

**QUANTUM ELECTRIC  
REMOTE CONTROL SYSTEM  
O. M. 25837**

DATE OF ISSUE: 04-04-13  
REVISION:

 **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***

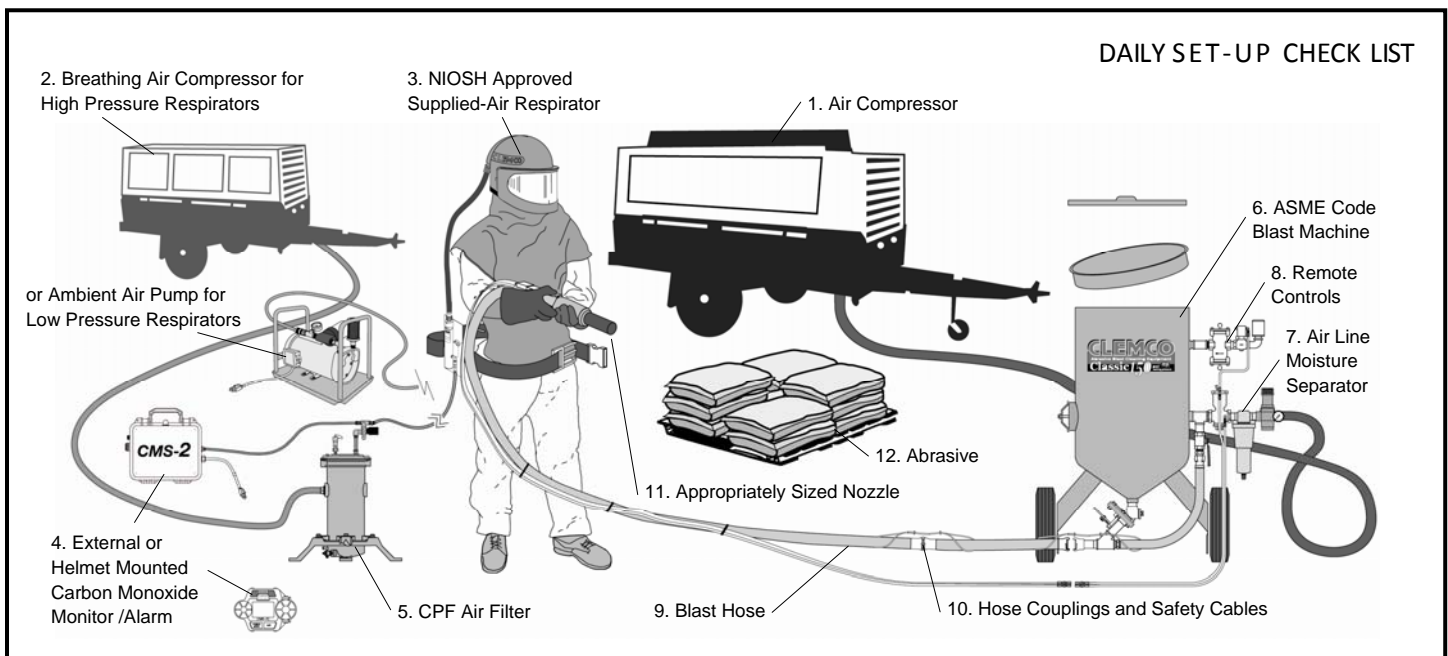
- Completely read and follow all service instructions and recommended maintenance intervals. Always shut off compressor and depressurize blast machine before performing any maintenance. At every service interval, clean all filters, screens, and alarm systems. If spring-loaded abrasive valves are used,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



## DAILY SET-UP CHECK LIST

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

1.1.1 This manual covers the installation, operation, maintenance, troubleshooting, and replacement parts for Clemco Quantum Electric Pressure-Hold Remote Control Systems. The following manuals may be used in conjunction with the Quantum system manual. They are available upon request from Clemco Industries Corp., or at our web site at [www.clemcoindustries.com](http://www.clemcoindustries.com).

- Single Chamber Blast Machine .....Manual No. 06160
- Dual Chamber Blast Machine .....Manual No. 06154
- ACE Air Valve .....Manual No. 23938
- RLX Control Handle..... Manual No. 10574
- Quantum Media Metering Valve .....Manual No. 22565

1.1.2 These instructions also contain important information required for safe operation of the blast machine. All blast operator(s) and machine (pot) tenders must be trained in the safe operation of the blast machine, remote control system, and all blasting accessories. Before using the machine, all personnel involved with the blast machine operation must read this entire manual, including the orange cover, and all accessory manuals.

1.1.3 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" 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.

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 General Description

1.3.1 The components of the Quantum electric remote control system are shown in Figure 1. They include the Quantum abrasive metering valve, ACE air valve, RLX electric control handle, electric panel assembly, 50-foot control cord with abrasive cut-off switch (ACS), all interconnecting control hoses, and all necessary fittings.

1.3.2 The 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 remote control handle, the abrasive metering valve and air valve close, stopping air and abrasive flow through the nozzle. The remote control system "fails to safe", which means when any interruption in the control-air or electrical circuit occurs, for reasons such as a break in the line, the compressor stops running, or the operator drops the blast hose, the remote control stops the blasting.

**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.

AC Unit have transformer to convert to 12 volt AC. There is 12-Volts at the control handle with either system

