

58 INCHES OF HANGAR SPACE

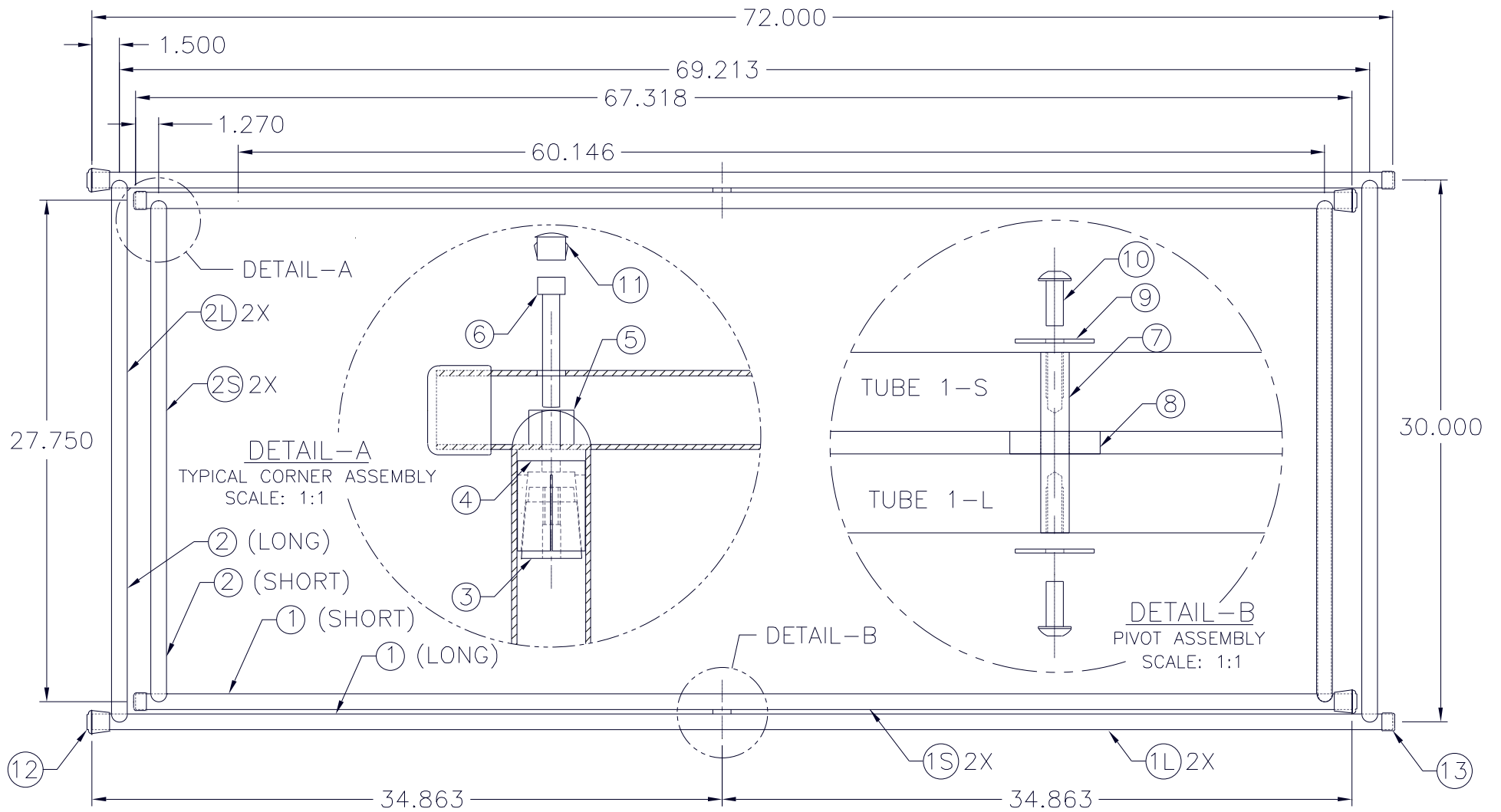
CONVENIENTLY FOLDS FLAT FOR HANGING ON WALL

PIVOT EXPLODED

PIVOT ASSEMBLED

RESTRAINT REQUIRED

- ASSEMBLY OF THREADED TUBE INSERT:
- ARRANGE COMPONENTS AS ILLUSTRATED,
  - SLIP PARTS TOGETHER, AND START BOLT THREADS,
  - TIGHTEN ASSEMBLY ONLY SNUG,
  - INSERT PARTS INTO END OF SCALLOPED TUBE,
  - TIGHTEN BOLT, TORQUE TO 10 IN-LB.
  - WHILE HOLDING SHOULDER OF TOOL AGAINST TUBE-END
  - REMOVE TOOL FROM THE ASSEMBLY,
  - CONTINUE WITH THE OTHER 7 INSERT ASSEMBLIES.



