

**PIPE-PRO XL™**  
**INTERNAL-PIPE BLAST TOOL**  
**O. M. 27804**

DATE OF ISSUE: 2014  
REVISION: B, 04/21

**! WARNING**

**Do not use this equipment before READING this MANUAL and UNDERSTANDING its contents.**

**These WARNINGS are included for the health and safety of the operator and those in the immediate vicinity. Failure to read and understand these warnings can result in injury or death.**

**Electronic files include a Preface containing the same important information as in the orange cover.**

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**1.0 INTRODUCTION**

**1.1 Scope of Manual**

**1.1.1** These instructions cover set-up, operation, maintenance, troubleshooting, and replacement parts for Clemco's Pipe-Pro XL™ internal pipe blasting tool.

**1.1.2** These instructions contain important safety information. All operators and personnel involved with the abrasive blast process must read and understand the contents of these instructions, including the orange cover. It is equally important that the operator is trained and qualified to safely operate the blast machine, remote controls, and all other equipment used with the blast machine.

**1.1.3** All personnel involved with the abrasive blasting process must be made aware of the hazards associated with abrasive blasting. The Clemco booklet "Abrasive Blasting Safety Practices" is included with every blast machine, and contains important safety information about abrasive blasting that may not be included in equipment operation manuals. To order additional copies, visit [www.clemcoindustries.com](http://www.clemcoindustries.com) or email [info@clemcoindustries.com](mailto:info@clemcoindustries.com).

**1.2 Safety Alerts**

**1.2.1** Clemco uses safety alert signal words, based on ANSI Z535.4-2011, 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 you to potential physical injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.**

**NOTICE**

**Notice indicates information that is considered important, but not hazard-related, if not avoided, could result in property damage.**

**CAUTION**

**Caution indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.**

**WARNING**

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

**DANGER**

**Danger indicates a hazardous situation that, if not avoided, will result in death or serious injury.**

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**2.0 COMPONENTS and OPERATING PRINCIPLES**

**2.1 Components**

**2.1.1** The primary components of the Pipe-Pro XL™ tool are shown in Figure 1 and Figure 2. Figure 1 shows the basic tool, Figure 2 shows the items in the air motor control-hose kit. The control-hose kit is packaged separately and must be assembled and installed. Nozzles and nozzle extensions are options, which are shown for reference and ordered separately.

For blasting 16-inch ID to 31-inch ID pipe, the following are included or required:

1. Basic tool: Includes the pipe tool with blast hose/lance coupling, air motor green supply-tube, and red return-tube.
2. Air motor control package includes:
  - Filter/pressure regulator assembly, to filter air and control compressed-air pressure to the air motor.
  - Inline air filter for the compressed-air supply side of the air motor.
  - Flow control assembly for the return side of the air motor.
  - Two 50-ft. lengths of 3/8" ID air hose; one for the air supply to the air motor, the other for the air return (exhaust) from the air motor.

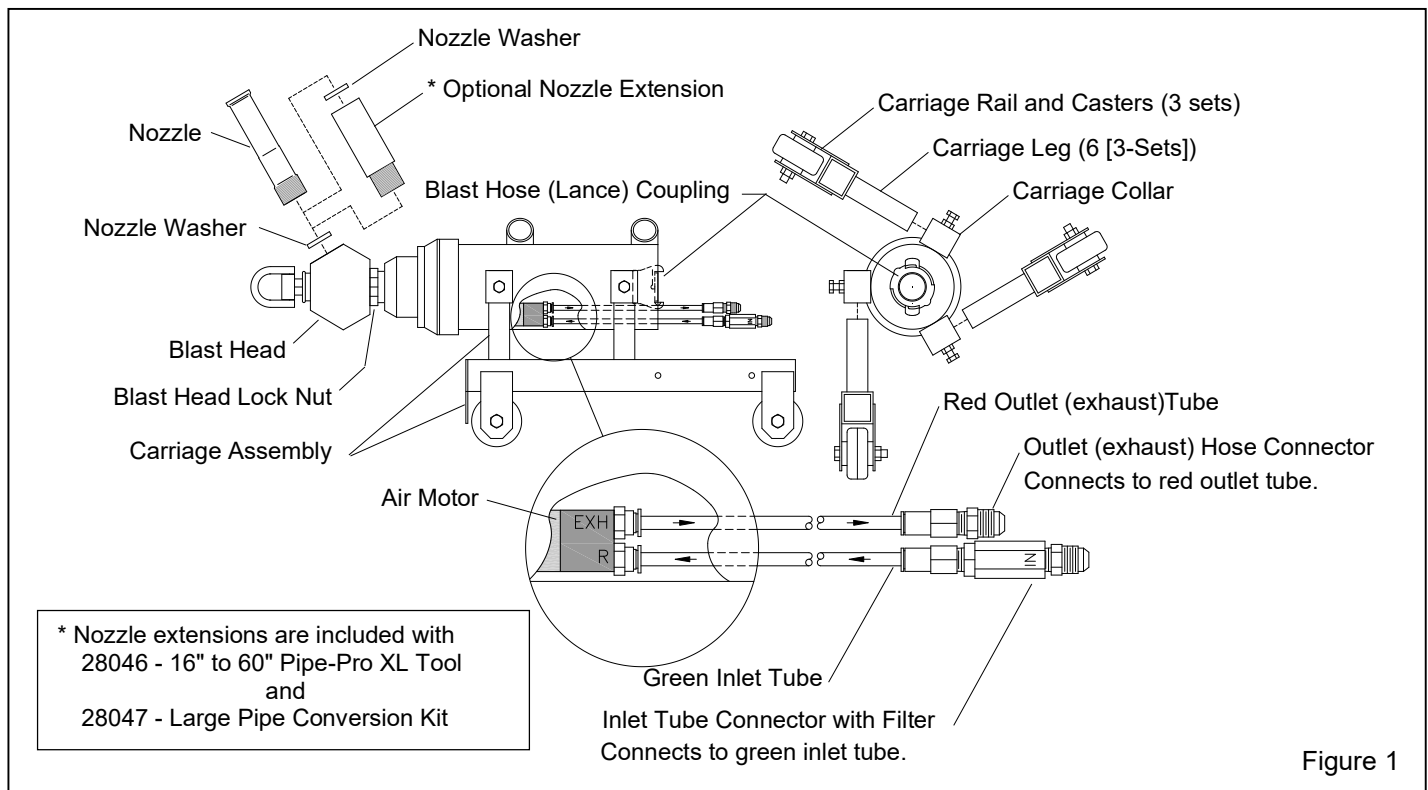


Figure 1

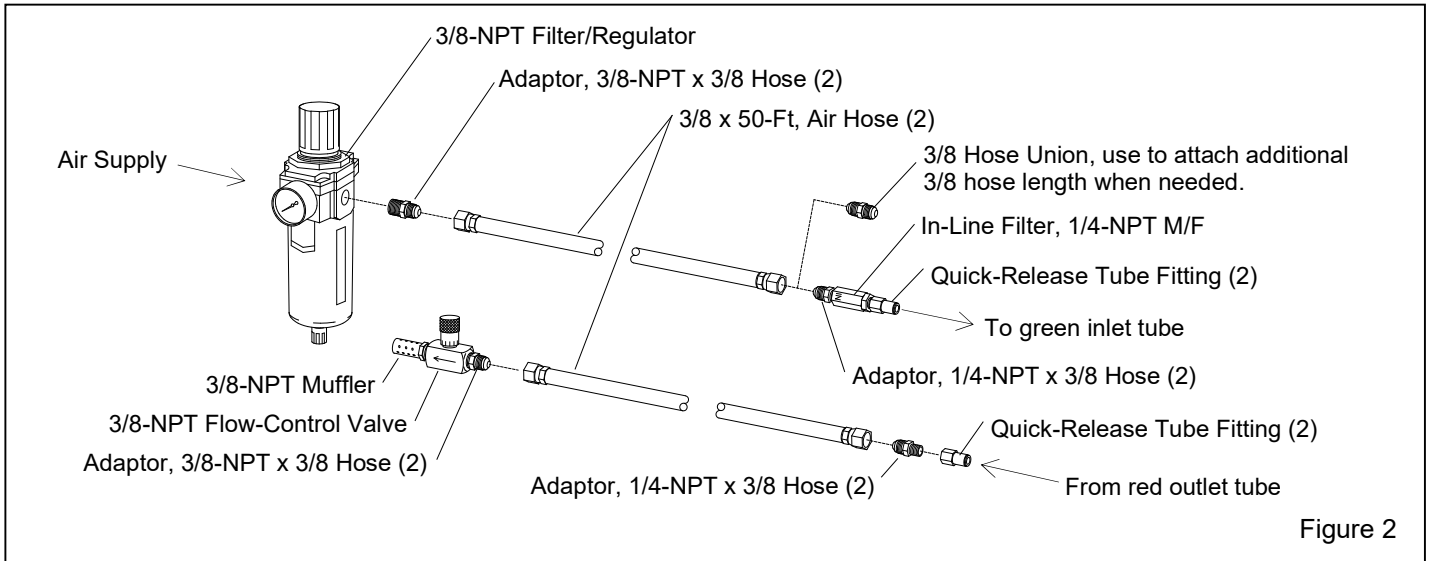


Figure 2

3. Centering carriage: Includes the carriage collar, a set of three rail and castor assemblies, and six each 6-inch and 12-inch legs.
4. Nozzles: Order two separately, refer to cfm requirements in Figure 3.

For blasting 32-inch ID to 60-inch ID pipe: In addition to the 16" to 31" tool noted above the large-pipe conversion kit, Stock No. 28047, is required. Refer to Section 11.8 for items included with the kit.

**2.2 Operating Principles**

**2.2.1** The Pipe-Pro XL™ blast tool attaches to the end of a pipe lance (refer to Section 3.3 for description and additional information on the lance) and blast hose in place of a standard nozzle.

**2.2.2** The tool is designed to blast clean the inside of 16" to 60" ID pipe, to a maximum distance of 100 feet; Distances beyond 100 feet may require blast machines with electric remote controls and large unrestricted air line, piping and blast hose.

**2.2.3** The tool includes a pneumatic-driven blast head that rotates independently from the force of the blast nozzles. Rotation speed is controlled with the flow-control valve on the air motor return (exhaust) line.

**2.2.4** The tool utilizes two venturi blast nozzles with orifice size ranging from 1/4" to 3/8", as shown in the table in Figure 3 and Section 11.4.

**2.2.5** The adjustable centering carriage centers the tool within the pipe. Soft carriage wheels provide smooth movement through the length of the pipe.

**3.0 ANCILLARY EQUIPMENT REQUIREMENTS**

**3.1 Blast Machine and Accessories**

**3.1.1** The blast machine should be of at least 6 cu. ft. capacity and have a minimum of 1-1/4" piping.

**3.1.2** Minimum recommended size for blast hose and pipe lance are as follows:

- 1/4" orifice or 5/16" orifice nozzles  
Use a 1 1/4" ID blast hose and lance.
- 3/8" orifice nozzles  
Use a 1 1/2" ID blast hose and lance.

Smaller diameter hose and lance may result in lower nozzle pressure and could cause premature wear on the blast hose and tool.

NOTE: The maximum recommended nozzle orifice size is 3/8" diameter. Larger orifice nozzles may result in lower nozzle pressure and will accelerate wear on the blast hose and tube.

Nozzles (2) Orifice Size	Air Consumption CFM at 100 PSI		Minimum ID Air Line
	New	Worn	
1/4"	165 to	275	1-1/2"
5/16"	275 to	395	2"
3/8"	395 to	510	2-1/2"

The table shows the minimum recommended ID for the air-supply line to the blast machine. CFM shown is the approximate cfm consumed by two nozzles when the nozzles are new and when worn. A nozzle is considered worn when the orifice is 1/16" larger than its original size.

Figure 3

**3.2 Nozzle Stand-Off-Distance Tables**

The stand-off distance is the distance from the exit end of the nozzle to the inside surface (diameter) of the pipe.

**3.2.1 For 16" to 31" Pipe**

**3.2.1.1** The table in Figure 4 shows the approximate stand-off distances of short and long venturi nozzles when blasting pipe diameters between 16" and 31".

