

**EASY LOAD SYSTEMS  
O.M. 10748**

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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 content.\* 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 Parts and Maintenance Guide refer to the orange warnings insert preceding the Index before continuing with the following instructions.**

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## 1.0 INTRODUCTION

**1.1 Scope:** This manual covers the installation, operation, maintenance, troubleshooting and replacement parts for the Clemco Easy Load Vacuum Systems. It is to be used in conjunction with manuals referring to the operation of the specific blast machine, remote control system and operator safety equipment being used.

### 1.2 Hazard Alerts

**1.2.1** Clemco uses signal words, based on ANSI Z535.2-1991, 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:

## ! NOTICE

"Notice" is used to indicate a statement of company policy as the message relates directly or indirectly to the safety of personnel or protection of property.

## ! CAUTION

"Caution" is used to indicate a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

## ! WARNING

"Warning" is used to indicate a potentially hazardous situation which if not avoided, could result in death or serious injury.

## ! DANGER

"Danger" is used to indicate an imminently hazardous situation which, if not avoided will result in death or serious injury.

**1.3 General Description:** The layout and components of the Easy Load systems are shown in Figures 1 and 2. The only difference between the two systems shown in the figures, is that one uses a 6 cubic foot storage hopper mounted on the blast machine, while the other uses the larger free-standing 17 cubic foot hopper. Figure 1 shows them set-up for loading, Figure 2 shows them set-up for recovery of spent abrasive.

The illustrations are shown with the reverse pulse dust collector. See Figure 4 for an illustration of the wet-filter. All connections, regardless of the dust containment options are the same as shown in Figures 1 and 2.

The first component, the Vacuum Producer ie., VPR, is designed in such a way that incoming compressed air creates a suction, giving the system its vacuum source. The vacuum is directed, through a sealed circuit, to the pick-up tool, where it will be used in one of two modes; loading, and recovery.

In either mode the sealed vacuum circuit flows through one of two dust containment options, a wet-filter drum, or the more efficient, dry, reverse pulse dust collector. Both dust containment options remove dust and fines, allowing only filtered air to enter the vacuum producer where it is exhausted through a silencer into the atmosphere.

### 1.4 Application

**1.4.1 Dual Purpose:** All systems can be used for loading or recovery.

**1.4.2 Loading Mode:** (See Figure 1) The Easy Load is a pneumatic abrasive loader which can move new or reusable abrasive from the loading hopper to the blast machine storage hopper, or the pick-up tool can be removed from the loading hopper to load piled abrasive. The system can be truck or trailer mounted for portable use or used in a permanent facility.

**1.4.3 Recovery Mode:** (See Figure 2) The pick-up tool is removed from the loading hopper and used as a portable pick-up tool. In this mode, spent abrasive is vacuumed from the blasting area, to a collection container for easy dumping.

| Blast Nozzle CFM Chart |     |     |     |     |     |     |     |     |
|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| PSI                    | 30  | 40  | 50  | 60  | 70  | 80  | 90  | 100 |
| Nozzle Size            | CFM |     |     |     |     |     |     |     |
| 1/4"                   | 33  | 40  | 47  | 54  | 61  | 68  | 74  | 81  |
| 5/16"                  | 53  | 65  | 77  | 89  | 101 | 113 | 126 | 137 |
| 3/8"                   | 72  | 90  | 108 | 126 | 143 | 161 | 173 | 196 |
| 7/16"                  | 101 | 124 | 147 | 170 | 194 | 217 | 240 | 254 |
| 1/2"                   | 137 | 166 | 195 | 224 | 252 | 280 | 309 | 338 |

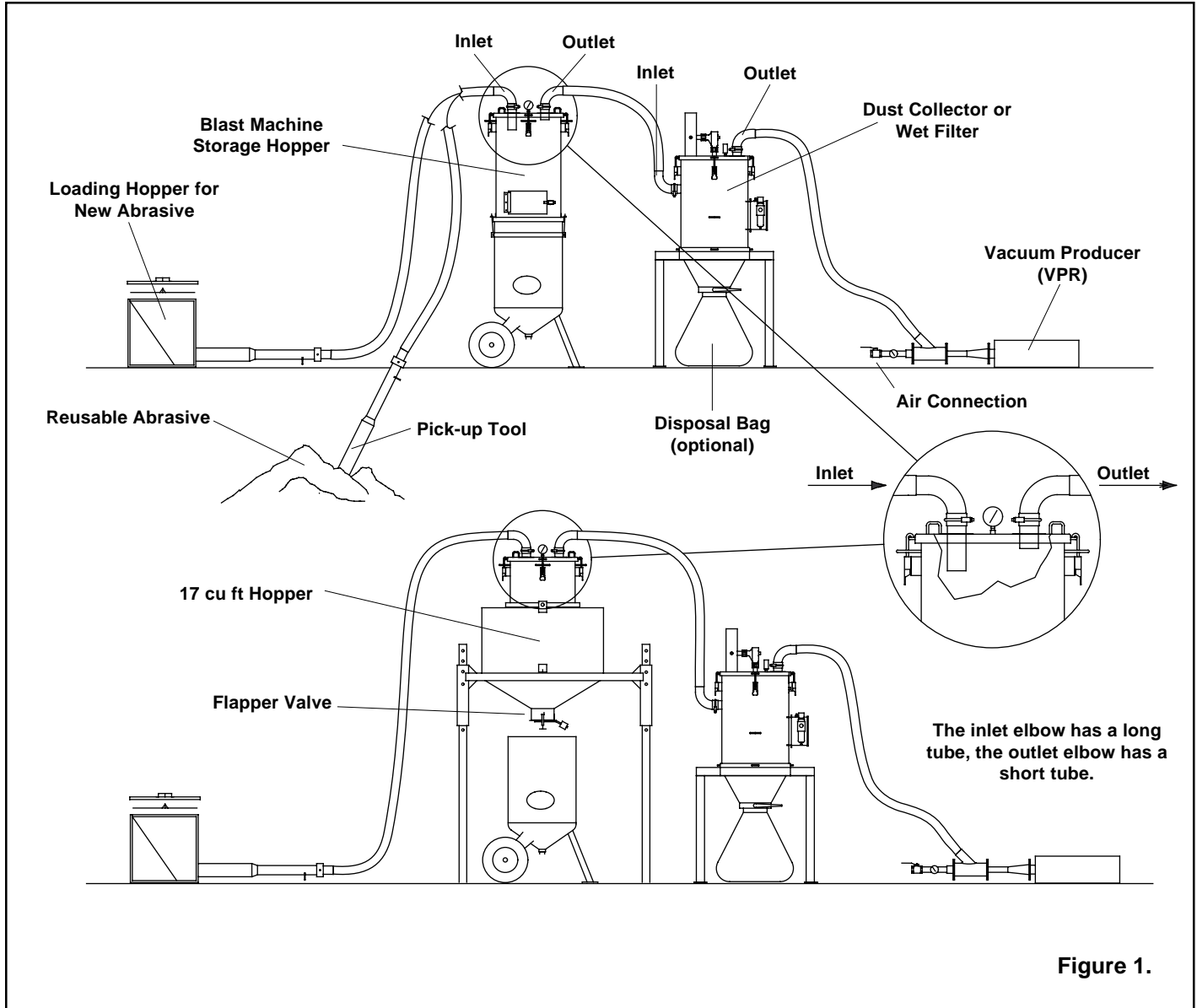


Figure 1.

## 2.0 AIR REQUIREMENTS

### 2.1 Vacuum Producer

**2.1.1** The vacuum producer (VPR) requires 290 cfm at 100 psi. The optional reverse pulse dust collector requires 10 cfm at 90 psi. The compressor must be large enough to maintain 90-100 psi at the VPR, or maintain the required pressure at the nozzle, as specified in the Blast Nozzle CFM Chart. If the VPR, blast machine, and dust collector are to be used at the same time, the compressor must be large enough to maintain all pieces of equipment, plus the additional cfm required by other tools.

### 2.2 Air Supply Hose

**2.2.1** Recommended air supply hose is 1-1/2" I.D. or larger. The vacuum producer connection is 1-1/2" npt.

## 3.0 SET-UP

### 3.1 Set-up Notes

**3.1.1** The following text explains the set-up for using the Easy Load in the loading mode. Set-up for recovery is the same except a recovery container is used in place of the blast machine storage hopper. If the 17 cubic foot hopper is used the only difference is the blast machine is removed from under the hopper and replaced with a disposal drum. See Figure 1 for loading set-up, Figure 2 for recovery set-up.