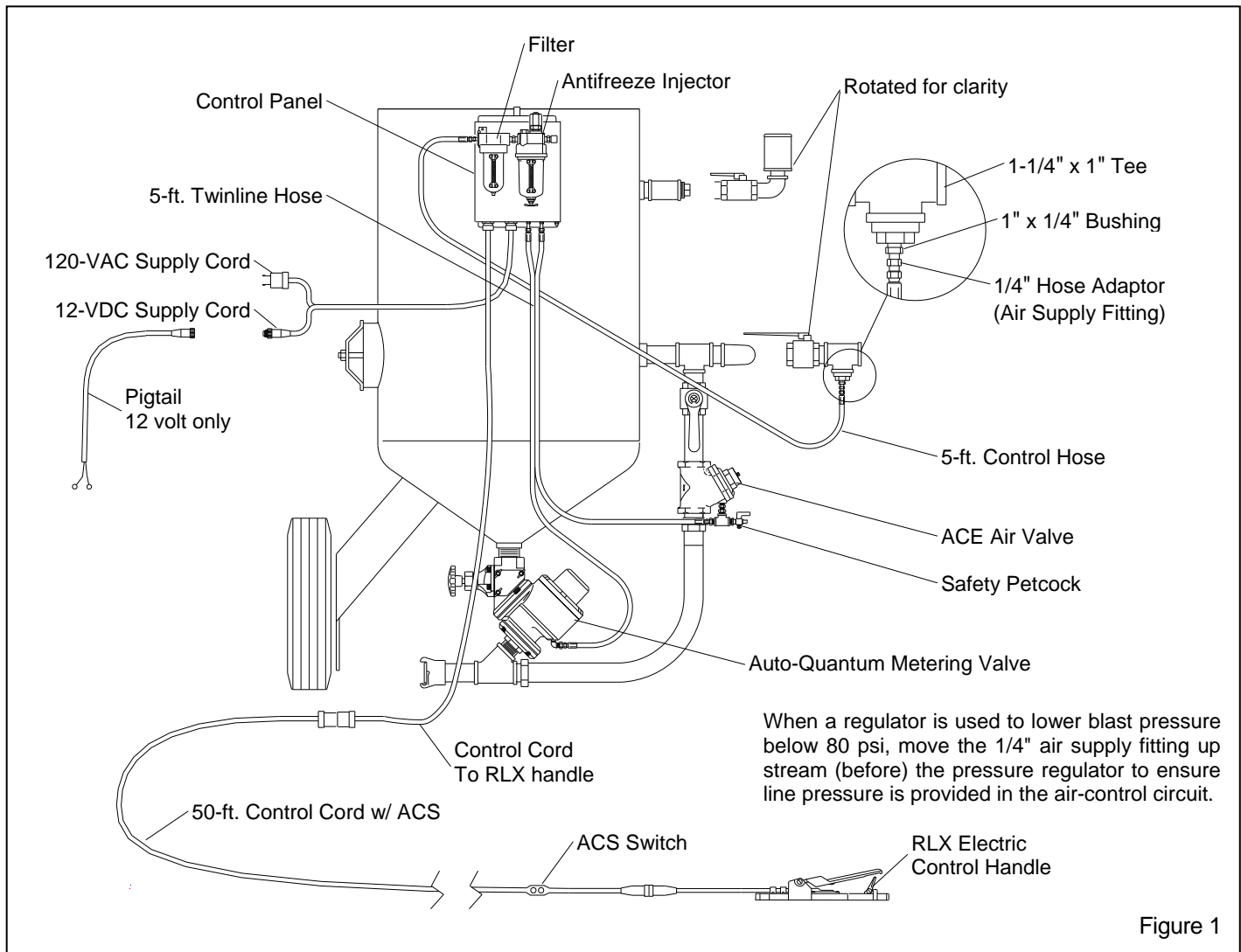


Figure 1

## 1.4 Operating Principles

**1.4.1** Quantum remote controls are pressure-hold type systems. This means that pressurization and depressurization of the blast machine is a separate function from the remote controls. Using hand operated inlet and outlet valves, the operator manually pressurizes and depressurizes the blast machine. Although the machine is under pressure neither air nor abrasive exits from the nozzle because the normally closed (NC) Quantum valve shuts off abrasive flow, and the ACE air valve shuts off air flow. Blasting will not start until the operator activates the control handle. Pressure remains in the blast machine until it is manually depressurized.

**1.4.2** Compressed air enters the blast machine through the inlet piping, and is split into three streams. One stream goes directly into the blast machine, the second stream goes into the pusher-line, and the third stream is the control air used to operate the remote controls.

**1.4.3** Quantum electric remote controls (electric over pneumatic) operate pneumatically (refer to Figure 1). When the machine is manually pressurized, control air travels through the filter and antifreeze injector, and into the control panel. If the electric control handle lever (which is the main activator of the system) is in the up (no blast) position, air stops at the control panel and the media and air valves remain closed. Pressing the electric control handle lever allows air to pass through the panel to open the media and air valves, which starts the blasting process. When the control handle is released, control air exhausts at the panel, the valves close and blasting stops.

**1.4.4** An abrasive cut-off switch (ACS) is a standard feature of the Quantum remote control. The cut-off switch is mounted on the control cord behind the control handle. The operator uses the switch to close the Quantum Valve independently of the air valve, thus air without abrasive exits the nozzle to clear the blast hose, or to blow-down the surface.

1.4.5 Electric remote controls (electro-pneumatic) are recommended when the nozzle and remote control handle are farther than 100 feet from the blast machine. Pressure drop of pneumatic systems over longer distances increases actuation time, which prevents fast, safe operation. Electric systems are also used in cold weather, when moisture in the air supply of pneumatic systems may freeze and cause the remote controls to fail. To prevent damp air from freezing an antifreeze injector is installed on all electric remote control panels. NOTE: The maximum recommended total length of control cord is 300 feet. Distances greater than 300 feet will offer electrical resistance, and may cause the controls to malfunction. If an application requires greater distance, an appropriate cord with larger diameter wire must be provided by the user.

## 2.0 INSTALLATION

2.1 **Factory Installation:** If the remote control system was factory installed, skip Section 2.2 and make the connections described in Section 2.3.

2.2 **Field Installation:** Refer to Figures 2 and 3.

2.2.1 Empty the blast machine of abrasive. Depressurize the machine. Shut down the compressed air source. Disconnect the air supply line; and lockout and tagout the air supply.

### WARNING

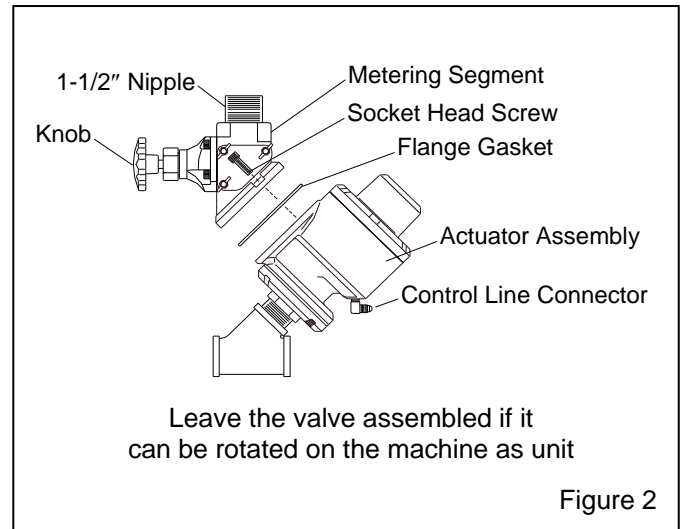
**Depressurize the blast machine, lockout and tagout the compressed air supply, and bleed the air circuit before performing any maintenance on the machine or pneumatic accessories. Failure to do so could cause severe injury or death from the sudden release of trapped compressed air.**

2.2.2 Remove the existing abrasive metering valve and all external piping from the blast machine.

NOTE: To ensure airtight seals, use pipe sealant on all male pipe threads.