**3.2.2 For 32" to 60" Pipe**

**3.2.2.1** The table in Figure 5 is a quick view of approximate stand-off distance for nozzles and nozzle extensions when blasting 32" to 60" pipe. When more precision is needed refer to Figure 6 to calculate nozzle stand-off distances.

**3.2.3** The nozzles and stand-off distances shown are only guidelines to assist the user in choosing nozzle type and orifice diameter; it does not show the nozzle to use with a given pipe diameter. Usually, the minimum stand-off distance is about four inches; maximum distance is generally between 8" and 16" but depends on nozzle orifice size (usually determined by the volume of compressed air available), nozzle pressure, surface condition, and degree of cleaning required.

PIPE INSIDE DIAMETER	NOZZLE STAND-OFF-DISTANCE FOR 16" to 31" ID PIPE			
	SHORT VENTURI NOZZLE	LONG VENTURI NOZZLE		
		1/4" Orifice	5/16" Orifice	3/8" Orifice
16"	3-3/4"	1-3/4"	1-1/4"	N/A
17"	4-1/4"	2-1/4"	1-3/4"	3/4"
18"	4-3/4"	2-3/4"	2-1/4"	1-1/4"
19"	5-1/2"	3-1/4"	3"	2"
20"	6"	4"	3-1/2"	2-1/2"
21"	6-1/2"	4-1/5"	4"	3"
22"	7"	5"	4-3/4"	3-3/4"
23"	7-3/4"	5-1/2"	5-1/4"	4-1/4"
24"	8-1/4"	6-1/2"	5-3/4"	4-3/4"
25"	9"	6-3/4"	6-1/2"	5-1/2"
26"	9-1/2"	7-1/2"	7"	6"
27"	10"	8"	7-1/2"	6-1/2"
28"	10-1/2"	8-1/2"	8"	7"
29"	11-1/4"	9"	8-3/4"	7-3/4"
30"	11-3/4"	9-3/4"	9-1/4"	8-1/4"
31"	12-3/4"	10-1/4"	9-3/4"	8-3/4"

Figure 4

NOZZLE STAND-OFF DISTANCE for 32" TO 60" ID pipe				
PIPE INSIDE DIAMETER	SHORT VENTURI NOZZLE	LONG VENTURI NOZZLE		
		1/4" Orifice	5/16" Orifice	3/8" Orifice
32" to 36" W/O Extensions	13" to 15-1/4"	10-3/4" to 13"	10-1/2" to 12-3/4"	9-1/2" to 11-3/4"
32" to 36" W/6" Extensions	7" to 9-1/2"	4-3/4" to 7"	4-1/2" to 6-3/4"	N/A
37" to 47" W/6" Extensions	9-3/4" to 15-1/2"	7-3/4" to 13-1/5"	7-1/4" to 13"	6-1/4" to 12"
48" to 60" W/12" Extensions	10" to 17"	8" to 15"	7-3/4" to 14-3/4"	6-3/4" to 13-3/4"
53" to 60" W/18" Extensions	7" to 11"	5" to 9"	4-1/2" to 8-3/4"	3-1/2" to 7-3/4"

Figure 5

FORMULA TO CALCULATE NOZZLE STAND-OFF FOR 32" to 60" PIPE	
NOZZLE TYPE	BASE DIMENSION @ 32" DIA. PIPE
Short Venturi	13 Inches
1/4" Orifice Long Venturi	11 Inches
5/16" Orifice Long Venturi	10-1/2 Inches
3/8" Orifice Long Venturi	9-1/2 Inches

To obtain stand-off distance for pipe larger than 32", add 0.58" for every inch over 32 and subtract length of nozzle extension.

For example, to calculate the stand-off distance of a 48 inch diameter pipe when using a No. 5 long venturi nozzle  
*Subtract 32" from 48" = 16"*  
*Multiply 0.58" x 16 = 9.28 (9-1/4")*  
*Add 9-1/4" to No. 5 base dim. (9-1/4 + 10-1/2" = 19-3/4")*  
 The stand-off distance is approximately 19-3/4".

When using a nozzle extension subtract the length of the extension. In the case of the example:  
*Subtract 6" for a 6" extension (19-3/4" - 6" = 13-3/4" stand-off).*  
*Subtract 12" for a 12" extension (19-3/4" - 12" = 7-3/4" stand-off).*

Figure 6

### 3.3 Pipe Lance, Figure 7

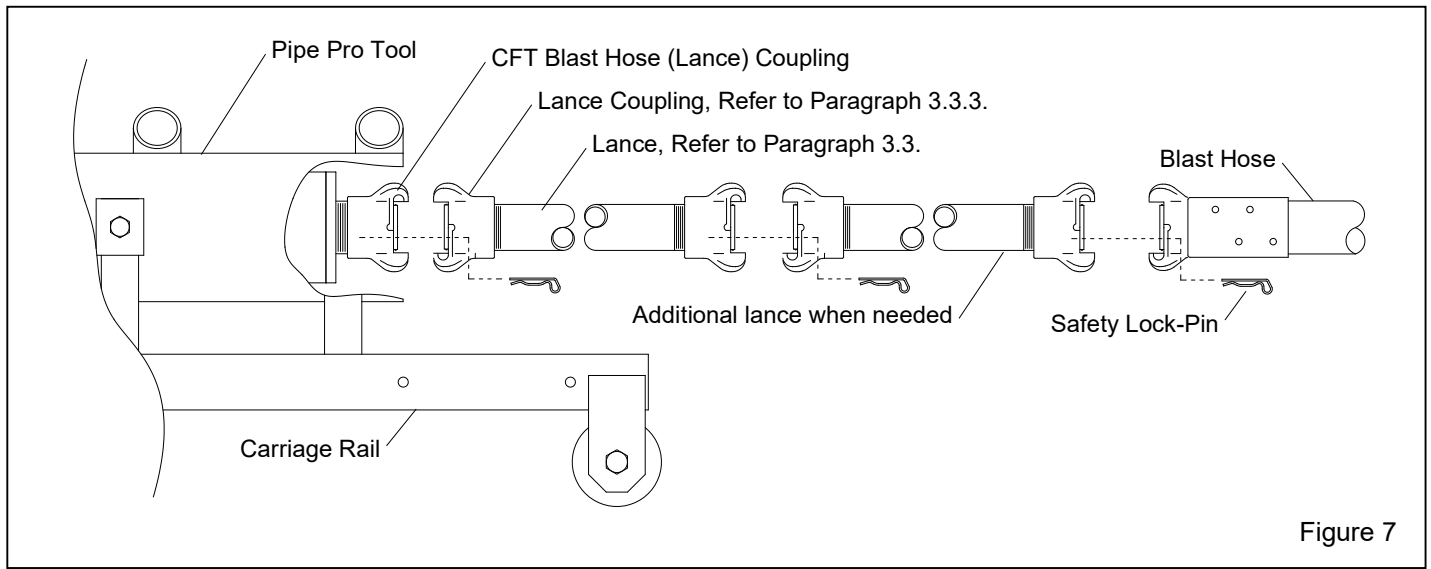


Figure 7

**3.3.1** The Pipe-Pro XL™ includes a **Clemco CFT Coupling, Stock No. 24232**, which provides a quick connection for a blast hose or lance using standard Clemco quick couplings.

**3.3.2** A lance is one or more length of standard schedule-40 pipe connected end-to-end to equal the length of pipe being blasted. Sections of pipe may be coupled or uncoupled as needed as the tool is moved through the pipe.

**3.3.3** Standard pipe couplings may be used to connect pipe sections together if there is no need to attach or remove sections while blasting. When sections do need to be added or removed, the following quick couplings on each end of the lance sections are recommended:

- 1-1/4" NPT lance: use two **Clemco CF Couplings, Stock No. 00551**.
- 1-1/2" NPT lance: use two **Clemco CF-2 Couplings, Stock No. 00553**.

### 3.4 Air Motor Air-Requirements

## NOTICE

**The air motor does not require lubrication. Trace amounts of oil in the air supply will not damage the motor. However, oil-contaminated compressed air will accelerate wear on the motor and cause sluggish rotation. Moisture will damage the motor.**

**3.4.1** Clean dry air is essential for trouble-free operation of the air motor; moisture in the air motor air line could accelerate wear on the motor.

**3.4.2** Dust or abrasive ingress will cause extensive damage to the air motor. The filter/pressure regulator removes particulates from the air supply. An inline filter is installed on the air inlet side of the air motor for additional protection.

**3.4.3** The air motor requires approximately 50 scfm of clean dry air at maximum air pressure of 100 psi. Higher pressure will damage the motor. A combination filter/pressure regulator is provided and must be installed at a convenient location in the air-supply line. The regulator is used to adjust pressure between the recommended pressures of 80 to 90 psi.

### 3.5 Compressed-Air Requirements

**3.5.1** The compressor and air-supply line to the blast machine must be sized to maintain a minimum of 100 psi at the cfm shown in the table in Figure 8.

**3.5.2** The table shows the volume of air used at 100 psi (minimum pressure) when nozzles are new and when they are considered worn (the nozzle is considered worn when the orifice, which is the smallest diameter inside the nozzle, is 1/16" larger than original size). The pneumatic drive motor (air motor) requires approximately 50 scfm of clean dry air for proper operation. Consult with an air compressor supplier for compressor recommendations.

Pipe-Pro Air Consumption		
Nozzle Orifice	New Nozzles	Worn Nozzles
1/4"	220 cfm	330 cfm
5/16"	330 cfm	450 cfm
3/8"	450 cfm	560 cfm

Figures include an additional 50 cfm required to operate the air motor

Figure 8

**3.6 Ambient Temperature Range Limits**

**3.6.1** 25° to 120° Fahrenheit. These are the upper and lower temperature limits for the air motor.

**4.0 ABRASIVES**

**4.1** The tool is best suited for use with slag products that are specifically manufactured for blasting.

Nozzle Orifice	Nominal Abrasive Size
1/4"	20 to 40 mesh
5/16"	20 to 40 mesh
3/8"	16 to 40 mesh

**4.2** Aggressive abrasives, such as garnet may be used, but the service life of any components exposed to the media will be reduced, and additional maintenance is required to keep the tool in good working order.

**5.0 SET-UP**

**⚠ WARNING**

**Hose disconnection while under pressure could cause serious injury or death. Use safety lock pins or safety wire to lock twist-on couplings together and prevent accidental separation, and use safety cables to prevent hose from whipping should separation occur. Safety lock pins and safety cables are listed in Section 11.1: Accessories.**

**5.1 Staging Platform**

**5.1.1** Provide a level platform or structural support for the carriage wheels to ride on at the entrance/exit end of the pipe. Do not manually lift the tool in or out of the pipe while blasting. A shroud may be built at the ends of the pipe to contain blasting, or any voids at the ends of the pipe can be blasted using a standard blast nozzle.

**5.2 Assemble Centering Carriage**

**5.2.1 16" to 31" carriage – Figure 9**

**5.2.1.1** Refer to the table in Figure 13, to determine which size leg should be used and how far the leg should be inserted into the collar couplings to center the tool in the pipe.

**5.2.1.2** Thread the six legs into the three carriage rails, as shown in Figure 9.

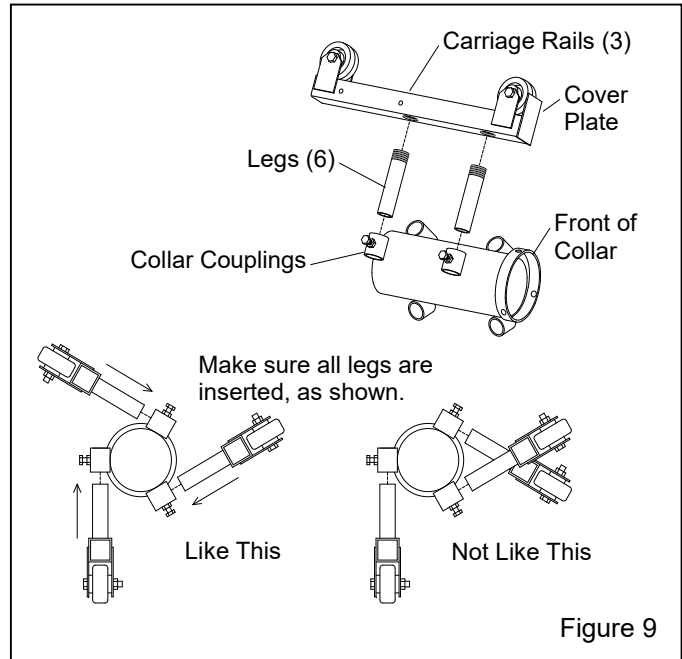


Figure 9

**5.2.1.3** One rail end is covered with a plate. When inserting the legs into the collar couplings, make sure the covered ends face the front of the collar, and inserted into the same side of the couplings, as shown.

