

**QUANTUM  
ABRASIVE METERING VALVES  
O. M. 22565**

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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 Parts 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**

- 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

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**

|  |
|--|
|  <b>WARNING</b>   |
| <ul style="list-style-type: none"> <li>• <b>ALWAYS</b> equip abrasive blast machines with remote controls.</li> <li>• <b>Abrasive blast machine operators must wear NIOSH-approved supplied-air respirators (ref: OSHA regulations 1910.94, 1910.132, 1910.139 and 1910.244).</b></li> </ul> |

- 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**

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

**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.

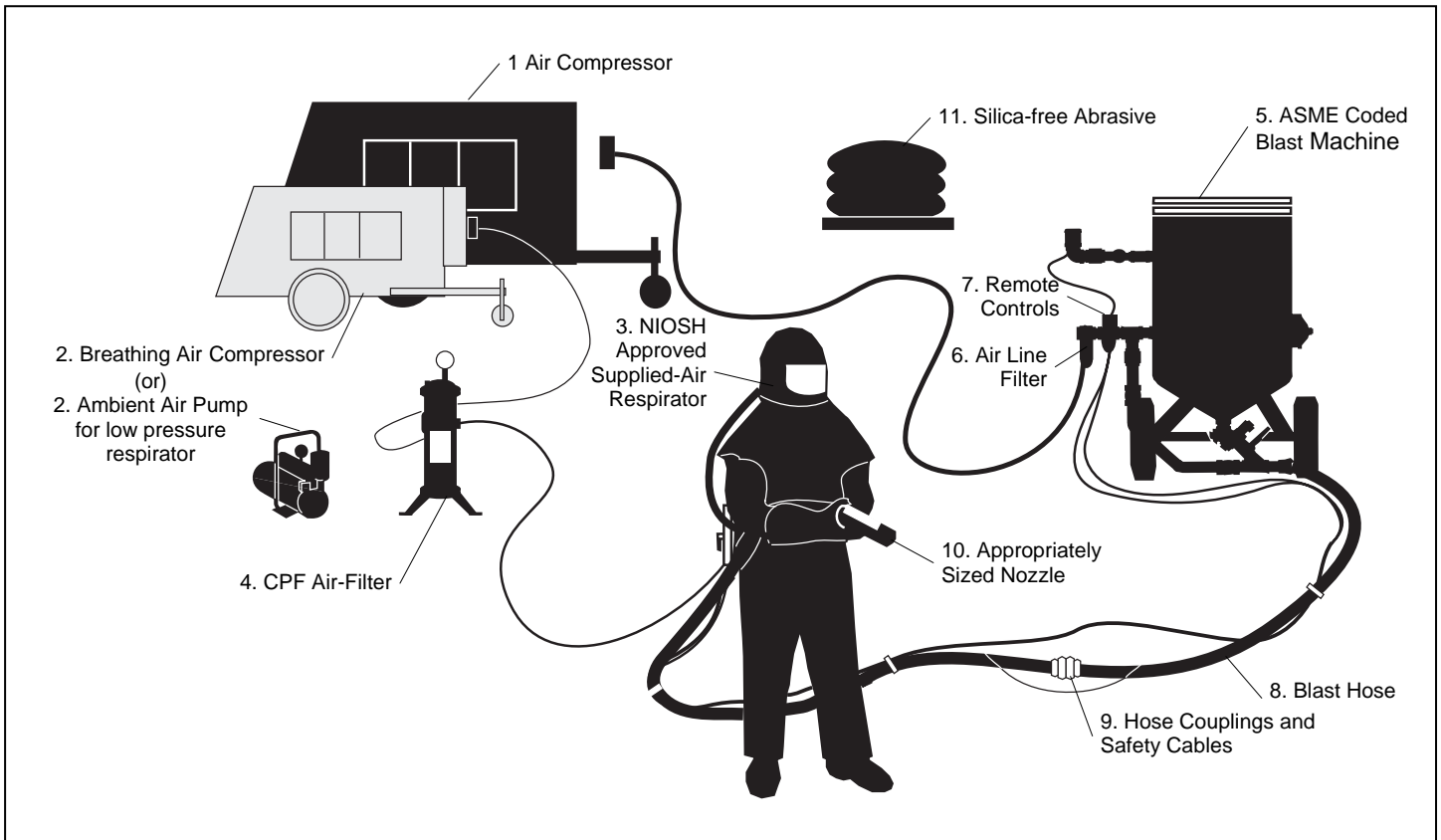
**8. BLAST HOSE** with ID 3 to 4 times the nozzle orifice. Lines MUST be run AS STRAIGHT AS POSSIBLE from machine to work area with NO sharp bends. Check DAILY for internal wear and external damage.