2.2.3 Install the 1-1/4" outlet nipple and wye on the metering valve, and position them as shown in Figure 2.

**NOTE:** The following describes installation of the Quantum valve on a machine with minimal rotation clearance. If the valve assembly will freely rotate beneath the blast machine, it may be installed as a unit.



2.2.4 Remove the four socket head screws holding the metering assembly to the actuator, and remove the actuator assembly.

2.2.5 Use the 1-1/2" x close, schedule 80 pipe nipple to connect the metering segment to the outlet coupling at the bottom of the blast machine. Position the metering knob as shown in the illustrations.

2.2.6 Make sure the flange gasket is in place, and bolt the actuator to the metering segment.

2.2.7 Install a 1-1/4" pipe tee (Tee No.1) at the blast machine inlet as shown in Figure 3.

2.2.8 Assemble a pusher-line between the tee-fitting and Quantum valve using standard pipe fittings or flexible pusher-line as shown in Figure 3. Start at the tee and work downstream; this line must include a manual choke valve and the ACE air valve, in that order.

2.2.9 Connect a manually operated ball valve (inlet valve) and a second tee (Tee No. 2) to the blast machine as shown. NOTE: The second tee and all fittings necessary to complete the assembly shown in the detail circle in Figure 1 are included with the remote system.

2.2.10 Refer to the detail circle in Figure 1, and install the bushings and adaptor fitting.



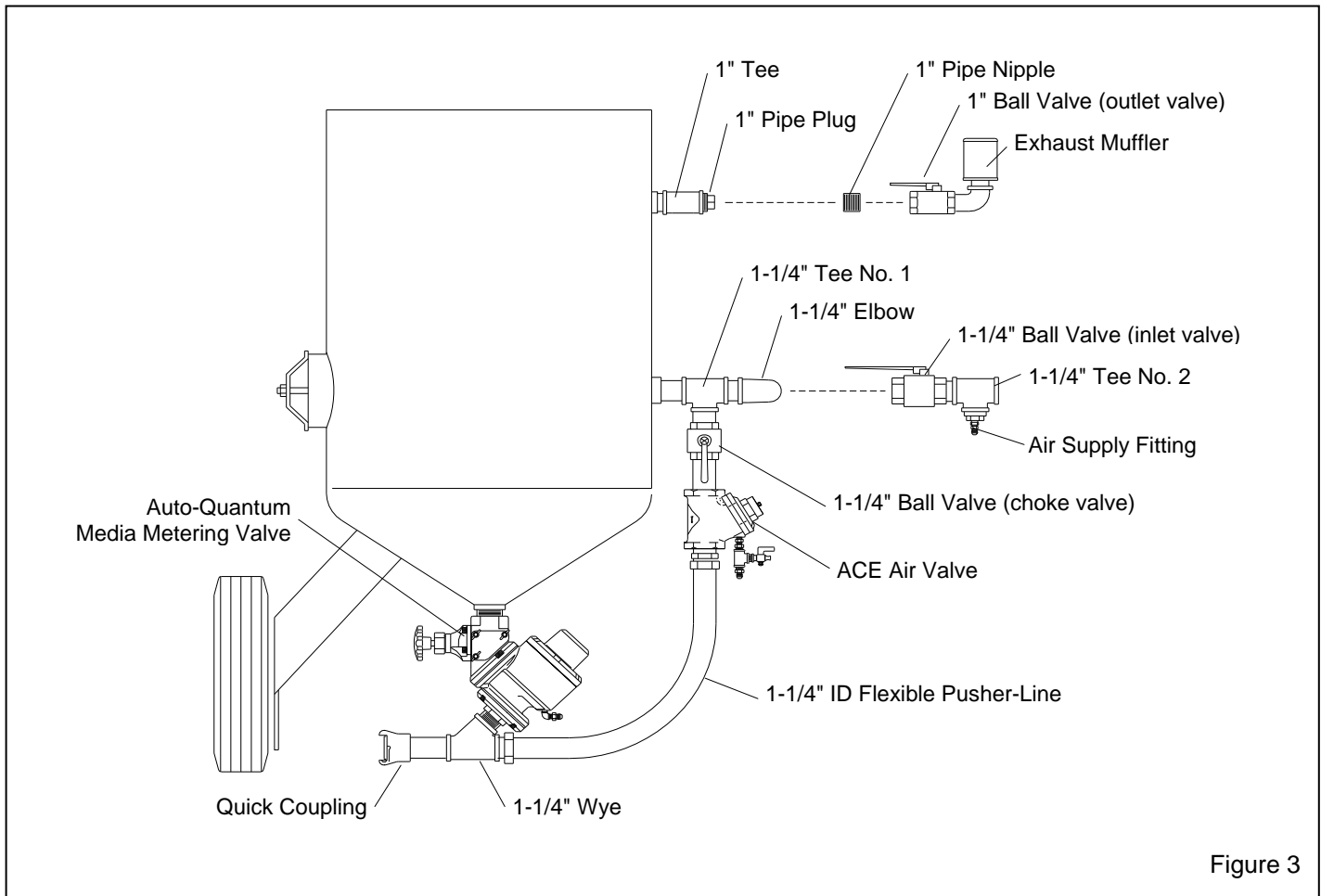


Figure 3

**2.2.11** Assemble a manual outlet valve assembly, and install it as shown. NOTE: Clemco supplies an exhaust muffler with all blast machines 1.5 cubic feet and larger. The muffler reduces exhaust noise and directs the exhaust downward, which prevents abrasive from exhausting into the air. When the blast machine is depressurized, the muffler body will pop up and diffuse the escaping air and abrasive. When the machine is fully depressurized, the muffler body will drop, permitting trapped abrasive to empty. For the muffler to work properly, it must be installed with the body facing up, as shown in Figures 1 and 3.

