



WESTINGHOUSE AIR BRAKE COMPANY
Wilmerding, Pennsylvania 15148

*operation &
maintenance
information*

ABU TYPE BRAKE CYLINDERS

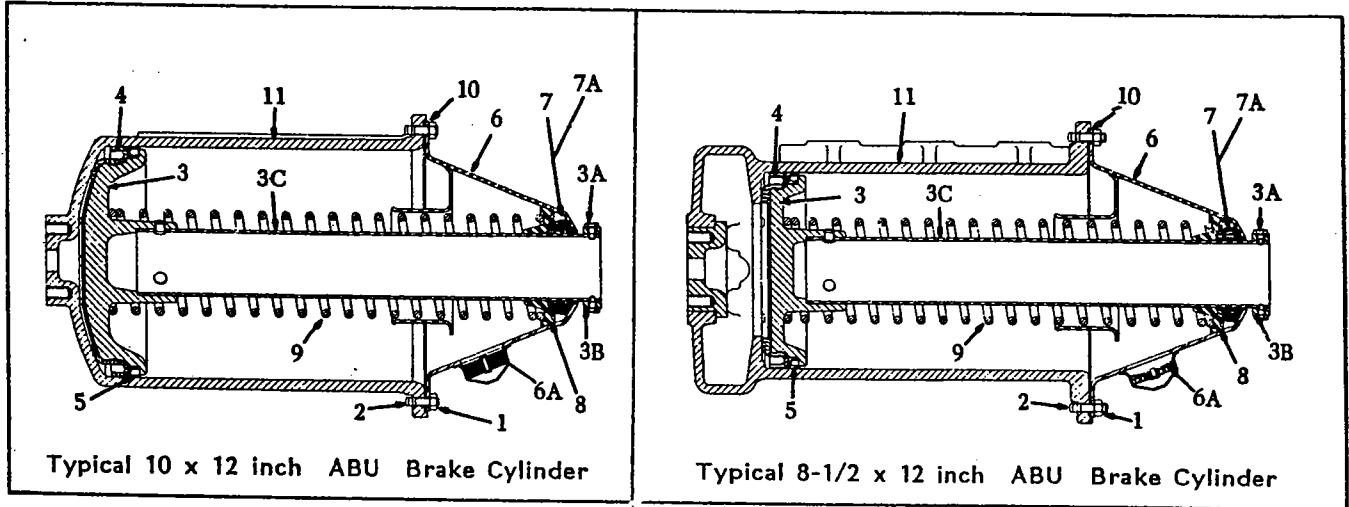


FIGURE 1 - ASSEMBLY VIEW

NOTE: The following description and operation is based on this device and its components being new or this device and its components having been repaired, tested, installed and maintained in accordance with instructions of this and any other applicable publications issued by the Westinghouse Air Brake Company, or its predecessor, the Westinghouse Air Brake Division.

1.0 DESCRIPTION

(Figure 1)

Designed for use on rail carried vehicles in freight service in equipment arrangements, where the air pressure does not exceed 110 psig, the ABU Type Brake Cylinder is designed to respond to air pressure to provide mechanical force through auxiliary multiplication levers to apply the brake shoes against the wheels during brake applications.

A WABCO snap-on packing cup (4) matches the piston contour. The circumference (or perimeter) of the piston has a machined groove that permits the inner bead section of the packing cup to snap into place to retain it in position under normal operating conditions. Adjacent to the groove is a machined surface to which is assembled the press fitted non-metallic guide ring (5). The diameter of the piston is made smaller than the cylinder bore and guide ring in order to avoid metal to metal contact between the piston and the bore thereby reducing friction and wear.

The surface of the hollow piston rod (3C) is specially treated to provide low wear, high corrosion resistance and long life. The non-pressure end of the piston rod is guided

internally by the spring seat (8) and its contact with the non-pressure head (6). To resist the entrance of dirt, an oil saturated felt packing seal (7A) and seal retainer (7) is fitted between the tapered surfaces of the spring seat and non-pressure rod as well as to shield the interior of the cylinder against entrance of dirt and moisture.

A release spring guide, which is an integral part of the non-pressure head, supports the spring (9) and restricts spring contact with the hollow rod due to vibration.

