

## operation & maintenance instruction

# "N" TYPE REDUCING VALVE PORTION

APRIL 1982

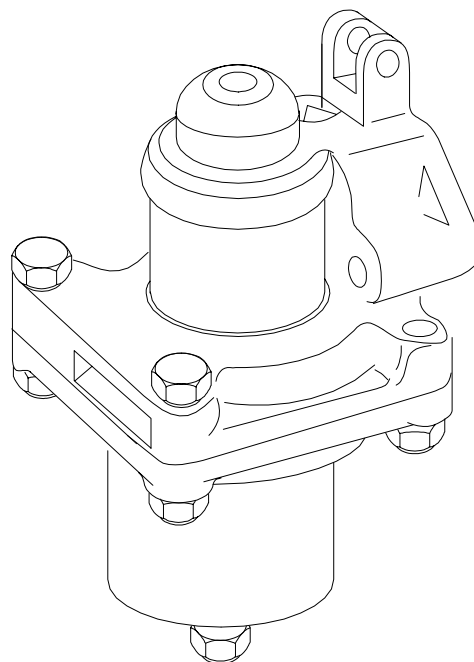
Supersedes Issue dated August 1978

**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.



## 1.0 DESCRIPTION

The "N" Type Reducing Valve Portion is a small capacity, self-lapping, diaphragm operated type regulating valve which reduces an air supply pressure to that of a lower delivery pressure. The delivery pressure is determined by a control spring force that is adjustable within specific limits. The reducing valve portion is available in several pressure ranges up to 150 psi. (Refer to WABCO Parts Catalog 3209-3 for piece numbers and settings). The portion is designed so that it can easily be removed from the pipe bracket or manifold to which it is mounted without disturbing the pipe connections.

## 2.0 OPERATION AND ADJUSTMENT

### 2.1 OPERATION

A control spring force under the diaphragm causes the exhaust valve seat to seal against a ball valve that is part of a two-ball valve "dumbbell" type inlet and exhaust valve unit. The two-ball valve is forced up to open the inlet valve. Supply air can then flow past the open inlet valve into the delivery passage and to the face of the diaphragm, forcing the diaphragm assembly down and compressing the control spring. When air pressure on the diaphragm equals the spring force, the two-ball valve will move down to seal the inlet valve. In this position, the Reducing Valve Portion is in a lap position, since both the inlet and exhaust valves are closed. If delivery air pressure is reduced for any reason, the control spring will again raise the two-ball valve to open the inlet valve, thus increasing the delivery pressure to that which is again equal to the spring force. If delivery air pressure is greater than the control spring force for any reason, the diaphragm assembly will move down to open the exhaust valve. The control spring will return the diaphragm assembly to lap position when delivery pressure on the diaphragm is again equal to the control spring force.

### 2.2 Adjustment

Manual adjustment of delivery pressure is made at the adjusting screw on the control spring. If a higher pressure is desired, the tension on the spring is increased so that a higher delivery pressure will be required to lap the valve portion. If a lower pressure is desired, the tension on the spring is lessened so that a lower delivery pressure will be required to lap the valve portion.

