operation & maintenance instruction

“UAHT” BRAKE CYLINDERS

NOVEMBER, 1989

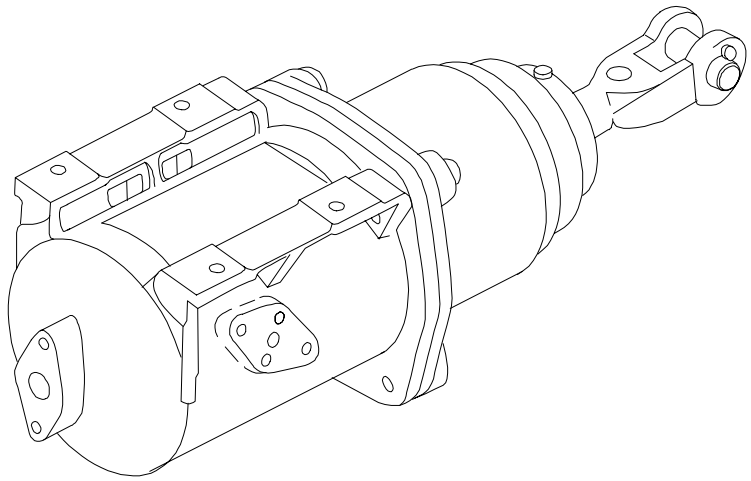
Supersedes issue dated November, 1986

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 issued by this and any other applicable Wabtec Corporation publications.

⚠ **WARNING:** At the time any part is replaced in this device, the operation of the complete device must pass a series of tests prescribed in the latest issue of the applicable Wabtec Test Specification. At the time this device is applied to the brake equipment arrangement, a stationary vehicle test must be made to insure that this device functions properly in the total brake equipment arrangement. (Consult your local Wabtec Representative for identity of the test specification, with latest revision date, that covers this device.)

IMPORTANT: Only Wabtec supplied parts are to be used in the repair of this device in order to obtain satisfactory operation. Commercially available non-O.E.M. parts are unacceptable.

NOTE: The part numbers and their associated descriptions are the property of Wabtec Corporation and may not be replicated in any manner or form without the prior sole written consent of an Officer of Wabtec Corporation**.**



