

Date 1-1-89

MC-9 MAINTENANCE MANUAL

SECTION 5

CLUTCH

<u>SUBJECT</u>	<u>PAGE</u>
Assembly	5-6
Clutch Brake	5-12
Clutch Pedal Adjustment.....	5-3
Clutch Life Remaining	5-13
Clutch Linkage Adjustment	5-1
Clutch Repair	5-3
Disassembly	5-4
Engine and Transmission Alignment.....	5-9
Inspection	5-6
Installation of Transmission to Clutch and Engine.....	5-10
Installing Clutch on Flywheel.....	5-10
Lubrication	5-13
Pre-Installation Checks	5-10
Service Tools	5-16
Specifications	5-15
Troubleshooting.....	5-14
Service Bulletin Page	

MC-9 MAINTENANCE MANUAL

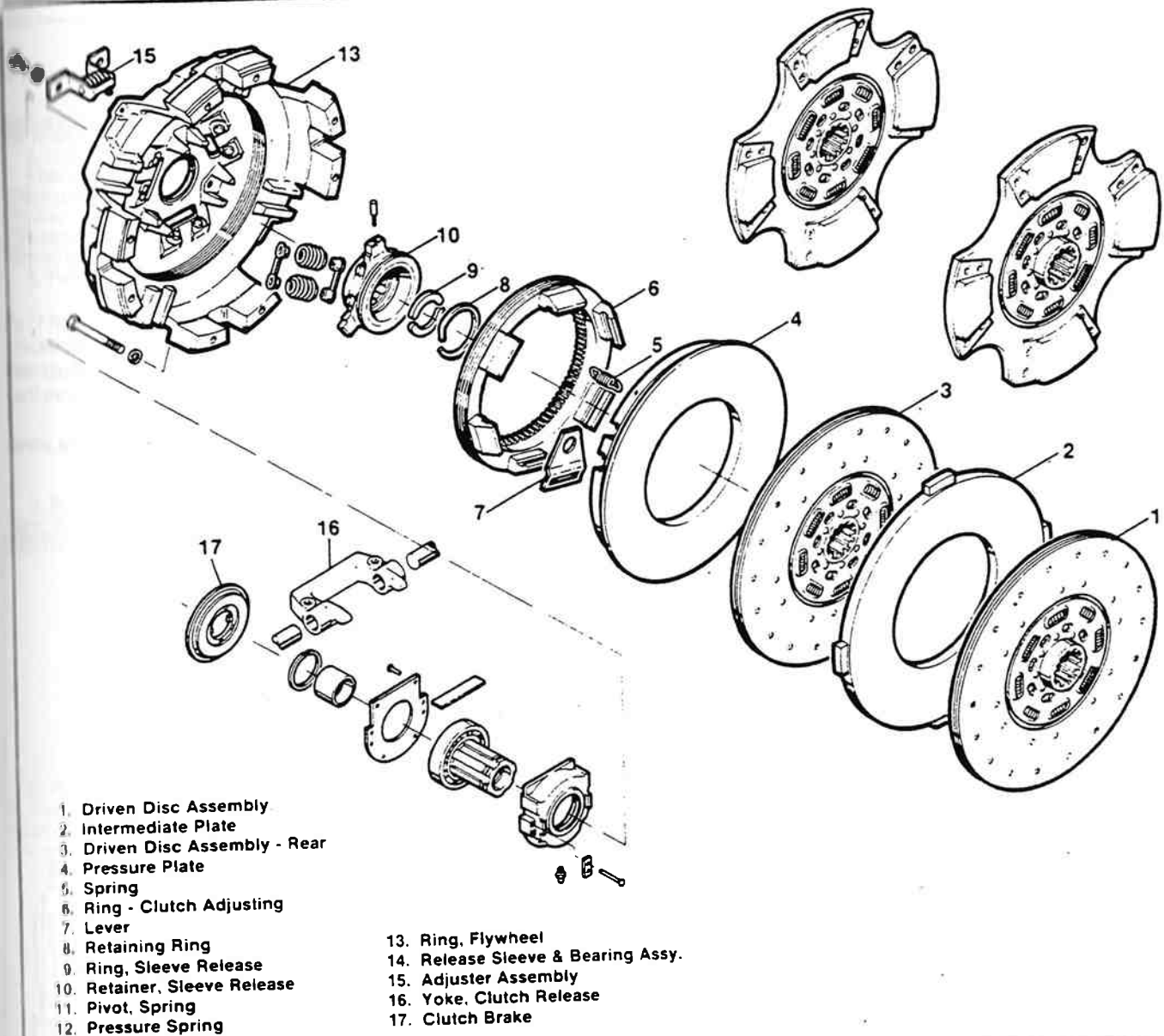


Figure 5-1. Clutch for 5-Speed Manual Transmission.

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.

MC-9 MAINTENANCE MANUAL

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.

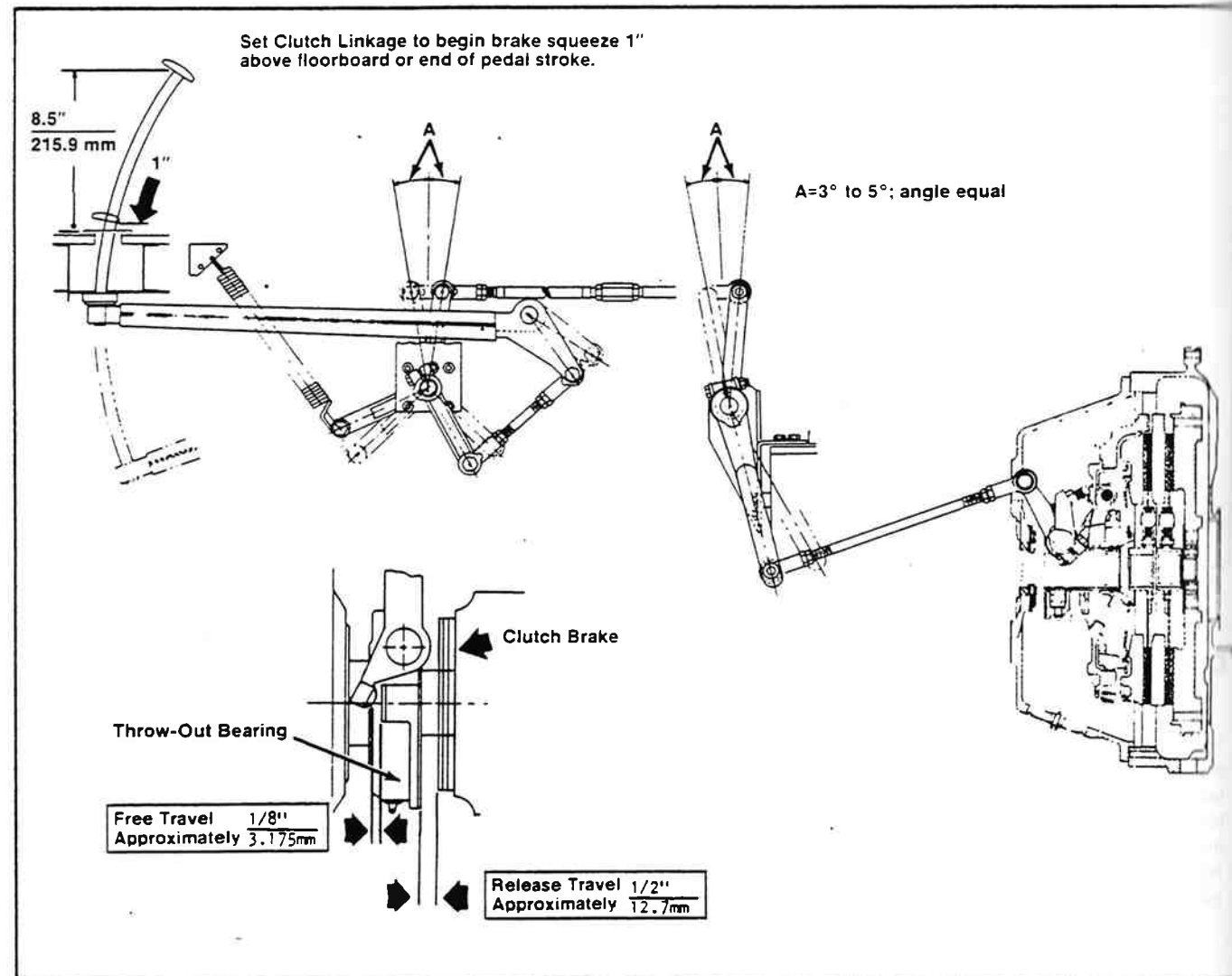


Figure 5-2. Clutch Linkage Adjustment - 5-Speed Manual Transmission.