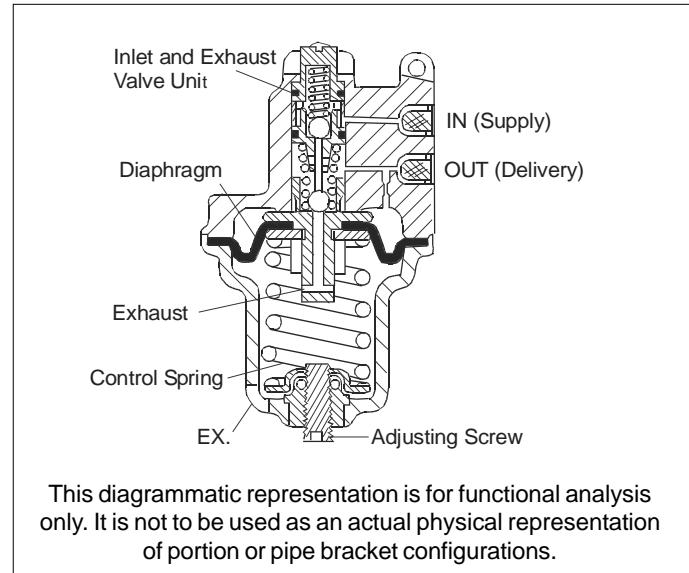


Figure 1 - Diagrammatic View

## 3.0 MAINTENANCE PROCEDURES AND TECHNIQUES

**3.1 IMPORTANT:** THE "N" TYPE REDUCING VALVE PORTION SHOULD BE REMOVED FROM THE VEHICLE, TAKEN TO THE SHOP, THOROUGHLY CLEANED, LUBRICATED AND TESTED ACCORDING TO THE FOLLOWING VEHICLE APPLICATION SCHEDULE OR MORE FREQUENTLY IF SERVICE CONDITIONS SO DICTATE:

| RECOMMENDED<br>TYPE OF APPLICATION | FREQUENCY -<br>AT LEAST ONCE EVERY |
|------------------------------------|------------------------------------|
| Locomotives                        | 12 Months                          |
| Passenger (Interstate)             | 36 Months                          |
| Transit                            | 36 Months                          |

### 3.2 CLEANING SOLVENTS AND LUBRICANTS

3.2.1 The solvent used for cleaning the parts of the Reducing Valve Portion **MUST BE** an aliphatic organic solution such as mineral spirits or naphtha, that will dissolve oil or grease, and that will permit all parts to be cleaned without abrasion.

3.2.2 No. 2 Silicone Grease, Wabtec Corporation Specification M-7680-2, is used to lubricate the o-rings, o-ring grooves, and the bearing surface of the bushings into which the o-ring assemblies are installed.

## operation & maintenance instruction

### 3.3 SPECIAL TOOLS

In addition to the regular shop tools, a holding fixture for disassembling and assembling the exhaust valve unit **MUST BE** available to the repairman. Dimensions and specifications for making this fixture are shown in Figure 2.

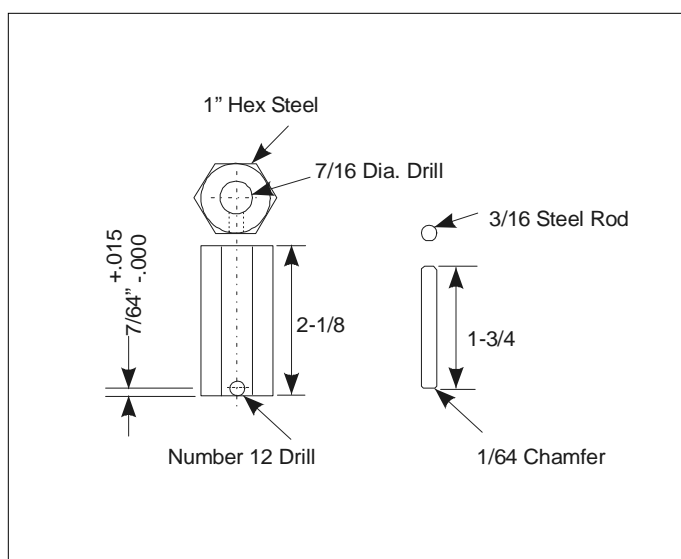


Figure 2 - Holding Fixture (Dwg. R-42-1)

### 3.4 SAFETY PROCEDURES AND WARNINGS

3.4.1 Regular owner-operating property and shop safety procedures are to be followed.

3.4.2 The work area is to be clean.

#### **⚠ WARNING**

The following statements of warning apply all or in part whenever 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.**

### 3.5 DISASSEMBLY (Refer to Figure 3)

3.5.1 Remove the two strainer gaskets (1) and the two strainers (2) from the manifold mounting face of the body (18).

**⚠ 3.5.2 IMPORTANT:** Turn the adjusting screw (17A) located in the spring housing (17) counterclockwise, as viewed from the spring housing end, **TO RELIEVE THE TENSION** on the regulating valve spring (15) **BEFORE ATTEMPTING THE DISASSEMBLY**. **NOTE:** It is not necessary to separate the adjusting screw (17A) from the housing during disassembly unless it is damaged, but care must be taken to insure all spring tension is removed before proceeding with step 3.5.3 to prevent personal injury.

⚠ 3.5.3 Carefully remove the four  $\frac{5}{16}$ " hex nuts (3, 4) which secure the spring housing (17) to the body (18).

