Clutch

Specifications

Fastener Tightening Specifications

Application	N·m	Lb Ft	Lb In
Clutch Cover Bolts (Diesel Engine)	34	25	—
Clutch Cover Bolts (Gasoline Engine)	40	29	—
Concentric Slave Cylinder Bolts	8	—	71

Diagnostic Information and Procedures

Preliminary Checking Procedure

Preliminary Checks

Identify the problem and the probable cause before attempting to repair the following components for any reason other than obvious failure:

- The clutch
- The transmission assembly
- Related hydraulic components

A large percentage of clutch and manual transmission problems include the following conditions:

- High-shift effort
- Gear clash
- Grinding

Carefully analyze the problems with the aid of the diagnostic tables.

Before removing what you suspect to be a failed hydraulic clutch system, check the reservoir fluid level with the actuator cylinder in place. Fill the reservoir to the specified level with GM Delco Supreme No. II® Brake Fluid (GM P/N 1052535), or equivalent fluid, that meets the DOT 3 specifications. Do not overfill the system.

If the reservoir requires any fluid, check the hydraulic system components for leakage. Remove the rubber boots from the cylinders, checking for leakage past the pistons. A slight wetting of the surfaces is acceptable. Excessive leakage requires replacement of the system.

Clutch Spin Down Time

Check the clutch spin down time as follows:

1. Apply the parking brake. Block the vehicle wheels.
2. Shift the 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.
7. If you hear a grinding noise, refer to *Release Bearing Noisy with Clutch Engaged* in Clutch.

Clutch Does Not Disengage

Step	Action	Value(s)	Yes	No
DEFINITION: When the pedal assembly is pressed to the floor, the shift lever does not move freely in and out of reverse gear.				
1	Check for a pedal travel restriction. Is the vehicle equipped with aftermarket floor covering?	—	*Go to Step 2*	*Go to Step 3*
2	Remove the aftermarket floor covering. Does the clutch work properly?	—	System OK	*Go to Step 3*
3	Check the clutch system. Refer to *Preliminary Checking Procedure.* Does the clutch work properly?	—	System OK	*Go to Step 4*
4	Check for air in the clutch hydraulic system. Is there air in the clutch hydraulic system?	—	*Go to Step 6*	*Go to Step 5*
5	Bleed the clutch hydraulic system. Refer to *Hydraulic Clutch Bleeding.* Does the clutch work properly?	—	System OK	*Go to Step 6*
6	Check the master cylinder for worn seals. Are the seals worn?	—	*Go to Step 7*	*Go to Step 8*
7	Replace the necessary components. Refer to *Master Cylinder Replacement.* Does the clutch work properly?	—	System OK	*Go to Step 8*
8	Check for a worn or damaged concentric slave cylinder. Is the concentric slave cylinder worn or damaged?	—	*Go to Step 9*	*Go to Step 10*

Clutch Does Not Disengage (cont'd)

Step	Action	Value(s)	Yes	No
9	Replace the necessary components. Does the clutch work properly?	—	System OK	*Go to Step 10*
10	Inspect the clutch assembly for the following: • Damaged or worn clutch driven plate • Binding on the clutch driven plate Are the clutch components OK?	—	—	*Go to Step 11*
11	Replace the clutch disc. Refer to *Clutch Assembly Replacement.* Does the clutch work properly?	—	System OK	—

Clutch Slipping

Step	Action	Value	Yes	No
DEFINITION: The clutch engages but slips while driving the vehicle.				
1	Check the clutch disc in order to ensure that it is properly seated in. Is the clutch disc properly seated in?	—	*Go to Step 3*	*Go to Step 2*
2	Make 30 to 40 normal starts. Do not over heat. Does the clutch still slip?	—	*Go to Step 3*	System OK
3	Check in order to ensure that the clutch disc is not over heated. Is the disc plate over heated?	—	*Go to Step 4*	*Go to Step 5*
4	Allow the disc plate to cool. Does the clutch still slip?	—	*Go to Step 5*	System OK
5	Check the clutch disc in order to see if the disc is oil soaked. Is the disc plate oil soaked?	—	*Go to Step 6*	*Go to Step 7*
6	Correct the leak at the source. Refer to *Oil Leak Diagnosis* in Engine Mechanical. Replace the clutch disc. Refer to *Clutch Assembly Replacement.* Does the clutch still slip?	—	*Go to Step 7*	System OK
7	Check the clutch disc for a worn facing or if the facing is torn from the disc plate. Is the facing worn or torn from the disc plate?	—	*Go to Step 8*	*Go to Step 9*
8	Replace the clutch disc. Refer to *Clutch Assembly Replacement.* Does the clutch still slip?	—	*Go to Step 9*	System OK
9	Check for a warped clutch cover on the disc plate or a weak diaphragm spring. Is the disc plate warped or the diaphragm spring weak?	—	*Go to Step 10*	—
10	Replace the necessary components. Refer to *Clutch Assembly Replacement.* Does the clutch still slip?	—	*Go to Step 1*	System OK

Clutch Grabbing

Step	Action	Value	Yes	No
DEFINITION: The clutch grabs or chatters during engagement.				
1	Inspect the engine mounting fasteners. Are the engine mounts loose or tightened out of sequence?	—	*Go to Step 2*	*Go to Step 3*
2	Tighten the engine mounting fasteners to the specified torque. Refer to *Fastener Tightening Specifications.* Does the clutch still grab?	—	*Go to Step 3*	System OK
3	Check for a damaged engine mount. Is the engine mounting damaged?	—	*Go to Step 4*	*Go to Step 5*
4	Replace the engine mount. Refer to *Engine Mount Replacement (Front)* in Engine Mechanical. Does the clutch still grab?	—	*Go to Step 5*	System OK
5	Check the pressure plate assembly for burned or smeared resin. Is there burned or smeared resin on the pressure plate?	—	*Go to Step 6*	*Go to Step 7*
6	If the burns or smears are superficial, clean or sand off the excess resin. If the pressure plate assembly is burned or has heat checked parts, then replace the pressure plate assembly. Refer to Clutch Assembly. Does the clutch still grab?	—	*Go to Step 7*	System OK
7	Check for a warped pressure plate. Is the pressure plate warped?	—	*Go to Step 8*	*Go to Step 9*
8	Replace the pressure plate. Ensure that the runout does not exceed the amount given in the value column. Refer to Clutch Assembly. Does the clutch still grab?	—	*Go to Step 9*	System OK
9	Check for oil on the clutch pressure plate facing or a burned or glazed facing. Is there oil on the clutch pressure plate facing or a burned or glazed facing?	—	*Go to Step 10*	*Go to Step 11*
10	Correct the leak at the source. Refer to *Oil Leak Diagnosis* in Engine Mechanical. Install a new clutch pressure plate. Does the clutch still grab?	*Go to Step 11*	System OK	—
11	Check for worn splines on the transmission main drive gear. Are there worn splines on the transmission main drive gear?	—	*Go to Step 12*	*Go to Step 13*
12	Replace the transmission main drive gear. Refer to Transmission Case Disassembly/Assembly in Manual Transmission. Does the clutch still grab?	—	*Go to Step 13*	System OK
13	Inspect the release bearing at the transmission main drive gear. Is the release bearing binding on the retaining tube on the transmission main drive gear?	—	*Go to Step 14*	—
14	Replace the necessary components. Does the clutch still grab?	—	*Go to Step 1*	System OK

