CD15 CE Certified

Operation and Service Manual

Lily Corporation

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Serial Number _____

EXPRESS WARRANTY AND DISCLAIMER OF IMPLIED WARRANTIES

Lily Corporation unconditionally guarantees its products to be free of defects in material or workmanship and further warrants that, for a period of three months from date of factory shipment, its product will meet the performance criteria stated in Lily Corporation's publications.

There are no other warranties, expressed or implied, including those of merchantability and fitness for particular purposes.

Lily Corporation cautions the users of its products that epoxies must be metered at the correct ratio and thoroughly mixed to achieve their formulated strength. The user is further cautioned that thorough mixing within a static mixing device can only occur with uniform flow of the two components.

Transmission of the components through separate hoses to a remote mixer may result in uneven flow of the components due to swelling and contracting of the hoses, or different compressibility of the material components due to air content or chemistry.

WARNING AND SAFETY PRECAUTIONS

The CD15 can develop fluid pressures in excess of 2,000 pounds per-square-inch (psi). Everyone within 25 feet should wear eye protection when the system is energized. Mechanical members are actuated under forces of up to 500 psi. Maiming injuries can be incurred. Do not energize the system unless all screens are in place, and fingers, tools, and other objects are outside of the frame of the machine.

Become thoroughly acquainted with first-aid procedures recommended by your resin supplier in the event resin enters one's eyes. 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.

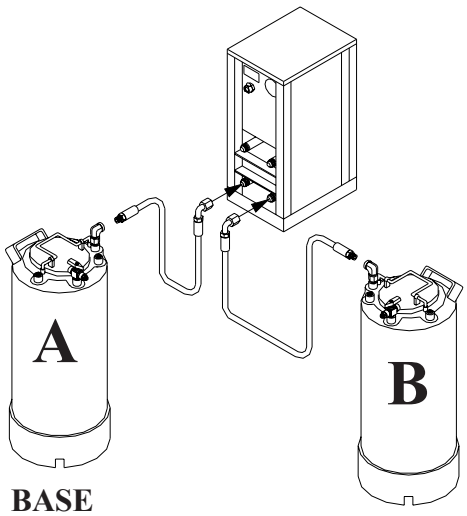
A thorough understanding of the Operators Manual is crucial to the safe operation of the CD15. Do not attempt to operate this system until thoroughly familiar with its contents. Phone Lily Corporation if clarifications are needed.

and finally:

Promptly – and thoroughly – inspect your shipment for damage and completeness. If any items are missing or damaged, immediately notify Lily Corporation. Claims for missing or damaged items must be timely and specific.

THE RESIN SUPPLY

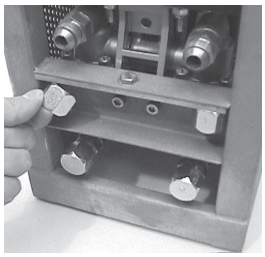
The Connections



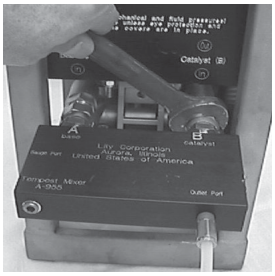
BASE CATALYST

Connect the fluid hose from the A tank (base resin) at the lower left hand fitting (base resin inlet) on the front of the CD15 dispenser. Connect the B tank (catalyst) at the lower right hand fitting (catalyst inlet) as you view the dispenser.

Use a 7/8" wrench to remove the caps and connect the hoses. Some fluid may drip from the fittings . It is a harmless material used to test the equipment following manufacture, and does not need to be purged from the system before dispensing. Stow the caps on the magnetic flange of the channel.



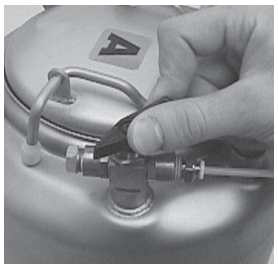
Leave the inlet fluid fittings connected. Their disconnection and re-connection only leaves opportunities for costly error.



Install the Tempest mixer at the dispenser outlet (upper) fittings by mating and tightening the two ½" compression fittings. Tighten the fittings **uniformly** or they will bind and be difficult to assemble. The fittings can be drawn up with the fingers, and then snugged with a 7/8" wrench. Be certain the component designations (A & B marked on the mixer) and the dispenser outlets match.

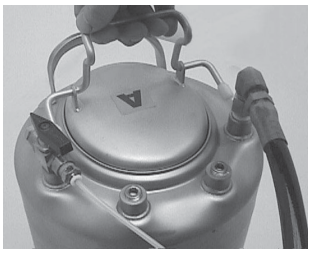
Filling the Supply Tanks

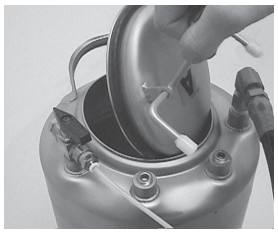
Epoxies have two components: The base resin, (Part A) is nearly always the majority component if the ratio is other than 1:1. The catalyst (Part B) **("B" does not stand for base!)** is also known as the hardener. The catalyst is usually thinner than the base. It is of the greatest importance that the 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.



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

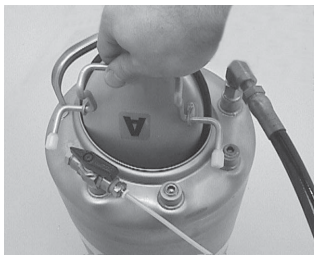
2. Lift the bale and press down on the tank lid to free it.





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.

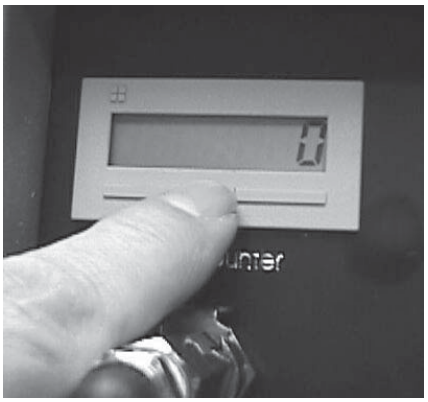


Warning: Corrosive damage to system components can occur if a resin component has a PH of greater than 10 or less than 1.

Monitoring the Resin Supply

If either resin container is depleted, the CD15 will dispense the remaining component. Air is a fluid, and the system cannot tell the difference. In the case of crack injection, the result may be very costly, as it is unlikely that the error can be fully corrected. Therefore,

Do not allow the supply tanks to run out of material



When the dispenser is supplied by pressure vessels, it is not possible to see how much resin remains in the tanks. However, the resin supply can be monitored by using the counter on the control panel. The counter registers the number of cycles the dispenser makes.

Resin Ratio	Cycles Per Gallon
1:1	40
2:1	54
3:1	61
3.5:1	63
4:1	65

To use the counter to monitor resin consumption, go to the chart to determine how many cycles occur in dispensing a single gallon of combined components at the ratio you are using. For examples, if you are dispensing at a 2:1 ratio, one gallon of material (the combined components) will be consumed with every 54 cycles. If you are dispensing at a 3.5:1 ratio, one gallon of material will be consumed with every 63 cycles.

Next, decide how many gallons can be safely dispensed without depleting either component. If, for example, the ratio is 2:1, and you have placed 4 gallons in the base tank and 2 gallons in the catalyst tank for a total of six gallons, 4 gallons of the combined components can be safely consumed. This will leave a reserve of two gallons.

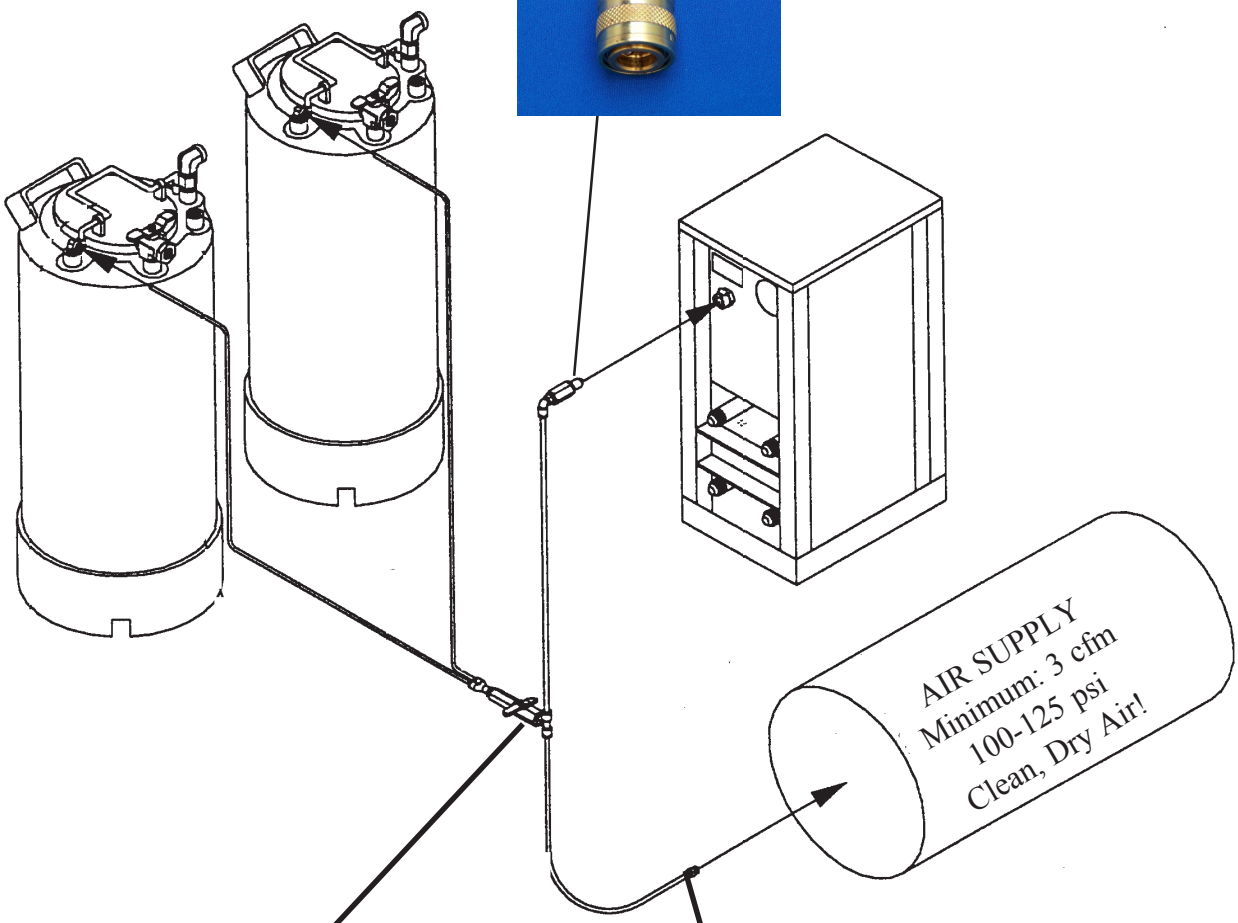
Now set the counter to zero by depressing the bar beneath the window. Mark the number 216 (4 gallons of resin @ 54 cycles per gallon = 216 cycles) in numbers on the top of the machine. Use a a Magic Marker or other conspicuous method to remind you to pay attention to the gauge reading. Until the count approaches 216, you do not have to worry about the supply.

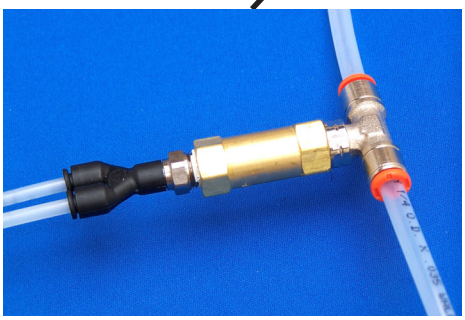
It is recommended that a **minimum** of 2 gallons be reserved as a margin. This is especially important at ratios other than 1:1. For instance, if the ratio is 4:1, a two gallon reserve leaves less than one half gallon in the catalyst tank!

If you are using a ratio that is not listed on the chart, ask Lily Technical Service for the number of dispense cycles at the ratio you are using.

THE AIR SUPPLY

The air connections are the 'press to connect' variety. The connection is made by firmly inserting the tube end into the fitting. It is released by pulling the fitting collar firmly back against the fitting body while pulling the tube from the fitting.





An excess of tubing is provided with this assembly. Trim the assembly to fit your installation.

OPERATION

To Begin With

- Purge the air hose from the compressor of water or other contaminants.
- Switch the dispenser cabinet **off**.
- Point the selector valve handles on the material tanks toward the tubing.
- Fix a mixer or manifold and fluid valve at the material outlet fittings.
- Reduce the dispenser air pressure to zero by turning the regulator counter clockwise until its spring is relaxed.
- Install the cabinet screens.
- Make certain ωater for eye-wash is at hand, and that those nearby are wearing goggles and protective gear as recommended by the resin supplier.
- Take steps I and II under **Clean-up** on Page 7.

Dispensing

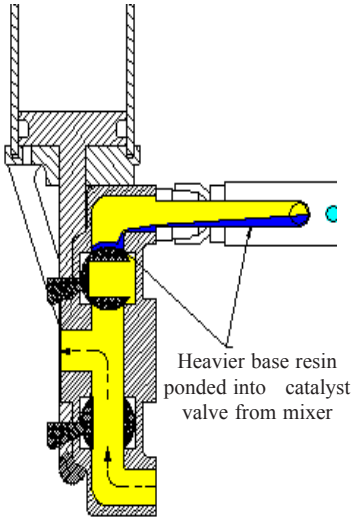
Connect the air supply, and switch the air on. Increase the air pressure at the dispenser regulator until the system begins to dispense. Slowly increase the pressure to the maximum while observing for fluid or air leaks. This practice will identify any damaged tubing, seals, or fittings before the system is moved on site. Following the high pressure check, reduce the pressure to that selected for the application at hand. The dispense pressure may be altered at any time by adjusting the regulator. Once the pressure setting has been selected, the unit will continue to dispense at that pressure until the setting is changed. *Note: The dispenser pressure gauge will only register a reading during a dispense cycle.*

A stem within a gage slot tracks the vertical travel of the dispense air cylinder. This enables the operator to monitor the dispense rate of the unit, and to determine when it has stalled due to the refusal of a crack to accept additional resin.

Ratio	Multiplier
1:1	4.0
2:1	5.4
2.5:1	5.7
3:1	6.0
3.5:1	6.2

The regulator at the control panel regulates the air pressure only to the main air cylinder when on its dispense (downward) stroke. The pressure it exerts on the metering pistons determines the pressure at which the resin exits the dispenser. However, the air cylinder pressure is never the same as that of the resin pressure. The resin pressure will vary with the ratio for which the dispenser is set. The chart at the left lists the relationship between the regulated cylinder pressure and the resin pressure at various ratios.

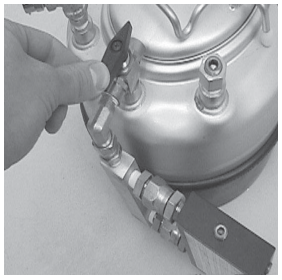
Shut Down



Because the resin components are not joined within the dispenser, no clean-up is required. And, most epoxy resins can be left within a system indefinitely. However, there is a very important step to be taken at shut-down if (a), a low viscosity resin is being used, and (b), a mixer or manifold is fixed directly to the outlet fittings of the Coco module. The procedure is called “burping”. Burping is necessary because the base and catalyst components of most low viscosity resins have a much different specific gravity. Like vinegar and oil in salad dressing, one is heavier than the other, and quickly sinks to the bottom. Until they are mixed, the base component tends to sink beneath the catalyst. When the components hover together within a mixer fixed to the outlet valves, it is possible within a very few minutes for the base component to settle and pond out beneath the catalyst. With sufficient time, it may enter the catalyst outlet valve with costly results as it hardens overnight.

Clean-up

Use the Gusto Purge Assembly (Page #30) to clean the mixer, tubing, FF-2 valves, and other items exposed to catalyzed resin. Complete steps 1 and 2 below to charge the Gusto tank before starting injection. It is a precaution which allows clean-up in the event the air supply is lost due to compressor failure. For with the Gusto tank fully charged with air, there is sufficient energy within the tank to clean up at least the major components.



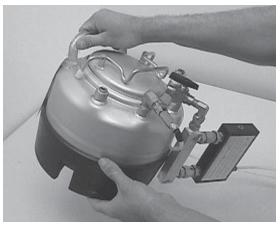
1. Vent the Gusto tank by rotating the selector valve so that it points away from the adapter block, and towards the bronze filter. Remove the lid and pour about one-half gallon of Acetone or Methyl Ethyl Ketone (MEK) solvent into the tank. Do not use petroleum based solvents such as toluol, xylol, mineral spirits or naptha, as they will destroy the Gusto lid seal. Do not fill the tank, as this will reduce the volume of air available for an emergency clean-up.

2. Replace the lid and secure it with its bale. Rotate the selector valve 90 degrees so that it is closed to the inlet and outlet. Connect the air supply and pressurize the tank at the maximum pressure available. Set the tank aside until time to clean-up.

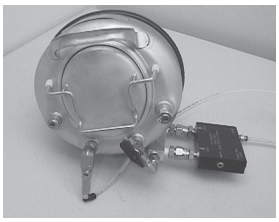
3. Next "burp" the CD15. To do this simply dispense a few ounces of material into a waste container immediately after removing the mixer from the dispenser. This will flush any base resin that may have entered the catalyst fitting or valvr.

3. Immediately after burping the dispenser and disconnecting the mixer, cap the dispenser outlet fittings with the caps secured at the magnetic bracket, Then secure the mixer to the manifold at the Gusto tank. Disconnect the air supply from the dispenser, and connect it at the Gusto air inlet. Close the FF-2 valve, and then rotate the selector valve to point to the mixer.

