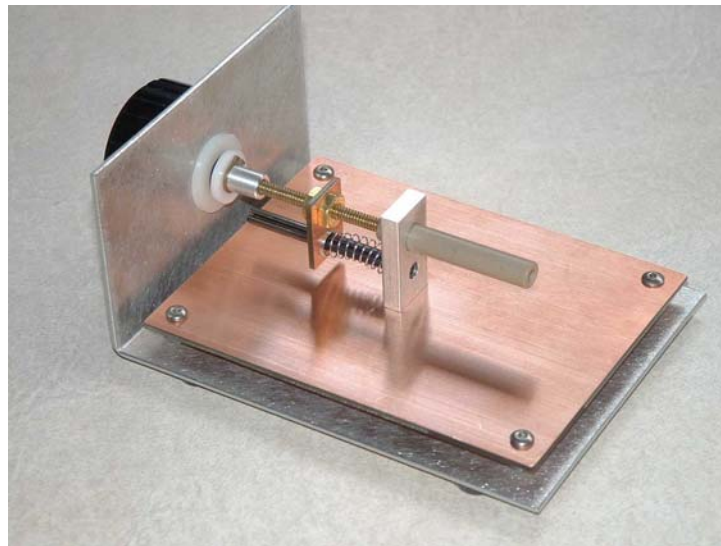


## Zero Backlash PTO Tuning Scheme

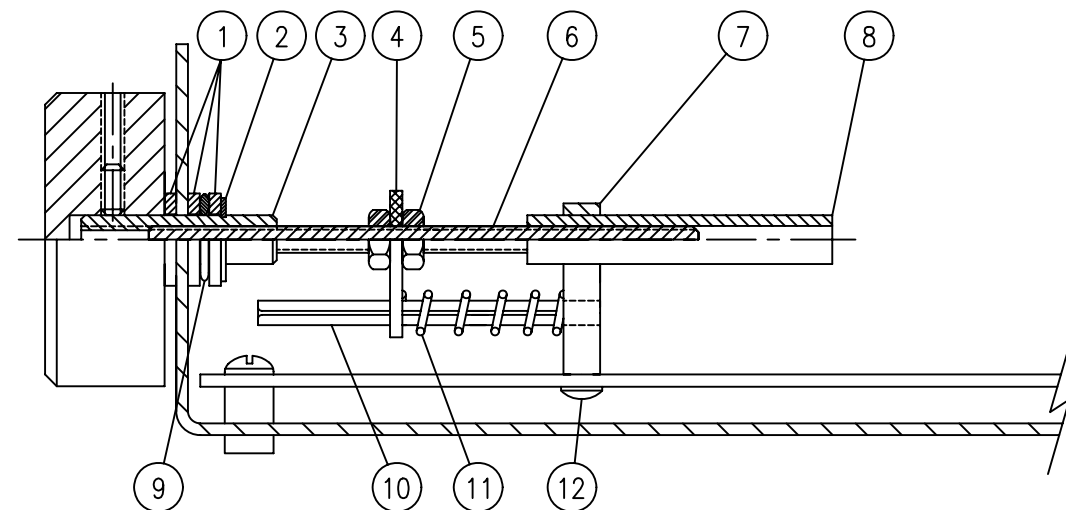


Several years ago after not liking the basic layouts of homebrew PTO mechanisms, I decided to layout one of my own, that had zero backlash, and the ability for the knob not to move in the Z axis. I designed two options detailed below. One that mounts on the actual project board and another variant the mounts on the front chassis over the pcb. Your construction techniques, and sizing may vary, but you may find this helpful.

