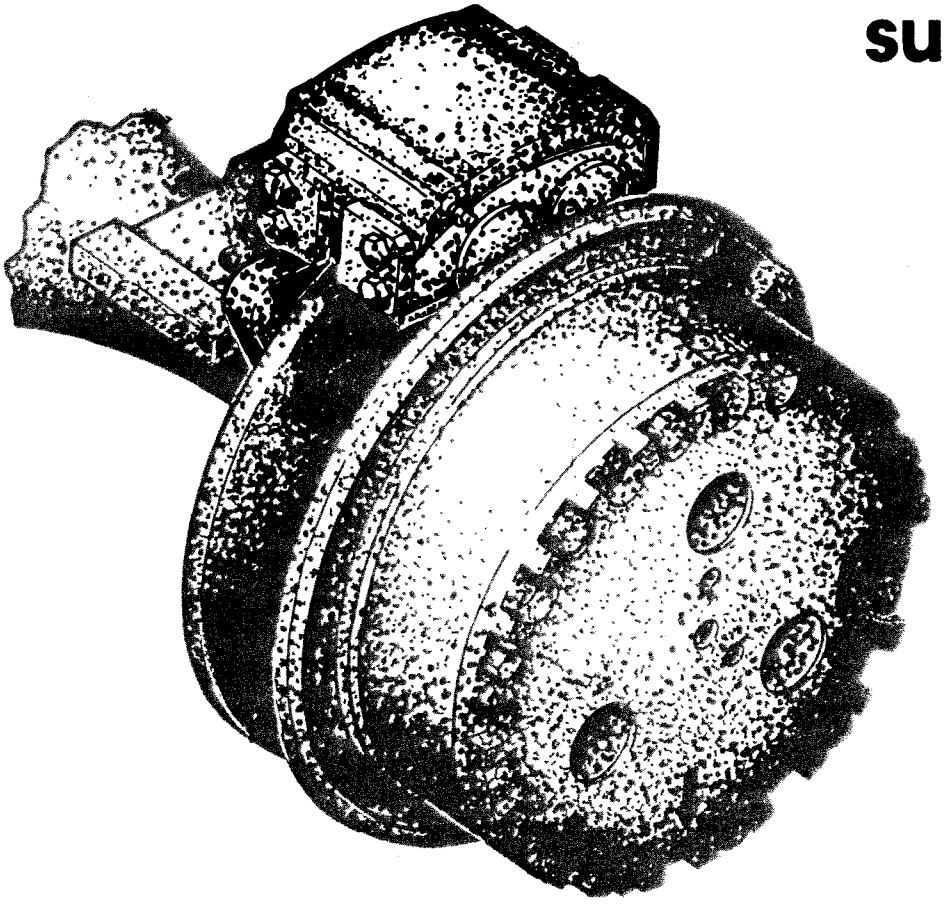
caliper disc brake

maintenance & service manual supplement



CLARK COMPONENTS COMPANY

Div. of Clark Equipment Company

SM CDB 2-82

FOREWORD

This manual has been prepared to provide the customer and the maintenance personnel with information and instructions on the maintenance and repair of the Caliper Disc Brake Assembly.

In order to become familiar with the various parts of the brake assembly, its principal of operation, service diagnosis and maintenance, it is urged that the mechanic study the instructions in this manual carefully and use it as a reference when performing maintenance and repair operations.

Whenever repair or replacement of component parts is required, only Clark-Approved Parts as listed in the applicable parts manual should be used. Use of "will-fit" or non-approved parts may endanger proper operation and performance of the equipment. The Clark Equipment Company does not warrant repair or replacement parts, nor failures resulting from the use thereof, which are not supplied by or approved by the Clark Equipment Company.

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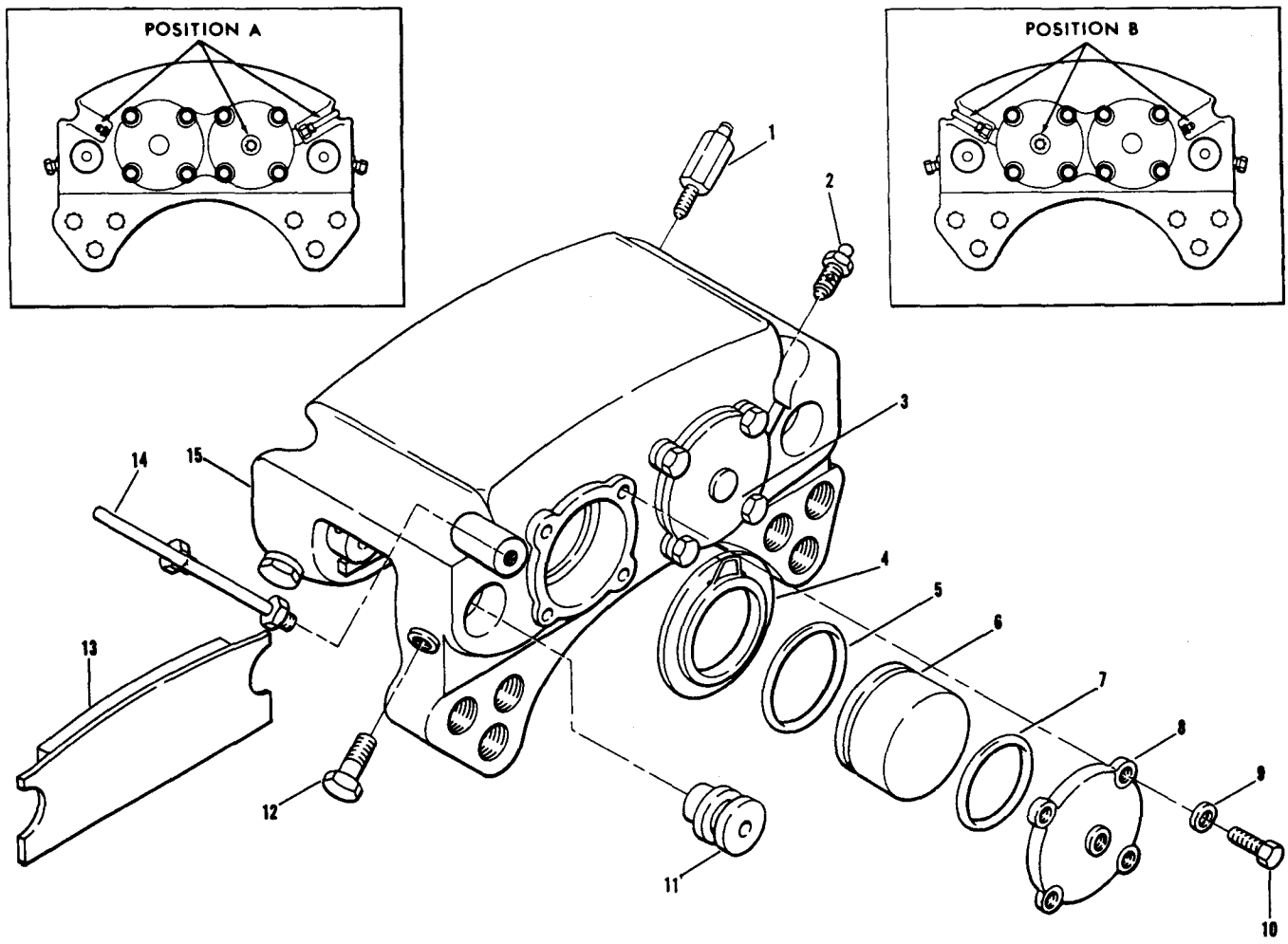


Figure 1

BRAKE HEAD ASSEMBLY

ITEM	DESCRIPTION	QTY.	ITEM	DESCRIPTION	QTY.
1	Hydraulic Bleeder Valve	1	8	Inlet Cap	1
2	Hydraulic Bleeder Valve	1	9	Flat Washer	8
3	Cap	1	10	Bolt	8
4	Boot	4	11	Pin	4
5	Preformed Packing	4	12	Bolt	4
6	Piston	4	13	Carrier & Lining Assembly	2
7	Packing	2	14	Tube & Nut Assembly	1
			15	Torque Plate Assembly	1

DESCRIPTION AND OPERATION

NOTE: Photographs used in this manual were taken with the axle assembly detached from the machine for maximum clarity and expediency.

