

POOL PAL
1 CU. FT. CAPACITY BLAST MACHINE
O. M. 24813

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 **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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AEROLYTE by Clemco Industries Corp.
Systems

⚠ WARNING

- Read and follow ALL instructions before using this equipment.
- Failure to comply with ALL instructions can result in serious injury or death.
- In the event that the user, or any assistants of the user of this equipment cannot read or cannot completely understand the warnings and information contained in these instructions, the employer of the user and his assistants must thoroughly educate and train them on the proper operation and safety procedures of this equipment.

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

The products described in this material, and the information relating to those products, is intended for knowledgeable, experienced users of abrasive blasting equipment.

No representation is intended or made as to the suitability of the products described herein for any particular purpose or application. No representations are intended or made as to the efficiency, production rate, or the useful life of the products described herein. Any estimate regarding production rates or production finishes are the responsibility of the user and must be derived solely from the user's experience and expertise, and must not be based on information in this material.

The products described in this material may be combined by the user in a variety of ways for purposes determined solely by the user. No representations are intended or made as to the suitability or engineering balance of the combination of products determined by the user in his selection, nor as to the compliance with regulations or standard practice of such combinations of components or products.

Abrasive Blast Equipment is only a component of the range of equipment used in an abrasive blasting job. Other products may include an air compressor, abrasive, scaffolding, hydraulic work platforms or booms, paint spray equipment, dehumidification equipment, air filters and receivers, lights, ventilation equipment, parts handling equipment, specialized respirators, or equipment that while offered by Clemco may have been supplied by others. Each manufacturer and supplier of the other products used in the abrasive blasting job must be contacted for information, training, instruction and warnings with regard to the proper and safe use of their equipment in the particular application for which the equipment is being used. The information provided by Clemco is intended to provide instruction only on Clemco products. All operators must be trained in the proper, safe, use of this equipment. It is the responsibility of the users to familiarize themselves with, and comply with, all appropriate laws, regulations, and safe practices that apply to the use of these products. Consult with your employer about training programs and materials that are available.

Our company is proud to provide a variety of products to the abrasive blasting industry, and we have confidence that the professionals in our industry will utilize their knowledge and expertise in the safe efficient use of these products.

GENERAL INSTRUCTIONS

Described herein are some, BUT NOT ALL, of the major requirements for safe and productive use of blast machines, remote control systems, operator respirator assemblies, and related accessories. Completely read ALL instruction manuals prior to using equipment.

The user's work environment may include certain HAZARDS related to the abrasive blasting operation. Proper protection for the blaster, as well as anyone else that may be EXPOSED to the hazards generated by the blasting process, is the responsibility of the user and/or the employer. Operators MUST consult with their employer about what hazards may be present in the work environment including, but not limited to, exposure to dust that may contain TOXIC MATERIALS due to the presence of silica, cyanide, arsenic or other toxins in the abrasive, or materials present in the surface to be blasted such as lead or heavy metals in coatings. The environment may also include fumes that may be present from adjacent coatings application, contaminated water, engine exhaust, chemicals, and asbestos. The work area may include PHYSICAL HAZARDS such as an uneven work surface, poor visibility, excess noise, and electrical hazards. The operator MUST consult with his employer on the identification of potential hazards, and the appropriate measures that MUST be taken to protect the blaster and others that might be exposed to these hazards.

ALL machines, components and accessories MUST be installed, tested, operated and maintained only by trained, knowledgeable, experienced users.

DO NOT modify or substitute any Clemco parts with other types or brands of equipment. Unauthorized modification and parts substitution on supplied air respirators is a violation of OSHA regulations and voids the NIOSH approval.

OPERATIONAL INSTRUCTIONS

OPERATOR SAFETY EQUIPMENT

⚠ WARNING

- Blast operators and others working in the vicinity of abrasive blasting must always wear properly-maintained, NIOSH-approved, respiratory protection appropriate for the job site hazards.
- DO NOT USE abrasives containing more than one percent crystalline (free) silica. Ref. NIOSH Alert #92-102
- Inhalation of toxic dust (crystalline silica, asbestos, lead paint and other toxins) can lead to serious or fatal disease (silicosis, asbestosis, lead or other poisoning).

- ALWAYS wear NIOSH-approved supplied-air respirators as required by OSHA, in the presence of any dust including, but not limited to, handling or loading abrasive; blasting or working in the vicinity of blast jobs; and cleanup of expended abrasive. Prior to removing respirator, an air monitoring

PREFACE

instrument should be used to determine when surrounding atmosphere is clear of dust and safe to breathe.

- NIOSH-approved, supplied-air respirators are to be worn ONLY in atmospheres:
 - NOT IMMEDIATELY dangerous to life or health and,
 - from which a user can escape WITHOUT using the respirator.
- Clemco supplied-air respirators **DO NOT REMOVE OR PROTECT AGAINST CARBON MONOXIDE (CO) OR ANY OTHER TOXIC GAS**. Carbon monoxide and toxic gas removal and/or monitoring device must be used in conjunction with respirator to insure safe breathing air.
- Air supplied to respirator **MUST BE AT LEAST GRADE D QUALITY** as described in Compressed Gas Association Commodity Specification G-7.1, and as specified by OSHA Regulation 1910.139 (d).
- ALWAYS locate compressors to prevent contaminated air (such as CO from engine exhaust) from entering the air intake system. A suitable in-line air purifying sorbent bed and filter or CO Monitor should be installed to assure breathing air quality.
- ALWAYS use a NIOSH-approved breathing air hose to connect an appropriate air filter to the respirator. Use of a non-approved air hose can subject the operator to illness caused by the release of chemical agents used in the manufacture of non-approved breathing air hose.
- ALWAYS check to make sure air filter and respirator system hoses are NOT CONNECTED to in-plant lines that contain nitrogen, acetylene or any other non-breathable gas. NEVER use oxygen with air line respirators. NEVER modify air line connections to accommodate air filter/respirator breathing hose WITHOUT FIRST testing content of the air line. **FAILURE TO TEST THE AIR LINE MAY RESULT IN DEATH TO THE RESPIRATOR USER.**
- Respirator lenses are designed to protect against rebounding abrasive. They do not protect against flying objects, glare, liquids, radiation or high speed heavy materials. Substitute lenses from sources other than the original respirator manufacturer will void NIOSH-approval of this respirator.

BLAST MACHINES AND REMOTE CONTROLS

WARNING

- **ALWAYS** equip abrasive blast machines with remote controls.
- **Abrasive blast machine operators must wear NIOSH-approved supplied-air respirators (ref: OSHA regulations 1910.94, 1910.132, 1910.139 and 1910.244).**

- NEVER modify OR substitute remote control parts. Parts from different manufacturers are NOT compatible with Clemco

equipment. If controls are altered, involuntary activation, which may cause serious injury, can occur.

- Inspect the air control orifice DAILY for cleanliness. NEVER use welding hose in place of twinline control hose. The internal diameter and rubber composition are UNSAFE for remote control use.
- UNLESS OTHERWISE SPECIFIED, maximum working pressure of blast machines and related components MUST NOT exceed National Board approved 125 psig (8.5 BAR).
- NEVER weld on blast machine. Welding may affect dimensional integrity of steel wall and WILL VOID National Board approval.
- Point nozzle ONLY at structure being blasted. High velocity abrasive particles WILL inflict serious injury. Keep unprotected workers OUT of blast area.
- NEVER attempt to manually move blast machine when it contains abrasive. EMPTY machines, up to 6 cu. ft.(270kg) capacity, are designed to be moved:
 - on flat, smooth surfaces by AT LEAST two people;
 - with the Clemco "Mule"; or
 - with other specially designed machine moving devices.
- Larger empty blast machines or ANY blast machine containing abrasive MUST be transported by mechanical lifting equipment.

AIR HOSE, BLAST HOSE, COUPLINGS, AND NOZZLE HOLDERS

- Air hose, air hose fittings and connectors at compressors and blast machines MUST be FOUR times the size of the nozzle orifice. Air hose lengths MUST be kept as short as possible AND in a straight line. Inspect DAILY and repair leakage IMMEDIATELY.
- Blast hose inside diameter MUST be THREE to FOUR times the size of the nozzle orifice. AVOID sharp bends that wear out hose rapidly. Use SHORTEST hose lengths possible to reduce pressure loss. Check blast hose DAILY for soft spots. Repair or replace IMMEDIATELY.
- ALWAYS cut loose hose ends square when installing hose couplings and nozzle holders to allow uniform fit of hose to coupling shoulder. NEVER install couplings or nozzle holders that DO NOT provide a TIGHT fit on hose. ALWAYS use manufacturers recommended coupling screws.
- Replace coupling gaskets FREQUENTLY to prevent leakage. Abrasive leakage can result in dangerous coupling failure. ALL gaskets MUST be checked SEVERAL times during a working day for wear, distortion and softness.
- Install safety pins at EVERY coupling connection to prevent accidental disengagement during hose movement.
- ALWAYS attach safety cables at ALL air hose AND blast hose coupling connections. Cables relieve tension on hose and control whipping action in the event of a coupling blow-out.

MAINTENANCE

- ALWAYS shut off compressor and depressurize blast machine BEFORE doing ANY maintenance.
- Always check and clean ALL filters, screens and alarm systems when doing any maintenance.
- ALWAYS cage springs BEFORE disassembling valves IF spring-loaded abrasive control valves are used.
- ALWAYS completely follow owner's manual instructions and maintain equipment at RECOMMENDED intervals.

ADDITIONAL ASSISTANCE

- Training and Educational Programs. Clemco Industries Corp. offers a booklet, Blast-Off 2, developed to educate personnel on abrasive blast equipment function and surface preparation techniques. Readers will learn safe and productive use of machines, components and various accessories, including selection of abrasive materials for specific surface profiles and degrees of cleanliness.
- The Society for Protective Coatings (SSPC) offers a video training series on protective coatings including one entitled "Surface Preparation." For loan or purchase information, contact SSPC at the address shown below.

TECHNICAL DATA AND RESEARCH COMMITTEES

- The following associations offer information, materials and videos relating to abrasive blasting and safe operating practices.