GENERAL ARRANGEMENT  
 ASSEMBLED COMPONENTS  
 SCALE: 1:5

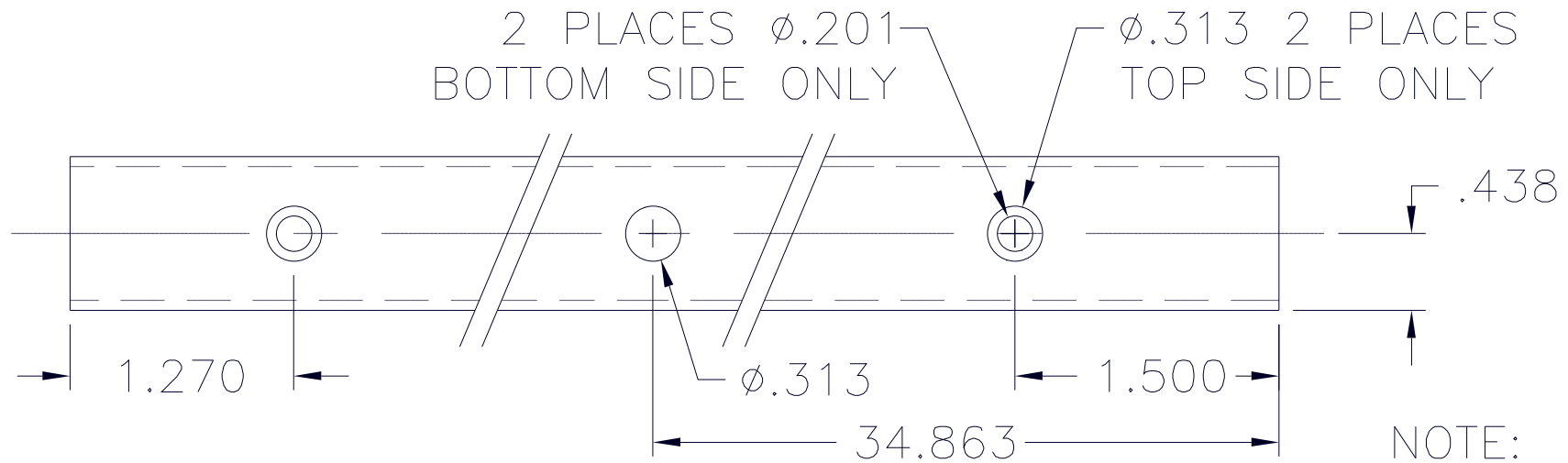
GENERAL NOTES:

1. DIMENSIONS ARE IN INCHES, UNLESS CALLED OUT OTHERWISE.
2. STANDARD TOLERANCES: XX  $\pm$ .01, .XXX  $\pm$ .005, ANGLES  $\pm$ .5°.
3. BREAK EDGES .01, FILLET INSIDE CORNERS .01 MAX.
4. USE ALCOHOL TO CLEAN SURFACES TO BE PAINTED.
5. ~ DENOTES ACE HARDWARE STOCK NUMBER.
6. \* DENOTES PARTS SELECTED FROM THE HILLMAN FASTENER DRAWERS\*\* AT ACE HARDWARE.

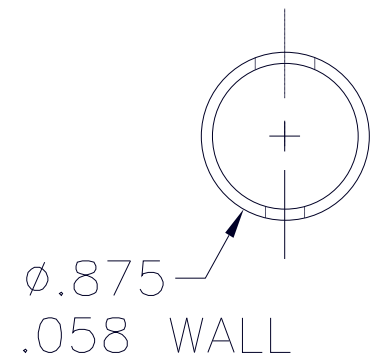
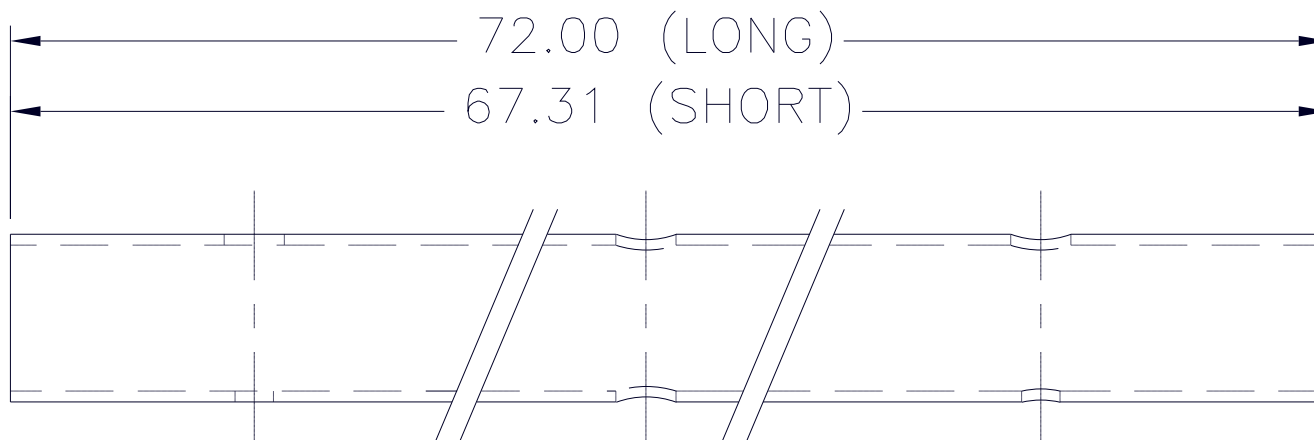
\*\* HILLMAN FASTENER CORP. CINCINNATI OH 45231

