

Date 1-1-89

## MC-9 MAINTENANCE MANUAL

# SECTION 5

# CLUTCH

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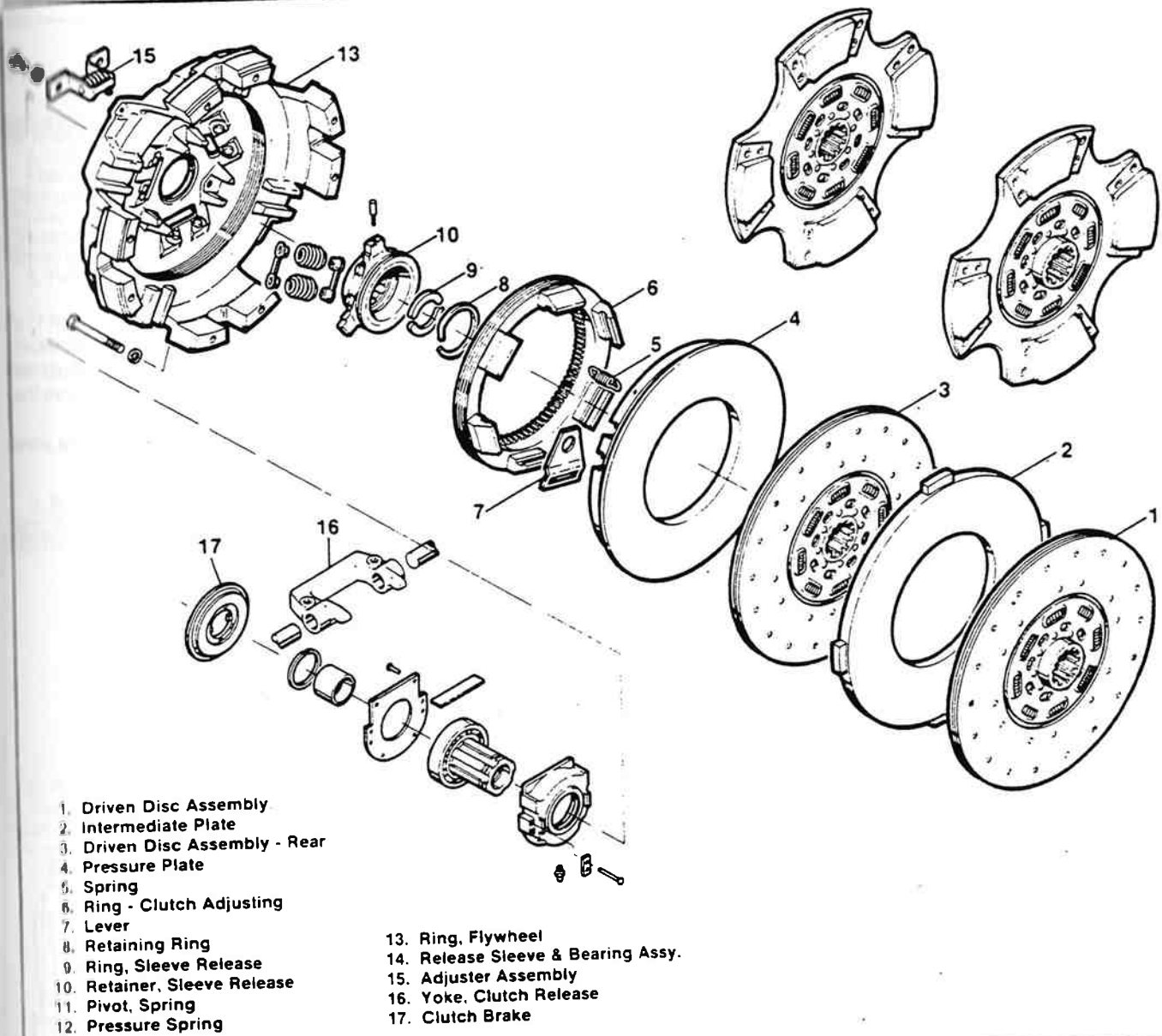


Figure 5-1. Clutch for 5-Speed Manual Transmission.

## CLUTCH

The clutch used with the 5-speed manual transmission is a 15½" dry disc 2-plate model. It is a pull type design with riveted organic facings on driven discs (except with 8V92 — ceramic facings are used). An integral self-adjusting mechanism checks for plate wear each time the clutch is actuated. Manual adjustment can be made on board by turning the adjusting ring (No. 6, figure 5-1) which is accessible through the inspection plate located on the clutch housing.

## CLUTCH LINKAGE ADJUSTMENT

With the engine and transmission installed, make the final adjustment of the clutch and linkage as follows.

1. Establish 8.5" (215.9 mm) height between clutch pedal and coach floor (figure 5-2).
2. Connect all front end linkage as shown.
3. Connect rear linkage and adjust clutch rod ends to maintain a 3°-5° (approx.) over center position for the clutch cross shaft levers. Lever travel must be equidistant on either side of vertical position.

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4. Place a 1" (25.4 mm) spacer between the clutch pedal and the coach floor.