The brake head assemblies covered by this manual are of the caliper type. The brake head is bolted to a mounting flange on the axle.

The brake head assembly consists of the following components: a torque plate, which has four (4) bores for a corresponding number of pistons, the two bores closest the wheel assembly having a blind closure, and the two bores farthest from the wheel assembly covered with caps. The caps differ only in that one is drilled and threaded to receive the fluid supply while the other has no inlet. The caps are fastened to the torque plate with four bolts and washers per cap, and are sealed with packing. A packing is installed in a groove in each bore in the torque plate. A protective boot is installed in a groove in each bore of the torque plate, and is snapped into a piston groove at the time of piston installation. The two carrier and lining assemblies are retained in the torque plate by four pins. The four retaining pins are locked in place by four bolts. Bleeding facilities are provided for the bleeding of each set of piston bores by two bleeder valves, one for each side of the torque plate. A tube and nut assembly is used to connect the two sides of the torque plate to allow for passage of hydraulic brake fluid.

The brake is actuated by fluid which enters the brake head through the threaded inlet in the inlet cap. The two piston bores on each side of the torque plate are interconnected by internal passages to allow for free flow of hydraulic brake fluid. The two sides of the torque plate are connected by means of a tube and nut assembly to allow for passage of fluid to all piston bores.

When the brake is actuated, the hydraulic pressure forces the pistons against the carrier and lining assemblies, which in turn are forced against the disc creating a braking action. The reaction to the braking action is supplied by the retaining pins which resist the rotating force imparted to the carrier and lining assemblies by the disc. The pins also retain the carrier and lining assemblies in their respective positions when the brake pressure is released.

For location and indentification of component parts, refer to the Brake Head Exploded View, (Figure 1, Page 1), and the Crossectional View (Figure 2) shown below.

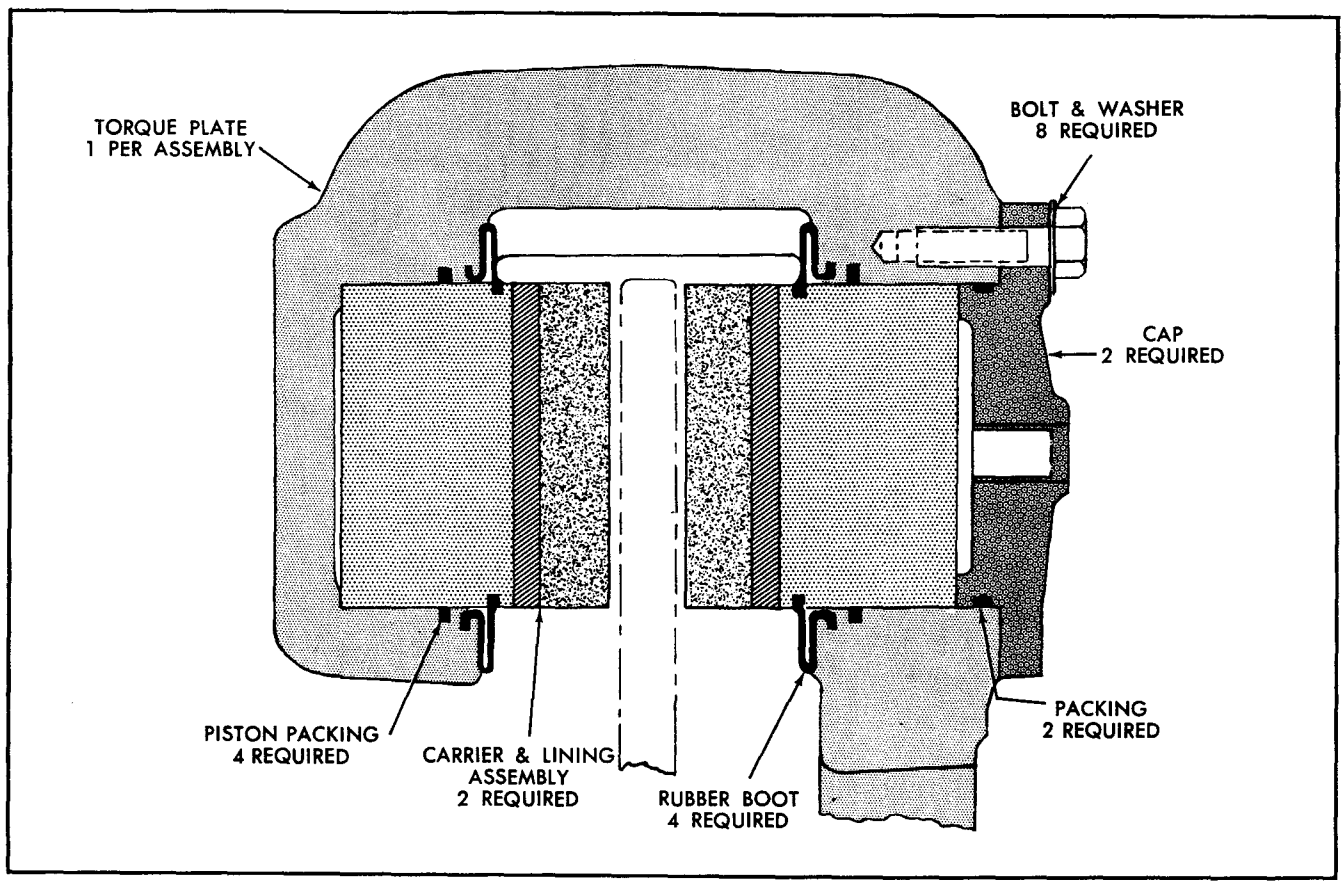


Figure 2
Brake Head Cross-sectional View

MAINTENANCE

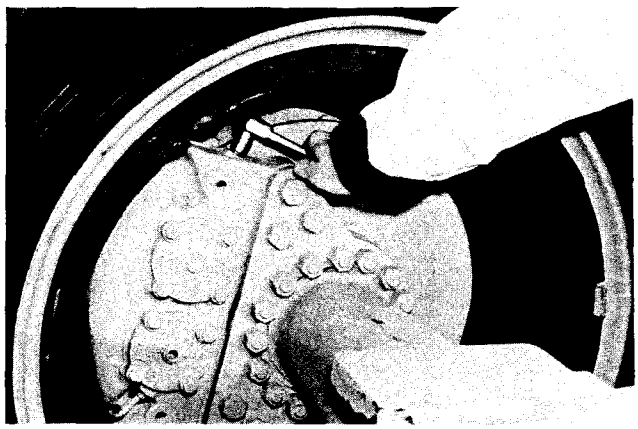


Figure 3
Loosen Locking Bolts

Inspect brake assembly daily to insure that all bolts are ight and there are no leaks. Inspect for boot deterioration ınd lining wear. Linings should be replaced when friction naterial is worn to ⅛" thickness.