**3.1.2** The illustrations in Figures 1 and 2 shows the optional reverse pulse dust collector. Set-up for the wet-filter is the same as the dust collector with the exceptions noted in section 3.6.1. See Figure 3 for wet-filter illustration.

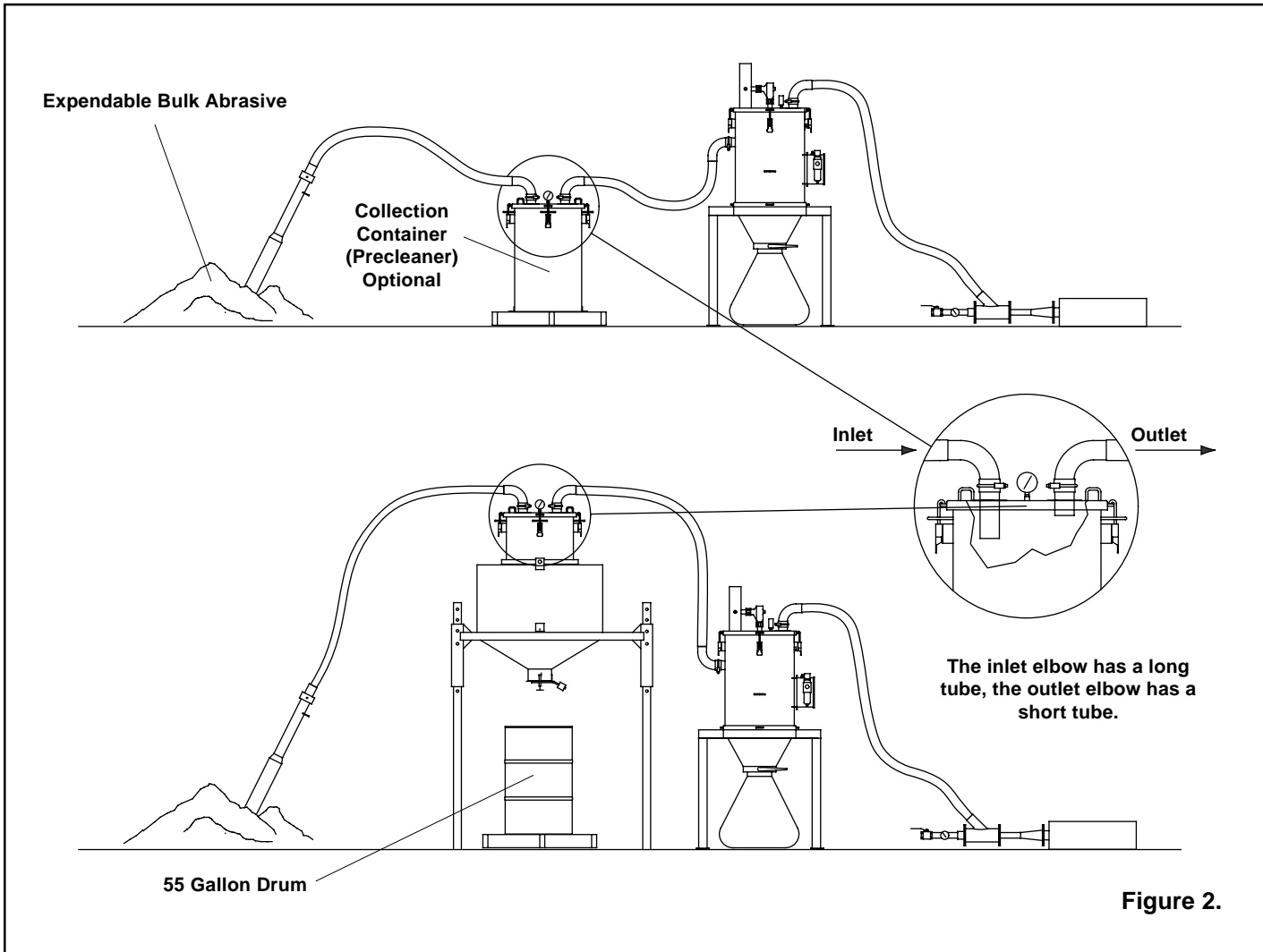


Figure 2.

### 3.2 Set-Up (Refer to Fig. 1 and 2).

#### 3.2.1 Position all components in a convenient location.

## !WARNING

**The blast machine and storage hopper must be assembled and used on a flat, level surface. The blast machine and hopper must be adequately supported to ensure stability when the hopper is loaded with abrasive.**

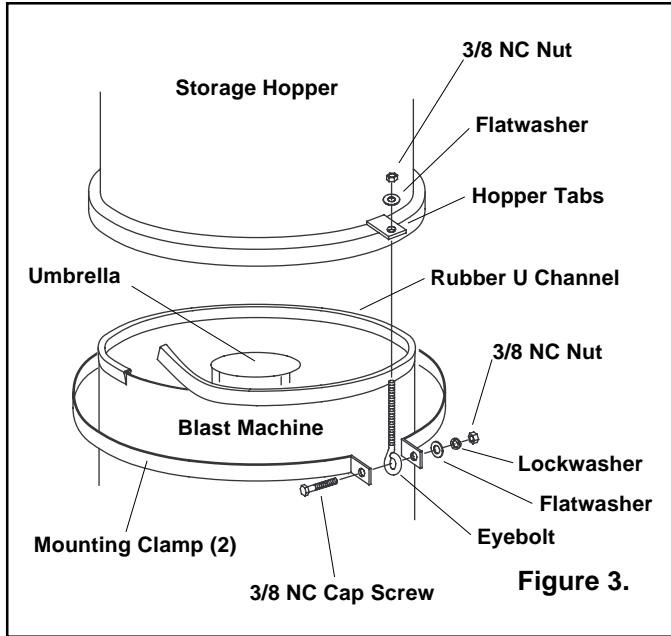
### 3.3 Six Cubic Foot Storage Hopper Assembly

NOTE: An umbrella must be installed over the blast machine pop-up opening for this application. If an umbrella is not installed, the weight of the abrasive will prevent the pop-up valve from closing.

**3.3.1** Attach the mounting clamps to the blast machine as shown in Figure 3. The top of the clamps should be approximately 2" to 3" from the top of the machine. Consideration must be given to where the access door should be located, before securing the mounting clamps.

**3.3.2** Place the rubber U-channel extrusion over the rim of the blast machine. To obtain an air tight seal, the ends of the extrusion must be square cut and tightly compressed. Rubber adhesive will help hold the extrusion in place during assembly.

**3.3.3** Lower the 6 cubic foot storage hopper onto the blast machine. Align it by guiding the mounting clamp eyebolts into the holes on the hopper tabs. Secure all nuts and bolts.



## ! WARNING

Do not work under the hopper while it is hanging from a lifting devise. Severe injury can occur if the hopper is released from the lifting device before it is secured to the blast machine.

**3.3.4** Place the lid assembly on the storage hopper. (When using the system in the recovery mode, use the lid over a collection container, see Figure 2). The elbow with the long dip tube is the inlet. Verify that the "IN" label is at the elbow with the long tube.

### 3.4 Seventeen Cubic Foot Hopper Assembly

## ! WARNING

Do not lift the storage unit, or adjust the hopper height if the hopper contains abrasive. Lifting lugs are NOT designed to lift the weight of the hopper with abrasive. Do not work under the hopper while it is hanging from a lifting devise. Severe injury can occur if the hopper is released from the lifting device before it is secured to all supporting legs.

**3.4.1** Mount the legs onto the triangular frame by aligning the holes in the legs with those in the frame, inserting quick release pins to secure. Adjust to approximate height.

**3.4.2** Mount the empty 17 cu. ft. storage hopper onto the frame, and adjust frame to required height.

**3.4.3** Place the lid assembly on the 17 cu. ft. hopper. The elbow with the long dip tube is the inlet. Verify the "IN" label is at the elbow with the long tube.

**3.4.4** Place the blast machine or collection container under the flapper valve assembly. The blast machine or container must be filled manually by opening the flapper valve.

