

**CYCLE TIMER  
FOR DUAL CHAMBER BLAST MACHINES  
O. M. 25729**

DATE OF ISSUE: 04/12/12  
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 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 equip abrasive blast machines with remote controls.</b></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.

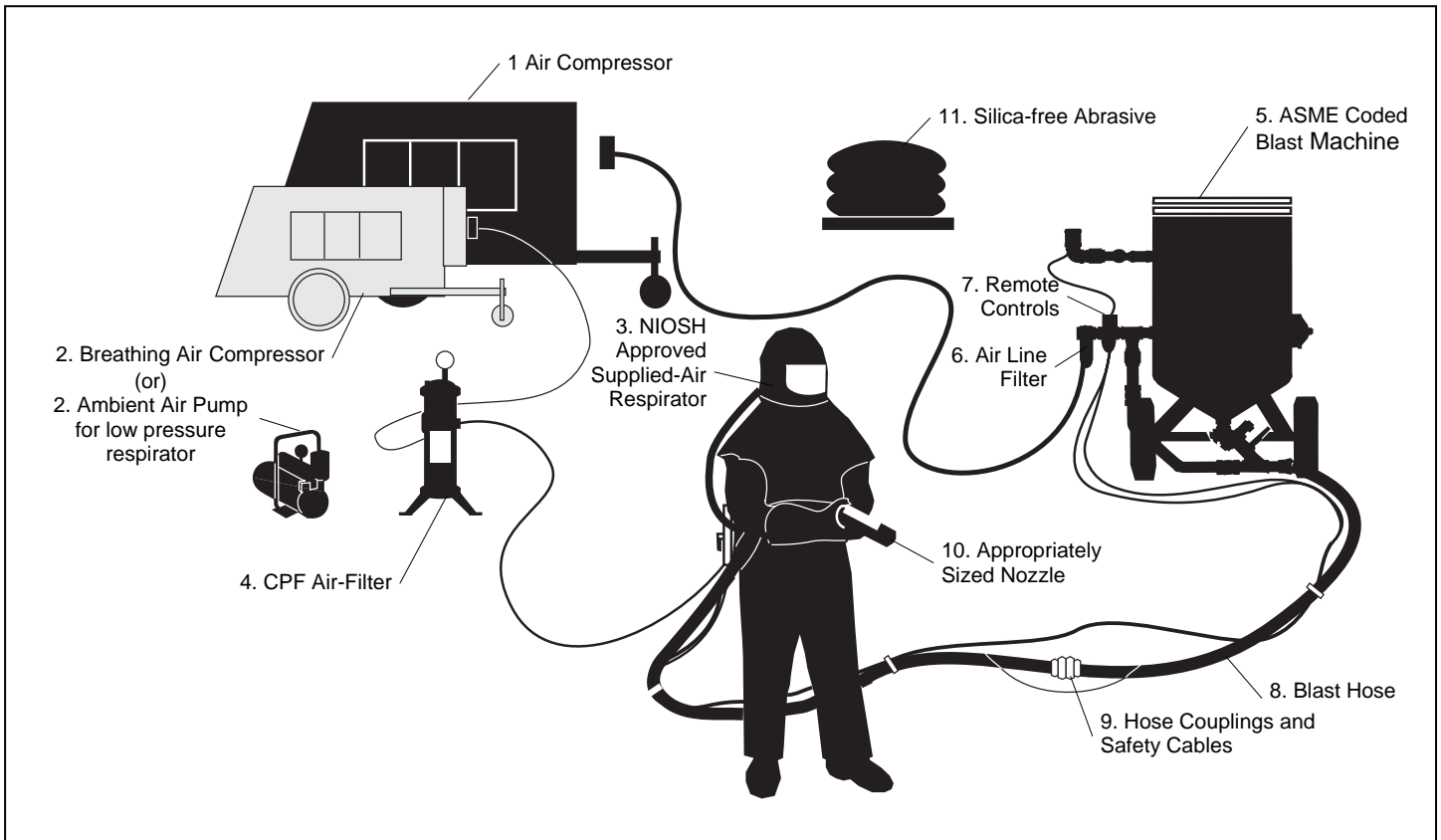
**8. BLAST HOSE** with ID 3 to 4 times the nozzle orifice. Lines MUST be run AS STRAIGHT AS POSSIBLE from machine to work area with NO sharp bends. Check DAILY for internal wear and external damage.

