SUPREME COURT OF THE STATE OF NEW YORK
SEVENTH JUDICIAL DISTRICT

In Re: Seventh Judicial District
Asbestos Litigation

SEVENTH JUDICIAL DISTRICT
ASBESTOS LITIGATION

This Document Applies to:

SUPREME COURT OF THE STATE OF NEW YORK
COUNTY OF ONTARIO

ANNE M. TINKER, Executrix of the
Estate of TIMOTHY W. TINKER, Deceased,
and Individually as the Surviving
Spouse of TIMOTHY W. TINKER,

Plaintiff,

CASE NO. 83778

vs.

A.E. CLEVITE, INC.,;
et al.,

Defendants

DEFENDANT MACK TRUCKS, INC.'S SUPPLEMENTAL RESPONSES TO PLAINTIFF'S SUPPLEMENTAL REQUEST FOR INSPECTION AND PRODUCTION OF DOCUMENTS

Defendant, MACK TRUCKS, INC. ("Mack Trucks"), serves this Supplemental Response to Plaintiff's Supplemental Request for Inspection and Production of Documents dated June 3, 1997.

INTRODUCTION AND GENERAL RESPONSE

Responses provided herein have been prepared pursuant to a reasonable and duly diligent investigation and search for the information requested. In conducting its business, Mack Trucks has each year created thousands of documents that have been

kept in numerous locations and have been moved as the organization changed and as employees changed jobs. Accordingly, Mack Trucks cannot represent that these responses contained herein provide all information requested; rather, these responses reflect information obtained before this date by Mack Trucks pursuant to a reasonable and duly diligent search and investigation in those areas where responsive information was expected to be found. To the extent that the request purports to require more, Mack Trucks objects on grounds that include that compliance with the request would impose an undue burden and expense.

These responses are intended to be accurate to the best of Mack Truck's knowledge and belief as of the time of the service of this response. To the extent that the responses are not consistent with any previous responses made in other cases, these responses are intended to supersede such earlier responses. Mack Trucks reserves the right to supplement these responses should it discover new information.

Some of the discovery requests ask for "all" documents that may pertain to a subject. Mack Trucks objects to requests for any and all of something on grounds that the requests are overly broad and unduly burdensome.

You have served Mack Trucks with discovery and yet you already may have some pertinent information or documents, perhaps even some information or documents not received from Mack Trucks. Mack Trucks objects on the grounds that it would be less burdensome, more convenient and less expensive for you to identify what documents you already have that fall within the scope of these requests. This would accomplish several purposes: (a) it would obviate Mack Trucks having to search

for and copy documents already in your possession; (b) it would enable Mack Trucks to use the documents provided by you as guides in looking for related material; and © it would, if your purposes were to obtain authentication of particular documents, enable Mack Trucks to authenticate the copies provided by you without having to conduct an uninformed search for those documents in Mack Trucks' files.

Mack Trucks further objects to requests where the matter sought is neither relevant to the subject matter involved in the pending action nor reasonably calculated to lead to the discovery of admissible evidence.

DEFINITIONS

As used in Mack Trucks' objections to these requests:

(I) "Lack of Relevance" means that a request calls for information which is not relevant to the subject matter of this action and is not reasonably calculated to lead to the discovery of admissible evidence;

(ii) "Unduly Burdensome" means that it would be oppressive, time consuming or expensive to require Mack to compile and furnish the information in light of the degree of its relevance and materiality, if any;

(iii) "Overly broad" means that such request is overly broad as to scope, time or location;

(iv) "Lack of Particularity" means that a request does not state with reasonable particularity the information to be furnished, is vague and ambiguous or incomprehensible;

(v) "Improper Assumption" means that a request assumes facts which are not true or accurate;

(vi) "Improper Opinion" means that a request improperly calls for an opinion, conclusion, contention or inference;

(vii) "Privileged" means a request calls for information protected by the attorney/client privilege or the work-product doctrine or the rule protecting materials prepared in anticipation of or in connection with litigation; and

(viii) "Premature" means that a request calls for opinion or contention that relates to fact or the application of law to fact and should not properly be required to be responded to at this time.

These comments and objections are incorporated into each Mack response set forth below as if they were set forth in their entirety as they apply to each response. Responses made after objections are not waivers of objections.

RESPONSES

1. All asbestos-containing brake and brake products (including but not limited to brake shoes and brake linings, brake pads and brake assemblies), and clutches, clutch facings, and any other clutch products manufactured, distributed, sold or relabeled by Mack Trucks or placed in their vehicles (except automobiles) between 1970 and 1980.

RESPONSE: Objections: unduly burdensome, overly broad, lack of particularity. Subject to and without waiving these objections, Mack Trucks states that, after a reasonably diligent search, exemplar brake components containing asbestos sold during 1970-1980 have not been located.

Dated: July 23, 1997
Orlando, Florida

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CLUTCH REMOVAL

NOTE

Always mark clutch cover and flywheel with a center-punch before removing clutch to facilitate reinstalling clutch in same position.

1. Use three spring retention tools (17-T-1123 for CL-28, 40 and 50 series, 17-T-1766 for CL-47 series) or retaining cups as shown in Figure 4 -1, when removing a clutch assembly from the flywheel.

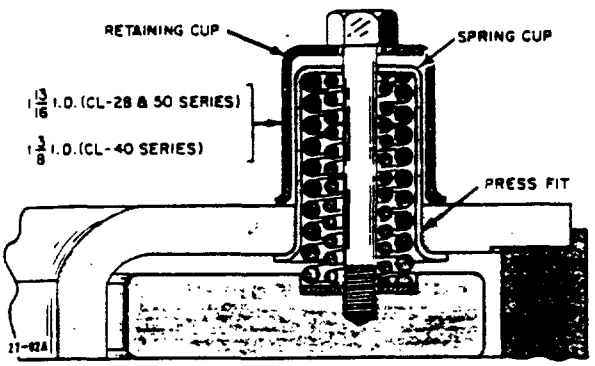


Figure 4-1. Retaining Cups

To use spring retention tools, bottom screws in tapped holes in pressure plate. Set tool nuts up snugly against tool bracket. Tighten tool nuts evenly to relieve spring tension on pressure plate. Not used on CL-58 Series.

2. Remove two clutch-to-flywheel capscrews with lockwashers at the ten o'clock and two o'clock positions of the flywheel and install two long headless guide studs to support the clutch assembly during removal of the remaining attaching capscrews.

3. After removal of all capscrew fasteners, carefully remove heavy clutch and disc assembly from flywheel counterbore and place on bench. Be careful not to drop driven disc assembly which is now free. Also remove the temporary guide studs from flywheel.

CLUTCH INSTALLATION

1. Using spring retention tools, bottom screws in tapped holes in pressure plate. Set tool nuts up snugly against tool bracket. Not used on CL-58 Series.

NOTE

Three retaining cups and screws are used to hold a new clutch assembly together until it is installed on the flywheel. Spring cups are pressed into the clutch cover hence the retaining cups are necessary to prevent spring cups loosening and slipping out of the cover during handling. Retaining cups and screws must be removed after the clutch is assembled to the flywheel. A tag is attached to new clutches (CL-28, 40 and 50 Series) calling attention to this fact and cups and screws are painted red for ready identification.

2. Engage splined end of clutch disc aligning mandrel or a spare main driving pinion with hub splines of driven disc from rear of long hub side. Then position driven disc assembly in flywheel so that spigot end of shaft engages inner race of clutch pilot bearing mounted in flywheel. This arrangement positions the disc assembly in proper alignment until clutch is completely assembled and secured in flywheel.

3. Install two long guide studs in the ten and two o'clock positions in flywheel rim. Mount clutch assembly on guide studs and push unit into flywheel bore until clutch cover flange enters counterbored pilot provided. Be careful not to disturb disc aligning mandrel.