Since atmospheric air must enter the non-pressure end of the cylinder during the release movement, the non-pressure head is fitted with a strainer (6A). With proper mounting of the cylinders with the strainer on the bottom side of the cylinder body at time of installation to the vehicle, a breather cover restricts flying dirt and water from directly contacting the strainer.

ABU Brake Cylinders are available in various sizes. As an example, Figure 1 shows a typical 10 x 12 inch and an 8-1/2 x 12 inch ABU Brake Cylinder.

The ABU 8-1/2 x 12 inch brake cylinder is similar to the 10 x 12 inch brake cylinder except it has an additional integral volume to permit air pressure equalization between the brake cylinder volume and the reservoir supply volume within specified limits.

Consult your Westinghouse Air Brake Company Representative for additional information on available ABU Type Brake Cylinders for specific applications.

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2.0 OPERATION

(Figure 1)

2.1 APPLICATION

When a brake application is initiated, air under pressure from the brake cylinder line entering the inlet port of the brake cylinder body (11) will be directed to and fill the cavity of the pressure head of the cylinder body (11) on the piston packing cup (4) face of the piston and hollow rod assembly (3 & 3C).

When the build-up of air pressure acting on the surface area of the piston packing cup (4) of the piston and hollow rod assembly (3 & 3C) exceeds the force exerted on the piston and hollow rod by the release spring (9), the piston and hollow rod assembly will move to compress the release spring (9) and the hollow rod of the piston and hollow rod assembly will extend from the non-pressure head (6) of the cylinder to apply force to the attached brake rigging through a push rod. The amount of force applied to the brake rigging is proportional to the air pressure acting on the piston packing cup surface area of the piston and hollow rod assembly.

2.2 RELEASE

When a brake release is initiated, air pressure is vented from the pressure end of the brake cylinder body (11). When the air pressure acting on the surface area of the piston packing cup (4) of the piston and hollow rod assembly (3 & 3C) is less than the force exerted on the piston and hollow rod assembly by the release spring (9), which is coiled around the hollow rod, the force of the spring (9) will move the piston and hollow rod assembly to its release or non-applied position.

3.0 MAINTENANCE SCHEDULE

IMPORTANT: At least ONCE EVERY TWELVE (12) YEARS, or more frequently if service conditions so indicate, the ABU Brake Cylinder should be removed from the equipment arrangement, taken to the shop, be completely disassembled, the parts cleaned, inspected, lubricated, assembled using NEW Westinghouse Air Brake Company rubber parts and other specified NEW Westinghouse Air Brake Company parts, and tested for correct operation.

4.0 PARTS CATALOG AND REPLACEMENT PART INFORMATION

4.1 PARTS CATALOG

4214-4, S.18

IMPORTANT: When ordering replacement parts for the ABU Type Brake Cylinders, refer to the current issue of the applicable Westinghouse Air Brake Company Parts Catalogs as listed, or contact your Westinghouse Air Brake Company Representative for the current Parts Catalog covering your specific ABU Brake Cylinder.

4.1.1 7-1/2 x 11 inch ABU Brake Cylinder, Part No. 583828; Parts Catalog 3214-4, S.29.

4.1.2 7-1/2 x 12 inch ABU Brake Cylinder, Part No. 577087; Parts Catalog 3214-4, S.18.

4.1.3 8 x 12 inch ABU Brake Cylinder, Part No. 302800; Parts Catalog 3214-4, S.28.

4.1.4 8-1/2 x 12 inch ABU Brake Cylinder, Part No. 578329; Parts Catalog 3214-4, S.25.

4.1.5 8-1/2 x 12 inch ABU-1 Brake Cylinder, Part No. 578330; Parts Catalog 3214-4, S.25.

4.1.6 8-1/2 x 12 inch ABU-2 Brake Cylinder, Part No. 578331; Parts Catalog 3214-4, S.25.

4.1.7 8-1/2 x 12 inch ABU-3 Brake Cylinder, Part No. 578715; Parts Catalog 3214-4, S.25.

4.1.8 10 x 12 inch ABU Brake Cylinder, Part No. 576079; Parts Catalog 3214-4, S.19.

