

LARGE SCALE MODEL RAILWAY ENGINEERING

Some Thoughts on building a pump

With this issue I have completed all of the drawings for the steam pump based on the Van Brocklin design. I thought that a few notes of explanation and some suggestions would be in order at this time.

First let it be said that extra care must be taken to assure that the runout of all of the various parts of the cylinder assemblies are not excessive. There are many parts that the piston rods must pass through with relatively tight clearances. The pistons and rods must slide freely if the pump is to work. If the rods stick on hangup with light hand pressure it will only get worse as the pump gets hot. Also the two spacers between the cylinders must be exactly the same length so the cylinders do not cock.

Another area that needs some attention is the Oring fits. It is critical that there is just enough screeze on the rings to prevent them from leaking but not enough to cause excessive friction. My recommendation for the Oring seats is to first ream the .187 rod bore and then use a .312 counterbore with a tight fitting .187 pilot to make the counterbores for the Oring. The edges of the counterbore must be honed down slightly with a honing stone to reduce the resultant hole to the required .308/.311 diameter. Use a scrap of brass to test the hole diameter as the tool diameter is reduced. I use counterbores for the check ball seats as you get a good square flat seat for the ball to sit on. It is usually not even necessary to seat the ball with a light tap.

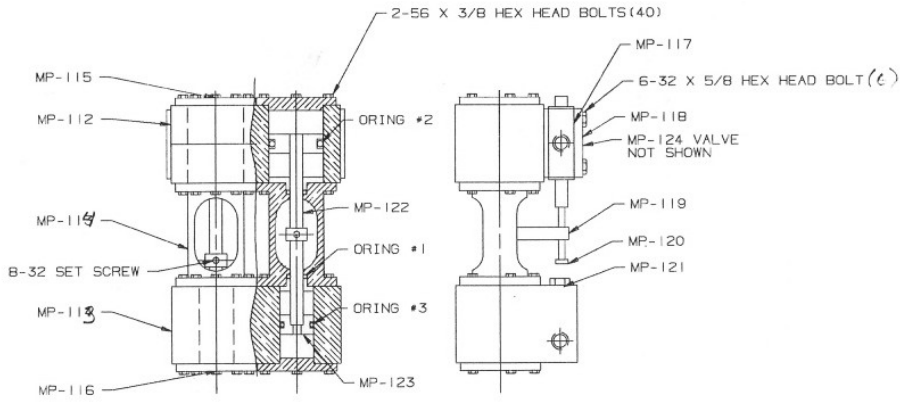
All gaskets should be 1/64 inch thick and be made from a premium gasket material. There is not a lot of material around the cylinder port and bolt holes and paper type gaskets tend to weaken and blow out.

Valve setting is quite simple. When one piston is at the top of its cylinder, its valve should open the bottom port and when the piston is at the bottom of the cylinder the top port should be open an like amount. Adjust the valve lever up and down on the piston rod so that the valve opening is the same. The valve rod set screw should be tightened on the flat that was machined on the piston rod. The valve itself should be able to lift off the steam cylinder to let condensed steam escape during startup.

A displacement lubricator is required in the steam line to the pump to supply lubrication to the steam end. Water lubricates the other end.

The check valves on the water cylinder should be free to lift .020 to .030 to allow free flow of water. If all is well the pump should deliver about .2 gal/min. and run on 15psi of air pressure.

Some addition ideas on fixturing some of the pump parts were discussed in an article by Steve Vitkovits in the March 1986 issue of Live Steam. Thanks to Dave Black for bringing this article to my attention. Good luck on this project.