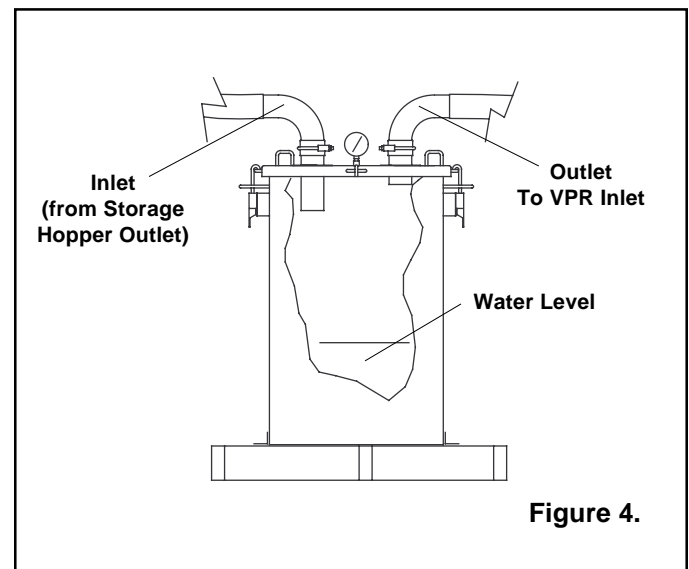
### 3.5 Position Loading Hopper

**3.5.1** The hopper may be mounted in the cube frame at ground level or recessed to be level with the floor. The recessed mounting requires a 22-1/4" square hole cut into the floor. The hopper is set into the hole, and is supported by the hopper flange.

NOTE: Recessed mounting requires 22" free space below the floor, and be accessible to install and adjust the bulk pick-up tool.

### 3.6 Assemble Dust Containers

**3.6.1 Wet-filter**, Figure 4: for assembly of the reverse pulse dust collector see section 3.6.2.



**3.6.1.1** Fill the wet-filter drum with water until approximately 1/3 full. The wet-filter drum must have enough water in it to contain dust. During operation, if excessive water comes from the VPR silencer, reduce the water level. If excessive dust is emitted, increase the water level. Small amounts of dust and water are normal. If conditions will not allow discharge from the VPR, the system can be up-graded to a reverse pulse collector.

**3.6.1.2** Attach the lid to the filter. The elbow with the long dip tube is the inlet. Verify the "IN" label is at the elbow with the long tube. Skip to section 3.7

### 3.6.2 Reverse Pulse Dust Collector

Figure 5

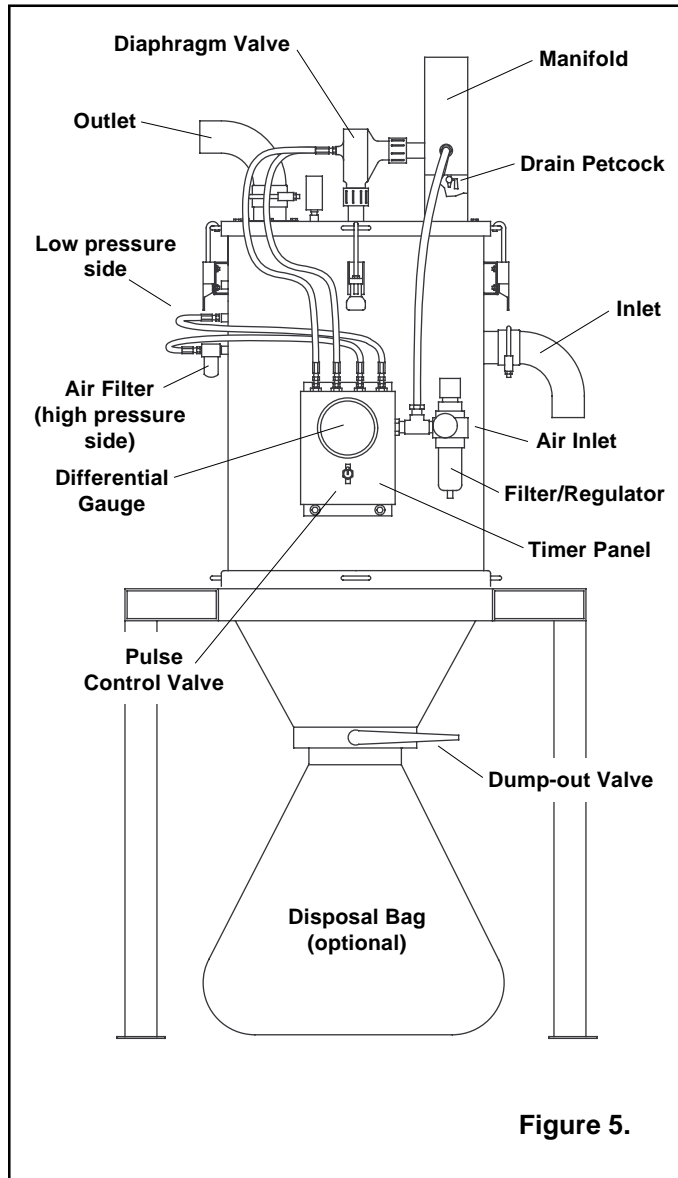


Figure 5.

**3.6.2.1** Attach the dust collector lid assembly to the collector housing. To ensure the pulse jets are positioned correctly, the lid has two locator bolts that must be aligned with holes on the body before clamping the latches.

**3.6.2.2** Install an air fitting on the timer panel filter/regulator, and attach a 1/2" or larger air hose.

**3.6.2.3** Connect air lines between the quick release diaphragm valves and panel fittings as shown in Figure 6.

**3.6.2.4** Open the panel to verify the following connections: Connect an air line between the "Low pressure" side of the differential pressure gauge to the upper fitting on the collector wall. Connect another line from the "High pressure" side of the gauge to the 1/4" air filter on the collector wall. See Figure 6 for air schematic.

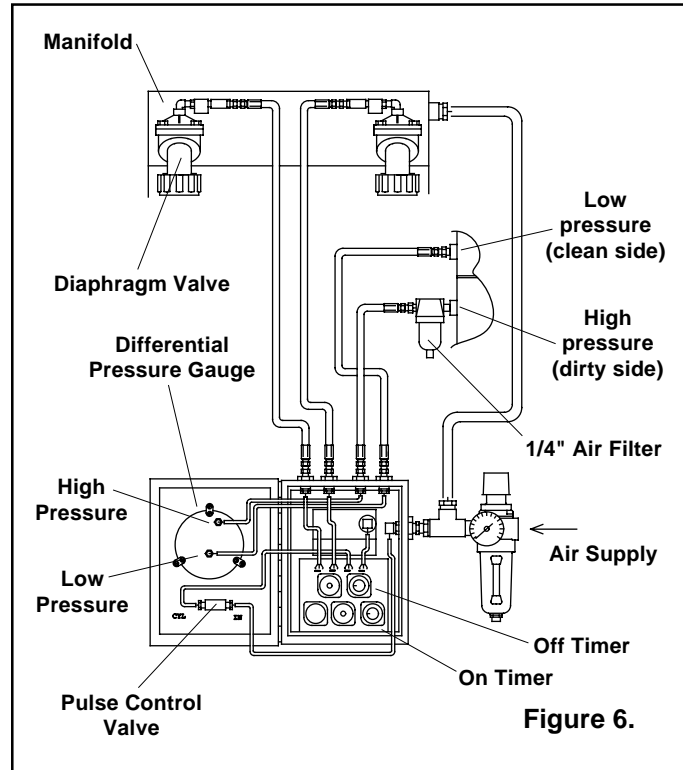


Figure 6.

**3.6.2.5** Close the dump-out valve.

**3.6.2.6** Place a dust disposal drum under the collector dump-out valve, or attach an optional disposal bag to the dump-out pipe.

### 3.7 Vacuum Hose Connections

**3.7.1** Attach one 3" x 10 ft. connecting hose to the vacuum producer by twisting the hose clockwise over the casting stub. The other end is attached to the outlet of the wet-filter or dust collector. Secure both ends with worm clamps.

**3.7.2** Attach the other 3" x 10 ft. connecting hose between the storage hopper outlet, and the wet-filter or dust collector inlet. Secure with worm clamps.

**3.7.3** Attach the uncoupled end of the 25 ft. pick-up hose to the storage hopper inlet. Do not connect the other end to the pick-up tool at this time.

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### 3.8 Vacuum Producer (VPR)

**3.8.1** Attach a 1-1/2" I.D. or larger air hose from the compressor to the inlet valve of the vacuum producer. The vacuum producer inlet valve is 1-1/2" NPT.

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## 4.0 OPERATION

**NOTE:** Operating vacuum is usually between 4" to 8" Mercury (Hg). Lower vacuum normally indicates a leak or the pick-up tool adjustment holes are open too far. Higher vacuum usually indicates not enough air enters the tool. Some applications may obtain better conveying rates with lower or higher than normal vacuum. Best conveying rates will be achieved by monitoring the vacuum gauge and air/abrasive mixture.

