

Operation & Maintenance Instruction

VX™ VENT VALVE PORTION, PART NO. 699505

SEPTEMBER, 2017

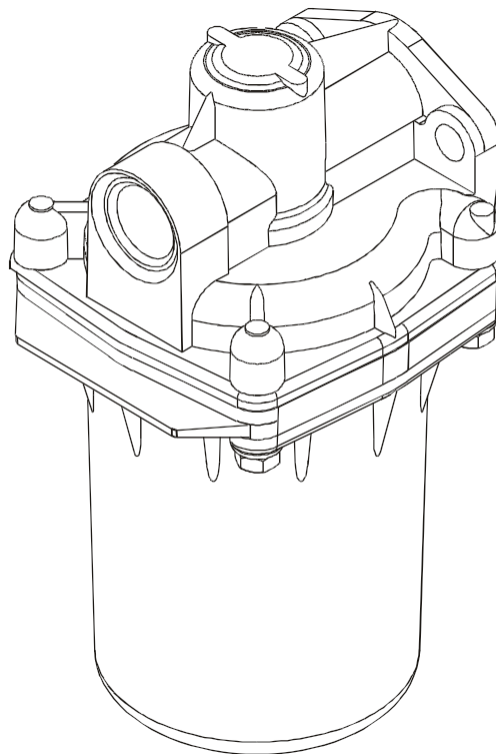
Supersedes issue dated December, 2003

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 Corporation Representative for identity of the test specification, with latest revision date, that covers this device.)

IMPORTANT: Only Wabtec Corporation 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.





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NOTE: The following description and operation is based on 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 Wabtec Corporation, or its predecessor, the Westinghouse Air Brake Company.

1.0 DESCRIPTION

The VX Vent Valve Portion is a double diaphragm type valve which, when properly installed and maintained, functions to deplete brake pipe air locally at a rapid rate to assist in propagating an emergency brake application whenever the main line of brake pipe is reduced at an emergency rate. The VX Vent Valve Portion features increased emergency venting capacity and jump distance capabilities. A unique diaphragm design incorporated within the Portion eliminates the need for a separate venting piston and provides a self-

purging action. Operation of a VX Vent Valve Portion at one location (in a train consist) aids in producing an emergency rate of brake pipe reduction at the next locomotive unit or car and action of the Vent Valve Portion on each succeeding unit or car assists in a fast transmission of an emergency brake signal through an open train line pipe.

The VX Vent Valve Portion is designed so that it can be readily removed from the pipe bracket, laminate, mounting plate, or branch pipe tee on which it is mounted, for maintenance or repair. Provision is made for the attachment of a vent protector arrangement at the exhaust port of the Portion body.

The VX Vent Valve Portion may be used in equipment arrangements where the air pressure does not exceed 150 psig. Special installation procedures are required when installing the VX Vent Valve Portion in specific equipment arrangements. Consult your Wabtec Corporation Representative for information on your required applications.

2.0 OPERATION

NOTE: The views shown in Figures 1, 2, 3 and 4 are diagrammatic representations for functional analysis only. They are not to be used as actual physical representations of the VX Vent Valve Portion.

2.1 RELEASE AND RUNNING

Brake pipe air under pressure entering Port 1 flows through the metal screen filter into cavity b, on the non-spring side of the vent valve diaphragm assembly, through passage B into cavity b1, above the control diaphragm and piston assembly, past the control piston seat of the body and into cavity b2 on the spring side of the vent valve diaphragm assembly. Brake pipe air flow continues through the passage in the seated piston where it is blocked by the exhaust valve. Brake pipe air under pressure in cavity b1 flows through the charging choke into the control pressure volume Q.