**2.3 Blast Hose and Control Hose Connections**  
Refer to Figure 1.

NOTE: The following instructions explain the connections on a single operator blast machine and remote control system. Connections for dual operator machines are the same except the connections must be made twice; once for operator #1 and again for operator #2. Controls for operator #1 and #2 must be kept separate. Read the following warning before making the connections.

**⚠ WARNING**

**Carefully trace, connect, and mark control lines and blast hose on multiple-outlet blast machines, or where two or more blast machines are used. Switching control lines or blast hose, could lead to injury and property damage from unintentional actuation of a blast machine. To reduce the possibility of hose switching, blast hose and control cord should be of equal lengths. Hose identification kits, part no. 15890 for two outlets, or part no. 15891 for up to four outlets, should be used where multiple blast hose and control lines are in use.**

**2.3.1** Use the panel mounting bracket to hang the panel on the blast machine rim. If preferred, for stationary blast machines the panel may be wall mounted.

**2.3.2** Connect the 5-ft. control hose between the 1/4" hose adaptor fitting at the inlet tee and the fitting on the air filter mounted on the front of the control panel.

**2.3.3** Connect one leg of the 5-ft. twinline hose between the panel outlet fitting marked "GRIT VALVE" and the fitting on the Quantum Valve.

**2.3.4** Complete the control hose connections by attaching the remaining leg of the 5-ft. twinline hose between the panel outlet fitting marked "AIR VALVE" and the fitting on the ACE air valve.

**2.3.5** Uncoil the blast hose and lay the 50-ft. control cord alongside it. Note: The control cord has the ACS switch wired into it. Place the switch end of the cord at the nozzle end of the blast hose.

**2.3.6** Band the electric control handle to the blast hose at a suitable, comfortable position behind the nozzle holder, using the two nylon ties provided. The tie ends should be clipped so they will not snag the operator's clothing or interfere with the operation of the control handle.

**2.3.7** Loosely wrap the whip cord from the electric control handle once around the blast hose as shown in Figure 4, and then connect it to the control cord. It is important to provide slack at all cord connections. If the cord is not wrapped and securely banded as described, excessive strain will cause the wires to pull out of the connectors or electric switch when the hose is bent or pulled.

**CAUTION**

**Provide enough slack at all cord connections to prevent the cord from pulling out of the connectors when the blast hose is pulled or dragged. Securely band the cord to the blast hose on both sides of all connections.**

**2.3.8** Band the cord to the hose on both sides of the cord connections as shown in Figure 4.

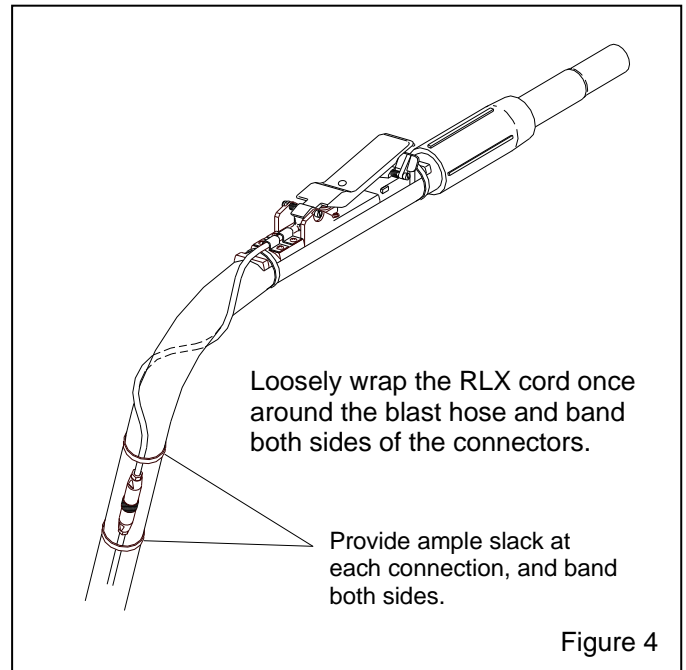


Figure 4

**2.3.9** Band the cord to the blast hose every 4 to 6 feet. When attaching control cord extensions wrap the cord around the blast hose and band the cord on both sides of each electrical connection.

**2.3.10** Attach the blast hose to the blast machine. Use safety lock pins or wires to securely lock the couplings.

**2.3.11** Connect the control cord to the control panel, lead cord marked "OPERATOR".

**2.3.12** Plug the power cord into an appropriate power source, 120-volt AC or 12-volt DC. 12-volt units are furnished with a pigtail with ring terminals to connect to a battery.

**⚠ WARNING**

**Do not use electrical adaptors that eliminate the ground prong on 120-volt plugs. Doing so can cause electric shock, and damage equipment.**

**3.0 OPERATION**

**3.1 Start-Up**

**3.1.1** Make sure the control handle is in the up (no-blast) position and that it moves freely. Make sure it will not engage the switch unless the safety lock is pulled down.

**⚠ 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.**

**3.1.2** Make sure that all hose and cord connections are secure. Install safety lock pins between all quick coupling. Use lock pins and safety cables on all quick coupling connections to help prevent accidental separation of hoses.

**3.1.3** Connect the blast machine to an adequate air supply. The compressor should be located upwind from the blasting operation to prevent dust from entering the compressor intake.

**3.1.4** Make sure the safety petcocks on the Quantum metering valve and ACE air valve are open. The ACS feature requires two separate control lines, one for the Quantum and one for the ACE valve. To prevent actuation of either valve, both safety petcocks must be open.

**⚠ WARNING**

**To prevent severe injury or death from accidental activation of the blast machine, open both safety petcocks when the blast machine is not in use. The control handle will not activate the machine when the petcocks are open.**

**3.1.5** Start the compressor, and bring it up to operating temperature and pressure. The pressure must be more than 80 pounds per square inch (psi) but not more than the maximum working pressure rating of the blast machine.

**3.1.6** Close the outlet valve, and open the inlet valve. The machine will pressurize.

**3.1.7** Close the safety petcocks. There should not be any air escaping from any place in the blast system.

**3.2 Blasting Attire**

**3.2.1** Operators and anyone else that may be exposed to the hazards generated by the blasting process must wear appropriate protective gear, including abrasive-resistant clothing, leather gloves, eye and hearing protection, and a NIOSH-approved Type CE Supplied-Air Respirator.