The Society for Protective Coatings (SSPC)
 40 24th Street, Pittsburgh PA 15222-4643
 Phone: (412) 281-2331 • FAX (412) 281-9992
 Email: research@sspc.org • Website: www.sspc.org

National Association of Corrosion Engineers (NACE)
 1440 South Creek Drive, Houston TX 77084
 Phone: (281) 228-6200 • FAX (281) 228-6300
 Email: msd@mail.nace.org • Website: www.nace.org

American Society for Testing and Materials (ASTM)
 100 Barr Harbor Dr., West Conshohocken, PA 19428
 Phone (610) 832-9500 • FAX (610) 832-9555
 Email: service@astm.org • Website: www.astm.org

NOTICE

This equipment is not intended to be used in an area that might be considered a hazardous location as described in the National Electric Code NFPA 70 1996, article 500.

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 the 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 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 a 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 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 the 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.

DAILY SET-UP CHECK LIST

 WARNING
<ul style="list-style-type: none"> • ALL piping, fittings and hoses MUST be checked DAILY for tightness and leakage. • ALL equipment and components MUST be thoroughly checked for wear. • ALL worn or suspicious parts MUST be replaced. • ALL blast operators MUST be properly trained to operate equipment. • ALL blast operators MUST be properly outfitted with abrasive resistant clothing, safety shoes, leather gloves and ear protection. • BEFORE blasting ALWAYS use the following check list.

1. PROPERLY MAINTAINED AIR COMPRESSOR sized to provide sufficient volume (cfm) for nozzle and other tools PLUS a 50% reserve to allow for nozzle wear. Use large compressor outlet and large air hose (4 times the nozzle orifice size). FOLLOW MANUFACTURERS MAINTENANCE INSTRUCTIONS.

2. BREATHING AIR COMPRESSOR (oil-less air pump) capable of providing Grade D Quality air located in a dust free, contaminant free area. If oil-lubricated air compressor is used to supply respirator, it should have high temperature monitor and CO monitor or both. If CO monitor is not used, air **MUST** be tested FREQUENTLY to ensure proper air quality.

3. Clean, properly maintained NIOSH-APPROVED SUPPLIED-AIR RESPIRATOR. ALL components should ALWAYS be present. NEVER operate without inner lens in place. Thoroughly inspect ALL components DAILY for cleanliness and wear. ANY substitution of parts voids NIOSH approval i.e. cape, lenses, breathing hose, breathing air supply hose, air control valve, cool air or climate control devices.

4. OSHA required BREATHING AIR FILTER for removal of moisture and particulate matter from breathing air supply. THIS DEVICE DOES NOT REMOVE OR DETECT CARBON MONOXIDE (CO). ALWAYS USE CO MONITOR ALARM.

5. ASME CODED BLAST MACHINE sized to hold 1/2 hour abrasive supply. ALWAYS ground machine to eliminate static electricity hazard. Examine pop up valve for alignment. Blast machine MUST be fitted with a screen to keep out foreign objects and a cover to prevent entry of moisture overnight.

6. AIR LINE FILTER installed AS CLOSE AS POSSIBLE to machine inlet. Sized to match inlet piping or larger air supply line. Clean filter DAILY. Drain OFTEN.

7. REMOTE CONTROLS MUST be in PERFECT operating condition. ONLY use APPROVED spare parts, including twin-line hose. DAILY: test system operation and check button bumper and spring action of lever and lever lock. DO NOT USE WELDING HOSE.

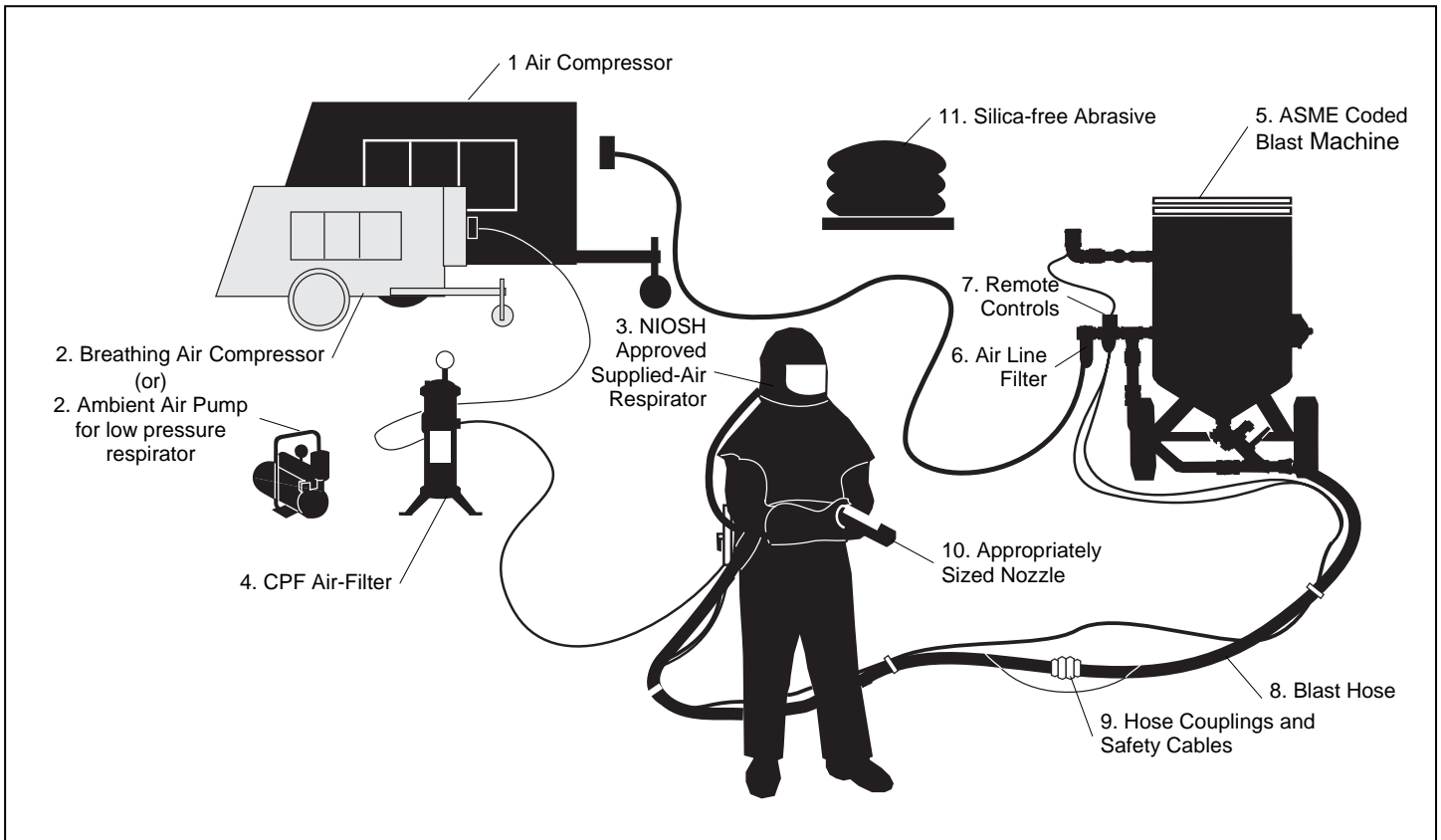
8. BLAST HOSE with ID 3 to 4 times the nozzle orifice. Lines MUST be run AS STRAIGHT AS POSSIBLE from machine to work area with NO sharp bends. Check DAILY for internal wear and external damage.

9. HOSE COUPLINGS, NOZZLE HOLDERS fitted SNUGLY to hose end and installed using PROPER coupling screws. Coupling lugs MUST be snapped FIRMLY into locking position. Gasket MUST form positive seal with safety pins inserted through pin holes. Check gaskets and replace if ANY sign of wear, softness or distortion. ALWAYS install safety cables at every connection to prevent disengagement. Check nozzle holder for worn threads. NEVER MIX DIFFERENT BRANDS OF COMPONENTS. Check each of these components DAILY.

10. Inspect NOZZLE and GASKET DAILY for wear. Replace nozzle when 1/16" larger than original size or if liner appears cracked. Check nozzle threads for wear.

11. Use abrasive that is properly sized and free of harmful substances; such as, free silica, cyanide, arsenic or lead. Check material data sheet for presence of toxic or harmful substances.

12. Test surface to be blasted for toxic substances. Take appropriate, and NIOSH required, protective measures for operator and bystanders which pertain to substances found on the surface to be blasted.



1.0 INTRODUCTION

1.1 Scope

1.1.1 These instructions cover set-up, operation, maintenance, troubleshooting, and replacement parts for Aerolyte Pool Pal (1.0 cu ft. capacity) blast machine, remote controls, and accessories.

1.1.2 Blast operators and personnel involved with the blast machine operation must be trained in the safe operation of the blast machine and blasting accessories. All personnel involved with the abrasive blasting process must be made aware of the hazards associated with abrasive blasting. The Clemco booklet "Abrasive Blasting Safety Practices" Stock No. 22090, is included with every blast machine, and contains important safety information about abrasive blasting that may not be included in equipment operation manuals. Additional copies are available from Clemco Industries. Visit www.clemcoindustries.com

1.2 Safety Alerts

1.2.1 Clemco uses safety alert signal words, based on ANSI Z535.4-1998, 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 the user of this equipment of potential personal injury hazards.

Obey all safety messages that follow this symbol to avoid possible injury or death.

CAUTION

Caution used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

 **CAUTION**

Caution indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

 **WARNING**

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

 **DANGER**

Danger indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

1.3 Description

1.3.1 The set-up and primary components of the blast machine and accessory package are shown in Figure 1. The remote controls and connections for the controls are shown in Figure 2.

1.3.2 Clemco blast machines (pressure vessels) are manufactured to American Society of Mechanical Engineers (ASME) standards, as described in Section VII, Div. 1, and carry a National Board certification. It is the owner's responsibility to maintain the integrity of the vessel as may be required by some states. This may include regular inspection and hydrostatic testing as described in National Board Inspection Code and Jurisdictional Regulations and /or Laws.

 **WARNING**

Welding, grinding, or drilling on the blast machine could weaken the vessel. Compressed air pressure could cause a weakened blast machine to rupture, resulting in death or serious injury. Welding, grinding, or drilling on the blast machine vessel, without a National Board R stamp voids the ASME and National Board certification.

1.3.3 All welding repairs done on the vessel must be performed by certified welders, at shops holding a National Board R Stamp. Welding performed by any welder not properly qualified per the ASME Code voids ASME and National Board certification of the vessel.