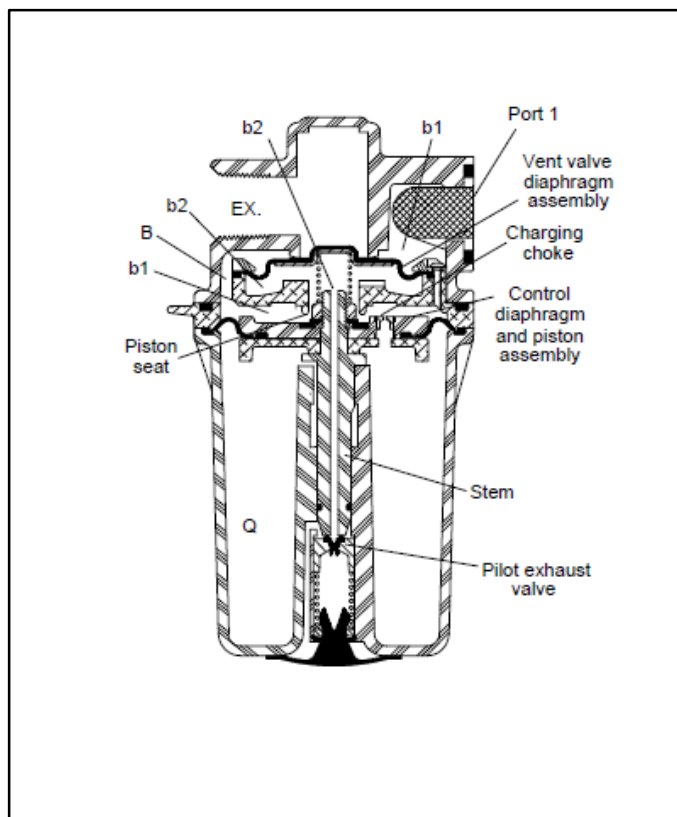


Figure 1 - Release and Running Diagrammatic View

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2.2 EMERGENCY - FIRST STAGE

When an emergency rate of brake pipe reduction occurs, the brake pipe air pressure in cavities b, b1 and b2 is reduced rapidly creating a differential between the brake pipe pressure in cavities b, b1 and b2 and the air pressure in the control pressure volume Q. This causes the control diaphragm and piston assembly to move, unseating the piston stem from its seat on the exhaust valve and seating the piston on the piston seat of the body. The seating of the piston isolates cavity b2 from cavity b1. Air pressure in cavity b2 is then directed to exhaust through the passage in the unseated piston stem at the exhaust valve. Cavity b2 is exhausted quickly due to its small volume.

2.3 EMERGENCY - SECOND STAGE

The rapid exhaust of air pressure from cavity b2 creates a differential on the non-spring side of the vent valve diaphragm assembly causing this assembly to move away from its seat and connects brake pipe air from port 1 and cavities b and b1 to exhaust (Port EX). Air pressure in the control pressure volume Q then flows to atmosphere through the charging choke of the control piston, cavity b1, passage B, cavity b and port EX, when the air pressure in the control pressure volume Q is vented, the vent valve diaphragm assembly and the control diaphragm and piston assembly are returned to the Release Position by the force exerted by the spring.

