

BETTCHER Industries, Inc.

Operating Instructions & Spare Parts List



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Operating Instructions in other languages are available on request. Additional copies of Operating Instructions are available by calling or writing your Regional Manager, or by contacting:

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The Information Provided in these Operating Instructions is
Important to your Health, Comfort and Safety.
For Safe and Proper Operation, Read this Entire Manual
Before Using this Equipment.



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Original Instructions

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SECTION 1.0 INTRODUCTION

The Bettcher AirShirz® is a lightweight, yet powerful, pneumatic cutting tool designed to perform operations previously performed by hand operated scissors or shears. It is highly effective for use in poultry and industrial environments, designed with the highest possible standards for safety, ergonomics, and productivity. This versatile tool, with its carefully engineered stainless steel blades, brings consistent yield control to all operations.

The Bettcher AirShirz® described in this Operating Instruction has been tested by an independent and certified body, the Pruef- und Zertifizierungsstelle der Fleischerei-Beruffsgenossenschaft, Mainz, Germany and complies with Machine Directive 89/392/EEC and is also in conformity with prEN 12984:1997E "Food Processing Machinery Portable And/Or Hand Operated Machines and Appliances Equipped With Mechanical Driven Cutting Tools Safety and Hygiene Requirements", which includes compliance with the following standards :



EN 292:1991 Parts 1 and 2 EN 31688 Acoustics
ISO 3744 Noise Measurement EN 28662-1 Vibration Measurement

In addition, the Bettcher AirShirz® is also authorized by the USDA and Agriculture and Agri-Food Canada for use in federally inspected meat and poultry plants.

1.1 Machine Specifications



Weight :	Power Unit	17 oz. – 24.6 oz. (480 g – 694 g) (Depending on Model)
	Blade Set	4 oz. – 9.3 oz. (113g – 262g) (Depending on Model)
Size :	Power Unit	1-3/4 x 4 x 6 inches (4.5x10x15 cm)
	Blade Set	Approx. 5 inches (13 cm) (Depending on Model)
	Coiled Tubing	8 feet (244 cm) When Straight




Power Supply	Filtered Air At 80 to 120 PSI (5.5 To 8.3 Bars)
Air Usage	Approximately .2 Standard Cubic Ft/Min. (5.5 l/min.) At 30 Cuts/Min.
Operating Temperature Range	0°C (32°F) to 40°C (100°F)
Exposed Materials	Stainless Steel, Anodized Aluminum, Nylon, Acetal, Polypropylene, Nitrile, Polysulfone, Polyurethane, and Polyetheretherketone

SECTION 2.0 DESIGNATED USE





2.1 Warning

The Bettcher AirShirz® is used for the removal of fat and tissue, the recovery of lean meat from fat in the poultry industry and as a universal cutting tool in other applications where manual scissors are used. Any use of this tool other than those applications for which the AirShirz® has been designed and built may result in serious injury.

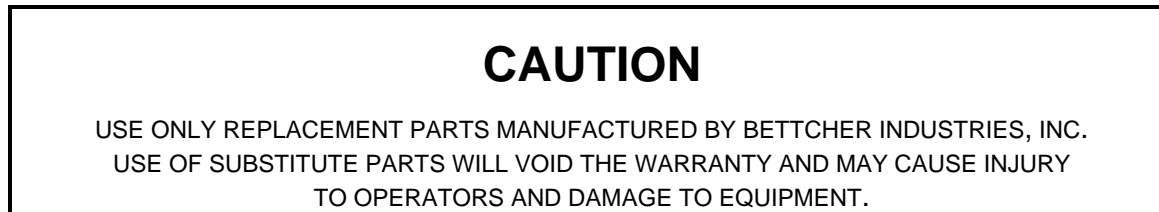
	<u>WARNING</u>	
<p>THE MANUFACTURER ASSUMES NO LIABILITY FOR ANY UNAUTHORIZED DESIGN CHANGES, MODIFICATIONS, OR USE OF PARTS NOT SUPPLIED BY THE MANUFACTURER OR THE USE OF PARTS NOT DESIGNED FOR USE ON THAT SPECIFIC MODEL, AND INCLUDES CHANGES IN OPERATING PROCEDURES MADE BY THE OWNER OR ANY OF HIS PERSONNEL.</p>		
<p><u>FOR SAFE AND PROPER OPERATION, READ THE ENTIRE MANUAL BEFORE USING THIS EQUIPMENT.</u></p>		

		<u>WARNING</u>	
<p>SHARP BLADES MAY CAUSE CUT INJURY! ALWAYS DISCONNECT POWER AND REMOVE THE BLADE SET PRIOR TO SERVICING.</p>			

		<u>WARNING</u>		
<p>THE BLADES ARE VERY SHARP. WEAR CUT RESISTANT GLOVES WHILE OPERATING THE AIRSHIRZ®.</p>				

		<u>WARNING</u>		
<p>AIRSHIRZ® MAGNUM</p>				
<p>AMPUTATION IS POSSIBLE. THE BLADES ARE VERY SHARP. WEAR METAL MESH CUT RESISTANT GLOVES WHILE OPERATING THE AIRSHIRZ® MAGNUM.</p>				

2.1 Warning (Continued)



2.2 Recommended Operation

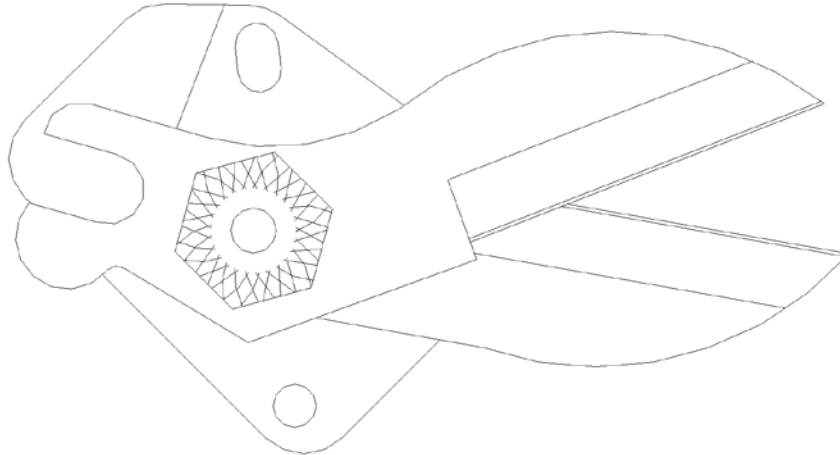
There is an assortment of accessories available from Bettcher Industries to adapt the AirShirz® to particular applications. Blade sets come standard in straight, curved, and ball-tip styles. Multiple blade configurations allow for a variety of poultry processing applications such as those listed on the following pages. These blades are not intended for cutting bones.

Special blade sets can be supplied for certain applications by contacting Bettcher Industries. Air pressure regulators and air filters for industrial compressed air systems are also available through Bettcher Industries. Food grade lubricants and spare parts are supplied by Bettcher Industries. (See Section 11.2)

The following recommendations are not intended to be a total and comprehensive listing, but are offered as a guide. Additional applications are possible.

2.2 Recommended Operation (Continued)

Straight Blades

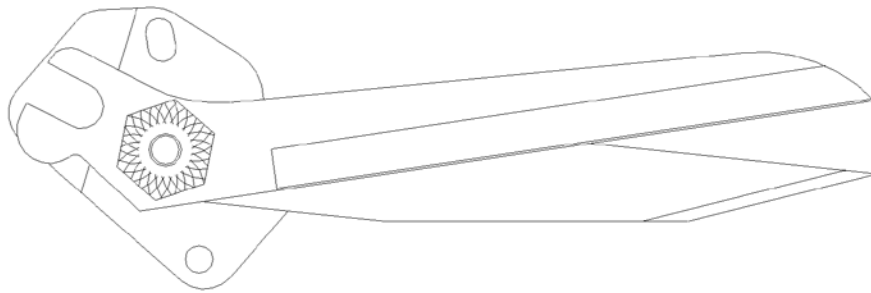


Part Number	Description	Typical Application
108498	1-3/8" Straight Blade Assembly (Serrated)	*General Applications
108499	1-11/16" Straight Blade Assembly	*General Applications
108539	2-1/2" Straight Blade Assembly (Serrated)	*General Applications
108169	3-1/4" Straight Blade Assembly	Cut tendons from tenders *General Applications
108702	3-3/4" Micro-Serrated	Kevlar® and Fiberglass
108053	4-1/4" Straight Blade Assembly	*General Applications
108361	5-1/4" Straight Blade Assembly	*General Applications

* General Applications	
Thigh Trim	Mark Tails For Tucking
Breast Trim	Hearts-Livers Separation and Trim-Gizzard
Cut Up Wings (Trim)	House Inspection
Remove Wing Tips	Back Up USDA Inspector
Remove Tails	Mirror Inspection Station

2.2 Recommended Operation (Continued)

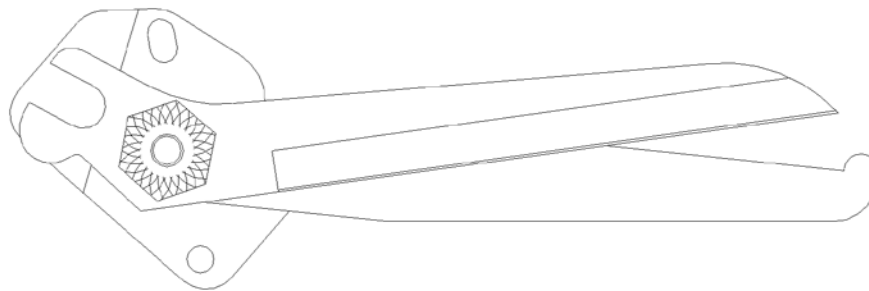
Gizzard Blades



Part Number	Description	Typical Application
108146	4-1/4" Gizzard Blade Assembly	Gizzard Open and Trim
108375	5-1/4" Gizzard Blade Assembly	Gizzard Open and Trim

2.2 Recommended Operation (Continued)

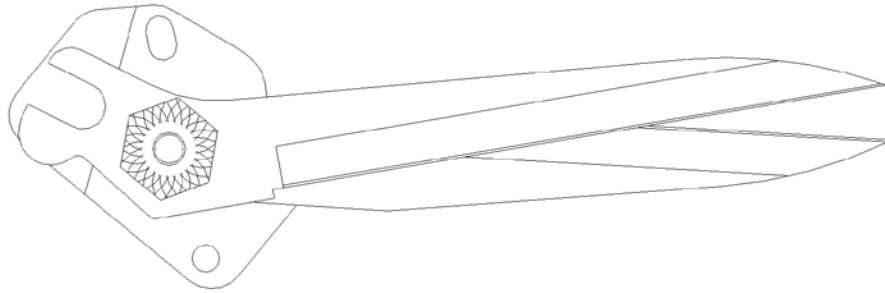
Ball Tip Blades



Part Number	Description	Typical Application
108209	3-1/4" Short Ball Tip Blade Assembly	J-Cut Turkey Hens / Vent Opening
108055	4-1/4" Ball Tip Blade Assembly	Backup Vent Opener and J-Cuts
108208	4-1/4" Broiler Vent Ball Tip Blade Assembly	Backup Vent Opener

2.2 Recommended Operation (Continued)

Low Profile Blades

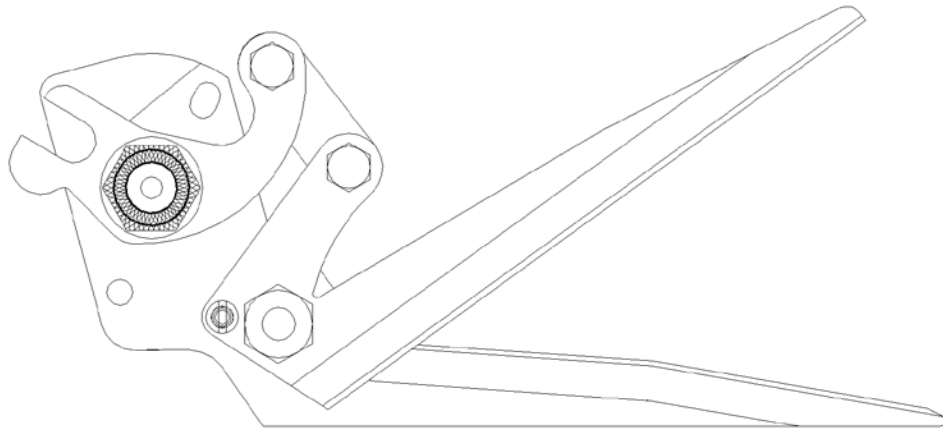


Part Number	Description	Typical Application
108496	2-1/2" Low Profile Straight Blade Assembly	*General Applications
108475	4-1/4" Low Profile Straight Blade Assembly	*General Applications

* General Applications	
Thigh Trim	Mark Tails For Tucking
Breast Trim	Hearts-Livers Separation And Trim-Gizzard
Cut Up Wings (Trim)	House Inspection
Remove Wing Tips	Back Up USDA Inspector
Remove Tails	Mirror Inspection Station

2.2 Recommended Operation (Continued)

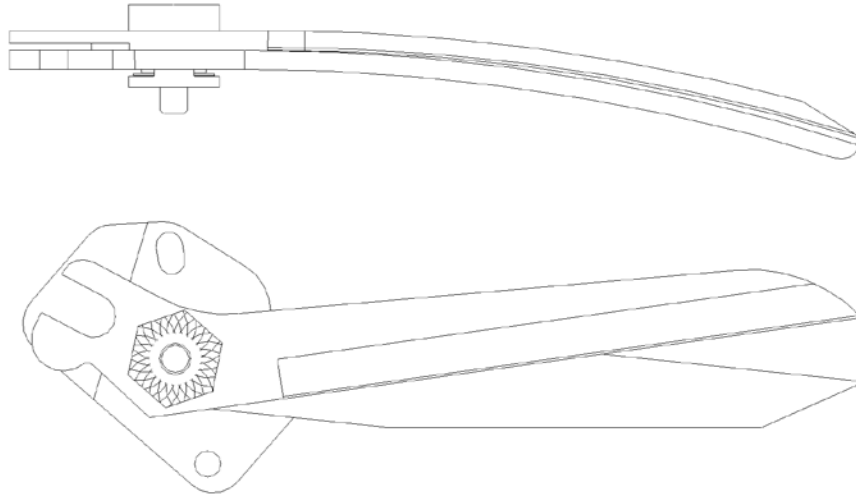
Tabletop Blades



Part Number	Description	Typical Application
108700	Micro-Serrated Tabletop Blade Assembly	Fiberglass and Textiles
108505	Tabletop Blade Assembly	Upholstery
108720	Kevlar® Tabletop Blade Assembly	Kevlar® and Heavy Fabrics

2.2 Recommended Operation (Continued)

Curved Blades

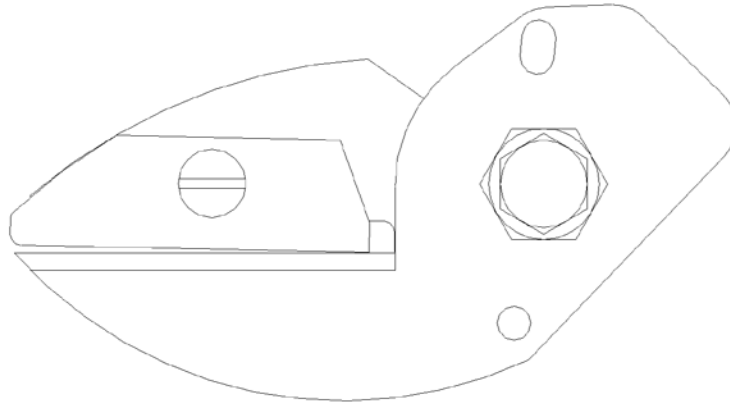


Part Number	Description	Typical Application
108054	4-1/4" Curved Blade Assembly	*General Applications
108210	4-1/4" Evis Curved Blade Assembly	*General Applications
103799	4-1/4" Reverse Curve Blade Assembly	*General Applications

* General Applications	
Thigh Trim	Mark Tails For Tucking
Breast Trim	Hearts-Livers Separation And Trim-Gizzard
Cut Up Wings (Trim)	House Inspection
Remove Wing Tips	Back Up USDA Inspector
Remove Tails	Mirror Inspection Station

2.2 Recommended Operation (Continued)

Neck Breaker Blades



Part Number	Description	Typical Application
108170	Neck Breaker Blade Assembly	Rework / Salvage Necks
108224	Neck Breaker Inverted Blade Assembly	Rework / Salvage Necks

SECTION 3.0 FUNCTION

3.1 Machine Function

The smooth actuation of the AirShirz® is achieved by controlling the amount of pressurized air delivered to both sides of the **power cylinder**. The **servo linkage** detects the positions of the movable blade and the finger loop, and generates a command signal to open or close the blade. This command signal is delivered to the **control valve** which then feeds or vents pressurized air to the **power cylinder**. The **power cylinder** drives a rod which rotates the **drive link assembly**. A roller in the **drive link assembly** engages a slot in the movable blade and causes it to pivot, opening or closing the blades.

The AirShirz® has the advantage of requiring much less hand force to operate, since the actual cutting power is supplied by air pressure. A second advantage is that it requires less movement of the operator's hand for a given size cut. The blades will open and close 45° while the finger loop only moves about 23°.

The AirShirz® is held and operated in the same way as a pair of hand scissors. There is a thumb hole and a finger loop. The blades close like scissors as the finger loop is squeezed, and open as it is released. The movement of the blades follows the movement of the finger loop.

A return spring moves the finger loop outward to the "blades open" position, relieving the operator's finger muscles during this phase of the cutting cycle. Since the AirShirz® gets its cutting power from the air line, the only force the operator feels during a cut is the force required to overcome the return spring. Therefore, **the amount of exertion by the operator is constant regardless of the difficulty of the cut.**

The basic AirShirz® consists of 3 parts - the Power Unit; the Blade Set; and the Filter/Coupler. The compressed air supply line should have a standard filter and pressure regulator. A lubricator is not required.

3.2 Safety Recommendations and Warnings

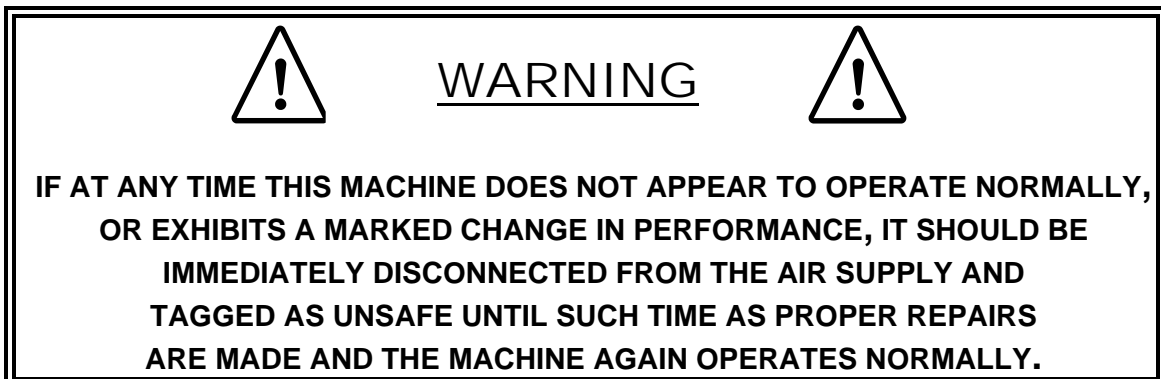
When used properly, the AirShirz® is safe and easy to use. However, **since this is a high powered cutting device, it can cause serious injury if used carelessly.**

3.2 Safety Recommendations and Warnings (Continued)






The blades are driven by linkages connecting them to the power cylinder. These linkages are driven with a lot of force. Care has been taken in the design of the AirShirz® such that the operator's fingers will be safely away from any pinch points **as long as the unit is held in the normal manner and operated with cover in place.** For left handed users, an additional finger guard is available to prevent the accidental placement of the finger in the blade opening (part number 108455).

Never leave the AirShirz® with the blades open as serious injuries could result! When the tool is not in use or is being handled in any way other than cutting product, (i.e., cleaning, maintenance, etc.), the air supply should be disconnected at the quick disconnect.







3.2 Safety Recommendations and Warnings (Continued)

  WARNING 

**SHARP BLADES MAY CAUSE CUT INJURY!
ALWAYS DISCONNECT POWER
AND REMOVE THE BLADE SET PRIOR TO SERVICING.**

  WARNING  

**THE BLADES ARE VERY SHARP. WEAR CUT RESISTANT
GLOVES WHILE OPERATING THE AIRSHIRZ®.**

  WARNING  

AIRSHIRZ® MAGNUM

**AMPUTATION IS POSSIBLE. THE BLADES ARE VERY SHARP. WEAR METAL
MESH CUT RESISTANT GLOVES WHILE OPERATING THE AIRSHIRZ® MAGNUM.**

 WARNING 

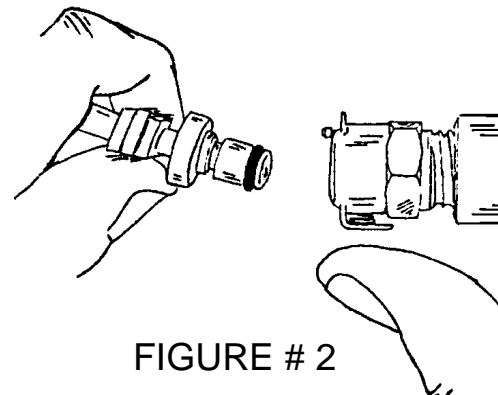
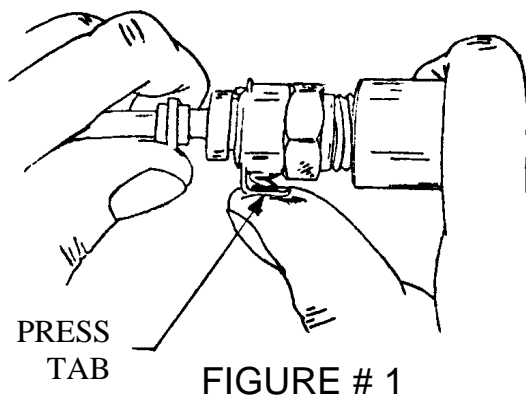
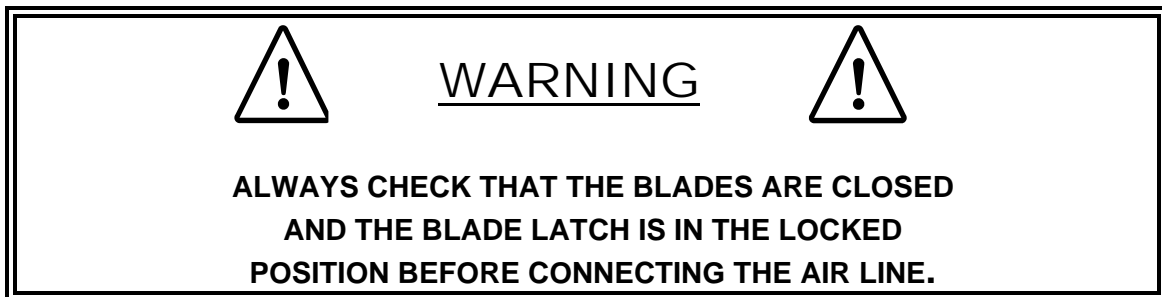
**ALWAYS CLOSE THE BLADES AND LOCK
THE BLADE LATCH WHEN NOT IN USE.**

SECTION 4.0 SAFETY FEATURES

The AirShirz® is designed to be safe and easy to use. The functions of these features should be clearly understood before operating this tool.

4.1 Air Supply Quick Disconnect

The push of a tab will disconnect the twin coiled tubing from the coupler (see Figures #1 and #2). To reconnect the air, push the couplings back together until the tab on the coupler clicks into position. (Sometimes it may be necessary to push the tab inward while inserting the connector). This connector should be disconnected when the tool is not in use.



4.2 Blade Latch

There is a latching ring just forward of the finger loop. When the finger loop is pulled inward against the power cylinder, ("blades closed" position), this ring can be rotated down against the finger loop. (See Figures #3 and #4). In this position, the finger loop will be locked closed and will be unable to drive the blades **once they are closed**.

Care should be taken to assure that the blades are closed before locking the blade latch. If the AirShirz® is connected to the air supply, simply hold the tool as if to make a cut, pull the finger loop fully inward, causing the blades to close, and rotate the latch to the locked position.

If the air supply is not connected, close the blades manually by squeezing them together with a gloved hand. Then pull the finger loop fully inward and rotate the latch to the locked position. **This is the normal rest position for handling the AirShirz®, i.e., Blades Closed - Latch Locked. Failure To Follow This Procedure Can Lead To Serious Injury.**

4.2 Blade Latch (Continued)

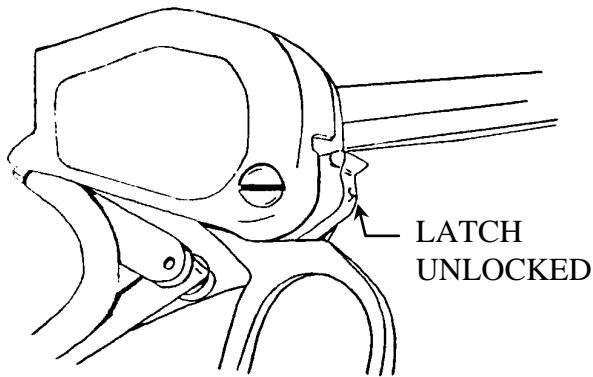
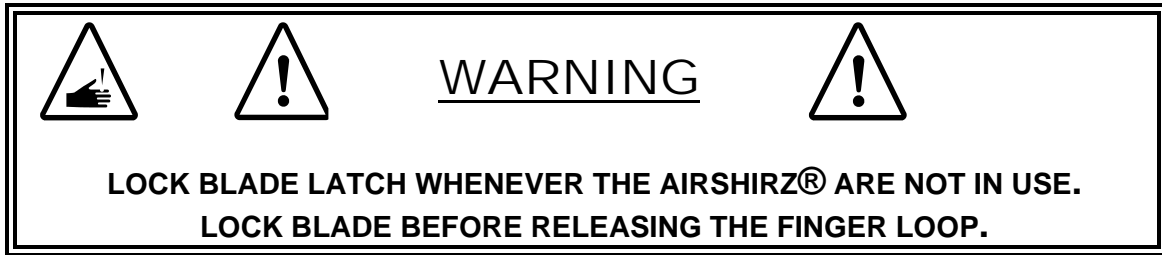


FIGURE # 3

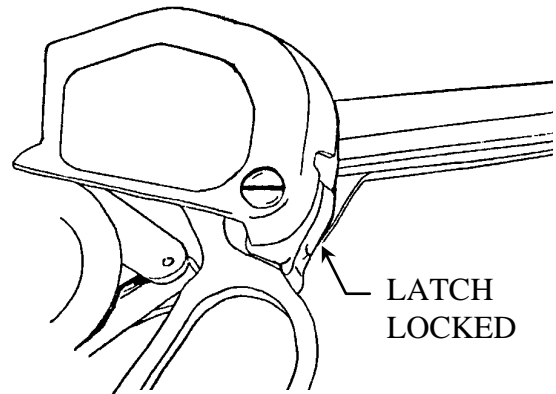


FIGURE # 4

To unlock the blade latch, hold the finger loop against the power cylinder and rotate the latch ring outward to the position shown above. There is a slight detent action that holds the latch ring in either the locked or unlocked position.

4.3 Fully Enclosed Finger Loop

The finger loop acts as a guide for the fingers. It keeps them away from the linkage and also shields the back of the fingers from bumping against the work. **Keep All Fingers Inside The Finger Loop While Operating The AirShirz®.**

SECTION 5.0 ERGONOMICS & ENVIRONMENT

The Bettcher AirShirz® has been designed to provide scissor-like performance while allowing full control of the blades at all times.

The ergonomic design is lightweight and balanced to fit comfortably in the worker's hand. Properly used, a dramatic reduction in force and muscle fatigue greatly reduces exposure to Cumulative Trauma Disorders and increases worker productivity.

Built-in safety features help reduce the risk of accidents.

The rugged and durable design provides long service life and easy in-plant maintenance.

An offset finger loop is available by special order for small hand sizes (Part Number 108304).

SECTION 6.0 UNPACKING

Carefully unpack all items and inspect them for shipping damage. Check off each item against the list below : (See Figure #5 below).

- All Units :
- Power Unit - With coiled tubing and MicroBreak Strap installed. **Do Not Remove The Strap At This Time.**
 - Blade Set
 - Filter/Coupler Assembly

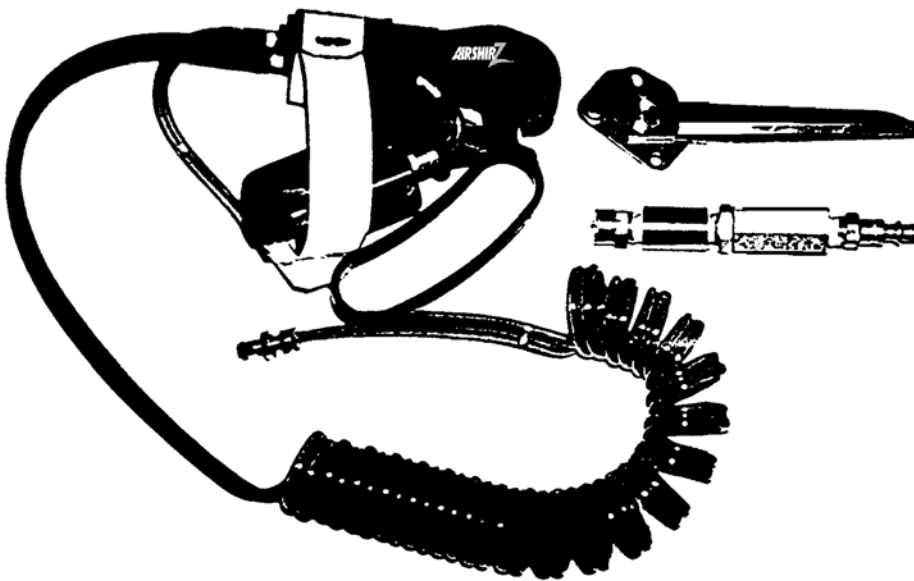


FIGURE #5

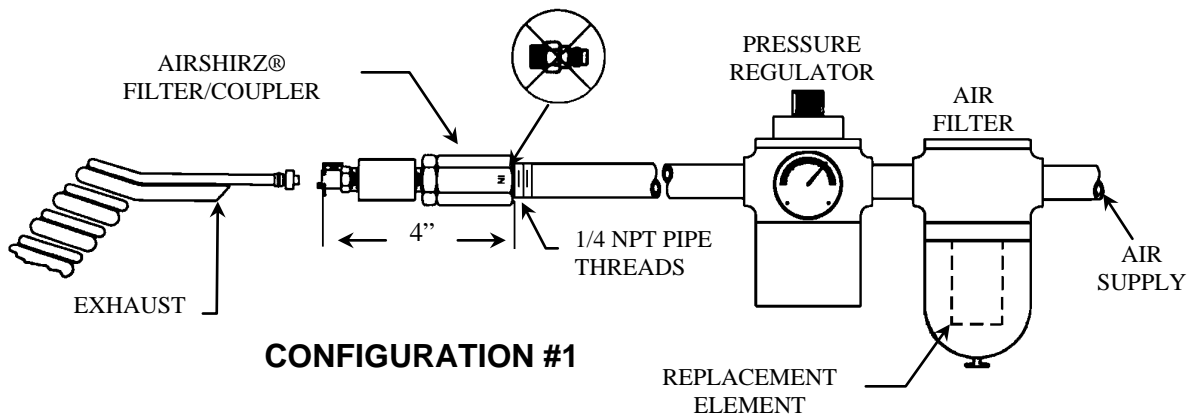
SECTION 7.0 INSTALLATION

The AirShirz® requires a supply of clean air in the range of 80 to 120 PSI (5.5 - 8.3 Bars). The location of the connection to this air supply should be carefully planned to provide a comfortable routing of the coiled tubing away from the work activities. The connection should be close enough to allow the operator full freedom of motion within the work space, yet not so close as to cause the coiled tubing to bunch and tangle. Note that the spent air is exhausted at the connector-end of the coiled tubing. This discharged air should be directed away from the operator and away from the product.