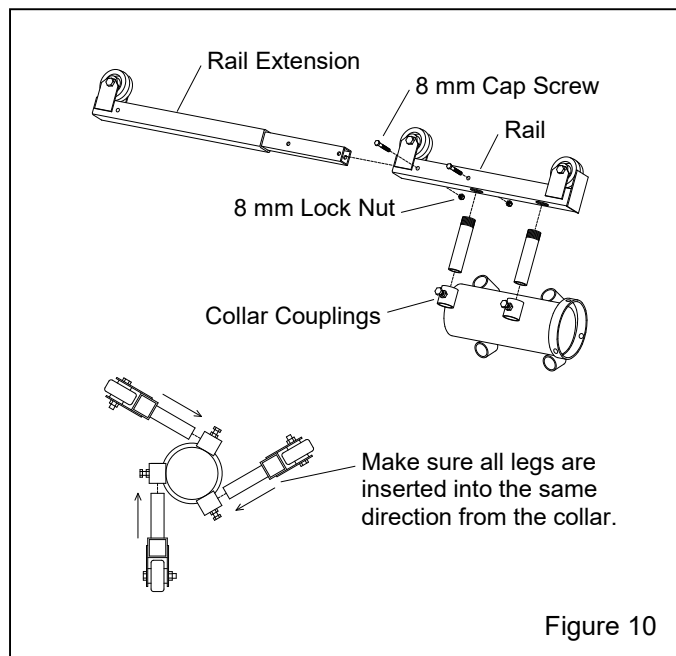
**5.2.1.4** Insert the legs to the initial length noted in the table in Figure 13, and tighten the bolts to secure.

**5.2.2 Optional 32" to 60" Carriage Extensions Figure 10**

**5.2.2.1** Screw the 26" legs into the rails.

**5.2.2.2** Refer to the table in Figure 13 to determine how far the leg should be inserted into the collar coupling to center the tool in the pipe. Make sure the legs are inserted into the same end of the coupling, all going either clockwise or counterclockwise, as shown in Figures 9 and 10. Tighten coupling bolts to secure the legs.

5.2.2.3 Insert the rail extensions into the carriage rails and align bolt holes. Use 8 mm fasteners provided to secure.



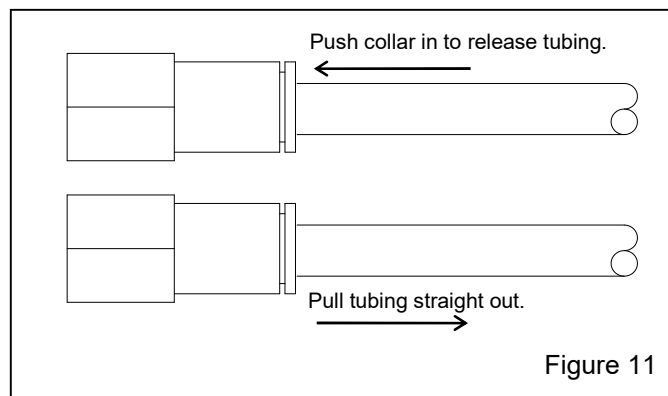
### 5.3 Air Motor Connections

5.3.1 Assemble and attach the inlet and outlet tube connectors, as shown in Figures 1 and 2. The inlet tube connector with filter must be connected to the green inlet tube. To attach the connectors to the tubing, simply insert the tubing through the collar and push until it bottoms out in the fitting. Tug on the tube to make sure it is secured. To release the connectors, refer to Figure 11. An arrow on the inlet tube shows the direction of air flow; the green tube, with the arrow pointing toward the tool is the inlet, the red tube is the outlet. **NOTE: If the arrow or tubing are removed or damaged, use a flashlight to look into the carriage collar; the green inlet tube goes to the "R" port on the air motor, the red outlet tube goes to the "EXH" port on the motor.**

## NOTICE

**To reduce the risk of abrasive ingress into the air motor, cover air motor fittings and hose ends when disconnecting air hoses from the tool. Any dust or abrasive from the air supply, which enters the air motor, will cause the air motor to fail. Motor failure from ingress of dust, abrasive, or any foreign matter voids the warranty.**

5.3.2 Refer to Figure 12 and set up an air supply to the 3/8" x 50' air hose provided with the tool.



5.3.3 The air-supply line to the filter/regulator inlet and the smallest inside diameter of any connections must be at least 3/8" ID. Increase the inside diameter to 1/2" when using more than one section of supply hose; multiple connections of 3/8" hose could restrict air volume needed to operate the air motor.

## NOTICE

**A combination filter/pressure regulator is provided and must be installed in the air motor air-supply line. The filter removes particles that could damage the motor. The pressure regulator reduces air pressure to below 100 psi. Maximum operating pressure for the air motor is 100 psi. Motor failure from excessive air pressure voids the warranty.**

5.3.4 Attach one 3/8" air hose from the air supply (filter/regulator) to the air motor inlet-tube connector, as shown in Figure 12. The inlet tube is identifiable by its green color and inline filter. The hose must be long enough to reach between both ends of the pipe being blasted; attach additional lengths of hose as needed.

5.3.5 Attach the flow-control assembly to one end of the second 3/8" hose and attach the other end to the tube connector on the red outlet tube from the air motor; this hose must also be long enough to reach between both ends of the pipe being blasted.

5.3.6 The flow-control valve should be placed at approximately the same location as the blasting control handle. Air flow through the motor begins when the flow-control valve is opened, the more the flow-valve is opened, the faster the head rotates. The head stops rotating when the flow-control valve or shutoff valve is closed. The flow-control valve is opened or closed, as required to rotate the blast head at 40-60 rpm.



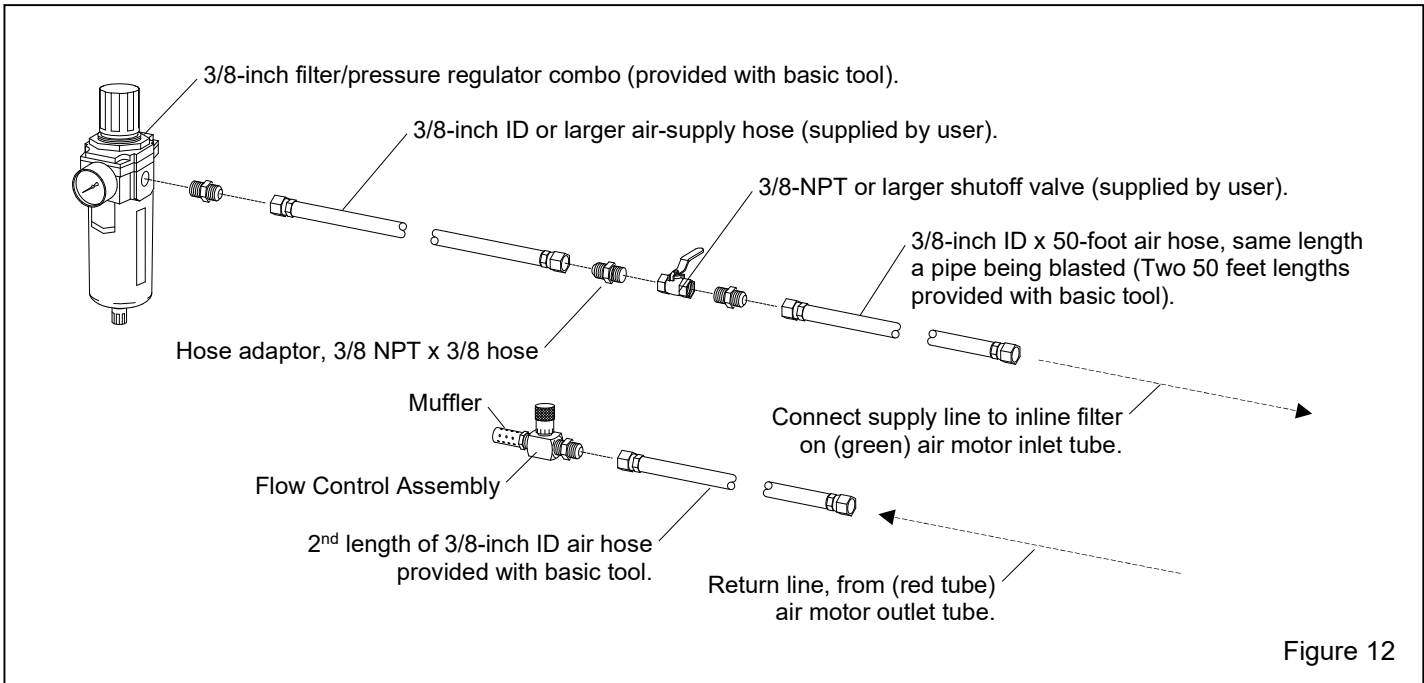


Figure 12

**5.4 Adjust Centering Carriage**

**5.4.1** Refer to the PIPE ID column in the table in Figure 13 to find the ID of the pipe to be blasted.

**5.4.2** Refer to the LEG column in the table to find the length of the carriage leg to use, then thread the appropriate length legs (two into each rail) into the rail assemblies, as shown in Figures 9 and 10.

**5.4.3** Refer to the drawing in Figure 14, which show from which points on the carriage the DIST. (distance) measurements for the legs are taken.

INITIAL CARRIAGE LEG SETTINGS					
PIPE ID	LEG	DIST.	PIPE ID	LEG	DIST.
16"	6"	5/8"	39"	26"	12-3/4"
17"	6"	1-1/4"	40"	26"	13-1/4"
18"	6"	1-3/4"	41"	26"	13-3/4"
19"	12"	2-3/8"	42"	26"	14-3/8"
20"	12"	2-7/8"	43"	26"	14-7/8"
21"	12"	3-3/8"	44"	26"	15-3/8"
22"	12"	4"	45"	26"	15-7/8"
23"	12"	4-1/2"	46"	26"	16-3/8"
24"	12"	5"	47"	26"	16-7/8"
25"	12"	5-1/2"	48"	26"	17-3/8"
26"	12"	6-1/8"	49"	26"	17-7/8"
27"	12"	6-5/8"	50"	26"	18-3/8"
28"	12"	7-1/8"	51"	26"	18-7/8"
29"	12"	7-5/8"	52"	26"	19-3/8"
30"	12"	8-1/8"	53"	26"	19-7/8"
31"	12"	8-5/8"	54"	26"	20-3/8"
32"	26"	9-1/4"	55"	26"	20-7/8"
33"	26"	9-3/4"	56"	26"	21-3/8"
34"	26"	10-1/4"	57"	26"	21-7/8"
35"	26"	10-3/4"	58"	26"	22-3/8"
36"	26"	11-1/4"	59"	26"	22-7/8"
37"	26"	11-3/4"	60"	26"	23-3/8"
38"	26"	12-1/4"			

Figure 13

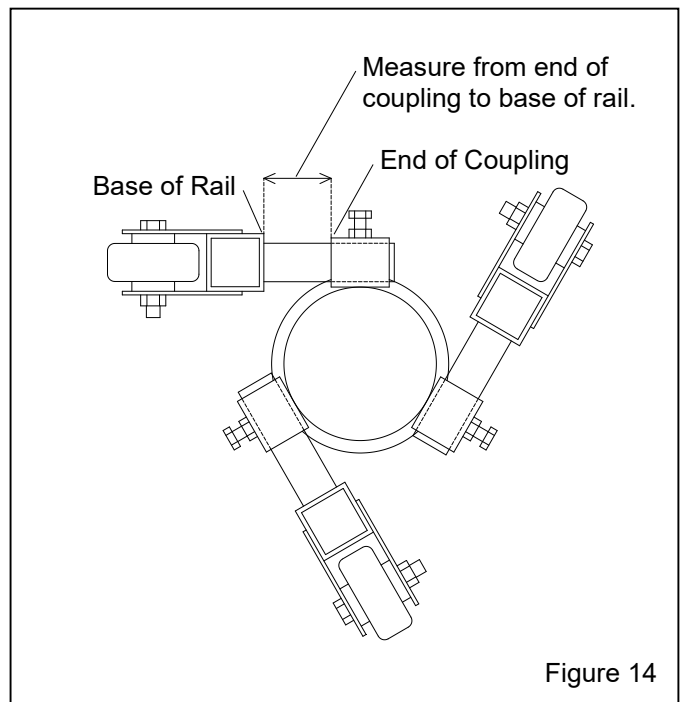


Figure 14

**5.4.4** Insert the legs into the couplings on the collar and adjust the depth to the distances noted in the DIST. column.

