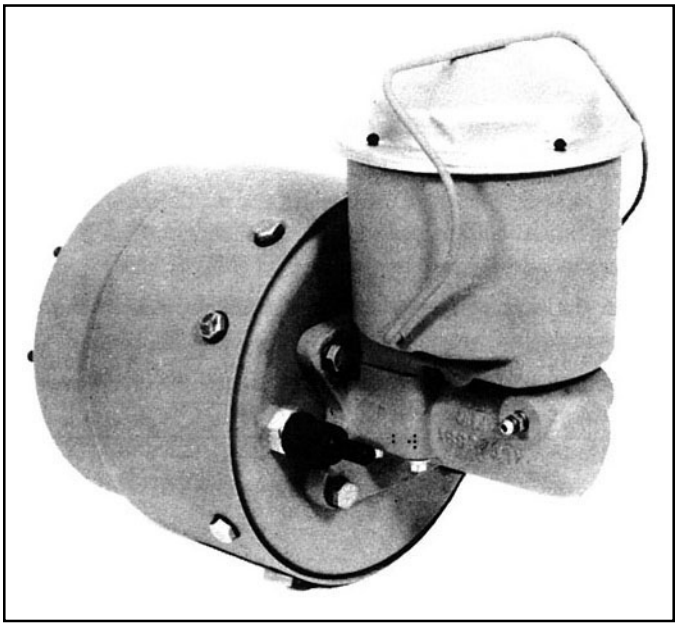
Bendix® AH-4™ Air Hydraulic Intensifier

DESCRIPTION

The AH-4™ is an air-over-hydraulic intensifier available with pressure ratios of 13.5 to 1, 17 to 1 and 23.5 to 1. The air chamber is a rotochamber, either type 30, 36 or 50. The master cylinder design is identical in all units; however, the master cylinder is available with seals for hydraulic brake fluid, or for mineral oil. The master cylinder displaces 6 cubic inches with the type 36 or type 50 actuator and 4.6 cubic inches with the type 30.

The type 30 unit is designed for dusty operation, as in off-highway, with the non-pressure cavity protected by a tight fitting head and a filter for breathing non-pressure air.

The master cylinder may have a remote or direct mounted reservoir. Fig. 1 shows a 23.5 to 1 unit with integral reservoir.



OPERATION

The AH-4™ intensifier is normally used to provide hydraulic pressure to hydraulic disc brakes on an air braked vehicle. It may be used in any application where it is desired to "intensify" available air pressure to a higher hydraulic pressure. 100 psi air pressure introduced to the center port at the rear of the rotochamber will produce approximately 1,350 psi hydraulic pressure at the master cylinder delivery port with a type 30 rotochamber, 1,700 psi with a type 36 rotochamber, and approximately 2,350 psi with a type 50 rotochamber.

PREVENTIVE MAINTENANCE

Important: Review the warranty policy before performing any intrusive maintenance procedures. An extended warranty may be voided if intrusive maintenance is performed during this period.

Because no two vehicles operate under identical conditions, maintenance intervals will vary. Experience is a valuable guide in determining the best maintenance interval for a vehicle.

Every Month, After 8,000 Miles, or 300 Operating Hours

1. Remove the cover and gasket from the brake fluid reservoir, taking extreme care to first remove all dirt and foreign material so that no foreign material is permitted to get into the hydraulic fluid. If the fluid lever is low, proper fluid should be added. CAUTION - The cover and gasket will each indicate whether hydraulic brake fluid or mineral oil should be added. The gasket for brake fluid is black and the gasket for mineral oil is green.
2. Check the stroke warning switch by grasping the switch extension rod underneath the rubber boot and pulling firmly. With the ignition turned on, the warning light in the cab should light. NOTE: If the warning light comes on during a service application, the vehicle should be brought in for service immediately.
3. Check tightness of mounting nuts, air and hydraulic fittings.

Every 12 Months, 100,000 Miles, or 3,600 Operating Hours

1. Disassemble and clean all parts.
2. Install new rotochamber diaphragm, reservoir gasket, seals or any parts worn or damaged.

OPERATING AND LEAKAGE TESTS

Operating Test

1. With the air system built up to governor cut-out pressure, make and hold a full brake application. Hold for at least 5 minutes. Check the rear of the rotochamber and the rotochamber head vents for air leakage by coating with a soap solution.
2. While still holding the brake application, check for hydraulic fluid leaks at all fitting connections and at the disc brake calipers.

