation Procedure

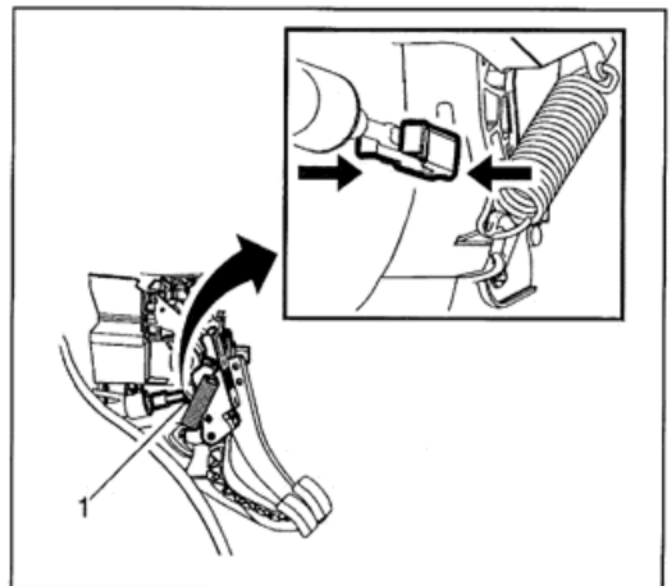
1. Install the clutch master cylinder into the brake pedal assembly.



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Caution: Refer to *Fastener Caution* on page 0-8.

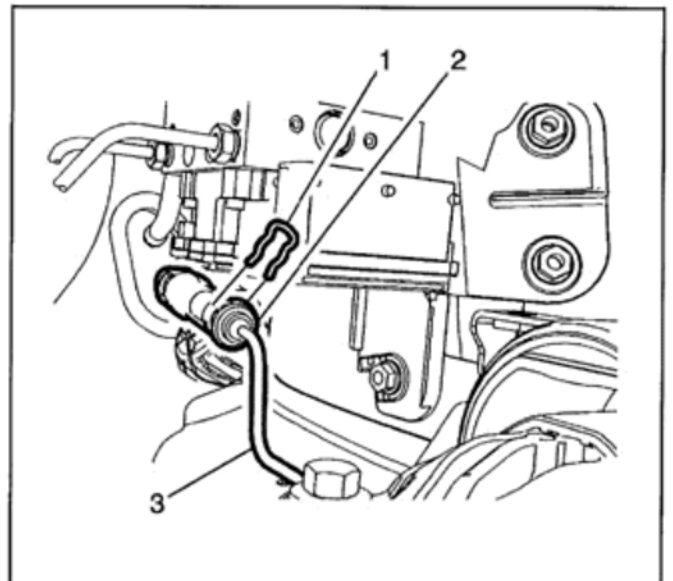
2. Install the 2 clutch master cylinder fasteners (1) and tighten to **4.5N•m (40 lb in)**.



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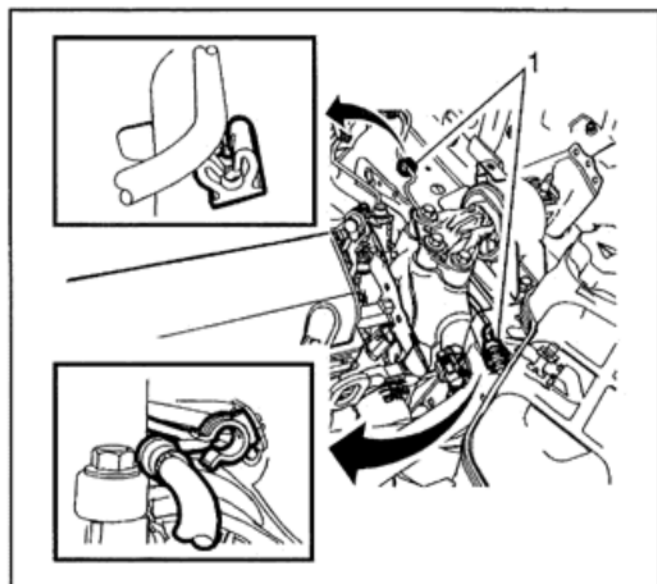
Note: An audible click will be heard when the clip is correctly seated.

3. Connect the push rod retainer (1) to the clutch pedal.
4. Install the brake pedal assembly. Refer to *Brake Pedal Assembly Replacement* on page 5-151.



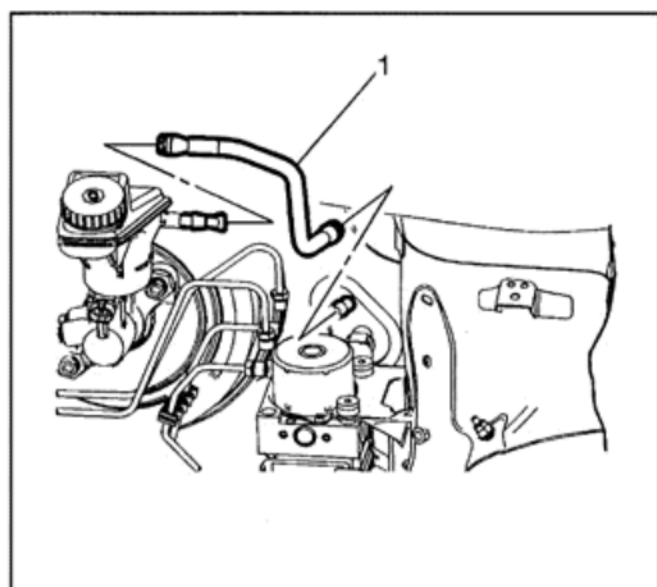
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5. Connect the clutch actuator cylinder front pipe (3) to the clutch master cylinder (2).
6. Install the retaining clip (1).



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7. Clip the clutch actuator cylinder front pipe into the 2 retainers (1).



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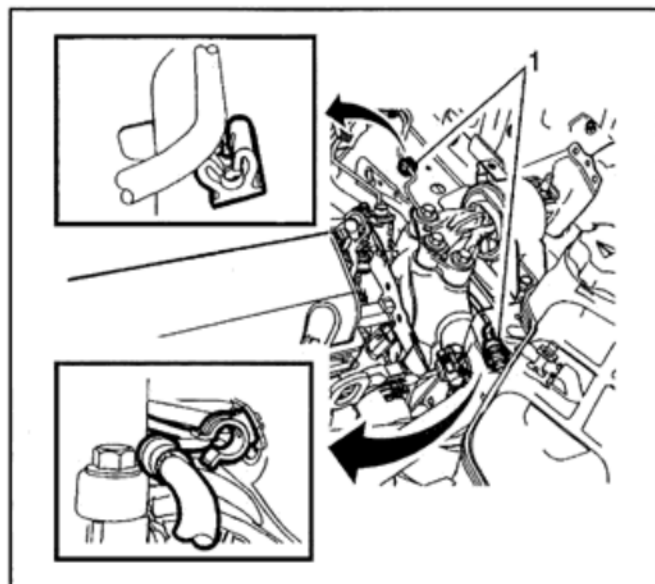
8. Install the clutch master cylinder reservoir hose (1) to the clutch master cylinder.
9. Install the battery tray. Refer to *Battery Tray Replacement* on page 9-721.
10. Bleed the hydraulic clutch system. Refer to *Hydraulic Clutch System Bleeding* on page 17-415.
11. Fill the reservoir with GM approved brake fluid from a clean, sealed brake fluid container up to the MAX level.

Clutch Actuator Cylinder Front Pipe Replacement

Removal Procedure

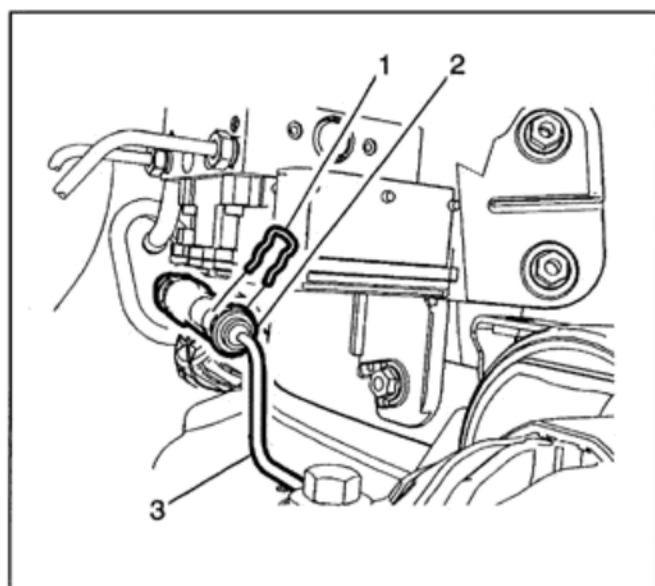
1. Remove the battery tray. Refer to *Battery Tray Replacement* on page 9-721.

2. Remove as much brake fluid out of brake fluid reservoir as possible.



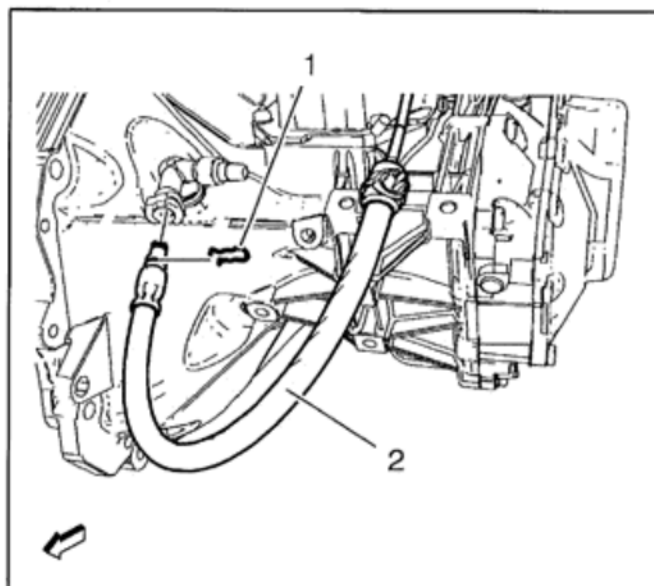
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3. Unclip the clutch actuator cylinder front pipe from the 2 retainers (1).