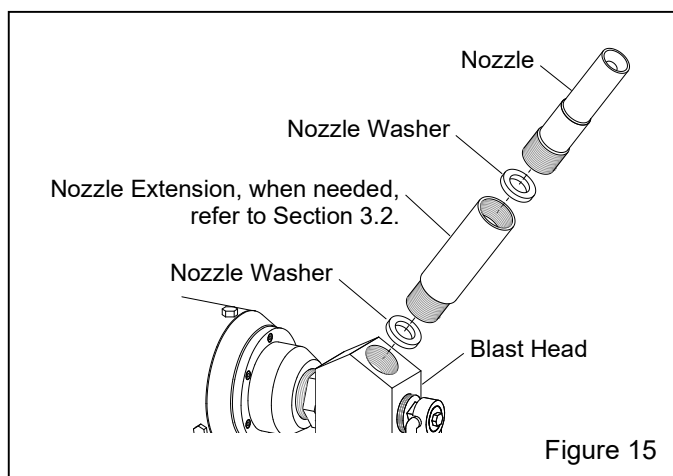
NOTE: The distance shown is for an initial adjustment, so the tool is approximately centered in the pipe. Minor readjustment may be needed.

**5.4.5** Place the tool inside the pipe and if needed, make minor final adjustments to center the tool.

## 5.5 Attach Nozzles and Nozzle Extensions Figure 15

**5.5.1** Refer to Section 3.2 for guidelines to determine nozzle stand-off distance.

**5.5.2** Insert nozzle washers into both ports in the blast head. If the nozzle is farther than 18 inches from the inner surface of the pipe, use a nozzle extension and insert a nozzle washer in the female end of the extension.



**5.5.3** Screw the nozzles (and extensions when needed) into the blast head. Make sure the nozzles and extensions are fully seated and compress the nozzle washers.

## 5.6 Connect Blast Hose and Lance

**5.6.1** Refer to Section 3.3 and connect a lance and appropriately sized blast hose between the blast machine and Pipe-Pro XL™.

Use one of the following:

1-1/4" ID x 2-brd hose coupled with 00570 aluminum, or 00565 brass couplings.

1-1/2" ID x 4-ply hose coupled with 00573 aluminum, or 00566 brass couplings.

## 6.0 OPERATION

**6.1** Set up and load abrasive into the blast machine and connect air lines, blast lines, and blast equipment as described in the applicable operation manuals.

**6.2** Push the tool through pipe until blast head exits the opposite end.

## 6.3 Set Motor Speed

**6.3.1** Adjust the pressure regulator to 80 to 90 psi.

## NOTICE

**Before providing air to the air motor make sure the pressure regulator is set to reduce pressure to below 100 psi. Maximum operating pressure for the air motor is 100 psi. Motor failure from excessive air pressure voids the warranty.**

**6.3.2** Open air supply to air motor. The flow control valve, when used in conjunction with the pressure regulator, enables the operator to control the rotation and speed of the air motor at the same location as the blasting controls. Smoothest head rotation is usually achieved when the air motor pressure is set high, around 80 to 90 psi, and rotation is controlled by opening or closing the flow valve.

**6.4** Pressurize the blast machine and adjust abrasive flow.

**6.5** Pull the tool through pipe at a constant speed to achieve the desired degree of blast cleanliness.

**6.6** As the tool exits the pipe, turn off air/abrasive supply from the blast machine. NOTE: Provide an exit ramp, platform, or structural support at the exit end of the pipe.

**6.7** When finished blasting, empty abrasive from the blast hose and lance, and shut down all equipment as described in the applicable operation manuals.

**7.0 PREVENTIVE MAINTENANCE**

**7.1 Air Motor Air-Supply Line**

7.1.1 Make sure the air-supply hose fittings are clean before connecting the hose to the tool's air connections.

**NOTICE**

The filter/regulator in the air-supply line protects the air motor from contamination in the air line. Take special care to prevent contaminants from the blasting environment from entering the air motor or air motor supply hose. Any dust or abrasive in the air supply that enters the air motor will cause the air motor to fail. To prevent contamination, cover the air hose connections and air motor tubing whenever the air supply or return hoses are removed. Motor failure from ingress of dust, abrasive, or any foreign matter voids the warranty.

**7.2 8-Hour Inspection – Figure 16**

**7.2.1 Nozzles and nozzle extensions**

7.2.1.1 Remove the nozzles, extensions, and nozzle washers and inspect for wear.

7.2.1.2 Replace the nozzle when the orifice diameter has worn 1/16" larger than the original size.

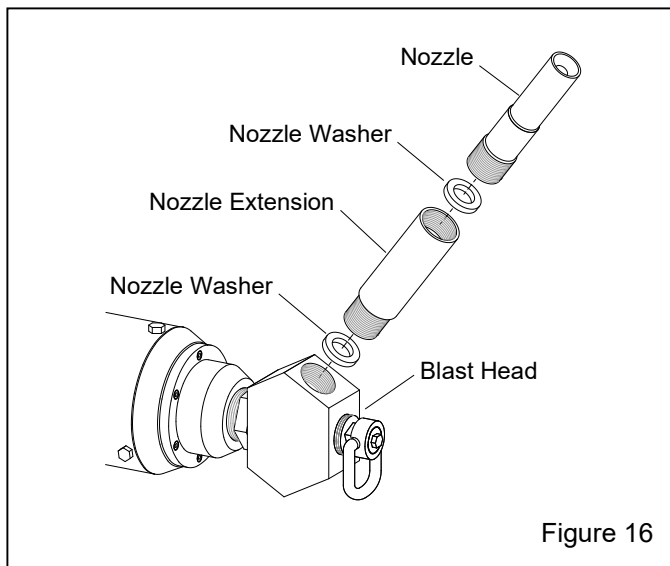


Figure 16

7.2.1.3 Inspect the inside of the nozzle extensions for wear. If extensions are worn to an oblong shape, turn the extension a quarter of a turn several times a day while maintaining pressure on the nozzle washer.

7.2.1.4 Make sure the nozzle washers in the head and in the extensions are in good condition before screwing in the extension and nozzles.

**7.3 16-Hour Inspection**

**7.3.1 Blast head assembly**

**NOTICE**

Disassemble and reassemble the blast head on a bench in a clean dust-free and abrasive-free environment. Dust and abrasive caught between the close tolerances of the head and deflector or in threads can cause parts to seize and cause thread damage.

7.3.1.1 Remove nozzles and nozzle extensions and inspect for wear.

7.3.1.2 To remove the head, loosen the blast-head lock nut and turn the head counterclockwise (when viewed from the head end of the tool). Note: If the axle turns with the head, insert the spanner's pin into the recess (between the lock nut and front housing), as shown in Figure 17 and use the spanner to hold the axle while turning the head counterclockwise to remove.

7.3.1.3 Refer to Figure 18 and remove the blast head gasket from the head.

7.3.1.4 Place the blast head in a vise. Remove the retaining plug and swivel eye assembly from the head. NOTE: If the wrench is too wide to fit onto the retaining-plug flats, remove the swivel eye by removing the bolt and then remove the plug.

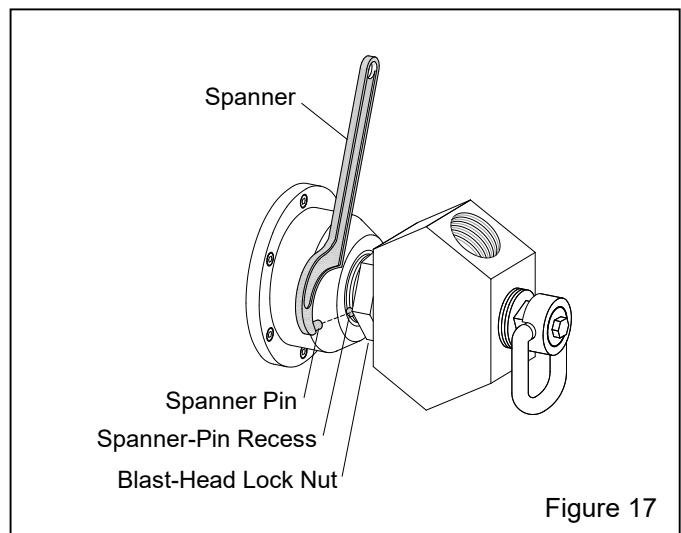


Figure 17

**7.3.1.5** Remove the deflector gasket and carbide deflector from the head. The deflector slides out from the plug end of the head; use fingers through the nozzle ports to push the deflector out. It does fit snugly; do not pound on it with a hammer or other hard surfaced tool, as doing so will break the brittle carbide deflector. If the deflector cannot be removed by hand, use a soft piece of wood or similar material placed against the deflector, and gently tap on the wood or use a press to remove the deflector.

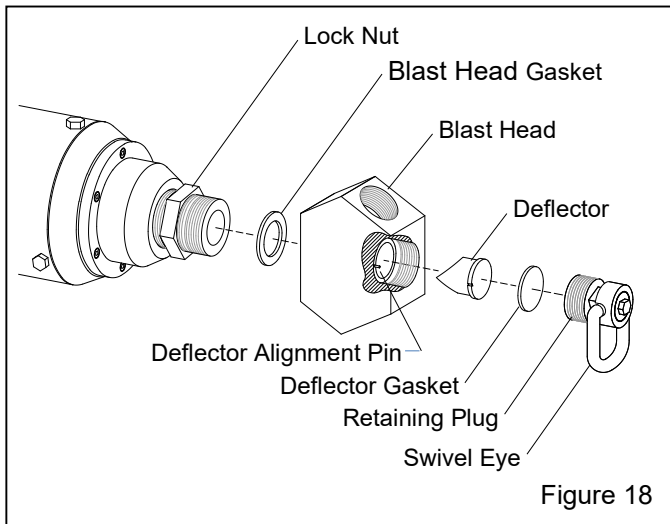


Figure 18

**7.3.1.6** Inspect all items for wear, and clean and replace as needed. The tolerance between the deflector and the head is very tight; make sure all surfaces are totally free of abrasive before inserting the deflector.

**7.3.1.7** Notice the notch in the deflector's flange and the alignment roll-pin in the mating flange in the blast head. The notch fits over the alignment pin and orientates the deflector to the correct position.

**7.3.1.8** Refer to Figure 19. Slide the deflector into the head and position it so the notch in the deflector's flange fits over the alignment pin; the flange must seat firmly onto the shoulder. Note that the tolerance is very tight between the deflector and head; some realigning may be needed to keep the deflector straight within the head. The deflector must be inserted straight into the head with no cocking or binding. Make sure the deflector is correctly seated; the top of the alignment pin should be at the top of the deflector.

**NOTICE**

**The deflector must be correctly aligned and seated in the head. If not correctly installed, rapid and irregular wear will occur on the head and related parts.**

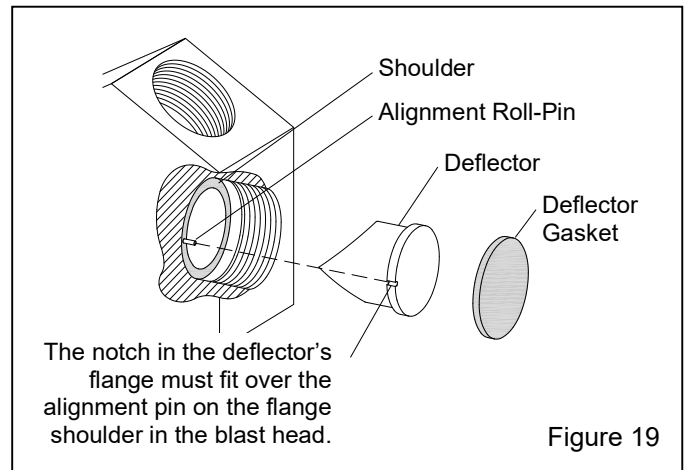


Figure 19

**7.3.1.9** Place the deflector gasket atop the deflector's flange.

**7.3.1.10** Wrap the plug thread with thread-seal tape and install the retaining plug. Tighten the plug to secure.

**NOTICE**

**Do not substitute the retaining plug with a common 1-1/4-NPT pipe plug. The taper on a pipe plug could prevent full compression of the deflector, deflector gasket, and plug, causing rapid and irregular wear.**

**7.3.1.11** If the swivel eye was removed from the plug as noted in Section 7.3.1.4, inspect the O-ring, and if needed, place a new O-ring on the swivel eye's bolt and attach the swivel to the blast head retaining plug.