ORING #1 5/16 X 3/16 VITON (8 REQD)
 ORING #2 13/16 X 5/8 VITON (2 REQD)
 ORING #3 1/2 X 3/8 VITON (2 REQD)

CHECK VALVES:
 1/4 STAINLESS (4)
 3/16 STAINLESS (4)

1/64 GASKETS ON ALL JOINTS
 SEAL ALL PLUGS AND CAPS

DO NOT SCALE DRAWING
 TOLERANCES
 UNLESS OTHERWISE SPECIFIED:
 ANGLES .1"
 DECIMALS .0005

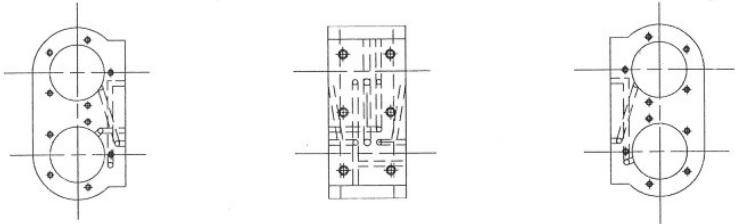
MATERIAL:

PIKE LAKE & EASTERN
 Hartford Shops

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DD	DATE	DRG	NO.
			1-100

SYM	ECO	REVISION	BY	DATE	TITLE	NO.
					PUMP ASSEMBLY	MP-111



DO NOT SCALE DRAWING
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 ANGLES .1°
 DECIMALS: (2 PLACES) ±.005

MATERIAL: BRASS

PIKE LAKE & EASTERN
 Herford Shops

						DATE	FILE	SCALE
						10-29-96		FULL
								1-100
						TITLE		NO.
SYM	ECO	REVISION	BY	DATE		PUMP STEAM CYLINDER		MP-112

#30 drill .56 deep 2 holes
this side 2 holes opposite
notch ends to bore

2-56 tap 1/4 deep
5 holes equally spaced
on 1.000 b.c. 4 groups
orientation important

1/2 cham and
polish to 32rms

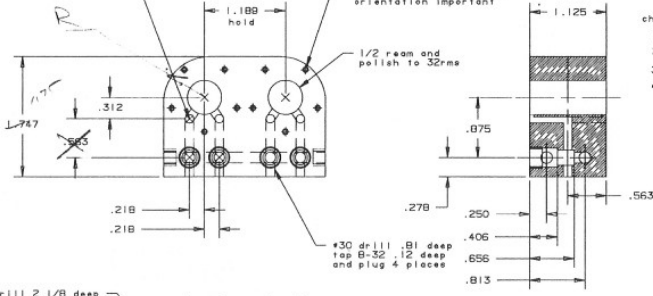
#30 drill .81 deep
top 8-32 .12 deep
and plug 4 places

#18 drill 2 1/8 deep
top end 1/4 mtp
2 places

bore must be square with faces

check valve machining 4 places:

- 1) #25 drill .813 deep, cham 5/32
- 2) 7/32 counterbore (5/32 pilot) .656 deep
- 3) 9/32 counterbore (7/32 pilot) .406 deep
- 4) top 5/16-32 3/16 deep