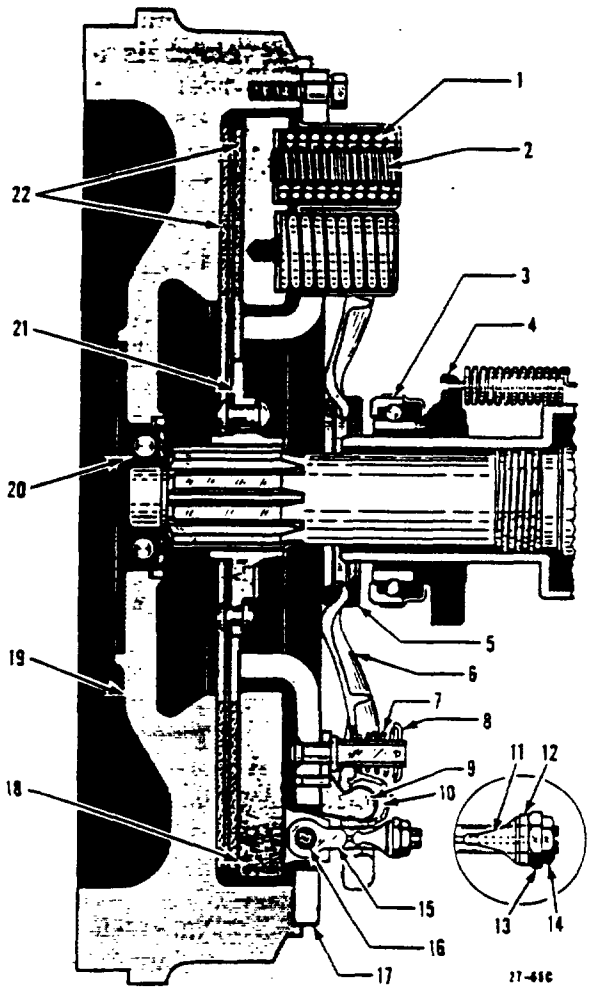
4. Lubricate and install cover-to-flywheel capscrews with their lock washers. Tighten capscrews a few turns at a time so that cover will not be misaligned and forced into flywheel pilot by the tightening of the capscrews. Remove the two guide studs and replace with capscrews and their lock washers. Remove aligning mandrel.

CL-28 and 40 SERIES

Description

CL-28, -40 Series assemblies are single plate, dry disc pusher type clutches. They consist of a pressure plate, a cover, and a driven disc which is splined to the transmission main driving pinion shaft. When

engaged. the driven disc is clamped between the pressure plate and the flywheel by the pressure of coil springs which are mounted in cups on the cover. Drive is transmitted to the pressure plate by pressure plate lugs which fit in the cover openings. Six release levers have ball pivots and are linked to the pressure plate by eyebolts. The inner ends of the levers are held by the notched release thrust washer. See Figure 4-2.



1. Clutch Spring (outer)
2. Clutch Spring (inner, where used)
3. Release Bearing
4. Release Collar
5. Thrust Washer
6. Release Lever
7. Lever Spring
8. Spring Washer
9. Lever Pivot
10. Lever Bushing
11. Eyebolt Fulcrum
12. Washer
13. Fulcrum Adjustment Nut
14. Lock Nut
15. Eyebolt
16. Eyebolt Pin
17. Cover Plate
18. Pressure Plate
19. Flywheel
20. Pilot Bearing
21. Driven Disc Assembly
22. Driven Disc Facings

Figure 4-2. Sectional View of CL-28. 40 Series Clutch

Disassembly

NOTE

Before disassembly of the various parts, it is good practice to mark these parts with a center-punch. so that at reassembly, they can be reassembled in their original positions. This is necessary in order not to disturb the dynamic balance of the clutch.

1. Before removing the three spring retention tools, compress clutch release lever springs, remove washer pins, then remove washers and release lever springs. Pry off snap ring from thrust washer. Remove eyebolt nuts, fulcrums, and clutch release levers.

CAUTION

If retaining cups are used instead of tool (17-T-1123), clamp the cover in a press before removing the cups. This is necessary because the screw used does not have sufficient thread length to completely release the spring load before coming out of the pressure plate.

2. While holding spring retention tool screws, back off tool nuts alternately making one turn at a time. When spring is entirely relieved, back out the three tool screws.

3. Remove clutch cover and springs. If heat-insulating washers are removed from pressure plate spring pockets, retain them for reassembly. The eyebolts need not be removed unless inspection reveals distortion or loose fit on pins.

Inspection and Repair

Remove all traces of dirt and oil with a suitable safe solvent. Inspect parts carefully for cracks. distortion or excessive wear.

1. If cover is cracked or distorted, replace. Tack-weld loose spring cups (on covers having this construction) replace worn or loose ball-fulcrums. Replace loose or bent pin rivets.

assembled in their original positions. This is necessary in order not to disturb the dynamic balance of the clutch.

1. Equally space three steel blocks 3/8 inch thick, on bed of arbor or drill press.

2. Place clutch with pressure plate side down, on blocks. (This is done in order to raise clutch to permit disassembly).

3. Place a block of wood, such as a two by four, across cover plate in a position that does not interfere with tips of release levers, as shown in Figure 4-10. Compress clutch assembly slightly, removing lever adjusting screw locknuts.

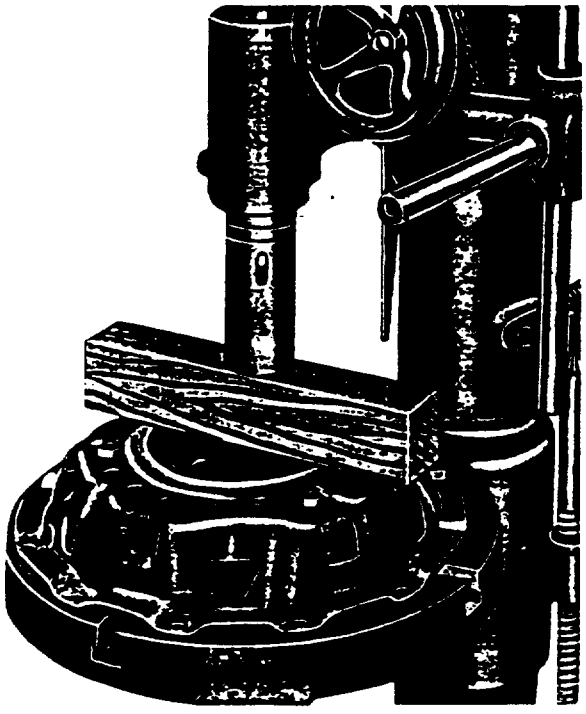


Figure 4-10. Compressing Clutch

4. Turn each lever adjusting screw down (clockwise), a few turns with a screwdriver, releasing spring tension a small amount. Repeat operation until all lever adjusting screws are entirely free of cover plate. Release remaining spring tension, and lift cover plate off pressure springs.

5. Pressure springs may now be removed. After extracting cotter pins and lever pins, remove release levers.

Inspection and Repair

Clean all parts thoroughly with a suitable safe solvent, then inspect carefully for excessive wear, distortion, or cracks as outlined below:

1. Check cover plate for distortion, excessive wear at indentations which register between drive bosses on pressure plate, and for stripped threads in holes accommodating release lever adjusting screws. If the above mentioned conditions are apparent, replacement of cover plate is required.

2. Replace springs if cracked or defective. Check all springs on a spring tester. Replace all that do not meet specifications.

3. Replace release levers that are badly worn on tips (this is an indication of a sticking release bearing), worn threads on lever adjusting screws and nuts, or where binding appears to be present, which retards free back and forth movement.

NOTE

Release levers are serviced as a subassembly only, and consist of lever, adjusting screw, roller, roller block, lever spring and spring retaining pin.

4. If pressure plate shows signs of scoring, excessive wear at lever pin holes, inside of drive bosses, heat checking, or if warped more than .020 inch, plate must be refaced or replaced. (When refacing pressure plate, remove only sufficient metal to obtain a smooth flat surface.)

NOTE

When pressure plate thickness becomes less than 1.141 inch, replacement is necessary.

5. If flywheel is warped or heat checked and surface is refinished, maintain the 1.188 inch dimension between disc surface and bolting face for proper release lever adjustment. No more than .070 inch maximum may be removed by grinding.

6. Inspect driven disc assembly for cracks, loose rivets, worn splines, warped or dished condition. If cracked, or hub splines are worn excessively, replace disc assembly.

If facings are worn down nearly even with countersunk, facing-retaining rivet heads and provided assembly is in otherwise good condition, it may be rebuilt.

7. Pilot bearing should be removed, cleaned and checked each time clutch or engine is removed. Discard bearing if balls or races are chipped or scored. After inspection, hand-pack bearing with clutch pilot bearing grease and install bearing in flywheel. Tap into place with shielded side toward clutch.