5. Depress clutch pedal until contact is made with 1" (25.4 mm) spacer and hold until adjustments of clutch brake and release bearing are made.

6. With a .0015" (.038 mm) strip gauge or equivalent between braking surface of the release bearing and clutch brake, adjust the linkage rod until a slight pull is required to remove the strip gauge. (Three people are required for steps 5 and 6.)

7. Tighten locking nut on adjusting screw.

## WITH ALL ADJUSTMENTS COMPLETED, THE FOLLOWING DIMENSIONS SHOULD BE ESTABLISHED

1. .500" (12.7 mm) between release bearing and clutch brake with clutch pedal released.

2. Approx. .125" (3.175 mm) free travel between release

yoke fingers and release bearing wear pads.

3. Between 1.5" and 2" (38.1-50.8 mm) free movement at the top of the clutch pedal travel.

4. At 1" (25.4 mm) from the floor clutch pedal actuates the clutch brake.

**NOTE: All above dimensions must be met to ensure clutch life.**

## CLUTCH BRAKE ADJUSTMENT

Check the clutch brake clamping force. It should start 1" off the floor. Adjustment is achieved by increasing or decreasing free travel with adjustment bolt on activating lever. Adjustment is very sensitive and should not affect free travel by more than 1/16".

Reinstall inspection plate, tighten all jam nuts, and install "E" clips on shafts and pins.

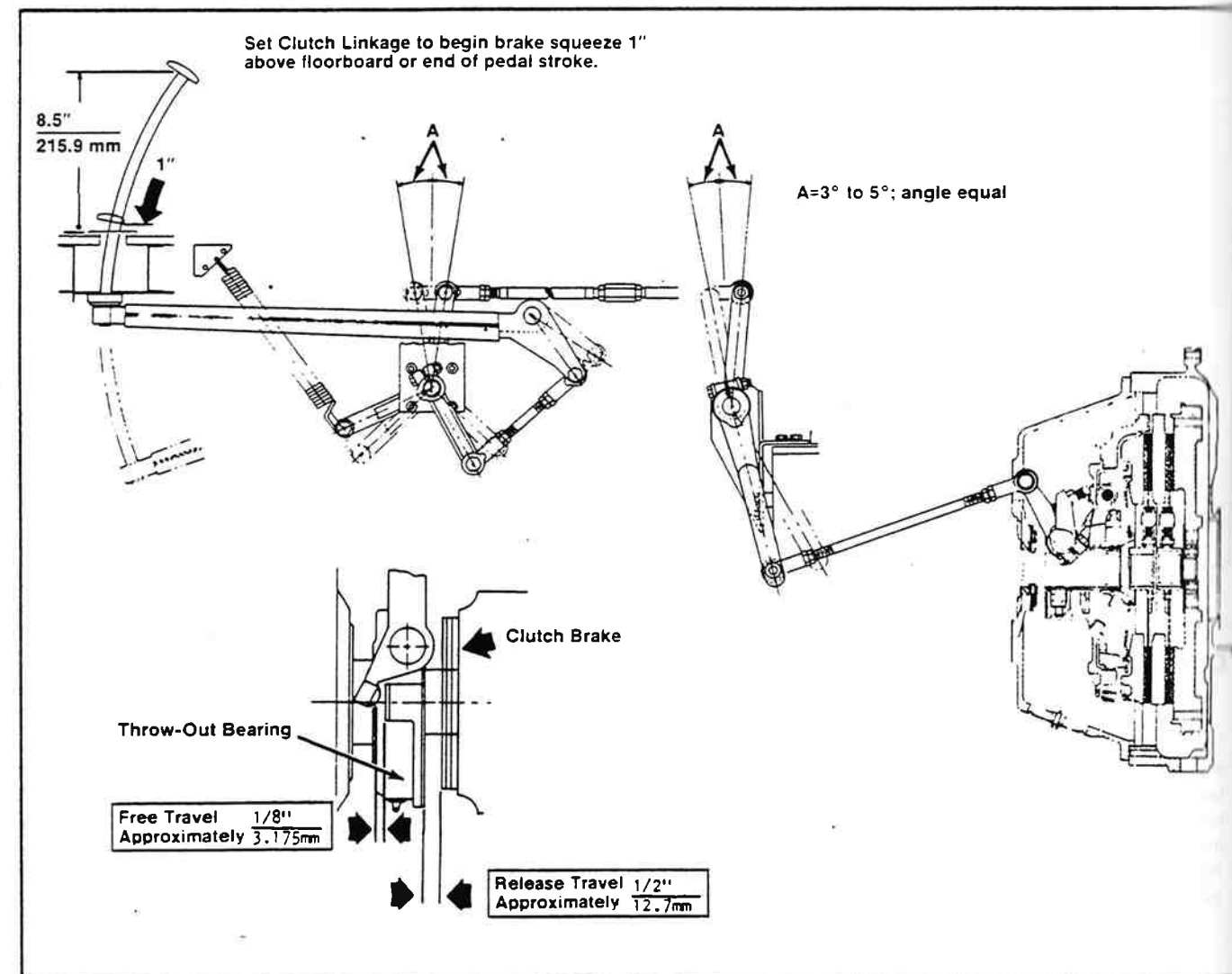


Figure 5-2. Clutch Linkage Adjustment - 5-Speed Manual Transmission.