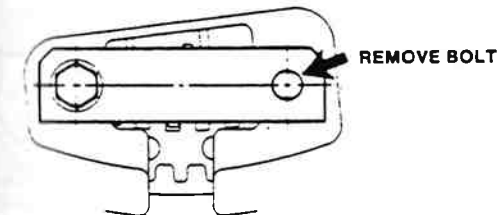
MC-9 MAINTENANCE MANUAL

CLUTCH ADJUSTMENT

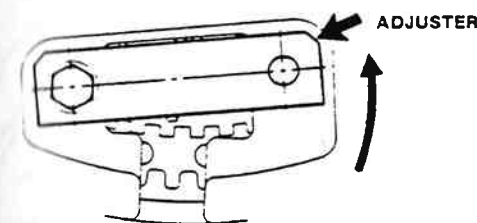
NOTE: Before installation or removal of clutch, check the following.

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.
4. 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.

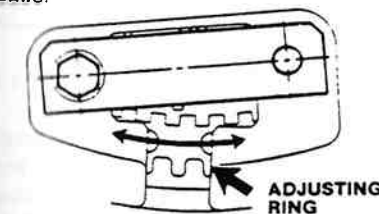
A. Remove right bolt. Loosen left bolt one turn.



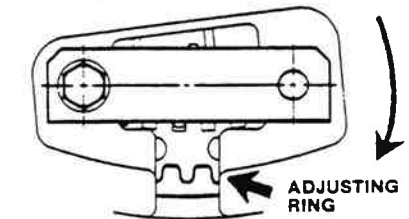
B. Rotate adjuster upward. This will disengage worm gear from the adjusting ring to allow manual adjustment. Hold adjuster disengaged and tighten left bolt.



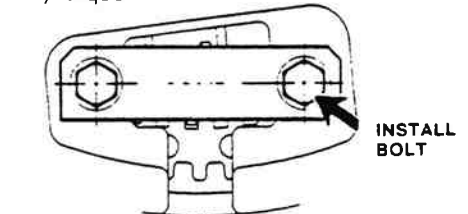
C. Rotate adjusting ring until approximately 1/2" (38.1 mm) of free pedal is acquired. — pedal must be down. Rotate clockwise to increase free pedal, counterclockwise to decrease.



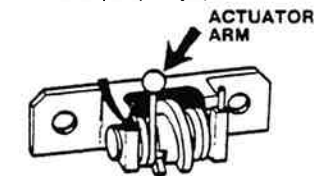
D. Loosen left bolt, rotate adjuster assembly downward to engage worm with adjusting ring teeth. Adjusting ring may have to be rotated slightly to allow worm to mesh.



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.

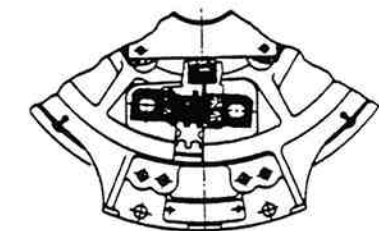


Figure 5-3. Clutch Adjustment Procedures.

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.

MC-9 MAINTENANCE MANUAL

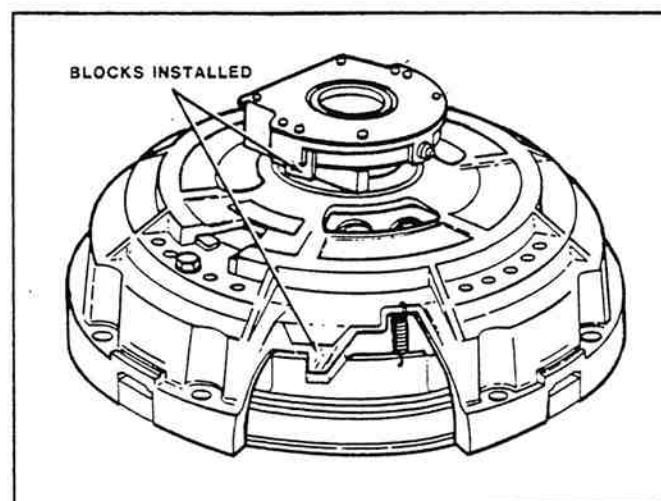


Figure 5-4. Wooden Blocks Inserted.

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

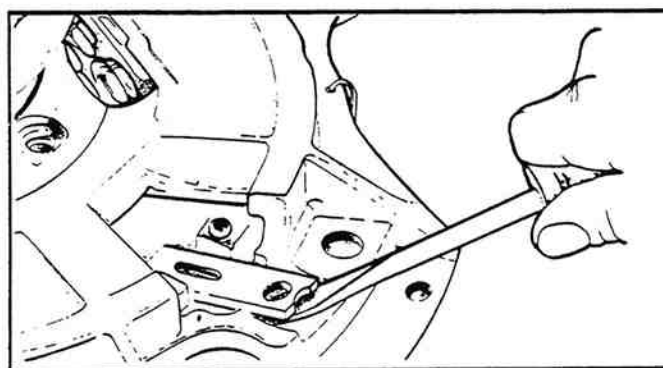


Figure 5-5. Remove Adjusting Ring Lock.

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).

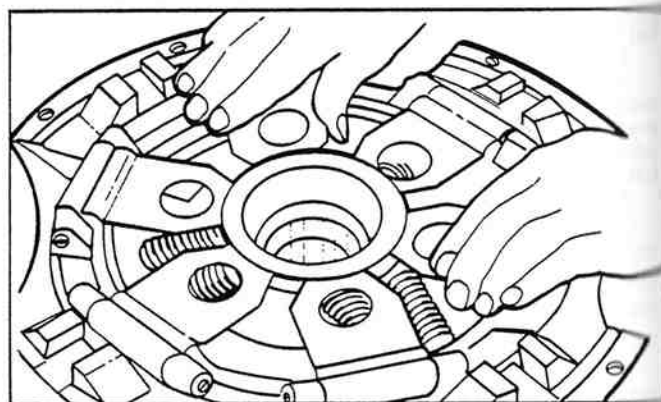


Figure 5-6. Turn Adjusting Ring D-1.

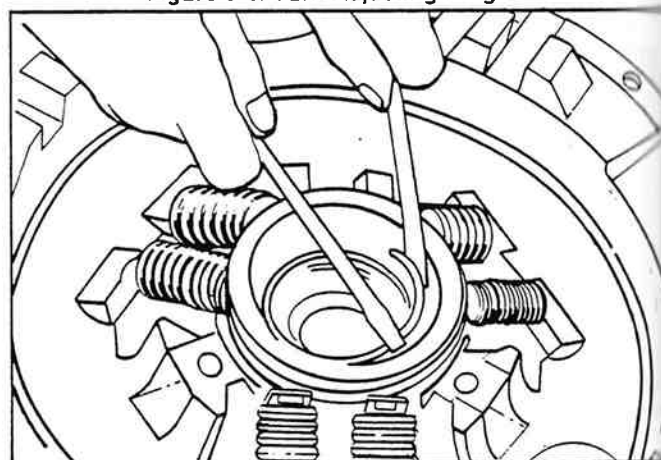


Figure 5-7. Remove Retaining Ring.

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).

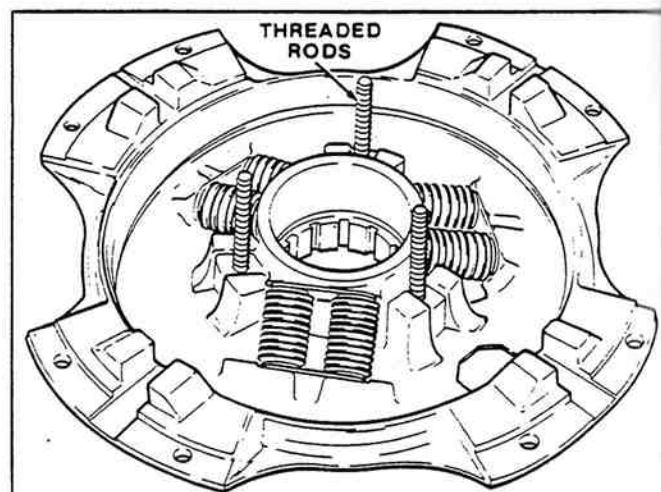


Figure 5-8. Install Threaded Rods.