**CAUTION:** EXERCISE CARE THAT THE HOUSING (17), SPRING SEAT (16) OR SPRING (15) DO NOT "FLY OUT" AND CAUSE BODILY INJURY.

3.5.4 Remove the spring housing (17), diaphragm-exhaust valve seat assembly (10, 11, 12, 13, 14) as a unit, the spring (15) and spring seat (16).

3.5.5 Remove the two  $\frac{5}{16}$ " cap screws (5) from the body (18). NOTE: The studs (18A) need not be removed from the body (18) unless they are damaged.

3.5.6 Disassemble the exhaust valve seat assembly (10, 11, 12, 13, 14, 15) by removing the following parts from the exhaust valve seat (14).

- a.  $\frac{3}{4}$ " O.D. o-ring (10)
- b.  $\frac{9}{16}$ " Hex nut (11)
- c. Follower (12)
- d. Diaphragm (13)

3.5.7 Remove the exhaust valve spring (9) from the body (18).

3.5.8 Remove the inlet and exhaust valve unit with o-rings (7, 8) from the body (18).

3.5.9 Remove the two  $\frac{3}{4}$ " O.D. o-rings (7) from the valve unit (8).

3.5.10 Disassemble the inlet and exhaust valve unit (8) as follows: (Refer to Figure 4)

- a. Using the holding fixture shown on Figure 2, insert the dumbbell end of the inlet and exhaust valve into the holding fixture so that the cross drill in the holding fixture aligns with the cross drill in the tapered end of the inlet valve seat.
- b. Insert the  $\frac{3}{16}$ " steel rod through the cross drill of the holding fixture and into the cross drill of the inlet valve seat.
- c. Carefully remove the housing from the inlet valve seat.
- d. Remove the spring from the inlet valve seat.
- e. Remove the  $\frac{3}{16}$ " steel rod from the inlet valve seat and the holding fixture.
- f. Remove the inlet valve seat assembly from the holding