**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

1.1.1 These instructions cover field assembly, operation, maintenance, troubleshooting, and replacement parts for dual chamber (continuous-action) cycle timer. For operation of the blast machine, refer to the blast machine owner's manual. Which may be one of the following Clemco dual chamber blast machines:

- O.M. 06154 Dual Chamber Blast Machine with Manual Controls.
- O.M. 23063 Dual Chamber Blast Machine with Remote Controls.

### 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.**

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## CAUTION

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

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## CAUTION

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

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## WARNING

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

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## DANGER

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

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### 1.3 Description

1.3.1 Components of cycle timer kit are shown in Figure 1. The kit includes:

One control panel, which includes 12 VDC or 120-VAC timer and solenoid. The timers are adjustable, and control the ON Time (when the upper chamber is under pressure) and OFF Time (when the upper chamber is not under pressure). A toggle switch on the cover enables and disables the timer.

One inlet valve: Includes control-line filter. The valve controls air into the top chamber.

Two abrasive traps: These traps carryout abrasive as the top chamber depressurizes, and protect the outlet valves from excessive abrasive erosion.

Two diaphragm outlet valves: They rapidly exhaust air from the top chamber when the timer times-out to depressurize the top chamber.

All interconnecting control hoses.

1.3.2 The cycle timer controls pressurization and depressurization of the upper chamber of dual chamber blast machines. This enables the machine to continue blasting while the upper chamber automatically cycles at regular timed intervals. The upper chamber automatically refills with abrasive if the machine is placed under a hopper.

1.3.3 Dual chambers enable refilling of the upper chamber with abrasive while blasting continues from the lower chamber. Pressurization and depressurization of the lower chamber is done independently of the cycle timer operation. Refer to the blast machine owner's manual for operation of the blast machine.

### 1.4 Theory of Operation

1.4.1 The lower chamber always contains abrasive and supplies abrasive to the metering valves. When the lower chamber is under pressure and the upper chamber is not, the upper chamber is refilled with abrasive. When the upper chamber pressurizes, and pressure in both chambers equalizes, the lower pop-up valve drops, transferring abrasive from the upper to lower chamber.

1.4.2 When the upper chamber depressurizes, the lower pop-up valve rises to seal the lower chamber (blasting continues from the lower chamber) while the upper pop-up drops and allows refilling of the upper chamber.