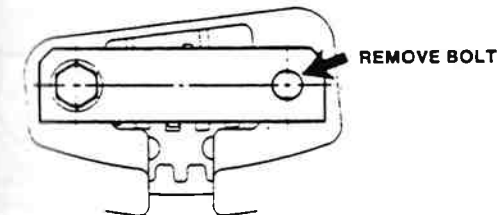
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## CLUTCH ADJUSTMENT

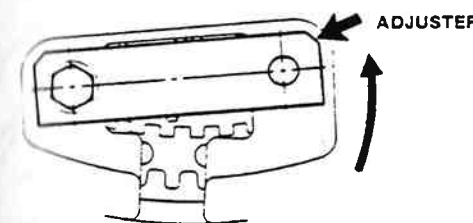
**NOTE: Before installation or removal of clutch, check the following.**

1. Do not remove shipping block until clutch is mounted.
  2. Lubricate release bearing; block release bearing to parallel release position any time clutch is removed from flywheel.
  3. Linkage must have 5/8" (15.9 mm) yoke travel capability.
- After installation adjust clutch linkage to ensure that clutch brake actuation occurs when the pedal is 1" (25.4 mm) above the floorboard. If free pedal is less than 1" (25.4 mm), manual adjustment is required. To obtain initial free pedal, see following.

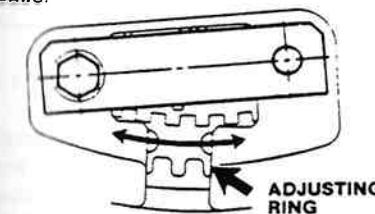
A. Remove right bolt. Loosen left bolt one turn.



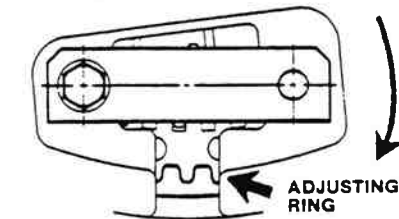
B. Rotate adjuster upward. This will disengage worm gear from the adjusting ring to allow manual adjustment. Hold adjuster disengaged and tighten left bolt.



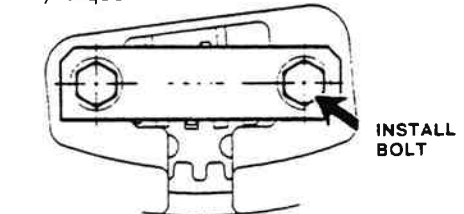
C. Rotate adjusting ring until approximately 1/2" (38.1 mm) of free pedal is acquired. — pedal must be down. Rotate clockwise to increase free pedal, counterclockwise to decrease.



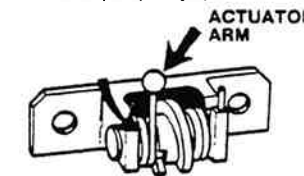
D. Loosen left bolt, rotate adjuster assembly downward to engage worm with adjusting ring teeth. Adjusting ring may have to be rotated slightly to allow worm to mesh.



E. Install right bolt and tighten both bolts to 25-30 lbs. ft. (34-47 Nm) torque.



F. Visually check to see if actuator arm is inserted into release sleeve retainer. (This can be accomplished through bell housing inspection opening.) The adjuster assembly spring will move back and forth if actuator arm is inserted into release sleeve retainer as the pedal is stroked several times. (Spring will move only one time if arm is not inserted.) If the adjuster assembly is not installed properly, proceed to Step 3G.



G. If for any reason the adjuster assembly is removed from the cover assembly for general inspection or replacement, the ball end of the actuator arm must be inserted into the hole of the release sleeve retainer. To insert the ball end into the release sleeve retainer hole, the simplest method is to have the clutch in the release position, pedal down. Let pedal up and adjuster bracket will move toward flywheel ring of cover assembly. Complete installation by installing adjuster bolts.

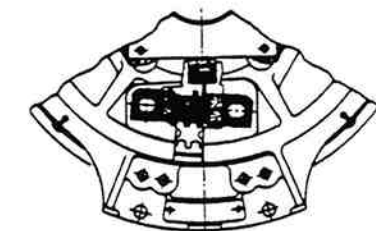


Figure 5-3. Clutch Adjustment Procedures.