1.3.4 This blast machine is rated for a maximum of 125 psi (pounds per square inch); do not exceed the rated pressure.

⚠ WARNING

Excessive compressed air pressure could cause a blast machine to rupture. To prevent serious injury or death, do not exceed the rated pressure of the blast machine vessel.

1.3.5 OSHA does not require pressure relief valves on blast machines when air compressors supplying air to the blast machines are built to ASME⁽¹⁾ specifications and comply with OSHA⁽²⁾ regulations. ASME Manual section VIII, Division 1, UG-125, paragraph A90 (g) states that pressure relief valves or protective devices "...need not be installed directly on a pressure vessel when the source of pressure is external to the vessel and is under such positive control that the pressure in the vessel cannot exceed the maximum allowable working pressure at the operating temperature...". OSHA regulation 1910.169 refers to the above ASME code when describing 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.

⁽¹⁾ American Society of Mechanical Engineers, Boiler and Pressure Vessel Code, 1989

⁽²⁾ Occupational Safety and Health Administration, 29 CFR 1910, Subpart M - Compressed Gas and Compressed Air Equipment.

1.3.6 Remote Controls

1.3.6.1 The blast machine is equipped with remote controls that pressurize and depressurize the blast machine. Pressurization, which starts blasting, occurs when the operator presses the control handle lever located near the nozzle. Depressurization, which stops blasting, occurs when the operator releases the control handle lever.

1.3.6.2 A remote control system is an OSHA-required safety device. The control handle, located near the blast nozzle, is the activator for the remote control system. When the operator intentionally or unintentionally removes hand-held pressure from the control handle, the machine depressurizes, stopping air and abrasive flow through the nozzle. The remote control system "fails to safe", which means any interruption in the control-air circuit, deactivates the blast machine.

⚠ WARNING

Never modify or substitute remote control parts. Parts from other manufacturers are not compatible with Clemco equipment. If ANY part of the remote control system is altered, involuntary activation, which may cause serious injury, can occur.

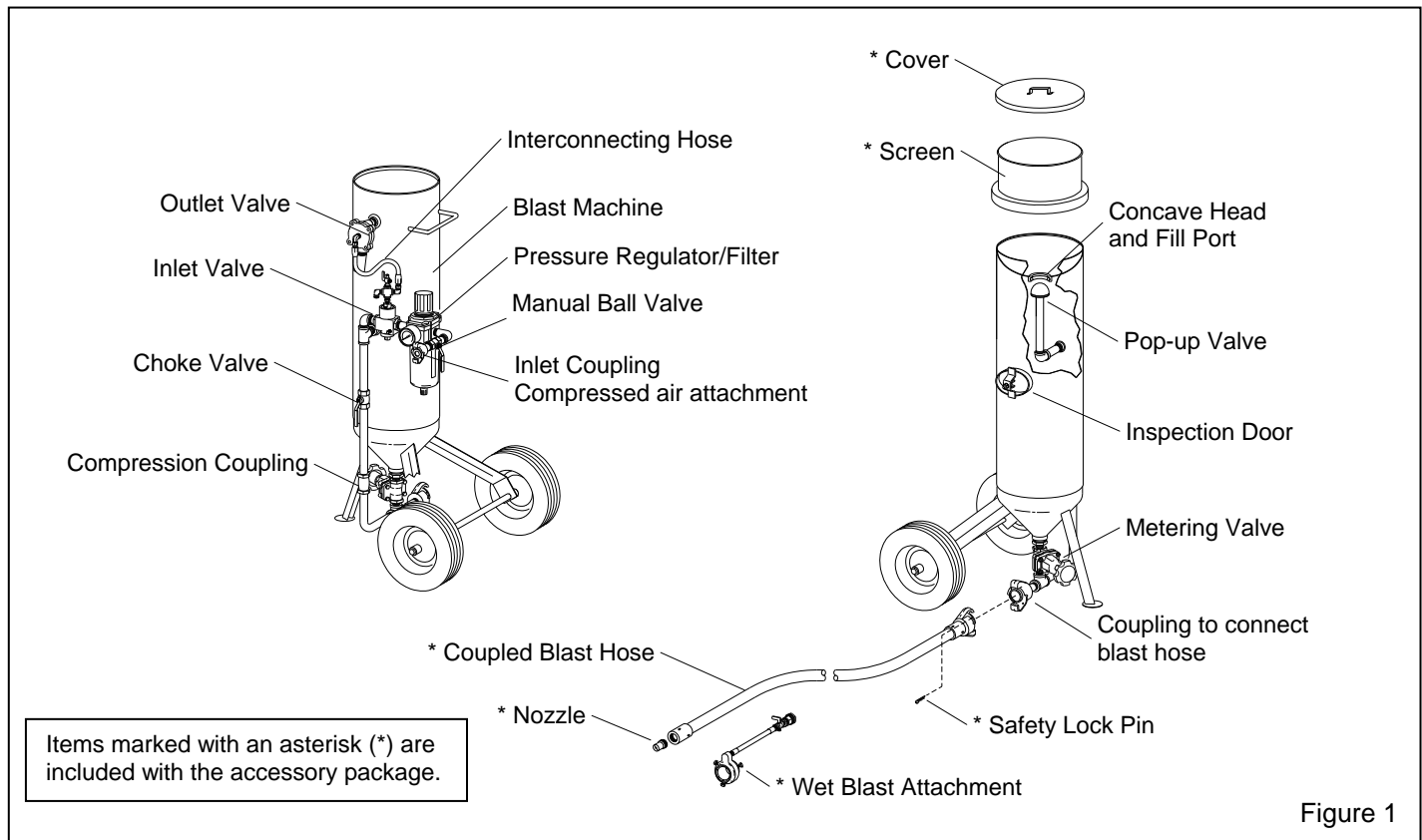


Figure 1

1.3.6.3 The components of the remote control system are shown in Figure 2. The controls include the inlet valve, diaphragm outlet valve, an 18-inch long interconnecting hose, control handle, 21-foot long urethane twinline control tubing, tubing unions, and nylon ties.

1.3.6.4 Clemco remote controls operate pneumatically on return air. If the control handle lever (the activator for the remote control system) is in the up (no blast) position, one stream of air travels down the outbound twinline (See Figure 2) and stops at the control handle. The normally-closed inlet valve remains closed, and the normally-open outlet valve remains open. As long as the control handle lever remains up, the remote control system is inactive. When the lever is pressed, air from the outbound line returns through the return line to open the inlet valve and close the outlet valve. This action pressurizes the blast machine and begins the blasting. Releasing the handle exhausts the control air, which closes the inlet valve and opens the outlet valve, which depressurizes the blast machine and stops the blasting.

1.3.7 Compressed-air Requirements

1.3.7.1 The size of the compressor required depends on the orifice size of the nozzle and blasting pressure. Unless specified otherwise, blast machine packages are supplied with a 1/8" orifice nozzle. Nozzles larger than 1/4" are not recommended because the accelerated velocity rapidly wears the blast hose.

1.3.7.2 Refer to the table in Figure 3 to determine cfm requirements. The table shows air consumption of nozzles when new. It does not show the recommended compressor size. As nozzles wear, they will consume 70% to 80% more air. Consult with a compressor supplier for suggested compressor size based on the air consumption of the next larger orifice size.

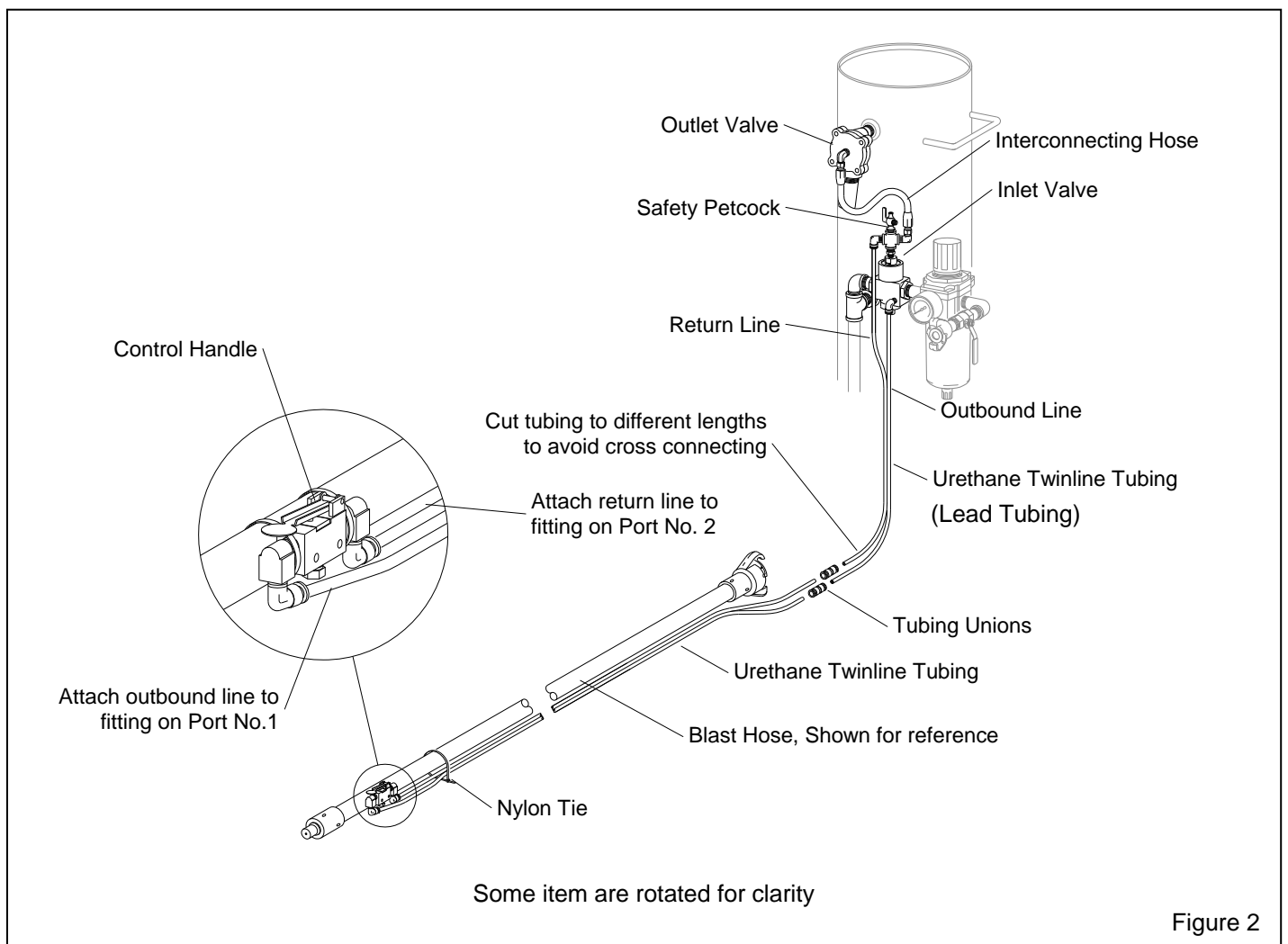


Figure 2

Compressed Air and Abrasives Consumption
Consumption rates are based on abrasives that weigh 100 pounds per cubic foot