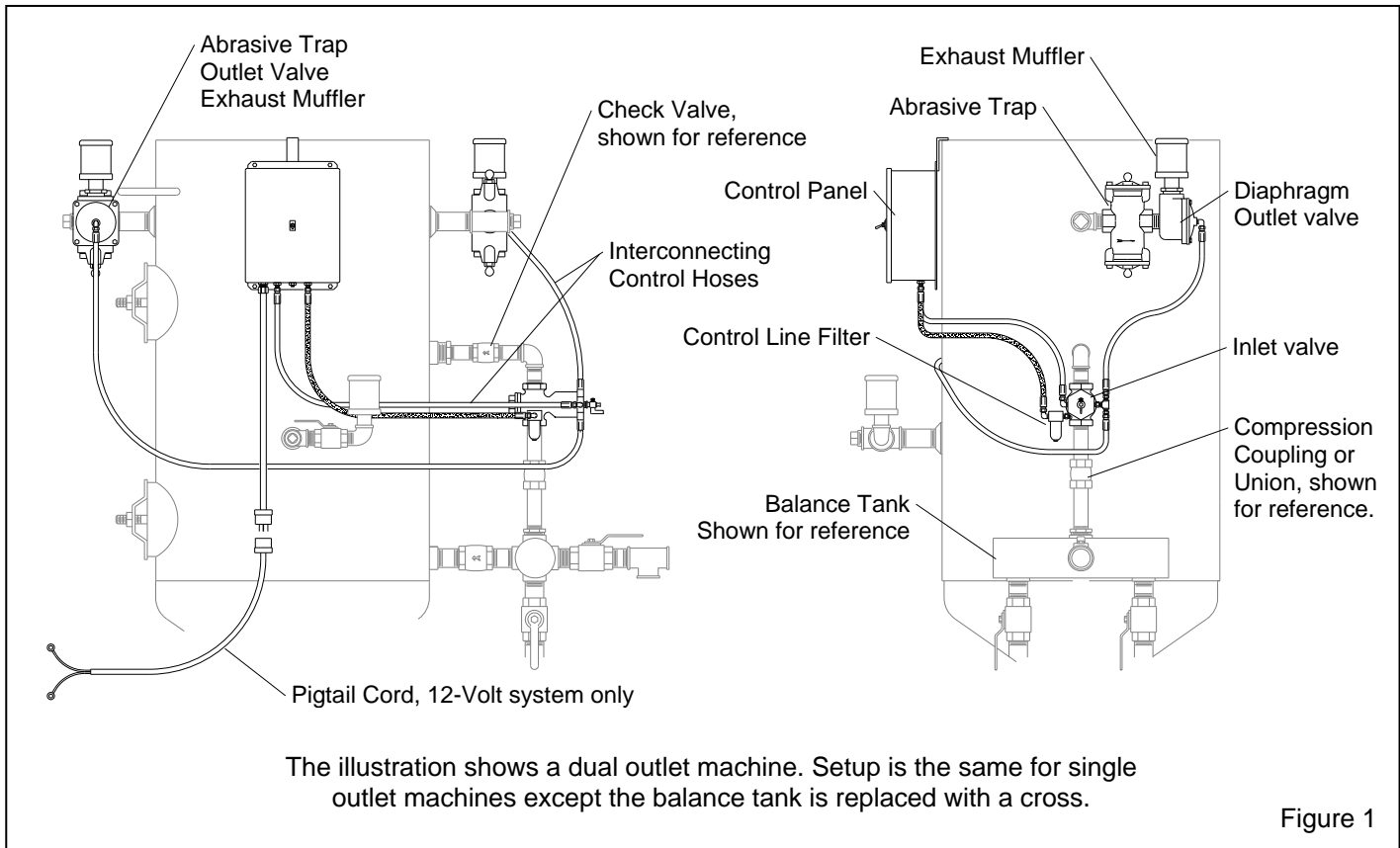


Figure 1

**1.4.3** The cycle timer automatically performs the operation. When the timer is in the OFF mode, the inlet valve is closed and the diaphragm outlet valves are open. The upper chamber is depressurized and can be filled with abrasive.

**1.4.4** When the timer goes into ON mode, the inlet valve opens permitting air to enter the upper chamber; the outlet valves close, keeping air in the upper chamber so it pressurizes.

**1.4.5** When air in the upper and lower chamber equalizes, the lower chamber pop-up drops, transferring abrasive from the upper chamber to the lower chamber while blasting continues. When the timer goes into OFF mode the inlet valve closes as the outlet valves open depressurizing the upper chamber, starting the cycle again.

## 2.0 INSTALLATION

Refer to Figure 1

### **⚠ WARNING**

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

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

**2.1** If there is an existing, manual inlet valve on the upper chamber piping, it may be removed or left on as a service valve. If it is left on, it must remain open during operation.

**2.2** Install inlet valve and outlet valve assemblies as shown in Figure 1. The directional arrow on the inlet valve must face up toward the upper chamber. The directional arrow on the abrasive traps must point away from the blast machine.

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**2.3** Place the control panel at a convenient location. It may be mounted on the rim of the blast machine, using the bracket provided or be mounted close by.