### 4.1 Common for loading and recovery

**4.1.1** Close the vacuum producer inlet valve.

**4.1.2** Check that all access doors are closed and secure including; lids, flapper valve (17 cu. ft. hopper only) or dump-out valve (dust collector only).

**4.1.3** Start the compressor and bring it to operating conditions.

**4.1.4** Slowly open the compressor's main air valve, to pressurize the air lines to the VPR, and dust collector (dust collector models only).

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## !NOTICE

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**New dust collectors and cartridges should not be pulsed until cartridges are seasoned, see section 6.2.6.**

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**4.1.5** Switch the pulse control valve, located on the timer panel cover, to on.

**4.1.6** Open the inlet valve on the vacuum producer, operation will begin immediately.

---

## !WARNING

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**Ear protection is required when the vacuum producer is in operation.**

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**4.1.7** Check the VPR pressure gauge. Optimum pressure is 90-100 psi.

**4.1.8** Check the pulse pressure (dust collector models only). Pressure should be 90-100 psi.

**4.1.9** Check the vacuum system for leaks by blocking approximately 90% of the pick-up end of the pick-up conveying hose with a board or other solid, flat object. Listen to, and feel each hose connection and seal between each segment for leaks. If leaks are found at hose connection, tighten the clamps. If there are leaks between segments, check the gaskets and clamp tension.

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## ! CAUTION

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**Never completely block off the vacuum air inlet. Damage to drums, hoppers, or hoses may occur due to the high vacuum produced. Shut-down immediately if vacuum exceeds 20" Hg.**

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**4.1.10** Turn off the vacuum producer by closing the air valve. Attach the pick-up tool to the coupled end of the pick-up conveying hose.

**4.1.11** The tool may now be put into the loading hopper, for operation in the loading mode, or it can be hand held for abrasive recovery.

### 4.2 Loading Mode

**4.2.1** Place the pick-up tool into the loading hopper.

**4.2.2** Remove the cover from the loading hopper, drop bagged abrasive onto the screen and bag opener. Tear the punctured bag open, permitting abrasive to fall into the hopper.

**4.2.3** Start the loading process by opening the air valve on the vacuum producer.

**4.2.4** Adjust the air intake on the pick-up tool as described in section 5.1.

**4.2.5** Continue to fill the loading hopper until the blast machine and/or storage hopper is full. **DO NOT OVER FILL.** Abrasive flow will slow down noticeably when hoppers are full.

**4.2.6** As hoppers become full, stop filling the loading hopper and allow the pick-up hose to clear.

**4.2.7** Shut-down the vacuum producer by closing the air inlet valve.

### 4.3 Recovery

**4.3.1** Hold the handle of the pick-up tool in one hand. The other hand is used to help maneuver the tool to the most comfortable position for the operator. The pick-up hose is usually placed over the opposite shoulder or under the opposite arm, depending upon the angle at which the tool will be used.

**4.3.2** The bulk pick-up tool is used for moving heavy concentrations of abrasive from the storage hopper, drums, or abrasive piles. Optional tools are available. They are listed under accessories and below for suggested use.

- Crevice Tool: used for vacuuming narrow recessed areas.
- \* Flare Tool: used to vacuum thin layers or spread out layers of abrasive on flat areas such as floors.
- Wall Brush: used for vacuuming dust from walls and floors.

**4.3.3** As the collection containers become full, the recovery rate will noticeably decrease. At that point, stop recovery and allow pick-up hose to clear.

**4.3.4** Shut-down the system to empty or replace the collection container and dust collector. Continue with the recovery until the blast area is clean.

### 4.4 Shut-down

NOTE: Do not recover and load any-more abrasive than will be used. Condensation may develop in the hopper and blast machine, which will cause abrasive to get damp. Abrasive should be stored in air tight containers at the end of the work day.

**4.4.1** Stop recovery and let abrasive clear from all recovery hoses.

**4.4.2** Shut-down the vacuum producer by closing the air inlet valve.

**4.4.3** Turn off the pulse control valve, and drain the manifold tank (dust collector models only).

**4.4.4** Empty dust containers, precleaner, and hopper.

## 5.0 ADJUSTMENTS

### 5.1 Pick-up Tool

**5.1.1** Adjust the air intake on the pick-up tool by sliding the bell shaped collar back from the outer pick-up tube. The further the collar is moved, the more air will be drawn in. Further adjustment may be made by moving the collar off of the air intake holes. Open only as far as needed to keep the abrasive flowing. Too much air will decrease recovery rates. Too little air will cause abrasive to pack, which will also decrease rates.

### 5.2 Latches

**5.2.1** Loosen the lock nut, and turn the latch hook in or out as required to pull the segment tight when the hook is latched.

**5.2.2** Tighten the lock nut.

### 5.3 Inlet/Outlet Elbows

**5.3.1** Loosen the nuts on the U-clamp.

**5.3.2** Rotate the elbows to the best position to facilitate vacuum hose connections.

**5.3.3** Be certain the slits in the elbow slides below the end of stub.

**5.3.4** Tighten the U clamps to secure.

### 5.4 Pulse Pressure (dust collector models only)

**5.4.1** Pulse pressure is adjusted by the filter regulator combination located on the timer panel inlet. Adjust pressure between 90 psi and 100 psi.

**5.5 Pulse Timer**  
(Refer to the air schematic in Figure 6, dust collector models only)

**5.5.1** The timers are located in the timer panel. Open the panel door and adjust as follows:

**5.5.2** Turn on the air supply, and switch the pulse control valve to on.

**5.5.3** Turn both timer knobs fully clockwise to close.

**5.5.4 "ON" time** (lower timer) "On" time is the length of each pulse. The pulse should be kept as short as possible, because it is the initial burst of air that cleans the cartridge. Adjust the "On" time by turning the knob three full turns counterclockwise.



**5.5.5 "OFF" time** (upper timer) "Off" time is the time between each pulse. Adjust the off time by turning the knob approximately one half turn counterclockwise until the time between each pulse is around 15 seconds.

**5.5.6** The differential pressure gauge is useful in determining the need to change the time between pulses ("off" time). When the gauge consistently reads 6" or above, (reading taken with the VPR on, and no recovery) turn the "OFF" time (upper timer) knob counterclockwise to increase the pulses, and lower the reading.

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## 6.0 MAINTENANCE

### 6.1 Preventive Maintenance

**6.1.1** Never operate without the pick-up tool. Using a hose without a pick-up tool to vacuum, will usually decrease recovery rates.

**6.1.2** Do not leave abrasive in storage hopper, blast machine, or loading hopper overnight. Condensation may develop in the hopper, which will cause abrasive to get damp. At the end of the work day abrasive should be stored in air tight containers.

**6.1.3** Do not over fill the system. Production decreases noticeably once the abrasive level reaches the bottom of the inlet tubes on the hopper cover. This will also cause carry over of useable abrasive into the dust container.

**6.1.4** Do not operate without the dust collector, or wet-filter drum. Doing so will cause premature wear on the vacuum producer and silencer, and excessive dust.

**6.1.5** Shut-down immediately if sand or dust is seen coming from the vacuum producer silencer. Check the filter cartridges or water level.

**6.1.6** Keep all hose as straight as possible. Bends in the hose will accelerate wear and also decrease efficiency.

**6.1.7** Do not pulse the dust collector with the dump-out valve open. Doing so will cause dust leaks every time the collector pulses.

**6.1.8** Do not operate with the dust collector dump-out valve open. Doing so will loose vacuum and cause pneumatic wear of dump-out valve and other parts.

**6.1.9** Drain the dust collector pulse manifold at the end of daily operations. Drain more frequently if water is present in the air line. A drain petcock is located on the bottom of the manifold.

## 6.2 General Maintenance

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### ! WARNING

**NIOSH approved air-supplied respirators and protective clothing must be worn when servicing any area of the system and collector that exposes the user to dust.**

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- 6.2.1** Check and clean storage hopper screens daily.
- 6.2.2** Empty dust filters and precleaner at least daily. Loading dusty abrasive, or recovering spent abrasive will require more frequent emptying.
- 6.2.3** Immediately check filter cartridges for damage if dust is emitted from the vacuum producer silencer.
- 6.2.4** Emptying dust collector
- 6.2.4.1** Shut off the VPR, turn off the pulse control valve, and drain the manifold tank.
- 6.2.4.2** Check that the dust disposal container or bag is in place and sealed around the dump-out opening.
- 6.2.4.3** Open the dump-out valve to let dust enter the disposal container.