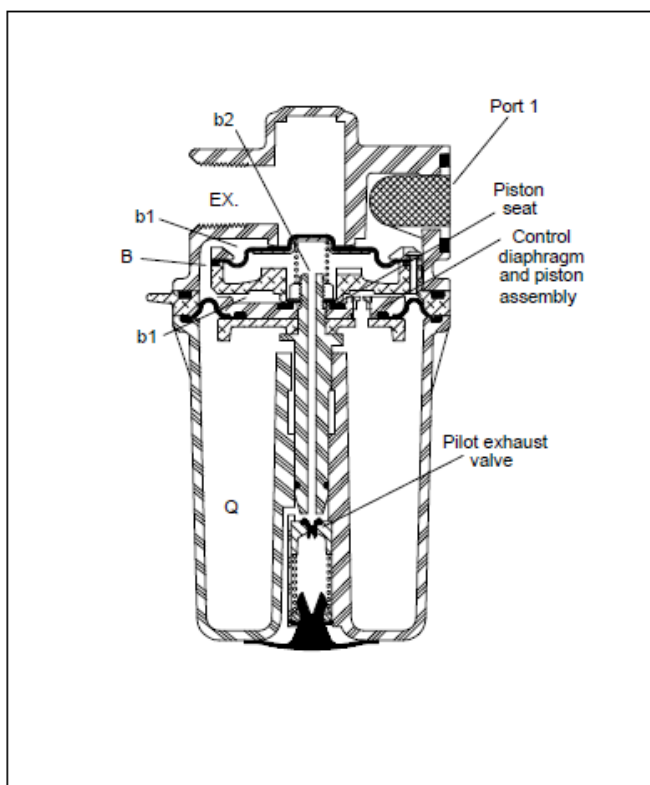


Figure 2 - Emergency Position - 1st Stage Diagrammatic View

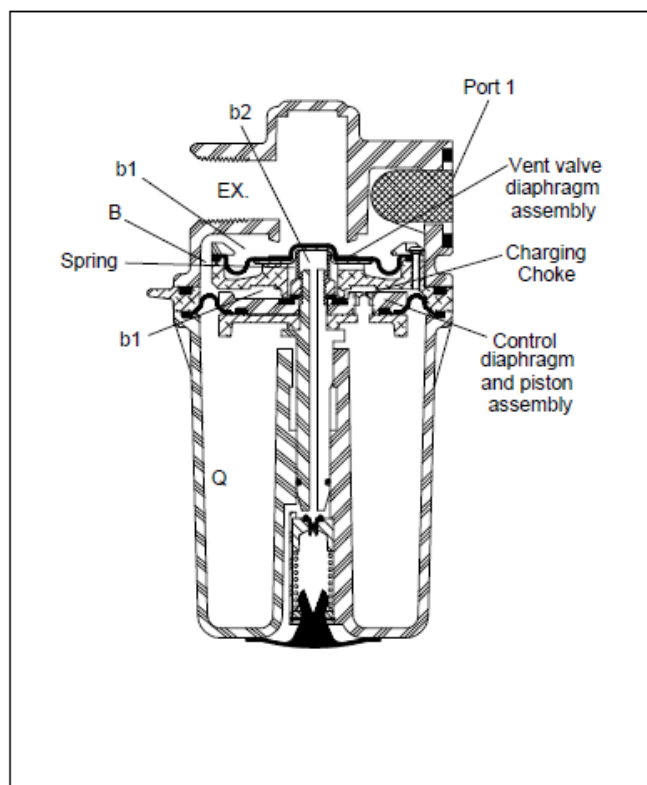


Figure 3 - Emergency Position - 2nd Stage Diagrammatic View



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3.0 MAINTENANCE SCHEDULE

3.1 **IMPORTANT:** The VX Vent Valve Portion is to be removed from the equipment arrangement and taken to the shop, be completely disassembled, the parts cleaned, inspected, lubricated and then reassembled using **NEW** Wabtec Corporation rubber parts and other **NEW** Wabtec Corporation parts as specified in accordance with the following vehicle application schedule, or more frequently, if service conditions so indicate. The assembled portion is then to be tested for correct operation.

Recommended Type of Application	Frequency - At Least Once Every
Freight Cars	120 Months
Locomotives	12 Months
Passenger (Interstate)	36 Months
Transit	24 Months

4.0 PARTS CATALOG AND REPLACEMENT PARTS

4.1 PARTS CATALOG

4.1.1 **IMPORTANT:** When ordering replacement parts for the VX Vent Valve Portion, Part No. 699505, refer to the current issue of the Wabtec Corporation Parts Catalog 3211-7, S.7.

NOTE: The reference numbers used in the Parts Catalog and those used in this publication may differ. Check the part number and the descriptive part name to be sure that the desired part is ordered.

4.2 REPLACEMENT PARTS

4.2.1 **IMPORTANT:** To obtain satisfactory operation and reliability of the VX Vent Valve Portion, **ONLY** Wabtec Corporation replacement parts are to be used in the maintenance of this portion.

5.0 SAFETY PROCEDURES AND WARNINGS

WARNINGS:

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 care taken to avoid possible injury when performing any work on this device and/or component part.



