

SECTION 7C

CLUTCH

CAUTION: When servicing the clutch system, do not create dust by cleaning components with compressed air. While not containing asbestos fibers, the clutch disc does contain fiberglass fibers which could cause bodily harm if inhaled. Any residue should also be washed from the skin as it could cause irritation.

NOTICE: When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread locking compound will be called out. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

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GENERAL DESCRIPTION

PRINCIPLE COMPONENTS

The principal components of the clutch system are the driving members, attached to the engine assembly and turning with the engine assembly; the driven member, attached to the transmission assembly and turning with the transmission assembly; and the operating members. The operating members include the clutch master cylinder and actuator assembly, the clutch release bearing assembly, the clutch pedal assembly, and the clutch pilot bearing.

Driving Members

The driving members of the clutch consist of two flat surfaced iron plates machined to a smooth finish. One of these surfaces is the rear face of the engine flywheel assembly and the other is the clutch pressure plate assembly (with cover). The 3.4L L32 engine uses a push-type clutch release system, while the 5.7L LT1 engine utilizes a pull-type clutch release system.

Driven Member

The driven member is the clutch driven plate assembly. This clutch driven plate assembly has a splined hub which meshes with the splines of the input shaft and drives the input shaft.

The driving and driven members are held in contact by spring pressure. This pressure is exerted by a diaphragm spring in the clutch pressure plate assembly (with cover).

Hydraulic Clutch

A hydraulic clutch operating mechanism is used to engage and disengage the clutch system. The mechanism consists of a remote master cylinder reservoir, a clutch master cylinder and a clutch actuator cylinder. The remote master cylinder reservoir is mounted to the left-hand hood strut bracket using a push-on retainer. The clutch master cylinder is mounted on the front of dash with a U-bolt fastener. The clutch actuator cylinder is mounted on the flywheel housing assembly on the 3.4L L32 engine and to the clutch actuator cylinder spacer on the flywheel housing assembly with the 5.7L LT1 engine. The clutch master cylinder is operated directly by the clutch pedal assembly.

When the clutch pedal assembly is pressed down, hydraulic fluid under pressure from the clutch master cylinder flows into the clutch actuator. On the 3.4L L32 engine the actuator piston engages the clutch fork assembly, which moves the release bearing assembly, pressing the diaphragm spring fingers to disengage the clutch.

On the 5.7L LT1 engine the actuator piston engages the clutch fork assembly which moves the release bearing

assembly pulling the diaphragm spring fingers to disengage the clutch.

The hydraulic clutch system sets the clutch pedal height and provides automatic clutch adjustment. No adjustment of clutch or clutch pedal assembly position is required.

Hydraulic Clutch Fluid

When adding fluid to or refilling the system after service operations use GM Delco-Supreme 11® brake fluid or an equivalent fluid that meets DOT 3 specifications.

NOTICE: Do not use silicon, mineral or paraffin based oil in the clutch hydraulic system. These fluids will damage the rubber parts in the cylinders.

Clutch Pilot Bearing

The clutch pilot bearing is an oil-impregnated bearing pressed into the crankshaft. This bearing requires attention when the clutch is removed from the vehicle. The clutch pilot bearing should be cleaned and inspected for excessive wear or damage and replaced if necessary.

DIAGNOSIS

PRELIMINARY CHECKS

Before attempting to repair the clutch, manual transmission assembly or related hydraulic components for any reason other than an obvious failure, the problem and probable cause should be identified. A large percentage of clutch and manual transmission assembly problems show up as shifting difficulties, such as high shift effort, gear clash and grinding, or transmission assembly blockout. When any of these conditions occur, a careful analysis of these difficulties should be performed before removing the clutch or manual transmission assembly for repairs. Refer to "Clutch System Diagnosis" in this section for conditions, causes and corrections.

Before removal of the clutch hydraulic system, verify the malfunction by removing the flywheel housing cover and measure the travel of the clutch actuator pushrod. With the clutch pedal pushed fully to the floor, the clutch actuator pushrod should extend a minimum of 11 mm (0.43 inch) against the clutch fork assembly. Do not replace the hydraulic system if pushrod travel exceeds this distance.

If the clutch actuator pushrod does not meet the travel requirements, check the clutch master cylinder reservoir fluid level.

- The clutch actuator cylinder must be in place when checking the fluid level.
- The proper level is indicated by a step on the clutch master cylinder reservoir. Fill to specified level with GM Delco-Supreme 11® brake fluid or an equivalent fluid that meets DOT 3 specifications.
- Do not overfill. The upper portion of the clutch master cylinder reservoir must accept fluid that is displaced from the clutch actuator cylinder as the clutch wears.

NOTICE: Carefully clean the top and sides of the clutch master cylinder reservoir before opening to prevent contamination of the system with dirt, water or other foreign material. Remove the clutch master cylinder reservoir diaphragm before adding fluid. Carefully replace the diaphragm, cover gasket and cover after filling.

If the clutch master cylinder reservoir requires any fluid, check the clutch hydraulic system components for leakage. Remove rubber boots from the clutch master cylinder and check for leakage past the pistons. A slight wetting of the surfaces is acceptable. Replace the clutch hydraulic system if excessive leakage is evident.

CLUTCH SYSTEM DIAGNOSIS

For diagnosis of either the 5-speed manual transmission clutch system or the 6-speed manual transmission clutch system refer to the following chart:

CONDITION	PROBABLE CAUSE	CORRECTION
Fails to Release (Pedal assembly pressed to floor, shift lever does not move freely in and out of reverse gear)	1. Faulty clutch pilot bearing. 2. Faulty driven plate assembly. 3. Fork assembly off of clutch fork ball stud or ball stud loose on 5-speed (called T-stud on 6-speed). 4. Driven plate assembly hub binding on input shaft assembly splines. 5. Driven plate assembly warped or bent. 6. Air in clutch hydraulic system. 7. Pedal assembly misaligned to the cowl.	1. Replace clutch pilot bearing. 2. Replace clutch driven plate assembly. 3. Install properly and lightly lubricate fingers at clutch release bearing and clutch fork ball stud. 4. Repair or replace input shaft assembly and/or driven plate assembly. 5. Replace driven plate assembly. Runout should not exceed 0.5 mm (0.020 inch). 6. Bleed clutch hydraulic system. 7. Loosen pedal assembly mounting bolts and realign pedal assembly.

CONDITION	PROBABLE CAUSE	CORRECTION
Slipping	1. Oil-soaked driven plate assembly. 2. Worn facing or facing torn from driven plate assembly. 3. Warped pressure plate assembly or flywheel assembly. 4. Weak diaphragm spring. 5. Clutch driven plate assembly not seated in. 6. Clutch driven plate assembly overheated.	1. Install new clutch driven plate assembly and correct leak at source. 2. Replace clutch driven plate assembly. 3. Replace pressure plate assembly or flywheel assembly. 4. Replace pressure plate assembly. 5. Make 30 to 40 normal starts. Do not overheat. 6. Allow to cool.
Grabbing (Chattering)	1. Oil on clutch pressure plate assembly facing or burned or glazed facing. 2. Worn splines on input shaft assembly. 3. Warped pressure plate assembly or flywheel assembly. 4. Burned or smeared resin on flywheel or pressure plate assemblies.	1. Install new clutch driven plate assembly and correct leak at source. 2. Replace input shaft assembly. 3. Replace pressure plate assembly or flywheel assembly. 4. Sand off if superficial. Replace burned or heat checked parts.
Release Bearing Assembly Noise with Clutch Fully Engaged	1. Release bearing binding on transmission bearing retainer. 2. Fork assembly improperly installed.	1. Clean, lubricate, check for burrs, nicks, and other wear. 2. Install properly.
Noisy	1. Worn release bearing. 2. Fork assembly off ball stud on 5-speed (called T-stud on 6-speed) (heavy clicking). 3. Clutch pilot bearing loose in crankshaft.	1. Replace bearing assembly. 2. Install properly and lubricate fork assembly fingers and bearing assembly. 3. Replace clutch pilot bearing.
Clutch Pedal Assembly Stays on Floor when Disengaged	1. Bind in release bearing assembly. 2. Master cylinder fell off pedal.	1. Lubricate and free-up release bearing assembly. 2. Install correctly.
Excessive Pedal Pressure	1. Linkage needs lubrication. 2. Pressure plate assembly release fingers binding. 3. Linkage misaligned. 4. Release bearing assembly sleeve binding on transmission bearing retainer. 5. Sticking linkage, master cylinder or actuator cylinder.	1. Lubricate linkage. 2. Free and lubricate. 3. Align linkage. 4. Free and lubricate. 5. Clean or replace as needed.
Rapid Clutch Driven Plate Assembly Wear	1. Scored flywheel assembly or pressure plate assembly. 2. Driver rides the clutch (rests left foot on clutch while driving). 3. Driver races engine and slips clutch excessively during starting. 4. Driver holds vehicle on hill by slipping clutch. 5. Weak pressure plate assembly springs.	1. Grind or replace. 2. Instruct driver. 3. Instruct driver. 4. Instruct driver. 5. Rebuild or replace pressure plate assembly.