**⚠ WARNING**

**Before blasting, test the coating and substrate for toxic materials (such as lead or other heavy metals, or asbestos). These hazards require special measures to protect the operators and the environment.**

**No dust is safe to breathe. Abrasive blasting produces harmful dust. Failure to wear approved respirators could result in serious lung disease or death. Blast operators must wear properly fitted and maintained NIOSH-approved, type-CE supplied-air respirators approved for abrasive blasting.**

**During abrasive blasting, abrasive particles and dust in the area around the blast machine and blast nozzle become airborne. Everyone working in the vicinity of abrasive blasting must wear properly-maintained, NIOSH-approved, respiratory protection appropriate for the job site hazards.**

**Loud noise generated by the use of compressed air could cause hearing damage. Everyone in the blasting area must wear approved eye and hearing protection.**

**3.3 Start Blasting**

**3.3.1** Press the ACS button farthest from the nozzle. (Refer to Operation of ACS in Section 3.6)

**3.3.2** Hold the blast hose securely and point the nozzle only toward objects intended to be blasted.

**3.3.3** Pull back the safety lever lock and depress the remote control handle. Be prepared for blasting to begin within a few seconds.

**⚠ CAUTION**

**Be prepared for the recoil from the blast hose. Blasting should begin within a few seconds after pressing the control handle lever.**

**⚠ WARNING**

**OSHA requires remote controls on all blast machines. 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 or death can result from uncontrolled blasting.**

3.3.4 Adjust abrasive flow per Section 4.1.

**3.4 Stop Blasting**

3.4.1 Before releasing the control handle, the operator may use the ACS to shut off the abrasive flow to clear the blast hose, or blow-down the blast surface. Refer to Section 3.6.

3.4.2 To stop blasting, release the control handle lever. The control handle safety lever will flip up to lock the handle lever in the up (no blast) position to prevent accidental activation of the blast machine.

3.4.3 Open the safety petcocks located on the Quantum metering valve and ACE air valve. Always open the safety petcocks during work breaks to prevent unintentional blasting.

3.4.4 It is not necessary to depressurize the machine between short blasting pauses. The media valve and air valve close when the control handle lever is released. To prevent accidental activation, depressurize the blast machine before any work break.

**3.5 Depressurize the Blast Machine**

3.5.1 Close the manual inlet valve and open the manual outlet valve. The machine will depressurize and the pop-up valve will open.

**3.6 Operation of Abrasive Cut-Off Switch**

3.6.1 The abrasive cut-off switch is wired into the one end of the control cord behind the connection for the control handle. Pressing the front (closest to the nozzle) "off" button, cuts off the air supply to the abrasive metering valve, closes the valve, and stops the abrasive flow. This action allows air alone to exit the nozzle, useful for clearing the blast hose before shut-down, and blowing abrasive off the blasted surface. Pressing the rear pushbutton (farthest from the nozzle) returns control air to the metering valve, this opens the valve, and starts abrasive flow. The switch can be opened or closed at any time, but will not activate the metering valve unless the control handle is pressed.

NOTE: The purpose of the ACS is to clear the blast hose and to blow abrasive off the blasted surface at the blasting area. Small amounts of abrasive may come out the nozzle with the air. Residual abrasive may remain that will have to be removed outside the blast area prior to painting.

**⚠ WARNING**

**People and the environment tolerate only limited amounts of toxic materials. OSHA limits these exposure levels. Airborne dust could increase the exposure levels beyond permissible limits. OSHA prohibits blowing with compressed air as a cleaning method for lead based paint dust or other hazardous dust, unless the compressed air is used in conjunction with a ventilation system designed to capture the volume of airborne dust created by the compressed air, 29 CFR 1926 (h). The ACS is only for blowing off abrasive from a blasted surface, NOT as a general area clean-up tool.**

**4.0 ADJUSTMENTS**

**4.1 Abrasive Metering**

4.1.1 Adjust abrasive flow by turning the knob on the metering valve located at the bottom of the blast machine.

4.1.2 The hole in the knob is a rotation reference enabling the operator to monitor its rotation and count turns as the knob is rotated. The reference hole helps return the setting to its original position, should temporary adjustments be required.

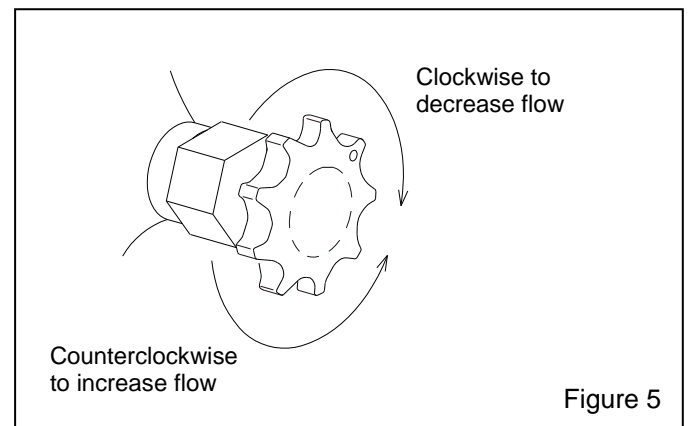


Figure 5

**4.1.3** The valve is closed when the knob is turned fully clockwise. Begin with the knob set 1-1/2 turns from fully closed. To increase abrasive flow, the machine tender turns the knob no more than 1/4 turn counterclockwise while the operator is blasting. Allow 10 to 15 seconds for the flow to stabilize before readjusting. Continue making adjustments as described until the correct flow is attained. The valve is fully open when the knob is turned fully counterclockwise.

**4.1.4** 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. As a rule, the stream of abrasive coming out of the nozzle should barely discolor the air when seen against a contrasting background.

**4.2 Antifreeze Injector**

NOTE: It is not necessary to use the injector unless temperatures fall to freezing. Close the injector when it is not required.

**4.2.1** A separate manual is supplied for the operation of the antifreeze injector. Refer to Manual No. 05599 for operation and adjustment of the injector.

**5.0 PREVENTIVE MAINTENANCE**

NOTE: These preventive maintenance instructions pertain to the remote controls only. Read the owners' manuals for the blast machine and all blast accessories, for inspection and maintenance schedules of those items.

**5.1 Daily**

**5.1.1** With the air off, before beginning blasting, inspect the following:

- 
- Inspect the RLX control handle; look for the following:
  - The lever must not engage the switch unless the lever lock is pulled down.
  - The **handle lever** must return to the "up" position when released.
  - The **safety lever lock** must return to the "up" position when the handle lever is released.
  - Both the handle lever and safety lever lock must move freely with no drag or binding.