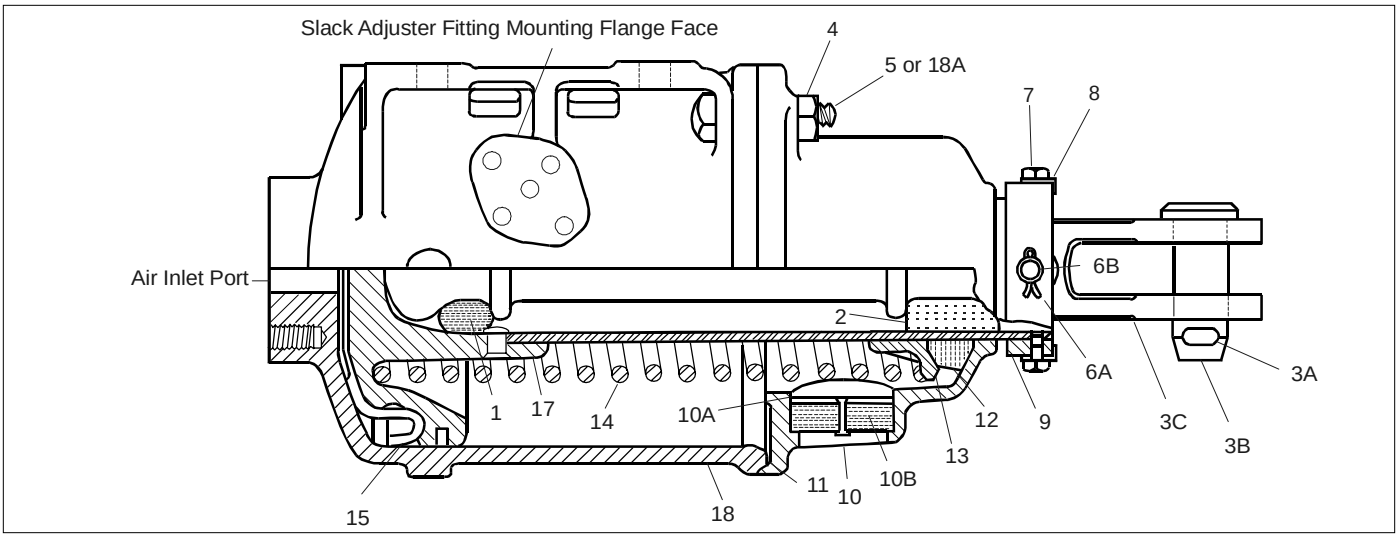


Figure 2 - Assembly View

1.0 DESCRIPTION

Designed for use on rail carried vehicles in equipment arrangements where the brake cylinder air pressure does not exceed 110 psig, the “UAHT” Brake Cylinder functions to transmit force, through a suitable brake rigging which is attached to the brake cylinder piston and rod, in proportion to the air pressure admitted into the brake cylinder on the pressure side of the brake cylinder piston.

The body and pressure head of the “UAHT” Brake Cylinder are combined in one casting. A tapped flange fitting port is provided in the body for the attachment of a slack adjuster fitting. The non-pressure head of the Cylinder is bolted to the body by means of a bolting flange. The “cast type” construction of the “UAHT” Brake Cylinder resists external damage and helps to retain internal lubrication to reduce cylinder and packing cup wear. Mounting flanges are provided for attachment to the vehicle while flange faces are provided for air line connections. The breather opening of the non-pressure head is protected by an air strainer. This strainer functions to assist in restricting the entry of dirt into the cylinder body when the piston is returned to its non-applied position (release position).

“UAHT” Brake Cylinders are available in various sizes and two body styles.

Most sizes of the “UAHT” Brake Cylinders may be ordered with or without a push rod assembly. Consult your Wabtec Corporation Representative and the current issue of the Wabtec Corporation Parts Catalog 3214-4, Sup. 12 for information on “UAHT” Brake Cylinders for specific applications and the availability of replacement parts.

2.0 OPERATION (Figure 2)

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 (18) will be directed into and fill the cavity of the pressure head of the cylinder body (18) on the piston packing cup (15) face of the piston and hollow rod assembly (15, 17).

When the build-up of air pressure acting on the surface area of the piston packing cup of the piston and hollow rod assembly (15, 17) exceeds the force exerted on the piston and hollow rod (17) by the release spring (14), the piston and hollow rod assembly (15, 17) will move to compress the release spring (14) and the hollow rod of the piston and hollow rod assembly (17) is extended from the non-pressure head (10) of the cylinder to apply force to the attached brake rigging. 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.

Whenever the piston and hollow rod assembly (15,17) travel exceeds a predetermined amount, the slack adjuster port in the body will be uncovered permitting brake cylinder air to flow through the slack adjuster port and into the attached slack adjuster fitting and associated slack adjuster arrangement.

IMPORTANT: If a slack adjuster arrangement is not used with the “UAHT” Brake Cylinder, a blanking pad or plug must be used to close the slack adjuster port of the body.

2.2 RELEASE

When a brake release is initiated, air pressure should be vented from the pressure head of the brake cylinder body (18). When the air pressure acting on the surface area of the piston packing cup of the piston and hollow rod assembly (15, 17) is less than the force exerted on the piston and hollow rod assembly (15, 17) by the release spring (14), which is coiled around the hollow rod, the force of the spring (14) will move the piston and hollow rod assembly (15, 17) and attached brake rigging to its release or non-applied position.

When a brake release occurs, the slack adjuster port is blocked by the piston and slack adjuster air is exhausted to atmosphere through the strainer (10B).

3.0 MAINTENANCE SCHEDULE

IMPORTANT: The "UAHT" Brake Cylinder should be removed from the equipment arrangement, taken to the shop, be completely disassembled, the parts cleaned, inspected, lubricated, assembled, and tested for correct operation according to the following vehicle application schedule, or more frequently if service conditions so indicate.

RECOMMENDED TYPE OF APPLICATION	FREQUENCY - AT LEAST ONCE EVERY
Locomotive	24 Months
Mass Transit	24 Months
Passenger (Interstate)	36 Months

4.0 PARTS CATALOG AND REPAIR PARTS INFORMATION

4.1 PARTS CATALOG

IMPORTANT: When ordering replacement parts for the "UAH" Brake Cylinders, refer to the current issue of the Wabtec Corporation Parts Catalogs 3214-4, S.12.