If the air supply does not already have a filter and pressure regulator, these items will need to be installed. If you purchased these items from Bettcher Industries, they will fit onto size 1/4 NPT pipe threads. The order of installation is very important. The air filter is installed **upstream** from the regulator and air gage as shown in the following illustrations.

NOTE:
USE A THREAD SEALING COMPOUND WHEN
MAKING PIPE CONNECTIONS.

The AirShirz® filter/coupler attaches to the outlet end of the air supply line and can be installed in either of two configurations:



7.1 Configuration #1 - Permanent Mount To End of Air Supply Pipe

Use a 3/4 inch open end wrench to hold the filter body while using a 9/16 inch wrench to unscrew the standard male quick connector.

7.1 Configuration #1 - Permanent Mount to End of Air Supply Pipe (Continued)

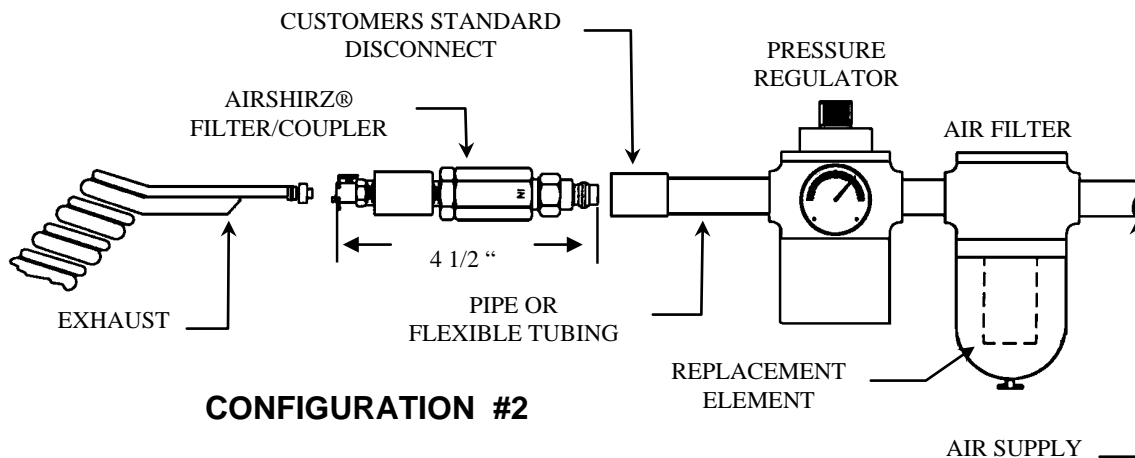
Discard the male connector.

Shut off the air supply.

Build the air line so that it ends with 1/4 NPT male threads to a point 4 inches (10 cm) from the desired AirShirz® plug-in point.

Apply a thread sealant to the male threads of the air supply line and mount the filter body directly onto the pipe.

Turn on the air supply. The coupler is ready to use. (The AirShirz® filter/ coupler shuts off automatically when it is disconnected from the power unit).



7.2 Configuration #2 - Mount to Air Hose or Pipe with Standard Quick Disconnect

Shut off the air supply.

Confirm that **your** quick connect female coupler mates properly with the male connector of the AirShirz® filter/coupler assembly.

Mount your female coupler to the end of a pipe or flexible air hose and run this pipe or hose to a point 4.5 inches (11 cm) from the desired AirShirz® plug-in point.

Turn on the air supply.

Connect the AirShirz® filter/coupler. It is ready to use.

When the AirShirz® is disconnected, it should be done at the small coupler on the coiled tubing.

SECTION 8.0 INSTRUCTIONS FOR OPERATION

8.1 The Blade Set

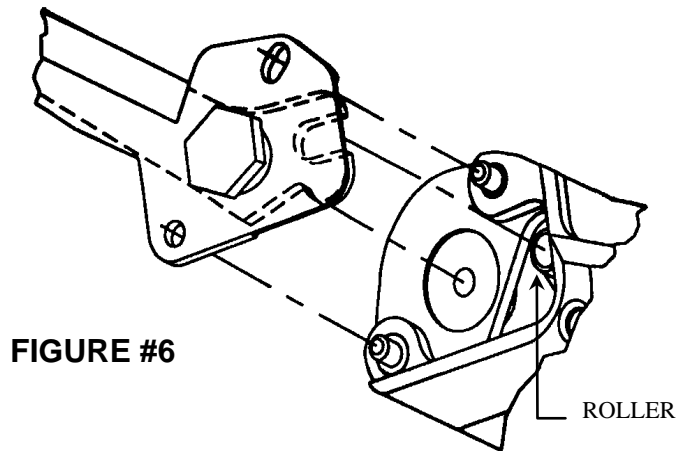
CAUTION

THE BLADES ARE VERY SHARP.
ALWAYS WEAR CUT RESISTANT GLOVES WHILE HANDLING THE BLADES.
KEEP THE BLADES IN THE CLOSED POSITION WHILE HANDLING.

The blades are supplied as a precision matched set, pre-adjusted at the factory for optimum performance. **Do not dismantle or change the adjustment on new blade sets.** The mounting screw is designed to float within the assembly and will not fall out. It should not be removed.

The blade set is shipped in the normal "**blades closed**" position. This protects both the operator and the cutting edges.

The blade set consists of two blades - a fixed blade and a movable blade. The fixed blade has two holes which slide onto the two pins in the power unit. The movable blade has a slot which fits over a roller on the internal driving linkage of the power unit. This roller is visible at the top of the pocket in the power unit as shown.

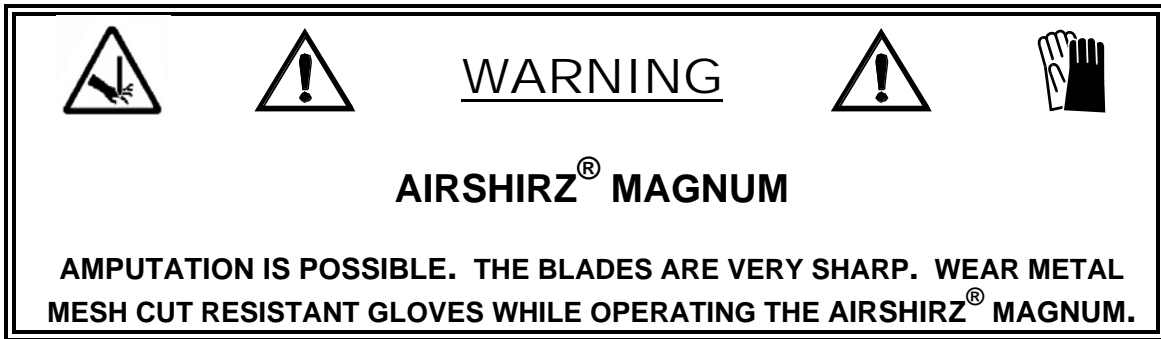
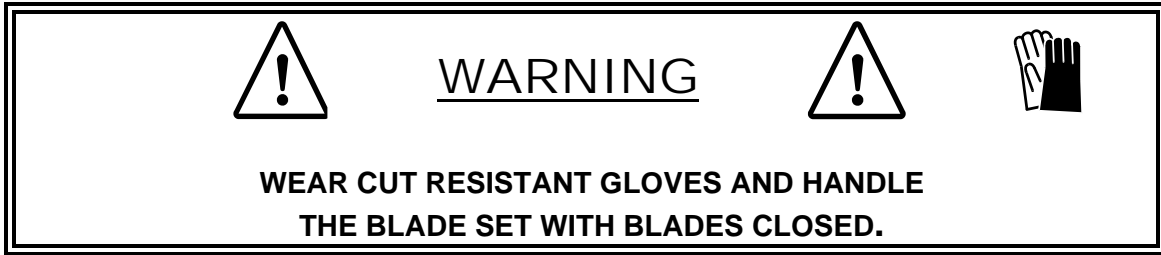


WARNING



NEVER LEAVE THE AIRSHIRZ® WITH THE BLADES IN THE OPEN POSITION.

8.1.1 Blade Installation Sequence



- Check that the finger loop is in the "blades closed" position with the blade latch in the locked position.

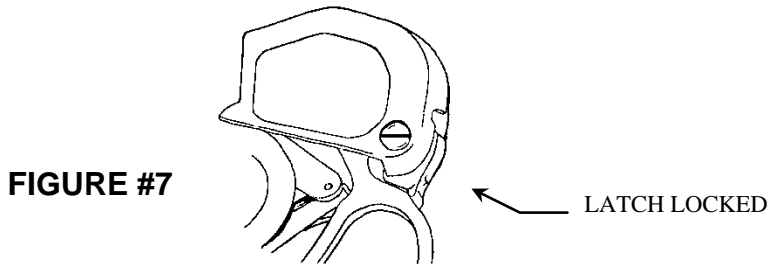
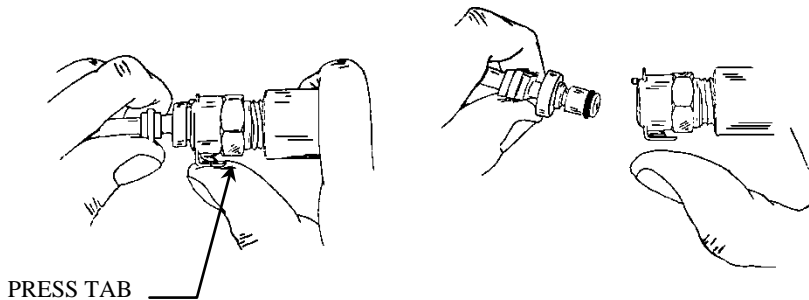


FIGURE #7

Disconnect the air supply.



PRESS TAB

FIGURE #8

FIGURE #9

- Check that all surfaces of the power unit blade pocket and pins are clean.

8.1.1 Blade Installation Sequence (Continued)

- Confirm that the roller is at the top of the pocket. If not, it can be moved by pushing forward on the linkage at the power cylinder rod. (See Figure #10).

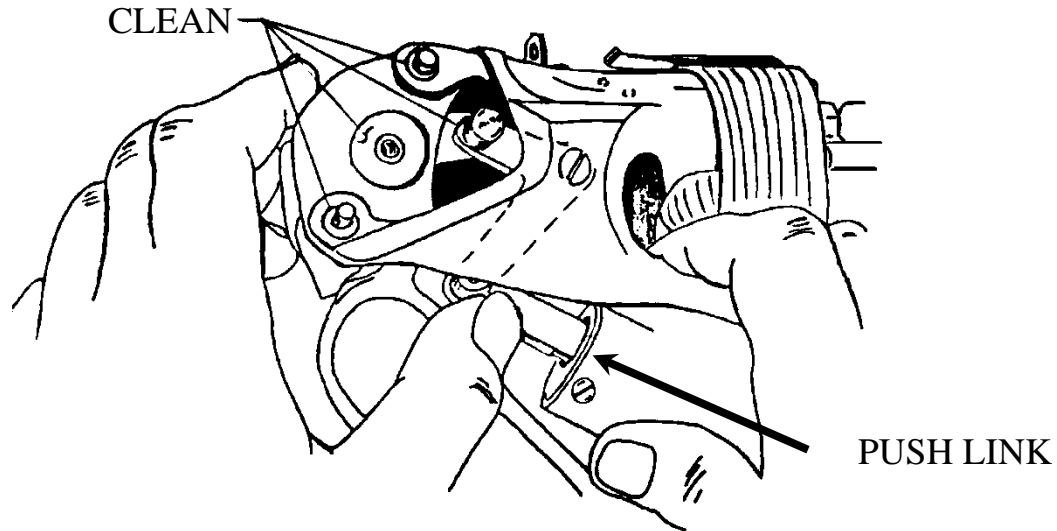


FIGURE #10

- Check that the blade set mechanism and mounting area are clean.
- Hold the blade set by the closed blades with a gloved hand. The fixed blade should be facing you and the movable blade will be behind it.
- Hold the power unit in your other hand so the blade pocket is facing you.
- Align the holes in the fixed blade with the pins on the power unit, as shown.

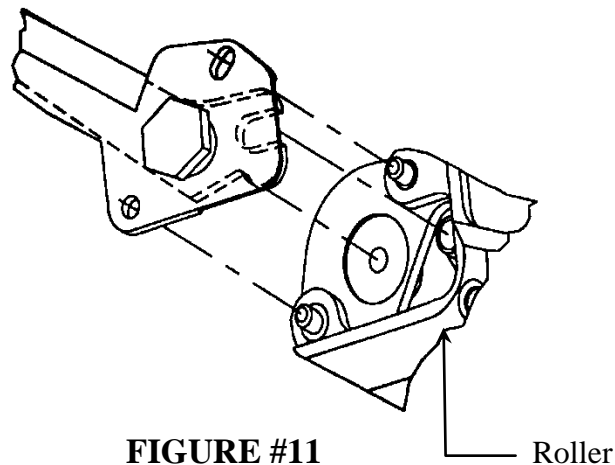


FIGURE #11

8.1.1 Blade Installation Sequence (Continued)

- Start the blade set over the pins and wiggle the blades slightly while pushing them into the power unit.

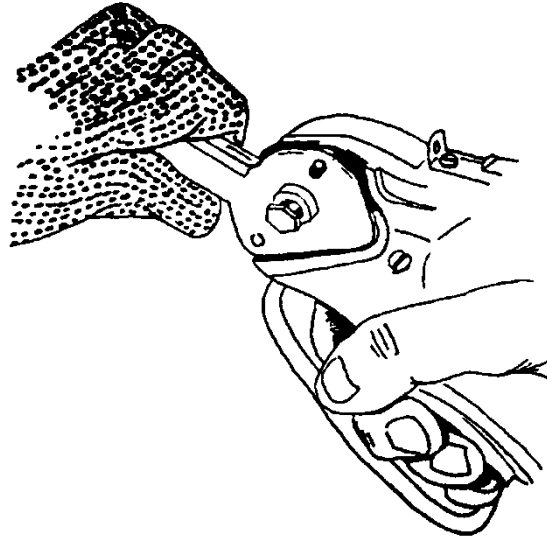


FIGURE #12

- If the blade set does not drop fully into the pocket, it is because the slot in the movable blade is not exactly aligned with the roller. To align the slot, press down at the corner of the fixed blade with your thumb while spreading the blades slightly with your gloved hand. When the slot and the roller become aligned, the blade set will drop into place.

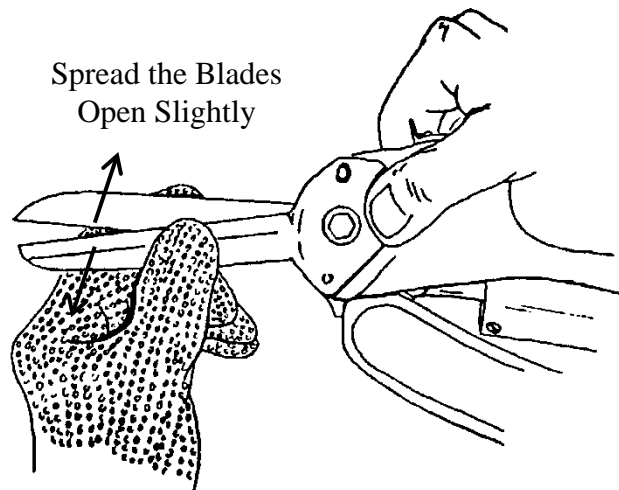


FIGURE #13

- Use a 1/2 inch wrench to tighten the blade set mounting screw.

8.1.1 Blade Installation Sequence (Continued)

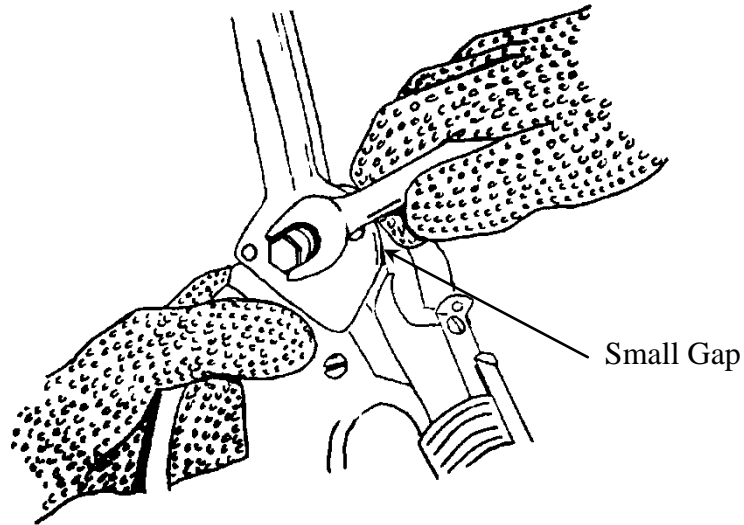






FIGURE #14

NOTE:

It is normal to have a very small gap between the inside of the fixed blade plate and the surface of the power unit.

8.1.2 Blade Removal Sequence

	<u>WARNING</u>		
WEAR CUT RESISTANT GLOVES AND HANDLE THE BLADE SET WITH BLADES CLOSED.			

		<u>WARNING</u>		
AIRSHIRZ® MAGNUM				
AMPUTATION IS POSSIBLE. THE BLADES ARE VERY SHARP. WEAR METAL MESH CUT RESISTANT GLOVES WHILE OPERATING THE AIRSHIRZ® MAGNUM.				

8.1.2 Blade Removal Sequence (Continued)

- Close the blades fully and lock the blade latch.

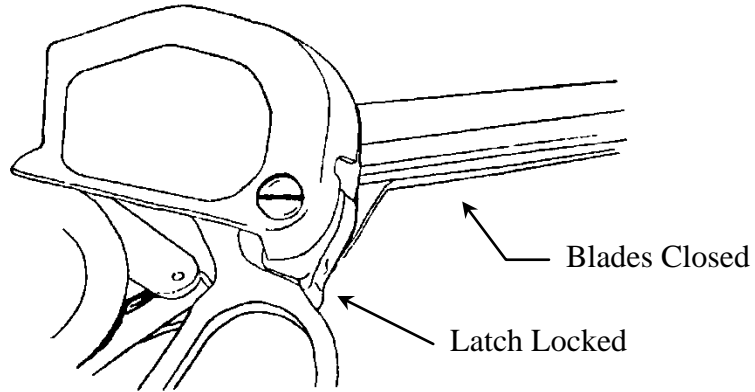


FIGURE #15

- Disconnect the air line before proceeding.

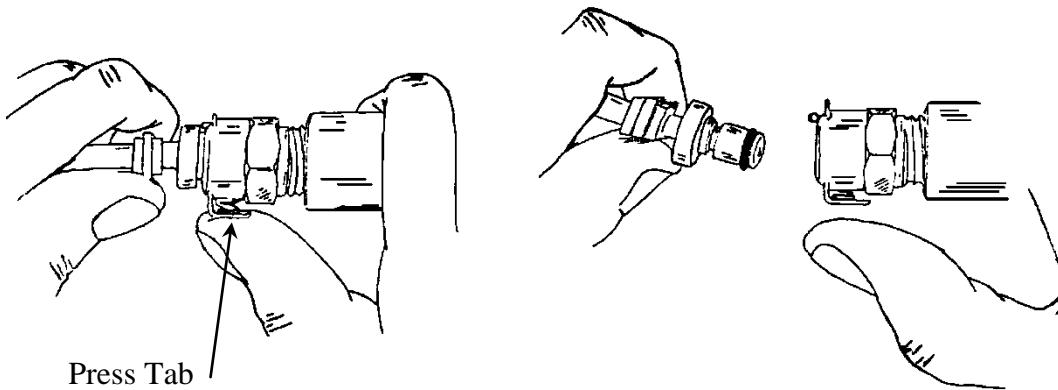


FIGURE #16

FIGURE #17

- Use a 1/2 inch wrench to unscrew the blade mounting screw until it becomes loose enough to move in and out. This screw will remain captured by the blade set and will not fall out. Do Not Attempt To Remove The Screw Completely.

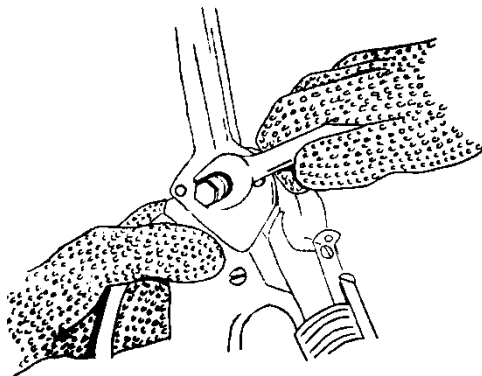


FIGURE #18

8.1.2 Blade Removal Sequence (Continued)

- Use a gloved hand to grab the blade set by the closed blades. Lift the blade set off the guide pins.

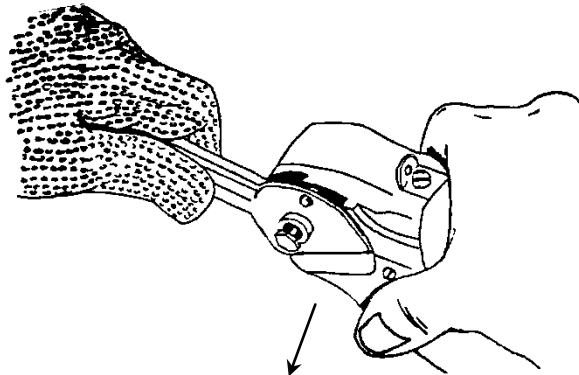


FIGURE #19

8.2 Microbreak Strap

A MicroBreak Strap has been provided on the AirShirz® power unit which allows the hand additional comfort. This strap is adjustable to the operator's hand. It is easily disengaged or removed at the snap buttons. **The Top Snap Is Only Removed For Cleaning Or Replacement.** The AirShirz® is shipped with the MicroBreak Strap mounted properly. Before detaching the strap, the routing should be examined and compared to Figure #21 below.

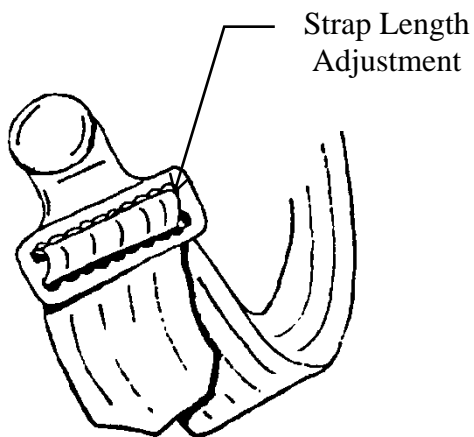


FIGURE #20

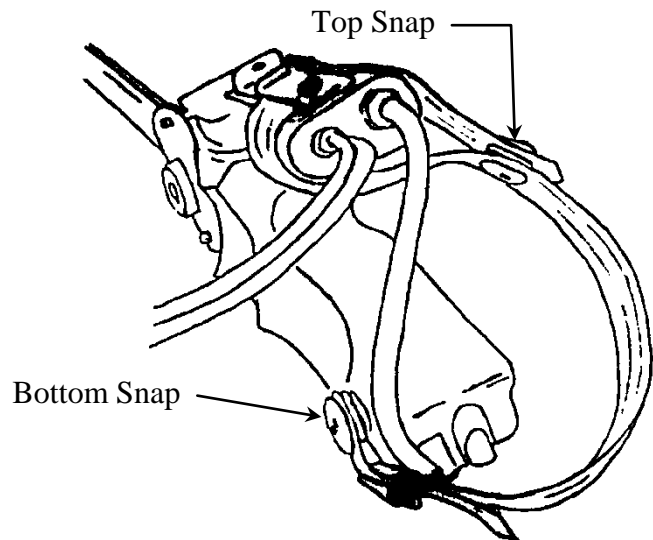
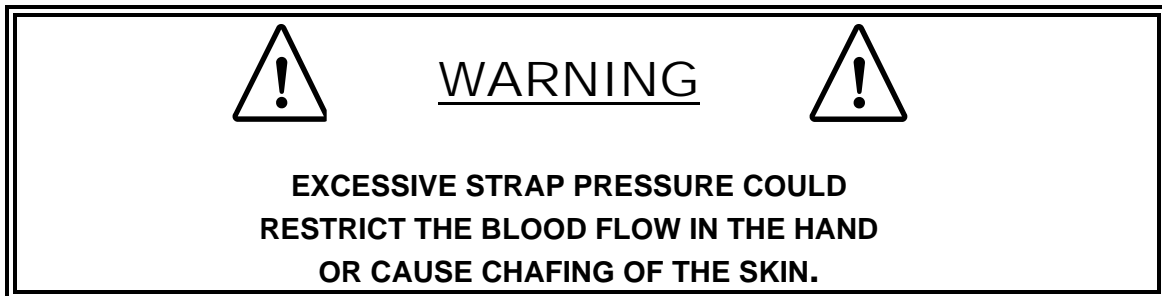


FIGURE #21

8.2.1 Adjusting the MicroBreak Strap

- Disconnect the strap at the bottom snap button.
- Pick up the AirShirz® power unit with a gloved hand and grasp it as you intend to hold it during operation. The thumb is passing through the thumb hole. The hand is as far forward as it will go. The fingers are passing through the finger loop, and it is being held closed.
- Pull the strap outward gently and wrap it over the back of the hand such that the inside portion of the top loop drapes smoothly across the hand. It may be necessary to pull the strap up and down a few times to get the top loop to rotate into alignment, such that both sides are under equal tension.
- Bring the free end of the strap around the back of the hand and attempt to align the bottom snap button with the snap mounted in the frame, without pulling on the strap. Note the amount by which the strap is either too short or too long.
- Set down the AirShirz® and adjust the length of the strap at the buckle until the strap fits with little or no slack and with no more than very slight pressure on the back of the hand. (See Figure #20)



8.2.2 MicroBreak Strap Removal

- Observe the strap routing as shown in Figure #21 above.
- Detach the bottom snap button (buckle end).
- Detach the top snap button and slide the strap forward out of the guide clip.
- Examine the strap for cuts or tearing, especially where snaps are fastened. Replace excessively worn straps.
- Clean strap thoroughly before reinstalling.

8.2.3 MicroBreak Strap Installation

- Put the top end of the strap, (end without the buckle), through the thumb hole, from the hand side of the power unit, such that the snaps are facing up.
- Wrap this end around and over the valve block of the power unit. Then slip the strap into the clip on top of the valve block.

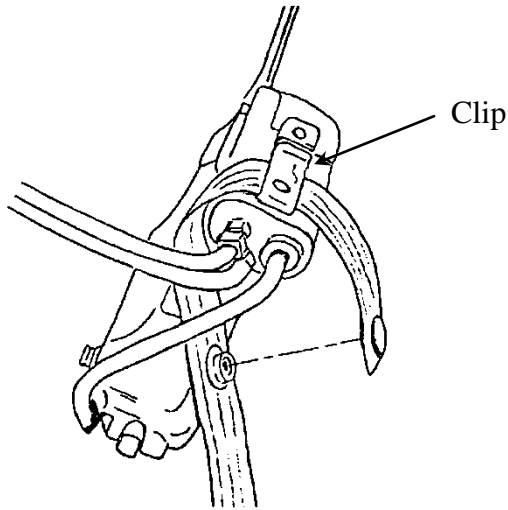










FIGURE #22

- Pull the end until the snap is aligned with the mating button near the middle of the strap. Snap these together.
- Route the buckle end around the power cylinder and snap it to the frame.
- If the adjustment was changed, it will need to be redone (see Section 8.2.1).

8.3 Operation and Product Handling

		<u>WARNING</u>		
THE BLADES ARE VERY SHARP. WEAR CUT RESISTANT GLOVES WHILE OPERATING THE AIRSHIRZ®.				

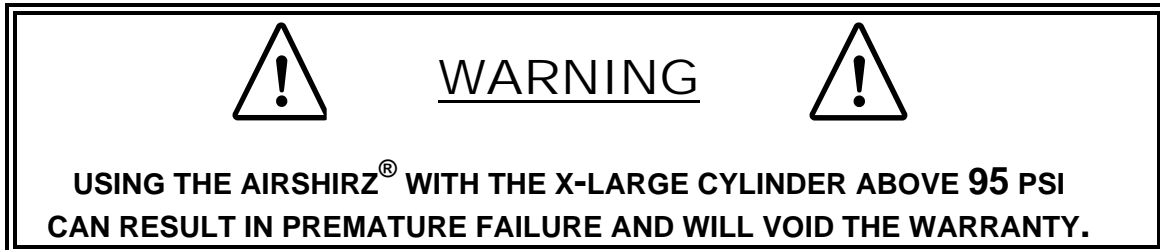
		<u>WARNING</u>		
AIRSHIRZ® MAGNUM				
AMPUTATION IS POSSIBLE. THE BLADES ARE VERY SHARP. WEAR METAL MESH CUT RESISTANT GLOVES WHILE OPERATING THE AIRSHIRZ® MAGNUM.				

		<u>WARNING</u>	
ALWAYS LEAVE THE AIRSHIRZ® WITH BLADES CLOSED AND BLADE LATCH LOCKED WHEN NOT IN USE.			

- Check that the blade latch is locked and the blades are closed.
- Check that the air line is set to the desired pressure between 80 PSI and 120 PSI (5.5 to 8.3 Bars).

8.3 Operation and Product Handling (Continued)

For most applications, the large cylinder offers optimum cutting power. For light duty applications the small air cylinder is recommended. For applications with limited airline pressure (95 PSI or less), an extra large air cylinder is recommended.