---

### ! CAUTION

**To avoid spilling harmful dust, close the dump-out valve before the dust container is full. The container must have the capacity to hold dust left in the tube after the valve is closed.**

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- 6.2.5** Changing filter cartridges.
- 6.2.5.1** Empty dust collector.
- 6.2.5.2** Remove the vacuum hose and manifold air hose from the dust collector lid.
- 6.2.5.3** Remove the lid from the dust collector body.
- 6.2.5.4** Remove the four hex nuts and hold-down plate on each cartridge.

**6.2.5.5** Pry up on the cartridge flange to break the seal on the cartridge gasket. Pull the filter cartridges straight up out of the collector housing.

**6.2.5.6** Clean the top side of the cartridge plate, particularly around the sealing area.

**6.2.5.7** Set the new cartridges in place, and replace the hold-down plates. Secure with the hex nuts.

**6.2.5.8** Replace the lid assembly. The lid has two locator bolts that must be aligned with holes on the housing before clamping the latches.

**6.2.5.9** Replace the vacuum hose and manifold air hose.

**6.2.5.10** Season the cartridges per section 6.2.6.

## 6.2.6 Seasoning Cartridges

**6.2.6.1** New cartridges must be seasoned. Cartridges are seasoned by letting a dust cake develop on the filter media before starting the pulse cycle.

**6.2.6.2** Let new cartridges run without pulsing (pulse control valve turned off) until the differential pressure gauge reads 1 inch above the initial reading. At that point the pulse control valve can be turned on to start the pulsing cycle. New dust collectors and cartridges should not be pulsed until cartridges are seasoned.

## 7.0 TROUBLESHOOTING

### 7.1 No vacuum or low vacuum at the pick-up tool.

**7.1.1** Clogged filter cartridges. Decrease pulse time or replace cartridges.

**7.1.2** Leak in hose connections, storage hopper or filter lids. See Section 4.7.

**7.1.3** Access door in storage hopper is open or leaking. Close, repair or replace gasket.

**7.1.4** Inadequate air supply. Check pressure gauge on vacuum producer. It should be between 90-100 psi.

**7.1.5** Worn venturi tube insert in vacuum producer. Replace.

**7.1.6** Venturi insert loose. Check and tighten.

**7.1.7** Dirt accumulated on VPR jet. Clean.

**7.1.8** Storage hopper or dust container is full. Check level.

**7.1.9** Blockage in pick-up hose. Remove pick-up tool and clear.

**7.1.10** Flapper valve is open (17 cubic foot hopper only). Close.

**7.2** If the abrasive flow at the pick-up tool stops for a few seconds then re-starts, check the following:

**7.2.1** Air intake on pick-up tool isn't open far enough. Refer to section 5.1 for adjustment.

**7.3** If dust or abrasive is coming from the vacuum producer, check the following:

**7.3.1** Damaged or loose filter, shut-down and check immediately.

**7.3.2** Water level in wet-filter is not high enough.

**7.4** If there is excessive water coming from the vacuum producer silencer (wet-filter only), check the following:

**7.4.1** Water level in the wet filter is too high.

**NOTE: A small amount of water coming from the silencer is normal. As dust is collected in the drum, the water level will rise and carry over to the vacuum producer.**

**7.5** Carry over of useable abrasive to dust container.

**7.5.1** Blast machine or storage container full. Decrease loading time.

**7.5.2** Inlet and outlet hose reversed on the storage hopper. The elbow with the long dip tube is the inlet, see Figure 1. Verify that the pick-up hose is connected to the elbow with the long tube.

## 8.0 ACCESSORIES

(Optional)

| Description  | Stock No. |
|--|-----------|
| Bulk pick-up tool, 2" O.D. ....                                      | 04327     |
| Crevice tool, 2" O.D. with swivel adaptor<br>and coupling.....       | 04270     |
| Crevice tool, 3" O.D. with swivel adaptor<br>and coupling.....       | 04271     |
| Flare tool, 2" O.D. with swivel adaptor<br>and coupling.....         | 04272     |
| Flare tool, 3" O.D. with swivel adaptor<br>and coupling.....         | 04273     |
| Wall brush assembly, 2" .....  | 04300     |
| Hose, 2" bulk vacuum, up to 100 ft.<br>(specify length in feet)..... | 10332     |

Hose, 3" bulk vacuum, up to 100 ft.  
 (specify length in feet) ..... 10286  
 3"-2" Vacuum hose transition,  
 connects 2" vacuum hose to 3" hose ..... 11221

NOTE: To connect two 3" hoses together, it is necessary to order:  
 2 Hose end coupler 3" ..... 04338  
 2 Clamp, 3" hose ..... 02816  
 1 Clamp, 3" coupler ..... 08777

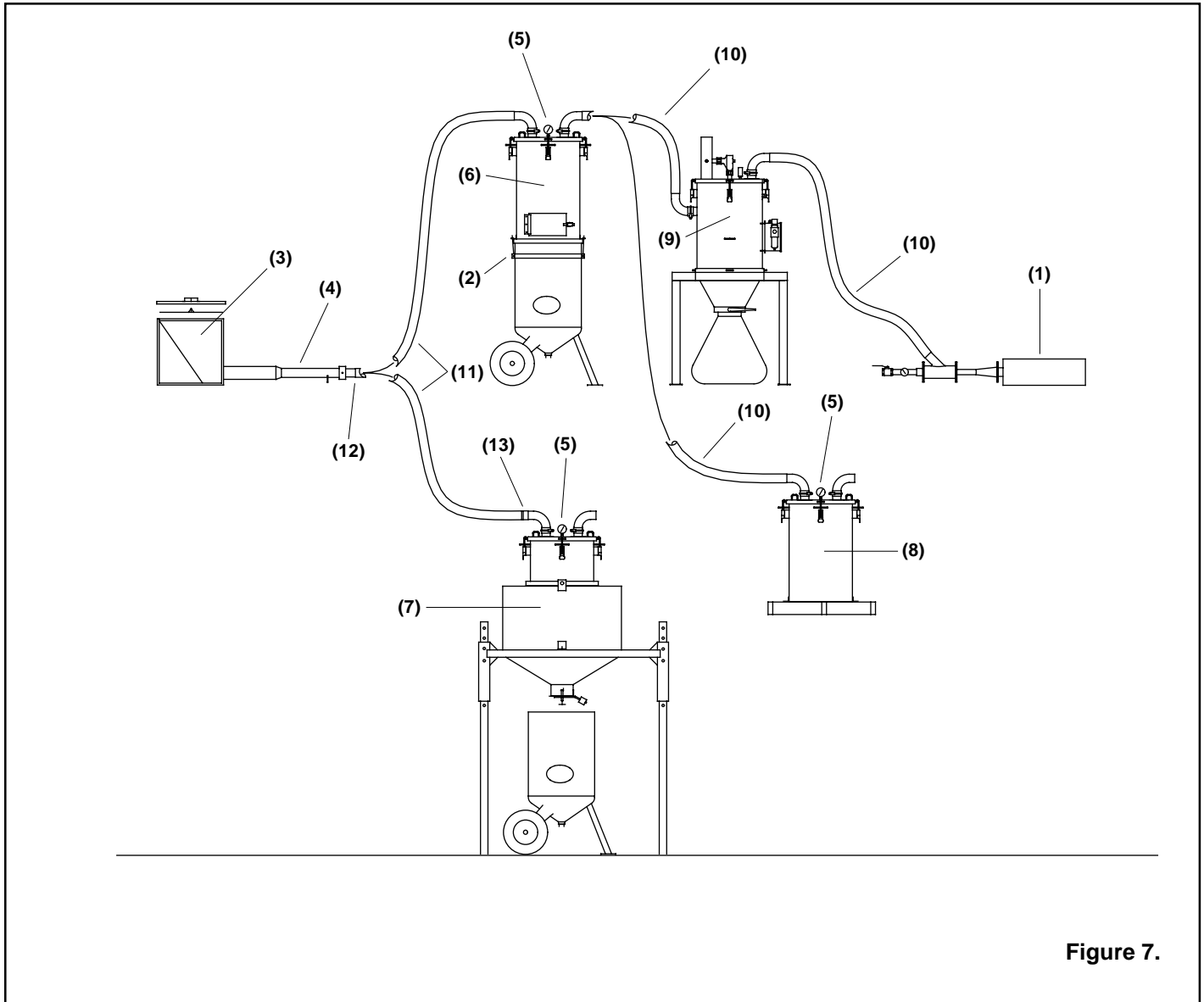


Figure 7.