**7.3.1.12** Refer to Figure 20 and install a new blast head gasket into the head's axle port. Make sure the gasket is fully seated within the thread-relief and against the shoulder in the head.

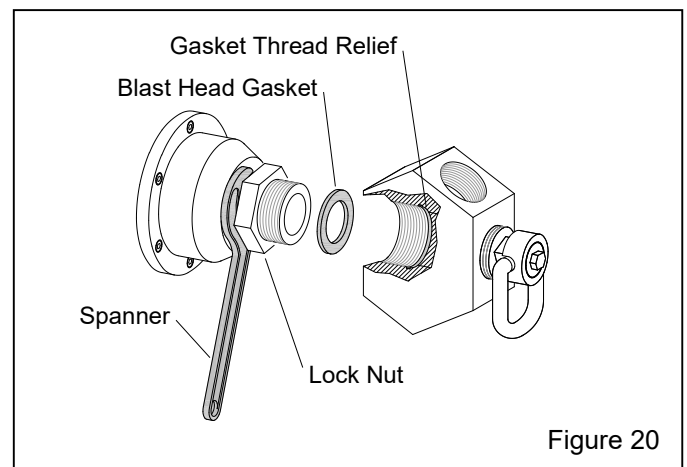


Figure 20

**7.3.1.13** Insert the spanner into the recess on the axle, as shown in Figure 20 and hand-tighten the lock nut against the spanner. Use the spanner to hold the axle while turning the blast head clockwise to install. Tighten the head enough to compress the gasket and create an airtight seal.

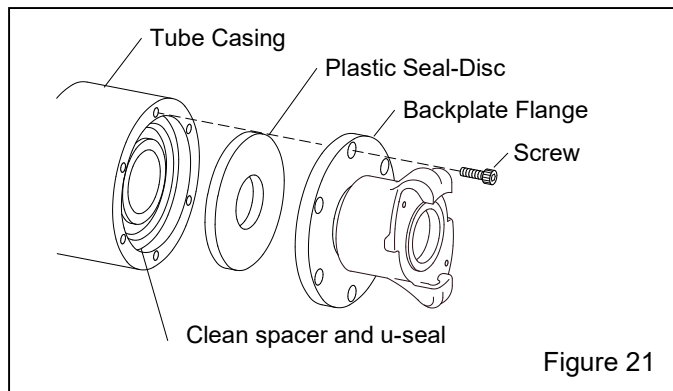
**7.3.1.14** Tighten the lock nut against the head to secure.

### 7.3.2 Backplate coupling-flange – Figure 21

**7.3.2.1** Remove the carriage, per Section 8.1.1

**7.3.2.2** Use a 4 mm hex key to remove the six socket head screws securing backplate flange to tube casing, and remove the flange.

**7.3.2.3** Remove the plastic seal-disc. Note the groove on the axle side of the disc; replace the disc if it is worn more than half way through.



**7.3.2.4** Thoroughly clean the spacer and u-seal that remain in the tube casing and all parts that are to be reused.

**7.3.2.5** Insert the grooved side of the plastic seal-disc into the tube casing. NOTE: New discs are not grooved; the groove will be formed from the ridge on the end of the axle as the axle turns.

## NOTICE

**If a new plastic seal-disc is installed, operate the tool for a short period of time with air only (no abrasive) so the ridge on the axle can form the groove in the seal. Applying abrasive before the ridge is formed can cause abrasive ingress and damage parts.**

**7.3.2.6** Attach the backplate coupling-flange to the casing using the six socket head screws to secure.

**7.3.2.7** Attach the carriage per Section 8.1.2.

## 7.4 30-Hour Inspection

**7.4.1** Inspect element in filter/regulator and clean or replace as needed.

**7.4.2** Remove the front housing, per Section 8.4, and inspect the bearing. Replace the bearing if it does not turn smoothly.

**7.4.3** Remove the backplate coupling-flange, per Section 7.3.2. Turn the axle; replace the bearing if it does not turn smoothly.

## 7.5 Every Three Months and Before Long Term Storage

**7.5.1** Completely disassemble the base tool, clean all parts, replace worn parts, lubricate, and reassemble.

## 7.6 Air Motor Service

Recommended service to the air motor should be done every 12 months or 500 hours of operation, whichever comes first. The air motor must be serviced by qualified technicians. Contact:

[www.pneumatictechnology.com](http://www.pneumatictechnology.com)  
Pneumatic Technology, Inc.  
30447 Edison  
Roseville, MI 48066  
Tel: (586) 776-1480

## 8.0 SERVICE MAINTENANCE, DISASSEMBLY

Service instructions are shown in order of total disassembly, and Section 9.0 is in order of reassembly after the tool is completely disassembled. If total disassembly is not required, skip the service that is not needed. For example, if bearings need service but the air motor is in good working order, the air motor need not be removed to service bearings (or the other way around).

## NOTICE

**Disassemble and reassemble the tool on a bench in a clean dust-free and abrasive-free environment. The bench should be covered with soft material to prevent damage to the tool's machined surfaces. If no other protective cover is available, use cardboard.**

The most frequent service is to the blast head and at the backplate coupling-flange. Instructions for removal, service, and reassembly of the head and backplate coupling-flange are shown in the preventive

maintenance section. Refer to Section 7.3.1 to service the blast head assembly and Section 7.3.2 to service the backplate coupling-flange assembly.

## NOTICE

**Remove the tool from the blast hose or lance and service it in a clean, abrasive-free and dust-free environment. Remove the tool from the carriage collar before performing any service other than the blast head and nozzles. Failure can inhibit access to parts and result in parts damage.**

### 8.1 Carriage

#### 8.1.1 Removing the carriage

**8.1.1.1** Completely remove the three cap screws holding the carriage collar to the drive cap and then slide the carriage from the base tool. Note: If lodged abrasive prevents removal from the carriage, pry the pieces apart at the seam between the drive cap and carriage collar flange, or place a wooden block or similar object against the quick coupling and rap the block with a hammer to remove the tool.

#### 8.1.2 Attaching the carriage

**8.1.2.1** Insert the base tool, quick coupling first into the flanged end of the carriage.

**8.1.2.2** Align the bolt holes in the drive cap with those in the carriage collar and insert the plate into the flange. Align the holes as needed and install the three flat washers, lock washers, and cap screws to secure.

### 8.2 Blast Head Assembly, Removal and Inspection

**8.2.1** Remove the blast head, per Section 7.3.1, and service the head assembly as needed. Do not yet reassemble the blast head unless no further service is required.

### 8.3 Backplate Coupling Flange Assembly Removal and Inspection

**8.3.1** Remove the backplate coupling flange, per Section 7.3.2, and service the head assembly as needed.

**8.3.2** The rear-seals cartridge (sleeve with u-seals and spacer) may slide out without pressing it. If it slides out, remove it now; if it does not slide, it will be pressed out later in Section 8.6. Do not yet reassemble the backplate and coupling flange unless no further service is required.

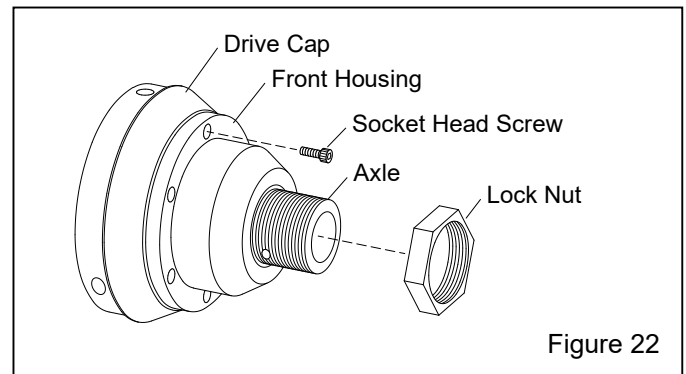
### 8.4 Front Housing and Bearing Removal and Inspection

**8.4.1** Refer to Figure 22 and unscrew the lock nut from the axle.

**8.4.2** Refer to the following caution and use a 4 mm hex key to remove the six socket head screws to separate the front housing from the drive cap and slide the housing off the axle.

## CAUTION

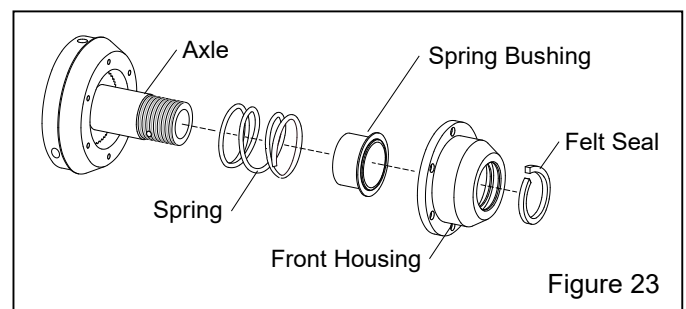
**The housing is under moderate spring pressure. When the retaining screws are removed, the spring will force the housing about 1-1/2 inches from the drive cap and can cause pinching.**



**8.4.3** Remove spring bushing and spring from the axle.

**8.4.4** Inspect the rim on the head (bearing) side of spring bushing. When new, the rim extends about 1/16" from the flange. If the rim is worn beyond 1/32", replace the bushing.

**8.4.5** Refer to Figure 23 and remove the felt seal from the front housing.



**8.4.6** Refer to Figure 24 and remove the bearing from the front housing; the bearing fits snugly in the housing, if required, use a puller to remove the bearing. Note: if the

bearing stays on the axle, it will be removed later as noted in Paragraph 8.6.5.

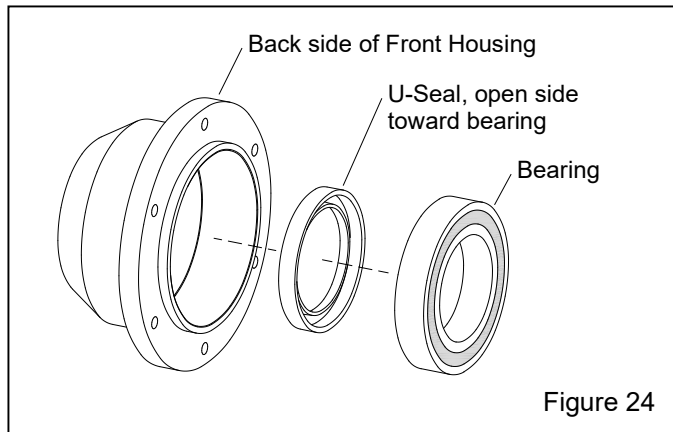


Figure 24

**8.4.7** Wipe the bearing clean and turn the races; the races should turn smoothly. Replace the bearing if it feels gritty when turning it.

**8.4.8** Inspect the inside of the housing:

- If no dust is present, replace only the felt seal.
- If dust is present on only the head side of the bearing, replace the felt seal and the u-seal.
- If dust is present on the inward side of the bearing, axle and axle-gear, service the axle per Section 8.6.

**8.4.9** If the gears are totally dust free, apply a liberal amount of Mobilgrease XHP 462 Moly, Chevron Delo Heavy Duty Moly 3% EP 2, or equivalent gear grease to the gear teeth, and reassemble the bearing and housing per Section 9.3.

**8.4.10** If no additional service is required, reassemble the tool per Section 9.0.

**8.5 Air Motor and Air Motor Gear Removal and Inspection – Figure 25**

NOTE: Removing the air motor requires a narrow 33 millimeter wrench or an adjustable wrench narrow enough to fit within the confines of the air motor's flats. If a wrench is not available, one should be purchased, or machine (or grind) one until it is narrow enough to fit within the flats. Remove the air motor for protection and inspection before removing the axle or drive cap.

