

# PVR PINCH-TUBE VALVES

O. M. 09327

DATE OF ISSUE: 08/26/83

REVISION: H, 03/14

## **WARNING**

**Do not proceed with these instructions until you have READ the orange cover of this MANUAL and YOU UNDERSTAND its contents. \***

**These WARNINGS are included for the health and safety of the operator and those in the immediate vicinity.**

**\*If you are using a Clemco Distributor Maintenance and Part Guide, refer to the orange warnings insert preceding the Index before continuing with the enclosed instructions.**

**Electronic files include a Preface containing the same important information as the orange cover.**

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## **WARNING**

- Employers are responsible for identifying all job site hazards, educating and training all persons who will operate and maintain these products, and ensuring that all blast operators and their assistants understand the warnings and information contained in these instructions relating to safe and proper operation and maintenance of this equipment.
- Serious injury or death can result from failure to comply with all Occupational Safety and Health Administration (OSHA) regulations and all manufacturer's instructions.
- This equipment is not intended for use in any area considered hazardous per National Electric Code NFPA 70 2011, Article 500.
- Read this document and follow all instructions before using this equipment.

OSHA regulations relating to abrasive blasting are contained in the Code of Federal Regulations, Title 29 (29 CFR 1910 General Industry; 1915 Maritime; 1926 Construction). The most pertinent include: 1910.94 Ventilation, 1910.95 Occupational Noise Exposure, 1910.132 Personal Protective Equipment, 1910.133 Eye and Face Protection, 1910.134 Respiratory Protection, 1910.135 Head Protection, 1910.244 (b) Remote Controls. Consult [www.osha.gov](http://www.osha.gov) for complete information.

### **NOTICE TO PURCHASERS AND USERS OF OUR PRODUCTS AND THIS INFORMATIONAL MATERIAL**

Clemco proudly provides products for the abrasive blast industry and is confident that industry professionals will use their knowledge and expertise for the safe and efficient use of these products.

The products described in this material, and the information relating to these products, are intended for knowledgeable, experienced users.

No representation is intended or made as to: the suitability of the products described here for any purpose or application, or to the efficiency, production rate, or useful life of these products. All estimates regarding production rates or finishes are the responsibility of the user and must be derived solely from the user's experience and expertise, not from information contained in this material.

It is possible that the products described in this material may be combined with other products by the user for purposes determined solely by the user. No representations are intended or made as to the suitability of or engineering balance of or compliance with regulations or standard practice of any such combination of products or components the user may employ.

Abrasive blast equipment is only one component of an abrasive blasting job. Other products, such as air compressors, air filters and receivers, abrasives, scaffolding, hydraulic work platforms or booms, equipment for lighting, painting, ventilating, dehumidifying, parts handling, or specialized respirators or other equipment, even if offered by Clemco, may have been manufactured or supplied by others. The information Clemco provides is intended to support the products Clemco manufactures. Users must contact each manufacturer and supplier of products used in the blast job for warnings, information, training, and instruction relating to the proper and safe use of their equipment.

### **GENERAL INSTRUCTIONS**

This material describes some, but not all, of the major requirements for safe and productive use of blast machines, remote controls, respirator systems, and related accessories. All equipment and accessories must be installed, tested, operated and maintained only by trained, knowledgeable, experienced users.

The blast operator and all workers in the vicinity must be properly protected from all job site hazards including those hazards generated by blasting.

Work environments involving abrasive blasting present numerous hazards. Hazards relate to the blast process from many sources that include, but are not limited to, dust generated by blasting or from material present on the surface being blasted. The hazards from toxic materials may include, but are not limited to, silica, cyanide, arsenic, or other toxins in the abrasives or in the coatings, such as lead or heavy metals. Other hazards from toxins include, but are not limited to, fumes from coating application, carbon monoxide from engine exhaust, contaminated water, chemicals or asbestos. In addition, physical hazards that may be present include, but are not limited to, uneven work surfaces, poor visibility, excessive noise, and electricity. Employers must identify all job site hazards and protect workers in accordance with OSHA regulations.

Never modify Clemco equipment or components or substitute parts from other manufacturers for any Clemco components or parts. Any unauthorized modification or substitution of supplied-air respirator parts violates OSHA regulations and voids the NIOSH approval.

### **IMPORTANT**

Contact Clemco for free booklets:

*Blast Off 2 – Guide to Safe, Productive, and Efficient Abrasive Blasting, and Abrasive Blasting Safety Practices – Guide to Safe Abrasive Blasting.*

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# OPERATIONAL INSTRUCTIONS

### *OPERATOR SAFETY EQUIPMENT*

## **WARNING**

- OSHA regulation 1910.134 requires appropriate respiratory protection for blast operators and workers in the vicinity of blasting. These workers must wear properly-fitted, properly-maintained, NIOSH-approved, respiratory protection that is suitable for the job site hazards. Blast respirators are to be worn only in atmospheres not immediately dangerous to life or health from which wearers can escape without use of the respirator.
- The employer must develop and implement a written respiratory protection program with required worksite- specific procedures and elements for required respirator use. The employer must provide effective training to employees who are required to use respirators. The training must be comprehensive, understandable, and recur annually, and more often if necessary.
- NEVER use abrasives containing more than one percent crystalline silica. Fatal diseases, such as silicosis, asbestosis, lead or other poisoning, can result from inhalation of toxic dusts, which include, but are not limited to, crystalline silica, asbestos, and lead paint. Refer to NIOSH Alert 92-102; and OSHA CPL 03-00-007: “National Emphasis Program – Crystalline Silica”, in which OSHA describes policies and procedures for implementing a national emphasis program to identify and reduce or eliminate health hazards from exposure to crystalline silica. Numerous topics associated with the hazards of crystalline silica in silica blasting sand can be found on [http:// osha.gov/](http://osha.gov/). Clemco urges users of silica blasting sand to visit this website, and read and heed the information it contains.
- Always make sure the breathing air supply (respirator hose) is not connected to plant lines that supply gases that include, but are not limited to, oxygen, nitrogen, acetylene, or other non-breathable gas. Never modify or change respirator air line connections without first testing the content of the line for safe breathing air. Failure to test the line may result in death to the respirator user.