3. Observe the stroke warning light. If the master cylinder piston seal leaks, the master cylinder, under sustained pressure, will slowly stroke until the stroke warning switch is activated.

REMOVAL FROM VEHICLE

1. Disconnect the hydraulic line from the delivery port of the master cylinder and allow the hydraulic fluid to drain into a suitable receptacle. The drainage may be expedited by removing the reservoir cover and gasket.
2. Disconnect the air line from the rotochamber, the fluid supply line from the master cylinder (in the case of remote mounted reservoirs), and the electrical connections from the stroke warning switch mounted in the head of the rotochamber.
3. Remove the nuts from the studs which hold the mounting brackets and remove the AH-4™ intensifier from the vehicle.

INSTALLING ON VEHICLE

1. Remount the AH-4™ intensifier, reconnect the air delivery line to the rotochamber and the electrical connections to the stroke warning switch.
2. In the case of remote mounted reservoir, reconnect the reservoir to the master cylinder.
3. Before adding hydraulic fluid, cycle the AH-4™ intensifier very carefully by making a very light brake application. The rotochamber should extend to full stroke and operate the stroke warning switch, causing the warning light to come on in the cab. This will test the stroke warning system. Release the application and reset the stroke warning switch.
4. Remove plugs, reconnect the fluid lines and bleed the master cylinder. The master cylinder itself may be bled by gravity by filling the reservoir and opening the bleeder fitting opposite the discharge port. When clear fluid flows from the bleeder fitting, it may be closed. If the rest of the system needs bleeding, it may be done by opening the appropriate bleed fitting and cycling the AH-4™ intensifier. Hydraulic brake fluid equivalent to DOT 3 specifications should always be used. Some AH-4™ intensifier units are designed to be used with mineral oil, in which case, the reservoir cover will clearly so designate. Rubber parts for use with mineral oil are color coded. Reservoir gasket diaphragm is green, seals and o-rings are brown.