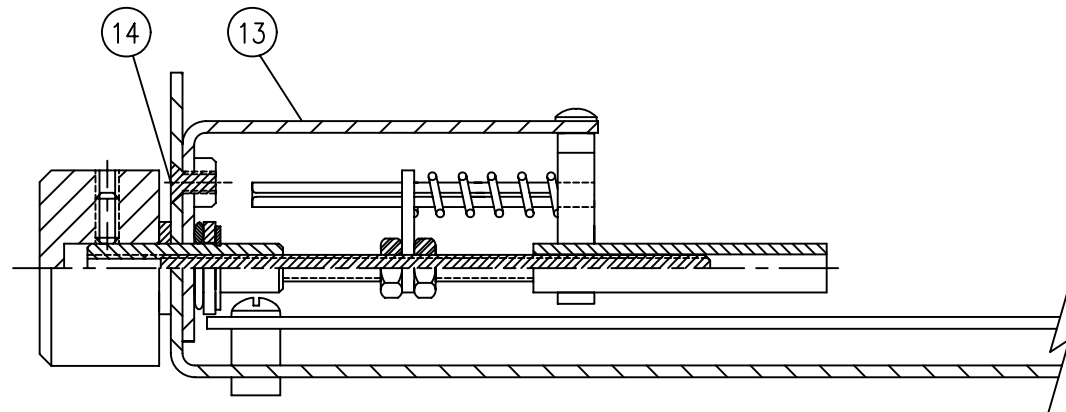
Referring to the SK-01 drawing, the threaded 6-32 brass rod, #6 does not rotate. You see it is secured via the two 6-32 nuts, #5, to the anti-rotation tab, #4. It is the piece of brass 6-32 threaded rod that gets pushed in and out of the nylon spacer, #8. The copper wire is wound onto the nylon spacer and the brass rod changes the inductance, as it travels.

The brass rod gets pushed as the 6-32 internally threaded tuning shaft, #3 is rotated. Since #6 is prevented from rotating and #3 can rotate, it pushes or pulls the threaded rod in and out of the coil form. The function of the spring, roll pin, and the small clearance hole in the tab merely act as an anti-rotation device for the tab, and take out any backlash in the tuning shaft to threaded rod union.

REVISIONS		
REV	DESCRIPTION	DATE
A	INITIAL RELEASE	07/08/07
B	ADDED FRONT PANEL DESIGN	07/14/07



BOARD MOUNTED OPTION



FRONT PANEL MOUNTED OR RETROFIT OPTION, ADD ITEM #13,14, LESS 1 PC. ITEM #1

14	1	SCREW, 4-40 x .25LONG, FLAT HEAD PHILLIPS, MCM# 91099A155
13	1	MOUNTING BRACKET, SK-08
12	1	4-40 x .38L., S.S., PAN HEAD, PHILIPS SCREW, MCM# 91772A108
11	1	LEE SPRING, #LP 013B 06 S316
10	1	.156 x 1.75L., ZINC PL., ROLL PIN, MCM# 90692A716
9	1	O-RING, BUNA, -010, MCM# 9452K18
8	1	NYLON SPACER, $\phi$ .25 x 1.5L., MCM# 94639A112-#6
7	1	SUPPORT, COIL FORM, SK-02
6	1	THREADED ROD 6-32, SK-04
5	2	BRASS NUT, 6-32, MCM# 92671A007
4	1	ANTI-ROTATION TAB, SK-03
3	1	TUNING SHAFT, SK-05
2	1	RETAINING RING, $\phi$ .250 SHAFT, MCM# 9841A113
1	3	NYLON 6/6 WASHER, $\phi$ .252x $\phi$ .472 x .062THK. MCM# 90295A140
ITEM	REQ'D	DESCRIPTION