## CLUTCH REPAIR (CLIP AND PIN LEVER TYPE)

1. Prior to actual clutch removal, assemble a clutch disc clamping tool to the driven disc and release bearing assembly.

**NOTE: Two 3/4" (19 mm) blocks of wood must be inserted between the clutch release bearing housing and clutch flywheel**

**ring as the clutch mounting bolts are loosened around the flywheel. These blocks will relieve the heavy internal spring load, preventing cocking and bending within the clutch and ensure easy removal of remaining mounting bolts. See figure 5-4.**

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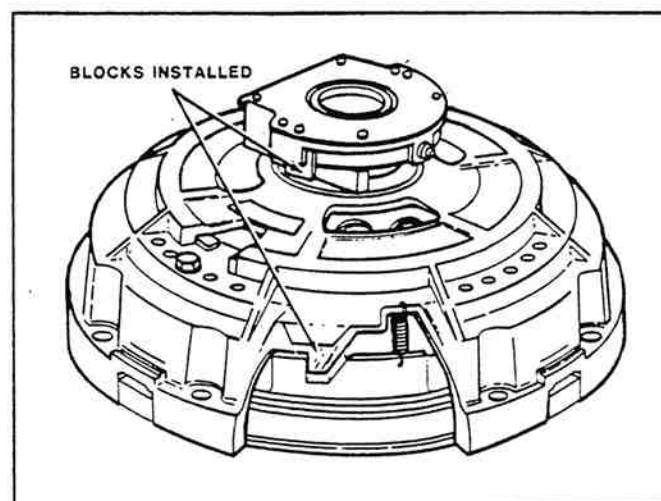


Figure 5-4. Wooden Blocks Inserted.

2. When all bolts have been removed, slide clutch assembly back and off using caution to keep aligning tool in place to retain discs and intermediate plate.

3. Carefully remove aligning tool, rear disc, intermediate plate and front disc.

4. See inspection section for checks of flywheel.

**NOTE:** This procedure applies directly to the Clip and Pin lever design (earlier production). The procedure for the Knife Edge lever design (current production) is similar. The photos will differ from actual construction.

## DISASSEMBLY

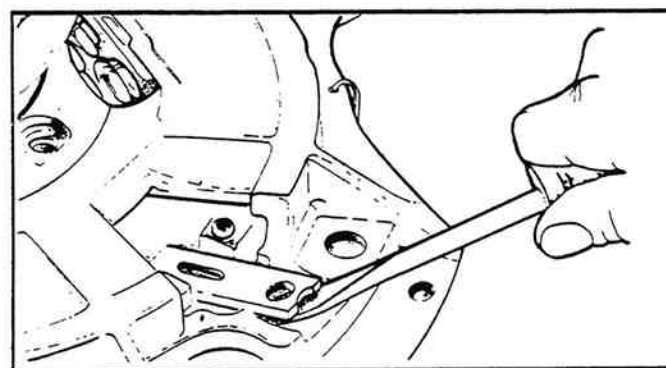


Figure 5-5. Remove Adjusting Ring Lock.

5. Remove bolt and lock washer assembly and adjusting ring lock. Use screwdriver of similar wedge to remove adjusting ring lock (figure 5-5).

6. Set clutch assembly (without driven discs and intermediate plate) upside down on a flat table or workbench. Unhook four return springs from flywheel ring and lift pressure plate off.

**NOTE:** Mark pressure plate in relation to the flywheel ring for reassembly purposes.

7. Turn the adjusting ring and lever assembly counter clockwise until free of flywheel ring. Then lift and remove assembly (figure 5-6).

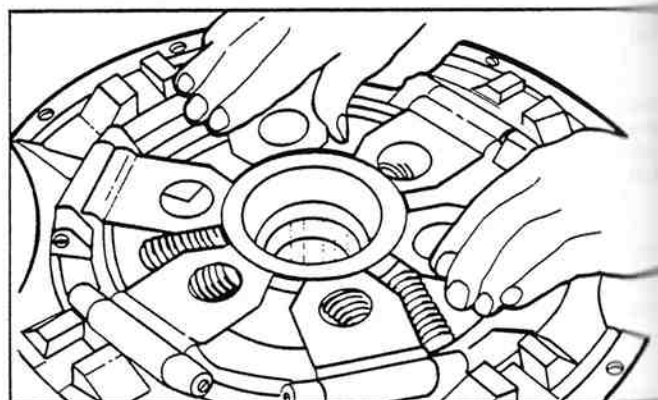


Figure 5-6. Turn Adjusting Ring D-1.

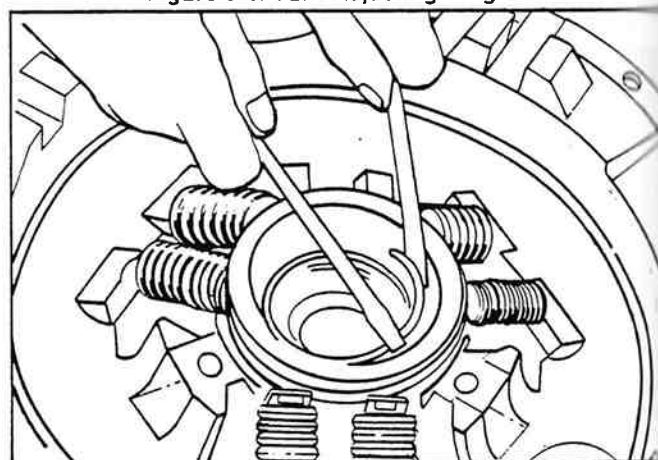


Figure 5-7. Remove Retaining Ring.

8. Remove retaining ring from release sleeve retainer (figure 5-7).

9. Install three 5/16" x 5" (7.9 x 12.7 mm) threaded rods through clearance holes in release sleeve retainer and into holes provided in flywheel ring. Rods must pass through flywheel ring far enough to put hex nuts on both ends (figure 5-8).