ON-VEHICLE SERVICE

BLEEDING HYDRAULIC SYSTEM

Figures 1, 2, and 3

Bleeding is necessary whenever the level of fluid in the reservoir has been allowed to fall so low that air has been drawn into the master cylinder.

NOTICE: Never, under any circumstances, use fluid which has been bled from a system to fill the clutch master cylinder reservoir as it may be aerated, have too much moisture content and possibly be contaminated.

NOTICE: See "Notice" on page 7C-1 of this section.

1. Loosen clutch master cylinder nuts (23 and 24) to end of threads on U-bolt (25).
2. Clean dirt and grease from the reservoir cap to ensure no foreign substances will enter the system.

3. Remove the reservoir cap and diaphragm.

4. Wrap a piece of mechanics wire around left-hand hood strut bracket (2 or 8) making sure wire is accessible from underside of vehicle.

5. Raise and suitably support vehicle. Refer to SECTION 0A.

6. Remove actuator cylinder nuts (5 or 10).

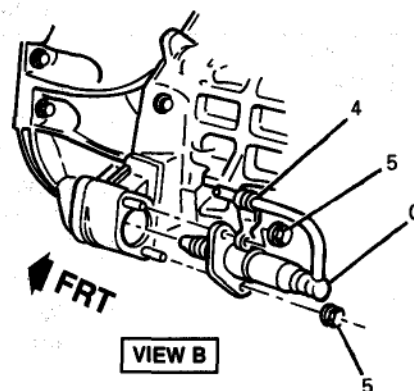
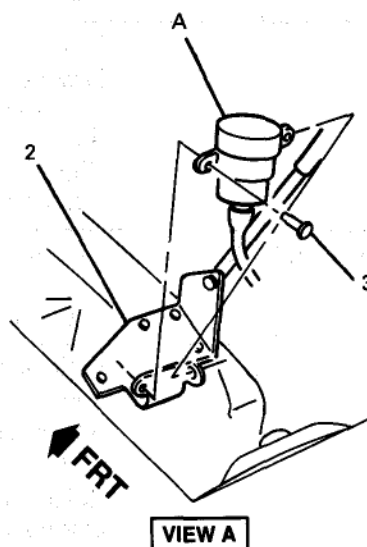
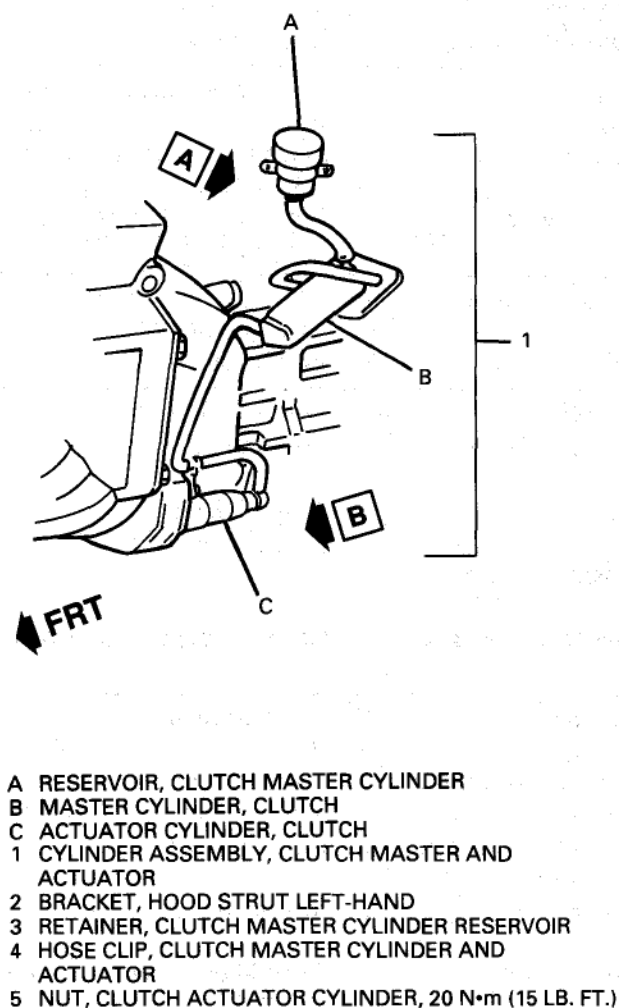
7. Remove actuator cylinder.

- Retain actuator cylinder in engine compartment using mechanics wire previously installed.

8. Lower vehicle.

9. Grasp actuator cylinder and depress hydraulic actuator cylinder pushrod approximately 20.0 mm (0.787 inch) into actuator cylinder bore and hold.

10. Install diaphragm and reservoir cap while holding in actuator cylinder pushrod.



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Figure 1 – Clutch Hydraulic System (6-Speed)