**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 of manual**

1.1.1 These instructions cover the installation, operation, maintenance, troubleshooting, and replacement parts for Clemco's manual and auto (pneumatically operated) Quantum abrasive metering valves.

1.1.2 These instructions do not contain the important information required for safe operation of the machine. All blast operators and machine (pot) tenders must be trained in the safe operation of the blast machine, remote control system, and all blasting accessories. The operators and all personnel involved with the abrasive blasting process must be well informed of the hazards associated with abrasive blasting. Before using the machine, all personnel involved with the blast machine operation must read the entire blast machine manual, including the orange cover, and all accessory manuals.

**1.2 Safety Alerts**

1.2.1 Clemco uses safety alert signal words, based on ANSI Z535.4-1998, 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 Components and Operating Principles**

**1.3.1 Components**

1.3.1.1 The replacement valve includes the valve assembly, a 1-1/2" nipple to connect the valve to the blast machine, a 1-1/4" nipple and 1-1/4" wye to connect the valve to the blast machine piping.

**1.3.2 Operating principals**

1.3.2.1 **Manual Quantum metering valve:** Abrasive flow of the metering valve is adjusted by turning the metering knob. Once the abrasive flow is set, the valve remains open at all times.

1.3.2.2 **Auto-Quantum metering valve:** The Auto-Quantum is made up of two segments: the metering segment and normally-closed actuator segment. The metering segment controls the volume of abrasive flow (flow is set manually by turning the metering knob). The actuator segment, which opens and starts abrasive flow when control-air is applied, and closes, stopping abrasive flow, when control-air is removed.

**2.0 INSTALLATION**

**WARNING**

Failure to observe the following before performing any maintenance on the blast machine 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.

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

2.1 Remove the existing metering valve from the blast machine.

2.2 Install the 1-1/4" outlet nipple and wye on the metering valve as shown in Figure 1. NOTE: 1-1/2" wye is available for 1-1/2" piping. Refer to Page 7, Figure 7.