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

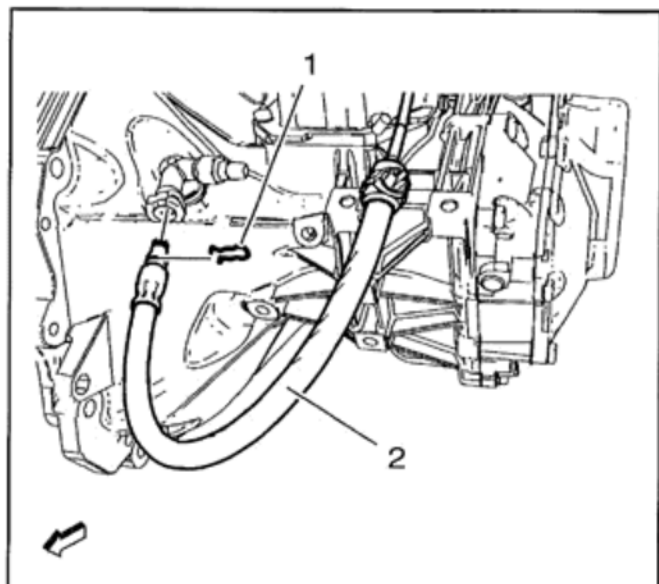


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6. Remove the retaining clip (1).
7. Disconnect the clutch actuator cylinder front pipe (2) from the clutch actuator cylinder pipe elbow.
8. Remove the clutch actuator cylinder front pipe from the vehicle.

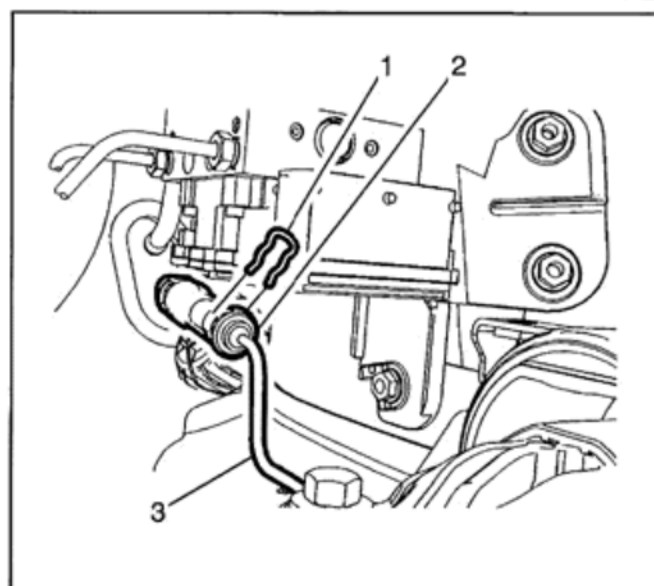
Installation Procedure

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



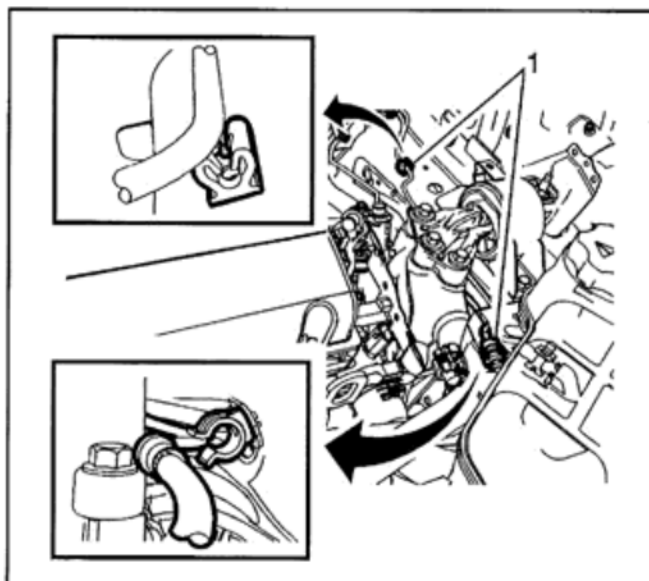
2028267

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



2530985

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



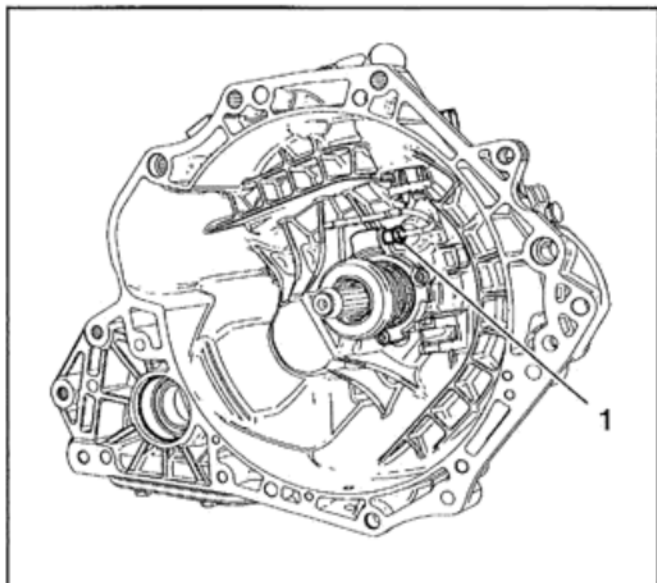
2536478

6. Clip the clutch actuator cylinder front pipe into the 2 retainers (1).
7. Install the battery tray. Refer to *Battery Tray Replacement* on page 9-721.
8. Bleed the hydraulic clutch system. Refer to *Hydraulic Clutch System Bleeding* on page 17-415.
9. 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 (F17)

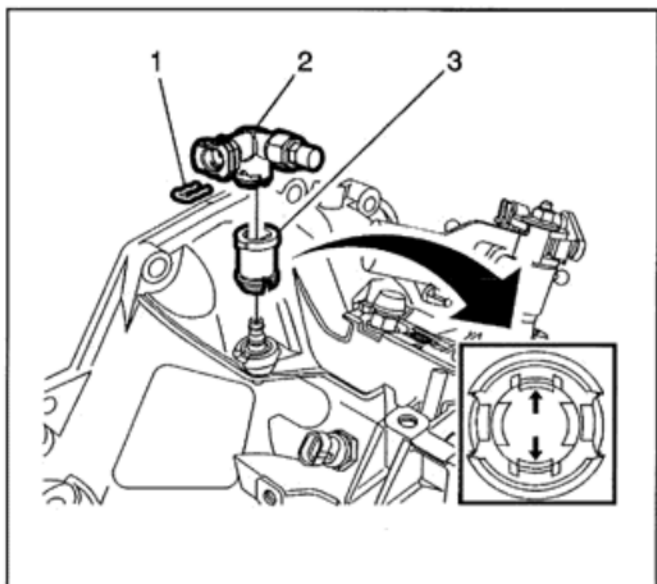
Removal Procedure

1. Remove the transmission. Refer to *Transmission Replacement* on page 17-463.



2191453

2. Loosen the clutch actuator cylinder pipe nut (1) from the clutch actuator cylinder.

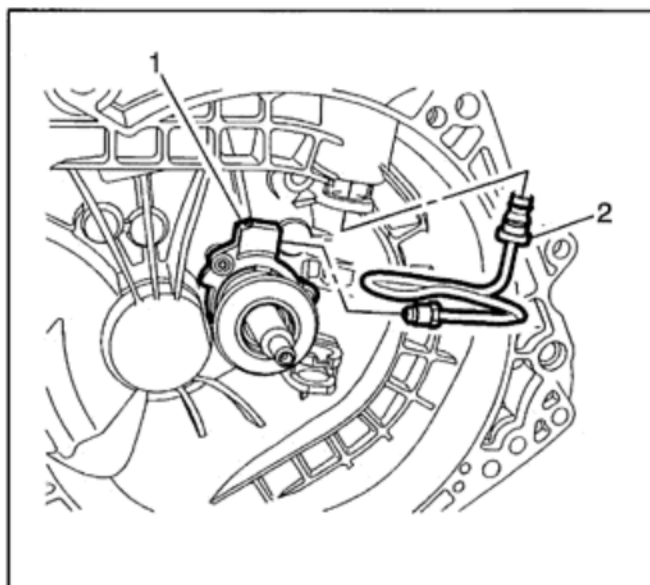


2567329

3. Remove the clutch actuator cylinder pipe connector elbow clip (1).
4. Remove the clutch actuator cylinder pipe 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.

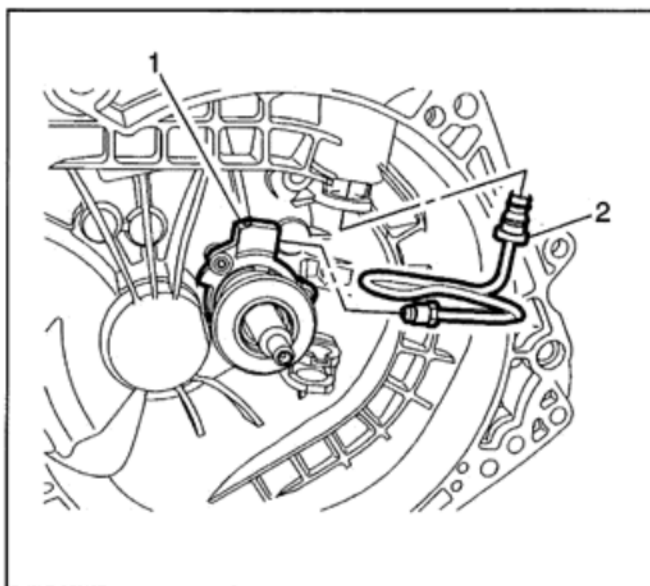
5. Remove the fastening sleeve (3) carefully out of the transmission housing and clutch actuator cylinder pipe.



2567342

6. Remove the clutch actuator cylinder pipe (2) from the transmission housing and clutch actuator cylinder (1).

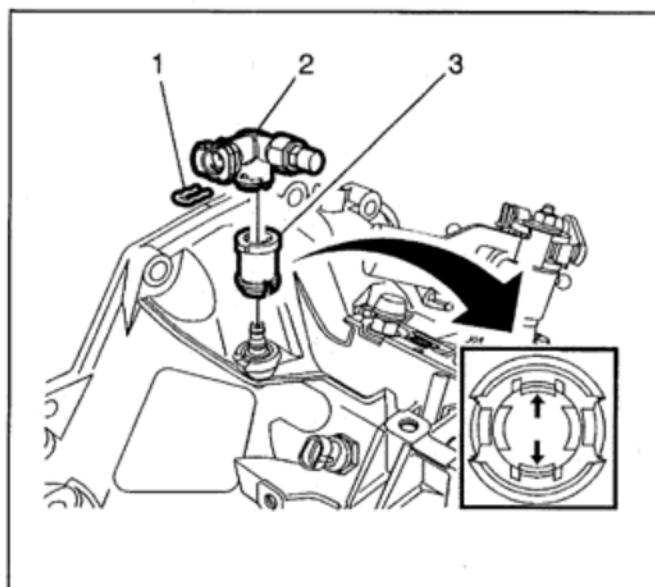
Installation Procedure



2567342

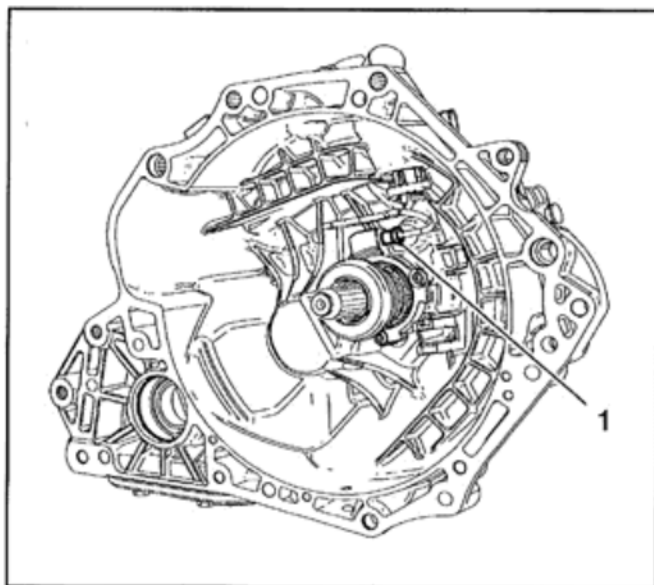
Note: Check the seal rings for cracks and damage. Replace if necessary.

