

Lily Corporation

Model CD30 S

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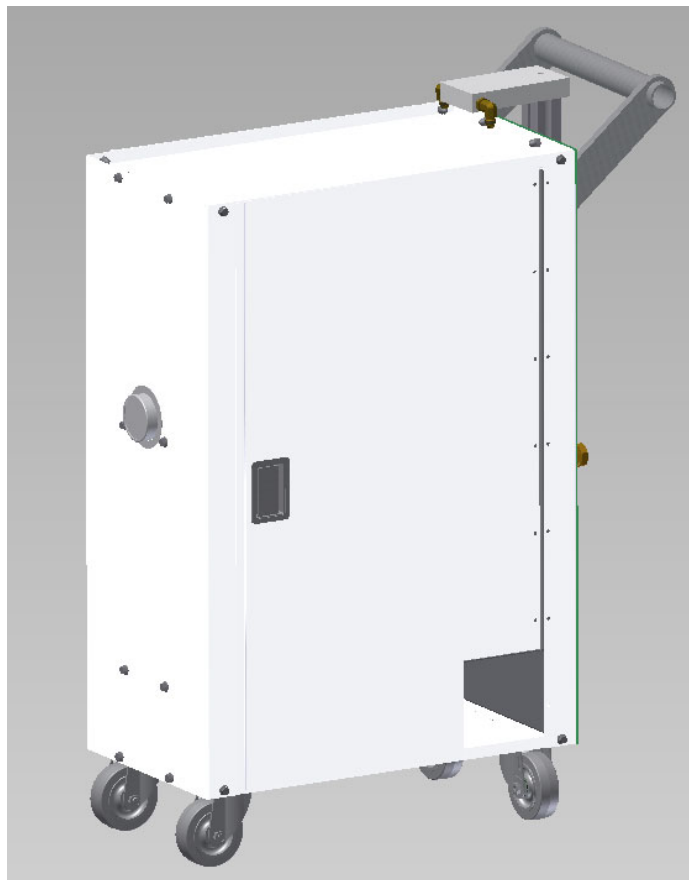
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Warning and Safety Precautions

Lily Model CD30 S dispensers can develop fluid pressures in excess of 2000 pounds per square inch. Mechanical members are actuated under forces of up to 500 psi. Do not energize the system unless all doors are closed, and fingers, tools, and other objects are outside of the machine cabinet.

Become thoroughly acquainted with first-aid procedures recommended by your resin supplier. Most resin suppliers also recommend skin & eye protection when handling epoxies. Closely follow these recommendations to avoid injury.

The heating element surface temperature can exceed 350 degrees Fahrenheit. Don't touch!

If solvents are to be used for cleaning, personnel should become thoroughly acquainted with their characteristics. Most solvents are hazardous under all circumstances and extremely dangerous in non-ventilated areas, or at elevated temperatures.

A thorough understanding of this Operation and Service Manual is crucial to safe operation. Do not attempt to operate this system until thoroughly familiar with its contents.

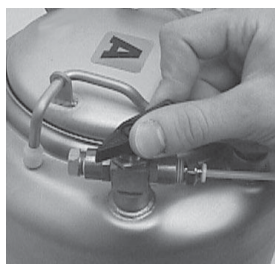
Introduction

Filling the Supply Tanks

Epoxies have two components: The base resin, (Part A) and the catalyst (Part B). The catalyst is usually thinner than the base. It is of the greatest importance that the person placing the components into the reservoirs knows—without any doubt—the difference. If there is any doubt as to which is which, STOP!.....until you “know” what you are doing.

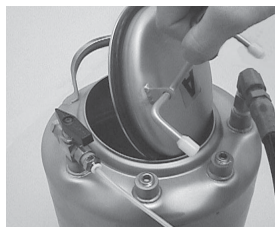
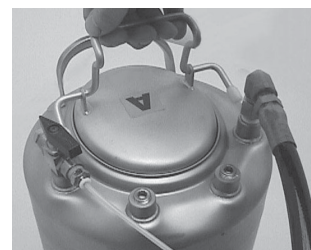
The resin components are held in two gallon pressure vessels located inside the cabinet, below the metering assemblies. They are labeled Base (A) and Catalyst (B). The epoxy manufacturers containers are similarly identified. The (A) vessel is removed and filled from the right side (as viewed from the handle end) of the machine and the (B) vessel is removed and filled from the left side (as viewed from the handle end of the machine) of the machine.

The vessel lids cannot be removed if the vessels are pressurized. To vent the vessel, rotate the directional valve handle to point away from the inlet air tube as shown in photo 1. Once the tank is thoroughly vented, free the lid by lifting its bale and pressing the lid down. See photo 2.



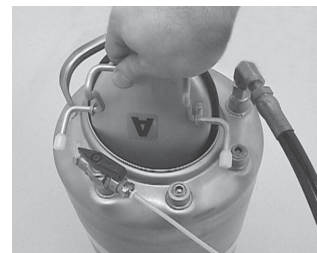
1. Rotate the selector valve pointer 180° from the air inlet tubing. This will close off incoming air, and vent the tank.

2. Lift the bale and press down on the tank lid to free it.



3. Twist and tilt the lid until it clears the opening. The lid seal should be attached to the rim. If not, check to see if it has dropped into the tank, or stuck to the underside of the tank lip.

4. After the material has been added, replace the lid. Lock it into place by pushing its bale forward. Rotate the selector valve pointer back toward the air supply tubing to energize the tank.

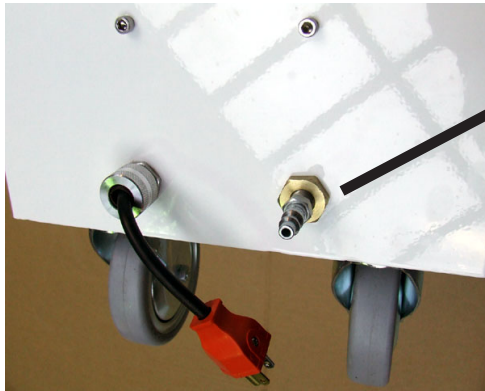


Fill one vessel at a time to avoid contamination. Make no mistakes when filling the pressure vessels. Proceed slowly and deliberately, for if the wrong component is poured into a vessel, significant damage to the system can result. If you discover you have made a mistake, do not operate the machine! Rather, empty the contaminated vessel or vessels as quickly as possible and clean with solvent. If you have operated the machine, empty the vessels, and then pump a solvent through the machine until the solvent runs clean.

When filling the vessels, leave the fluid levels at least two inches or more below the lip to allow the lid to be maneuvered into place without dunking it into the resin. After replacing the lids, rotate the directional valves to point the to the air supply tube (see photo 4). This will pressurize the vessels.

Introduction

The Air Supply



The air inlet is located at the front of the machine (same side as the handle), as shown in the photo on the left.

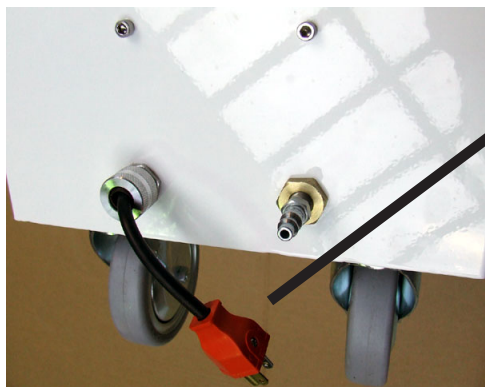
The machine requires 4-6 cfm of clean, dry air at a minimum of 70 psi. There is an air filter mounted inside the dispenser. It is a coalescing type filter that is designed to remove oil vapors and small particles from the air stream. It will remove some moisture but that is not its main function. Water that is accumulated within the air filter will be vented when the air pressure to the machine has been released. This is normal and not a cause for concern. Never use WD-40, Marvel Mystery Oil, 3 in 1 Oil or similar to enter the air supply. These lubricants contain additives that will damage the seals.



The pressure regulator at the front of the machine is adjusted by rotating to the right (clockwise) to increase the dispense pressure. Increasing the dispense pressure will increase the flow of material from the static mixer. Turning the regulator to the left (counter clockwise) decreases the dispense pressure. The knob locks into place when pushed in and must be pulled out to adjust the pressure.

The pneumatic fittings used throughout the dispenser are of the “press-to-connect” variety. The connection is made by firmly inserting or pressing the tube into the fitting. The tube is released by holding the fitting collar firmly back against the fitting body, while pulling the tube from the fitting.

The Electricity



The electrical connection is located on the front (handle side) of the machine. The electricity is used to power the heater inside the cabinet. The electric heater requires less than 10 amps of 110v or 240v AC voltage.

Operation

To Begin With

Connect electricity to the dispenser. Open one of the side doors. At the bottom of the cabinet you will find the thermostat for the heater. Rotate the dial to the desired temperature setting at least four hours before use to assure thorough heating of the resin and system.

Fill both vessels with the appropriate resin and clamp the lids in place.

Reduce the air cylinder pressure setting by rotating the knob on the pressure regulator counter clockwise until the spring is relaxed.

Make sure that the proper personal protective equipment is being used. Make yourself familiar with the precautions recommended by the resin manufacturer.

Rotate the directional valves on the pressure vessels so that the handles point to the air supply tubing.

Dispensing

Connect the air supply to the dispenser.

Attach a static mixer to the dispense nozzle. Its a good idea to put some grease on the threads of the dispense nozzle at this time. This will help to keep the mixer nut from being glued in place. Place a waste container below the static mixer to catch the epoxy resin. This container will then be disposed of.

Turn the dispenser on.

Press the left lever on the Remote Trigger Assembly (RTA). There will be an audible noise when the ball valves switch.

Increase the dispense air pressure to start material flow from the static mixer. This is done by rotating the knob on the regulator in the clockwise direction. The flow can be adjusted to the desired rate by increasing or decreasing the air pressure. Once this pressure is set it will remain constant for the following dispense cycles.



Note: The dispenser will only register a reading on the pressure gauge during a dispense cycle. This is because it is reading the pressure to the main air cylinder on its dispense stroke.

A full dispense stroke will yield approximately 100 cc's of material. To dispense a partial stroke, press the left lever on the RTA handle and when you have the desired amount of material, press the right lever.

Operation

Clean-up

Because the two resin components are not joined until they meet within the static mixer, there is no formal clean-up procedure required after each use. Turn the dispenser “Off” and reduce the air pressure to zero. Remove the static mixer from the Twin Shut-off Valve (TSO) and dispose of it. Also wipe the threads clean with solvent. When you are ready to dispense again, simply install another static mixer. There is no need to flush or otherwise clean the system.

Make a daily check of resin leakage from the metering cylinders. A slight amount of wetting is normal, but if puddles begin to form below the cylinders, it is an indication that the piston seals need replacement.

Ratio Assurance Check

WARNING! The Model CD30 S Dispenser contains moving parts which are by definition wearing parts. Critical components are wearing from the moment you energize the system. It is absolutely essential that this wear be anticipated and monitored to assure proper ratio dispensing. Key personnel must become familiar with the following procedure for monitoring the wear of metering seals, for if it does not become routine, improperly metered material will result.

The frequency with which the performance of the seals should be checked varies with the abrasiveness of the fillers within the product being dispensed, as well as the volume of resin dispensed. Normally, once each week of operation is sufficient to detect any ratio error before it becomes significant. However, if the results are critical, monitoring should be more intense. The ratio check is a three stage procedure.

Stage I: To determine if the COCO outlet valve seals are leaking in the direction of normal flow.