4. Direct the FF-2 valve into an appropriate waste container, and then open it to allow the air stream to purge most of the resin from the mixer and line. Once the air stream is free of resin, close the fluid outlet valve to allow the compressor to build up the maximum air pressure available.



5. Allow the pressure in the volume tank on the compressor to catch up before introducing the solvent bursts. With the maximum pressure and volume available, open the fluid outlet valve. Quickly shake the Gusto tank to splash small solvent bursts into the air stream. Space the bursts about 5 seconds apart. If a low viscosity resin is being used, 5 or 6 bursts are usually sufficient to clean the mixer and tubing. However, if a thick material must be purged, more bursts will be required. Keep the bursts as small as possible, for large dosages of solvent choke the air stream velocity, reducing the scouring effect. Continue until the exhausted solvent is free of resin.



6. To clean the interior of the FF-2 valves, lay the Gusto tank on its side so that solvent floods the outlet fitting. Then, quickly rotate the valves a few times under the full solvent flow.

Ratio Assurance Check

WARNING! The CD15 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 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. Remove the mixer from the dispenser.
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 no pressure is registered on the gauge.
2. Flip the dispenser switch "on". [This will open the outlet valves and close the inlet valves.]
3. Repeat steps 4 and 5 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
2. Turn the switch "on". [This will open the outlet valves and close the inlet valves.]
3. Rotate the directional valves to vent the pressure vessels.
4. Disconnect the material supply hoses at the dispenser.
5. Turn the dispenser pressure regulator knob clockwise to the maximum pressure available.
6. Wipe the inlet fittings, and place a paper towel beneath them.
7. 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.

Changing Ratio

Ratio is determined by the relative diameters of the catalyst and base pistons. If the ratio is 1:1, both metering pistons will be the same. However, with any other ratio, the catalyst metering piston will be of a smaller diameter. Ratio is therefore changed by exchanging one catalyst metering assembly for another. A metering assembly consists of a metering cylinder, a metering piston, and the seals, etc. component to them. Metering assemblies for alternate ratios are available from Lily. A few simple steps are required to change ratio:

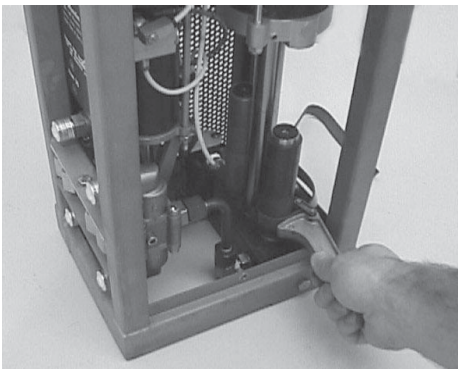
1. Switch the dispenser off.

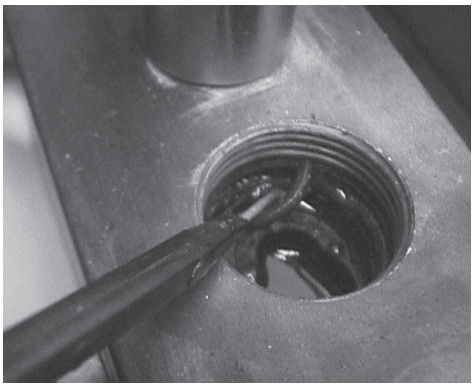
2. Use the directional valve to thoroughly vent the pressure vessels.

3. Remove the right hand and rear screens.

4. Grip the catalyst metering piston, and press it down until it is clear of the underside of the main air cylinder end cap. The material in the metering cylinder will be forced to flow back into the tank. If the piston does not go down easily, use a strap wrench to free it, and twist it as it is pressed downward.

5. Use a strap wrench to turn the catalyst metering assembly counter-clockwise until it is free. Do not attempt to remove the assembly with any tool other than a strap wrench, as the chamber may be damaged by any uneven grasping force.





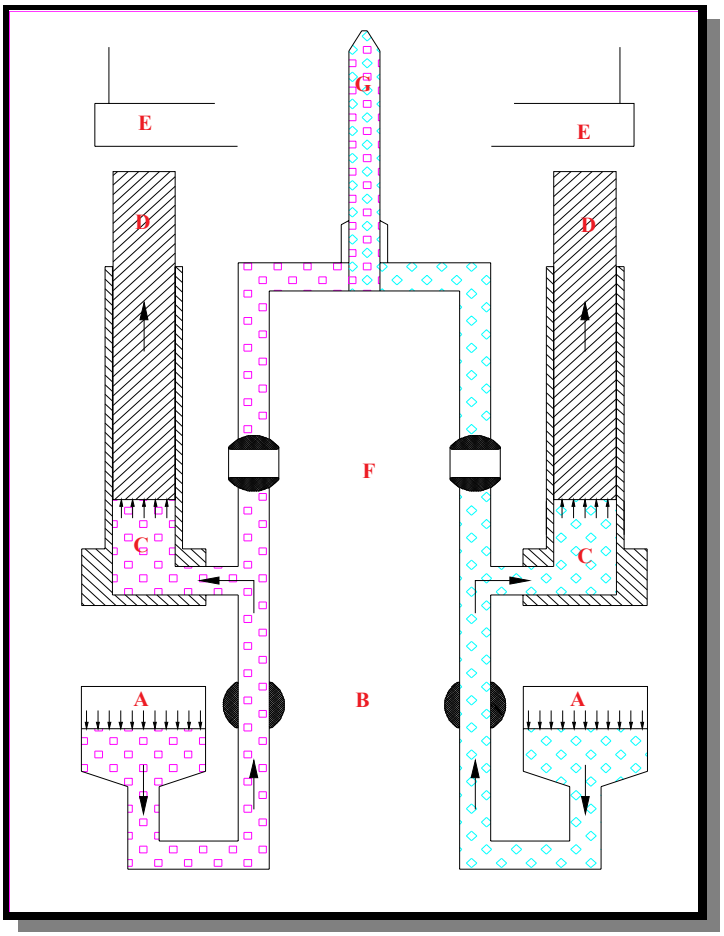
6. Use the seal pick to remove the base manifold o-ring. Clean the pocket thoroughly, and install a new o-ring in the lower groove.

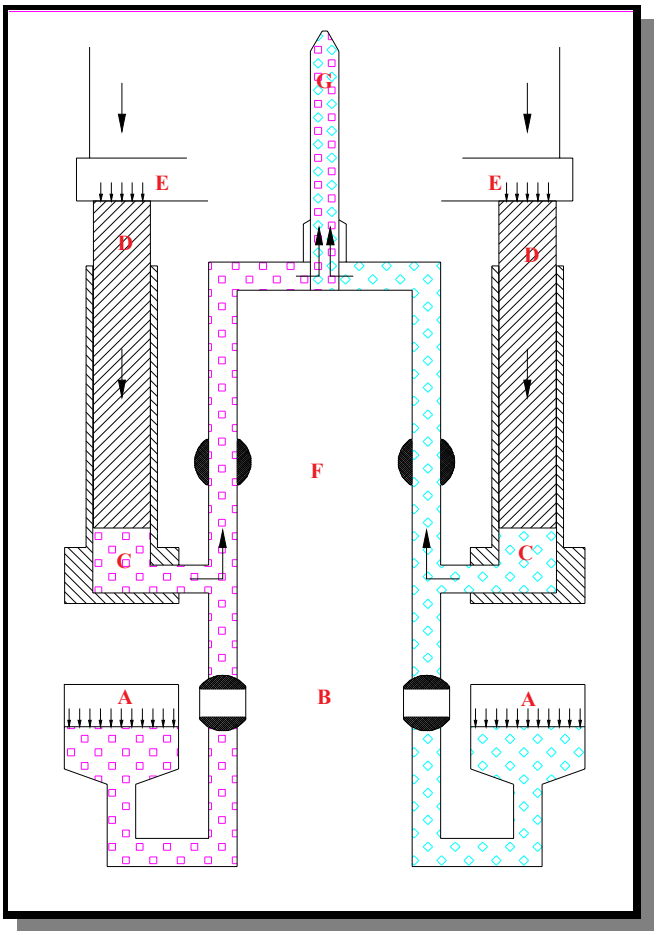
7. Lubricate the threads of the replacement metering asssembly with an anti-sieze compound or silicone lubricant. Thread the assembly into the manifold by turning it clockwise until it is seated. Do not overtighten. As the chamber bottoms out in the manifold you will feel a definite stop. Do not tighten further.

8. Replace the screens.

The Fluid Circuit

A thorough understanding of the CD15 operation will take the guess work out of trouble shooting, and provide a better appreciation of conditions which may adversley affect its performance.





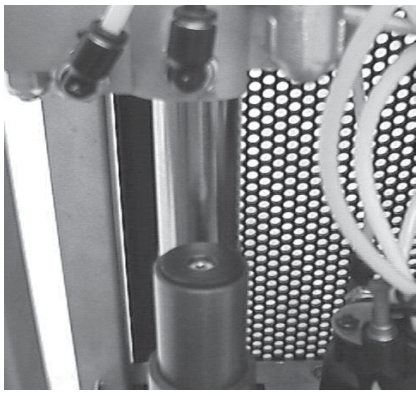
The resin components are pressurized within vessels (**A**) or by pumps. Pressurized, the components flow through open inlet valves (**B**) to enter their respective metering cylinders (**C**).

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**) descending against the metering pistons (**D**).

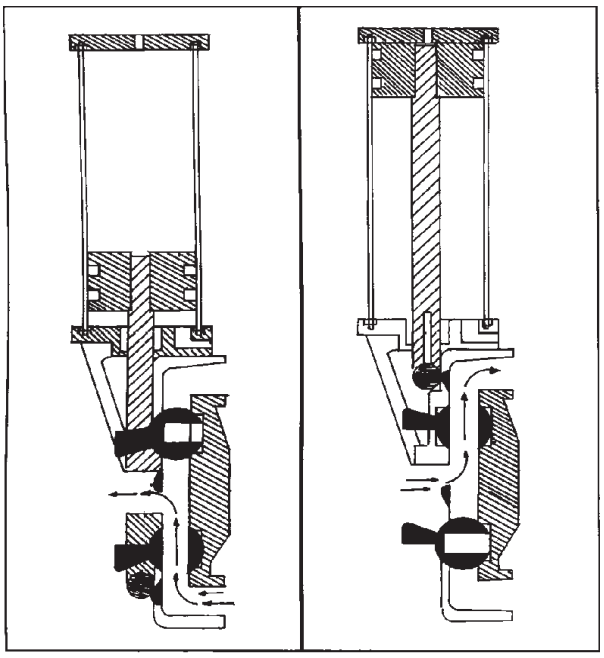
The components merge at a mixer (**G**). When the dispense stroke is completed, the outlet valves (**F**) close, the inlet valves (**B**) open to allow the metering cylinders to refill, as the main air cylinder ascends.



The metering pistons extend under fluid pressure

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 the ratio. The Coco module orchestrates the opening and closing of the inlet and outlet valves in precise sequence.



This is how COCOJ 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 COCOJ 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.

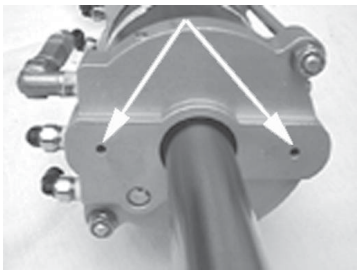
After both metering cylinders have filled, the air cylinder retracts the cam pusher. As the pusher retracts (Frame **B**), it cams the lower flipper 90º to close the inlet valves…and then continues its travel to cam the upper flipper to open the outlet valves.

Following completion of the dispense stroke, COCOJ 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. COCOJ cannot make a mistake.

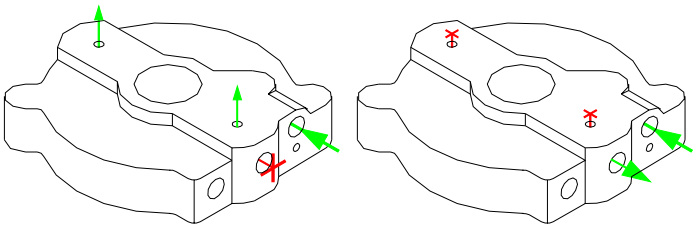
The Fill Sensors

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.

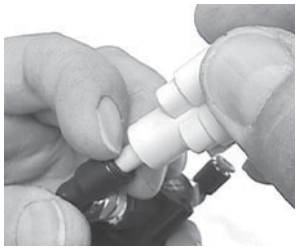
The Pneumatic Control Circuit

The circuit does not need to be thoroughly understood, or understood at all for that matter, in order to operate the dispenser. No more so than there is a need to understand electricity in order to operate a toaster or television. Nevertheless, on page #20 in the Appendix, an air logic diagram is included and explained a bit for those who understand circuitry, or for those more curious than most as to how an air circuit functions.

SERVICING THE SYSTEM

If the CD15 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



If the air supply is properly maintained, the system will deliver literally millions of trouble-free cycles. However, in the real world, that is not always possible. Therefore, periodic (twice a year) lubrication of the air circuitry is recommended. To do so, de-energize the system and remove the left cover. Free the four way air fitting (P-189) from the elbow (P-242) fixed to the air filter (S-570) by pressing the collar of the elbow down. Do not disconnect any other tubing. Squeeze a generous dose of Lily Silicone Lube (P-315) into the rigid leg of the four-way fitting. Reconnect the fittings. No other lubrication is needed. Never use WD-40 or similar products in the air circuit.

The Coco Module

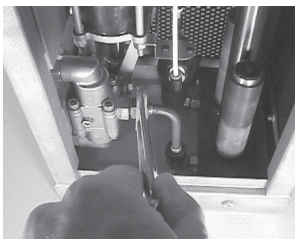
When a ratio assurance check reveals a need for seal replacement at the Coco module, it is not necessary to replace all of the seals within the module. Rather, replace only those seals metering the same component. Resin components differ dramatically in terms of their abrasiveness, so the wear of the seal managing one component is seldom an indication that the seals on the opposite side are similarily 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 #26 as well as the illustrated steps below.

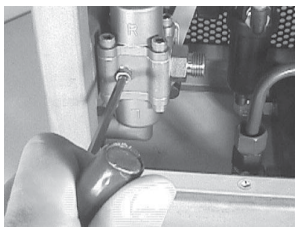
Disassembly

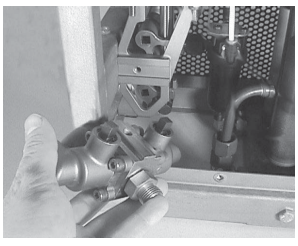
Turn the switch off. Vent the fluid tanks, and disconnect the air supply to the dispenser. Remove all three screens. Grasp the metering pistons and press them down into their cylinders. This will purge the cylinders of material, which will flow back into the tanks. Disconnect the material supply hoses at the Coco inlet fittings, and remove the mixer at the outlet fittings. Then, follow the steps below:



1. Use a 13/16” wrench to loosen the zero clearance fittings at the rigid tube segment (M-617). Remove the tube, taking care not to lose the seals within the fittings.

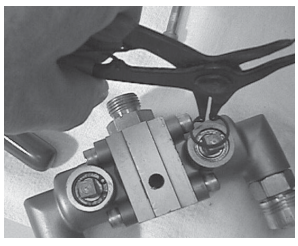
2. Remove the bolt (S-334) securing the spacer block to the module frame (M-571).

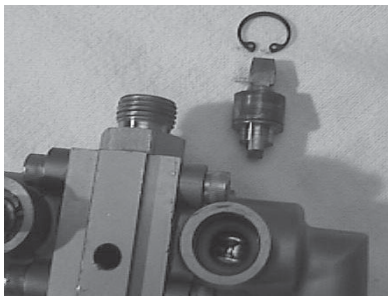




3. Pull the assembly from the frame. If is is not free, use a plastic, wood, or rubber instrument to urge it loose.

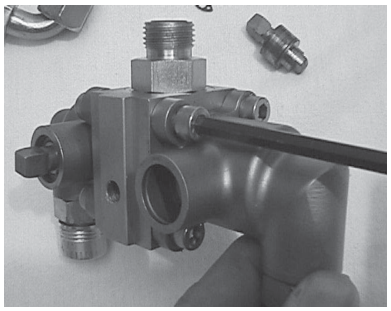
4. Use an 8-15 mm snap ring tool to remove the ring retaining the coupler shaft (M-581).

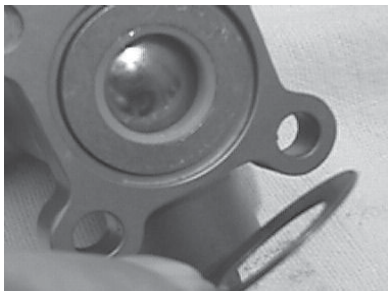




5. Grasp the coupler shaft (M-581) with a cushioned tool, and gently work it and its bushing (M-802) from the cavity.

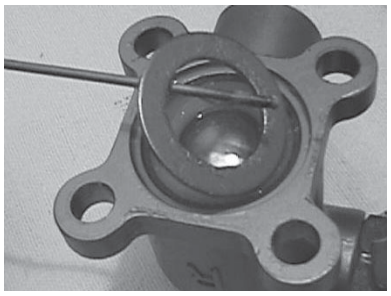
6. Use a 3/16" allen wrench to remove the four screws securing the valve to the spacer block. If they do not separate easily, tap them apart. Use a plastic mallet.