 **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 or death could result from unintentional blasting.**

**5.2 Weekly**

**5.2.1** While blasting, inspect all control hoses, and valves for leaks. If leaks are found, stop blasting and repair.

**5.3 Periodic Inspection**

**NOTE: Periodic inspection of the following items will prevent unscheduled down-time.**

**5.3.1** The remote control system is a safety device. To be safe and to avoid unscheduled down-time, inspect the internal parts of the Quantum valve and ACE air valve. Inspect them for wear and lubrication of o-rings, pistons, springs, seals, and castings. Refer to the individual owners' manuals for equipment listed in Section 6.

**5.3.2** The control handle is the actuator of the remote control system. Periodically clean around the springs, handle lever, and safety lever lock to ensure that the unit is free of abrasive and debris that could cause the handle lever or safety lever lock to bind. Refer to the RLX owner's manual for service instructions.

6.0 SERVICE MAINTENANCE

 **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.

6.1 Quantum Metering Valve

Refer to the Quantum valve owner's manual, No. 22565, for service instructions for the Quantum metering valve.

6.2 ACE Air Valve

Refer to the ACE air valve owner's manual, No. 23938, for service instructions for the air valve.

6.3 RLX Control Handle

Refer to the RLX control handle owner's manual, No. 10574, for service instructions for the control handle.

7.0 TROUBLESHOOTING

**NOTE:** This section only identifies conditions and problems in the remote control system. Always refer to the appropriate section of this manual, or manuals for accessory equipment when troubleshooting the equipment.

 **WARNING**

To avoid serious injury, observe the following when troubleshooting the machine and remote controls.

- Turn off the compressed air, and lockout and tagout the air supply.
- When checking the 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 the remote control handle lever down in the operating position.

7.1 Blasting Does Not Start When the Control Handle Lever is Pressed.

**NOTE:** The easiest way to check a dual panel is to substitute one control cord and handle with another until the fault is found.

7.1.1 Listen to the control panel to determine if it clicks when the control handle is pressed and released. If it does, the fault not likely electrical, go to Section 7.1.5 for pneumatic checks.

7.1.2 Check for fault in the control panel by removing the 50-ft. control cord from the 5 ft. lead cord coming from the panel. Hold the lead cord socket so the angled slot is facing up. The slot to the left (counterclockwise of the angled slot) carries the power from the panel (hot line). Jump between the hot line and the angled slot (media valve solenoid), and listen for a click from the lower solenoid valve. Then jump between the hot line and the slot to the right (air valve solenoid) of the angled slot. The upper solenoid valve should click. If both valves click, check the control cord and electric RLX control handle per Section 7.1.3 and 7.1.4. If one solenoid does not click, it is most likely faulty. If neither solenoid clicks, the problem may be in both solenoids, but more likely one of the following:

- Check for faulty fuse or loose connections in the control panel.
- Check for inadequate power to the control panel.
- Check continuity of all panel wiring and solenoids.
- Check for faulty transformer (120-VAC systems only).

7.1.3 Check each control cord extension, by connecting them one at a time to the panel, and jump across the extension cord socket as explained in Section 7.1.2. Continue to check all extension cords in like manner.

7.1.4 Check the end control cord (with ACS Switch) by jumping across terminals No. 1 and 3 on the lo-profile connector. The upper solenoid (air valve solenoid) should click. With the jump in place, move the ACS Switch on and off. Moving the ACS switch should cause the lower (media valve solenoid) solenoid to click. If the panel does not click, the cord, connectors or switch are faulty and should be repaired or replaced. If the panel does click, the remote control handle is the probable cause and should be repaired. Refer to the RLX control handle owner's manual.

7.1.5 Make sure the blast machine is pressurized.

7.1.6 Make sure the safety petcocks are closed.

7.1.7 Check for air leaks in Quantum valve, ACE air valve, connecting hose, and tube fittings inside the panel.

**7.1.8** Inspect the air filter and 3/16" supply hose for blockage, clean if necessary.

**7.1.9** Open the petcock on the ACE air valve and press the control handle. If air does not come out of the petcock, check for blockage in the control lines.

**7.2 Air Continues to Leak From the Nozzle After the Control Handle Lever is Released.**

**7.2.1** Close the choke valve. If the leak stops, the problem is in the ACE air valve, a blockage in the control line between the air valve and panel, or a sticking solenoid. If the leak continues, the Quantum requires service, or there is a blockage in the control line between the Quantum and the panel.

**7.3 Heavy Abrasive Flow.**

**7.3.1** Adjust the metering valve per Section 4.1.

**7.3.2** Make sure the choke valve is open.

**7.3.3** Inspect the metering plate in the Quantum valve for wear. Refer to the Quantum valve owner's manual for service instruction for the Quantum metering valve.

**7.3.4** Check the solenoid operating the air valve (upper solenoid).

**7.3.5** Inspect the diaphragm in the ACE air valve for damage.

**7.4 Abrasive Flow Does Not Stop When the ACS "Off" (forward) Button is Pressed.**

NOTE: The ACS will not function unless the control handle is pressed.

**7.4.1** Check the exhaust port on the bottom of the panel, air should momentarily exhaust from the port when the ACS switch is turned off. If it does not, check the following:

- Obstruction in the line between the Quantum Valve and the "GRIT VALVE" connection on the panel.
- Faulty ACS switch.
- Faulty solenoid.
- Worn seat or plunger in Quantum valve. Inspect valve for wear.

**7.5 Air Flow, but No Abrasive.**

**7.5.1** Make sure the machine contains abrasive.

**7.5.2** Make sure the Quantum valve is not closed. The valve is closed is when the knob is turned fully clockwise.

**7.5.3** Make sure the ACS switch is in the "ON" position. Refer to Section 3.6.1.

**7.5.4** Check for leaks or blockage in the hose or fittings from the control panel to the Quantum valve, and for leaks inside the panel.

**7.5.5** Check the solenoid operating the Quantum valve (lower solenoid).

**7.5.6** Use the following methods to check for obstruction in the Quantum valve.

**7.5.6.1** Fully open the metering valve. The valve is full open when the knob is turned fully counterclockwise. While blasting, close the choke valve to force out small obstructions or wet abrasive.

---

 **WARNING**

**Depressurize the blast machine, and lockout and tagout the air supply before continuing.**

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**7.5.6.2** For large obstructions, shut down the machine to examine the Quantum valve. Remove the inspection plate from the flanged adaptor and clear obstruction.