1. Switch the dispenser “off”. (This will open the inlet valves, and close the outlet valves.)
2. Disconnect the dispense hoses from the machine.
3. Wipe the outlet fittings, and place a paper towel beneath them.
4. Wait at least five minutes, and then observe the towel for any evidence of leakage from the fittings.
If no seepage has occurred, move to stage II.

If seepage, regardless of how minute, has occurred, replace the leaking seals.

Stage II: To determine if the Coco inlet valve seals are leaking in the direction of normal flow.

1. Turn the pressure regulator counterclockwise until it becomes “loose”.
2. Flip the dispenser switch “on”. (This will open the outlet valves and close the inlet valves.)
3. Repeat steps 3 and 4 from **Stage I**.

If seepage, regardless of how minute, has occurred, replace the leaking seals.

Stage III: To determine if the Coco inlet valves are leaking in the direction opposite normal flow.

1. Tightly cap the outlet fittings with the caps supplied.
2. Rotate the directional valves to vent the pressure vessels.
3. Disconnect the material supply hoses at the COCO valves.
4. Turn the dispenser pressure regulator knob clockwise to the maximum pressure available.
5. Wipe the inlet fittings, and place a paper towel beneath them.
6. Wait at least five minutes, and then observe the towel for any evidence of leakage from the fittings.

If seepage, regardless of how minute, has occurred, replace the leaking seals.

Trouble Shooting

Spurts of air, or air bubbles in the material:

Check material level. Some air may enter the resin as it cavitates just before it is depleted. Check the pressure vessel for an air leak into the stem at its interior fitting.

Off ratio:

Conduct ratio assurance check to confirm valve performance. (See page 6)

Sluggish flow:

Disconnect the outlet fittings and observe the resin flow from the outlet ports. If the flow is unrestricted, replace the mixer or other restriction in the exterior plumbing. Make sure the exterior of the metering pistons are clean. Make sure there is adequate air pressure to the machine.

Leakage of resin at material pistons:

Replace the piston seal(s).

Leakage of resin between COCO flippers and valve bodies:

Replace the COCO stem seals.

Metering piston fails to extend, or extends slowly:

Disconnect the material inlet hose at the COCO valve assembly and check the flow from the pressure vessels. If the flow is restricted, check for an obstruction in the material supply line, or insufficient delivery from pressure vessel. Also insure adequate air pressure.

If the material supply is adequate, remove the metering assembly, and check for freedom of piston movement within the cylinder. If the piston is seized or binding, service the metering assembly.

With the piston fully extended, turn the dispenser off and wipe the piston clean with solvent, then lubricate with grease.

System begins to dispense, but cannot complete a dispense cycle:

Obstruction in material outlet lines or metering cylinder.

System is unresponsive:

Check air supply and pressure.

Lubricate the Twin Valve.

Trouble Shooting cont'd

System does not make a dispense stroke. Audible air leak at sensor ports:

Metering pistons not sealing off sensor ports due to worn or damaged piston pads. Replace the pads.
Insufficient material pressure to firmly impinge the piston pads against the end cap.
Leaking lid seal on pressure preventing sufficient pressure build up. Vent the tank and re-seat or replace the seal.

COCO module fails to fully shift valves or is sluggish:

Low air supply pressure.
Misaligned inlet valve bodies.

Main air cylinder return is sluggish:

Defective Rapid Exhaust Valve.
Inadequate air pressure.

Main air cylinder fails to return following full dispense stroke:

Malfunctioning sensor valve in upper end cap. Service the valve, replace the air filter element, and check on cleanliness of air supply.

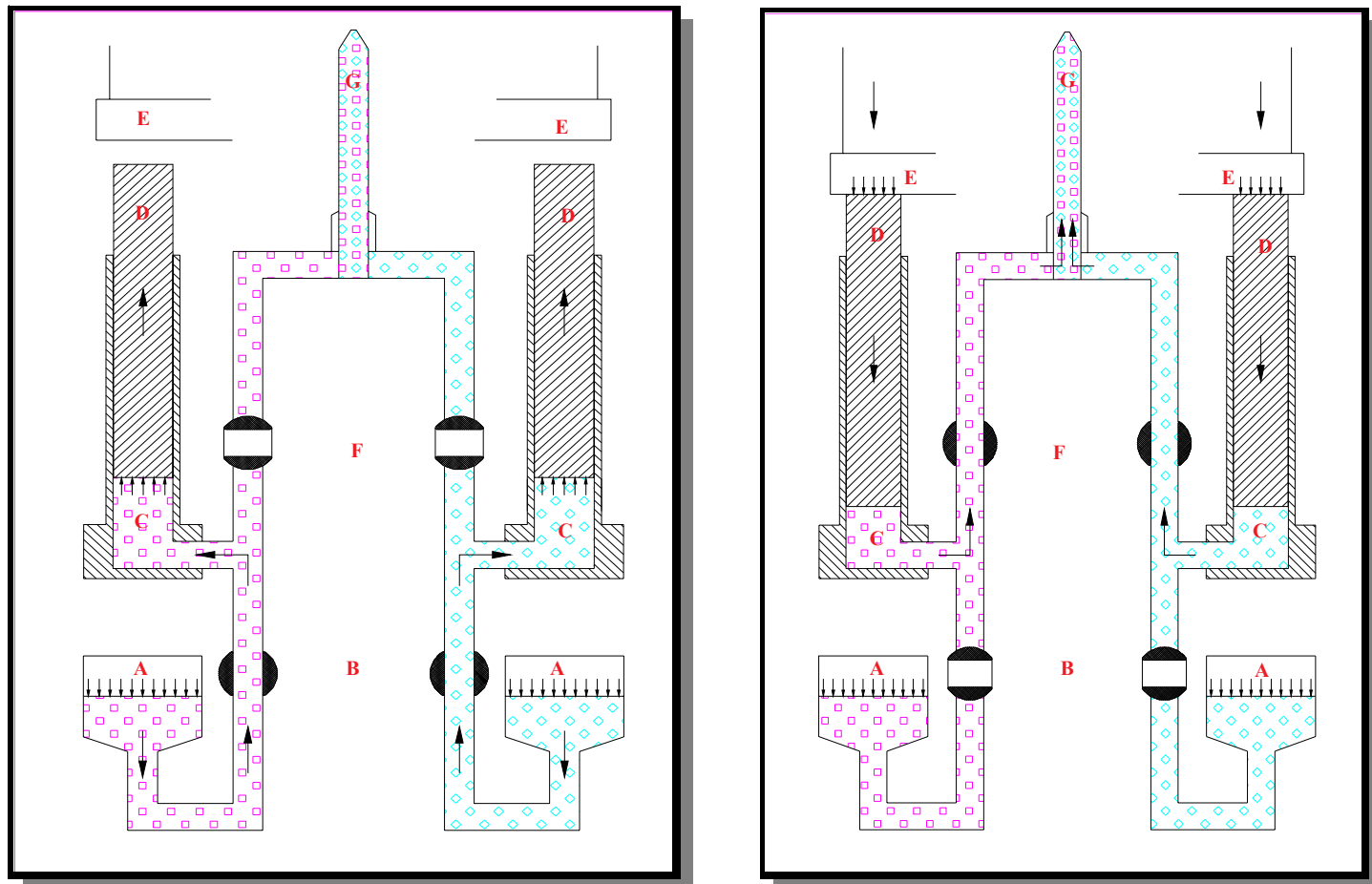
Switch to "OFF" does not return main air cylinder:

Twin Valve not shifting. Service the valve, replace the air filter element, and check on cleanliness of air supply.

The System, and How It Works

The Fluid Circuit

A thorough understanding of the Model CD30 S operation will take the guess work out of trouble shooting, and provide a better appreciation of conditions which may adversely affect its performance.



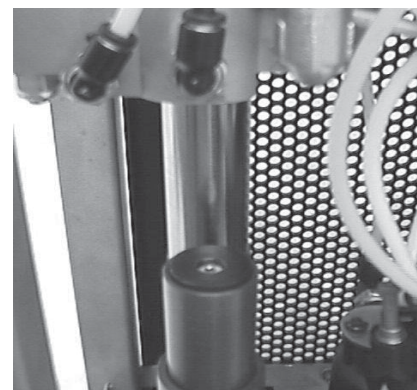
The resin components are pressurized within vessels (A). Pressurized, the components flow through open inlet valves (B) to enter their respective metering cylinders (C).

The metering pistons (D) are extended by the resin pressure until they bear against the main air cylinder end cap (E).

After both metering pistons are fully extended, the inlet valves (B) close, and the outlet valves (F) open.

The resin components then exit under the pressure exerted by the main air cylinder (E) pressing against the metering pistons (D).

The components merge at a mixer (G). When the dispense stroke is completed, the outlet valves (F) close, the inlet valves (B) open to allow the metering cylinders to refill, as the main air cylinder returns.



The metering pistons extend under fluid pressure

The System, and How It Works

Coco Valve Module

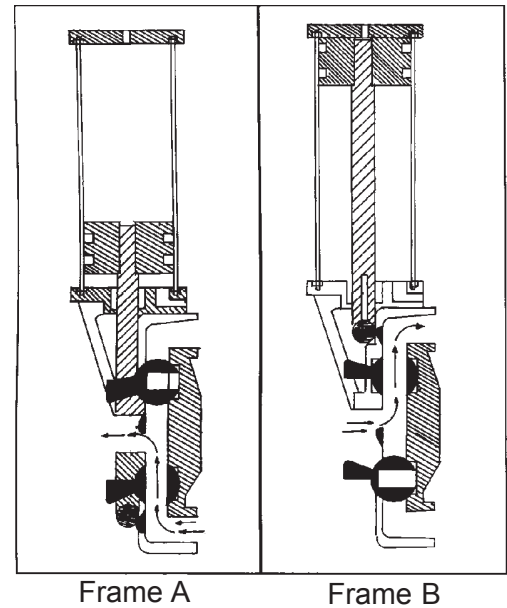
The proper sequencing of the fluid valves is vital to the performance of the dispenser. If the valves open or close out of sequence, unmetered resin may pass, corrupting

This is how COCO works: The inlet ball valves (A) are linked to a common flipper, and the outlet valves (B) are commonly linked to a second flipper. As a bar (cam pusher) (C) passes across the flippers, they are cammed to rotate 90 degrees, opening or closing their respective valves.

In Frame **A**, the COCO cylinder rod is fully extended, placing the cam pusher bar below the inlet valve flipper. In this position, the outlet valves are closed and the inlet valves are open, allowing the resin components to flow into their metering cylinders from a pressurized supply.

After both metering cylinders have filled, the air cylinder retracts the cam pusher. As the pusher retracts (Frame **B**), it cams the lower flipper 90 degrees to close the inlet valves...and then continues its travel to cam the upper flipper to open the outlet valves.

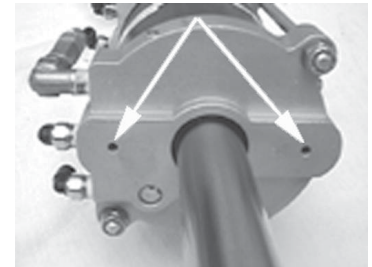
Following completion of the dispense stroke, COCO extends its pusher (Frame **A**) to close the outlet valves, and then continue on to open the inlet valves, allowing the metering cylinders to refill. Note that it is impossible for the inlet or outlet valves to open until after the opposite valves are closed. COCO cannot make a mistake.



