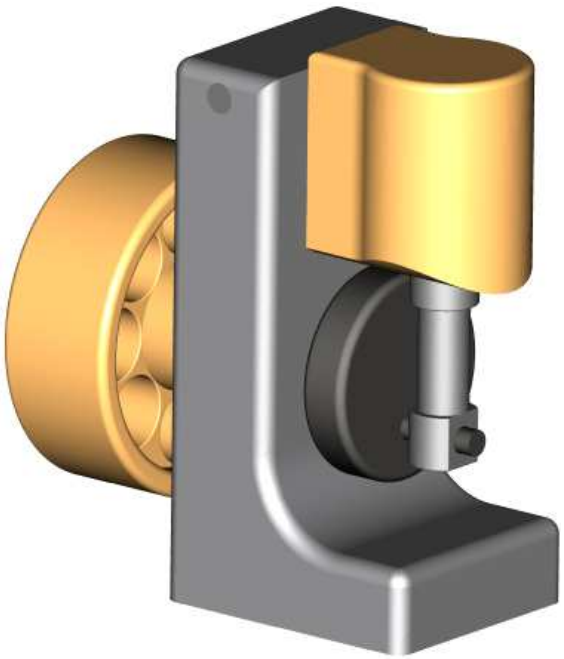
CAUTION: ENGINE HAS NOT BEEN BUILT – THERE MAY BE MISTAKES



My intention was to have an engine that the intake and exhaust tubes were not visible. My plan was to make a small wooden stand and have the air/steam come in through the back of the box and up to the bottom of the engine. Below are just a few of my notes to explain what I tried to do with this design.

MAIN FRAME

All of the 2.5 x 2.5 x .375 aluminum that I have seen has had the large radius be approx .250. I do not think that this differs much, but I believe that I have designed the frame to compensate for this. If this radius is less, you will have to compensate for the 10-32 hole. (Please see the MAIN FRAME drawing for details on this). The 10-32 hole is for mounting the frame to the stand. Make sure the 4-40 screw has a little play through the CYLINDER BUSHING and MAIN FRAMW. If not, and hole is not a "perfect" 90 degree angle to the frame, the screw may keep the cylinder from contacting the frame fully, Be sure to polish the area that the cylinder contacts the frame.

CRANKSHAFT

Location of cutout on shaft is not critical. My intention was to use this flat to adjust the flywheel for endplay for the crankshaft.

CYLINDER BUSHING

My intention is to have the bushing to be a (light) press fit in the MAIN FRAME, and have a nice free fit for the cylinder. The builder could make this bushing different diameters if he wishes.

CYLINDER

Polish the face that goes against the MAIN FRAME to keep friction low. The radius on the bottom of the cylinder is to clear the crankshaft as it rotates, otherwise the cylinder will hit the crankshaft as it oscillates back and forth. Care should be taken when you drill the 4-40 hole as it comes very close to the cylinder bore. The depth show should be considered the maximum.

FLYWHEEL

The 8, .218 diameter holes are strictly cosmetic. The outside diameter should be kept as shown as anything larger would make spring pressure adjustment more difficult.