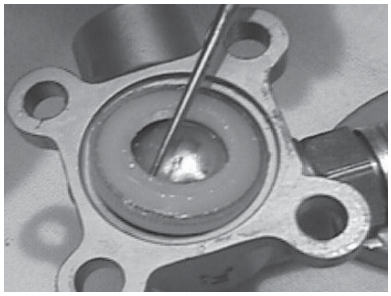




7. Remove the O-Ring (S-509) and the seal spring (S-330) (concave washer).

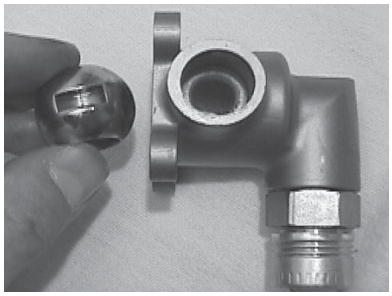
8. Remove the remaining washer (S-329).

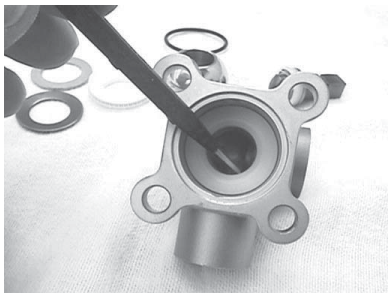




9. Use a seal pick to remove the seal (S-332). Take care not to scratch the ball or the wall of the pocket.

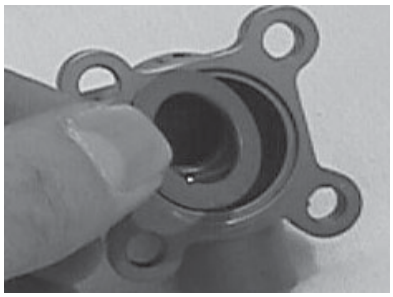
10. Shake the ball (M-803) free from the valve body.





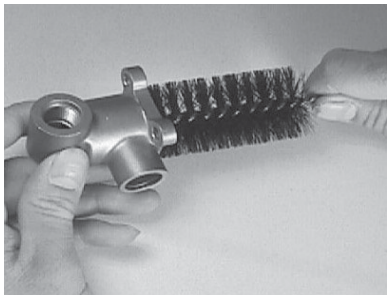
11. Use the seal pick to gently urge the lower seal from its seat. Take care not to scratch the housing.

12. Remove the lower 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.

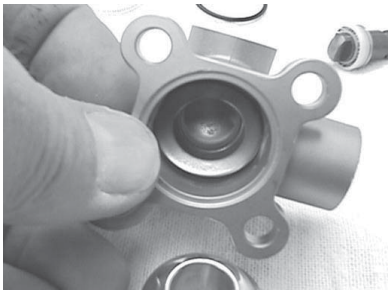
Inspection Carefully inspect each part. If possible, use a magnifier and light. Pay special attention to the balls and the valve sockets. If there is any blemish, replace the part. Flat and spring washers do not need to be replaced unless damaged.

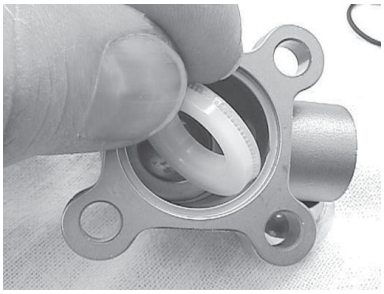


Assembly

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

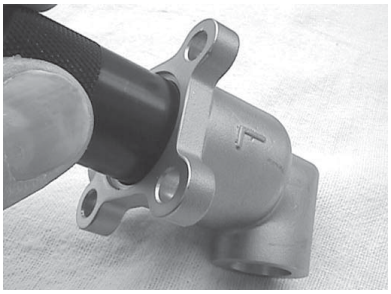
2. Place the washer (S-329) over the spring. Nudge it to be certain that both it and the spring are fully seated.

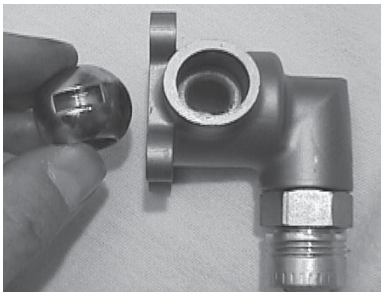




3. Insert the seal vertical to the pocket until it is within the pocket. Then, twist it flat so that the spring side of the seal is facing down.

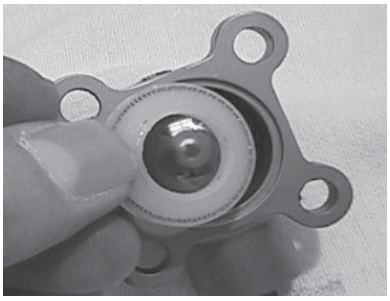
4. Nudge it into place with the fingers, and then press it firmly into the bottom of the pocket with the setting tool (M-806) from the seal kit.

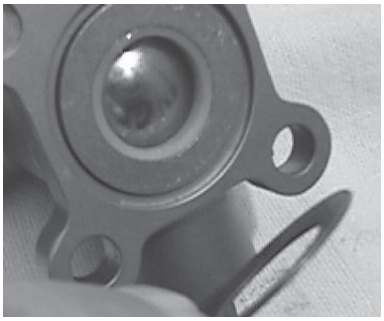




5. Slide the ball into the pocket with the detent (slot) facing the coupler pocket. Use the tang of the coupler shaft (M-581) to squarely align the ball slot.

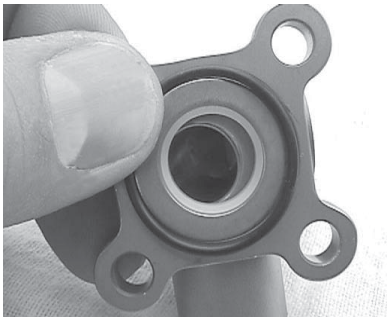
6. Install the exterior seal (S-332) with the spring groove facing away from the ball.

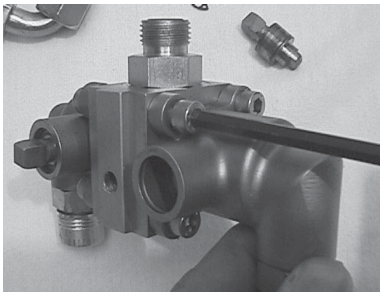




7. Install the flat washer over the seal, and apply silicone lube to hold it in place. Install the spring with the concave side facing the ball!!

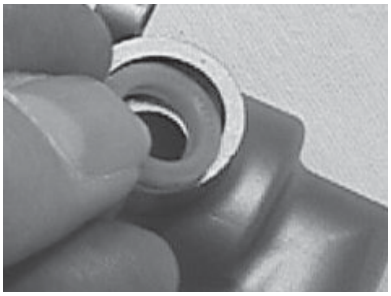
8. Press a new o-ring into the groove around the outside of the spring and washer. Use silicone lube to hold it in place.

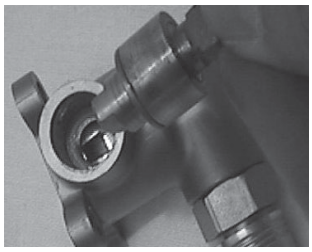




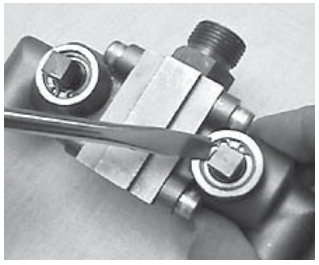
9. Attach the valve bodies to the Coco Spacer Block (M-572). Take care not to distort the o ring seals. Snug, but do not tighten the bolts!

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



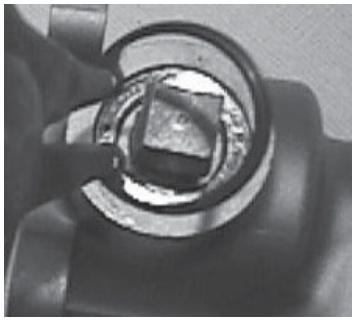


11. Carefully insert the coupler shaft (M-581), bronze bushing (M-802) and washer (P-469) into the housing.

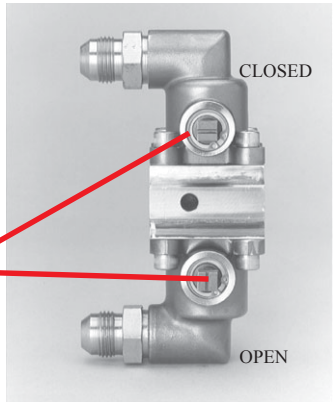


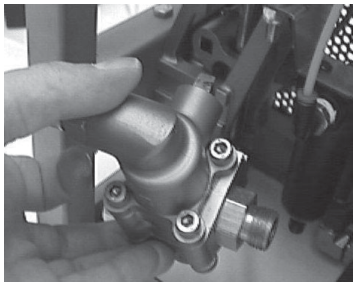
13. Make certain the ring is fully engaged in its groove.

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.

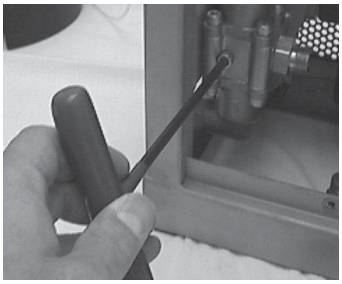


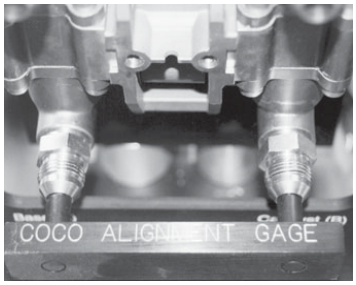
14. Before bolting the valve assembly to the frame, be certain that the valve positions are oriented properly. If the Coco air cylinder rod (M-580) is fully extended (normal position if the dispenser was switched off before disassembly), the inlet valves (the bottom valves) should be open, and the upper 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.





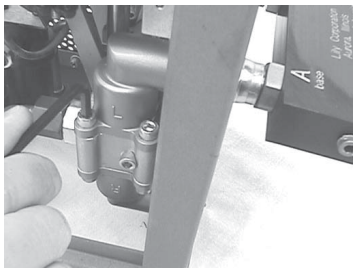
15. Fit the valve assembly to its frame. Make certain that the valve spline fits snugly into the frame slot. Apply an anti-seize compound to the threads of the mounting bolt (S-334) and draw it up tight.





16. Fit the Coco Alignment Gage (M-037) posts into the inlet ports of the Coco Module. It may be necessary to nudge the valve bodies with a wooden or plastic tool to manage the fit. If the valves don't budge, slightly loosen the bolts (S-310) securing the valve to the Spacer block.

17. With the gage posts fully inserted, snug the bolts securing the inlet valve bodies to the center block. Then further tighten the bolts in sequence, moving from corner to corner across the valve until all are tight. Remove theAlignment Gage amd move it to the outlet valves and repeat the procedure. These steps assure smooth operation of the valve sequencing cams and ease in removing and installing the mixer.

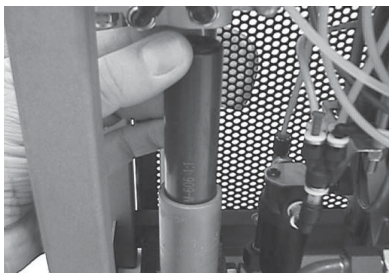


And finally, conduct a ratio assurance check!

The Metering Cylinders

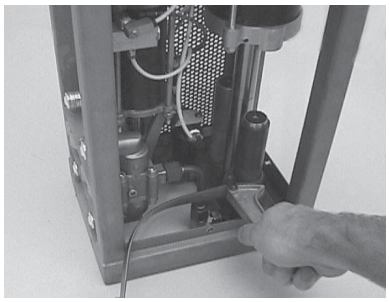
The frequency of service will depend upon the abrasive content of the material being dispensed, and to a lesser degree, the abrasive atmosphere common to many construction sites. The need for metering assembly service is recognized by leakage between the metering piston and its cylinder, sluggish extension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

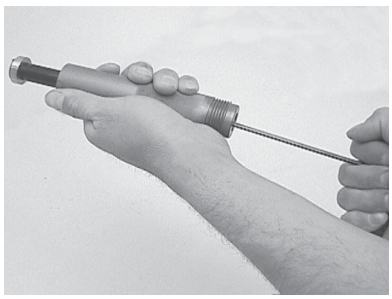
To remove a metering cylinder for service, turn the dispenser switch off, disconnect the air supply at the dispenser, rotate the selector valves on the material tanks to vent, remove the screens, and follow the steps below:



1. Grasp the metering piston and press it into its cylinder, thus purging the component back into its tank.

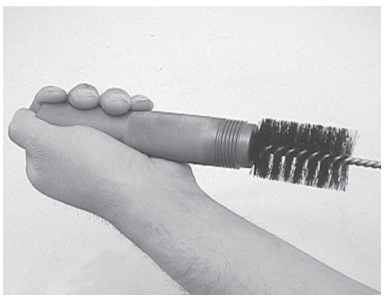
2. Loosen and remove the metering cylinder by rotating it counter-clockwise. Do not use a pipe wrench! Use a strap wrench.

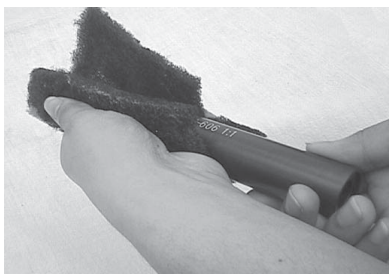




3. Press the metering piston from the cylinder bore. If it is seized, phone Lily or visit a machine shop for assistance. Do not damage the bore!

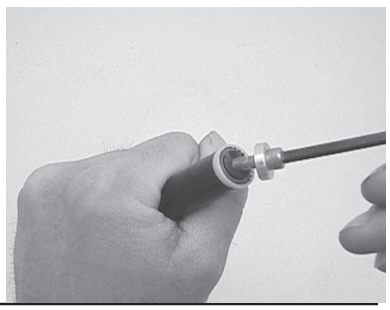
4. Clean the bore and piston thoroughly. Examine the cylinder. If it is scratched or otherwise damaged, it must be replaced.

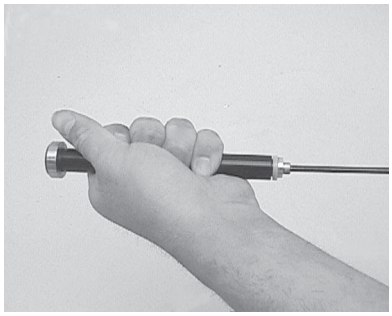




5. If the piston is scratched or marred, polish its surface with an abrasive cloth until no burr remains to damage the metering sleeve.

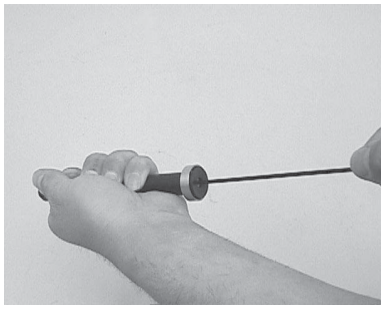
6. To replace the piston seal, remove the screw in the cap retaining the seal. Then remove the cap and the seal.

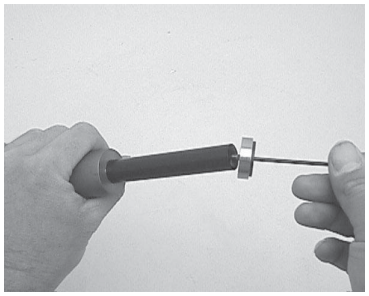




7. Replace the seal with its spring groove towards the bottom of the piston.

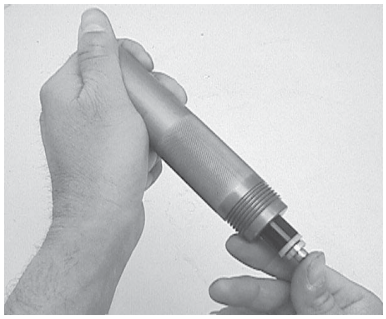
8. Inspect the piston pad. If it is torn or worn, replace it by removing its retaining screw. Apply a drop of blue Loctite thread seal or equal to the screw at reassembly.

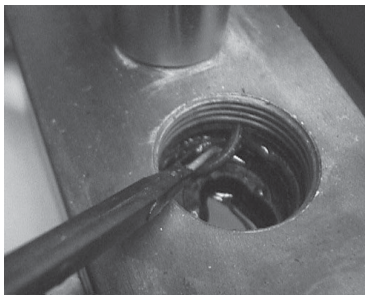




9. If the piston cap is larger than the piston diameter, it, and its cap, must be removed to insert the piston back into the cylinder.

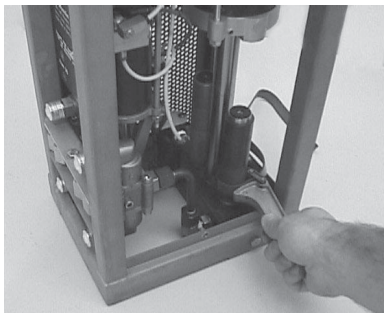
10. Lubricate the piston and chamber with silicone and insert the piston pad end first into the bottom (threaded end) of the metering cylinder. .

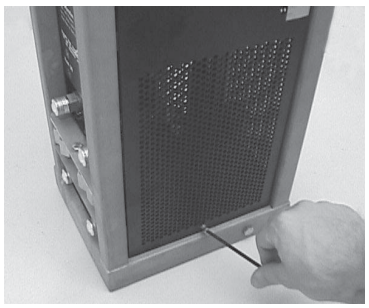




11. Use the seal pick (P-457) to remove the base manifold o-ring seal. Clean the pocket thoroughly before installing a new seal.

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





13. Replace the screens.

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.

TROUBLE SHOOTING

Spurts of air, or air bubbles in the material ..... Check the material level. Some air may enter the resin as it cavitates just before it is depleted. This is especially true of viscous material.