**2.4** Attach interconnecting hoses as follows:

1. Attach one leg of the 3-foot twinline hose to the filter on the inlet valve (shown as shaded hose in Figure 1). Connect the other end to fitting marked "Filtered Air In" at the bottom of the panel.
2. Attach the other leg of the 3-foot twinline hose between the one of the fittings at the top of the inlet valve and the fitting marked "Control Air Out" at the bottom of the panel.
3. Connect the 5-foot hose between one of the fittings on the inlet valve and the farthest outlet valve.
4. Connect the 18-inch hose between the remaining fitting at the top of the inlet valve and the outlet valve closest to the inlet valve.
5. Do not connect any hose to the "Exhaust Port" fitting at the bottom of the panel.

**2.5** Make sure the panel's toggle switch is OFF, and then connect power to the panel. Make sure the voltage matches that of the panel.

## **2.6 Functional Tests**

**2.6.1** Attach an air line to the blast machine inlet, and pressurize the lower chamber.

**2.6.2** Close the petcock on the cycle timer inlet valve.

**2.6.3** Flip control panel toggle switch ON.

**2.6.4** Set the timer OFF time to a low setting, approximately one minute.

**2.6.5** Set the timer ON time to about two minutes.

**2.6.6** The timer should pressurize the top chamber for about one minute and depressurize it for about two minutes. While the top chamber is under pressure, check the piping fittings, abrasive traps, outlet valves and control hoses for leaks.

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## **3.0 OPERATION**

**3.1** Add enough abrasive to fill the lower chamber.

**3.2** Place the cycle timer toggle to OFF and pressurize the lower chamber.

**3.3** Close the safety petcock on the inlet valve. The petcock should be kept closed unless the machine or controls are being serviced. The safety petcock prevents control pressure from operating the top chamber.

**3.4** Start blasting and time how long it takes to run out of abrasive.

**3.5** Set timer sub-range ON time and OFF time to operate within the durations required. Refer to the timer operating instructions. Initially set the sub-range of ON and OFF time to operate between one and ten minutes.

**3.6** Set the timer ON time to run slightly less than the time it take to empty the lower chamber.

**3.7** Set the timer OFF time to slightly less than the ON time.

**3.8** Test the operation under actual blast conditions. If the machine runs out of abrasive, adjust the cycle time accordingly.

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## **4.0 MAINTENANCE**

### **4.1 Daily**

**4.1.1** Empty the abrasive trap and clean the abrasive trap screen at least twice a day, more often if trap is full or screen is blocked.

**4.1.2** Inspect outlet valves while top chamber is pressurized; make sure valves seal. If valve leaks, replace diaphragm.

### **4.2 Monthly**

**4.2.1** Remove the hose from the panel's control "air out port" at the inlet valve. Place a drop or two of light weight tool oil in the inlet valve fitting.

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**5.0 TROUBLESHOOTING**

**5.1 Machine runs out of abrasive before the top chamber cycles to refill.**

**5.1.1** Make sure storage hopper contains ample abrasive.

**5.1.2** Decrease ON time to shorten the blast time from the lower chamber, or if the upper chamber is not fully filling, increase OFF time to allow more time for the upper chamber to fill.

**5.1.3** Make sure metering valve is correctly adjusted to avoid excessive abrasive consumption.

**5.2 Timer does not cycle**

**5.2.1** Make sure the toggle is positioned to ON, and power is supplied to the panel.

**5.2.2** Make sure timer is set correctly and that the timer sub-range is set correctly.

**5.2.3** Make sure the safety petcock on the inlet valve is closed. An open petcock will prevent the valves from operating.