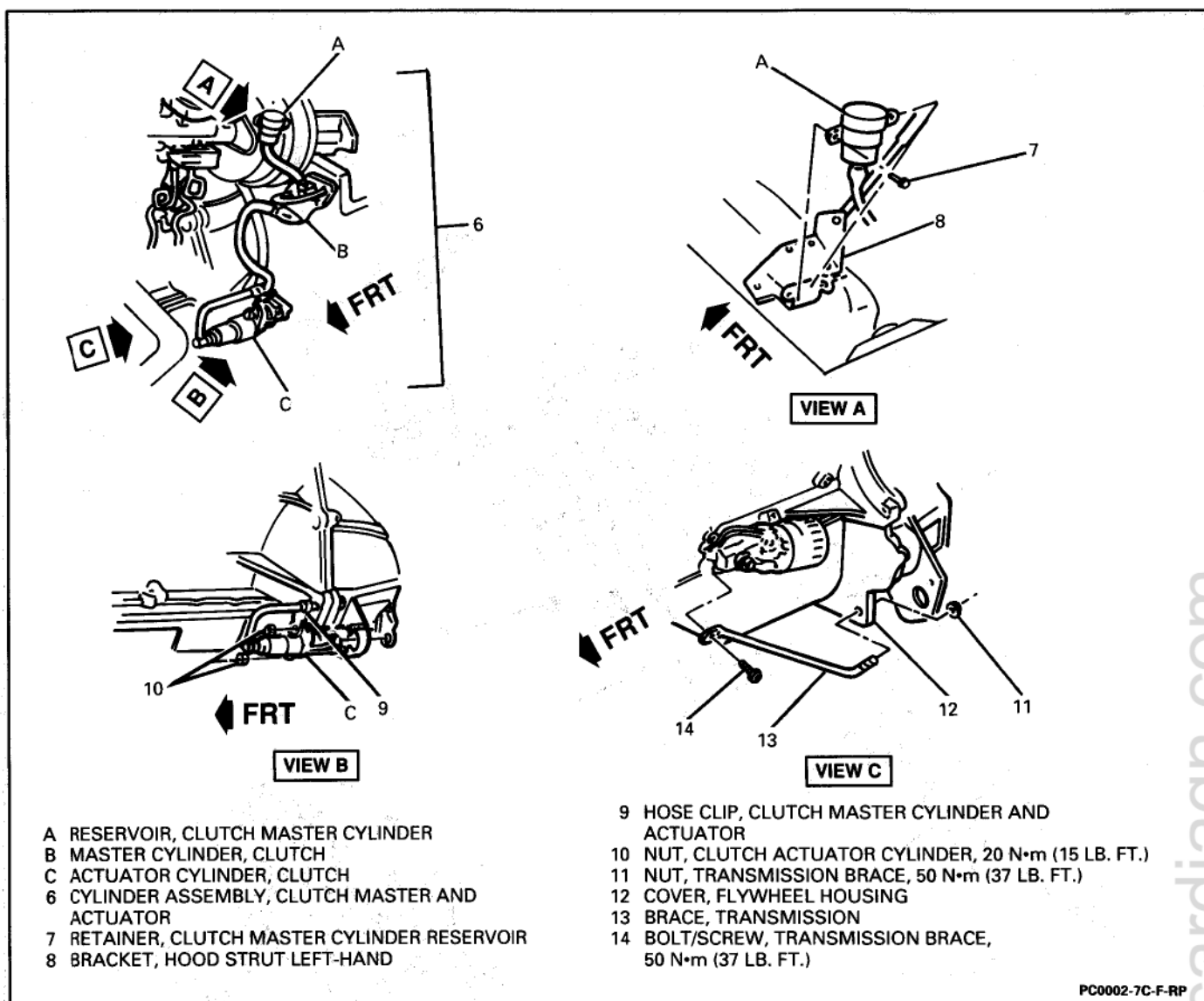


Figure 2 – Clutch Hydraulic System (5-Speed)

11. Release actuator cylinder pushrod.
12. Hold actuator cylinder vertically with the pushrod end facing down.

Important

- Actuator cylinder should be lower than the master cylinder.

13. Press pushrod into actuator cylinder bore with short 10.0 mm (0.390 inch) strokes.

Inspect

- Master cylinder reservoir for air bubbles.

14. Continue until air bubbles are no longer entering reservoir.
15. Raise and suitably support vehicle. Refer to SECTION 0A.
16. Remove actuator cylinder from mechanics wire.
17. Install actuator cylinder.

18. Install actuator cylinder nuts (5 or 10).

Tighten

- Clutch actuator cylinder nuts (5 or 10) to 20 N·m (15 lb. ft.).

19. Lower vehicle.

20. Remove mechanics wire from left-hand hood strut bracket (2 or 8).

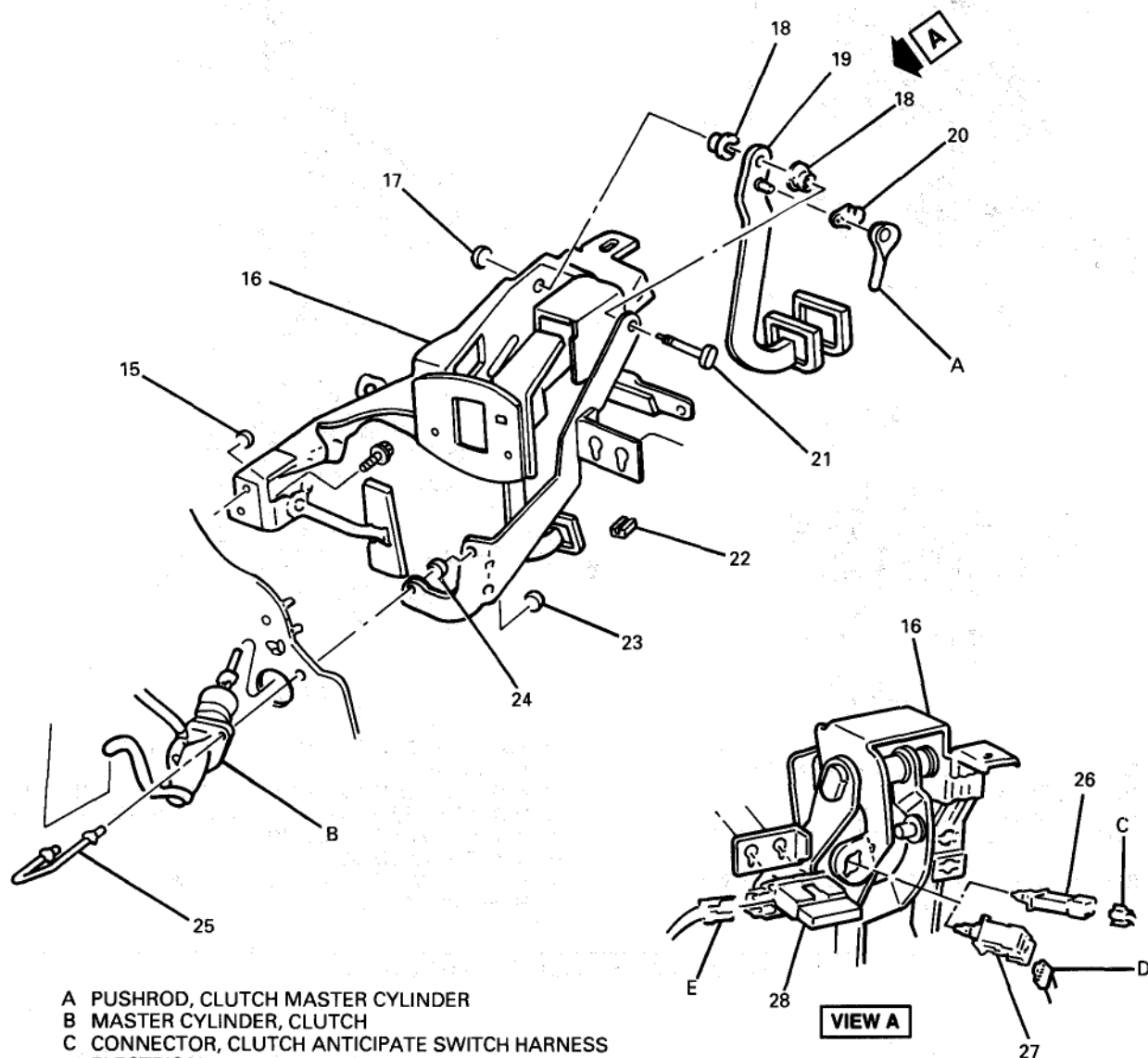
21. Install clutch master cylinder nuts (23 and 24).

Tighten

- Clutch master cylinder nuts (23) to 27 N·m (20 lb. ft.).

Inspect

- Fluid level in clutch master cylinder reservoir. Fill clutch master cylinder reservoir with Delco-Supreme 11® fluid or equivalent DOT 3 fluid.