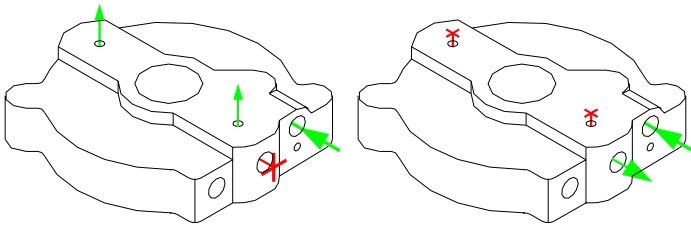
The Fill Sensors

Sensors prevent the dispense cycle until both metering cylinders are completely filled. This is important, because if a dispense cycle occurs before both metering cylinders are filled, there will be a shortage of one component, and inadequate cure of the dispensed resin as a result.

The air signal that triggers the system to dispense is routed through a conduit within the main air cylinder end cap. This conduit is intersected by two holes which vent, and thereby erase, the signal if they are not plugged.



Air bleed holes under



The holes can only be sealed off by the impingement of the ends of both of the metering pistons when fully extended. Once both of the vent holes are sealed, (confirming the arrival of both pistons) pressure builds in the air circuit to trigger the dispense cycle.

Urethane pads fixed to the ends of the metering pistons cushion the impact against the air cylinder end cap, and make a tight seal at the vent holes.

Servicing the System

If the CD30 S is properly maintained, service will involve little more than routine replacement of dynamic seals exposed to material being dispensed. The frequency of seal replacement will depend upon the material dispensed. Thousands of gallons of non-abrasive resin with good lubricity may be dispensed with little, if any, service; while the use of an abrasive – and usually inexpensive – material is likely to necessitate frequent seal replacement. Costly damage to metering cylinders and their pistons may also result from the use of an abrasive product.

Lubrication

Periodic (twice a year) lubrication of the pneumatic components is recommended. To do so, de-energize the system and open the door on the foot pedal side. Below the pressure vessel grate, on the left side, you'll find a four way connector connected to the air filter. Disconnect the clear nylon 5/32" tubing, there are two. Squeeze a generous dose of silicone lubricant into the two clear tubes. To lube the Twin Valve, remove one of the two clear nylon tubes from the center port marked "Inlet". Squeeze a small amount of the silicone grease into the tubing. Reconnect the tubing. No other lubrication is needed. Never use WD-40 or similar products in the air circuit.



The Coco Module

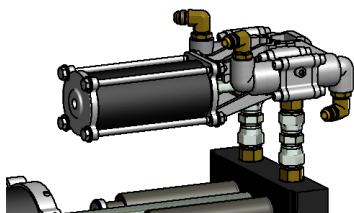
When a ratio assurance check reveals a need for seal replacement at the Coco module, it is not necessary to replace all of the seals within the module. Rather, replace only those seals metering the same component. Resin components differ dramatically in terms of their abrasiveness, so the wear of the seal managing one component is seldom an indication that the seals on the opposite side are similarly worn.

It is good practice to replace the coupler shaft seals (S-328) when replacing the ball seals. They are exposed to the same product, so the wear is comparable. Besides, the seals are exposed during the course of replacing the ball seals, and therefore easily replaced in the course of ball seal replacement.

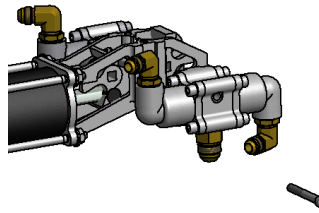
When servicing the Coco module, refer to the exploded parts view on page #20 as well as the illustrated steps below.

Disassembly

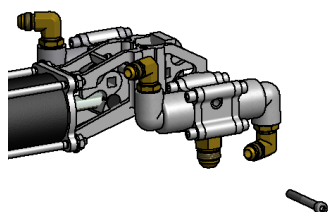
Turn the switch off. Vent the fluid tanks, and disconnect the air supply to the dispenser. Grasp the metering pistons and press them down into their cylinders. This will purge the cylinders of material, which will flow back into the tanks. Disconnect the material supply and dispense hoses at the Coco fittings.



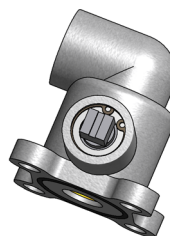
1. Use a 7/8" wrench to loosen the JIC fitting at the base manifold.



2. Remove the bolt (S-334) securing the spacer block to the COCO frame (M-571).

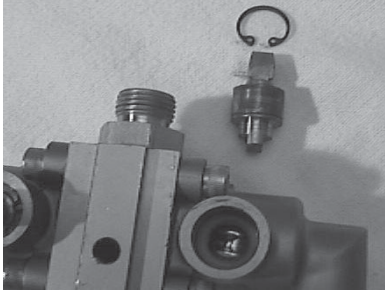


3. Pull the ball valve assembly from the frame. If it is not free, use a plastic, wood, or rubber instrument to urge it loose.



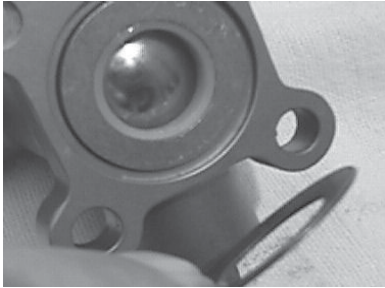
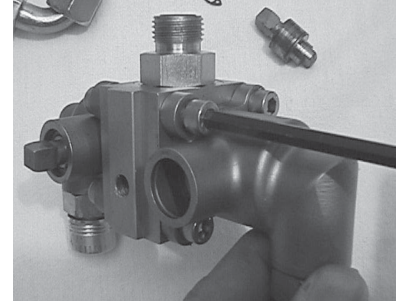
4. To remove the coupler shaft, use a snap ring tool to remove the retaining ring (M-581).

Servicing The System



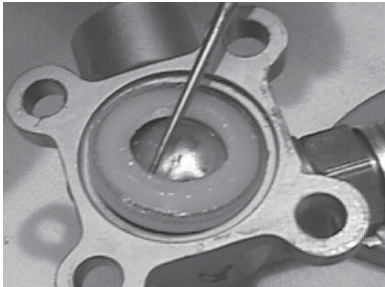
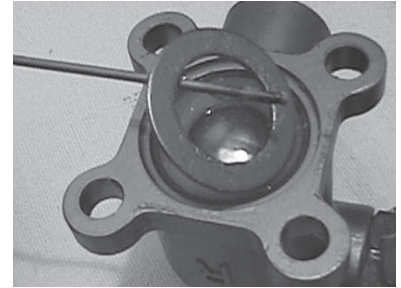
5. Grasp the coupler shaft (M-581) with a cushioned tool, and gently work it and its bushing (M-802) from the cavity.

6. Use a 3/16" allen wrench to remove the four screws securing the valve to the spacer block.



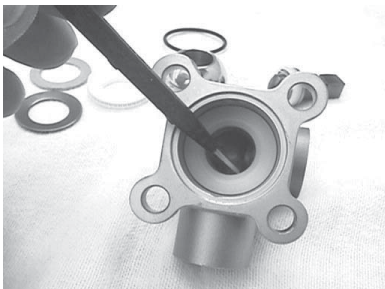
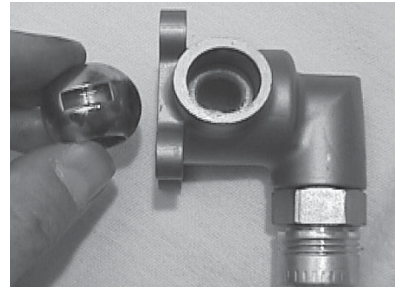
7. Remove the O-Ring (S-509) and the seal spring (S-330) (concave washer).

8. Remove the seal support washer (S-329).



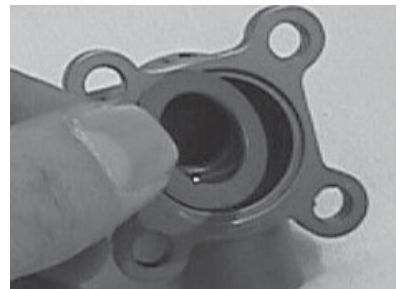
9. Use a seal pick to remove the seal (S-332). Take care not to scratch the ball or the wall of the pocket.

10. Remove the ball (M-803) from the valve body.



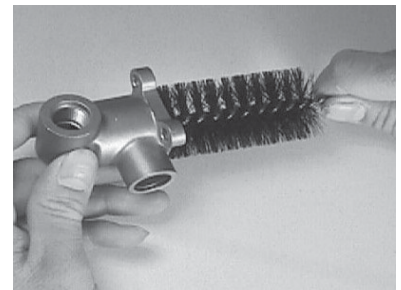
11. Use the seal pick to remove the lower seal from its seat. Take care not to scratch the housing.

12. Remove the lower seal support washer and spring. Take care not to scratch the housing.



Cleaning Clean the components thoroughly, but do not use steel bristle brushes or instruments likely to scratch or gouge. Most solvents and cleaning agents can be used without damage to the stainless steel parts.

Inspection Carefully inspect each part. If possible, use a magnifier and light. Pay special attention to the balls and the valve sockets. If there is any blemish, replace the part. Flat and spring washers do not need to be replaced unless damaged.



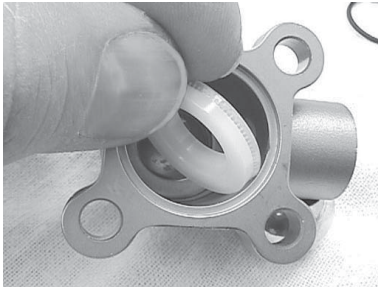
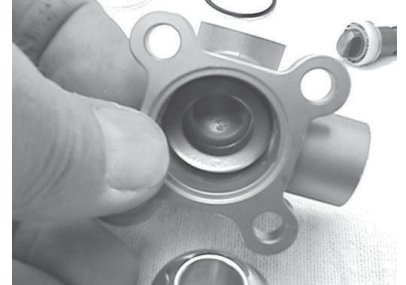
Servicing The System

Assembly



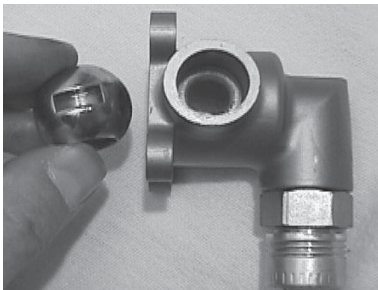
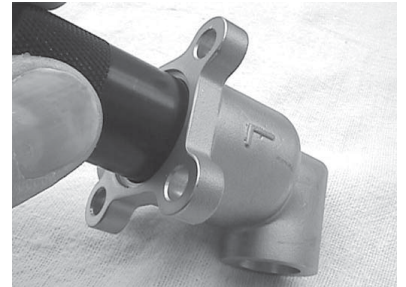
1. Fit the seal spring (S-330) into the pocket with its concave side toward the ball.

2. Place the washer (S-329) over the spring. Be certain that both it and the spring are fully seated.



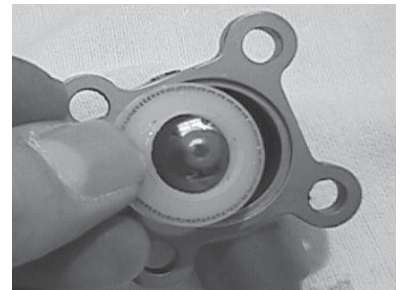
3. Insert the seal vertical to the pocket until it is within the pocket. Then, twist it flat so that the spring side of the seal is facing down.

4. Push it into place with the fingers, and then press it firmly into the bottom of the pocket with the setting tool (M-806) from the seal kit.