**5.2.4** Check all control lines, fittings, and outlet valves for leaks. Any leak will cause the system to malfunction.

**5.3 Top Chamber Does Not Depressurize**

**5.3.1** Check abrasive trap screens for blockage. Clean screens and traps twice daily.

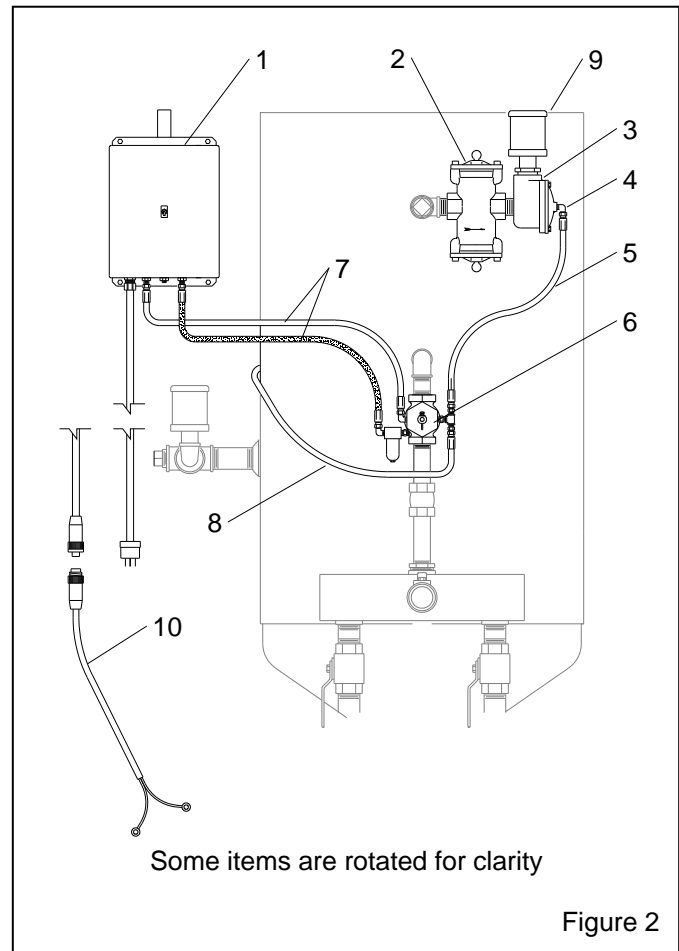
**6.0 REPLACEMENT PARTS**

**6.1 Cycle Timer Systems**

|                                   |       |
|-----------------------------------|-------|
| 120-Volt Cycle timer system ..... | 02207 |
| 12-Volt Cycle timer system .....  | 03439 |

**6.2 System Replacement Parts, Figure 2**

| Item | Description  | Stock No. |
|------|--|-----------|
| 1.   | Control Panel with mounting bracket<br>120-Volt AC .....           | 02205     |
|      | 12-Volt DC .....   | 06147     |
| 2.   | Abrasive trap .....  | 02011     |
| 3.   | Outlet valve, 1" diaphragm .....                                   | 03371     |
| 4.   | Elbow, 1/4" NPT adaptor .....                                      | 02513     |
| 5.   | Hose, 3/16" x 18-inch, coupled .....                               | 02454     |
| 6.   | Inlet valve, CA/CAD cycle timer w/filter .....                     | 04111     |
| 7.   | Hose, 3-ft Twinline, coupled .....                                 | 02240     |
| 8.   | Hose, 3/16" x 5-foot, coupled .....                                | 03083     |
| 9.   | Muffler, exhaust .....   | 05068     |
| 10.  | Pigtail, 12-Volt supply cord<br>used on 12-volt systems only ..... | 10831     |



6.3 Control Panel, Figure 3

| Item | Description                                 | Stock No. |
|------|---|-----------|
| (-)  | Control Panel with mounting bracket         |           |
|      | 120-Volt AC .....                           | 02205     |
|      | 12-Volt DC .....                            | 06147     |
| 1.   | Timer, on/off cycle                         |           |
|      | 120-Volt AC .....                           | 08805     |
|      | 12-Volt DC .....                            | 08758     |
| 2.   | Valve, NC air                               |           |
|      | 120-Volt AC .....                           | 03425     |
|      | 12-Volt DC .....                            | 03426     |
| 3.   | Adaptor, elbow 1/4 NPT x 1/4 tube .....     | 03428     |
| 4.   | Adaptor, straight, 1/4 NPT x 1/4 tube ..... | 03429     |
| 5.   | Adaptor, straight, 1/8 NPT x 1/4 tube ..... | 03430     |
| 6.   | Tubing, 1/4" OD, specify ft. required.....  | 03427     |
| 7.   | Adaptor, 1/4 NPT fem. Bulkhead.....         | 03432     |
| 8.   | Bushing, 1/4 NPT x 1/8 NPT, brass .....     | 02010     |
| 9.   | Switch, toggle .....                        | 04184     |
| 10.  | Switch plate on/off .....                   | 07694     |
| 11.  | Supply cord, 5-foot                         |           |
|      | 120-Volt AC w/twist lock connector .....    | 02216     |
|      | 12-Volt DC w/lo-profile connector .....     | 10833     |