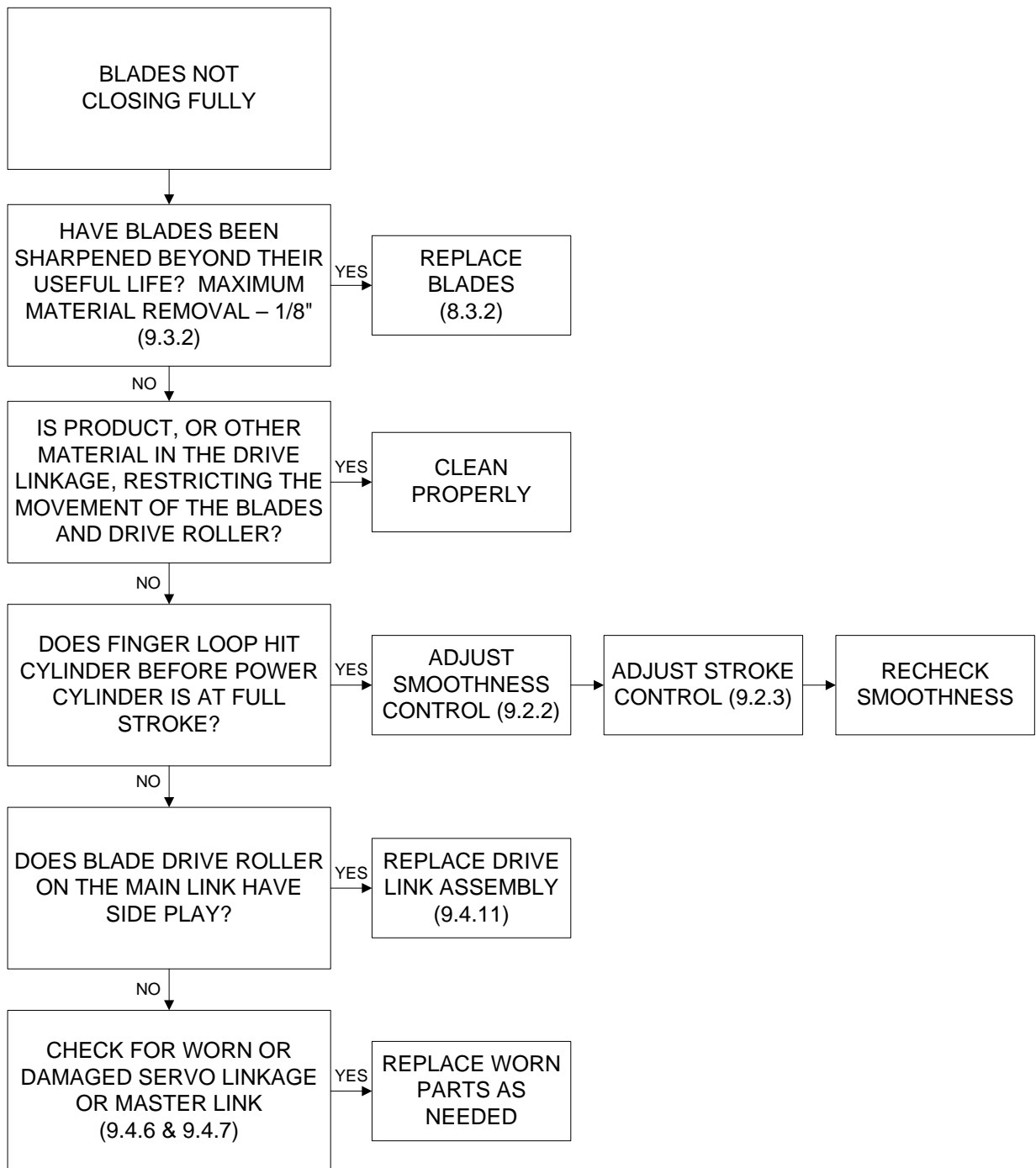
- Connect the coiled tubing to the filter/coupler.
- Put your hand in the AirShirz® and fasten the MicroBreak Strap. Do not unlock the blade latch at this time.
- Position yourself at the work station and check that the coiled tubing is not tangled and is routed in such a way that it does not interfere with the cutting operation.
- Squeeze the finger loop while reaching under the blades with your other hand to unlock the blade latch. (Rotate it forward).

The AirShirz® is now ready to cut. Hold the AirShirz® clear, then open and close the finger loop a few times. Observe the action of the blades. They should open as the finger loop swings out, and close as the finger loop is squeezed inward. If you only open the finger loop part way, the blades will follow this motion and stop part way open. The blades should close fully when the finger loop is squeezed fully inward. If the blades do not close fully, or if the blade action is rough, see the adjustments in Section 9.2.

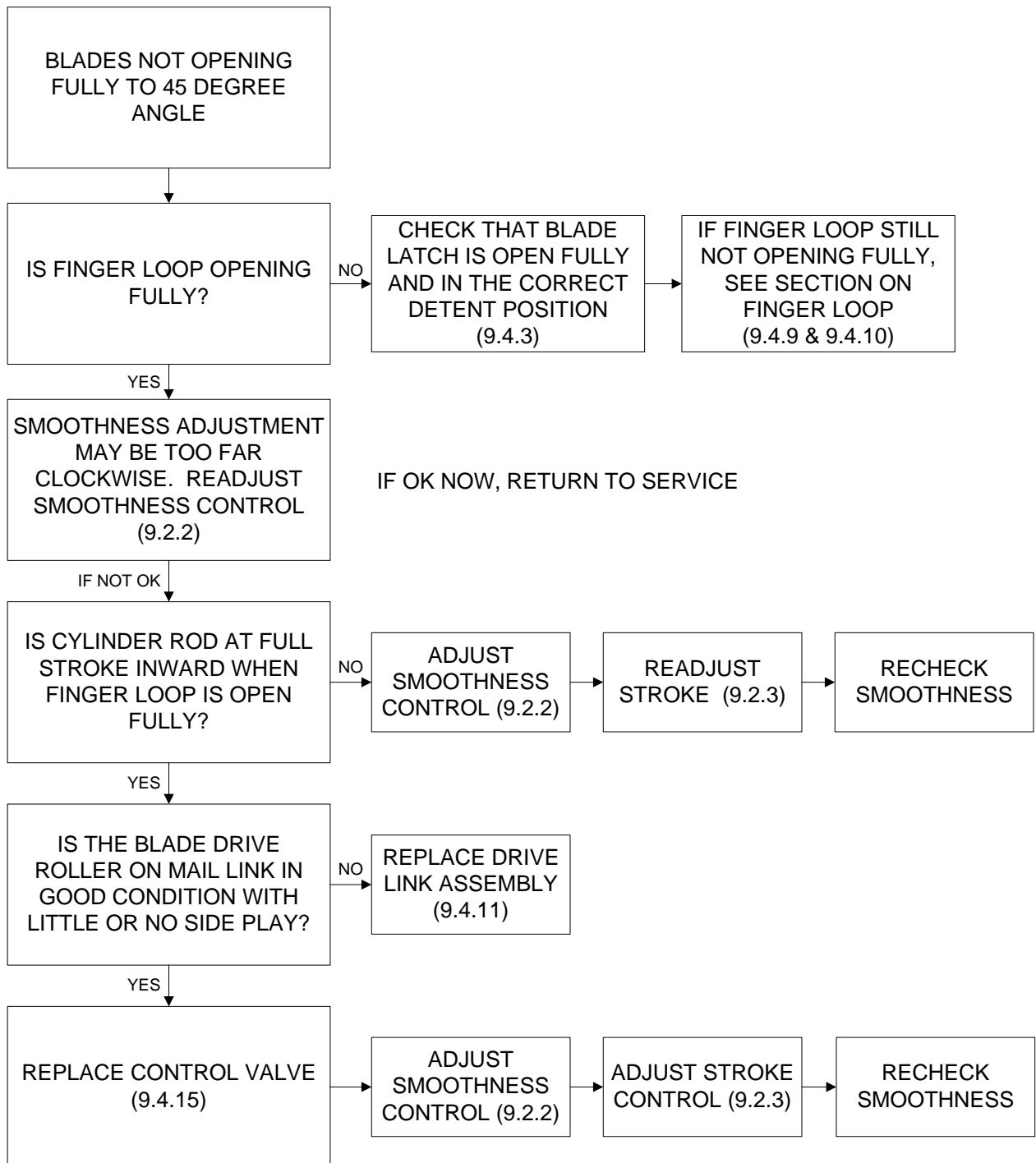
Cut the product in the same way as you would using a standard pair of scissors. You have control of the length and speed of cuts. You can make short snips to full length cuts. Some especially difficult cuts may stall the blades. When this happens, open the blades, push the scissors further onto the product and make another cut. The closer the product is to the throat of the blades, the more forceful the cut will be.

Since this is a powered tool, you will not feel any increased operating force as the blades become dull with use. A dull blade will produce a jagged, incomplete cut. The blades may "fold over", i.e., spread apart around the uncut product. The blades will then need to be resharpened. (See Section 9.1.1). The blade sets are interchangeable, so if you have a spare set, you can install them at the work station. Close the blades, lock the blade latch and follow the procedures in Section 8.1.2.

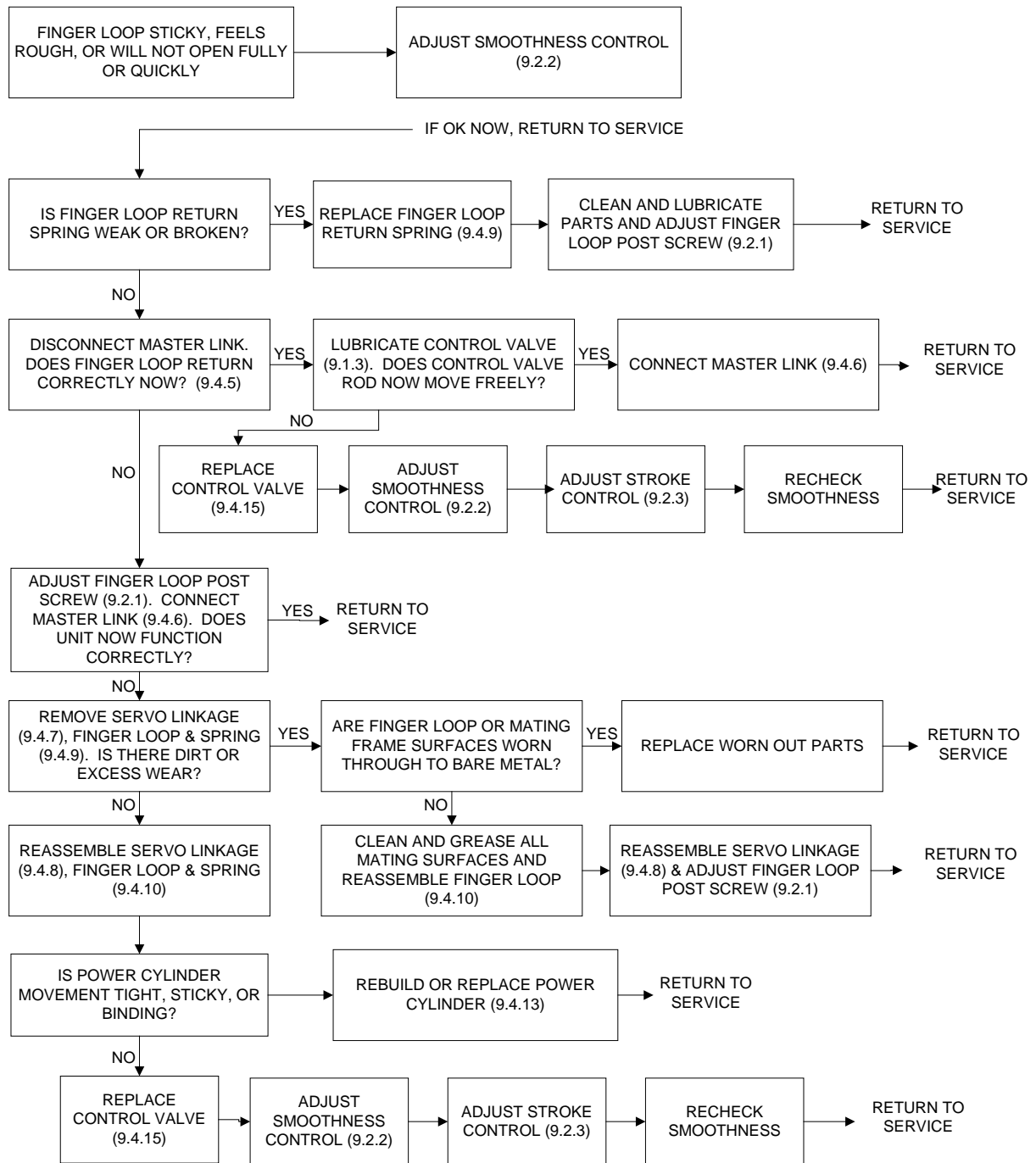
8.4 Fault Detection & Correction



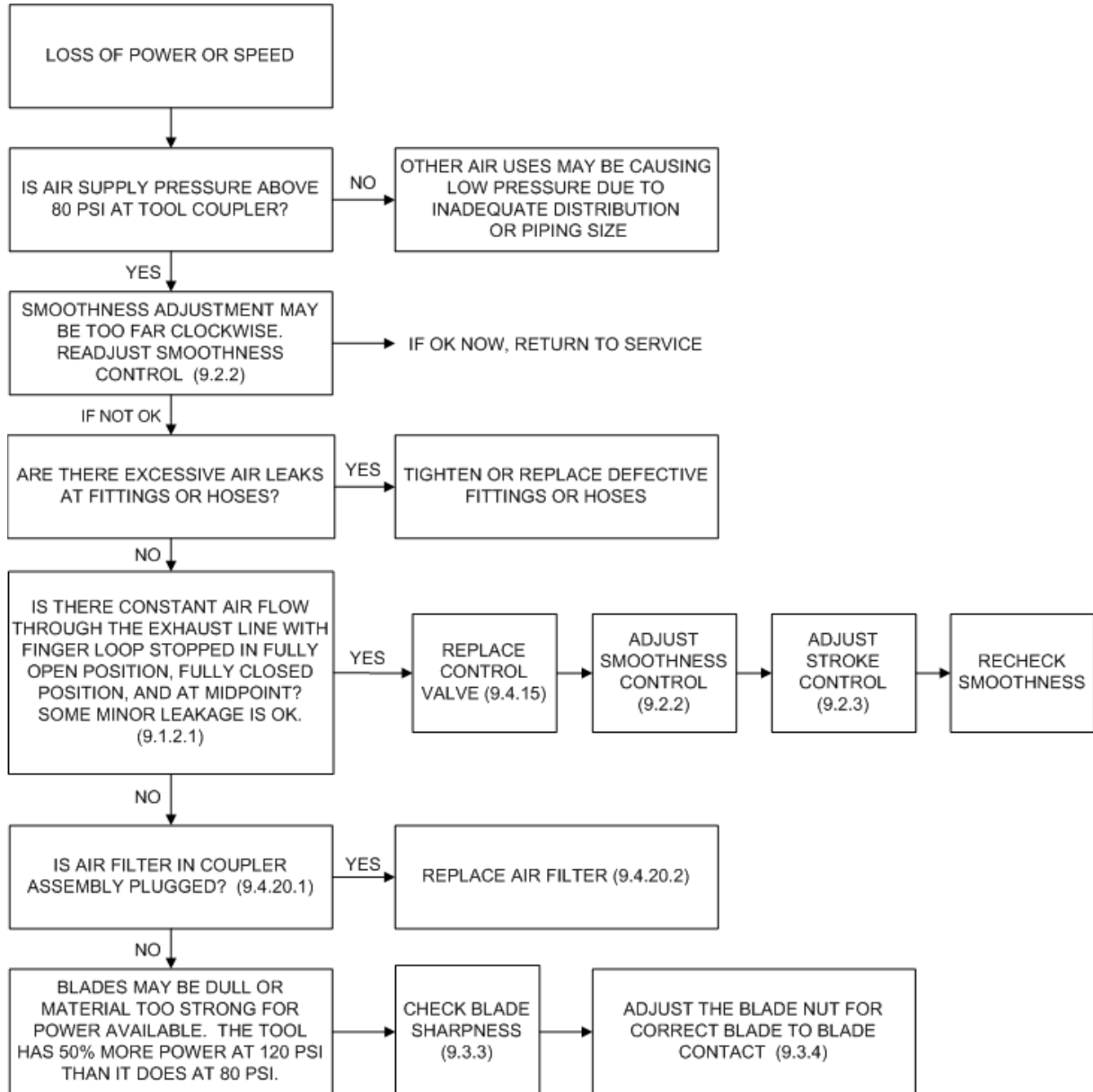
8.4 Fault Detection & Correction (Continued)



8.4 Fault Detection & Correction (Continued)



8.4 Fault Detection & Correction (Continued)

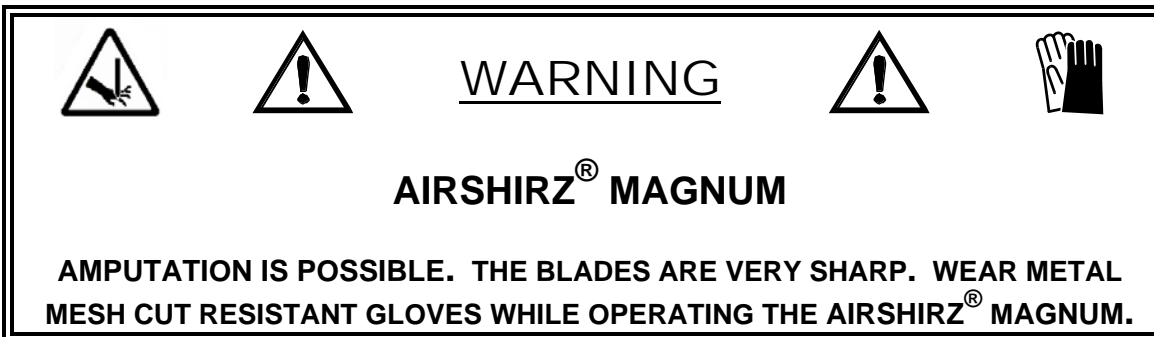


SECTION 9.0 MAINTENANCE

9.1 Daily/Periodic Checks

9.1.1 Blade Sharpness

If blades fold over instead of cutting through the product, then they need to be sharpened. Also see Section 9.3.3 Checking Blade Sharpness. Disconnect the air supply and remove the blade set (reference Section 8.1.2).



Open the blades fully. Look along the cutting edges. If the edges are not nicked or overly rounded, the sharpness may be restored by "steeling". For optimum sharpness, use the Bettcher Industries Model 212 EdgeKing Scissor Sharpener System.

9.1.2 Leak Tests

A small amount of air leakage will not significantly affect the operation of the AirShirz®. However, large leaks will cause the AirShirz® to operate at reduced power and speed. There are two simple tests that may be done.

9.1.2.1 Exhaust Leak

While operating the AirShirz® with one hand, place the other hand about 1 inch (2.5 cm) over the exhaust outlet. Stop the cutting action in three places : 1) Blades fully open; 2) Blades half closed; and 3) Blades fully closed. You should not be able to feel a stream of air at this outlet whenever the blades are **Not Moving**. A stream of air indicates a worn or defective control valve, or a leaking piston O-ring in the power cylinder.

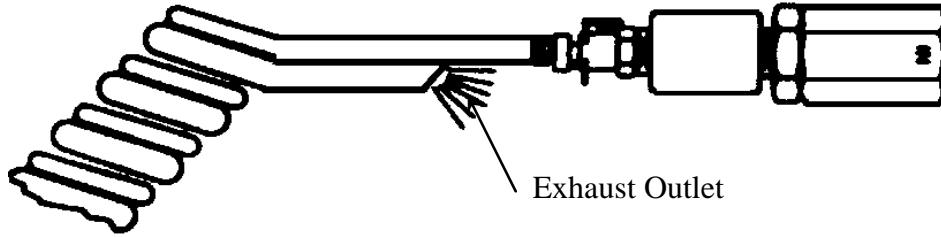


FIGURE #23

9.1.2.2 General Leak

Disconnect the air supply and remove the blade set.

Reconnect the air supply and operate the AirShirz® while it is submerged in a pan of water. Observe around all the fitting connections, at the power cylinder rod and at the control valve rod. Any more than a few bubbles at these points require attention. Check for loose fittings.

9.1.2.3 Power Cylinder Leak

Disconnect the air supply and remove the blade set.

Disconnect the front air tube to the power cylinder at the valve body.

Use a screwdriver to pry the tube end over the barb of the fitting while pulling on the tubing with the other hand. Be careful not to damage the barb.

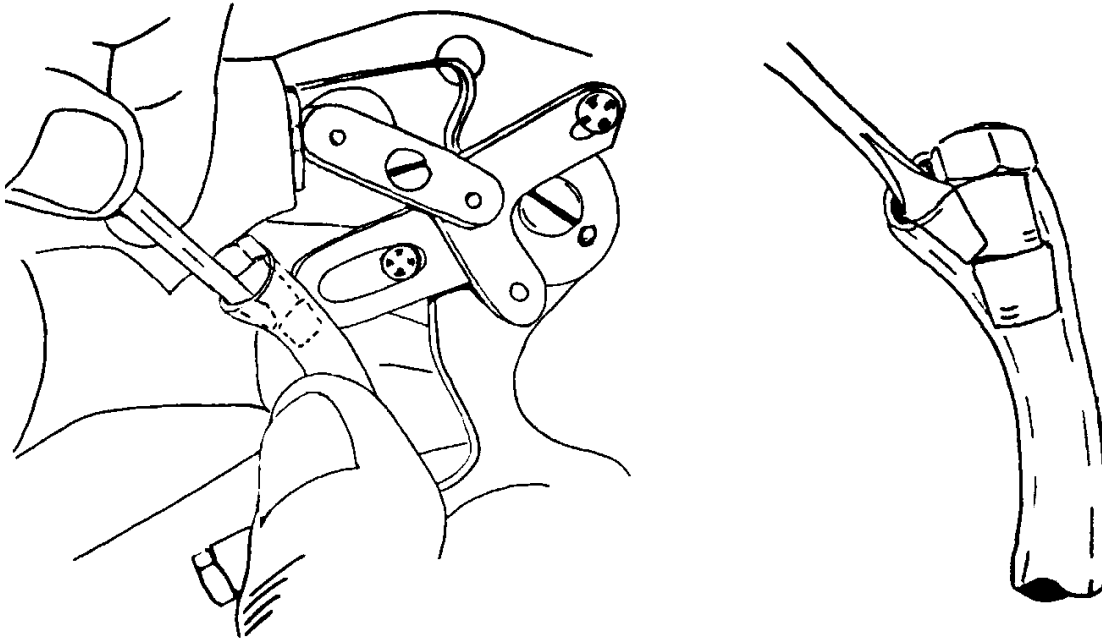


FIGURE #24

9.1.2.3 Power Cylinder Leak (Continued)

Use the same method to disconnect the rear air tube at either end. Push the power cylinder rod fully in.

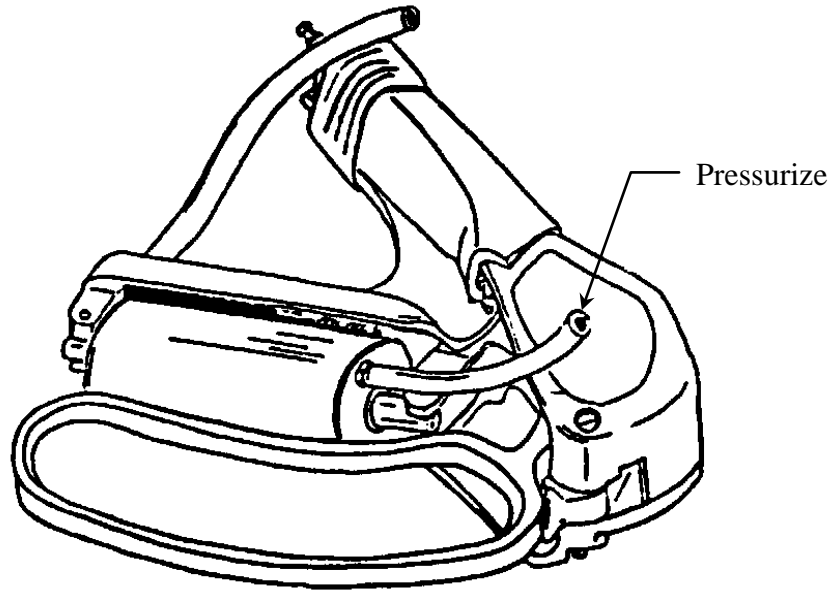


FIGURE #25

Use a shop air nozzle to pressurize the front (short) air tube while submerging the cylinder rod and rear tube in a pan of water. There should be no more than a few bubbles emerging anywhere.

9.1.3 Lubrication

Most of the moving parts of the AirShirz® are designed to operate without periodic lubrication. If dirt accumulation becomes a problem with some moving parts, clean them and reassemble them with a generous coat of Bettcher® Max-Z-Lube to inhibit dirt penetration into the works.

9.1.3.1 Greasing the Drive Roller and Servo Link

The drive roller and servo link should be greased daily to prevent excess wear.

- Disconnect the air line
- Remove the blade set
- Open the linkage cover
- To expose the grease fitting at the end of the link pin, push the rod into the power cylinder to its full stroke position as shown in Figure #26

9.1.3.1 Greasing the Drive Roller and Servo Link (Continued)

- Hold the grease gun directly over the grease fitting, and push the cone tip of the gun tightly against the fitting
- Pump the plunger on the grease gun until grease is seen coming out at the ends of the roller. Wipe off excess grease. Push the roller upward, then push the rod to the fully out, end of stroke, position.
- Hold the grease gun in the hole in the white servo link (see Figure #26B) and push the cone tip of the gun tightly against the link.
- Pump the plunger on the grease gun until grease is seen coming out from the back side of the servo link.
- Close the linkage cover
- Install the blade set

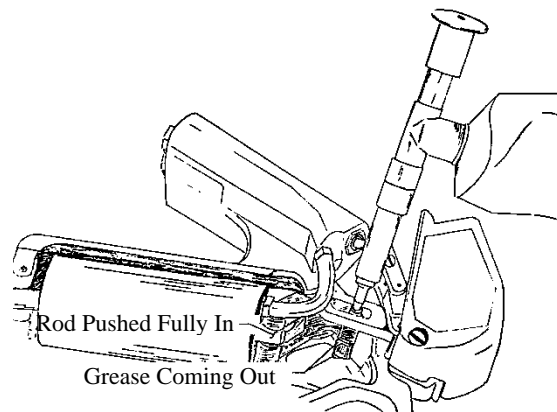
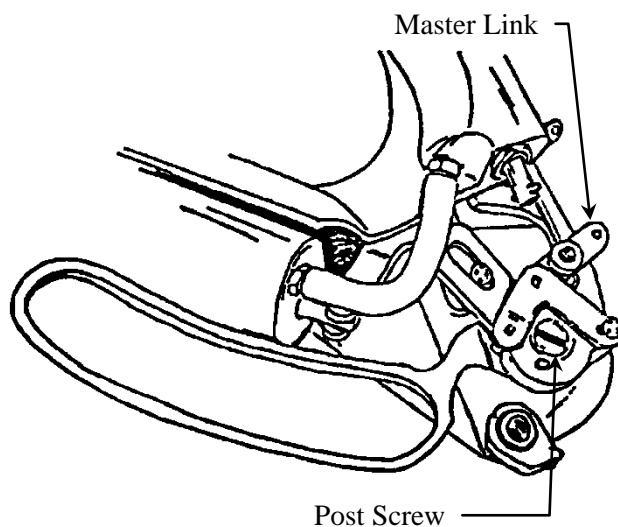


FIGURE #26A



NOTE:

To load the grease gun, thread a new tube of Bettcher® Max-Z-Lube into the side of the grease gun. Squeeze the tube to remove air while pumping the plunger until grease comes out the tip in a steady stream.

Do Not Remove the Tube of Grease from the Gun Once it is Installed, Until the Tube is Empty.

FIGURE #26B

9.1.3.2 Weekly / Monthly (Depending on Air Quality)

Disconnect the air supply line and squirt a few drops of light oil into the line with connector on it. (See Approved Oils below). Reconnect the air supply and operate the AirShirz® about 10 times to work in the oil. This will flush out any gummy deposits forming in the valve.

Approved Oils - Mineral Oils (Bettcher P/N 103603). **Do Not Use WD-40 Or Similar Products.** **NOTE:** Food Applications Should Always Use Food Grade Lubricants.

9.2 Adjustments

9.2.1 Finger Loop Post Screw Setting

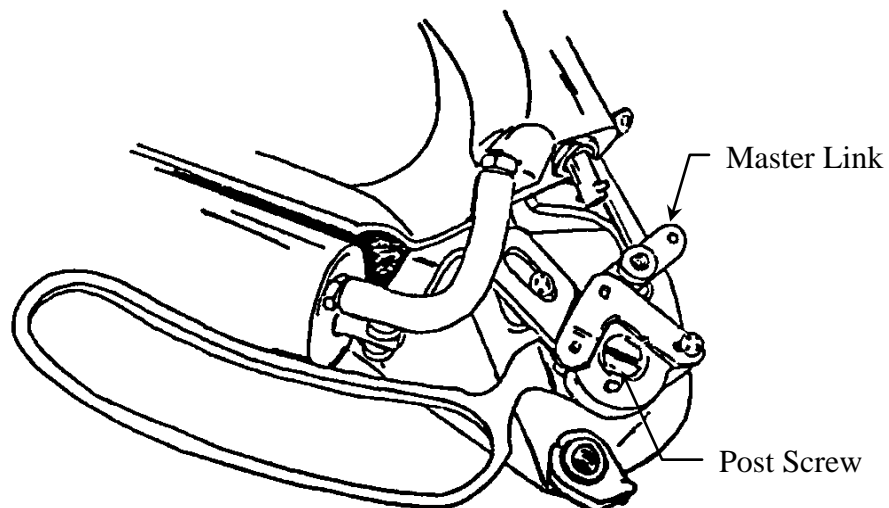


FIGURE #27

Disconnect the air line.

Remove cover. (Reference Section 9.4.1)

Disconnect master link. (Reference Section 9.4.5).

Hold finger loop fully inward (against the power cylinder). Tighten the post screw until the finger loop is held in place.

NOTE: The post screw should always turn with some resistance. If not, replace with Special Self Locking Screw Part Number 108185.

9.2.1 Finger Loop Post Screw Setting (Continued)

With your hand off the finger loop, slowly loosen the screw (counterclock-wise) until the finger loop **just opens freely**. There should be a slight bounce or "clunk" when the finger loop hits the stop. Test the finger loop action a few times and readjust the post screw slightly as needed. Then loosen the screw an additional 22° (approximately) using Figure #28 below as a guide.

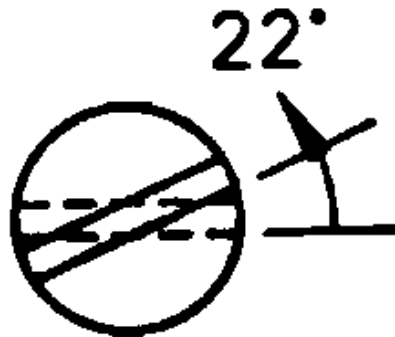


FIGURE #28

Connect the master link (Reference Section 9.4.8)

Install the cover. (Reference Section 9.4.2)

9.2.2 Smoothness Adjustment

The inner workings of the control valve are set precisely to respond quickly to commands from the finger loop. They may need to be readjusted after a long period of use, or after removing the rear fitting assembly.

Disconnect the air line.

Remove the blade set. (Reference Section 8.3.2).

Connect the air line and disengage the blade latch.

Loosen the locknut for the rear fitting, located at the rear of the valve body, one full turn.

While operating the finger loop full travel open and closed, use a 5/16 inch open-end wrench to rotate the square part on the rear fitting, counterclockwise, until operation feels rough. If you have been doing the stroke adjustment, be sure the control valve lock nut at the front of the valve is tight. Otherwise the whole valve body may rotate.

9.2.2 Smoothness Adjustment (Continued)

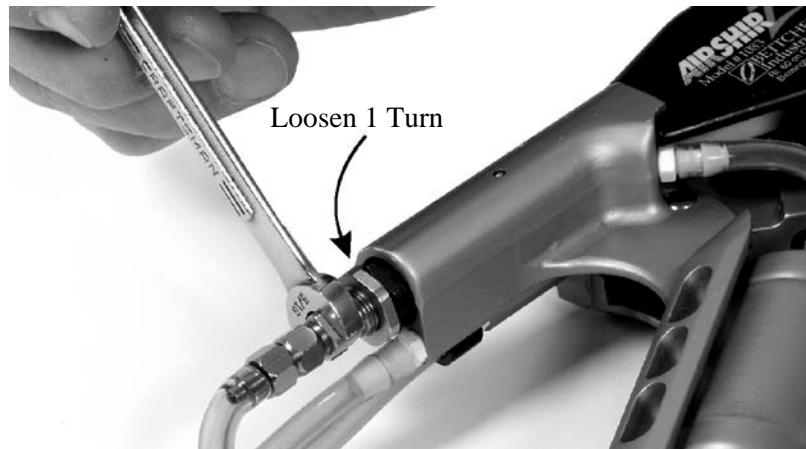


FIGURE #29

Now, slowly rotate the fitting clockwise while operating the finger loop until operation **just becomes smooth**. (At this setting, the noise at the exhaust line also becomes loudest). The sound of the exhaust should be about equally loud when opening or closing the finger loop.

