

# GROUP 4

## CLUTCH, S-M TRANSMISSIONS

### SECTIONS IN GROUP 4

Section	Subject	Page	Section	Subject	Page
4-A	45000 Clutch . . . . .	4-1	4-D	3-Speed Synchromesh—46000 . . . . .	4-35
4-B	46000 Clutch . . . . .	4-8	4-E	4-Speed Synchromesh—46000 . . . . .	4-50
4-C	3-Speed Synchromesh—45000 . . . . .	4-19			

## SECTION 4-A

### 45000 CLUTCH

#### CONTENTS OF SECTION 4-A

Paragraph	Subject	Page	Paragraph	Subject	Page
4-1	Clutch Specifications . . . . .	4-1	4-4	Removal, Lubrication, Inspection and Installation of Clutch . . . . .	4-3
4-2	Description of Clutch . . . . .	4-2	4-5	Clutch Trouble Diagnosis . . . . .	4-6
4-3	Clutch Adjustments . . . . .	4-3			

## 4-1 CLUTCH SPECIFICATIONS

### a. Tightening Specifications

Part	Location	Thread Size	Torque Ft.-Lbs.
Bolt Special Stud	Clutch Cover to Flywheel . . . . .	3/8-16 x 1	30-40
Bolt	Clutch Release Fork Ball . . . . .	3/16-16	35-45
Bolt	Transmission to Flywheel Housing . . . . .	1/2-13 x 1 1/2	45-60
Bolt	Flywheel Housing to Cylinder Block . . . . .	3/8-16 x 1 1/4	30-40

### b. Clutch Specifications

Type	Single Plate Dry Disc
Pedal Pressure . . . . .	28 - 30 lbs.
Pedal Lash . . . . .	5/8" to 7/8"
Driven Plate Diameter . . . . .	10 13/32"
Driven Plate Facings . . . . .	Woven Asbestos
Number of Facings . . . . .	2
Facing Attachment . . . . .	Riveted
Facing Area (Sq. in.) . . . . .	106.81
Vibration Damping . . . . .	6 Springs

