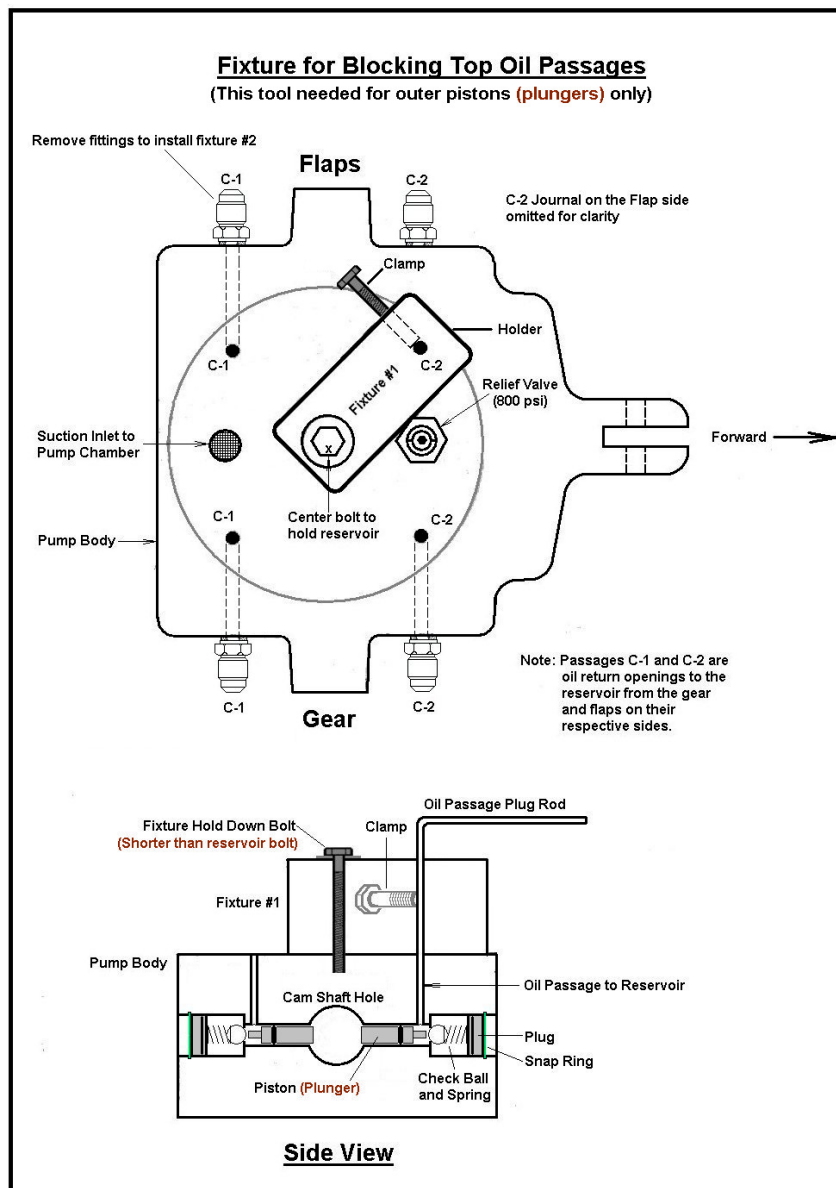


## Electrol 430 Piston (Plunger) Installation Procedures

*The information below was found in a box of papers I got with a Seabee project I purchased a while back. It seems accurate and I am working on a "tool kit" to aid in re-assembly of the pump. I have no idea who wrote this but, who ever it was went to a lot of trouble to produce it. I hope it helps and please let me know what you find out when YOU rebuild your Electrol 430 pump. Putting the plungers back in is the hardest part of the overhaul process. One note about the terminology used in this article; the author used the term "piston" for "plungers" (Electrol Co. used the term "plungers"). These are the eight small actuators that push the check-balls open to allow fluid from the flap and gear actuators to return to the reservoir. Their use in this article is interchangeable. My comments are in **RED**. All other notes are original but cleaned up a bit. Update: These tools and procedures work! (S.M. for the Seabee Club)*

### (Four) Special tools for re-assembly of Electrol 430 Hydraulic Pump:

Purpose of the tool (Fixture #1) below: To block oil passage so piston (plunger) can be installed without cutting a slice out of the small piston O-rings during installation. (I made fixture #1 from 3/4" x 3/4" aluminum stock and it seems to work fine. You can drill the Center Bolt Hole slightly larger to aid in aligning the 1/8" Oil-Passage-Plug-Rod, then tighten the center bolt. Use this tool only on the outer plungers. Plug rods are all 1/8" diameter.)