**NOTICE**

**Do not use a pipe wrench or similar tool to remove the air motor; doing so will damage the motor.**

**8.5.1** The air motor has left-handed or reverse threads; to remove the motor from the drive cap, turn the motor clockwise, as shown in Figure 25.

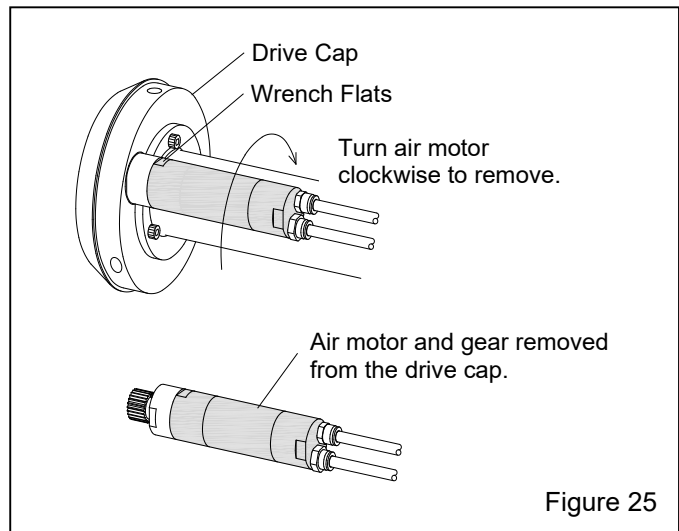


Figure 25

**8.5.2** Inspect the gear; there is no need to separate the gear from the motor if neither is being replaced. If service or replacement is needed, use a 2-mm hex key to remove the gear.

**8.5.3** It is not necessary to remove the 1/8 x 8 mm inlet tube adaptor, 1/4 x 8 mm outlet tube adaptor, or tubing from the air motor unless either requires replacement or the air motor needs service. When required, remove the adaptors by unscrewing them.

**NOTICE**

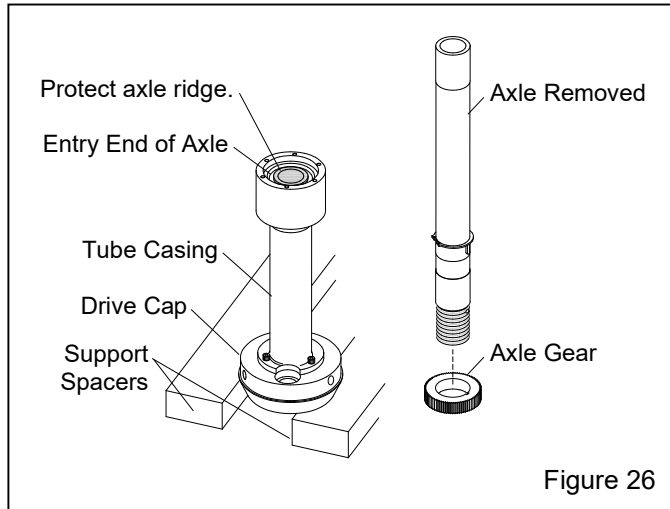
**To reduce the risk of abrasive or foreign material contamination into the air motor, cover air motor fittings, ports, or tubing. Any foreign material entering the air motor will cause the air motor to fail. Motor failure from ingress of dust, abrasive, or foreign matter voids the warranty.**

**8.6 Axle, Axle Gear, and Rear Bearing Removal and Inspection**

**8.6.1** Occasionally the axle can be removed from the tube casing by sliding the axle back and forth as you would a slide puller. If the axle cannot be removed as noted, it can be pressed out, as follows.

**8.6.2** Support the drive cap and tube casing in the press, as shown in Figure 26. Make sure the supports do not block the axle.

**8.6.3** Place a wooden dowel or similar soft object of approximately 1-7/8" diameter on the end of the axle, shown shaded in Figure 26. Make sure it is no larger in diameter than the axle. Take precautions not to damage the ridge on the entry end of the axle.



**8.6.4** Make sure there is means of catching the axle and gear if they suddenly slide from the casing. The axle needs to be pressed only about 2 inches to be free of the rear bearing. If in doubt about catching it, place sufficient padding below the axle to prevent it from being damaged if it should fall. Apply a small amount of pressure to press the axle free of the drive cap and casing.

**8.6.5** The rear-seals cartridge and bearing may easily be removed from the opposite end of the casing. If the bearing stayed on the axle as noted in Paragraph 8.4.6, turn the axle around and press off the bearing and axle gear.

**8.7 Rear-Seals Cartridge Removal and Inspection**

**8.7.1** Since the rear-seals cartridge has been removed, replacing the u-seals recommended.

**8.7.2** To remove the u-seals, press or pry the old seals from the sleeve. Note: If the seals are to be replaced, it does not matter if the old seals are destroyed while removing them. However, take precautions not to damage the sleeve and spacer.

**8.7.3** Cleans all parts to be reused.

If no other service is required, reassemble per Section 9.0.

**9.0 SERVICE MAINTENANCE, REASSEMBLY**

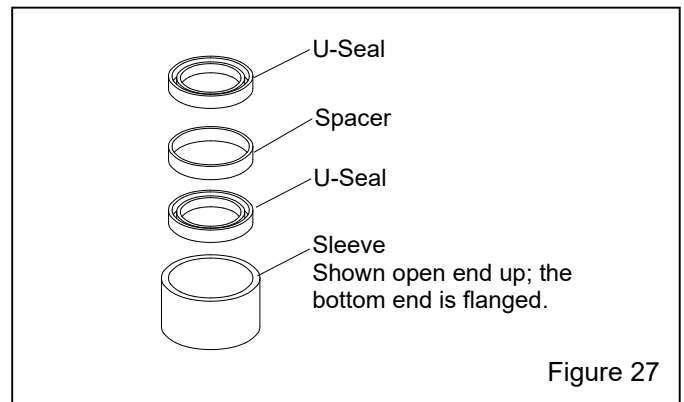
The order of reassembly is shown for a tool that was totally disassembled. If the tool was not totally disassembled, skip the sections that do not apply.

**9.1 Rear-Seals Cartridge Reassembly – Figure 27**

**9.1.1** To ease insertion of the seals, apply a thin layer of grease to the outside of the seals and inside of the sleeve.

**9.1.2** Lay the sleeve on a clean table, with the flanged end facing down.

**9.1.3** Press the first u-seal (open end up) into the sleeve until it is fully seated on the sleeve's flange. Note: U-seals are identical; it does not matter which seal is installed first.



**9.1.4** Insert the spacer above the first seal and then press the second seal into place against the spacer. Temporarily set the cartridge assembly aside.

**9.2 Axle, Axle Gear, and Casing Reassembly Figure 28**

**9.2.1** It should not be necessary to press the axle gear onto the axle. Slide the gear onto the axle, align the keyway and key and apply even pressure to seat the gear against the retaining ring. If pressing is needed make sure not to use excessive pressure that would damage the retaining ring.

**9.2.2** Place a liberal amount of Mobilgrease XHP 462 Moly, Chevron Delo Heavy Duty Moly 3% EP 2, or equivalent gear grease to the gear teeth.

**9.2.3** Insert the axle with gear attached, into the casing. When fully inserted, the gear will move up by about 3/16". Make sure the key is correctly placed in the gear keyway; when the front bearing housing is attached, the spring will push the gear into position.



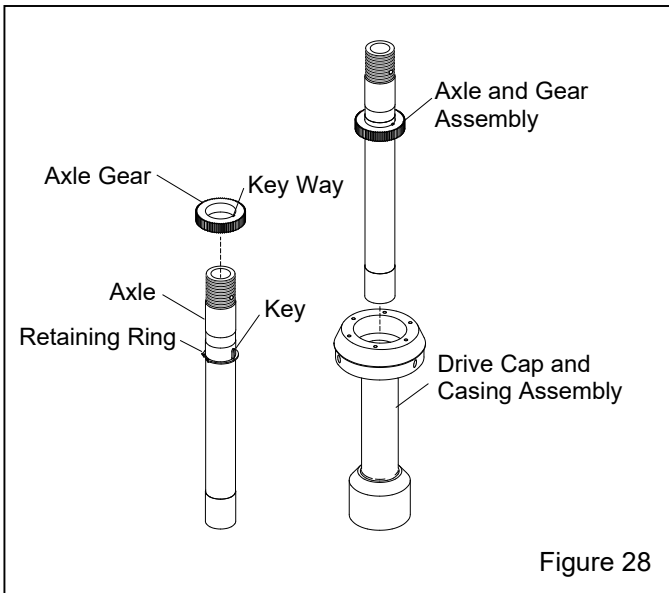


Figure 28

**9.3 Front Housing and Bearing Reassembly**

**9.3.1** Place a liberal amount of 10 weight oil or machine oil on the felt strip and insert the strip fully into the groove in the front bearing housing, as shown in the upper illustration in Figure 29. Make sure the strip is fully inserted into its groove and that the ends are compressed together for a full seal.

**9.3.2** Turn the housing around and press the bearing u-seal (open end facing out) into the housing, making sure it is fully seated. To ease insertion of the seal, apply a thin layer of grease to the outside of the seal and inside of the housing.

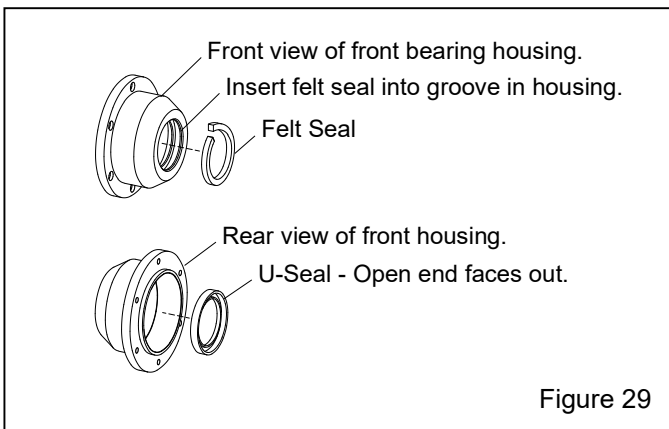


Figure 29

**9.3.3** Turn the front housing on its end, as shown in Figure 30 and insert the bearing into the housing until it is fully seated against the u-seal. Note that the fit between the outer race on the bearing and housing are very tight; the bearing can be inserted without pressing it, if it inserted straight into the housing without any side-cocking.

**9.3.4** Place the spring bushing and spring in the housing, as shown in the illustration.

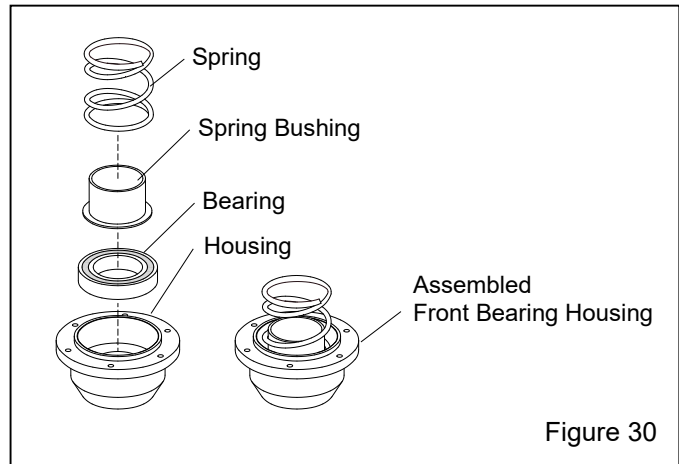


Figure 30

**9.3.5** Place the tube casing (drive cap up, as shown in Figure 31) securely in a vice.

**9.3.6** While holding the spring in place to prevent the spring bushing and bearing from moving, turn the housing assembly over and slide it onto the axle, as shown in Figure 31. NOTE: Make sure the felt is not damaged or pushed from the housing as the axle passes through. If necessary, use a small screwdriver to make sure the felt remains in place.