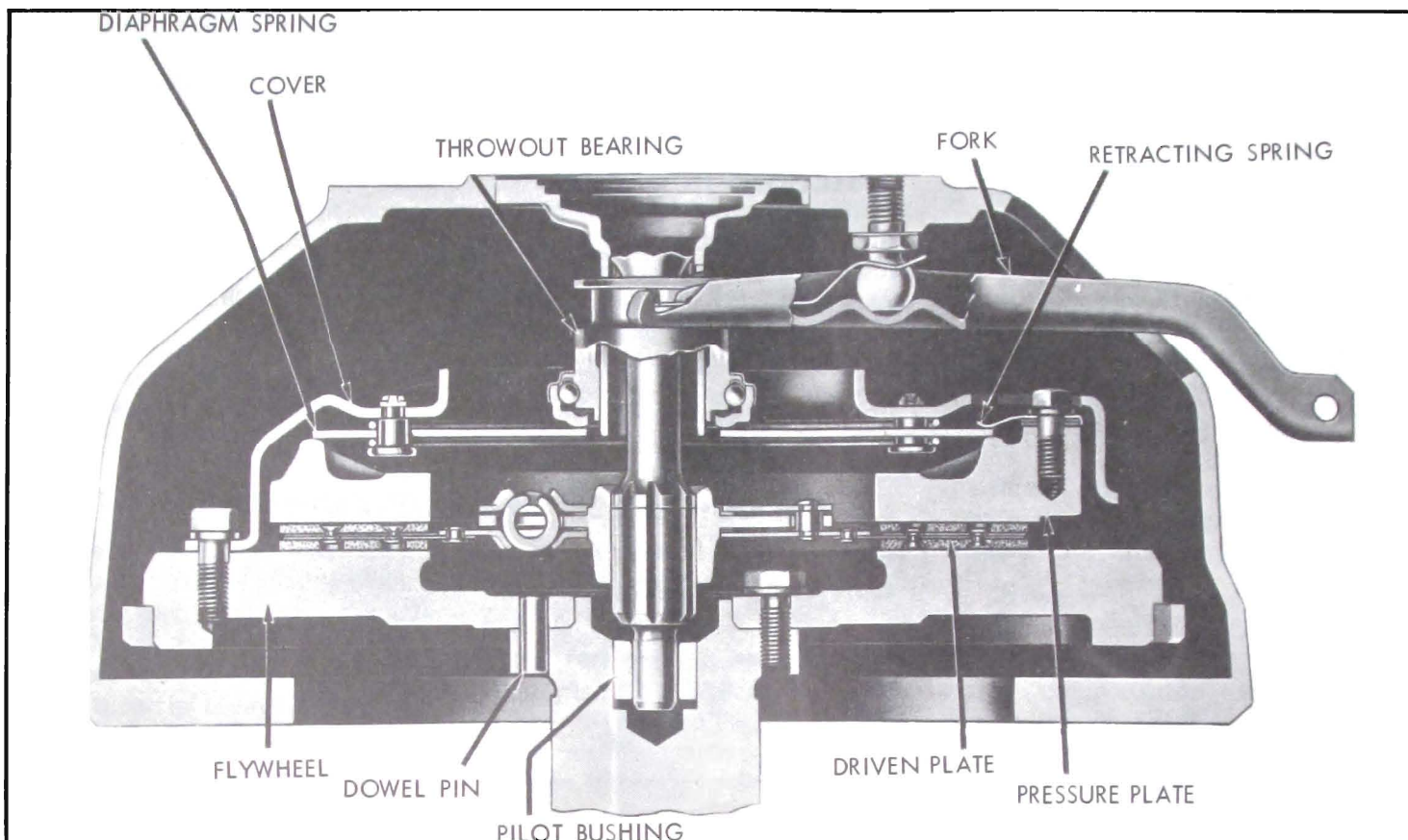


Figure 4-1—Standard Clutch

## 4-2 CLUTCH DESCRIPTION

All 45000 synchromesh cars are equipped with a single plate dry disc clutch, using a diaphragm spring assembly. See Figure 4-1.

### a. Release

Depressing the clutch pedal causes movement of the clutch fork in the direction shown in Figure 4-2. Actual operation of the linkage in this operation is explained in paragraph C below. The clutch fork, pivoting on a ball stud, acts upon the throw out bearing. The bearing in turn, forces the tangs of the diaphragm spring in the direction shown in Figure 4-2. The diaphragm spring, being retained in the clutch cover by 9 rivets and 2 wire rings, is mounted in such a way that the spring can pivot or dish on these rings, again reversing the direc-