**Note:** There are a number of these 1/8" diameter rods in the kit (**At least two different ones**). They have their ends cut to various angles, but all at .107" concave radius. The variety of cuts is necessary to accommodate the different angles of intersection between check valve passage and oil passage. These rods must be fitted, as nearly as possible, with great care to fill the hole that is the oil passage. (**Rod ends should be polished to eliminate sharp edges.**)

Using a strong light shining into the cam shaft hole, use a jewelers eye-magnifying-lens to look in the outer end of the check-valve passage to determine the exact placement of the oil-passage-plug-rod so it exactly comes flush with the inside of the check valve passage. It is extremely important that this be as flush as possible. If this is not flush, the O-ring on the check-valve-piston will be sliced and a piece will shave off and the hydraulic oil will leak out the cam-shaft hole.

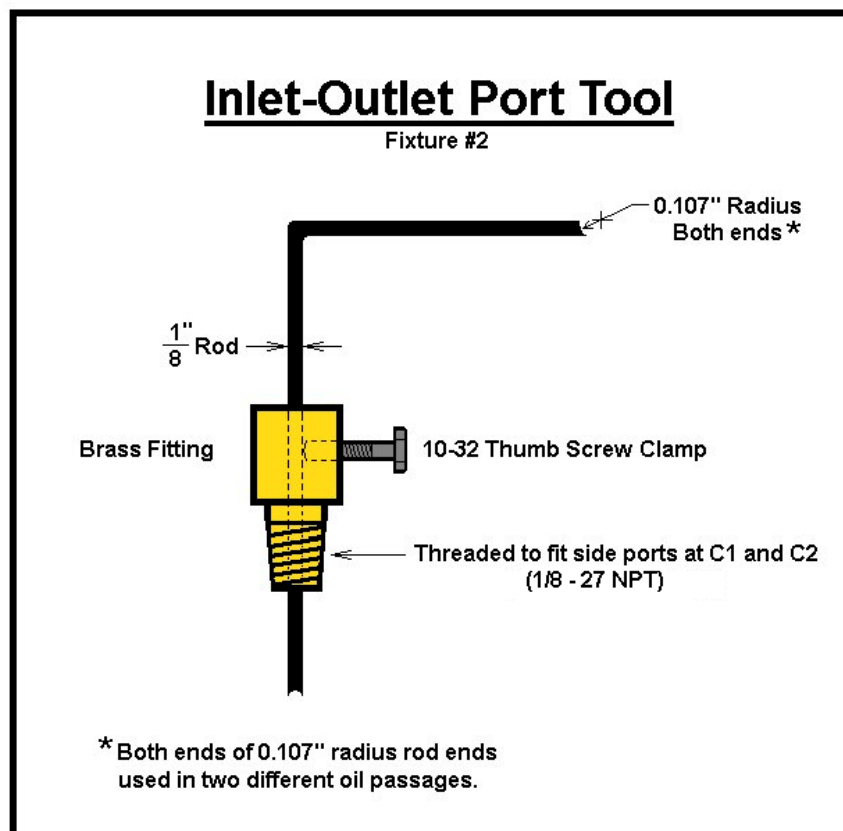
**Note:** Putting an O-ring on the cam-shaft makes for an hydraulic lock if O-rings are also on check-valve-pistons (**plungers**). You can have one or the other **but not both**.

The four holes or oil passages that are on top of the pump body (bottom of reservoir) lead down into the two outside check valve passages nearest to port and starboard sides of the pump body.