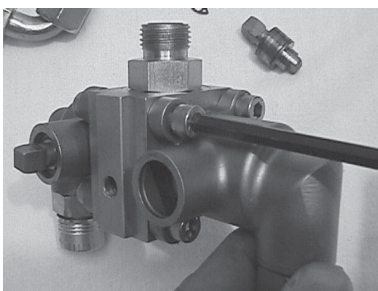
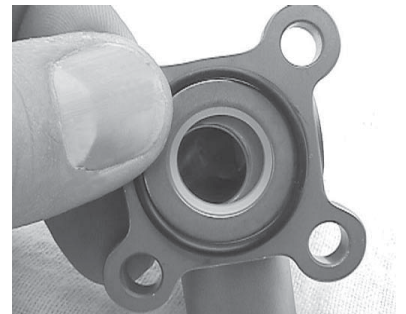
5. Slide the ball into the pocket with the detent (slot) facing the coupler pocket. Use the tang of the coupler shaft (M-581) to squarely align the ball slot.

6. Install the exterior seal (S-332) with the spring groove facing away from the ball.



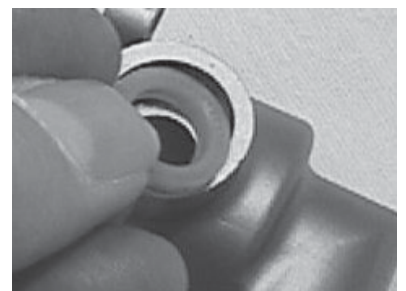
7. Install the seal support washer over the seal, and apply silicone lube to hold it in place. Install the spring with the concave side facing the ball!!

8. Press a new o-ring into the groove around the outside of the spring and washer. Use silicone lube to hold it in place.

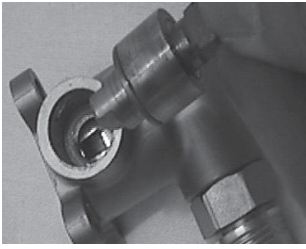


9. Attach the valve bodies to the Coco Spacer Block (M-572). Take care not to distort the o-ring seals. Snug, but do not tighten the bolts!

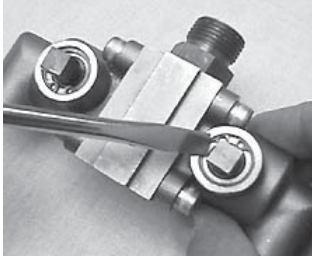
10. Insert the coupler shaft seal, (S-328) into the shaft bore. To avoid damage to the seal, start it perpendicular to the bore, then flatten it into place with the spring toward the ball.



Servicing The System

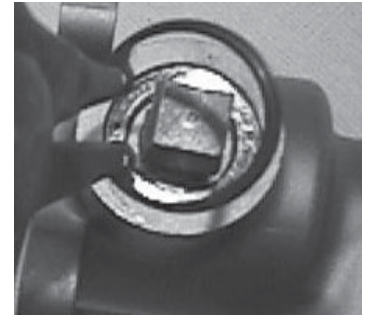


11. Carefully insert the coupler shaft (M-581), bronze bushing (M-802) and washer (P-469) into the housing.

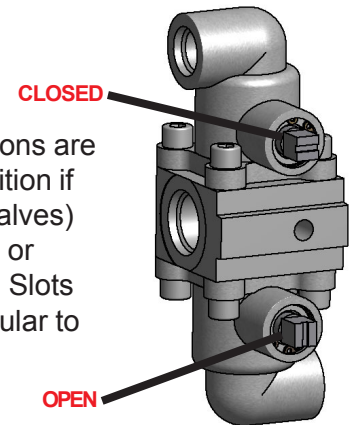


13. Make certain the ring is fully engaged in its groove.

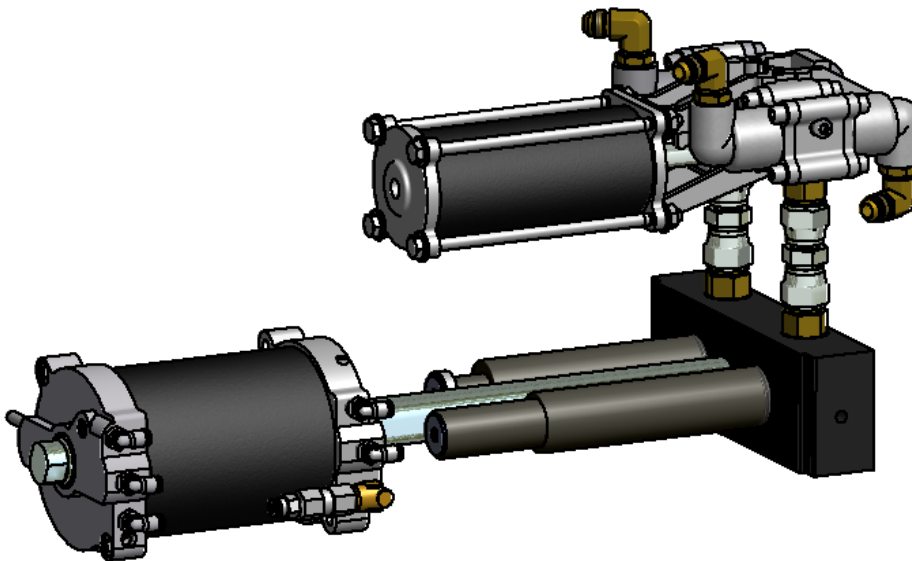
12. Install the retaining ring (P-505). Note that one side of the ring has slightly rounded edges, while the other side has a sharp square edge. The sharp edge of the snap ring must face away from the ball. Use an 8-15mm snap ring tool to insert the ring.



14. Before bolting the valve assembly to the frame, be certain that the valve positions are oriented properly. If the Coco air cylinder rod (M-580) is fully extended (normal position if the dispenser was switched off before disassembly), the inlet valves (the bottom valves) should be open, and the upper outlet valves closed. The valves are easily opened or closed by grasping the coupler shaft (M-581) with a cushioned tool, and rotating it. Slots are machined into the stems to indicate the valve positions. If the slot is perpendicular to the flow the valve is closed. If the slot is in line with the flow, the valve is open.



15. Fit the valve assembly to its frame. Make certain that the valve spline fits snugly into the frame slot. Apply an anti-seize compound to the threads of the mounting bolt (S-334) and draw it up tight.



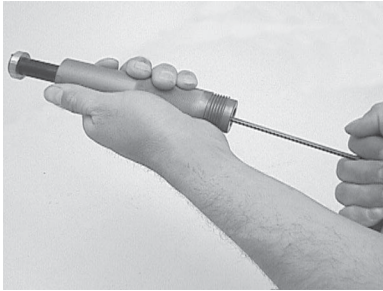
And finally, conduct a ratio assurance check!

Servicing The System

The Metering Cylinders

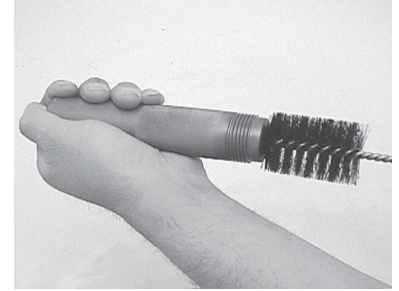
The frequency of service will depend upon the abrasive content of the material being dispensed, and to a lesser degree, the abrasive atmosphere common to many construction sites. The need for metering assembly service is recognized by leakage between the metering piston and its cylinder, sluggish extension of the piston, or by seizure of the piston within the cylinder.

To remove a metering cylinder for service, turn the dispenser switch off, disconnect the air supply at the dispenser, rotate the selector valves on the material tanks to vent, remove the screens, and follow the steps below:



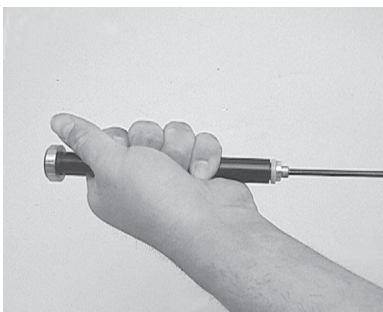
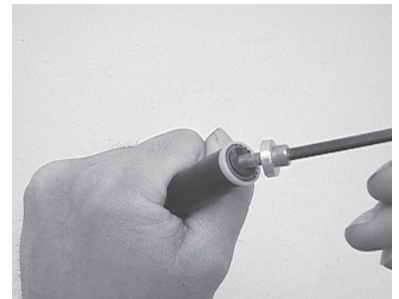
1. Press the metering piston from the cylinder bore. If it is seized, phone Lily or visit a machine shop for assistance. Do not damage the bore!

2. Clean the bore and piston thoroughly. Examine the cylinder. If it is scratched or otherwise damaged, it must be replaced.



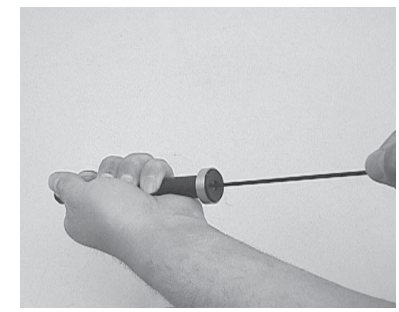
3. If the piston is scratched or marred, polish its surface with an abrasive cloth until no burr remains to damage the metering sleeve.

4. To replace the piston seal, remove the screw in the cap retaining the seal. Then remove the cap and the seal.



5. Replace the seal with its spring groove towards the bottom of the piston.

6. Inspect the piston pad. If it is torn or worn, replace it by removing its retaining screw. Apply a drop of blue Loctite thread seal or equal to the screw at reassembly.