- A PUSHROD, CLUTCH MASTER CYLINDER
- B MASTER CYLINDER, CLUTCH
- C CONNECTOR, CLUTCH ANTICIPATE SWITCH HARNESS ELECTRICAL
- D CONNECTOR, CLUTCH ANTICIPATE SWITCH HARNESS ELECTRICAL
- E CONNECTOR, CLUTCH PEDAL POSITION SWITCH HARNESS ELECTRICAL
- 15 NUT, BRAKE PEDAL, 25 N•m (18 LB. FT.)
- 16 PEDAL ASSEMBLY, BRAKE AND ACCELERATOR AND CLUTCH (WITH BRACKET)
- 17 NUT, BRAKE PEDAL PIVOT, 54 N•m (40 LB. FT.)
- 18 BUSHING, CLUTCH PEDAL PIVOT
- 19 PEDAL ASSEMBLY, CLUTCH
- 20 RETAINER, CLUTCH PEDAL LEVER PIN
- 21 BOLT/SCREW, BRAKE PEDAL PIVOT
- 22 BUMPER, CLUTCH PEDAL
- 23 NUT, CLUTCH MASTER CYLINDER, 27 N•m (20 LB. FT.)
- 24 NUT, CLUTCH MASTER CYLINDER (PUSH-ON)
- 25 U-BOLT, CLUTCH MASTER CYLINDER
- 26 SWITCH ASSEMBLY, CLUTCH ANTICIPATE (WITH 3.4L L32 ENGINE)
- 27 SWITCH ASSEMBLY, CLUTCH ANTICIPATE (WITH 5.7L LT1 ENGINE)
- 28 SWITCH ASSEMBLY, CLUTCH PEDAL POSITION (SWITCH ASSEMBLY, CLUTCH START)

Figure 3 – Clutch Pedal Assembly and Switches

CLUTCH MASTER AND ACTUATOR CYLINDER ASSEMBLY

Figures 1, 2 and 3

Remove or Disconnect

CAUTION: Refer to "Caution" under "Disconnecting the Battery Negative Cable Assembly" in SECTION 0A.

1. Battery negative cable assembly.
2. Instrument panel driver knee bolster assembly. Refer to SECTION 8C.
3. Clutch master cylinder pushrod from clutch pedal assembly (19).
4. Clutch master cylinder nuts (23 and 24) from dash panel assembly.
5. Clutch master cylinder U-bolt (25) from dash panel assembly.
6. Clutch master cylinder from dash panel assembly.
7. Clutch master cylinder reservoir retainer (3 or 7).
8. Clutch master cylinder reservoir from left-hand hood strut bracket (2 or 8).
9. Raise and suitably support vehicle. Refer to SECTION 0A.
10. Clutch actuator cylinder nuts (5 or 10).
11. Clutch actuator cylinder from clutch housing.
12. Clutch master and actuator cylinder assembly (1 or 6) from vehicle.

Install or Connect

NOTICE: See "Notice" on page 7B-1 of this section.

1. Clutch actuator cylinder.
2. Clutch actuator cylinder nuts (5 or 10).

Tighten

- Clutch actuator cylinder nuts (5 or 10) to 20 N•m (15 lb. ft.).
3. Lower vehicle.
 4. Clutch master cylinder to dash panel assembly.
 5. Clutch master cylinder U-bolt (25) to dash panel assembly.
 6. Clutch master cylinder nuts (23 and 24).

Tighten

- Clutch master cylinder nuts (23) to 27 N•m (20 lb. ft.).
7. Clutch master cylinder reservoir to left-hand hood strut bracket (2 or 8).
 8. Clutch master cylinder reservoir retainer (3 or 7).
 9. Clutch master cylinder pushrod to clutch pedal assembly (19).

10. Instrument panel driver knee bolster assembly. Refer to SECTION 8C.
11. Battery negative cable assembly.

CLUTCH PEDAL ASSEMBLY

Figure 3

Remove or Disconnect

1. Brake and accelerator and clutch pedal assembly (with bracket). Refer to SECTION 5.
2. Brake pedal pivot nut (17) and bolt/screw (21).
3. Clutch pedal assembly (19) with pivot bushings (18).

Install or Connect

NOTICE: See "Notice" on page 7C-1 of this section.

1. Clutch pedal assembly (19) with pivot bushings (18).
2. Brake pedal pivot bolt/screw (21) and nut (17).

Tighten

- Brake pedal pivot nut (17) to 54 N•m (40 lb. ft.).
3. Brake and accelerator and clutch pedal assembly (with bracket). Refer to SECTION 5.

CLUTCH ANTICIPATE SWITCH ASSEMBLY

Figure 3

Remove or Disconnect

CAUTION: Refer to "Caution" under "Disconnecting the Battery Negative Cable Assembly" in SECTION 0A.

1. Battery negative cable assembly.
2. Instrument panel driver knee bolster assembly. Refer to SECTION 8C.
3. Clutch anticipate switch harness electrical connector from clutch anticipate switch assembly (26 or 27).
4. Clutch anticipate switch assembly (26 or 27) from brake and accelerator and clutch pedal assembly (with bracket) (16).

Install or Connect

1. Clutch anticipate switch assembly (26 or 27) to brake and accelerator and clutch pedal assembly (with bracket) (16).
2. Clutch anticipate switch harness electrical connector to clutch anticipate switch assembly (26 or 27).
3. Instrument panel driver knee bolster assembly. Refer to SECTION 8C.
4. Battery negative cable assembly.

CLUTCH PEDAL POSITION SWITCH ASSEMBLY (CLUTCH START SWITCH ASSEMBLY)

Figure 3

Remove or Disconnect

CAUTION: Refer to "Caution" under "Disconnecting the Battery Negative Cable Assembly" in SECTION 0A.

1. Battery negative cable assembly.
2. Instrument panel driver knee bolster assembly. Refer to SECTION 8C.
3. Clutch pedal position switch harness electrical connector from clutch pedal position switch assembly (28).
4. Clutch pedal position switch assembly (28) from brake and accelerator and clutch pedal assembly (with bracket) (16).

Install or Connect

1. Clutch pedal position switch assembly (28) to brake and accelerator and clutch pedal assembly (with bracket) (16).
2. Clutch pedal position switch harness electrical connector to clutch pedal position switch assembly (28).
3. Instrument panel driver knee bolster assembly. Refer to SECTION 8C.
4. Battery negative cable assembly.

CLUTCH DRIVEN PLATE ASSEMBLY (5-SPEED)

Figures 2, 3, 4 and 5

Tool Required:

J 33169 Clutch Alignment Arbor

Remove or Disconnect

CAUTION: Refer to "Caution" under "Disconnecting the Battery Negative Cable Assembly" in SECTION 0A.

1. Battery negative cable assembly.
2. Instrument panel driver knee bolster assembly. Refer to SECTION 8C.
3. Clutch master cylinder pushrod from clutch pedal assembly (19).
4. Raise and suitably support vehicle. Refer to SECTION 0A.
5. 5-Speed manual transmission assembly. Refer to SECTION 7B.
6. Clutch actuator cylinder nuts (10).

NOTICE: Do not allow clutch actuator cylinder to hang by hydraulic lines as this could cause damage to clutch hydraulic lines.

7. Clutch actuator cylinder and retain with mechanics wire.

8. Transmission brace nut (11) and bolt/screw (14).
9. Transmission brace (13).
10. Flywheel housing cover bolts/screws (53).
11. Flywheel housing cover (12).
12. Flywheel housing bolts/screws (65).
13. Flywheel housing assembly (34).
14. Clutch pressure plate and cover bolts/screws (51).
15. Clutch pressure plate assembly (with cover) (30) and clutch driven plate assembly (37).

Inspect

- Clutch pressure plate assembly (with cover) (30) for wear or damage. Repair or replace as necessary.
- Clutch driven plate assembly (37) for wear or damage. Replace as necessary.
- Engine flywheel assembly. Refer to SECTION 6A2A.

Install or Connect

NOTICE: See "Notice" on page 7C-1 of this section.

1. Clutch driven plate assembly (37) to engine flywheel assembly (29).
2. Clutch pressure plate assembly (with cover) (30).
3. Clutch pressure plate and cover bolts/screws (51).

Tighten

- Clutch pressure plate and cover bolts/screws (51) finger tight.
4. Align clutch driven plate assembly (37) with pilot bearing assembly (38) and clutch pressure plate assembly (with cover) (30) using J 33169.