Clutch Rattle (Trans Click)

Step	Action	Value	Yes	No
DEFINITION: A rattling or clicking noise is coming from the clutch or the transmission.				
1	Check the transmission for noise. Is the transmission OK?	—	System OK	*Go to Step 2*
2	Remove the clutch disc and check for the following conditions: • Damaged or weak disc plate springs • Weak diaphragm spring Is the diaphragm spring weak or are the springs damaged?	—	—	*Go to Step 3*
3	Replace the necessary components. Is the clutch system OK?	—	System OK	*Go to Step 1*

Release Bearing Noisy with Clutch Engaged

Step	Action	Value	Yes	No
DEFINITION: The clutch release bearing is noisy with the clutch fully engaged or during engagement.				
1	Inspect the release bearing. Is the release bearing worn?	—	*Go to Step 2*	*Go to Step 3*
2	Replace the release bearing. Is the clutch release bearing still noisy?	—	*Go to Step 3*	System OK
3	Check the clutch release bearing or binding on the transmission bearing retainer. Is the release bearing binding on the transmission bearing retainer?	—	*Go to Step 4*	—
4	Clean and lubricate the affected area. Replace the components as necessary. Is the clutch release bearing still noisy?	—	*Go to Step 1*	System OK

Clutch Noisy

Step	Action	Value	Yes	No
DEFINITION: The clutch is noisy with the clutch fully engaged.				
1	Check for a worn release bearing. Is the release bearing worn?	—	*Go to Step 2*	—
2	Replace the release bearing assembly. Is the clutch still noisy?	—	*Go to Step 1*	System OK

Pedal Stays on Floor (Clutch Disengaged)

Step	Action	Value	Yes	No
DEFINITION: Low clutch pedal or pedal on the floor.				
1	Inspect the clutch hydraulic line. Is the hydraulic line bursting or leaking?	—	*Go to Step 2*	*Go to Step 3*
2	Replace the hydraulic line. Does the clutch pedal still stay on the floor when disengaged?	—	*Go to Step 3*	System OK
3	Inspect the reservoir for fluid. Is there fluid in the reservoir?	—	*Go to Step 5*	*Go to Step 4*
4	Fill the reservoir with fluid and bleed. Does the clutch pedal still stay on the floor when disengaged?	—	*Go to Step 5*	System OK
5	Inspect the clutch release bearing for binding. Is there binding on the clutch release bearing?	—	*Go to Step 6*	*Go to Step 7*

Pedal Stays on Floor (Clutch Disengaged) (cont'd)

Step	Action	Value	Yes	No
6	Lubricate and free up the clutch release bearing or replace the clutch release bearing. Does the clutch pedal still stay on the floor when disengaged?	—	*Go to Step 7*	System OK
7	Check to see of the master cylinder pushrod has fallen off the clutch pedal. Has the master cylinder pushrod fallen off the clutch pedal?	—	*Go to Step 8*	*Go to Step 9*
8	Correctly install the master cylinder pushrod. Refer to *Master Cylinder Replacement.* Does the clutch pedal still stay on the floor when disengaged?	—	*Go to Step 9*	System OK
9	Inspect the master cylinder. Is the master cylinder faulty?	—	*Go to Step 10*	*Go to Step 11*
10	Replace the clutch master cylinder as needed. Refer to *Master Cylinder Replacement.* Does the clutch pedal still stay on the floor when disengaged?	—	*Go to Step 11*	System OK
11	Inspect the diaphragm spring. Is the diaphragm spring weak or broken?	—	*Go to Step 12*	*Go to Step 13*
12	Replace the clutch pressure plate. Does the clutch pedal still stay on the floor when disengaged?	—	*Go to Step 13*	System OK
13	Check the master cylinder seal and the master cylinder center valve seal. Is the master cylinder seal or the center valve seal faulty?	—	*Go to Step 14*	—
14	Replace the master cylinder. Refer to *Master Cylinder Replacement.* Does the clutch still stay on the floor when disengaged?	—	*Go to Step 1*	System OK

Clutch Pedal Hard to Push

Step	Action	Value	Yes	No
DEFINITION: Excessive pedal pressure.				
1	Check the clutch pedal in order to ensure that it is properly lubricated. Does the clutch pedal need lubricating.	—	*Go to Step 2*	*Go to Step 3*
2	Lubricate the clutch pedal. Is the pedal still hard?	—	*Go to Step 3*	System OK
3	Inspect the clutch hydraulic tube for blockage or crimping. Is the hydraulic tube blocked or crimped?	—	*Go to Step 4*	*Go to Step 5*
4	Replace the clutch hydraulic tube. Refer to *Master Cylinder Replacement.* Is the pedal still hard?	—	*Go to Step 5*	System OK
5	Check the concentric slave cylinder for binding. Is the concentric slave cylinder binding?	—	*Go to Step 6*	*Go to Step 7*
6	Replace the necessary components. Is the pedal still hard?	—	*Go to Step 7*	System OK
7	Inspect the clutch master cylinder for binding. Is the clutch master cylinder binding?	—	*Go to Step 8*	*Go to Step 9*
8	Replace the master cylinder as needed. Refer to *Master Cylinder Replacement.* Is the pedal still hard?	—	*Go to Step 9*	System OK
9	Inspect the clutch disc for wear. Is the clutch disc worn?	—	*Go to Step 10*	—
10	Replace the disc plate. Is the pedal still hard?	—	—	System OK

Clutch Pedal Travels to Floor(Fluid in Master Cyl)