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

4.2 REPLACEMENT PARTS

IMPORTANT: To obtain satisfactory operation and reliability of this device, **ONLY** Wabtec Corporation 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 "UAH" 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 components 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 components 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**

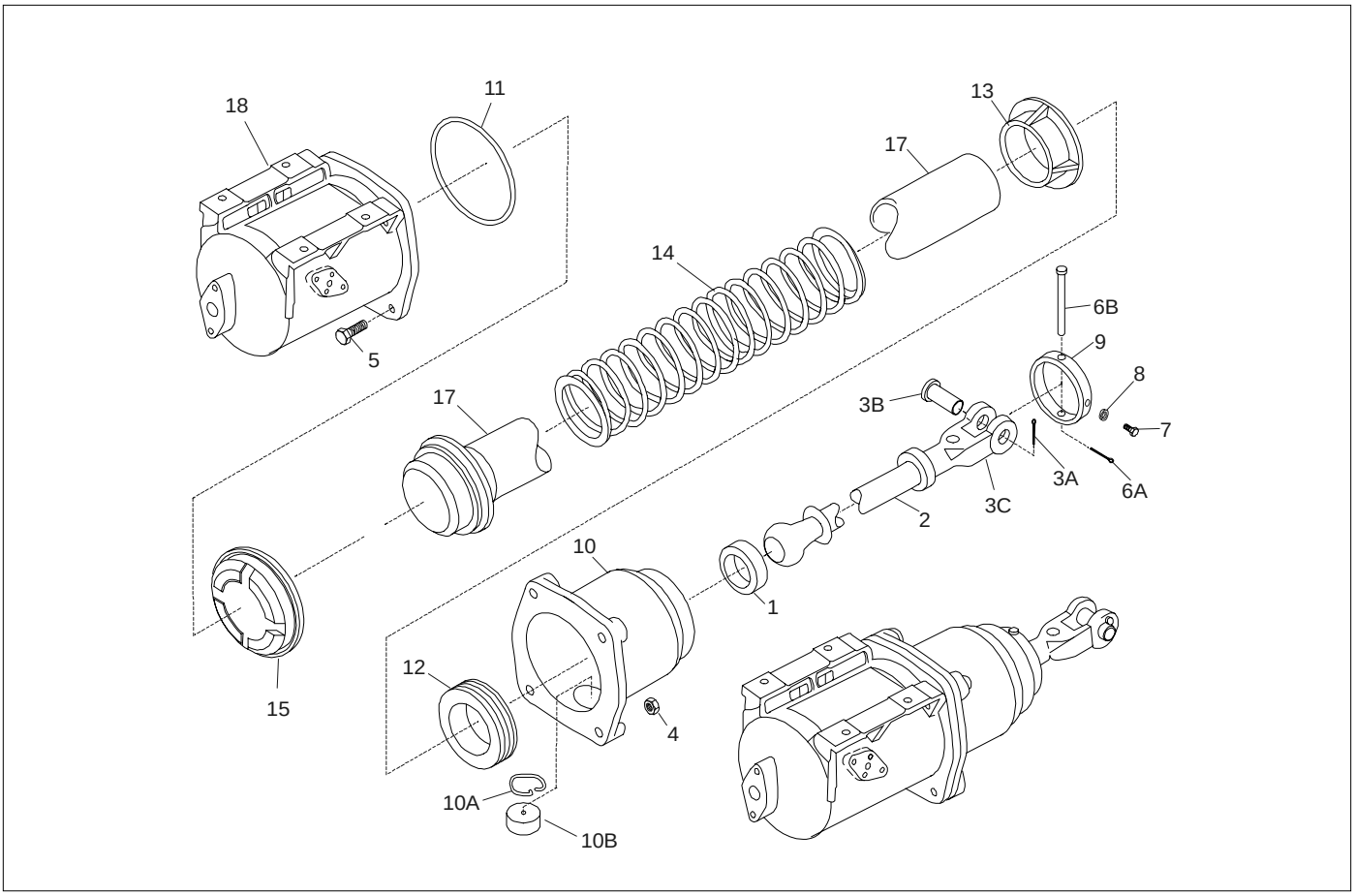


Figure 3 - Exploded View

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 there must be no bodily contact with the work bench. Failure to heed this warning could result in severe injury or death.**

6.0 CLEANING SOLVENT & LUBRICANT

6.0 CLEANING SOLVENT, LUBRICANT, & SPECIAL TOOLS

6.1 CLEANING SOLVENT

The solvent used for cleaning the metal parts of the "UAHT" 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 LUBRICANT

Brake Cylinder Lubricant, Wabtec Corporation Specification M-7651-2, (AAR Specification 914), such as Union Oil Company of California Special Golden Grease Number 2, is required for the lubrication of the piston and hollow rod assembly, the skirt of the piston packing cup **(ONLY)**, and the walls 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.