- Breathing air quality must be at least Grade D, as defined by the Compressed Gas Association specification G-7.1, per OSHA Regulation 29 CFR 1910.134. When compressed air is the breathing air source, a Clemco CPF (suitable sorbent bed filter) should be used. Respirator hose connecting the respirator to the filter must be NIOSH approved. Non- approved hose can cause illness from chemicals employed to manufacture the hose.

- All workers must always wear NIOSH-approved respirators when any dust is present. Exposure to dust can occur when handling or loading abrasive, blasting, cleaning up abrasive, or working in the vicinity of blasting. Before removing the respirator, test the air with a monitoring device to ensure it is safe to breathe.

- Clemco respirators DO NOT remove or protect against carbon monoxide or any other toxic gas. Monitoring devices must be used in conjunction with the respirator to ensure safe breathing air. Always locate compressors and ambient air pumps where contaminated air will not enter the air intake.

- Always use Clemco lenses with Clemco respirators; installing non-approved lenses voids the NIOSH approval. Respirator lenses are designed to protect the wearer from rebounding abrasive; they do not protect against flying objects, heavy high-speed materials, glare, liquids, or radiation.

### *INDUSTRY ORGANIZATIONS*

For additional information, consult:

Occupational Safety and Health Administration (OSHA) - [www.osha.gov](http://www.osha.gov)

Compressed Gas Association (CGA) - [www.cganet.com](http://www.cganet.com)

The Society for Protective Coatings (SSPC) - [www.sspc.org](http://www.sspc.org)

National Association of Corrosion Engineers (NACE) - [www.nace.org](http://www.nace.org)

American Society for Testing and Materials (ASTM) - [www.astm.org](http://www.astm.org)

National Institute of Occupational Safety and Health (NIOSH) - [www.niosh.gov](http://www.niosh.gov)

American National Standards Institute (ANSI) - [www.ansi.org](http://www.ansi.org)

# PREFACE

## ***BLAST MACHINES AND REMOTE CONTROLS***

### **⚠ WARNING**

OSHA regulation 1910.169 describes the necessity of pressure relief valves on compressed air equipment. Do not operate blast machines with air compressors that are not equipped with properly functioning pressure relief valves.

OSHA regulation 1910.244(b) requires the use of remote controls on blast machines.

Serious injury or death can result from many sources, among them:

- Involuntary activation of the remote controls. Never modify or substitute remote control parts; parts are not compatible among different manufacturers. Welding hose is not suitable for remote control hose. Its ID and material composition make it unsafe for remote control use.
- Exceeding the maximum working pressure. Clemco blast machines are built to ASME-code and carry a 'U' or 'UM' stamp, and National Board/serial number. Every machine is marked with its maximum working pressure. Never exceed the maximum working pressure limits of the blast machine.
- Uncontrolled blast stream. High-velocity abrasive particles will inflict serious injury. Always point the blast nozzle in the direction of the blast surface only. Keep unprotected workers out of the blast area.
- Welding on the blast machine. Never weld on the blast machine; welding voids the National Board approval and may affect the dimensional integrity of the vessel.
- Moving the blast machine. Never manually move a blast machine containing abrasive, any machine containing abrasive must be moved with appropriate mechanical lifting equipment.

## ***HOSES, COUPLINGS, AND NOZZLE HOLDERS***

- The inside diameter (ID) of air hoses, fittings, and connections should be at least four times larger than the nozzle orifice size. Blast hose ID should be three to four times the size of the nozzle orifice. Example: a #6 nozzle (3/8" diameter orifice) calls for 1-1/2" ID blast hose and 1-1/2" ID or larger compressor hose. All hose runs should be kept as short as possible and run in as straight a line as possible to reduce pressure loss.
- To install, squarely cut the end of the hose so that it fits snugly against the coupling or hose end shoulder. Always use the screws recommended by the manufacturer ensuring that they do not penetrate the inner wall. Make sure the couplings tightly fit the hose. Install cotter pins at every connection or use couplings with built-in lock-springs to prevent disengagement. Install safety cables at all connections to prevent whipping if hoses disengage or blow out.

## ***MAINTENANCE AND REPAIR***

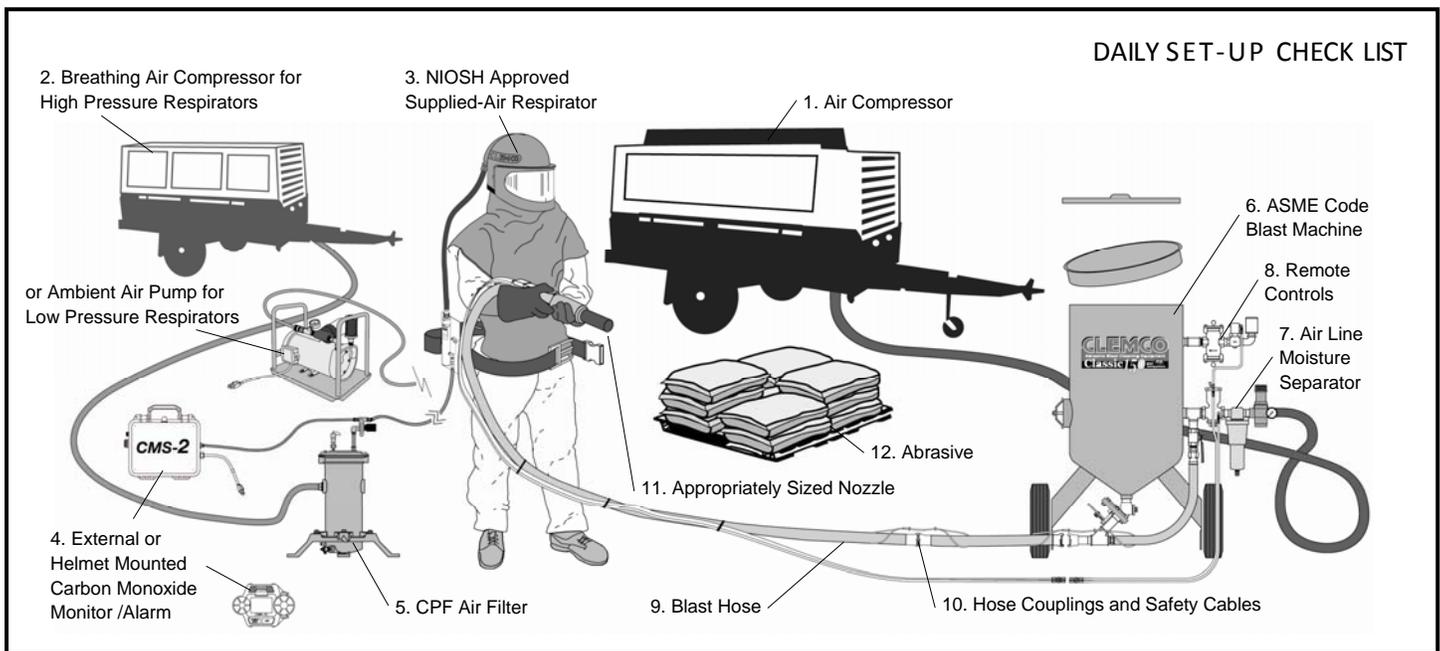
- Completely read and follow all service instructions and recommended maintenance intervals. Always shut off compressor and depressurize blast machine before performing any maintenance. At every service interval, clean all filters, screens, and alarm systems. If spring-loaded abrasive valves are used, always cage spring before disassembly.