4.1.9 10 x 12 inch ABU-1 Brake Cylinder, Part No. 578286; Parts Catalog 3214-4, S.16.

4.1.10 10 x 12 inch ABU-2 Brake Cylinder, Part No. 578288; Parts Catalog 3214-4, S.26.

4.1.11 10 x 12 inch ABU-3 Brake Cylinder, Part No. 578544; Parts Catalog 3214-4, S.26.

4.1.12 Contact your Westinghouse Air Brake Company Representative for Parts Catalog information on any ABU Type Brake Cylinders. Parts Catalog information is subject to change without notice. It is the user's responsibility to obtain current Parts Catalogs.

NOTE: The reference numbers used in this publication and those used in the parts catalogs may differ. Check the descriptive parts name and part number to be sure that the desired part is ordered. If in doubt about any part, contact your Westinghouse Air Brake Company Representative for assistance.

4.2 REPLACEMENT PARTS

IMPORTANT: To obtain satisfactory operation and reliability of this device, ONLY Westinghouse



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Air Brake Company Replacement Parts are to be used in the maintenance of this device.


5.0 SAFETY PROCEDURES & WARNINGS

Regular shop safety procedures are to be followed when performing any work on the ABU Type Brake Cylinder(s).

The work area is to be clean.



WARNING

The following statements of warning apply all or in part wherever the symbol  appears in the maintenance procedures. Failure to observe these precautions may result in serious injury to those performing the work and/or bystanders.

- The use of an air jet, which must be less than 30 p.s.i.g., to blow parts clean or to blow them dry after being cleaned with a solvent will cause particles of dirt and/or droplets of the cleaning solvent to be airborne. Wire brushing may also cause particles of dirt, rust, and scale to become airborne. These conditions may cause skin and/or eye irritation.
- When using an air jet do not direct it toward another person. Improper use of air jet could result in bodily injury.
- Personal eye protection must be worn when performing any work on this device or its component parts to avoid any possible injury to the eyes.
- The use of solvents as cleaning agents and the use of lubricants can involve health and/or safety hazards. The manufacturers of the solvents and lubricants should be contacted for safety data (such as OSHA Form OSHA-20 or its equivalent). The recommended precautions and procedures of the manufacturers should be followed.
- When performing any test or work on devices or equipment while they are on the vehicle (on car test etc.) special precautions must be taken to insure that vehicle movement will not occur which could result in injury to personnel and/or damage to equipment.
- Assembly may be under a spring load. Exercise caution during disassembly so that no parts "Fly Out" and cause bodily injury.
- All air supply and/or electric current to this device and/or to any component part must be cut-off before this device and/or any component part is removed from the equipment arrangement.
- "Bottled" up air under pressure (even though air supply is cut-off) may cause gaskets and/or particles of dirt to become airborne and an increase in sound level when this device and/or any component part is removed from the

equipment arrangement. Personal eye and ear protection must be worn and care taken to avoid possible injury when performing any work on this device and/or component part.

- To prevent receiving electrical shock when performing electrical tests, hands must be clear of electrical components, contacts and housing and the required "in-lab" grounding procedures must be strictly adhered to. A wooden work bench should be used. Failure to heed this WARNING could result in severe injury or death.
- An adequate support or lifting device must be available to support the Device and/or Valve Portion(s) during removal, installation and maintenance procedures.

6.0 CLEANING SOLVENT, LUBRICANTS, & SPECIAL TOOLS

6.1 CLEANING SOLVENT

The solvent used for cleaning the reusable metal parts of the ABU Type Brake Cylinder MUST BE an aliphatic organic solution, such as naphtha or mineral spirits, that will dissolve oil or grease, and that will permit all of the metal parts to be cleaned without abrasion.

6.2 LUBRICANTS

6.2.1 Brake Cylinder Lubricant, Westinghouse Air Brake Company Specification M-7651-2, (AAR Specification M-914) such as Texaco Incorporated Texaco Number 1934 is required for the lubrication of the piston and hollow rod assembly, the skirt of the piston packing cup (ONLY), and the cylindrical wall of the cylinder body during the assembly procedure. **NO LUBRICANT IS TO BE APPLIED TO THE DOME AREA (TOP OR INSIDE) OF THE PISTON PACKING CUP.**

6.2.2 Triple Valve Oil, Westinghouse Air Brake Company Specification M-7611-20 (AAR Specification M-912) such as Automatic Transmission Fluid - General Motors Dexron, General Motors Dexron II or Ford ESW-M1C33F as manufactured by Gulf Oil Corp. (Standard Oil of California), Texaco Incorporated, Getty Oil Company, Shell Oil Company or Union Oil Company of California is required for the lubrication of the felt packing seal before its installation.