4	10	56921 ~	7/8" ID	NYLON	CAP, TUBE	13
4	10	51246 ~	7/8" ID	RUBBER	FOOT TIP, TUBE	12
8	7	58127D *	5/16"	NYLON, MOULDED	HOLE PLUG	11
4	8	43996F *	#10-32 UNF X .50	STEEL, STAINLESS	BOLT, BUTTON HEAD	10
4	8	2910F *	$\phi$ .875 X .20 X .04	STEEL, STAINLESS	FLAT WASHER	9
2	9		$\phi$ 1.0 X $\phi$ .313 X 2.0	NYLON	SPACER	8
2	9	TYPE 303	$\phi$ 5/16 X 2.0	STEEL, STAINLESS	PIVOT PIN	7
8	8	3249F *	#10-24 UNC X 1.25	STEEL, STAINLESS	BOLT, SOCKET HEAD	6
8	7	6061-T6	$\phi$ .75 X .50	ALUMINUM ROUND BAR	BEARING BLOCK	5
8	6	6061-T6	$\phi$ .75 X 1.00	ALUMINUM ROUND BAR	SHELL, EXPANSION	4
8	6	6061-T6	$\phi$ .75 X .80	ALUMINUM ROUND BAR	PLUG, EXPANSION	3
1	5	6061-T6	.875, .058 X 27.75	TUBE, AL, EXTRUDED	CROSSBAR, SHORT	2-S
1	5	6061-T6	.875, .058 X 30.0	TUBE, AL, EXTRUDED	CROSSBAR, LONG	2-L
1	4	6061-T6	.875, .058 X 67.32	TUBE, AL, EXTRUDED	LEG, SHORT	1-S
1	4	6061-T6	.875, .058 X 72.0	TUBE, AL, EXTRUDED	LEG, LONG	1-L
REQ'D	PAGE	SPEC	SIZE	MATERIAL	DESCRIPTION	ITEM