1. Position the clutch actuator cylinder pipe (2) to the transmission housing and clutch actuator cylinder (1).



2567329

2. Install the fastening sleeve (3) carefully to the transmission housing and clutch actuator cylinder pipe.
3. Install the clutch actuator cylinder pipe connector elbow (2) to the clutch actuator cylinder pipe end.
4. Install the clutch actuator cylinder pipe connector elbow clip (1).



2191453

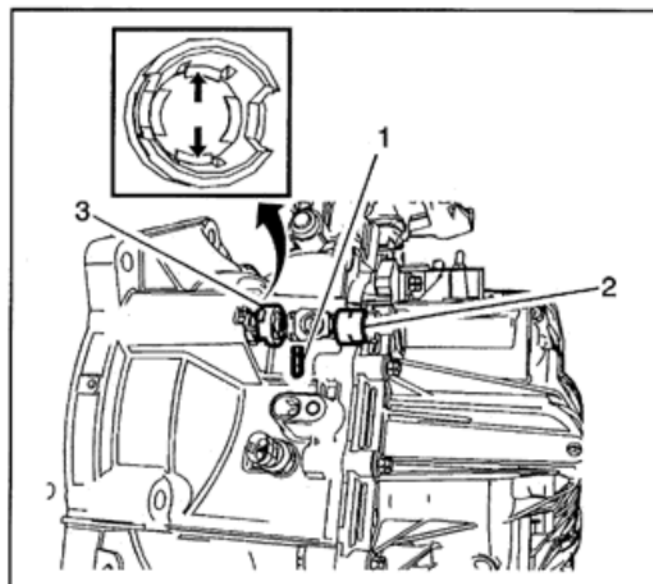
Caution: Refer to *Fastener Caution* on page 0-8.

5. Install the clutch actuator cylinder pipe nut (1) to the clutch actuator cylinder and tighten to **14 N·m (124 lb in)**.
6. Install the transmission. Refer to *Transmission Replacement* on page 17-463.

Clutch Actuator Cylinder Pipe Replacement (M20/32)

Removal Procedure

1. Remove the transmission. Refer to *Transmission Replacement* on page 17-586.

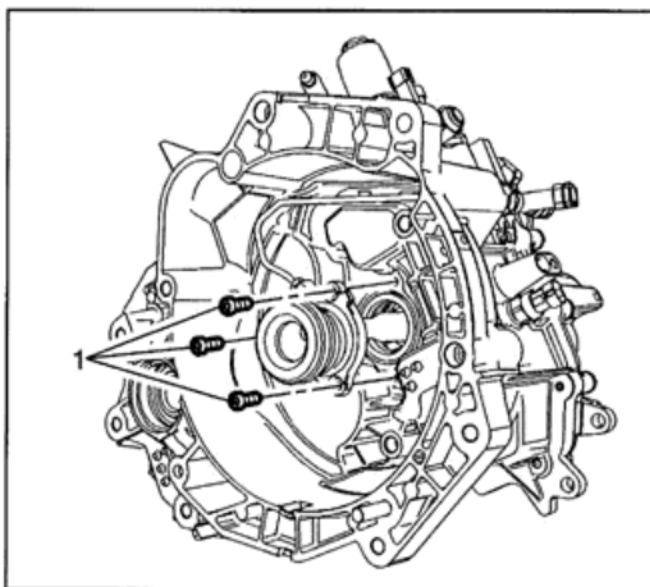


2551912

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.

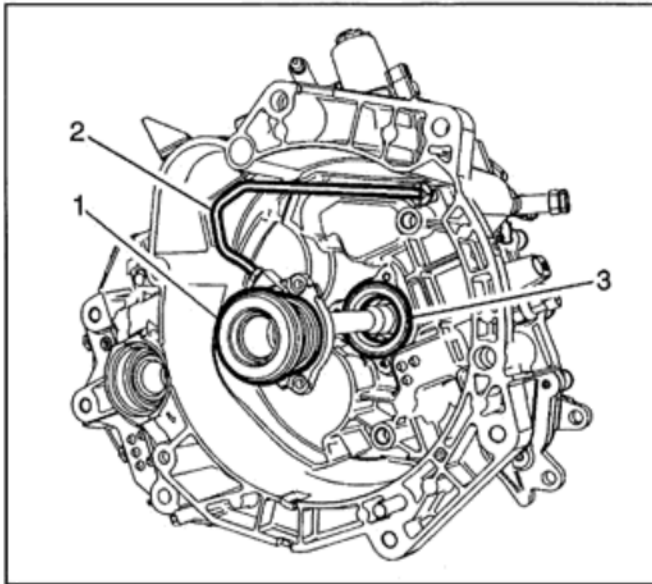
Note: Release the fastening sleeve key (arrows) using a screwdriver or equivalent to remove the fastening sleeve.

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



2551925

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



2551931

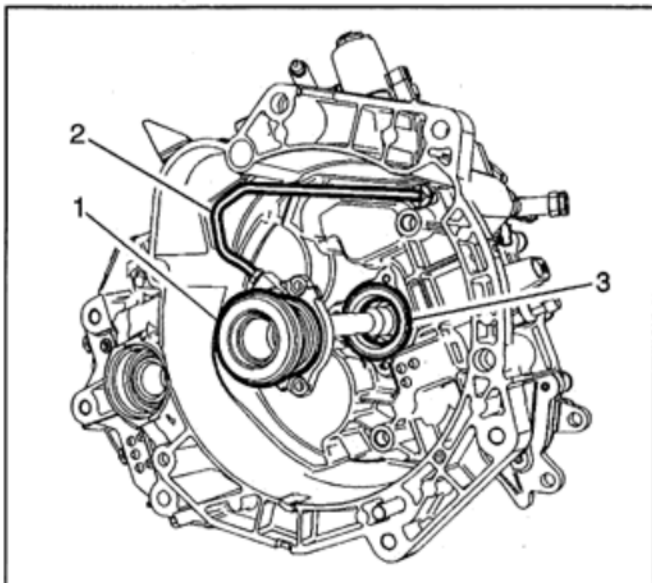
6. Remove the clutch actuator cylinder (1) and the clutch actuator cylinder pipe (2) at the same time.

Note: Discard the clutch actuator cylinder seal.

7. Remove the seal (3).

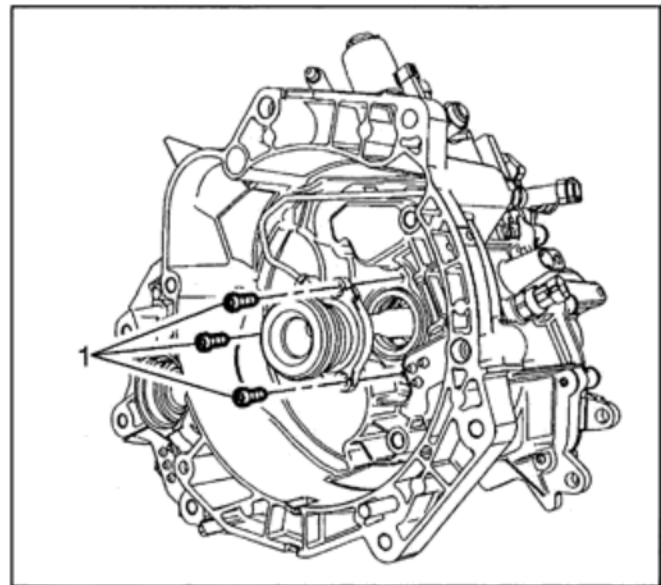
Installation Procedure

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



2551931

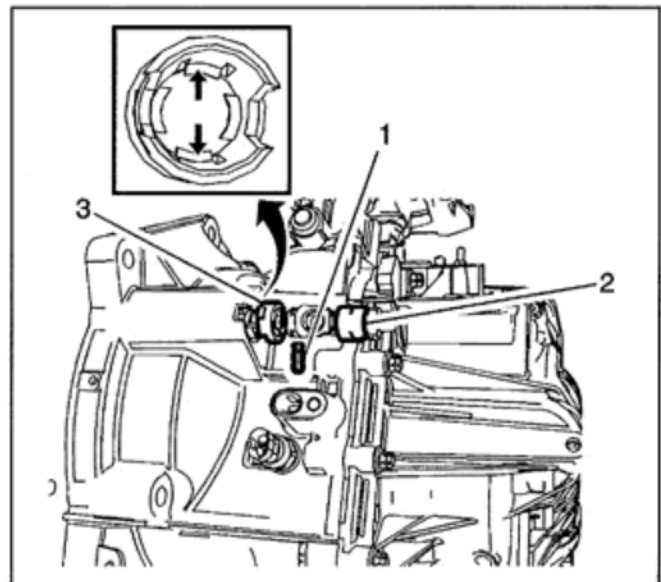
2. Install a NEW clutch actuator cylinder seal (3).
3. Install the clutch actuator cylinder (1) and clutch actuator cylinder pipe (2).



2551925

Caution: Refer to *Fastener Caution* on page 0-8.

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



2551912

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* on page 17-586.