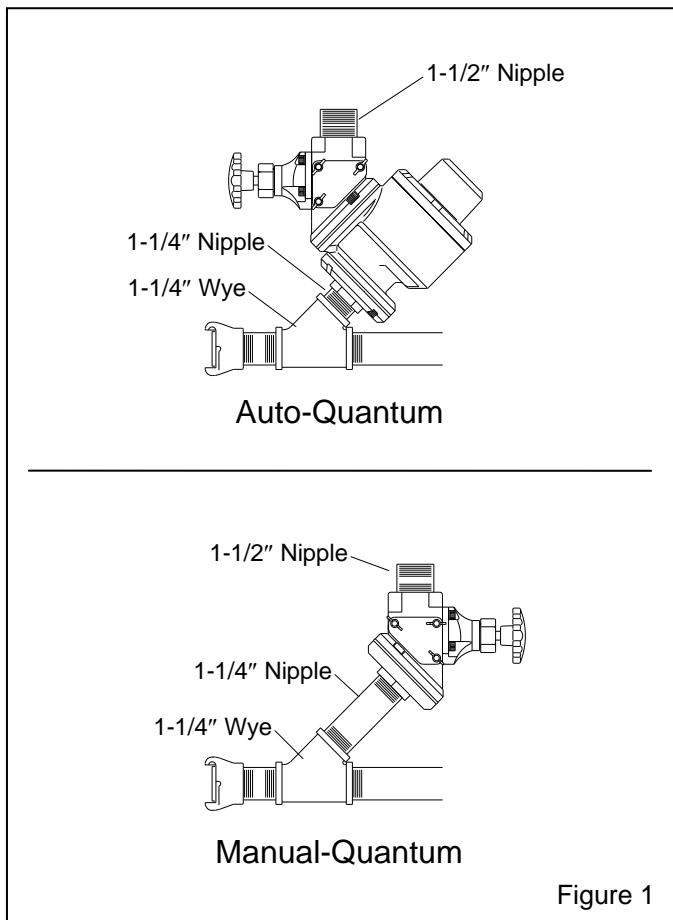


Figure 1

2.3 Using the 1-1/2" nipple, install the valve on the blast machine. Position the valve assembly so the wye is aligned as shown in Figure 1. NOTE: On some blast machines it may be necessary to disassemble the valve at the upper body in order to rotate the valve onto the machine. Some realigning of the vertical and horizontal piping may be required to align the piping.

2.4 On auto valves only, connect the control line to the port on the bottom of the actuator assembly.

3.0 ADJUST ABRASIVE FLOW, Figure 2

3.1 Adjust abrasive flow by turning the knob on the metering valve located at the bottom of the blast machine. Use the metering knob to adjust abrasive flow.

3.2 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.

3.3 The valve is closed when the knob is 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.

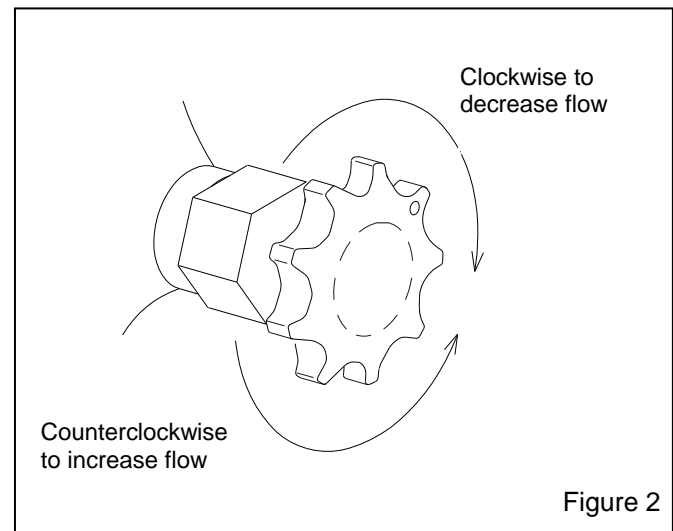


Figure 2

3.4 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.

4.0 MAINTENANCE

**WARNING**

Failure to observe the following before performing any maintenance on the blast machine 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.

NOTE: Service kits are available for the Quantum metering assembly and actuator segments. Keeping kit(s) on-hand will avoid unnecessary downtime. Replace all seals provided in the kit whenever the valve is opened.

If immediate service is required and a service kit is not readily available, take extreme care not to misplace or damage o-rings, gaskets, or other seals. Thoroughly clean all reusable parts.

4.1 Metering Assembly, Ref. Figure 3

See Section 4.2 for servicing the actuator segment used on Auto-Quantum valves.

4.1.1 Empty the machine of abrasive. Turn off the compressed air supply. Lockout and tagout the air supply, and bleed the air supply line to the blast machine.

4.1.2 Remove the inspection plate wing nuts and inspection plate.

4.1.3 Remove the four socket head screws securing the metering housing, and remove the housing assembly.

4.1.4 The upper body and actuator do not need to be removed from the blast machine to service the metering assembly. Thoroughly inspect the upper body for wear, and replace it if worn.