PARTS AND MATERIALS FOR ONE ASSEMBLY



NOTE:  
ALL HOLES  
MUST BE  
PARALLEL



①

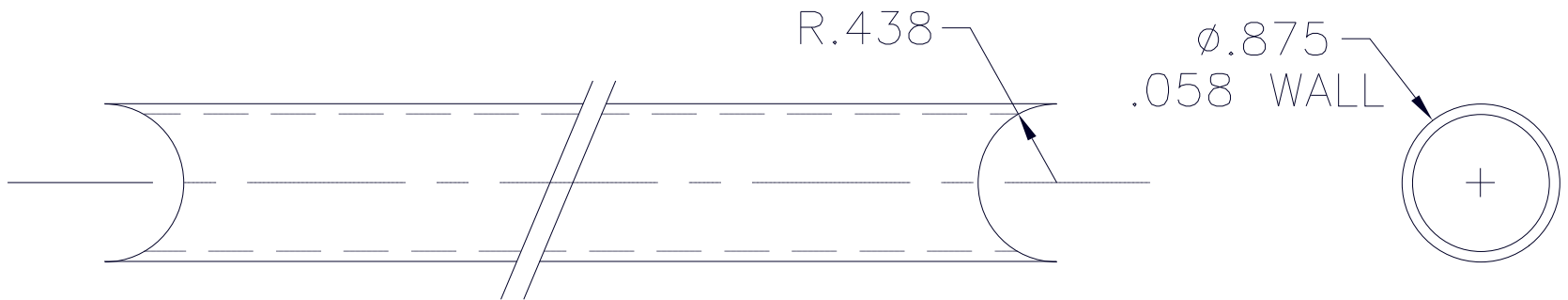
LEG

MATERIAL: ALUMINUM 6061-T6

REQUIRED: 2 LONG. 2 SHORT



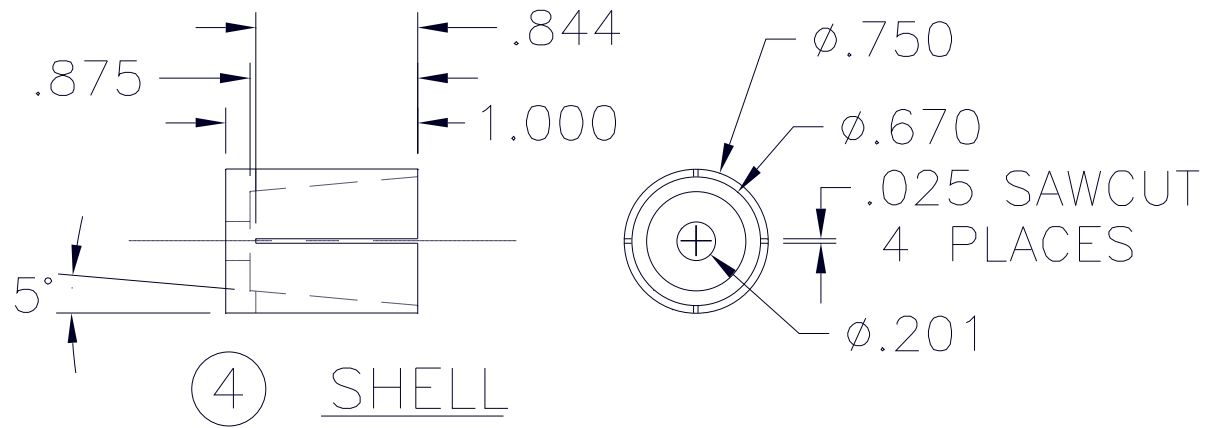
NOTE:  
END SCALLOPS MUST BE PARALLEL



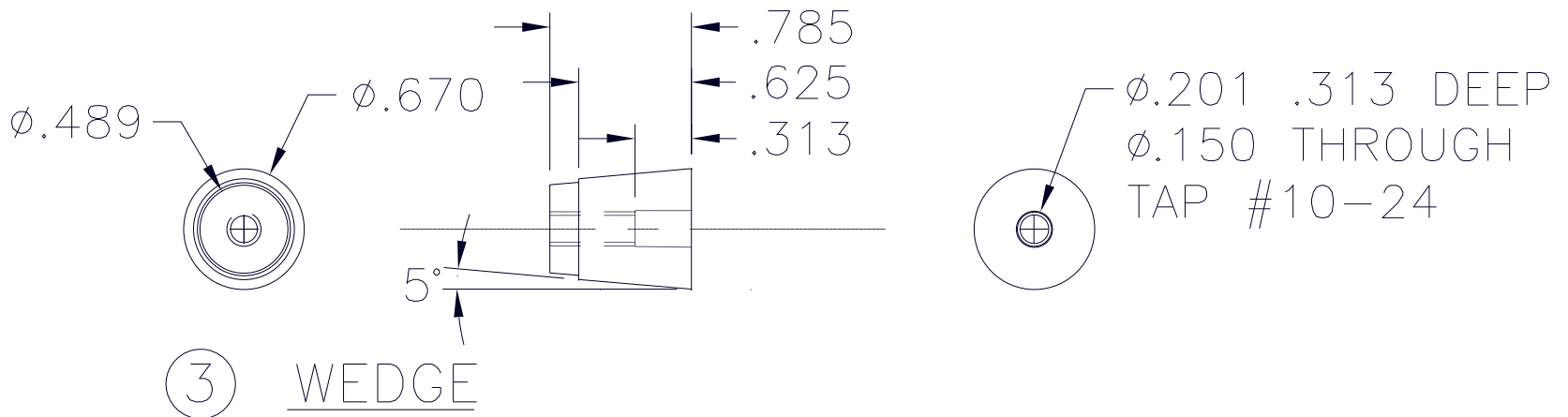