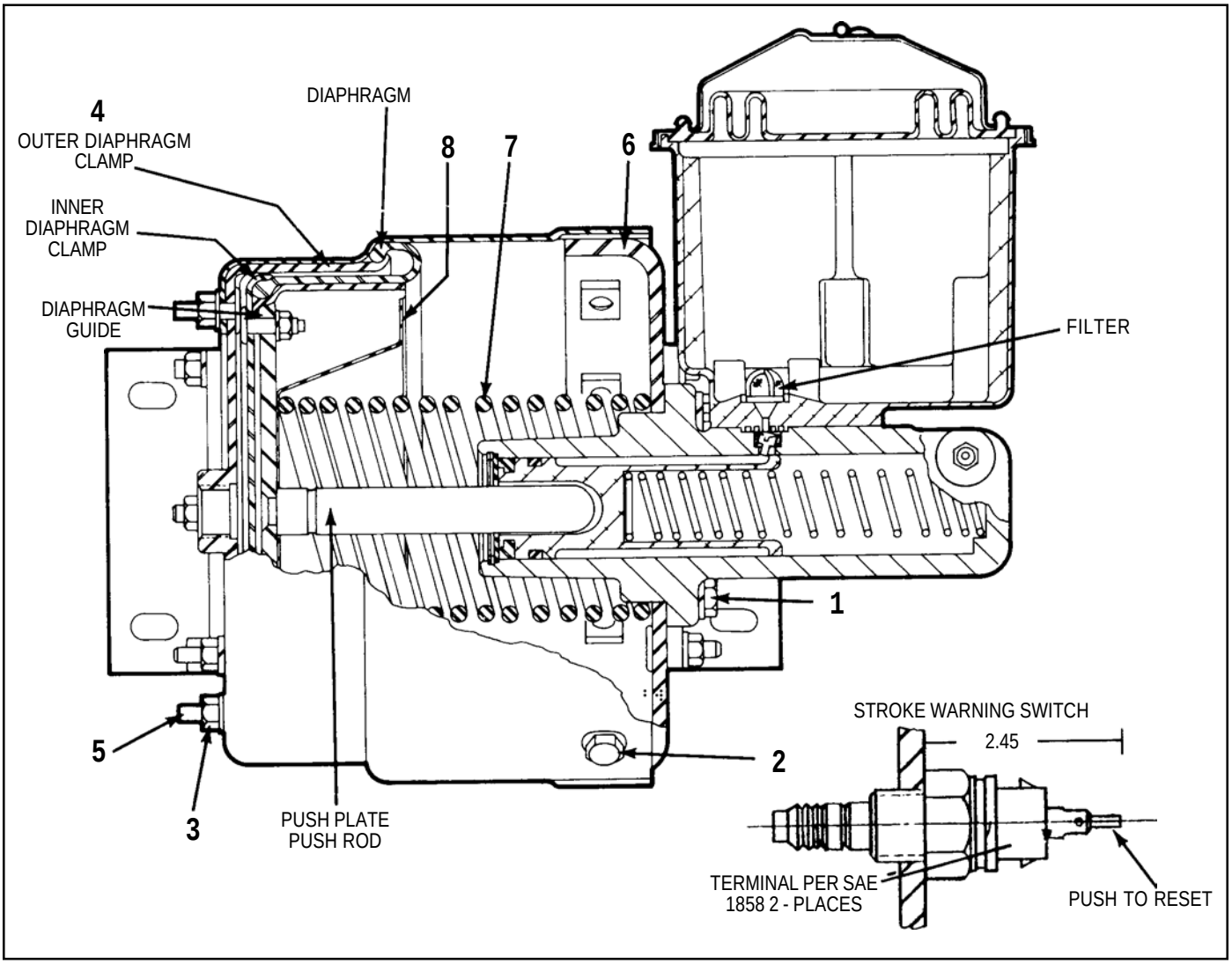


FIGURE 1

DISASSEMBLY

Rotochamber from Master Cylinder FIGURE 1

1. Remove four cap screws (1), and remove the master cylinder from the rotochamber.

Rotochamber

1. Remove the Gap screws (2) which hold the rotochamber head in the shell and remove the head (6), return spring (7), and spring guide (8).
2. Remove the nuts (3) from the body which secure the outer clamp (4) to the body. On some units, one of the mounting brackets is also retained by three of these nuts.
3. Place body, open end down on bench and tap the ends of the studs (5) with a brass drift, lead or plastic hammer. The studs should be tapped on one side of the air inlet and then the other alternately, to free the outer clamp.
4. Grasp the push rod and, by pulling and wiggling the entire assembly consisting of push rod and plate, diaphragm guide, diaphragm, inner and outer clamps should ease out of the body.
5. Remove the outer clamp.
6. Remove nuts from inside of diaphragm guide.
7. Disassemble the inner diaphragm clamp, diaphragm, push plate rod assembly, and diaphragm guide.
8. Remove the stroke warning switch from the rotochamber head and bench test for electrical integrity. If OK, replace in head.

DISASSEMBLY

Master Cylinder FIGURE 2

1. Clean exterior of master cylinder and drain any remaining fluid, In the case of remote mounted reservoir, drain and clean the reservoir.
2. Secure master cylinder in a vise. Depress piston (1) Fig. 2, at least 1/2 in. and hold. This may be done with a simple tool as shown in Figs. 3 and 4. Remove the four self-threading bolts (9) securing the adapter block or the reservoir to the master cylinder. Remove the adapter block or reservoir and the compensating valve (3) and spring (11).

   CAUTION The compensating valve must be removed before any attempt is made to remove the hydraulic piston assembly (see Fig. 5).
3. Remove retaining ring (8) and stop washer (7).
4. Remove piston holding tool and remove piston (1) and spring (4).
5. Remove cap nut (10) from adapter block. Remove o-ring (2) from cap nut and compensating valve seal (5) from adapter block or reservoir.