WA4MNT

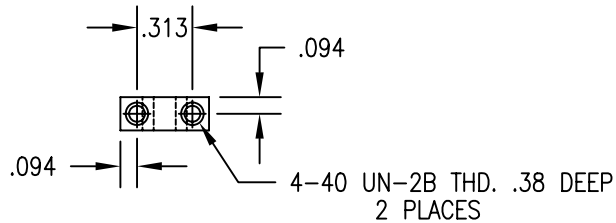
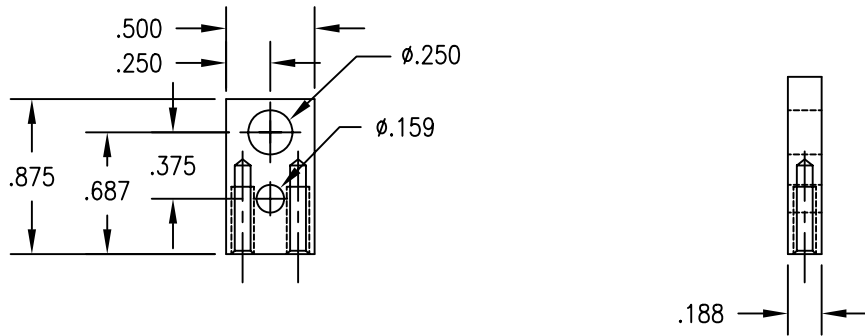
TITLE

STATIONARY KNOB PTO TUNING ASSEMBLY

DRAWN	LOCASALE	SCALE	FULL	DATE	07/08/07
SHEET	1 OF 1	REF.		DWG.#	SK-01

UNLESS OTHERWISE SPECIFIED  
DIMENSIONS ARE IN INCHES  
TOLERANCES ARE:  
FRACTIONS DECIMALS ANGLES  
 $\pm 1/32$  .XX  $\pm$  .015  $\pm 1^\circ$   
.XXX  $\pm$  .005  
SURFACE FINISH  $\sqrt{\quad}$   
BREAK EDGES .005-.020  
RADIUS OR CHAMFER

REVISIONS		
REV	DESCRIPTION	DATE
B	.875 WAS 1.000	07/08/07

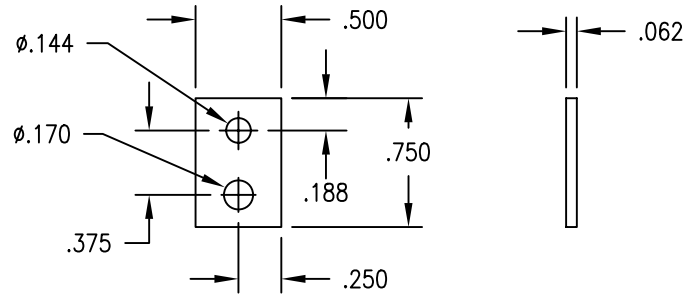


MATERIAL - ALUMINUM, 6061-T6

UNLESS OTHERWISE SPECIFIED  
DIMENSIONS ARE IN INCHES  
TOLERANCES ARE:  
FRACTIONS DECIMALS ANGLES  
 $\pm 1/32$  .XX  $\pm .015$   $\pm 1^\circ$   
.XXX  $\pm .005$   
SURFACE FINISH  $\sqrt{\quad}$   
BREAK EDGES .005-.020

ITEM	REQ'D	DESCRIPTION	MAT'L
WA4MNT			
TITLE SUPPORT, COIL FORM			
DRAWN	LOCASALE	SCALE FULL	DATE 07/08/07
SHEET	1 OF 1	REF.	DWG.# SK-02

REVISIONS		
REV	DESCRIPTION	DATE
A	INITIAL RELEASE	07/08/07

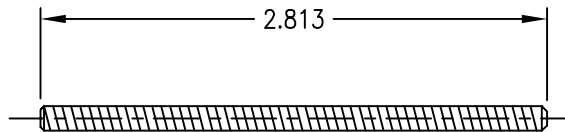


MATERIAL - G10 PCB, DOUBLE SIDE, .0625 THK.