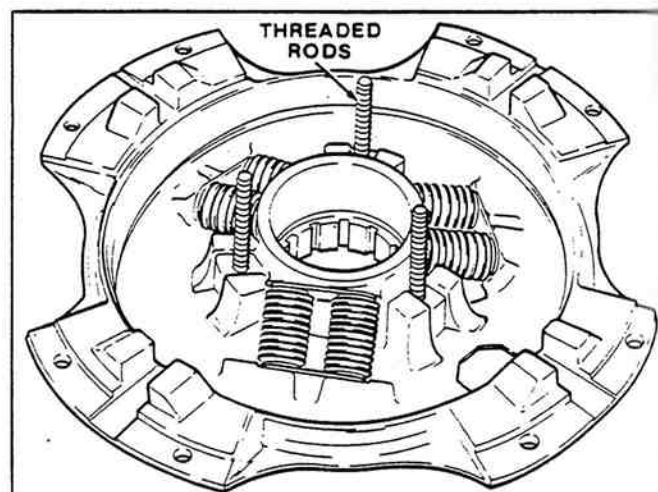


Figure 5-8. Install Threaded Rods.

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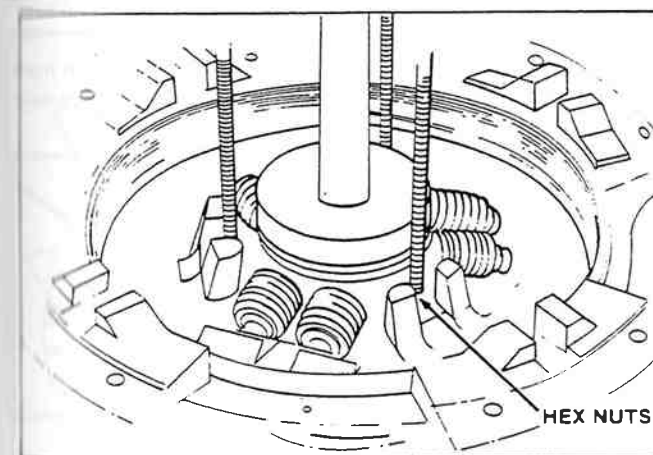


Figure 5-9. Compress Retainer.

10. Place assembly on an arbor press with a piece of tubing (see Note) supporting the release sleeve. Compress retainer until drive lugs bottom on flywheel ring and draw three hex nuts tightly against retainer (figure 5-9).

**NOTE:** Use a short piece of 2 1/2" or 2 3/4" O.D. (63.5-69.9 mm) tubing to support release sleeve assembly. Do not support on clutch release bearing cover rivet threads.

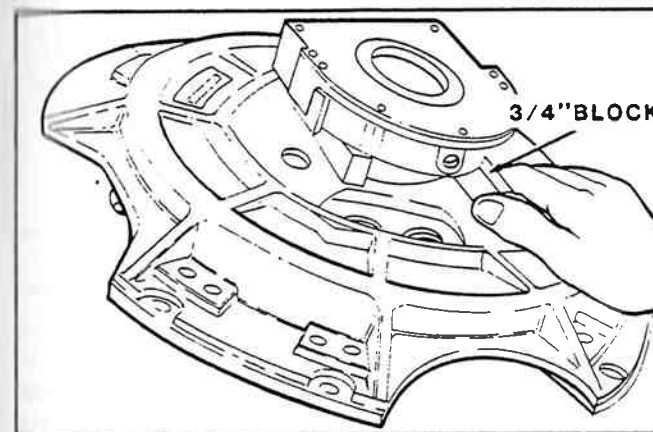


Figure 5-10. Remove Wooden Blocks.

11. Raise arbor. Tilt assembly and remove wooden blocks (figure 5-10).

12. Again support release sleeve on tubing as in Step 10. Remove half ring locks (figure 5-11). Release sleeve and bearing assembly are now free to slide through retainer toward rear of clutch.

13. To disassemble pressure springs and retainer, compress retainer to relieve load on hex nuts. Back off hex nuts and remove load on pressure springs. Remove pressure springs and spring pivots (figure 5-12).

14. To complete disassembly, remove the retainer clip from pivot pins, and remove pins and levers (figure 5-13).

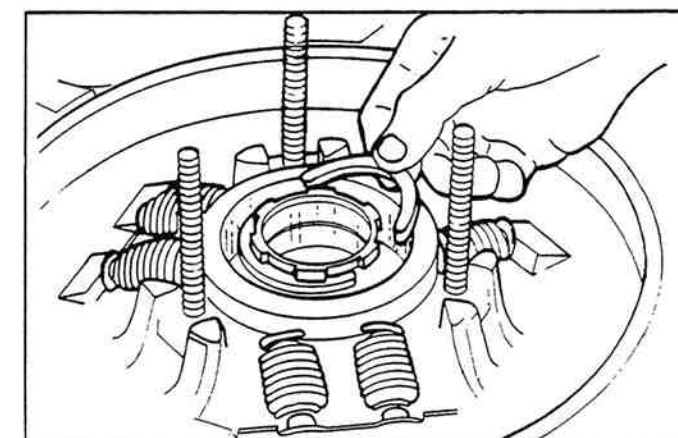


Figure 5-11. Remove Half Ring Locks.