Replace excessively worn brake linings as follows:

1. Refer to Figure 3 and loosen the two locking bolts at the most accessible end of the brake head.

2. Remove the unlocked pin from the side of brake head closest to the differential. A device consisting of a 2" diameter pipe coupling, two large flat washers and a bolt the same diameter and thread size as the hole drilled and tapped in the retaining pin, as shown in Figure 4, may be helpful in extracting the unlocked pin.

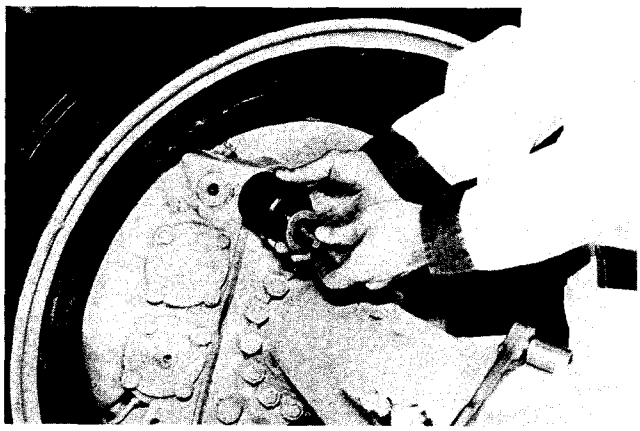


Figure 4
Pin Removal Device

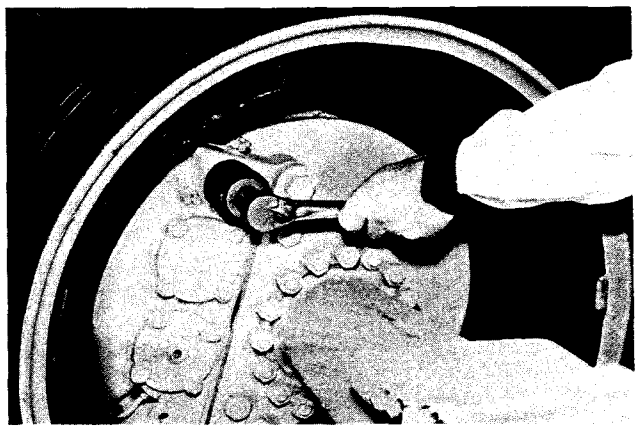


Figure 5
Loosen Unlocked Pin

3. Place pipe coupling over end of unlocked pin. Cover open end of coupling with the two large flat washers. Insert bolt in drilled and tapped hole on end of unlocked pin and turn in a clockwise direction with a wrench to loosen unlocked pin as shown in Figure 5.

4. When pin turns freely, remove extracting device and remove pin as shown in Figure 6.

5. Using a large punch and a hammer drive the second unlocked pin away from disc as shown in Figure 7. Access to second unlocked pin can best be gained by working through hole vacated by first unlocked pin guiding punch next to edge of disc.

6. After driving back second unlocked pin, brake linings can be removed by rotating along outer diameter of disc and out of brake head assembly.

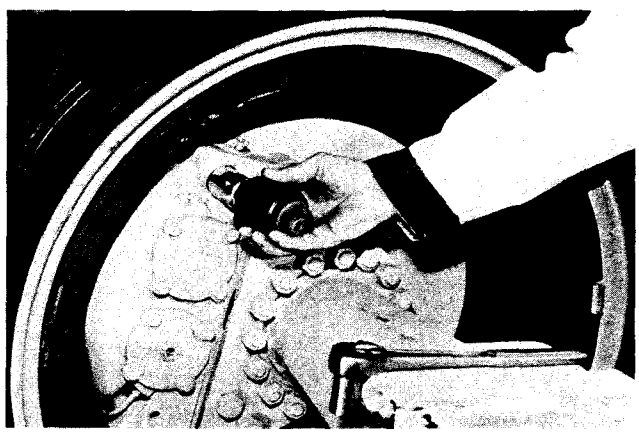


Figure 6
Remove Unlocked Pin

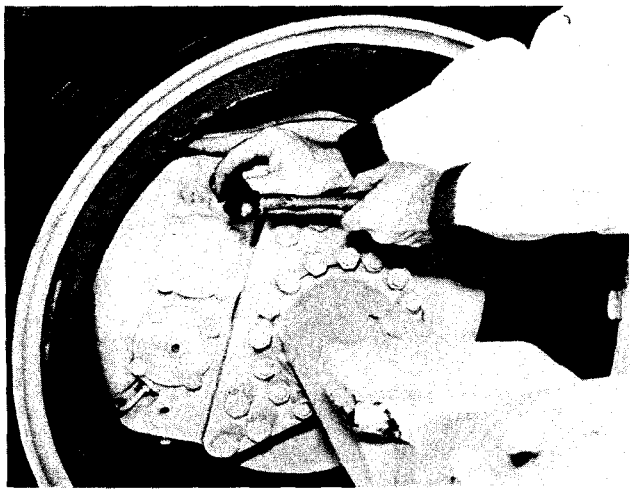


Figure 7
Drive Second Unlocked Pin Back

7. Refer to Figure 8 and remove brake carrier and lining assemblies from both sides of disc by rotating lining along contour of disc.

8. Open bleeder screws on both sides of brake head and depress all four pistons as far back into brake head as possible. A small pry bar may be used if required.

9. Close both bleeder screws.

10. Replace carrier and lining assemblies by rotating same along contour of disc and seat against retaining pin as shown in Figure 9.