MC-9 MAINTENANCE MANUAL

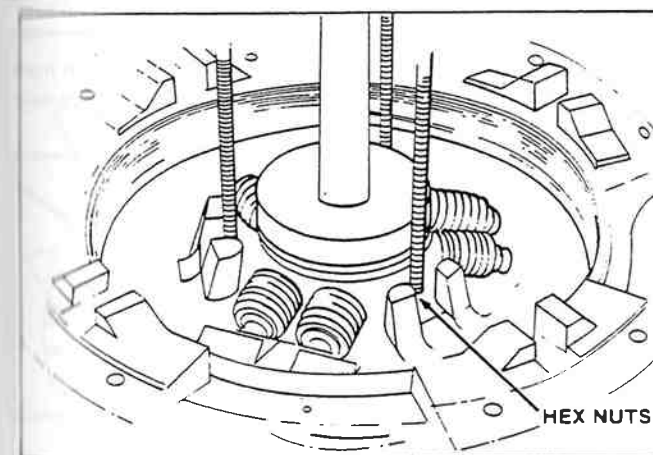


Figure 5-9. Compress Retainer.

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.

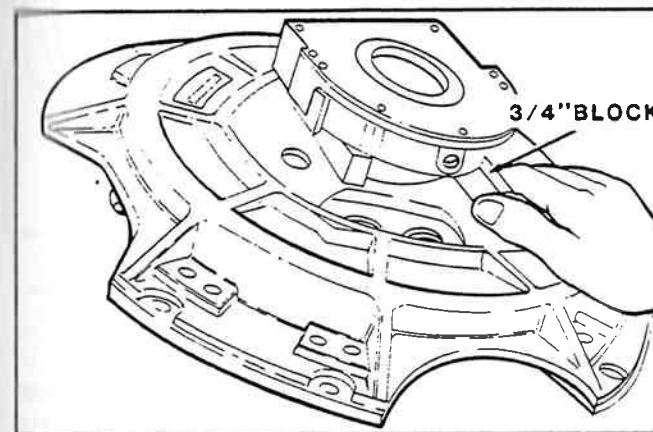


Figure 5-10. Remove Wooden Blocks.

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).

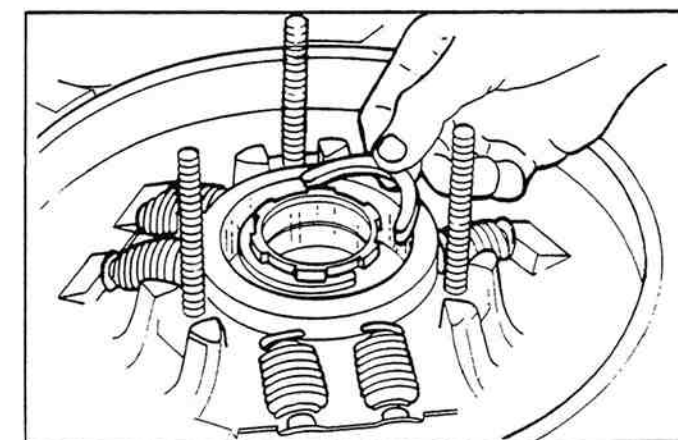


Figure 5-11. Remove Half Ring Locks.

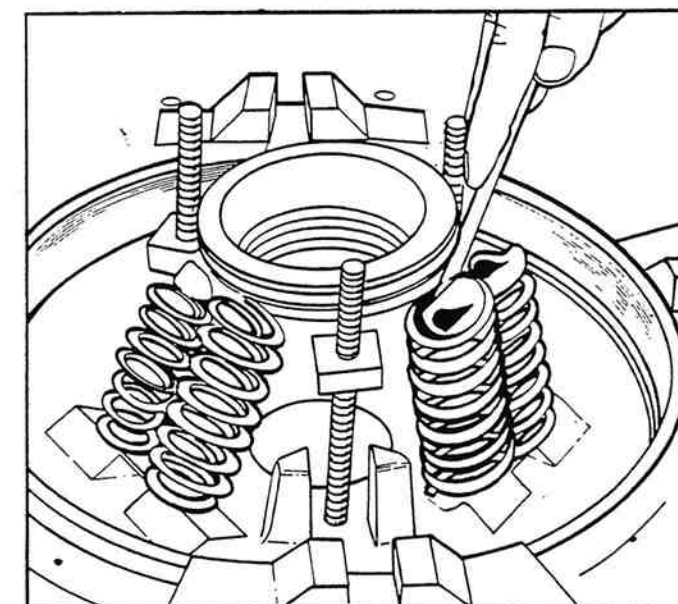


Figure 5-12. Remove Springs and Pivots.

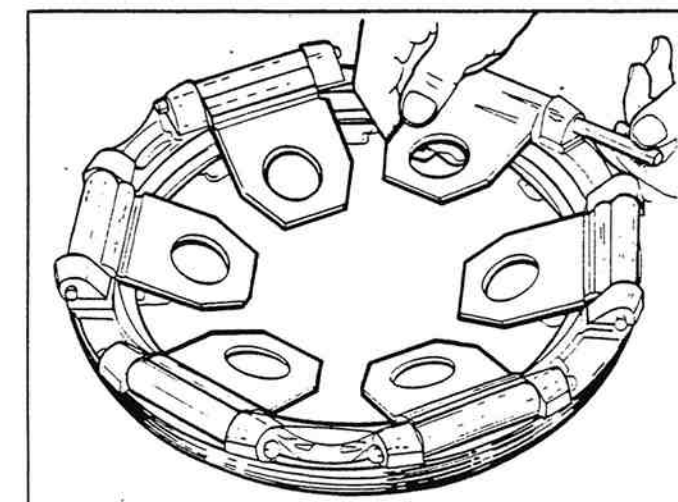


Figure 5-13. Remove Retainer Clips, Pins and Levers.

MC-9 MAINTENANCE MANUAL

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).

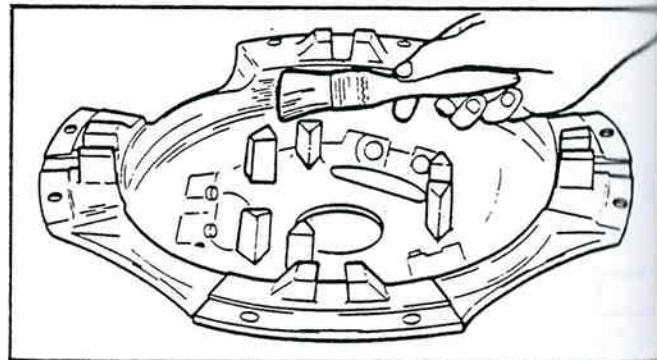


Figure 5-14. Coat Threads.

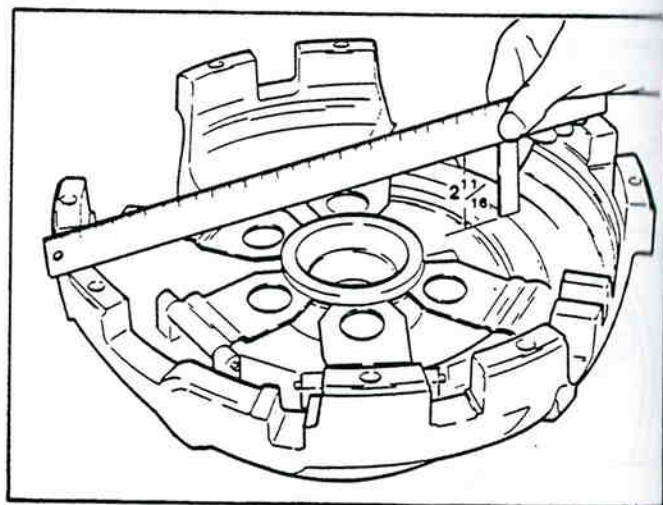


Figure 5-15. Adjusting Ring Dimensions.

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).