4.1.5 Turn the metering shaft clockwise to remove the shaft from the metering screw.

4.1.6 Loosen the knob nut, and pull the knob assembly from the housing.

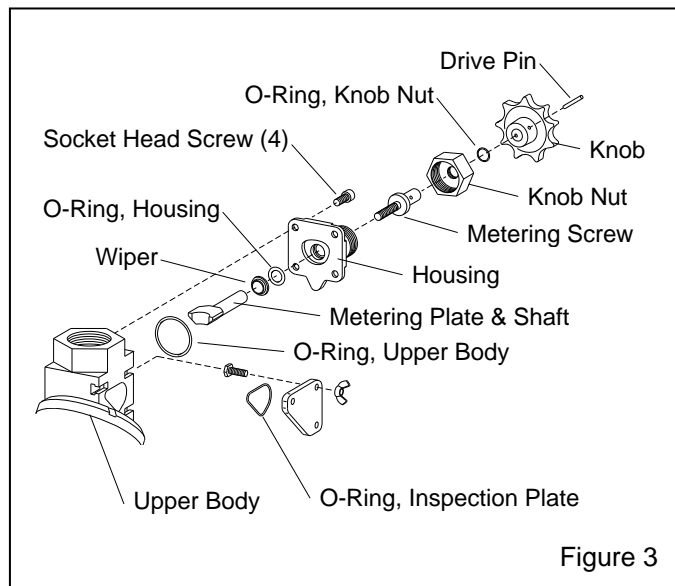


Figure 3

4.1.7 Use a drive pin and hammer to force the roll pin from the knob, and remove the knob.

4.1.8 Remove the metering screw by pushing it out the front of the knob nut.

4.1.9 Inspect the metering screw for damage and any signs of abrasive ingress or metal filings.

4.1.10 Clean the metering screw threads, and test the condition of the threads by screwing it into the metering plate shaft. Replace the metering screw if there is any resistance, binding or metal filings.

4.1.11 Remove the o-ring from the knob nut, and remove the o-ring and wiper from the housing.

4.1.12 Thoroughly clean and inspect all parts that are to be reused. Replace all worn parts.

4.1.13 Place a new o-ring in the knob nut.

4.1.14 Place a new o-ring and wiper seal in the housing. A generous amount of silicone-based lubricant eases installation. The small side of the wiper seal faces away from the o-ring.

4.1.15 Insert the metering plate shaft through the housing bore, and wipe off any lubricant on the metering plate side of the bore.

4.1.16 Reassemble the metering screw, nut, knob, and drive pin. Note: applying a small amount of silicone-based lubricant on the unthreaded end of the metering shaft eases insertion through the nut o-ring.

**4.1.17** Apply a molybdenum disulfide or graphite based anti-seize lubricant to the metering shaft and metering screw threads, and thread the shaft onto the screw.

**4.1.18** Place a new o-ring in the groove on the face of the upper body.

**4.1.19** Insert the metering plate (flat side up) through the upper body opening. Take care not to displace the o-ring.

**4.1.20** Secure the metering housing finger tight before tightening all screws.

**4.1.21** Place a new o-ring on the inspection plate, and securely attach the plate.

**4.1.22** Service of the metering assembly is complete. Test the machine and piping for air leaks before putting into service.

**4.2 Actuator Segment, Ref. Figures 4 and 5**

See Section 4.1 for servicing the manual valve, and the metering assembly of the auto valve.

**NOTE: A rubber piston-cup and bushing replaces the machined aluminum piston and u-seal. The aluminum piston is no longer available; the u-seal is still available and may be replaced as long as the aluminum piston is in good condition.**

**4.2.1** Empty all abrasive from the machine per instructions supplied with the blast machine. **NOTE:** If the metering assembly does not require service, abrasive flow may be shutoff by closing the metering valve.

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

**4.2.3** Refer to Figure 4 and remove the screws securing the upper body and the outlet flange to the valve actuator assembly, and then remove the actuator assembly. Both of the flange gaskets, plus the retaining ring, and o-ring will be loose as the actuator assembly is removed. Do not misplace them.

**4.2.4** Refer to Figure 5 and unscrew the six socket head screws, and remove the cylinder cover, spring and felt disc. Spring compression is removed when the cover is approximately 9/16" from the body.