After bearing is properly installed, pack the entire cavity in back of the bearing with the same specified clutch pilot grease.

NOTE

To prevent damage to the bearing seal when the transmission is assembled to the engine, the space occupied by the main driving pinion pilot must not be filled with grease. See Figure 4-11.

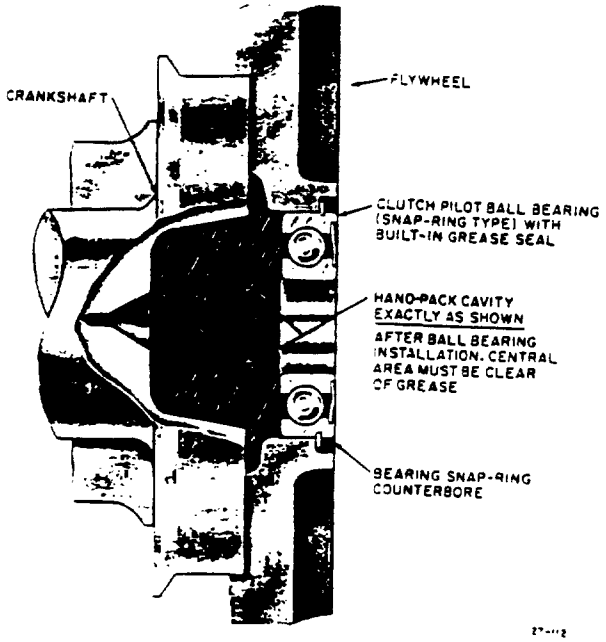


Figure 4-11. Cut-away View of Clutch Pilot Bearing Grease Reservoir Correctly Packed

Use only the recommended pilot bearings specified. These bearings will function without premature failure where slight misalignment exists between engine and transmission.

Reassembly

1. Mount release lever assemblies on pressure plate. Set pressure plate assembly on three equally spaced steel blocks 3/8 inch thick, on bed of arbor or drill press, plate side down.

2. Place pressure springs in position on pressure plate, as shown in Figure 4-12.

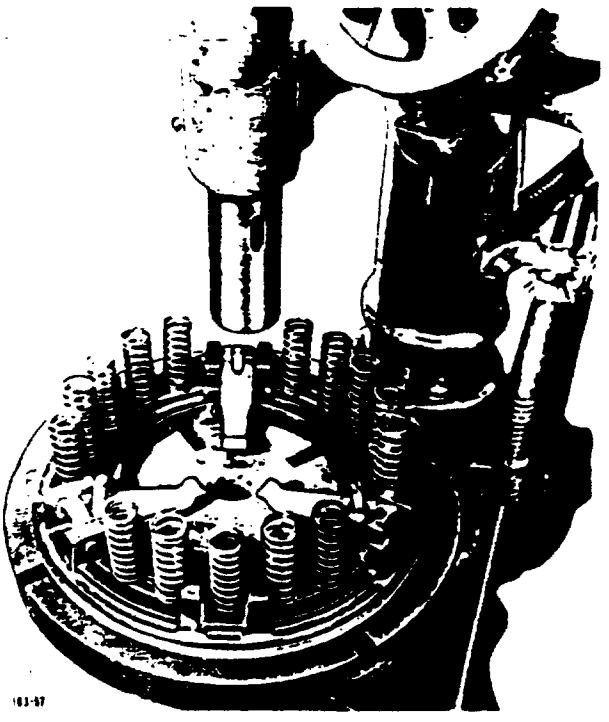


Figure 4-12. Assembling Clutch

3. Lay cover plate over springs, being sure that all springs are seated on bosses of pressure plate, and around indentations on inside of cover.

4. If pressure plate was refaced, it will be necessary at assembly, to add shims under each pressure spring equal to total metal removed.

5. Compress assembly slowly, aligning lever adjusting screws with threaded holes in cover plate. (The indentations inside cover, should enter the spaces between drive bosses on pressure plate freely.) With screwdriver, thread ends of adjusting screws into cover evenly, until screws protrude about 1/2 inch. Hold assembly compressed, while placing locknuts in position, but do not tighten.

6. To facilitate installation on flywheel, place wood blocks approximately 3/8 inch thick, between the tops of release levers and inner rim of cover plate. (Be sure these stay in position as all tension is released).

7. Insert the three spring retention tools (17-T-1766), through cover and bottom in tapped holes in pressure plate (center hole of each five series in cover). With pres-

sure plate face down on smooth surface, insert three clutch cover spacer gages (17-T-1767) (3/4 inch) at three equidistant points around edge of cover. These gages may be held with bolts, but do not allow bolts to extend beyond lower face of gages.

8. Holding bolt head of spring retention tool, draw up nuts evenly until blocks can be removed from between release levers and cover. After removing blocks, release tension by backing off nuts until pressure plate and cover spacers rest evenly on smooth surface. Using lever setting gage (17-T-1768), check distance from release lever tips to smooth surface. Adjust screws until desired setting is obtained. See specifications. Then lock screws in position with locknuts.

CL-50 SERIES

Description

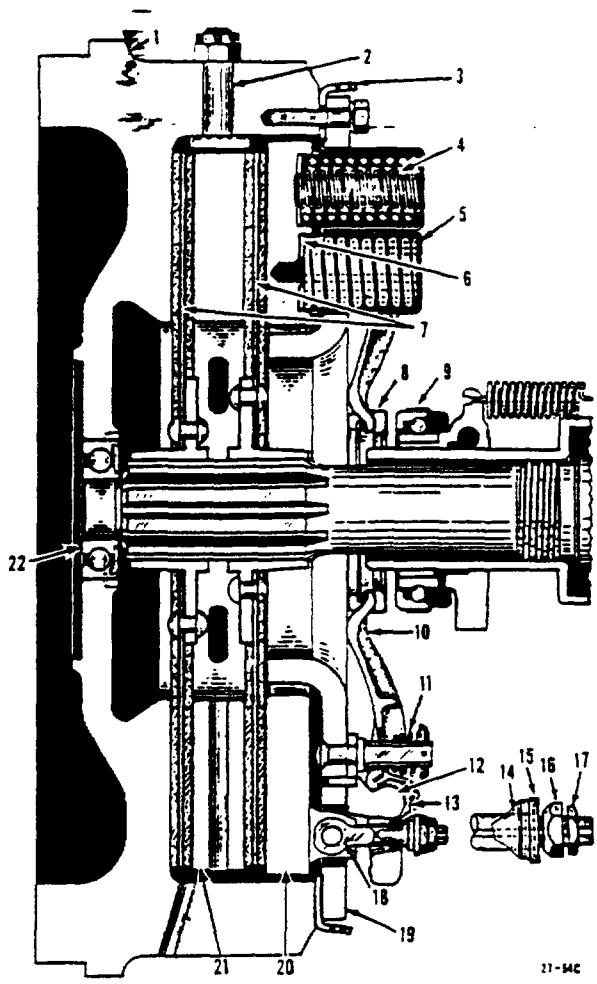
CL-50 Series assemblies are two-plate, dry disc pusher type clutches. In engagement, the two driven discs and the intermediate plate are clamped between the pressure plate and the flywheel by the force of multiple-helical springs backed up by the cover which is bolted to the flywheel. Six lugs in the flywheel, drive the intermediate plate, but permit free longitudinal movement. Pressure plate drive is transmitted by six cleft lugs which fit openings in the cover. The release levers have ball pivots and are linked to the pressure plate by eyebolts. The inner ends of the levers are held by the notched release thrust washer. See Figure 4-13.

Disassembly

NOTE

Before disassembly of the various parts, it is good practice to mark these parts with a centerpunch, so that at reassembly, they can be reassembled in their original positions. This is necessary in order not to disturb the dynamic balance of the clutch.

1. Before removing the three spring retention tools, compress clutch release lever springs, remove washer pins, then remove washers and release lever springs. Pry off snap ring from thrust washer. Remove eyebolt nuts, fulcrums, and clutch release levers.