TUBE FITTINGS

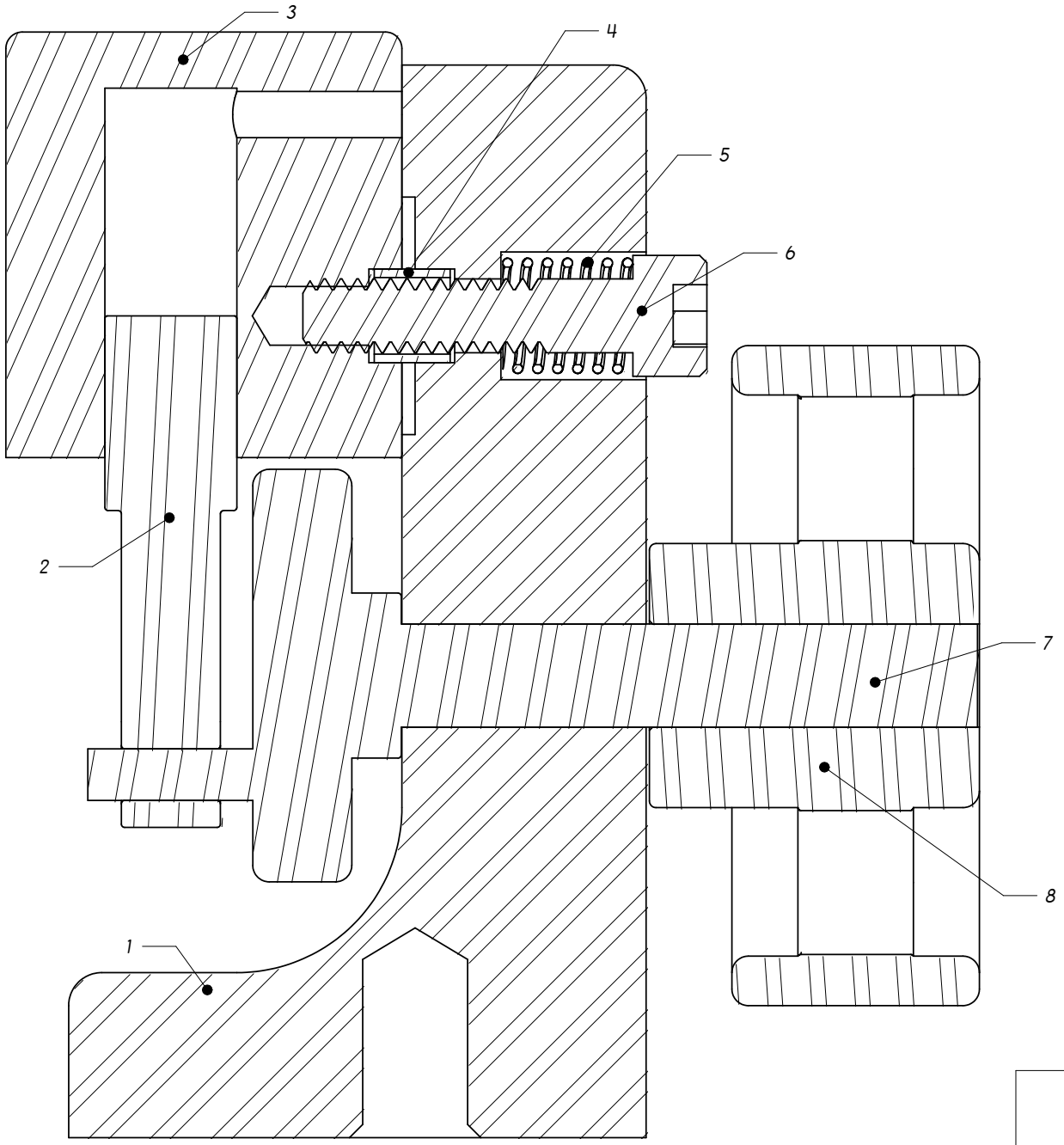
Be sure to taper slightly the ends that are to be pressed into the MAIN FRAME. I have pressed thin walled pieces like this into aluminum with no problem. The guide can be out of any scrap material that you have on hand.

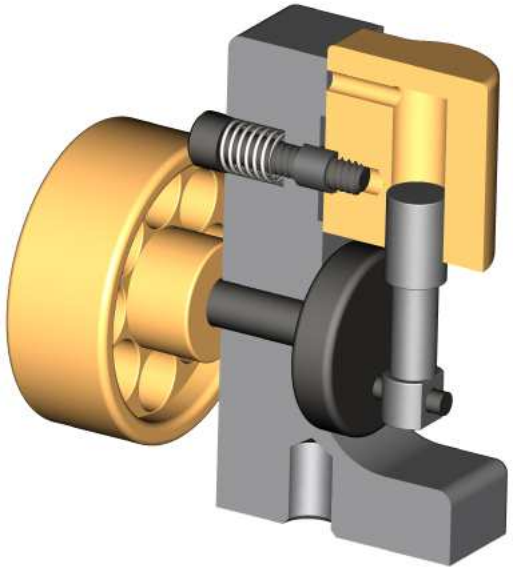
AIR PASSAGE PLUG

The head diameter and thickness does not matter as this is just to press the part into the frame. This is to be filed or machined off after being pressed in. Be sure to undercut as shown to make sure the .063 length will be pressed in full depth.