② CROSSBAR

MATERIAL: ALUMINUM 6061-T6

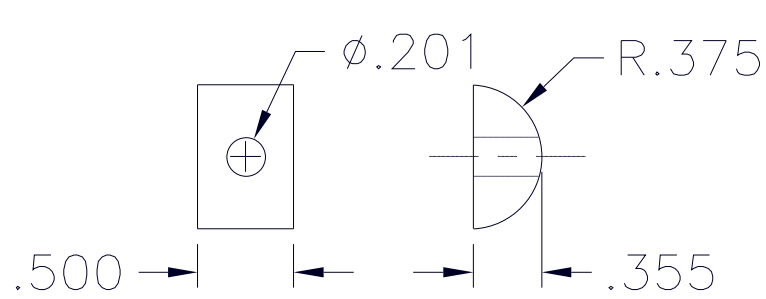
REQUIRED: 2 LONG, 2 SHORT



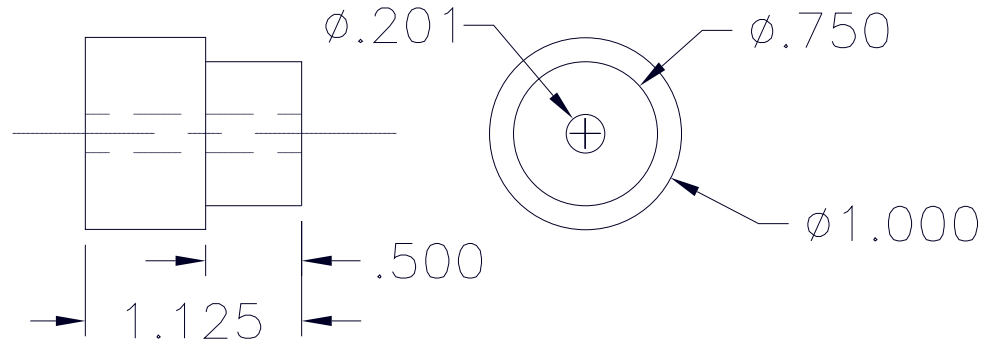
MATERIAL: ALUMINUM 6061-T6  
 REQUIRED: 8



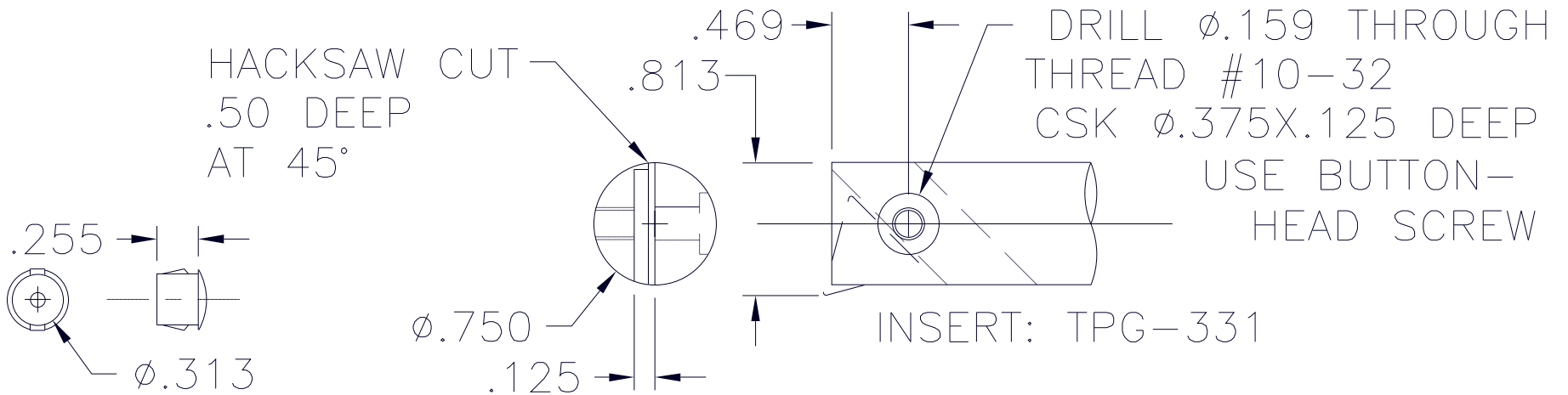
MATERIAL: ALUMINUM 6061-T6  
 REQUIRED: 8