The two inside check valve passages relieve their pressure and dump pressurized oil laterally out through drilled .125" holes through the wall between the inside and outside check valve passages out the threaded ports (port and starboard) to the flaps and landing gear cylinders.

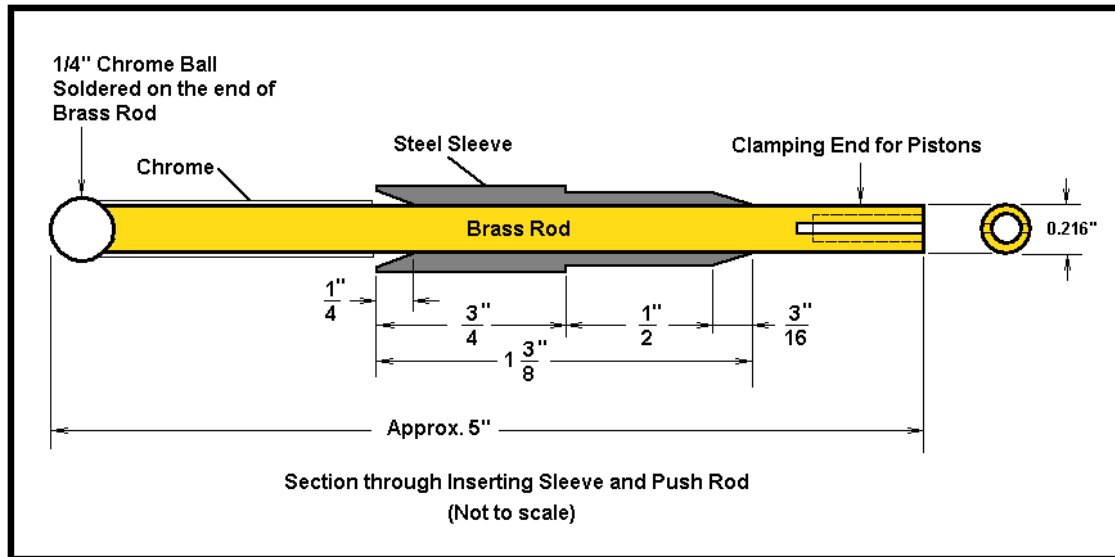
By threading a special fixture (**#2**) into the threaded ports the oil passage plug-rods can be held in place in the inner check valve passage (the passages parallel to, and nearest to, the pump-plunger-chamber). This is for the same purpose as the outer check valve passages. (**You MUST install the inner plungers first then the outer plungers. Fixture #1 above only needs to be used on the OUTER plungers. The INNER plungers need only fixture #2 below.**)

Oil Passage Blocking Tool (Fixture #2):



### Piston (Plunger) Inserting Tool:

The Piston (Plunger) Inserting Sleeve is a tube 1-3/8" long, tapered to a sharp edge on one end and funneled on the other end. Outside diameter is 0.314" and inside diameter is 0.216". The chrome ball is used for "setting" the plunger after the o-ring has cleared the sharp edged orifice. Just push in on the plunger until the chrome ball seats as a check ball would. This prevents pushing the plunger in too far.



In use, the check valve piston has a new O-ring placed on it. Then the piston's little pin is inserted into the clamping end of the push-rod. Dip piston into hydraulic oil to wet and lubricate (Some people let the o-rings sit in hydraulic fluid for a while, then install them. You can also use Vaseline or Parker O-ring Lube. Lubricate the inside of the plunger ports in the pump body as well. Use a small diameter toothpick or aluminum rod to lubricate the inside plunger chamber and inside the steel sleeve.) Then slide into funnel end of the piston-inserting-sleeve. Holding the sleeve by your fingers and thumb of one hand firmly against the check-ball seat in the check-valve-passages. Push on push-rod with the other hand until the piston and O-ring are visible but not pushed out into the cam shaft hole. Pull out the push-tube and the piston should be safely past the oil relief passage hole and now safe from being cut.