Air bubbles in the resin ..... Check the resin tank for an air leak into the stem at its interior fitting.

Incorrect ratio ..... Conduct ratio assurance check to confirm valve performance. (Page #9)
Check compressibility of viscous components due to air content.

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.

If the material is viscous (thick) due to chemistry or temperature, heat the material to 100°F. Anticipate a shorter working life!

Leakage of resin at material piston ..... Replace the piston seal(s). (Page #'s 16,17).

Leakage of resin between flippers and valve bodies ..... Replace the COCO stem seals. (Page #14).

Metering piston fails to extend, or extends slowly ..... Disconnect the material inlet hose at the dispenser and check the flow. If the flow is restricted, check for an obstruction in the material supply line, or insufficient delivery from the pressure vessel or transfer pump.

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 assembly. (Page #'s 16,17).

With the piston fully extended, turn the switch off and wipe the piston with soap and water or a solvent. Lubricate as well.

Material contains abrasive fillers, or is too thick.

System begins to dispense, but cannot complete a dispense cycle ..... Obstruction in material outlet lines or metering cylinder.

System is unresponsive ..... Check the air supply.

System does not make dispense stroke. Audible air leak at sensor ports. ..... Metering pistons not sealing off sensor ports due to worn or damaged pads. Replace the pads. (Page #18)

Insufficient material pressure to firmly impinge the pads against the cap.

Leaking lid seal on pressure vessel 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 ..... Material contains too much abrasive filler**.** Change materials.

Low air supply pressure.

Misaligned inlet valve bodies. See Steps 16 and 17 on page 15,16.

Main air cylinder return (ascent) is sluggish. ..... Defective Rapid Exhaust valve (P-184)

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.

"Or " element (P-794) not functioning. Verify by turning the switch off. If cylinder then returns, replace the Or element.

Switch to "off" does not return main air cylinder. ..... Twin valve (A-201) not shifting. Service the valve, replace the air filter element, and check on cleanliness of air supply.

If you cannot correct the problem,
contact Lily Corporation with an exact description of how the various components are responding.

If possible, phone with the unit, air, tools, and resin information at hand.

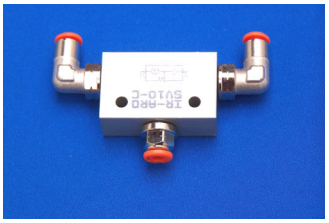
The Control Circuit

The CD15 is entirely pneumatic. It uses compressed air for its control circuit, as well as for energy to dispense. An air circuit is nearly as reliable as an electric circuit if the air supply is clean, dry, and free of lubricants and additives, other than those applied by the manufacturer.

To understand an air circuit, it is necessary to understand the symbols used:

The **"Unregulated Air"** symbol is used to indicate the presence of unregulated air. Rather than use lines to show the tubing carrying unregulated air to energize various valves, the symbol avoids a maze of lines more likely to confuse rather than enlighten.

The **"Or"** (P-794) element relays an air signal arriving from either inlet port. If a signal arrives from one port "or" another, it is relayed.



S Port

The **"Stroke Sensor"** (P-182) sends an air signal from its port S whenever there is no pressure in the line in which it is installed. However, if the line is energized, ort S is vented.

Diagram I The switch is on, energizing port "H" at the lower end cap. The system is poised to dispense. However, it cannot do so until the material metering cylinders have filled, fully extending their pistons to seal off the air signal escaping through vents "V". Note that the air cylinder piston has depressed the stem of the lower end cap sensor valve, allowing incoming air at "H" to energize the conduit within the air cylinder end cap. Once the two bleed holes, "V", intersecting the conduit are plugged by the rising pistons, a signal will be sent to port A4 of the twin valve. The signal to A4 will initiate the valve sequence illustrated in Diagram II.

Diagram II The metering cylinders have filled, fully extending both of the metering pistons to close off vents "V". A signal has emerged from "O" to the Twin Valve at port A4, venting port A3, and energizing Port A2. The signal from Port A2 has shifted the Coco module to close the inlet valves, and open the outlet valves. One leg of the signal from Port A2 passed through the Stroke Sensor to Twin Valve port B4, venting port B3, and energizing port B2. By pressurizing the Stroke Sensor, Port "S" of the sensor is vented.

Diagram III The switch is off. The on/off switch directs the signal to the "Or" element, from where it delivers a signal to the A1 port of the Twin Valve (M-017). This signal shifts the valve to provide a signal from its A3 port, and vent the A2 port. The signal from the A3 port has shifted the coco air cylinder downward, closing the outlet valves, and opening the inlet valves. Note that in venting the A2 port, it also vented the pressure at the "Stroke Sensor", triggering a signal from its "S" port. The signal from the "S" port is delivered to port B1 of the twin valve, where it shifts the valve to energize port B3, and vent port B2. The air from B3 has energized the ascent of the main air cylinder.

Note that the system is returned to the mode shown in Diagram III by a signal from port "O" of the upper main air cylinder, as well as from the "off" position of the on/off switch. When the main air cylinder completes its descent, the air cylinder piston depresses the sensor switch in the upper end cap, making the circuit between port "H" and port "O".

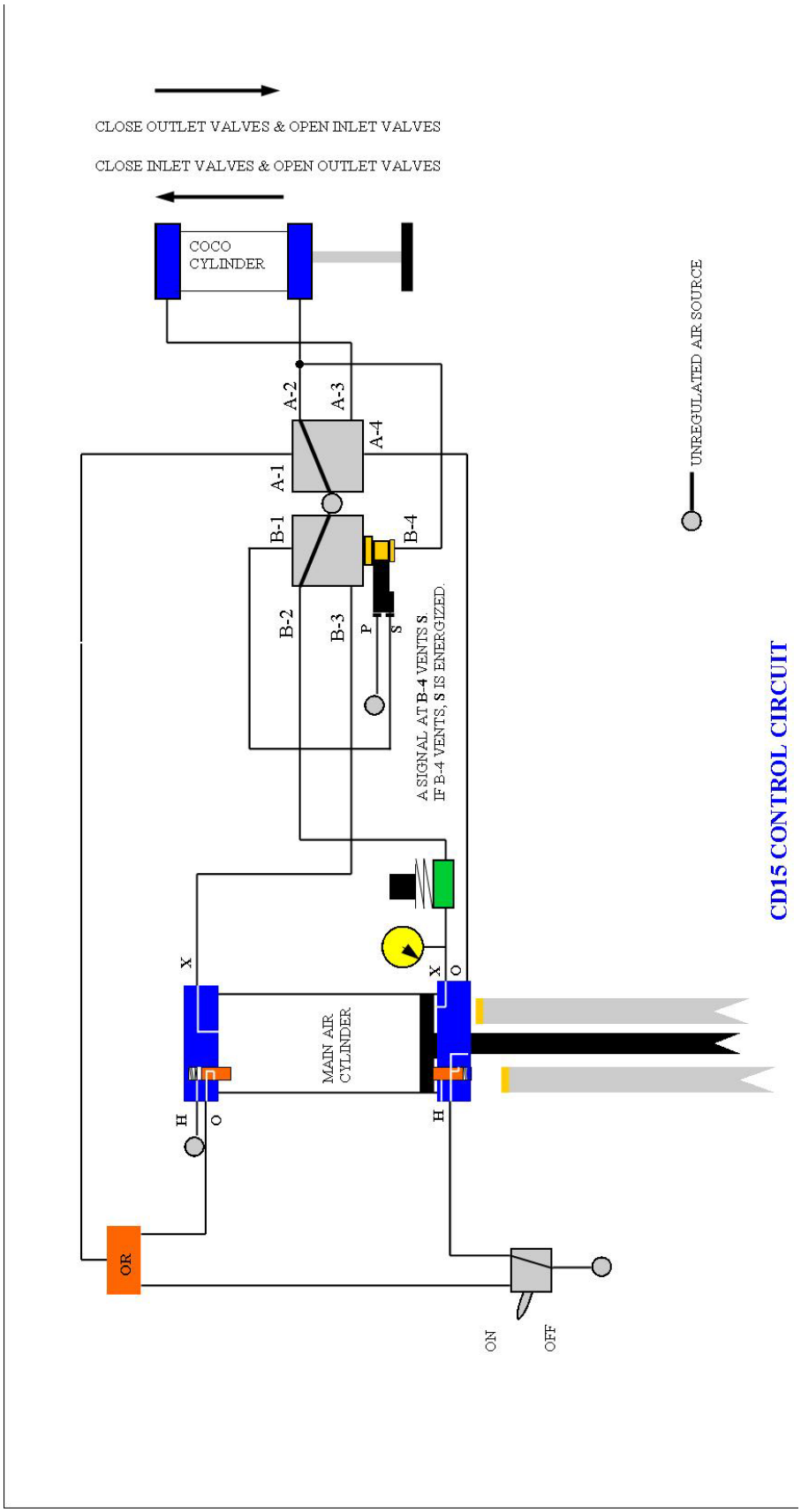

CLOSE OUTLET VALVES & OPEN INLET VALVES
CLOSE INLET VALVES & OPEN OUTLET VALVES
COCO CYLINDER
A-1
A-2
A-3
A-4
B-1
B-2
B-3
B-4
P
S
A SIGNAL AT B-4 VENTS S.
IF B-4 VENTS, S IS ENERGIZED.
UNREGULATED AIR SOURCE
CD15 CONTROL CIRCUIT
X
O
MAIN AIR CYLINDER
H
O
OR
ON
OFF

Diagram I

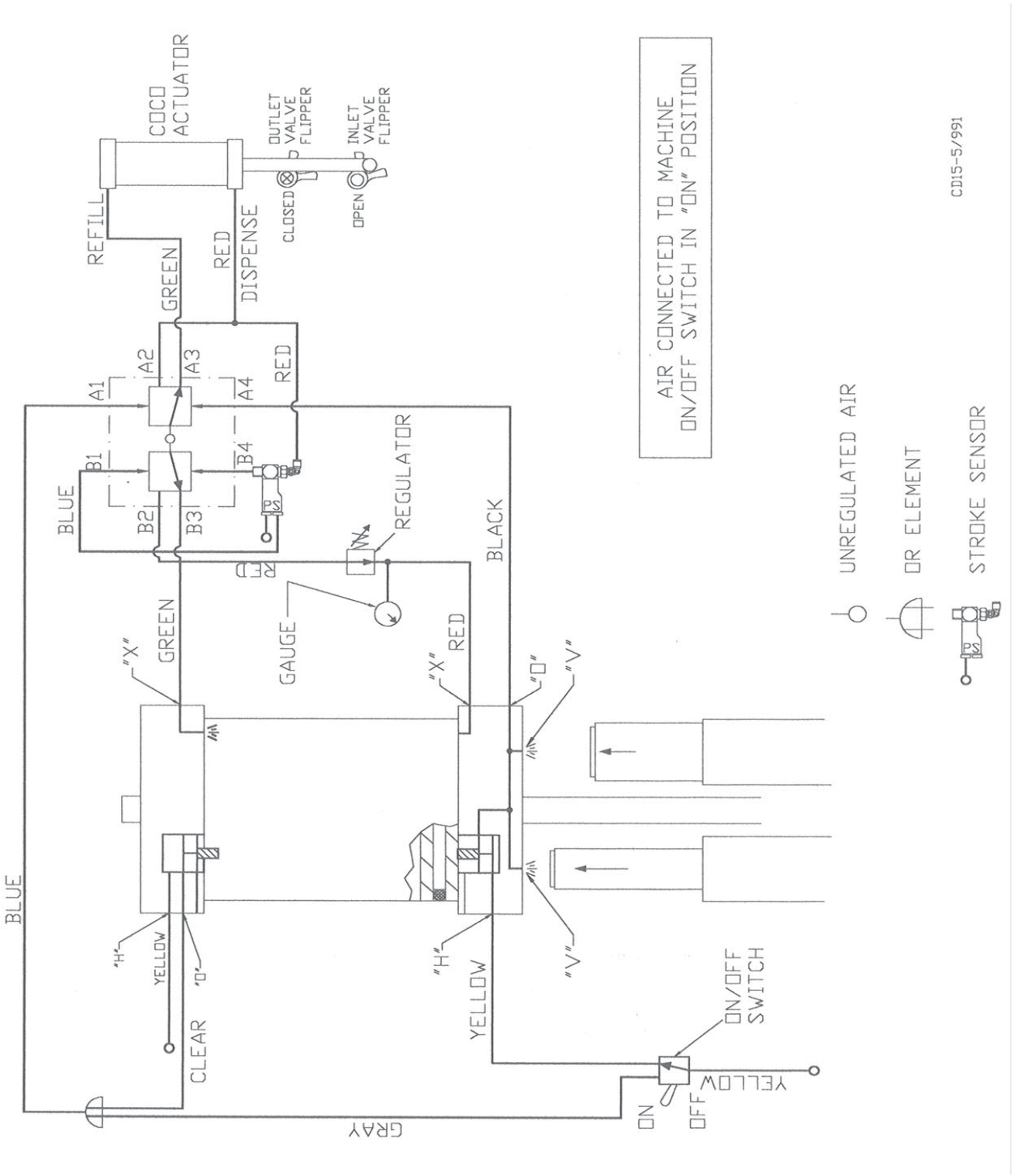

COCO ACTUATOR
OUTLET VALVE FLIPPER
INLET VALVE FLIPPER
CLOSED
OPEN
REFILL
DISPENSE
GREEN
RED
A1
A2
A3
A4
B1
B2
B3
B4
BLUE
REGULATOR
GAUGE
BLACK
"X"
"H"
"O"
"V"
YELLOW
CLEAR
GRAY
ON/OFF SWITCH
ON
OFF
AIR CONNECTED TO MACHINE ON/OFF SWITCH IN "ON" POSITION
UNREGULATED AIR
OR ELEMENT
STROKE SENSOR
CD15-5/991