Step	Action	Value	Yes	No
DEFINITION: The clutch pedal travels to the floor with no pressure and very little resistance.				
1	Check the fluid level in the clutch master cylinder reservoir. Is the fluid level OK?	—	*Go to Step 3*	*Go to Step 2*
2	Fill the master cylinder reservoir to the required level. Is the clutch system OK?	—	System OK	*Go to Step 3*
3	Check for a burst or a leaking hydraulic pipe. Is the hydraulic pipe OK?	—	*Go to Step 5*	*Go to Step 4*
4	Replace the clutch hydraulic line. Is the clutch system OK?	—	System OK	*Go to Step 5*
5	Check for hydraulic fluid in the master cylinder dust cover area. Is there fluid in the dust cover?	—	*Go to Step 6*	*Go to Step 7*
6	Replace the clutch hydraulic pipe. Refer to *Master Cylinder Replacement.* Is the clutch system OK?	—	System OK	*Go to Step 7*
7	Check for a rising hydraulic fluid level in the master cylinder reservoir. Does the fluid level rise when the clutch pedal is depressed?	—	*Go to Step 9*	*Go to Step 8*
8	Replace the master cylinder. Refer to *Master Cylinder Replacement.* Is the clutch system OK?	—	System OK	*Go to Step 9*
9	Inspect the clutch master cylinder. Is the clutch master cylinder faulty?	—	*Go to Step 10*	*Go to Step 11*
10	Replace the clutch master cylinder. Refer to *Master Cylinder Replacement.* Is the clutch system OK?	—	System OK	*Go to Step 11*
11	Inspect the concentric slave cylinder. Is the concentric slave cylinder faulty?	—	*Go to Step 12*	—
12	Replace the concentric slave cylinder. Refer to *Concentric Slave Cylinder.* Is the clutch system OK?	—	*Go to Step 1*	—

Clutch Master Cylinder Fluid Leaks

Step	Action	Value	Yes	No
DEFINITION:Hydraulic fluid is present in the master cylinder dust cover and on the clutch pedal assembly.				
1	Inspect the master cylinder seal for any hydraulic fluid leaks. Does the clutch master cylinder seal have any leaks?	—	*Go to Step 2*	—
2	Replace the necessary components. Is the clutch system OK?	—	System OK	—

Clutch Actuator Fluid Leaks

Step	Action	Value	Yes	No
DEFINITION: Hydraulic fluid is in the concentric slave cylinder area or on the cylinder body.				
1	Check the concentric slave cylinder for hydraulic fluid leaks. Is there a leak on the concentric slave cylinder?	—	*Go to Step 2*	—
2	Replace the required components. Is the clutch system OK?	—	System OK	—

Clutch Pedal Spongy

Step	Action	Value	Yes	No
DEFINITION: The clutch pedal feels spongy when depressed.				
1	Check the fluid level in the master cylinder reservoir. Is the fluid level OK?	—	*Go to Step 3*	*Go to Step 2*
2	Fill the reservoir with clean brake fluid. Is the reservoir properly filled?	—	*Go to Step 3*	*Go to Step 2*
3	Bleed the clutch hydraulic system. Refer to *Hydraulic Clutch Bleeding.* Does the clutch work now?	—	System OK	*Go to Step 4*
4	Inspect the clutch master cylinder. Is the master cylinder faulty?	—	*Go to Step 5*	*Go to Step 6*
5	Replace the clutch master cylinder. Refer to *Master Cylinder Replacement.* Does the clutch work now?	—	System OK	*Go to Step 6*
6	Inspect the concentric slave cylinder. Is the concentric slave cylinder faulty?	—	*Go to Step 7*	—
7	Replace the concentric slave cylinder. Refer to *Concentric Slave Cylinder.* Does the clutch work now?	—	System OK	—

Unable To Select Gears

Step	Action	Value	Yes	No
DEFINITION: Clutch pedal effort and clutch pedal travel are normal.				
1	Go to *Preliminary Checking Procedure.* Is the clutch system OK?	—	System OK	*Go to Step 2*
2	Diagnose the transmission. Refer to *Transmission Replacement (NV3500).* Does the clutch work now?	—	System OK	*Go to Step 3*
3	Check the master cylinder. Is the master cylinder worn or faulty?	—	*Go to Step 4*	*Go to Step 5*
4	Replace the clutch master cylinder. Refer to *Master Cylinder Replacement* Does the clutch work now?	—	System OK	*Go to Step 5*
5	Inspect the concentric slave cylinder. Is the concentric slave cylinder worn or faulty?	—	*Go to Step 6*	—
6	Replace the concentric slave cylinder. Refer to *Concentric Slave Cylinder.* Does the clutch work now?	—	System OK	—

Clutch Pedal Sticks or Binds

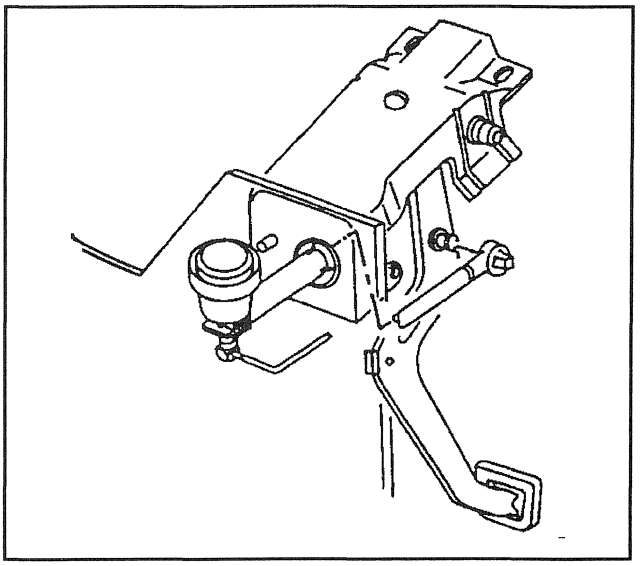
Step	Action	Value(s)	Yes	No
DEFINITION: The clutch pedal sticks or binds during clutch pedal travel.				
1	Check the clutch pedal bushings for wear. Are the clutch pedal bushings worn?	—	*Go to Step 2*	*Go to Step 3*
2	Repair the clutch pedal assembly. Refer to *Clutch Pedal Replacement* Does the clutch work properly?	—	System OK	*Go to Step 3*
3	Check the clutch release bearing. Is the release bearing faulty?	—	*Go to Step 4*	—
4	Replace the clutch release bearing. Refer to *Clutch Pedal Replacement.* Does the clutch work properly?	—	System OK	—