## ***WARRANTY***

The following is in lieu of all warranties, express, implied or statutory, and in no event shall seller or its agents, successors, nominees or assignees, or either, be liable for special or consequential damage arising out of a breach of warranty. This warranty does not apply to any damage or defect resulting from negligent or improper assembly or use of any item by the buyer or its agent or from alteration or attempted repair by any person other than an authorized agent of seller. All used, repaired, modified, or altered items are purchased "as is" and with all faults. In no event shall seller be liable for consequential or incidental damages. The sole and exclusive remedy of buyer for breach of warranty by seller shall be repair or replacement of defective parts or, at seller's option, refund of purchase price, as set forth below

1. Seller makes no warranty with respect to products used other than in accordance hereunder.
  2. On products seller manufactures, seller warrants that all products are to be free from defects in workmanship and materials for a period of one year from date of shipment to buyer, but no warranty is made that the products are fit for a particular purpose.
  3. On products which seller buys and resells pursuant to this order, seller warrants that the products shall carry the then standard warranties of the manufacturers thereof, a copy of which shall be made available to the customer upon request.
  4. The use of any sample or model in connection with this order is for illustrative purposes only and is not to be construed as a warranty that the product will conform to the sample or model.
  5. Seller makes no warranty that the products are delivered free of the rightful claim of any third party by way of patent infringement or the like.
  6. This warranty is conditioned upon seller's receipt within ten (10) days after buyer's discovery of a defect, of a written notice stating in what specific material respects the product failed to meet this warranty. If such notice is timely given, seller will, at its option, either modify the product or part to correct the defect, replace the product or part with complying products or parts, or refund the amount paid for the defective product, any one of which will constitute the sole liability of the seller and a full settlement of all claims. No allowance will be made for alterations or repairs made by other than those authorized by seller without prior written consent of seller. Buyer shall afford seller prompt and reasonable opportunity to inspect the products for which any claim is made as above stated.
- Except as expressly set forth above, all warranties, express, implied or statutory, including implied warranty of merchantability, are hereby disclaimed.

# PREFACE



Make sure all blast operators are properly trained and suitably attired with a blast suit, safety boots, leather gloves, respiratory and hearing protection. Every day before start up, check all equipment components, including piping, fittings, and hoses, and valves, for leaks, tightness, and wear. Repair or replace as needed. Use the following checklist.

- 1. PROPERLY-MAINTAINED AIR COMPRESSOR** sized to provide sufficient volume (cfm) at given pressure for nozzle and other tools. ADD 50% volume (cfm) reserve to allow for nozzle wear. Use large compressor outlet and air hose (at least 4 times the nozzle orifice diameter). For oil-lubricated compressors, the employer shall use a high-temperature or carbon monoxide alarm, or both, to monitor carbon monoxide levels. If only high-temperature alarms are used, the air supply shall be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm. Follow the manufacturer's checklist and maintenance instructions.
- 2. BREATHING-AIR COMPRESSOR** (or oil-less ambient air pump) capable of providing Grade D quality air, located in a dust free area. Read # 1 above.
- 3. CLEAN, PROPERLY-MAINTAINED NIOSH-APPROVED SUPPLIED-AIR RESPIRATOR** worn by blast operators, and other workers exposed to blast dust. Make sure all respirator components are in place — all lenses, inner collar, and cape. Thoroughly inspect all components for wear. The NIOSH approval (approval number is listed in the owner's manual) is for a complete assembly from point of attachment on the CPF (sorbet bed) filter to the complete respirator. Substitution of any part voids the NIOSH approval.
- 4. CARBON MONOXIDE MONITOR/ALARM** installed at the CPF filter or inside the supplied-air respirator for monitoring for the presence of deadly CO gas and warning the operator(s) when the CO level reaches an unacceptable level. When an ambient air pump is used for breathing air, a CO monitor provides a measure of safety. Read # 1 above.
- 5. BREATHING-AIR FILTER (OSHA-REQUIRED sorbet bed filter)** for removal of moisture and particulate matter in the compressed air breathing-air supply. Monitor the condition of the cartridge and replace when odor is detected or at 3 month intervals, whichever comes sooner. The breathing air filter does NOT detect or remove carbon monoxide (CO). Always install a CO monitor/alarm.
- 6. BLAST MACHINE** (bearing U or UM stamp, National Board Number, and Maximum Working Pressure) sized to hold a 30-minute abrasive supply. Examine pop-up valve for alignment. Check piping, fittings, screens, valves for tightness, leaks, and wear. Always ground the machine to eliminate hazard of static shock. Install a blast machine screen to keep out foreign objects. Use a blast machine cover if left outdoors overnight. Never exceed the maximum working pressure of the vessel.
- 7. AIR LINE FILTER** (moisture separator) installed as close as possible to the blast machine inlet and sized to match the size of the inlet piping or larger air supply line. Clean filter and drain often. Damp abrasive causes operational problems.
- 8. REMOTE CONTROLS** are required by OSHA and must be in perfect operating condition. Test and check all components to ensure all parts are present and fully functional. Use genuine replacement parts. NEVER mix parts from different manufacturers. Never use welding hose for remote control hose.
- 9. BLAST HOSE** should have an inside diameter sized to suit the blast nozzle. The ID should be three to four times the size of the nozzle orifice diameter. Blast hose should be arranged in as straight a line as possible from the blast machine to the work area, avoiding sharp bends.
- 10. COUPLINGS AND NOZZLE HOLDERS** should fit snugly on the hose and be installed with manufacturer recommended screws. Coupling lugs must snap firmly into locking position. Gasket must always be used to form a positive seal, and cotter pins must be installed. Replace gasket when wear, softness or distortion is detected. Check nozzle holder for thread wear; replace at any sign of wear. Install safety cables at all connections.
- 11. NOZZLE** orifice size should be checked and nozzle replaced when worn 1/16" from original size. (No. 5 nozzle has 5/16" orifice diameter; replace when it measures 3/8"). Threads should be inspected daily for wear and nozzle should be replaced when wear is detected. Always use a nozzle washer.
- 12. ABRASIVE** must be a material specifically manufactured for blasting. It should be properly sized for the job. Check material safety data sheet for free-silica, cyanide, arsenic, lead and other toxins and avoid use when these toxic, harmful substances are present.
- SURFACE TO BE BLASTED** should be examined for hazardous substances. Take appropriate protective measures as required by OSHA to ensure the blast operator, other workers in the vicinity, and any bystanders are properly protected.