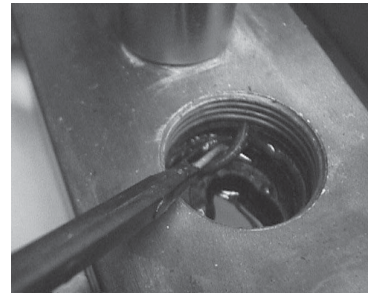


Servicing The System



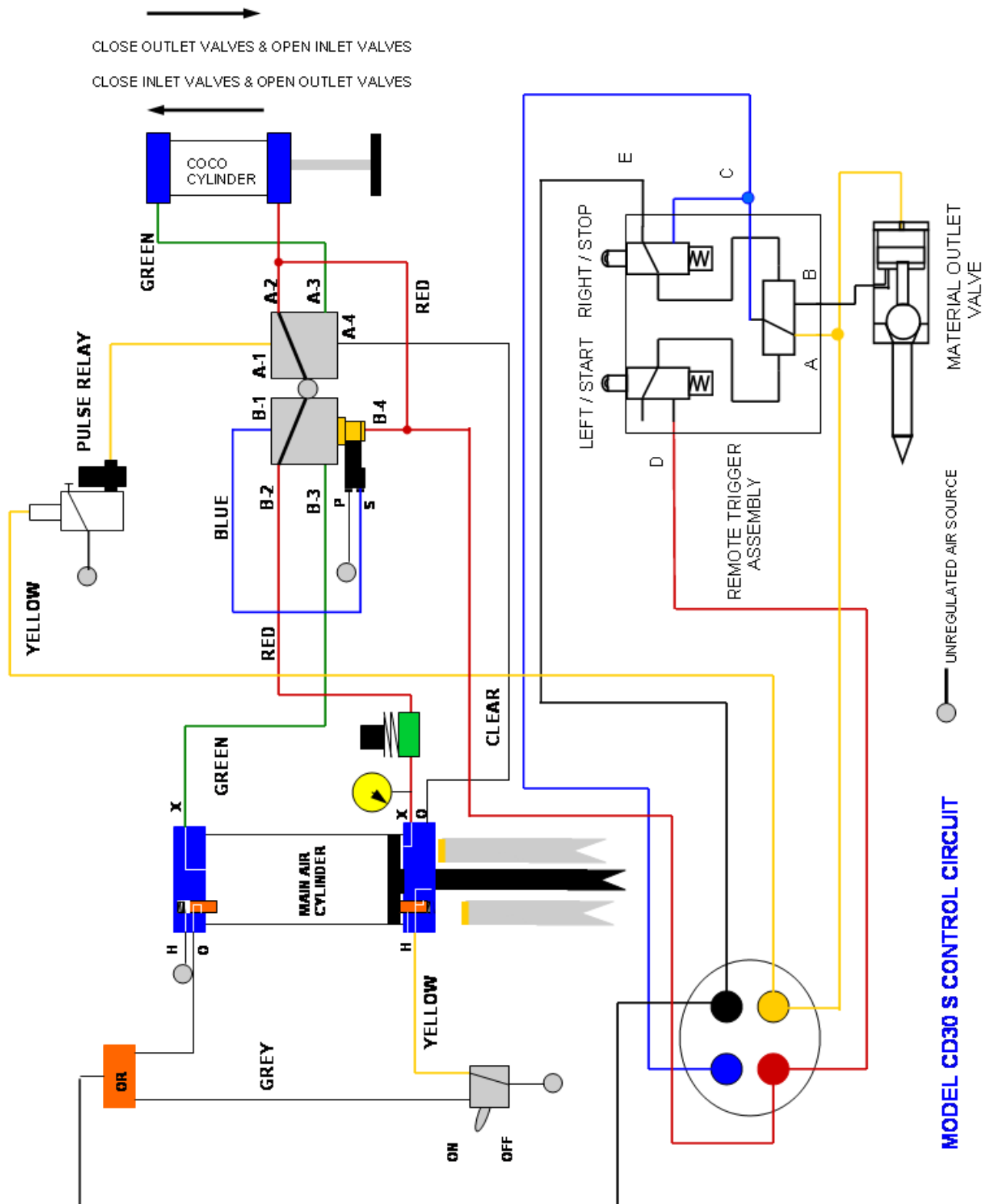
7. Lubricate the piston and chamber with silicone and insert the piston pad end first into the bottom (threaded end) of the metering cylinder.

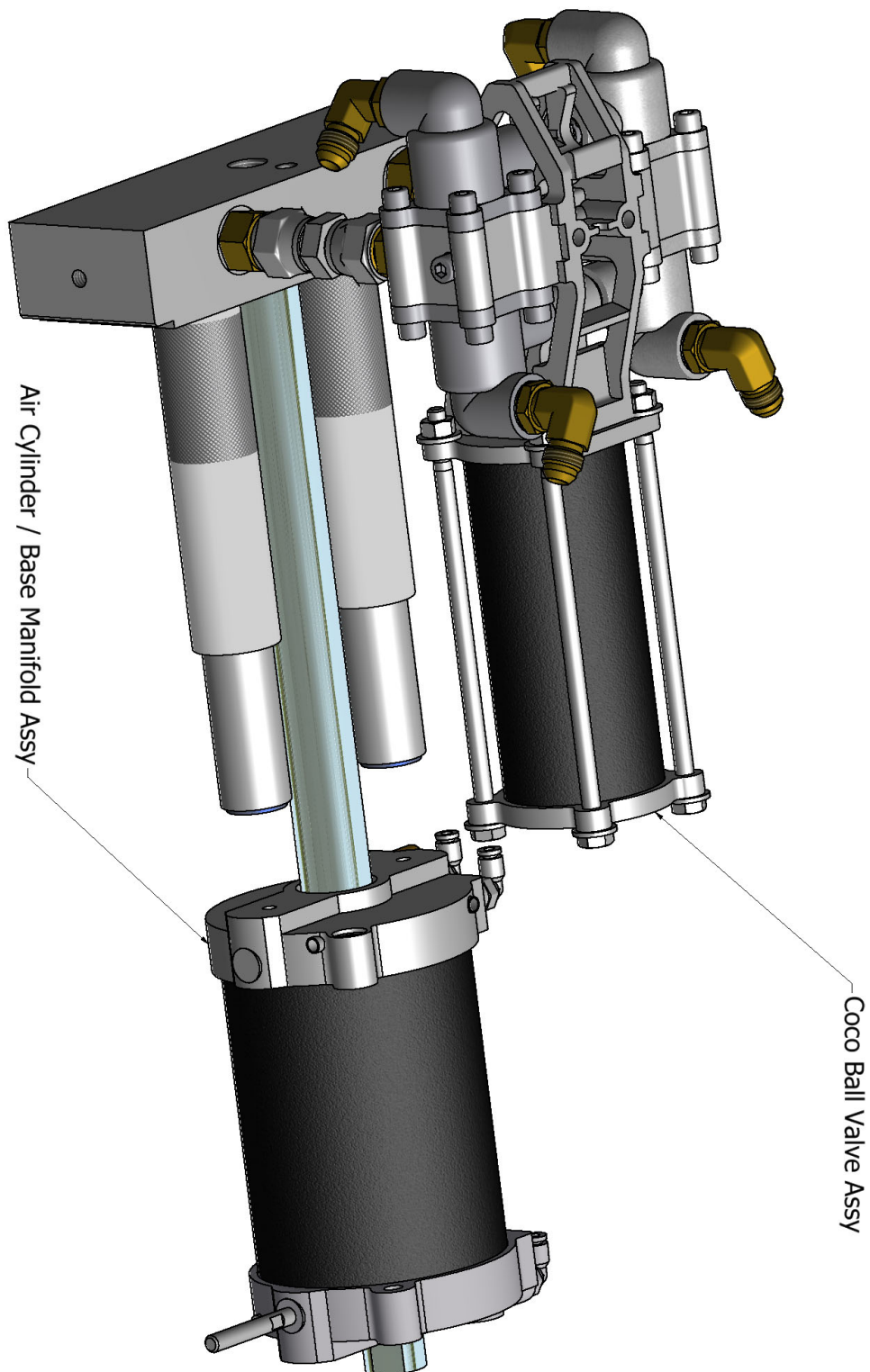
8. Use the seal pick (P-457) to remove the base manifold o-ring seal. Clean the pocket thoroughly before installing a new seal.



9. Apply an anti-seize compound to the cylinder threads, and then screw it into the manifold. Do not over-tighten!

Following seal replacement, slight leakage may be noticed between the piston and the cylinder. This will usually stop after dispensing a few gallons of resin.