**9.0 REPLACEMENT PARTS**

**9.1 System Replacement Parts,  
 Figure 7**

| Item | Description                             | Stock No. |
|------|---|-----------|
| 1.   | 290 Vacuum producer with silencer ..... | 07585     |
| 2.   | Attachment kit, 24" blast machine ..... | 10289     |
| 3.   | Loading hopper .....                    | 07556     |
| 4.   | Pick-up tool, 3" bulk .....             | 04275     |
| 5.   | Lid assembly,<br>with 3" inlet .....    | 20417     |
|      | with 2" inlet (for CCB) .....           | 20419     |
| 6.   | Hopper assembly, 6 cu.ft. ....          | 07568     |
| 7.   | Hopper assembly, 17 cu.ft .....         | 10793     |
| 8.   | Precleaner/wet-filter drum .....        | 20418     |
| 9.   | Dust collector, complete .....          | 20416     |
| 10.  | Hose, 3" x 10 ft vacuum .....           | 10900     |
| 11.  | Hose, 3" x 25 ft vacuum .....           | 10902     |
| 12.  | Hose end coupler, 3" .....              | 04338     |
| 13.  | Clamp, 3" hose .....                    | 02816     |

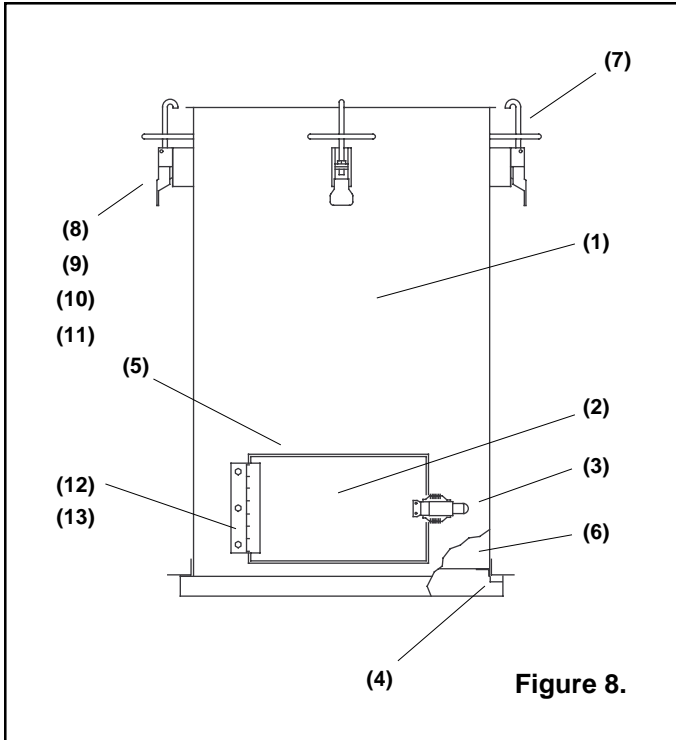


Figure 8.

**9.2 Storage Hopper, 6 Cubic Foot**

Figure 8

| Item | Description   | Stock No. |
|------|---|-----------|
| (-)  | Storage hopper, complete .....                              | 07568     |
| 1.   | Storage hopper weldment .....                               | 07548     |
| 2.   | Door .....  | 07560     |
| 3.   | Latch assy, spring, door .....                              | 12263     |
| 4.   | Gasket, 7/16" x 1" adhesive backed,<br>7 ft. required ..... | 00190     |
| 5.   | Gasket, door .....  | 11745     |
| 6.   | Screen .....  | 15091     |
| 7.   | Latch assy, hook .....                                      | 20445     |
| 8.   | Screw, 1/4-nc x 1 hex head. ....                            | 03053     |
| 9.   | Nut, 1/4-nc hex .....                                       | 03111     |
| 10.  | Washer, 1/4" lock .....                                     | 03117     |
| 11.  | Washer, 1/4" flat .....                                     | 03116     |
| 12.  | Screw, 10-32 x 1/2" truss .....                             | 12062     |
| 13.  | Nut, 10-32 lock .....                                       | 12731     |

**9.3 Hopper Assembly, 17 Cubic Foot**

Figure 9

| Item | Description                         | Stock No. |
|------|-------------------------------------|-----------|
| (-)  | Hopper assembly, complete .....     | 10793     |
| 1.   | Hopper only, 17 cu. ft. ....        | 07579     |
| 2.   | Volume segment .....                | 07547     |
| 3.   | Stand assembly .....                | 07559     |
| 4.   | Release pin and chain .....         | 10276     |
| 5.   | Hinge (rubber), flapper valve ..... | 04062     |
| 6.   | Gasket, flapper valve .....         | 04061     |
| 7.   | Clamp, flapper valve .....          | 10186     |
| 8.   | Tee bolt, flapper valve .....       | 10187     |
| 9.   | Counter weight, flapper valve ..... | 04065     |
| 10.  | Clamp, flapper valve hinge .....    | 04057     |
| 11.  | Latch assy., hook .....             | 20445     |

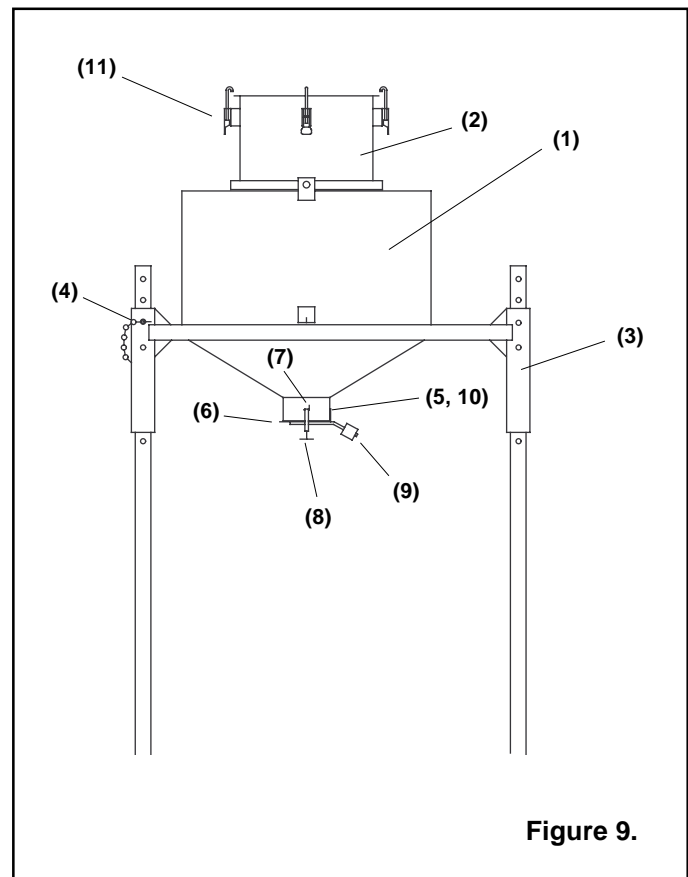


Figure 9.

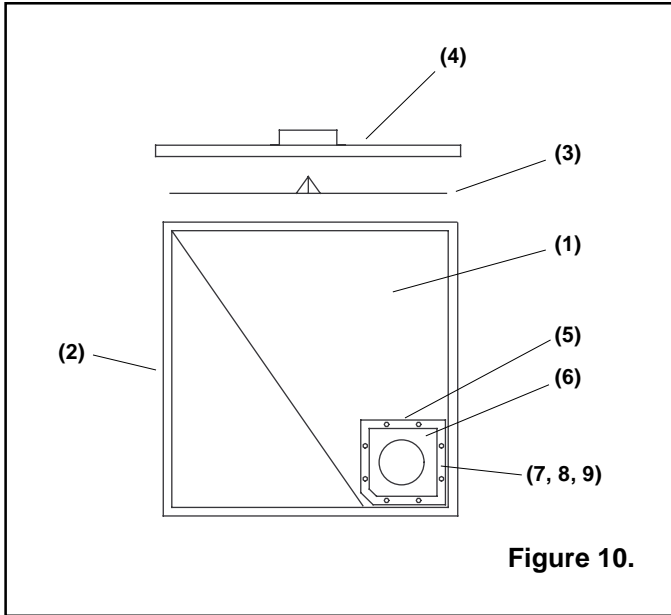


Figure 10.