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- To prevent receiving electrical shock when performing electrical test, 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, LUBRICANT, SEALANT AND SPECIAL TOOLS

6.1.1 The solvent used to clean the reusable parts of the VX Vent Valve Portion **MUST BE** an aliphatic hydrocarbon solvent, such as mineral spirits or naphtha, that will dissolve oil or grease and that will permit the parts to be cleaned without abrasion.

IMPORTANT: Cleaning solvents are to be used in a well ventilated area.

6.2 LUBRICANTS

6.2.1 Number 2 Silicone Grease, Wabtec Corporation Specification M-7680-2, (Industry Designation MIL-G-4343), such as Dow Corning Corporation Dow Corning 55, is required for the lubrication of specified o-rings, o-ring grooves and the o-ring bearing surfaces of the bushing(s) which will be in contact with the o-rings.

6.2.2 A compound consisting of one part of graphite, Wabtec Corporation Specification M-7695-2, (AAR Specification M-913), such as Super Flake Graphite Company - Superfine Number 597 Joseph Dixon Crucible Company - Microfyne Graphite or National Carbon Company Number 38 or 39 Graphite, and two parts of SAE-20 oil by weight is required for the lubrication of the threads of the cleaned or **NEW** piston choke plug prior to the installation of this choke plug in the piston.

6.3.1 Locking Sealant, Wabtec Corporation Specification M-7499-05, such as Loctite Corporation TL-242, is required for application to the threads of the piston stem prior to the installation of the piston jam nut.

7.0 MAINTENANCE PROCEDURES

NOTE: When performing the procedures which follow, **DO NOT** use hard or sharp tools to remove o-rings, gaskets, seals or the diaphragms. Exercise care so that no damage is done to reusable parts.

⚠ WARNING: When performing the procedures which follow, springs within the assembly may be placed under compression. Exercise care so that no parts are inadvertently expelled. Inadvertently expelled parts may cause bodily injury and/or damage to parts.

7.1 DISASSEMBLY

NOTE: The VX Vent Valve Portion weighs approximately 7 pounds.

7.1.1 If the mounting gasket is still in its groove in the mounting face of the body (2), it is to be removed and **SCRAPPED**. The gasket IS NOT a part of the VX Vent Valve Portion and is not illustrated.

7.1.2 Remove and **SCRAP** the wire mesh strainer (3) from its port in the body (2).

7.1.3 Remove the four $\frac{3}{8}$ " x $1\frac{1}{2}$ " hex. head cap screws (1) which secure the housing (19), filling piece (9), and body (2) together.

7.1.4 Carefully remove the body (2) from the filling piece (9), then remove the filling piece with diaphragm and diaphragm clamping plate subassembly (5, 6, 7, 9) from the housing (19) as a unit.

7.1.4.1 Remove the spring (8).

7.1.5 Remove the three #8 x $\frac{1}{2}$ " button head screws (5) which secure the diaphragm clamping plate (6), diaphragm (7) and filling piece (9) together.

7.1.6 Remove the diaphragm clamping plate (6) and diaphragm (7) from the filling piece (9). **SCRAP** the diaphragm (7).

7.1.7 Remove and **SCRAP** the $5\frac{1}{4}$ " O.D. o-ring (4) from its groove in the filling piece (9).

7.1.13 Remove the piston-diaphragm sub-assembly (13, 14, 15) as a unit from the piston stem (17) and diaphragm follower (16).