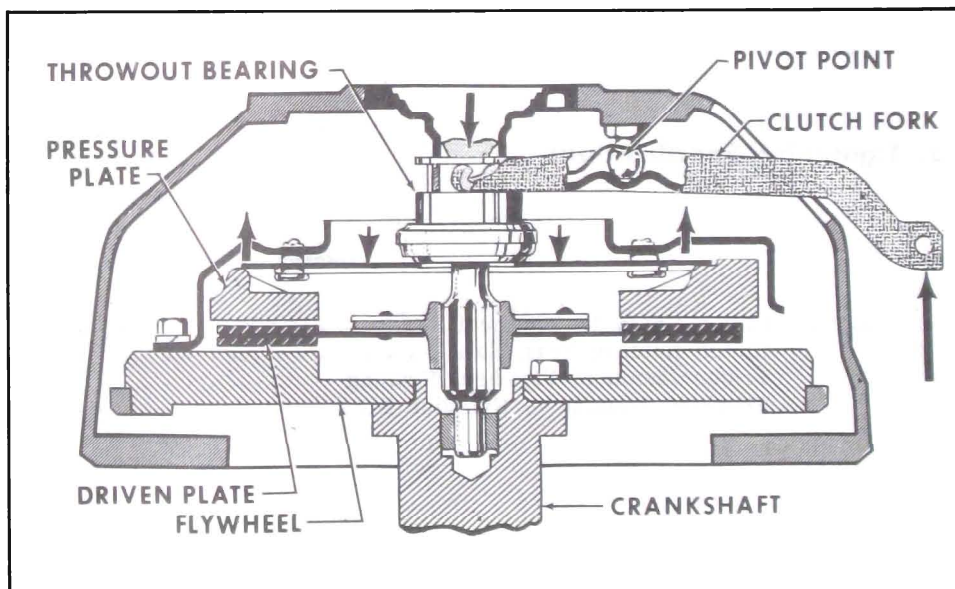


Figure 4-2—Clutch Releasing Action

tion of force. This force is applied directly to the 3 retracting springs which, in turn, pull the pressure plate rearward and out of contact with the driven plate.

### b. Clutch Driven Plate

The clutch driven plate assembly is mounted with a free sliding fit on the transmission main drive

gear and is keyed to the gear by ten splines. The front end of the main drive gear is piloted by a bushing pressed into a recess in the rear end of the engine crankshaft. See Figure 4-1.

The outer area of the driven plate is divided into segments which are formed in low waves to provide springs between the plate facings and thereby cushion engagement of the clutch. A molded facing, grooved to give release, is riveted to each side of every segment of the plate. When the clutch is fully released, the waved segments cause the facings to spread approximately .045" and the movement of pressure plate provides an additional clearance of approximately .030" to assure full release of driven plate. See Figure 4-2.

The driven plate assembly is designed to prevent torsional periods of the engine from being transmitted to the transmission gears and causing rattle. This is accomplished by driving the plate hub through torsional coil springs and providing frictional dampening by means of friction between disc and the nuts.

### c. Clutch Linkage

The clutch pedal is the suspended type and pivots on a shaft which extends thru a bracket bolted to the cowl. The pedal arm returns against a rubber bumper. See Figure 4-3.

The clutch pedal rod extends from the clutch pedal arm assembly through the floor pan to connect with the frame side of the equalizer. The equalizer pivots between a ball stud located at the frame and a ball stud located on a bracket located on the transmission.

A rod threaded at one end is attached to the clutch fork op-

erating rod assembly which is attached to the engine side of the clutch equalizer and the other end is attached to the clutch fork. The threaded end of the rod is provided for clutch adjustment. See Figure 4-3. Movement of the equalizer assembly is thus transmitted to the clutch fork. Pedal return is provided by a spring between the clutch rod assembly and a bracket mounted on the flywheel housing. See Figure 4-3.

## 4-3 CLUTCH ADJUSTMENT

Pedal lash (free pedal) must be adjusted occasionally to compensate for normal wear of clutch facings. As the driven plate wears thinner, pedal lash decreases.

It is very important to maintain pedal lash at all times. Insufficient pedal lash will cause the throw-out bearing to ride against the diaphragm spring tangs constantly, resulting in abnormal wear of these parts. It may also cause clutch slippage and abnormal wear of the driven plate, flywheel, and pressure plate if pressure on the spring tangs is enough to prevent positive engagement of the clutch.

Check pedal lash (free pedal) by pushing on the pedal pad with the hand. Pedal lash should be approximately 5/8" to 7/8" measured at the pedal pad. (See Figure 4-3).

Adjust pedal lash as follows:

1. Check pedal at full release position, making sure it contacts rubber stop.
2. Make certain clutch fork is touching fingers on pressure plate.
3. Adjust clutch release rod so clevis pin will just assemble into clutch fork.
4. Lengthen release rod 3 full turns. Re-install retainer and pin.