Diagram II

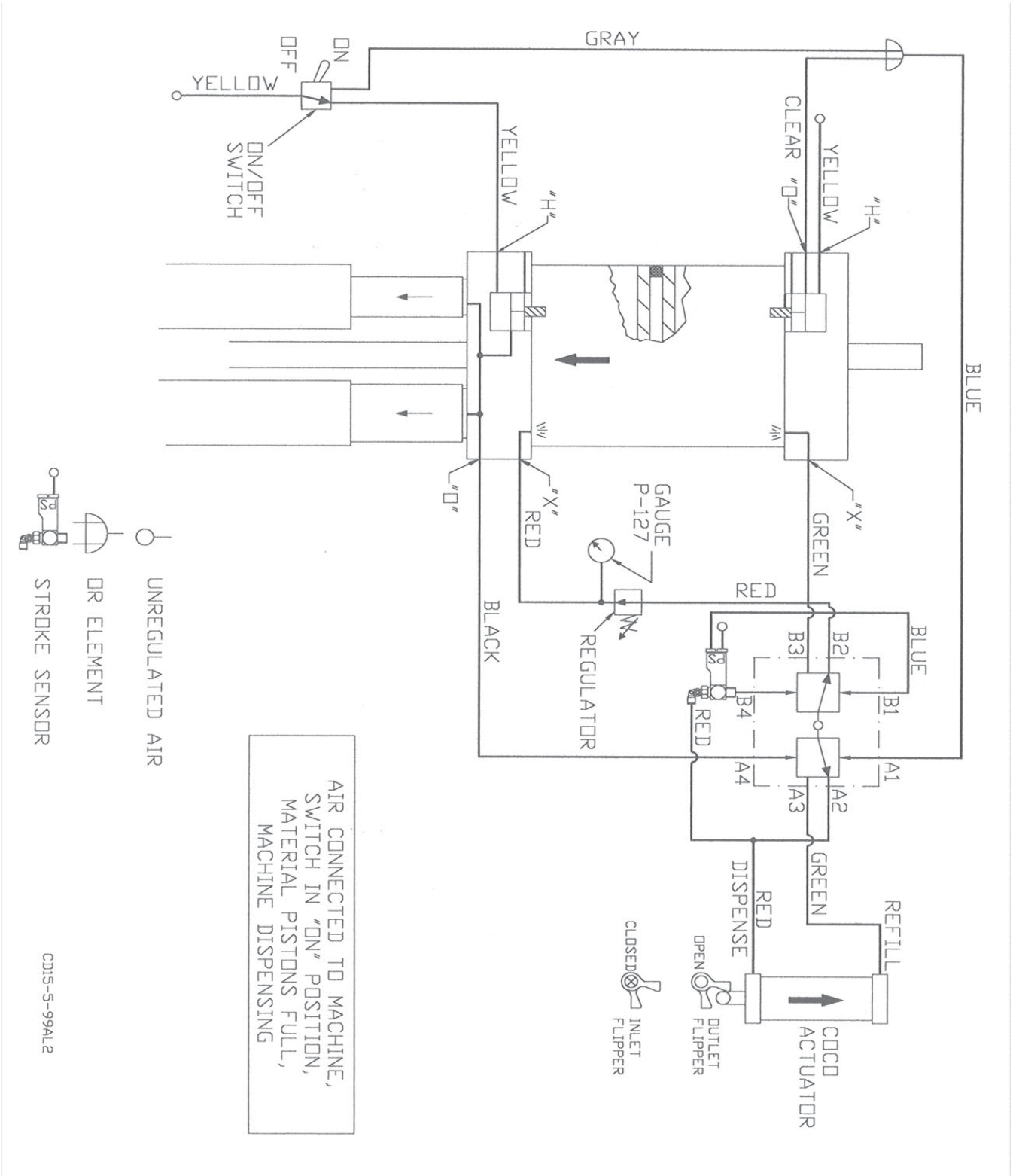
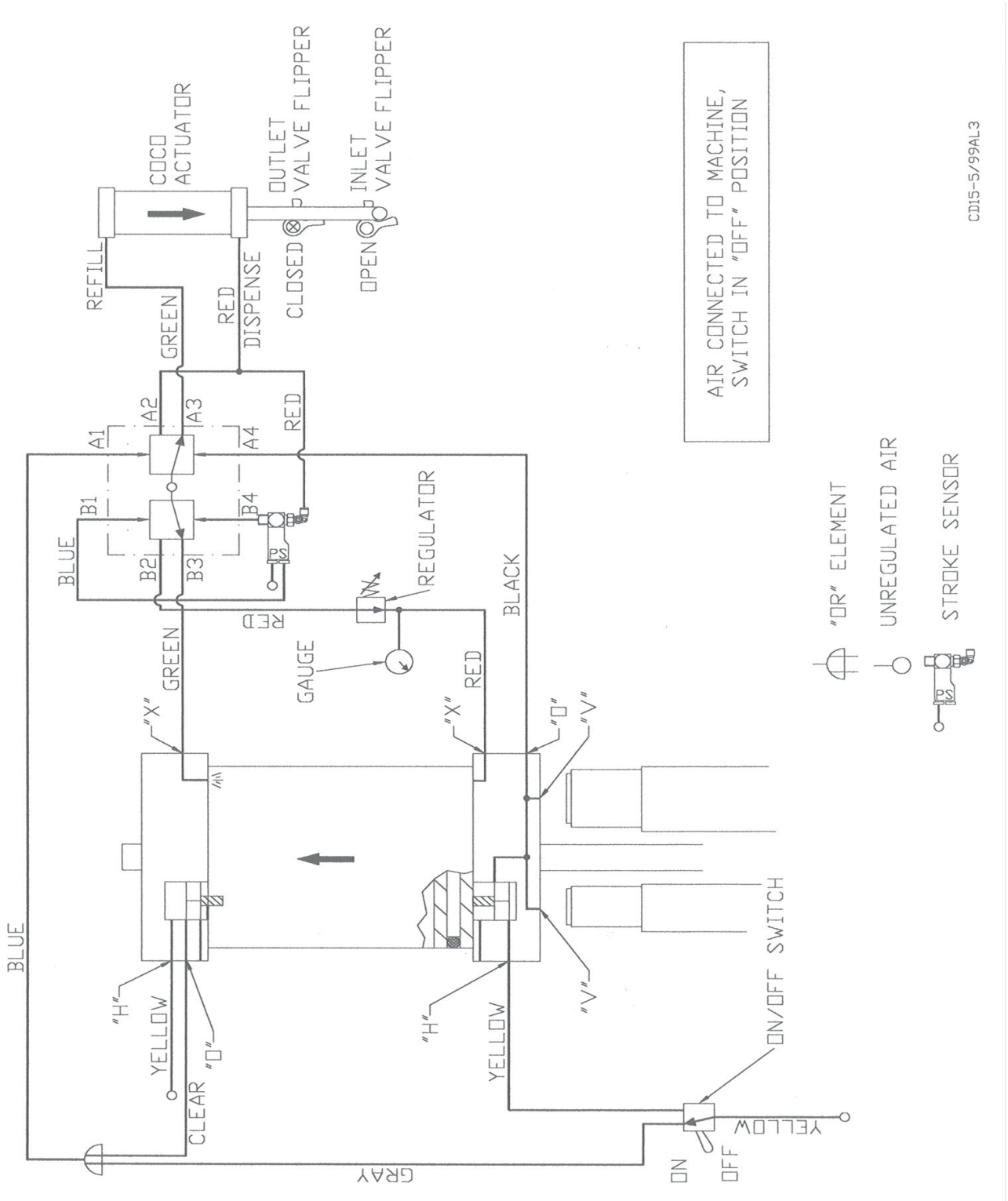
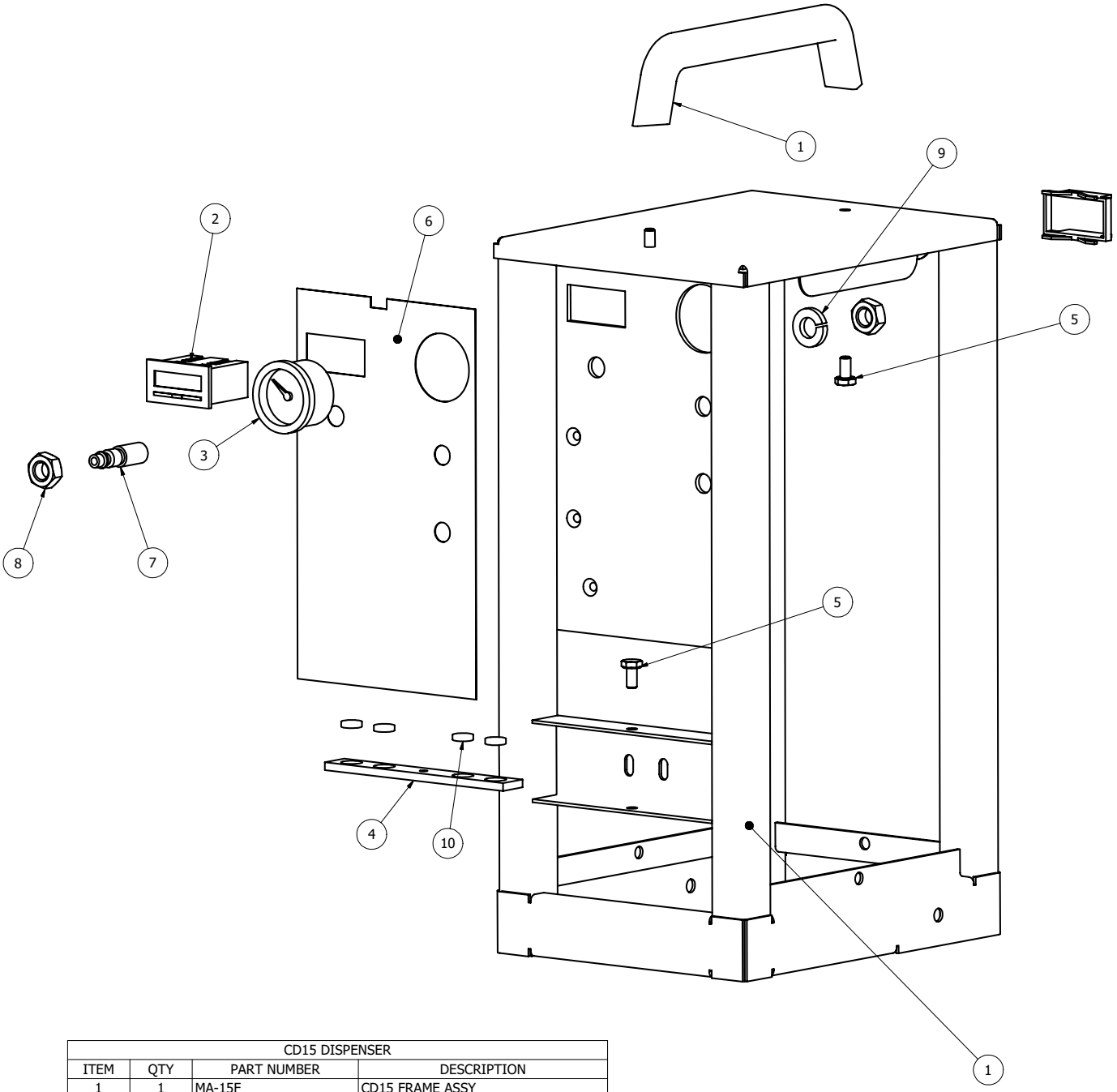

GRAY
OFF
ON
YELLOW
ON/OFF SWITCH
YELLOW
"H"
CLEAR "O"
YELLOW
"H"
BLUE
"O"
"X" RED
GAUGE P-127
"X" GREEN
RED
BLACK
REGULATOR
B3
B2
BLUE
B4
B1
RED
A4
A3
A2
A1
GREEN
RED DISPENSE
REFILL
CLOSED
OPEN
INLET FLIPPER
OUTLET FLIPPER
COCO ACTUATOR
AIR CONNECTED TO MACHINE, SWITCH IN "ON" POSITION, MATERIAL PISTONS FULL, MACHINE DISPENSING
UNREGULATED AIR
OR ELEMENT
STROKE SENSOR
CD15-5-99AL2

Diagram III


COCO ACTUATOR
OUTLET VALVE FLIPPER
INLET VALVE FLIPPER
CLOSED
OPEN
REFILL
DISPENSE
GREEN
RED
A1
A2
A3
A4
B1
B2
B3
B4
BLUE
REGULATOR
GAUGE
BLACK
"X"
"H"
"O"
"V"
YELLOW
CLEAR
GRAY
ON/OFF SWITCH
ON
OFF
AIR CONNECTED TO MACHINE, SWITCH IN "OFF" POSITION
"OR" ELEMENT
UNREGULATED AIR
STROKE SENSOR
CD15-5/99AL3



CD15 DISPENSER			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	MA-15F	CD15 FRAME ASSY
2	1	P-299	COUNTER - ELECTRIC
3	1	P-127	PRESSURE GAUGE
4	1	M-709	MAGNET HOLDER
5	3	S-100	1/4-20 X .5 HEX HEAD BOLT S.S.
6	1	M-603	DASHBOARDCD15
7	1	M-008	ADAPTER - THREADED BULKHEAD
8	2	S-032	1/2-13 THIN HEX NUT S.S.
9	1	P-078	Helical Spring Lock Washer S.S.
10	4	P-071	MAGNET

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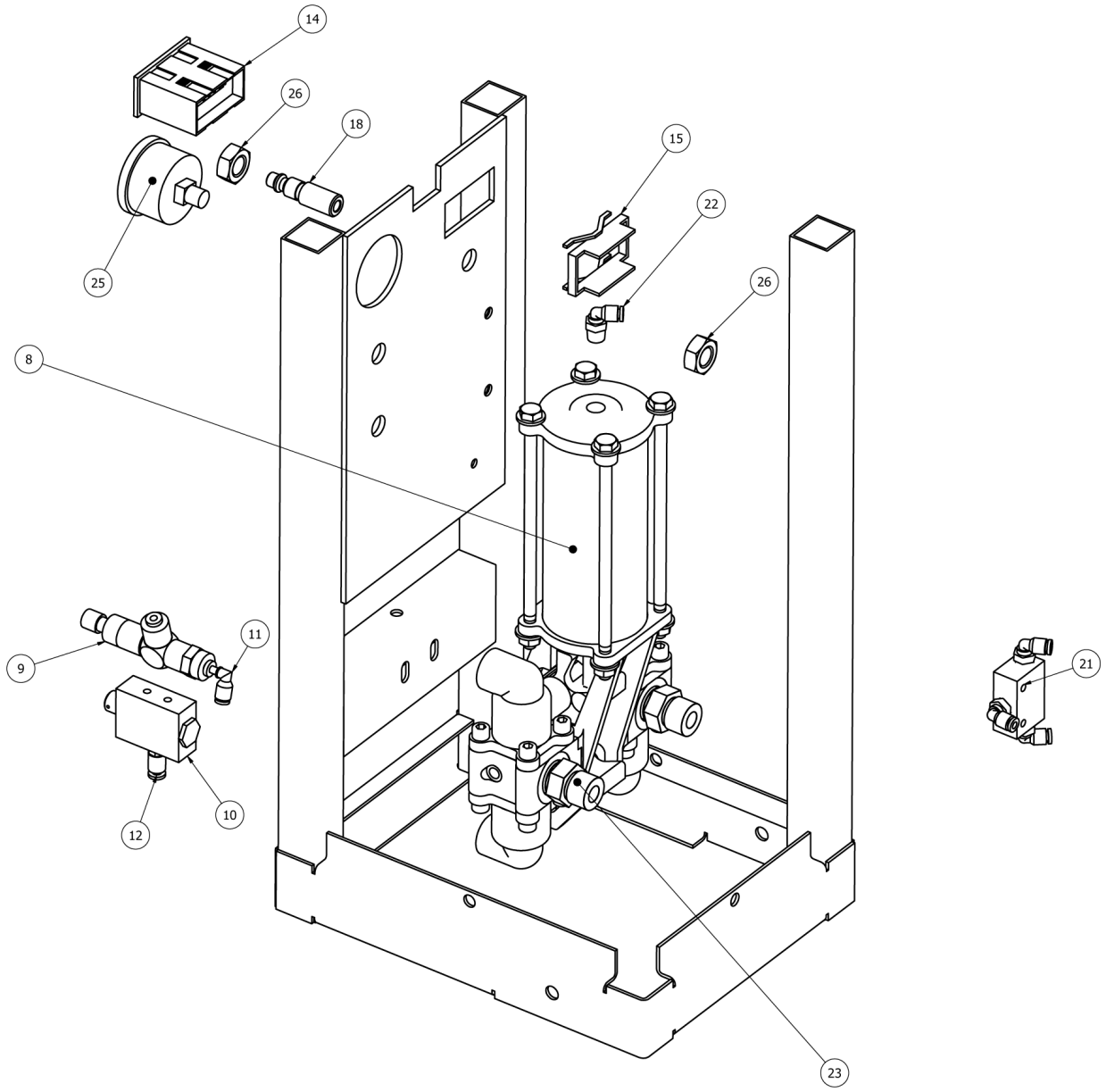
APPENDIX



Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
8	1	A-160-6	COCO BALL VALVE AND ACTUATOR ASSY
9	1	P-377	MINIATURE REGULATOR
10	1	P-700	AL - SWITCH ON-OFF
11	1	P-209	CF SFT - 5/32 X 5/32 SWIVEL ELBOW
12	1	P-186	10-32 X 5/32 UNION
14	1	P-299	COUNTER - ELECTRIC
15	1	P-299 CLAMP	COUNTER CLAMP
18	1	M-008	ADAPTER - THREADED BULKHEAD
21	1	P-794	AL - VALVE - "OR" ELEMENT
22	4	P-176	5/32 X 1/8 NPT SWIVEL ELBOW
23	2	S-304	STRAIGHT THREAD CONNECTOR
25	1	P-127	PRESSURE GAUGE
26	2	S-032	1/2" - 13 SS JAM NUT

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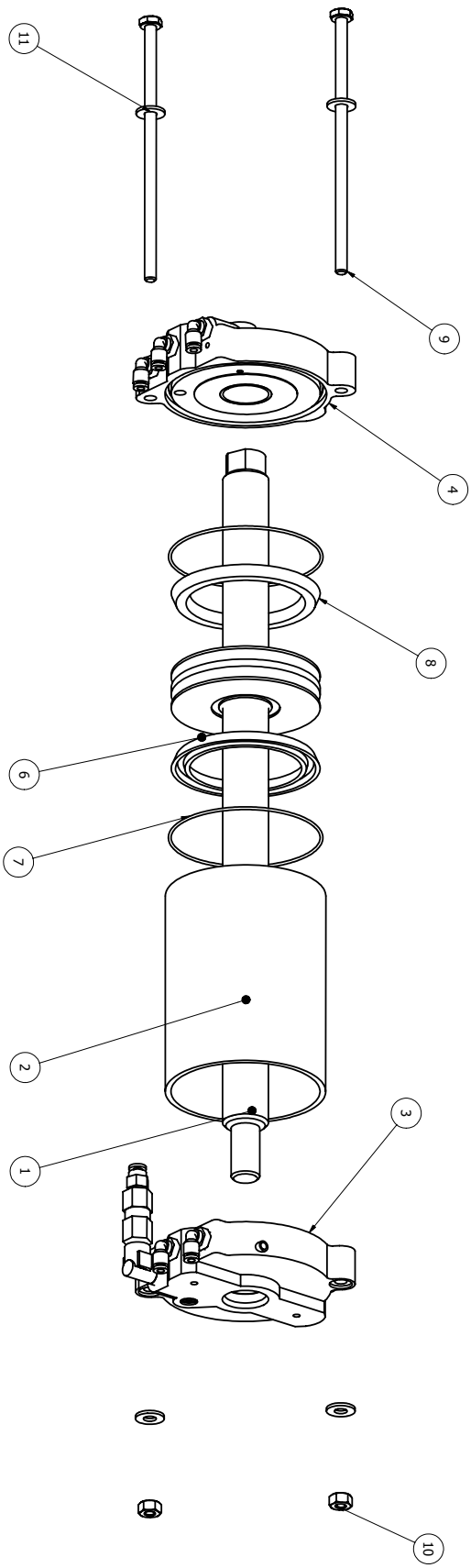
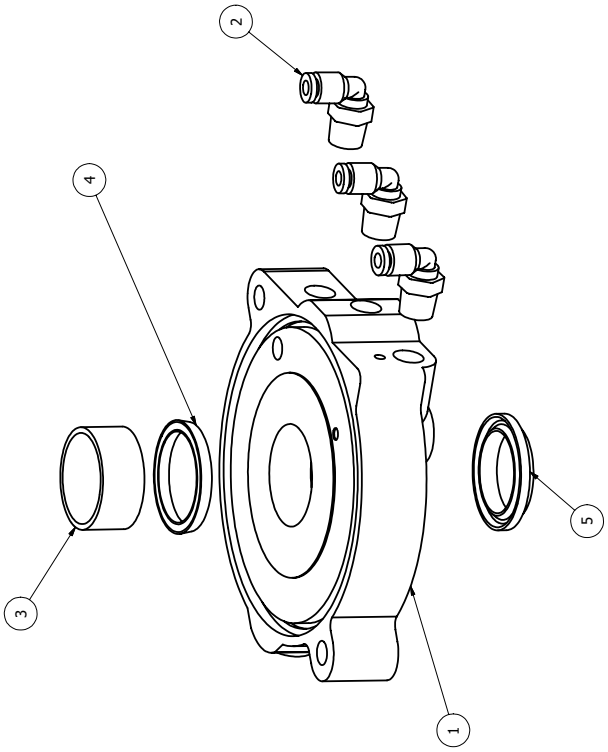


AC - CD15 AIR CYLINDER ASSY.