**9.4 Loading Hopper Assembly**

Figure 10

| Item | Description                         | Stock No. |
|------|-------------------------------------|-----------|
| (-)  | Loading hopper, complete .....      | 07556     |
| 1.   | Hopper .....                        | 07567     |
| 2.   | Frame .....                         | 07532     |
| 3.   | Screen .....                        | 10293     |
| 4.   | Cover .....                         | 10294     |
| 5.   | Retainer, gasket .....              | 07533     |
| 6.   | Gasket .....                        | 07534     |
| 7.   | Screw, 1/4-nc x 1/2" hex head ..... | 03051     |
| 8.   | Nut, 1/4-nc .....                   | 03111     |
| 9.   | Washer, 1/4" flat .....             | 03116     |

**9.5 Lid, Cover Assembly**

Figure 11

| Item | Description                                 | Stock No. |
|------|---|-----------|
| (-)  | Lid assembly, complete, with 3" inlet ..... | 20417     |
| (-)  | Lid assembly, complete, with 2" inlet ..... | 20419     |
| 1.   | Lid weldment .....                          | 20414     |
| 2.   | Retainer quadrant, each .....               | 20395     |
| 3.   | Elbow, 2" .....                             | 10792     |
| 4.   | Elbow, 3" .....                             | 10179     |
| 5.   | Gauge, 30" Hg vacuum .....                  | 10169     |
| 6.   | Gasket, dip tube .....                      | 10232     |
| 7.   | Gasket, extruded .....                      | 20443     |
| 8.   | 3" Outlet tube, 3.5" long .....             | 10451     |
| 9.   | 3" Inlet tube, 8.5" long .....              | 10452     |
| 10.  | 2" Inlet tube, 8.5" long .....              | 10790     |
| 11.  | 2" U-clamp .....                            | 10789     |
| 12.  | 3" U-clamp .....                            | 10486     |

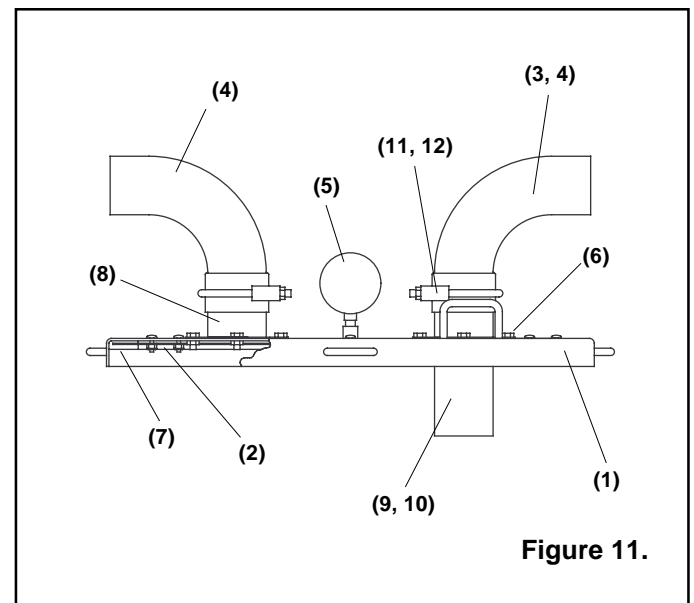


Figure 11.

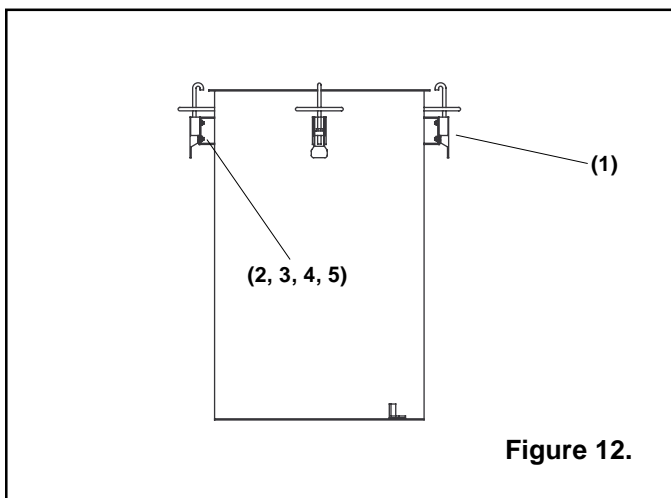


Figure 12.

**9.6 Precleaner Drum**

Figure 12

| Item | Description                      | Stock No. |
|------|----------------------------------|-----------|
| (-)  | Precleaner drum, complete .....  | 20418     |
| 1.   | Latch assembly, hook .....       | 20445     |
| 2.   | Screw, 1/4-nc x 1 hex head ..... | 03053     |
| 3.   | Nut, 1/4-nc hex head .....       | 03111     |
| 4.   | Washer, 1/4" lock .....          | 03117     |
| 5.   | Washer, 1/4" flat .....          | 03116     |

**9.7 Vacuum Producer**

Figure 13

| Item | Description                         | Stock No. |
|------|-------------------------------------|-----------|
| (-)  | VPR assembly complete .....         | 07585     |
| (-)  | VPR assembly without silencer ..... | 07599     |
| 1.   | Silencer .....                      | 07594     |
| 2.   | Venturi tube .....                  | 07544     |

|     |                                |       |
|-----|--------------------------------|-------|
| 3.  | Screw, 1/4-nc x 1/4" set ..... | 03075 |
| 4.  | Jet, air VPR-290 .....         | 07516 |
| 5.  | Body .....                     | 07524 |
| 6.  | Adaptor, air jet, 290 .....    | 07598 |
| 7.  | Gasket .....                   | 07514 |
| 8.  | Nipple, 1-1/2" x 10" .....     | 07531 |
| 9.  | Gauge, pressure .....          | 07520 |
| 10. | Valve, 1-1/2" npt ball .....   | 07596 |
| 11. | Insert, 290 venturi .....      | 10912 |

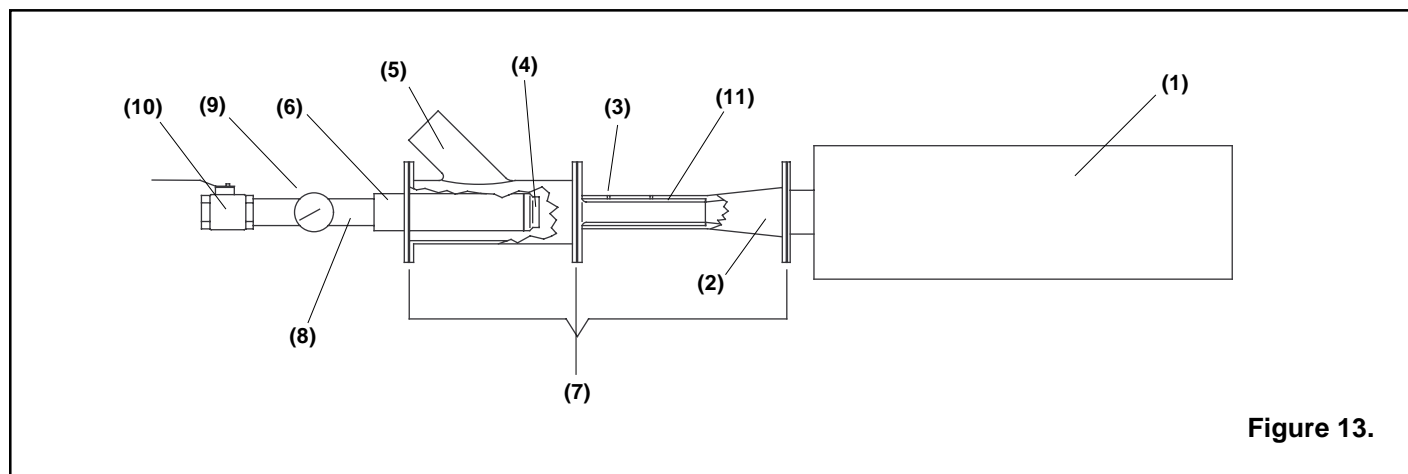


Figure 13.