⑤ BEARING BLOCK  
 MATERIAL: ALUM  
 REQUIRED: 8

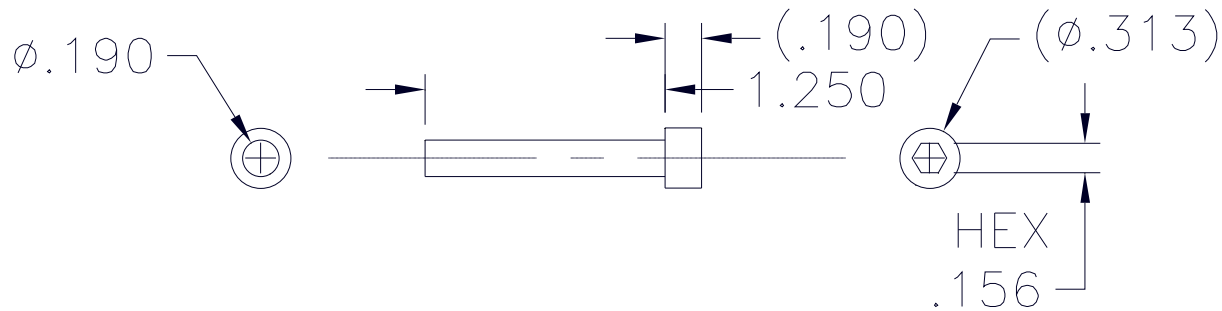


Ⓐ TOOL, ASSEMBLY  
 MATERIAL: CRS  
 REQUIRED: 1



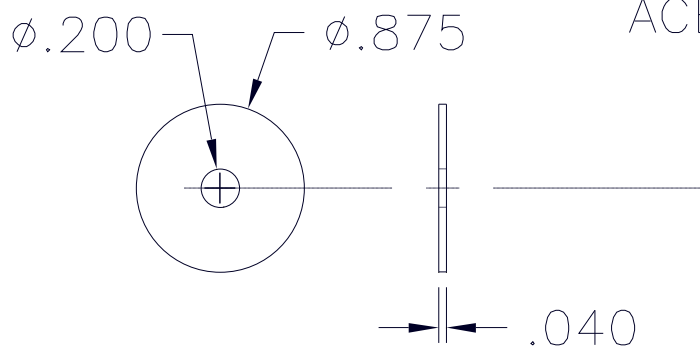
⑪ PLUG  
 MATERIAL: NYLON  
 REQUIRED: 8

Ⓑ BORING TOOL  
 TO MAKE TUBE END-CUTS  
 MATERIAL: CRS  
 REQUIRED: 1



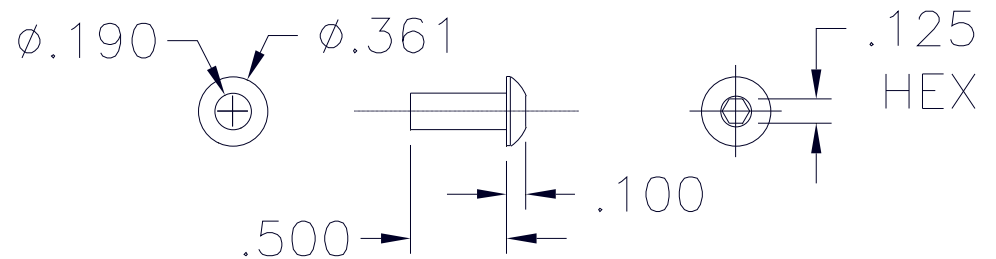
⑥ SOCKET HEAD CAP SCREW

MATERIAL: STAINLESS STEEL  
 SIZE: #10-32 UNC X 1.25"  
 REQUIRED: 8  
 REFERENCE DIMENSIONS  
 ACE (HILLMAN) P/N 3249F



⑨ FLAT WASHER

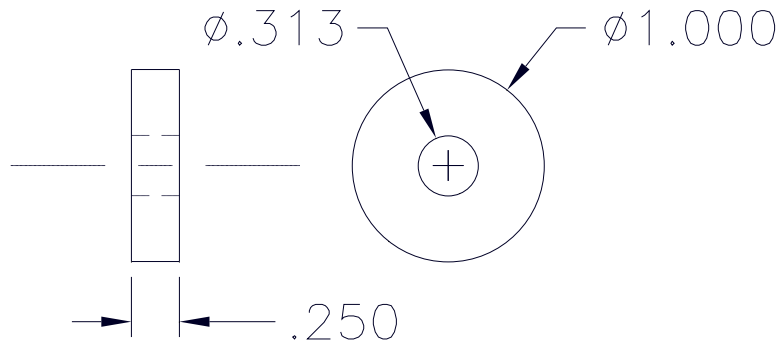
MATERIAL: STAINLESS STEEL  
 REQUIRED: 4  
 REFERENCE DIMENSIONS  
 ACE (HILLMAN) P/N 2910F