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	M-600	AIR CYLINDER ROD - CD15
2	1	M-597	AIR CYLINDER SLEEVE - CD15
3	1	A-613	CD15 BOTTOM END CAP ASY.
4	1	A-619	CD15 TOP END CAP ASSY.
6	1	M-596	AIR CYLINDER PISTON - CD15
7	2	S-326	SEAL - O-RING
8	2	S-513	SEAL - PISTON U-CUP
9	2	S-309	HEX HEAD BOLT 1/4-20 X 6 SS
10	2	P-208	HEX NUT 1/4-20 SS
11	4	S-414	Washer



AC-1 TOP END CAP PARTS LIST

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

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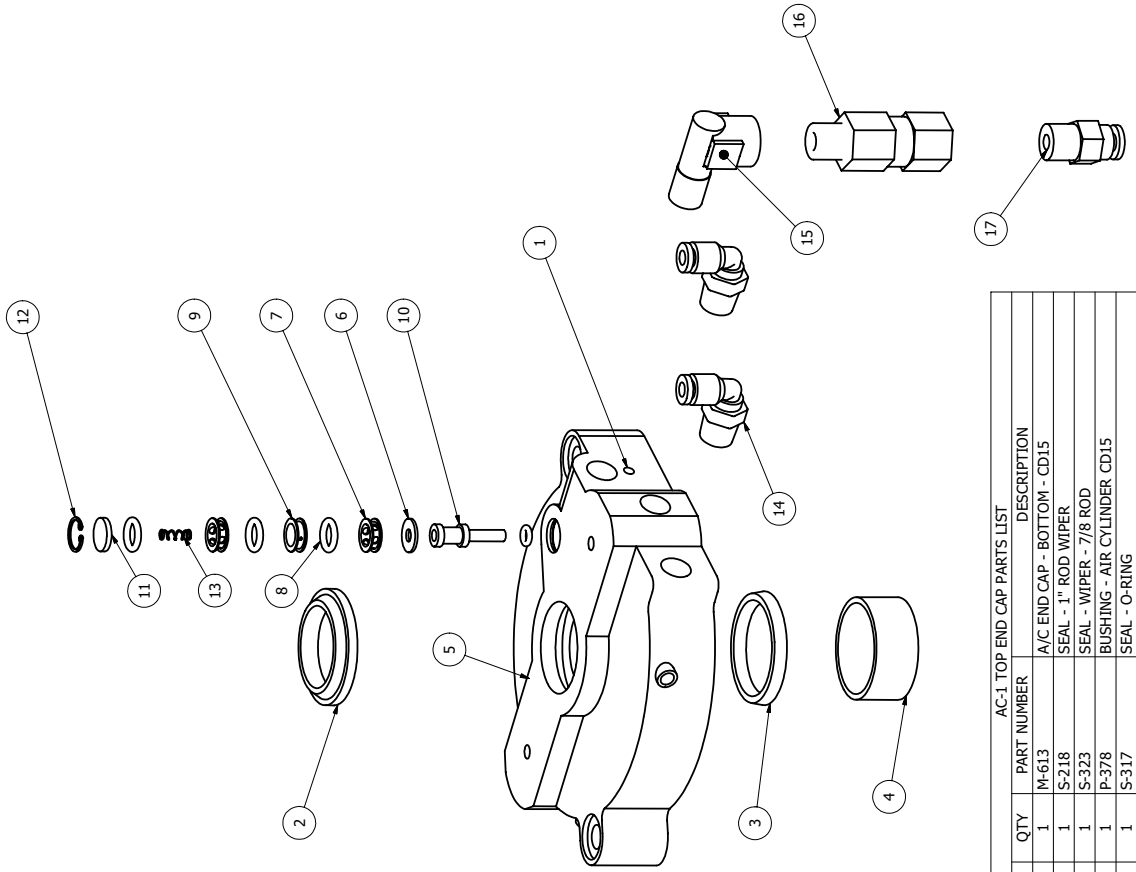
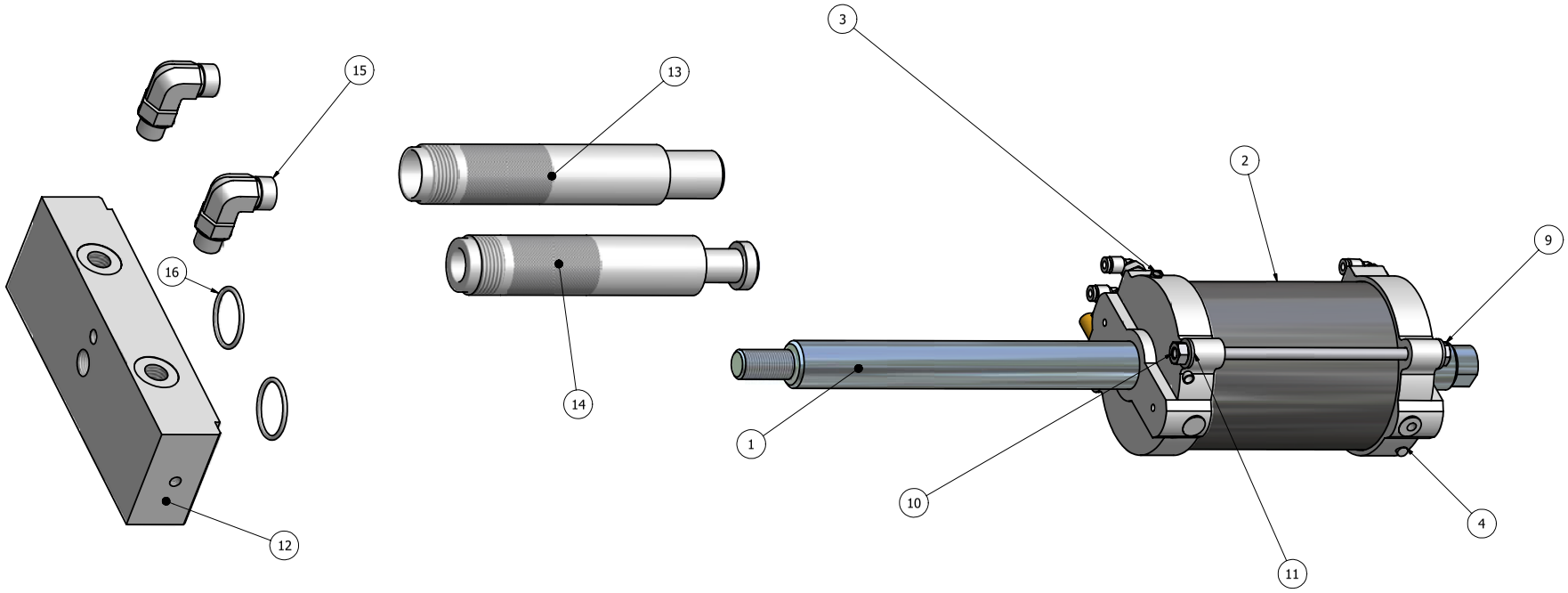


AC-1 TOP END CAP PARTS LIST

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/ORIFICE - 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



Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
2	1	AC - CD15 AIR CYLINDER ASSY	AIR CYLINDER ASY
12	1	M-594	MANIFOLD - PUMP BASE CD15
13	1	A-143	METERING ASSY / CD-15 1:1
14	1	A-144	METERING ASSY / CD15 2:1
15	2	S-308	SEAL LOK - STRT THD SWVL EL
16	2	S-217	SEAL - O-RING BASE MANIFOLD CD15

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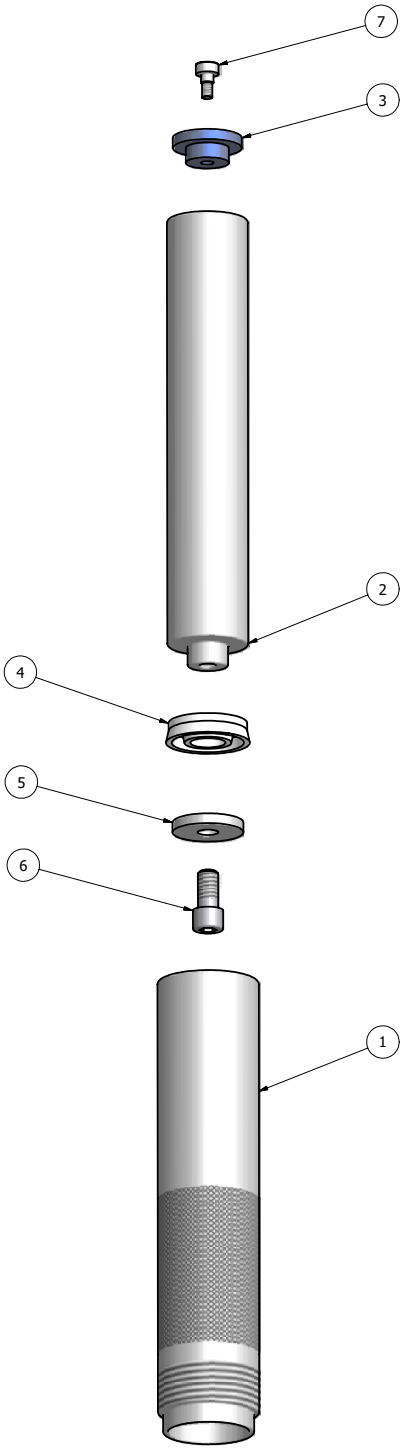

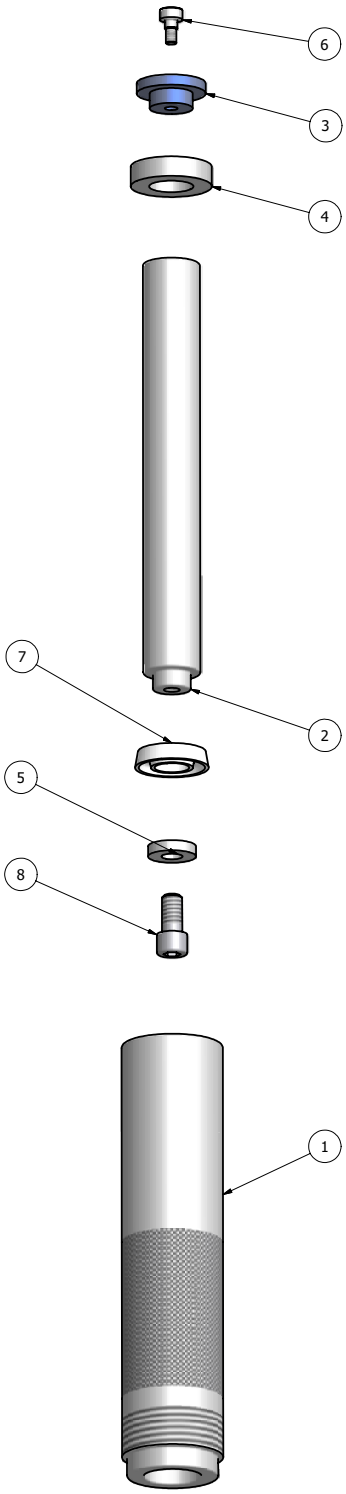

METERING CYLINDER ASSEMBLY			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	M-608	CHAMBER - PUMP 1:1 CD15
2	1	M-606	MP - 15 1.000/1.001
3	1	P-860	PISTON PAD
4	1	P-527T	PS - CD15 1:1 TEFLON
5	1	M-161	PISTON CAP 1:1 CD15
6	1	S-99	1/4-20 X .5 SOCKET HEAD CAPSCREW SS
7	1	P-539	MP - 15 1.000/1.001

METERING CYLINDER ASSEMBLY			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	M-609	CHAMBER - PUMP 2:1 CD-15
2	1	M-607	PISTON - PUMP 2:1 CD-15
3	1	P-860	PISTON PAD
4	1	M-610	PISTON ADAPTER
5	1	M-614	CAP - PISTON 2:1 CD-15
6	1	P-539	MP - 15 1.000/1.001
7	1	P-280	SEAL - 2:1 CD15
8	1	S-99	1/4-20 X .5 SOCKET HEAD CAPSCREW SS

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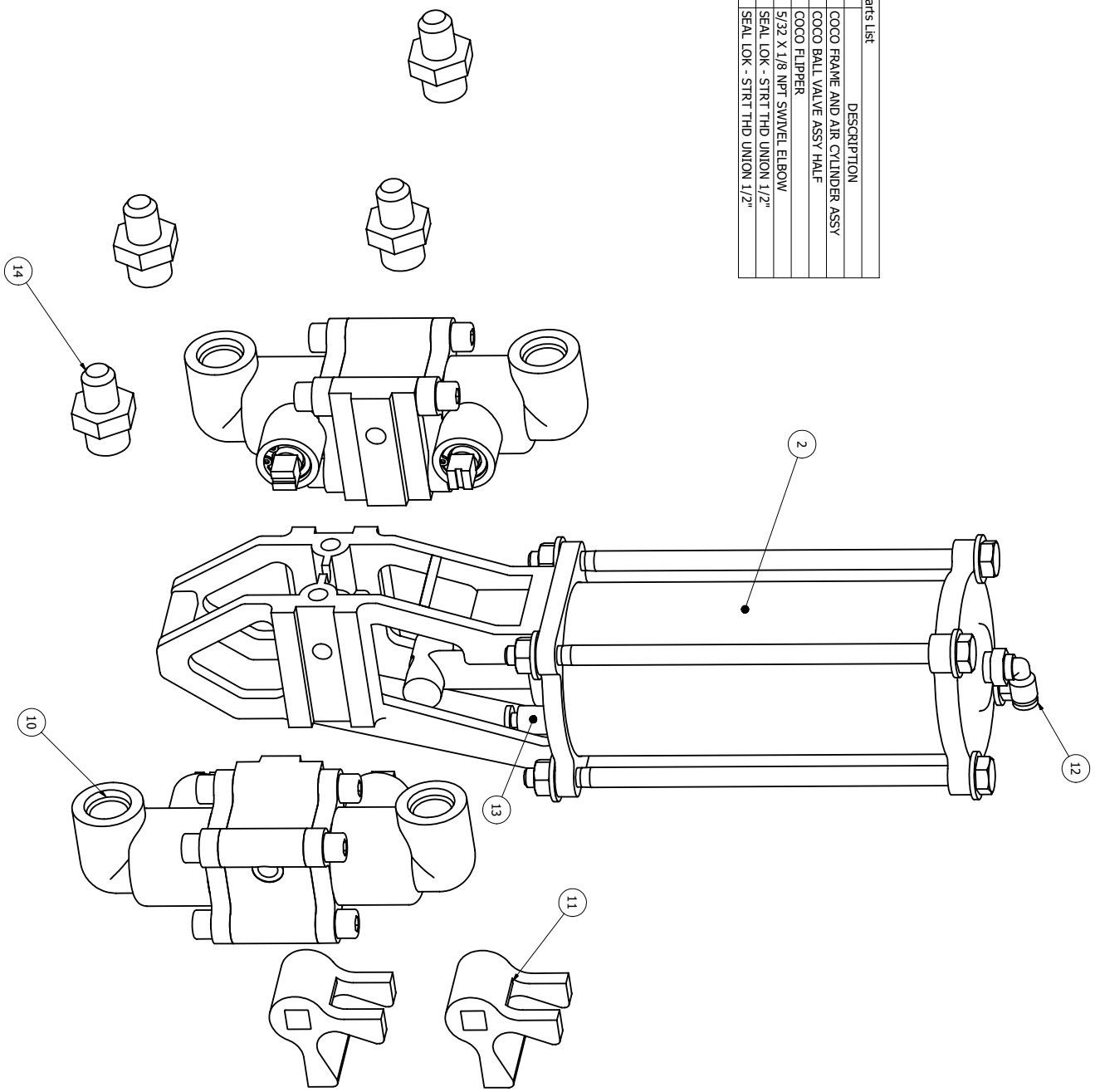
Parts List

ITEM	QTY	PART NUMBER	DESCRIPTION
2	1	A-013	COCO FRAME AND AIR CYLINDER ASSY
10	2	A-160-3	COCO BALL VALVE ASSY HALF
11	2	M-574	COCO FLIPPER
12	1	P-176	5/32 X 1/8 NPT SWIVEL ELBOW
13	1	P-186	SEAL LOK - STRT THD UNION 1/2"
14	4	S-307	SEAL LOK - STRT THD UNION 1/2"