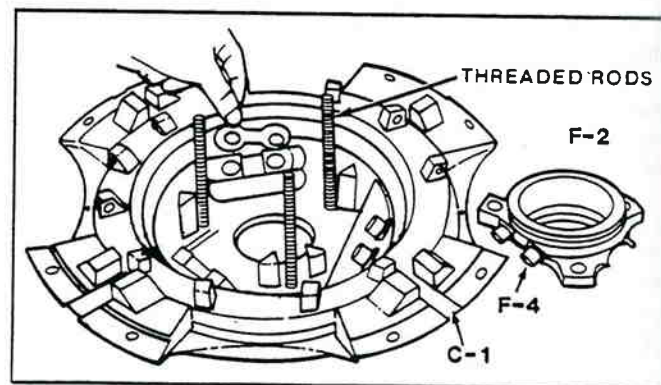


Figure 5-16. Install Spring Pivots.

MC-9 MAINTENANCE MANUAL

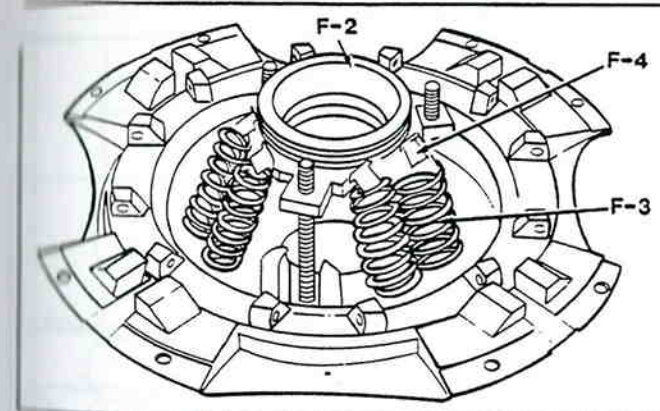


Figure 5-17. Install Release Sleeve Retainer.

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).

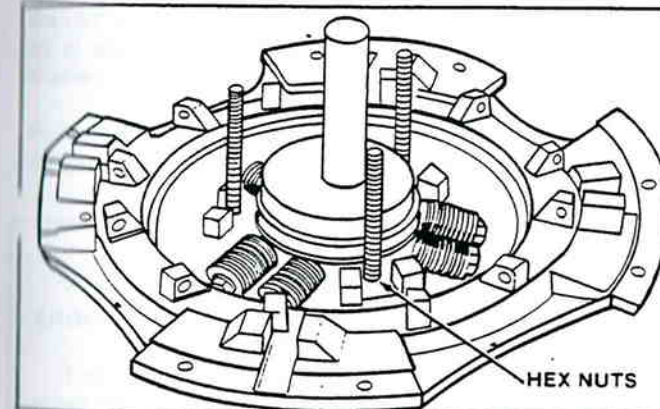


Figure 5-18. Depress Retainer.

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.

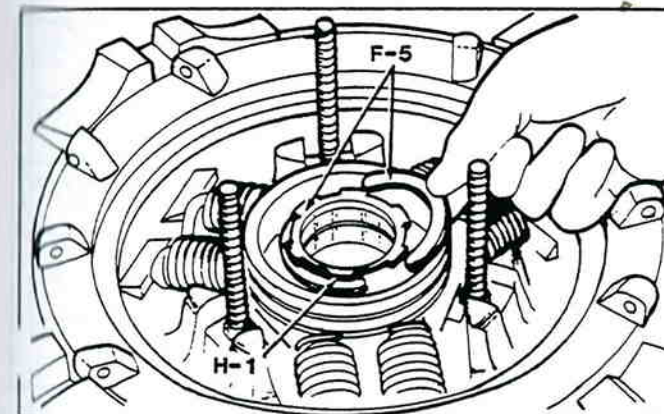


Figure 5-19. Install Half Ring Locks.

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.

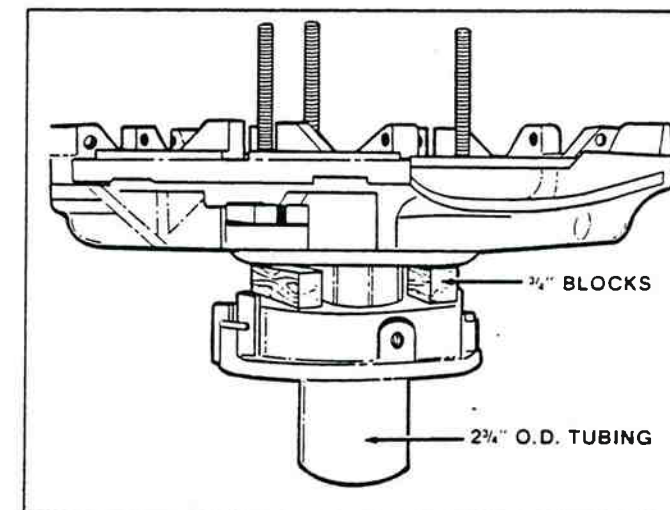


Figure 5-20. Install Wooden Blocks.

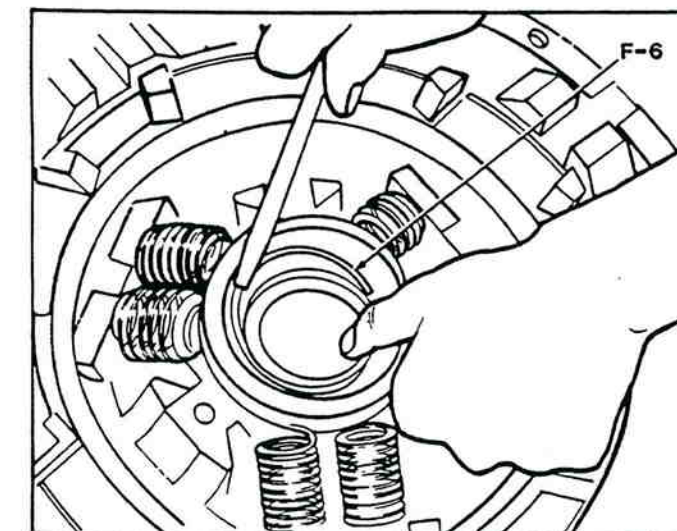


Figure 5-21. Install Retaining Ring.

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

MC-9 MAINTENANCE MANUAL

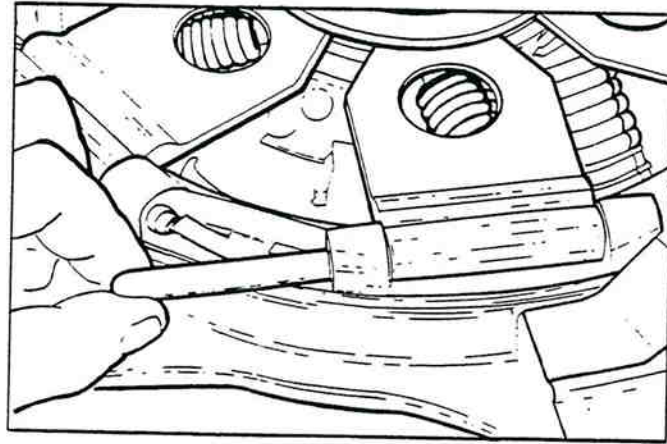


Figure 5-22. Insert Pivot Pins.

9. Return assembly to workbench and place levers between adjusting ring bosses with narrow end or "nose" in groove of release sleeve retainer. Lever fulcrum or raised area of lever must be facing pressure plate. Move adjusting ring either clockwise or counterclockwise as necessary to insert pivot pins. Return adjusting ring to previously set position (figure 5-22).

CAUTION: Spring clips must be installed so that one spring clip retains two pivot pins. Clips will only fit in every other opening because of casting interference.

10. Place retainer clip into position and insert pivot pin through clip hole into adjusting ring and lever holes until pin head snaps into position (figure 5-23).

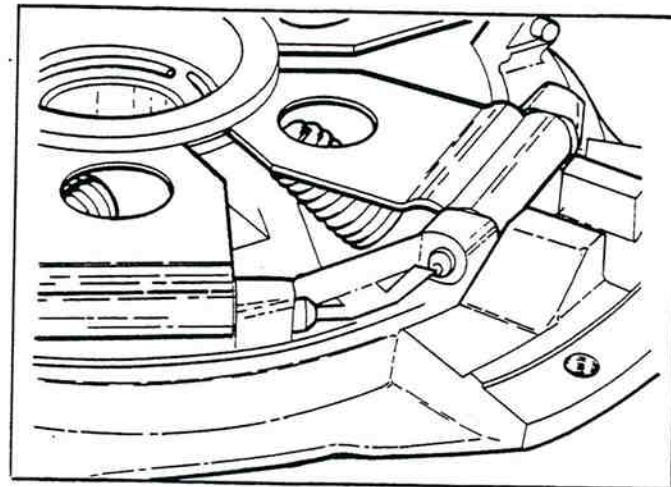


Figure 5-23. Install Retainer Clip.