---

 **WARNING**

**Do not stick fingers into the piston area of the inspection opening. The piston is under spring pressure, and could suddenly close when the obstruction is cleared.**

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**7.5.7** The Quantum valve may require service. Refer to the Quantum valve owner's manual.

**7.6 Abrasive Flow Does Not Stop After the Control Handle Lever is Released.**

**7.6.1** Inspect Quantum valve seat for wear or obstruction. Refer to the Quantum valve owner's manual.

**7.6.2** Inspect Quantum valve shut-off piston for wear.

**7.7 Quantum Metering Knob Will Not Move.**

**7.7.1** Damp or hardened abrasive has packed around metering plate. Disassemble valve to inspect and clean.

**7.8 Air Leaks Through Relief Hole in Quantum Valve Cylinder Cap.**

**7.8.1** Replace worn piston cup. Refer to the Quantum valve owner's manual.

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**8.0 REPLACEMENT PARTS**

**8.1 Quantum Remote Control Systems**

Item	Description	Stock No.
	120-Volt AC single-operator system .....	25830
	12-Volt DC single-operator system .....	25831
	120-Volt AC dual-operator system .....	25832
	12-Volt DC dual-operator system .....	25833

**8.2 Quantum Remote Control System Replacement Parts, Figure 6**

Item	Description	Stock No.
1.	Panel, single-operator control 12-Volt DC .....	05621
	120-Volt AC .....	07650
2.	Panel, dual-operator control 12-Volt DC .....	05622
	120-Volt AC .....	07651
3.	Auto Quantum metering valve with 1-1/4" wye, standard .....	24447
	with 1-1/2" wye, for 1-1/2" piping .....	25281

4.	ACE 1-1/4" air valve, standard valve only, without fittings .....	24074
	valve assembly with fittings .....	24044
	ACE 1-1/2" air valve, for 1-1/2" piping valve only, without fittings .....	25288
	valve assembly with fittings .....	25289
5.	RLX electric control handle .....	10840
6.	Cord, 50-ft. control w/ACS switch .....	10847
7.	Extension cord, 50' for ACS, w/twist lock .....	15138
8.	Extension cord, 100' for ACS, w/twist lock .....	19528
9.	Hose, 5-ft. coupled .....	03083
10.	Hose, 5-ft. twinline, coupled .....	01952
11.	Tee, 1-1/4" x 1" for single operator controls.....	01811
	2" x 1" for dual operator controls .....	01812
12.	Bushing, 1" x 1/4" .....	02023
13.	Adaptor, 1/4" NPT .....	02494
14.	Pigtail, for 12-volt DC only, with lo-profile connector .....	10831
15.	Nylon tie .....	02195

**8.3 Valve Replacement Parts**

NOTE: Refer to the following manuals for valve replacement parts for the  
 Quantum Abrasive Metering Valve ..Manual No. 22565  
 ACE Air Valve ..Manual No. 23938  
 RLX Control Handle. ....Manual No. 10574