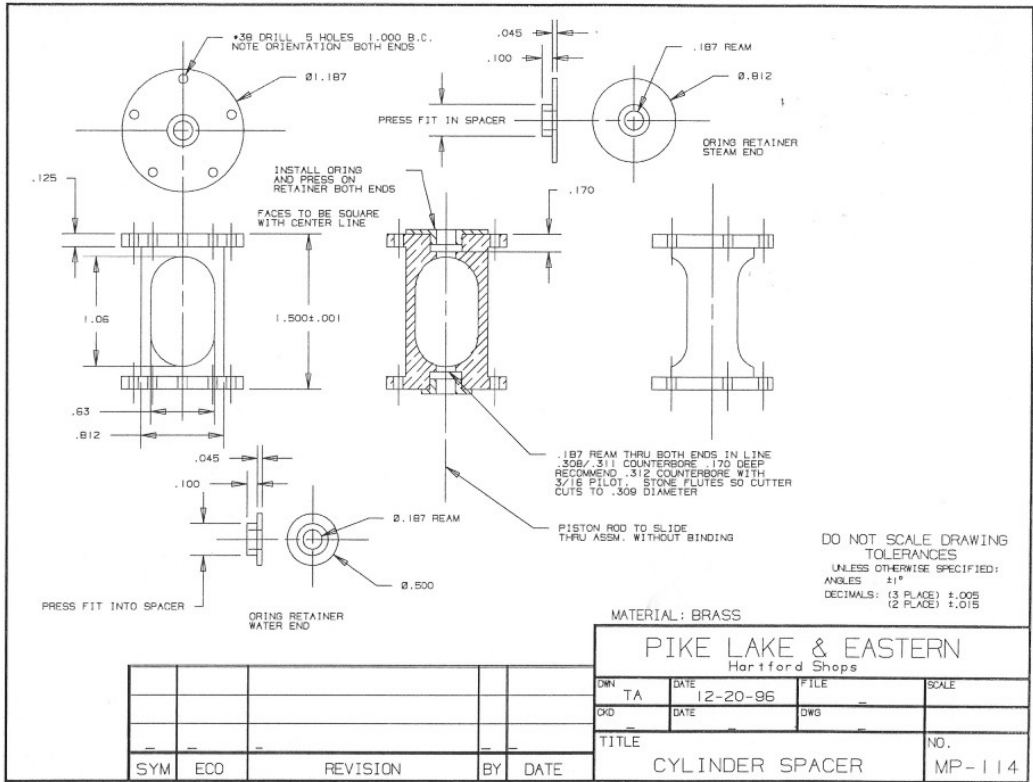
Handwritten note: 11-20-96

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UNLESS OTHERWISE SPECIFIED:
HOLE: .015
DIMENSIONS: 12 PLACES ±.005

MATERIAL: BRASS

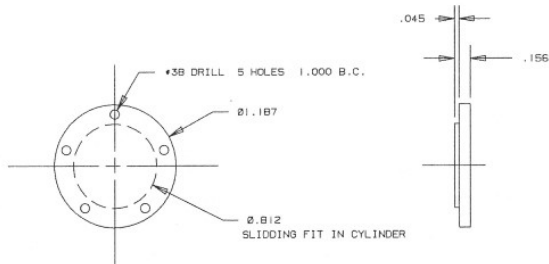
PIKE LAKE & EASTERN
Hartford Shops

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TITLE					PUMP, WATER CYLINDER		NO.	
							MP-113	



SYM	ECO	REVISION	BY	DATE

PIKE LAKE & EASTERN Hartford Shops			
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OKD		DATE	DWG
TITLE			NO.
CYLINDER SPACER			MP-114

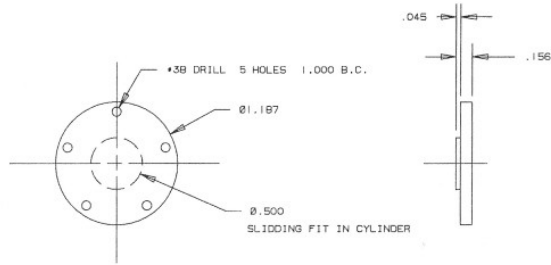


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TOLERANCES
UNLESS OTHERWISE SPECIFIED:
ANGLES $\pm 1^\circ$
DECIMALS: (3 PLACE) $\pm .005$
(2 PLACE) $\pm .015$

MATERIAL: BRASS

PIKE LAKE & EASTERN
Hartford Shops

					DWN	TA	DATE	12-20-96	FILE	SCALE
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					TITLE					NO.
SYM	ECO		REVISION	BY	DATE	CYLINDER HEAD, STEAM				MP-115