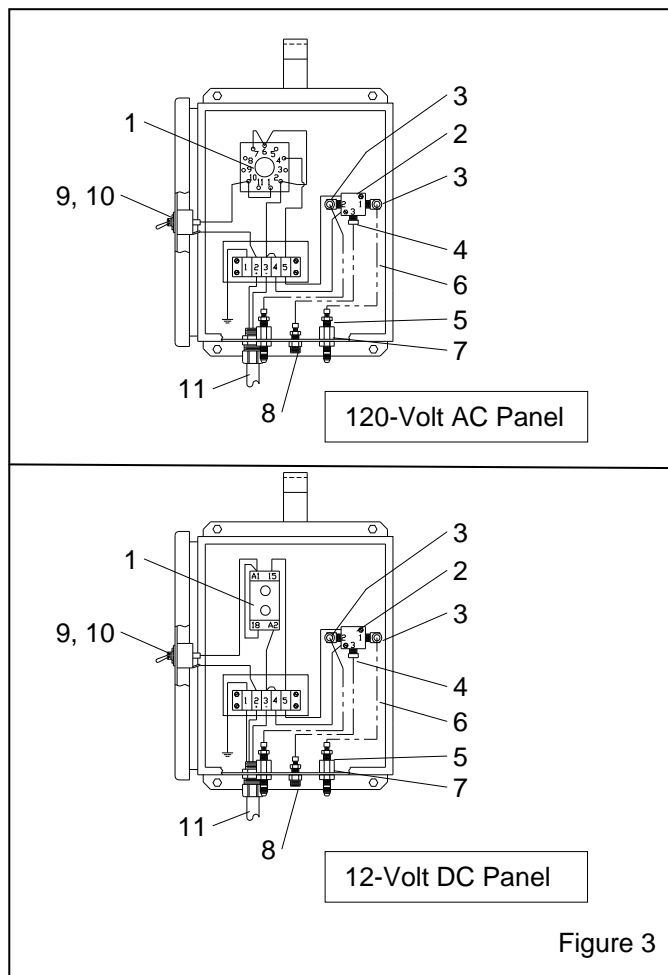


Figure 3

6.4 Inlet Valve, CA/CAD Cycle Timer, Figure 4

| Item | Description   | Stock No. |
|------|---|-----------|
| (-)  | Inlet valve, CA/CAD cycle timer w/filter                                | 04111     |
| 1.   | Petcock 1/4" NPT .....  | 01993     |
| 2.   | Elbow, 1/8" NPT adaptor .....   | 02827     |
| 3.   | Nipple, 1/8" brass hex .....  | 01962     |
| 4.   | Tee, 1/8" NPT brass .....   | 02171     |
| 5.   | Bottom cap .....  | 01985     |
| 6.*  | Spring, 5/8" x 1-11/16" long (1) .....                                  | 01982     |
| 7.*  | Seal, bottom cap (1) .....  | 01989     |
| 8.   | Valve plug .....  | 01984     |
| 9.   | Valve body .....  | 01981     |
| 10.* | Washer, valve plug (2) .....  | 01969     |
| 11.* | Retainer, valve plug washer (1) .....                                   | 01986     |
| 12.* | O-Ring 3/16" ID x 1/16" (1) .....                                       | 01992     |
| 13.  | Piston and rod assembly .....   | 01987     |
| 14.* | O-Ring 1-3/4" OD (1) .....  | 01990     |
| 15.  | Cylinder cap .....  | 01983     |
| 16.  | Filter, 1/8" NPT, 20 micron .....                                       | 02545     |
| (-)  | Service kit, includes items marked *, quantities are shown in ( ) ..... | 01929     |