Nozzle Orifice Size (in.)	Pressure At The Nozzle (psi)							Air, Power and Abrasive Requirements
	50	60	70	80	90	100	125	
No. 2 1/8"	11	13	15	17	19	20	25	Air (cfm)
	67	77	88	101	112	123	152	Abrasive (lbs/hr)
	2.5	3	3.5	4	4.5	5	5.5	Compressor (hp)
No. 3 3/16"	26	30	33	38	41	45	55	Air (cfm)
	150	171	196	216	238	264	319	Abrasive (lbs/hr)
	6	7	8	9	10	10	12	Compressor (hp)
No. 4 1/4"	47	54	61	68	74	81	98	Air (cfm)
	268	312	354	408	448	494	608	Abrasive (lbs/hr)
	11	12	14	16	17	18	22	Compressor (hp)

- Air requirements were measured by a flow meter under actual blasting conditions, and are therefore lower than figures for air alone, with no abrasive.
- Horsepower requirements are based on 4.5 cfm per horsepower.
- Figures are for reference only, and may vary for different working conditions. Several variables, including metering valve adjustments, can affect abrasive flow.
- Figures show approximate compressed air and abrasive consumption when nozzles are new. Consumption will increase as the nozzle wears.

Figure 3

2.0 INITIAL SET-UP

2.1 Blast Hose, Control Handle and Control Line

2.1.1 Urethane lead tubing: The urethane lead tubing is factory installed; this section explains the process for reference. Skip to Section 2.1.2 if not replacing lead tubing.

2.1.1.1 Use 4-feet of lead tubing. If necessary cut 4 ft from the 21-foot length (or bulk length) of urethane twinline tubing.

2.1.1.2 Separate (split) about 6-inches from one end of the 4-foot tubing. Measure the distance between the connector elbows (approximately 4-1/4") and shorten one side of the tubing accordingly. Refer to Figure 4.

2.1.1.3 Following the instructions in Figure 5, insert the short side of the tubing into the lower elbow on the inlet valve as shown in Figure 4. Tug on the tubing to make sure it is secure. This line becomes the "outbound" control line.

2.1.1.4 Insert the longer side of the tubing into upper elbow. This line becomes the "return" control line.

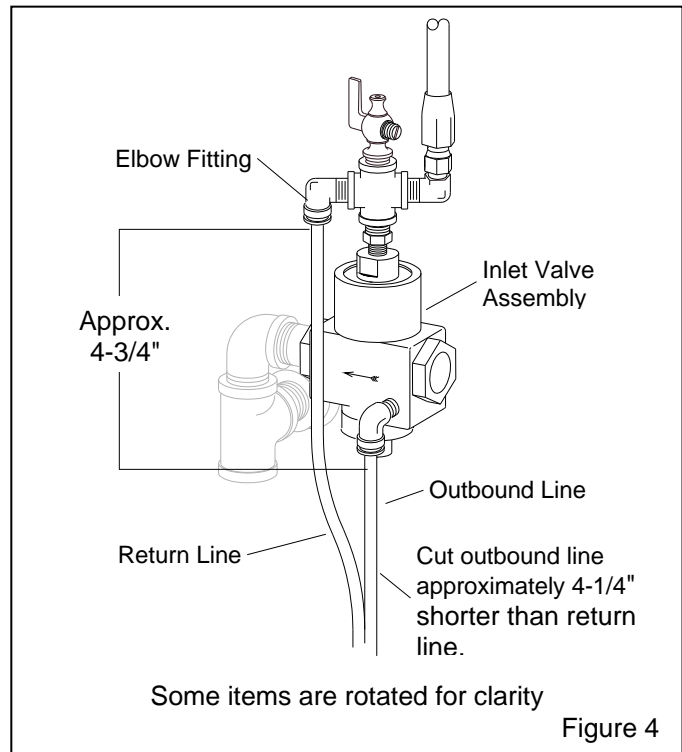
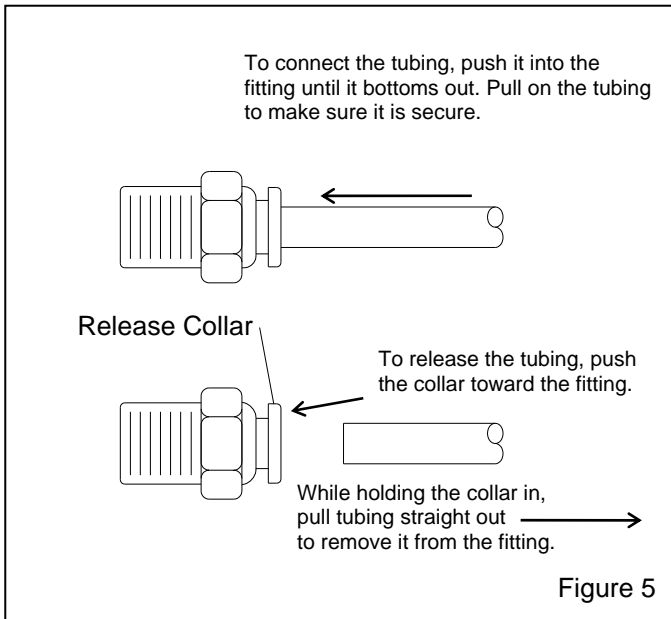


Figure 4

2.1.1.4 Band the tubing to the vertical, pusher-line piping along the side of the machine and to the nipple between the blast hose coupling at the bottom of the machine, and tee below the metering valve.

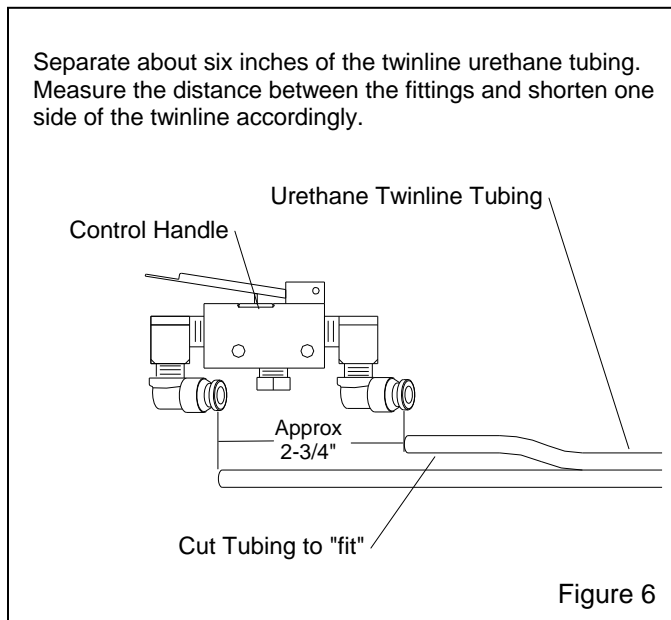


2.1.2 Urethane Twinline Control Tubing

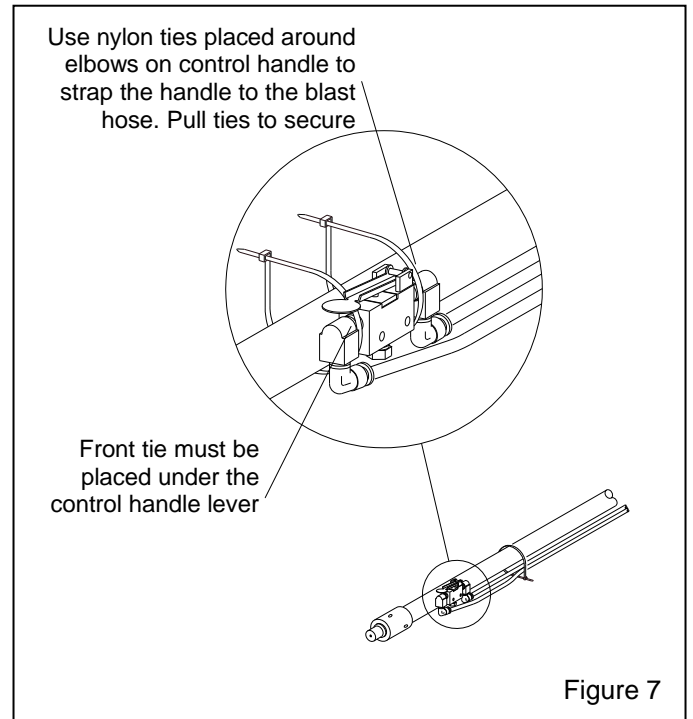
2.1.2.1 Temporarily connect the blast hose to the quick coupling at the bottom of the blast machine.

2.1.2.2 Separate approximately six-inches from one end of the twinline tubing. Cut one side to the correct length as shown in Figure 6 (remove approximately 2-3/4"). This makes what becomes the "return" line, slightly shorter than the "outbound" line.

2.1.2.3 Connect the urethane tubing to the control handle elbows as explained in Figure 5. Tug on the tubing to make sure it is secure.



2.1.2.4 Position the control handle on the side of the blast hose where it is the most comfortable to operate while holding the hose. Use nylon ties placed around elbows on control handle to strap the handle to the blast hose, as shown in Figure 7. Pull the ties to secure, and then clip the loose ends.



2.1.2.5 Working from the control handle back, band the twinline tubing to the blast hose every 18 to 24 inches. Make sure the tubing is straight with no twists, as the lines must be traced. The last band should be just behind the hose coupling that connects to the blast machine.

2.1.2.6 Overlap the lead tubing (on the blast machine) and the control tubing on the blast hose. Separate the ends of both tubing.