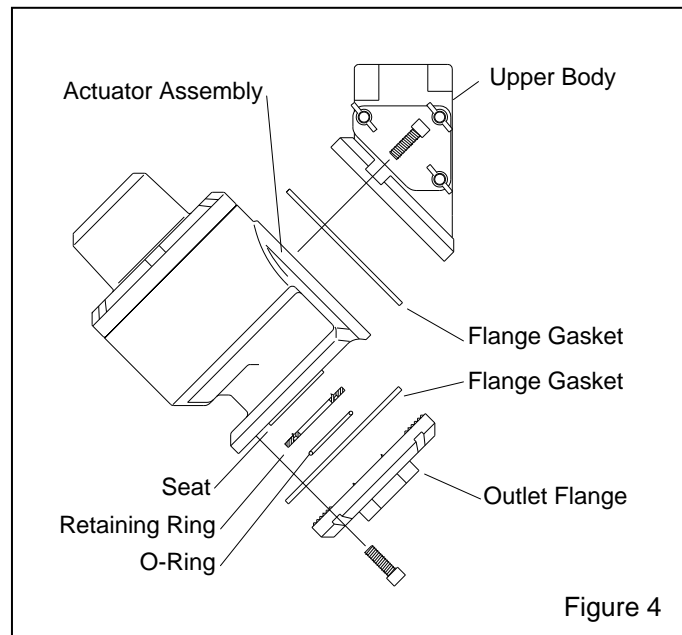


Figure 4

**4.2.5** Use a hammer handle or similar object to push the plunger from the bottom, forcing the plunger/piston assembly out the top of the valve body cylinder.

**4.2.6** Pry the urethane seat from the bottom of the valve body.

**4.2.7** Remove the wear sleeve and roll pin from the body.

**4.2.8** It is not necessary to separate the plunger from the piston unless either part is scored or worn. To separate the parts, hold the plunger in a vise with the vise jaws covered with copper or similar protection (if the plunger is damaged it does not matter if the vise jaws mar the plunger). Using a wrench placed on the flats of the piston stop, unscrew the stop.

**4.2.9** Remove the piston u-seal from the piston, and the wiper and o-ring from the valve body. **(NOTE: if the piston is aluminum, and if it is scored or otherwise damaged, replace it with the rubber piston-cup and bushing. The bushing flange must be as shown, on the top side of the piston-cup, facing the piston stop. Refer to Figure 5)**

- Inspect the urethane seat. Replace if worn or damaged.
- Inspect the upper body and outlet flange for wear. Replace if worn.

**4.2.10** Clean all items and inspect for wear. Replace worn or damaged parts.

**4.2.11** If the plunger and piston were separated as noted in Section 4.2.8, apply removable thread sealant

to the threads on the piston stop, and reassemble the parts using a new o-ring.

**4.2.12** Replace the wiper and o-ring in the actuator body, the o-ring side of the wiper must face toward the bottom of the body as shown in Figure 5.

**4.2.13** Replace the u-seal on the piston, the open side must face down as shown in Figure 5. **NOTE: The newer, rubber piston-cup does not require a u-seal.**

**4.2.14** Lubricate the o-ring and wiper in the actuator body, and the piston u-seal, with a silicone-based lubricant.

**4.2.15** Install the plunger and piston assembly into the body. Make sure the open side of the piston u-seal does not fold back during assembly. Tucking the lip of the seal in, while applying pressure to the piston, eases assembly.

**4.2.16** Place the roll pin and wear sleeve in the actuator body. The sleeve is correctly positioned when the alignment slot in the sleeve fits the roll pin in the body.

**4.2.17** Place the urethane seat into the wear sleeve, with the beveled side toward the sleeve.

**4.2.18** Place the retaining ring o-ring into the groove on the bottom of the retaining ring. Place the retaining ring (o-ring down) on the outlet flange gasket, and align it with the opening.

**4.2.19** Assemble the actuator assembly onto the upper body and outlet flange. Note: The upper body is secured with three screws, and the outlet flange is secured with four screws. The gaskets are the same for both parts. Align the gaskets so the mounting holes match the pattern in the flange. First hand-tighten the outlet flange screws (this ensures that the retaining ring and o-ring do not shift during the remainder of the assembly). Hand-tighten the upper body flange screws before tightening all screws.

**4.2.20** Install the felt disc, spring, and cylinder cover, and tighten the screws to secure.

**4.2.21** Connect the control line to the fitting or port on the actuator assembly, and test the operation before putting the valve in service.