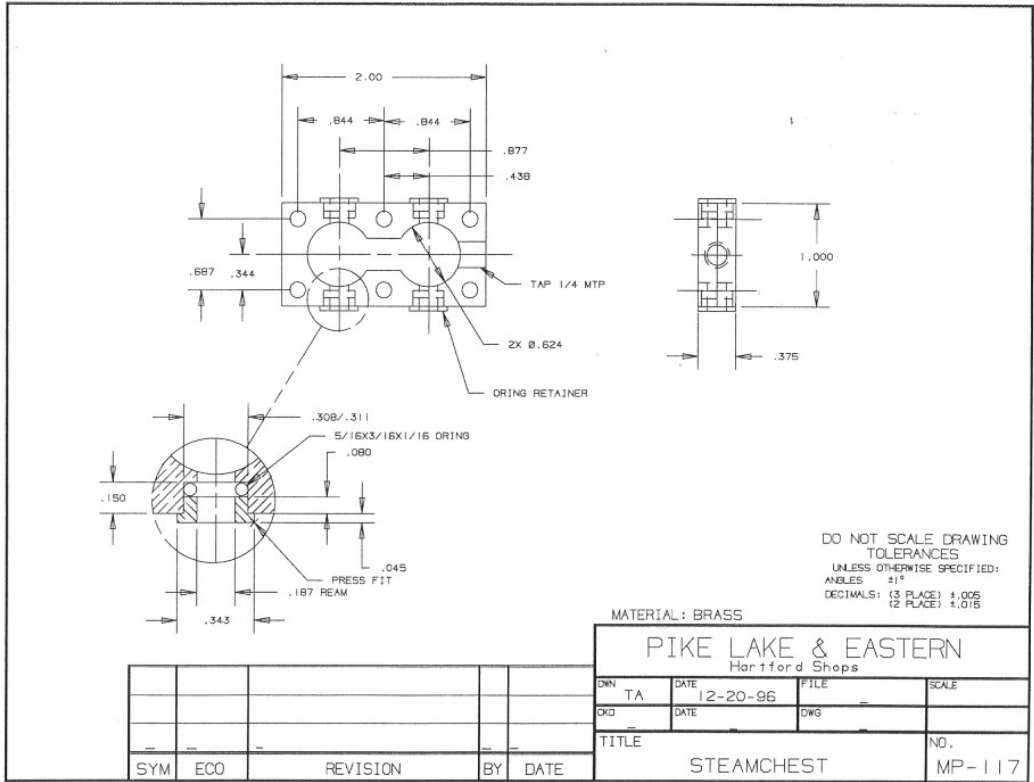
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 TOLERANCES
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 ANGLES ±1°
 DECIMALS: (3 PLACE) ±.005
 (2 PLACE) ±.015

MATERIAL: BRASS

PIKE LAKE & EASTERN
 Hartford Shops

SYM	ECO	REVISION	BY	DATE	

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CYLINDER HEAD, WATER					MP-116

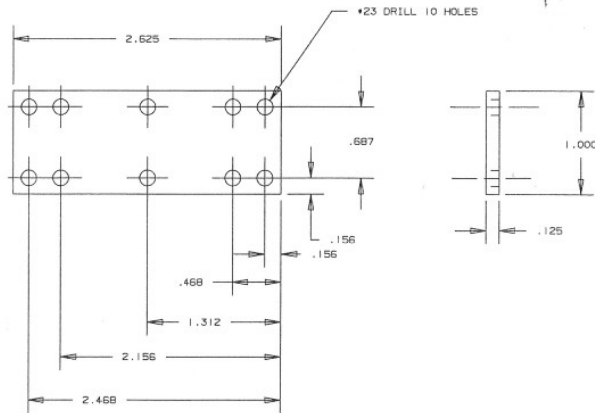


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 ANGLES ±1°
 DECIMALS: (3 PLACE) ±.005
 (2 PLACE) ±.015