2.1.2.7 Carefully trace the lines; leaving slack in both sides of the tubing, cut the ends at different lengths as shown in Figure 2. Make sure the outbound line (the lower elbow on the inlet valve) connects to Port No. 1 on the control handle, and the return line (upper elbow on the inlet) connects to port NO. 2 on the control handle, as shown in Figure 2.

Note: Offsetting the lengths of the tubing reduces the possibility of switching lines when uncoupling and coupling the hoses.

2.1.2.8 Use the tubing unions to connect the lead tubing to the longer control tubing. Tug on the tubing to make sure they are secure.

2.2 Optional Wetblast Head

2.2.1 Loosen the three holding screws and slide the collar onto the nozzle holder as shown in Figure 8. Tighten the screws to secure.

2.2.2 Connect a garden hose from a faucet to the swivel adapter on the attachment.

2.2.3 When ready to use open the water faucet and control water flow at the petcock on the attachment. It may be necessary to loosen the three holding screws and slide the collar on the nozzle holder to obtain the best flow into the air stream.

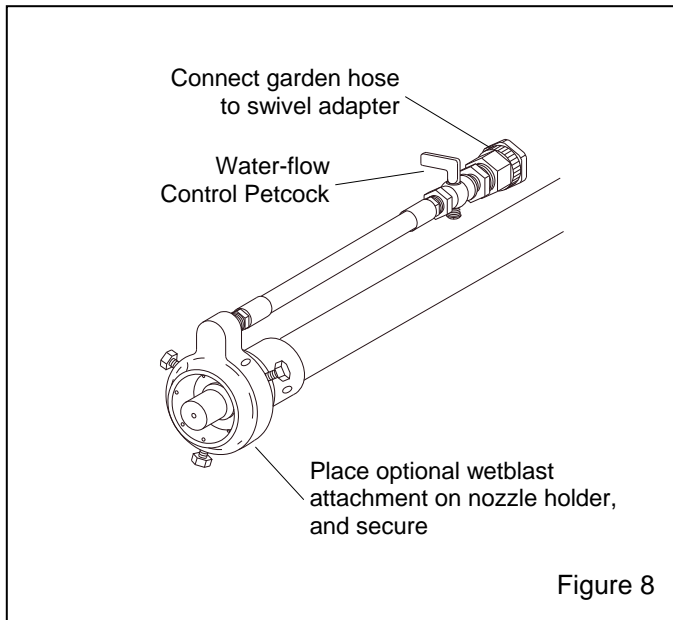


Figure 8

3.0 OPERATION

3.1 Transporting and moving

3.1.1 Transporting a blast machine

3.1.1.1 Always empty the machine before transporting. Transporting a machine containing abrasive may increase the weight to an unsafe handling limit, and could cause abrasive to settle in the piping.

⚠ WARNING

- Always empty the blast machine before transporting.
- Never hoist the machine by the handle or piping, or with a sling through the handle or piping.
- When transporting a machine on a pallet, always securely attach the machine to a sturdy pallet.
- Always securely anchor the machine to the transport vehicle.
- Failure to observe these warnings could result in serious injury or death.

3.1.2 Moving a blast machine

⚠ WARNING

Never manually move a blast machine when it contains abrasive. Empty machines may be moved when the following criteria are met.

3.1.2.1 An empty machine may be moved manually, on level flat surfaces.

3.1.2.2 Move the machine by pushing it in a forward direction. Do not back-up while moving the machine, as potential tripping hazards may be out of view.

3.2 Set-up

3.2.1 Locate the compressor upwind and/or away from the blasting operation to prevent contaminated air from entering the compressor intake.

3.2.2 Connect a 3/4" ID or larger air line from the compressor to the inlet coupling. NOTE: If the air line supplies air to other pneumatic tools, install an isolation valves to enable depressurization of each line for service.

 WARNING

If twist-on type air hose couplings are used, they must be secured by safety lock pins or wires to prevent accidental disconnection while under pressure. Hose disconnection while under pressure could cause serious injury.

3.2.3 Make sure the coupling gaskets are in place and in good condition before connecting the blast hose to the quick coupling on the blast machine. To prevent accidental separation during blasting, use safety lock-pins or safety wire to lock the couplings together. See Section 7.1 for optional safety cables.

3.2.4 Connect the urethane twinline control tubing to the urethane lead tubing.

3.2.5 Make sure the choke valve is open (handle in-line with the piping).

3.2.6 Close the abrasive metering valve. The valve is closed when the metering knob is turned fully clockwise.

3.2.7 Close the manual ball valve on the blast machine inlet piping.

3.2.8 Close the air valve on the compressor. Start the compressor, and bring it up to operating temperature and pressure. The pressure must not exceed 125 psi.

3.2.9 Load abrasive into the machine by following the instructions in Section 3.7.

3.2.10 Slowly open the compressor air valve to pressurize the air supply line. Listen for noise that indicates any open lines or leaks.

3.3 Blasting Attire

3.3.1 Operators must wear appropriate protective gear, including: abrasive-resistant clothing, leather gloves, hearing protection, and a NIOSH-approved, and properly maintained supplied-air respirator.

 WARNING

Abrasive blasting produces harmful dust. Everyone in the blasting area must wear a properly fitted and properly maintained NIOSH-approved supplied-air respirator.

3.4 Blasting

3.4.1 Make sure the control handle lever is in the "up" (no blast) position, and then open the manual ball valve on the inlet piping.

3.4.2 Close the safety petcock located on the inlet valve. Closing the petcock prepares the machine for remote operation and activation by the control handle.

3.4.3 Hold the blast hose securely and point the nozzle only at objects intended to be blast cleaned.

3.4.4 Press the control handle lever. Be prepared; blasting will begin as soon as the machine pressurizes.

 WARNING

OSHA requires remote controls on all blast machines when an operator controls the nozzle. Do not tie down the control handle or attempt to bypass any part of the remote control system. Doing so will defeat the purpose of the fail-to-safe feature of the remote control. Severe injury can result from uncontrolled blasting.

3.4.5 Adjust blast pressure per Section 3.5.

3.4.6 If the abrasive metering valve is closed as instructed, in Section 3.2.6, only air will exit the nozzle. Adjust the metering valve per Section 3.6.

3.4.7 To stop blasting, release the control handle lever.

3.4.8 Open the safety petcock. Always open the safety petcock during work breaks to prevent unintentional blasting.

3.5 Adjust Blasting Pressure

3.5.1 The filter/pressure regulator combination, located on the inlet piping, enables the user to adjust blasting pressure to suit the application. The suitable pressure depends on the application. Lower pressures may be used for delicate work, and higher pressure used on tough cleaning jobs on durable substrates. In all cases, highest production can be achieved only when pressure is carefully monitored.

3.5.2 To adjust pressure, unlock the knob, and turn it clockwise to increase pressure or counter-clockwise to decrease pressure. Pressure will usually drop from closed-line pressure when blasting is started. After pressure is set, lock the knob to maintain the setting.

3.6 Adjust Abrasive Metering Valve

3.6.1 Abrasive flow is adjusted with the knob.

3.6.2 Begin adjustments with the metering valve closed. The valve is closed when the metering knob is turned fully clockwise.

3.6.3 While blasting, increase abrasive flow by turning the knob counterclockwise at 1/4 turn increments. Allow time for the flow to stabilize before readjusting.

3.6.4 Optimum abrasive flow depends on the type and size of abrasive and blasting pressure, and can best be determined by experience. Use as little abrasive as possible while maintaining the maximum cleaning rate. The air/abrasive mixture should be mainly air. Abrasive exiting the nozzle should barely discolor the air when seen against a contrasting background.

3.7 Loading Abrasive into the Blast Machine

3.7.1 Depressurize machine using normal procedures. The pop-up valve automatically drops when air is expelled from the machine and pressure equalizes.

3.7.2 Load abrasive into the machine by pouring it into the concave head. Using an optional screen, placed over the head, prevents large objects from falling inside. A screen is recommended to keep objects such as pieces of abrasive bags or other objects from falling into the machine. Foreign objects will jam the machine. Abrasive flows through the fill port into the machine. Keep the abrasive level below the pop-up valve. Abrasive on the pop-up valve could be forced up and out of the top of the machine when the machine is pressurized.

NOTE: Use only abrasive specifically manufactured for blast cleaning, and that is compatible with the surface being blasted.

3.7.3 After the machine is filled, use normal procedures to begin blasting.

3.8 Emptying the Machine of Abrasive

3.8.1 When working in environments subject to extreme temperature changes, or very humid conditions, condensation may develop inside the machine. Condensation wets abrasive and causes flow problems. To prevent this, empty the machine of all abrasive when shutting down for the day. This will eliminate trouble from moist abrasive when starting a new day's blasting. One way to avoid having to empty the machine is to load only as much abrasive as will be used during the work period. If the machine must be purged of abrasive, do the following:

3.8.2 With the blast machine off, turn the blast pressure to approximately 40-50 psi, close the choke valve and set the abrasive metering valve at full open.

3.8.3 To prevent rapid wear of the nozzle holder threads, the nozzle should be firmly attached to the nozzle holder. Removal of the nozzle is not recommended. If circumstances require the nozzle to be removed, also remove the nozzle washer. Purging the machine without a nozzle, will eventually erode the thread area of the nozzle holder, which could cause a hazardous condition.

3.8.4 Point the nozzle (or hose end) into a drum or suitable container, or in the direction the abrasive is to be disposed.

3.8.5 Hold the hose securely (do not leave the hose unattended), and pressurize the machine by activating the control handle. Be prepared for surging, or recoil of the hose, which can be severe.

3.8.6 When the machine is empty, release the control handle lever, open the safety petcock, and open the choke valve.

3.8.7 If the nozzle was removed, thoroughly inspect the nozzle holder threads for wear before installing the nozzle washer and attaching the nozzle.

 WARNING

Inspect the threads on the nozzle and nozzle holder each time the nozzle is secured to the holder. Check threads for wear, and make sure nozzle holder securely grips the nozzle. The nozzle washer must also be inspected for wear. Worn nozzle washers cause thread erosion. A loose fitting nozzle may eject from the holder under pressure and cause severe injury.

3.9 Shutdown

3.9.1 When finished blasting, and after cleanup is completed, remove the respirator outside the respirator-use area and where the air is safe to breathe.

3.9.2 Close the air supply valve at the compressor.

3.9.3 Drain the air filter (bottom section of the filter/regulator combination), drain receiver tank, and water collecting devices, and bleed the compressed-air supply hoses.