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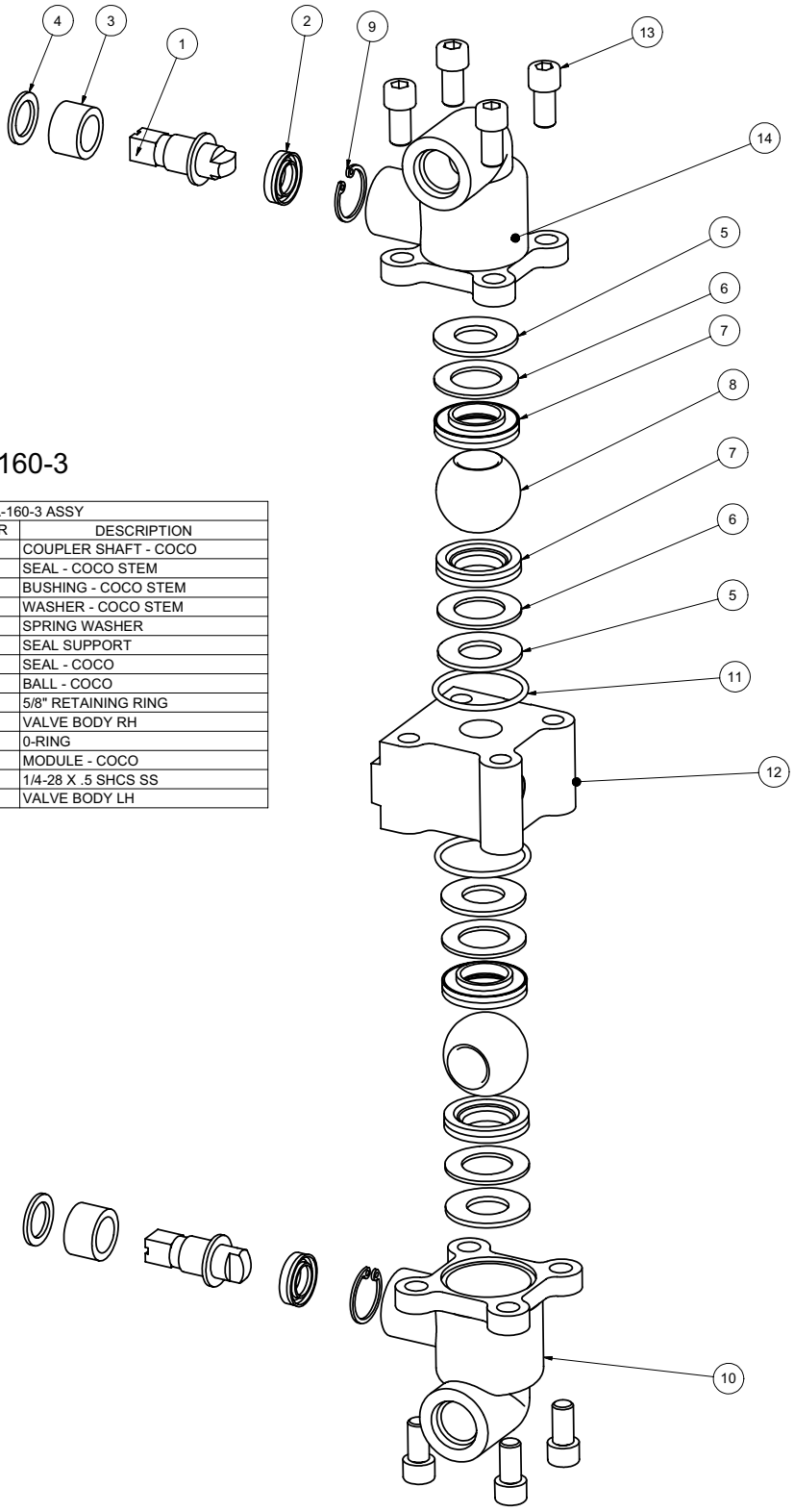

A-160-3

A-160-3 ASSY			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	2	M-581	COUPLER SHAFT - COCO
2	2	S-328	SEAL - COCO STEM
3	2	M-802	BUSHING - COCO STEM
4	2	P-469	WASHER - COCO STEM
5	4	S-330	SPRING WASHER
6	4	S-329	SEAL SUPPORT
7	4	S-332	SEAL - COCO
8	2	M-803	BALL - COCO
9	2	P-5051	5/8" RETAINING RING
10	1	M-573	VALVE BODY RH
11	2	S-509	0-RING
12	1	M-572	MODULE - COCO
13	8	S-310	1/4-28 X .5 SHCS SS
14	1	M-575	VALVE BODY LH

* S-013, P-530, P-691, ALL COMPONENT TO P-762

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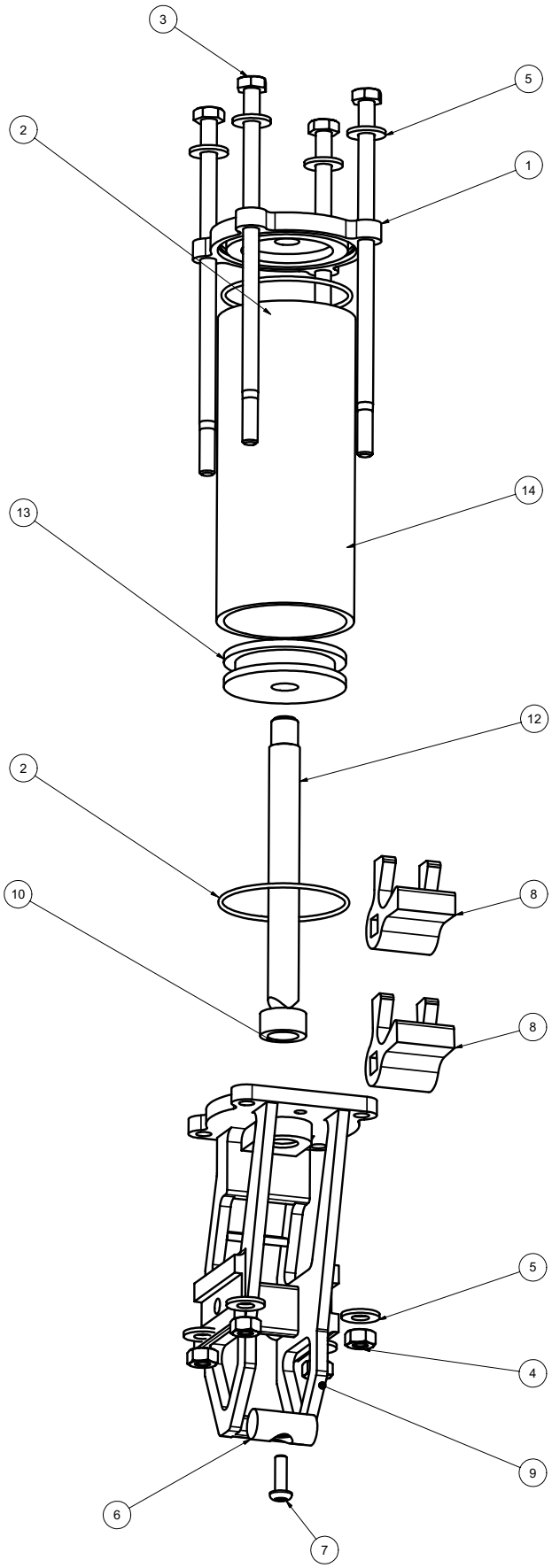

A-013 ASSY

A-013 ASSY			
ITEM	QTY	PART NUMBE	DESCRIPTION
1	1	M-570	A/C END CAP COCO CYLINDER
2	2	S-504	SEAL - O-RING
3	4	S-309	1/4-20 X 6 HHCS S.S.
4	4	P-208	1/4-20 HEX NUT S.S.
5	8	S-415	WASHER 1/4"
6	1	M-577	A/C CAM BAR
7	1	S-299	10-32 X .625 BHCS S.S.
8	2	M-574	COCO FLIPPERS
9	1	M-571	FRAME COCO
10	1	M-804	BUSHING COCO FRAME
12	1	M-580	SHAFT COCO A/C
13	1	M-579	PISTON COCO A/C
14	1	M-582	A/C SLEEVE COMPOSITE

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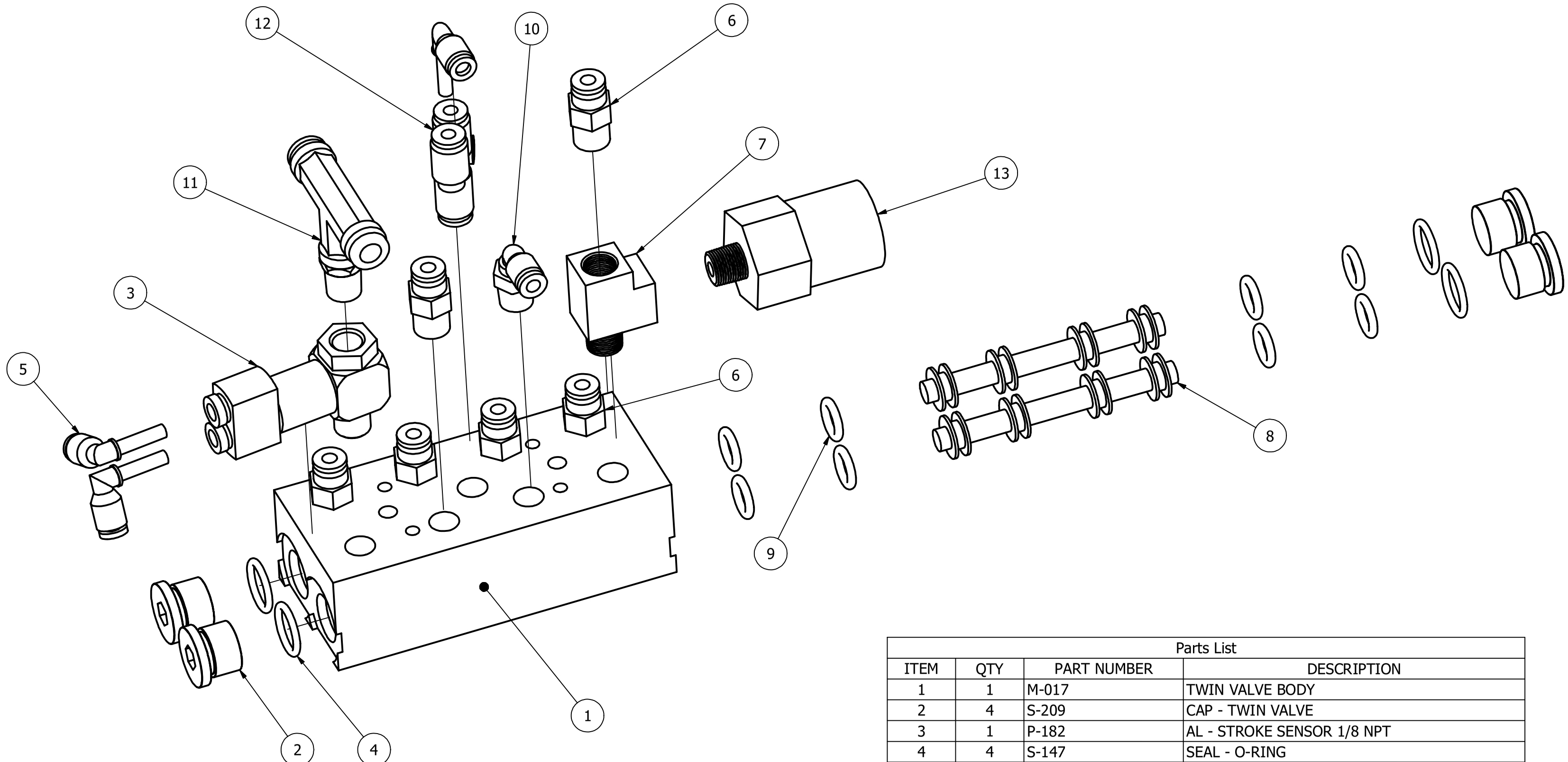

Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	M-017	TWIN VALVE BODY
2	4	S-209	CAP - TWIN VALVE
3	1	P-182	AL - STROKE SENSOR 1/8 NPT
4	4	S-147	SEAL - O-RING
5	3	P-209	CF SFT - 5/32 X 5/32 SWVL ELBOW
6	6	P-174	1/8 NPT X 5/32 UNION
7	1	S-021	PIPE TEE 1/8 NPT BRASS
8	2	M-012	SPOOL - TWIN VALVE
9	8	P-515	SEAL - QUAD RING - TWIN VALVE
10	1	P-176	5/32 X 1/8 NPT SWIVEL ELBOW
11	1	P-339	CF SFT - 5/32 X 1/8 NPT MALE BRANCH TEE
12	1	S-507	CF SFT - 5/32 X 1/8 NPT "Y"
13	1	P-024	AL - PRESSURE TRANSDUCER

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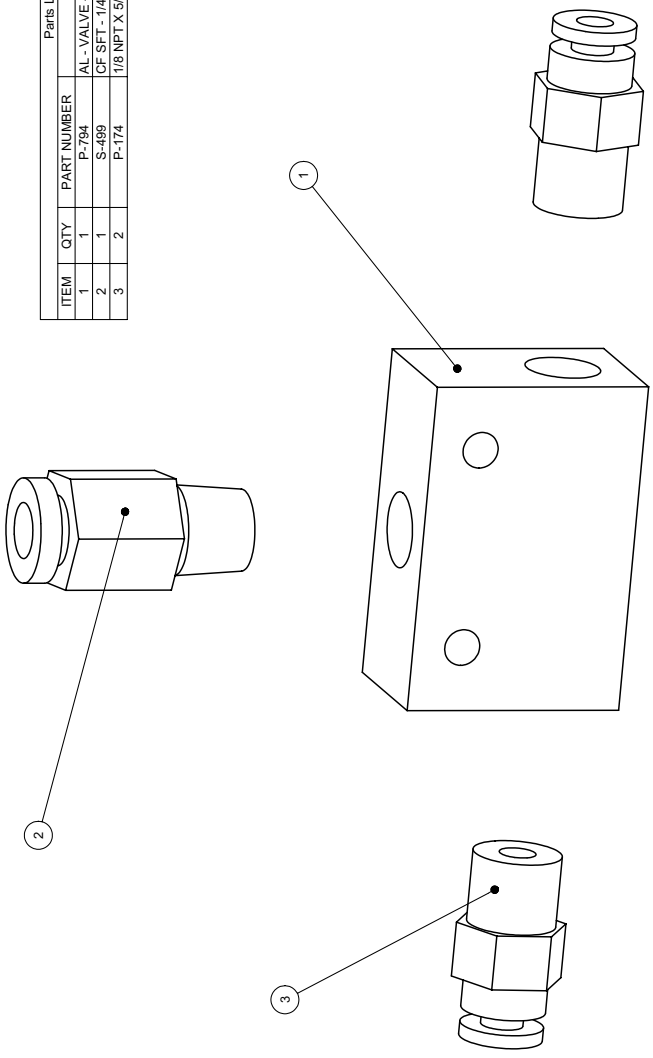
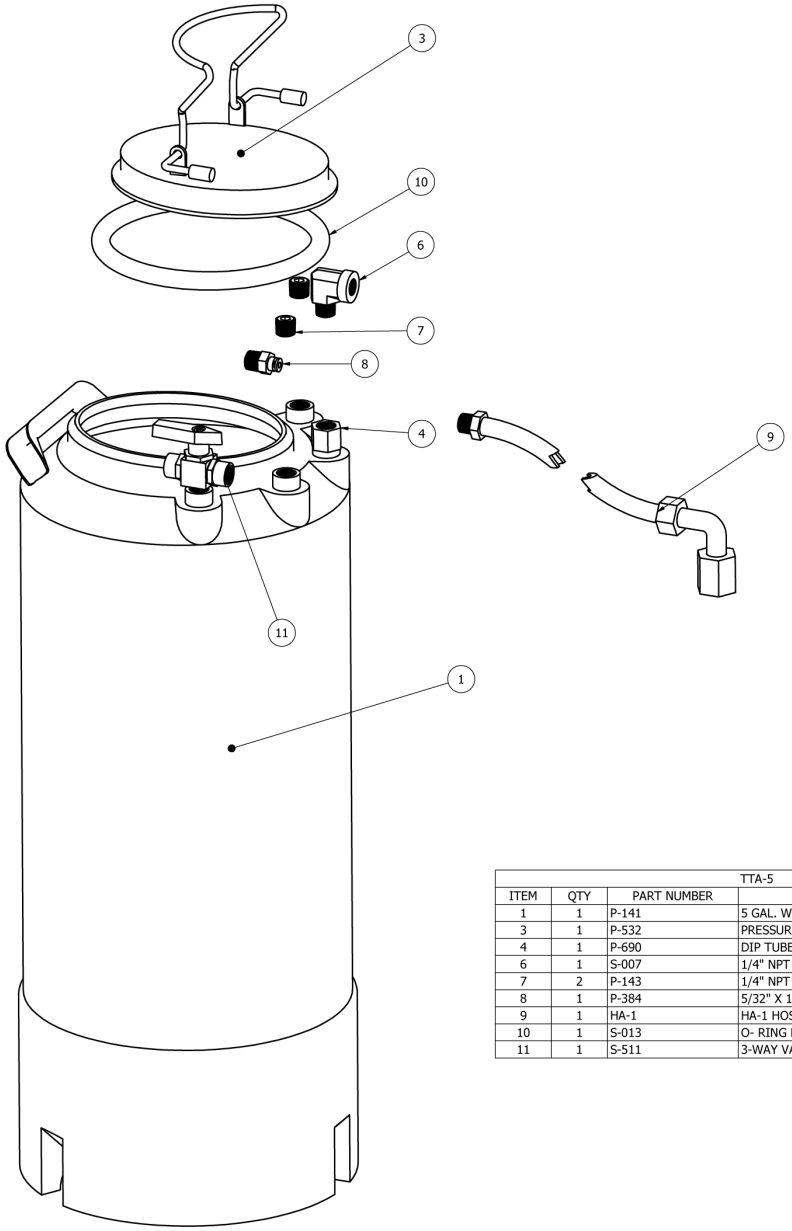
“OR” ASSY

Parts List

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	P-794	AL - VALVE - "OR" ELEMENT
2	1	S-499	CF SFT - 1/4 X 1/8 NPT UNION MALE
3	2	P-174	1/8 NPT X 5/32 UNION



PRESSURE VESSEL ASSEMBLY
TTA-5



TTA-5			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	P-141	5 GAL. WIDE MOUTH PRESSURE VESSEL
3	1	P-532	PRESSURE VESSEL LID
4	1	P-690	DIP TUBE 5 GAL. PRESSURE VESSEL
6	1	S-007	1/4" NPT ELBOW
7	2	P-143	1/4" NPT HEX PLUG
8	1	P-384	5/32" X 1/4" NPT UNION
9	1	HA-1	HA-1 HOSE ASSY
10	1	S-013	O- RING LID SEAL
11	1	S-511	3-WAY VALVE