Ernie Daniel

REVISION		
REV	DESCRIPTION	DATE





1. MAIN FRAME
2. PISTON
3. CYLINDER
4. CYLINDER BUSHING
5. SPRING - Ø.177 x .25
6. 4-40 x .500 SHCS
7. CRANKSHAFT
8. FLYWHEEL
9. 2-56 x .125 FP SS (not shown)
10. TUBE FITTINGS (not shown)
11. AIR PASSAGE PLUG (not shown)

NOTE:

1. SOME LINES OMITTED FOR CLARITY

UNLESS OTHERWISE STATED

.xx ± .010

.xxx ± .003

.xxxx ± .001

ANGULAR ± 0° 30'

BREAK ALL EDGES

DO NOT SCALE DRAWING

125

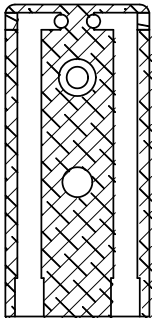
63

SP1 - WOBBLER

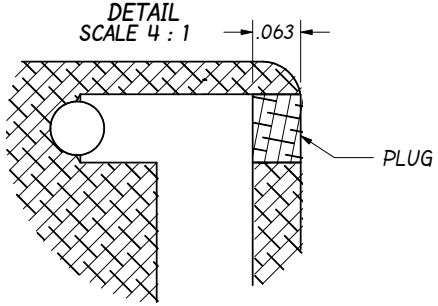
SECTION VIEW

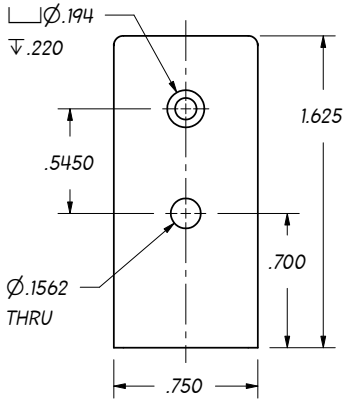
MATERIAL	SCALE 4 : 1	REV	DRAWN BY E. DANIEL

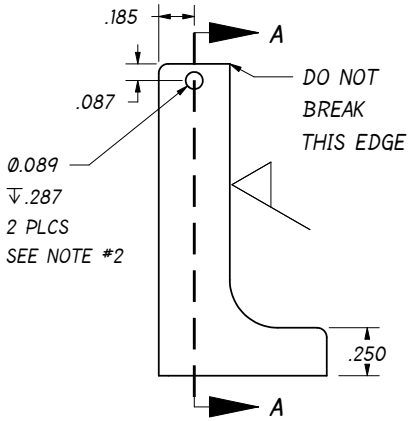
REVISION		
REV	DESCRIPTION	DATE

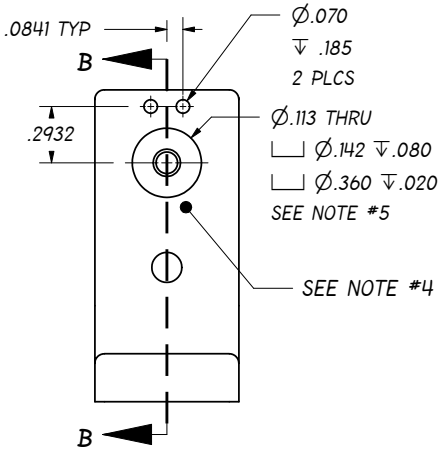


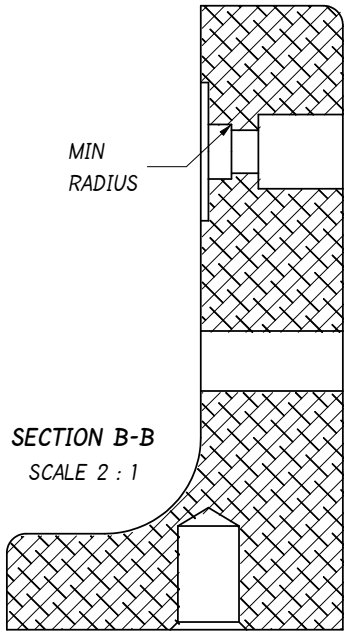
SECTION A-A



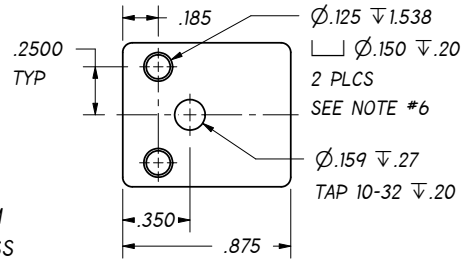








SECTION B-B
SCALE 2 : 1



NOTE:

1. SOME LINES OMITTED FOR CLARITY
2. INSERT PLUG AFTER DRILLING - SEE DETAIL
3. MATERIAL - 2.5 x 2.5 x .375, 6061 ANGLE ALUMINUM
4. MINIMUM CLEANUP TO INSURE .365 -.375 THICKNESS POLISH AREA WHERE CYLINDER CONTACTS FRAME SURFACE
5. THE .142 DIA. DIMENSION TO BE A LIGHT PRESS FIT FOR THE CYLINDER BUSHING
6. THE .150 DIA DIMENSION TO BE A PRESS FIT FOR THE INTAKE AND EXHAUST TUBES

UNLESS OTHERWISE STATED
.xx ± .010
.xxx ± .003
.xxxx ± .001
ANGULAR ± 0° 30'
BREAK ALL EDGES
DO NOT SCALE DRAWING

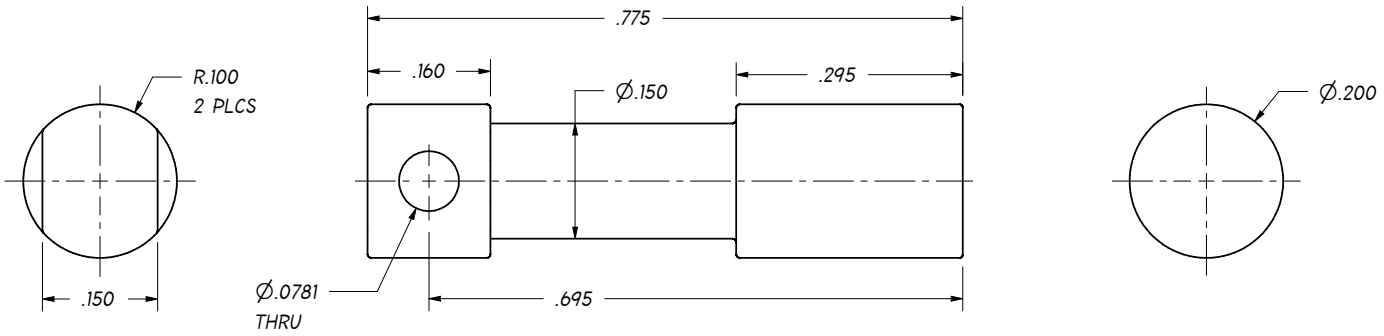
125
63

SP1 - WOBBLER

MAIN FRAME

MATERIAL	SCALE	REV	DRAWN BY
SEE NOTES	1 : 1		E. DANIEL

REVISION		
REV	DESCRIPTION	DATE



NOTE:

1. SOME LINES OMITTED FOR CLARITY
2. MINIMUM EDGE BREAK ALL CORNERS
3. LAP PISTON TO FIT CYLINDER BORE

UNLESS OTHERWISE STATED

.xx ± .010
.xxx ± .003
.xxxx ± .001

125
63

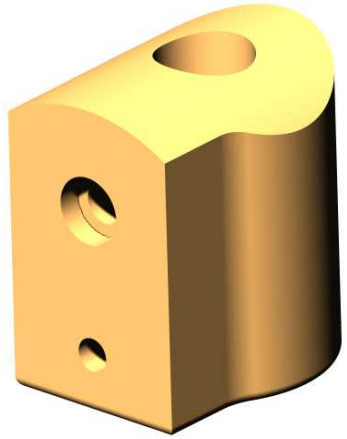
ANGULAR ± 0° 30'
BREAK ALL EDGES
DO NOT SCALE DRAWING