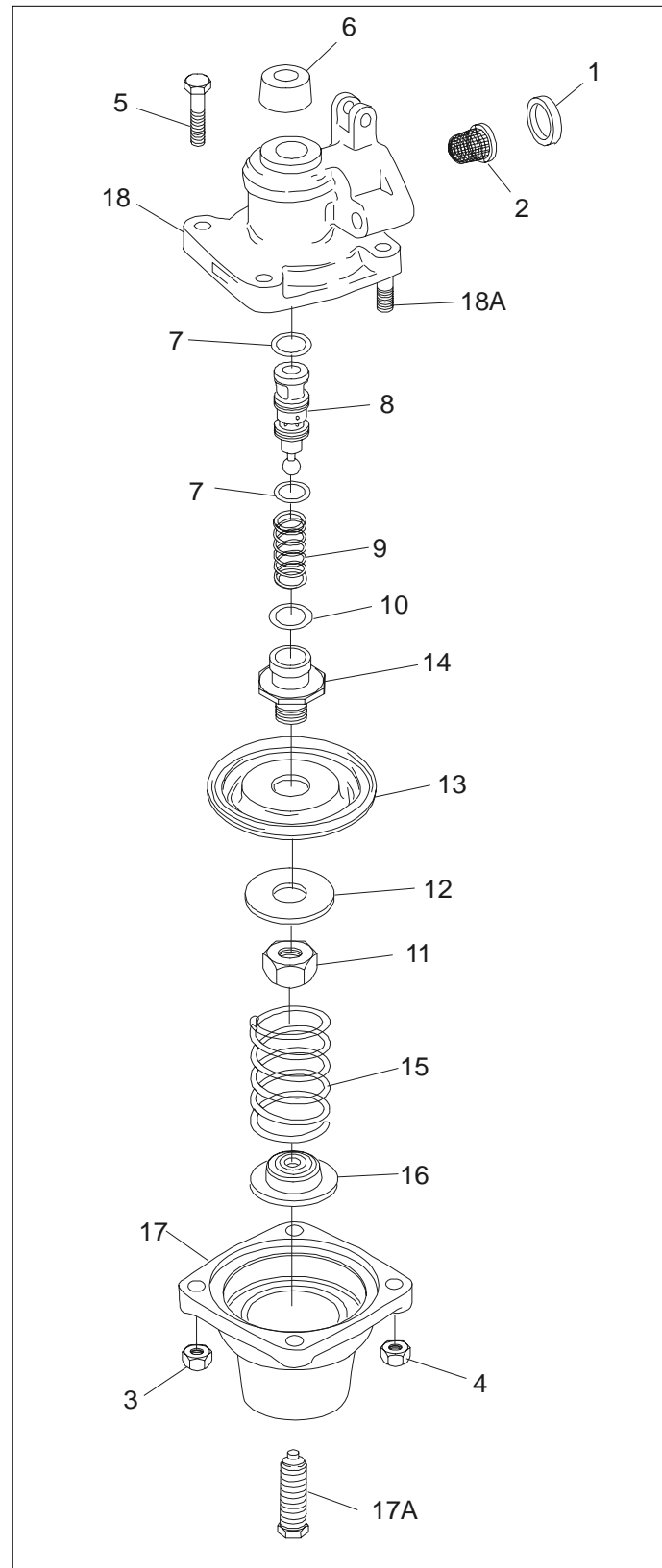


Figure 3 - Exploded View

## operation & maintenance instruction

fixture.

3.5.11 Remove the dirt protector (6) from the body (18).

### 3.6 CLEANING, INSPECTING AND REPAIRING

(Refer to WABCO Parts Catalog 3209-3 when ordering replacement parts. **CAUTION:** The reference numbers used in this publication and those used in the parts catalog may differ. Check the description to insure that the desired part is ordered).

#### 3.6.1 RUBBER PARTS

All rubber parts **MUST BE** discarded and replaced with **NEW** Wabtec Corporation parts.

#### 3.6.2 METAL PARTS

⚠ 3.6.2.1 Wash all of the metal parts in the solvent described in 3.2.1.

⚠ 3.6.2.2 The springs may be wire brushed to assist in the removal of rust and scale.

⚠ 3.6.2.3 After cleaning, blow the parts dry with a pressure jet of clean, dry air.

3.6.2.4 Inspect the parts.

- a. Reject and replace any spring that is rusted, distorted, or that has taken a permanent set.
- b. Reject and replace any part that is cracked, cut, broken, worn excessively, damaged or is in such a condition that would result in unsatisfactory operation.

### 3.7 LUBRICATING AND ASSEMBLING

⚠ 3.7.1 Just prior to assembling, lubricate all o-rings, o-ring grooves and bushings into which the o-ring assemblies are installed with No. 2 Silicone Grease WABCO Specification M-7680-2 as follows:

- a. Coat the o-rings with the grease.
- b. Fill the o-ring grooves with the grease.
- c. Lightly coat the bearing surface of the bushing into which the o-ring assembly is installed with the grease.