6.3 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.

6.3.2 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 "UAHT" Brake Cylinder and some of the internal parts may differ in size and shape from those shown in the assembly and exploded views. The views shown in Figures 2 and 3 are representative of the parts and do not show the exact shape or style.

⚠ **WARNING: The "UAHT" 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

(Figures 2 & 3)

7.1.1 Remove the push rod assembly (1 to 3C) from the brake cylinder by first removing the cotter pin (6A) and holder pin (6B) which secures the push rod assembly (1 to 3C) in place.

Pull the push rod assembly (1 to 3C) from the brake cylinder.

SCRAP the cotter pin (6A).

7.1.2 If not already removed, remove the cotter pin (3A) and push rod pin (3B) from the push rod (3C). **SCRAP** the cotter pin (3A).

Remove and **SCRAP** the anti-rattler ring (1) and the hollow piston rod seal (2).

7.1.3 Remove the piston and hollow rod assembly with the non-pressure head (7 to 17) **as a unit** from the cylinder body (18) by first removing the 1/2" hex nuts (4) from the tee head bolts (5) or studs (18A), depending on style of cylinder. Remove the tee head bolts (5) if used.

NOTE: On some models of the "UAHT" Brake Cylinder, eight tee head bolts and nuts are required. Check the parts catalogs listed in Section 4.0 for the correct number of bolts, nuts, and studs.

7.1.4 With the aid of the wooden tool described in Section 6.3.2, remove the piston packing cup (15) from the head of the piston of the piston and hollow rod assembly (17). **SCRAP** the piston packing cup.

7.1.5 **IMPORTANT: Place the non-pressure head with piston and hollow rod assembly in a suitable holding fixture so that the release spring (14) is held partially compressed.**

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

7.1.6 Remove the two 5/16" locking dog point set screws (7) and lock washers (8), if used, which secure the push rod holder (9) to the hollow rod of the piston and hollow rod assembly (17). **SCRAP** the set screws (7).

7.1.7 **IMPORTANT: Slowly and carefully release the compression on the release spring (14) and allow it to slowly extend its full travel.**

7.1.8 Remove the following parts from the hollow rod of the piston and hollow rod assembly (17).

7.1.8.1 Seal and retainer assembly (12). **SCRAP** the assembly.

7.1.8.2 Spring seat (13).

7.1.8.3 Release Spring (14).

7.1.9 Remove the piston and hollow rod assembly (17) from the holding fixture.

7.1.10 **IMPORTANT:** The procedure which follows deals with the removal of the air strainer (breather) from the non-pressure head. In certain styles of the "UAHT" Brake Cylinder, the air strainer (breather) is secured in place by a retaining ring; in other styles, a retaining ring is not required to secure the air strainer in place. Refer to the parts catalog covering the specific "UAHT" Brake Cylinder being maintained to see if a retaining ring is used.

7.1.10.1 Using the proper tool, remove the retaining ring (10A) which secures the air strainer (10B) in place in the non-pressure head (10) if a retaining ring is used.

7.1.10.2 Remove and **SCRAP** the air strainer (10B).

7.1.11 Remove and **SCRAP** the non-pressure head gasket (11).

⚠ 7.2 CLEANING & INSPECTING

7.2.1 NON-REUSABLE PARTS

The piston-packing cup, all seals, the anti-rattler ring, the non-pressure head gasket, the air strainer, self-locking set screws, and all cotter pins are to be **SCRAPPED** and replaced with NEW Wabtec Corporation parts during the assembly procedure.

7.2.2 REMAINING PARTS

7.2.2.1 Wash all of the remaining parts in a bath of 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.

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 dry.

7.2.2.3 Inspect the release spring (14).

7.2.2.3.1 If it is rusted, pitted, distorted, or if it has taken a permanent set, it is to be replaced with a **NEW** Wabtec Corporation part.

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

7.2.2.4 Inspect the piston and hollow rod assembly (17).

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 Wabtec Corporation 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 $2^{3}/_{4}$" or less, the piston and hollow rod assembly is to be scrapped and replaced with a NEW Wabtec Corporation 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 $3^{1}/_{16}$" or more, the non-pressure head is to be replaced with a NEW Wabtec Corporation part.