3.9.4 Shutdown the compressor.

3.9.5 Cover the machine when not in use.

4.0 PREVENTIVE MAINTENANCE

4.1 Daily

4.1.1 With the air off, before blasting, inspect the following:

- Make sure that couplings are secure and lock pins and safety cables are in place.
- Make sure the nozzle washer is in place and not worn.
- Inspect the control handle, the lever must move freely with no drag or binding, and must return to the "up" position when released.

WARNING

Malfunctioning control handles could cause unintentional actuation of a blast machine, or prevent a machine from deactivating upon release. Malfunctioning control handles must be taken out of service immediately and repaired or replaced. Serious injury can result from unintentional blasting.

4.1.2 During blasting, inspect the following:

- Inspect all couplings and coupling gaskets for leaks.
- Check the blast machine for leaks. If leaks are found around the pop-up valve, inspection door, or pipe fittings at the bottom of the cone, stop blasting immediately and repair or replace worn parts. If leaks are allowed to continue, abrasive erosion could cause irreparable damage to the blast machine.
- Check all external piping, control hoses, and valves for leaks. If leaks are found, stop blasting and repair.
- Inspect blast hose, couplings, and nozzle holders for leaks. At the first sign of a leak, stop blasting and inspect all items for wear.

WARNING

Leaks around couplings and nozzle holders indicate worn or loose-fitting parts. Nozzle holders and couplings that do not fit tightly on hose, and nozzles that do not fit tightly in nozzle holders could disconnect while under pressure. Impact from nozzles, couplings, hoses, or abrasive, and parts disconnected while under pressure could cause severe injury.

4.2 Weekly

4.2.1 With the air off, before blasting, do the following:

- Remove the nozzle for inspection. Replace if the orifice diameter is worn 1/16" or more, or if the liner is cracked.
- Inspect the blast hose for wear; look for soft spots. Soft spots mean the hose is worn. Replace the blast hose before the tube wears as far as the fabric plies.

WARNING

Worn blast hose could suddenly fail by bursting. Couplings and nozzle holders may not adequately grip worn hose, causing them to blow off under pressure. Compressed air and abrasive escaping from a burst hose, or disconnected coupling or nozzle holder, could cause severe injury.

4.2.3 Monthly inspection

With the air off, before blasting, inspect the following:

- Check the pop-up valve's urethane coating for cracks and grooves. Replace the pop-up valve at the first sign of wear. See Section 5.3.
- Inspect the rubber pop-up seal, and replace at the first sign of wear, drying, or cracking. See Section 5.4.

5.0 SERVICE MAINTENANCE

⚠ WARNING

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

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

5.1 Removing damp abrasive from the blast machine.

5.1.1 To clear a minor blockage caused from damp abrasive, while blasting, rapidly open and close the choke valve several times.

5.1.2 For more difficult blockages, proceed as follows: See Section 5.2 to check for obstructions in the metering valve.

5.1.3 With the blast machine off, disconnect the blast hose and remove the gasket from the quick coupling on the machine.

5.1.4 Place the machine so that the outlet is pointed away from any objects or persons.

⚠ WARNING

Place the machine so that the outlet is pointed away from any objects or persons. Stand clear of the path of exiting abrasive. It may come out at high velocity. Impact from exiting abrasive could cause severe injury.

5.1.5 Close the choke valve and fully open the abrasive metering valve. Pressurize the machine to force out any damp abrasive.

5.1.6 When the obstruction has been removed, depressurize the machine. Remove the nozzle and nozzle washer, and reconnect the hose. Open the choke valve and close the abrasive metering valve. Pressurize the machine to clear the hose. When the hose is cleared, depressurize the machine so the nozzle and nozzle washer can be attached.

⚠ WARNING

The threads on the nozzle and nozzle holder must be inspected each time the nozzle is secured to the holder. Check the threads for wear, and make sure nozzle holder securely grips the nozzle. The nozzle washer must also be inspected for wear. Worn nozzle washers cause thread erosion. A loose fitting nozzle may eject from the holder under pressure and could cause severe injury.

5.1.7 With the hose cleared, start the machine using normal procedures.

5.2 Clearing obstructions in the abrasive metering valve and blast machine.

5.2.1 If the nature of the obstruction permits emptying the machine of abrasive, follow the instructions per Section 3.8.

5.2.2 Turn off the compressed air supply. Lockout and tagout the air supply, and bleed the air supply line to the blast machine.

5.2.3 Remove the inspection door and check the inside of the machine for obstructions from foreign objects

5.2.4 Check the inside of the machine for signs of moisture. If moisture is present, condensation is in the compressed air, and must be eliminated.

5.2.5 Make sure the inspection door gasket is in good condition and that it is correctly in place before bolting the door onto the machine.

5.2.6 Check to make sure all inspection door and hoses are secure before starting the compressed air supply.

5.3. Replacing the Pop-Up Valve, Figure 9

5.3.1 All service on the pop-up valve must be done with the compressed air off and the air supply locked-out and tagged-out.

5.3.2 To gain access to the pop-up valve, remove the inspection door assembly.

5.3.3 Using a small pipe wrench, unscrew the pop-up valve guide by turning it counterclockwise. Remove the pop-up valve and guide from the machine.

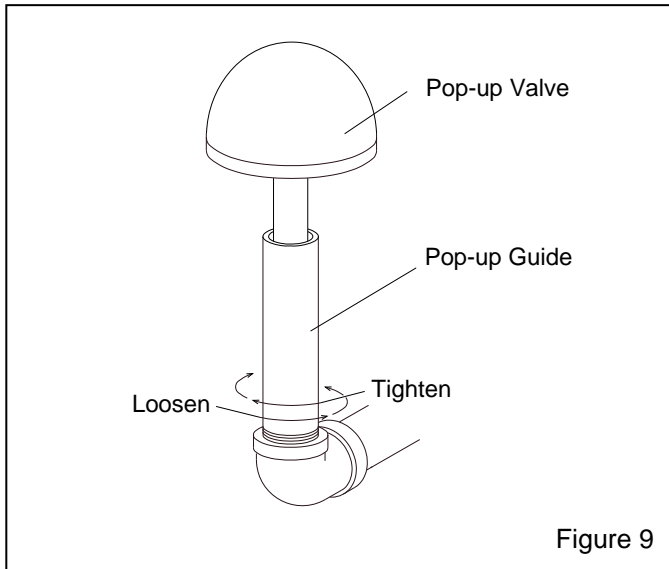


Figure 9

5.3.4 Slide the new pop-up valve into the guide, and then screw the valve guide (with the pop-up valve in it) into position inside the machine. Tighten the guide snug, but not wrench-tight. Over-tightening the guide will make it difficult to remove, the next time the pop-up valve needs replacement.

5.3.5 Check alignment through the pop-up opening. If necessary use a large screw driver or pry-bar to realign. A misaligned pop-up valve could result in early valve failure, or abrasive leakage when the machine is pressurized or depressurized.

5.3.6 Put a new gasket on the inspection door assembly before bolting the door onto the machine.

5.4 Replacing the Pop-Up Seal

5.4.1 All service on the blast machine must be done with the compressed air off and the air supply locked-out and tagged-out.

5.4.2 If unable to change the seal using the following methods, or if the seal falls inside the machine, remove the inspection door and work from inside the machine.

5.4.3 Remove the old seal using fingers, screwdriver, or similar object, to work the seal out of the retaining groove.

5.4.4 Push the new seal all the way through the fill port and then fit it into the retaining groove. When most of the seal is seated in the groove, pull up on the seal and allow it to pop into position.

5.5 Inlet Valve, Ref. Figure 15

5.5.1 All service on the inlet valve must be done with the air off and the air supply locked-out and tagged-out.

5.5.2 Use snap-ring pliers to remove the top and bottom retaining rings.

5.5.3 To remove the top cap, twist the petcock/cross assembly while pulling up.

5.5.4 Pull down on the bottom plug to remove it. If necessary, use pliers to grab the wrench flats to remove it from the body. Cup the bottom opening to catch the spring, retainer, and washer as the plug is removed.

5.5.5 If the piston cannot be removed with finger or thumb force, use a dowel or similar object inserted through the bottom opening to push the piston assembly out the top.

5.5.6 Clean all parts and inspect for wear as follows:

- The spring is approximately 1" long. If it is rusted or compressed, replace it.
- Inspect the piston, rubber washer, washer retainer top cap and bottom plug for damage. Replace all damaged parts.
- Look into the bottom opening in the valve body. If the machined seat is worn, replace the body.
- Inspect all O-rings. If any are damaged or flattened, replace them.

5.5.7 Lubricate all O-rings, and use the illustration in Figure 12, to reassemble the valve in reverse order, assembling the top end first.

5.6 Diaphragm Outlet Valve, Ref. Figure 14

5.6.1 All service on the outlet valve must be done with the air off and the air supply locked-out and tagged-out.

5.6.2 Remove the cap by unscrewing the four cap screws.

5.6.3 Remove the diaphragm and inspect it for damage. Replace as necessary.

5.6.4 Inspect the machined seat in the body. If worn, replace the body.

5.6.5 Reassemble in reverse order.

6.0 TROUBLESHOOTING

NOTE: This section only identifies conditions and problems in the blast machine. Always refer to the appropriate section of this manual, or manuals for the remote controls or other accessory equipment, before servicing the equipment.

⚠ WARNING

To avoid serious injury or death, observe the following when troubleshooting the machine and remote controls:

- Turn off the air, and lock out and tag out the air supply.
- When checking the machine or controls requires air, always enlist the aid of another person to operate the control handle while holding the nozzle securely and pointing it in a safe direction.
- Never strap down the remote control handle lever in the operating position.

6.1 Neither abrasive nor air comes out of the nozzle while the machine is under pressure.

6.1.1 Depressurize the blast machine. After the pop-up valve has dropped, remove the nozzle, and check for obstruction.

6.1.2 Make sure that both the abrasive metering valve and choke valve are open.

6.2 Air only (no abrasive) comes out the nozzle

6.2.1 Abrasive metering valve may be closed or needs adjustment. Adjust the metering valve per Section 3.6.

6.2.2 Blast machine may be empty.

6.2.3 Abrasive may be damp. See Section 5.1 to clear damp abrasive.

6.2.4 Check the machine for obstructions per Section 5.2.

6.3 Heavy abrasive flow

6.3.1 Make sure the choke valve is open. The valve is open when the handle is in-line with the piping.

6.3.2 Abrasive metering valve may be open too far. See Section 3.6.

6.4 Abrasive surging

6.4.1 A certain amount of abrasive surge is normal at start-up. Should the flow of abrasive continue to surge, reduce the amount of abrasive in the air stream by adjusting the metering valve. See Section 3.6.

