

1. Housing
2. Bleeder
3. Crossover Tube
4. T-Fitting
5. Elbow Fitting
6. Retainer Bolt
7. End Cap
8. End Cap
9. Brake Lining
10. Piston Dust Shield
11. Piston
12. Piston O-Ring Seal
13. Backup Ring
14. Brake Mounting Bolt
15. Washer

FIGURE 5-3. BRAKE CALIPER (HALF)

### Disassembly

1. Remove bleeders (2, Figure 5-3) and end caps (7 and 8) from each end of each brake caliper housing (1).
2. Remove linings from the caliper assembly.

*NOTE: A shallow container may be necessary to receive any remaining fluid that will drain from cavities. Do not reuse fluid.*

3. Carefully remove the piston dust shields (10) from behind the groove lip in the housing and from the grooved lips on the piston.
4. Mark each piston and corresponding brake caliper housing position and pull piston out of the housing. Do not interchange parts.
5. Remove O-ring seals (12) and backup ring (13) from the piston cavity using small flat non-metallic tool having smooth round edges.
6. Refer to "Caliper Cleaning and Inspection" on the following page for detailed instructions regarding condition and usability of parts.

### Assembly

When assembling pistons (11, Figure 5-3) into the housings (1), lubricate all cylinder walls, threads, seals, piston seal surfaces, etc., with clean C-4 hydraulic oil.

1. Install new piston seals (12) and backup rings (13) in housings.
2. With housing lying on mounting face, gently push each piston past piston seal until seated in bottom of cavities.
3. Install new or reusable dust shields (10).

*NOTE: Do not allow lubricant to contact dust shields.*

4. Install all fittings (4 & 5) and bleeder (2) in correct position in housings.
5. Apply Loctite® 271 to threads of capscrew (6). Install linings (9) and end caps (7 & 8) with bolts (6) and tighten to **403 ft. lbs. (546 N.m)** torque.
6. Refer to "Rear Disc Brakes" in this Section and perform "Bench Test" before installing caliper.
7. After bench test is performed, refer to "Installation" for procedures for installing calipers on brake adapter.

## Cleaning and Inspection

1. Preliminary cleaning can be more effective if linings are first removed. However, retaining plates should be temporarily reinstalled in order to stay with brake assembly through overhaul cycle.

### **IMPORTANT**

**Use care when wiping dust shields. Too much pressure on shield over sharp tip of housing cavity may cause dust shield to be cut.**

2. Cleaning may be done by brush or spray, using a petroleum base cleaning solvent. Clean diesel fuel is acceptable for this operation. Cleaning should be thorough enough for preliminary inspection and disassembly. Subassemblies should be blown dry with compressed air after cleaning. Dust shields should be wiped dry with a clean cloth.

*NOTE: If brake has not accumulated excessive surface dirt, preliminary cleaning can be done in the overhaul area. However, it is recommended that preliminary cleaning be done before removal of pistons from housings.*

3. Inspect dust shields (10, Figure 5-3) for any physical damage or rupture, and any hardening, cracking, or deterioration of material from excessive heat. Failure of dust shield can admit dirt to the piston cavity, causing damage to surface finish of piston and cylinder wall, and damage to seal. If dust shields are found to be soft and pliable, with no sign of hardening or cracking, they should be wiped clean and set aside for reuse.
4. Inspect piston cavities and surfaces of piston for evidence of dirty fluid, particularly if dust shields were ruptured.
5. Inspect piston cavities for evidence of varnish formation, caused by excessive and prolonged heating of brake oil.

### **IMPORTANT**

**Piston should be handled with care. The usual cause of nicked piston surfaces is mishandling during the cleaning procedure.**

**Steel tools should never be used in piston cavities and seal grooves. Copper, brass, aluminum, wood, etc. are acceptable materials for such purposes.**

*NOTE: All seals (12, Figure 5-3) should be replaced at assembly.*

6. Inspect piston (11) surfaces for scratches, excessive wear, nicks, and general surface finish deterioration that can contribute to seal damage and fluid leakage.