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**1.0 INTRODUCTION**

**1.1 Scope:** These instructions cover operation, service, and replacement parts for PVR Pinch-Tube Air Valves and PVR Pinch-Tube Grit (abrasive Metering) Valves. The valves are part of a remote control system and blast machine. Do not put the valves in operation until all personnel involved with the blast machine operation and maintenance read this entire manual, including the orange cover, and all accessory manuals.

**1.2 Safety Alerts**

**1.2.1** Clemco uses safety alert signal words, based on ANSI Z535.4-2011, to alert the user of a potentially hazardous situation that may be encountered while operating this equipment. ANSI's definitions of the signal words are as follows:

 This is the safety alert symbol. It is used to alert you to potential physical injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

**NOTICE**

Notice indicates information that is considered important, but not hazard-related, if not avoided, could result in property damage.

**CAUTION**

Caution indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

**WARNING**

Warning indicates a hazardous situation that, if not avoided, could result in death or serious injury.

**DANGER**

Danger indicates a hazardous situation that, if not avoided, will result in death or serious injury.

**1.3 Description:** PVR valves are normally-closed and pneumatically operated, requiring compressed air to open. The components are shown in Figure 1.

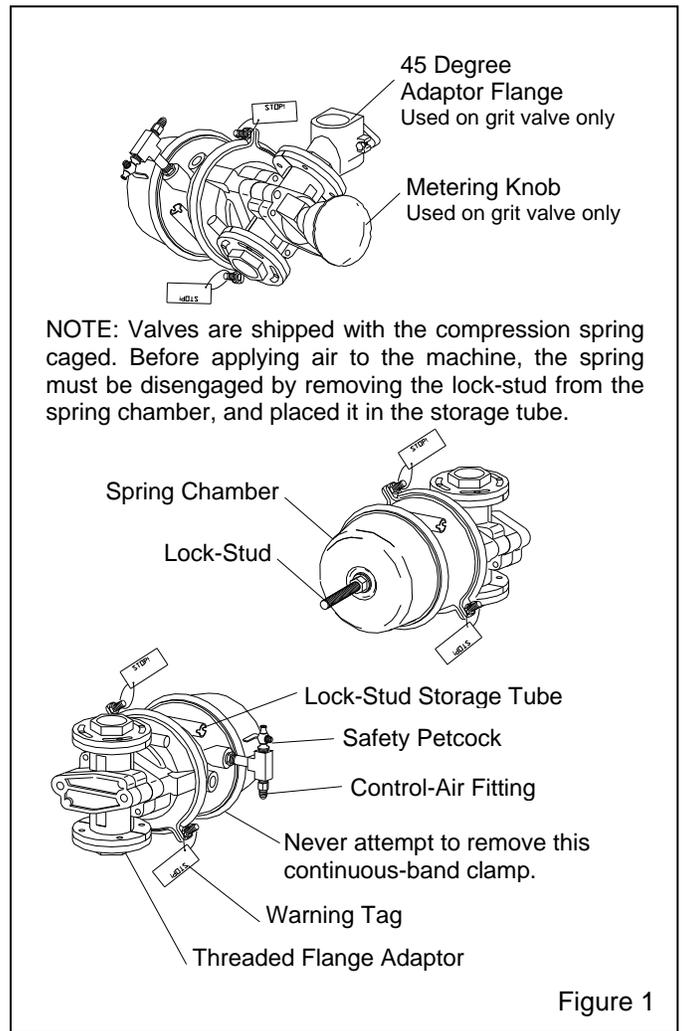


Figure 1

**2.0 INSTALLATION**

**WARNING**

Failure to observe the following before performing any maintenance could cause serious injury or death from the sudden release of trapped compressed air.

- Depressurize the blast machine.
- Lockout and tagout the compressed air supply.
- Bleed the air supply line to the blast machine.

**2.1** Remove existing valve(s) from the blast machine.

**2.2** Use new pipe fittings to connect the valves to the blast machine. Use a schedule 80 nipple to connect the 45 degree adaptor flange on the grit valve to the bottom of the blast machine. The air valve is a non-directional valve; it does not matter which end is the inlet, or in what direction the valve is rotated.

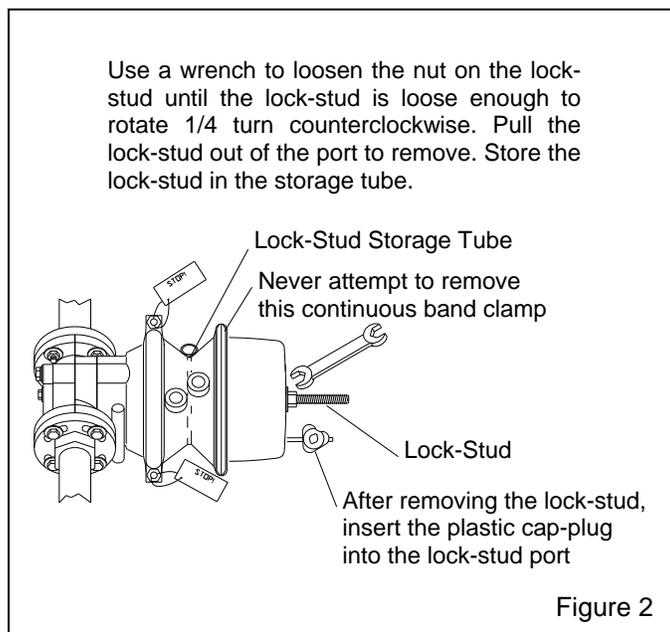
**2.3** Connect the air control line to the air fitting shown in Figure 1.