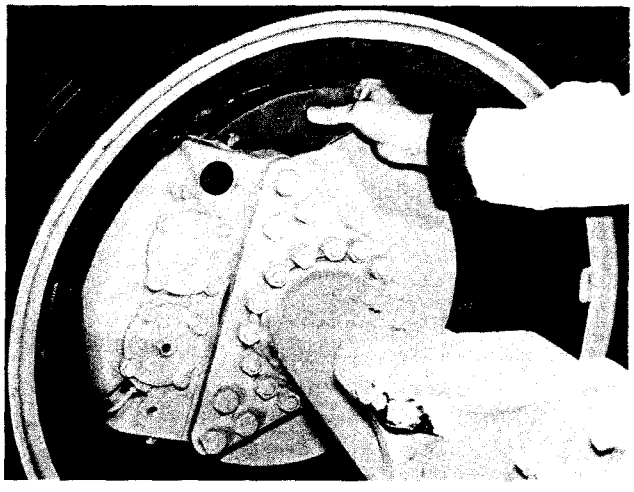


Figure 8
Remove Brake Lining

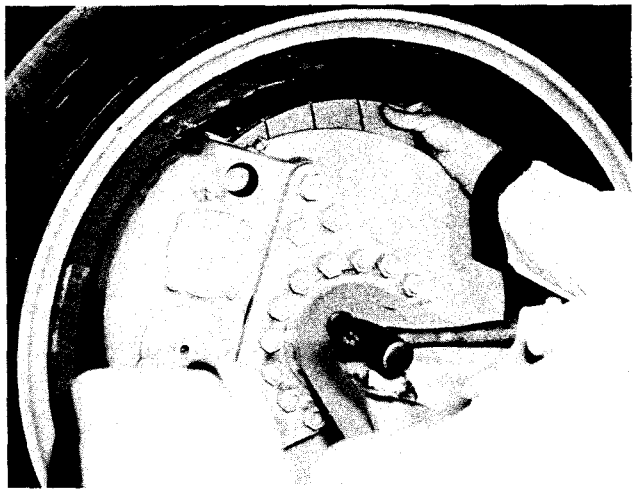


Figure 9
Install New Brake Lining

11. Reinstall retaining pins. A suitable "C" clamp may be used to force pins in place.

12. Retighten locking bolts, making sure bolts seat in groove in retaining pins. See Figure 10.

13. Pump brake pedal several times until linings are in contact with disc.

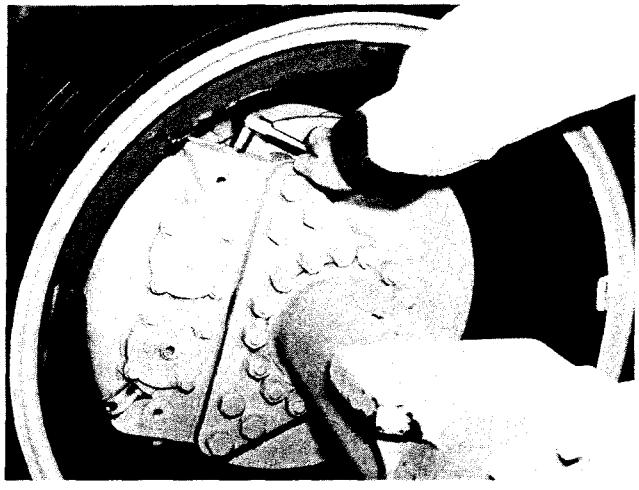


Figure 10
Tighten Locking Bolts

OVERHAUL INSTRUCTIONS

The following instructions will cover the disassembly and reassembly of the caliper type disc brake assembly in a sequence that will normally be followed after the wheel and tire assembly has been removed and the brake assembly is to be completely overhauled.

DISASSEMBLY

1. With machine securely blocked and wheel and tire assembly removed, attach a chain hoist to brake head assembly with bolts and flatwashers through drilled and tapped holes in retaining pins as illustrated in Figure 11, then remove mounting bolts.

Figure 11
Attach Hoist and Remove Mounting Bolts

2. With the aid of hoist, place brake head assembly on work bench or other working surface to be used for disassembly of brake head.

Figure 12
Loosen Locking Bolts

3. Loosen two of the four locking bolts with wrench as shown in Figure 12.

4. Remove the two unlocked pins by pressing outward as illustrated in Figure 13.

Figure 13
Remove Unlocked Pins

5. With two unlocked pins removed, both carrier and lining assemblies may be easily removed by simply lifting outward as shown in Figure 14.

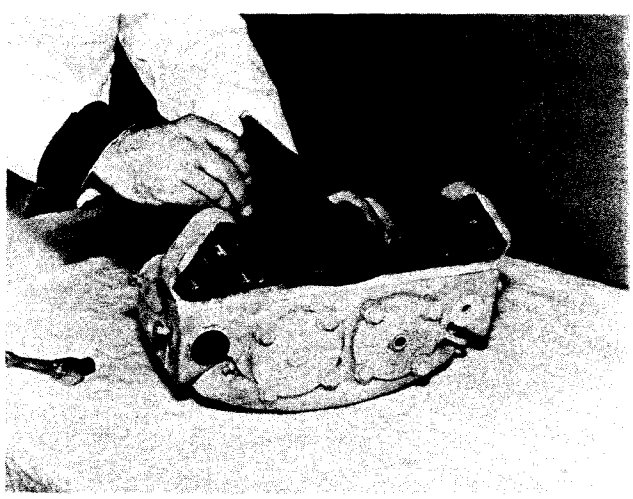


Figure 14
Remove Carrier and Lining Assemblies

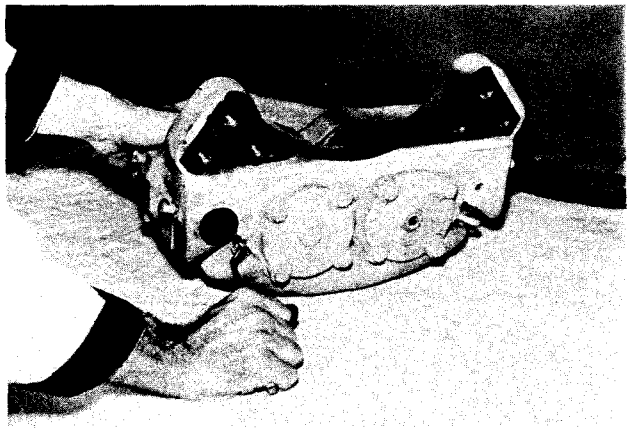


Figure 15
Open Bleeder Screws

6. Open bleeder screws on both sides of brake head as shown in Figure 15.

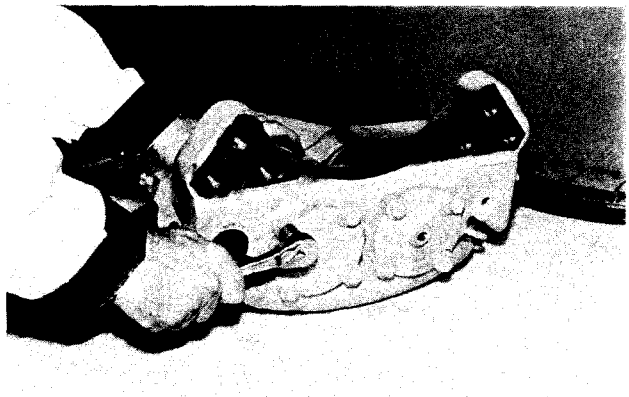


Figure 16
Remove Bolts

7. Remove bolts holding piston retaining caps in place as shown in Figure 16.

Figure 17
Remove Piston Retaining Caps

8. Remove piston retaining caps as shown in Figure 17. A small screwdriver may be used to loosen piston retaining cap if necessary.

9. Remove pistons on open side of brake head by pressing pistons in toward center of brake head as shown in Figure 18. A clean cloth may be used inside brake head to catch piston as it is removed, protecting same from being nicked or scratched.

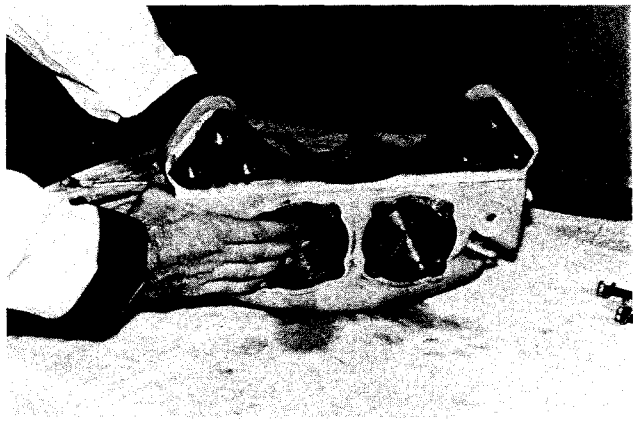


Figure 18
Press Out Pistons

10. Remove blind side pistons by prying in to center of brake head with pair of screwdrivers as shown in Figure 19. Alternate method may be used by closing blind side bleeder screw and removing crossover tube, and attaching an external hydraulic source to crossover tube hole pushing piston out with hydraulic pressure.