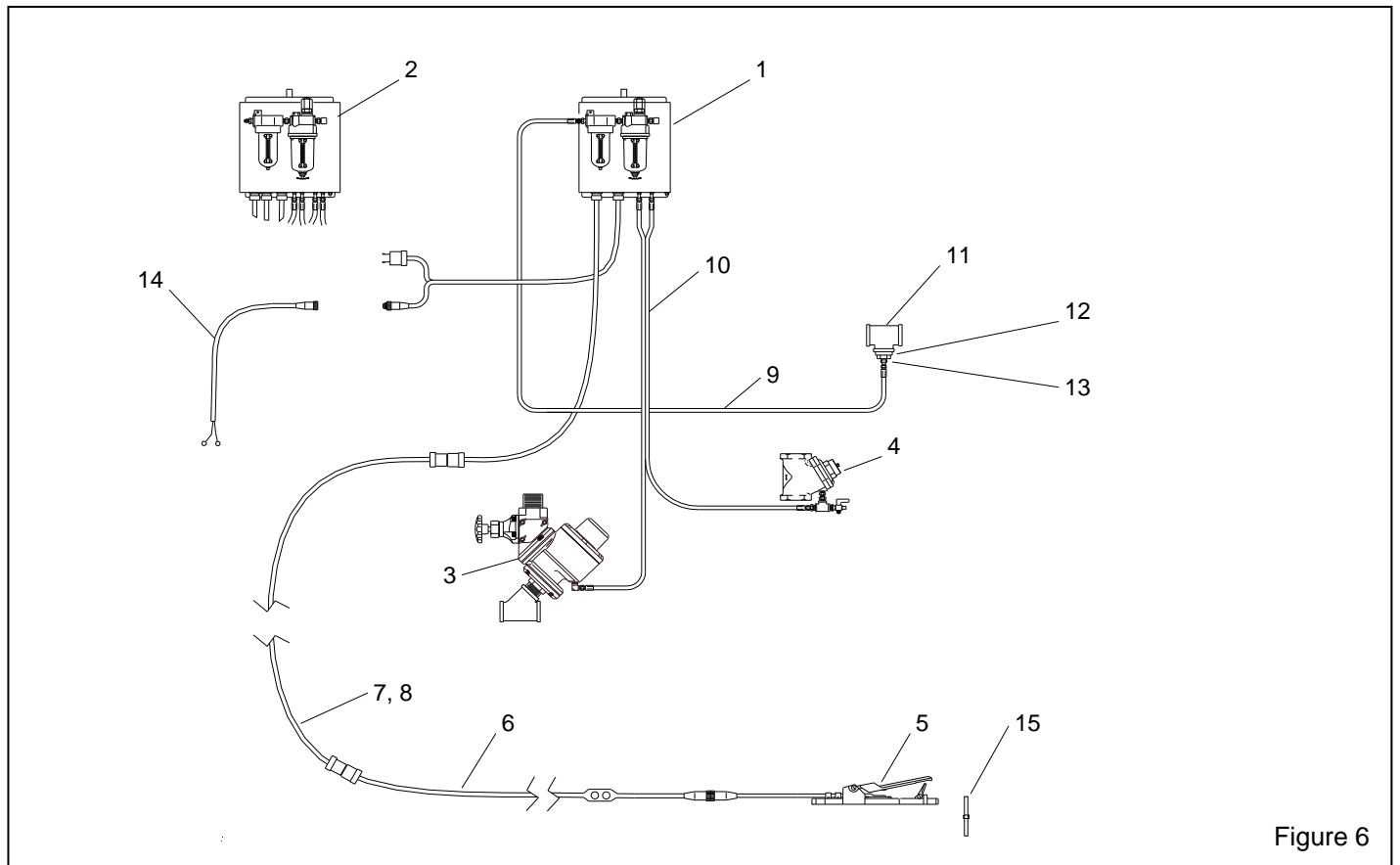


Figure 6



8.4 Control Panel, Figure 7

Item	Description	Stock No.
(-)	Control panel, single operator	
	12-volt DC.....	05621
	120-volt AC.....	07650
(-)	Control panel, dual operator	
	12-volt DC.....	05622
	120-volt AC.....	07651
1.	Air filter, 1/4-NPT .....	05617
2.	Antifreeze injector, 1/4-NPT .....	05616
3.	Valve, 3-way air	
	12-volt DC (for 12-volt DC panel) .....	07664
	12-volt AC (for 120-volt AC panel) .....	07662
4.	Terminal block, 5 pole .....	02268
5.	Adaptor, 1/4-NPT .....	02494
6.	Hex nipple, 1/4-NPT .....	02808
7.	Elbow, 1/4-NPT brass street .....	02027
8.	Fitting, 1/4-NPT female bulkhead .....	05605

9.	Bushing, 1/4-NPT x 1/8 (exhaust port) .....	02010
10.	Adaptor, 1/8-NPT fem bulkhead x JIC.....	03432
11.	Supply cord, 5-foot	
	12-volt, with lo-profile connector .....	10833
	120-volt, with twist-lock connector.....	02216
12.	Cord, control whip .....	07675
13.	Connector, 1/2" strain relief .....	02213
14.	Locknut, 1/2" conduit .....	02925
15.	Elbow, male 1/4-NPT x 1/4" tube .....	03428
16.	Tee, 1/4" tube .....	03351
17.	Connector, 1/8-NPT x 1/4" tube .....	03430
18.	Tubing, 1/4" white, specify feet required ....	03427
19.	Tubing, 1/4" red, specify feet required .....	05612
20.	Tubing, 1/4" blue, specify feet required ....	05613
21.	Tubing, 1/4" green, specify feet required ...	05614
22.	Tubing, 1/4" orange, specify feet required .	05615
23.	Bracket, panel mount .....	04188
24.	Fuse, 2-amp 1/4" x 1-1/4", 120-volt only ...	03039
25.	Fuse block, 120-volt only .....	03040
26.	Transformer, 12.6-volt, 120-volt only .....	02198

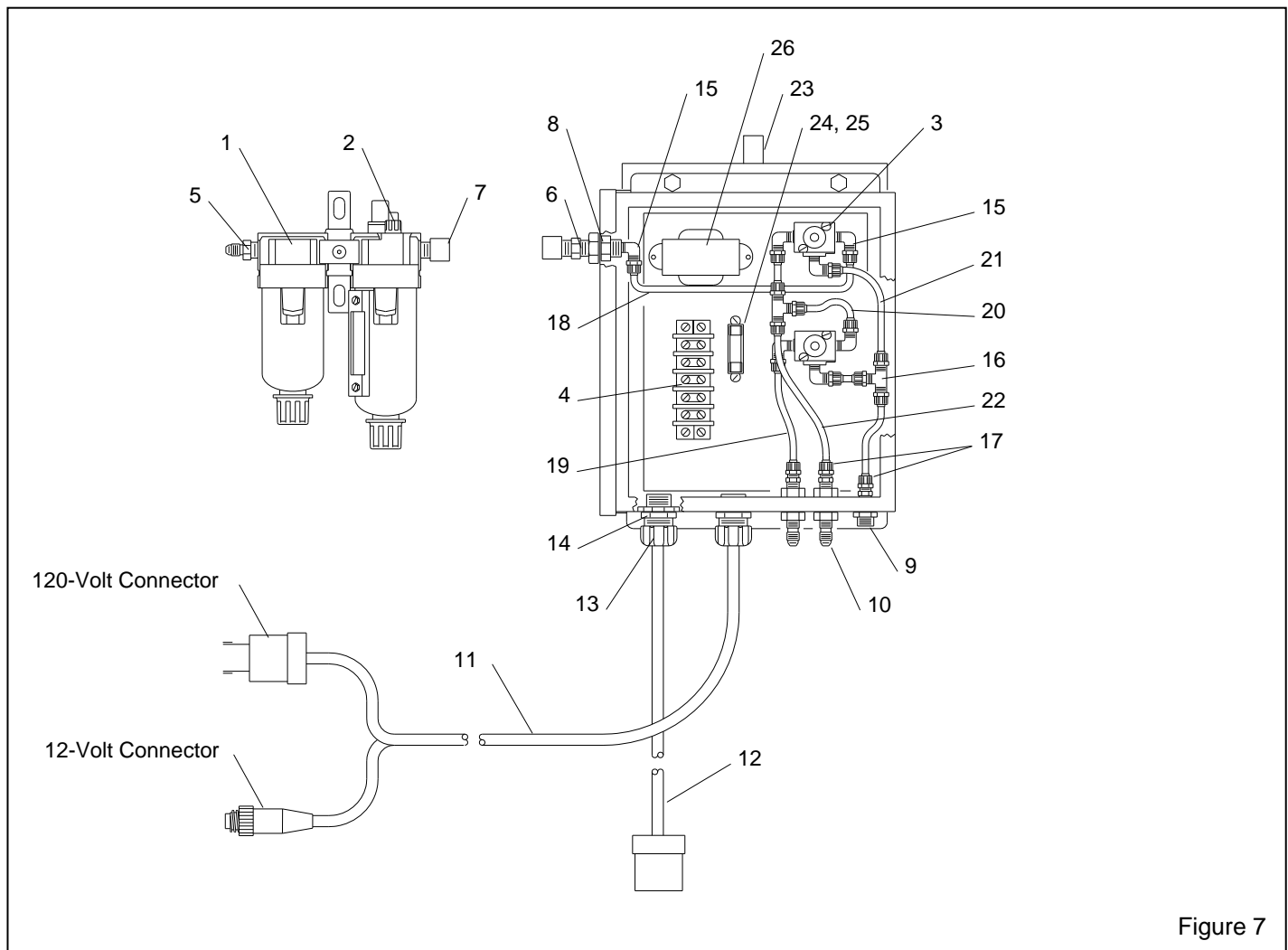


Figure 7