7.2.2.6 Inspect the cylinder body.

7.2.2.6.1 Replace the cylinder body with a Wabtec Corporation manufactured cylinder body that has been satisfactorily reconditioned 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.

7.2.2.6.2 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 an available Wabtec Corporation part that is within the specified cylinder bore dimension.

NOTE: The nominal size of the cylinder body bore can be determined by referring to the designated size of the “UAHT” Brake Cylinder. As an example, for a 7 x 6 “UAHT” Brake Cylinder Assembly, the nominal size of the cylinder body bore is 7". For an 8 x 10 “UAHT” Brake Cylinder Assembly, the nominal size of the cylinder body bore is 8", etc.

7.2.2.7 Inspect the remaining parts.

7.2.2.7.1 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 (Figures 2 & 3)

7.3.1 Install a NEW air strainer (breather) (10B) in place in its cavity in the non-pressure head (10).

If a retaining ring (10A) was removed from the non-pressure head (10) during the disassembly procedure, it should be installed at this time to secure the air strainer (10B) in place. Use the proper tool to install the retaining ring (10A).

NOTE: The retaining ring (10B) is not required on all styles of the “UAHT” Brake Cylinder. Refer to the current issue of the parts catalog listed in Section 4 for location and parts required for specific Brake Cylinders.

7.3.2 Apply a coating of brake cylinder lubricant, Wabtec Corporation Specification M-7651-2, (AAR Specification M-914) to the outer surfaces of the hollow rod of the piston

and hollow rod assembly (17).

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 (17) into a holding fixture so that the piston is seated firmly on the base of the fixture.

7.3.4 Install the following parts on and over the hollow rod of the piston and hollow rod assembly (17).

7.3.4.1 Release spring (14). Be sure it seats in the piston.

7.3.4.2 Spring Seat (13). Be sure that the "shaft" of the spring seat enters the spring (14).

7.3.4.3 A NEW hollow rod seal with retainer (12,12). Be sure the retainer is fitted into the open end of the spring seat (13).

7.3.5 Place the non-pressure head assembly (10, 10A, 10B) on to and over the hollow rod of the piston and rod assembly (17) so that it comes to rest on the seal (12).

IMPORTANT: Check to **BE SURE** that the assembly is firmly secured in the holding fixture, then **CAREFULLY** apply pressure to the non-pressure head (10) 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. Hold the non-pressure head (10) in this compressed position.

7.3.6 Place the push rod holder (9) on the hollow rod of the piston and hollow rod assembly (17) so that the holes for the set screws in the holder (9) are aligned with the set screw holes of the hollow rod. Secure the push rod holder (9) in place by installing two lock washers (8), if used and two NEW $^{5}/_{16}$" self-locking dog point set screws (7).

7.3.7 **IMPORTANT:** Check the assembly **TO BE SURE** that the push rod holder is properly secured, then **CAREFULLY** and slowly release the press on the non-pressure head (10) to relieve the compression on the release spring (14).

Remove the piston and hollow rod - non-pressure head assembly from the holding fixture.

7.3.8 Visually inspect the head of the piston of the piston and hollow rod assembly (17) to be sure that it is dry and free of lubricant.

Install a NEW piston packing cup (15) onto the head of the piston. Be sure that the packing cup is firmly in place.

7.3.9 Apply a coating of brake cylinder lubricant, Wabtec Corporation Specification M-7651-2, (AAR Specification M-914) to the walls of the cylinder body (18) and to the skirt (the wall bearing surface) of the piston packing cup (15).

IMPORTANT: DO NOT apply lubricant to the entire exposed area of the packing cup. ONLY the skirt is to be lubricated. The dome area (top and inside) of the piston packing cup is to remain dry. Be sure that the walls of the cylinder body are thoroughly covered with the lubricant.

7.3.10 Install a NEW non-pressure head gasket (11) in place on the cylinder body (18).

7.3.11 Place the non-pressure head - piston and hollow rod assembly across the opening of the cylinder body (18) so that the piston packing cup (15) is in position to enter the body (18). Carefully apply pressure on the assembly so that the piston and hollow rod with piston packing cup (15, 17) enters the cylinder body (10). Continue to apply pressure until the piston packing cup (15) is clear of the non-pressure head mounting surface of the cylinder body (18), then raise the hollow rod until it is perpendicular to the bore of the cylinder body (18). Continue to press the piston and hollow rod assembly into the cylinder body until the non-pressure head (10) seats on the mounting surface of the body (18).