Tighten

- Clutch pressure plate and cover bolts/screws (51) to 20 N•m (15 lb. ft.) plus 30 degrees.
5. Flywheel housing assembly (34).
 6. Flywheel housing bolts/screws (65).

Tighten

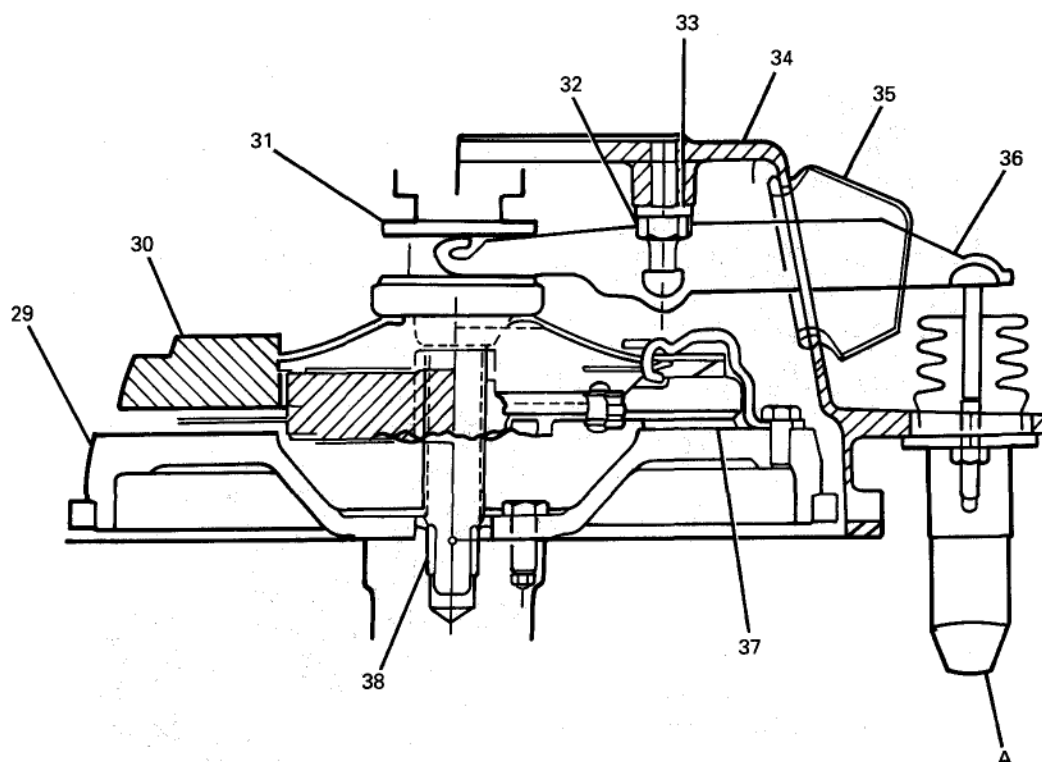
- Flywheel housing bolts/screws (65) to 75 N•m (55 lb. ft.).

Important

- Check for proper clutch fork assembly (36) to clutch release bearing assembly (31) engagement.
7. Flywheel housing cover (12).
 8. Flywheel housing cover bolts/screws (53).

Tighten

- Flywheel housing cover bolts/screws (53) to 8.5 N•m (75 lb. in.).
9. Transmission brace (13).



- A ACTUATOR CYLINDER, CLUTCH
 29 FLYWHEEL ASSEMBLY, ENGINE
 30 PLATE ASSEMBLY, CLUTCH PRESSURE (WITH COVER)
 31 BEARING ASSEMBLY, CLUTCH RELEASE
 32 STUD, CLUTCH FORK BALL
 33 WASHER, CLUTCH FORK BALL STUD
 34 HOUSING ASSEMBLY, FLYWHEEL
 35 BOOT, CLUTCH FORK
 36 FORK ASSEMBLY, CLUTCH
 37 PLATE ASSEMBLY, CLUTCH DRIVEN
 38 BEARING, CLUTCH PILOT

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Figure 4 - Clutch System Cross Section (5-Speed)

10. Transmission brace nut (11) and bolt/screw (14).

**Tighten**

- Transmission brace nut (11) and bolt/screw (14) to 50 N•m (37 lb. ft.).

11. Clutch actuator cylinder.

12. Clutch actuator cylinder nuts (10).

**Tighten**

- Clutch actuator cylinder nuts (10) to 20 N•m (15 lb. ft.).

13. 5-Speed manual transmission assembly. Refer to SECTION 7B.

14. Lower vehicle.

15. Clutch master cylinder pushrod to clutch pedal assembly (19).

16. Instrument panel driver knee bolster assembly. Refer to SECTION 8C.

17. Battery negative cable assembly.

CLUTCH DRIVEN PLATE ASSEMBLY (6-SPEED)

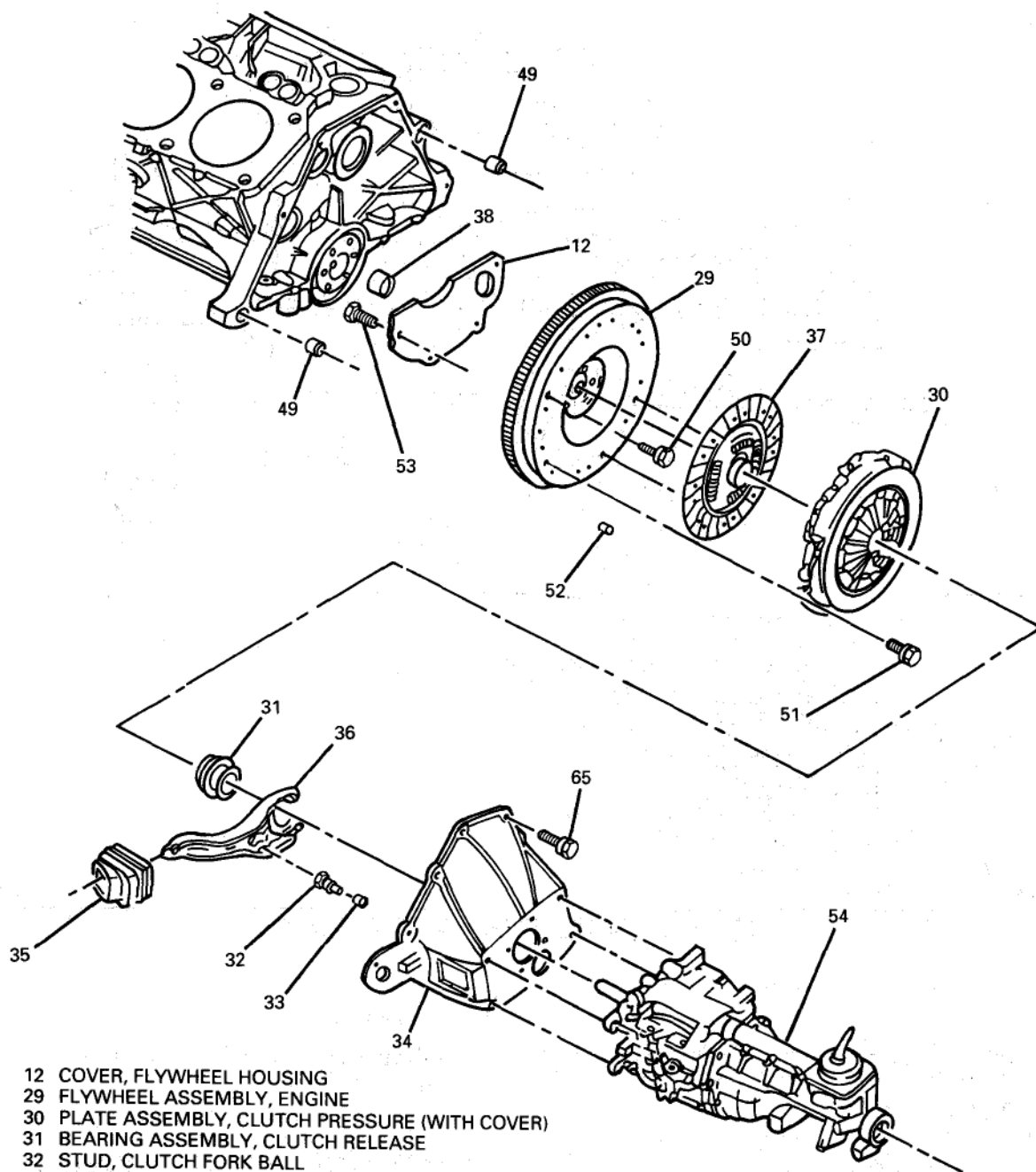
Figures 3, 6, and 7

**Remove or Disconnect**

Tool Required:

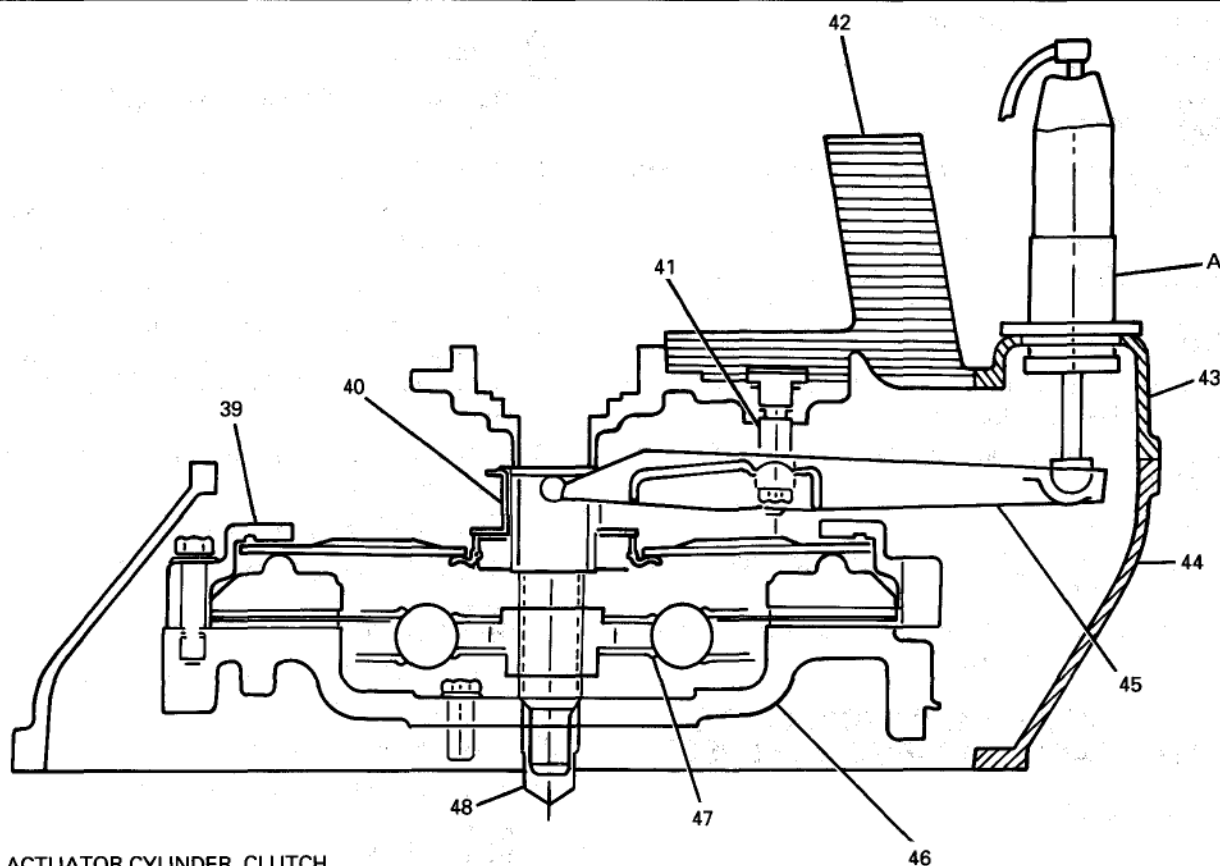
J 38836 Clutch Alignment Arbor

1. Instrument panel driver knee bolster assembly. Refer to SECTION 8C.
2. Clutch master cylinder pushrod from clutch pedal assembly (19).
3. Raise and suitably support vehicle. Refer to SECTION 0A.



- 12 COVER, FLYWHEEL HOUSING
- 29 FLYWHEEL ASSEMBLY, ENGINE
- 30 PLATE ASSEMBLY, CLUTCH PRESSURE (WITH COVER)
- 31 BEARING ASSEMBLY, CLUTCH RELEASE
- 32 STUD, CLUTCH FORK BALL
- 33 WASHER, CLUTCH FORK BALL STUD
- 34 HOUSING ASSEMBLY, FLYWHEEL
- 35 BOOT, CLUTCH FORK
- 36 FORK ASSEMBLY, CLUTCH
- 37 PLATE ASSEMBLY, CLUTCH DRIVEN
- 38 BEARING, CLUTCH PILOT
- 49 PIN, FLYWHEEL HOUSING LOCATOR
- 50 BOLT/SCREW, FLYWHEEL, 83 N·m (61 LB. FT.)
- 51 BOLT/SCREW, CLUTCH PRESSURE PLATE AND COVER, 20 N·m (15 LB. FT.) PLUS 30 DEGREES
- 52 PIN, FLYWHEEL GROOVE
- 53 BOLT/SCREW, FLYWHEEL HOUSING COVER, 8.5 N·m (75 LB. IN.)
- 54 TRANSMISSION ASSEMBLY, MANUAL (5-SPEED)
- 65 BOLT/SCREW, FLYWHEEL HOUSING, 75 N·m (55 LB. FT.)

Figure 5 – Clutch System (5-Speed)



- A ACTUATOR CYLINDER, CLUTCH
 39 PLATE ASSEMBLY, CLUTCH PRESSURE (WITH COVER)
 40 BEARING ASSEMBLY, CLUTCH RELEASE
 41 T-STUD, CLUTCH FORK
 42 TRANSMISSION ASSEMBLY, MANUAL (6-SPEED)
 43 SPACER, CLUTCH ACTUATOR CYLINDER
 44 HOUSING ASSEMBLY, FLYWHEEL
 45 FORK ASSEMBLY, CLUTCH
 46 FLYWHEEL ASSEMBLY, ENGINE
 47 PLATE ASSEMBLY, CLUTCH DRIVEN
 48 BEARING, CLUTCH PILOT

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Figure 6 - Clutch System Cross Section (6-Speed)

4. 6-Speed manual transmission assembly. Refer to SECTION 7B.

NOTICE: Do not allow clutch actuator cylinder to hang by hydraulic lines as this could cause damage to clutch hydraulic lines.

5. Flywheel housing cover bolts/screws (61).
6. Flywheel housing cover (56).
7. Flywheel housing bolts/screws (62).
8. Flywheel housing assembly (44).
9. Clutch pressure plate and cover bolts/screws (57).
10. Clutch pressure plate assembly (with cover) (39) and clutch driven plate assembly (47).

Inspect

- Clutch pressure plate assembly (with cover) (39) for wear or damage. Repair or replace as necessary.
- Clutch driven plate assembly (47) for wear or damage. Replace as necessary.
- Engine flywheel assembly. Refer to SECTION 6A3A.

Install or Connect

NOTICE: See "Notice" on page 7C-1 of this section.