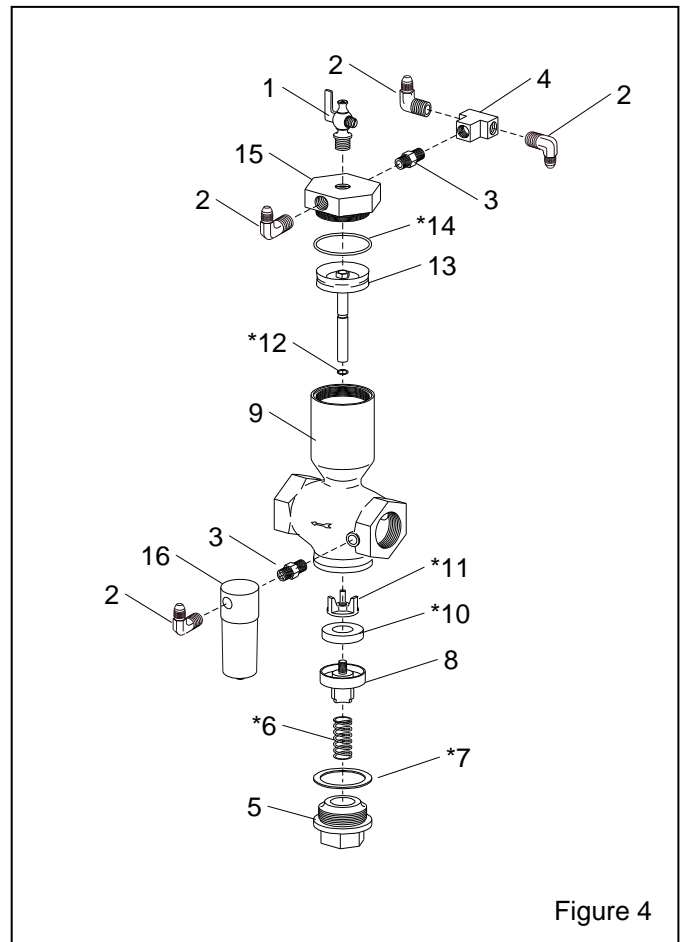


Figure 4

6.5 Abrasive Trap, Figure 5

| Item | Description   | Stock No. |
|------|---|-----------|
| (-)  | Abrasive Trap, complete .....   | 02011     |
| 1.*  | Screen (3) .....  | 02012     |
| 2.*  | O-Ring (2) .....  | 02013     |
| 3.   | Cap .....   | 02014     |
| 4.   | Body .....  | 02015     |
| 5.   | Lock bar .....  | 02016     |
| 6.   | Screw, 3/8" NC x 1" thumb .....   | 03289     |
| 7.   | Shoulder screw, 3/8" x 3/8" .....                                       | 03291     |
| 8.*  | Gasket, screen, 1/8" thick (1) .....                                    | 02434     |
| 9.*  | Decal, clean screen (1) .....   | 02129     |
| (-)  | Service kit, includes items marked *, quantities are shown in ( ) ..... | 01925     |