1. Flywheel
2. Intermediate Plate Drive Pin
3. Adjusting Spacer
4. Clutch Spring
5. Spring Cup
6. Insulating Washer
7. Driven Disc
8. Thrust Washer
9. Release Bearing
10. Release Lever
11. Lever Spring
12. Lever Pivot
13. Lever Bushing
14. Eyebolt Fulcrum
15. Adjusting Nut Washer
16. Eyebolt Adjusting Nut
17. Eyebolt Lock Nut
18. Eyebolt
19. Clutch Cover
20. Pressure Plate
21. Intermediate Plate
22. Pilot Bearing

Figure 4-13. Sectional View of CL-50 Series Clutch

CAUTION

If retaining cups are used instead of tool (17-T-1123), clamp the cover in a press before removing the cups. This is necessary because the screw used does not have sufficient thread length to completely release the spring load before coming out of the pressure plate.

early bearing failure and considerable damage to costly components. Use only the recommended snap ring type bearings specified. These bearings will function without premature failure where slight misalignment exists between engine and transmission.

Before assembling the clutch, a positive wear check should be made to insure that it will provide maximum disc wear. This check will uncover any interference that might prevent full release lever travel and allow corrections to be made before the clutch is assembled.

Place the pressure plate assembly and cover (without springs) into position as shown in Figure 4-19, making sure that shims of the correct thickness (.250) are inserted between cover and spacer (17-T-1763). Install each release lever and while pressing firmly on the fulcrum, measure distance (1) inboard end of lever is raised above cover. Correct height is 3-11/32 inches. Remove any interference that prevents obtaining this dimension.

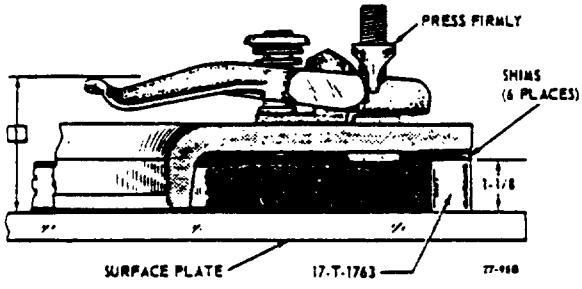


Figure 4-19. Wear Check

Reassembly

1. Remove the shims used for the wear check. Lightly lubricate pivot ball bushing, fulcrum groove, eyebolt pin and inboard end of release lever with clutch lever grease.

2. Place the pressure plate on a surface plate with the spring pockets of the pressure plate up. Place heat-insulating washers and the springs in the pressure plate spring pockets.

NOTE

If pressure plate and intermediate plate were refaced, insert washers into the spring cups of a thickness equal to the metal removed from the pressure plate and intermediate plate. Shellac the washers in place to facilitate retention.

3. Place the cover in position, align the springs in the pockets. Bottom the screws of the three spring retention tools into the threaded holes of the pressure plate and bring the tool nuts down snugly against the tool bracket. Tighten the tool nuts alternately, one turn at a time, guiding the pressure plate lugs into the clutch cover holes until the inside face of the cover is 1.1875 inch from the face of the pressure plate. Special tool (17-T-1763) and a 1/16 inch spacer (17-T-11337), is used to facilitate obtaining this dimension. See Figure 4-20.

NOTE

If the intermediate driving plate is worn or has been machined, the consequent reduction in thickness will produce the same effect as worn clutch discs when the clutch assembly is installed in a vehicle. In an extreme case, one-half the available release collar wear travel may be used up before the vehicle is put back into service.

To compensate for this condition, shims of appropriate thickness must be inserted between cover and spacers (17-T-1763) while the clutch is adjusted. Measure thickness of the intermediate driving plate which will be used with clutch being adjusted and compare with new thickness as shown in specifications. If plate is .010 inch or more below new thickness, secure shims equal in thickness to amount of metal removed and insert them between clutch cover and spacers (17-T-1763) at equally spaced intervals. See Figure 4-20.

4. Place the clutch release levers on the ball fulcrums and eyebolt shanks. Place the lever springs on the spring pins with the small diameter against the release levers. Place the spring washers in position, com-

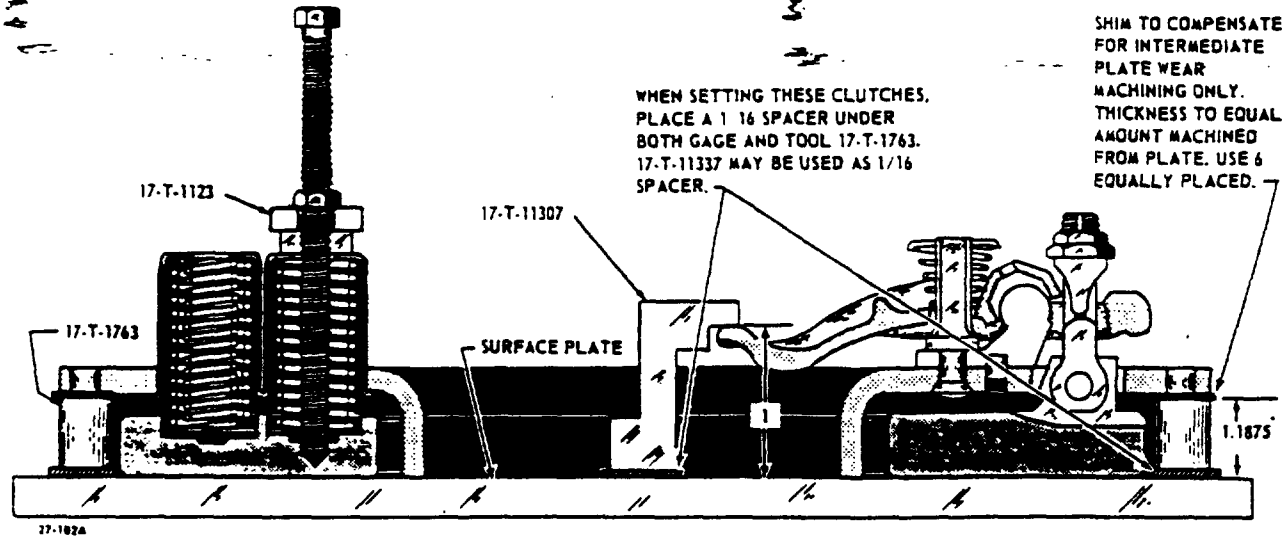


Figure 4-20. Method of Setting Clutch

press, and insert the washer lock pins. Install the fulcrums and adjust the nuts until the distance between the convex surface of each lever to the pressure plate (dimension (1), Figure 4-20) agrees with specifications. Special tools (17-T-11307) and a 1/16 inch spacer (17-T-11337) are used to facilitate obtaining this dimension. See Figure 4-20 showing use of these tools. Torque eyebolt locknut 40 to 45 lbs. ft. Install the thrust washer on the release levers and lock it in place with the snap ring.

CL-58 SERIES

Description

The CL-58 Series clutches are of the conventional single-plate, dry-disc pusher-type. They consist of a cast iron pressure plate, a cast iron cover and a rigid-type driven disc which is splined to the transmission main driving pinion shaft. When engaged, the driven disc is clamped between the pressure plate and flywheel web by the pressure of thirty-six compressed helical main springs reacting on the rigid cast iron cover. The springs are arranged symmetrically in groups of six between each pair of levers. Drive from cover-to-pressure plate is by engagement of six pairs of integral lugs on the pressure plate which are straddled by six pairs of mating lugs integral with the cover. The six forged and hardened steel release levers have anti-friction needle roller bearing mounting to the plate at the drive lugs and pivot in similar anti-friction needle roller bearings supported by yokes bolted to the cover. All six release levers are provided with individual anti-rattle springs. The notched release lever thrust washer ring is held in engagement with the lever tips by wire clamp extensions of three alternate lever anti-rattle springs. See Figure 4-21.