Repair Instructions

Clutch Pedal Replacement

Removal Procedure

1. Remove the push rod from the clutch pedal.



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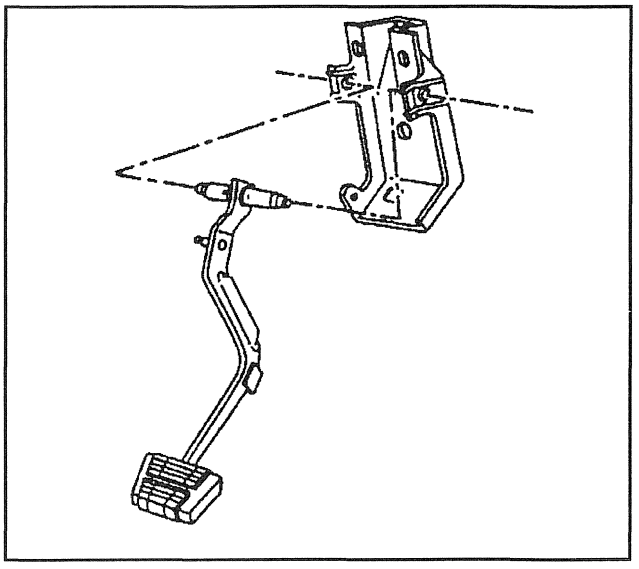
2. Push in the two spring-loaded bushings in order to remove the clutch pedal.



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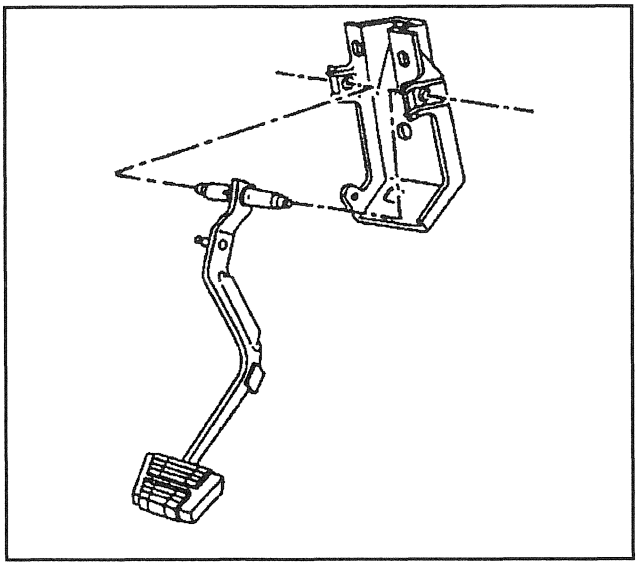

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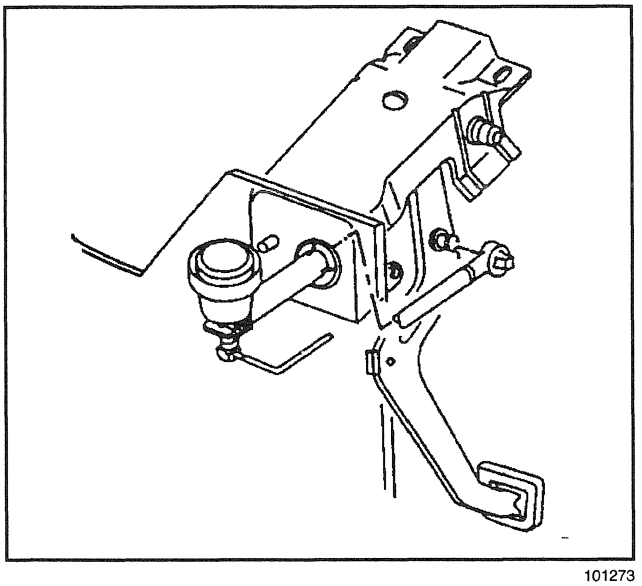
Installation Procedure

1. Depress both of the spring-loaded bushings. Position the bushings into the clutch pedal support. The bushings will pop out and hold the pedal in place.



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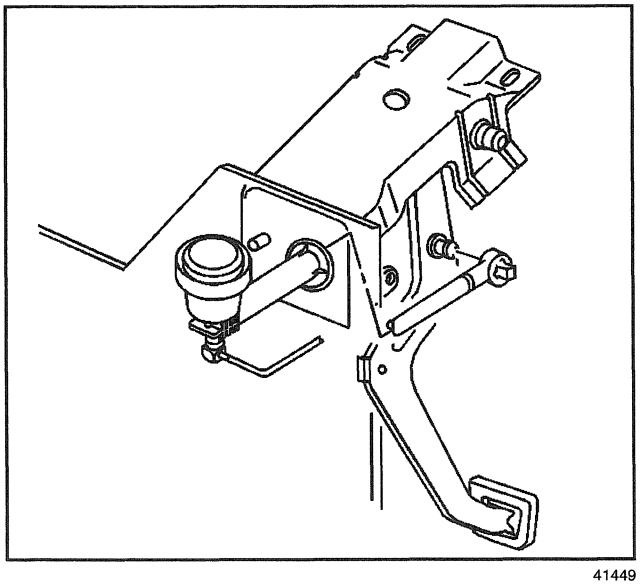
2. Install the push rod to the clutch pedal.