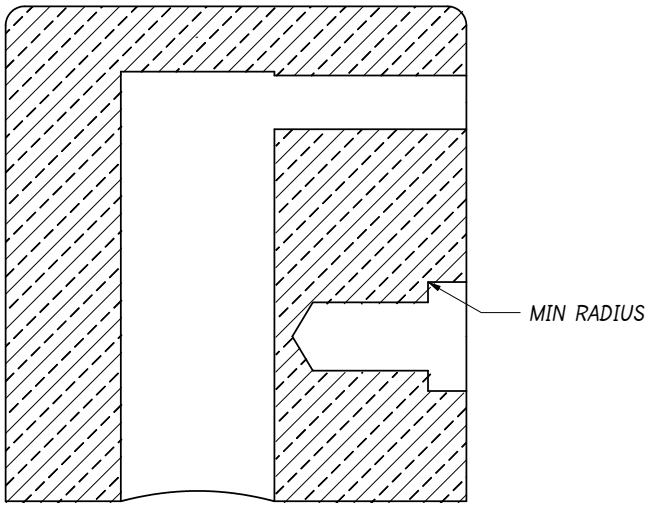
SP1 - WOBBLER

PISTON

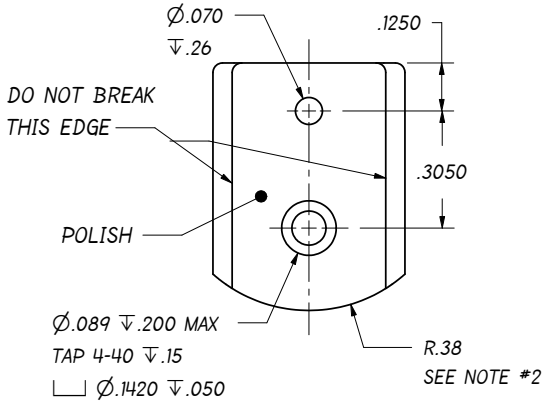
MATERIAL	SCALE	REV	DRAWN BY
ALUMINUM	4 : 1		E. DANIEL

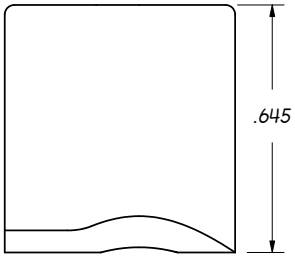
REVISION		
REV	DESCRIPTION	DATE

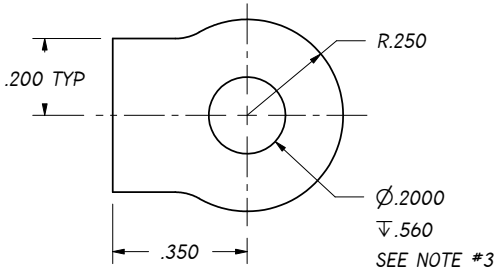




SCALE 4 : 1







NOTE:

1. SOME LINES OMITTED FOR CLARITY
2. RADIUS REQUIRED TO CLEAR .625 DIAMETER ON CRANKSHAFT
3. LAP BORE TO FIT PISTON

UNLESS OTHERWISE STATED

.xx ± .010
.xxx ± .003
.xxxx ± .001
ANGULAR ± 0° 30'
BREAK ALL EDGES
DO NOT SCALE DRAWING

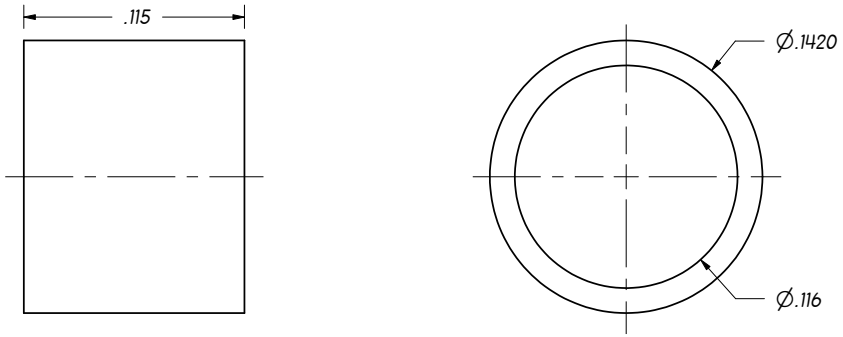
125
63

SP1 - WOBBLER

CYLINDER

MATERIAL	SCALE	REV	DRAWN BY
BRASS	2 : 1		E. DANIEL

REVISION		
REV	DESCRIPTION	DATE



NOTE:

1. SOME LINES OMITTED FOR CLARITY

UNLESS OTHERWISE STATED

.xx ± .010

.xxx ± .003

.xxxx ± .001

ANGULAR ± 0° 30'

BREAK ALL EDGES

DO NOT SCALE DRAWING

125

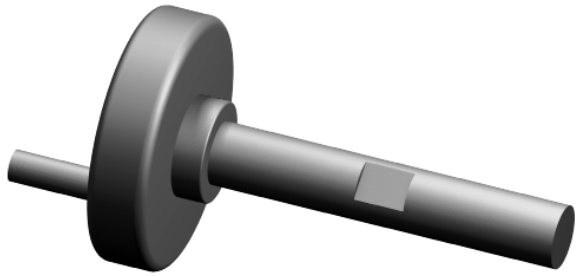
63

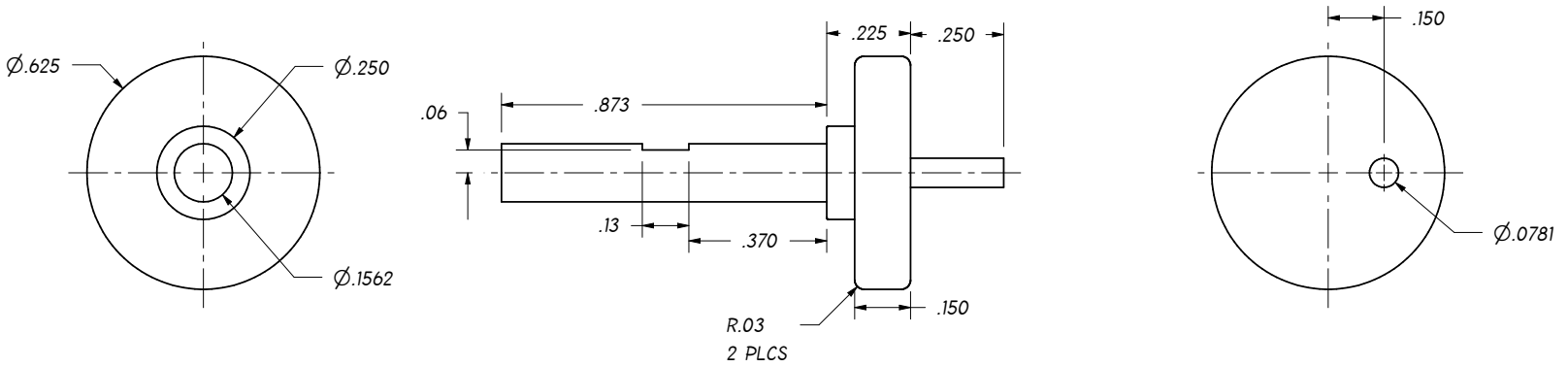
SP1 - WOBBLER

CYLINDER BUSHING

MATERIAL	SCALE	REV	DRAWN BY
STEEL	10 : 1		E. DANIEL

REVISION		
REV	DESCRIPTION	DATE





NOTE:

1. SOME LINES OMITTED FOR CLARITY
2. MAY BE MACHINED AS ONE PIECE, OR MACHINED AS TWO PIECES, THEN PRESSED OR SOLDERED TOGETHER

UNLESS OTHERWISE STATED

.xx ± .010

.xxx ± .003

.xxxx ± .001

ANGULAR ± 0° 30'