    CAUTION: No fluid other than normal hydraulic brake fluid or mineral oil may be allowed to enter brake head. Deterioration of rubber parts will result if this precaution is not observed. **(See Vehicle Manufacturer's Recommendation)**

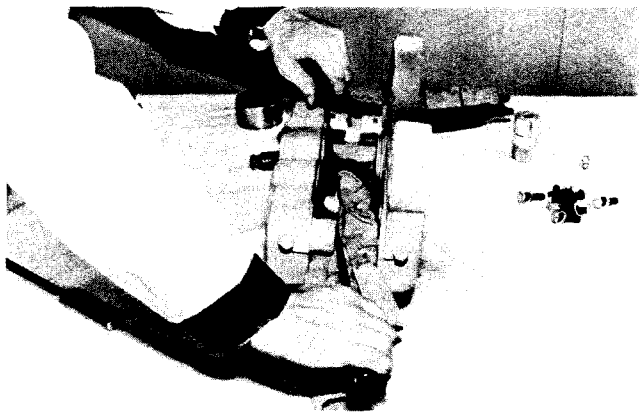


Figure 19
Remove Blind Side Pistons

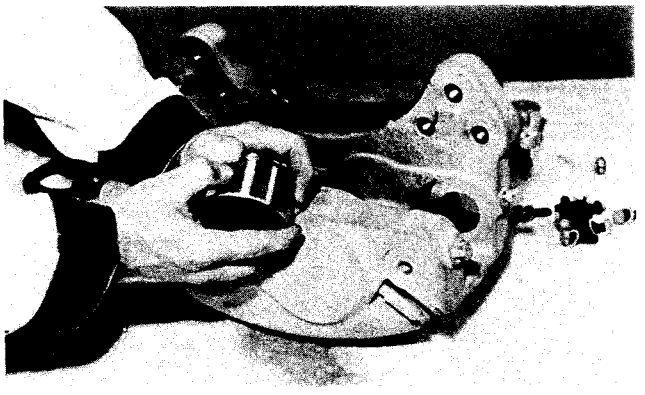


Figure 20
Inspect Pistons

11. Inspect pistons for minor scratches and nicks and blend with crocus cloth. If piston is badly scratched, nicked, or worn, replace piston. Piston showing evidence of excessive wear or rubbing off of the chromed surface will cause undue friction and must be replaced. Visually inspect pistons as shown in Figure 20.

12. Remove rubber boots as shown in Figure 21. Do not use tools which will damage boot.

13. Replace all old rubber boots if brake head had extended use. If brake head has not seen extended use, carefully inspect visually as in Figure 22.

14. With the aid of a small piece of shim stock or other such device, carefully lift piston bore packings out of groove as shown in Figure 23. Extreme care must be exercised not to damage this seal if its reuse is intended, as any cuts or other abrasions will necessitate replacement of the seal.

15. If brake head has seen extensive use, replace cylinder

Figure 21
Remove Rubber Boots

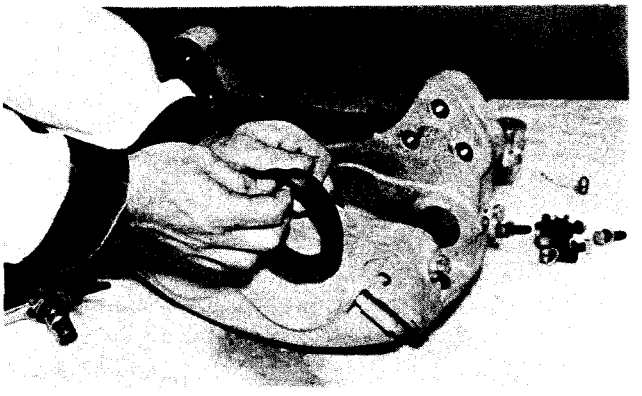


Figure 22
Visually Inspect Rubber Boots

bore packing seal. If brake head has seen limited use, visually inspect packing, as shown in Figure 24, for cuts or other abrasions that will make seal ineffective.

6. Clean torque plate with solvent. Make sure no solvent remains in fluid passages or grooves. Inspect cylinder bores for minor nicks or scratches and blend with crocus cloth. Replace torque plate if broken or severely damaged.

REASSEMBLY

17. Lubricate packing and pistons with only brake actuating fluid recommended by vehicle manufacturer.

18. Reinstall cylinder bore packings in grooves. Be careful not to damage packings. Press into grooves as shown in Figure 25.

19. Reinstall rubber boots in cylinder bore grooves as shown in Figure 26.

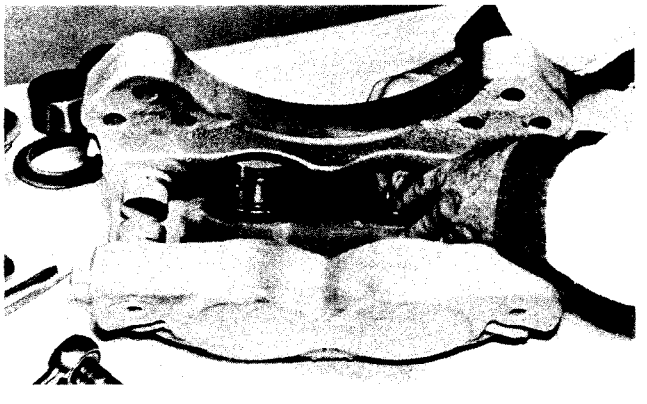


Figure 23
Remove Piston Bore Packing

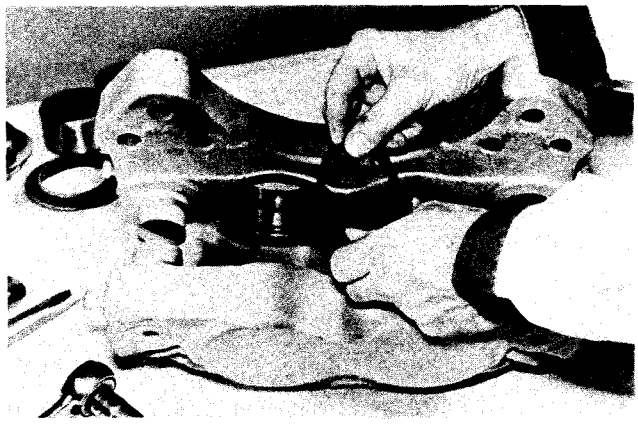


Figure 24
Inspect Packing Seals

20. Reinstall pistons in cylinder bores by sliding piston thru rubber boot as shown in Figure 27. Be careful not to turn lip of boot under when installing piston. *CAUTION: Do not damage boot.*