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Master Cylinder Replacement

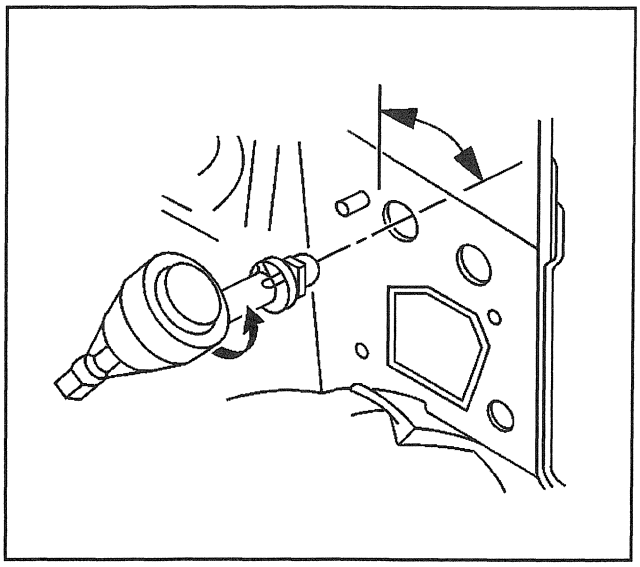
Removal Procedure

Tools Required

- *J 36221* Quick Connect Coupling Special Tool

1. Remove the push rod from the clutch pedal.

2. Remove the hydraulic tube from the concentric slave cylinder quick connect coupling.



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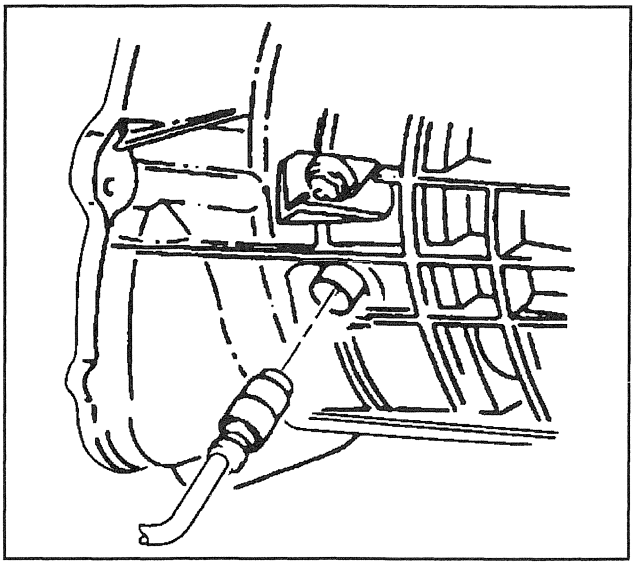
3. Using *J 36221*, remove the clutch line from the concentric slave cylinder in order to depress the white plastic sleeve on the quick connect coupling. Separate the clutch line from the concentric slave cylinder.
4. Remove the tubes clips from the wiring harness bracket and sheet metal.
5. Rotate the master cylinder body 45° clockwise in order to remove the master cylinder from the cowl panel.



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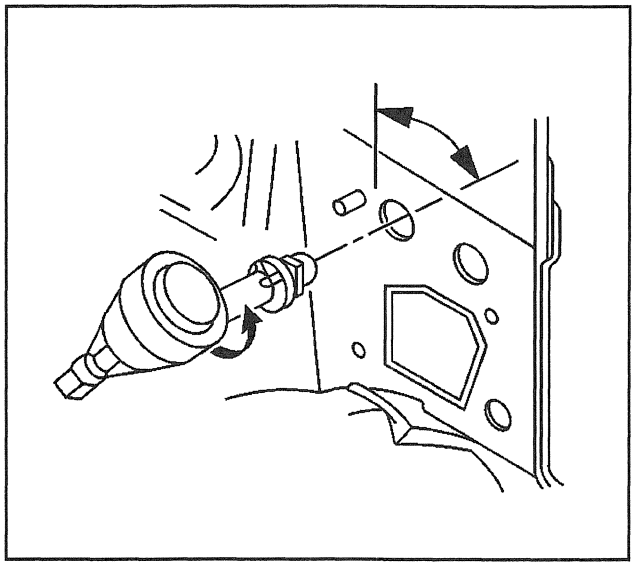
Installation Procedure

1. Position the master cylinder to the cowl panel.

Important: Do not over rotate the master cylinder or damage will occur.

2. Install the master cylinder by holding it at a 45° angle and rotating it counterclockwise.
3. Connect the hydraulic tube to the concentric slave cylinder quick connect coupling.
4. Install the tube clips to the wiring harness bracket and the sheet metal.



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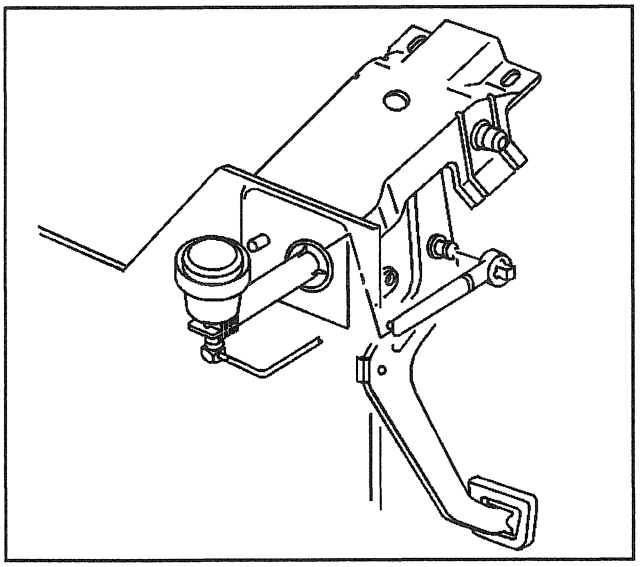

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5. Secure the push rod to the clutch pedal.
6. Check the reservoir to ensure the oil level is at the full level. Use Delco Supreme® II Brake Fluid (GM P/N 1052535) or an equivalent.

Hydraulic Clutch Bleeding

Important: Never use fluid that you have bled from a system to fill the reservoir. The fluid may be aerated or contaminated.

1. Fill the reservoir with new brake fluid. Use Delco Supreme® Brake Fluid (GM P/N 1052535) or equivalent.

Caution: Refer to Vehicle Lifting Caution in Cautions and Notices.

2. Raise the vehicle.
3. Depress the clutch pedal (hold the pedal down).
4. Open the bleed screw on the concentric slave cylinder in order to expel the air.
5. Close the bleed screw then release the clutch pedal.

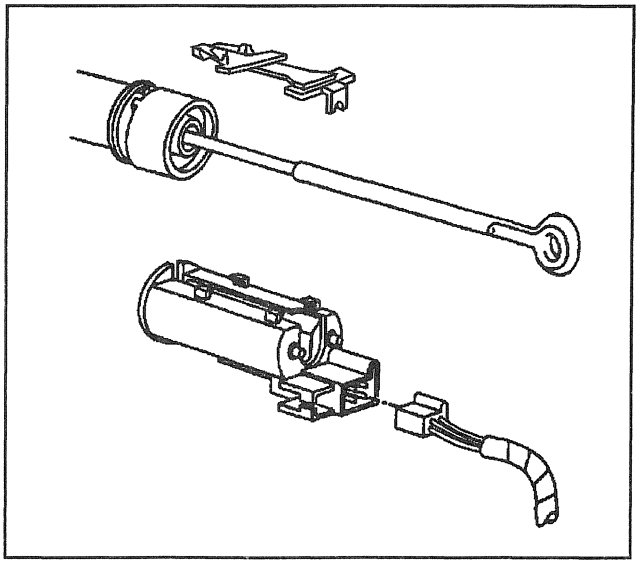
Important: Ensure no air is drawn into the clutch system.