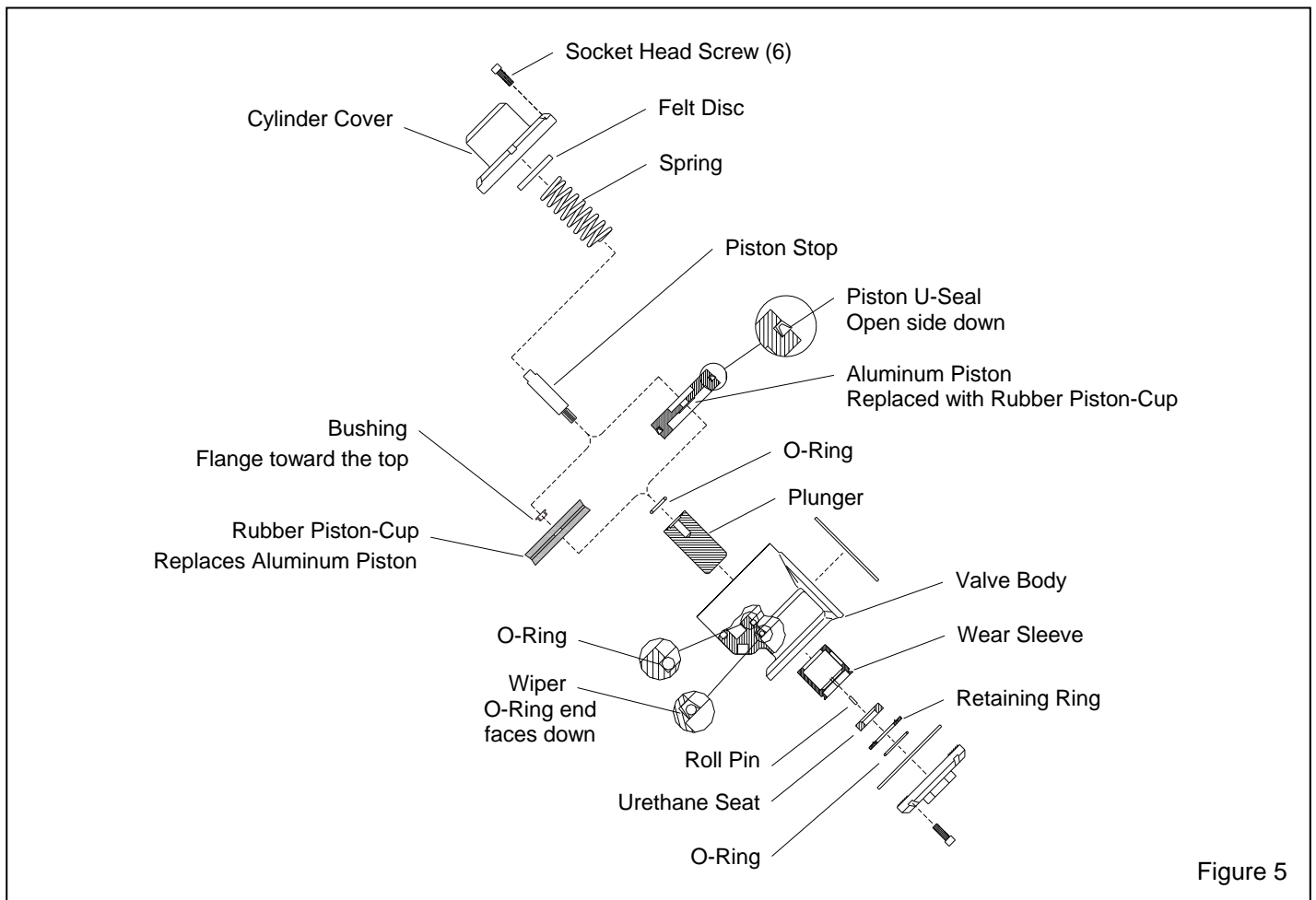
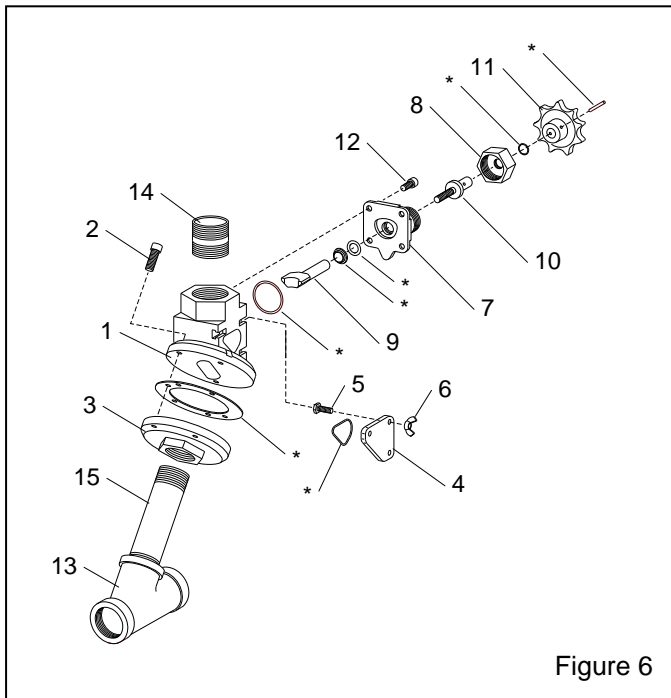