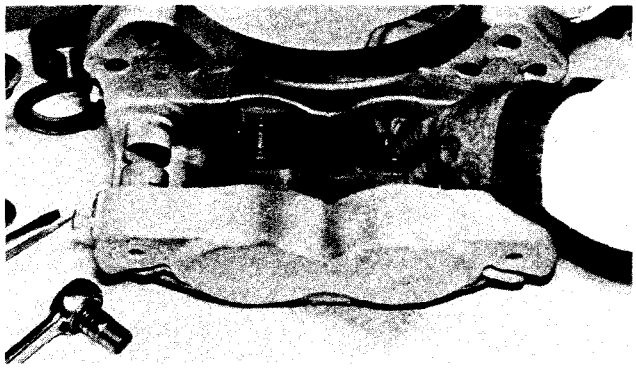


Figure 25
Reinstall Packings in Grooves

Figure 26
Reinstall Rubber Boots

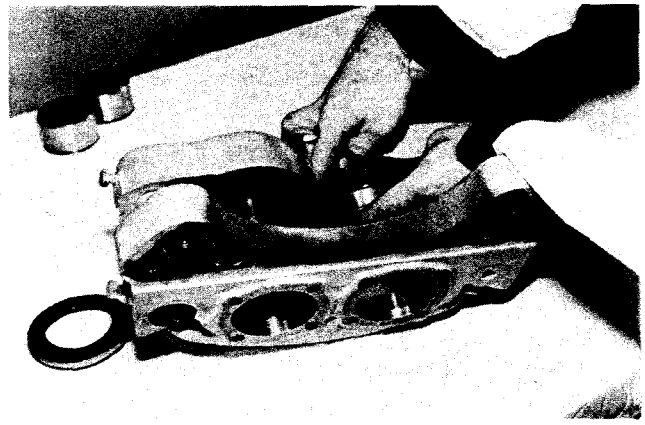


Figure 27
Reinstall Pistons

21. As piston slides into cylinder bore, snap lip on rubber boot into groove on piston, being careful not to leave lip on boot twisted. A properly fitted lip will insure a good seal.

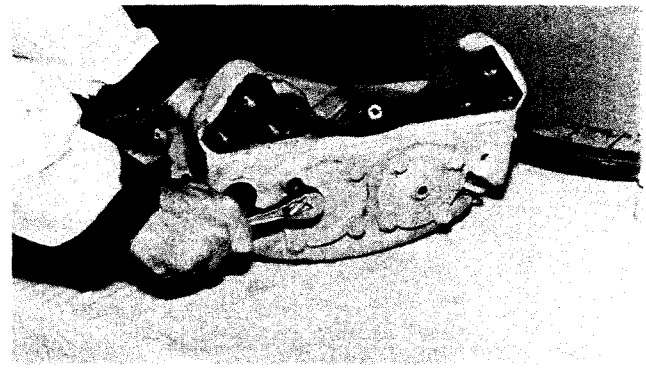


Figure 28
Reinstall Retaining Caps

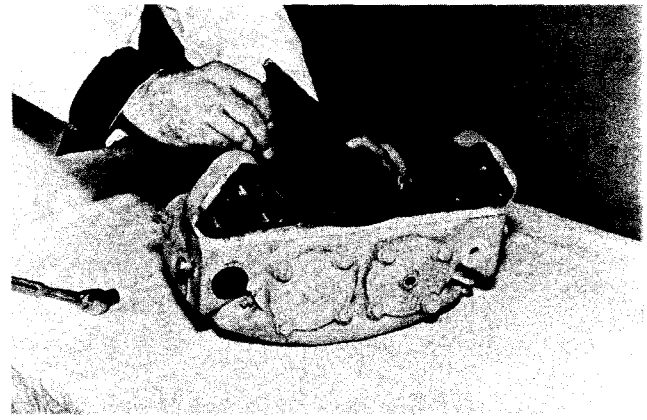


Figure 29
Install Carrier and Lining

Figure 30
Reinstall Retaining Pins

22. Lubricate cylinder retaining cap packings with brake fluid and install in retaining caps. Reinstall retaining caps on torque plate with original bolts and washers as shown in Figure 28. Torque bolts to 38 to 42 ft. lbs. [5.26-5.80 M-kg] with dry threads.

23. Install carrier and lining assemblies in torque plate as shown in Figure 29. If lining material is worn to ⅛ inch thickness replace lining.

24. Reinstall carrier and lining retaining pins in torque plate as shown in Figure 30. If pins are deeply grooved they should be replaced or rotated so that grooved end is opposite the end of carrier and lining.

25. Reinstall locking bolts in torque plate. Make sure the locking bolt is aligned with the groove in the retaining pin so that it may perform its function. See Figure 31.

Figure 31
Reinstall Locking Bolts

26. Inspect disc for undue wear or damage. If disc has been worn to less than thickness shown on disc or shows evidence of damage, it must be replaced. See Figure 32.

27. Reinstall brake head on axle as shown in Figure 33. Torque mounting bolts to proper torque (see torque chart). Close both bleeder screws and reconnect hydraulic brake line to piston retaining inlet cap.

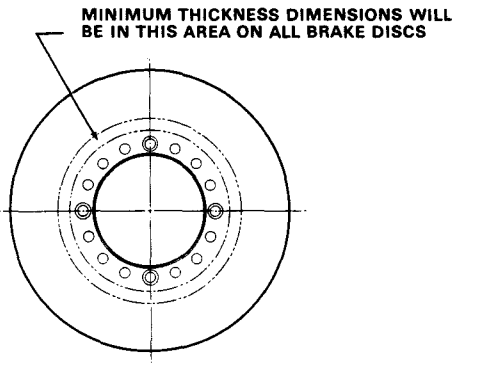


Figure 32

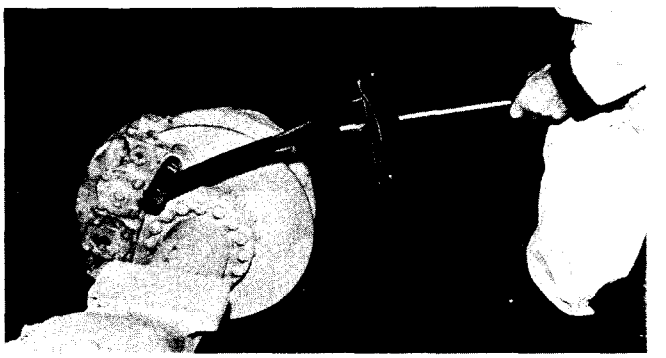


Figure 33
Torque Mounting Bolts

Bleeder Brake System: After reinstalling brake head assembly on machine, the brake system must be bled to remove air bubbles and air pockets left in the system.

See vehicle manufacturer's recommendation for proper brake actuating fluid.

NOTE: It is recommended to use a bleeder hose on bleeder valves whenever possible to keep fluid away from linings. Keep master cylinder filled during the bleeding process.

1. Open bleeder valve (see Item 1, Figure 1), and actuate brakes several times until fluid coming from bleeder valve is free of bubbles. Depress brake pedal and close bleeder valve, then release brake pedal.