6. Repeat steps 2, 3, and 4 until all the air is out of the clutch system.
   - 6.1. Check and refill the reservoir as needed while bleeding.
   - 6.2. After bleeding, pump the clutch pedal several times. If the clutch engagement is not satisfactory, repeat the bleeding procedure.
7. If the previous procedures are unsuccessful, perform the following steps.
   - 7.1. Remove the reservoir cap.
   - 7.2. Pump the clutch pedal very fast for 30 seconds.
   - 7.3. Stop pumping and let the air escape.
   - 7.4. Repeat this procedure as necessary.
8. Lower the vehicle.

Clutch Start Switch Replacement

Removal Procedure

1. Remove the LH IP sound insulator panel.
2. Remove the plastic retainer tabs from the clutch start switch.
3. Remove the clutch start switch from the push rod.
4. Remove the connector from the switch.



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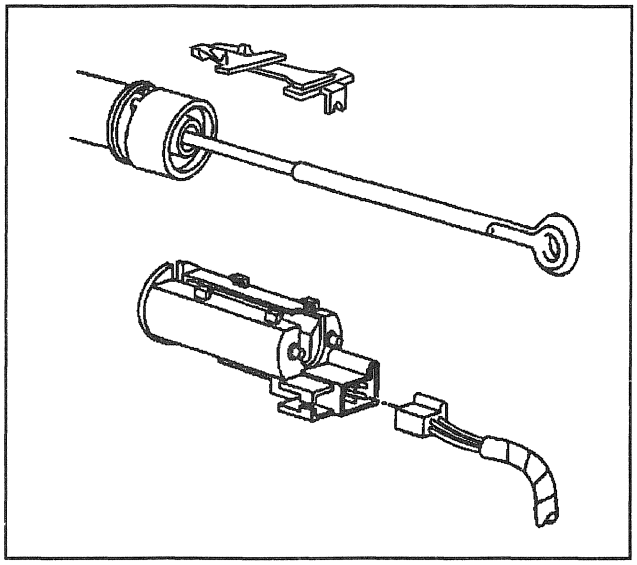
Installation Procedure

1. Install the connector to the clutch start switch.
2. Install the clutch start switch to the pushrod with the plastic tabs.
3. Install the push rod to the clutch pedal.
4. Install the LH IP sound insulator panel.



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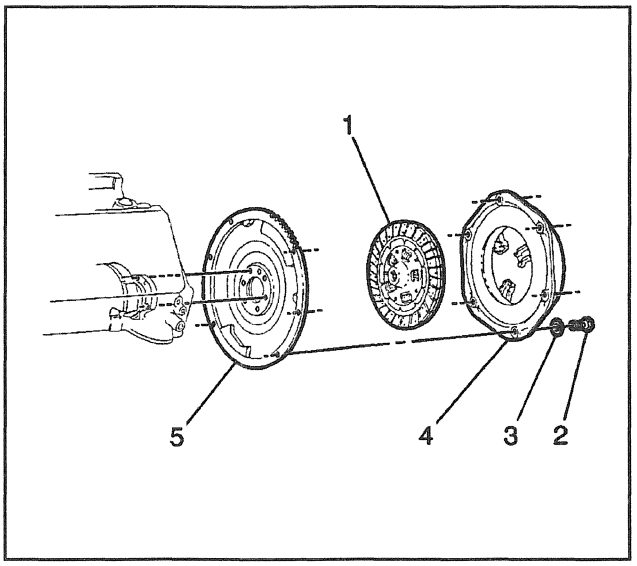
Clutch Assembly Replacement

Removal Procedure

Tools Required

J 36221 Clutch Alignment Tool

1. Raise the vehicle. Refer to *Vehicle Lifting Caution* in General Information.
2. Remove the quick disconnect from the concentric slave cylinder. Refer to *Master Cylinder Replacement.*
3. Remove the transmission. Refer to *Transmission Replacement (NV3500)* or *Transmission Replacement (NV4500 RWD)* or *Transmission Replacement (NV4500 4WD)* in Manual Transmission.
4. Install the *J 36221* in order to support the clutch.
5. Mark the flywheel (5) and a clutch pressure plate lug for the installation alignment.



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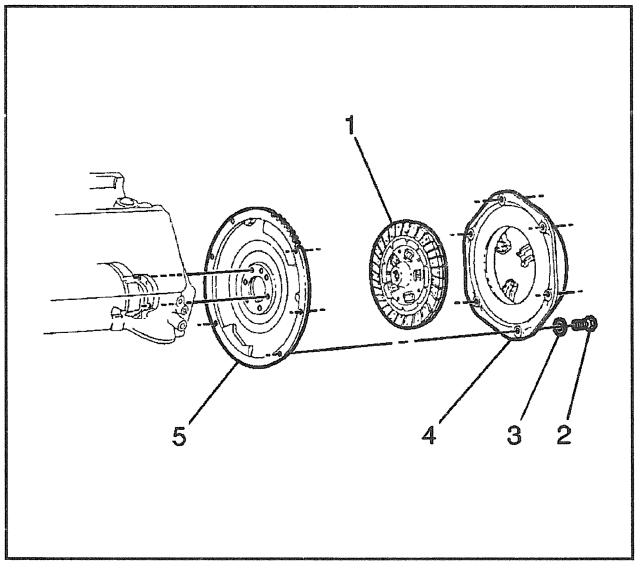
6. Remove the bolts (2) and the washers (3). Secure the clutch pressure plate (4) and the clutch driven plate (1) to the flywheel (5).
   6.1. Remove the *J 36221*
   6.2. Clean all of the parts with a water dampened cloth.
   6.3. Inspect all of the parts for wear and damage.
   6.4. Use a straight edge in order to inspect the contact surfaces for scoring and flatness.
   6.5. Inspect the friction pads for scoring, gouges, and loose rivets.
   6.6. Inspect the friction pads for oil. Replace the clutch driven plate if the friction pads are soaked with oil.
   6.7. Inspect all of the splines for the following:
      - Nicks
      - Burrs
      - A smooth sliding fit
   6.8. Inspect all of the springs for bending and breakage.



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Installation Procedure

Tools Required

J 36221 Clutch Alignment Tool

1. Install the bolts (2) and the washers (3) that secure the clutch pressure plate (4) and the clutch driven plate (1) to the flywheel (5).
2. Install the *J 36221* in order to support the clutch.

Notice: Refer to *Fastener Notice* in Cautions and Notices.

3. Align the marks made during removal or, if new align the lightest part of the clutch pressure plate, identified by a yellow dot, to the heaviest part of the flywheel, identified by an "X".