Figure 5

5.0 REPLACEMENT PARTS

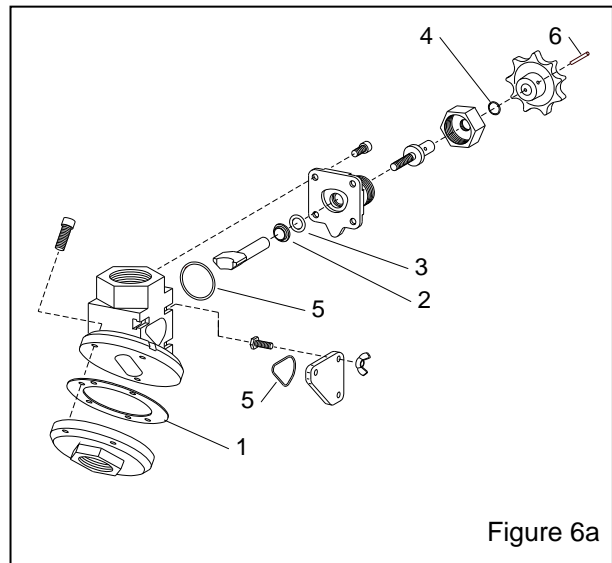
5.1 Manual Quantum Abrasive Metering Valve  
Figure 6

| Item | Description                                    | Stock No. |
|------|--|-----------|
| (-)  | Manual Quantum metering valve w/wye .....      | 22845     |
| *    | Service kit, metering assembly (Fig. 6a) ..... | 22854     |
| 1.   | Upper body .....                               | 21314     |
| 2.   | Screw, 3/8-NC x 1" socket head .....           | 22655     |
| 3.   | Flange, threaded outlet .....                  | 22621     |
| 4.   | Inspection plate .....                         | 22620     |
| 5.   | Screw, 1/4-NC x 3/4" hex head cap .....        | 03052     |
| 6.   | Nut, 1/4-NC wing .....                         | 03113     |
| 7.   | Housing, knob .....                            | 22761     |
| 8.   | Nut, knob housing .....                        | 22762     |
| 9.   | Metering plate and shaft .....                 | 22763     |
| 10.  | Metering screw .....                           | 22764     |
| 11.  | Knob, adjustment .....                         | 22766     |
| 12.  | Screw, 5/16-NC x 3/4" socket head .....        | 22767     |
| 13.  | Wye, 1-1/4" .....                              | 01818     |
| 14.  | Nipple, 1-1/2" x 2" heavy wall .....           | 01840     |
| 15.  | Nipple, 1-1/4" x 5-1/2" .....                  | 01874     |