1. Clutch driven plate assembly (47) to engine flywheel assembly (46).
2. Clutch pressure plate assembly (with cover) (39).
3. Clutch pressure plate and cover bolts/screws (57).

Tighten

- Clutch pressure plate and cover bolts/screws (57) finger tight.
4. Align clutch driven plate assembly (47) with clutch pilot bearing (48) and clutch pressure plate assembly (with cover) (39) using J 38836.

Tighten

- Clutch pressure plate and cover bolts/screws (57) to 30 N•m (22 lb. ft.).

5. Flywheel housing assembly (44).
6. Flywheel housing bolts/screws (62).

**Tighten**

- Flywheel housing bolts/screws (62) to 47 N•m (35 lb. ft.).
7. Flywheel housing cover (56).
 8. Flywheel housing cover bolts/screws (61).

**Tighten**

- Flywheel housing cover bolts/screws (61) to 8.5 N•m (75 lb. in.).
9. 6-Speed manual transmission assembly. Refer to SECTION 7B.
 10. Lower vehicle.
 11. Clutch master cylinder pushrod to clutch pedal assembly (19).
 12. Instrument panel driver knee bolster assembly. Refer to SECTION 8C.

CLUTCH FORK ASSEMBLY AND CLUTCH RELEASE BEARING ASSEMBLY (5-SPEED)

Figures 2, 4 and 5

**Remove or Disconnect**

1. Instrument panel driver knee bolster assembly. Refer to SECTION 8C.
2. Clutch master cylinder pushrod from clutch pedal assembly (19).
3. Raise and suitably support vehicle. Refer to SECTION 0A.
4. 5-Speed manual transmission assembly. Refer to SECTION 7B.
5. Clutch actuator cylinder nuts (10).

NOTICE: Do not allow clutch actuator cylinder to hang by hydraulic lines as this could cause damage to clutch hydraulic lines.

6. Clutch actuator cylinder and retain with mechanics wire.
7. Transmission brace nut (11) and bolt/screw (14).
8. Transmission brace (13).
9. Flywheel housing cover bolts/screws (53).
10. Flywheel housing cover (12).
11. Flywheel housing bolts/screws (65).
12. Flywheel housing assembly (34).
13. Clutch release bearing assembly (31).
14. Clutch fork assembly (36).
15. Clutch fork ball stud (32) and washer (33).

**Inspect**

- Clutch release bearing assembly, clutch fork assembly, and clutch fork ball stud for wear or damage. Replace as necessary.

**Install or Connect**

NOTICE: See "Notice" on page 7C-1 of this section.

1. Clutch fork ball stud (32) and washer (33).
2. Lubricate clutch ball stud (32) using wheel bearing lubricant GM P/N 1051344, or equivalent.
3. Clutch fork assembly (36) onto clutch ball stud (32).
4. Lubricate recess on inside diameter of clutch release bearing assembly (31) and the clutch fork groove using wheel bearing lubricant GM P/N 1051344, or equivalent.
5. Clutch release bearing assembly (31) to clutch fork assembly ((36).
6. Flywheel housing assembly (34).
7. Flywheel housing bolts/screws (65).

**Tighten**

- Flywheel housing bolts/screws (65) to 75 N•m (55 lb. ft.).
8. Flywheel housing cover (12).
 9. Flywheel housing cover bolts/screws (53).

**Tighten**

- Flywheel housing cover bolts/screws (53) to 8.5 N•m (75 lb. in.).
10. Transmission brace (13).
 11. Transmission brace nut (11) and bolt/screw (14).

**Tighten**

- Transmission brace nut (11) and bolt/screw (14) to 50 N•m (37 lb. ft.).
12. Clutch actuator cylinder.
 13. Clutch actuator cylinder nuts (10).

**Tighten**

- Clutch actuator cylinder nuts (10) to 20 N•m (15 lb. ft.).
14. 5-Speed manual transmission assembly. Refer to SECTION 7B.
 15. Lower vehicle.
 16. Clutch master cylinder pushrod to clutch pedal assembly (19).
 17. Instrument panel driver knee bolster assembly. Refer to SECTION 8C.

CLUTCH FORK ASSEMBLY AND CLUTCH RELEASE BEARING ASSEMBLY (6-SPEED)

Figures 3, 6, and 7

Tool Required:

J 33169 Clutch Alignment Arbor

Remove or Disconnect

1. Instrument panel driver knee bolster assembly. Refer to SECTION 8C.
2. Clutch master cylinder pushrod from clutch pedal assembly (19).
3. Raise and suitably support vehicle. Refer to SECTION 0A.
4. 6-Speed manual transmission assembly. Refer to SECTION 7B.
5. Flywheel housing cover bolts/screws (61).
6. Flywheel housing cover (56).
7. Flywheel housing bolts/screws (62).
8. Flywheel housing assembly (44).
9. Clutch pressure plate and cover bolts/screws (57).
10. Clutch pressure plate assembly (with cover) (39) and clutch driven plate assembly (47).
11. Clutch release bearing retainer (58).
12. Clutch release bearing assembly (40).
13. Clutch fork assembly (45) from 6-speed manual transmission assembly (42).
14. Bolt/screw (63) and clutch fork T-stud (41) from 6-speed manual transmission assembly (42).

Inspect

- Clutch release bearing assembly (40), clutch fork assembly (45), and clutch fork T-stud (41) for wear or damage. Replace as necessary.

Install or Connect

NOTICE: See "Notice" on page 7C-1 of this section.

1. Clutch fork T-stud (41) and bolt/screw (63).

Tighten

- Clutch fork T-stud bolt/screw (63) to 24 N•m (18 lb. ft.).
2. Lubricate clutch fork T-stud (41) using wheel bearing lubricant GM P/N 1051344, or equivalent.
 3. Clutch fork assembly (45) on clutch fork T-stud (41) at first detent position.
 - Do not fully seat clutch fork assembly (45) on clutch fork T-stud (41) until after installation of 6-speed manual transmission assembly (42). It will fully seat itself when transmission assembly (42) is installed.
 4. Clutch release bearing assembly (40) to clutch pressure plate assembly (with cover) (39).
 5. Clutch release bearing retainer (58).
 6. Clutch driven plate assembly (47) to engine flywheel assembly (46).
 7. Clutch pressure plate assembly (with cover) (39).
 8. Clutch pressure plate and cover bolts/screws (57).

Tighten

- Clutch pressure plate and cover bolts/screws (57) finger tight.
9. Align clutch driven plate assembly (47) with clutch pilot bearing (48) and clutch pressure plate assembly (with cover) (39) using J 38836.

Tighten

- Clutch pressure plate and cover bolts/screws (57) to 30 N•m (22 lb. ft.).
10. Flywheel housing assembly (44).
 11. Flywheel housing assembly bolts/screws (62).

Tighten

- Flywheel housing bolts/screws (62) to 47 N•m (35 lb. ft.).
12. Flywheel housing cover (56).
 13. Flywheel housing cover bolts/screws (61).

Tighten

- Flywheel housing cover bolts/screws (61) to 8.5 N•m (75 lb. in.).
14. 6-Speed manual transmission assembly. Refer to SECTION 7B.
 15. Lower vehicle.
 16. Clutch master cylinder pushrod to clutch pedal assembly (19).
 17. Instrument panel driver knee bolster assembly. Refer to SECTION 8C.