   Tighten

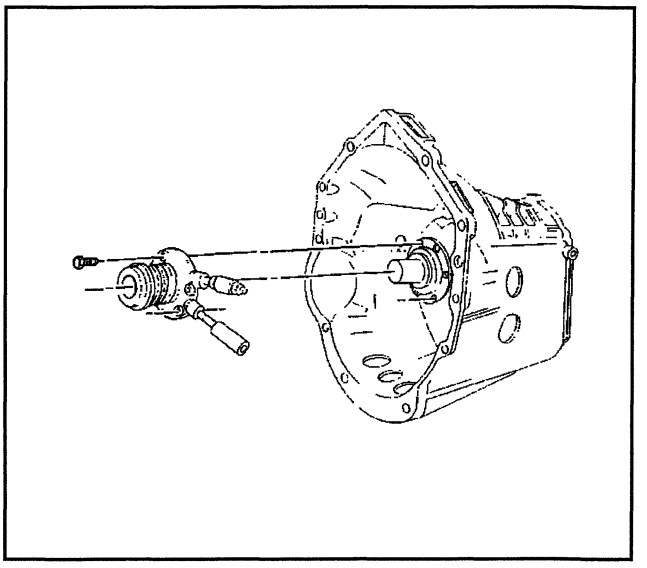
   Tighten the clutch pressure plate to the flywheel bolts to 41 N·m (30 lb ft).

   Remove the *J 36221*.
4. Install the transmission. Refer to *Transmission Replacement (NV3500)* or *Transmission Replacement (NV4500 RWD)* or *Transmission Replacement (NV4500 4WD)* in Manual Transmission.
5. Install the hydraulic line fitting to the concentric slave cylinder. Refer to *Master Cylinder Replacement*.
6. Lower the vehicle.

Concentric Slave Cylinder

Removal Procedure

1. Remove the transmission. Refer to *Transmission Replacement (NV3500)*.
2. Remove the bolts that secure the concentric slave cylinder to the clutch housing shaft.



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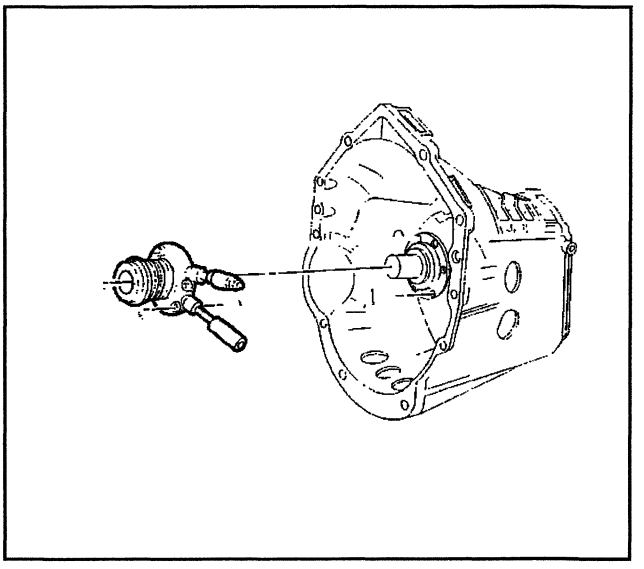
3. Remove the slave cylinder from the transmission input shaft.



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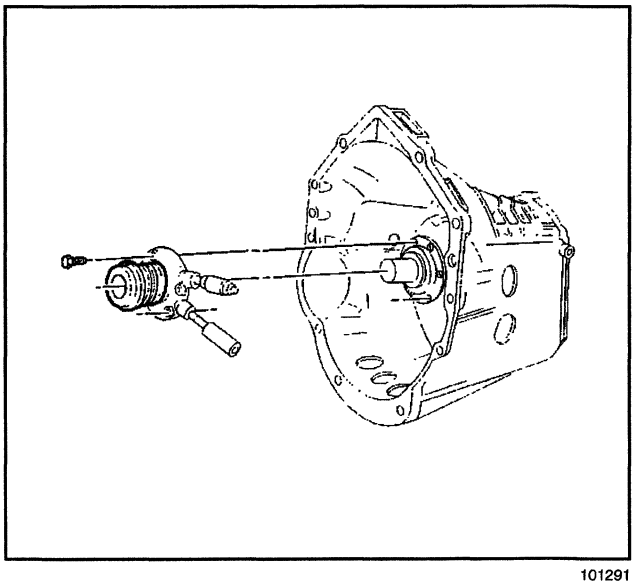
4. Remove the bearing from the slave cylinder.



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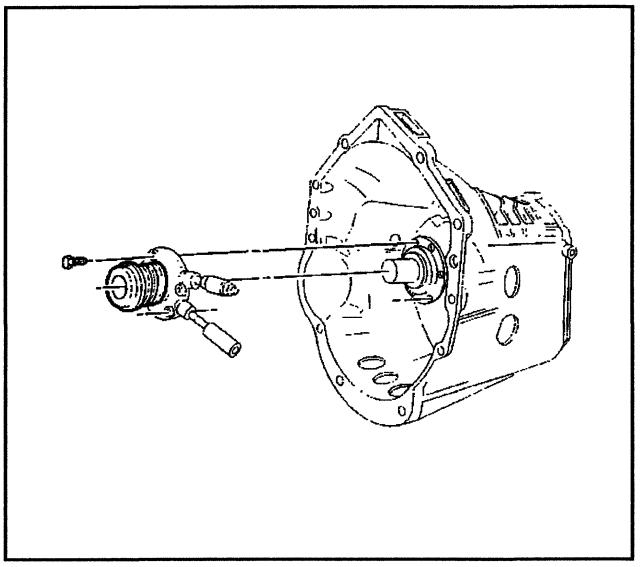

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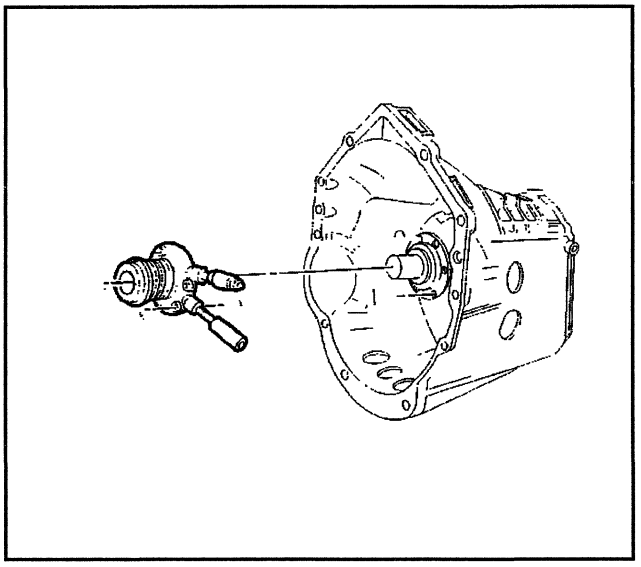
Installation Procedure