6.3 SPECIAL TOOLS

6.3.1 A suitable holding fixture is required during the disassembly and assembly procedures. This fixture will be used to hold piston and hollow rod assembly and the non-pressure head assembly.

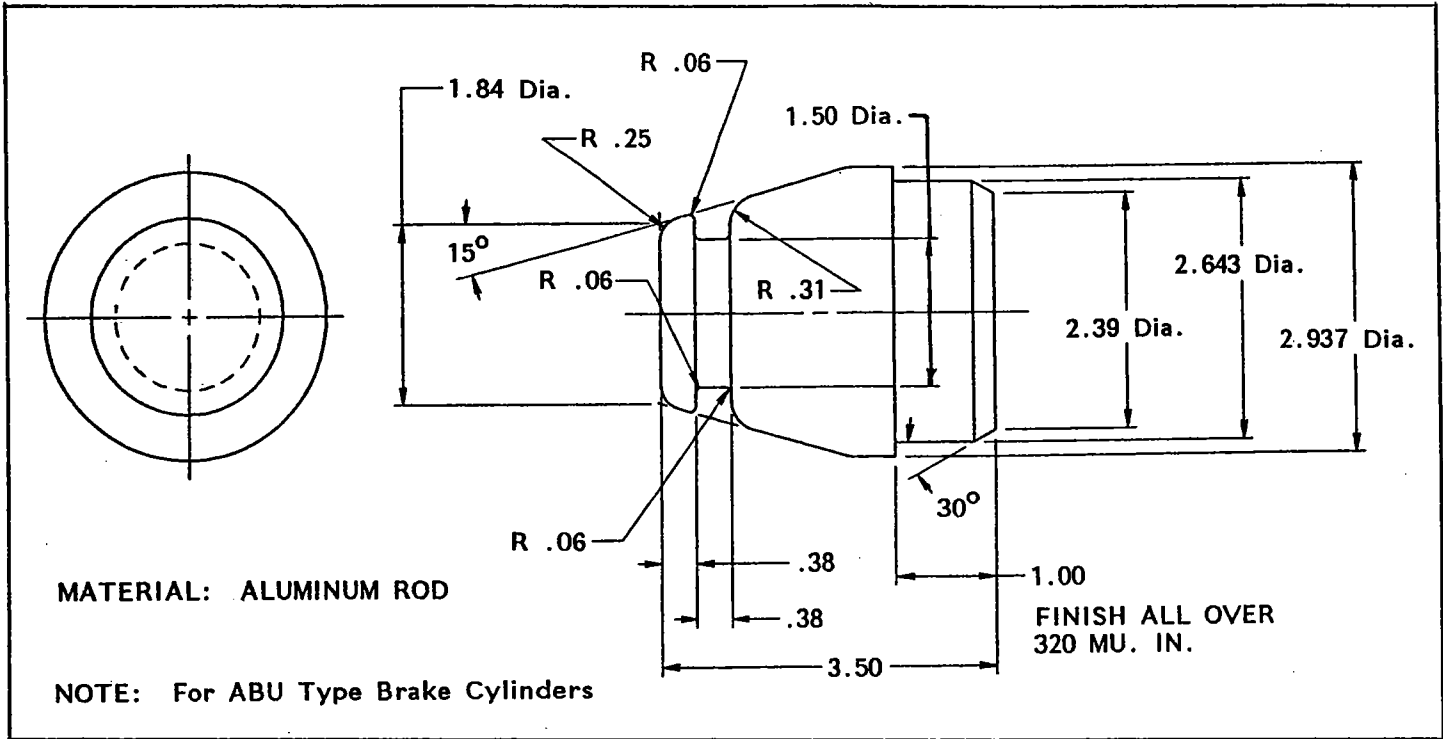


FIGURE 2 - NON-PRESSURE HEAD ASSEMBLY TOOL
(Drawing B0660502)

6.3.2 A Non-Pressure Head Assembly Tool is required when assembling the non-pressure head on the piston and hollow rod. Dimensions and specifications for making this tool are shown in Figure 2.