⑩ SCREW, BUTTON HEAD

MATERIAL: STAINLESS STEEL  
 REQUIRED: 4  
 REFERENCE DIMENSIONS  
 ACE (HILLMAN) P/N 43995F

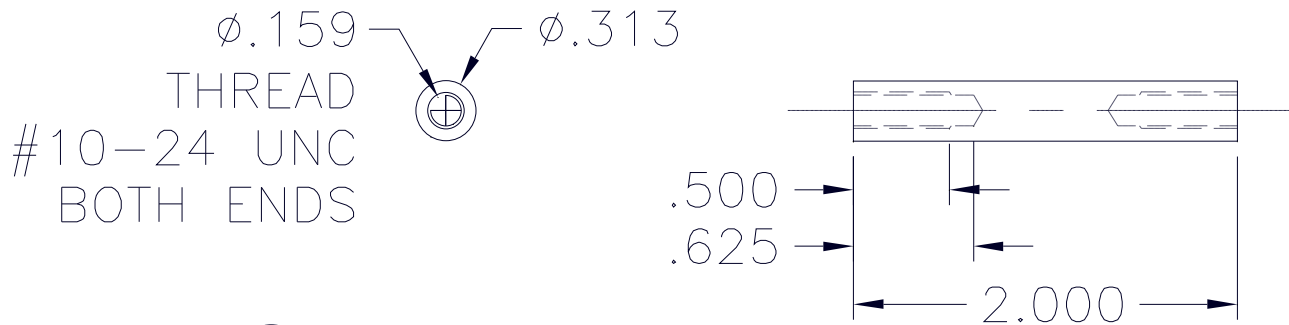




⑧ SPACER

MATERIAL: DELRIN

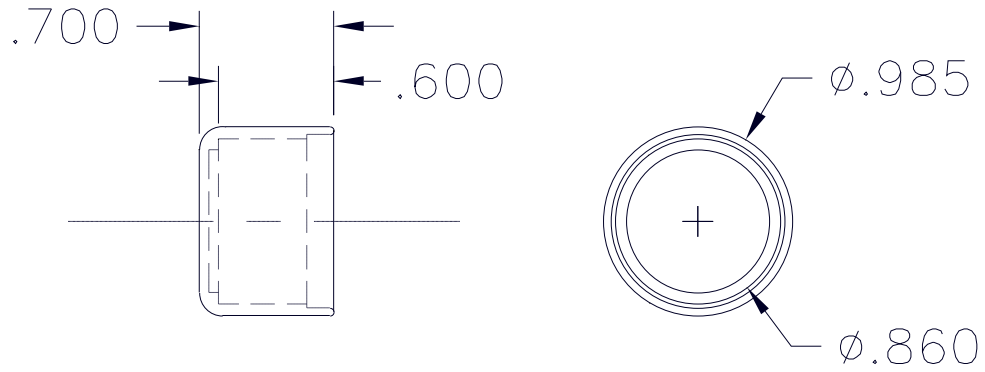
REQUIRED: 2



⑦ PIVOT PIN

MATERIAL: 303 STAINLESS STEEL

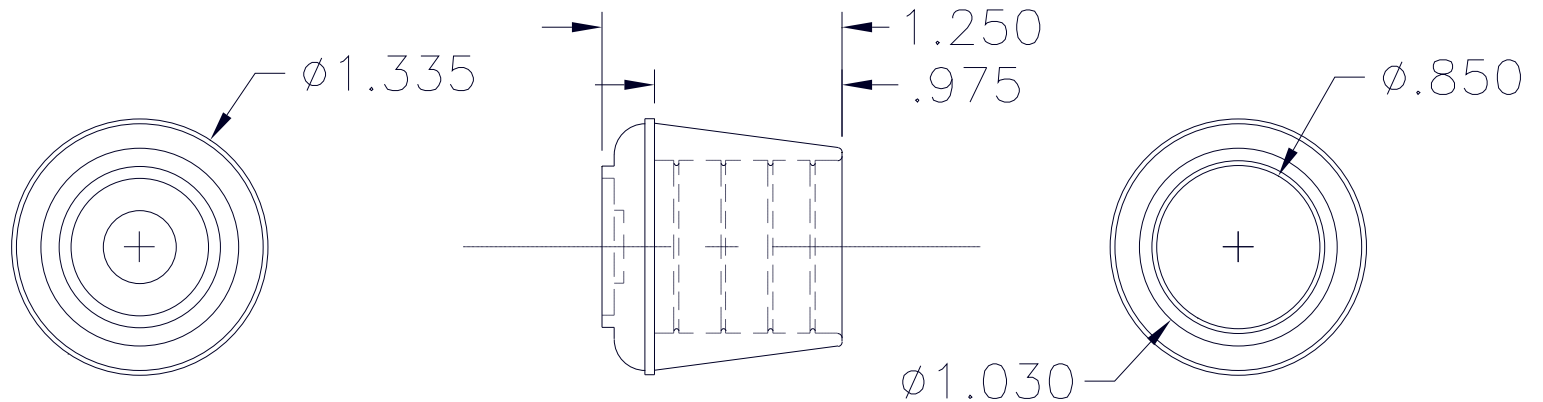
REQUIRED: 2



⑬ CAP

MATERIAL: PLASTIC (WHITE)  
 SIZE: 7/8" (ACE P/N 56921 (4-PAK))  
 REQUIRED: 4

NOTE:  
 DIMENSIONS ARE FOR  
 REFERENCE ONLY



⑭ FOOT

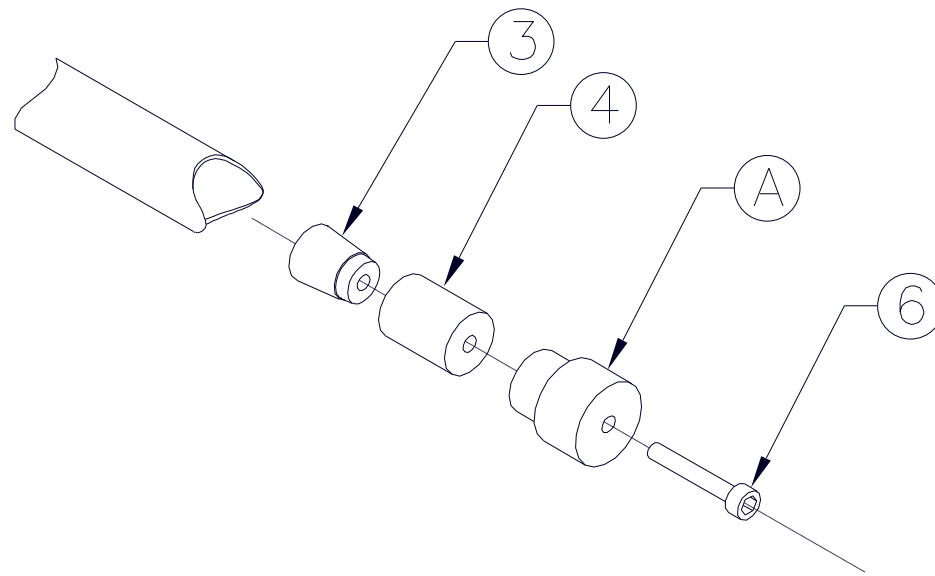
MATERIAL: RUBBER (BEIGE)  
 SIZE: 7/8" (ACE P/N 51246 (4-PAK))  
 REQUIRED: 4

This project was inspired by a Honey-Do directive that came from a mail order catalog. There, was offered a rack 60 inches tall by 18 inches wide that had a painted finish. Naturally, we were too cheap to spend \$25 plus postage for something that simple. So, a trip to the metal store yielded 3 12-foot lengths of Aluminum extruded tube, plus a foot of 3/4 inch round bar. At \$15 each for the tubes, economy is no longer a factor. The purchased bits and pieces made the total for materials something over \$60. Should have used emt conduit, but, no one seems to offer any pre-made tips or caps for that size.

It would have been possible to turn some Aluminum plugs to be a press fit into the tube-ends, to accept a bolt that would hold the corners of the rack parts together. But, being engineering-oriented, a two part cup and wedge was designed instead. The wedge taper angle of 5° would be self-locking and should hold tightly in the open end of a tube segment. So far, nothing has become loose in use.