11. Place pressure plate (B-1) in drive slots on flywheel ring. Check clearance between driving lugs on pressure plate and drive slots in flywheel ring (C-1). Clearance should be .004" to .008" (.102- .203 mm) (figure 5-24).

NOTE: Pressure plate was marked in relation to the flywheel ring when removed. Reassemble in same slot location.

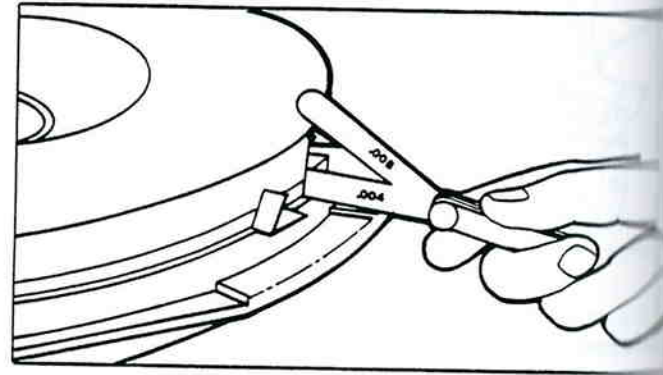


Figure 5-24. Check Driving Lug Clearance.

12. Install return springs (B-2) as shown. Make sure they are completely seated in hole (figure 5-25). Springs are to be hooked from inside of pressure plate first. Then hook opposite end from outside of flywheel ring.

13. Complete reassembly by turning assembly on pressure plate side and replace adjusting ring lock (D-2) and bolt assembly (D-3) (figure 5-26).

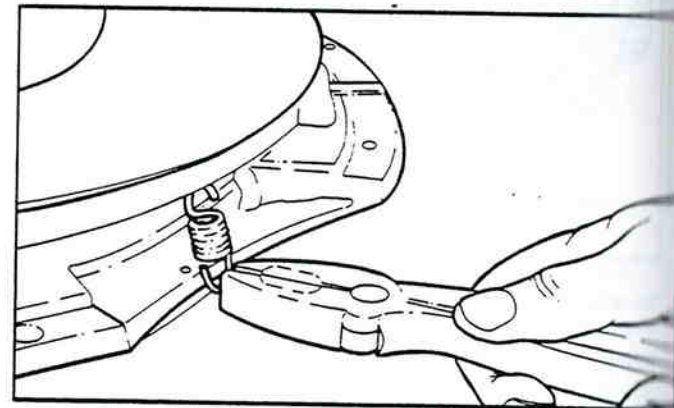


Figure 5-25. Install Return Springs.

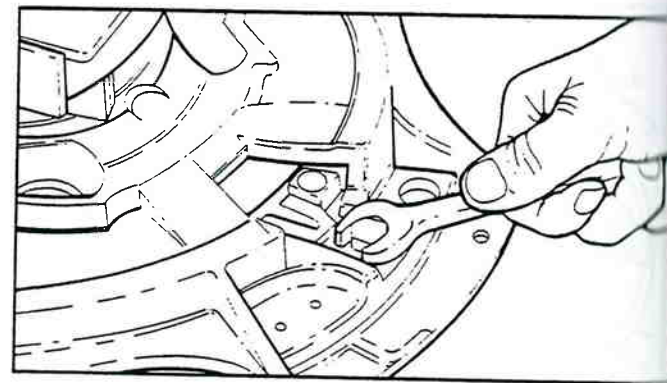


Figure 5-26. Replace Adjusting Ring Lock.

MC-9 MAINTENANCE MANUAL

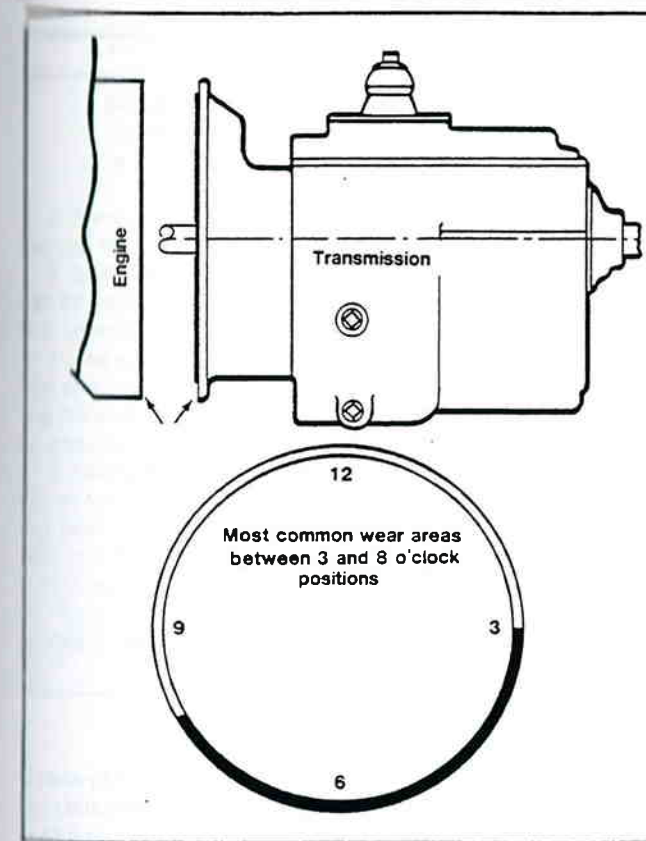


Figure 5-27. Housing Wear Areas.

ENGINE AND TRANSMISSION ALIGNMENT

The engine and transmission must line up. To check for this, make the following checks or measurements. Surfaces being gauged or measured must be clean for accurate measurements.

1. Inspect the mating faces of the transmission clutch housing and the engine flywheel housing (figure 5-27). Any appreciable wear on either housing will cause misalignment. Replace housing if worn. Most wear will be found on the lower half of the facings. Most common wear areas are between the 3 and 8 o'clock positions (figure 5-27).

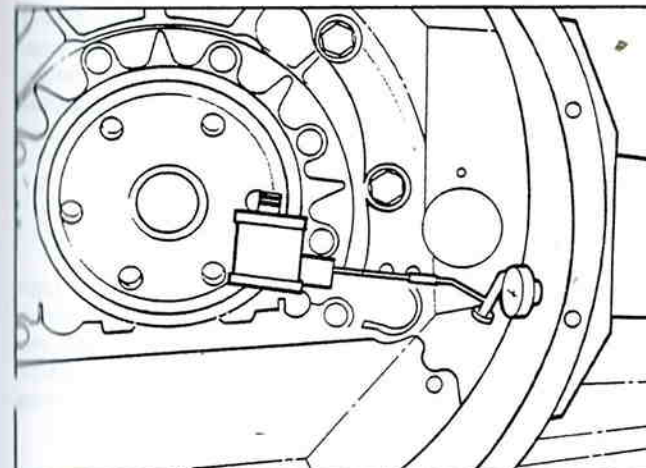


Figure 5-28. Checking Housing Pilot Runout.

2. With dial indicator secured to engine flywheel (figure 5-28) and gauge stylus against housing pilot, rotate flywheel by hand. With chalk or soapstone, mark high and low points. Total indicated difference between high and low points must be .008" (.203 mm) or less.

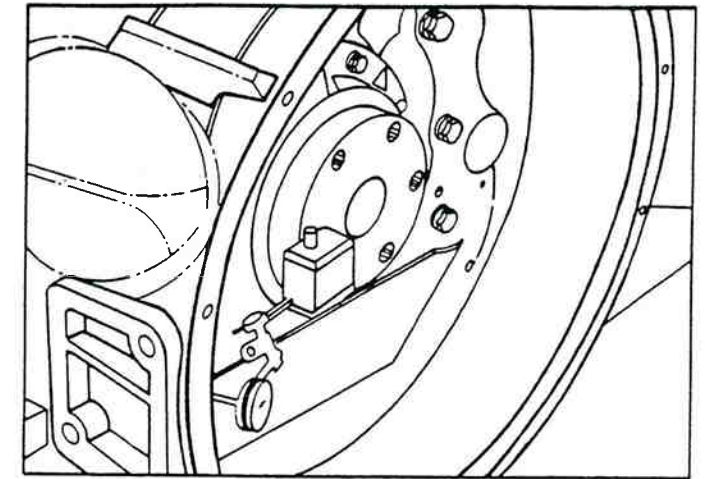


Figure 5-29. Flywheel Housing Face Runout.