1. Install the bearing to the slave cylinder.



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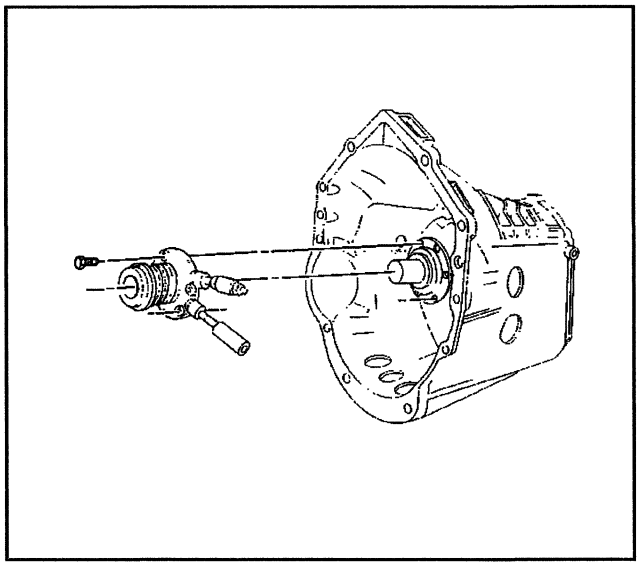
2. Install the slave cylinder to the transmission input shaft. Ensure that the bleed screw and the coupling are positioned with the transmission ports.



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3. Install the two bolts that secure the concentric slave cylinder to the clutch housing shaft.

   Tighten

   Tighten the bolts to 8 N·m(71 lb in).

Notice: Refer to *Fastener Notice* in Cautions and Notices.

4. Install the transmission. Refer to *Transmission Replacement (NV3500).*

Description and Operation

Clutch Driving Members

The clutch driving members are two flat surfaces machined to a smooth finish. They are:

- 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 spring pressure. This pressure is exerted by a diaphragm spring in the clutch pressure plate.

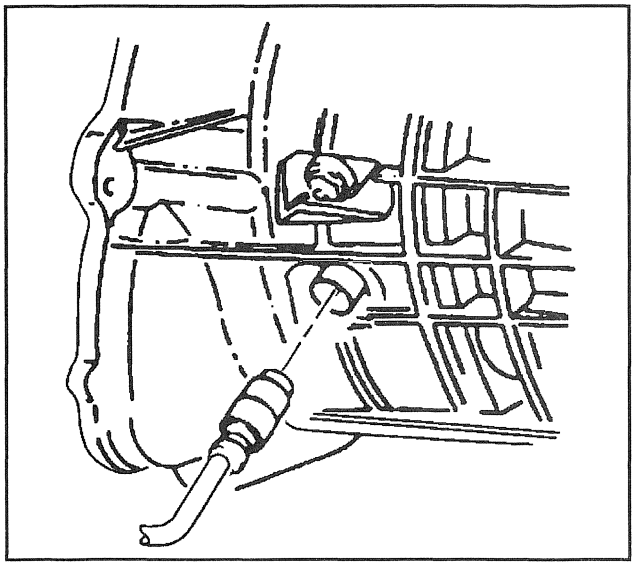
Clutch Operating Members

Hydraulic Clutch Fluid

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

When refilling the system or adding fluid after service, use GM Delco Supreme No. II® Brake Fluid, or an equivalent that meets DOT 3 specifications.

Hydraulic Clutch



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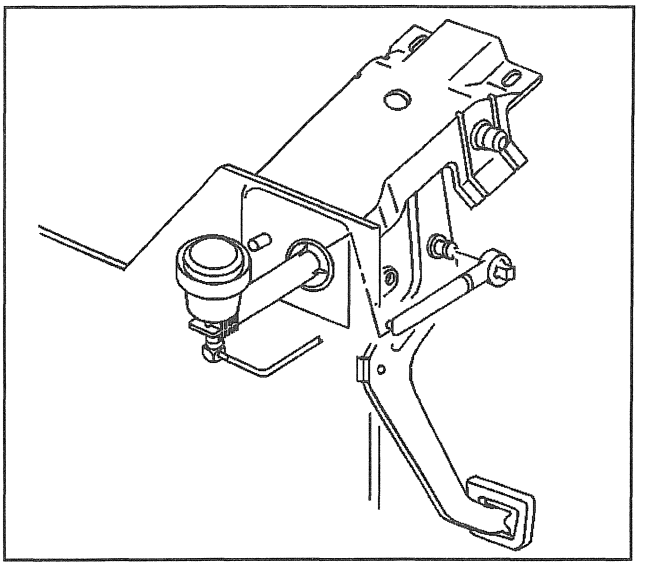

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The clutch release system consists of the following components:

- A master cylinder with a reservoir
- A switch
- An actuator cylinder connected to hydraulic tubing

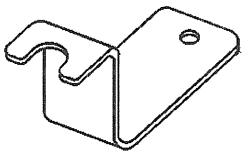
With depression of the clutch pedal, the clutch master cylinder becomes pressurized from the force of the push rod into the master cylinder. This forces hydraulic fluid into the tubing from the master cylinder to the concentric slave cylinder. The slave cylinder then engages by pushing the release bearing into the diaphram spring and releasing the clutch.

A hole in the cowl panel accommodates the master cylinder. A quick connect coupling helps route the hydraulic tubing. The concentric slave cylinder is inside the transmission and on the input bearing retainer. The hydraulic control system can be replaced without having to gain access to the clutch system internal components, simply engage the quick connect coupling mounted through the transmission housing.

There are automatic clutch system adjustments. No mechanical changes in the linkage or clutch position are necessary. As the clutch wears, the fluid level in the master cylinder reservoir rises as a result of less fluid in the hydraulic system. A new system will have a fluid level at the very top of the reservoir.

An electrical switch on the push rod has two functions: One function is a clutch interlock, assuring that the engine does not start unless the clutch pedal is engaged (positioned to the floor). The second function is to cut off the cruise-control system (if so equipped) when the clutch pedal is engaged.

Special Tools and Equipment

Illustration	Part Number Description
 400483	J 42371 Clutch Line to Concentric Slave Cylinder Removal Tool
 586	J 33169 Clutch Alignment Tool