**2.4** Refer to the remote control system manual for which the valve is used, as additional installation may be required.

### 3.0 OPERATION

NOTE: Valves shown in the following illustrations are air valves. The main difference between the air valve and grit valve is: the grit valve has a metering knob assembly that closes off the pinch tube, and therefore adjusts abrasive flow, as noted in Section 3.5. Operation and service of the valves are the same unless otherwise noted.

**3.1** Before supplying air to the system, remove the lock-stud from the port in the spring chamber. Place the lock-stud in the storage tube. Use the nut and washer to secure the stud in the tube. Install the plastic cap-plug into the lock-stud port. See Figure 2.



## ⚠ WARNING

**PVR Valves are shipped with the lock-stud in place. The lock-stud holds the valve open by compressing the compression spring. The lock-stud must be removed from the valve before air is applied to the blast machine. Severe injury could occur if compressed air is supplied to the valve before the lock-stud is removed.**

**3.2** PVR valves are normally closed; when air is supplied through the control air fitting, the valve opens.

**3.3** Supply air to the system and check for leaks.

**3.4** Opening the safety petcock disables the pneumatic controls. Refer to the remote control system manual for use of the safety petcock.

## NOTICE

**To avoid pinch tube deformation, reinstall the lock-stud and cage the spring whenever the valve will be out of use for more than two days.**

### 3.5 Adjust Abrasive Flow (grit valve only)

**3.5.1** The metering knob on the grit valve adjusts abrasive flow. Begin blasting and turn the knob fully clockwise to close.

**3.5.2** Slowly turn the knob counterclockwise until the ideal flow is attained, usually seen as a blur against the background. The air/abrasive mixture should be mainly air.

### 4.0 SERVICE

**4.1** The spring chamber spring must be caged before doing any service. Ref. Section 4.3. Read the following instructions prior to servicing the valves, and follow the instructions exactly.

## ⚠ DANGER

**Never attempt to remove the continuous band around the spring chamber. The chamber is a non-serviceable area. The chamber contains a spring under extreme compression. Tampering with the sealed band could release the spring. Impact from a released spring will cause severe injury or death.**

**4.2** The differences between the air valve and grit valve are:

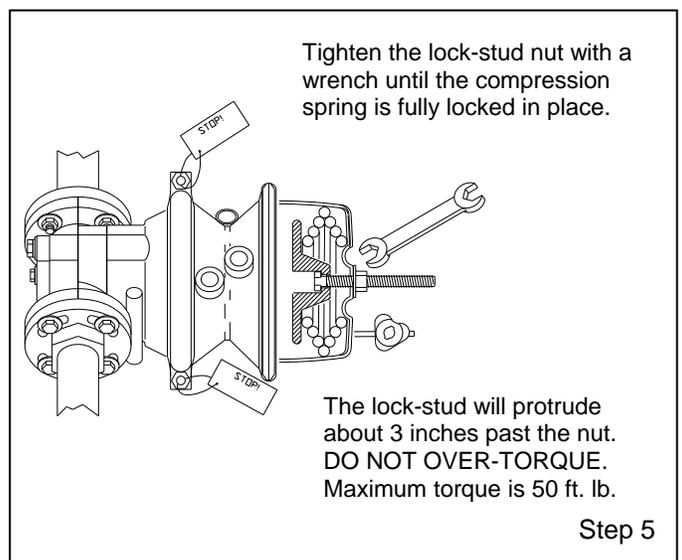
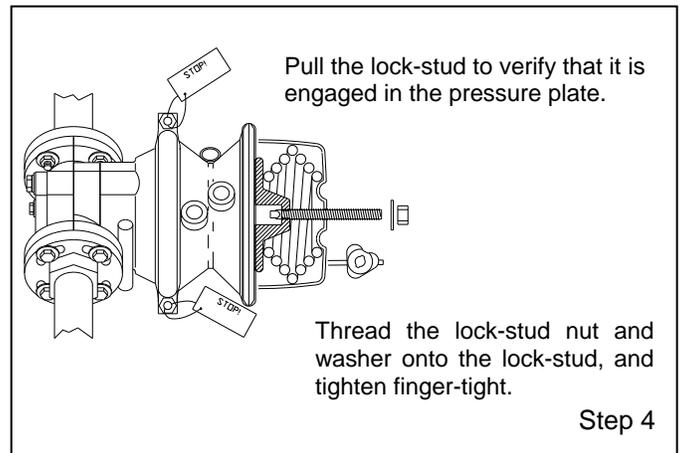
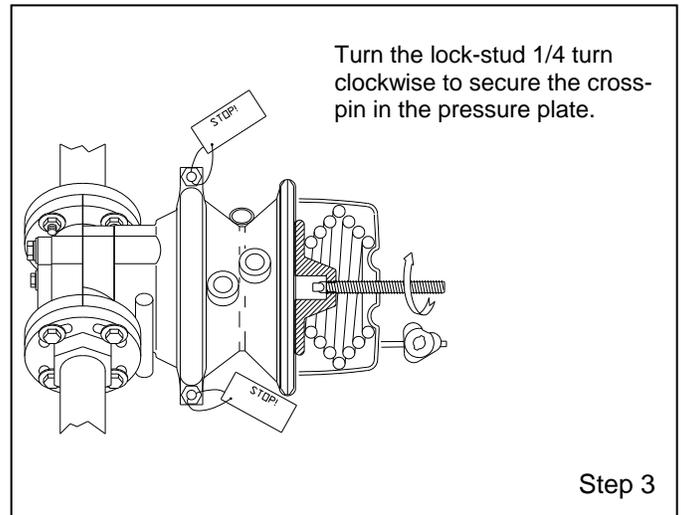
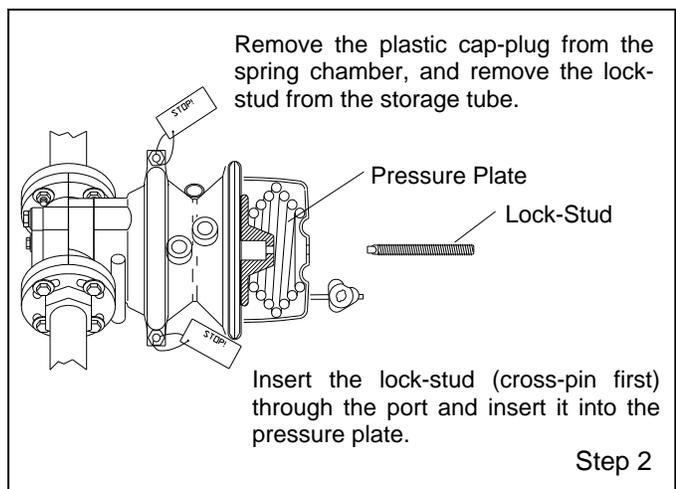
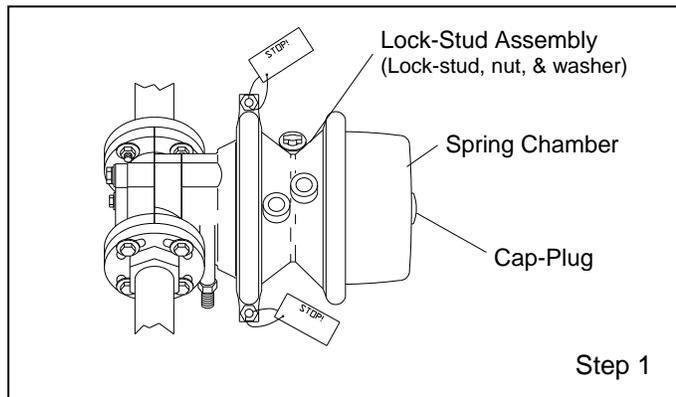
- The grit valve has a metering knob opposite the spring chamber, and the air valve has a plate.
- The pinch tube in the air valve is 1-1/4" ID, and the tube on the grit valve is 1" ID. The following illustrations show the air valve.
- When servicing the grit valve, fully open the metering knob by turning it counterclockwise.