7.3.12 Depending on the style of "UAHT" Brake Cylinder, install the required number of tee bolts (5) and 1/2" hex. nuts (4), or install the required number of $^{1}/_{2}$" hex nuts (4) on the studs of the cylinder body (18) to secure the assemblies together. Equally tighten the nuts (4).

NOTE: Check the parts catalog listed in Section 4.0 for the correct hardware for the specific "UAHT" Brake Cylinder being serviced.

7.3.13 If the brake cylinder is equipped with a push rod, the push rod assembly should be installed at this time.

7.3.13.1 Apply a coating of brake cylinder lubricant, Wabtec Corporation Specification M-7651-2 (AAR Specification M-914) to the surfaces of a NEW hollow rod piston seal (2) and a new anti-rattler ring (1).

7.3.13.2 Install the NEW lubricated seal (2) and the NEW lubricated anti-rattler ring (1) in place on the push rod (3C).

7.3.13.3 Insert the push rod assembly (1, 2, 3C) into the hollow rod of the piston and hollow rod assembly (17), anti-

rattler ring end first.

7.3.13.4 Align the push rod holder pin hole of the push rod holder (9) with the hole provided in the push rod (3C), then insert the holder pin (6B) through the aligned holes to secure the push rod (3C) in the piston and hollow rod (17). Secure the holder pin (6B) in place by installing a NEW cotter pin (6B) in the hole provided in the holder pin (6B). Bend the legs of the cotter pin around the holder pin to secure it.

7.3.13.5 Insert the push rod pin (3B) in the end of the push rod (3C) and secure it in place by installing a NEW cotter pin (3A).

8.0 TESTING & ADDITIONAL INFORMATION

IMPORTANT: After the "UAHT" Brake Cylinder has been assembled, BUT BEFORE it is returned to service, it MUST BE pressure tested. The following procedure and equipment is recommended for testing the "UAHT" Brake Cylinder(s).

8.1 REQUIRED EQUIPMENT

8.1.1 A holding fixture which will limit piston travel, but that will permit a pressure test for piston packing cup leakage.

8.1.2 A local air supply of at least 50 psig, with piping which includes a strainer (air filter), a cut-off valve, a control device, a pressure gauge, and a cut-out cock.

The cut-off valve MUST BE installed so that it can cut off air supply to the piping to the brake cylinder and to vent air pressure to atmosphere when testing is completed.

The pressure gauge is to be located in the air line between the brake cylinder and cut-out cock. The cut-out cock is to function to isolate the brake cylinder and gauge and to prevent air loss or increase in specified pressure.

⚠ 8.2 TESTING PROCEDURE

8.2.1 Place the brake cylinder in the holding fixture so that piston and hollow rod travel is limited. The slack adjuster port should be blanked or plugged.

8.2.2 Connect the inlet port of the brake cylinder to the proper air supply line as described in Section 8.1.2.

8.2.3 Open and close the cut-out cock to permit several operations of the piston in the cylinder with an inlet air pressure of approximately 50 psig to seat the piston packing cup against the cylinder wall, then deplete the air pressure to zero.

8.2.4 Open the cut-out cock and control device and charge the brake cylinder to 15 psig.

Allow 15 seconds for temperature effect, then isolate the brake cylinder from the air supply by closing the cut-out cock.

After brake cylinder isolation has been completed, observe the gauge. THERE IS TO BE NO DROP IN AIR PRESSURE FOR FIFTEEN SECONDS.

8.2.5 After the testing is completed, turn off the air supply. Operate control device to vent air pressure from the test line to atmosphere, open the cut-out cock to vent air pressure from the brake cylinder and observe that the gauge drops to 0 psig.

After **ALL** air pressure is depleted, remove the brake cylinder from the holding fixture.

If the cylinder has met all test requirements, it may be returned to service.

If the cylinder did not pass the leakage test - repeat the maintenance procedure or **SCRAP** the cylinder.

8.3 **IMPORTANT:** Whenever a "UAHT" Brake Cylinder is removed from an equipment arrangement for any reason, and it is re-installed or replaced with a NEW or repaired and tested cylinder, a stationary vehicle test MUST BE made to be sure that the "UAHT" Brake Cylinder functions properly in the equipment arrangement.

8.4 Consult your Wabtec Corporation Representative if additional information is required.

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