## 4-4 REMOVAL, LUBRICATION INSPECTION AND INSTALLATION OF CLUTCH

### a. Removal from Vehicle

1. Remove transmission as outlined in paragraph 4-15.
2. Remove clutch throw-out bearing from the fork.
3. Remove clutch fork return spring. Disconnect clutch fork release rod.
4. Remove flywheel housing.
5. Disconnect clutch fork from ball stud by forcing it toward the center of the vehicle.
6. Mark clutch cover and flywheel with a center punch so that cover can be reinstalled in the same position on flywheel in order to preserve engine balance.
7. Loosen the clutch attaching bolts one turn at a time until diaphragm spring is released.
8. Support pressure plate and cover assembly while removing last bolts, then remove pressure plate, then the driven plate.

**NOTE:** Use extreme care to keep clutch driven plate CLEAN.

9. If it becomes necessary to disassemble pressure plate, proceed as follows:

- a. Remove three drive-strap to pressure plate bolts and retracting springs and remove pressure plate from clutch cover.

**NOTE:** When disassembling, note position of grooves on edge of pressure plate and cover. These marks must be aligned in assembly to maintain balance.

- b. The clutch diaphragm spring and two pivot rings are riveted to the clutch cover. Spring, rings and cover should be inspected for excessive wear or damage, and if there is a defect, it is necessary

