

VARIOMETERS-CAST FROM CLEAR PLASTIC

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Over the past decade, Robinson-type pellet variometers have been used extensively in sailplanes and gliders throughout the world. This instrument has proven to be effective and reliable for the detection and centering of thermals. It is of particular interest since it is simple in principle and can be easily constructed by the amateur. There are several commercial models at moderate prices but it is thought that students wishing to fly on extremely limited funds would be interested in fabricating a pellet variometer.

In the past, the process has been to drill, ream and polish tapered holes in a solid block of lucite. The reaming and polishing process proved to be rather formidable for people without extensive experience and facilities. Thus an investigation of available plastics was conducted to determine the feasibility of casting the polished tapered holes. A brief search revealed that clear room temperature cured plastics were available at most plastic supply houses and model shops. Such material is normally used to cast insects, flowers, jewelry, etc. This approach was first used three years ago to produce some ten instruments, which operated satisfactorily and, in fact, are still in use today. In all, some twenty variometers in the past three years have been constructed using this technique. The results have been quite satisfactory and it is thought that the general elements of this fabrication process would be of interest to other members of the soaring group. This essential features of

the required equipment and fabrication process are given below.

EQUIPMENT

1. Mold (Fig. 1)

The mold is essentially a rectangular box, 1" by 1 1/4" by 2 1/2".

2. Tapered Shafts (Fig. 2)

The tapered shafts are constructed from brass rods, 3/16" to 1/4" in diameter, available at most hardware stores. After machining a taper of 1/4" per foot, the rods are polished with emery cloth and a buffing wheel using ordinary polishing rouge. The shafts can be used in this condition but it is recommended that they be hard chrome-plated, since the plastic adheres to the raw brass more readily than to the chrome-plate. It will be noted that each tapered shaft is necked down at the small end to retain the pellet.

3. Internal Connection Between the Tapered Holes (Fig. 3)

The internal connection between the top of one tapered hole and the bottom of the adjacent one is accomplished by means of a 1/16" to 3/32" polished drill rod, available at most hardware stores. This rod is cast in place at the same time the tapered holes are cast.

4. Mounting Lug (Fig. 3)

In order to make this variometer easy to mount and require only one small hole in the instrument panel, it was decided to cast the mounting lug directly into the plastic material. In order to provide a good bond between the lug and the plastic, a

castellated 1/4"-20 NC nut was used.

5. Plastic Material

The casting plastic material available locally has the trade name "Claro Cast" and is available at the Fry Plastics Company, 7826 South Vermont Avenue, Los Angeles 44, California, at a cost of \$1.95 a pint and \$3.75 a quart. A small amount of 10A hardener (2% to 3% by weight) is mixed with the Claro Cast a few minutes prior to pouring the mixture into the mold.

FABRICATION

Place the rectangular mold on a piece of plateglass, insert the mounting lug, cross-connect rod and tapered shafts in the mold as shown in Figure 3. Prior to placing the cross-connect rod and the tapered shafts in the mold, it is necessary to coat them with a thin film of parting agent or light grease, such as vaseline. This process is usually accomplished by applying a liberal amount and then wiping the parts clean with a small piece of tissue. This will leave a small, invisible film of oil on the parts. Note: Do not coat the mounting lug with anything.

Prior to pouring the plastic material in the mold, it is necessary to seal the lower edge of the rectangular mold. This can be accomplished with putty on a heavy filler of vaseline. When all of the parts are properly placed in the mold, mix the 10A hardener with the plastic, allow the air bubbles to rise to the surface and then pour the mixture into the mold level with the top. Normally the plastic will polymerize into a clear solid within 24 hours or less at room temperature. This process can be accelerated by increasing the amount of 10A hardener used.

After solidification of the plastic material is complete, the tapered shafts and the cross-connect shaft are removed using a pulling twisting motion. The plastic material then can be removed from the rectangular

FIG 1 - METAL MOLD

1/16" DIA #20 DRILL
2 HOLES

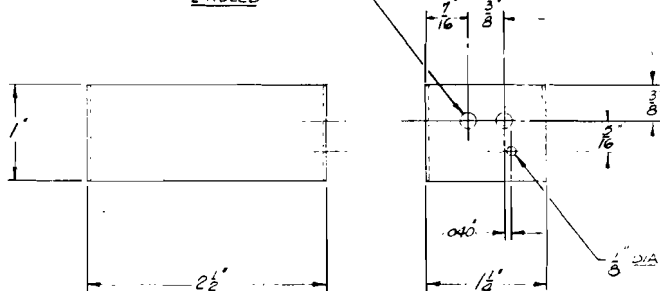


FIG 2 - TAPERED SHAFTS

NOTE: UP SHAFT IS IDENTICAL EXCEPT THAT R.H. END IS .070 DIA PARALLEL & 2" LONG