MATERIAL: BRASS

PIKE LAKE & EASTERN Hartford Shops			
DRN	TA	DATE	12-20-96
CHK		DATE	
TITLE			NO.
STEAMCHEST			MP-117

SYM	ECO	REVISION	BY	DATE



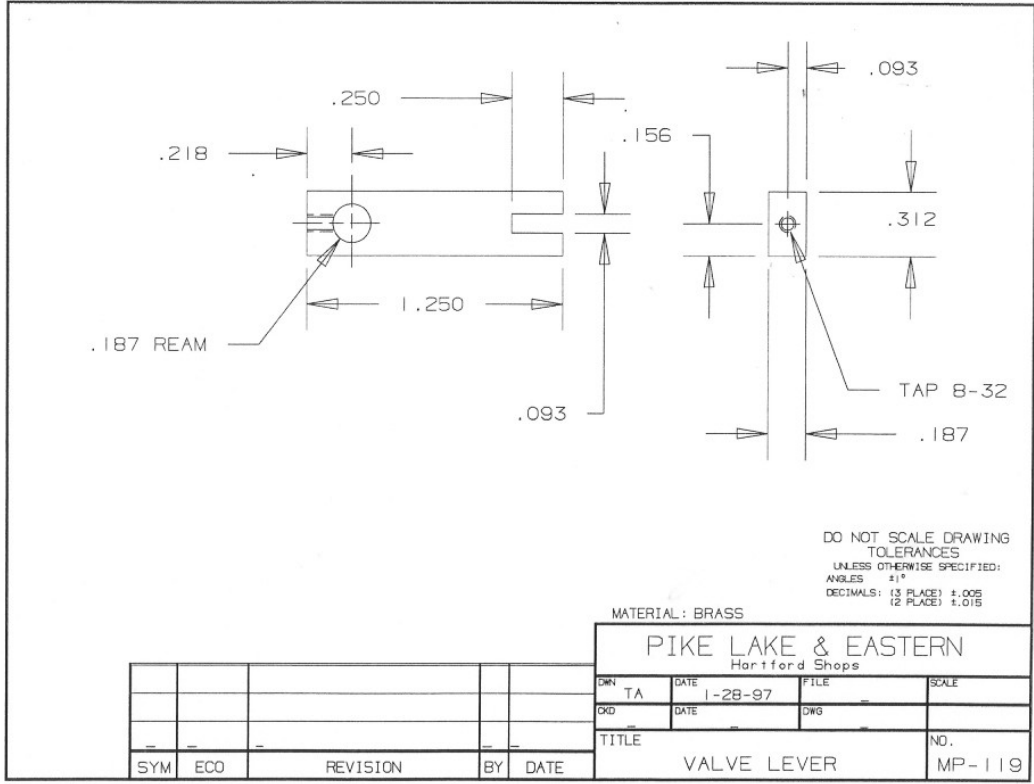
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 (2 PLACE) ±.015

MATERIAL: BRASS

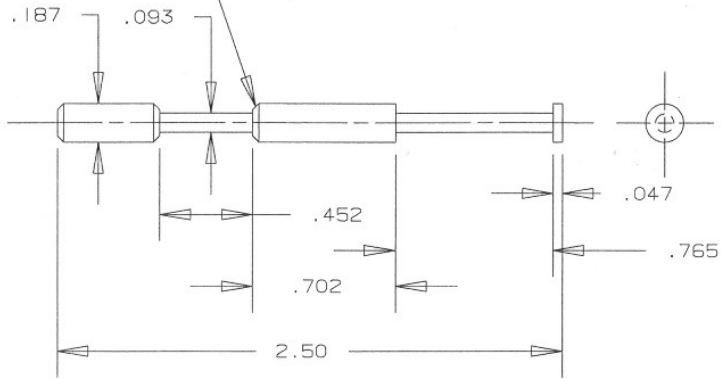
PIKE LAKE & EASTERN
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SYM	ECO	REVISION	BY	DATE

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TITLE					NO.
STEAMCHEST COVER					MP-118