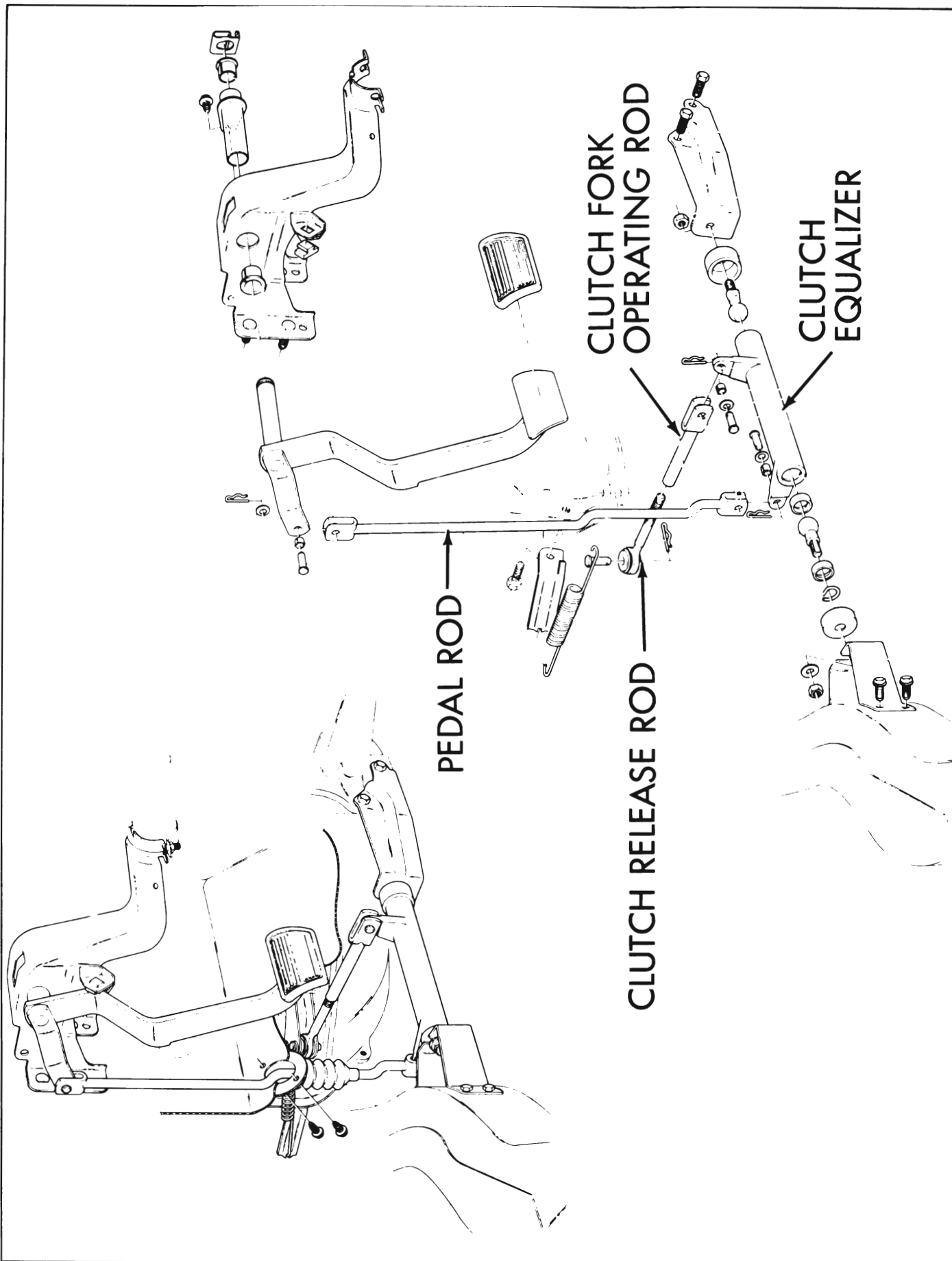


Figure 4-3—Clutch Linkage

to replace the complete cover assembly.

### b. Lubrication of Clutch

1. Very sparingly apply wheel bearing lubricant in pilot bushing in crankshaft.

**NOTE:** If too much lubricant is used, it will run out on face of flywheel when hot and ruin the driven plate facings.

2. Make sure that splines in the driven plate hub are clean and apply a light coat of wheel bearing lubricant. Apply a light coat of wheel bearing lubricant on transmission drive gear splines. Slide driven plate over transmission drive gear several times. Remove driven plate and wipe off all excess lubricant pushed-up by hub of plate.

**NOTE:** Driven plate facings must be kept clean and dry.

3. Fill groove in throw-out bearing with wheel bearing lubricant. See Figure 4-5. Make sure transmission front bearing retainer is clean and apply a light coat of wheel bearing lubricant. Slide throw-out bearing over transmission retainer several times. Remove throw-out bearing and wipe off all excess lubricant pushed up by hub of bearing.

4. Clean and apply wheel bearing lubricant to ball stud in flywheel housing and to the seat in clutch fork.

5. Check clutch pilot bearing for excessive wear or damage. If replacement is necessary, remove bearing with J-1448. For installation use Driver J-1522.

**NOTE:** Very sparingly apply wheel bearing lubricant in pilot bushing. If too much lubricant is used, it will run out on face of flywheel when hot and ruin the driven plate facings.

### c. Inspection of Clutch

Wash all metal parts of clutch, except release bearing and driven plate, in suitable cleaning solution to remove dirt and grease. Soaking release bearing in cleaning solution would permit solution to seep into bearing and destroy the lubricant. Soaking driven plate in cleaning solution would damage the facings.

1. Flywheel and Pressure Plate. Examine friction surfaces of flywheel and pressure plate for scoring or roughness. Slight roughness may be smoothed with fine emery cloth, but if surface is deeply scored or grooved the part should be replaced.

2. Clutch Driven Plate. Inspect driven plate for condition of facings, loose rivets, broken or very loose torsional springs, and flattened cushion springs.

If facings are worn down near rivets or are oily, the plate assembly should be replaced. A very slight amount of oil on clutch facings will cause clutch grab and chatter. A large amount of oil on facings will cause slippage. Removal of oil by solvents or by buffing is not practical since oil will continue to bleed from facing material when hot.

When oil is found on driven plate facings, examine transmission drainback hole, pilot bushing, engine rear main bearing and other points of oil leakage.

Test the fit of driven plate hub on transmission main drive gear for an easy sliding fit.

3. Bearings. Inspect clutch release bearing for scoring or excessive wear on front contact face. Test for roughness of balls and races by pressing and turning front race slowly. Inspect main drive gear pilot bushing in crankshaft. If bushing is rough or worn it should be replaced.