6.5 Intermittent abrasive flow.

6.5.1 Moisture in the blast machine or saturated air filter. Drain moisture from the compressor's receiver tank, and air filter. If moisture continues to be a problem, a dryer or aftercooler may be required in the air supply line.

6.6 Blast machine does not pressurize when the control handle is pressed.

6.6.1 Make sure the safety petcock is closed.

6.6.2 Make sure that the air supply is on and all supply valves are open.

6.6.3 Insufficient-size air supply hose or reduced-size fittings between the compressor and blast machine. See Section 3.2.2.

6.6.4 Check all control lines and fittings for air leaks. There should be no leaks anywhere in the system.

6.6.5 Pop-up valve stuck, or internal piping worn or out of alignment. Inspect internal piping.

6.6.6 Press the control handle and check for air escaping from the muffler under the control handle. If air escapes when the handle is pressed, the tubing is connected backwards. Refer to Paragraph 2.1.2.7 and the illustration in Figure 2. Trace the lines to make sure they are connected correctly.

6.6.7 Open the safety petcock and press the control handle lever. Air should come from the petcock. If air does not escape, check the following:

- The control line to or from the control handle is blocked. Inspect tubing for blockage.
- Inspect the outlet valve diaphragm for a rupture.

6.6.8 Close the safety petcock, and press the control handle lever. Check that no air escapes through the vent hole on the cylinder body of the inlet valve body. Air escaping from this vent indicates a worn piston or O-ring in the inlet valve. See Section 5.5.

6.7 Outlet valve does not exhaust or exhausts too slowly.

6.7.1 Make sure the inlet valve closes. If it does not seal-off incoming air, the valve requires service.

6.7.2 Diaphragm in outlet valve has taken a set. Remove the cap and reverse the diaphragm.

6.8 Pop-up valve seats for a short time and then falls, or it "hovers" but fails to seat.

6.8.1 Insufficient air supply. Check the compressor output, air supply hose and isolation valves.

6.8.2 Outlet valve diaphragm may be worn or ruptured. Inspect it and replace worn parts.

7.0 REPLACEMENT PARTS

7.1 Accessories, not shown

Description	Stock No.
Pool Pal, 1.0 cu. ft. capacity blast machine with remote controls	24774
Pool Pal Package: include all items shown above plus, 16 ft. coupled blast hose, CT-2 nozzle, screen, cover, and wetblast attachment	24775
WB-1 Wetblast attachment	02701
Safety cable, 1/2" to 1-1/4" OD hose	15012
Cover, blast machine, poly	15097

7.2 Blast Machine and Accessories, Figure 10

Item	Description	Stock No.
1.	Seal, pop-up, rubber	01245
2.	Pop-up valve and shaft	01242
3.	Handle, 1/2" ball valve	01252
4.	Valve, 1/2" NPT ball w/ handle	01241
5.	Wheel, 10" diameter, rubber tire	20349
6.	Metering valve, abrasive	99555
7.	Coupling, CFA-1/2, 1/2" NPT alum.	00558
8.	Gasket, inspection door, 3" x 4"	01249
9.	Inspection door assembly, 3" x 4"	01267
10.	Gaskets, CQG, for 00558, pack of 10	00850
11.	Formed pipe pusher line, 1/2"	11013
12.	Coupling, 1/2" Compression	11086
13.	Bushing, shoulder, each, two required per wheel	25257
14.	Washer, 3/4" thrust	03804
15.	Retaining ring, 3/4"	03805

16.	Screen, 10" dia.	03362
17.	Cover, 10" dia.	03107
18.	Blast hose, 1/2" ID coupled 16 ft., standard length 25 ft., Optional length	01251 01268
19.	Holder, nozzle, CHE-1/2	00577
20.	Coupling, CQA-1/2 quick	00599
21.	Nozzle, tungsten lined, 3/4" NPT x 1-3/4" CT-2, 1/8" orifice CT-3, 3/16" orifice CT-4, 1/4" orifice	01351 01352 01353
22.	Washers, NW-1, pack of 10	21580
23.	Lock pin, coupling, package of 25	11203
24.	Filter Regulator w/gauge, 1/2"	05530
25.	Coupling, 1/2" NPT universal female	00594
26.	Axle, 3/4" x 26-13/16"	25251
27.	Extension, leg	25258
28.	Screw, 1/4-NC x 1-1/4" cap	03054
29.	Nut, 1/4-NC hex	03111
30.	Washer, 1/4" flat	03116
31.	Washer, 1/4" lock	03117

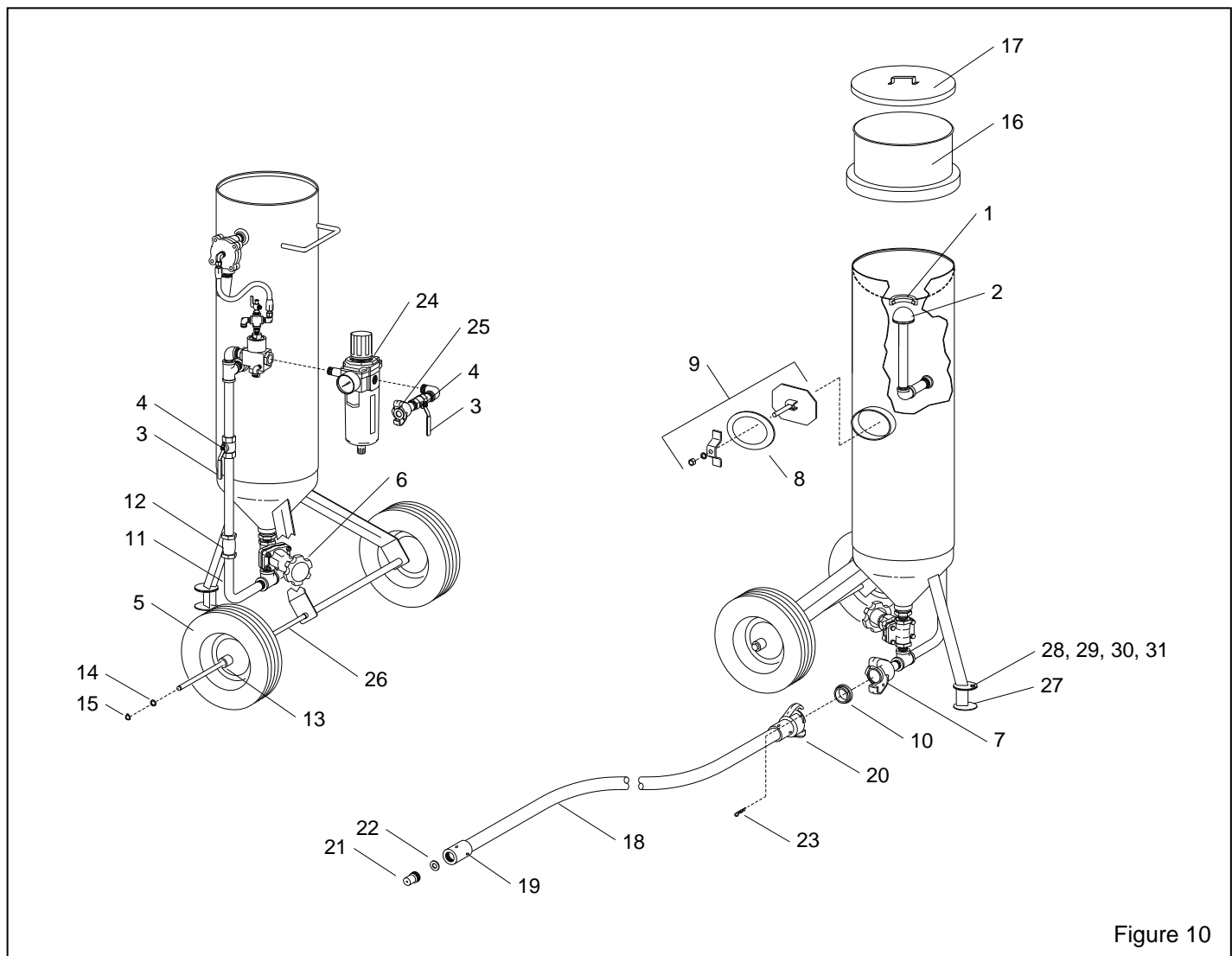


Figure 10

7.3 Remote Controls, Figure 11

Item	Description	Stock No.
1.	Control handle assembly	24800
2.	Tubing, urethane twinline specify feet required, 21 ft standard	19577
3.	Valve, 1/2" inlet	24803
4.	Valve, 1/2" diaphragm outlet	02512
5.	Hose, 3/16" x 18 in. coupled	02454
6.	Nylon tie	12140
7.	Union, urethane tubing	24472

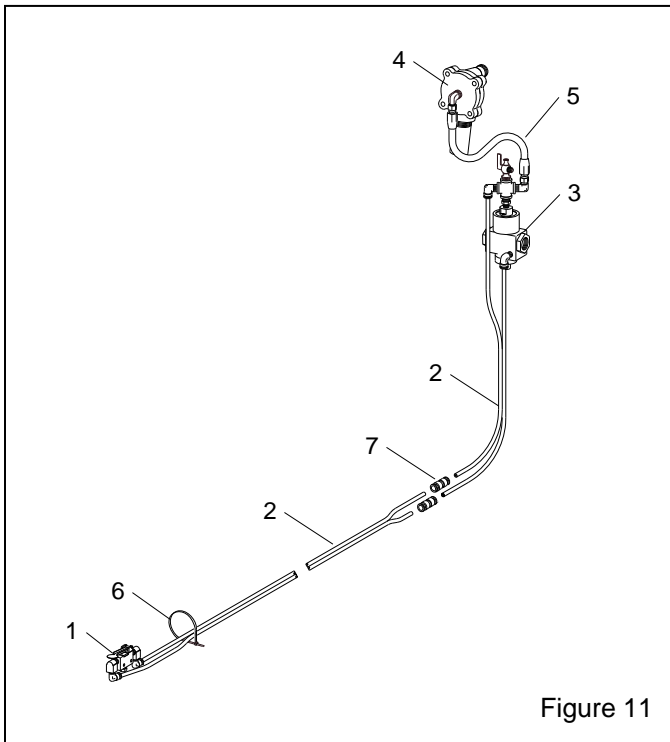


Figure 11

7.4 Abrasive Metering Valve, Figure 12

Item	Description	Stock No.
(-)	Metering valve, 1/2", complete	99555
1.	Valve body	22562
2.	Diaphragm	22563