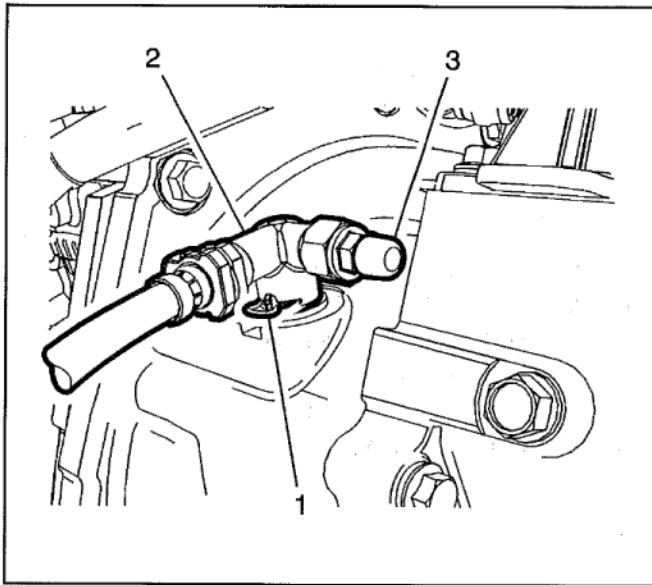
Hydraulic Clutch System Bleeding

Warning: Refer to *Brake Fluid Irritant Warning* on page 0-4.

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* on page 0-7.

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



2498555

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:
 - 1.1. Remove the valve cap (3) from the bleeder valve.
 - 1.2. Fill brake fluid reservoir up to "MAX" marking.
 - 1.3. Press and hold clutch pedal.
 - 1.4. Open bleeder valve until air or air/brake fluid mixture emerges.

Note: Do not close the bleeder valve too fast.

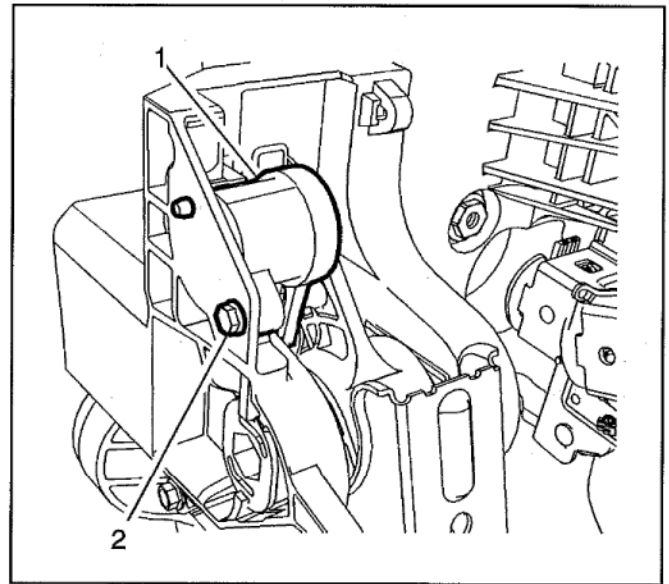
- 1.5. Close the bleeder valve.
 - 1.6. Release the clutch pedal slowly.
 - 1.7. Wait approximately 5 seconds.
 - 1.8. Repeat this bleeding process 4 times.
 - 1.9. Tighten bleeder valve .
 - 1.10. Push valve cap on to bleeder valve to protect the bleeder valve.
2. Check shifting for ease of movement with vehicle stationary, with engine running and with clutch disengaged.
3. 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 lower trim pad cover. Refer to *Instrument Panel Lower Trim Pad Cover Replacement (Without AAL)* on page 2-40 or *Instrument Panel Lower Trim Pad Cover Replacement (With AAL)* on page 2-41.

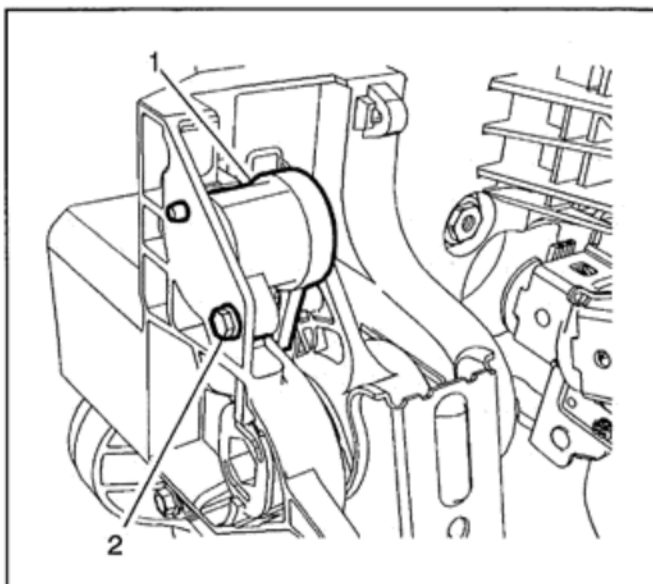


2498838

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

1. Connect the clutch pedal position sensor wiring harness connector.



2496839

2. Install the clutch pedal position sensor (1).

Caution: Refer to *Fastener Caution* on page 0-8.

3. Install the clutch pedal position sensor bolt (2) and tighten to 3 N·m (27 lb in).
4. Install the instrument panel lower trim pad cover. Refer to *Instrument Panel Lower Trim Pad Cover Replacement (Without AAL)* on page 2-40 or *Instrument Panel Lower Trim Pad Cover Replacement (With AAL)* on page 2-41.

Clutch Pressure and Driven Plate Replacement (1.4L)

Special Tools

DT-6263 Remover/Installer

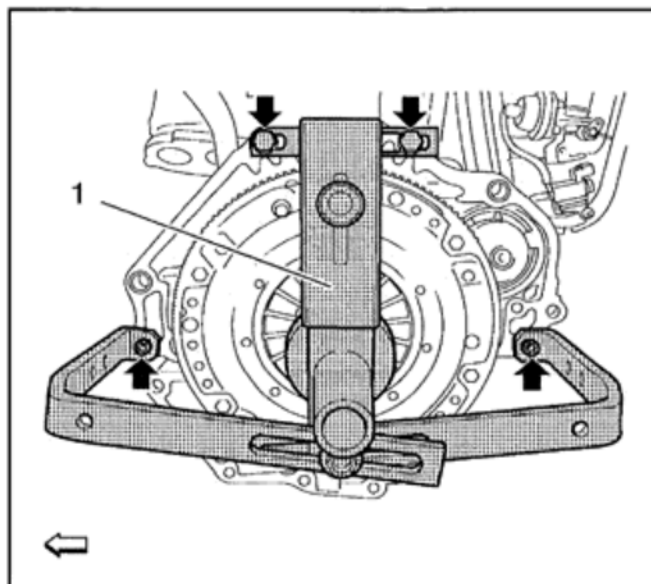
For equivalent regional tools, refer to *Special Tools* on page 17-425.

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* on page 17-463.



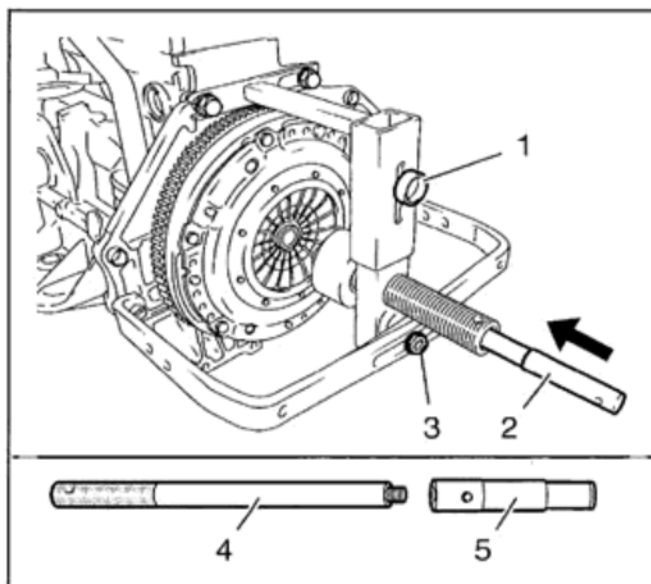
2028117

Note: DT-6263 remover/installer may only be attached to the engine block and not to the oil pan.

2. Attach DT-6263 remover/installer (1) or equivalent to the engine block.

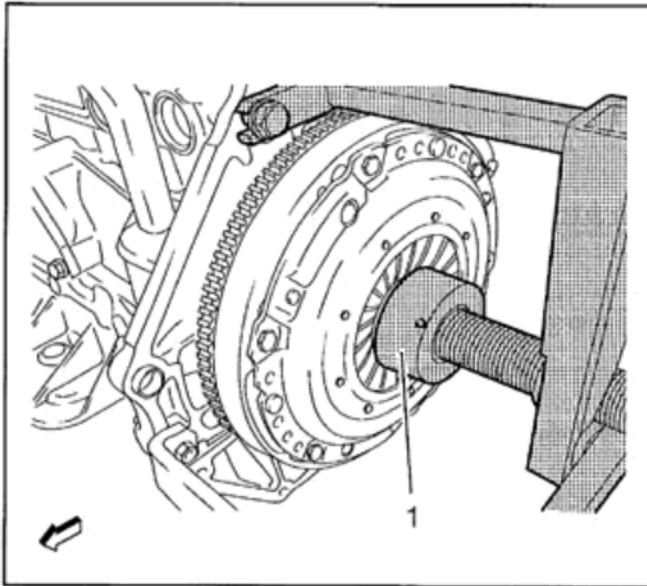
Note: Do not tighten the bolts yet.