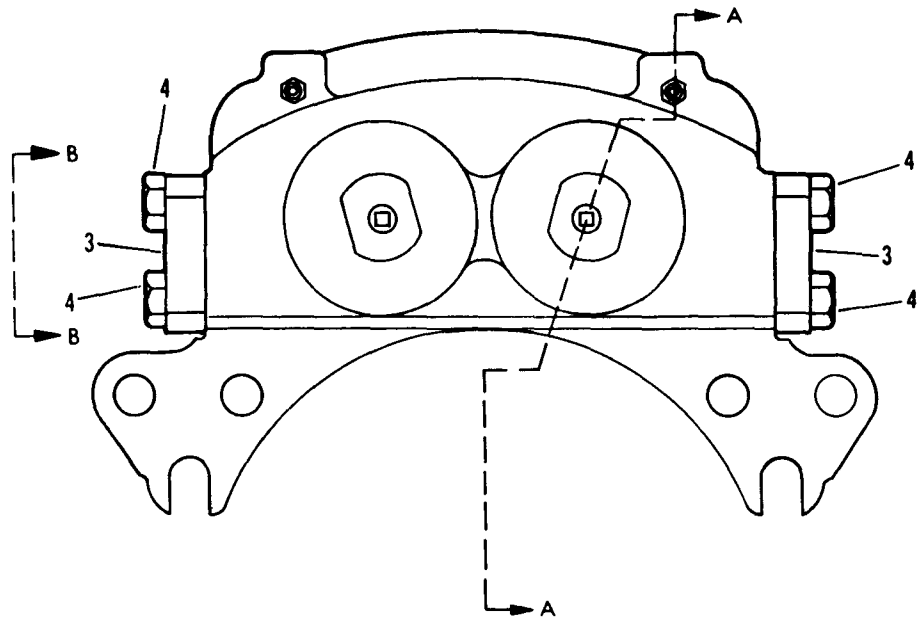
2. Open second bleeder valve (see Item 2, Figure 1) Depress brake pedal several times until fluid coming from bleeder valve is free of bubbles. Depress brake pedal and close bleeder valve, then release brake pedal.

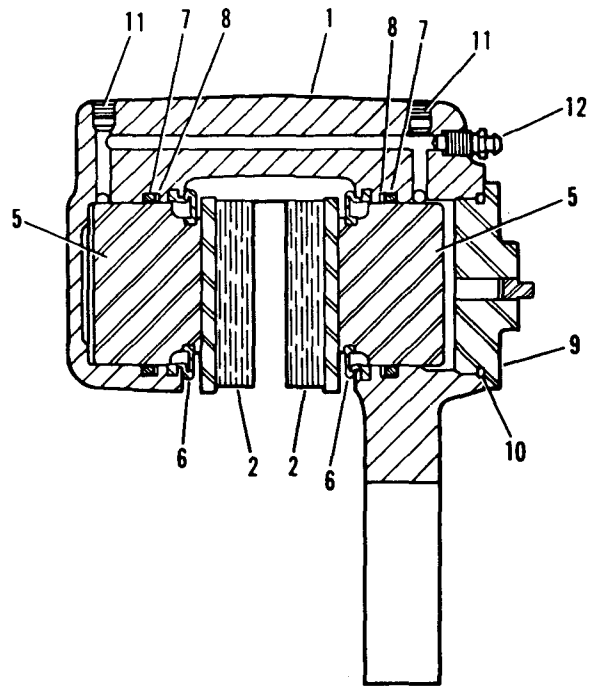
3. Actuate brakes several times.

4. Repeat Steps 1 and 2 until no bubbles are observed in fluid from bleeder valves.

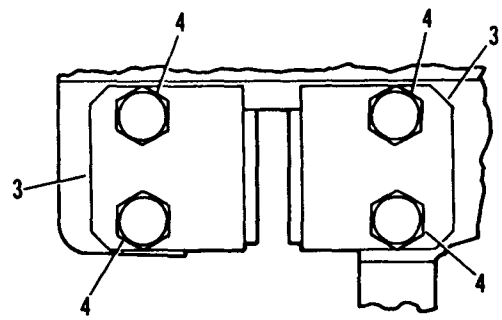
5. Repeat entire process at each brake head to finish bleeding system.

NOTE: Master cylinder must be kept full at all times.





SECTION A–A



SECTION B–B

BRAKE HEAD ASSEMBLY

1	Brake Head Assembly	1
2	Brake Lining Assembly	2
3	Brake Lining Retaining Plate	4
4	Brake Lining Retaining Plate Capscrew	8
5	Piston	4
6	Piston Dust Cover	4
7	Piston Sealing Ring	4
8	Backup Ring	4
9	Cylinder Head	2
10	Cylinder Head Sealing Ring	2
11	Brake Housing Hole Plug	4
12	Bleeder	2

DISC BRAKE DISASSEMBLY

After brake is removed from axle and prior to disassembly the housing should be drained of fluid and the openings capped and plugged. Also, remove the lining retention plates and lining. Clean exterior of brake head to prevent the possibility of dirt and foreign matter entering cylinder head bores and fluid passages.

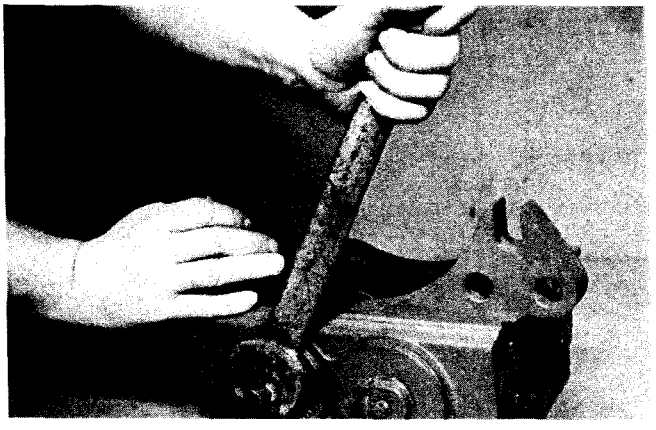


Figure 1
Loosen cylinder heads.

Figure 2
Remove cylinder head from brake housing.

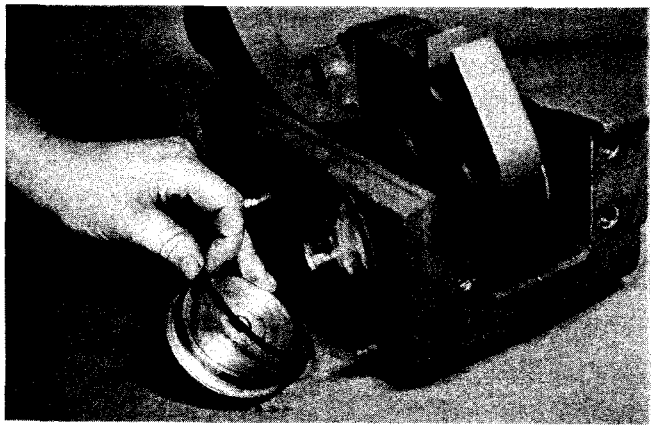


Figure 3
Remove "O" ring from cylinder head.

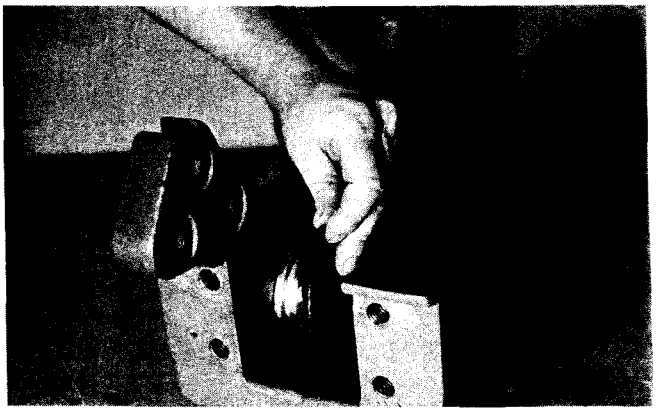


Figure 4
Remove piston dust seal.