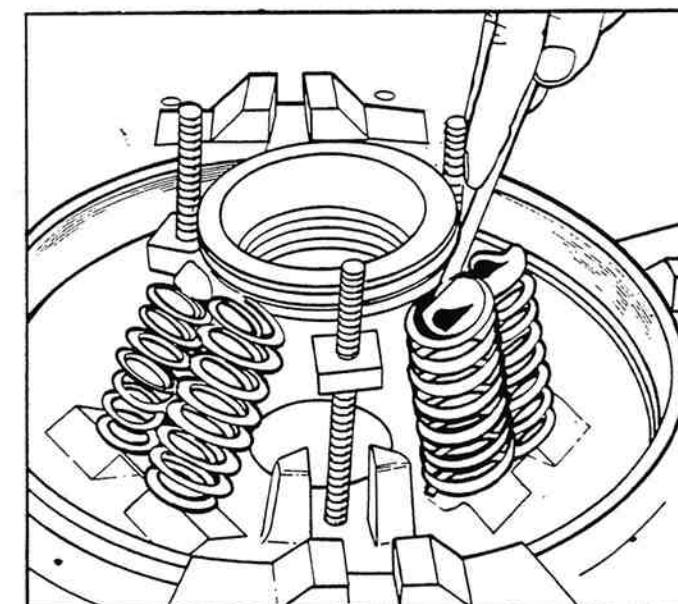


Figure 5-12. Remove Springs and Pivots.

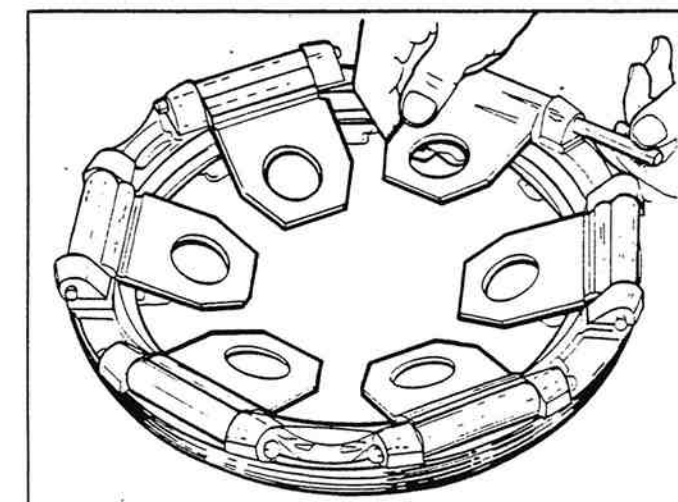


Figure 5-13. Remove Retainer Clips, Pins and Levers.

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## INSPECTION

**NOTE: All parts must be clean and dry for inspection.**

1. Inspect release levers for excess wear at all points of contact with pressure plate, release sleeve retainer, and pivot pin. If levers are bent or worn, replace with new levers. It is good preventive maintenance to replace levers during clutch rebuild.
2. Inspect release sleeve retainer for wear in lever groove and internal splines. Refer to specifications for driving slot clearance between flywheel ring drive slots and release sleeve retainer drive lugs.
3. Inspect spring pivots for cracks; if visible, replace.
4. Check release sleeve subassembly bushing for excessive wear. Check bearing diameter for tight fit. Refer to specifications and replace if necessary.
5. We recommend replacing the release bearing and sleeve assembly as a unit at the time of clutch rebuild.
6. Check pivot pin holes in adjusting ring for wear. Clearance may not exceed .010" (.254 mm) between pin and hole. Inspect for cracks; replace if cracks are visible.
7. Inspect the flywheel ring for cracks. Replace if cracks are visible. Check slots for indentation caused by wear of pressure plate driving lugs. Note specifications for slot limits.
8. Inspect bolt circle face and pilot for nicks and burrs due to removal or handling. Remove burrs with file to ensure proper seating and squareness when clutch is mounted on flywheel.
9. Inspect fulcrum of pressure plate for wear. If wear exceeds .015" (.38 mm), remachine. See specifications for maximum rework.
10. Inspect friction surface of pressure plate for scoring, burning, heat checking or distortion. If friction surface is badly scored, heat checked, warped or dished in excess of .010" (.254 mm), resurface or replace with new pressure plate. Smooth and flat pressure plate surfaces are required for satisfactory clutch life.
11. Check drive lugs for wear per specifications.
12. Inspect friction surfaces of intermediate plate for heat checks, scoring or distortion as noted in the above paragraph. Inspect driving slots of intermediate plate for wear. See specifications.
13. Inspect disc assembly for cracks, loose rivets, worn splines, warped or dished condition. Straighten if dished or warped; .015" (.381 mm) maximum runout. Replace if hub is cracked or splines are worn excessively.
14. Replace facings if they are glazed, scored, worn down to rivet heads, burned, or if grease or oil is on them. Check specifications for proper thickness. Proper riveting is essential. Use a star set anvil to spread the rivet so it contacts the tapered counterbore of the facing. Do not use a roll or eyelet anvil (except with metallic facings).