Disassembly

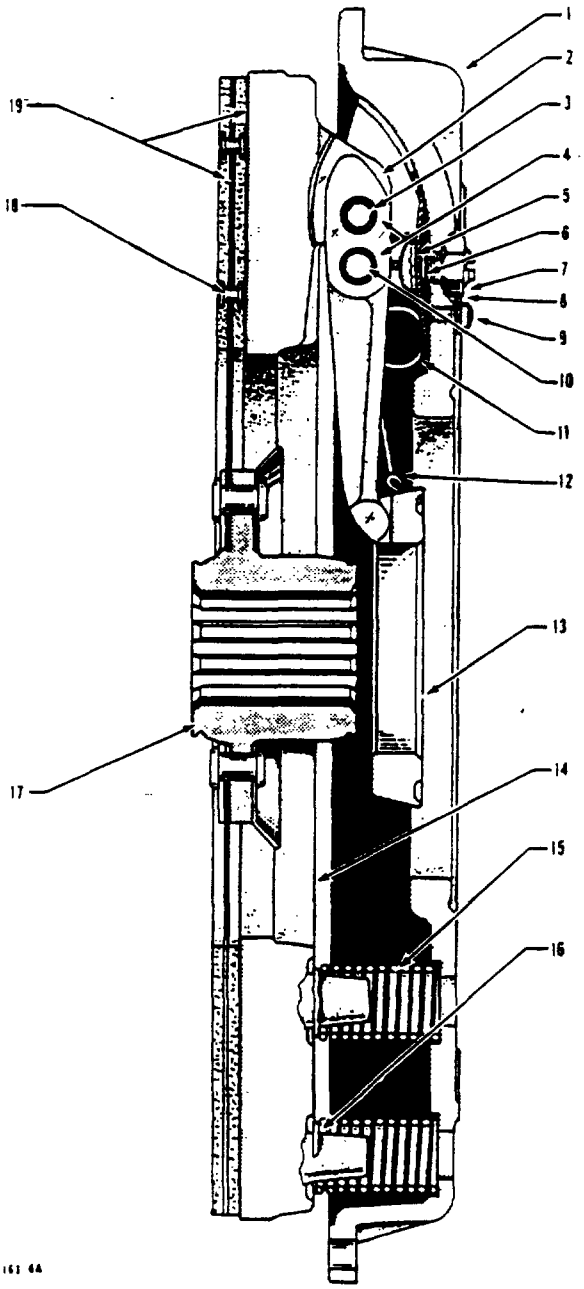
NOTE

Before disassembly of the various parts, it is good practice to mark these parts with a centerpunch, so that at reassembly, they can be reassembled in their original positions. This is necessary in order not to disturb the dynamic balance of the clutch.

1. With a screwdriver, unhook the wire clamps that retain slotted thrust washer ring to the lever tips and remove ring.

2. With pressure plate side down, position clutch assembly on rebuild machine table. With a suitable clamping device, compress the spring-loaded cover assembly. Remove nut lock plate retaining screws, lockwashers, nut lock plates and lever adjusting nuts from cover and put aside for use at reassembly. See Figure 4-22. Clamping pressure on the clutch cover may now be relieved.

3. Remove inverted leaf springs from lever yoke stems, helical main springs, and



1. Clutch Cover
2. Release Cover
3. Release Lever Pin
4. Needle Bearings
5. Release Lever Yoke
6. Yoke Leaf Spring
7. Lever Adjusting Nut
8. Adjusting Nut Lock Plate
9. Lock Plate Lock Screw
10. Yoke Clevis Pin
11. Double Torsion Anti-Rattle Spring
12. Thrust Washer Clamp
13. Lever Thrust Washer Ring
14. Pressure Plate
15. Helical, Main Spring
16. Heat Insulator Ring
17. Driven Disc Assembly
18. Facing Rivet
19. Driven Disc Facings

Figure 4-21. Sectional View of CL-58 Series Clutch

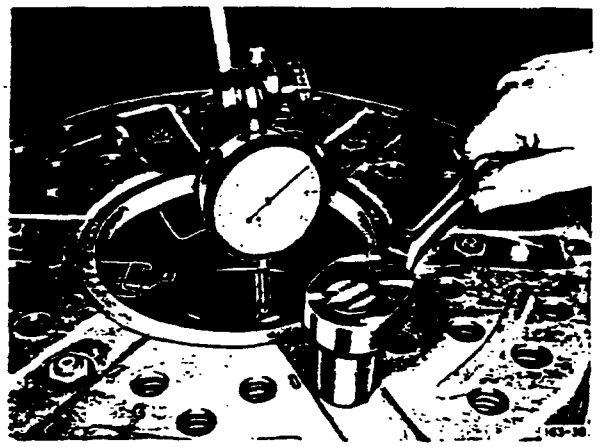


Figure 4-22. Removing Lever Adjusting Nut Lock Plates

main spring insulator washers from pressure plate bosses.

NOTE

Do not remove the six lever anti-rattle springs from the cover unless replacement is necessary.

4. Lay pressure plate on bench and with a soft metal drift, drive hardened lever pins out of pressure plate drive lugs to free release levers. With a pair of pliers, remove cotter pin from each lever yoke clevis pin and then press out each yoke clevis pin by hand.

NOTE

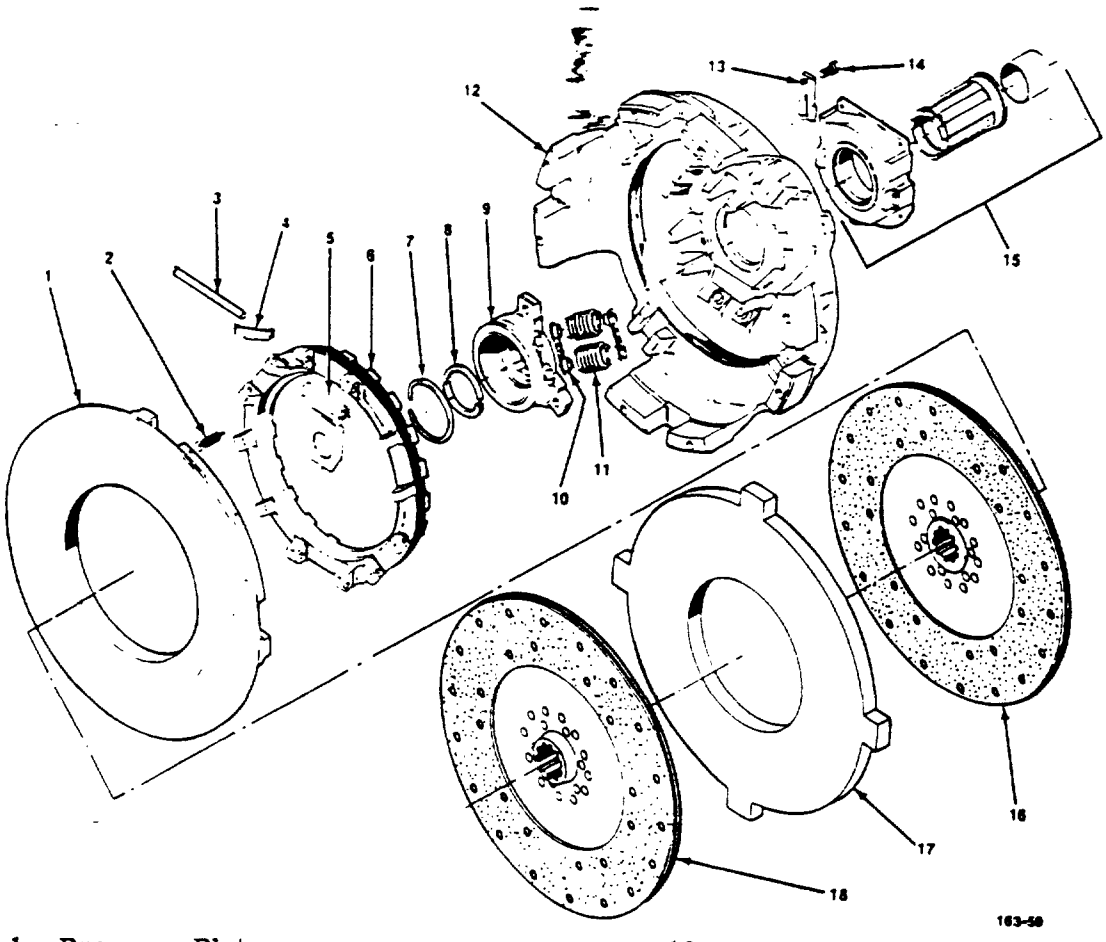
When removing levers from pressure plate drive lugs and lever yoke, be very careful not to lose any of the small uncaged needle rollers.

Inspection and Repair

Remove all traces of dirt and oil with a suitable safe solvent. Inspect parts carefully for cracks, distortion or excessive wear as follows:

1. Replace springs if cracked or defective. Check all springs on a spring tester. Replace all that do not meet specifications.

2. If pressure plate is scored, heat checked, or warped more than .025 inch, it must be replaced or refaced. Remove only enough metal to obtain a smooth flat surface. No more than .070 inch maximum may be removed by grinding.