*NOTE: In normal operation, a very slow rate of wear should be experienced, and will be noticeable by the slow disappearance of the hard chrome finish. Minor nicks and scratches may be blended out by hand with 180 grit aluminum oxide or carborundum cloth, then successively finer grades used until a surface comparable to the original surface is obtained. Extensive local polishing should be avoided, since the **minimum piston diameter is 3.619 in. (91.923 mm)**. The piston finish is important in providing a proper seal surface and seal wear life. Where surface finish has deteriorated beyond restoration by moderate power buffing with a fine wire brush, piston should be replaced. Determination of ideal surface finish quality can be made by comparison with a new piston. Surface roughness of piston face through contact with lining back plate is not detrimental to its operation, and is a normal condition.*

7. Inspect piston cavities for damage similar to Step 6 above, with particular attention to the edge of the seal grooves. These must feel smooth and sharp with no nicks or sharp projection that can damage seals or scratch pistons. Seal groove surfaces must be smooth and free of pits or scratches. Finish of cylinder wall is not as critical as surface finish of piston. Surface deterioration near entrance of cavity should be hand polished very carefully to avoid enlarging cavity beyond a **maximum of 3.629 in. (92.176 mm) inside diameter** at the outer edge of the seal groove. Power polishing or honing may be used in cases of extreme surface finish deterioration of cavity walls.

*NOTE: Care must be taken that a minimum amount of material is removed, within the previous maximum diameter limitation of 3.629 in. (92.176 mm). Power polishing will not normally be required, and should not be used as a standard overhaul procedure.*

8. Inspect inlet and bleeder ports in housings for damage to threads or seal counterbores. Thread damage that cannot be repaired by use of a 0.475-20 UNF-2B tap will require housing to be replaced.
9. Inspect retainer plates (7 & 8) for bent or cracked condition, replace if such damage is found. Inspect retainer plate bolts (6), and tapped holes in housing.

**NOTE:** These bolts are highly stressed and should be replaced whenever their condition appears questionable. A 3/4-16 UNF-28 tap lubricated with a light oil may be used to inspect tapped holes in housings for thread damage and to clean up any minor thread roughness.

10. Brake housings and pistons should be thoroughly cleaned. After cleaning, passages, cavities, and external surfaces should be blown dry with clean, dry, compressed air. Piston should also be cleaned and blown dry.

**NOTE:** Cleaned and dried parts should not be left exposed for any appreciable time without a protective coating of lubricant; for short term storage, coating all internal cavities, passages, and bosses with hydraulic fluid will be adequate protection; for longer term storage wipe cavities, connector bosses, and threads with a protective grease, such as petroleum jelly.

## BRAKE LINING

### Replacement

Each front wheel speed disc assembly has three (some trucks may have four) calipers on one disc. Each caliper has six pistons and two linings, three apply pistons and one lining for each side of disc. Lining should be changed when friction material is worn to 0.125 in. (3.22 mm) thickness.

## WARNING

**Failure to replace lining when worn to limits will result in loss of braking and possible catastrophic failure.**

1. To replace front linings, remove front tire and rims, refer to "Wheel and Tire Installation", Section "G".
2. Remove end plates (7 or 8) Figure 5-3 from either end of caliper.
3. Pry between lining and disc to force pistons to bottom in caliper housing.
4. Remove lining from inboard and outboard sides of disc.
5. Inspect dust seals. Seals should be soft, pliable, and show no evidence of hardening or rupture. If damage is observed, the dust covers must be

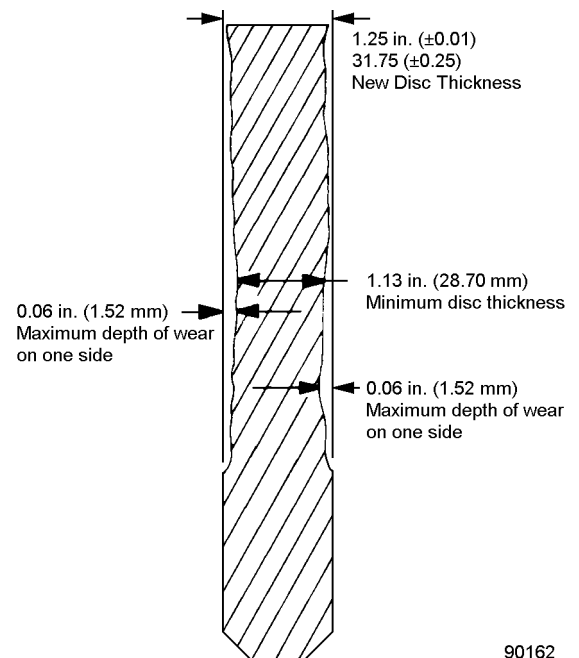
replaced. This will require disassembly of the caliper.