.03 X 45° CHF.
3 PLACES

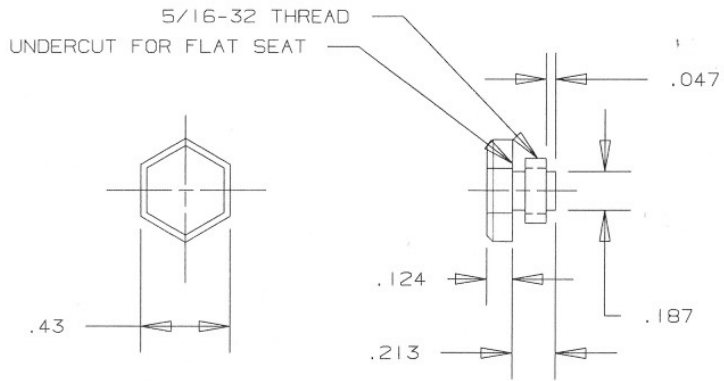


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DECIMALS: (3 PLACE) ±.005
(2 PLACE) ±.015

MATERIAL: STAINLESS STEEL

PIKE LAKE & EASTERN
Hartford Shops

SYMBOL	ECO	REVISION	BY	DATE	DWN	TA	DATE	FILE	SCALE
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TITLE									NO.
VALVE ROD									MP-120

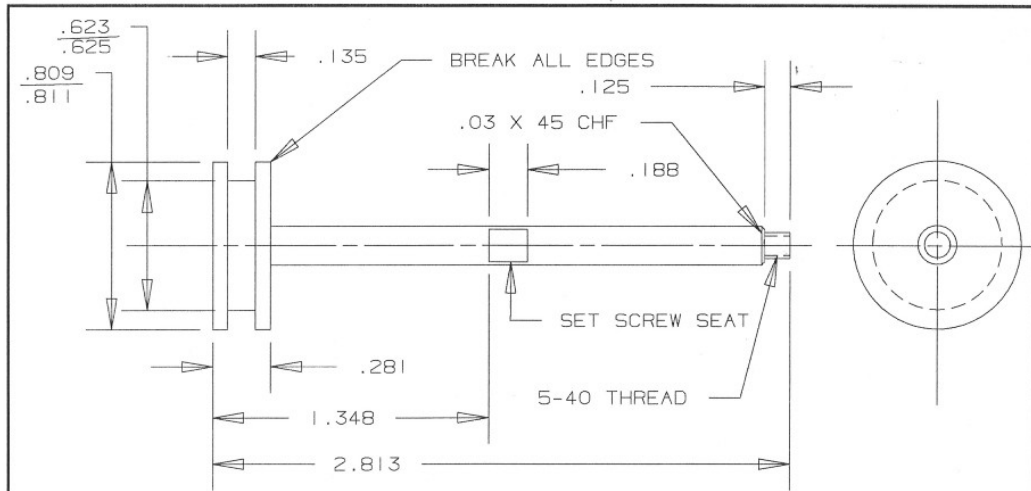


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 ANGLES ±1°
 DECIMALS: (3 PLACE) ±.005
 (2 PLACE) ±.015

MATERIAL: 7/16 HEX BRASS

PIKE LAKE & EASTERN
 Hartford Shops

					OWN	TA	DATE	1-28-97	FILE	SCALE
					CHKD		DATE		DWG	
					TITLE					NO.
					VALVE CAP, WATER CYL					MP-121
					SYM	ECO	REVISION	BY	DATE	