Rotate the rear fitting an additional 1/8 turn clockwise.

Retighten the locknut.

9.2.3 Stroke Adjustment

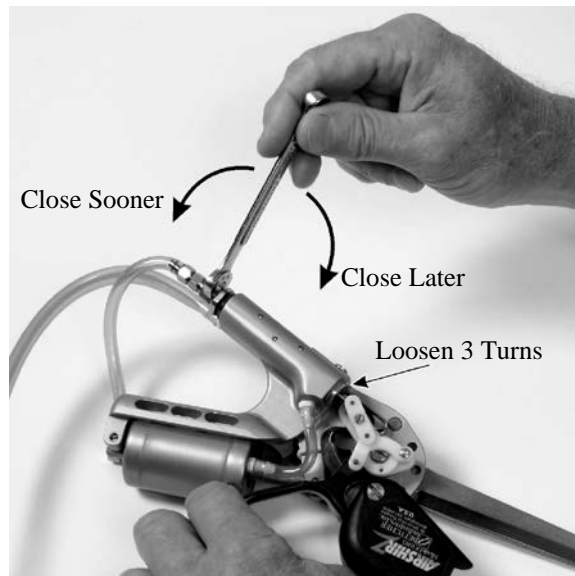


FIGURE #30

9.2.3 Stroke Adjustment (Continued)

The relationship between the blades and the finger loop position can be adjusted so the point where the blades just close fully can be put in some preferred position. (Usually where the finger loop is just about fully inward. Special blades may prefer other positions).

Verify that the smoothness is adjusted properly before proceeding.

Disconnect the air line.

Remove the blade set (reference Section 8.3.2).

Open the cover and using a 9/16 inch open-end wrench, loosen the control valve lock nut about 3 turns. Then close cover. (**NOTE:** On the AirShirz® Magnum, it is necessary to remove the cover).

Connect the air line and disengage the blade latch.

Observe the power cylinder rod position while working the finger loop fully in and out. The rod should reach the end of its stroke, both ways, before the finger loop reaches the limits of its stroke. See Figure #30A.

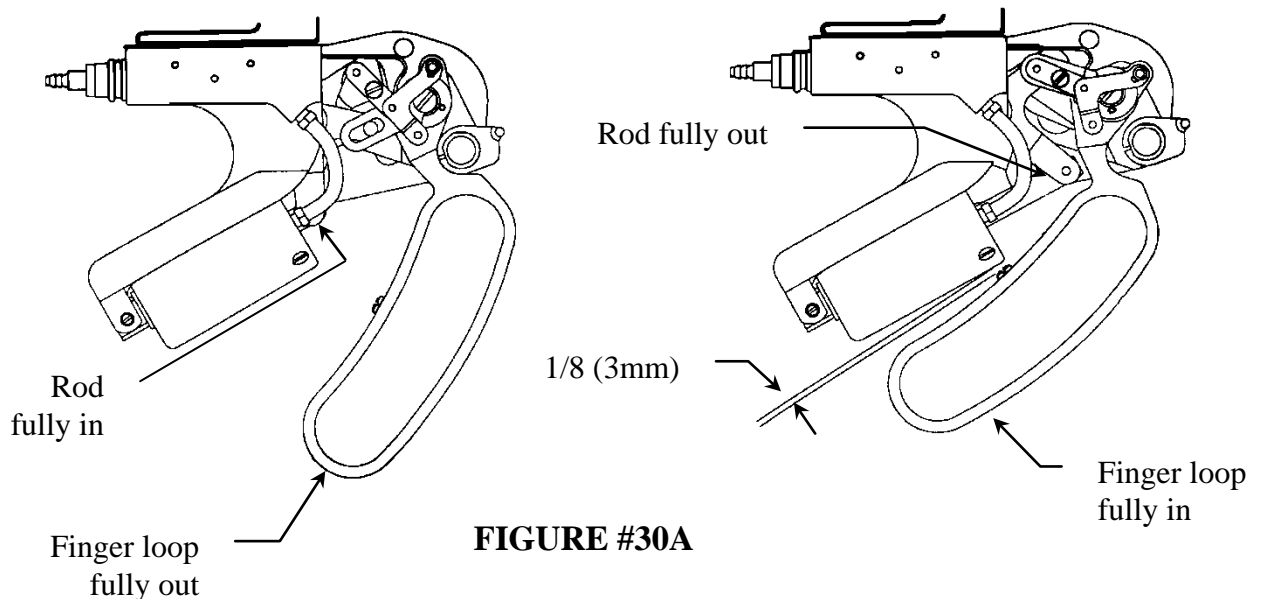


FIGURE #30A

9.2.3 Stroke Adjustment (Continued)

Use a 1/2 inch open-end wrench to rotate the control valve assembly at the rear of the frame. (See Figure #30).

A clockwise rotation causes the rod to move outward (blades close sooner).

A counterclockwise rotation causes the rod to move further into the power cylinder (blades close later).

There is typically about 1/8 inch (3 mm) gap between the finger loop and the power cylinder when the rod just becomes fully extended. When the desired setting is obtained, close the blades and engage the latch ring. Disconnect the air line.

Open the cover and use a 9/16 inch open-end wrench to tighten the locknut against the frame. Close cover. On the AirShirz® Magnum, replace the cover.

Recheck smoothness adjustment.

9.3 Blade Sharpening and Maintenance

This section does not apply to **Neck Breaker** or other special blade styles. Refer to separate instruction sheet provided with the blade set.

9.3.1 Steeling the Blades

Steeling is a technique that requires a high degree of skill to hold the blade edge properly against the steeling rod. Those who are not adept at this should use the grinding method (see Section 9.3.2).

First use a ceramic steeling rod. Open the blades fully. Hold the rod in one hand and with the other hand, set a blade edge flat against the surface of the rod. Rock the blade back and forth if necessary to find this flat point.

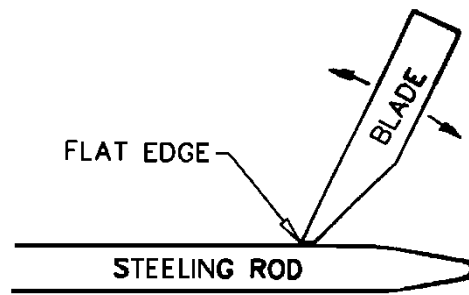


FIGURE #31

9.3.1 Steeling the Blades (Continued)

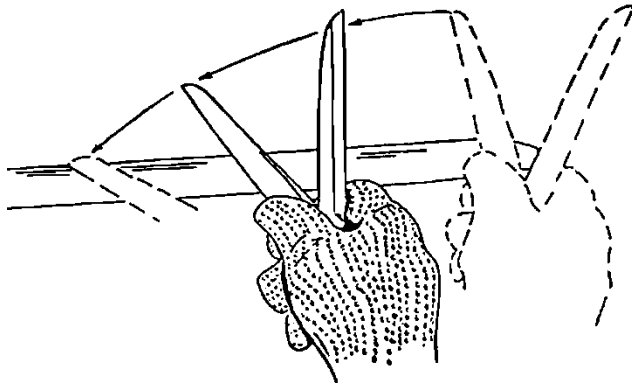


FIGURE #32

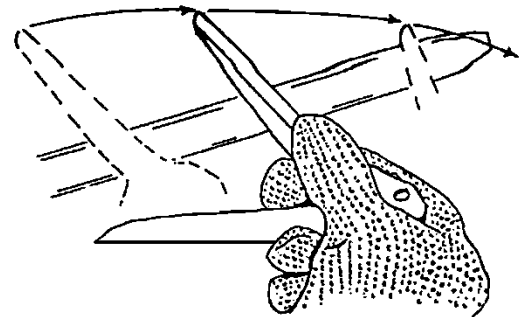


FIGURE #33

Start with the throat of the blade placed near the tip of the steeling rod. Apply moderate pressure. Slide the blade toward you while sweeping the contact point outward such that the entire edge is worked in each stroke. Repeat this stroke several times. (See Figure #32).

Turn the blade so the flat side (back), lays flat against the steeling rod with the blade edge facing away from you. Start near the handle of the rod and at the throat of the blade. Apply light pressure. Slide the blade away from you while sweeping the contact point outward such that the entire surface of the blade is worked in one stroke. (See Figure #33).

Perform same procedure on the mating blade.

Repeat the entire steeling procedure using a smooth metal steeling rod. Check blade sharpness (see Section 9.3.3). If sharpness is not restored, then blades will need to be ground.

9.3.2 Grinding the Blades

In most cases, the blades can be reground until the edges no longer overlap at full closure. The grind depth of both edges is at least 1/16 inch (1.5mm) before they begin to lose overlap (see Figure #34A). You may be able to grind up to 1/8" (3 mm) depending on the application. For some heavy cutting applications, the loss of stiffness due to grinding may require blade replacement sooner, or the transfer of that blade set to a lighter operation.

9.3.2 Grinding the Blades (Continued)

Blades which have a small gap at the tip often may be restored by grinding back the length of both blades up to the point of overlap (see Figure #34B). This procedure may be repeated until the blade length no longer suits the application. **CAUTION:** Do not let the blade tips overheat during grinding, or the strength of the metal will be destroyed. Dip the tips in a cup of water to cool them between each grind.

If you are using a special blade set, follow the recommendations that came with them.

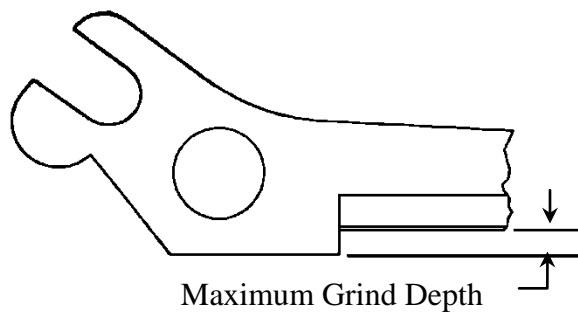


FIGURE #34A

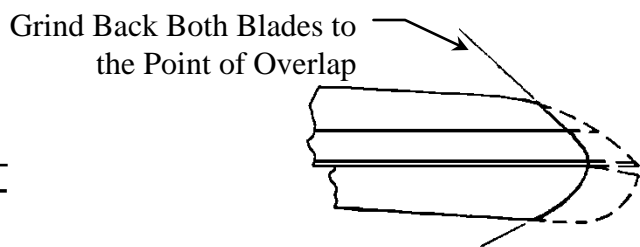
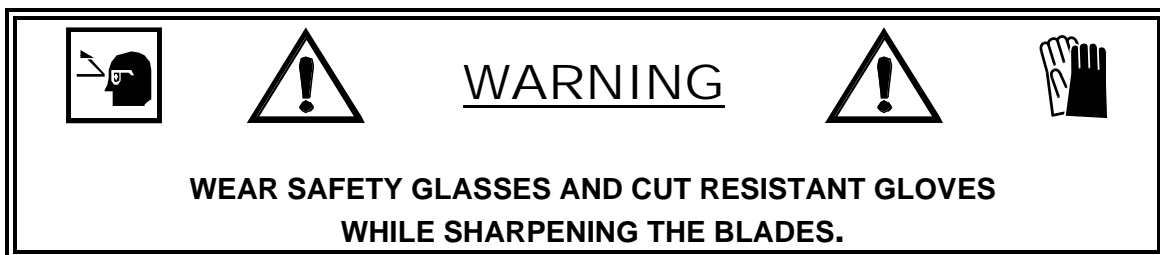


FIGURE #34B

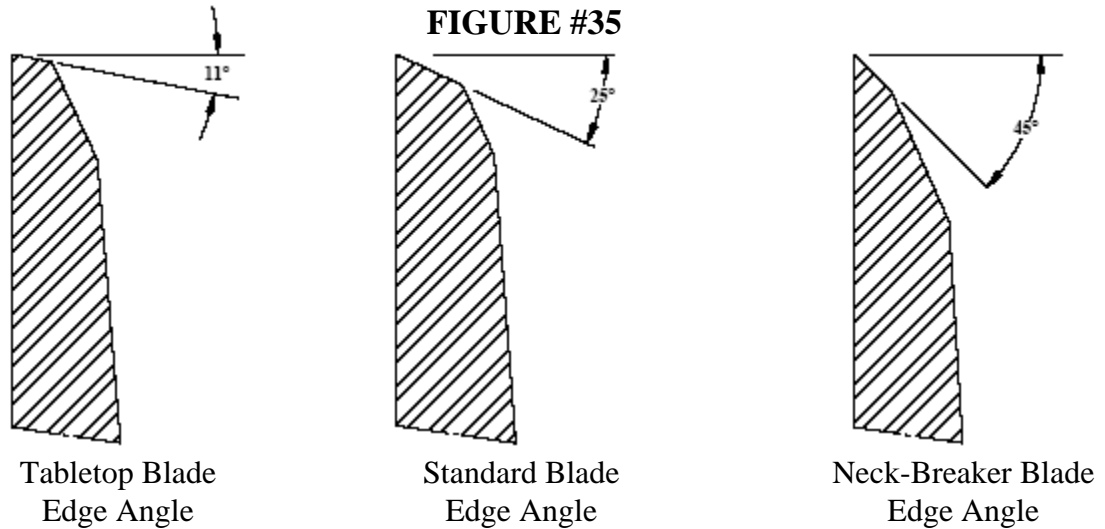
Use a bench grinder type sharpener that has both a grinding wheel and a buffing wheel.

After sharpening, the blade nut will usually need to be adjusted so that the blades engage adequately over the full cutting length (see Section 9.3.4).



Grind the edge of both blades at 25°. **NOTE:** Special blades sets may specify a different angle. It is very important to always regrind the blades to their same angle, otherwise, blade life will be reduced significantly.

9.3.2 Grinding the Blades (Continued)



Support the blade with the edge at the proper angle against the grinding wheel. Use **light** pressure against the wheel. Start at the throat of the blade and move with a smooth steady motion until the tip of the blade passes by the wheel.

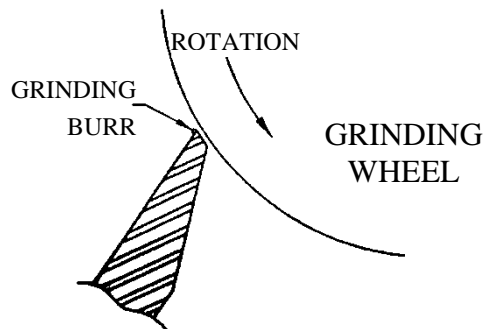


FIGURE #36

CAUTION

PRESSURE TOO HARD OR MOTION TOO SLOW WILL
BURN THE BLADE EDGE, ESPECIALLY NEAR THE TIPS.

Make repeat passes until the edge is restored. Grind away as much as needed to remove nicks and create a continuous new edge.

9.3.2 Grinding the Blades (Continued)

After both blades have been ground, close the blades **while holding them spread apart sideways so that the cutting edges do not touch**. Now press the blades together while opening them slowly. This will cause the grinding burr to be rolled back onto the edge where it can be buffed off.

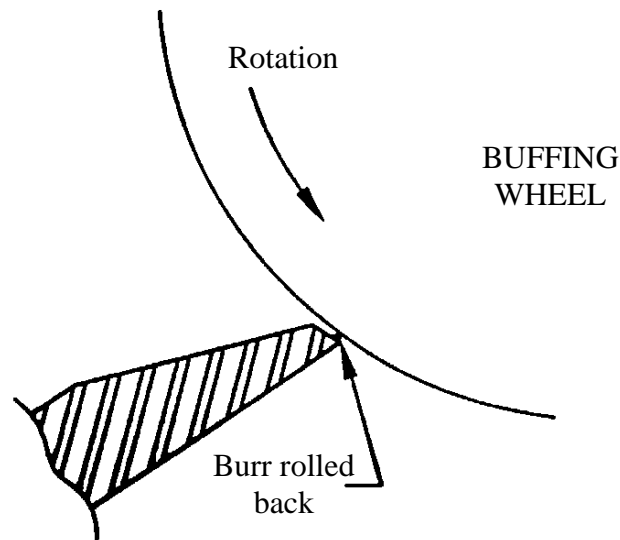


FIGURE #37

Buff the blade edges at the same angle, and in the same way as they were ground, except for the direction of the blade against the wheel. (See Figure #37 above). After buffing both blades a few times, take the blade set and close the blades normally by hand. This will trim off any residual burr and create a matching shape on the cutting edges.

9.3.3 Checking Blade Sharpness

A sharp blade set will be able to cut cleanly through a sheet of 8 mil (.2mm) thick latex without fold over (sold as "Dental Dam" from dental supply outlets or available from Bettcher Industries #108218). Check this cut when blades are closing slowly and then again, with blades closing fast.

		<u>WARNING</u>		
NEVER HOLD LATEX SHEETS IN YOUR HAND WHILE MAKING CUTS. ALWAYS WEAR CUT RESISTANT GLOVES WHEN HANDLING THE AIRSHIRZ®.				

9.3.3 Checking Blade Sharpness (Continued)

The recommended way to use the latex sheets is to tape the top edge to the edge of a shelf. Let the sheets drape down and make vertical cuts as shown.

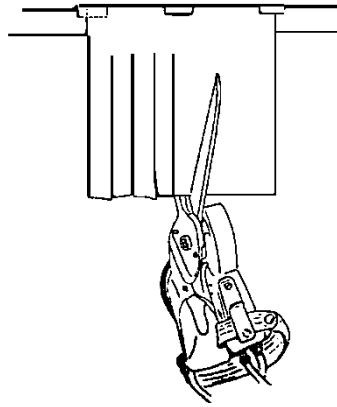


FIGURE #38

The mating blades should form a small contact point. Hold the blade set up to a light and look through the gap between the blades. As the blades are closed by hand, the contact point will be seen to travel from the throat to the blade tip. If this contact point is not present and uniform from the throat to the tip, the blade nut may need adjusting, or the blades may have been bent.

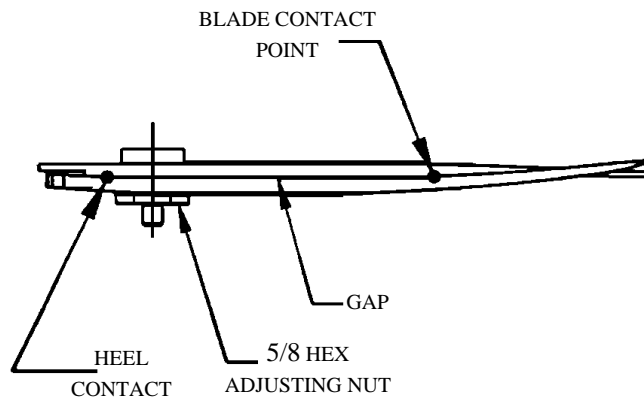


FIGURE #39

9.3.4 Adjusting the Blade Nut

It is common for a freshly re-sharpened blade set to require a slight tightening of the blade nut. Other things that may require adjustment of the blade nut are; wear, deformation of the plastic washer under the locknut, and wear in the self-locking threads after many adjustments. If any of these other conditions are true, all the parts should be replaced (see Section 9.3.5).

9.3.4 Adjusting the Blade Nut (Continued)

The blade nut can be tightened using a 5/8 inch wrench. Tighten the nut **Only Enough** to re-establish blade contact at the throat. (See Figure #39).

CAUTION

DO NOT OVER TIGHTEN THE NUT AS THIS WILL CAUSE EXCESSIVE WEAR. THE BLADE NUT HAS A SELF-LOCKING THREAD. THEREFORE, IT SHOULD ALWAYS TURN WITH SOME RESISTANCE.

The AirShirz® blades are designed to require more force to close them than hand scissors. This is normal and required for the blades to cut properly.

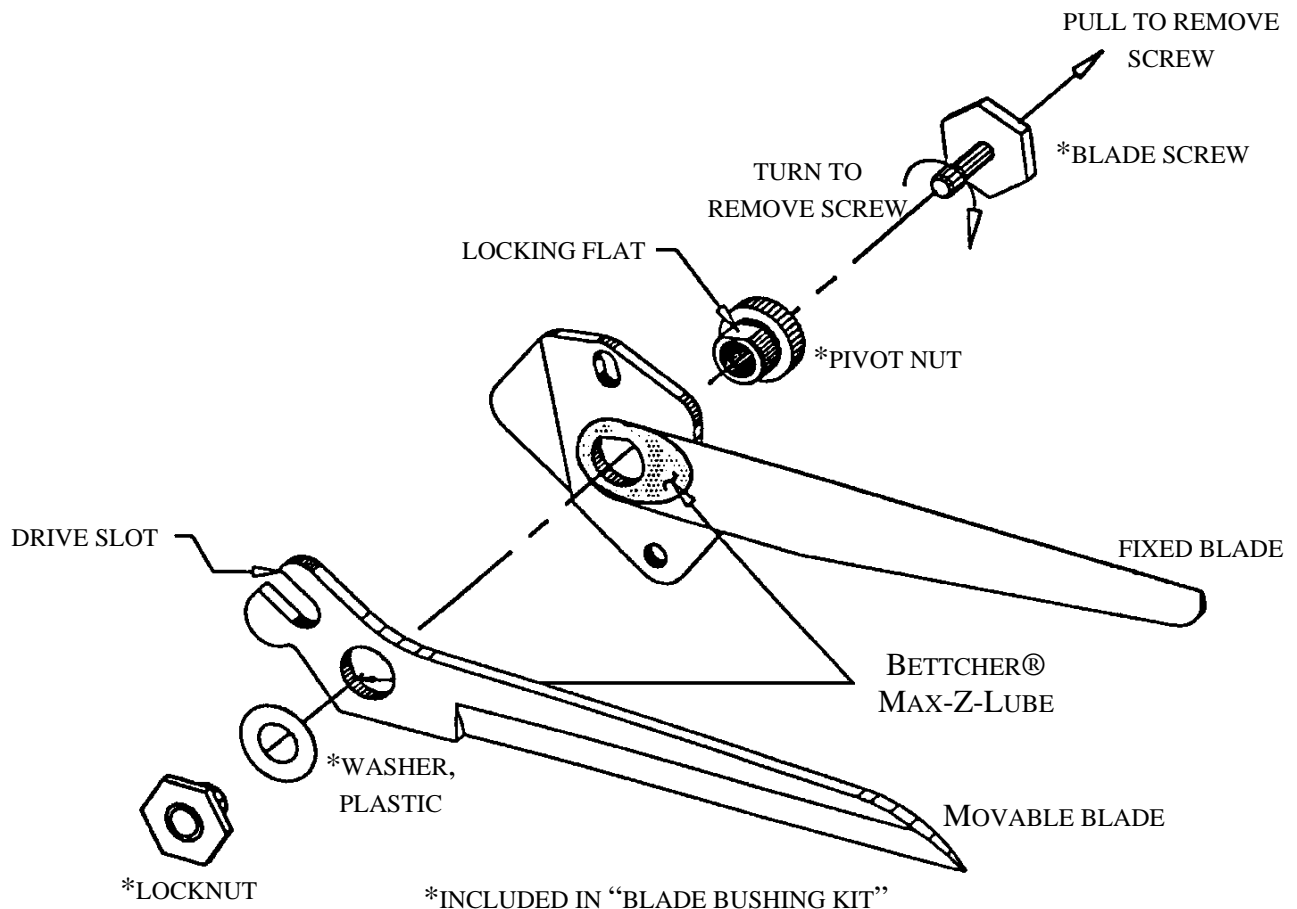
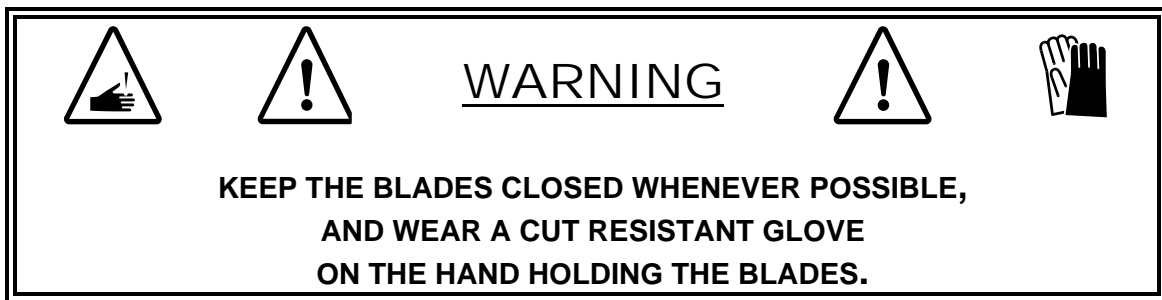


FIGURE #40

9.3.5 Replacing Blade Pivot Bushings

Significant wear in any of the components usually indicates wear in mating components; therefore all the pivoting parts should be replaced at once. However, do not interchange blades from other blade sets. They are manufactured as a matched pair.



First, remove the blade screw. (See Figure #40)

This screw normally floats loosely, being trapped by a secondary set of threads inside the locknut. To engage these threads, pull outward on the head of the screw while rotating it counterclockwise. **Failure To Remove This Screw Before Proceeding Will Damage The Threads, Causing It To Become Stuck.**

Use a 5/8 inch open end wrench to unscrew the locknut (counterclockwise). Remove the plastic washer and the movable blade. Grasp the fixed blade and push the pivot bushing out of the hole.

Thoroughly clean the pivot hole and mating surfaces of both blades. Inspect the drive slot and pivot hole of the movable blade for excessive wear. The blade set should be replaced if the surface of the slot is worn noticeably deep or the edges are rolled outward. In this case, also check the condition of the drive roller (see Section 9.4.12). A worn pivot hole will appear egg-shaped. If the hole wear is not too deep, the installation of a new pivot bushing may take up enough clearance to make the blades usable. Excessive wear causes excessive free play in the blades which leads to inconsistent cutting action.

If the pivoting parts are to be reused, they must be thoroughly cleaned. Place the plastic washer onto the locknut.

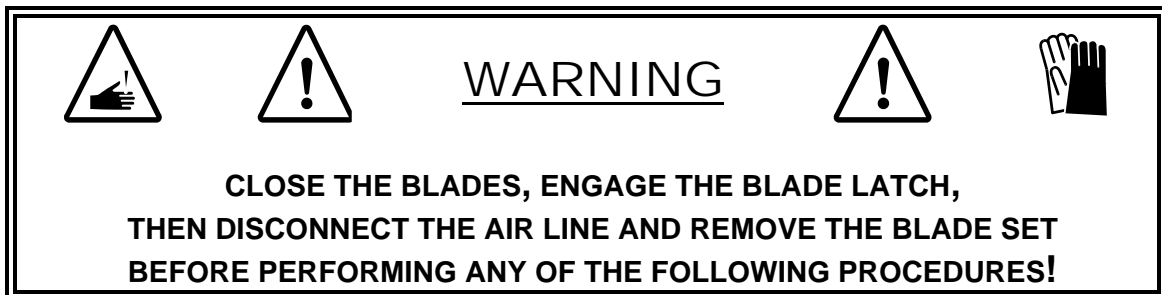
9.3.5 Replacing Blade Pivot Bushings (Continued)



Apply a light coating of Bettcher® Max-Z-Lube to the mating surfaces of the blades near the pivot as shown in Figure #40. Pick up the fixed blade and align the flat on the pivot nut with "D" shaped hole on the blade. Push the pivot nut into the hole and hold it in place with your finger. Place the movable blade over the pivot nut, and against the fixed blade. Place the locknut, with the plastic washer, onto the blade and screw it into the threads of the pivot bushing (clockwise).

The lock nut should produce some resistance to turning. Use a 5/8 inch wrench to screw the locknut in until it just contacts the blade. Install the blade screw, then perform the blade nut adjustment (see Section 9.3.4).

9.4 Assembly/Disassembly Procedures



NOTE:

Place the Power Unit on a Clean, Well-Lit Table with
Enough Space to Set Aside Removed Parts.

9.4.1 Cover Removal

Disconnect the air line.

Remove the cover pivot screw. Clean any debris from the cover and linkage. Inspect the cover for cracks.

9.4.1 Cover Removal (Continued)

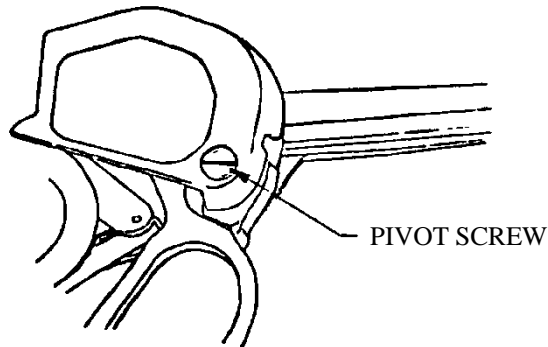


FIGURE #41

9.4.2 Cover Installation

Disconnect the air line.

Lay the cover over the linkage in the closed position. Install the pivot screw and tighten firmly. Lift locking tab of cover and pivot cover clockwise. Cover should swivel easily and should snap back into closed position.

9.4.3 Blade Latch Removal

Disconnect the air line.

Remove the cover (refer to Section 9.4.1). Pull finger loop against power cylinder. Lift latch ring off cover pivot post. Inspect tangs of latch ring for dirt, wear or distortion. Tangs may spring inward slightly upon removal from post.

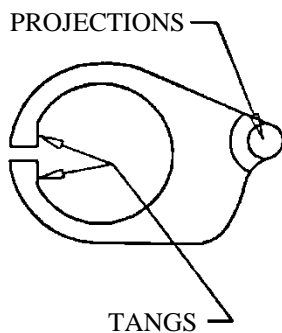


FIGURE #42

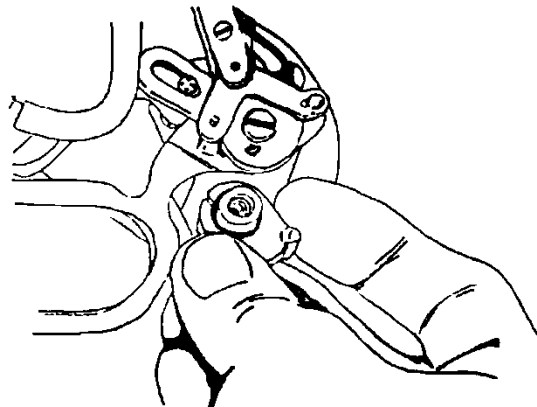


FIGURE #43

9.4.4 Blade Latch Installation

Disconnect the air line.

Clean area around post and re-install latch ring with the projections at the top edge as shown in Figure #43. Rotate latch ring between the unlocked and locked positions. The tangs of the latch ring should engage the flats on the post to produce a "detent" action in both positions. If this detent action does not hold the latch ring in the unlocked position, replace the latch ring.

Re-install the cover (refer to Section 9.4.2).

9.4.5 Disconnecting Master Link

Disconnect the air line.

Remove blade set and cover (refer to Section 9.4.1)

Push the rod fully into the power cylinder.

Remove the screw holding the halves of the master link together.

Lift the top plate of the master link off the pivot pins and set aside. Push the end of the master link attached to the control valve off the rod pin and rotate it forward.