1. Pressure Plate
2. Return Spring
3. Pivot Pin
4. Spring Clip
5. Adjusting Ring
6. Lever
7. Snap Ring
8. Release Sleeve Ring
9. Release Sleeve Retainer
10. Spring Pivot
11. Pressure Spring
12. Flywheel Ring
13. Adjusting Ring Lock
14. Bolt & Lock Washer Assy
15. Release Bearing & Bearing Assy
16. Driven Rear Disc
17. Intermediate Plate
18. Driven Front Disc

Figure 4-33. Exploded View AS-1550 Series Clutch Assembly

Removal and Disassembly

A suitable "sling" or transmission jack should be used to properly support and maintain the engine/transmission alignment when removing or installing a transmission on an engine. DO NOT let the rear end of the transmission drop down and hang unsupported in the splined hubs of the clutch discs to avoid bending or distorting the friction discs. Disconnect the external linkage from the clutch release arm to permit the release yoke to turn up and pull free of the release bearing thrust pads.

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

It is important that two 3/4 inch blocks of wood as shown in Figures 4-34 and 4-35 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 insure easy removal of remaining mounting bolts.

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.

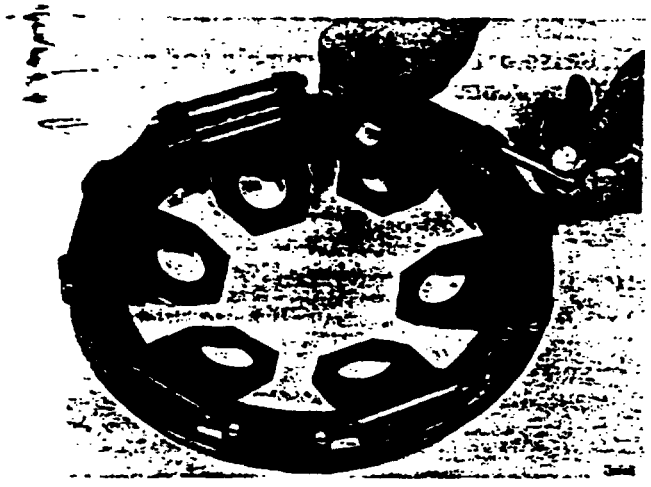
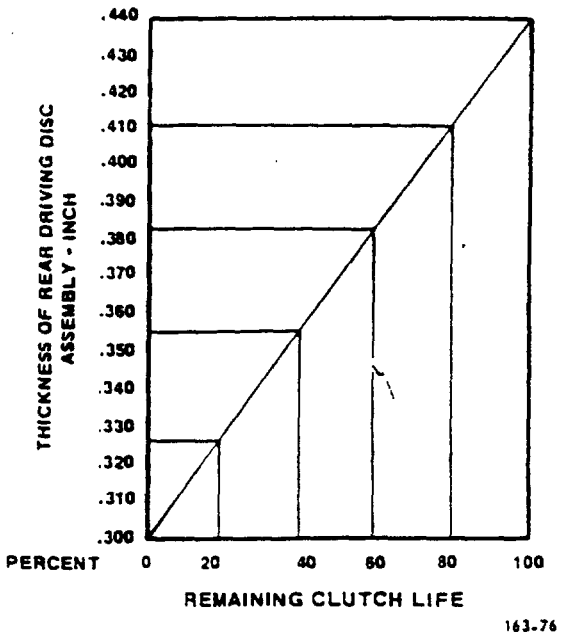


Figure 4-43. Removing Retainer Clip

Remaining Clutch Life Chart - %



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Inspection and Repair

Clean all parts thoroughly with a suitable safe solvent.

Many clutches are replaced as a preventative maintenance item at low mileage during repairs of the transmission or engine. Before the Clutch Assembly is replaced, the unit should be inspected for the following items:

1. Heat cracks in the pressure plate.
2. Excessive wear in all drive slots.
3. Broken springs.
4. Dry or damaged release bearing.
5. Broken intermediate plate.
6. Excessive driven disc hub spline wear.
7. Burned facings.
8. Excessive wear on drive pins or intermediate plate slots.

If the preceding list has been inspected and looks to be in good condition, use the chart to determine the approximate remaining clutch life by measuring the thickness of the rear driven disc assembly.

Find thickness of rear disc on column to left then follow curve on right then drop this point down to read % of clutch life remaining.

Driven Discs

Inspect disc assembly for cracks, loose rivets, worn splines, warped or dished condition. Re-straighten if dished or warped - 0.015 inch maximum runout. Replace if hub is cracked, or splines are worn excessively.

Replace facings if they are glazed, scored, worn down to rivet heads, burned, or if grease or oil are on them.

The riveted asbestos facing driven discs, use high-quality facings riveted to the steel disc. They may be furnished with rigid disc or damper type. Used discs can be reworked in the field by drilling out the rivets to remove old facings. Use the correct size drill when removing old rivets to avoid enlarging holes in disc. Use proper facings and a star set anvil to reline used discs.

Ceramic friction material, a combination of metal and ceramic, is relatively new to the clutch facing industry. It is used in producing round or trapezoidal buttons which are riveted to steel discs. These clutch

discs, available with either rigid or damper hubs, offer many advantages for heavy-duty applications. Reworking these discs in the field is not recommended because the ceramic buttons must be assembled and ground to hold thickness as well as squareness with splines.

Super-duty discs have six trapezoidal ceramic buttons and are available with rigid or damper hubs. These S-D discs are thinner than standard discs while the intermediate plate is thicker. This combination of more ceramic buttons and thicker intermediate plate provides longer life and increased torque capacity.

A super-duty kit consisting of two driven discs and an intermediate plate is available for converting a standard Angle-Spring clutch into a super-duty A-S clutch. It is very important that the kit be installed as a unit and its components should never be intermixed with standard components.

Flywheel Ring

Inspect the flywheel ring for cracks. Replace if cracks are visible. Check slots for indentation caused by wear of pressure plate driving lugs. See Specification Chart for slot limits.

Inspect bolt circle face and pilot for nicks and burrs due to removal or handling. Remove burrs with file to insure proper seating and squareness when clutch is mounted to flywheel.

Adjusting Ring

Check pivot pin holes for wear. Clearance may not exceed 0.010 inch between pin and hole. Inspect for cracks; replace if cracks are visible.

Pressure Plate

Inspect fulcrum for wear. If wear exceeds 0.015 inch, remachine. See Specification Chart for maximum rework.

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 0.010 inch, resurface or replace with new pressure plate. Smooth and flat pressure plate surfaces must be used for satisfactory clutch life.

Check drive lugs for wear per Specification Chart.

Intermediate Plate

Inspect friction surfaces of intermediate plate for heat checks, scoring or distortion. If friction surface is badly scored, heat checked, warped or dished in excess of 0.020 inch, resurface or replace with new intermediate plate. Smooth and flat intermediate plate surfaces must be used for satisfactory clutch life. Inspect driving slots of intermediate plate for wear per Specification Chart.

Release Levers

Inspect levers for excessive wear at 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.

Release Sleeve Retainer

Inspect 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.

Spring Pivots

Inspect for cracks; if visible, replace.

Release Sleeve Sub-Assembly

Check bushing for excessive wear. Check bearing diameter for tight fit. Refer to Specifications Chart and replace if necessary.

Release Bearing and Sleeve Assembly

It is recommended that the release bearing and sleeve assembly be replaced as a unit at the time of clutch rebuild. Assemblies are available as service replacement items.

3/8 inch capscrews. 7/16 inch capscrews are used for 15-1/2 inch - 2 applications.

The pressure plate is driven by means of driving lugs extending into mating slots of the flywheel ring (cover). The intermediate plate is driven by drivepins located in the engine flywheel.

Depressing the clutch pedal pulls the release bearing toward the transmission. The release bearing being connected to the release levers thus retracts the pressure plate from contact with the driven disc assembly, thereby relieving the pressure on the intermediate plate and the forward driven disc assembly which disengages the clutch.

Releasing the clutch pedal allows the release bearing assembly to move toward the engine permitting the pressure plate to move toward the flywheel gripping the discs, causing engagement.

Clutch Installation

Before installing the clutch on the flywheel, check for free fit of cover assembly to flywheel and flywheel alignment before proceeding with installation. See Figures 4-80, 4-81, 4-82 and 4-83.

Be sure that intermediate drive pins are a press fit in holes in flywheel rim and that the heads are perfectly square to the friction surface. Drive pins must be square to provide proper clearance for the drive slots in the intermediate plate. A machinist's square and feeler gage may be used to check for squareness.