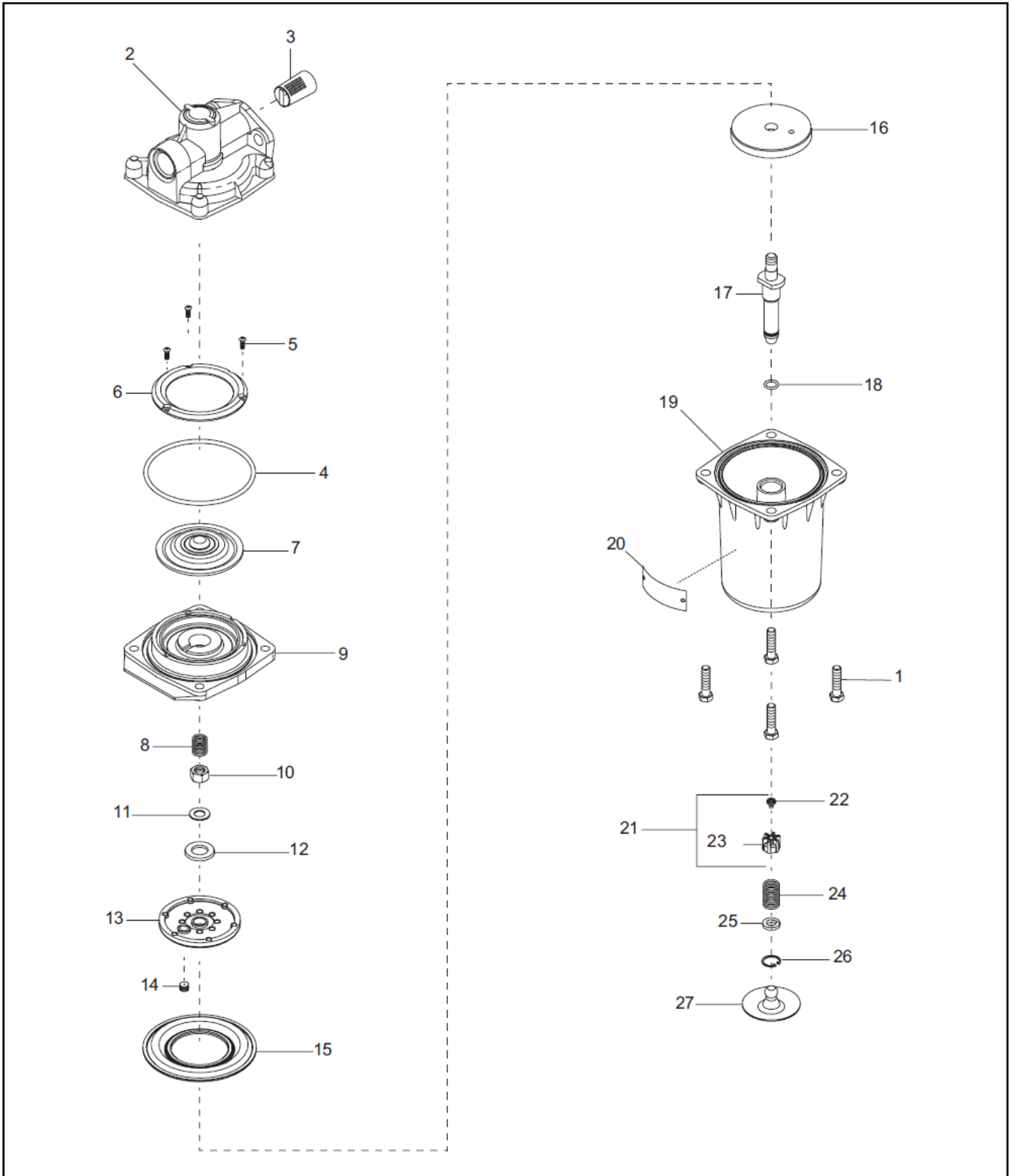


Figure 4 - VX Vent Valve Portion



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7.1.14 Remove and SCRAP the diaphragm (15) from the piston (13).

7.1.15 Remove the diaphragm follower (16) from the piston stem (17).

7.1.16 Remove and SCRAP the vent protector seal (27) from the washer (26) in the bottom of the housing (19). The seal has an interference fit with the washer and can be pulled out.

7.1.17 **⚠ WARNING:** During the following procedure, the spring (24) will be compressed. Exercise care so that no parts are inadvertently expelled from the assembly. Inadvertently expelled parts may cause bodily injury and/or damage to property.

Carefully depress the washer (25) and spring (24) into the housing (19), then, while holding these parts depressed, remove the retaining ring (26) from its groove in the housing (19). Slowly release the hold on the washer (25) and spring (24) permitting the spring (24) to extend its full travel.