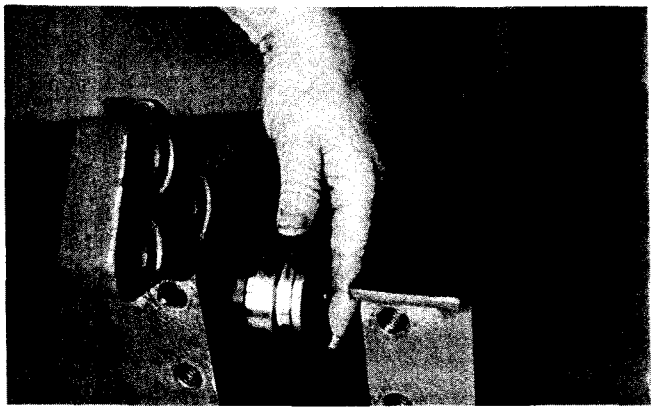


Figure 5
Remove piston.

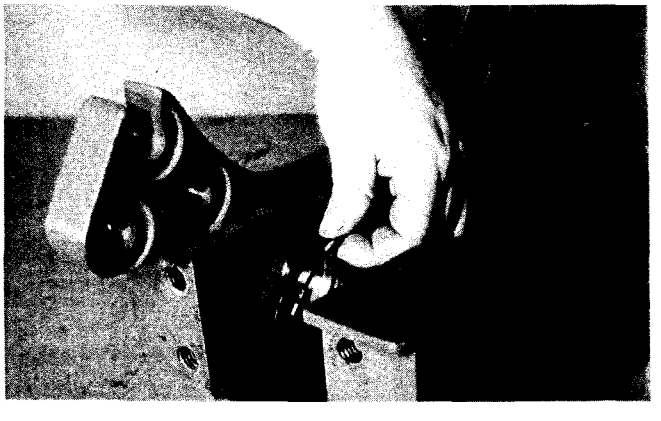


Figure 6
Remove piston "O" ring and back-up ring from housing. Repeat procedures 1 thru 6 for complete brake head disassembly.

CLEANING AND INSPECTION

Clean all parts with the same brake fluid that is used in the brake system.

Inspect seal grooves in housing and in cylinder heads for nicks, scratches and dirt. Minor scratches and nicks can be rubbed out with fine emory cloth.
Inspect cylinder walls and piston surfaces for nicks and scratches. Polish if necessary with fine emory cloth.

It is recommended all "O" rings, back-up rings and piston dust covers be replaced with new ones for re-assembly.

Before reassembly lubricate all cylinder bores, threads, seals, piston seal surfaces and seal grooves with the same brake actuating fluid as used in the brake system.

BRAKE DISC HEAD REASSEMBLY

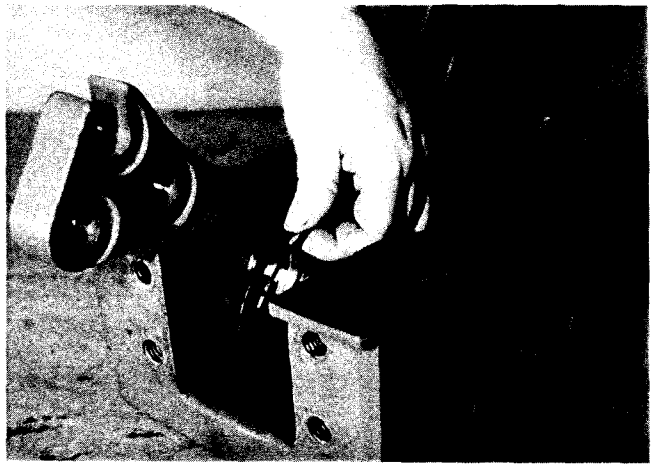


Figure 7

Install piston "O" rings and back-up rings in housing. **NOTE:** Back-up ring is located on the lining side of the ring groove.

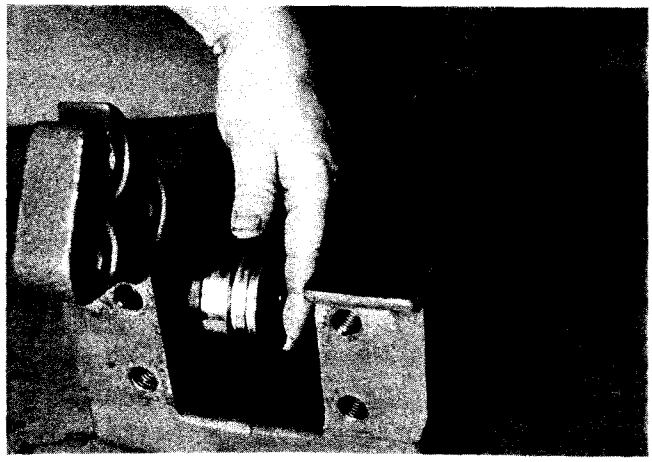


Figure 8

Position piston in piston bore. Push piston in bore far enough to allow piston dust seal to be installed.

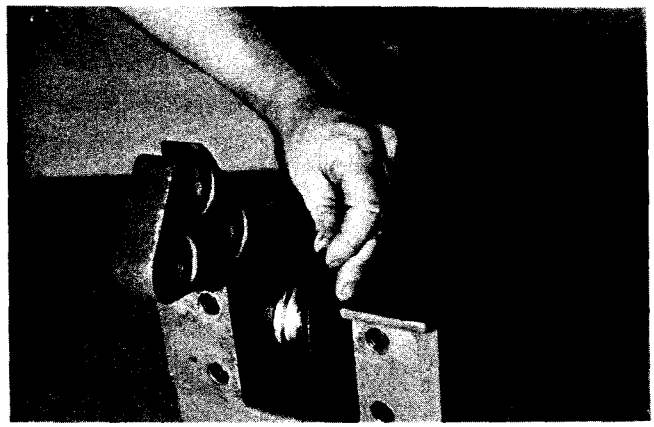


Figure 9

Position dust seal on piston and into seal groove in housing. Push piston in housing until dust seal groove is in line with housing wall.

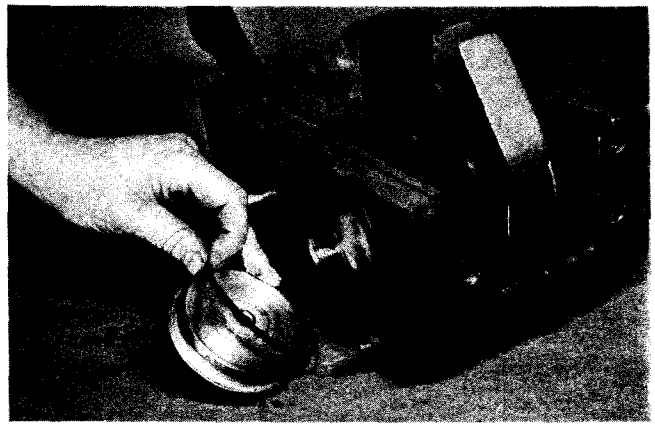


Figure 10

Position new "O" ring on cylinder head.

Figure 11

Install cylinder head in brake housing. Tighten to 75 ft. lbs. torque [10, 4 m.kg].