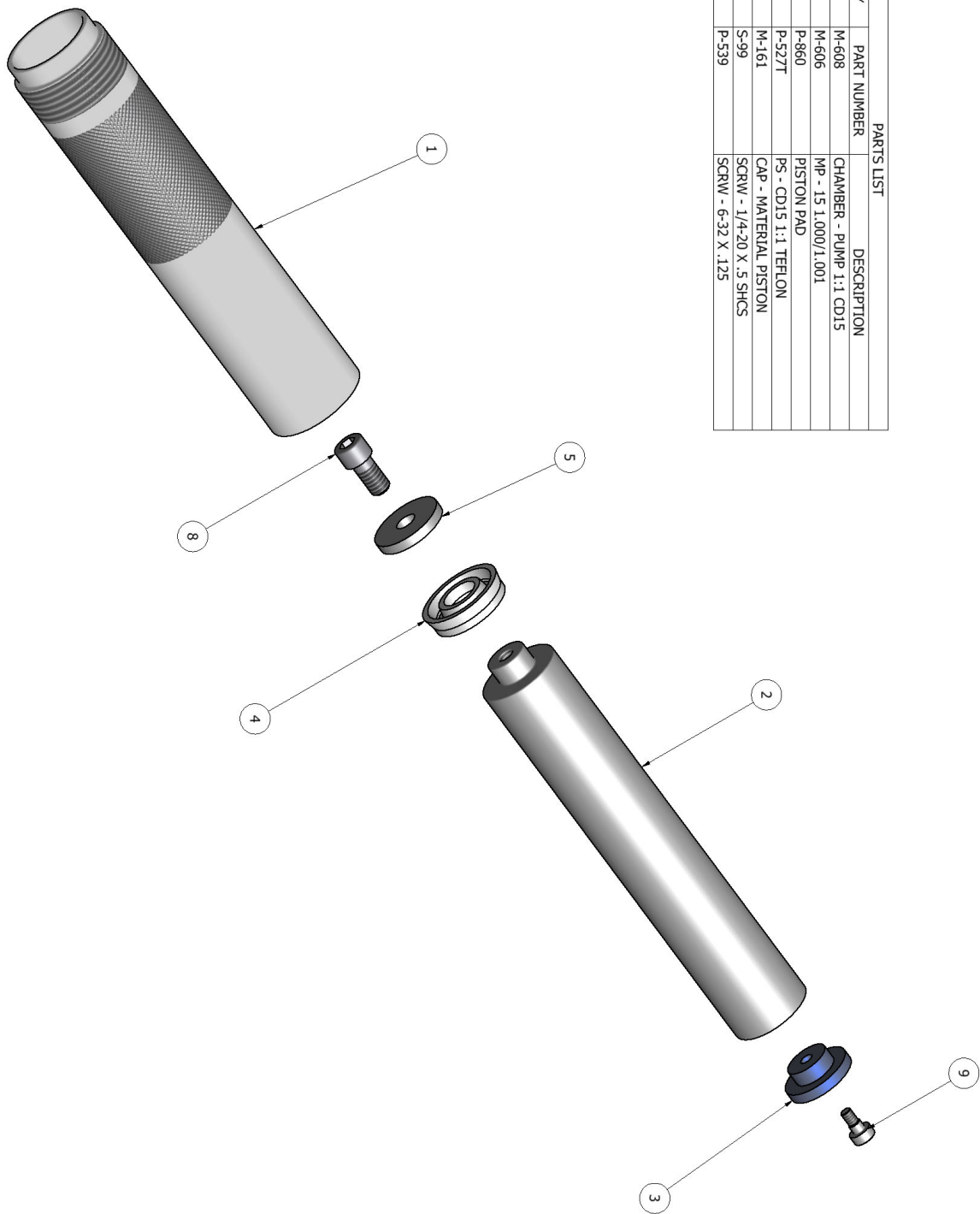




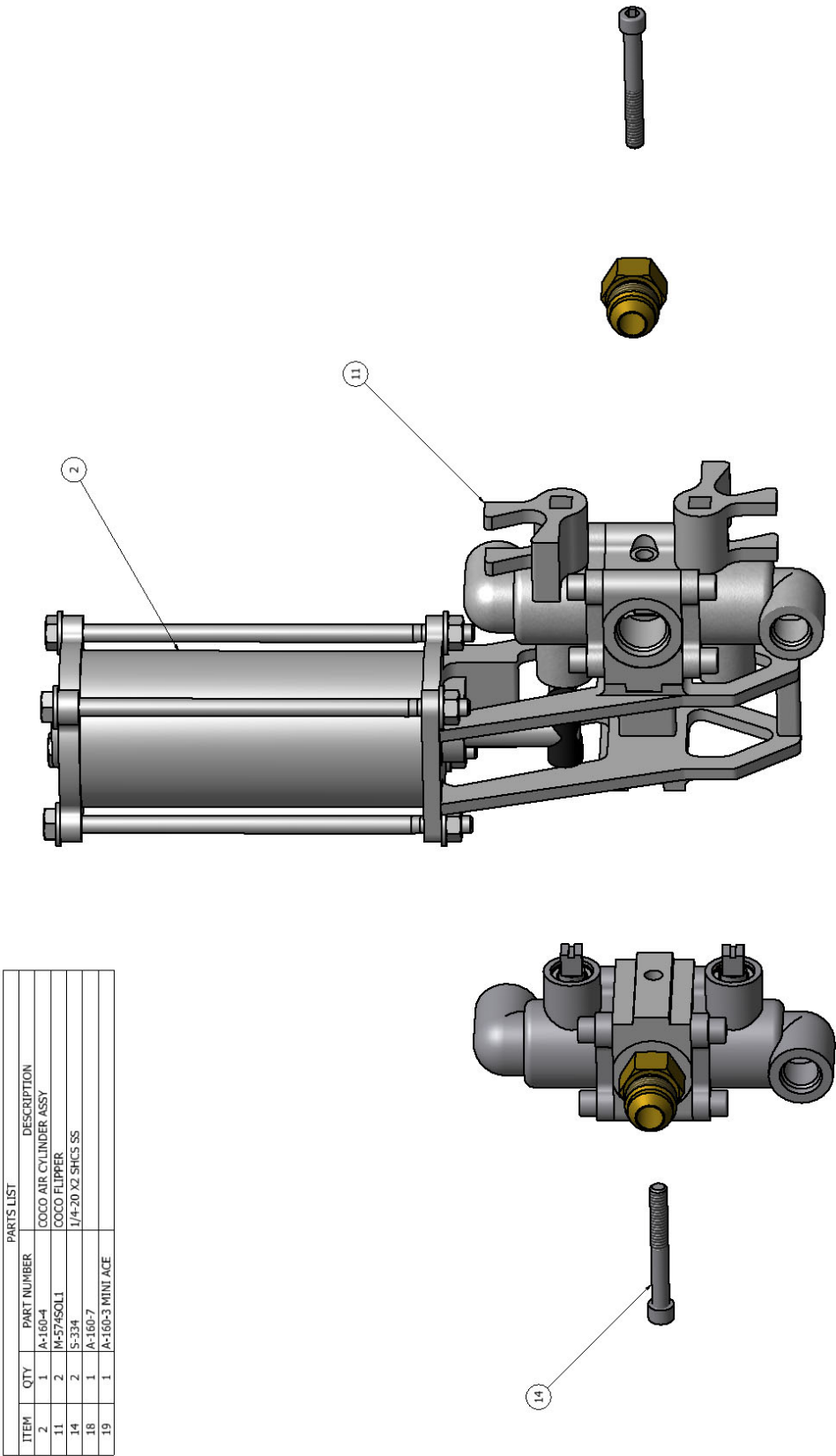
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	M-619	A/C END CAP - TOP - CD15
2	3	P-176	5/32 X 1/8 NPT SWIVEL ELBOW
3	1	P-378	BUSHING - AIR CYLINDER CD15
4	1	S-323	SEAL - WIPER - 7/8 ROD
5	1	S-218	SEAL - 1" ROD WIPER

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	M-613	A/C END CAP - BOTTOM - CD15
2	1	S-218	SEAL - 1" ROD WIPER
3	1	S-323	SEAL - WIPER - 7/8 ROD
4	1	P-378	BUSHING - AIR CYLINDER CD15
5	1	S-317	SEAL - O-RING
6	1	S-325	WASHER - TROUT VALVE
7	2	M-212	AL-SPACER-TROUT VALVE
8	3	S-024	SEAL - O-RING
9	1	M-215	SPACER W/O-RING - TROUT VALVE
10	1	M-213	AL - SPOOL - TROUT VALVE
11	1	M-401	CAP - TROUT VALVE
12	1	P-740	RETAINING RING 3/8" INTERNAL
13	1	S-216	SPRING - TROUT VALVE
14	2	P-176	5/32 X 1/8 NPT SWIVEL ELBOW
15	1	P-106	1/8" NPT ELBOW
16	1	P-184	RAPID EXHAUST 1/8" NPT
17	1	P-174	1/8 NPT X 5/32 UNION

C:\INVENTOR DATA\DISPENSERS\CD15\AC-2 REAR END CAP ASSY CD15.IDW

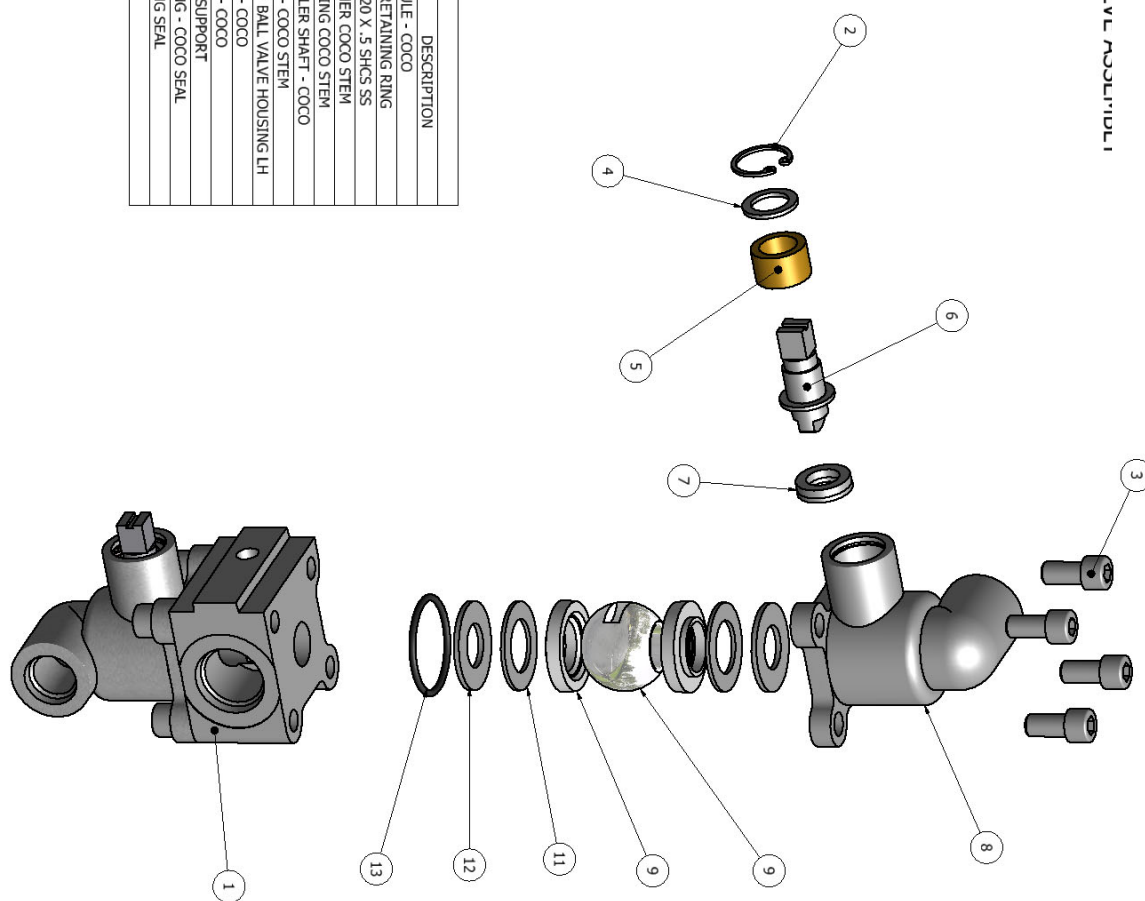


PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	M-608	CHAMBER - PUMP 1:1 CD15
2	1	M-606	MP - 15 1.000/1.001
3	1	P-860	PISTON PAD
4	1	P-527T	PS - CD15 1:1 TEFLON
5	1	M-161	CAP - MATERIAL PISTON
8	1	S-99	SCRW - 1/4-20 X .5 SHCS
9	1	P-539	SCRW - 6-32 X .125



Model CD30 S Ball Valve Assy

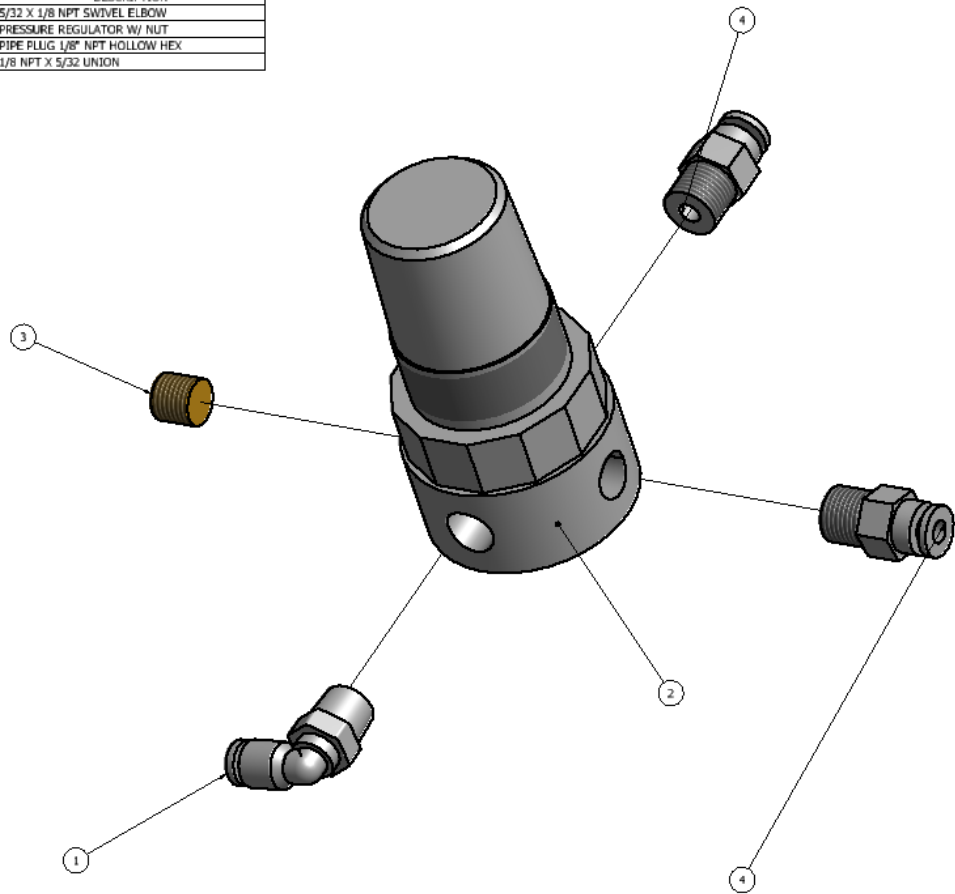
ACLU PUBLISHES REPORT ON VALVE MODIFICATION



PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	M-572	MODULE - COCO
2	1	P-505	5/8" RETAINING RING
3	8	S-310	1/4 - 20 X .5 SHCS SS
4	1	P-469	WASHER COCO STEM
5	1	M-802	BUSHING COCO STEM
6	1	M-581	COUPLER SHAFT - COCO
7	1	S-328	SEAL - COCO STEM
8	1	M-575	COCO BALL VALVE HOUSING LH
9	1	M-803	BALL - COCO
10	1	S-332	SEAL - COCO
11	1	S-329	SEAL SUPPORT
12	1	S-330	SPRING - COCO SEAL
13	1	S-509	O-RING SEAL
7	1	a-160-1	CLOSE