3. Install 4 bolts (arrows) to engine block.



2191651

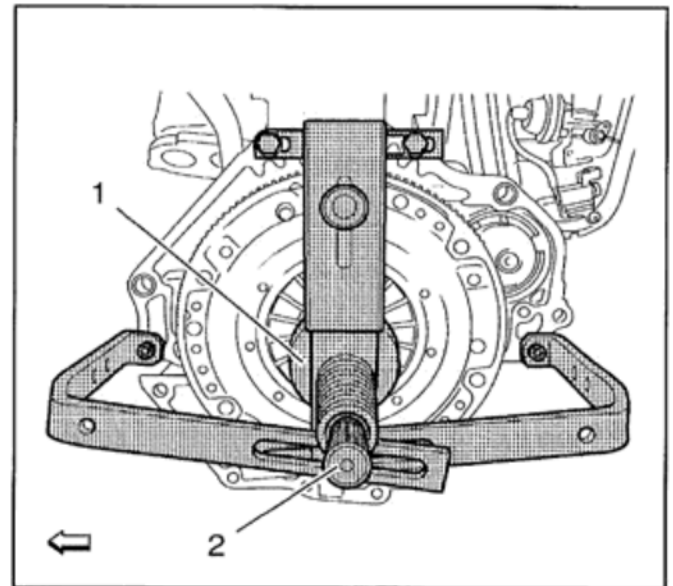
4. Attach a suitable clutch center guide (5) to DT-6263-30 centering drift (4).
5. Fasten DT-6263 remover/installer.
 - Align DT-6263 remover/installer to center.
 - Insert DT-6263-30 centering drift (2) in conjunction with clutch center guide through DT-6263 remover/installer into clutch pressure plate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



2028119

6. Preload clutch springs using DT-6263 remover/installer.

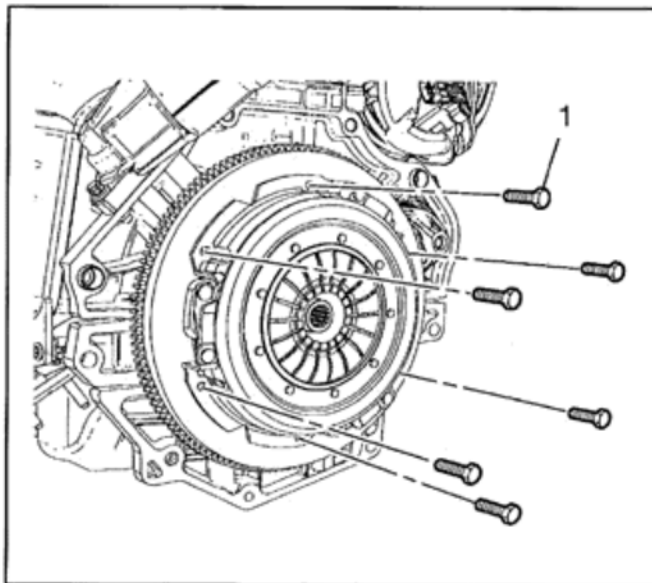
- Move DT-6263 remover/installer (1) that it rests against the spring tangs of clutch pressure plate.
- Turn DT-6263 remover/installer clockwise to the stop.



2028122

8. Release DT-6263 remover/installer (1).

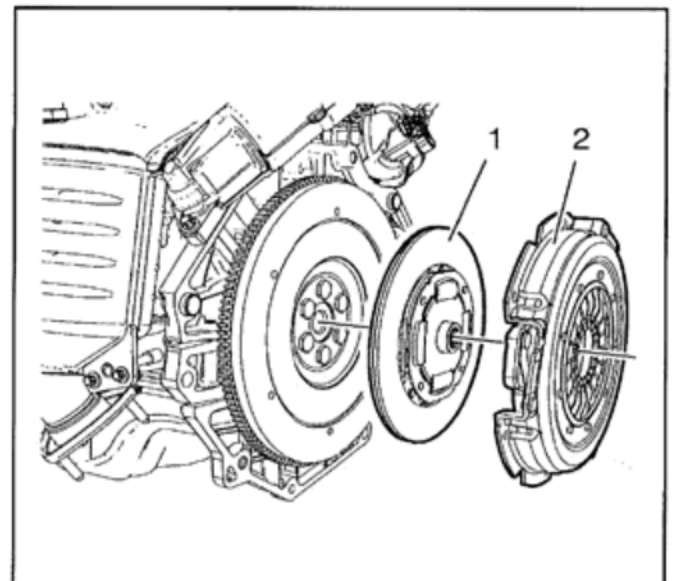
- Turn DT-6263 remover/installer counterclockwise to the stop.
- Remove DT-6263-30 centering drift (2) in conjunction with clutch center guide.



2191625

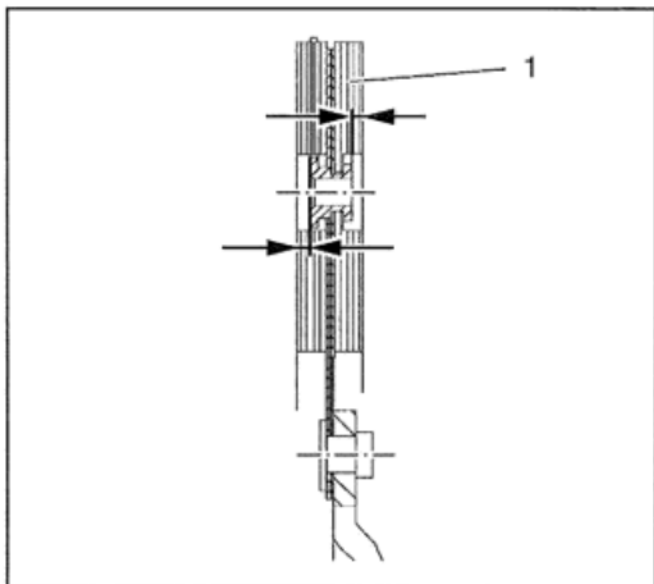
Note: Discard the bolts.

7. Remove 6 clutch pressure plate bolts (1).



2191626

9. Remove clutch pressure plate (2) and driven plate (1).



2028217

Note: Clutch pressure plate and driven plates 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.

10. Inspect clutch pressure plate and driven plate (1) and replace if necessary. Inspect for the following conditions:

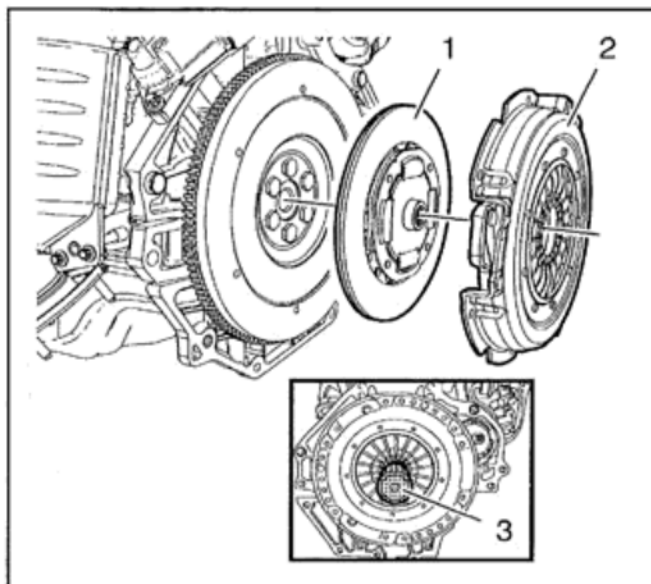
- Excessive wear
- Burned friction surface
- Oil on friction surface
- Damaged spline hub
- Damaged springs

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

11. Inspect projection of lining at the clutch lining rivets.
12. Slide clutch driven plate onto the transmission input shaft and check for easy movement.

Installation Procedure

1. Clean 6 threads in flywheel for fastening clutch pressure plate.

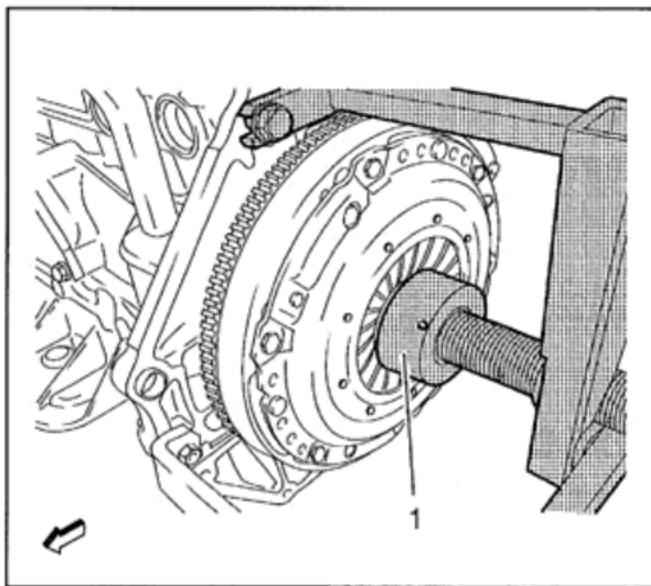


2191652

Note: Lettering transmission side faces the transmission.

Center clutch driven plate using *DT-6263-30* centering drift in conjunction with clutch center guide.

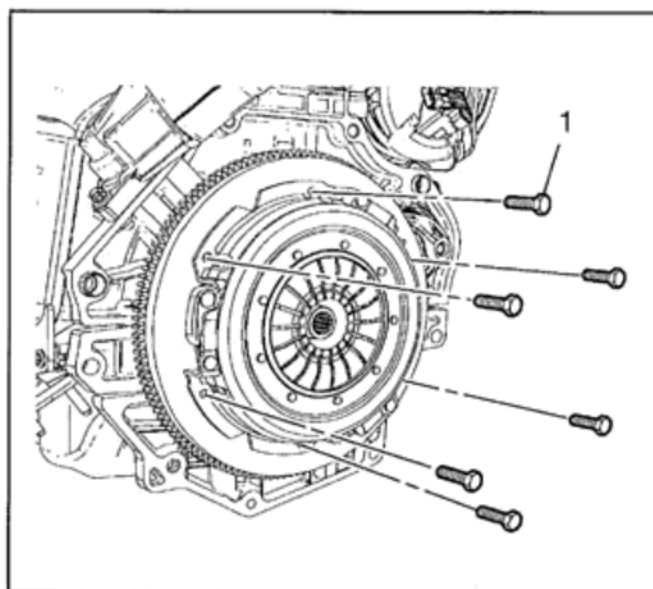
2. Install driven plate (1) and clutch pressure plate (2).



2028119

3. Preload clutch springs using *DT-6263* remover/installer.

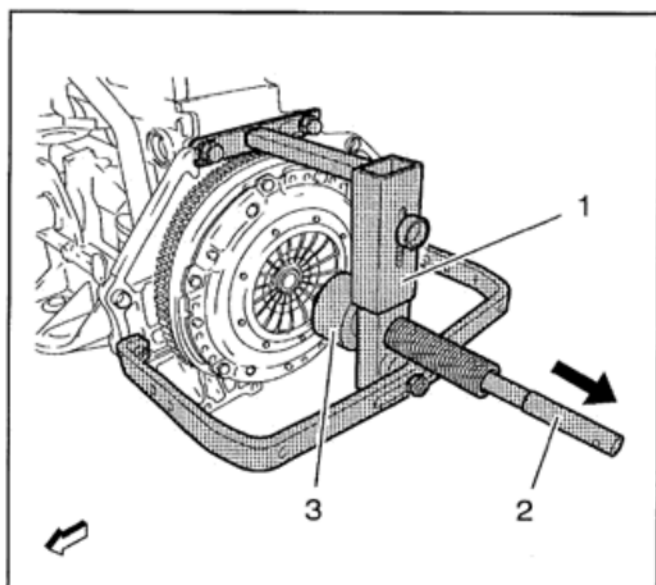
- Move *DT-6263* remover/installer (1) that it rests against the spring tangs of clutch pressure plate.
- Turn *DT-6263* remover/installer clockwise to the stop.



2191625

Caution: Refer to *Fastener Caution* on page 0-8.