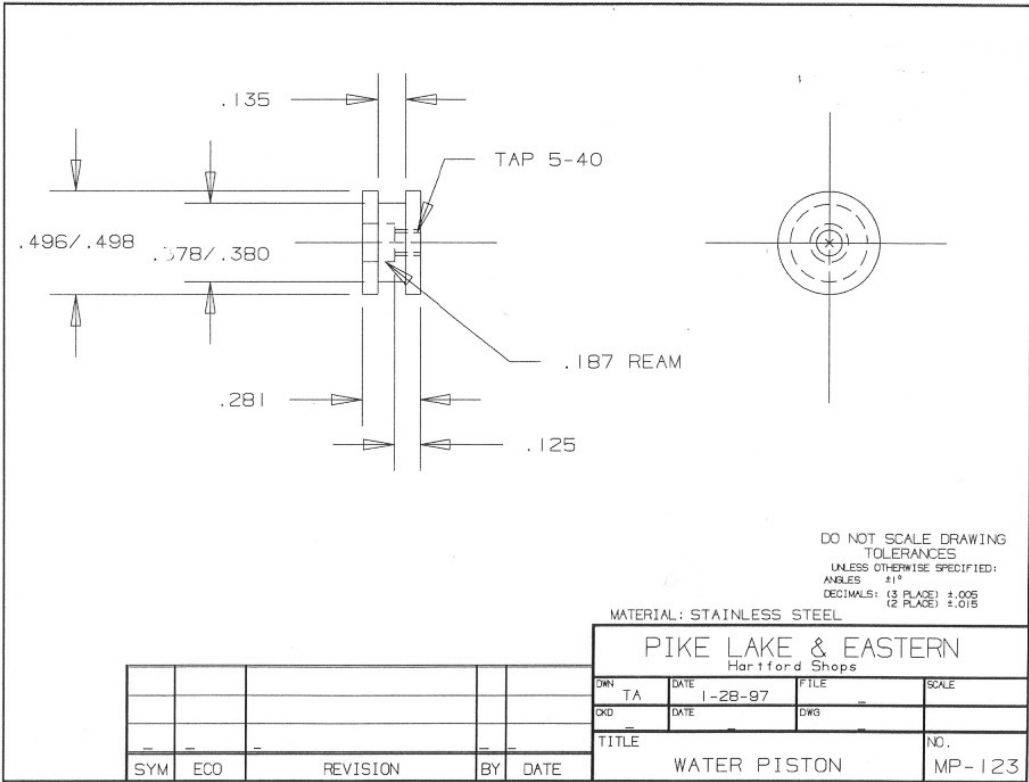
DO NOT SCALE DRAWING
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 ANGLES ±1°
 DECIMALS: (3 PLACE) ±.005
 (2 PLACE) ±.015

MATERIAL: STAINLESS STEEL

PIKE LAKE & EASTERN
 Hartford Shops

SYM	ECO	REVISION	BY	DATE

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CHK	DATE	DWG	NO.	
TITLE				NO.
PISTON AND ROD				MP-122

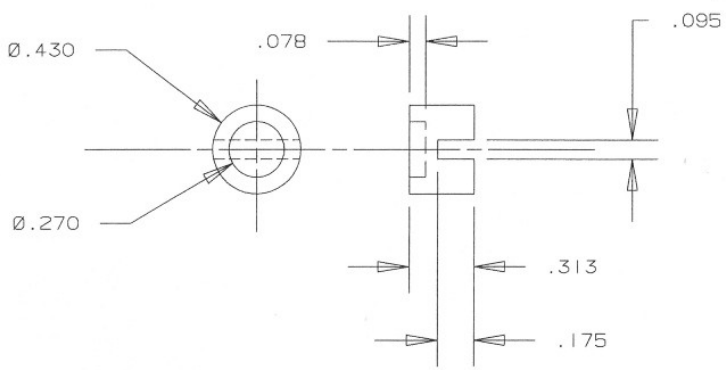


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 TOLERANCES
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 ANGLES ±1°
 DECIMALS: (3 PLACE) ±.005
 (2 PLACE) ±.015

MATERIAL: STAINLESS STEEL

PIKE LAKE & EASTERN Hartford Shops			
OWN	TA	DATE	SCALE
		1-28-97	
OKD		DATE	DWG
TITLE			NO.
WATER PISTON			MP-123

SYM	ECO	REVISION	BY	DATE	



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 ANGLES .1°
 DECIMALS: (3 PLACE) ±.005
 (2 PLACE) ±.015

MATERIAL: STAINLESS STEEL

PIKE LAKE & EASTERN
 Hartford Shops

SYM	ECO	REVISION	BY	DATE
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-	-	-	-	-
-	-	-	-	-

DWN	TA	DATE	FILE	SCALE
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CHKD	DATE	DWG		
TITLE				NO.
VALVE				MP-124