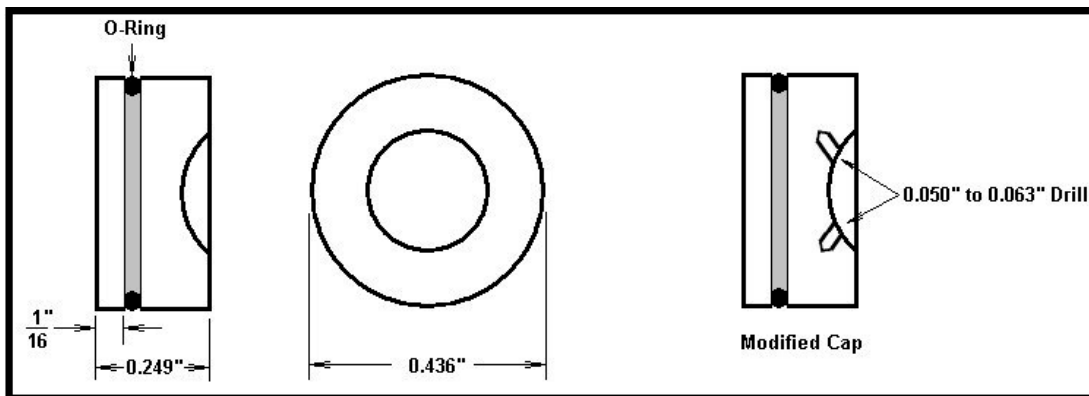
Do the same with all four pistons on each side of the pump before installing cams. The cams can not be installed if the springs are in pushing on the balls and pistons. After all the pistons are in place, install the cams first then the check balls, springs, caps and clips in that order. (Don't forget the Plug Covers! These are shown on page 5 below. There should be washers over the plug circlips to hold them in place, then install the covers. Holes are drilled VERY CAREFULLY into the pump body and threaded using a bottoming tap; one that is flat on the end. Do this before you reassemble the pump.)

**Caution:** After installing each piston, carefully inspect for any sign of O-ring material that may have been cut off. Even the slightest debris is evidence of a cut O-ring so you will have to install a new O-ring on that piston and reinstall it.

### Oil Passage End Plugs:

End plugs are barrel shaped aluminum alloy plugs for the ends of the check-valve passages and the two oil galleries. They are 0.436" in diameter and 0.249" thick with a slight concave surface on the outer end. The other end is flat faced. From the flat end, 1/16" inboard is a groove cut for a 1/16" x 7/16" O-ring groove (P/N: MS28775-011). This groove is .082" wide and 3/64" deep. It is not always possible to remove the plugs from the pump body by pressure of oil or air. I have devised an easy method of removal and insertion of these plugs without pressure. The drawing below shows the hole-drilling layout.

(Some pumps I have seen have 1/8"-27 NPT threaded plugs, similar to the hull plugs, instead of the Plug/Snap ring combination. These can be VERY tough to get out. Use caution.)



**Plug removal tool:** (Before trying the procedure below, try using air and/or hydraulic fluid pressure first) Obtain snap ring pliers similar to the drawing below (Waides Truarc Plier No. 2) Carefully bend the tips outward slightly to hook solidly into the drilled holes in the plugs. This works very well. Don't drill the holes too deep or you will cut into the O-ring groove and cause a leak. (I found these exact pliers on eBay for around \$3)



**Editor's Note:** Although the above is very good information, one thing missing was the condition of the check-ball seats inside the pump body. Any corrosion or deformity under the check ball will cause a leak. These check valve seats can be resurfaced by a reputable machine shop. Don't let them take off too much material however. The rest of the O-rings in the pump are fairly simple to change. Also, a screen in the suction port just aft of the center reservoir bolt hole is a good idea (see below). I stole my wife's Tea Bag strainer for the fine mesh screen. This should be checked each annual inspection for blockage. A protective cover over the screen will keep it from popping out under certain conditions; it obviously must have a hole (~1/4") in it for the fluid to pass through. A photo of mine is shown below. Refill the reservoir with new fluid. Never use hydraulic fluid that has been in the system before! Always use NEW fluid.