4. Install 6 NEW clutch pressure plate bolts (1) and tighten crosswise to **15N·m (11 lb ft)**.



2028222

5. Remove DT-6263 remover/installer (1) from engine block.
 - Turn DT-6263 remover/installer (3) counterclockwise to the stop.
 - Remove DT-6263-30 centering drift (2) in conjunction with clutch center guide (arrow).
 - Remove 4 bolts of DT-6263 remover/installer from engine block.
6. Install the transmission. Refer to *Transmission Replacement* on page 17-463.

Clutch Pressure and Driven Plate Replacement (1.8L)

Special Tools

DT-6263 Remover/Installer

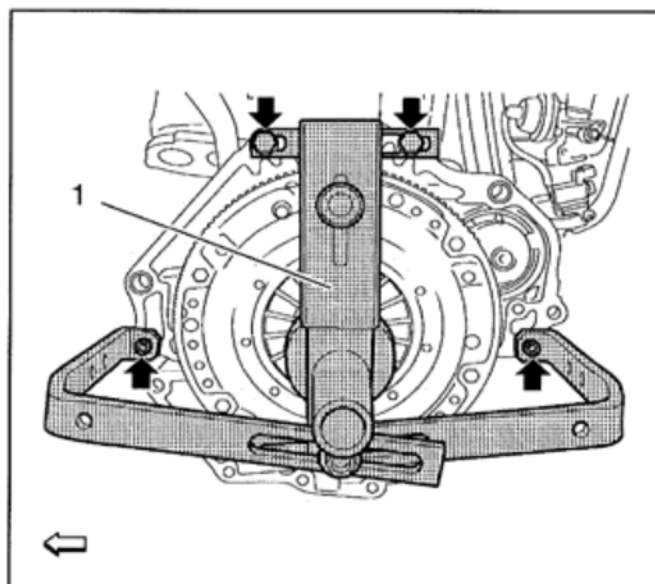
For equivalent regional tools, refer to *Special Tools* on page 17-425.

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* on page 17-463.



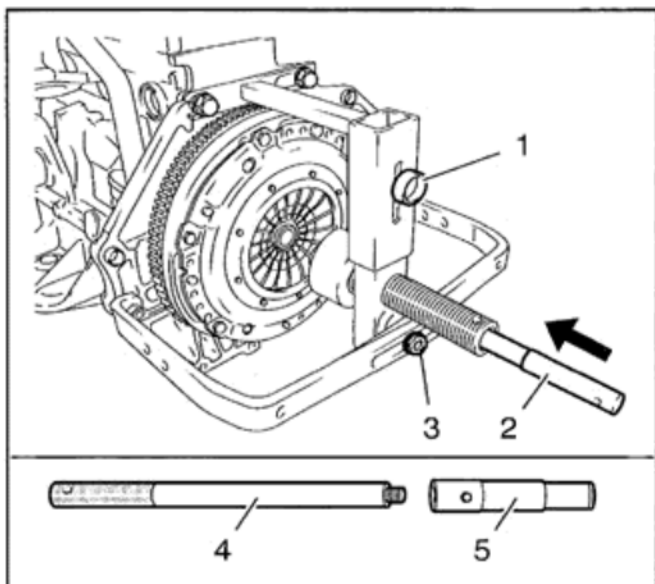
2028117

Note: DT-6263 remover/installer may only be attached to the engine block and not to the oil pan.

2. Attach DT-6263 remover/installer (1) or equivalent to the engine block.

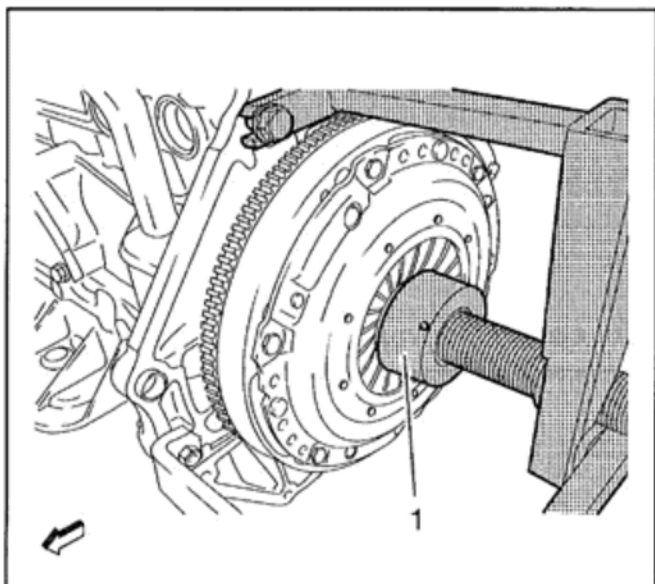
Note: Do not tighten the bolts yet.

3. Install 4 bolts (arrows) to engine block.



2191851

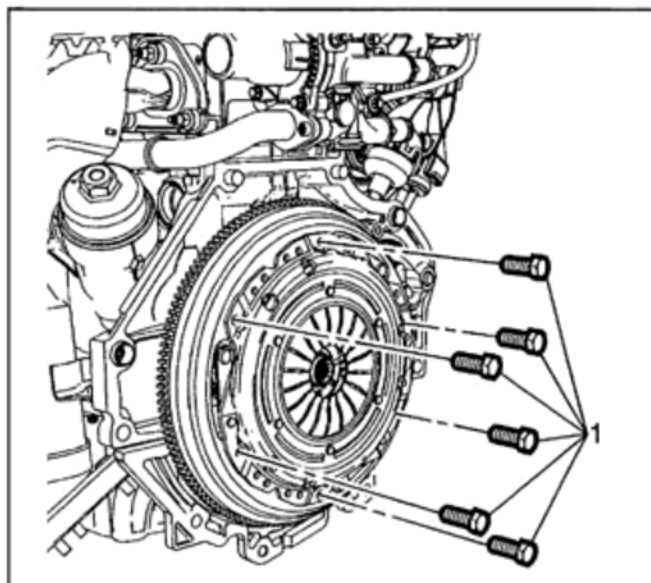
4. Attach a suitable clutch center guide (5) to DT-6263-30 centering drift (4).
5. Fasten DT-6263 remover/installer.
 - Align DT-6263 remover/installer to center.
 - Insert DT-6263-30 centering drift (2) in conjunction with clutch center guide through DT-6263 remover/installer into clutch pressure plate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



2028119

6. Preload clutch springs using DT-6263 remover/installer.

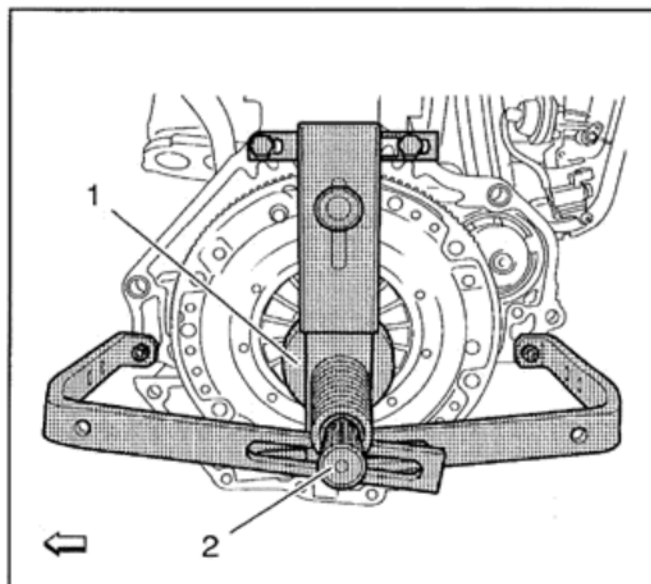
- Move DT-6263 remover/installer (1) that it rests against the spring tangs of clutch pressure plate.
- Turn DT-6263 remover/installer clockwise to the stop.



2531060

Note: Discard the bolts.

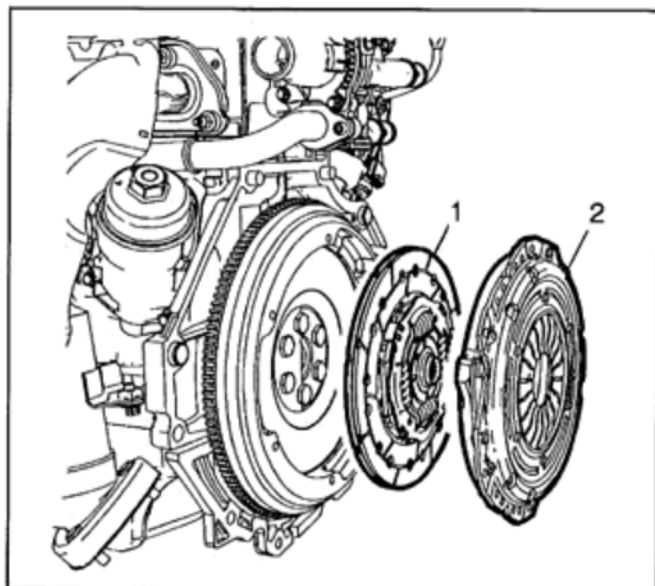
7. Remove 6 clutch pressure plate bolts (1).



2028122

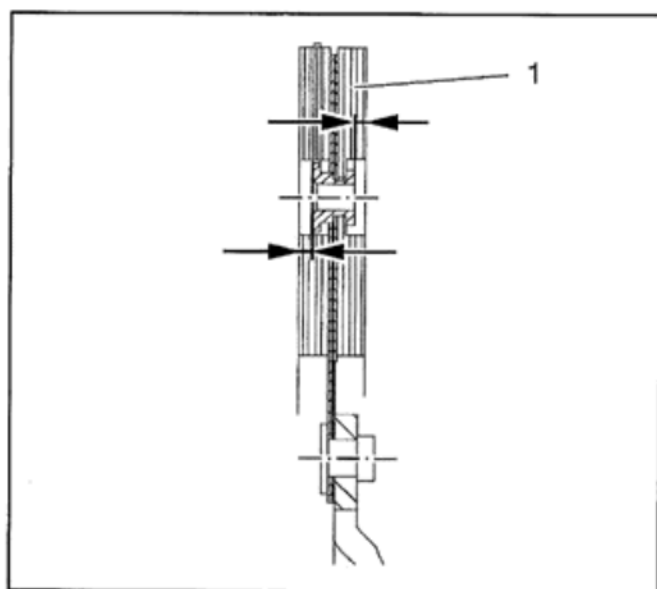
8. Release DT-6263 remover/installer (1).

- Turn DT-6263 remover/installer counterclockwise to the stop.
- Remove DT-6263-30 centering drift (2) in conjunction with clutch center guide.



2531085

9. Remove clutch pressure plate (2) and driven plate (1).



2028217

Note: Clutch pressure plate and driven plates 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.