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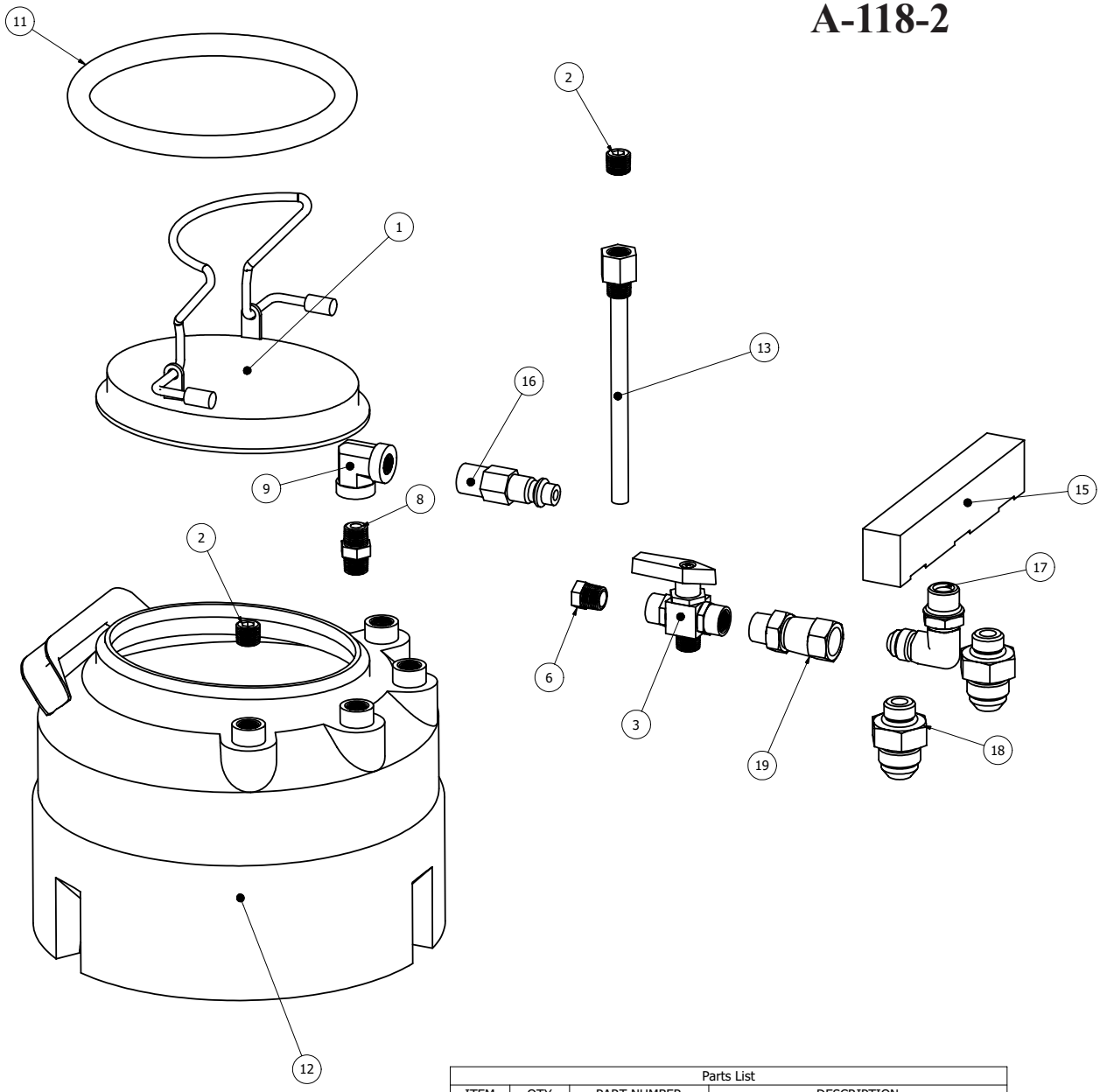
PURGE TANK ASSEMBLY
A-118-2



Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	P-532	PURGE TANK LID
2	1	P-143	1/4" NPT PIPE PLUG
3	1	S-511	1/4" NPT BALL VALVE
6	1	P-572	1/4" NPT BREATHER VALVE
8	1	P-478	1/4" NPT CHECK VALVE
9	1	P-289	1/4" NPT FEMALE ELBOW
11	1	S-013	LID SEAL
12	1	P-762	1 GAL. PURGE TANK
13	1	P-691	PURGE TANK DIP TUBE
15	1	M-540	OUTLET MANIFOLD
16	1	S-160	MALE QUICK CONNECT
17	1	P-496	ELBOW - 3/8 X 3/8 JIC
18	2	S-307	SEAL LOK - STRT THD UNION 1/2"
19	1	P-673	FTG FLD - 3/8 X 1/4 NPT SWVL U

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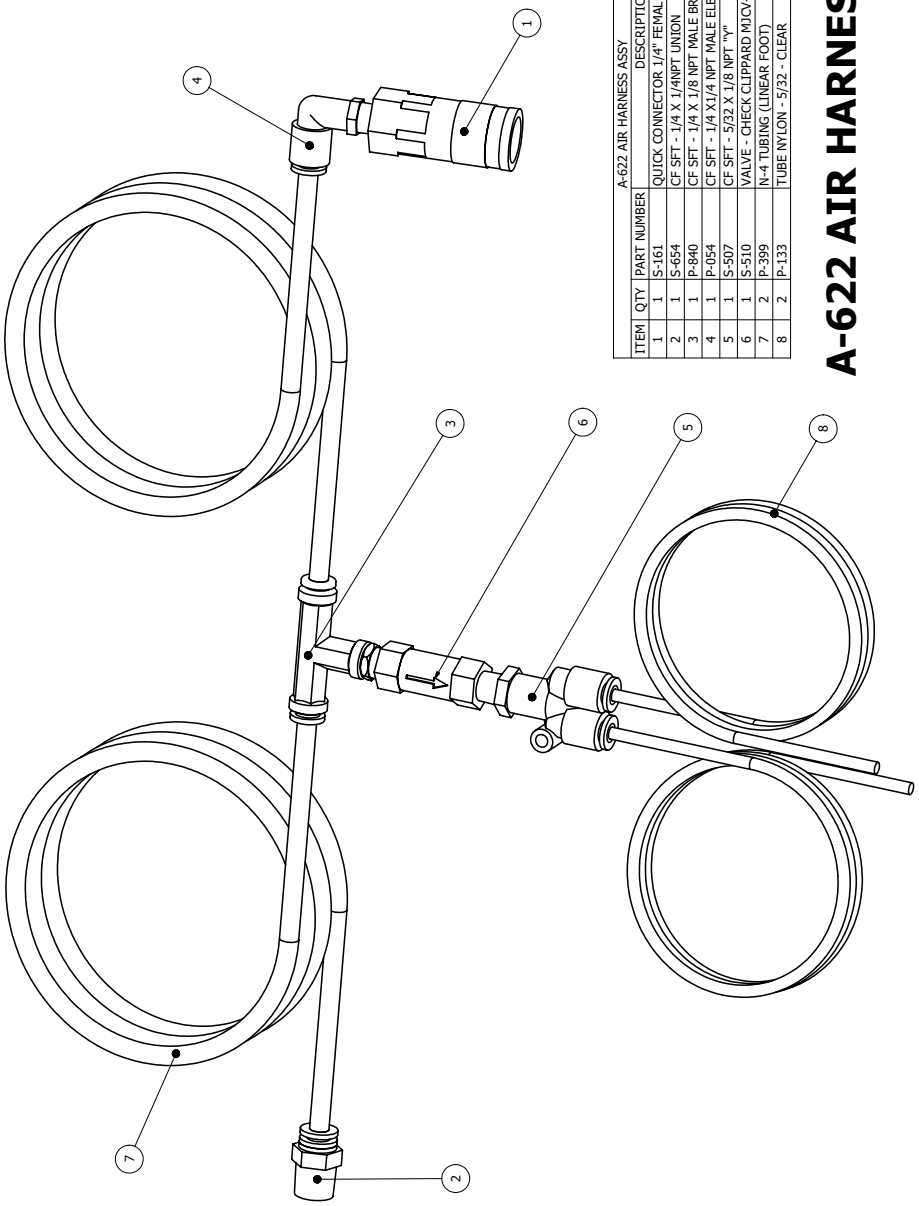
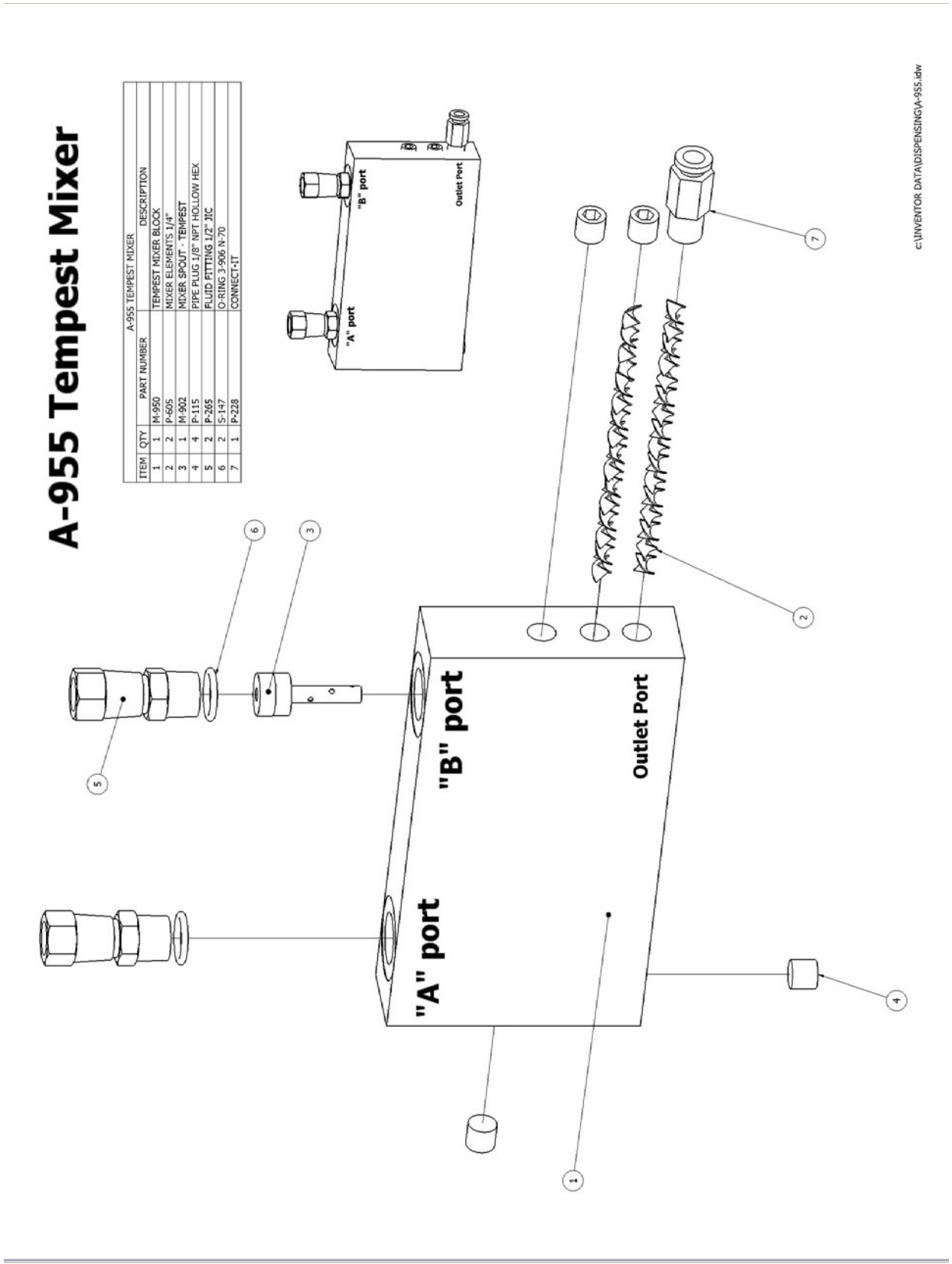
A-622 AIR HARNESS ASSY

A-622 AIR HARNESS ASSY			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	S-161	QUICK CONNECTOR 1/4" FEMALE - ACE
2	1	S-654	CF SFT - 1/4 X 1/4NPT UNION
3	1	P-840	CF SFT - 1/4 X 1/8 NPT MALE BRANCH TEE
4	1	P-054	CF SFT - 1/4 X1/4 NPT MALE ELBOW
5	1	S-507	CF SFT - 5/32 X 1/8 NPT "Y"
6	1	S-510	VALVE - CHECK CLIPPARD MJCV-1
7	2	P-399	N-4 TUBING (LINEAR FOOT)
8	2	P-133	TUBE NYLON - 5/32 - CLEAR




A-955 Tempest Mixer
A-955 TEMPEST MIXER
ITEM QTY PART NUMBER DESCRIPTION
1 1 M-950 TEMPEST MIXER BLOCK
2 2 P-605 MIXER ELEMENTS 1/4"
3 1 M-902 MIXER SPOUT - TEMPEST
4 4 P-115 PIPE PLUG 1/8" NPT HOLLOW HEX
5 2 P-265 FLUID FITTING 1/2" JIC
6 2 S-147 O-RING 3-906 N-70
7 1 P-228 CONNECT-IT
"B" port
Outlet Port
"A" port
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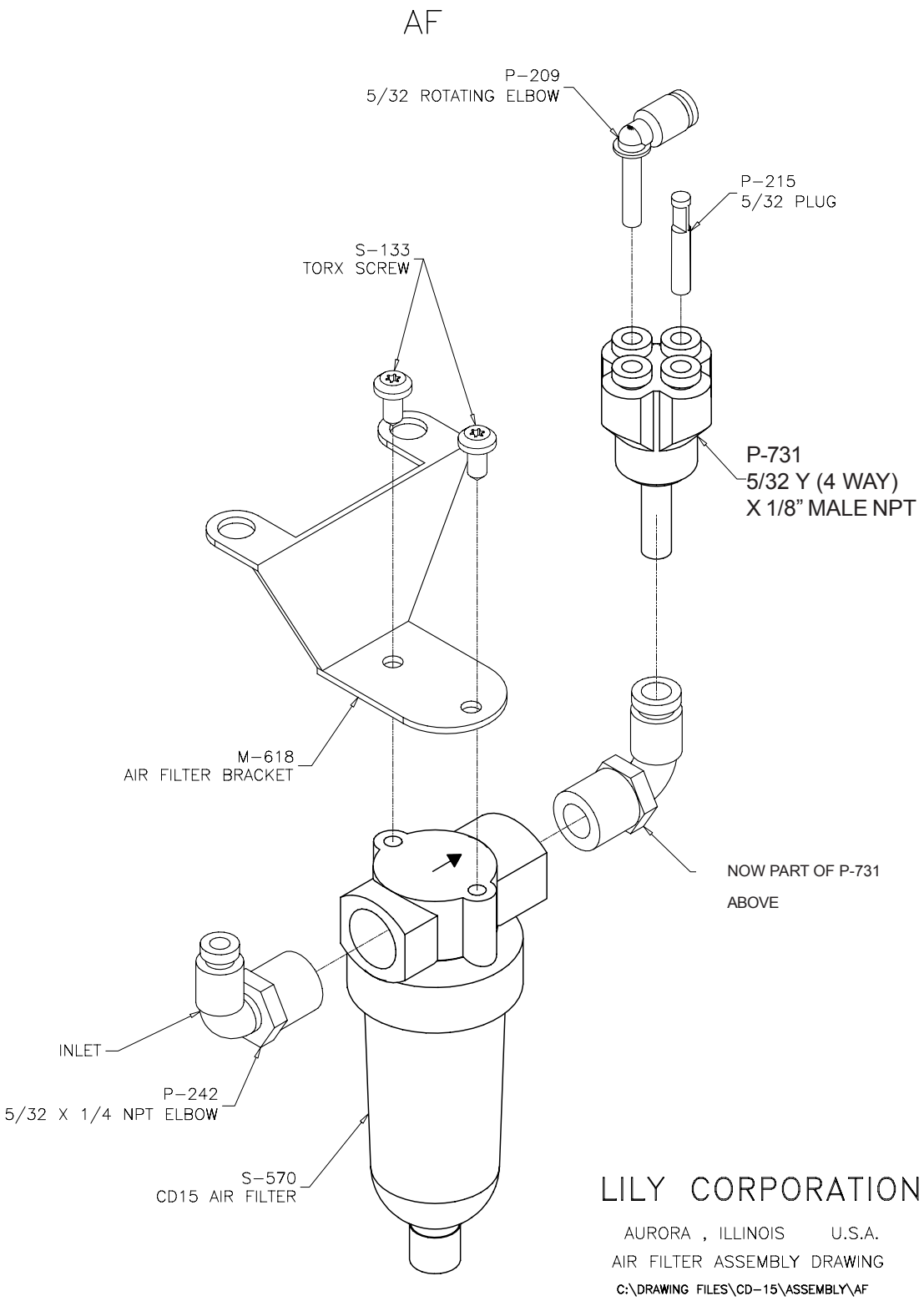
AF
P–209
5/32 ROTATING ELBOW
P–215
5/32 PLUG
S–133
TORX SCREW
P-731
5/32 Y (4 WAY)
X 1/8" MALE NPT
M–618
AIR FILTER BRACKET
NOW PART OF P-731
ABOVE
INLET
P–242
5/32 X 1/4 NPT ELBOW
S–570
CD15 AIR FILTER
LILY CORPORATION
AURORA , ILLINOIS U.S.A.
AIR FILTER ASSEMBLY DRAWING
C:\DRAWING FILES\CD–15\ASSEMBLY\AF