NOTE: The information shown in Figure 2 for making the Non-Pressure Head Assembly Tool is furnished as a convenience. The Westinghouse Air Brake Company, or its predecessor, the Westinghouse Air Brake Division, shall have no responsibility for tools which they do not supply. The Westinghouse Air Brake Company, or its predecessor, the Westinghouse Air Brake Division, will not be responsible for the use of any tool including claims by third parties.

6.3.3 To help in the removal of the piston packing cup from the piston and hollow rod assembly, a 1" wide, 3/32" thick wooden tool that has rounded edges is recommended.

7.0 MAINTENANCE PROCEDURES

IMPORTANT: In the procedures which follow, DO NOT use sharp or hard metal tools to remove the piston packing cup, gaskets or other non-metal parts. Exercise care so that no damage is done to the metal parts.

The exterior shape of a particular ABU Brake Cylinder and some of the internal parts may differ in size and shape from those shown in the assembly views. The views shown in Figure 3 are representative of the parts and do not show the exact shape or style.

⚠ WARNING: The ABU Type Brake Cylinder Assembly is under spring load. A suitable, substantially built holding fixture **MUST BE USED** to secure the piston spring arrangement during the disassembly and assembly procedures to prevent parts from being inadvertently expelled as projectiles which could possibly cause injury to the repair person, workers, and bystanders.

⚠ 7.1 DISASSEMBLY

(Figure 3)

7.1.1 Remove the piston and hollow rod assembly with the non-pressure head (3 to 10) as a unit from the cylinder body (11) by first removing the 3/8" hex. nuts (1) from the 3/8" bolts (2) or studs (not illustrated), depending on style of cylinder. Remove the 3/8" bolts (2). SCRAP the bolts (2) and nuts (1).

NOTE: All models of the ABU Type Brake Cylinders, with the exception of the 8 x 12 inch Cylinder, Part No. 583828 and Part No. 302800