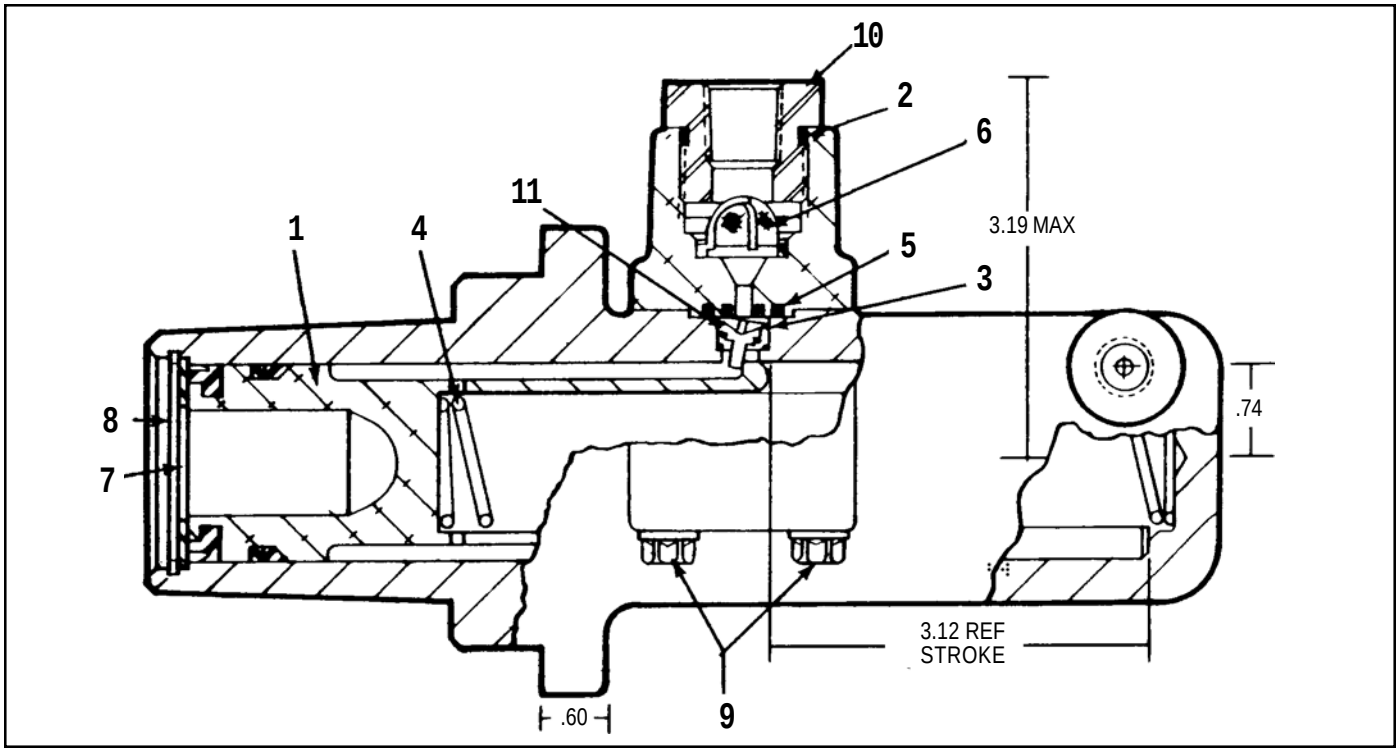


FIGURE 2

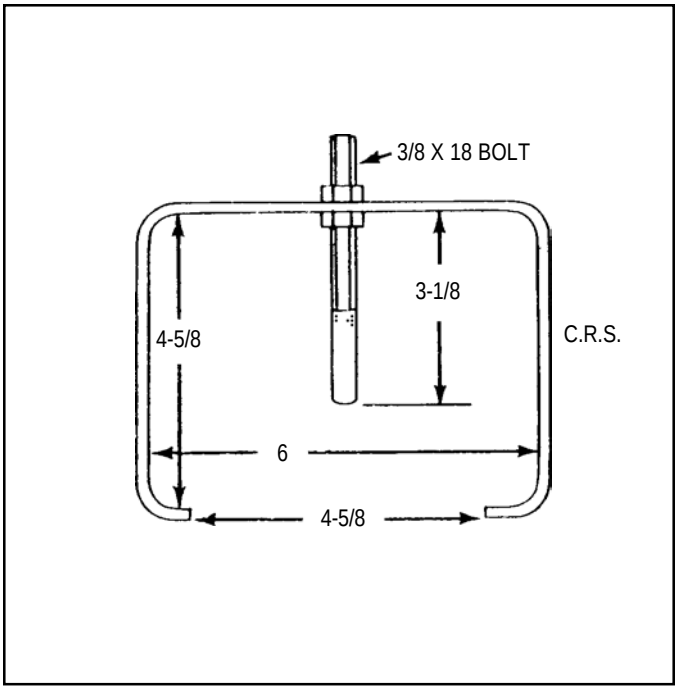


FIGURE 3

ASSEMBLY

Rotochamber

1. Position the diaphragm on end in the inner diaphragm clamp (Fig. 1). The smaller diameter end of the diaphragm should be against the diaphragm clamp.
2. Place and install the diaphragm guide within the diaphragm and over the inner diaphragm clamp studs.
3. Install the push plate push rod assembly within the diaphragm guide and over the inner diaphragm clamp studs.
4. Install nuts on the inner diaphragm clamp studs and tighten securely (55-70 inch pounds)
5. Place the assembly consisting of the push rod, push plate, diaphragm guide, diaphragm, and inner clamp inside of the outer clamp.
6. Roll the free end of the diaphragm back and over the end of the outer diaphragm clamp.