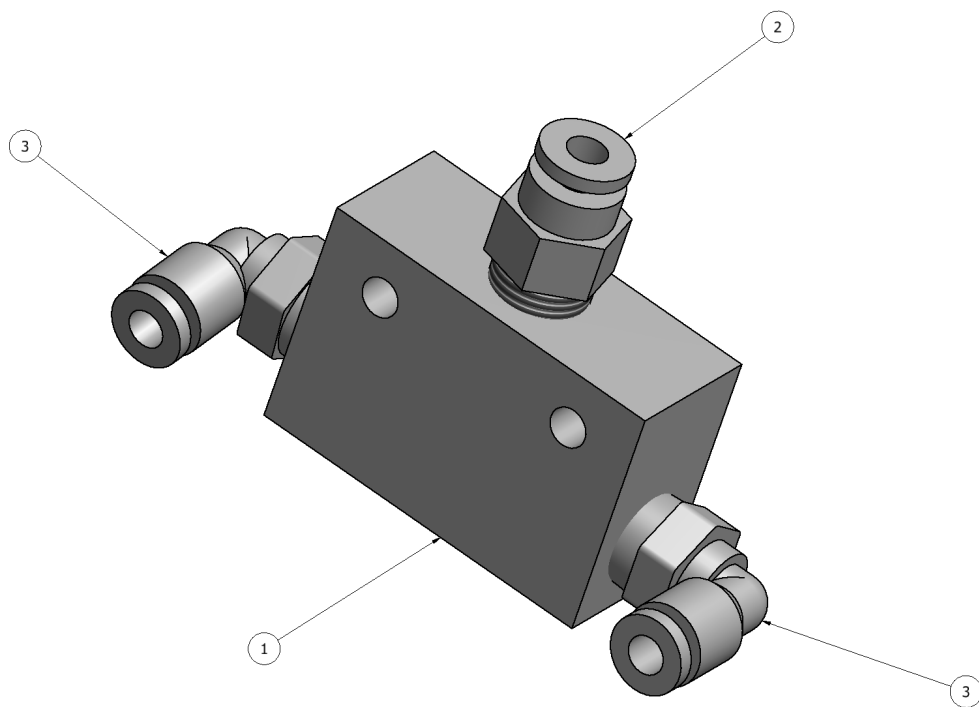
Appendix

REGULATOR ASSY			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	P-176	5/32 X 1/8 NPT SWIVEL ELBOW
2	1	A-106	PRESSURE REGULATOR W/ NUT
3	1	P-115	PIPE PLUG 1/8" NPT HOLLOW HEX
4	2	P-174	1/8 NPT X 5/32 UNION

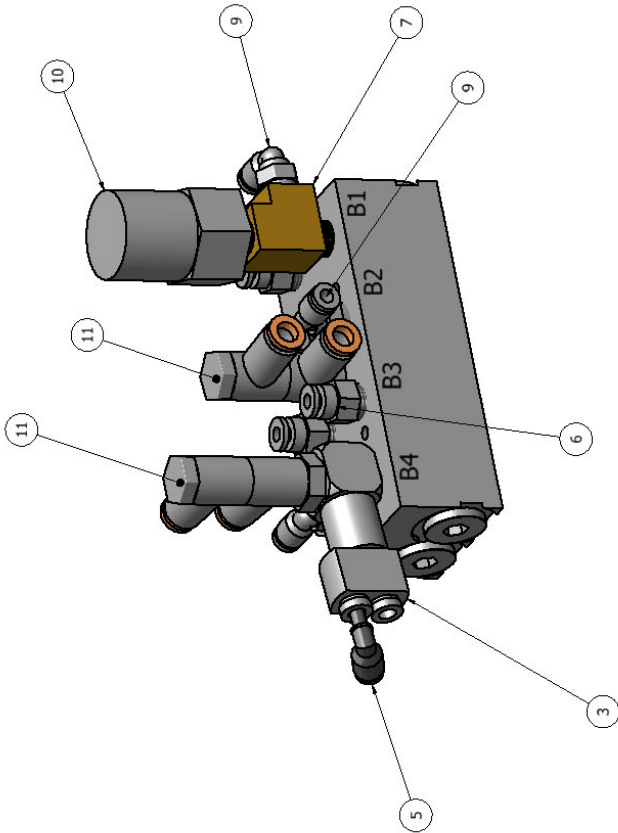
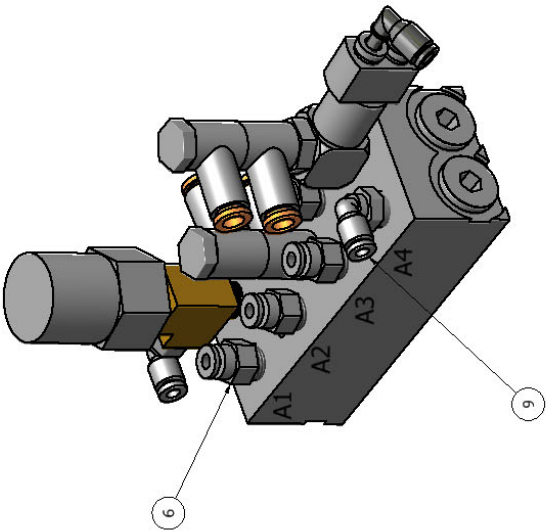


Appendix

"OR" VALVE ASSY			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	P-794	AL - VALVE - "OR" ELEMENT
2	1	P-174	1/8 NPT X 5/32 UNION
3	2	P-176	5/32 X 1/8 NPT SWIVEL ELBOW

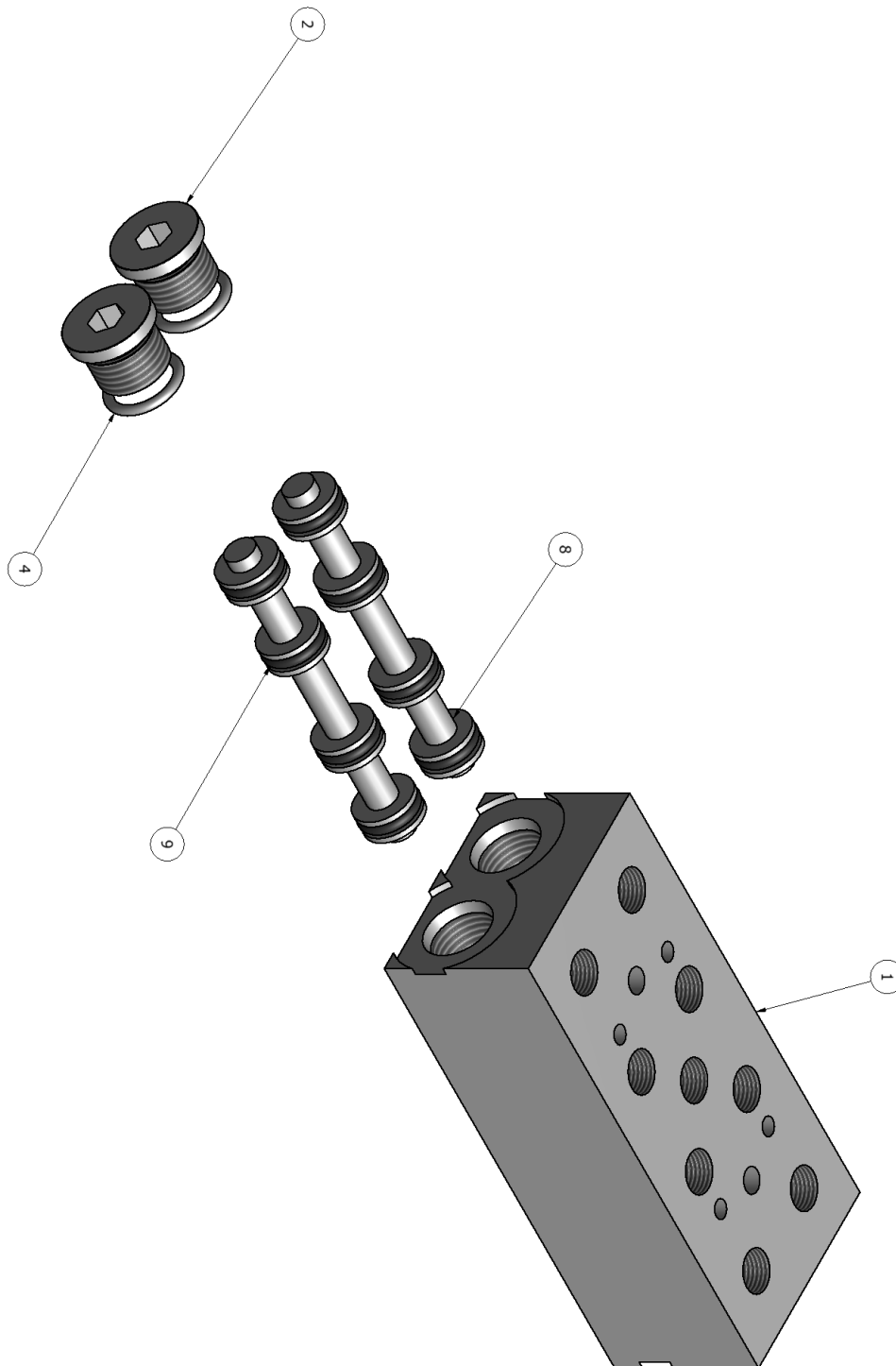


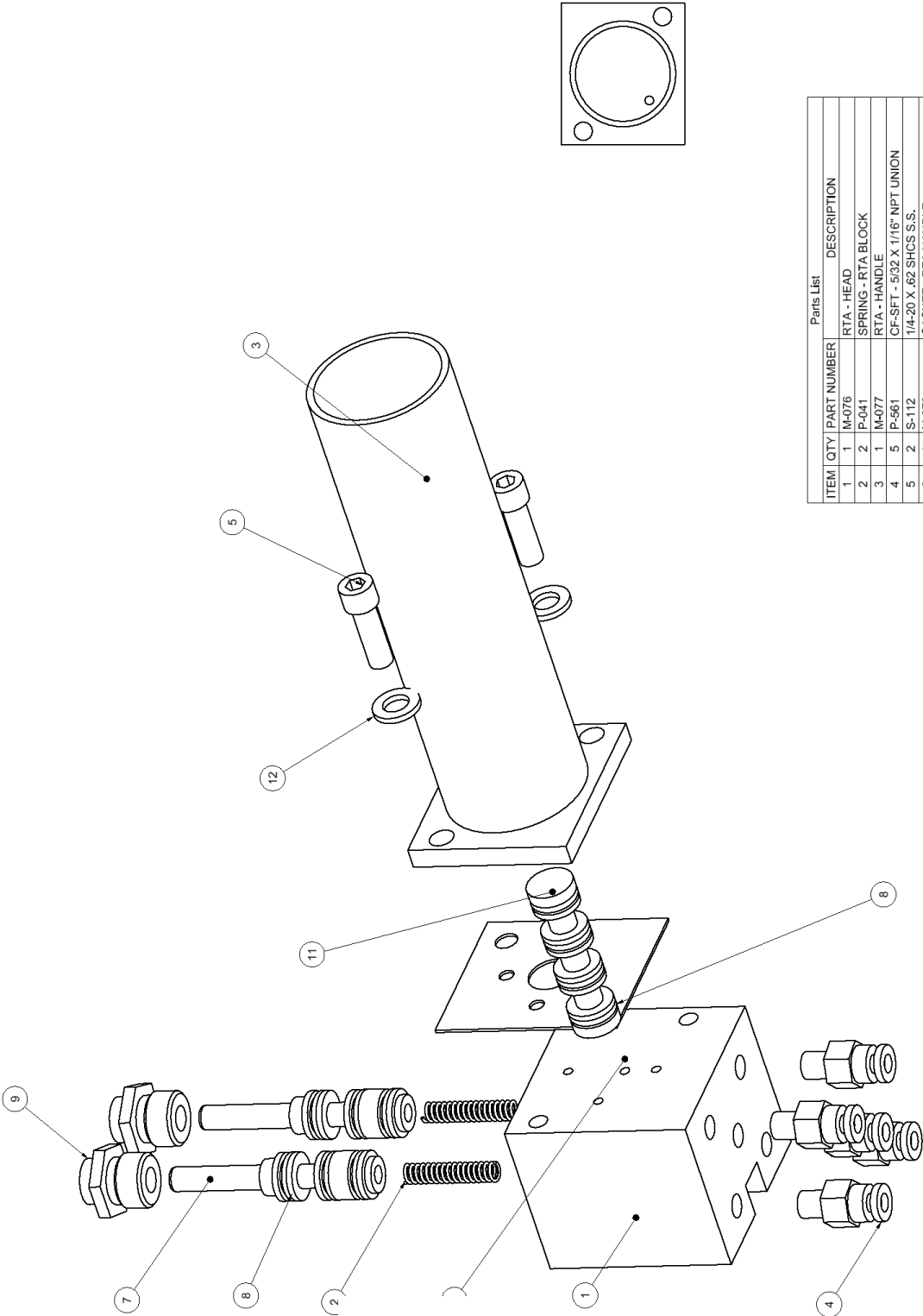
PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
3	1	P-182	AL - STROKE SENSOR 1/8 NPT
4	4	S-147	O-RING 3-906 N-70
5	1	P-209	ROTATING ELBOW
6	4	P-174	1/8 NPT X 5/32 UNION
7	1	S-021	PIPE TEE 1/8 NPT BRASS
9	3	P-176	5/32 X 1/8 NPT SWIVEL ELBOW
10	1	P-024	PRESSURE TRANSDUCER
11	2	P-065	1/8" NPT X 5/32" TUBE DBL BANJO