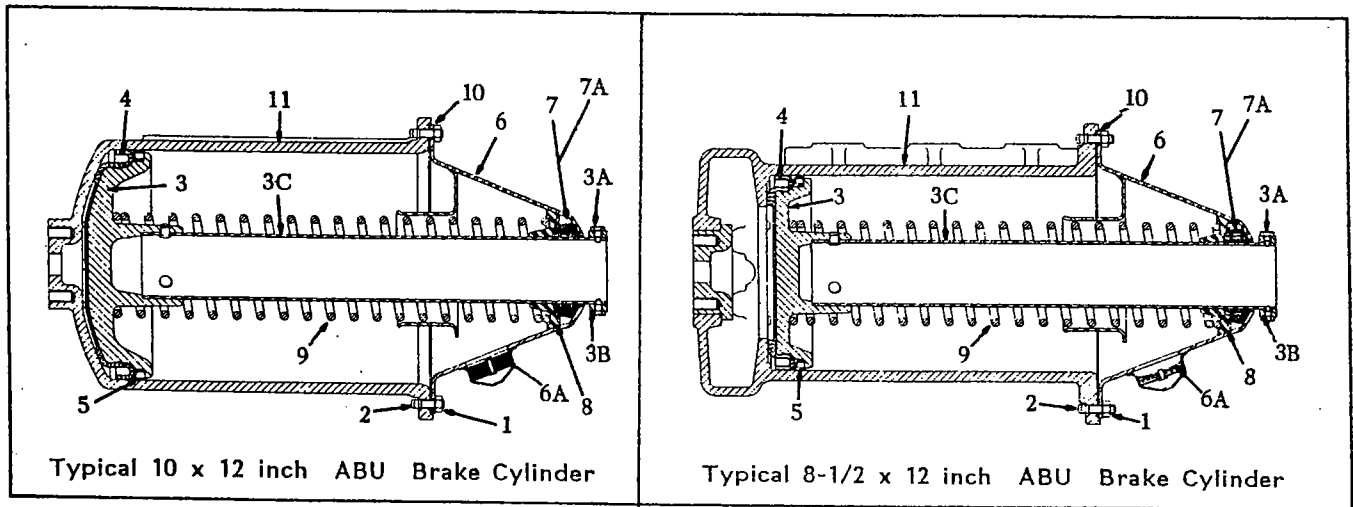


FIGURE 3 - ASSEMBLY VIEW

require eight bolts and nuts. Part No. 583828 and Part No. 302800 require seven bolts, one stud, and eight nuts. Check the parts catalogs listed in Section 4.0 for the correct number of bolts, nuts, and studs.

7.1.2 With the aid of the wooden tool described in Section 6.3.3, remove the piston packing cup (4) from the head of the piston and hollow rod assembly (3). **SCRAP** the piston packing cup (4).

7.1.3 Remove the piston guide ring (5) from the piston of the piston and hollow rod assembly (3 & 3C).

7.1.4 **IMPORTANT:** Place the non-pressure head with piston and hollow rod assembly in a suitable holding fixture so that the release spring (9) is held partially compressed.

BE SURE that the assembly is securely held in the holding fixture before proceeding with the disassembly procedure.

7.1.5 Remove the two 5/16" locking dog point set screws (3A), which secure the hollow rod collar (3B) to the hollow rod (3C) of the piston and hollow rod assembly (3 & 3C). **SCRAP** the set screws (3A).

7.1.6 **IMPORTANT:** Slowly and carefully release the compression on the release spring (9) and allow it to slowly extend its full travel.

7.1.7 Remove the following parts from the hollow rod of the piston and hollow rod assembly (3 & 3C).

7.1.7.1 Felt packing seal and retainer assembly

(7). **SCRAP** the assembly, or remove and **SCRAP** the packing seal (7A).

7.1.7.2 Spring Seat (8). Line up the two flats of the spring seat with the spring guide of the non-pressure head to facilitate the removal of the spring seat from the non-pressure head.

7.1.7.3 Release Spring (9).

7.1.8 Remove the piston and hollow rod assembly (3 & 3C) from the holding fixture.

7.1.9 Using the proper tool, remove and **SCRAP** the air strainer (6A).

7.1.10 Remove and **SCRAP** the non-pressure head gasket (10).

⚠ 7.2 CLEANING & INSPECTING

7.2.1 NON-REUSABLE PARTS

The piston-packing cup, all seals, the non-pressure head gasket, the air strainer, self-locking set screws, the bolts and nuts which secure the non-pressure head to the body are to be **SCRAPPED** and replaced with **NEW** Westinghouse Air Brake Company parts during the assembly procedure.

7.2.2 REMAINING PARTS

7.2.2.1 Wash all of the remaining parts using the cleaning solvent as described in Section 6.1.

The release spring may be wire brushed to assist in the removal of any dirt, rust, or scale.



A dull wooden-rubber spatula type tool may be used to assist in removing any build-up of brake cylinder lubricant from the walls of the brake cylinder body. Use a clean, lint-free cloth, which has been saturated with the prescribed cleaning solvent to further clean the body.

7.2.2.2 After the parts are cleaned, they must be completely dried. Use a low pressure jet of clean, dry air to blow the parts totally dry.

7.2.2.3 Inspect the release spring (9).

7.2.2.3.1 If it is rusted, pitted, distorted, damaged in any way, or if it has taken a permanent set, it is to be replaced with a NEW Westinghouse Air Brake Company part.

Refer to the appropriate parts catalog covering the ABU Type Brake Cylinder being serviced for spring information and identification. See Section 4.0.

7.2.2.4 Inspect the piston and hollow rod assembly (3 & 3C).

7.2.2.4.1 If this assembly is cracked, cut, bent, broken, excessively worn, damaged in any way, or if it is in such a condition that it may result in the unsatisfactory operation of the Brake Cylinder it is to be **SCRAPPED** and replaced with a NEW Westinghouse Air Brake Company part.

7.2.2.4.2 Measure the outside diameter of the hollow rod of the piston and hollow rod assembly at its most worn area. If this measurement is 2.774" or less, the piston and hollow rod assembly is to be **SCRAPPED** and replaced with a NEW Westinghouse Air Brake Company part.