10. Inspect clutch pressure plate and driven plate (1) and replace if necessary. Inspect for the following conditions:

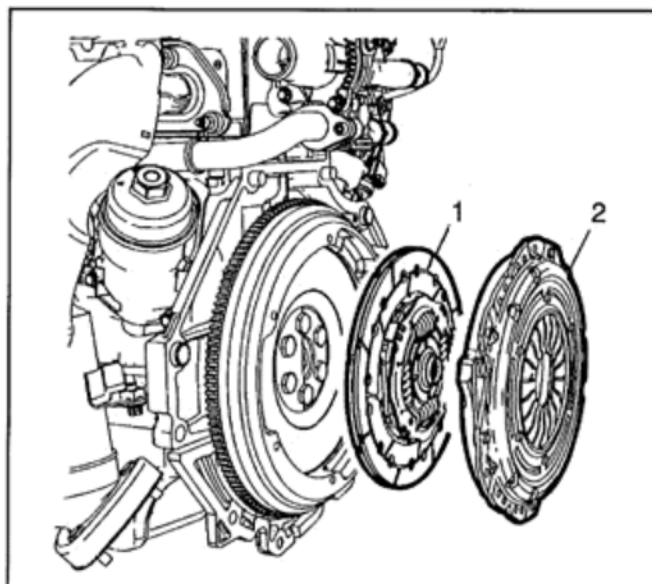
- Excessive wear
- Burned friction surface
- Oil on friction surface
- Damaged spline hub
- Damaged springs

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

11. Inspect projection of lining at the clutch lining rivets.
12. Slide clutch driven plate onto the transmission input shaft and check for easy movement.

Installation Procedure

1. Clean 6 threads in flywheel for fastening clutch pressure plate.

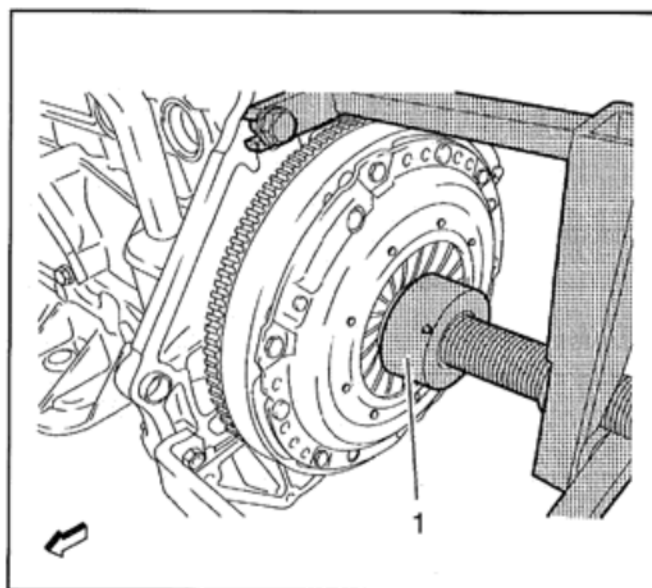


2531085

Note: Lettering transmission side faces the transmission.

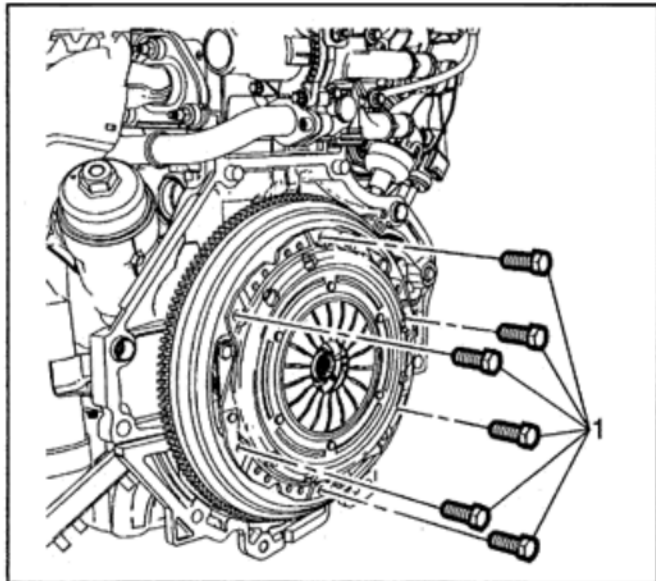
Center clutch driven plate using DT-6263-30 centering drift in conjunction with clutch center guide.

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



2028119

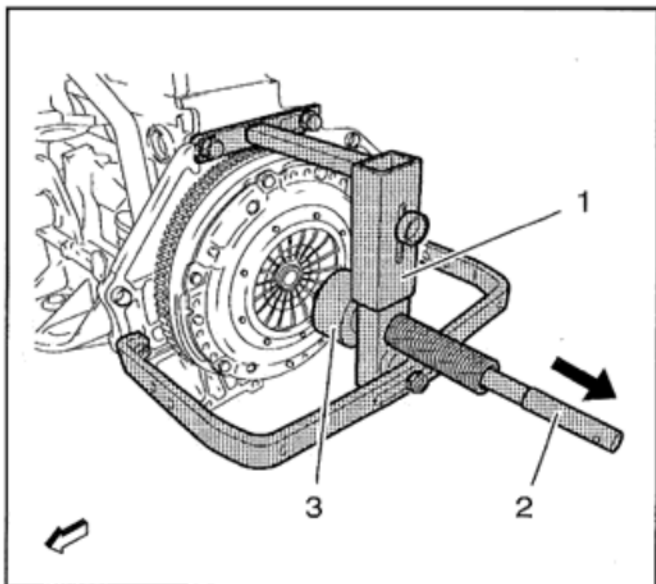
3. Preload clutch springs using DT-6263 remover/installer.
 - Move DT-6263 remover/installer (1) that it rests against the spring tangs of clutch pressure plate.
 - Turn DT-6263 remover/installer clockwise to the stop.



2531060

Caution: Refer to *Fastener Caution* on page 0-8.

4. Install 6 NEW clutch pressure plate bolts (1) and tighten crosswise to **15 N·m (11 lb ft)**.



2028222

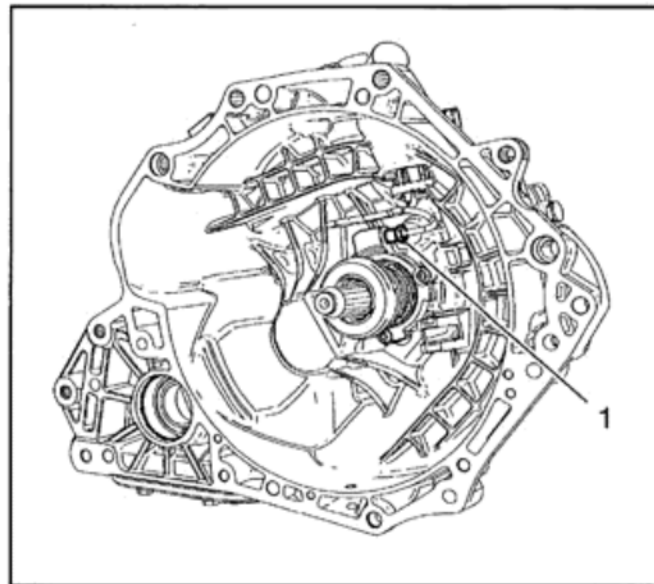
5. Remove DT-6263 remover/installer (1) from engine block.
 - Turn DT-6263 remover/installer (3) counterclockwise to the stop.
 - Remove DT-6263-30 centering drift (2) in conjunction with clutch center guide (arrow).
 - Remove 4 bolts of DT-6263 remover/installer from engine block.

6. Install the transmission. Refer to *Transmission Replacement* on page 17-463.

Clutch Actuator Cylinder Replacement (F17)

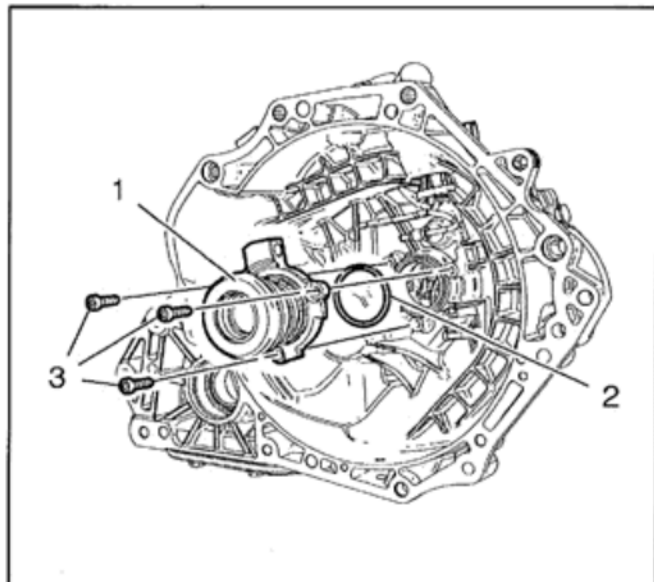
Removal Procedure

1. Remove the transmission. Refer to *Transmission Replacement* on page 17-463.



2191453

2. Loosen the clutch actuator cylinder pipe fitting(1) from the clutch actuator cylinder.

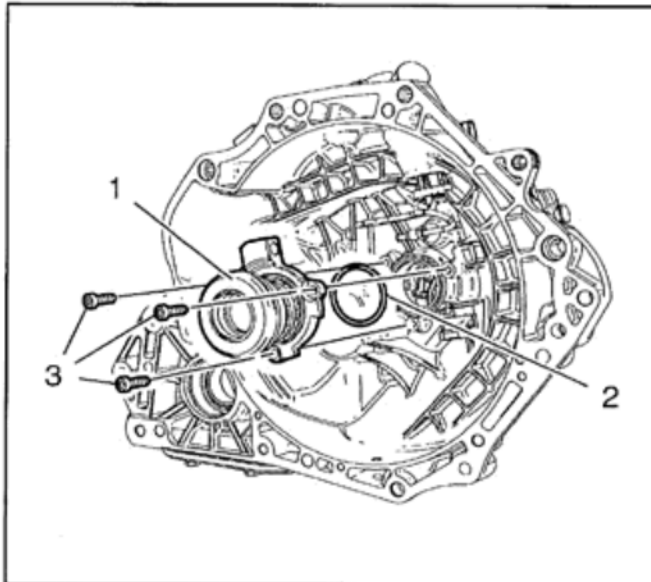


2191454

3. Remove the 3 clutch actuator cylinder fasteners (3).
4. Remove the clutch actuator cylinder (1).
- Note:** Discard clutch actuator cylinder seal.
5. Remove the seal (2).