7.1.18 Remove the washer (25), spring (24) and exhaust valve with seal (21) from the housing (19).

7.1.19 Remove and SCRAP the exhaust valve seal (22) from the exhaust valve (23).

7.2 Cleaning and Inspecting

7.2.1 NON-REUSABLE PARTS

7.2.1.1 **ALL** gaskets, o-rings, seals, the wire mesh strainer and diaphragms **ARE TO BE SCRAPPED** and replaced with **NEW** Wabtec Corporation parts.

NOTE: A Kit of Rubber Parts for the VX Vent Valve Portion is available and may be obtained by ordering Part Number 654716. See Parts Catalog 3211-7, S.7 for parts included in this Kit.

7.2.2 BODY AND HOUSING

IMPORTANT: Cleaning solvents are to be used in a well ventilated area.

7.2.2.1 Using a clean, lint-free rag that has been saturated with the cleaning solvent, as described in Section 6.1.1, clean the interior and exterior surfaces of the body (2) and housing (19).

7.2.2.2 After these 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 body (2) and housing (19) for damage. Pay particular attention to the bushings within the housing. The bushings should be free of nicks, scratches and pits. Replace the body and/or housing if found to be damaged, or if they show signs of excessive wear, or if they are in such a condition that may result in the unsatisfactory operation of the VX Vent Valve Portion.

7.2.3 EXHAUST VALVE

7.2.3.1 Dip the exhaust valve (23) in a bath of the prescribed cleaning solvent, Section 6.1.1 and promptly wipe it clean with a clean, lint-free cloth.

7.2.3.2 Blow the exhaust valve (23) completely dry, using a low pressure jet of clean, dry air.

7.2.3.3 Inspect the exhaust valve (23). It is to be replaced if it is found to be nicked, cut, cracked, broken, or damaged in any way, or if it is in such a condition that may result in the unsatisfactory operation of the VX Vent Valve Portion.

7.2.4 REMAINING REUSABLE PARTS

7.2.4.1 Wash all remaining reusable parts using the cleaning solvent as described in Section 6.1.1.

7.2.4.2 The springs (8, 24) may be wire brushed to assist in the removal of any dirt, rust or scale.

7.2.4.3 After the parts have been cleaned, they **MUST BE** completely dried. Use a low pressure jet of clean, dry air blow to the parts dry.

7.2.4.4 Inspect the piston (13). Replace the piston if it is bent, broken, damaged, excessively worn, or if it is in such a condition that may result in the unsatisfactory operation of the VX Vent Valve Portion.

7.2.4.4.1 Remove the 1/8" choke plug (14) from the piston (13) and place it in a bath of the cleaning solvent to soak.

7.2.4.4.2 While the choke plug is soaking, inspect the opening in the piston (13) from which the choke plug (14) was removed to be sure that it is clean and free of dirt. If necessary, blow the opening clean with a low pressure jet of clean, dry air.

7.2.4.4.3 Remove the choke plug (14) from its solvent and blow it completely dry, using a low pressure jet of clean, dry air.

7.2.4.5 Inspect the piston (13). Replace the piston if it is bent, broken, damaged, excessively worn, or if it is in such a condition that may result in the unsatisfactory operation of the VX Vent Valve Portion.

7.2.4.6 Inspect the orifice of the choke plug (14) to be sure that it is clean and that its size, 1.1mm Drill, has not been changed. **DO NOT** use hard or sharp metal tools to clean the orifice as its size and shape **MUST NOT** be changed. Replace the choke plug if it is damaged in any way or if the size of the orifice, 1.1mm Drill, has been changed.

7.2.4.7 Lightly coat the threads of the cleaned and inspected or **NEW** choke plug (14) with the oil and graphite compound as described in Section 6.2.2, then install the choke plug (14) in place in the piston (13). The choke plug it to be installed at its full travel in the piston (13).