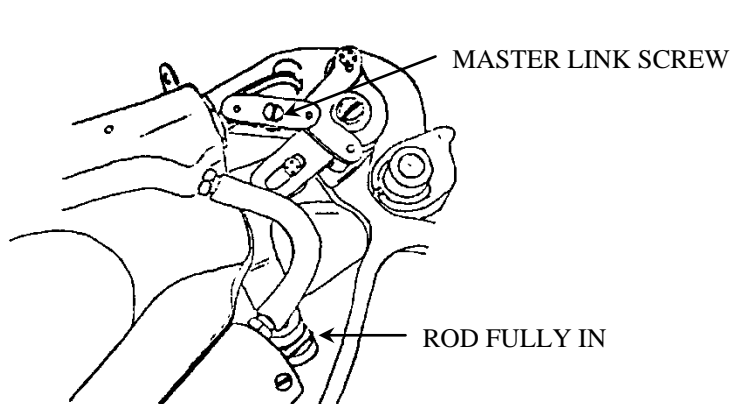


FIGURE #44

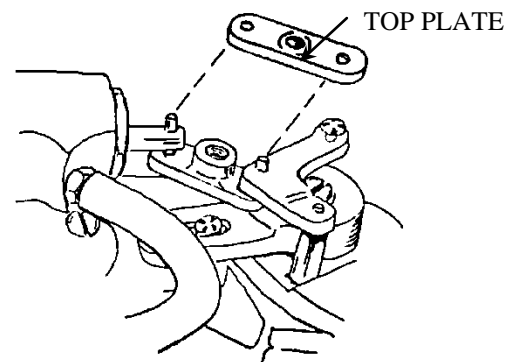


FIGURE #45

9.4.6 Connecting Master Link

Disconnect the air line.

If needed, pull the control valve rod outward slightly. Rotate the finger loop until the free end of the master link engages the pin on the control valve rod.

Install the top plate over both pins, with the large side of the middle hole facing up. Install the screw loosely. Verify that both ends of the master link and top plate are fully seated on the pins. Tighten the screw.

9.4.7 Servo Linkage Removal

Disconnect the air line.

Remove the cover. (Reference Section 9.4.1)

Disconnect the master link. (Reference Section 9.4.5).

Push the power cylinder rod fully inward and hold the finger loop against the power cylinder to allow access to the post screw. Remove the post screw and small washer beneath it.

Note the engagement of the blade link slot with drive link pin.

Grasp the servo linkage from beneath and by the link attached to the finger loop post. Lift the linkage assembly along with the master link off the pins and post.

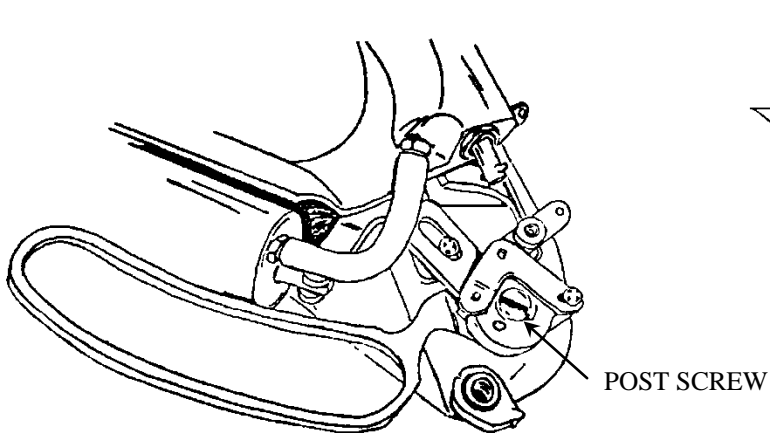


FIGURE #46

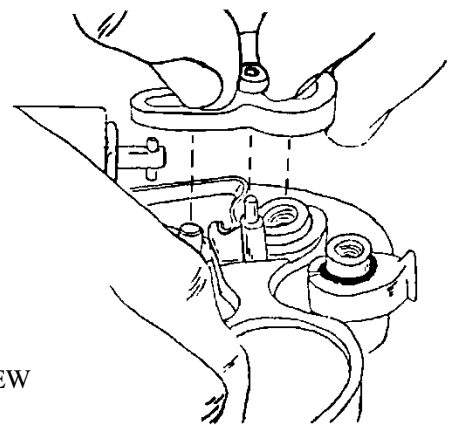


FIGURE #47

9.4.7 Servo Linkage Removal (Continued)

Remove the master link from the underside of the middle pin if it has not fallen off on its own.

CAUTION

IF IT IS NOT INTENDED THAT THE FINGER LOOP BE REMOVED AT THIS TIME,
BE SURE IT IS SEATED FULLY ONTO THE POST AND DO NOT DISTURB IT.

9.4.8 Servo Linkage Installation

Disconnect the air line.

Wipe clean all links, screw, small washer, and the finger loop post. Inspect all holes and slots for signs of wear. All pivoting and sliding parts should fit together with little or no side play.

Install one end of the master link to the underside of the middle pin. Install the top plate onto the top side of the middle pin and loosely install the small screw to hold the master link and top plate together as shown below.

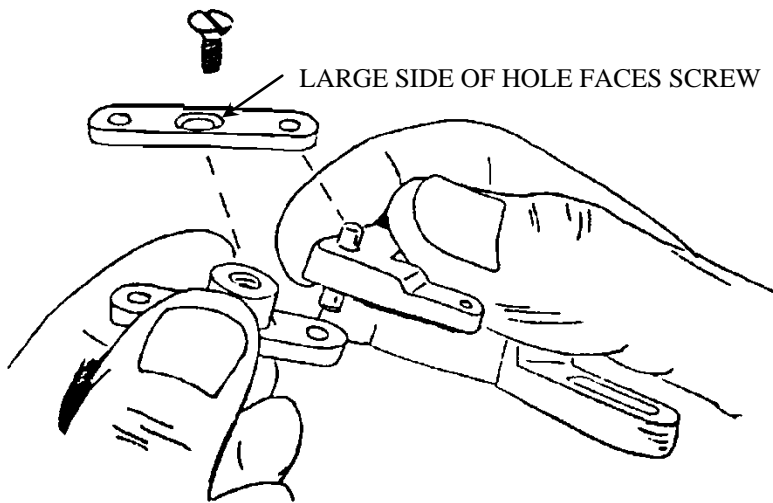


FIGURE #48

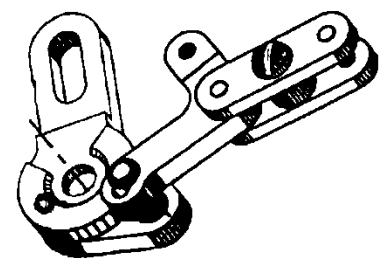


FIGURE #49

Apply Bettcher® Max-Z-Lube to the finger loop post.

9.4.8 Servo Linkage Installation (Continued)

Lay the servo link assembly over the power unit and orient the links so their holes are aligned with their corresponding pins as shown in Figure #50. Push the links over the pins and post. Press down on the linkage to be sure it is seated fully onto the finger loop post.

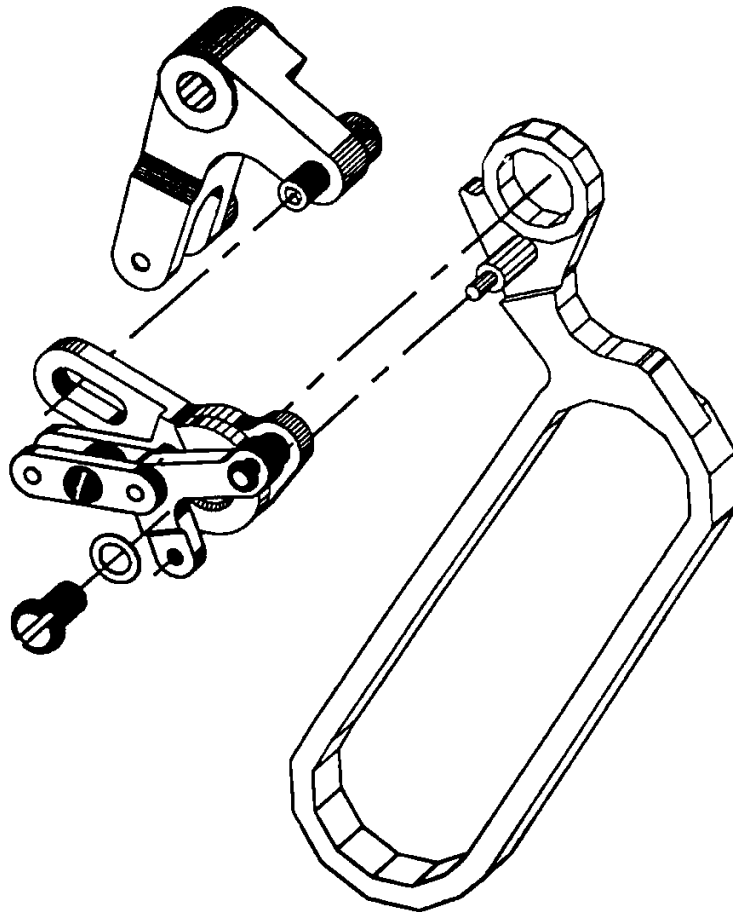


FIGURE #50

Push the power cylinder rod fully inward and hold the finger loop against the power cylinder to allow access to the mounting hole.

Put the small washer onto the post screw then place them both into the mounting hole of the servo link assembly as shown in Figure #50. Partially tighten the post screw leaving the linkage and finger loop free to rotate. **Do Not Over Tighten.** (Due to the self-locking nature of this screw, a certain resistance to turning is normal and required).

Wiggle the linkage gently to check for side play at the pins and the finger loop post. If any joints have more than a few thousandths of an inch of side play, the linkage should be replaced.

Perform finger loop post screw adjustment procedure (see Section 9.2.1).

9.4.9 Finger Loop and Spring Removal

Disconnect the air line.

Remove blade latch. (Reference Section 9.4.3)

Remove the servo linkage. (Reference Section 9.4.7)

Place thumb of left hand over the return spring. With the other hand, rotate finger loop back and forth slightly while pulling it off the post.

Remove the Teflon® washer from the post.

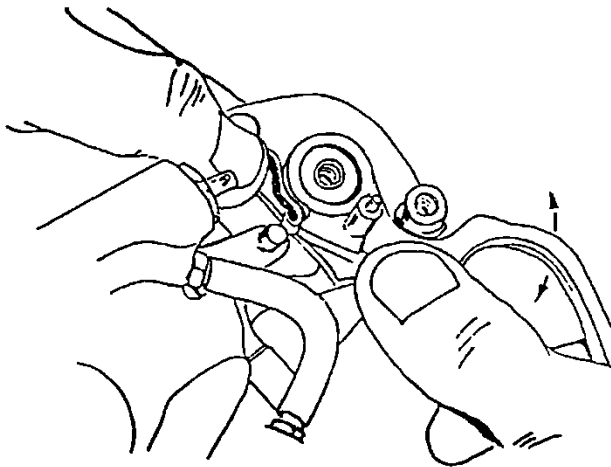


FIGURE #51

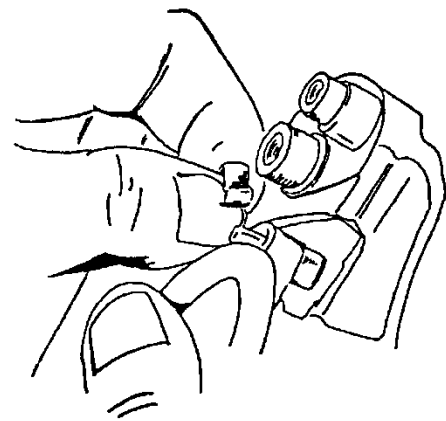


FIGURE #52

Grasp the spring and tilt it outward until it clears the post, then slide it to the right until it comes out.

9.4.10 Finger Loop and Spring Installation

Disconnect the air line.

Thoroughly clean the spring, finger loop and post area.

Inspect the finger loop hole and bottom surface for signs of excessive wear. If the coating is worn through to bare metal, it should be replaced. Check the condition of the bumper screw (on some models). See Figure #54. Replace screw if it is worn or damaged.

9.4.10 Finger Loop and Spring Installation (Continued)

Inspect the post and the surface around it. If the coating is worn through to bare metal, the frame should be replaced.

Apply Bettcher® Max-Z-Lube to the post and the surface around it. (See Figure #54).

With the rod of the power cylinder pushed fully inward, hold the frame with blade end pointing upward, as shown in Figure #53.

Grasp the spring at the loop end and push the straight end into the pocket in the frame at an angle coming from the right of the finger loop post.

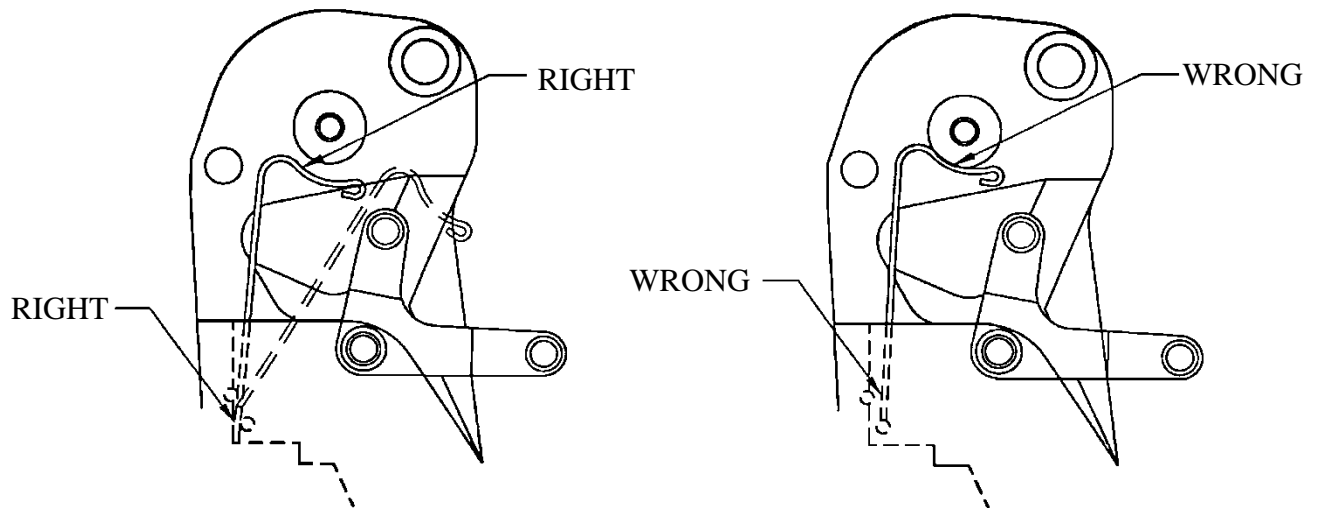


FIGURE #53

Care should be taken to guide the spring such that the straight end goes behind the rear spring pin, as shown in Figure #53 above. When correctly installed, the spring will fit loosely in the position shown above.

If the finger loop is difficult to engage with spring, it may mean that the spring is not installed correctly (see Figure #53).

Apply Bettcher® Max-Z-Lube to the finger loop in the pivot hole, on the top and bottom surfaces, and in the spring engagement notch.

9.4.10 Finger Loop and Spring Installation (Continued)

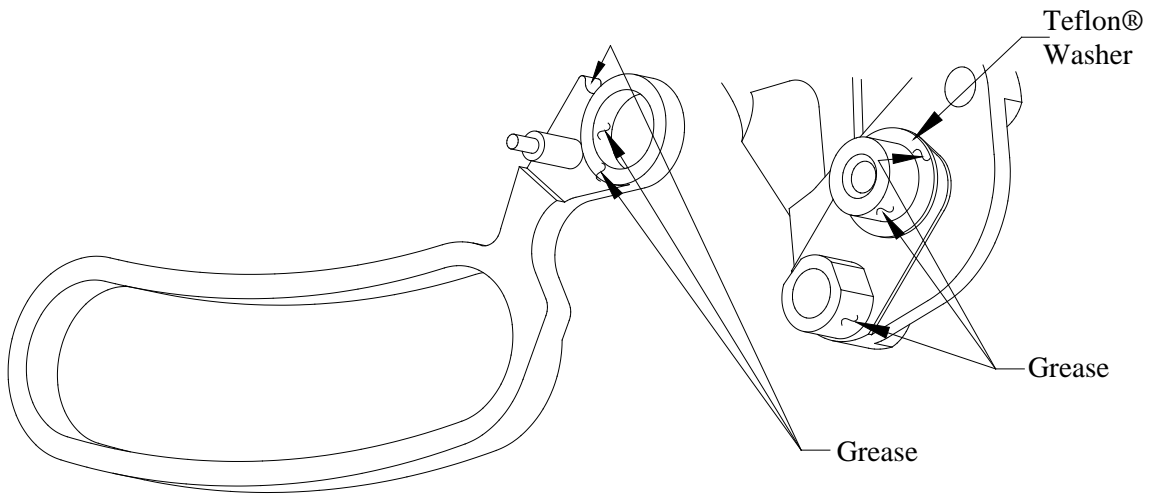


FIGURE #54

- First, place the Teflon washer onto the post. Then place the finger loop onto the post, above the spring and rotate it fully counterclockwise until it is against the cover post (with blade latch removed).
- With the thumb of the left hand, pull upward on the spring until the spring tip is aligned with the notch of the finger loop. Push downward on the finger loop while wiggling it slightly until the spring engages the notch and the finger loop moves fully onto the post.
- Install servo link assembly (see Section 9.4.7) and perform finger loop post screw adjustment procedure (See Section 9.2.1).
- Install blade latch ring (Section 9.4.4) and cover (Section 9.4.2).

9.4.11 Drive Link Removal

- Disconnect the air line.
- Remove blade set (Section 8.3.2), cover (Section 9.4.1) and blade latch (Section 9.4.3).
- Remove the front tubing from the air fitting at the frame. (See Section 9.4.21).
- Unscrew the air fitting using a 1/4 inch hex socket wrench.

9.4.11 Drive Link Removal (Continued)

Loosen the flat head screw. (see Figure #56 below).

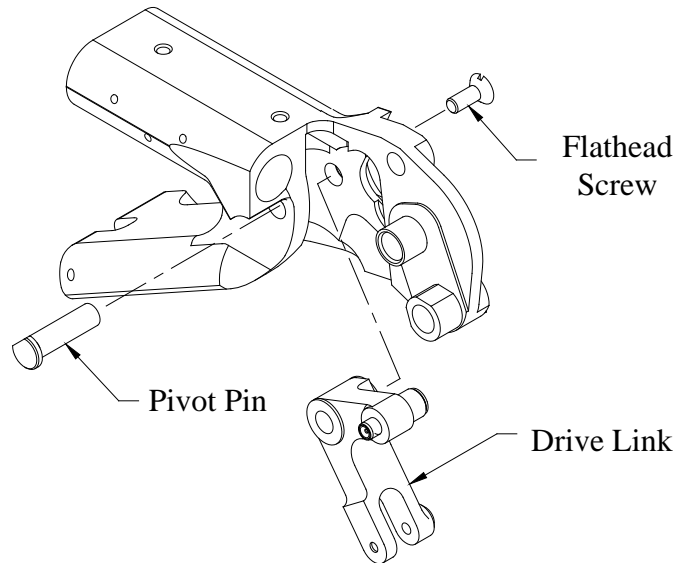


FIGURE #56

Loosen the screw about 5 turns then tap the head of the screw with the handle of the screwdriver until the pin becomes loose.

Remove the flat head screw. Use a small screwdriver or rod from the screw side to push the pin out.

Push the drive link at the clevis until the power cylinder rod is at mid stroke so the clevis screw is accessible.

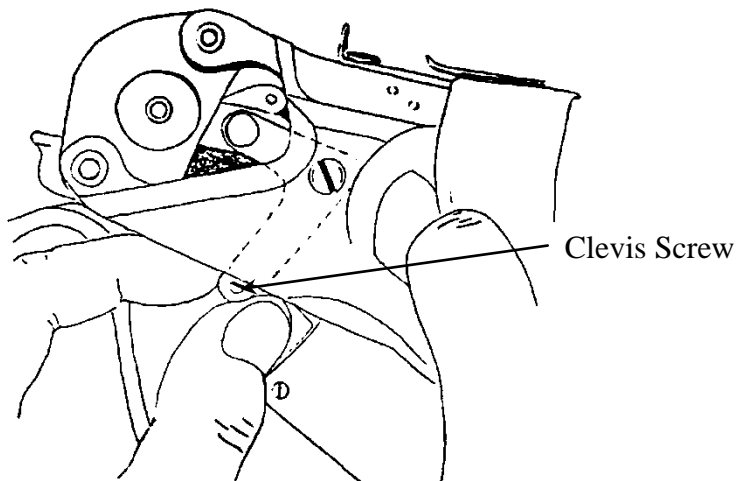


FIGURE #57

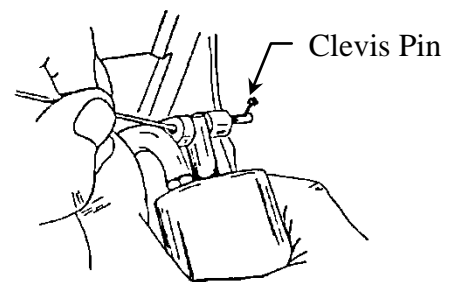


FIGURE #58

9.4.11 Drive Link Removal (Continued)

Use a small screwdriver to remove the clevis screw. Turn the AirShirz® over and use a small diameter rod or a paper clip to push or tap the clevis pin out. Move the power cylinder rod outward slightly and push aside the tubing as needed to gain access to the end of the clevis pin. Pull outward on the power cylinder if necessary to let the pin clear the frame.

Pivot the power cylinder outward being careful not to bend the swivel fitting at the rear of the cylinder. Grasp the drive link at the clevis end. Pull outward while tipping upward to let the drive pin slide out of the slot in the servo linkage, as shown below.

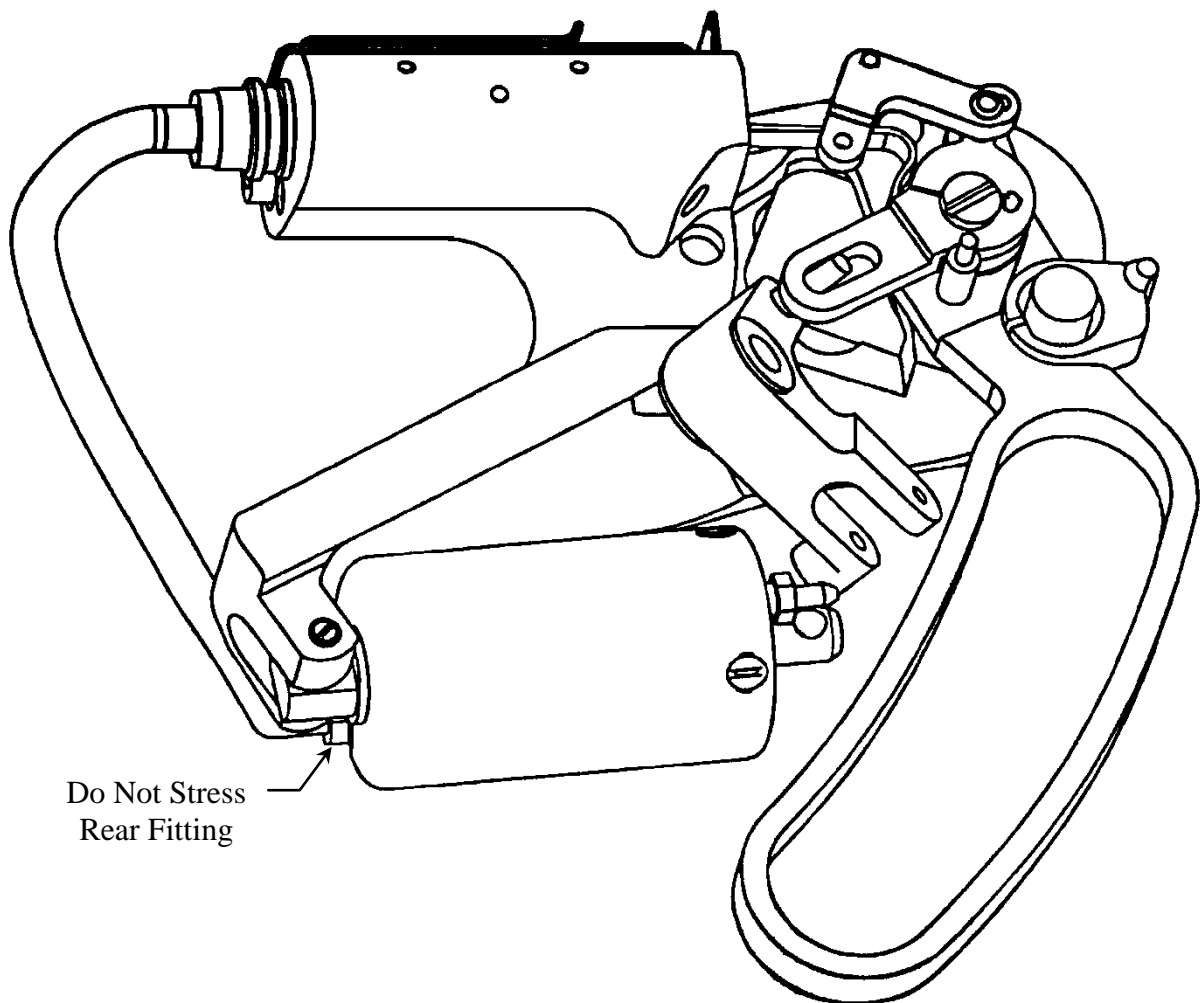


FIGURE #59

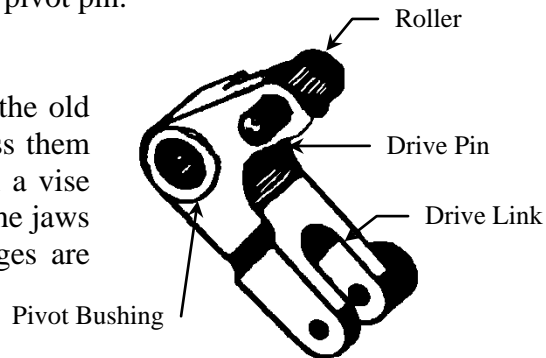
9.4.12 Drive Link Installation

Disconnect the air line.

Clean area around flange bearings and drive roller.

Inspect clevis pin and pivot pin for dirt or excessive wear. Replace if worn. The pivot bushings should always be replaced when replacing the pivot pin.

To Replace The Pivot Bushings : Push out the old bushings. Align both new bushings and press them in part way by hand. Hold the drive link in a vise such that the flanges of the bushings contact the jaws of the vise. Tighten the vise until the flanges are flush against the surfaces of the drive link.



Inspect the drive roller. You should be able to rotate the drive roller by hand and should not have more than .004 inch (.1 mm) radial play or more than .008 inch (.2 mm) axial play.

Inspect roller sleeve for cracks, deep grooves or heavy pitting.

If any other areas of the drive link are worn or damaged, the drive link should be replaced as a unit. Always use a new clevis screw with a new drive link.

Grasp the drive link at the clevis end with the roller facing downward to the right. With the frame in the other hand, and the power cylinder swung outward, slide the drive link under the servo linkage such that the pin on the drive link enters the slot from its underside. Push the drive link into the pocket of the frame, while rotating it into alignment. (See Figure #59 above).

Turn the AirShirz® over so the threaded side of the drive link clevis is facing up. Position the clevis hole over the hole in the power cylinder rod and insert clevis pin. Wiggle the clevis while pushing on the pin until it slides in past the threads. Install the pin retaining screw and tighten firmly.

Align the flange bearings of the drive link with the pivot hole in the frame and insert the pivot pin with the large end facing out. (See Figure #56).

9.4.12 Drive Link Installation (Continued)

Hold the pin against the frame with a finger while installing flat head screw from other side of frame. Hold the pin while tightening the flat head screw. Do not over tighten. Drive link should rotate freely, but should have little or no side play.

Examine threads and barb of air fitting and replace it if damaged.

Install air fitting using 1/4 inch hex socket wrench. Tighten until fitting seats against frame surface. **Do Not Over Tighten.**

Grasp tubing coming from power cylinder and push in fully onto barb of air fitting.

Connect air supply of AirShirz® and operate to verify the motion of power cylinder, drive unit, and servo linkage.

Dribble some water over air fitting while operating to check for leaks. If leaks occur, remove tubing and retighten or replace air fitting.

Disconnect the air line.

Install blade latch (See 9.4.4) and cover (see 9.4.2).

9.4.13 Power Cylinder Removal

Disconnect the air line.

Remove the front tube from the power cylinder. (See Section 9.4.21).

Disconnect strap at the snap on rear of frame.

Use a 5/16 inch open-end wrench to remove the rear fitting from the power cylinder. While unscrewing the fitting, support the tubing with the other hand such that the fitting is not being pulled crooked as this could damage the threads.

Push the power cylinder rod to about its mid stroke position so the clevis screw on the drive link is accessible (see Figure #60). Remove the clevis screw. Turn the AirShirz® over and use a small diameter rod or a paper clip to push the clevis pin out as shown.

9.4.13 Power Cylinder Removal (Continued)

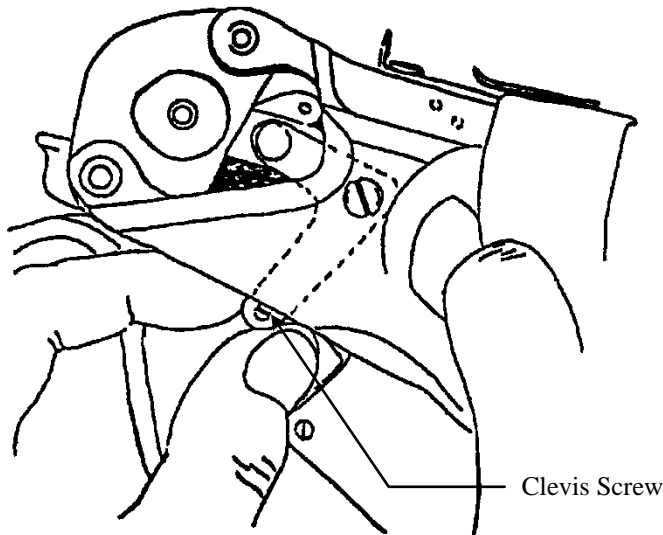


FIGURE #60

In like manner, remove the rear clevis screw and pin. (NOTE: These pins and screws are interchangeable, except on the AirShirz® Magnum).