After the pins are installed and properly squared, try the intermediate plate for fit over the pins. With new pins and a new intermediate plate, there should be from 0.006 inch to 0.014 inch clearance. Try the plate in different positions and select the position which provides the greatest freedom of movement. Mark the plate for location to the flywheel. Lock the drive pins in place with the socket head or Allen set screws.

Driven discs are marked, "Pressure Plate Side" and "Flywheel Side", to indicate their proper positions. Install as indicated.

The cover assembly may now be installed on the flywheel but, before tightening capscrews, install an aligning shaft through the two hubs and into pilot bearing.

Cover capscrews may now be tightened progressively around the flywheel using 35 to 40 ft. lbs. of torque.

Remove the three hold down bolts from cover before removing splined aligning shaft or disc assemblies may fall out of position.

Disc Brakes

No manual adjustment required. Brakes adjust automatically during braking operation. The square-cut piston seal is distorted when pressure is applied to piston. When braking pressure is released, the seal returns to its normal condition and pulls the piston away from the lining. This action, plus some slight rotor lateral runout ("wobble"), considered normal, provides adequate running clearance.

Disassembly and Assembly

When brakes are relined or disassembled for other repairs, all parts should be inspected for wear and worn parts should be replaced as required.

Cam Brakes - (See Figure 8-10)

Disassembly

1. Remove shoe return spring.

2. Remove lock rings, retainers, and felts from brake shoe anchor pins.

3. Cut lock wire and remove anchor pin lock screws.

4. Remove anchor pins and shoe assemblies.

5. Remove brake shoe roller retaining clip (or screw) and remove roller.

6. Remove slack adjuster lock ring and spacing washers.

7. Remove camshaft, washer, and felt seal (if used).

8. Remove nylon bushings if replacement is necessary. Use suitable tool for both removal and installation of bushing. See Figure 8-17.

NOTE

On brakes where lip type seals are used, these will have to be removed and replaced if nylon bushings are replaced.

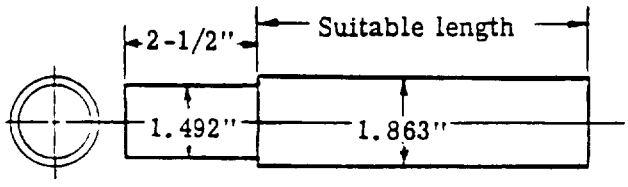

Figure 8-17. Bushing Removal and Installation Tool

Assembly

1. Install new nylon bushings, if required. using suitable tool. (Install new lip type seal if used.)

2. Install brake shoe rollers and retainers. Make certain rollers are of proper size. See instructions relative to brake shoe "Cam Roll-Over."

3. Install camshaft, washer, and felt seals. (if used.)

4. Position brake shoe assembly over spider and tap anchor pin into position with brass punch, "flat" in line with lock screw hole.

5. Install lock screws, tighten securely and thread with lockwire.

6. Position felts, retainers, and lock rings on anchor pins.

7. Install shoe return spring. New springs should be used with each brake reline. Tension loss occurs from normal use and heat build up. New springs will ensure that shoes are returned to fully relaxed position, and not in contact with drum, which would cause premature wear.

8. Assemble slack adjuster on splined end of camshaft; using spacers and washers on each side of adjuster to obtain .030-.060 end play.

Wedge Brakes - (See Figure 8-12)

Disassembly

1. Remove shoe return springs. Use brake spring pliers. (Do Not use screwdriver.)

2. Remove brake shoe assembly.

3. Remove plunger guide screws and gaskets from plunger housing. If brake is automatic adjusting, remove hollow capscrew, gaskets, spring and adjusting pawl. It may be necessary to use a magnet to remove the adjusting pawl.

4. Using a suitable screwdriver, pry the seals loose and remove anchor (solid) plungers, adjusting plungers, adjusting sleeves (actuators) and adjusting bolts.

5. Thoroughly inspect and clean all parts including the housing plunger and seal bores and shoe rest pads. DO NOT solvent clean any rubber parts (plunger seals or gaskets).

4. Lift the caliper off the hub and rotor. See Figure 8-23.

Figure 8-23. Removing Caliper

NOTE

It is not necessary to remove the hydraulic line when replacing shoe and lining assemblies. However, do not let the caliper hang on the hydraulic line. Lay the caliper on the suspension.

Removing Shoe and Lining Assembly

1. Remove the inner shoe and lining assembly from the anchor plate.

2. Remove outer shoe and lining hold-down spring, pin and cup. See Figure 8-24.

Figure 8-24. Removing Spring, Pin, and Cup.

3. Remove outer shoe and lining assembly. See Figure 8-25.

Figure 8-25. Remove Outer Shoe and Lining Assembly.

Inspecting Caliper

1. Check the inside of caliper for hydraulic fluid leak. If evidence of fluid leak is noted, the caliper should be overhauled.

2. Wipe the inside of the caliper, clean and check the dust boots for cuts, cracks or other damage. If damage is noted the caliper should be overhauled. See Figure 8-26.

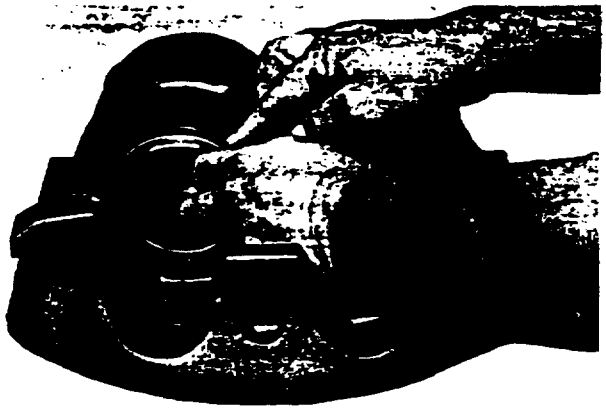

Figure 8-26. Inspecting Boots for Cracks and Cuts.

Assembly

Installing Shoe and Lining Assemblies

1. Install new inner shoe and lining assembly into anchor plate.

2. Push the pistons to the bottom of the piston bore. This is done by taking a small block of wood and placing it over the pistons and boots. With a "C" clamp, push the pistons to the bottom of the piston bores.

3. This will provide clearance for the caliper to fit over the hub and rotor when new shoe and linings are installed. See Figure 8-27

19. Install new shoe and lining assemblies, and caliper as previously described.

20. Connect the brake hose to the caliper.

21. Bleed the system. Allow the caliper to fill with brake fluid. After all air bubbles have escaped and fluid runs clear from bleeder, close the bleeder screw. Replenish the brake fluid in the hydraulic fluid reservoir.

22. "Pump" the brake pedal several times to actuate the piston seals and position the shoe and lining assemblies.

23. Check for fluid leakage at all connections under maximum pressure. Refill fluid reservoir as necessary.

24. Install front wheels and lower vehicle.

25. Always check the hub and rotor braking surface for deep scores, cracks, and heat checks. See Figure 8-34.

Figure 8-34. Checking Rotor Surface

26. Always check hub and rotor lateral runout ("wobble"). Lateral runout must not exceed .008".

SLACK ADJUSTERS, BRAKE CHAMBERS AND POWER CYLINDERS

Despite differences in construction, the wide variety of brake actuators, brake chambers or power cylinders in use perform an identical function. Basically, applied air pressure is converted into the mechanical force and motion required to expand brake shoes. The slack adjuster, in conjunction with the brake camshaft, serves as mechanical leverage for brake shoe application. Air pressure exerted against a diaphragm in the brake chamber or power cylinder moves a push rod linked to the slack adjuster. The brake camshaft, through splined engagement with the slack adjuster, rotates with slack adjuster movement and the integral constant lift cam spreads the brake shoes, applying the brakes. Release of air pressure reverses the cycle. Brake adjustment to compensate for lining wear is provided at the slack adjuster. See Figure 8-35.

Slack Adjusters

There are two types of manual slack adjusters and two types of automatic slack adjusters in use.

Manual Type

The two manual types of slack adjusters shown in Figure 8-35 differ primarily in the adjustment screw locking device. Type I features a lock ball and detent adjustment lock while Type II has a sliding sleeve lock. This difference must be recognized as certain adjustment procedures will vary accordingly.