## ASSEMBLY

1. Place flywheel ring upside down on a table or workbench. Use a small paint brush and coat threads of adjusting ring and internal threads of flywheel ring with Darina EP-1 (figure 5-14).
2. Assemble adjusting ring to flywheel ring with "notches" down. Preset adjusting ring by placing two pivot pins in adjust-

ing ring bosses directly opposite each other. Dimension from flywheel ring mounting surface to straight edge to be approximately 2-11/16" (68.3 mm) (figure 5-15).

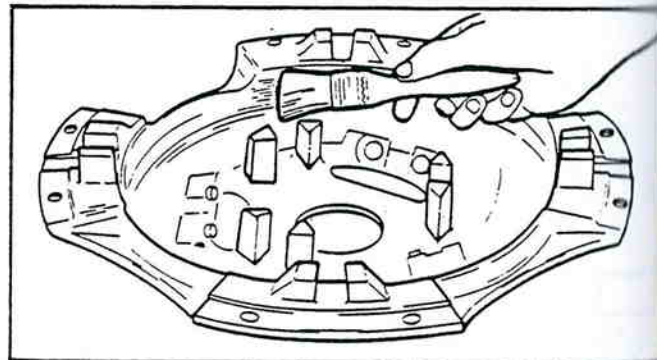


Figure 5-14. Coat Threads.

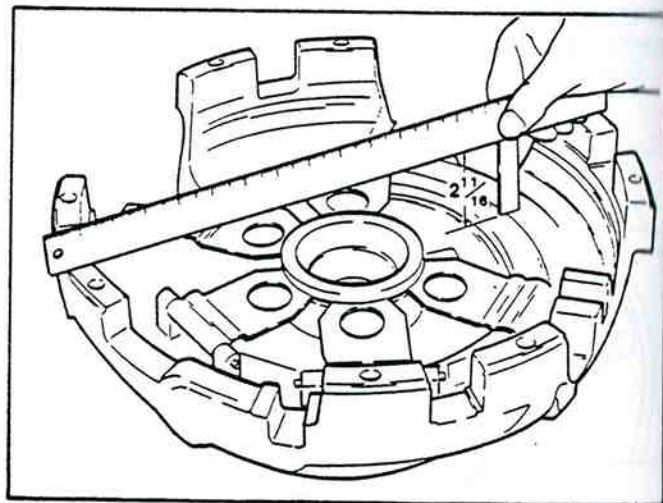


Figure 5-15. Adjusting Ring Dimensions.

3. Install three threaded rods in holes provided in flywheel ring. Place hex nut on opposite side of flywheel ring. Place spring pivots (F-4) on bosses in flywheel ring (C-1) and retainer (F-2) (figure 5-16).

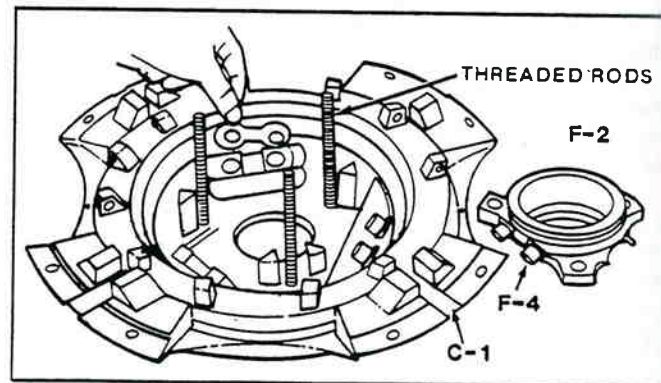


Figure 5-16. Install Spring Pivots.

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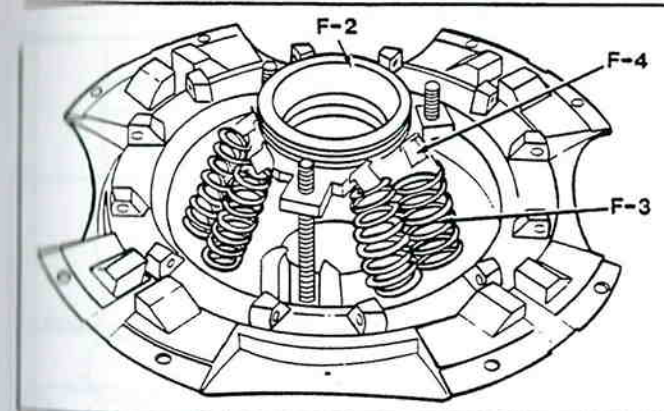


Figure 5-17. Install Release Sleeve Retainer.

4. Place release sleeve retainer (F-2) in position, guided on threaded rods. Install pressure springs (F-3) between spring pivots (F-4). Place hex nuts on three threaded rods and draw down enough to hold release sleeve retainer assembly in place (figure 5-17).