UNLESS OTHERWISE SPECIFIED  
DIMENSIONS ARE IN INCHES  
TOLERANCES ARE:  
FRACTIONS    DECIMALS    ANGLES  
± 1/32        .XX ± .015        ± 1°  
                  .XXX ± .005  
SURFACE FINISH    ✓  
BREAK EDGES .005-.020

ITEM	REQ'D	DESCRIPTION	MAT'L
WA4MNT			
TITLE			
ANTI-ROTATION TAB			
DRAWN	LOCASALE	SCALE	DATE
		FULL	07/08/07
SHEET	1 OF 1	REF.	DWG.# SK-03

REVISIONS		
REV	DESCRIPTION	DATE
A	INITIAL RELEASE	07/08/07



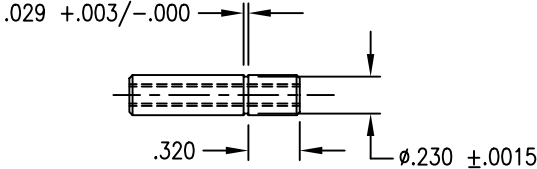
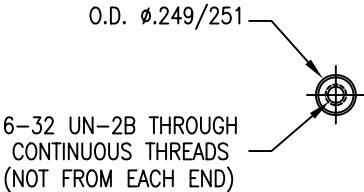
CUT OFF 3/16" TO DIMENSION SHOWN

MATERIAL - MCM# 93025A568, 6-32x3.00L., BRASS

UNLESS OTHERWISE SPECIFIED  
 DIMENSIONS ARE IN INCHES  
 TOLERANCES ARE:  
 FRACTIONS    DECIMALS    ANGLES  
 $\pm 1/32$     .XX  $\pm .015$      $\pm 1^\circ$   
                   .XXX  $\pm .005$   
 SURFACE FINISH     $\sqrt{\quad}$   
 BREAK EDGES .005-.020

ITEM	REQ'D	DESCRIPTION	MAT'L
WA4MNT			
TITLE THREADED ROD			
DRAWN	LOCASALE	SCALE    FULL	DATE    07/09/07
SHEET	1 OF 1	REF.	DWG.#    SK-04

REVISIONS		
REV	DESCRIPTION	DATE
A	INITIAL RELEASE	07/08/07

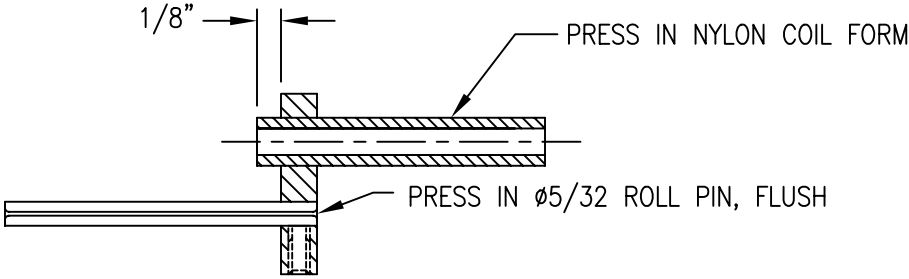


MATERIAL - FREE MACHINING BRASS

UNLESS OTHERWISE SPECIFIED  
DIMENSIONS ARE IN INCHES  
TOLERANCES ARE:  
FRACTIONS DECIMALS ANGLES  
 $\pm 1/32$   $.XX \pm .015$   $\pm 1^\circ$   
 $.XXX \pm .005$   
SURFACE FINISH  $\sqrt{\quad}$   
BREAK EDGES  $.005-.020$

ITEM	REQ'D	DESCRIPTION	MAT'L
WA4MNT			
TITLE TUNING SHAFT			
DRAWN LOCASALE		SCALE FULL	DATE 07/08/07
SHEET 1 OF 1		REF.	DWG.# SK-05