7.2.2.5 Inspect the non-pressure head.

7.2.2.5.1 Replace the non-pressure head if it is cracked, bent, broken, excessively worn, damaged in any way, or if it is in such a condition that may result in the unsatisfactory operation of the Brake Cylinder.

7.2.2.5.2 Measure the inside diameter of the guide end bore of the non-pressure head at the spring seat end. If the inside diameter measurement is 3.0625" or more, the non-pressure head is to be replaced with a NEW Westinghouse Air Brake Company part.

7.2.2.6 Inspect the guide ring (5).

7.2.2.6.1 Replace the guide ring if it is cracked, cut, broken, bent, excessively worn, damaged in any way, or if it is in such a

condition that it may result in the unsatisfactory operation of the Brake Cylinder.

7.2.2.6.2 **NOTE:** When the guide ring is assembled to the piston, press the ring in against the piston and check the overlap of the ring to the piston at this point. Condemn the guide ring if the overlap is .005" or less.

7.2.2.7 Inspect the cylinder body (11).

7.2.2.7.1 Replace the cylinder body if it is cracked, cut, broken, bent, excessively worn, damaged in any way, or if it is in such a condition that may result in the unsatisfactory operation of the Brake Cylinder.

7.2.2.7.2 Measure the diameter of the cylinder bore. If the diameter at the most worn area is 5/64" more than the nominal size of the cylinder body bore, the body is to be replaced with a NEW Westinghouse Air Brake Company part.

NOTE: The nominal size of the cylinder body bore can be determined by referring to the designated size of the ABU Type Brake Cylinder. As an example, Part No. 577087 covers a 7-1/2 x 12 inch ABU Brake Cylinder Assembly, the nominal size of the cylinder body bore is 7-1/2". Part No. 578330 covers an 8-1/2 x 12 inch ABU Brake Cylinder Assembly, the nominal size of the cylinder body bore is 8-1/2", etc.

7.2.2.8 Inspect the remaining parts.

7.2.2.8.1 Replace ANY part that is cracked, cut, broken, excessively worn, damaged in any way, or that is in such a condition that may result in the unsatisfactory operation of the Brake Cylinder.

△ 7.3 ASSEMBLY

(Figure 2)

7.3.1 Install a NEW air strainer (breather) (6A) in place in its cavity in the non-pressure head (6).

7.3.2 Apply a coating of brake cylinder lubricant, Westinghouse Air Brake Company Specification M-7651-2, (AAR Specification M-914) to the outer surfaces of the hollow rod (3C) of the piston and hollow rod assembly (3 & 3C).

IMPORTANT: DO NOT apply the lubricant to the head of the piston, (the area onto which the piston packing cup will be installed).

7.3.3 Place the piston and hollow rod assembly (3 & 3C) into a holding fixture so that the piston is seated firmly on the base of the fixture.



7.3.4 **IMPORTANT:** Since the felt packing seal (7A) was removed from the retainer (7) of the felt packing seal and retainer assembly in Section 7.1.7.1, a **NEW** felt packing seal (7A) **MUST BE** installed in the retainer (7) at this time, or a **NEW** felt packing seal and retainer assembly (7, 7A) **MUST BE** used.

Saturate the **NEW** felt packing seal and retainer assembly (7, 7A) with Triple Valve Oil, Westinghouse Air Brake Company Specification M-7611-20 (AAR Specification M-912), by dipping the assembly (7, 7A) in the oil for a minimum of ten minutes. Remove the felt packing seal and retainer assembly (7, 7A) from the Triple Valve Oil and allow it to drain for ten minutes.

7.3.4.1 Install the **NEW** oil saturated felt packing seal and retainer assembly (7, 7A) in place in the non-pressure head (6).

7.3.5 Install the spring seat (8) in place in the non-pressure head (6) as follows:

7.3.5.1 Position the spring seat (8) so that the spring guide extension of the seat is facing away from the felt packing seal and retainer assembly (7, 7A). Carefully line up the flats on the spring seat (8) with the spring guide of the non-pressure head (6), then install the spring seat (8) in the non-pressure head (6) so that it seats on the felt packing seal and retainer assembly (7, 7A).