Regardless of whether the old

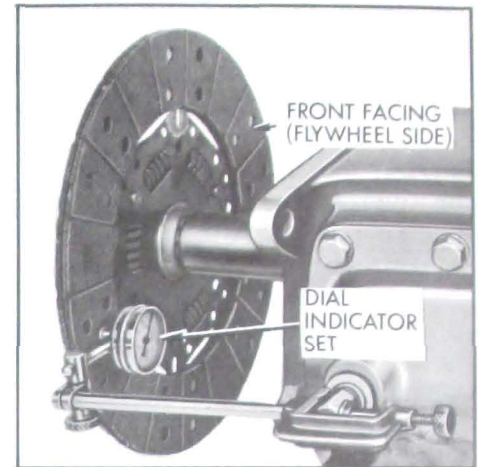


Figure 4-4—Checking Driven Plate For Run-Out

plate or a new one is to be installed, the plate should be checked for run-out. This check can be made by sliding the driven plate, front side first, over the transmission main drive gear until it is tight on the spline, then setting up a dial indicator to bear against the plate facing as shown in Figure 4-4. While holding firmly against front end of main drive gear to take up play in main drive gear bearing, slowly rotate driven plate and observe the amount of run-out shown by indicator. If run-out of front facing exceeds .025", the plate should not be used since it is not practical to correct excessive run-out by bending.

### d. Installation of Clutch

1. If the pressure plate was disassembled, follow Steps a and b.

a. Install the pressure plate in the cover assembly, lining up the groove on the edge of the pressure plate with the groove on the edge of the cover.

b. Install pressure plate retracting springs and drive-strap to pressure plate bolts and lock washers and tighten to 18-25 ft. lbs. torque. The clutch is now ready to be installed.

2. Install the pressure plate and driven plate. Support both assemblies with a spare main drive gear.

NOTE: Be sure to align marks on clutch cover with the mark made of the flywheel on disassembly.

3. Install all bolts so that clutch is drawn in place square with flywheel. Each bolt must be drawn one turn at a time to avoid bending the clutch cover flange. Torque bolts to 30-40 ft. lbs.

4. Lubricate the ball stud and clutch fork with wheel bearing lubricant and install clutch fork.

NOTE: Check and insure that

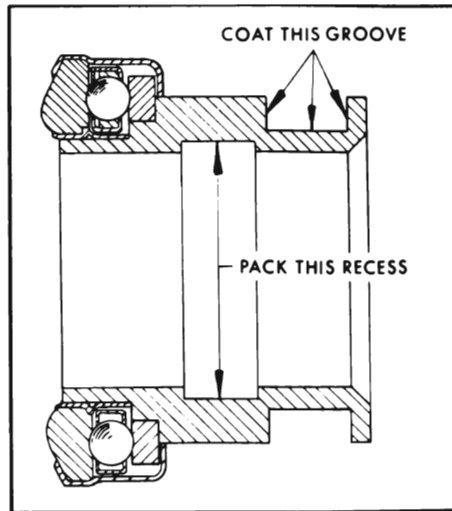


Figure 4-5—Throw-Out Bearing Lubrication

fork retaining spring is tight on pivot ball stud.

5. Install flywheel housing.

CAUTION: Insure that dowel pins are in place in crankcase.

6. Lubricate the recess on the inside of the throw-out bearing collar. See Figure 4-5.

CAUTION: Be careful not to use too much lubricant.

7. Install throw-out bearing assembly and hook up all clutch linkage.

NOTE: Make certain clutch fork is seated in throw-out bearing. (See Figures 4-1 and 4-2.)