Appendix

PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	M-017	TWIN VALVE BODY
2	4	S-209	CAP - TWIN VALVE
4	4	S-147	SEAL - O-RING
8	2	M-012	SPOOL - TWIN VALVE
9	8	P-515	SEAL - QUAD VALVE





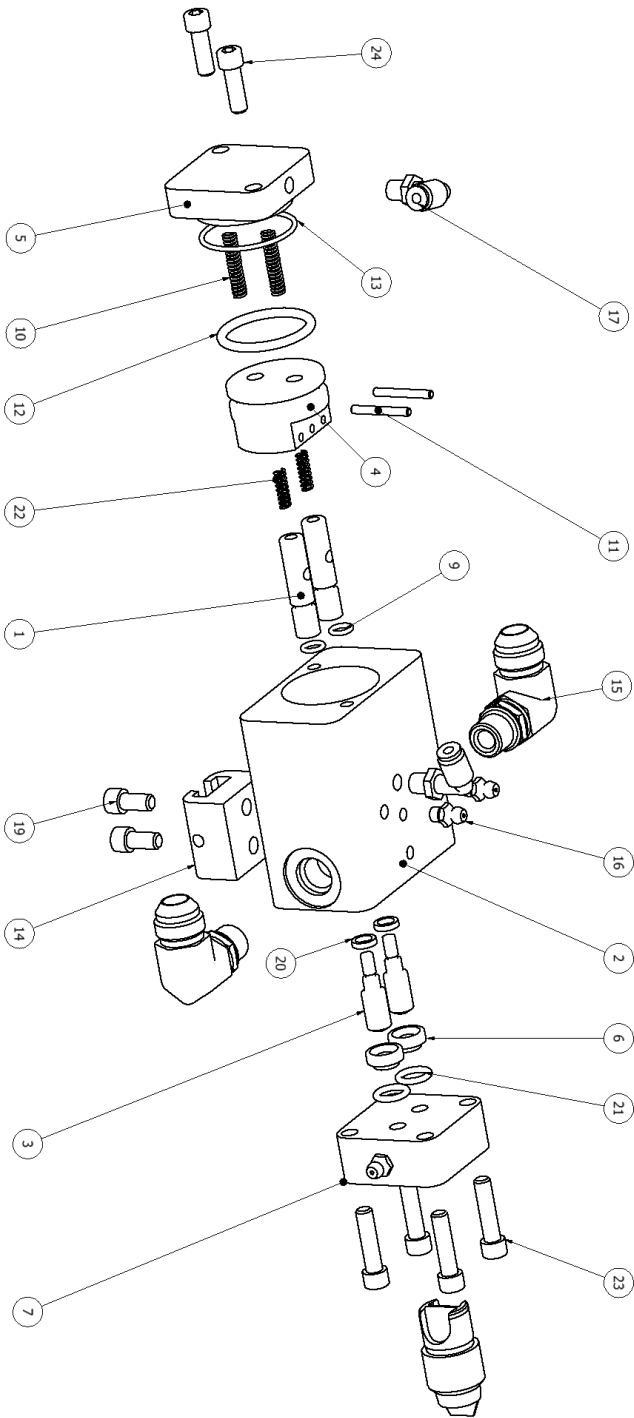
Parts List			DESCRIPTION
ITEM	QTY	PART NUMBER	
1	1	M-076	RTA - HEAD
2	2	P-041	SPRING - RTA BLOCK
3	1	M-077	RTA - HANDLE
4	5	P-561	CF-SFT - 5/32 X 1/16" NPT UNION
5	2	S-112	1/4-20 X .62 SHCS S.S.
6	1	M-078	GASKET - RTA HANDLE
7	2	M-079	SPOOL - RTA BLOCK
8	10	P-502	SEAL - O-RING
9	2	M-067	CAP - RTA
10	2	P-345	SEAL - O-RING
11	1	M-080	SPOOL - RTA HANDLE
12	2	S-415	WASHER

TSO ASSEMBLY

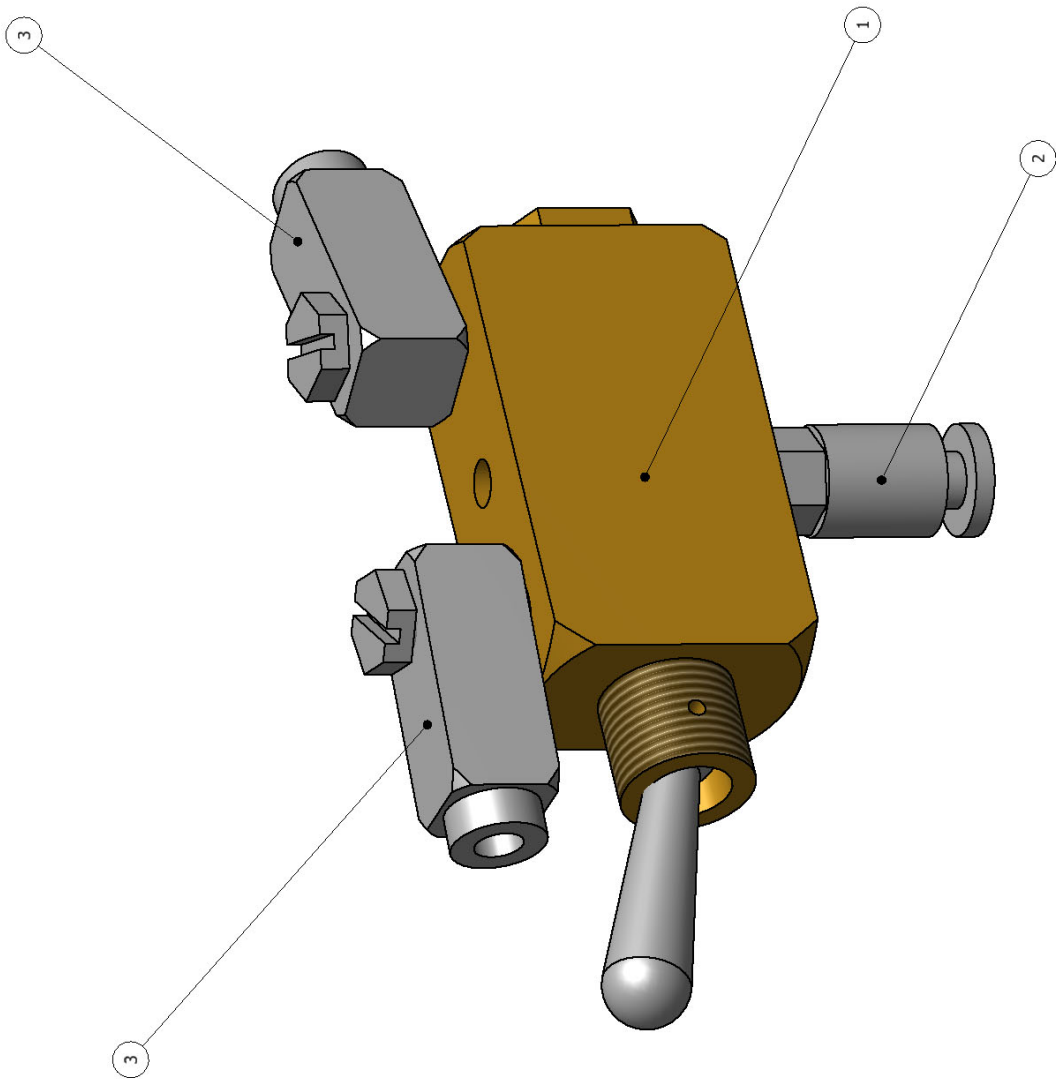
QTY	ITEM NO.	DESCRIPTION
4	1	TSO - PISTON
5	1	M-032 TSO - CAP PISTON SIDE
5	1	M-048 TSO - CAP PISTON SIDE
6	2	M-051 SEAT TSO
7	1	M-052 TSO - CAP MATERIAL SIDE
8	1	M-509 NOZZLE - PRESS TO FIT
9	2	S-024 SEAL - O-RING - 2.010 N70
10	2	P-321 SPRING - TSO VALVE
11	2	P-323 PIN - RETAINING
12	1	S-423 SEAL O-RING 2.218
13	1	S-424 O-RING
14	1	TSO - RAIL MOUNT
15	2	M-053 ELBOW - 3/8 X 1/2 JIC
16	4	P-495 1/4 UNF ST Zerk
17	2	P-563 CF SFT - 5/32 X 1/16" NPT ELBOW
19	2	P-565 SCRW - 1/4-20 X .5 SHCS
20	2	S-99 SEAL - U-CUP TSO PLUNGERS
21	2	S-419 SEAL - O-RING 2.110
22	2	P-484 SPRING - TSO VALVE
23	4	S-037 1/4 - 20 X 1 SHCS 18-8 SS
24	2	P-687 1/4 - 20 X .75 SHCS 18-8 SS

A-060 TSO REBUILD KIT CONTAINS:

- (2) M-051 VALVE SEATS
- (2) S-425 O-RINGS
- (2) S-024 O-RINGS
- (1) P-315 SILICONE LUBE
- (2) S-419 U-CUP SEALS
- (2) P-321 SPRING
- (2) P-484 SPRING
- (4) P-563 GREASE FITTING
- (1) S-423 O-RING
- (1) S-424 O-RING



NOTE: ITEM NOS. 15 & 14 ARE AVAILABLE OPTIONS DEPENDING ON APPLICATION REQUIREMENTS.



CD30S ON/OFF SWITCH			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	P-700	ON/OFF SWITCH
2	1	P-186	5/32 X 10-32 UNION
3	2	P-173	5/32 X 10-32 BANJO FTG.