7.3.6 Insert the Non-Pressure Head Assembly Tool (Figure 2), non pointed end first, into the end of the hollow rod of the piston and hollow rod assembly (3, 3C).

(Figure 4)

7.3.7 Install the release spring (9) on the piston and hollow rod assembly (3 & 3C) so that the spring fits over the hollow rod and seats in the piston. Be sure that the spring is properly seated in the piston.

7.3.8 **IMPORTANT:** When installing the non-pressure head, the vent **MUST BE** positioned so that it will face downward (toward the tracks) when the brake cylinder is installed in an equipment arrangement.

While holding the felt packing seal and spring seat sub-assembly (7, 7A, 8) in place in the non-pressure head (6), **carefully** position the non-pressure head onto the piston and hollow rod assembly (3 & 3C) and return spring (9). Be sure that the pointed end of the Non-Pressure Head Assembly Tool will enter the hole in the center of the felt packing seal and retainer

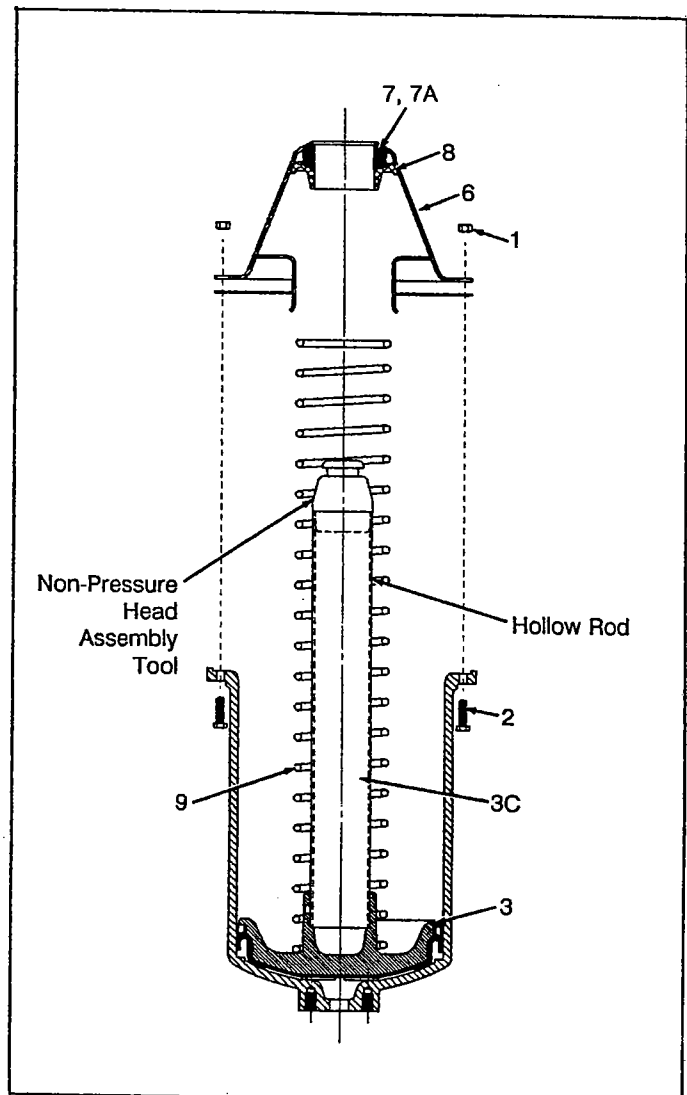


FIGURE 4 - NON-PRESSURE HEAD ASSEMBLY TOOL USE
(Drawing D0660502, OZ)

assembly (7, 7A) and that the return spring (9) is properly seated on the spring guide extension of the spring seat (8).

(Figure 3)

IMPORTANT: Check to **BE SURE** that the assembly is firmly secured in the holding fixture, then **CAREFULLY** apply pressure to the non-pressure head (6) to force it downward on the hollow rod so that the release spring is partially compressed. The non-pressure head **MUST BE** pressed down on the hollow rod far enough to expose the set-screw holes of the hollow-rod (3C). **Hold the non-pressure head (6) in this compressed position.**

7.3.9 Remove the Non-Pressure Head Assembly