After a few hours of effort, the tube insert parts were completed. Then, an existing boring bar that holds a carbide insert was adapted to cut the radius needed in the cross-tube ends, so that the horizontal parts would fit snugly against the vertical parts. The boring bar was inserted in a collet in the Mill spindle for cutting the scallops. The tubes, cut to length, were held in the milling vise horizontally, and the cutter advanced from above. Several steps were needed to cut to full depth, since only a small part of the cutter extended past the side of the boring bar. Much care is needed to cut the opposite ends of tube cutouts, since both ends must be kept exactly parallel. The long tubes each needed 3 holes drilled along the length, and these must also be kept parallel. A length of steel angle was used to hold the tubing for mounting in the milling vise, so that the holes could be placed on the proper axis.

After the holes were complete, the assembly went together with no hitches, and is serving the wish very well.



#### ASSEMBLY OF THREADED TUBE INSERT:

- ARRANGE COMPONENTS AS ILLUSTRATED,
- SLIP PARTS TOGETHER, AND START BOLT THREADS,
- TIGHTEN ASSEMBLY ONLY SNUG,
- INSERT PARTS INTO END OF SCALLOPED TUBE,
- TIGHTEN BOLT, TORQUE TO 10 IN-LB.

WHILE HOLDING SHOULDER OF TOOL AGAINST TUBE-END

- REMOVE TOOL FROM THE ASSEMBLY,
- CONTINUE WITH THE OTHER 7 INSERT ASSEMBLIES.