BREAK ALL EDGES

DO NOT SCALE DRAWING

125

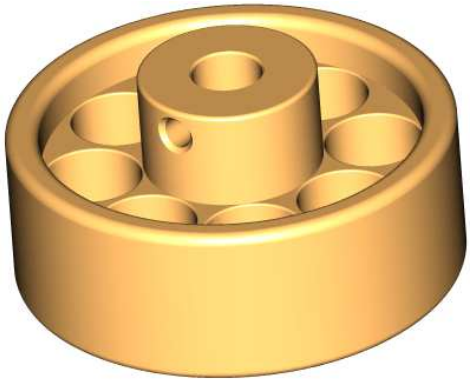
63

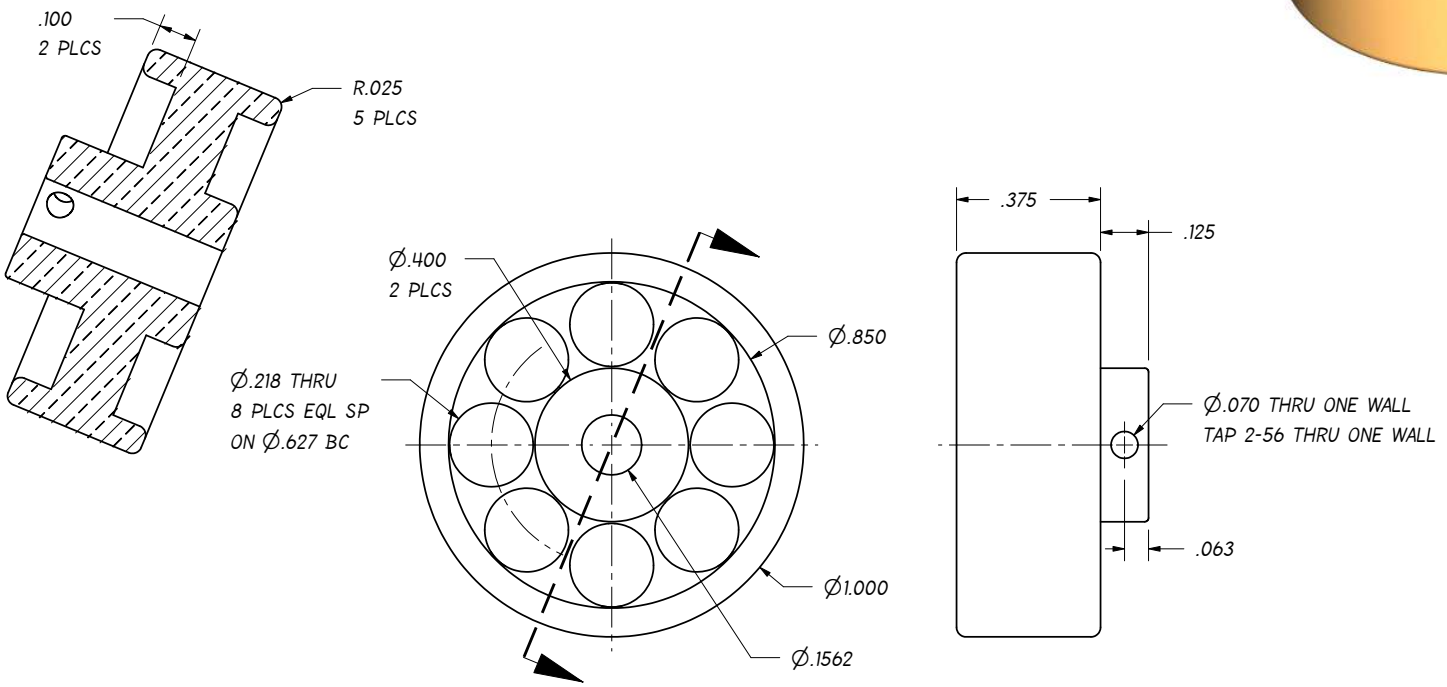
SP1 - WOBBLER

CRANKSHAFT

MATERIAL	SCALE	REV	DRAWN BY
STEEL	2 : 1		E. DANIEL

REVISION		
REV	DESCRIPTION	DATE





NOTE:

1. SOME LINES OMITTED FOR CLARITY
2. ONE 2-56 x .125 FLAT POINT SET SCREW REQUIRED FOR ASSEMBLY

UNLESS OTHERWISE STATED

.xx ± .010

.xxx ± .003

.xxxx ± .001

ANGULAR ± 0° 30'