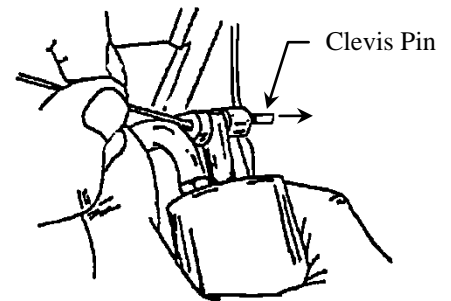
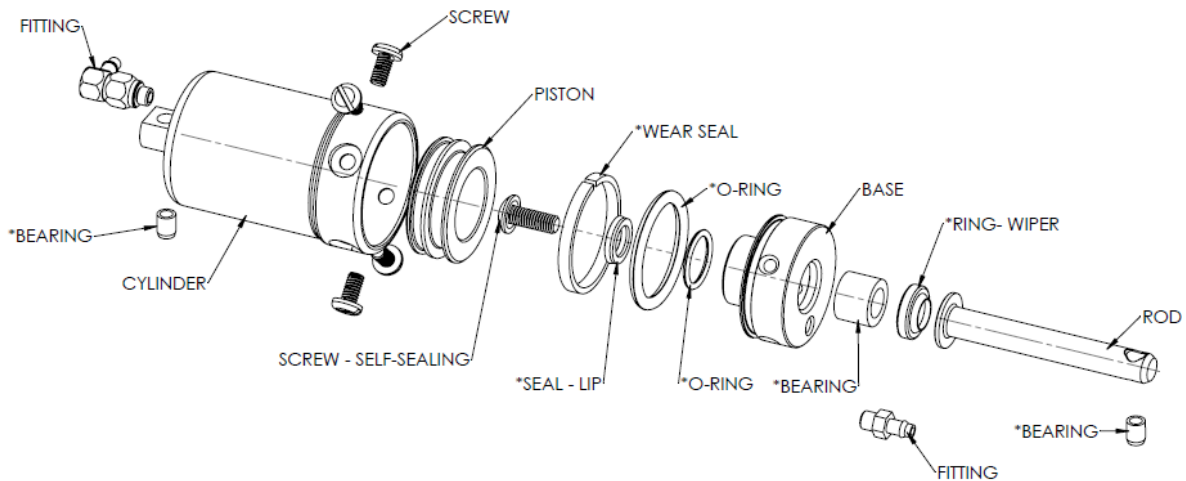


FIGURE #61

9.4.13.1 Single Power Cylinder Disassembly & Repair



*Items included in Power Cylinder Overhaul Kit

FIGURE #62 (X- Large Heavy Duty Power Cylinder Shown)

9.4.13.1 Single Power Cylinder Disassembly & Repair (Continued)

Pull power cylinder rod fully outward and thoroughly clean its surface.

Remove the four (4) flat head screws from the side of the power cylinder.

Temporarily put a clevis pin into the rod bearing to act as a gripping handle. Be sure to work over a table to catch loose parts. While holding the body of the power cylinder in one hand, pull outward on the rod with other hand until the front end of the power cylinder comes out. **Never Grasp Rod with a Tool as Any Nicks Will Destroy it!**

Set aside clevis pin and the wear strip which fell out of rear piston groove.

Further Disassembly Is Recommended Only As Needed.

Clean the rod and make sure it is free of dirt or burrs. Check that there are no sharp edges at the cross-hole. (If the cross-hole edges are sharp, the piston will need to be removed from the rod, so the rod can be pulled out of the base from the front. Otherwise, the lip seal may be damaged). Apply a thin coat of Bettcher® Max-Z-Lube, then slowly slide it and the piston, out of the base.

Examine all seals:

- O-rings with a wide flat band, pinch marks, cracks or nicks should be replaced. Remove defective O-ring. Clean the groove. Apply Bettcher® Max-Z-Lube to new O-ring and install into groove.
- The lip seal for the rod should be replaced if air had been leaking from the rod, if it was removed, or if the inner lip appears uneven or worn. Use tweezers or a small wire to pry lip seal inward and pull it out from the inside of the base. Clean the groove between base and bearing. Apply Bettcher® Max-Z-Lube all over the new seal and squeeze it into the base from the same side it was removed. Use a blunt object to coax it into position. Be sure that the lip is facing toward the inside of the base as shown in Figure #63.

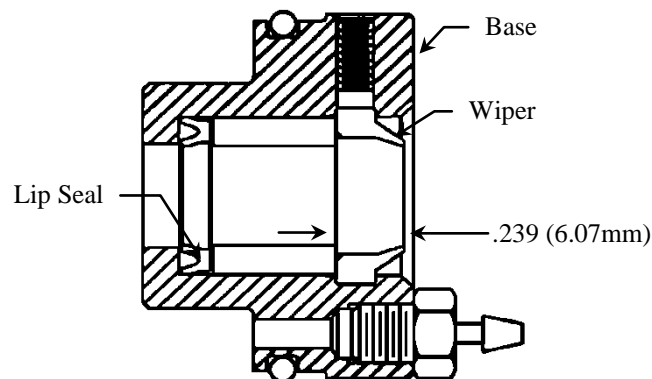


FIGURE #63

9.4.13.1 Single Power Cylinder Disassembly & Repair (Continued)

- The wiper should be replaced if it shows any signs of wear. A new wiper has a sharp front edge where it contacts the rod. Wear produces a widening band of contact at this edge. Run the blade of a screwdriver around the groove between the base and the edge of the seal to remove dirt and grease. Use a small screwdriver or tweezers to dig into the old seal and pry it out of its groove and into the center of the hole. Remove old seal and wipe groove clean. Apply Bettcher® Max-Z-Lube all over the new wiper and angle it into the groove **With the Lip Projection Facing Outward**. Use the blade of the screwdriver to tap the flat face of the wiper down until it expands into the groove. Fill the region behind the wiper lip with Bettcher® Max-Z-Lube. Apply Bettcher® Max-Z-Lube to rod surface and carefully insert rod into base from inside. Confirm that wiper is seated properly in groove as rod extends into it. **Do Not Use a Damaged Rod As It May Destroy the Wiper**. Remove the rod.

The rod bearing should be replaced if there is excessive side play in the rod, or if abrasive particles have become embedded. The wiper and lip seal should also be replaced at this time.

Remove the wiper (per above). Use a screwdriver blade entering the base from the inside to push the bearing out from the rear. Hand force is usually adequate. **Be Careful Not to Gouge the Bore of the Base**. Remove the lip seal.

Wipe the bore clean and apply a film Bettcher® Max-Z-Lube to the bore and to a new lip seal. Install the lip seal from the front with the lip facing the inside until it is fully down. Set the bearing squarely over the bore and, using a support peg of slightly less than 1/2 inch (12.7 mm) diameter, press the bearing until the outer edge is flush with the rear surface of the wiper groove .239 inch (6.07 mm) from the surface of the base as shown in Figure #63). **Do Not Over Press as This Will Damage the Lip Seal**. Install a new wiper (per instructions above).

The wear strip should be replaced if its thickness is worn unevenly, or if the piston shows signs of having worn against the power cylinder wall.

The rod should be replaced if its surface has become rough, if the coating has worn off, or if there are any scratches or dings on the portion that slides past the wiper. Use a 1/8 inch (3mm) diameter rod or a clevis pin inserted into the rod end bearing to act as a handle. Use a Phillips screwdriver to remove the screw at the top of the piston.

9.4.13.2 Single Power Cylinder Reassembly (See Fig. #62)

If the rod was removed from the piston, reassemble them as follows:

Clean rod surface thoroughly. Grease the rod with Bettcher® Max-Z-Lube and slowly slide the threaded end into the base from the outside (wiper end). Put a clevis pin or other rod of 1/8 inch (3mm) diameter into the rod end bearing to act as a handle. Clean mating surface of piston, place it onto the threaded end of the rod and install piston screw tightly. Remove the 1/8 inch (3mm) diameter pin.

Otherwise: Check that there are no scratches or burrs on the rod, especially at the cross hole. Grease the rod with Bettcher® Max-Z-Lube and slowly slide it into the base from the inside. Slide the piston up against the base.

Wipe the cylinder bore clean and apply a thin film of Bettcher® Max-Z-Lube. Apply Bettcher® Max-Z-Lube to both O-rings.

Position the wear strip into **Rear** groove of piston and hold it in place with fingers while sliding cylinder over it with the other hand.

On the small cylinder it may be easier to install the piston and rod with the wear strip into the cylinder before putting the base onto the rod.

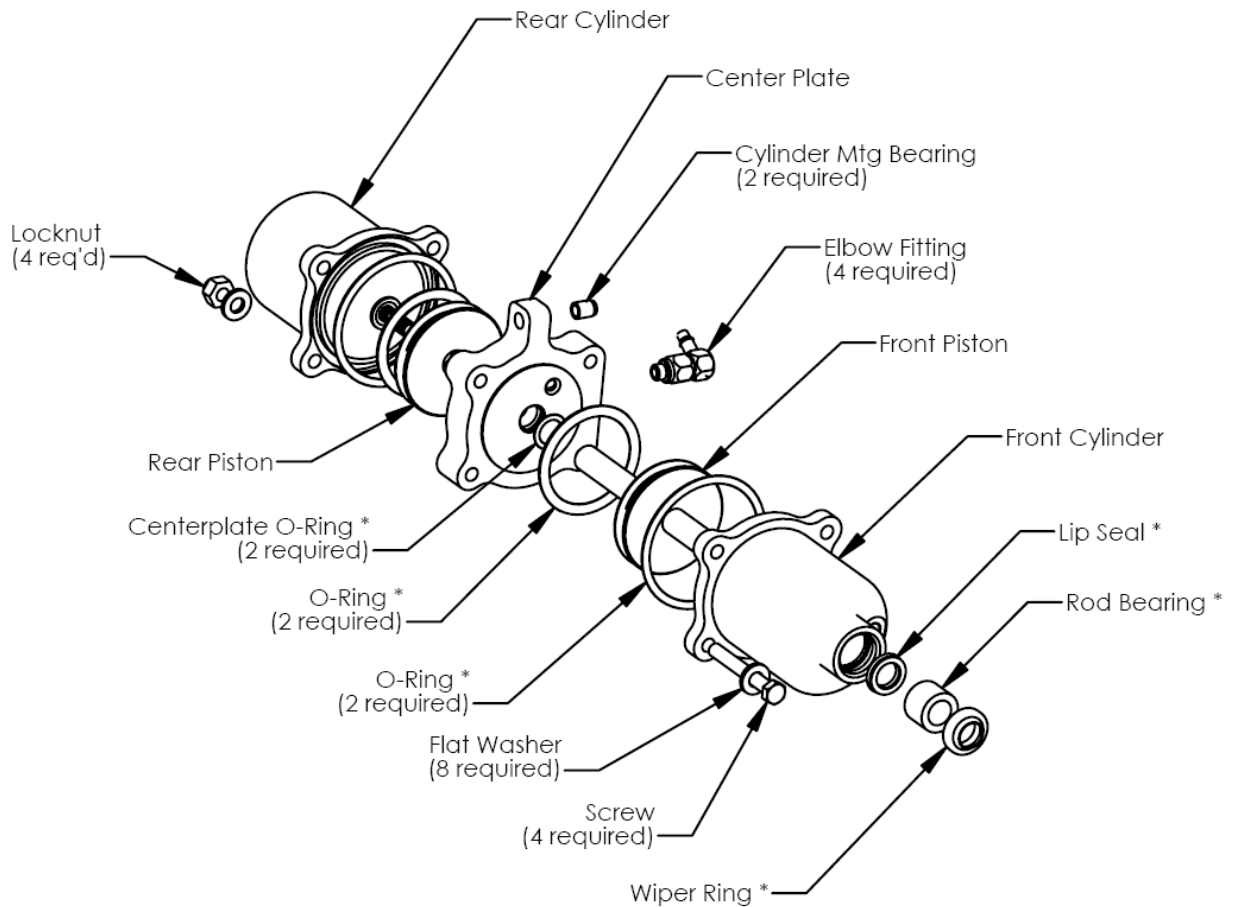
Before pushing the base fully into the cylinder, rotate base until the base air fitting is on the opposite side of the clevis as the rear fitting. (See Figure #62). Rotate the base until the screw holes are in-line with the side holes of the cylinder.

Push the base into the cylinder until the front face is flush. Rotate the base slightly if needed to center the screw holes.

Install the flat head screws. Tighten each half-tight, then full tight to let the components align themselves.

Perform leak test (see Section 9.1.3).

9.4.13.3 Dual Power Cylinder Disassembly and Repair (See Fig. #64)



* Items Included in Cylinder Overhaul Kit

FIGURE #64 (AirShirz® Magnum Power Cylinder Shown)

9.4.13.3 Dual Power Cylinder Disassembly and Repair (See Fig. #64) (Continued)

Thoroughly clean the outside of the power cylinder. Be sure to work over a table to catch loose parts.

Remove the four (4) screws, flat washers, lockwashers, and hex nuts, holding both halves of the power cylinder together. Note the location and number of fasteners. Hold the cylinder assembly with one hand, and remove the rear cylinder with a gentle twisting motion with the other.

Clean the rod and make sure it is free of dirt and burrs. Check that there are no sharp edges at the cross-hole; otherwise the seals may be damaged. Apply a thin coat of Bettcher® Max-Z-Lube to the surface of the rod. Hold the rear piston and carefully pull the front cylinder off the piston rod, using a twisting motion to prevent damage to the lip seal.

Put a clevis pin or other rod of 1/8 inch (3mm) diameter into the rod end bearing to act as a handle. Remove the piston screw, and then remove the rear piston. Lubricate the piston rod, and pull it out through the center plate.

Examine all seals:

- O-rings with a wide flat band, pinch marks, cracks or nicks, should be replaced. Remove defective O-ring. Clean the groove. Apply Bettcher® Max-Z-Lube to the new O-ring and install into groove.
- The lip seal for the rod should be replaced if air had been leaking from the rod, if it was removed, or if the inner lip appears uneven or worn. Use tweezers or small wire to pry lip seal inward and pull it out from the inside of the cylinder. Clean the groove between the cylinder flange and bearing (refer to figure #65). Apply Bettcher® Max-Z-Lube all over the new seal and squeeze it into the front cylinder housing from the same side it was removed. Use a blunt object to coax it into position. Be sure that the lip is facing toward the inside cylinder as shown.
- The wiper should be replaced if it shows any signs of wear. A new wiper has a sharp front edge where it contacts the rod. Wear produces a widening band of contact at this edge. Run the blade of a screwdriver around the groove between the cylinder flange and the edge of the seal to remove dirt and grease. Use a small screwdriver, or pair of tweezers, to dig into the old seal and pry it out of its groove and into the center of the hole. Remove the old seal and wipe groove clean. Apply Bettcher® Max-Z-Lube all over the new wiper and angle it into the groove **with the lip protection facing outward**. Use a screwdriver blade to push the flat face of the wiper down until it expands into the groove. Fill the region behind the wiper lip with Bettcher® Max-Z-Lube. Apply Bettcher® Max-Z-Lube to rod surface and carefully insert the rod into the cylinder body from inside. Confirm that the wiper is seated properly into the groove as the rod extends into it. **Do not use a damaged rod, as it may destroy the wiper.** Remove the rod.

9.4.13.3 Dual Power Cylinder Disassembly and Repair (See Fig. #64) (Continued)

The rod bearing should be replaced if there is excessive side play in the rod, or if abrasive particles have become embedded. The wiper and lip seal should be replaced at this time.

Remove the wiper, per above. Use a screwdriver blade against the back face of the bearing to push the bearing out the front of the cylinder. Hand force is usually adequate. **Be careful not to gouge the bore of the cylinder.** Remove the lip seal.

Wipe the bore clean and apply a film of Bettcher® Max-Z-Lube to the bore and to a new lip seal. Install the lip seal from the front, with the lip facing the inside, until it is fully down. Set the bearing squarely over the bore and, using a support of slightly less than 1/2 inch (12.7mm) diameter, press the bearing until the outer edge is flush with the rear surface of the wiper groove, .239 inch (6.07mm), from the surface of the cylinder housing, as shown in Figure #65. **Do not over press as this will damage the lip seal.** Install a new wiper per instructions above.

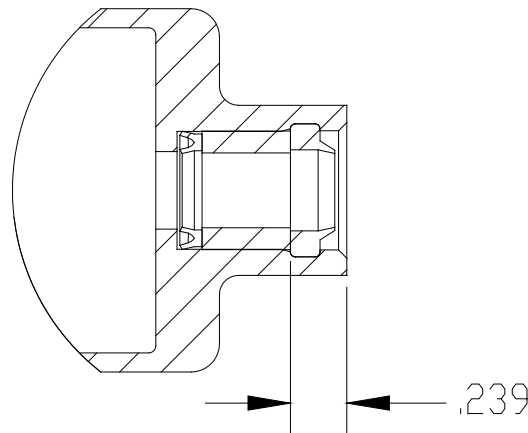


FIGURE #65

The rod should be replaced if its surface has become rough, if the coating has worn off, or if there are any scratches or dings on the portion that slides past the wiper. Use a 1/8 inch (3mm) diameter rod or clevis pin inserted into the rod end bearing to act as a handle. Use a Phillips screwdriver to remove the screw at the back of the rear piston.

9.4.13.4 Dual Power Cylinder Reassembly (See Figure #64)

If the rod was removed from the center plate, reassemble as follows:

Remove both O-rings from their grooves in the center plate. Lubricate new O-rings and carefully install them in their grooves.

Clean rod surface thoroughly. Grease the rod with Bettcher® Max-Z-Lube and slowly slide the threaded end through the O-rings in the bore of the center plate. Use a gentle twisting motion to avoid damaging or unseating the O-rings. Place a 1/8 inch (3mm) diameter rod through the rod end bearing to act as a handle, install the rear piston over the end of the rod, then install the piston screw and tighten it securely. Remove the 1/8 inch (3mm) diameter pin.

Lubricate both piston O-rings thoroughly with Bettcher® Max-Z-Lube. Carefully fit the front cylinder over the rod, using a gentle twisting motion as the rod passes through the lip seal, bearing, and wiper on the nose of the cylinder. Rotate the cylinder until its air fitting is offset to the same side as the fittings on the center plate. Install the rear cylinder over the rear piston in the same manner, using a gentle twisting motion and rotating it so its air fitting is also offset to the same side as the fittings on the center plate. Align the four holes, install the screw, flat washers, lock washers, and hex nuts per Figure #63. Be sure the O-rings are lubricated and seated in the grooves in the cylinder faces, and then tighten all four screws securely.

Perform leak test. (See Section 9.1.3)

9.4.14 Power Cylinder Installation – All Models

Disconnect the air line.

Examine clevis bearings. If pins fit with more than .007 inch (.18mm) side play, bearings and pins should be replaced. Use a tool as described in Figure #66 below, to press out old bearings and install new bearings. Note orientation of bearing for installation. The chamfered end should press in first.

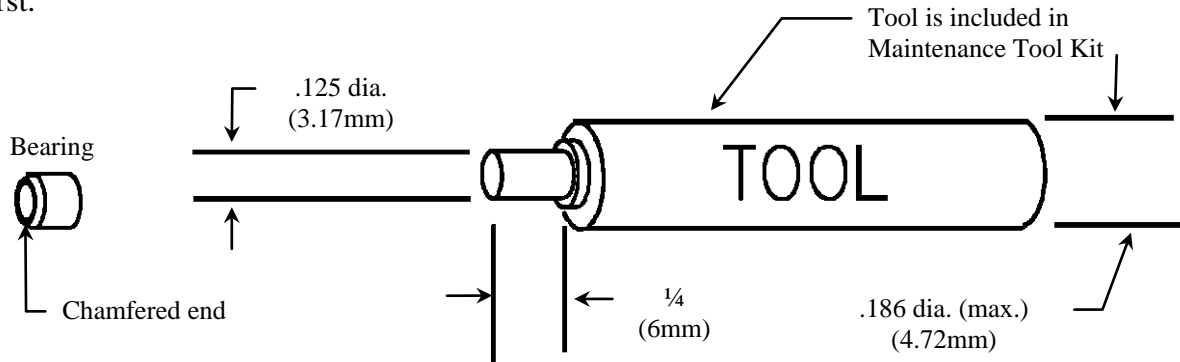


FIGURE #66

Install the rubber sealing washer (provided with the swivel fitting) over the threads. Apply a small amount of thread sealant, such as Loctite #567 thread sealant, to the threads. Install the rear air fitting into the clevis end of the power cylinder. To start threads, hold the fitting with tubing in one hand; grasp the power cylinder assembly in the other hand and rotate it clockwise against the fitting until the tubing hits against the clevis. Use a 5/16 inch open-end wrench to tighten the fitting until it is firmly seated. **Take Care Not To Over Tighten.**

Slide the rear mount of the power cylinder into the frame clevis with the rear fitting facing the tubing notch in the frame. Check that the front fitting is on the same side as is the front tubing. (If not, remove the four flat head screws and rotate the base then reinstall the screws).

Insert a clevis pin into the threaded end of the frame clevis. Wiggle the power cylinder as needed while pushing the pin in until the threads are visible. Install the retaining screw and tighten firmly. (The screw is self-locking, so it should turn with some resistance. If not, it should be replaced).

Place a clevis pin in the rod end and rotate the rod until the axis of the pin is in line with the clevis on the drive link. Push the rod to approximately mid stroke.

Remove the pin, position the clevis over the rod hole and reinsert the pin from the threaded side. If the pin doesn't go down fully, slide the rod slightly in and out of the power cylinder while pushing on the rod. **Do Not Attempt To Pound The Pin In As This May Damage The Bearing.** When the threads become visible, install the retaining screw and tighten firmly.

Position the front tube over the air fitting and push on fully.

9.4.15 Control Valve Removal

Disconnect the air line.

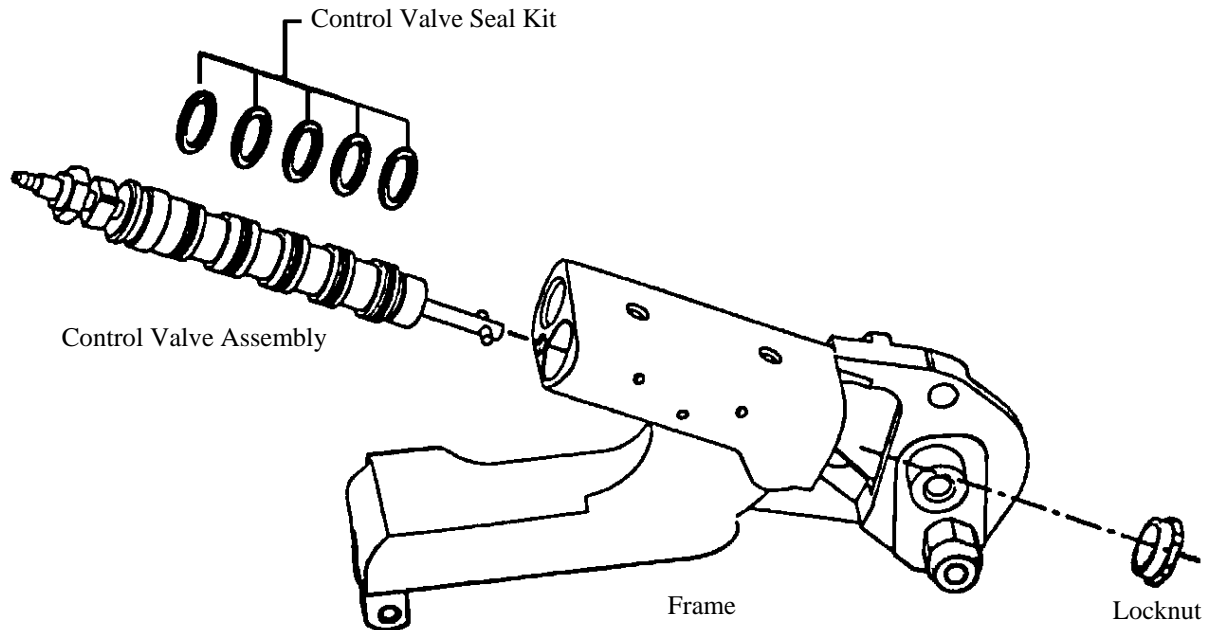


FIGURE #67

Remove blade set. (Reference Section 8.3.2)

Disconnect master link (see Section 9.4.5).

Use a 9/16 inch open-end wrench to unscrew locking nut at front end of control valve. Slide nut over valve rod and remove.

Note approximately how far rear end of control valve projects beyond frame. Use a 1/2 inch open-end wrench on flats at rear end of control valve to unscrew control valve assembly (counterclockwise). Note that valve assembly may not feel loose when it is fully unscrewed due to the sealing force of its O-rings.

Grab rear fitting on control valve and its tubing. Pull control valve assembly out of the frame.

Remove the hose from the rear fitting (see Section 9.4.21).

9.4.16 Control Valve Installation (See Figure #67)

Disconnect the air line.

Examine the (5) O-rings on the valve body for nicks, cuts, or cracks. Replace any damaged O-rings. Apply Bettcher® Max-Z-Lube to new O-rings and install them with a rolling action to get them over the grooves. Be careful not to cut them on the groove edges.

Apply a thin film of Bettcher® Max-Z-Lube to each of the (5) O-rings on the control valve body.

Push the control valve body into the frame at the rear until the rear threads engage the bore.

Place the locking nut over the control valve rod with the collar end facing the valve.

Use a 1/2 inch open-end wrench to rotate the control valve clockwise while pushing it inward from the rear to engage the rear threads.

Screw the control valve inward until it is in approximately the same position it was prior to removal or until the end of the valve body is 1/8 inch (3mm) from the frame.

Screw locking nut onto front control valve threads, but leave it about 3 turns loose.

Rotate the control valve rod until the axis of the cross-pin is in line with the master link.

Connect master link (see Section 9.4.8).

Perform smoothness adjustment (see Section 9.2.2) then stroke adjustment (see Section 9.2.3).

9.4.17 Rear Fitting Assembly Removal

Disconnect the air line.



FIGURE #68

Remove tubing from barbed fitting (as shown in Figure 24).

Note approximately how far the square portion of the fitting projects past the end of the control valve. Loosen the locknut. Then, using a 5/16 inch open-end wrench, unscrew the rear fitting assembly from the control valve (counterclockwise).

9.4.18 Rear Fitting Assembly Installation (See Figure #68)

Disconnect the air line.

Examine the front face of the fitting assembly. It must be free of nicks or scratches. A new part must have a sharp square inside edge. A used part should have a slightly tapered inside edge. (A defective face will cause air to leak out of the exhaust tube when the blades are driven fully closed).

Screw the fitting assembly into the control valve to its previous position, or until the face lightly contacts the seat. Re-install the tubing over the barbed fitting.

Perform smoothness adjustment (see Section 9.2.2).

Tighten locknut.

9.4.19 Air Line Coiled Tubing Replacement

Disconnect the air line.

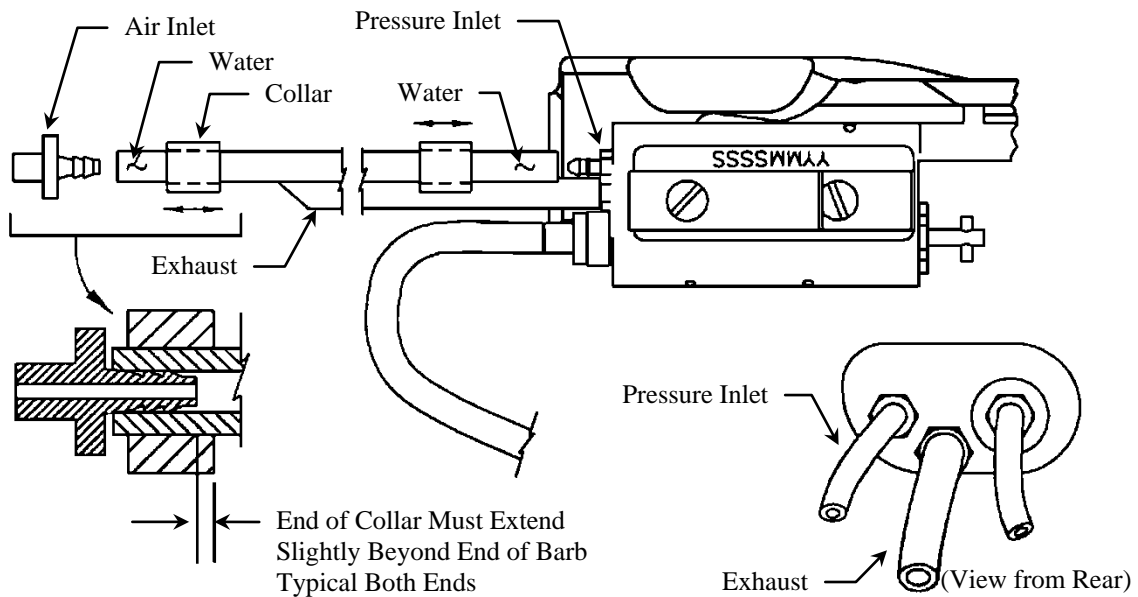


FIGURE #69

Remove the coiled tubing from all three locations - Air inlet coupling, Pressure inlet fitting, and Exhaust fitting (see Section 9.4.21).

Slide a locking collar onto the tube end that is next to the exhaust outlet. Push the end of this tube fully onto the barbs of the inlet coupling. Apply a couple of drops of water on the tubing outer surface at the barbs. Push the locking collar with one hand, while pulling on the tubing with the other hand until the collar slides over barbed region.

Pull the locking collar back, if needed, so that it extends beyond the fitting slightly, as shown above.

Take the larger tube at the other end and push it fully over the barb of the exhaust fitting.

Slide a locking collar on the smaller tube at the other end. Push the end of this tube fully onto the pressure inlet fitting. Apply a couple of drops of water and slide collar over fitting as described above.

9.4.20 Air Line Filter Element Replacement

9.4.20.1 Filter Element Replacement

Disconnect the air line.

Attach the filter gauge tool (108334) between the air supply line and the AirShirz® coiled tubing as shown in Figure #70A below.

Check that the pressure is reading between 80 and 120 PSI (5.5 to 8.3 Bars).

Rapidly operate the tool, moving the finger loop fully in and out while watching the pressure gauge. The needle should **not** fluctuate more than 5 PSI (0.3 Bars).

If the pressure drop is more than 5 PSI (0.3 Bars), the filter element is plugged and should be replaced.

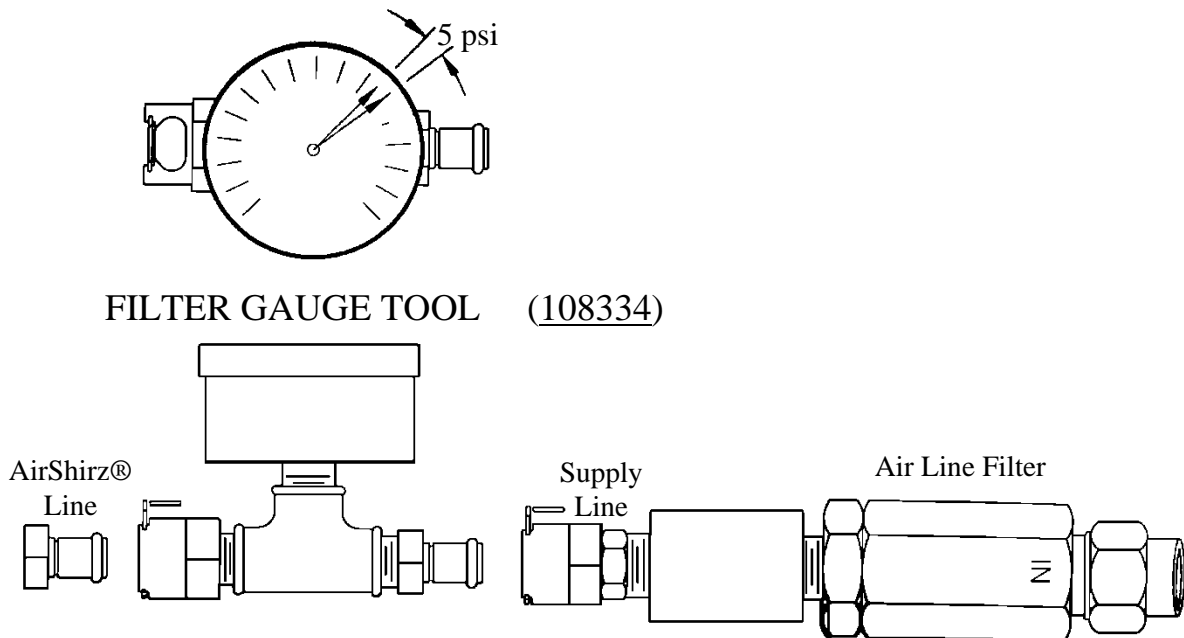


FIGURE #70A

9.4.20.2 Filter Element Replacement

Disconnect the air line.