Installation Procedure

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

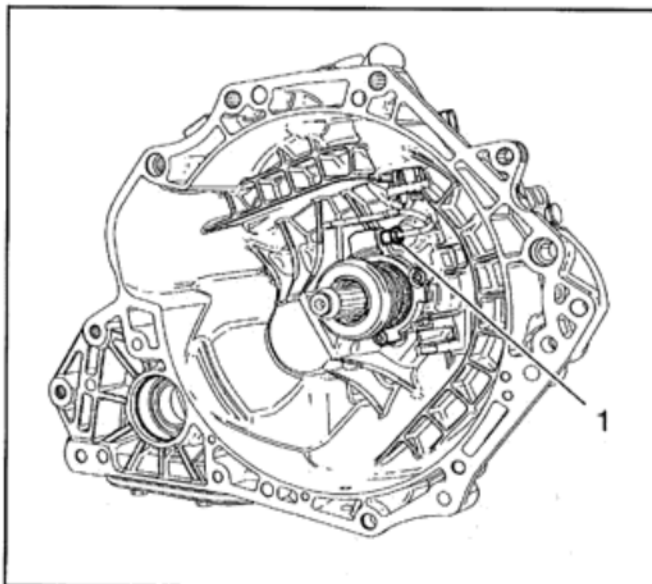


2191454

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

Caution: Refer to *Fastener Caution* on page 0-8.

4. Install the 3 clutch actuator cylinder fasteners (3) and tighten to **5 N·m (44 lb in)**.



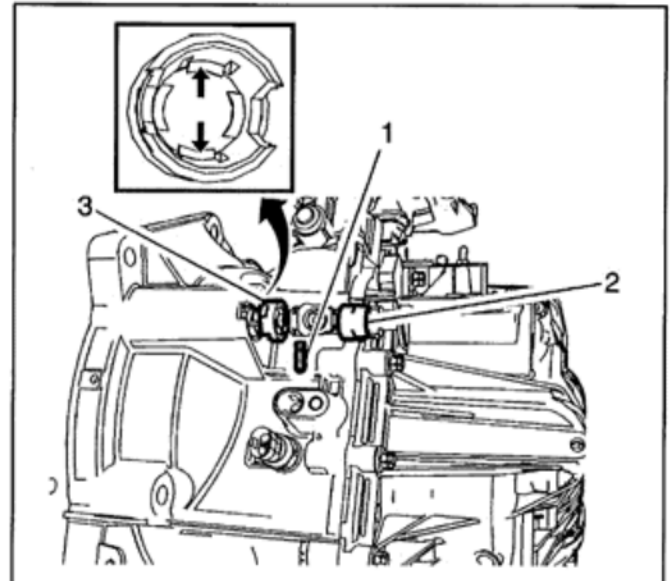
2191453

5. Install the clutch actuator cylinder pipe fitting (1) and tighten to **14 N·m (124 lb in)**.
6. Install the transmission. Refer to *Transmission Replacement* on page 17-463.

Clutch Actuator Cylinder Replacement (M20/32)

Removal Procedure

1. Remove the transmission. Refer to *Transmission Replacement* on page 17-586.

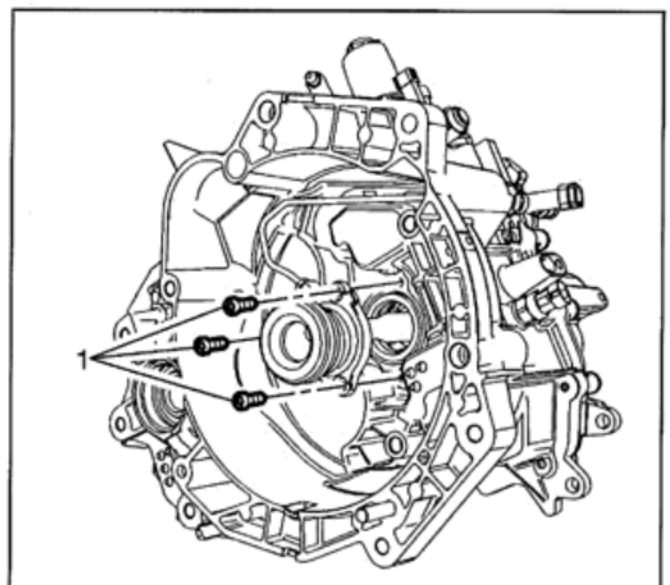


2551912

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.

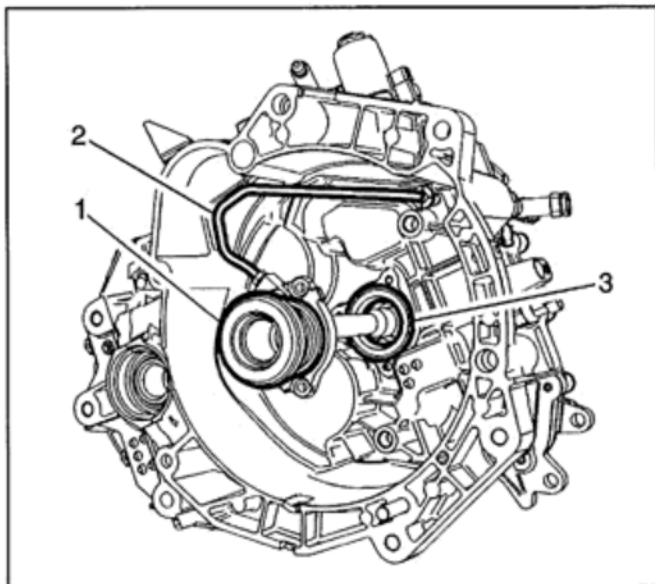
Note: Release the fastening sleeve key (arrows) using a screwdriver or equivalent to remove the fastening sleeve.

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



2551925

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



2551931

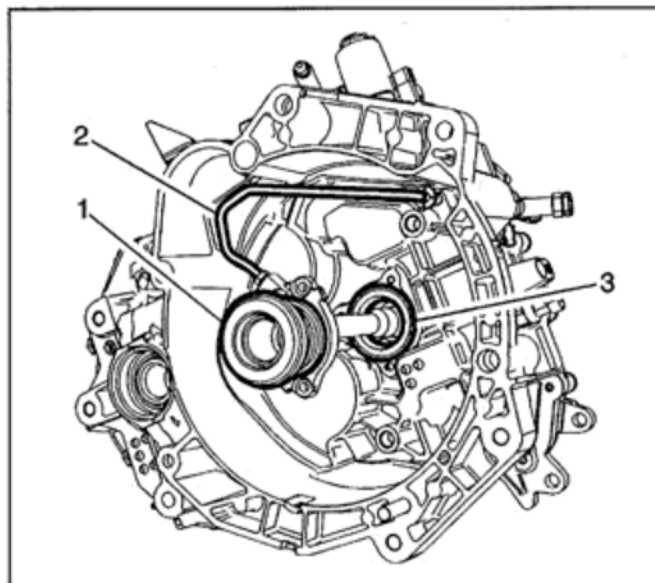
6. Remove the clutch actuator cylinder (1) and the clutch actuator cylinder pipe (2) at the same time.

Note: Discard the clutch actuator cylinder seal.

7. Remove the seal (3).

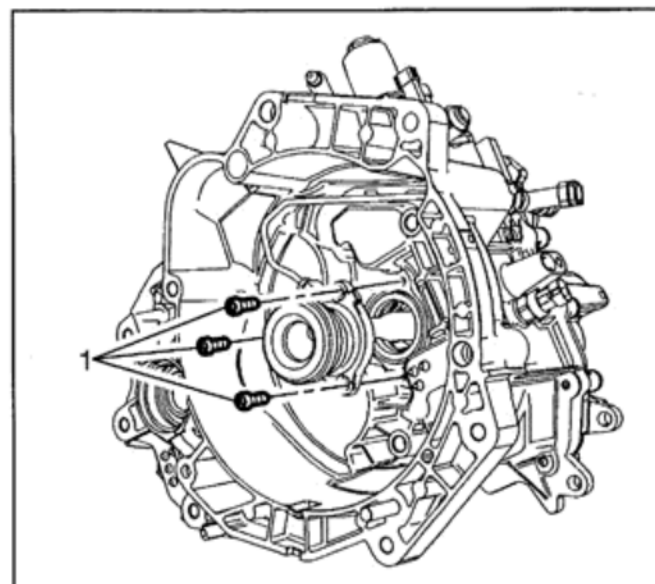
Installation Procedure

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



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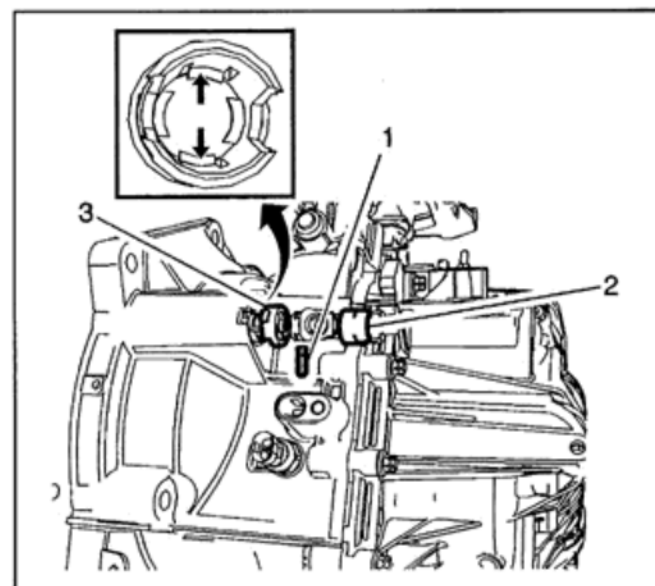
2. Install a NEW clutch actuator cylinder seal (3).
3. Install the clutch actuator cylinder (1) and clutch actuator cylinder pipe (2).



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Caution: Refer to *Fastener Caution* on page 0-8.

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



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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* on page 17-586.

Description and Operation

Clutch System Description and Operation

Clutch Spin Down Time

Inspect the clutch spin down time as follows:

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

Clutch Driving Members

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

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

Clutch Driven Members

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

Hydraulic Clutch Fluid

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

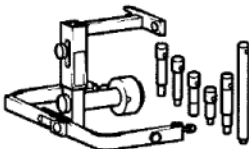
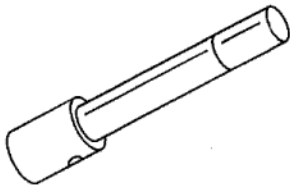
The clutch system consists of the following components:

- 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 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

Illustration	Tool Number/ Description
 2027936	DT-6263 KM-6263 Remover/Installer
 2670413	DT-6263-26 KM-6263-26 Clutch Center Guide