BREAK ALL EDGES

DO NOT SCALE DRAWING

125

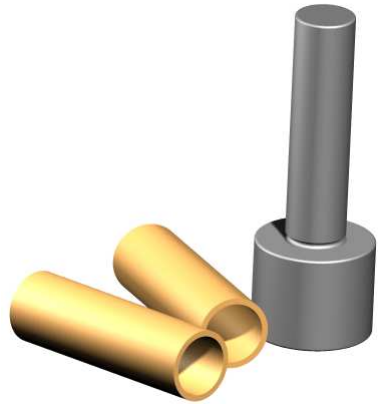
63

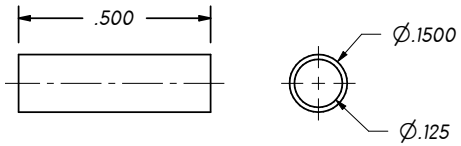
SP1 - WOBBLER

FLYWHEEL

MATERIAL	SCALE	REV	DRAWN BY
BRASS	2 : 1		E. DANIEL

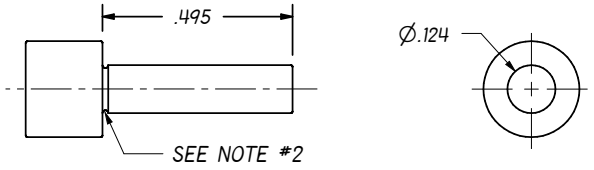
REVISION		
REV	DESCRIPTION	DATE





TUBE FITTING

BRASS



TUBE FITTING GUIDE

ALUMINUM

NOTE:

1. *SOME LINES OMITTED FOR CLARITY*
2. *UNDERCUT TO INSURE 90 DEGREE CORNER*
3. *TWO TUBE FITTINGS REQUIRED FOR INTAKE AND EXHAUST*

UNLESS OTHERWISE STATED

.xx ± .010

.xxx ± .003

.xxxx ± .001

ANGULAR ± 0° 30'

BREAK ALL EDGES

DO NOT SCALE DRAWING

125

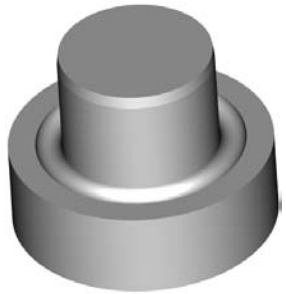
63

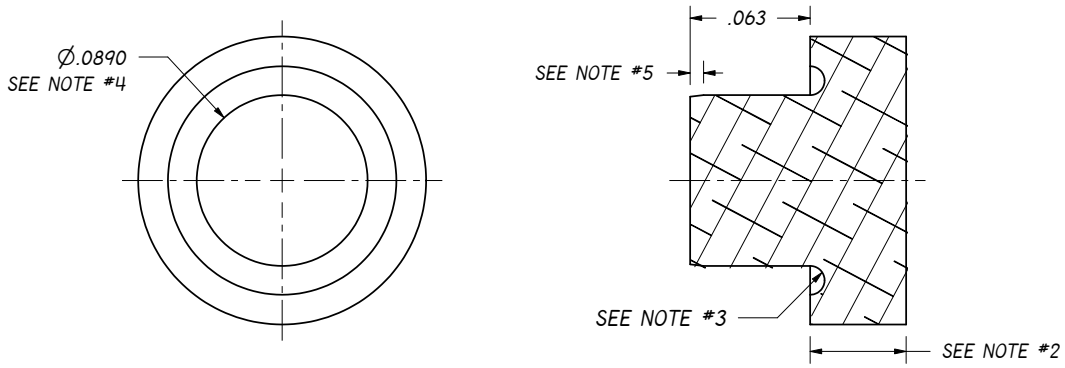
SP1 - WOBBLER

TUBE FITTINGS

MATERIAL	SCALE 2 : 1	REV	DRAWN BY E. DANIEL

REVISION		
REV	DESCRIPTION	DATE





NOTE:

1. SOME LINES OMITTED FOR CLARITY
2. TO BE FILED OR MACHINED OFF AFTER PLUG IS PRESSED IN
3. UNDERCUT TO INSURE 90 DEGREE CORNER
4. TO BE A PRESS FIT INTO MAIN FRAME
5. SLIGHT TAPER TO INSURE PROPER ALIGNMENT

UNLESS OTHERWISE STATED

.xx ± .010
.xxx ± .003
.xxxx ± .001
ANGULAR ± 0° 30'
BREAK ALL EDGES
DO NOT SCALE DRAWING

125
63

SP1 - WOBBLER

AIR PASSAGE PLUG

MATERIAL	SCALE	REV	DRAWN BY
ALUMINUM	10 : 1		E. DANIEL