3. Now move gauge stylus to contact face of engine flywheel housing (figure 5-29). Rotate flywheel and mark high and low points. Total runout should not exceed .008" (.203 mm).

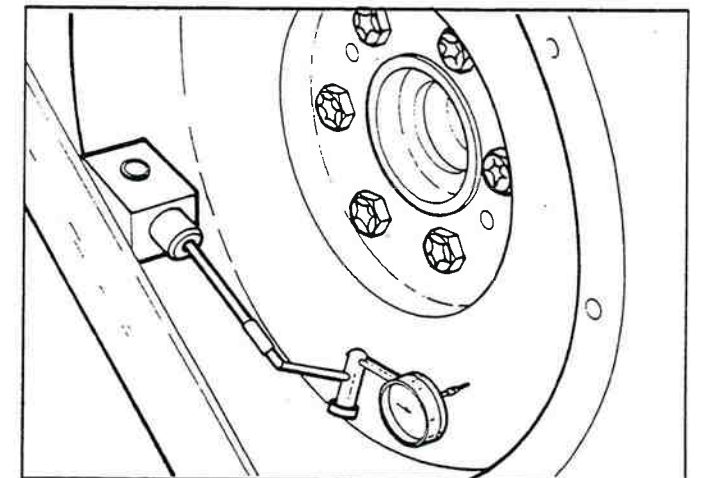


Figure 5-30. Flywheel Outer Edge Runout.

4. Next, secure dial indicator to engine flywheel housing with gauge stylus on face of flywheel near the outer edge (figure 5-30). Rotate flywheel. Maximum permissible runout is .0005" per inch of flywheel diameter. For instance, with a 15 1/2" clutch, .0075" (.1905 mm) runout is allowable.

MC-9 MAINTENANCE MANUAL

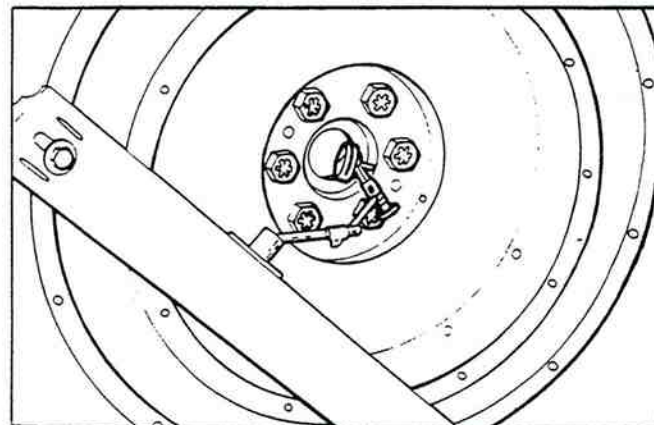


Figure 5-31 Pilot Bearing Bore Surface Runout.

5. Now move gauge stylus to contact pilot bearing bore surface (Figure 5-31). Rotate flywheel. Maximum total allowable runout is .005" (.127 mm).

If any of these limits are exceeded, the problem must be corrected or misalignment will cause premature wear to drive train components.

PRE-INSTALLATION CHECKS

Before installing the clutch, check the following items:

1. Inspect friction face of flywheel for smoothness, heat checks, scoring, excessive wear or runout on contact surface. The inspection for heat checks and scoring must be visual and based on experience; however, measure friction surface wear with straight edge and feelers. Replace or repair flywheel if wear is excessive. Refer to the manufacturer's recommendations concerning replacement or rebuilding.
2. If clutch is new, remove protective coating from pressure plate and intermediate plate.
3. A new pilot bearing should be used with a new or rebuilt clutch. If the old bearing is reused, clean and check the bearing thoroughly. Repack with lubricant.
4. If the flywheel has been replaced, always indicate the face and pilot diameters to make sure total indicator runouts are within engine manufacturer's specifications.
5. Check fit of splined hubs of front and rear friction discs by sliding on main drive gear spline of transmission. Hubs must slide free if clutch is expected to release cleanly and properly.

INSTALLING CLUTCH ON FLYWHEEL

1. Insert two 7/16"-14NC (5" (.127 mm) long), guide studs into two upper mounting holes of the flywheel. Rotate flywheel if necessary to level guide studs.
2. Slide clutch disc aligning tool or drive gear stem through release bearing sleeve and assemble rear disc on tool.
3. Place intermediate plate in clutch cover assembly. Align driving lug of plate with slots provided. Assemble front disc on tool. See Figure 5-32 for proper location of driven discs.
4. Position clutch assembly under flywheel and use a small chain hoist or jack to lift clutch assembly into position on the two guide studs.

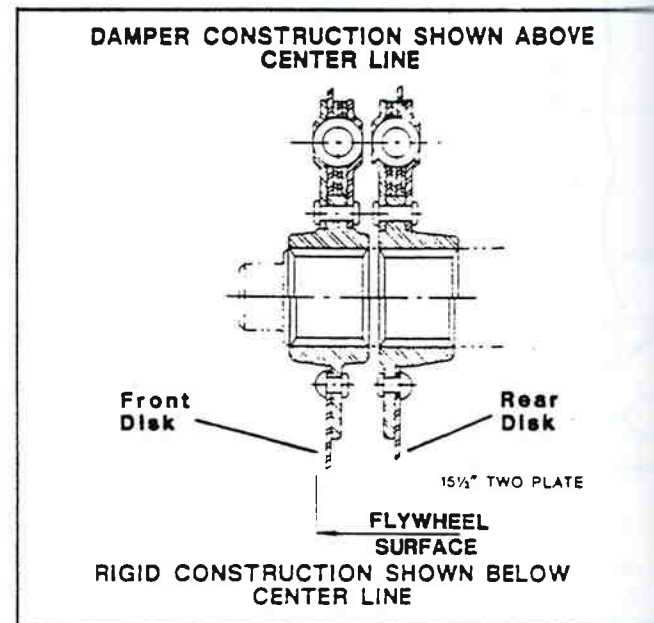


Figure 5-32. Clutch Plate Construction.

5. Slide clutch assembly forward and position in flywheel pilot. Start eight retaining capscrews with lock washers and run in finger tight. Tap clutch disc aligning tool to make sure it has entered and centered in pilot bearing.

6. Tighten the capscrews progressively and evenly to pull the clutch ring into its proper position in the flywheel pilot.

CAUTION: Don't try to pull the clutch into place by running one capscrew completely down with an impact wrench. This procedure can crack or break the pilot shoulders, causing eccentricity, off-square mounting and out-of-balance conditions.

7. Remove the two guide studs and insert two remaining capscrews and lock washers. For the final check, progressively tighten all capscrews to 35-40 ft. lbs. (47-54 Nm) torque.

8. As the capscrews are tightened, the 3/4" wooden shipping blocks should fall free. If they don't, remove them at this time. Likewise, the final tightening will clamp the front and rear driven disc in position, so remove the clutch disc aligning tool at this time.

INSTALLATION OF TRANSMISSION TO CLUTCH AND ENGINE

1. Apply a light coating of anti-seize compound or high temperature grease to the sides and bottom of the main drive gear splines. This will help prevent rust, fretting, corrosion, etc. while the clutch is in service and afford easier transmission removal at a later date. Spread a small amount of grease inside the clutch release bearing.

MC-9 MAINTENANCE MANUAL

CAUTION: Avoid the common practice of smearing a handful of grease over the splines of the drive gear. Most of this grease will be wiped off by the release bearing sleeve when the transmission is assembled to the clutch.

2. Always check wear on clutch release yoke fingers and replace the yoke if necessary.
3. Shift transmission into gear so that the main drive gear can be rotated during assembly to align with clutch driven disc splines.
4. Use a suitable sling or transmission jack to properly support and maintain engine/transmission alignment when installing the transmission. Raise transmission and position it square and aligned with engine.
5. Rotate top of clutch release yoke (CR-7) rearward and enter the yoke on drive gear bearing cap. Yoke must be held in this position during early part of assembly. Enter main drive gear into clutch release bearing sleeve (H-1). Slide transmission forward slowly to pick up driven disc splined hubs. It may be necessary to rotate companion flange slowly to align the splines of drive gear and clutch discs (figure 5-33).