7. Lubricate the inside wall of the body and the rolled surface of the diaphragm with BW652M Type 2.
8. Slide the above assembly into the body. The end of the diaphragm should fit snugly against the shoulder in the body. Position the outer diaphragm clamp studs through the holes at the end of the body, install nuts and tighten securely. Torque to 100-125 inch pounds.
9. Install spring guide, and install spring over push rod.
10. Install cover over push rod and into body. Attach cover to body with cap screws, tightening securely. Torque to 110-150 inch pounds.

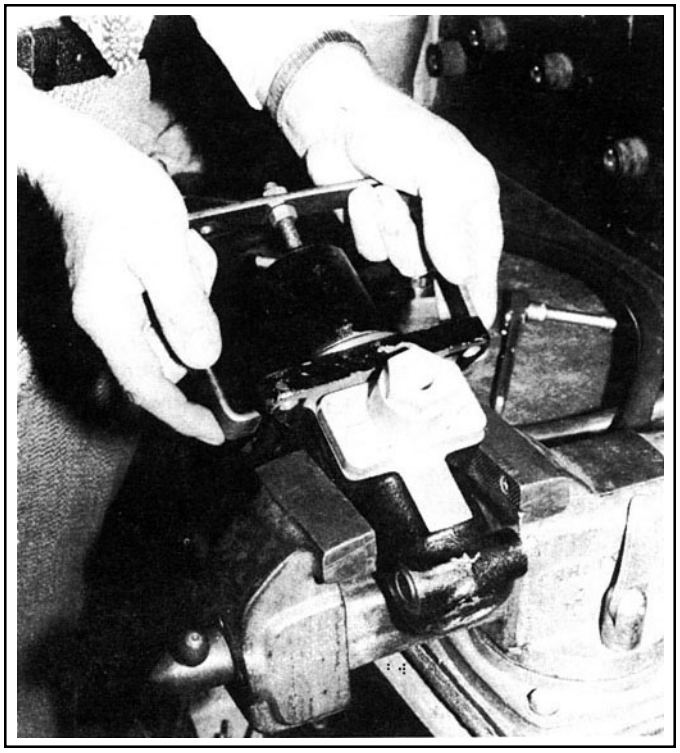


FIGURE 4

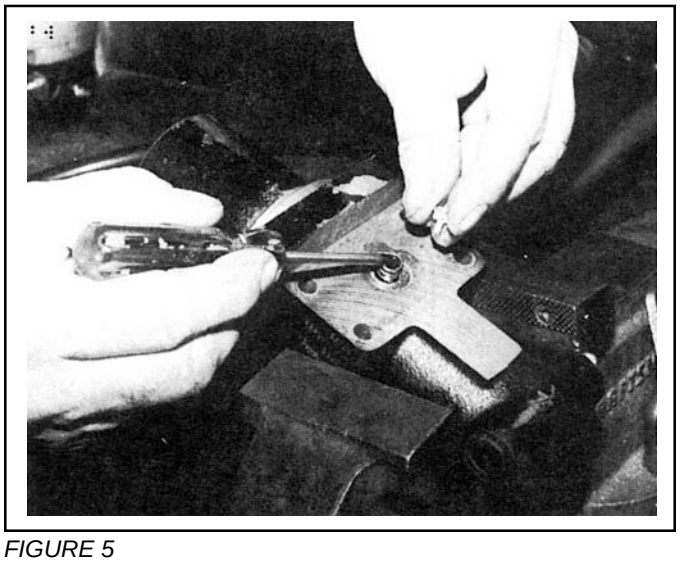


FIGURE 5

ASSEMBLY

Master Cylinder

1. Wash the cap nut, adapter block, and cylinder castings with alcohol or mineral spirits and dry thoroughly.
2. Carefully clean the filter screen. (6)

Continued on Page 5.