**⚠ WARNING**

Failure to observe the following before performing any service could cause serious injury or death from the sudden release of trapped compressed air.

- Depressurize the blast machine.
- Lockout and tagout the compressed air supply.
- Bleed the air supply line to the blast machine.

**4.3 Caging the Compression Spring**

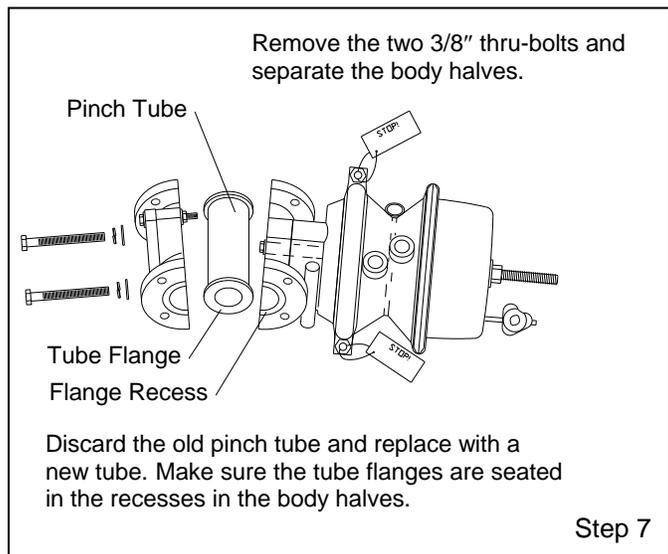
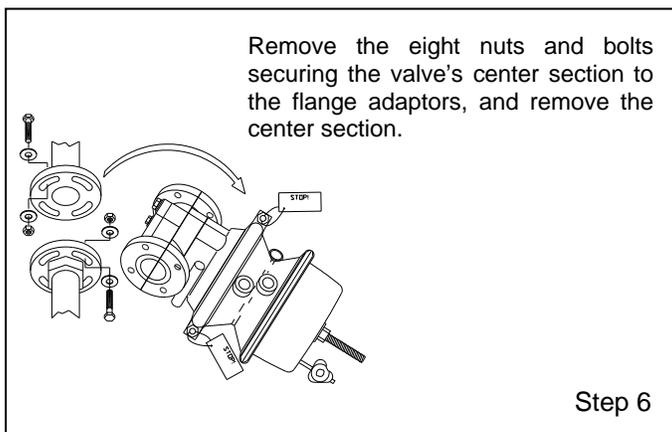


4.4 Pinch Tube Replacement

**NOTICE**

Do not proceed with steps 6 and 7 until steps 1 through 5 have been completed. Failure to cage the compression spring before separating the body halves will cause the actuator to close, making it difficult or impossible to service.

4.4.1 Replacement of the pinch tube cannot be done until steps 1 through 5 have been completed.



4.4.2 With the new pinch tube in place, reassemble the body halves and attach the valve's center section to the adaptor flanges.

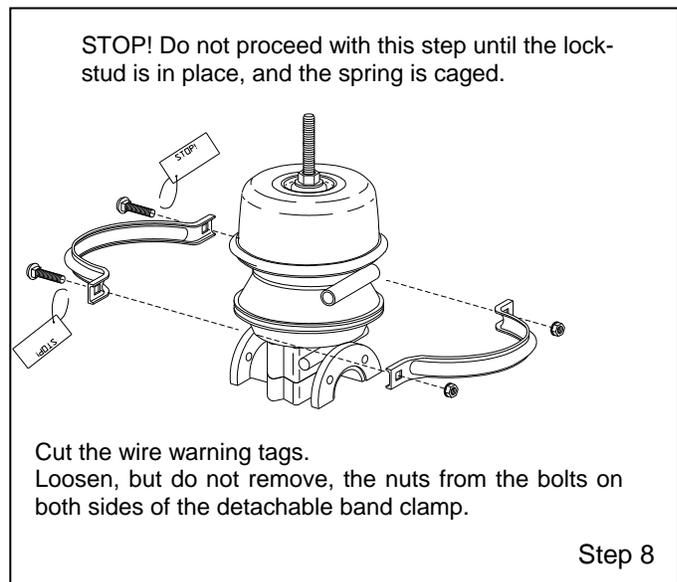
4.4.3 Remove the lock-stud from the spring chamber and store in the storage tube. Install the plastic cap-plug into the lock-stud port.