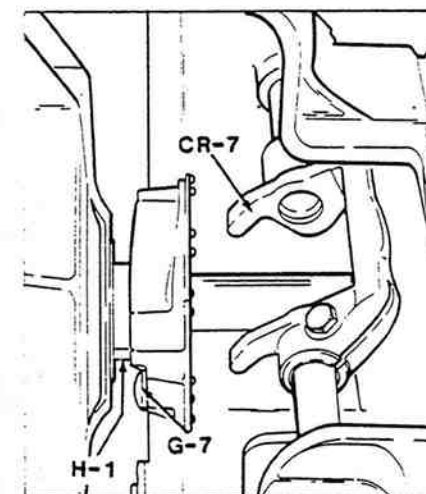


Figure 5-33. Yoke Position.

6. Observing through handhole opening in bell housing, make certain release bearing assembly is vertical with flat section on top and clutch release yoke fingers tipped up and entered to pass over release pads of release bearing assembly (figure 5-34).

CAUTION: Use care to avoid springing the driven discs when the transmission is being installed. Do not force the transmission into the clutch or flywheel housing if it resists. Don't let the transmission drop or hang unsupported by the driven discs.

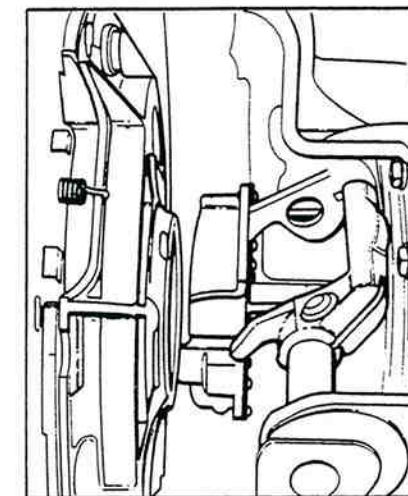


Figure 5-34. Check Release Bearing Assembly.

7. As soon as the fingers of the clutch release yoke pass the thrust pads of release bearing assembly, turn the release shaft to swing the yoke fingers down in front of release pads (G-7) (figure 5-35).

8. Enter pilot of clutch housing into flywheel housing and align capscrew holes. Start all capscrews and tighten progressively around housing.

9. Connect clutch release linkage and check for proper free pedal, release bearing travel, clutch brake squeeze, etc., as outlined under clutch adjustment.

10. Readjust clutch and linkage, if required at this time. If new clutch facings were installed, it may be necessary to readjust clutch shortly after clutch is placed in service.

IMPORTANT: Interference with release yoke fingers by the clutch flywheel ring will prevent assembly of transmission or cause binding of release shaft if it is not rotated as shown in figure 5-35.

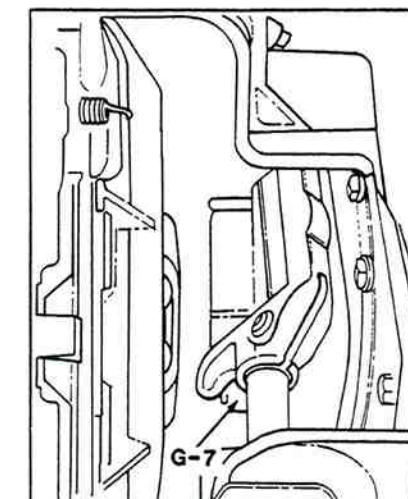


Figure 5-35. Swing Yoke Fingers Down.

MC-9 MAINTENANCE MANUAL

TORQUE-LIMITING CLUTCH BRAKE

The torque-limiting clutch brake (figure 5-36) helps lengthen the life of the transmission by aiding in smooth gear engagement at those times when the transmission gears may still be in motion even though the coach is stopped. Examples of this situation are (1) stopping at a traffic signal and immediately starting up again or (2) when shifting from first to reverse or from reverse to first gear.

The torque-limiting feature is provided by internal spring washers which are driven by a hub. The spring washers react against the clutch brake covers with facing material positioned between each spring washer and cover. The hub and spring washer combination slips with respect to the covers after approximately a 25 ft. lb. load has been exceeded.

Longer tang life is provided by the brake's ability to limit torsionally induced damage. Also, 5° of free play is provided between the hub and spring washers so that the inertia of the spring washers cannot load the hub directly. Inertia present in the covers is allowed to load the hub only up to the 25 to 30 ft. lb. load mentioned above. And, the tangs themselves are thicker to absorb what remaining torsionals do find their way to the hub.

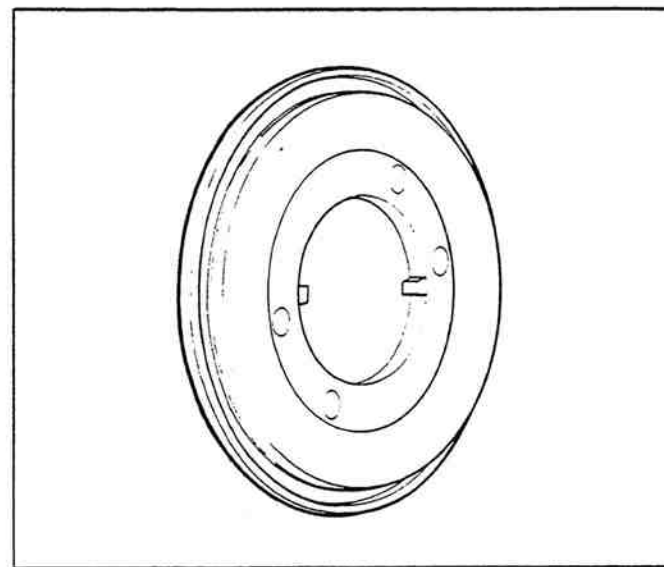


Figure 5-36. Clutch Brake.

There is no extra work on the driver's part to activate the brake. Depressing the clutch pedal to the floorboard, beyond the normal clutch disengage position, causes the clutch release bearing to come in contact with the clutch brake. Because the brake is splined to the transmission main drive gear (figure 5-37), the transmission is slowed down or stopped. The driver can then shift from first to reverse or from reverse to first without clashing or putting undue strain on the gears.

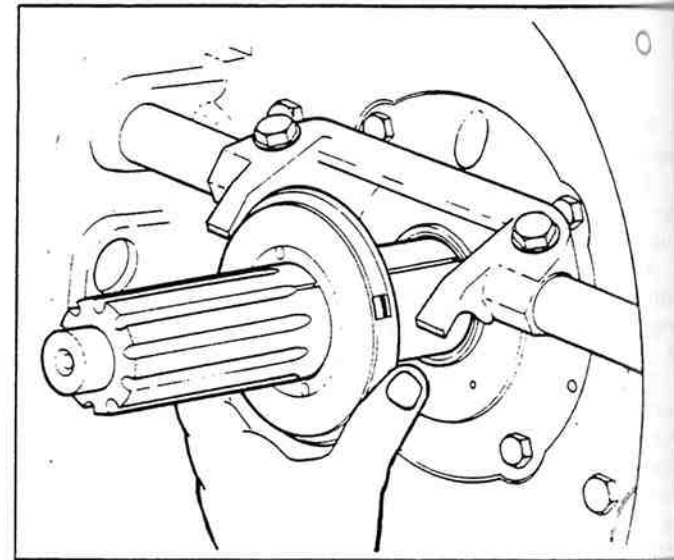


Figure 5-37. Clutch Brake Installed.

INSTALLATION

Install clutch brake before installing the transmission.

When used with Fuller Transmission equipped with standard bearing cap, clutch brake should be mounted with large facing diameter toward transmission.

ADJUSTMENT

Clutch brake adjustment can be found in earlier pages of this section as part of the clutch adjustment procedure.

MC-9 MAINTENANCE MANUAL

LUBRICATION

Remove the handhold cover on the bottom of the clutch wheelhousing to gain access to clutch release bearing for lubrication. Only high-temperature grease should be used. chassis lube or all-purpose lubricants are not recommended. Add lubricant at each chassis lubrication or more often if service is extreme.

WARNING: The release bearing housing has not been prepacked with grease. It must be lubricated when the clutch is installed in the coach. Otherwise, premature failure will occur.