3. Install the new o-ring (2) on the cap nut after lubricating with the fluid to be used in the master cylinder or Dow Corning 55-M pneumatic grease. Thread the cap nut in the adapter block and torque to 300 inch pounds.
4. Coat the new compensating seal (5) with fluid or Dow Corning 55-M pneumatic grease and install in mating grooves in bottom of adapter block or reservoir.
5. Coat bore in master cylinder with fluid to be used, place spring (4) in piston assembly (1) and slide both into bore of master cylinder (fig. 6).

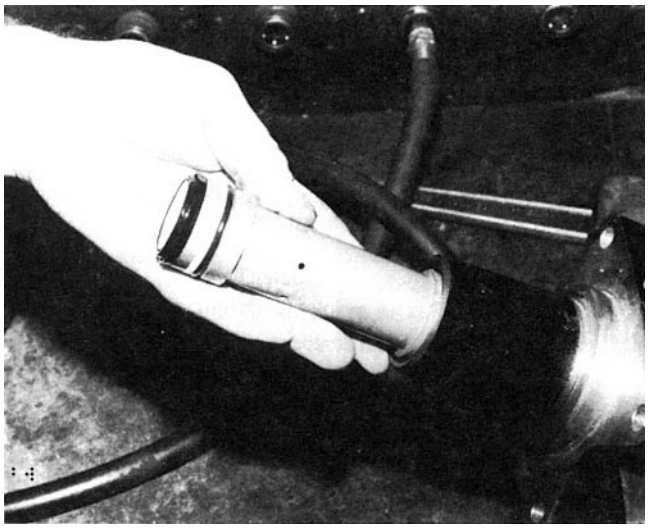


FIGURE 6

6. Place the stop washer (7) and retaining ring (8) over the center post of the retaining tool, depress the piston (1) (see Fig. 7). Make certain the retaining ring is properly seated in its corresponding groove in the master cylinder casting (see Fig. 8). **CAUTION - Keep retaining tool in place until step 8 is completed!!**

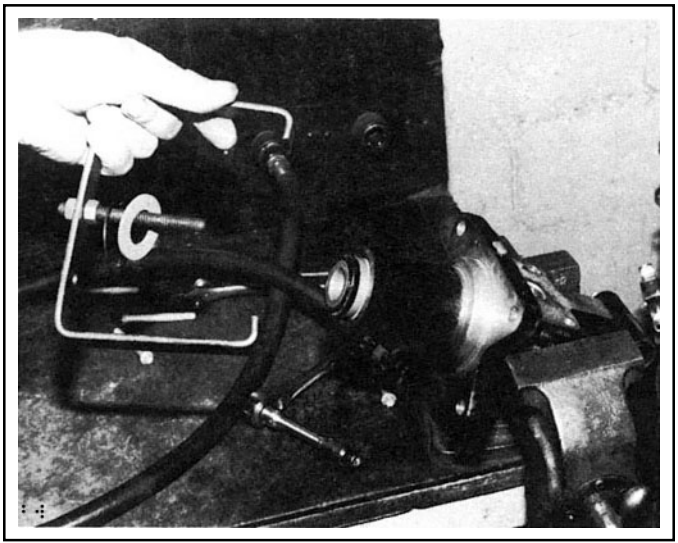


FIGURE 7

7. With piston still depressed, install compensating spring (11) and compensating valve (3). Set adapter block (or reservoir) in place. The master cylinder casting should preferably be held in a horizontal position for this operation. Start the four self-threading bolts (9) by hand to prevent cross threading and torque to 150- 200 inch pounds. **Care should be taken that the compensating valve is properly located before the adapter block or reservoir is located and snugged down** (Fig. 9). The piston may now be released by removing the retaining tool.