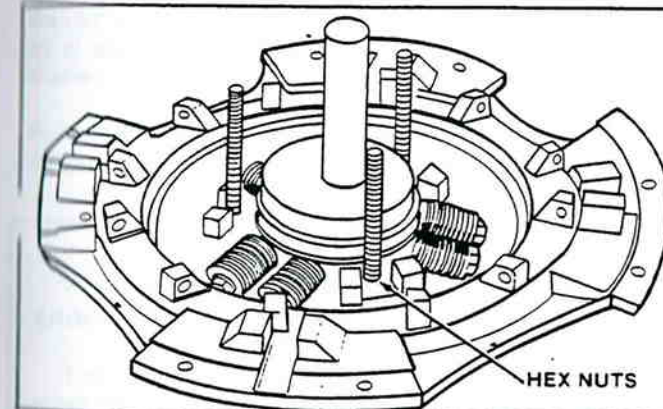


Figure 5-18. Depress Retainer.

5. Place flywheel ring and release sleeve retainer assembly on an arbor press and depress retainer until it bottoms against flywheel ring. Draw tightly three hex nuts on threaded rod against retainer (figure 5-18).

**NOTE: Visually check pressure springs to assure seating on spring pivots.**

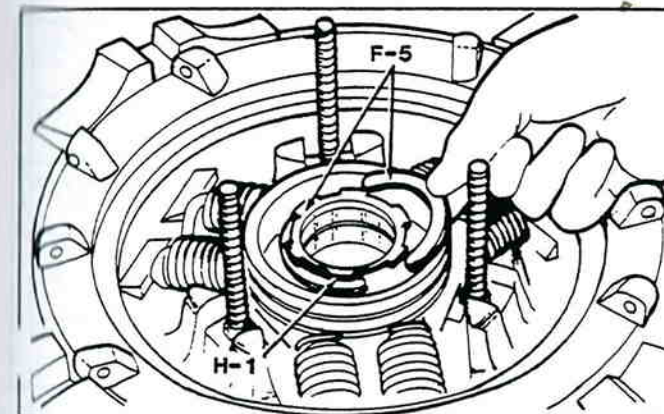


Figure 5-19. Install Half Ring Locks.

6. Install release sleeve and release bearing (G-1) assembly through flywheel ring and release sleeve retainer. Place half ring locks (F-5) in groove of release sleeve (figure 5-19).

7. Install 3/4" (19 mm) wooden blocks between flywheel ring and release bearing housing. Place assembly on arbor press, supporting sleeve on 2 1/2"-2 3/4" O.D. (6.35-69.9 mm) tubing. Compress retainer to relieve load on hex nuts. Remove threaded rods and release load against wooden blocks (figure 5-20).

**NOTE: Do not support assembly on clutch release bearing cover rivet heads.**

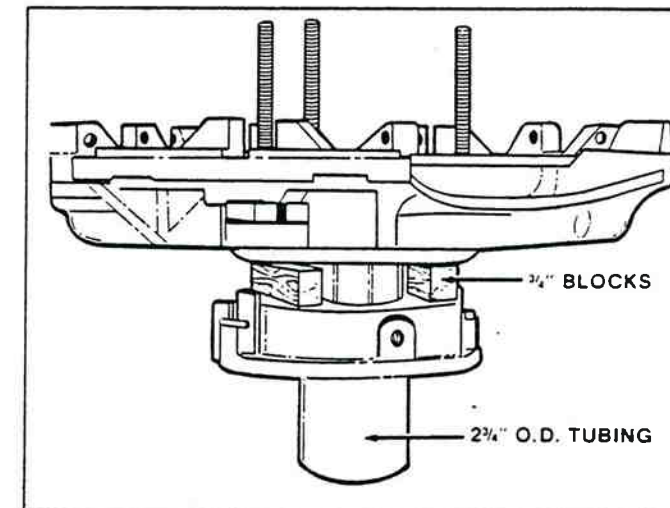


Figure 5-20. Install Wooden Blocks.

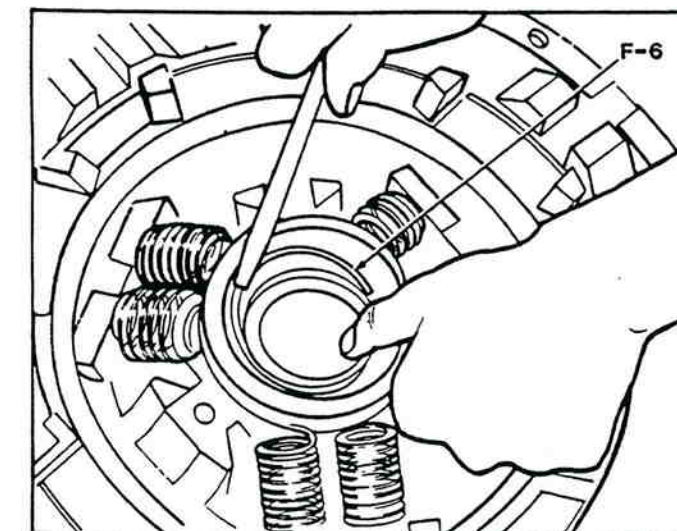


Figure 5-21. Install Retaining Ring.

8. Complete subassembly by placing retaining ring (F-6) in groove above the half-ring locks (figure 5-21)