REVISIONS		
REV	DESCRIPTION	DATE
A	INITIAL RELEASE	07/08/07



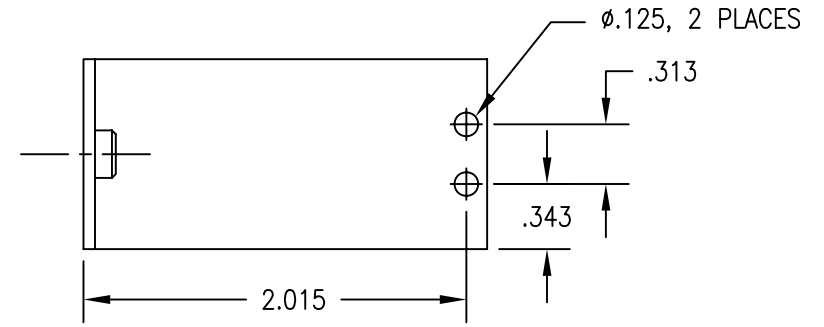
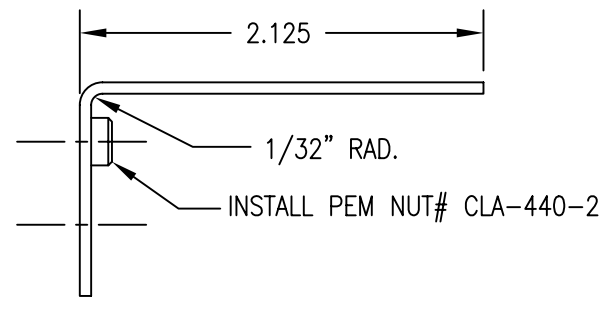
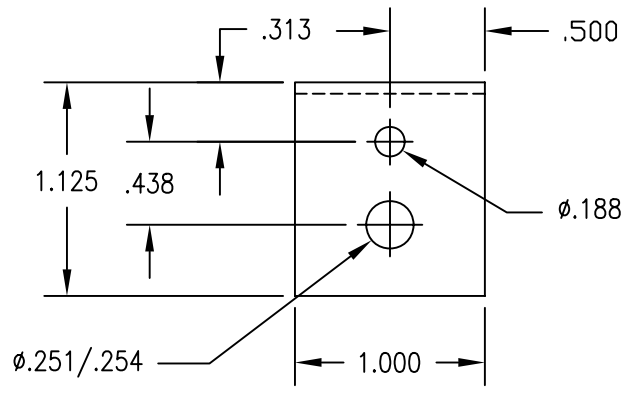
UNLESS OTHERWISE SPECIFIED  
DIMENSIONS ARE IN INCHES  
TOLERANCES ARE:

FRACTIONS	DECIMALS	ANGLES
$\pm 1/32$	.XX $\pm .015$	$\pm 1^\circ$
	.XXX $\pm .005$	

SURFACE FINISH  $\sqrt{\quad}$   
BREAK EDGES .005-.020

ITEM	REQ'D	DESCRIPTION	MAT'L
WA4MNT			
TITLE			
COIL SUBASSEMBLY			
DRAWN		SCALE	DATE
LOCASALE		FULL	07/08/07
SHEET 1 OF 1		REF.	DWG.# SK-06

REVISIONS		
REV	DESCRIPTION	DATE
A	INITIAL RELEASE	07/08/07



MATERIAL - ALUMINUM, .0625 THK, 5052-H32

UNLESS OTHERWISE SPECIFIED  
DIMENSIONS ARE IN INCHES  
TOLERANCES ARE:  
FRACTIONS    DECIMALS    ANGLES  
 $\pm 1/32$      $.XX \pm .015$      $\pm 1^\circ$   
                   $.XXX \pm .005$   
SURFACE FINISH     $\sqrt{\quad}$   
BREAK EDGES     $.005-.020$

ITEM	REQ'D	DESCRIPTION	MAT'L
<b>WA4MNT</b>			
TITLE MOUNTING BRACKET			
DRAWN	LOCASALE	SCALE	DATE
SHEET	1 OF 1	REF.	DWG.#
		FULL	07/08/07
			SK-08