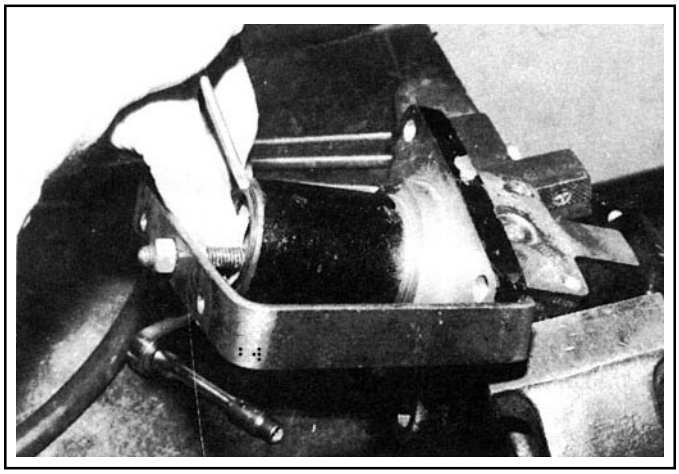


FIGURE 8

8. A simple check may be made to determine that the compensating valve is properly installed. Apply air pressure on the discharge port of the master cylinder. With the piston released, air should back flow through the compensating valve and out the adapter fitting or reservoir. Depress the piston at least 1/4 in. Air pressure should now be trapped in the master cylinder and there should be no evidence of back flow out the adapter block or reservoir.

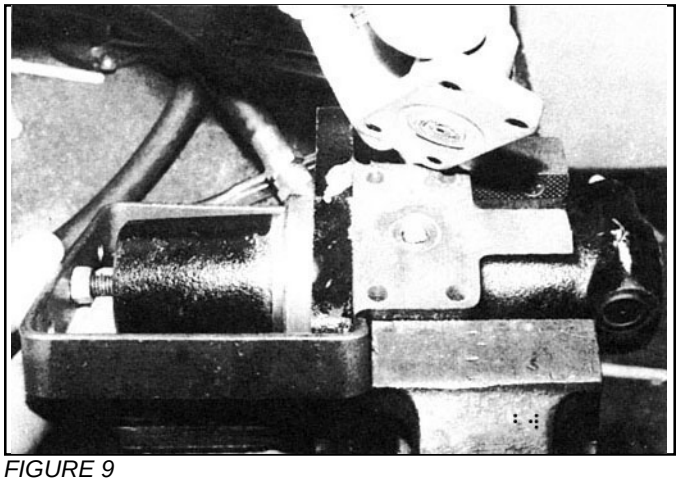


FIGURE 9

CAUTION - 50 psi air pressure will create approximately 100 pounds of additional reactive force on the piston. The piston retaining tool should, therefore, be used for this test.

9. Install the master cylinder on the rotochamber with four 3/8 in. cap screws torqued to 300 inch pounds.

WARNING! PLEASE READ AND FOLLOW THESE INSTRUCTIONS TO AVOID PERSONAL INJURY OR DEATH:

When working on or around a vehicle, the following general precautions should be observed at all times.

1. **Park the vehicle on a level surface, apply the parking brakes, and always block the wheels. Always wear safety glasses.**
2. **Stop the engine and remove ignition key when working under or around the vehicle. When working in the engine compartment, the engine should be shut off and the ignition key should be removed. Where circumstances require that the engine be in operation, EXTREME CAUTION should be used to prevent personal injury resulting from contact with moving, rotating, leaking, heated or electrically charged components.**
3. **Do not attempt to install, remove, disassemble or assemble a component until you have read and thoroughly understand the recommended procedures. Use only the proper tools and observe all precautions pertaining to use of those tools.**
4. **If the work is being performed on the vehicle's air brake system, or any auxiliary pressurized air systems, make certain to drain the air pressure from all reservoirs before beginning ANY work on the vehicle. If the vehicle is equipped with an AD-IS™ air dryer system or a dryer reservoir module, be sure to drain the purge reservoir.**
5. **Following the vehicle manufacturer's recommended procedures, deactivate the electrical system in a manner that safely removes all electrical power from the vehicle.**
6. **Never exceed manufacturer's recommended pressures.**
7. **Never connect or disconnect a hose or line containing pressure; it may whip. Never remove a component or plug unless you are certain all system pressure has been depleted.**
8. **Use only genuine Bendix® replacement parts, components and kits. Replacement hardware, tubing, hose, fittings, etc. must be of equivalent size, type and strength as original equipment and be designed specifically for such applications and systems.**
9. **Components with stripped threads or damaged parts should be replaced rather than repaired. Do not attempt repairs requiring machining or welding unless specifically stated and approved by the vehicle and component manufacturer.**
10. **Prior to returning the vehicle to service, make certain all components and systems are restored to their proper operating condition.**