RECOMMENDED LUBRICANTS:

SUPPLIER	PRODUCT
American Oil Co.	Amoco Lithium - M.P. Grease
Cities Service Co.	Citgo Premium Lithium Grease No. 2
Crude Refining Co.	Lubriplate 630-2
Keystone Lubricating Co.	No. 81 Light
Mobil Oil	Mobilgrease M.P.
Shell Oil Co.	Retinax A
	Alvania No. 2
Atlantic Richfield Co.	Arco M.P.
Texaco	Multifak No. 2
Mumble Oil Co.	Lidok 2
Chevron Oil Co.	Teknifax BRB-2, S.R.I.
	Teknifax BRB-2, S.R.I.

CLUTCH LIFE REMAINING

Many clutches are replaced as a preventive maintenance item at low mileage during repairs of the transmission or engine. Before the clutch assembly is replaced, it should be inspected for the following:

- Heat cracks in the pressure plate.
- Excessive wear in all drive slots.
- Broken springs.
- Dry or damaged release bearing.
- Broken intermediate plate.
- Excessive driven disc hub spline wear.
- Burned facings.
- Excessive wear on drive pins or intermediate plate slots.

If any of the above are not observed, the following graph (figure 5-36) can be applied to determine the approximate remaining clutch life by measuring the thickness of the rear driven disc assembly.

Find thickness of rear disc on column at left, then follow to curve on right and down to read percent of clutch life remaining.

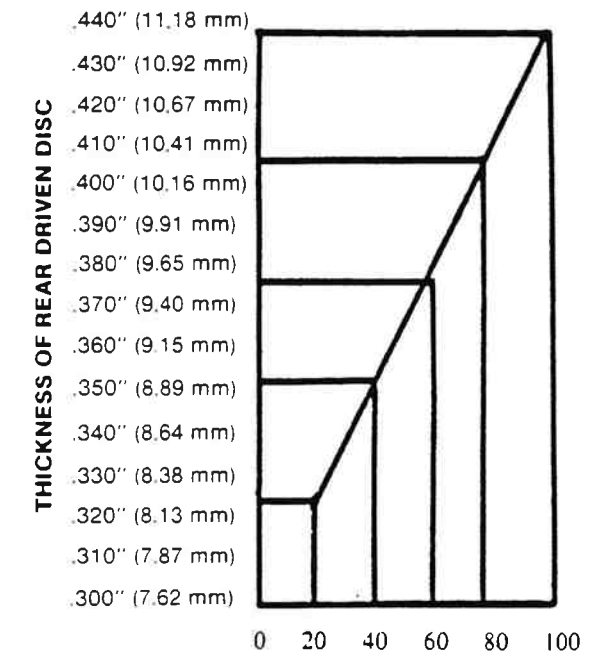


Figure 5-36. Percent of Clutch Life Remaining.

MC-9 MAINTENANCE MANUAL

CLUTCH TROUBLESHOOTING

TROUBLE	CAUSE
TOO MUCH FREE PEDAL	1. Check linkage for too much release travel.
NO FREE PEDAL	<ol style="list-style-type: none"> 1. Ball not in retainer hole. 2. Broken or weak pedal return spring. 3. Adjusting spring not free to rotate. 4. Defective adjuster assembly. 5. Check release travel - must be 1/2" (12.7 mm) plus about 1/4" (3.175 mm) free travel. Short travel linkage will not work with this mechanism. 6. Clutch brake adjusted too high. Should be adjusted 1" (25.4 mm) from end of stroke. 7. Total clutch adjustment has been taken up. (Remove and replace clutch.) <ol style="list-style-type: none"> a. Check pressure plate drive lugs for proper clearance of .006" min. (.152 mm). b. Check pressure plate return springs are bent or stretched. c. Replace if necessary. d. Insufficient release travel. e. Lever nose out of groove in release sleeve retainer.
POOR RELEASE	
1. Pressure plate not retracting.	<ol style="list-style-type: none"> a. Driven disc assembly must be straight within .015" (.381 mm) total indicator reading. Replace discs if they can't be straightened. b. Damage to driven discs can be caused by poor installation methods. Do not force transmission drive gear into disc hubs. This will distort or bend driven discs causing poor release.
2. Driven disc distorted or warped.	<ol style="list-style-type: none"> a. Replace drive gear and check driven disc hubs for excessive wear. If worn, replace disc. Check flywheel housing alignment of engine and transmission. Make sure driven discs slide freely on drive gear splines. b. Check pressure plate drive lugs for proper clearance of .006" min. (.152 mm).
3. Splines worn on main drive gear of transmission.	<ol style="list-style-type: none"> a. Readjust clutch for standard release travel. Refer to adjusting instruction. b. Proper clutch adjustment must be maintained for proper clutch release.
4. Internal clutch adjustment not correct	<ol style="list-style-type: none"> a. Free pilot bearing to a light push. b. Fit in flywheel and on drive gear pilot. c. If gearing is rough, replace.
5. Flywheel pilot bearing fitting too tightly in flywheel or on end of driven gear.	<ol style="list-style-type: none"> a. Replace facings or entire driven disc assembly b. Cleaning not recommended
6. Facings gummed with oil or grease.	<ol style="list-style-type: none"> a. Replace bearing. b. If bearing is grease type, lubricate.
7. Damaged clutch release bearing.	<ol style="list-style-type: none"> a. Relocate shaft so it does not project. b. Check all housing bushings and release yoke for wear.
8. Clutch release shaft projecting through release yoke.	<ol style="list-style-type: none"> a. Replace release yoke with proper yoke.
9. Release yoke contacting cover assembly at full release position	
10. Release yoke will not align with release bearing properly.	<ol style="list-style-type: none"> a. Flywheel has been resurfaced more than recommended .060" (1.524 mm) removal.
CLUTCH SLIPPAGE	
1. Weak pressure springs.	<ol style="list-style-type: none"> a. Replace springs.
2. No free pedal.	<ol style="list-style-type: none"> a. Readjust clutch. b. Refer to adjustment instructions.

MC-9 MAINTENANCE MANUAL

CLUTCH TROUBLESHOOTING (Cont'd)

TROUBLE	CAUSE
NOISY CLUTCH	
1. Clutch release bearings dry or damaged.	a. Lubricate bearing, or replace.
2. Flywheel pilot bearing dry or damaged.	a. Lubricate bearing or replace.
3. Clutch release bearing housing striking flywheel ring.	<ol style="list-style-type: none"> a. Adjust clutch. b. Refer to adjustment instructions. c. Also check wear on cross shafts, bell housing bushings and release yoke fingers. If badly worn, replace parts.
4. Excessive clearance between drive slots and drive lugs on intermediate and pressure plates.	a. Check clearance as noted on wear limits. If above limits, replace parts.
5. Worn clutch facings.	a. Replace facings or complete driven disc assembly.
6. Release mechanism binds.	<ol style="list-style-type: none"> a. Free up mechanism and linkage, check clutch adjustment. b. Refer to adjustment instructions.
7. Grease or oil on facings.	a. Replace facings or complete driven disc assembly.

CLUTCH SPECIFICATIONS

Manufacturer	Dana
Type	Dry 2-Plate, Pull Type
Size	15 1/2"
Disc and Facing Thickness - standard	487 / 452" (12.4 / 11.5 mm)
Hub Spline Size (inches/no splines)	2-10
Disc Assembly Max Runout (T.I.R.)	.015" (.381 mm)
Disc Assembly Max Out-of-Flat	.020" (.508 mm)
Release Sleeve	1.754 / 1.750" (44.552 / 44.45 mm)
Bushing Diameter (new)	2.010 / 2.008" (51.054 / 51.003 mm)
Intermediate Plates, driving lugs to slot clearance (new, min.)	.006" (.152 mm)
(max. worn)	.015" to .021" (.381 mm to .533 mm)
Pressure Plates, driving lugs to slot clearance (new)	.003" to .010" (.076 to .254 mm)
Pressure Plates, driving lugs to slot clearance (max. worn)	.016" to .021" (.406 to .533 mm)
Intermediate Plates and Pressure Plates	.000 to .004" (.000 to .102 mm)
Out-of-Flat	.004" (.102 mm) Concave
Scoring - Max. depth that can be reused	.015" (.381 mm)
Regrind - Max. removal per side	.015" (.381 mm)
Fulcrum Wear (Max.) rework	.030" (.762 mm)
Release Sleeve Retainer, driving lugs to slot clearance (max. worn)	.020" (.508 mm)
Clutch Plate Load	2800 lbs (1270 kg)