6. Inspect end plates for wear. Replace if grooves will not allow lining back plate to slide freely.
7. Inspect disc for wear limits, Figure 5-4. If disc is worn below the limits shown, the disc must be replaced. Refer to "Wheel and Tire Installation", Section "G".
8. If original linings have sufficient lining material for reuse, inspect lining back plate for cracks or excessive yielding where plate fits into end plates 7 or 8 (Figure 5-3).

## CAUTION

**When replacing linings, never mix new and used linings in a brake assembly.**

9. Slide linings (9) into caliper. It may be necessary to again pry pistons into housing (1).
10. Install end plates (7 & 8), apply Loctite® 271 to threads of end plate capscrews (6). Install capscrews and tighten to **403 ft.lbs. (54.6 N.m)** torque. Check that linings (9) slide freely between end plates.
11. After completing lining replacement, reinstall front wheels. Refer to "Wheel and Tire Installation", Section "G".



90162

FIGURE 5-4. DISC WEAR LIMITS

# FRONT SERVICE BRAKE CONDITIONING (BURNISHING) PROCEDURE

After any brake lining replacement, or at new truck start up, the brake linings and discs must be burnished. A surface pyrometer will be necessary to accurately record disc temperature during brake burnishing procedure.

## SAFETY PRECAUTIONS



- **BEFORE DISCONNECTING PRESSURE LINES, REPLACING COMPONENTS IN THE HYDRAULIC CIRCUITS, OR INSTALLING TEST GAUGES, ALWAYS BLEED DOWN HYDRAULIC STEERING ACCUMULATORS AND BRAKE SYSTEM ACCUMULATORS.**

*The steering accumulators can be bled down with engine shut down, turning the keyswitch OFF and waiting 90 seconds. Confirm the steering pressure is released by turning the steering wheel - No front wheel movement should occur.*

*The brake accumulators are bled by opening the two valves (7, Figure 5-5) on the brake manifold (inside brake cabinet).*

- **BEFORE DISABLING ANY BRAKE CIRCUIT, insure truck wheels are blocked to prevent possible rollaway.**
- **REAR BRAKES MUST BE DISCONNECTED WHEN BURNISHING THE FRONT BRAKES. Front brakes require burnishing independently from rear brakes in order to control disc temperatures**
- **EXTREME SAFETY PRECAUTIONS SHOULD BE USED WHEN MAKING HIGH-ENERGY/ HIGH-SPEED BRAKE STOPS ON ANY DOWNGRADE.**  
*Safety berms or adequate run off ramps are necessary for any stopping performance tests.*
- **Heavy smoke and foul odor from brake linings is normal during burnishing procedures.**

## Front Brake Conditioning

1. To prevent overheating and possible destruction of rear brakes, temporarily disconnect the REAR brakes while burnishing front wheel brakes as follows:
  - a. Relieve stored pressure in hydraulic system according to the previous **“WARNING”** instructions.
  - b. Disconnect “BR” hydraulic tube (1, Figure 5-5) at both ends inside brake control cabinet. Install a #8, 0.75 x 16 UNF-2B, 37° flare Cap Nut (WA2567, or equivalent) on each fitting where tube was removed. Tighten caps to standard torque to prevent leakage. Cap or plug tube to prevent contamination.

*NOTE: This will disconnect the hydraulic supply from the operator's brake pedal to the rear brakes. There will be a noticeable loss of “braking action” at the pedal. However, this method of temporarily disabling the brakes will still permit the application of Brake Lock, in the event of an emergency.*

- c. Close brake accumulator bleed valves (7, Figure 5-5).
2. Drive truck at speeds of 5 to 10 MPH with brake alternately applied and released using sufficient pressure to make engine “work” to a noticeable extent during apply.

*NOTE: The Override Switch on the instrument panel must be depressed and held by the operator in order to propel with the brakes applied.*

3. Apply front brakes at full pressure until discs reach 900°- 1000°F (482°-538°C). Hold in override switch to maintain propulsion to obtain disc temperature. Check temperature after 200 yards (182 meters).
4. Let discs cool to 400°F (204°C) and repeat procedure two more cycles.
5. Allow front disc to cool to 300°F (149°C).
6. RECONNECT rear brakes:
  - a. Relieve pressure in hydraulic system according to the previous **“WARNING”** instructions.
  - b. Remove Cap Nuts and reinstall tube (1). Tighten tube nuts to standard torque.
  - c. Close accumulator bleed valve (7) handles.
7. Start engine and check for leaks. Bleed brakes according to bleeding procedures.
8. Insure all brakes are functioning properly.