22854 SERVICE KIT  
QUANTUM METERING ASSEMBLY

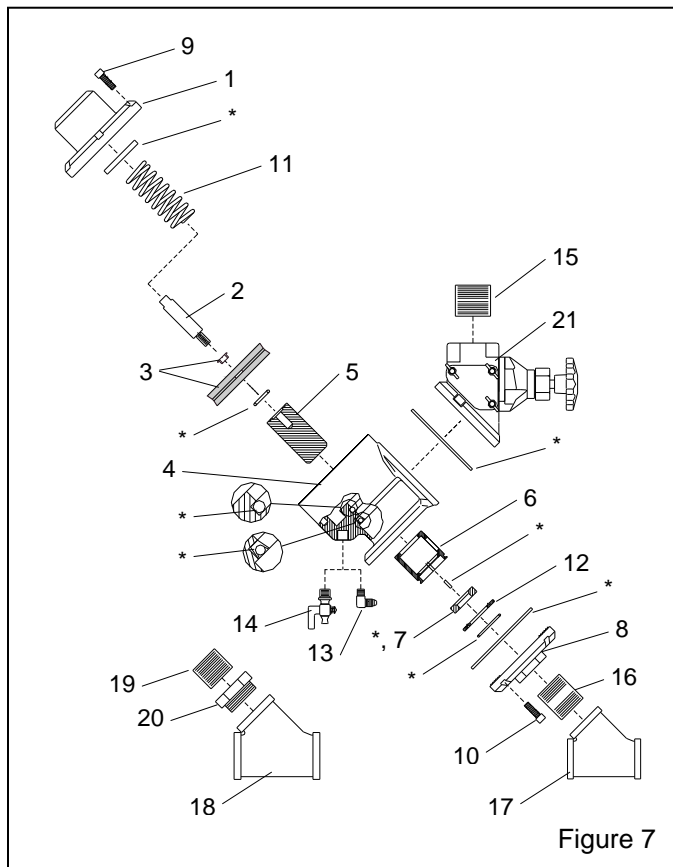
| Item | Qty | Description              |
|------|-----|--------------------------|
| 1.   | 1   | Flange gasket            |
| 2.   | 1   | Wiper seal               |
| 3.   | 1   | O-ring, 3/4" OD nominal  |
| 4.   | 1   | O-ring, 5/8" OD nominal  |
| 5.   | 2   | O-ring 1-1/2" ID nominal |
| 6.   | 1   | Roll Pin                 |



5.2 Quantum Metering Valve Actuator, Figure 7

| Item | Description                                  | Stock No. |
|------|--|-----------|
| (-)  | Auto-Quantum, metering valve w/1-1/4" wye .  | 24447     |
| (-)  | Auto-Quantum, metering valve w/1-1/2" wye .  | 25281     |
| *    | Service kit, Quantum actuator, See Fig. 7a.. | 24446     |
| 1.   | Cover, cylinder .....                        | 21317     |
| 2.   | Stop, piston .....                           | 21323     |
| 3.   | Piston -cup w/bushing.....                   | 21329     |
| 4.   | Valve body .....                             | 21349     |
| 5.   | Plunger, grit valve .....                    | 21326     |
| 6.   | Wear sleeve, grit valve .....                | 21342     |
| 7.   | Seat, urethane .....                         | 21344     |
| 8.   | Flange, threaded outlet .....                | 22077     |
| 9.   | Screw, 5/16-NC x 1-3/4" socket head .....    | 21321     |
| 10.  | Screw, 5/16-NC x 1" socket head .....        | 21318     |
| 11.  | Spring .....                                 | 20600     |
| 12.  | Retaining ring .....                         | 22429     |
| 13.  | Adaptor, 1/4" NPT elbow .....                | 02513     |
| 14.  | Petcock, 1/4" NPT .....                      | 01993     |
| 15.  | Nipple, 1-1/2" x close, schedule 80 .....    | 01791     |
| 16.  | Nipple, 1-1/4" x 2" .....                    | 01718     |
| 17.  | Wye, 1-1/4" NPT .....                        | 01818     |
| 18.  | Wye, 1-1/2" NPT .....                        | 01819     |
| 19.  | Bushing, 1-1/2 NPT x 1-1/4 NPT .....         | 01805     |
| 20.  | Nipple, 1-1/4 x close HD .....               | 01854     |
| 21.  | Metering assembly, Quantum .....             | 24587     |

Refer to Section 5.1 for replacement parts



24446 SERVICE KIT  
QUANTUM ACTUATOR ASSEMBLY

| Item | Qty | Description                                  |
|------|-----|--|
| 1.   | 1   | Seat, urethane                               |
| 2.   | 2   | Flange gasket                                |
| 3.   | 1   | U-seal, 3-1/2" ID (used only w/ alum piston) |
| 4.   | 1   | O-ring, 1-1/2" ID x 3/16" nom.               |
| 5.   | 1   | Wiper, plunger                               |
| 6.   | 1   | O-ring, 31/64" ID                            |
| 7.   | 1   | Roll pin, 1/8" x 1/2"                        |
| 8.   | 1   | O-ring, 1-1/2" ID x 3/32" nom.               |
| 9.   | 1   | Felt disc                                    |