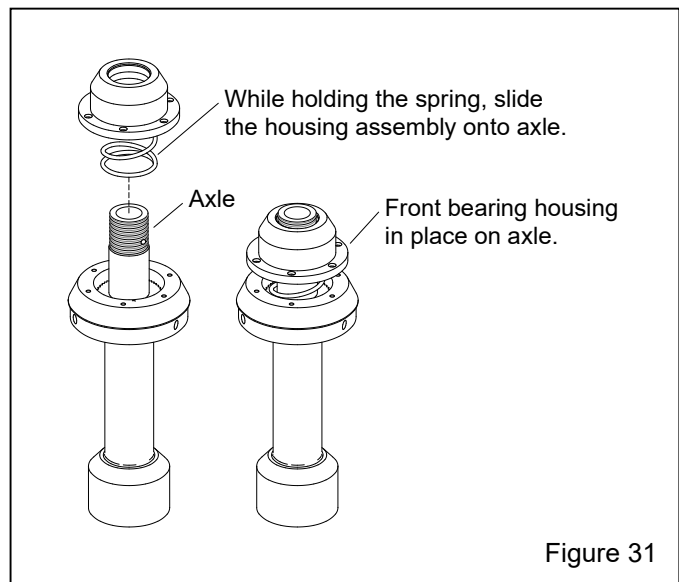


Figure 31

**9.3.7** Refer to Figure 32 and align the screw holes in the bearing housing with those in the drive cap. Apply downward pressure to lower the housing enough to engage the screw threads into the drive cap. Start at least two screws on opposite sides of the housing before releasing downward pressure.

**NOTICE**

If the housing makes hard contact before it is close enough for the screws to engage, do not force it; internal parts are not aligned. Release and reapply pressure until the housing slides into position so it can be secured with screws. Failure can result in part damage.

9.3.8 Observe the gap between the bearing housing and tighten the screws in unison until the flange on the housing just begins to enter the drive cap. At that time tighten each screw about half a turn at a time, the screws should easily turn. If a screw becomes tight, move to another until the housing is fully seated into the drive cap.

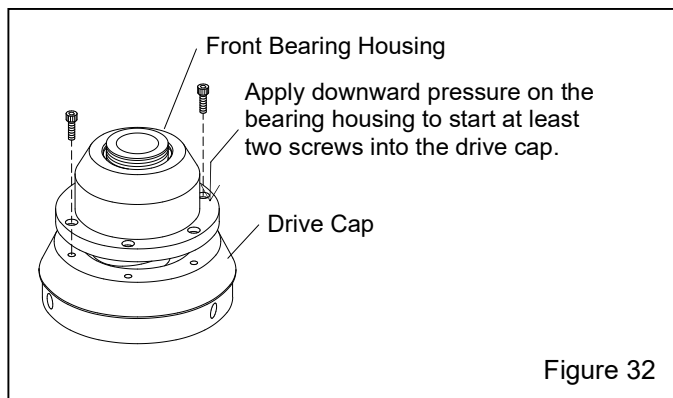


Figure 32

9.3.9 After the housing is seated in the drive cap, tighten all screws to secure.

**9.4 Rear Bearing, U-Seal Cartridge, and Tube Casing Reassembly**

9.4.1 Place the assembled tool on a bench with the rear of the tube casing facing up, as shown in Figure 33.

9.4.2 Fully insert the rear bearing into the end of the tube casing. Pressing the bearing is usually not needed if the bearing is inserted straight with no side-cocking.

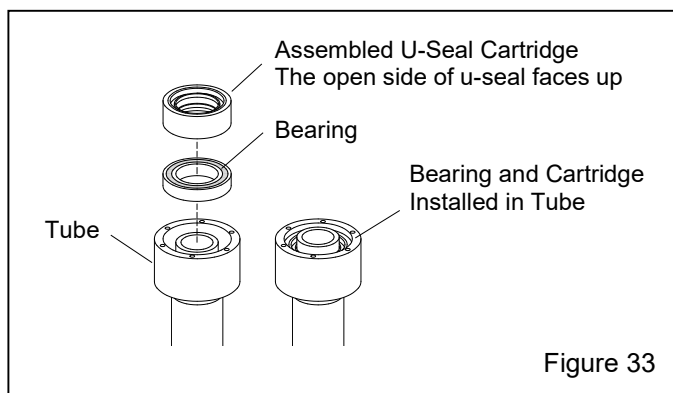


Figure 33

9.4.3 Insert the u-seal cartridge into the tube casing. The side of the cartridge with the open u-seal faces up.

**9.5 Backplate Coupling-Flange Reassembly Figure 34**

9.5.1 Place the plastic seal-disc into the tube casing. Note: If the disc is to be reused, make sure the grooved side faces toward the axle. If the disc is new the sides are identical; it does not matter how it is installed. The groove will be formed by the rotating axle.

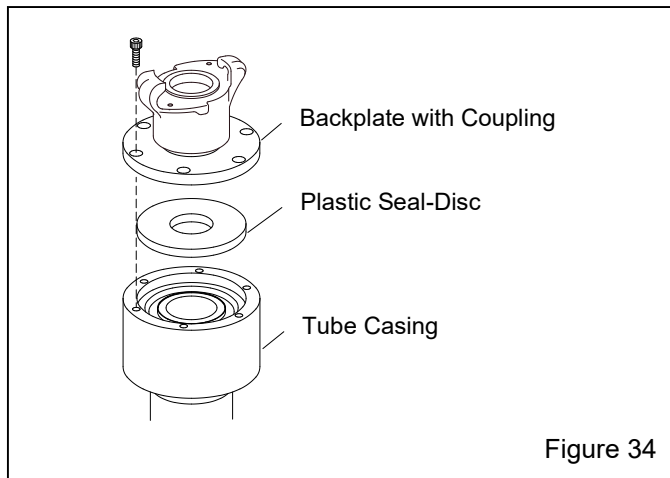


Figure 34

9.5.2 Place the backplate atop the disc and uniformly tighten the screws to secure. Note: If the end of the axle extends too far out to prevent installation of the screws, remove the disc, place a folded paper towel or similar protective cover over the ridge on the axle, and tighten the backplate enough to press the axle into the tube casing. Remove the backplate and protective cover and reassemble with the seal-disc in place.

**9.6 Air Motor and Air Motor Gear Reassembly Figure 35**

NOTE: Installation of the air motor requires a narrow 33-millimeter wrench. If a wrench is not available, one should be purchased, or machine (or grind) one until it is narrow enough to fit within the flats.

9.6.1 If the gear was removed or replaced, install it onto the motor shaft with the set screw end facing toward the motor, as shown in Figure 35. Slide it fully onto the shaft leaving only enough room to insert a 2-mm hex key into the set screw. Tighten the screw to secure.

9.6.2 Apply a generous amount of Mobilgrease XHP 462 Moly, Chevron Delo Heavy Duty Moly 3% EP 2, or equivalent gear grease to the gear teeth, and gear socket in the drive cap.

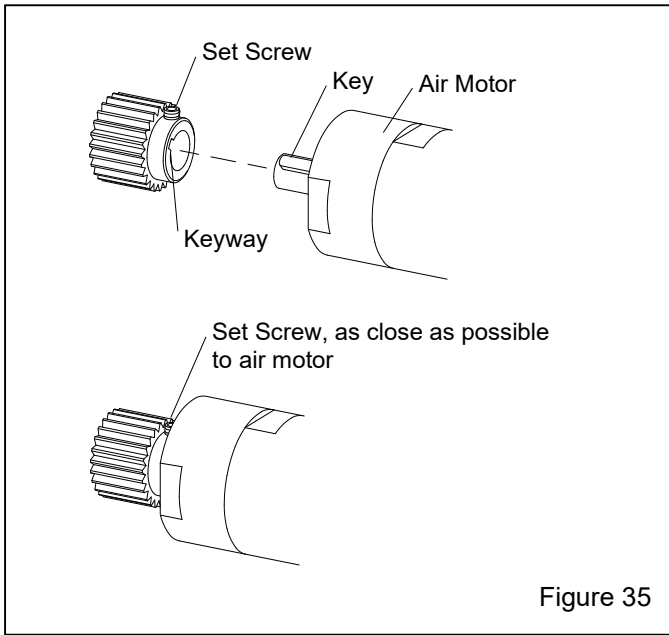


Figure 35

**9.6.3** If the tube adaptors were removed from the air motor, make sure they are clean and that the O-rings are on both adaptors before reinstalling them. Refer to Figure 36.

**9.6.4** Insert the gear end into the drive cap and mesh the teeth on the motor gear with those on the axle gear. If the teeth are not correctly meshed, the motor cannot be inserted into the opening in the drive cap.

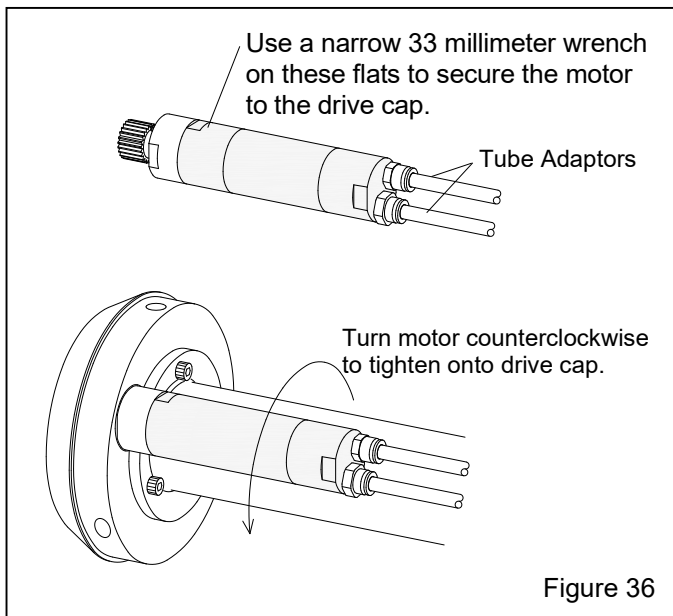


Figure 36

**9.6.5** The air motor has left-handed (reverse) threads; to install the motor, turn it counterclockwise, as shown in Figure 36. Use a narrow 33-millimeter wrench to tighten the motor.

**9.7 Blast Head Assembly Reassembly**

**9.7.1** Reassemble the blast head per Section 7.3.1.

**10.0 TROUBLESHOOTING**

**10.1 Blast head does not turn or turns too slowly**

**10.1.1** Volume or pressure of air at motor is too low. Adjust pressure to between 80 and 90 psi.

**10.1.2** Flow control valve is closed too far. Open flow valve.

**10.1.3** Leak or blockage in supply line to the air motor. Check for leaks or blockage.

**10.1.4** Inlet and outlet tubes reversed on air motor. Make sure green supply tube connects to air motor "R" Port and red outlet tube connect to the "Exh" Port. If lines are reversed, the head will rotate slowly counterclockwise when viewed from the head end of the tool.

**10.1.5** Dust or abrasive ingress in bearing area. After checking the steps above, inspect felt seal, u-seals, and bearings for wear.

**11.0 ACCESSORIES and REPLACEMENT PARTS**

**11.1 Accessories**

Item	Description	Stock No.
(-)	Safety cable for 1-1/2" to 3" OD hose .....	15013
	for 1-1/2" to 4" OD hose .....	27405
(-)	Lock pin, coupling (package of 25) .....	11203
	When connecting a nylon coupling to a metal coupling, use one lock pin, use two when connecting two metal couplings together.	