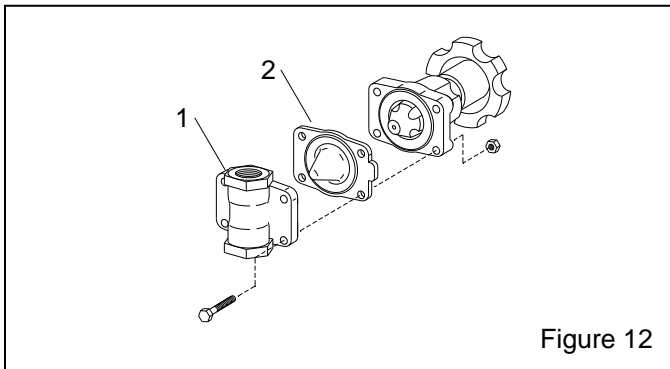


Figure 12

7.5 Control Handle Assembly, Figure 13

Item	Description	Stock No.
(-)	Control handle assembly	24800
1.	Control valve	24809
2.	Elbow, 1/8" NPT, 90° brass st.	03993
3.	Elbow, 1/8" NPT x 90°, 1/4" tubelock	11740
4.	Muffler, 1/8" NPT breather	07657
5.	Nylon tie	12140

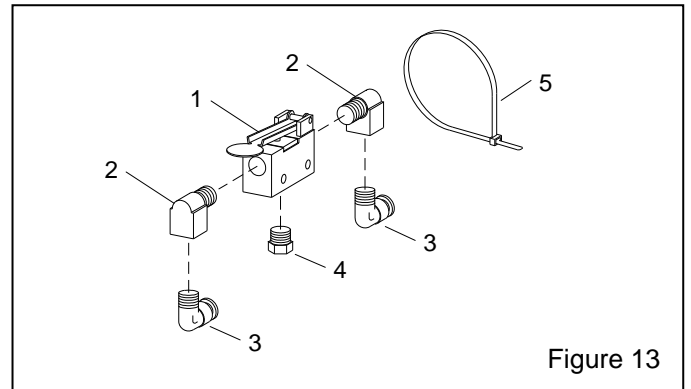


Figure 13

7.6 1/2" Diaphragm Outlet Valve, Figure 14

Item	Description	Stock No.
(-)	1/2" NPT Diaphragm outlet valve	02512
1.	Nipple, 1/2" NPT x close	01733
2.	Diaphragm	02511
3.	Washer, 1/4" lock	03117
4.	Elbow, 1/4" NPT adaptor	02513
5.	Cap	02299
6.	Body	02298
7.	Nipple, 1" NPT x 3" TOE	01841
8.	Screw, 1/4-NC x 1" cap	03053

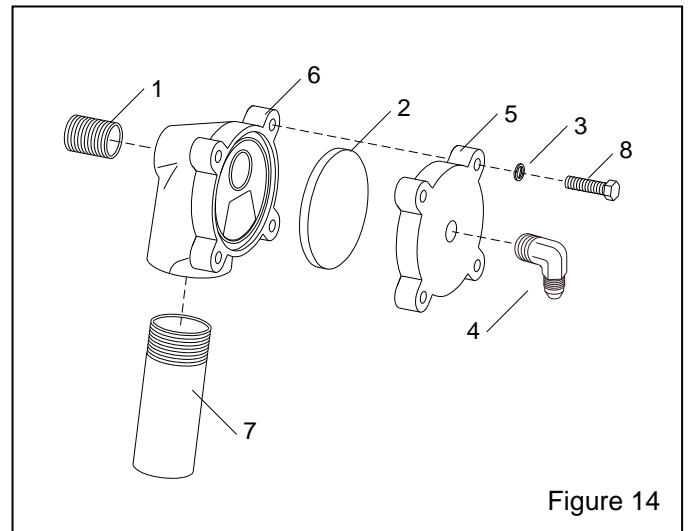


Figure 14

7.7 Inlet Valve, Figure 15

Item	Description	Stock No.
(-)	1/2" Inlet Valve, complete	24803
*	Service kit, 1/2" Inlet Valve (Fig. 15a)	07814
1.	Cap	02175
2.	Piston	02192
3.	Body	02170
4.	Plug, bottom	02176
5.	Elbow, 1/4" NPT adaptor	02513
6.	Reducer, 1/4" NPT x 1/8" NPT	02026
7.	Cross, 1/4" NPT brass	02193
8.	Petcock 1/4" NPT	01993
9.	Elbow, 1/8" NPT x 90°, 1/4" tubelock	11740
10.	Elbow, 1/4" NPT x 90°, 1/4" tubelock	11738
11.	Nipple, 1/2" NPT x close	01733

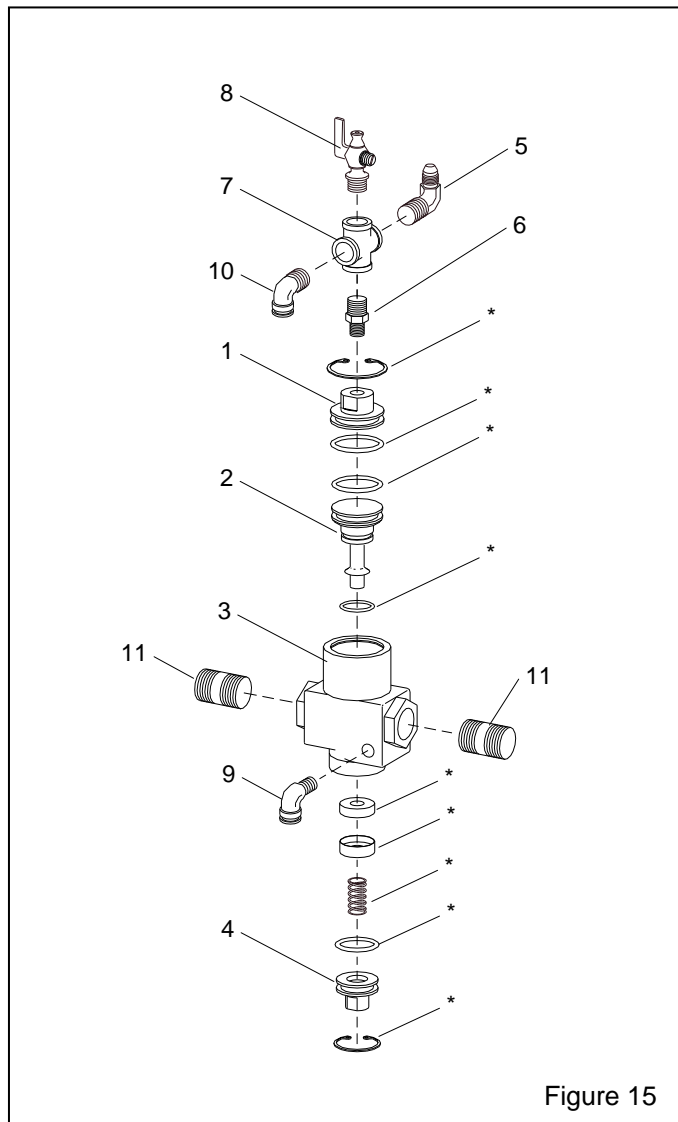


Figure 15

07814 SERVICE KIT
TLR-50 INLET VALVE

Item	Qty.	Description
1.	1	Retaining ring, cap
2.	1	Retainer, washer
3.	1	Spring, 17/32" OD x 1" long
4.	1	Retaining ring, bottom plug
5.	1	O-ring, 7/8" ID x 1/8" C/S
6.	1	Washer
7.	1	O-ring, 3/4" ID x 3/32" C/S
8.	1	O-ring, 1-1/8" ID x 1/8" C/S
9.	1	O-ring, 1-3/16" ID x 1/8" C/S

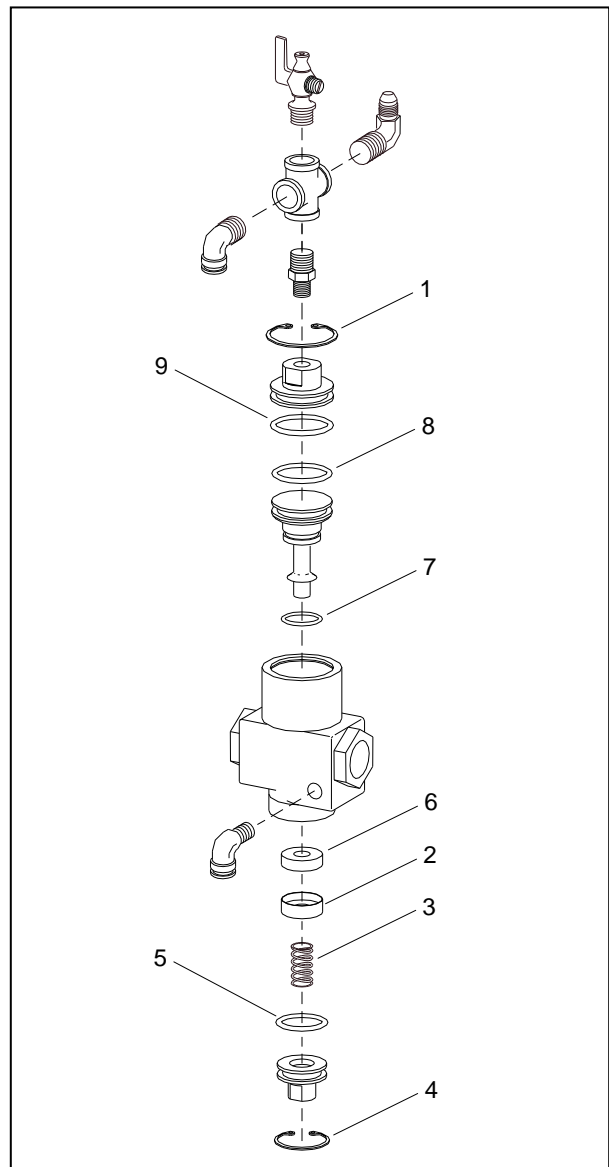


Figure 15a