4.5 Return Spring and Actuator Service

**WARNING**

Do not proceed with steps 8 through 12 until steps 1 through 5 have been completed. Failure to cage the compression spring before removing the detachable clamp will cause spring compression to force the actuator body and chamber body apart, which could cause severe injury.

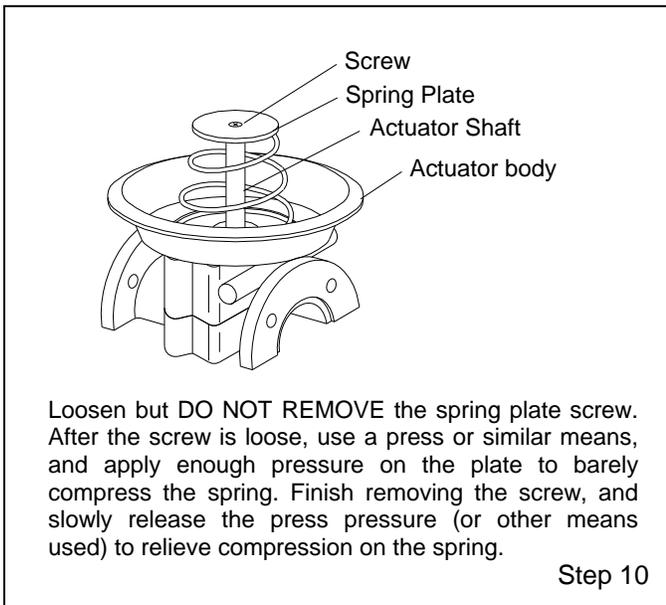
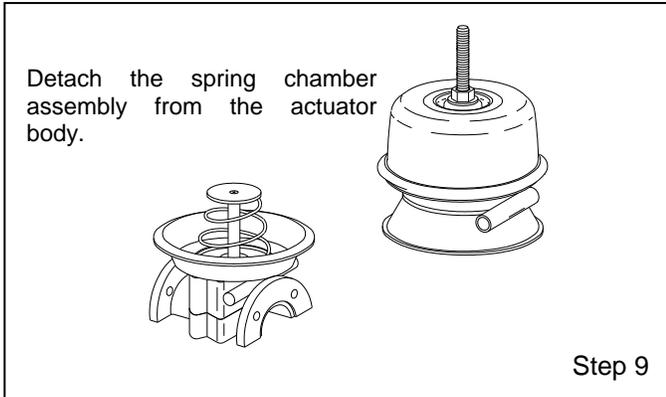
4.5.1 Cut the warning tags and loosen (DO NOT REMOVE) the clamp bolts on both side of the detachable clamp ring.



**WARNING**

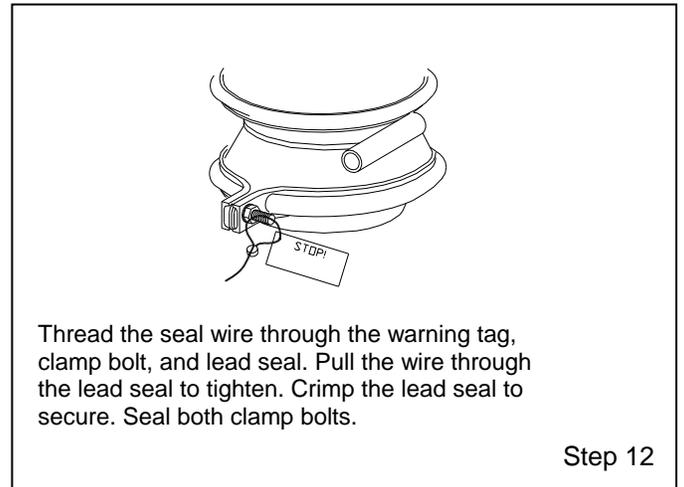
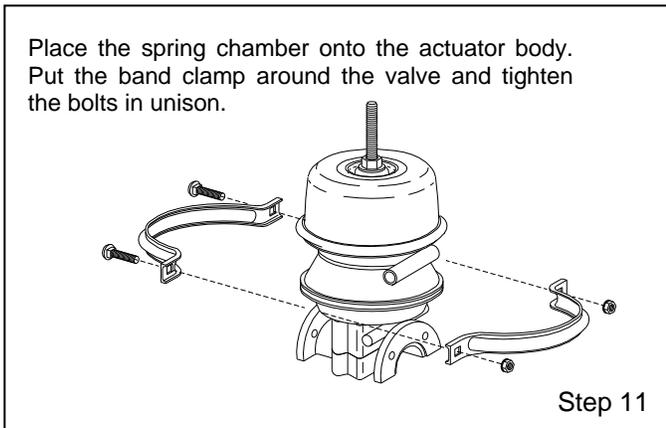
If the spring chamber is forced away from the actuator body, or if the clamp does not move freely when the nuts are loosened, STOP! The compression spring is not safely caged. CAREFULLY retighten the band clamp nuts, and review 1 through 5. DO NOT REMOVE THE CLAMP.

4.5.2 After the clamp nuts are loose and the clamp moves freely, finish removing the nuts, clamp bolt, and clamp, as shown in Step 8.



**4.5.3** Inspect and replace all worn parts, including the seal located in the shaft hole in the actuator body.

**4.5.4** Reassemble in reverse order. Use a press to compress the spring, and apply breakable thread-lock to the screw threads before securing the screw.



**4.5.5** Reassemble the valve's center section to the flange adaptors.

**4.5.6** Remove the lock-stud from the spring chamber, and secure it in the lock-stud storage tube.

**4.5.7** Place the cap-plug in the lock-stud port.

**4.6 Cage the Compression Spring During Periods of Non-Use**

**4.6.1** Whenever the valve(s) will be out of use for more than two days, cage the compression spring per Section 4.3, to take pressure off the pinch tube.