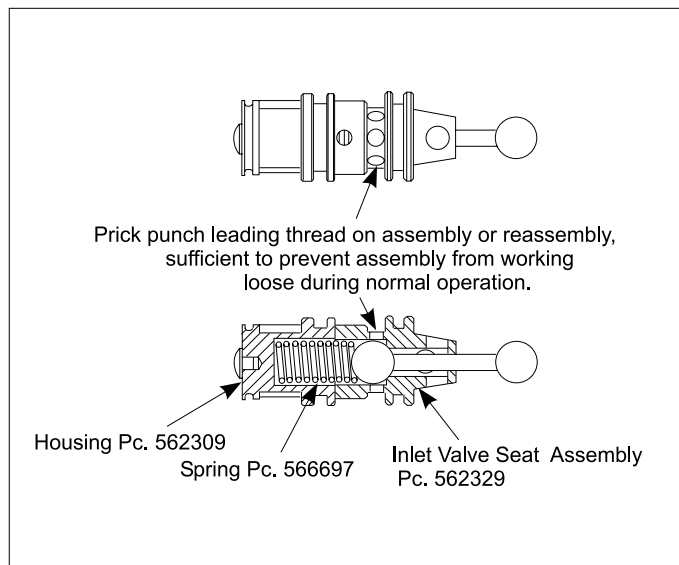


Figure 4 - Inlet and Exhaust Valve Unit - ASSEMBLY

3.7.2 Assemble the inlet and exhaust valve unit as follows: (Refer to Figure 4).

- a. Insert the dumbbell end of the inlet valve seat into the holding fixture so that the cross drill in the holding fixture aligns with the cross drill in the tapered end of the inlet valve seat.
- b. Insert the  $\frac{3}{16}$ " steel rod through the cross drill of the holding fixture and into the cross drill of the inlet valve seat.
- c. Insert the inlet valve spring into the inlet valve seat.
- ⚠ d. Assemble the housing onto the inlet valve seat. **CAUTION:** EXERCISE CARE THAT THE SPRING DOES NOT "FLY OUT" AND CAUSE BODILY INJURY.
- ⚠ e. **IMPORTANT:** Prick punch the leading thread of the seat assembly sufficiently to prevent the inlet and exhaust valve unit from coming apart during normal operations.

- f. Remove the  $\frac{3}{16}$ " steel rod from the inlet valve seat and the holding fixture.
- g. Remove the inlet and exhaust valve unit from the holding fixture.

3.7.3 Install two lubricated  $\frac{3}{4}$ " O.D. o-rings (7) into the grooves on the inlet and exhaust valve unit (8). Remove the excess grease by wiping with a soft, clean, lint-free



cloth.

3.7.4 Insert the inlet and exhaust valve unit with o-rings (7), housing end first, into the valve body (18).

3.7.5 Assemble the diaphragm and exhaust valve seat as follows:

- a. Place the diaphragm (13) and diaphragm follower (12) on the exhaust valve seat (14).
- b. Secure the diaphragm (13), follower (12) and seat (14) together with the  $\frac{9}{16}$ " hex nut (11).

3.7.6 Install a lubricated  $\frac{3}{4}$ " O.D. o-ring (10) in the groove on the exhaust valve seat (14). Remove the excess grease by wiping with a soft, clean, lint-free cloth.

3.7.7 If the adjusting screw (17A) was removed from the spring housing (17), it **MUST BE** replaced at this time. Insert screw a minimum number of threads to prevent spring tension during assembly.

3.7.8 Install the spring seat (16), spring (15) and diaphragm-exhaust valve seat assembly with o-ring (10, 11, 12, 13, 14) into the spring housing (17).

3.7.9 Install the inlet and exhaust valve spring (9) onto the unit (8) which was previously installed in the body (18).

**⚠** 3.7.10 **MAKE SURE** the exhaust opening in the spring housing (17) is located in the direction of the manifold mounting face of the body (18) when placing the spring housing assembly (10 to 17A incl.) on the body (18).

**CAUTION:** EXERCISE CARE SO THAT NO PARTS "FLY OUT" AND CAUSE BODILY INJURY.

3.7.11 Install the two  $\frac{5}{16}$ " x  $1\frac{3}{8}$ " hex head cap screws (5)

through the aligned holes of the spring housing (17) and the body (18).

3.7.12 Install two  $\frac{5}{16}$ " nuts (3) on the two  $\frac{5}{16}$ " screws (5) and two  $\frac{5}{16}$ " nuts (4) on the two  $\frac{5}{16}$ " studs (18A) of the body (18). Equally tighten the nuts (3, 4) to secure the body and spring housing assemblies (17, 18) together.

3.7.13 **MAKE SURE** the two strainers (2) and two gaskets (1) are installed into the ports of the manifold mounting face of the body (18) to filter the air to the device.

3.7.14 Install the dirt protector (6) over the housing end of the inlet and exhaust valve unit (8) and onto the body (18).

#### 4.0 TESTING AND ADDITIONAL INFORMATION

4.1 After the "N" Type Reducing Valve Portion has been assembled, **BUT BEFORE** it is returned to service, it **MUST PASS** a series of tests following the procedure of the current issue of the WABCO Test Specification T-1605-0.

4.2 When mounting the Portion, after it has passed the test, **NEW** mounting gaskets **MUST BE** used.

4.3 **IMPORTANT:** **WHENEVER AN "N" TYPE REDUCING VALVE PORTION IS REMOVED FROM THE BRAKE EQUIPMENT ARRANGEMENT FOR ANY REASON, AND IT IS REMOUNTED OR REPLACED WITH A NEW OR REPAIRED AND TESTED PORTION, A STANDING VEHICLE AIR BRAKE TEST MUST BE MADE TO INSURE THAT THE PORTION FUNCTIONS PROPERLY IN THE BRAKE EQUIPMENT ARRANGEMENT.**

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