7.2.4.8 Inspect the piston stem (17). Replace the stem if it is found to be bent, cracked, broken, damaged in any way, or if the size of the passage way of the stem has been changed, (the size of the passage way **MUST BE** a 0.156" Drill) or if the stem is in such a condition that may result in the unsatisfactory operation of the VX Vent Valve Portion. Be sure that all of the old locking sealant is cleaned from the stem threads.

7.2.4.9 Inspect the springs (8,24). Replace any spring that is cracked, rusted, pitted, broken, bent damaged in any way, or if it has taken a permanent set.


7.2.4.10 Inspect the retaining ring (26). Replace the retaining ring (26) if it is not elastic enough to hold securely.

7.2.4.11 Inspect the remaining parts. Replace any part that is cracked, cut, bent, broken, excessively worn, damaged in any way, or that is in such a condition that may result in the unsatisfactory operation of the VX Vent Valve Portion.

7.3 ASSEMBLY

7.3.1 Apply Number 2 Silicon Grease, Wabtec Corporation Specification M-7680-2 to a **NEW** exhaust valve seal (22) and press in place in the exhaust valve (23), then install the exhaust valve with seal (21), seal end first, into the bushing in the bottom of the housing (19).

7.3.2 Install the exhaust valve spring (24) into the bottom of the housing (19) so that the spring (24) is seated on the exhaust valve (23), then install the washer (25) so that it seats on the spring (24).

7.3.3  **WARNING:** In the procedure which follows, the spring (22) will be compressed. Exercise care so that no parts are inadvertently expelled from the assembly.

Carefully depress and hold the washer (25) and spring (24) far enough into the bushing in the housing (19) to expose the retaining ring groove, then while holding these parts depressed, install the retaining ring (26) being sure that it "snaps" into its groove. Slowly release the hold on the washer (25) and spring (24) permitting the spring (24) to extend its full travel to seat the washer (25) on the retaining ring (26).

7.3.4 Apply Number 2 Silicon Grease, Wabtec Corporation Specification M-7680-2 to a **NEW** vent protector seal (27) and press in place in the washer (25). The seal (27) will have an interference fit in the washer.

7.3.5 Install a **NEW** diaphragm (15) on the piston (13, 14) and be sure that the inner bead of the diaphragm fits into the bead groove of the piston (13).

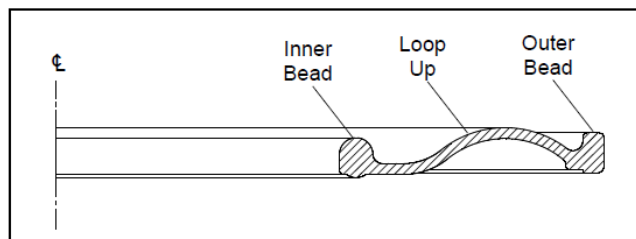


Figure 5 – Piston Diaphragm (15)

7.3.6 Install the diaphragm follower (16), flat side up, onto the threaded end of the piston stem (17), then install the diaphragm and piston sub-assembly (13, 14, 15) so that the diaphragm (15) contacts the diaphragm follower (16).

7.3.7 Install a **NEW** seal seat (12) in place in its groove on the piston (13).

7.3.8 Install the washer (11) on the piston stem (17) so that it contacts and seats on the seal - seat (12).

7.3.9 Apply a coating of locking sealant, Wabtec Corporation Specification M-7499-5, to the exposed threads of the piston stem (17).



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IMPORTANT: The locking sealant is to be applied according to the instructions of the locking sealant manufacturer.

7.3.10 Install the $\frac{1}{2}$ " jam nut (10) on the threaded end of the piston stem (17) and snug it against the washer (11). Using a $\frac{7}{8}$ " open end wrench on the flats of the piston stem (17) to hold the sub-assembly, torque the $\frac{1}{2}$ " jam nut (10) to 30 to 35 foot-pounds.

NOTE: The diaphragm - piston - follower - piston stem sub-assembly (10 to 17) **MUST BE** set aside to permit the locking sealant to cure. See locking sealant manufacturer instructions for proper curing time.