**NOTICE**

**To avoid pinch tube deformation, reinstall the lock-stud and cage the spring whenever the valve will be out of use for more than two days.**

**4.6.2** Make sure the lock-stud is removed per Paragraph 3.1, before returning the valve to service.

**WARNING**

**The lock-stud holds the valve open by caging (compressing) the compression spring. The lock-stud must be removed from the valve before air is applied to the blast machine. Severe injury could occur if compressed air is supplied to the valve before the lock-stud is removed.**

5.0 REPLACEMENT PARTS

5.1 Pinch Tube Valve Assembly, Figure 3

Item	Description	Stock No.
(-)	Pinch Tube Grit Valve Assembly .....	04319
(-)	Pinch Tube Air Valve Assembly .....	04320
1.	Body, pinch valve, machined .....	05677
2.	Body, actuator (includes items 6 & 7) .....	05678
3.	Spring chamber .....	05663
4.	Cap screw, 5/16-NC x 1" .....	03152
5.	Nut, 5/16-NC wing .....	03213
6.	Bushing, actuator body .....	05684
7.	Seal, actuator body .....	05685
8.	Plunger, actuator .....	05676
9.	Shaft, actuator .....	05670
10.	Return spring .....	05686
11.	Plate, return spring .....	05687
12.	Screw, flat head, 1/4-NC x 5/8" .....	03090
13.	Pinch tube, 1-1/4" ID for air valve .....	07730
	1" ID for grit valve .....	04635
14.	Flanged adaptor .....	05673
15.	Flanged adaptor, 45 degree .....	05672
16.	O-ring .....	01990
17.	Inspection plate .....	02440
18.	Cover plate .....	05674
19.	Clamp assembly kit .....	20660
20.	Flat washer, s/s .....	05694
21.	Adaptor, 1/4" NPS .....	02494
22.	Petcock .....	01993
23.	Lock-stud assembly, includes item 24 .....	05691
24.	Nut, lock-stud, 1/2-10 .....	07628
25.	Metering knob assembly .....	05072
26.	Tee, 1/4" NPT brass .....	02025
27.	Nipple, 1/4" NPT x 2" .....	01828
28.	Plug, lock-stud port .....	05683
29.	Warning label and decal kit .....	20661

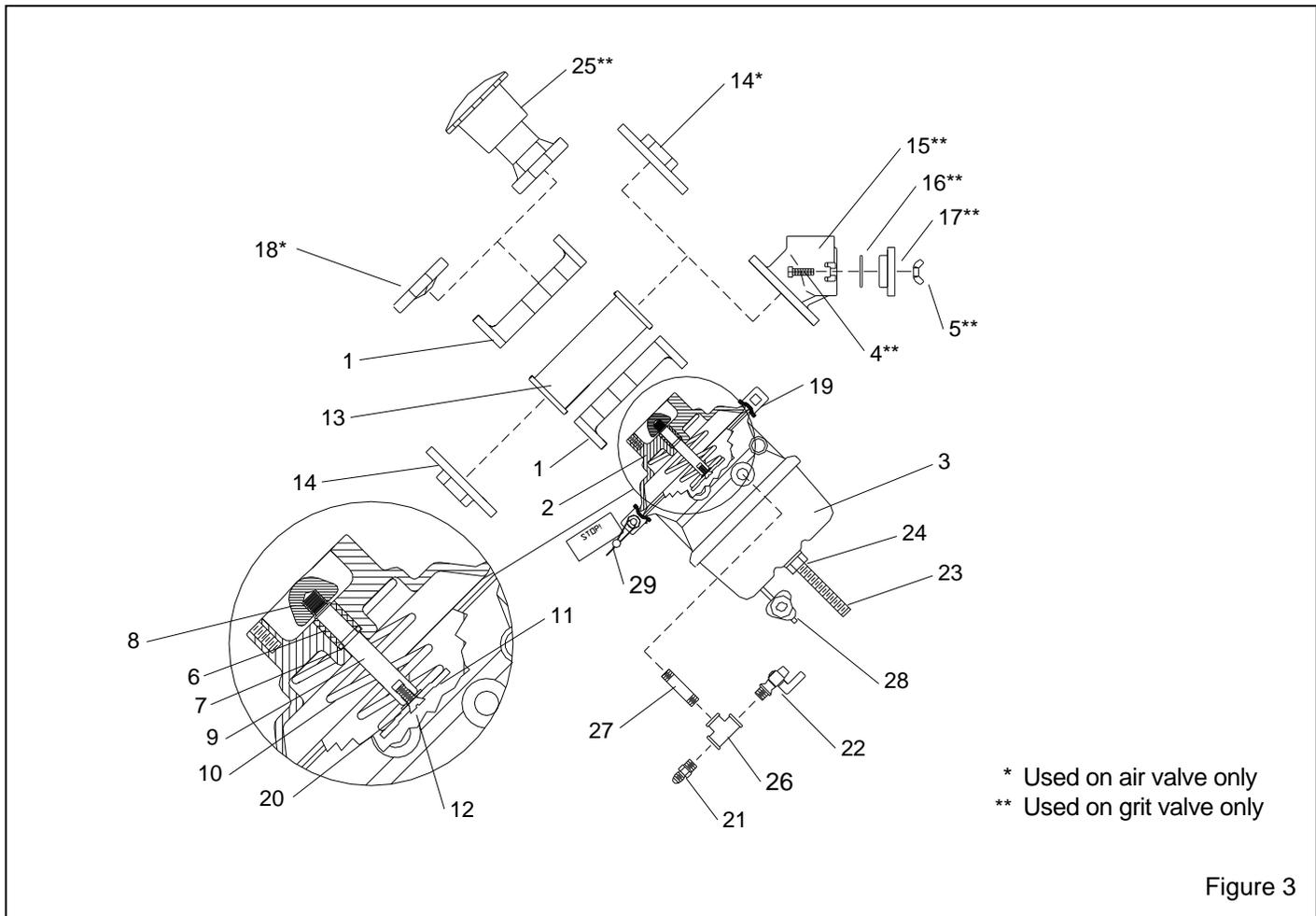


Figure 3