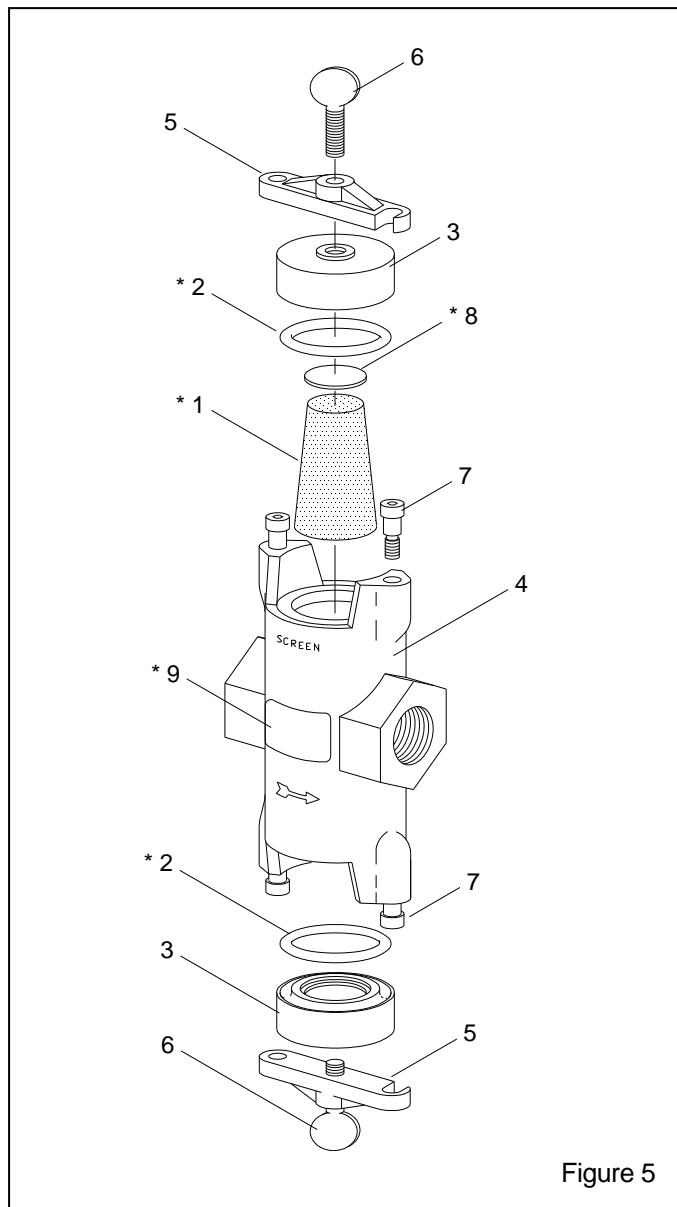


Figure 5

6.6 1" Diaphragm Outlet Valve Figure 6

| Item | Description                               | Stock No. |
|------|---|-----------|
| (-)  | 1" Diaphragm Outlet Valve, complete ..... | 03371     |
| 1.   | Nipple, 1" x close .....                  | 01701     |
| 2.   | Diaphragm .....                           | 06149     |
| 3.   | Washer, 1/4" lock.....                    | 03117     |
| 4.   | Cap screw, 1/4-NC x 1" HH .....           | 03053     |
| 5.   | Cap, diaphragm outlet .....               | 03393     |
| 6.   | Body, diaphragm outlet .....              | 06135     |
| 7.   | Bushing, 1-1/4" x 1" .....                | 01804     |

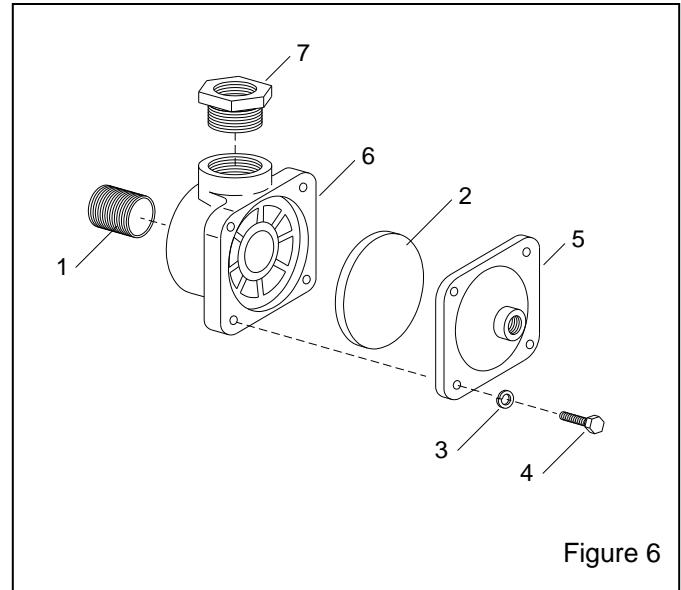


Figure 6