The brakes are adjusted by turning the adjusting screw (1) until the brake shoes are against the brake drum with the brake chamber push rod in the released position. With the Type I lock, a distinct click will be heard each time the spring loaded ball seats in the indent. With the Type II no click will be evident. The adjusting screw cannot be turned until the locking sleeve has been depressed, freeing the adjustment screw hex head for necessary movement. Upon completion of adjustment the locking sleeve is released and engages the head of the adjusting screw, locking the adjustment. With this exception, the procedure is essentially the same.

Check push rod travel. Keep stroke (2) as short as possible without brakes dragging. With push rods in full-released position, turn adjusting screw (1) until linings are tight against drum.

With Type I locking device, back off screw to first notch (a distinct click will be heard) and then three additional notches.

CAUTION

Make sure locking ball is seated in notch.

With Type II position the wrench over the adjusting screw and depress adjusting lock sleeve BEFORE attempting to turn adjusting screw. After linings are tight against drum, back off adjusting screw until wheel rotates freely. When the adjustment is completed, be sure the locking sleeve is returned to its locked position by permitting the sleeve to engage the hex head of the adjusting screw.

leading to the bottom of the container. The air then rises through the alcohol and passes into the line to the compressor, carrying alcohol in the form of vapor with it. The alcohol, thus introduced into the air system acts as an anti-freeze.

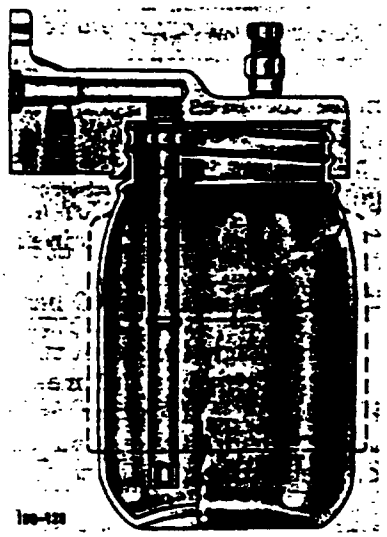

Figure 8-55. Alcohol Evaporator

Preventive Maintenance

Every 1,000 Miles or as Determined by Actual Usage

Check alcohol level and if necessary replenish with 188 proof methanol alcohol. In cold weather, alcohol level should be at least 2/3 full.

NOTE

If alcohol is not being consumed, it indicates the evaporator is inoperative and should be inspected.

Every 1,800 Operating Hours or 50,000 Miles

Remove strainer if present in bottom of evaporator body and clean thoroughly in solvent.

Every Year, 3,600 Operating Hours or 100,000 Miles

Disassembly evaporator unit and clean thoroughly. Inspect all parts for cracks and be sure evaporator tube is not clogged with dirt. Replace all gaskets and rubber parts.

Inspection

When the compressor is compressing air, air bubbles should be passing through the alcohol. If air bubbles are not present when the compressor is compressing air, then the alcohol evaporator is not functioning properly. Check to be sure all connections are tight. Check condition of filler cap gasket and cover gasket.

RELINING & RECONDITIONING

Drum-Type Brakes

After supporting the axle on stands, cage the springs in the spring brake chambers. Remove the tires, wheels, and drums as an assembly, and inspection drums for heat checks, cracks, distortion or other damage.

Close inspection of all worn brake parts may lead to clues for corrective action to improve lining life and future drum damage.

Scored Drum

Only the tops of the ridges will contact brake lining. Since a small percentage of the brake lining is required to do all the work, hard pedal and fade will result. A scored drum must be reconditioned in a lathe. See Figure 8-56.

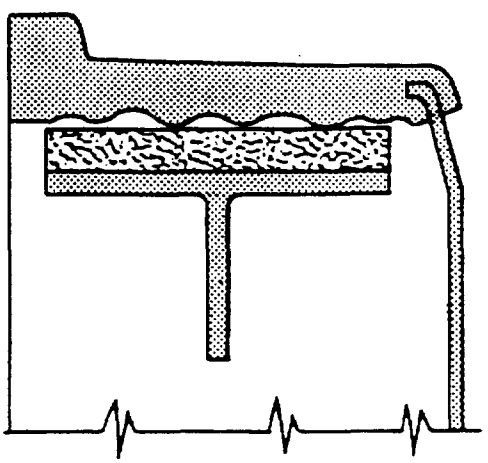

Figure 8-56. Scored Durm

Hard Spots

Hard spots are "islands" of steel in the cast iron surface. They result from a change in metallurgy caused by the heat of braking Hard spots must be ground out or brake performance will be poor and erratic. See Figure 8-57.

Bell-Mouthed Drum

If a drum is bell-mouthed or flared, full lining to drum contact cannot be achieved. Hard pedal, fade and noise can be expected. A bell-mouthed drum must be trued in a lathe in order to procure full lining to drum contact. See Figure 8-58.

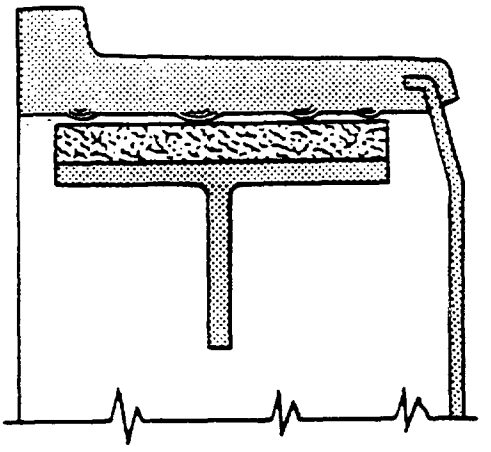

Figure 57. Hard Spots

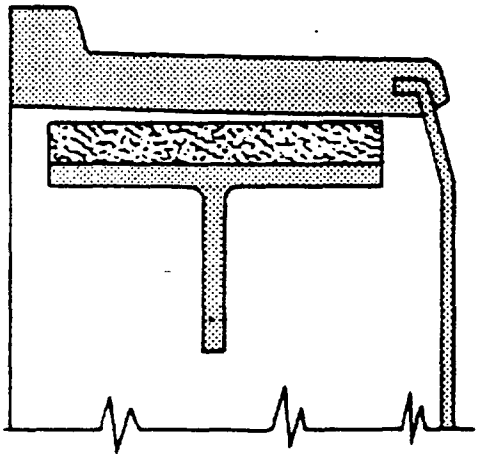

Figure 8-58. Bell Mouthed Drum.

Heat checking and discoloration, if only superficial, can be corrected by resurfacing the drum, otherwise replace drum.

Drums having more than .010" out of round, or any of the conditions described above should be resurfaced. Use only those drums which produce a satisfactory surface finish.

CAUTION

Drum manufacturer and state vehicle inspection laws (where applicable) govern the amount of drum diameter increase allowed when resurfacing. Most drums are stamped by manufacturers as to maximum oversize allowable.

Excessive removal of drum material could result in drum failure or unsatisfactory brake performance and is illegal in some states.

NOTE

When reconditioning brakes, it is important that the brake assemblies on each side of the same axle be serviced in exactly the same manner. This will avoid unequal braking performance. (Drums on the same axle should be resurfaced within .010 of each other.

Cam Roll-Over

Increasing the drum diameter will permit the cam to rotate beyond its maximum lift when the lining becomes worn. To prevent cam "Roll-Over," oversize roller cam followers are available.

Standard (1.250" O. D.)

Standard rollers are used when installing standard linings with standard drums, "X" lining (1/16 oversize) with 1/16 oversize drums, and "XX" lining (1/8 oversize) with 1/8 overside drums.

1/8" Oversize (1.375")

1/8" oversize rollers are to be used with the installation of standard linings with worn or trued drums which are 1/32" oversize. 1/8" oversize rollers should be installed and the liners circle ground a few thousandths less than drum diameter.

1/4" Oversize (1.500")

Where "X" linings have been installed with 1/16" oversize drums and standard rollers, these rollers should be removed and 1/4" oversize installed before the lining becomes worn to a point where the brake cam is no longer effective with the standard rollers.

1/2" Oversize (1.750")

Where "XX" linings and 1/8" oversize drums have been used, the standard rollers should be removed when the linings become approximately 50% worn and 1/2" oversize rollers installed.

Brake Linings

Linings must be the correct material for a specific application, and the same type lining should be used for each wheel on the same axle.

Handle lining carefully to prevent grease, oil, or any other type of contamination to come in contact with lining surface.