CLUTCH PILOT BEARING

Figures 5 through 7

Tool Required:

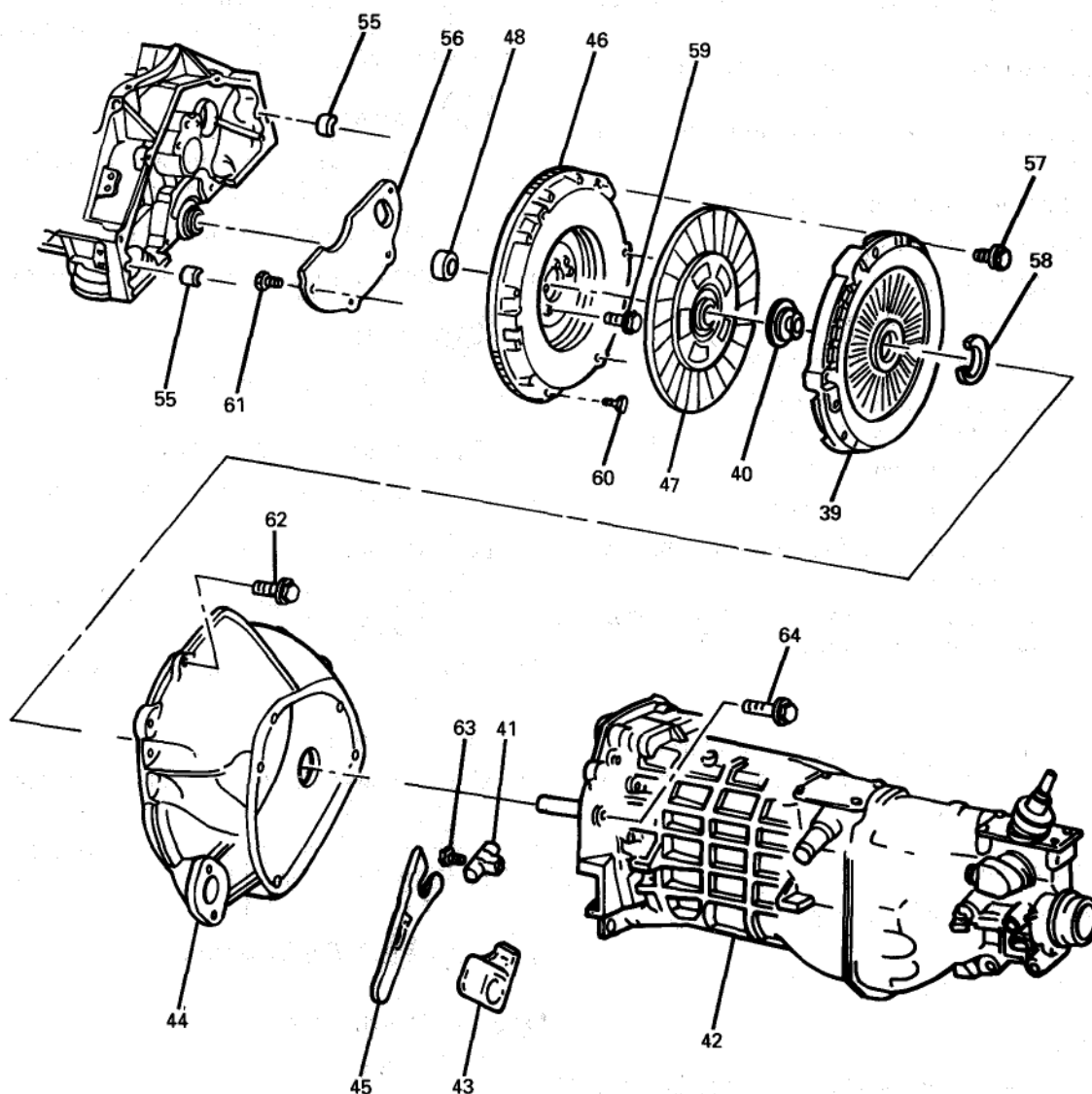
J 23907 Clutch Pilot Bearing Remover

Remove or Disconnect

1. Clutch driven plate assembly. Refer to "Clutch Driven Plate Assembly (5-Speed)" or "Clutch Driven Plate Assembly (6-Speed)" in this section.
2. Engine flywheel assembly. Refer to SECTION 6A2A or 6A3A.
3. Clutch pilot bearing (38 or 48) using J 23907.

Install or Connect

1. Clutch pilot bearing (38 or 48).
2. Engine flywheel assembly. Refer to SECTION 6A2A or 6A3A.
3. Clutch driven plate assembly. Refer to "Clutch Driven Plate Assembly (5-Speed)" or "Clutch Driven Plate Assembly (6-Speed)" in this section.



- 39 PLATE ASSEMBLY, CLUTCH PRESSURE (WITH COVER)
- 40 BEARING ASSEMBLY, CLUTCH RELEASE
- 41 T-STUD, CLUTCH FORK
- 42 TRANSMISSION ASSEMBLY, MANUAL (6-SPEED)
- 43 SPACER, CLUTCH ACTUATOR CYLINDER
- 44 HOUSING ASSEMBLY, FLYWHEEL
- 45 FORK ASSEMBLY, CLUTCH
- 46 FLYWHEEL ASSEMBLY, ENGINE
- 47 PLATE ASSEMBLY, CLUTCH DRIVEN
- 48 BEARING, CLUTCH PILOT
- 55 PIN, FLYWHEEL HOUSING LOCATOR
- 56 COVER, FLYWHEEL HOUSING

- 57 BOLT/SCREW, CLUTCH PRESSURE PLATE AND COVER
30 N·m (22 LB. FT.)
- 58 RETAINER, CLUTCH RELEASE BEARING
- 59 BOLT/SCREW, FLYWHEEL, 100 N·m (74 LB. FT.)
- 60 PIN, FLYWHEEL GROOVE
- 61 BOLT/SCREW, FLYWHEEL HOUSING COVER,
8.5 N·m (75 LB. IN.)
- 62 BOLT/SCREW, FLYWHEEL HOUSING, 47 N·m
(35 LB. FT.)
- 63 BOLT/SCREW, CLUTCH FORK T-STUD, 24 N·m
(18 LB. FT.)
- 64 BOLT/SCREW, TRANSMISSION, 35 N·m (26 LB. FT.)

Figure 7 – Clutch System (6-Speed)

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Brake Pedal Nut	25 N•m (18 lb. ft.)
Brake Pedal Pivot Nut	54 N•m (40 lb. ft.)
Clutch Actuator Cylinder Nut	20 N•m (15 lb. ft.)
Clutch Fork T-Stud Bolt/Screw	24 N•m (18 lb. ft.)
Clutch Master Cylinder Nut	27 N•m (20 lb. ft.)
Clutch Pressure Plate and Cover Bolt/Screw (6-Speed)	30 N•m (22 lb. ft.)
Clutch Pressure Plate and Cover Bolt/Screw (5-Speed)	20 N•m (15 lb. ft.) Plus 45 Degrees
Flywheel Bolt/Screw (5-Speed)	83 N•m (61 lb. ft.)
Flywheel Bolt/Screw (6-Speed)	100 N•m (74 lb. ft.)
Flywheel Housing Cover Bolt/Screw	8.5 N•m (75 lb. in.)
Flywheel Housing Bolt/Screw (5-Speed)	75 N•m (55 lb. ft.)
Flywheel Housing Bolt/Screw (6-Speed)	47 N•m (35 lb. ft.)
Transmission Brace Bolt/Screw	50 N•m (37 lb. ft.)
Transmission Brace Nut	50 N•m (37 lb. ft.)
Transmission Bolt/Screw	35 N•m (26 lb. ft.)

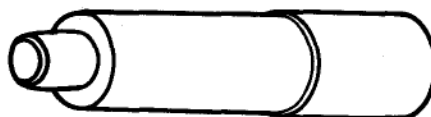
SPECIAL TOOLS

1.



J 33169

2.



J 38836

3.



J 23907

1. CLUTCH ALIGNMENT ARBOR (3.4L L32 ENGINE)
2. CLUTCH ALIGNMENT ARBOR (5.7L LT1 ENGINE)
3. CLUTCH PILOT BEARING REMOVER

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