7.3.11 Apply a light coating of Number 2 Silicone Grease, Wabtec Corporation Specification M-7680-2, to the surfaces of a **NEW** $\frac{11}{16}$ " O.D. o-ring (18). Also, fill the o-ring groove on the piston stem (17) and lightly lubricate the lower bushing of the housing (25), the bushing which the o-ring will contact, with the lubricant.

7.3.12 Install the **NEW** lubricated $\frac{11}{16}$ " O.D. o-ring (18) in its groove on the piston stem (17). Remove any excess lubricant by wiping with a clean, dry, lint-free cloth.

7.3.13 Install the diaphragm - piston - follower - piston stem sub-assembly (10 to 18) as a unit into the housing (19) so that the piston stem with o-ring (17, 18) enters the bushing in the housing (19) and the outer bead of the diaphragm (15) fits into the bead groove of the housing (19). Apply finger pressure to seat the bead of the diaphragm (15) in its groove.

7.3.14 Install the control spring (8) over the exposed threads of the piston stem (17) so that the spring (8) seats on the top of the jam nut (10).

7.3.15 Install a **NEW** diaphragm (7) in place in the filling piece (9) so that the metal spring cup of the diaphragm faces the filling piece (9) and the bead of the diaphragm (7) enters the bead groove of the filling piece (9). Apply finger pressure to seat the bead of the diaphragm in its groove.

7.3.16 Place the diaphragm clamping ring (6) over the diaphragm (7) and on the filling piece (9) being sure that the three screw holes of the clamping plate (6) are aligned with the tapped holes in the filling piece (9).

7.3.17 Install three #8 x $\frac{1}{2}$ " button head screws (5) through the aligned holes of the diaphragm clamping ring (6) and the filling piece (9). Equally tighten the screws to maintain alignment and secure the sub-assembly. Torque the screws to 20-23 in-lbs.

7.3.18 Install a **NEW** $5\frac{1}{4}$ " O.D. o-ring (4) into its groove in the filling piece (9). Apply Number 2 Silicon Grease, Wabtec Corporation Specification M-7680-2 to the O-ring and groove.

7.3.19 Place the filling piece - diaphragm sub-assembly (4 to 9) onto the housing (19) and over the spring (8) so that the spring (8) fits inside the spring cup of the diaphragm (7) and so that the mounting screw holes of the filling piece (9) are aligned with the four screw holes of the housing (19).

7.3.20 Place the body (2) onto the filling piece (9) so that the exhaust port of the body (2) faces the same direction as the VX Vent Valve tab on the filling piece (9), then install four $\frac{3}{8}$ " x $1\frac{1}{2}$ " hex. head cap screws (1) through the aligned holes of the housing (19) and filling piece (9) and into the body (2). Equally tighten the screws (1) in an alternating fashion to 20-25 ft-lbs.

7.3.21 Install a **NEW** wire mesh strainer (3) in place in the inlet port #1 of the body.

8.0 TESTING AND ADDITIONAL INFORMATION

8.1 **IMPORTANT:** After the VX Vent Valve Portion, Part No. 699505, has been assembled, **BUT BEFORE** it is returned to service, it **MUST PASS** a series of test following the procedures of the current issue of the Wabtec Corporation Test Specification T-4322-O.

8.2 **IMPORTANT:** Whenever the VX Vent Valve Portion, Part No. 699505, is removed from an equipment arrangement for any reason, and it is reinstalled or replaced with a **NEW** or repaired and tested VX Vent Valve Portion, a **NEW** mounting gasket **MUST BE** used. This 1" flange fitting gasket, Part No. 93986, is not a part of the VX Vent Valve Portion, but it is included in the Rubber Parts Kit, Part No. 654716.

8.3 **IMPORTANT:** Whenever the VX Vent Valve Portion, Part No. 699505, is removed from an equipment for any reason, and it is reinstalled or replaced with a **NEW** or repaired and tested VX Vent Valve Portion, a stationary vehicle test **MUST BE** made to be sure that the VX Vent Valve Portion functions properly in the total equipment arrangement.

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



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