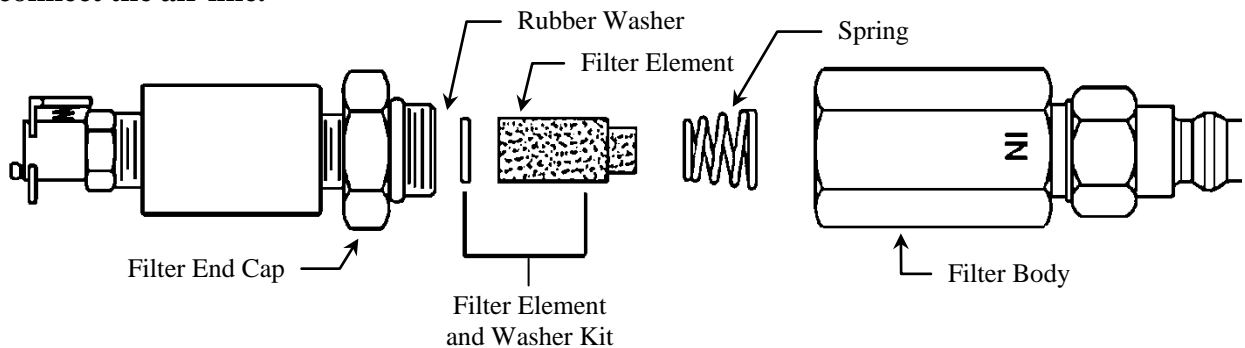


FIGURE #70B

The in-line filter is located ahead of the quick connect coupling to the AirShirz® coiled air line. Remove this section from the air line if it is on a quick connector, otherwise, **SHUT OFF THE AIR TO THIS LINE AND BLEED OFF ALL PRESSURE BEFORE PROCEEDING.**



Using two adjustable wrenches, or 3/4 inch open-end wrenches, unscrew the filter end cap from the filter body.

Carefully remove the filter element. Watch for the rubber washer and rear spring.

Clean out inside of valve body and install a new element so the small, closed-end fits into the small side of the spring in the valve body, as shown.

Be sure the rubber washer is in the recess of the end cap. Then install the end cap back onto the filter body and tighten.

9.4.21 Removing Tubing from Barbed Fittings

Disconnect the air line.

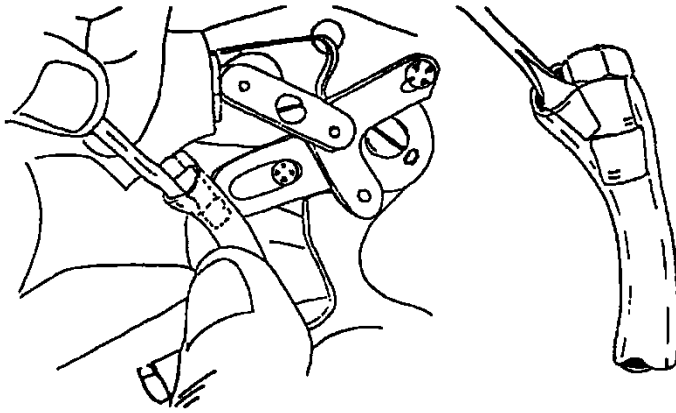


FIGURE #71

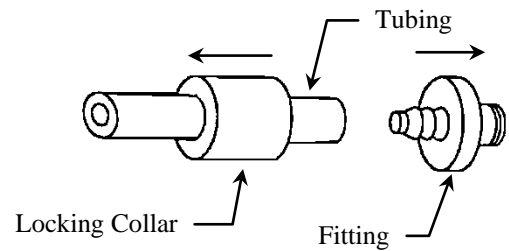


FIGURE #72

Pull back the locking collar if present.

Use a small screwdriver to pry the tube end over the barb of the fitting. Insert the screwdriver under the tubing and push it up to the barb. Pry the tubing over the barb while pulling on the tubing with your other hand, as shown. **Take Care Not To Damage The Barb.**

SECTION 10.0 CLEANING

The AirShirz® is constructed of corrosion resistant, easily cleanable materials. The metallic parts are either stainless steel or aluminum with an anodize coating. The plastic parts are acetyl, nylon, polypropylene, nitrile, or polysulfone. The tubing is polyurethane.

Mild detergents may be used but alkaline solutions should be avoided.

SECTION 10.0 CLEANING (Continued)

CAUTION

PROLONGED USE OF ALKALINE CLEANERS, OR SOAKING
IN ALKALINE SOLUTIONS, WILL DESTROY THE FINISH
AND CORRODE THE ALUMINUM PARTS.

Do not use water hotter than 70°C (160°F) as this will soften the tubing. Let the AirShirz® cool to below 40°C (100°F) before using.

Do not allow soapy water to get inside the air lines.

Cleaning Procedures:

1. Close the blades and lock the blade latch.
2. Disconnect the air supply.
3. Remove the blade set.
4. Open the cover by lifting at the cover tab until it clears the frame and then rotate the cover upward and forward as shown.

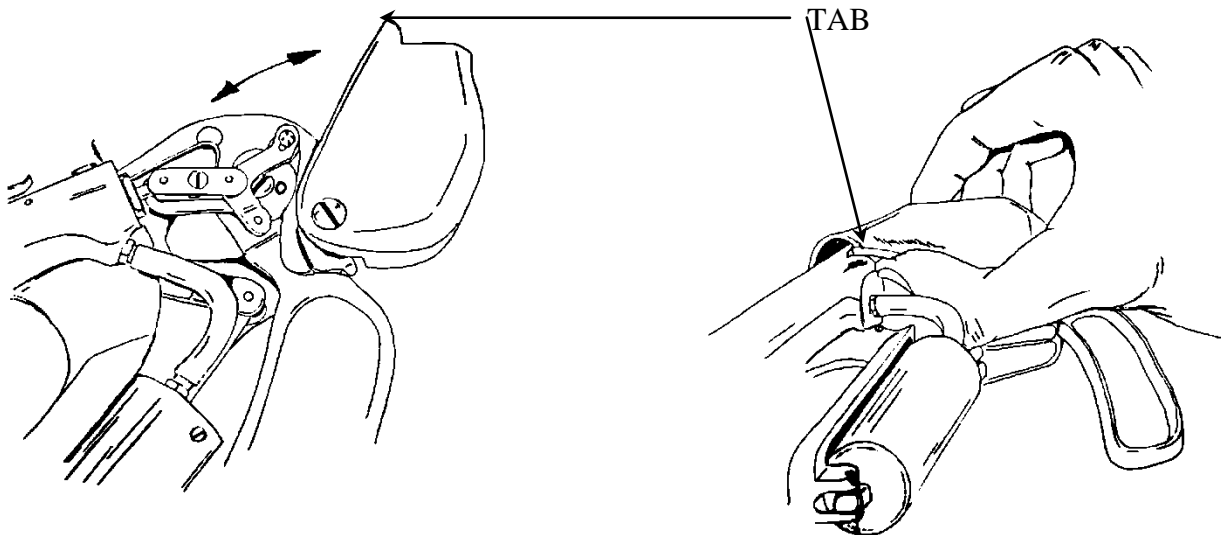
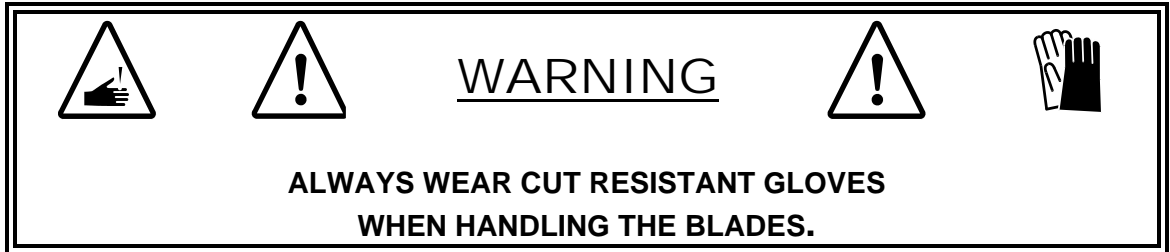


FIGURE #73

SECTION 10.0 CLEANING (Continued)

5. Use a bristle brush or water jet to remove debris from the linkage and blade pocket. The power unit may be left soaking overnight in a mild detergent. Never Soak It In An Alkaline Solution.
6. Scrub the blade drive mechanism with a brush or water jet. The blade set may be cleaned separately in an alkaline solution.

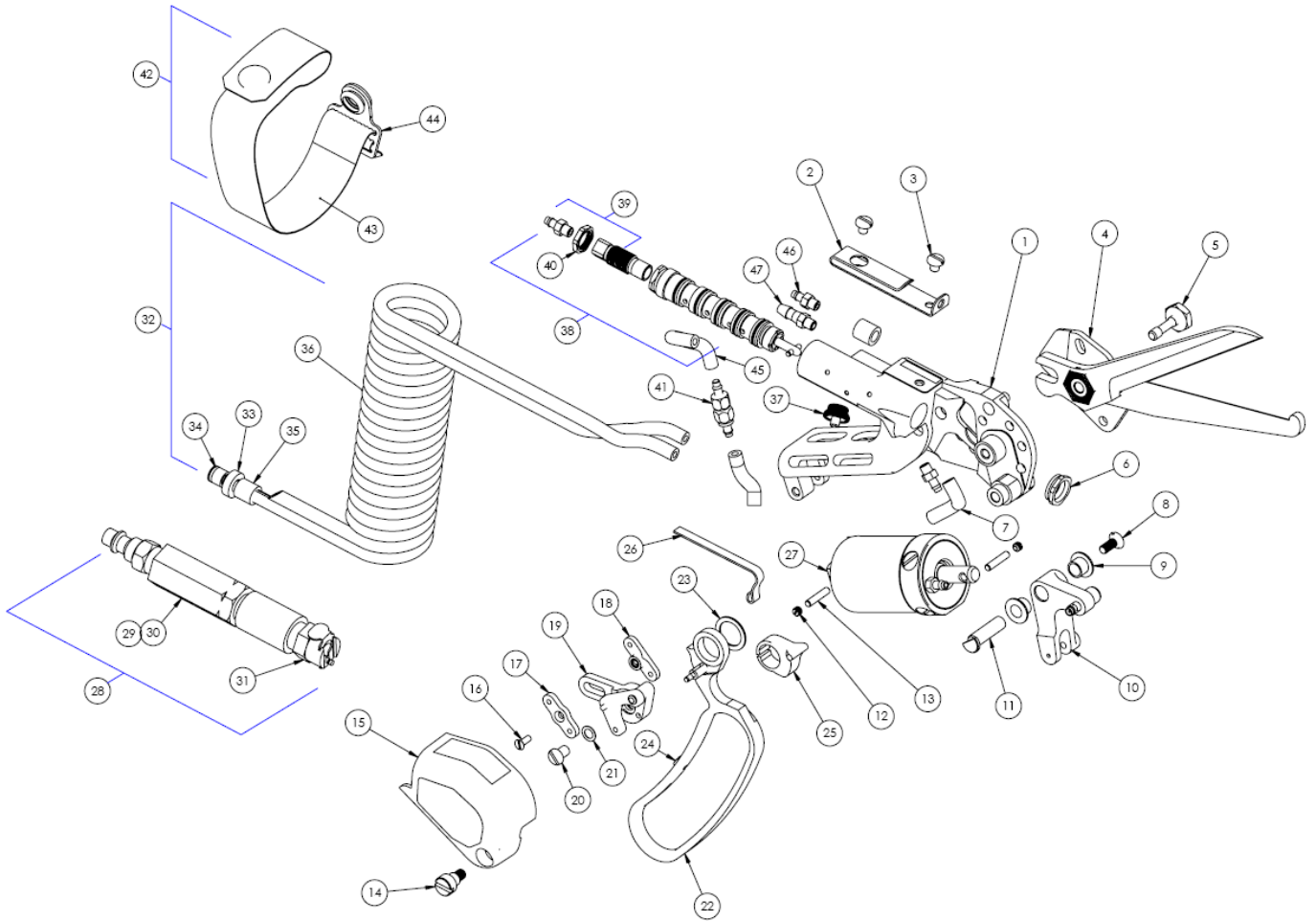


7. The MicroBreak Strap may be removed for cleaning.
8. To close the cover, pivot it back and lift the tab to allow it to slide over the top of the frame and snap into place.

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SECTION 11.0 SPARE PARTS LIST

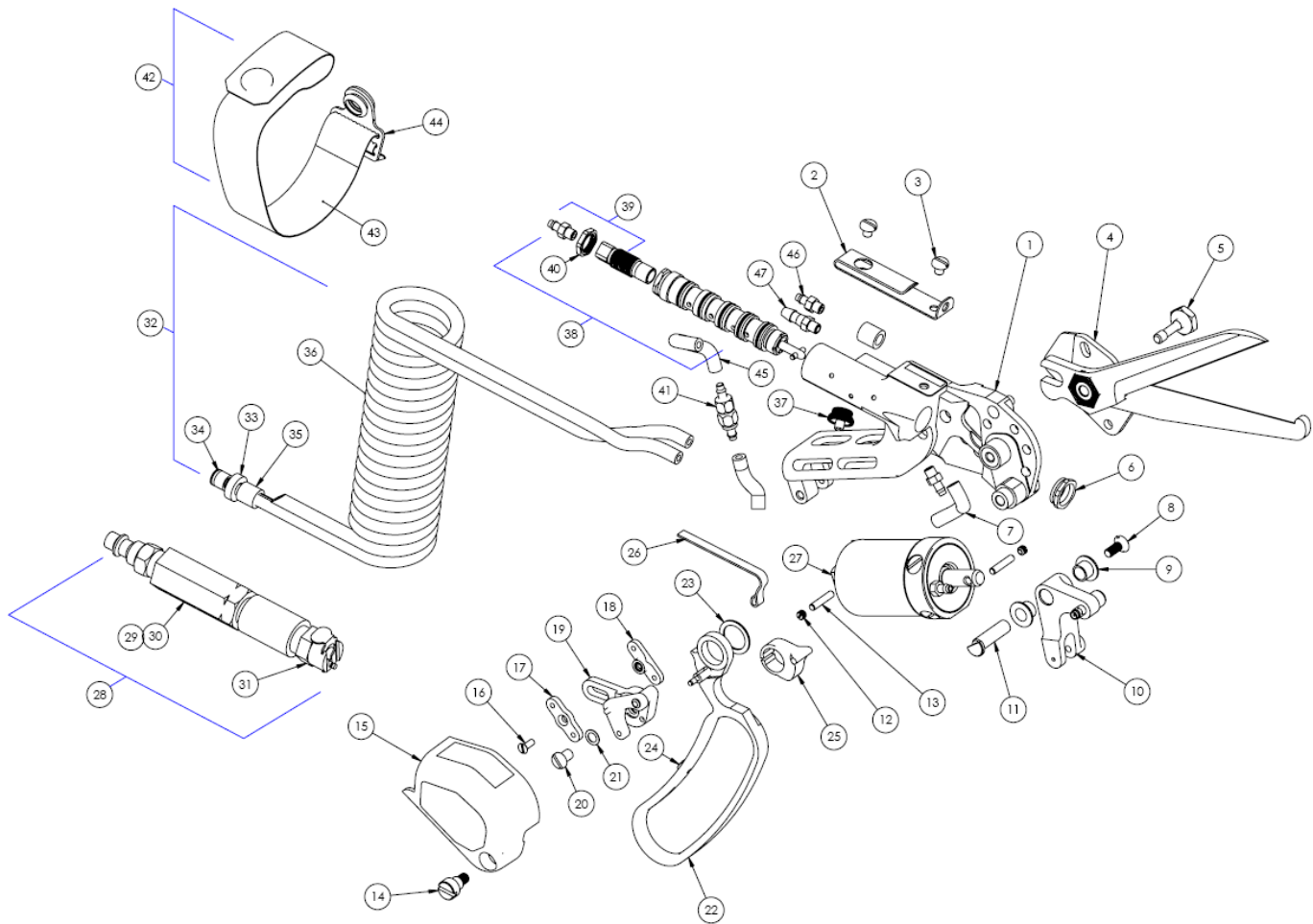
11.1 Airshirz® Exploded View



11.1 Airshirz® Exploded View (Continued)

Item	Description	Part Number	Qty.
1	Frame Assembly – Black	108052	1
	Frame Assembly – Blue	108549	1
2	Clip – Microbreak Strap	108134	1
3	Screw #8-32 x 3/16	123250	2
4	Blade Options:	<i>See Below</i>	
	Straight Blade Assembly	108053	1
	Curved Blade Assembly	108054	1
	Reverse Curve Blade Assembly	103799	1
	Ball Tip Blade Assembly	108055	1
	Gizzard Blade Assembly	108146	1
	Straight Short Blade Assembly	108169	1
	Neck Breaker Blade Assembly	108170	1
	Broiler Vent Ball Blade Assembly	108208	1
	Short Ball Tip Blade Assembly	108209	1
	Evis Curved Blade Assembly	108210	1
	Inverted Neck Breaker Blade Assembly	108224	1
	Straight 5-1/4” Blade Assembly	108361	1
	Gizzard 5-1/4” Blade Assembly	108375	1
	Low Profile 4-1/4” Straight Blade Assembly	108475	1
	Low Profile 2-1/2” Straight Blade Assembly	108496	1
	1-3/8” Short Straight Blade Assembly	108498	1
	1-11/16” Short Straight Blade Assembly	108499	1
	Table Top Blade Assembly	108505	1
	Side Cutter Blade Assembly	108526	1
Serrated Straight 2-1/2” Blade Assembly	108539	1	
Micro-Serrated Tabletop Blade Assembly	108700	1	
Micro-Serrated 3-3/4” Blade Assembly	108702	1	
Kevlar® Tabletop Blade Assembly	108720	1	
5	Blade Screw, Hex Head	108213	1

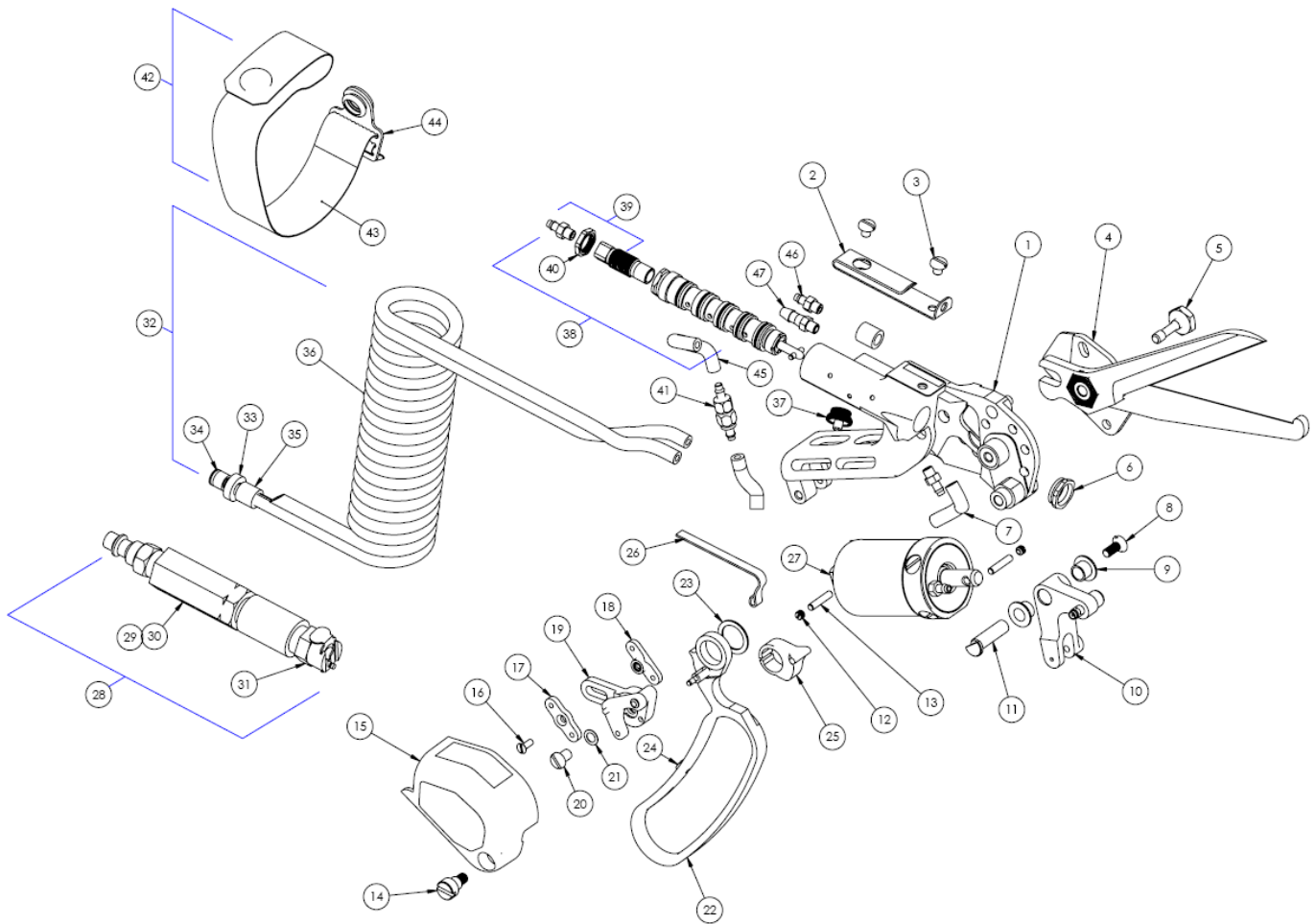
11.1 Airshirz® Exploded View (Continued)



11.1 Airshirz® Exploded View (Continued)

Item	Description	Part Number	Qty.	
6	Locknut	108156	1	
7	Tubing, 1/8" I.D. x 1-7/8" Long	108103	2	
8	Screw #8-32 x 7/16" Flat Head Self-Locking	108151	1	
9	Flanged Pivot Bushing	108728	2	
10	Drive Link Assembly Kit (Includes Item #13 and 2 pc. Item #9)	108206	1	
11	Link Pivot Pin Replacement Kit (Includes Item #8)	108763	1	
12	Setscrew, #8-32 x 1/8" Self-Locking	108141	1	
13	Dowel Pin Replacement Kit (Includes 2 Pins and 2 pcs. Item #12)	108710	1	
14	Shoulder Screw, 1/4" x 3/16"	123249	1	
15	Black Cover	108680	1	
16	Screw #4-40 x 5/16" Flat Head Self-Locking	108088	1	
17	Master Link Top Plate	108749	1	
18	Master Link Assembly	108765	1	
19	Servo Link Assembly Replacement Kit (Includes Items 20 & 21)	108762	1	
20	Screw #10-32 Special Self-Locking	108185	1	
21	Drive Washer	108112	1	
22	Fingerloop Options:	--	--	
	Fingerloop Kit (Includes Item 23)	108766	1	
	Fingerloop Kit – Offset (Includes Item 23)	108768	1	
	Fingerloop Kit-Offset Small (Includes Item 23)	108769	1	
23	Fingerloop Kit Open – (Includes Item 23)	108767	1	
	Teflon® Washer	108750	1	
	24	Fingerloop Bumper Replacement Kit	108313	1
	25	Latch Ring Options:	--	--
Regular Latch Ring		108138	1	
Bump-Resistant Latch Ring		108299	1	
Stroke-Limiting Latch Ring		108470	1	
26	Flat Spring	108074	1	
27	Complete Power Unit with Large Heavy Duty Cylinder – Black	108171	1	
	Large Heavy Duty Power Cylinder Assembly – Black	108788	1	
	Complete Power Unit with Small Cylinder – Black	108172	1	
	Small Power Cylinder Assembly – Black	108263	1	
	Complete Power Unit with X-Large Cylinder – Black	108476	1	
X-Large Power Cylinder Assembly – Black	108474	1		

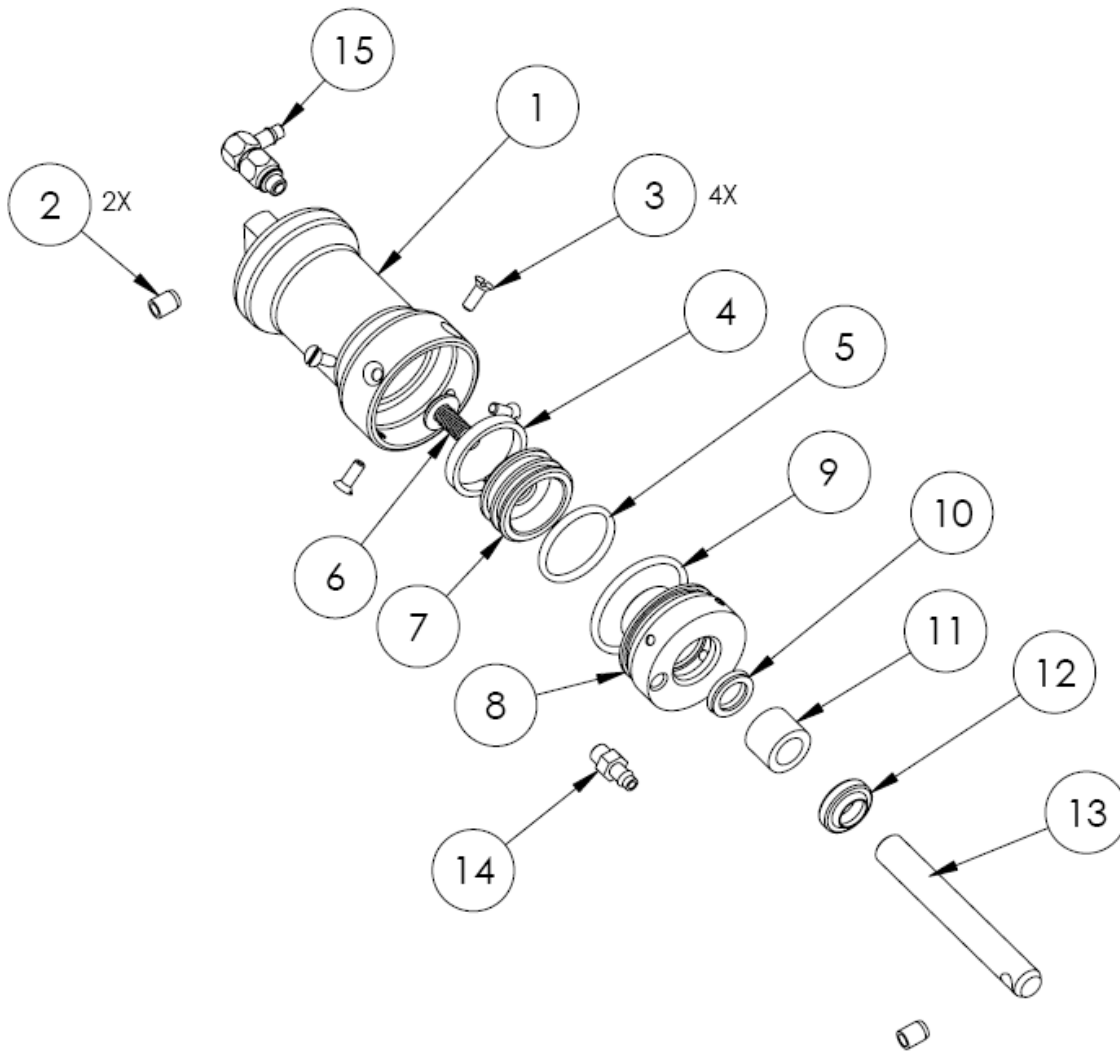
11.1 Airshirz® Exploded View (Continued)



11.1 Airshirz® Exploded View (Continued)

Item	Description	Part Number	Qty.
28	Filter Assembly Complete (Includes Items 29, 30, and 31)	108042	1
29	Filter Body (Includes Element)	108043	1
30	Filter Element (Inline) with Washer	108196	1
31	Connector, Female Line	108044	1
32	Twin Tubing Assembly – Black AirShirz (Includes Items 33, 35 and 36)	108221	1
	Twin Tubing Assembly – Colored AirShirz (Includes Items 33, 35, and 36)	108595	1
33	Connector, Male Line (Includes Item 34)	108045	1
34	O-Ring	122344	1
35	Locking Collar	108556	2
36	Twin Tubing, Coiled – Black AirShirz	108220	1
	Twin Tubing Coiled – Colored AirShirz	108594	1
37	Snap, #8-32 Phillips Head	108163	1
38	Control Valve Assembly (Includes Items 39, 40 and 46)	108017	1
39	Fitting Assembly (Includes Item 46)	108738	1
40	Locknut, Fitting	108740	1
41	Straight Swivel Fitting	125591	1
42	Microbreak Strap Assembly, Complete (Includes Items 43 & 44)	108160	1
43	Strap Sub-Assembly	108159	1
44	Buckle Sub-Assembly	108158	1
45	Tubing – 1/8” I.D. x 2-1/2” Long	108846	1
46	Fitting – Barbed 1/8”	108021	3
47	Fitting – Barbed 5/32”	101440	1

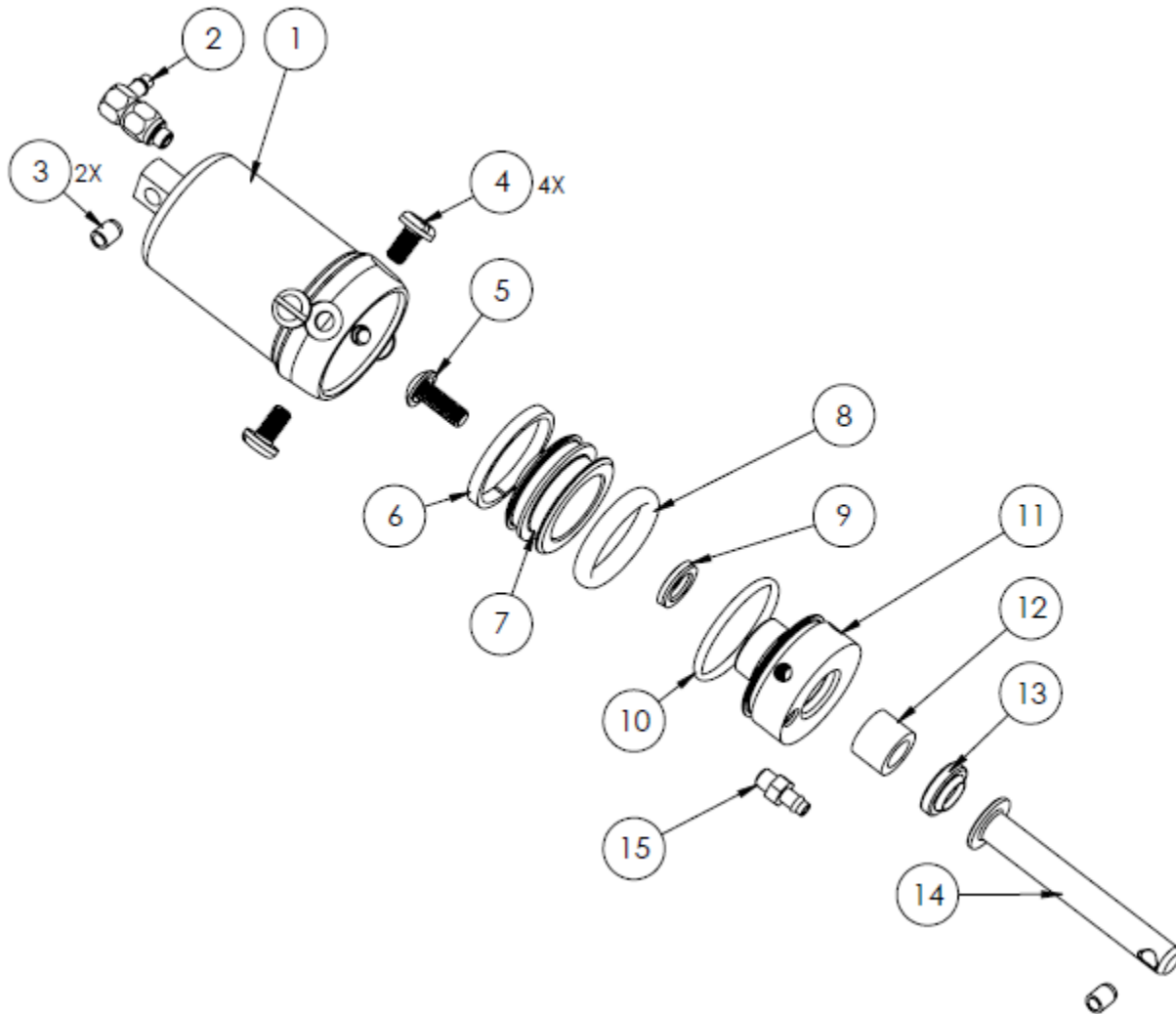
11.2 Small Power Cylinder Assembly



11.2 Small Power Cylinder Assembly (Continued)

Item	Description	Part Number	Qty.
--	Small Power Cylinder Assembly	108263	1
1	Cylinder, Small	108262	1
2	Bearing, Power Cylinder Mounting	108742	2
3	Screw, #4-40 x5/16" Flat Self-Locking	108088	4
4	Wear Seal	122346	1
5	O-Ring, 3/4" x 1/16" x 7/8"	122327	1
6	Screw, #10-32 x1/2" Pan Head Self-Sealing	108039	1
7	Piston, Small	108261	1
8	O-Ring, 1" x 1/16"x1-1/8"	122339	1
9	Base, Small/Large	108120	1
10	Seal, Rod Cylinder	122341	1
11	Bearing	108034	1
12	Ring-Wiper	108033	1
13	Rod Assembly Kit (Includes 1 pc Item 2)	108439	1
14	Tube Fitting	108021	1
15	Fitting, Swivel Elbow	125587	1