**9.8 Dust Collector**

Figure 14

| Item | Description                              | Stock No. |
|------|--|-----------|
| (-)  | Dust Collector, Complete .....           | 20416     |
| 1.   | Valve, 1" diaphragm .....                | 10392     |
| 2.   | Filter cartridge .....                   | 20444     |
| 3.   | Gauge, 30" Hg vacuum .....               | 10169     |
| 4.   | Elbow, 3" .....                          | 10179     |
| 5.   | 3" U-clamp .....                         | 10486     |
| 6.   | Latch assy, hook .....                   | 20445     |
| 7.   | Petcock .....                            | 01993     |
| 8.   | U-channel, rubber, 7 feet required ..... | 04076     |
| 9.   | 3" Outlet tube, 3.5" long .....          | 10451     |
| 10.  | Gasket, dip tube .....                   | 10232     |
| 11.  | Filter regulator 1/2" .....              | 20442     |
| 12.  | Lid weldment .....                       | 20414     |
| 13.  | Valve, 6" dump .....                     | 21082     |
| 14.  | Pipe, 6" outlet .....                    | 20459     |
| 15.  | Bag, 4 cu ft dust .....                  | 21083     |
| 16.  | Clamp .....                              | 11576     |
| 17.  | Gasket, dump valve, 2 required .....     | 20204     |

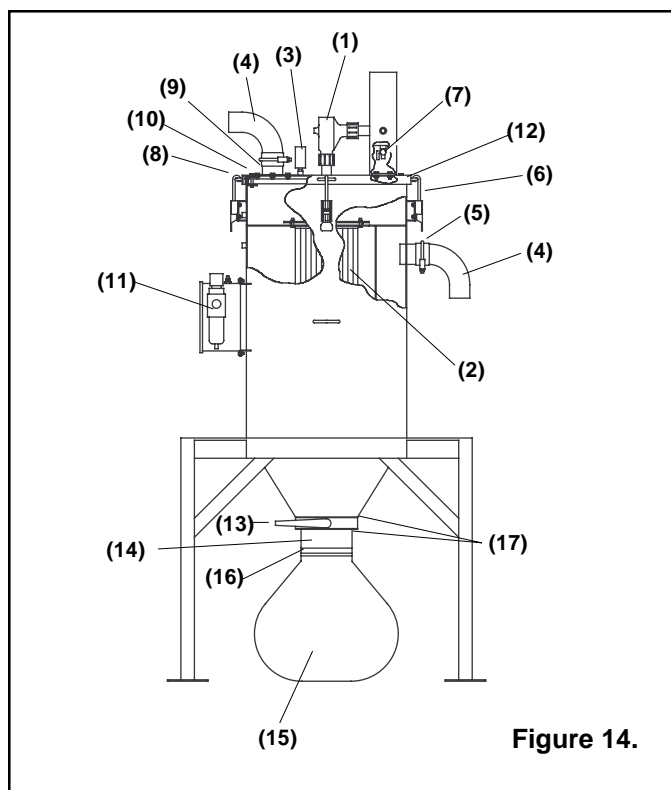
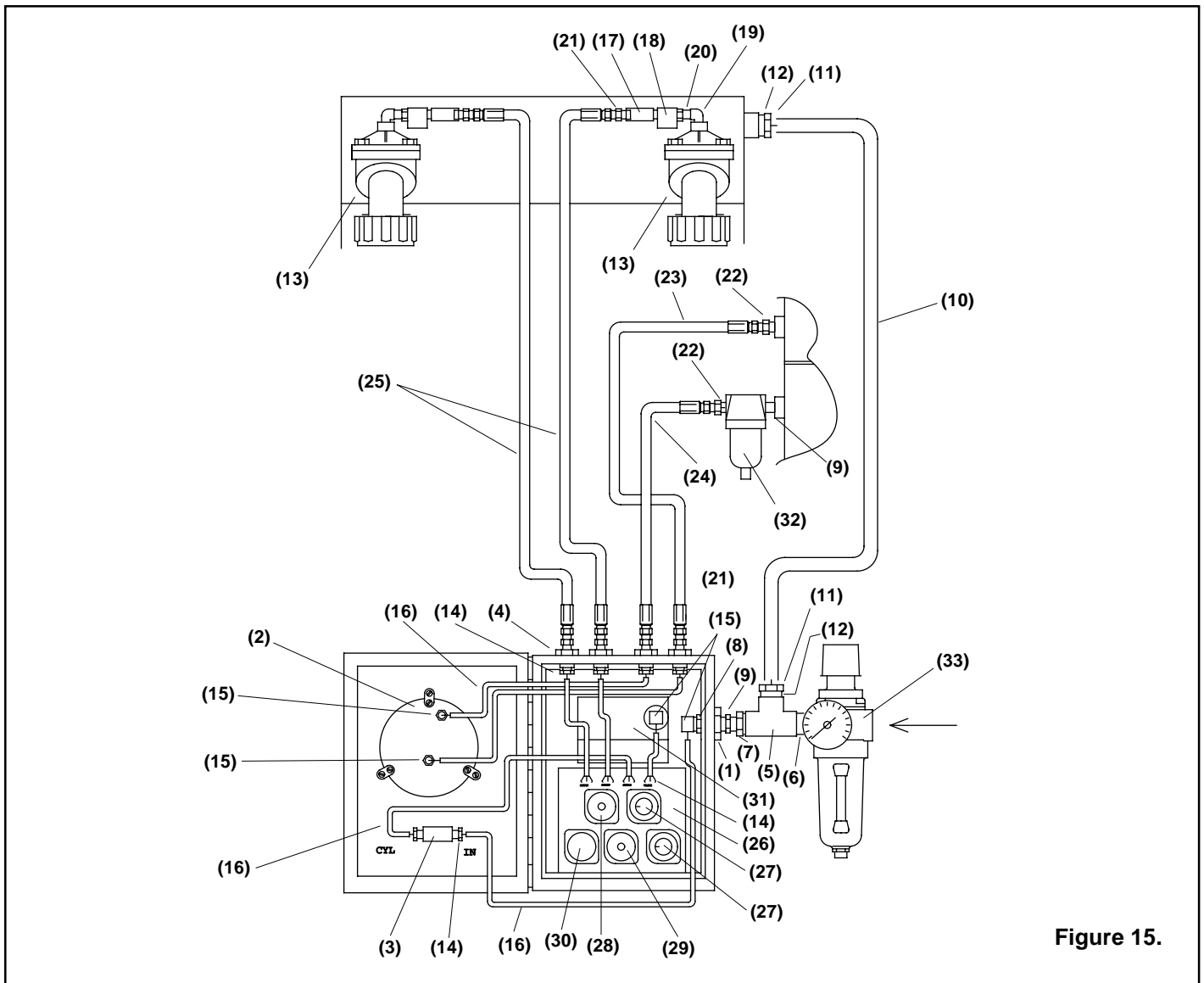


Figure 14.

**9.8 Dust Collector Air Schematic, Figure 15**

| Item | Description                                | Stock No. |
|------|--|-----------|
| 1.   | Fitting, 1/4" bulkhead .....               | 05605     |
| 2.   | Differential pressure gauge .....          | 10188     |
| 3.   | Valve, 3 way toggle .....                  | 07658     |
| 4.   | Fitting, 1/8" bulkhead .....               | 20114     |
| 5.   | Tee, 1/2" npt .....                        | 01787     |
| 6.   | Nipple, 1/2" npt x close .....             | 01733     |
| 7.   | Bushing, 1/2" x 1/4" .....                 | 01801     |
| 8.   | Bushing, 1/4" x 1/8" .....                 | 02010     |
| 9.   | Nipple, 1/4" npt x close .....             | 01829     |
| 10.  | Hose, 1/2" air, 4' req. ....               | 12472     |
| 11.  | Hose end, 1/2" swivel .....                | 15002     |
| 12.  | Adaptor, 1/2" npt x 1/2" flare .....       | 11351     |
| 13.  | Valve, 1" diaphragm .....                  | 10392     |
| 14.  | Adaptor, 1/8" npt x 1/8" barb .....        | 11732     |
| 15.  | Adaptor, elbow, 1/8" npt x 1/8" barb ..... | 11733     |
| 16.  | Tubing, 1/8" urethane .....                | 12475     |
| 17.  | Actuator, air pilot .....                  | 19123     |
| 18.  | Valve, 3 way .....                         | 12202     |
| 19.  | Elbow, 1/8" npt st .....                   | 03993     |
| 20.  | Nipple, 1/8" npt hex .....                 | 01962     |
| 21.  | Adaptor, 1/8" npt .....                    | 01940     |
| 22.  | Adaptor, 1/4" npt .....                    | 02494     |
| 23.  | Hose, 3/16" x 18" .....                    | 02454     |
| 24.  | Hose, 3/16" x 12" .....                    | 20440     |
| 25.  | Hose, 3/16" x 36" .....                    | 02498     |
| 26.  | Subplate, pulse timer .....                | 20446     |
| 27.  | Control, air timer .....                   | 20447     |
| 28.  | Valve, air timer .....                     | 20448     |
| 29.  | Valve, air timer .....                     | 20449     |
| 30.  | Valve, air timer .....                     | 20450     |
| 31.  | Timing chamber .....                       | 20424     |
| 32.  | Filter, 1/4" .....                         | 20438     |
| 33.  | Filter regulator .....                     | 20442     |



**Figure 15.**