**11.2 Pipe-Pro XL™ Internal Pipe Blast Tools**

Item	Description	Stock No.
(-)	Pipe-Pro XL tool only, without carriage or air-motor control hose kit, includes items 1 through 38 in Figure 38 .....	28050
(-)	Pipe-Pro XL tool 16" to 31" .....	27792
	Includes:	
	• Pipe-Pro XL tool with 16" to 31" centering carriage	
	• Air-motor control hose kit (all items shown in Section 11.5, Figure 37).	
(-)	Pipe-Pro XL tool 16" to 60" .....	28046
	Includes:	
	• 27792 Pipe-Pro XL tool with 16" to 31" centering carriage and control hose package	
	• 32" to 60" carriage leg and rail extensions, as shown in Section 11.8, Figure 40	
	• 2 each 6-inch and 12-inch nozzle extensions, as shown in Section 11.8, Figure 40	
	• 10 nozzle washers (for nozzle extensions)	

**11.3 Conversion kit, converts 16" to 31" tool to 16" to 60"**

Item	Description	Stock No.
	Large pipe conversion kit, includes items marked with (*), as shown in Section 11.8, Figure 40. ....	28047

**11.4 Nozzles and Nozzle Extensions**

Item	Description	Stock No.
(-)	Nozzle, each, 2- required	
	Long venturi	
	TSP-4, 1/4" orifice .....	23514
	TSP-5, 5/16" orifice .....	23515
	TSP-6, 3/8" orifice .....	23516
	Short venturi	
	TJP-4, 1/4" orifice .....	23508
	TJP-5, 5/16" orifice .....	23509
	TJP-6, 3/8" orifice .....	23510
(-)	Nozzle extensions	
	6" long, set of 2 .....	25118
	12" long, set of 2 .....	24647
(-)	Nozzle washers, NW-4, pack of 10 for nozzles and extensions .....	00869

**11.5 Air-Motor Control Hose Kit – Figure 37**

Item	Description	Stock No.
(-)	Kit, air-motor control hose includes all items shown in Figure 37 ...	28859
1.	Filter/Regulator, 3/8-NPT w/gauge .....	11690
2.	Muffler, 3/8-NPT .....	28041
3.	Valve, 3/8-NPT flow control .....	28040
4.	Hose, 3/8" x 50 ft., coupled .....	27799
5.	Union, 3/8 hose to 3/8 hose .....	01020
6.	Adaptor, 1/4-NPT x 3/8 hose .....	01019
7.	Adaptor, 1/4-NPTF x 8 mm tube .....	28038
8.	Adaptor, 3/8-NPT x 3/8 hose .....	00022
9.	Filter, 1/4-NPT m/f inline .....	28039

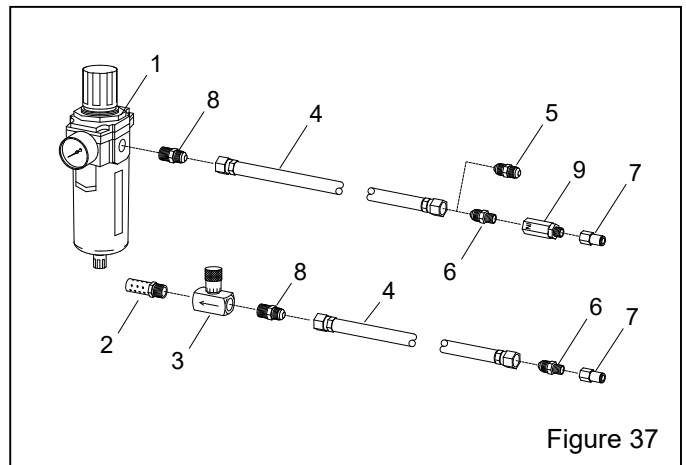


Figure 37

11.6 Pipe-Pro XL™ Basic Tool – Figure 38

Item	Description	Stock No.
1.*	Blast head (1)	27819
2.*	Gasket, blast head (2)	27817
3.*	Deflector, carbide (1)	27818
4.	Swivel eye and bolt	100956
5.*	Plug, retaining, 1-1/4 BSP (1)	28028
6.*	Gasket, deflector (2)	28027
7.	Screw, socket head, 5 mm x 16 mm	28024
8.	Coupling, CFT 1-1/2 BSP	24232
9.*	Washer, NW-4 nozzle, pack of 10 (1)	00869
10.*	Flange, backplate-coupling (1)	27810
11.*	Seal-disc, plastic (2)	27811
12.*	U-seal, 2-11/16" OD, nominal, each (3)	28030
13.*	Spacer, u-seal (1)	27814
14.	Sleeve, u-seal/spacer	27815
15.*	Bearing, axle, each (2)	28029
16.	Tubing, green inlet, 8 mm x 1 foot	28582
17.	Tubing, red outlet, 8 mm x 1 foot	28583
18.	Adaptor, 1/8 x 8 mm air motor inlet tube	28584
19.	Adaptor, 1/4 x 8 mm air motor outlet tube	28585
20.	Screw, 4 x 6 mm set	90592
21.	Gear, air motor	27808
22.	Tube casing	27816
23.	Screw, 6 x 18 mm socket head cap	90155
24.	Cap, Drive	27809

25.*	Seal, felt (2)	28023
26.	Housing, front-bearing	27796
27.	Bushing, spring	27812
28.*	Spring, axle shaft (1)	28022
29.	Gear, axle	28021
30.*	Retaining ring (1)	28031
31.*	Axle (1)	27813
32.*	Key, 6 x 6 x 14 mm (1)	28020
33.*	O-ring, 1/4" ID (2)	00794
34.	Air motor	28025
35.	Locknut, blast head	28048
36.*	Pin, deflector alignment (1)	29550
37.	Adaptor, 1/4-NPTF x 8 mm tube	28038
38.	Spanner wrench, 45-50 mm	28051
39.*	Gasket, CQG, pack of 10 (1)	00850
40.	Collar, carriage	27807
41.	Screw, 10 x 20 mm hex head cap	28032
42.	Washer, 10 mm lock	28034
43.	Washer, 10 mm flat	28033
44.	Lock pin, coupling (package of 25)	11203
*	Kit, Pipe-Pro XL recommended spare parts, quantities shown in ( )	29543

NOTE: All parts exposed to abrasive and any moving parts are subject to wear. To avoid unscheduled downtime, follow recommended inspections and maintenance schedules and replace all spare parts as they are used. When doing large jobs, consider having a spare pipe tool for use while rebuilding the initial tool.

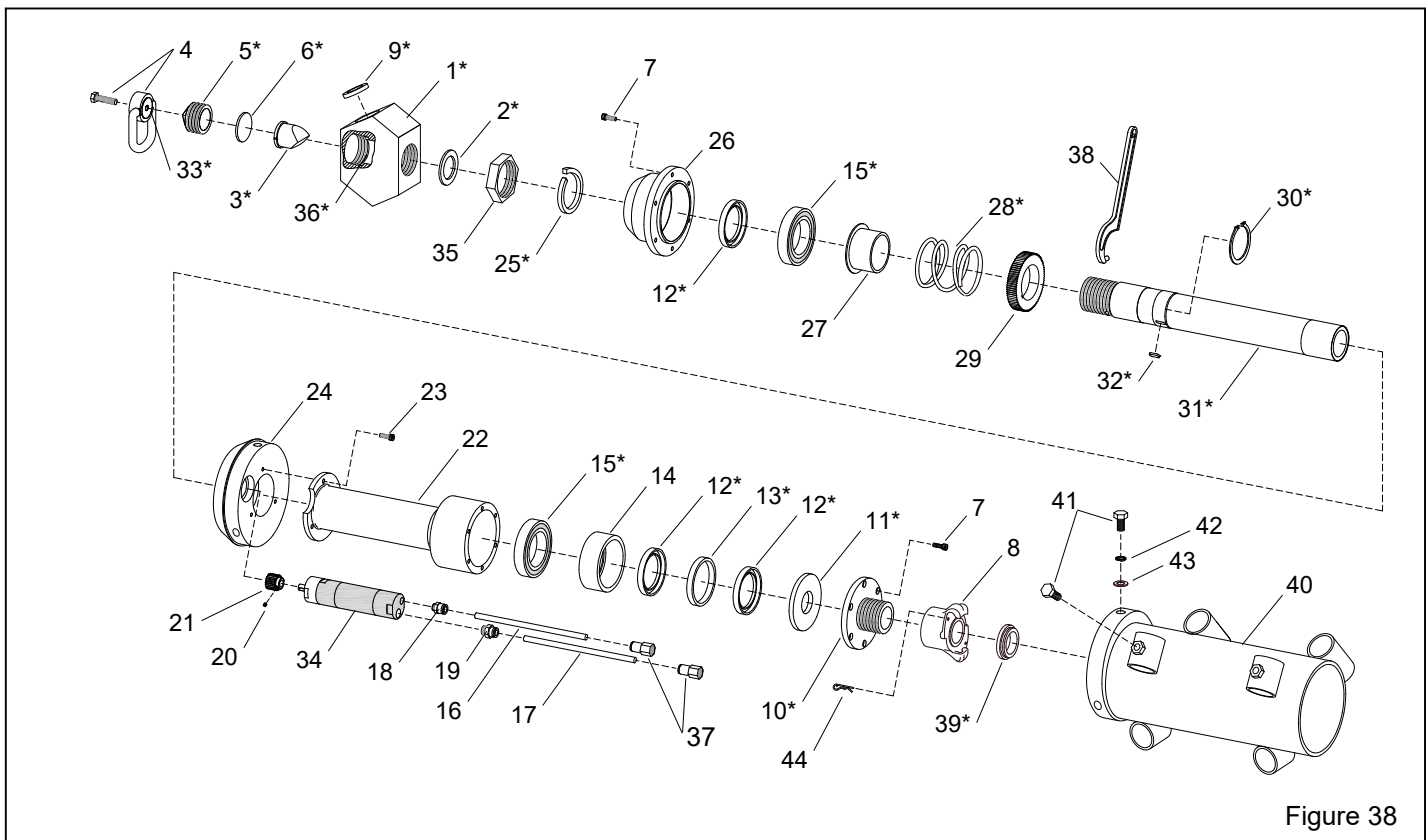
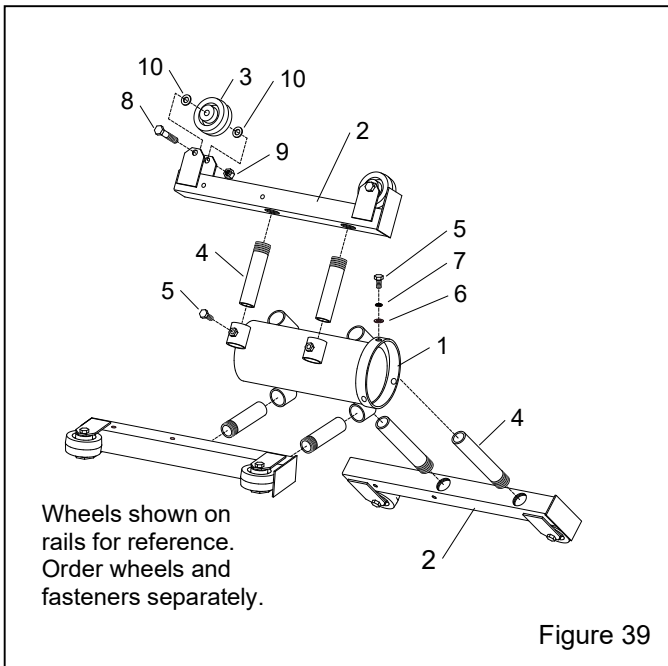


Figure 38

**11.7 Carriage, 16" to 31" Centering – Figure 39**  
 Unless noted the unit for all items is 1 (each)

Item	Description	Stock No.
(-)	Carriage, 16" to 31" centering includes items 1 thru 10	28640
1.	Collar, carriage	27807
2.	Rail, carriage, does not include wheels	27805
3.	Wheel, carriage	28026
4.	Leg, carriage	
	6" long	27793
	12" long	27794
5.	Screw, 10 x 20 mm hex head	28032
6.	Washer, 10 mm flat	28033
7.	Washer, 10 mm lock	28034
8.	Screw, 12 x 75 mm hex head	28035
9.	Nut, 12 mm hex	28036
10.	Washer, 12 mm flat	28037



**11.8 Carriage, 16" to 60" Centering – Figure 40**  
 Unless noted the qty. for all items is 1 (each)

Item	Description	Stock No.
(-)	Carriage, 16" to 60" centering includes items shown in Figure 40	28641
(-)	Conversion kit, converts 16" to 31" centering carriage to 16" to 60" carriage, includes items marked with (*)	28047
1.	* Extension rail (set of three w/wheels)	28856
2.	Extension, rail (does not include wheels)	27806
3.	Leg, carriage	
	6" long	27793
	12" long	27794
	* 26" long	27795
4.	* Screw, 8 mm x 65 mm hex head	28052
5.	* Nut, 8 mm lock	28053
6.	* Washer, 5/16" flat	03216
7.	Extension, nozzle	
	* 6 inches long, set of 2	25118
	* 12 inches long, set of 2	24647
8.	* Washers, NW-4 Nozzle, pack of 10	00869
9.	Collar, carriage	27807
10.	Rail, carriage (does not include wheels)	27805
11.	Wheel, carriage	28026
12.	Screw, 10 x 20 mm hex head	28032
13.	Washer, 10 mm flat	28033
14.	Washer, 10 mm lock	28034
15.	Screw, 12 x 75 mm hex head	28035
16.	Nut, 12 mm hex	28036
17.	Washer, 12 mm flat	28037