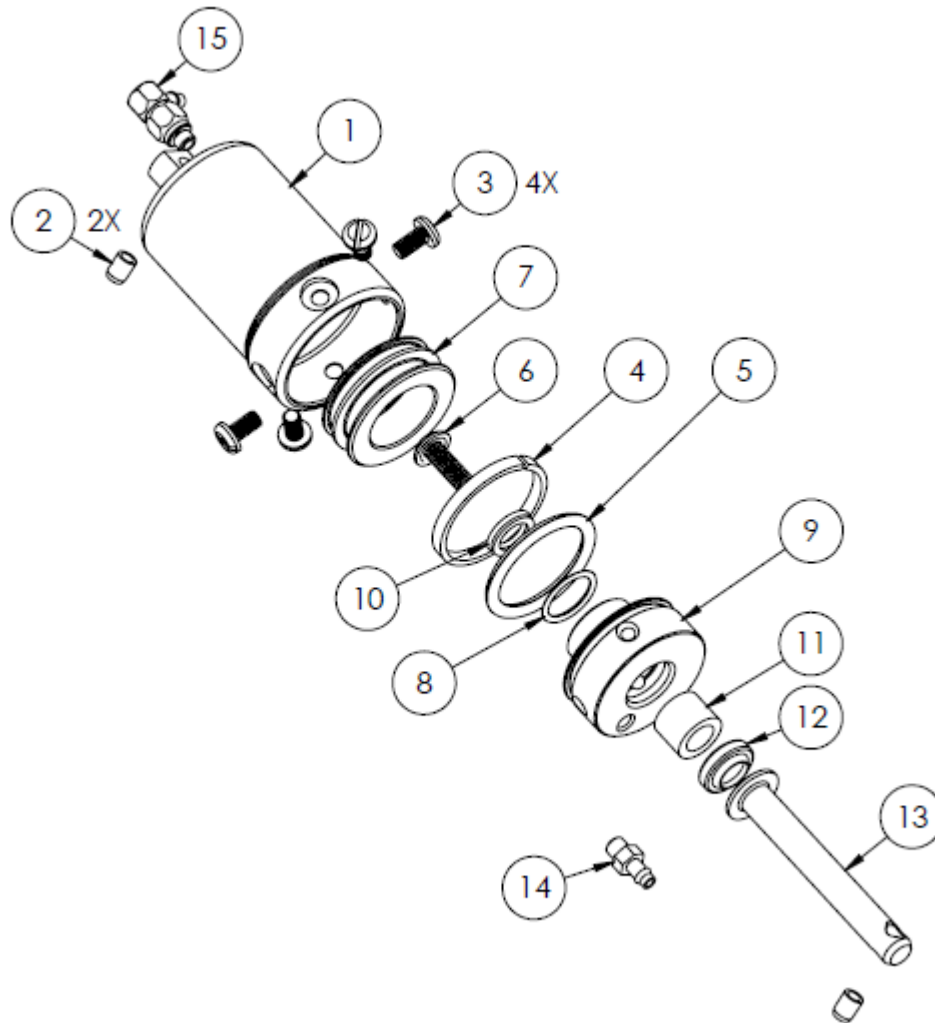
11.3 Large Heavy Duty Power Cylinder Assembly



11.3 Large Heavy Duty Power Cylinder Assembly (Continued)

Item	Description	Part Number	Qty.
--	Large Heavy Duty Power Cylinder Assembly	108788	1
1	Cylinder, Large, Heavy Duty	108786	1
2	Fitting- Swivel Elbow	125587	1
3	Bearing, Power Cylinder Mounting	108742	2
4	Screw, #10-32x 5/16" Pan Head Self-locking	108794	4
5	Screw, #10-32 x 1/2 " Pan Head Self-sealing	108039	1
6	Wear Seal	122342	1
7	Piston - Cylinder, Large	108121	1
8	O-Ring, 7/8" x 1/8" x 1- 1/8"	122340	1
9	Seal, Rod Cylinder	122341	1
10	O-Ring 1- 1/16 " x 1-3/16"	122483	1
11	Base, Large, Heavy Duty	108787	1
12	Bearing	108034	1
13	Ring -Wiper	108033	1
14	Rod Assembly Kit (Includes 1 pc Item 2)	108439	1
15	Tube Fitting	108021	1

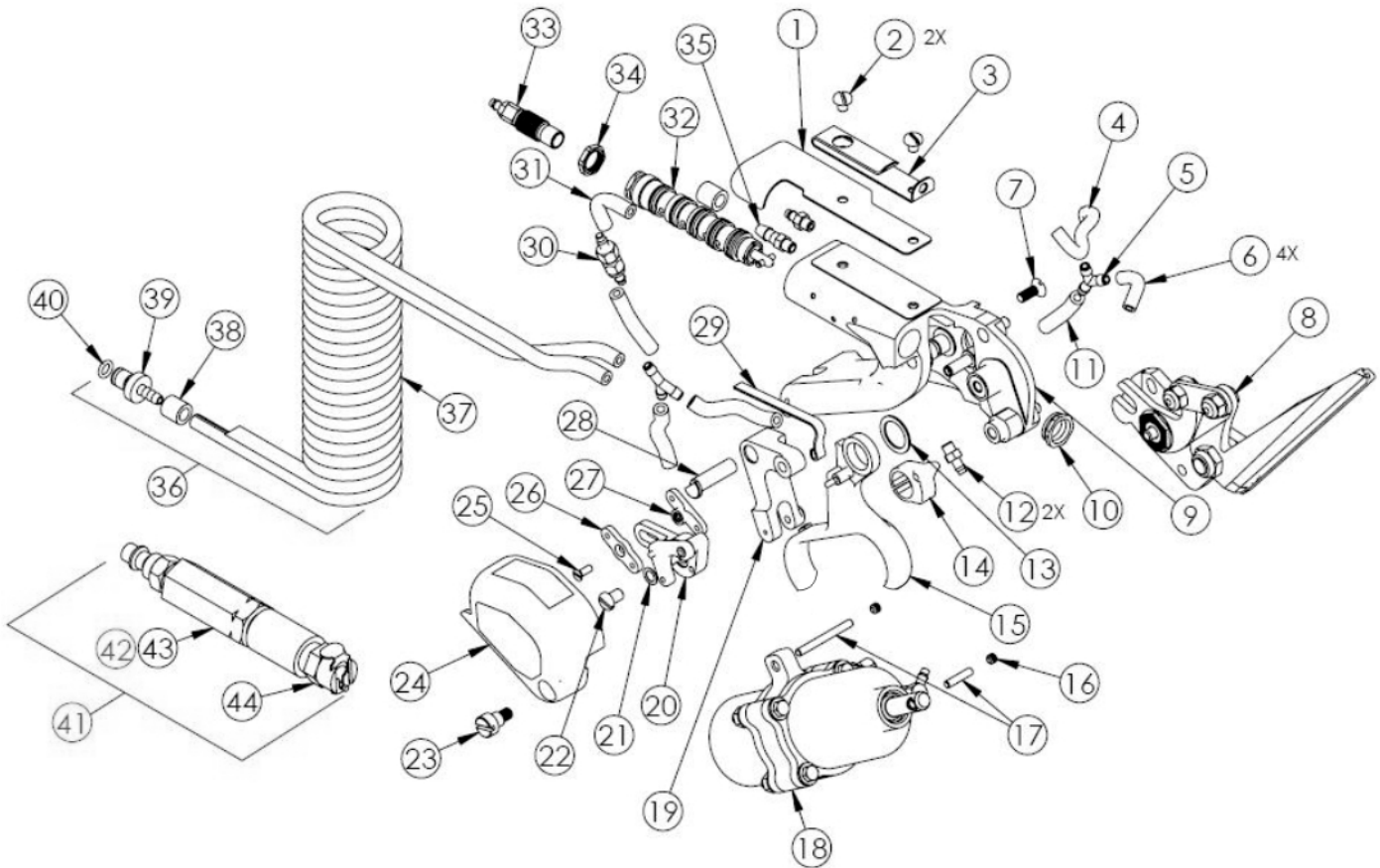
11.4 X-Large Heavy duty Power Cylinder Assembly



11.4 X-Large Heavy Duty Power Cylinder Assembly (Continued)

Item	Description	Part Number	Qty.
--	X-Large Heavy Duty Power Cylinder Assembly	108474	1
1	Cylinder (Black), X-Large	108472	
2	Bearing, Power Cylinder Mounting	108742	2
3	Screw, #8-32 x 5/16" Pan Head Self-Locking	104246	4
4	Wear Seal	122473	1
5	O-Ring, 1" x 1/8" x 1-1/4"	122474	1
6	Screw, #10-32 x 1/2" Pan Head Self-Sealing	108039	1
7	Piston, X-Large	108473	1
8	O-Ring, 1-3/16"x1/16"x1-5/16"	103439	1
9	Base (Black), X-Large	108471	1
10	Seal, Rod Cylinder	122341	1
11	Bearing	108034	1
12	Ring-Wiper	108033	1
13	Rod Assembly Kit (Includes 1 pc Item 2)	108439	1
14	Tube Fitting	108021	1
15	Fitting, Swivel Elbow	125587	1

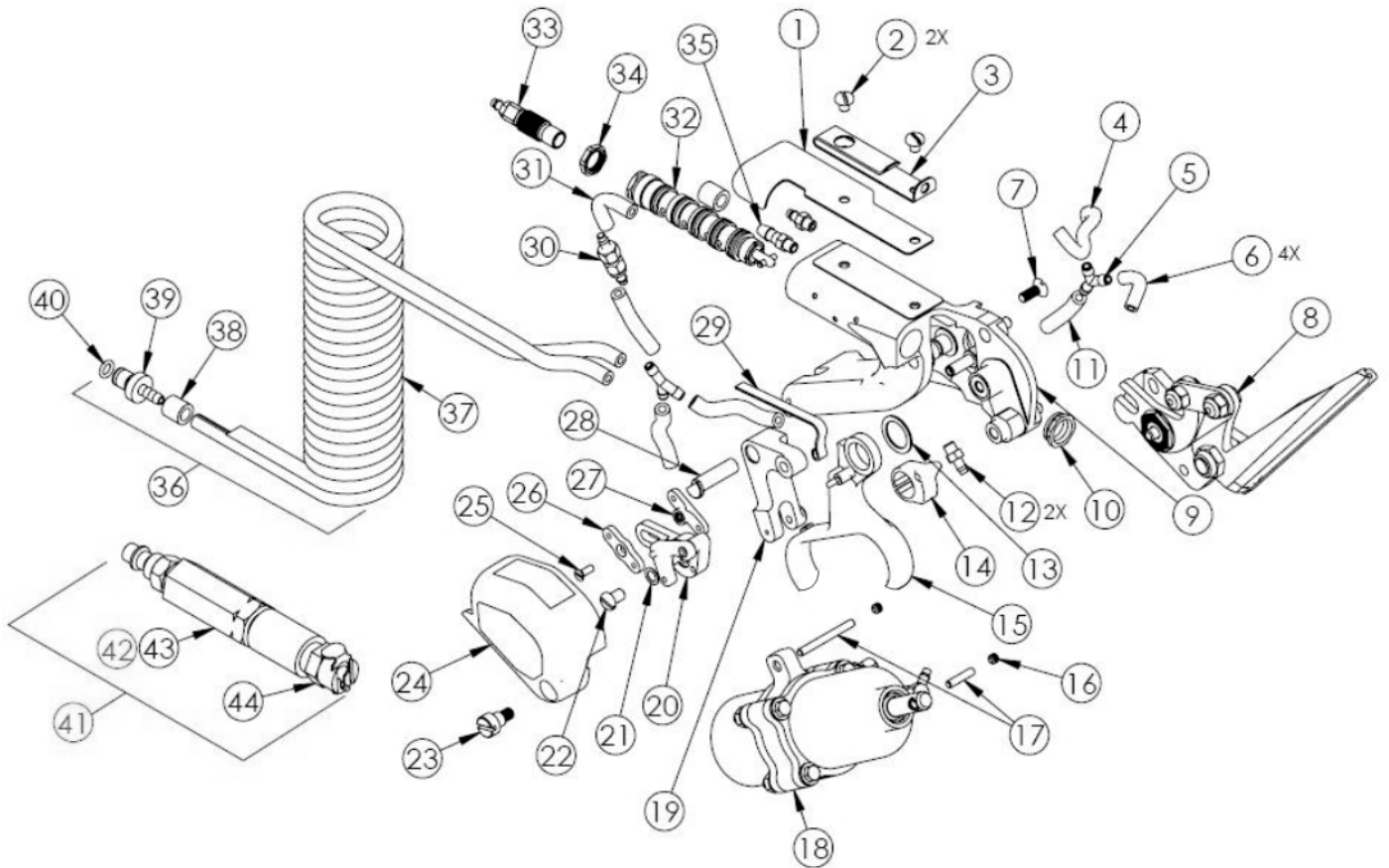
11.5 AirShirz® Magnum Exploded View



11.5 AirShirz® Magnum Exploded View (Continued)

Item	Description	Part Number	Qty.
	Complete Power Unit with XX-Large Cylinder	108723	1
1	Plate – Shield	108516	1
2	Screw #8-32 x 3/16”	123250	2
3	Clip	108134	1
4	Tubing – 1/8” I.D. x 5 1/4” Long	108102	1
5	Fitting – Y Connector	108755	2
6	Tubing – 1/8” I.D. x 1 7/8” Long	108103	4
7	Screw, Flat self-Locking #8-32 x 7/16”	108151	1
8	Blade Options:	See Below	
	Straight Blade Assembly	108053	1
	Curved Blade Assembly	108054	1
	Ball Tip Blade Assembly	108055	1
	Gizzard Blade Assembly	108146	1
	Straight Short Blade Assembly	108169	1
	Neck Breaker Blade Assembly	108170	1
	Broiler Vent Ball Blade Assembly	108208	1
	Short Ball Tip Blade Assembly	108209	1
	Evis Curved Blade Assembly	108210	1
	Inverted Neck Breaker Blade Assembly	108224	1
	Straight 5-1/4” Blade Assembly	108361	1
	Gizzard 5-1/4” Blade Assembly	108375	1
	Low Profile 4-1/4” 35° Straight Blade Assembly	108475	1
	Low Profile 2-1/2” Straight Blade Assembly	108496	1
	1-3/8” Short Straight Blade Assembly	108498	1
	1-11/16” Short Straight Blade Assembly	108499	1
	Table Top Blade Assembly	108505	1
	Side Cutter Blade Assembly	108526	1
	Straight 2-1/2” Blade Assembly (Serrated)	108539	1
Micro-Serrated Table Top Assembly	108700	1	
Micro-Serrated 3-3/4” Assembly	108702	1	
Kevlar® Tabletop Blade Assembly	108720	1	

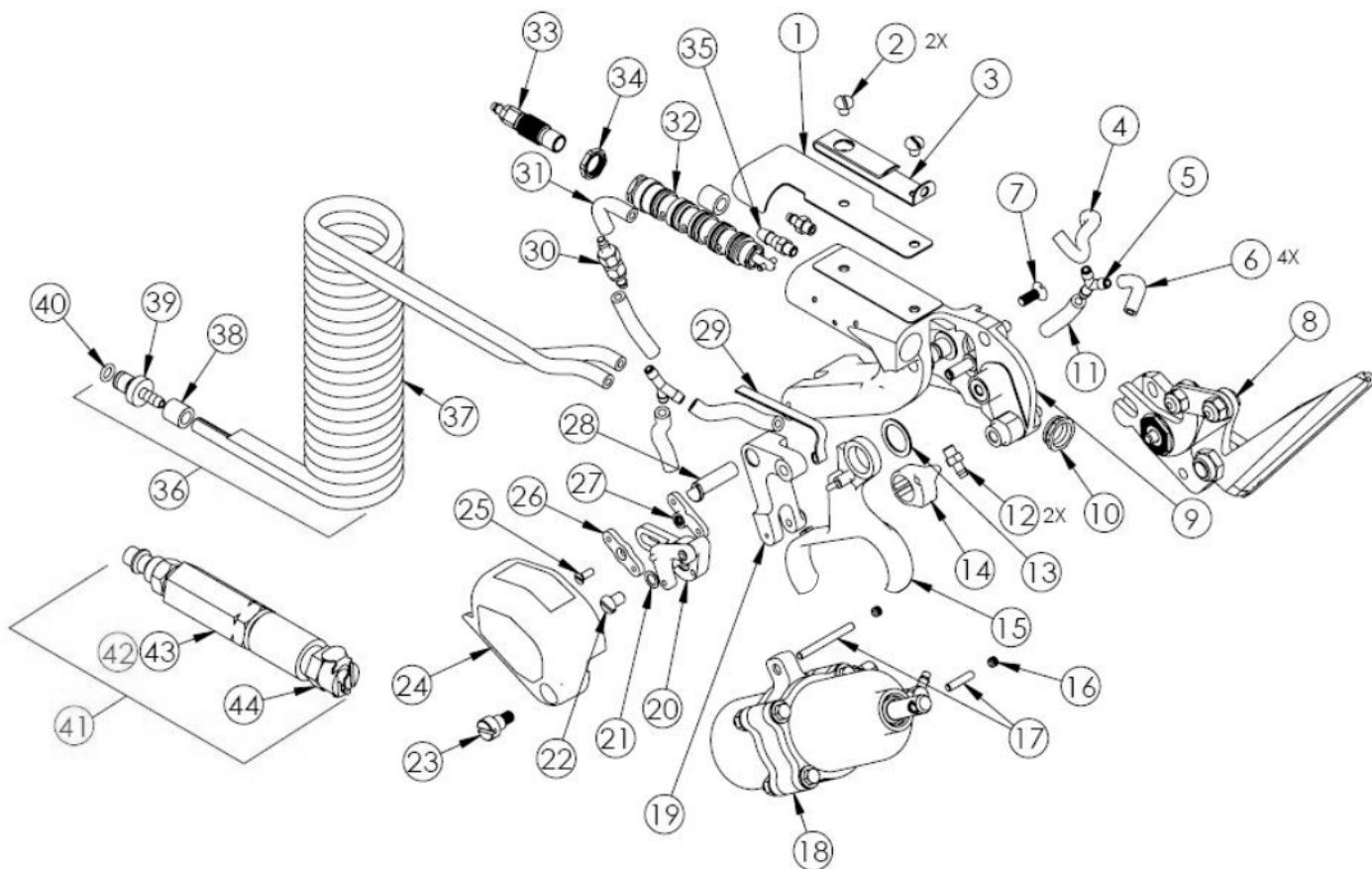
11.5 AirShirz® Magnum Exploded View (Continued)



11.5 AirShirz® Magnum Exploded View (Continued)

Item	Description	Part Number	Qty.
9	Frame Assembly	108732	1
10	Locknut, Control Valve	108156	1
11	Tubing –1/8” I.D. x 1” Long	108754	1
12	Fitting –Tube	108021	2
13	Teflon Washer	108750	1
14	Latch Ring	108138	1
15	FINGER LOOP OPTIONS:	--	--
	Finger Loop Kit, XXL Open	108770	1
	Finger Loop Kit, Offset Small, Open	108769	1
16	Set Screw, #8-32 x 1/8” Self-Locking	108141	2
17	Kit-Cylinder Pivot Pin Replacement (Includes 2 pc. Item #16)	108760	1
18	Power Cylinder Assembly XX-Large	108724	1
19	Kit-Drive Link Replacement XXL (Includes Item 16 and 2 pc. Item 49)	108761	1
20	Kit – Servo Link Assy. Replacement (Includes Items 21 & 22)	108762	1
21	Washer, Plastic	108112	1
22	Screw #10-32 Special Self-Locking	108185	1
23	Shoulder Screw ¼” x 3/16”	123249	1
24	Cover Assembly, Black, XXL	108756	1
25	Screw #4-40 x 5/16” Self-Locking	108088	1
26	Plate, Master Link Top	108749	1
27	Master Link Assembly	108765	1
28	Kit – Link Pivot Pin Replacement (Includes Item #7)	108763	1
29	Flat Spring	108074	1
30	Fitting-Straight Swivel	125591	1
31	Tubing 1/8 I.D. x 2 ½” Long	108846	1
32	Control Valve (Includes Item #33)	108017	1
33	Fitting Assembly (Includes Item 12)	108738	1
34	Locknut, Fitting	108740	1

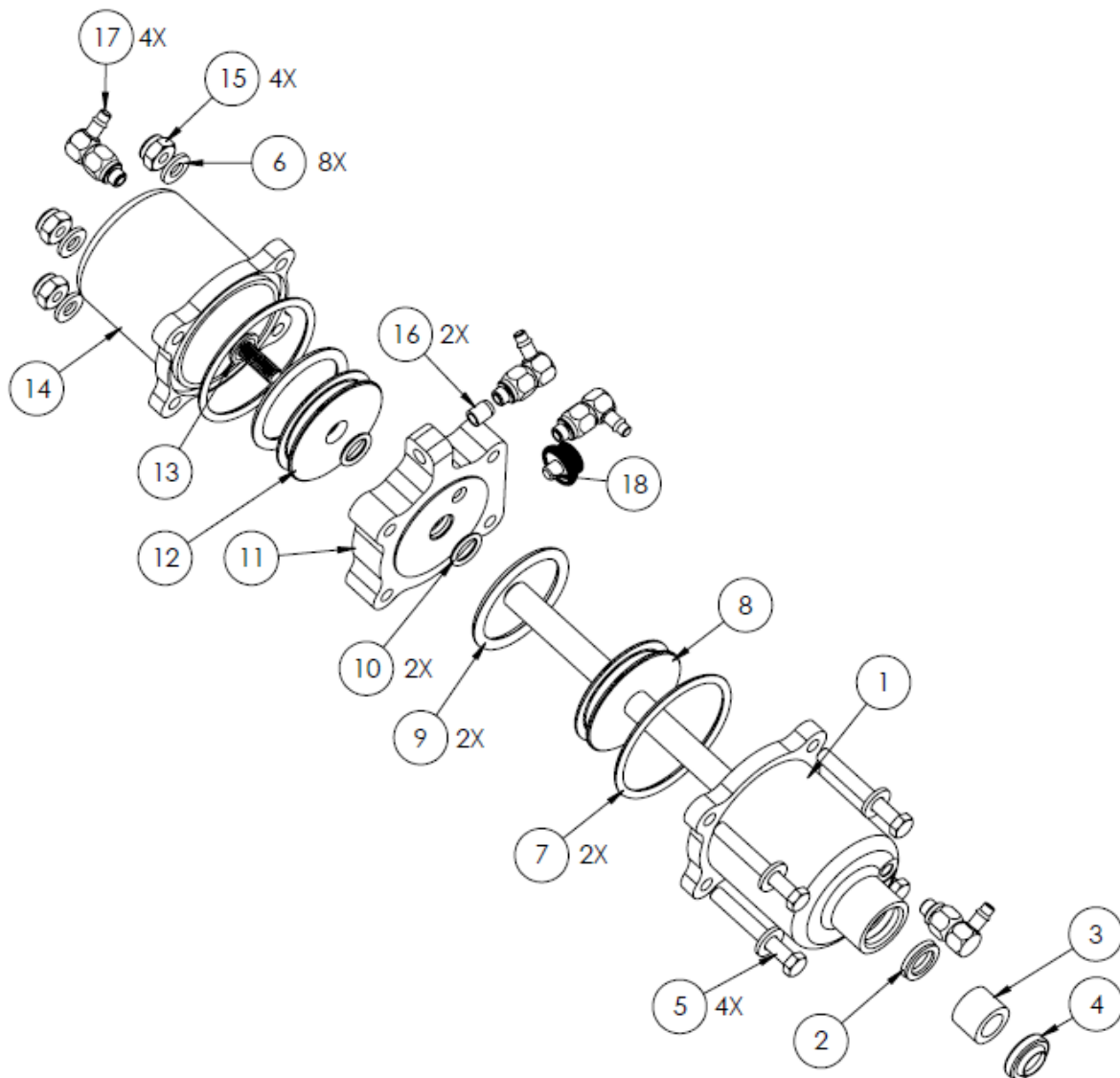
11.5 AirShirz® Magnum Exploded View (Continued)



11.5 AirShirz® Magnum Exploded View (Continued)

Item	Description	Part Number	Qty.
35	Fitting – Large Tubing	101440	1
36	Twin Tubing Assembly (Includes Items 37, 38, & 39)	108221	1
37	Twin Tubing, Coiled	108220	1
38	Locking Collar	108556	2
39	Connector, Male Line (Includes Item 40)	108045	1
40	O-Ring 3/16” x 1/16” x 5/16”	122344	1
41	Filter Assembly, Complete	108042	1
42	Filter Body (Includes Element)	108043	1
43	Filter Element (Inline) with Washer	108196	1
44	Connector, Female Line	108044	1
45	Kit – Finger Loop Bumper Screw (Not Shown)	108313	1
46	MicroBreak Strap Assembly, Complete (Not Shown)	108160	1
47	MicroBreak Strap Sub-Assembly (Not Shown)	108159	1
48	MicroBreak Strap Buckle Assembly (Not Shown)	108158	1
49	Bushing, Flanged (Not Shown)	108728	2

11.6 XX-Large Power Cylinder Assembly



11.6 XX-Large Power Cylinder Assembly (Continued)

Item	Description	Part Number	Qty.
--	Power Cylinder Assembly – XX-Large	108724	1
1	Cylinder, Front, XX-Large	108725	1
2	Ring – Wiper	108033	1
3	Bearing	108034	1
4	Seal – Rod Cylinder	122341	1
5	Screw #8-32 x 1-1/4" Hex Head	123273	4
6	Washer #8 Flat	120260	8
7	O-Ring 1-1/2" x 3/32" x 1-11/16"	122479	2
8	Rod, Piston, XX-Large	108735	1
9	O-Ring 5/16" x 1/16" x 7/16"	122478	2
10	O-Ring 1-1/8" x 1/8" x 1-3/8"	122314	2
11	Plate, Center, XX-Large Cylinder	108726	1
12	Piston, XX-Large	108736	1
13	Screw #10-32 x 1/2" Pan-Head Self-Locking	108039	1
14	Cylinder, Rear, XX-Large	108727	1
15	Lock Nut #8-32	120301	4
16	Bearing, Power Cylinder Mounting	108742	2
17	Fitting – Swivel Elbow	125587	4
18	Snap #8-32 Phillips Head	108163	1

11.7 Optional Equipment Available (Order by Part Number)

Part Number	Description
184282	Bettcher® Max-Z-Lube – 4 oz. Tube
113326	Grease Gun
103603	Food Grade Mineral Oil
108218	Kit-Latex Sheets
108226	Maintenance Tool Kit
108205	Blade Bushing Kit
108198	Power Cylinder Overhaul Kit (Large Cylinder)
108789	Power Cylinder Overhaul Kit (Large Heavy Duty Cylinder)
108296	Power Cylinder Overhaul Kit (Small Cylinder)
108494	Power Cylinder Overhaul Kit (X-Large Cylinder)
108764	Power Cylinder Overhaul Kit (XX-Large Cylinder)
108199	Control Valve Seals Kit
108334	Filter Gauge Kit
108196	Filter Element (Inline) with Washer
108201	Air Filter Assembly (Air Supply)
163186	Filter Element Replacement (Air Supply)
108200	Regulator without 160 PSI Gauge
108299	Latch Ring – Bump Resistant
108728	Drive Link Pivot Bushing
108304	Finger loop Assembly, Offset
108455	Left-Handed Finger loop Kit
108470	Latch Ring – Stroke Limiting
108516	Shield, Air Line
108707	MicroBreak Strap Retrofit Kit
108798	Kit, Drive Link, XXL- Poultry
108804	Pin-Threaded, Repair
108803	Kit, Heavy Duty Pivot Pin Replacement
122740	Tool Positioner Reel

11.7.1 Latch Ring – Stroke Limiting

This latch ring can be used to limit how far the finger loop opens thus limiting how far the blades open. The surface that stops the finger loop in the open position may be filed away to customize the desired opening position.

11.7.2 Finger Loops

The full finger loop, as seen throughout this manual, is standard on all models except the colored AirShirz®. An offset, full finger loop is available (108304) for operators with small hands. A two-finger finger loop (108448) is available as an option for use where the full closed finger loop may get in the way on particular applications. The colored AirShirz® use a two-finger open loop as standard.

Section 12 ABOUT THESE OPERATING INSTRUCTIONS

12.1 Other Languages

Translations into any of the languages used in the European Union are available at cost price upon request. Call or write the local Distributor or contact Bettcher Industries.

12.2 Document Identification

Copies of this Operation Instruction may be ordered by quoting the Document ID as listed below:

Document ID:	Manual #108057
Document Description:	Operating Instructions and Spare Parts List for the Bettcher AirShirz®
Issued:	June 3, 1996

Operating Instructions for other Bettcher Industries Tools and Trimmers may be requested by quoting the model designation of the tool as shown on the identification plate on the tool.

12.3 Software and Duplication

This document has been created with Microsoft Word for Windows and set in Times New Roman 12 points for A-size paper (8.5 x 11 inches).

For more information, contact your local Representative or:

Bettcher Industries
Administrative Assistant/Engineering Department
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Vermilion, Ohio 44089
U.S.A.

SECTION 13.0 CONTACT ADDRESSES AND PHONE

For additional information, technical support and spare parts, contact your Local Representative, Distributor, or Bettcher Representative:

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