8. Install transmission as outlined in paragraph 4-15.

#### 4-5 45000 CLUTCH TROUBLE DIAGNOSIS

SYMPTOM AND PROBABLE CAUSE	PROBABLE REMEDY
FAILS TO RELEASE (PEDAL PRESSED TO FLOOR—SHIFT LEVER DOES NOT MOVE FREELY IN AND OUT OF REVERSE GEAR)	
a. Improper linkage adjustment	a. Adjust linkage
b. Improper pedal travel	b. Adjust linkage
c. Loose linkage	c. Replace bushings
d. Faulty pilot bearing	d. Replace bearing
e. Faulty driven disc	e. Replace disc
f. Fork off ball stud	f. Install properly and lubricate fingers at throw-out bearing
g. Clutch disc hub binding on clutch gear spline	g. Lubricate if worn replace
SLIPPING	
a. Improper adjustment (no lash)	a. Adjust linkage
b. Oil soaked driven disc	b. Install new disc and correct oil leak at its source
c. Worn facing or facing torn from disc	c. Replace disc
d. Warped pressure plate or flywheel	d. Replace same
e. Weak diaphragm spring	e. Replace cover assembly
f. Driven plate not seated in	f. Make 20-50 normal starts
g. Driven plate overheated	g. Allow to cool—Check lash

**4-5 45000 CLUTCH TROUBLE DIAGNOSIS (Cont'd.)**

SYMPTOM AND PROBABLE CAUSE	PROBABLE REMEDY
<b>GRABBING</b>	
<ul style="list-style-type: none"> <li>a. Oil on facing or burned or glazed facings</li> <li>b. Worn splines on clutch gear</li> <li>c. Loose engine mountings</li> <li>d. Warped pressure plate or flywheel</li> <li>e. Burned or smeared resin on flywheel or pressure plate</li> </ul>	<ul style="list-style-type: none"> <li>a. Install new disc</li> <li>b. Replace transmission clutch gear</li> <li>c. Tighten or replace mountings</li> <li>d. Replace pressure plate or flywheel</li> <li>e. Sand off if superficial, replace burned or heat checked parts</li> </ul>
<b>RATTLING—TRANSMISSION CLICK</b>	
<ul style="list-style-type: none"> <li>a. Weak retracting springs</li> <li>b. Throw-out fork loose on ball stud or in bearing groove</li> <li>c. Oil in driven plate damper</li> <li>d. Driven plate damper spring failure</li> </ul>	<ul style="list-style-type: none"> <li>a. Replace springs</li> <li>b. Check ball stud and retaining spring and replace if necessary</li> <li>c. Replace driven disc</li> <li>d. Replace driven disc</li> </ul>
<b>THROW-OUT BEARING NOISE WITH CLUTCH FULLY ENGAGED</b>	
<ul style="list-style-type: none"> <li>a. Improper adjustment</li> <li>b. Throw-out bearing binding on transmission bearing retainer</li> <li>c. Insufficient tension between clutch fork spring and ball stud</li> <li>d. Fork improperly installed</li> <li>e. Weak linkage return spring</li> </ul>	<ul style="list-style-type: none"> <li>a. Adjust linkage</li> <li>b. Clean, relubricate, check for burrs, nicks, etc.</li> <li>c. Replace fork</li> <li>d. Install properly</li> <li>e. Replace spring</li> </ul>
<b>NOISY</b>	
<ul style="list-style-type: none"> <li>a. Worn throw-out bearing</li> <li>b. Fork off ball stud (Heavy clicking)</li> </ul>	<ul style="list-style-type: none"> <li>a. Replace bearing</li> <li>b. Install properly and lubricate fork fingers at bearing</li> </ul>
<b>PEDAL STAYS ON FLOOR WHEN DISENGAGED</b>	
<ul style="list-style-type: none"> <li>a. Bind in linkage</li> <li>b. Springs weak in pressure plate</li> <li>c. Weak pedal return spring</li> </ul>	<ul style="list-style-type: none"> <li>a. Lubricate and free up linkage</li> <li>b. Replace</li> <li>c. Replace</li> </ul>
<b>HIGH PEDAL EFFORT</b>	
<ul style="list-style-type: none"> <li>a. Bind in linkage</li> <li>b. Driven plate worn</li> </ul>	<ul style="list-style-type: none"> <li>a. Lubricate and free up linkage</li> <li>b. Replace driven plate</li> </ul>