

Centre of Gravity

Locating the exact C.G. position on your model is one of the most difficult parameters to measure, as anyone will attest who has tried to balance a low wing monoplane on a pair of pencils stuck in a 2 x 4.

If you want to know where the C.G. is located on almost any configuration of model plane accurately, and I mean within 1/16", make this device! It works on any model, from a 1/2A two channel to a 30-lb. 1/4 scale Tiger Moth.

It works every time, is simple to use, and it's accurate.

It can be made of almost anything kicking around the workshop - a piece of 1 x 2 (or 2 x 2) wood about a foot long; a piece of 1/4 or 3/8 dowel also about a foot long; some flexible but strong cord about 1/8" in diameter; a pulley you can hook up to the ceiling (preferably over a bench where your plane can sit), and a little plumb bob.

Construction:

Drill a hole parallel to the long dimension near the end of the 1 x 2. It must be snug enough so that you can just turn the dowel by hand. If it is too loose put a saw-cut through the hole and a bit beyond it, and a bolt with a wing nut (as shown in Fig. A) so that it can be adjusted by hand. A hole in the other end for the "hanging rope," a pulley, and two nails in a stud to snub the "hanging rope," and that part is ready.

Next, make two equal loops of soft rope or cord to support the model. The pair I use are 40" in circumference, and they handle most 40 to 60 size models. Cut two pieces of soft cord 40" long and tie the ends together. Pull them taut over your index fingers to make sure that the lengths are equal, and then put a drop of CA on each knot to assure they stay forever.

Now make a small plumb bob. I made one out of a 2" length of 3/8" dia. aluminium rod. I chucked it in a drill press and filed a point on one end. A small axial hole at the other end and a cross-hole made a neat place to tie a piece of string or thread. I discovered later that wallpaper stores sell little lead bobs that are perfect. About a foot and a half of thread tied in a slipknot will allow you to adjust the height of the plumb bob.

Use:

To use this marvellous device, place the model aircraft on the bench with the centre of the wing more or less below the pulley in the ceiling. Lower the dowel and support to a couple of inches above the wing. Place the 40" loops around the wing as shown in Fig. C or D, and wrap them around the dowel 4 or 5 times (same on both sides). Since the C.G. is normally well forward of the centre of the chord of the wing, there will be more weight on the forward side of the loop than the rear, and the angle of dangle will be different fore and aft. Thus the rope would like to slip forward, but the wraps around the dowel provide enough friction to prevent this. Put the plumb bob string over the dowel. Usually it is more convenient to have the plumb bob on the inside of the loop, hanging over the fuselage, or wing root.

Carefully hoist the model a couple of inches off the bench. Steady it until it reaches a state of equilibrium. By hand rotating the dowel in its hole, adjust the model to a level flight attitude. An important detail in using this device is to have the dowel parallel to the wing spar.

Adjust the slipknot on the plumb bob so that it hangs just above the model and - Voila! - It points to the Center of Gravity. Since all of the weight of the model is being supported by the

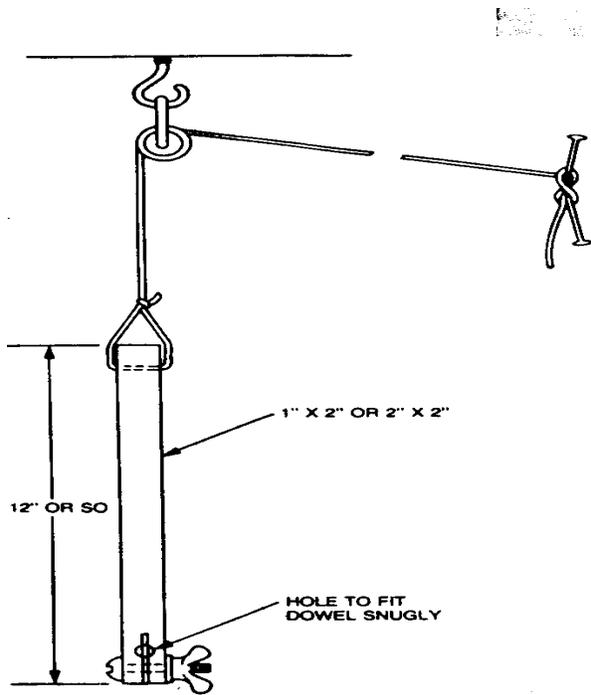
dowel, the C.G. will be directly beneath the dowel (where- the plumb bob is pointing).

Put a piece of masking tape on the model where the plumb bob is pointing, and mark the spot with a felt tip pen. Or better still; put the tape on before you hoist the model, mark where the C.G. should be, and then get the good/bad news when you hoist it. While it is still up there, you can add weight to the nose or tail, adjust the attitude to level flight again by rotating the dowel, and see before your very eyes where the C.G. has moved to. After a couple of tries you should know exactly how much weight to put where.

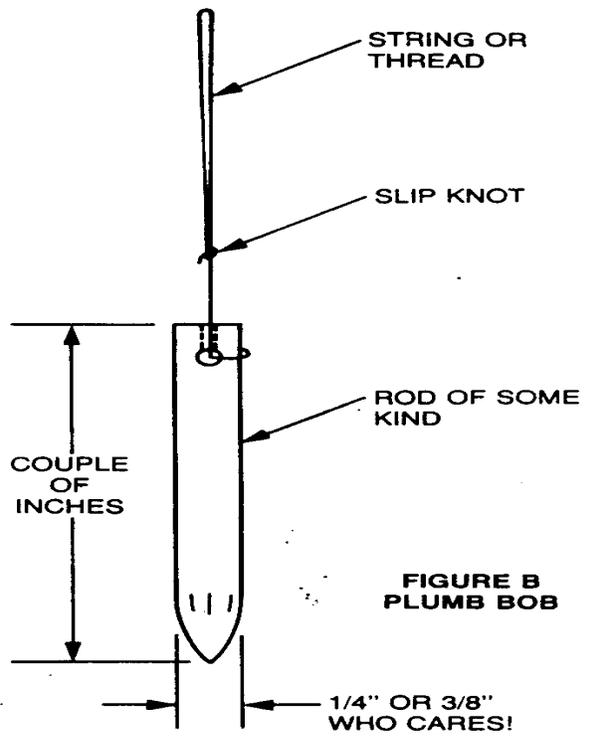
Versatility.

Fig. C shows a high wing trainer, but the device works equally well with a low or mid wing pattern type aircraft (Fig. D). With a biplane, just put the loop around both wings (Fig. E). You say you have a J3 Cub with wing struts that get in the way! No problem; make a pair of 40" ropes with a loop at one end and a little wire hook at the other end. Feed this under the wing, around the dowel, and put the hook in the loop.

If you have flaps or strip ailerons that come close to the fuselage, and may not support the weight put on them by the ropes, a couple of things can be done. Make a single large loop of rope and sling it under the fuselage fore and aft of the wing as shown in Fig. F. Tape the rope to the bottom of the fuselage, far enough behind the wing to keep the rope off the trailing edge. Or cut a piece of balsa an inch or so wide and a bit longer than the chord of the wing at the root. Place this under the wing with the rope beneath. Make sure they stay in place as you hoist the model. A delta can be tested with the single loop fuselage sling method (Fig. F) by putting a strip of 3/32" balsa beneath the fuselage. The strip must be long enough to be held by the front sling, and protrude behind the wing for the rear sling.



**FIGURE A
THE DEVICE**



**FIGURE B
PLUMB BOB**

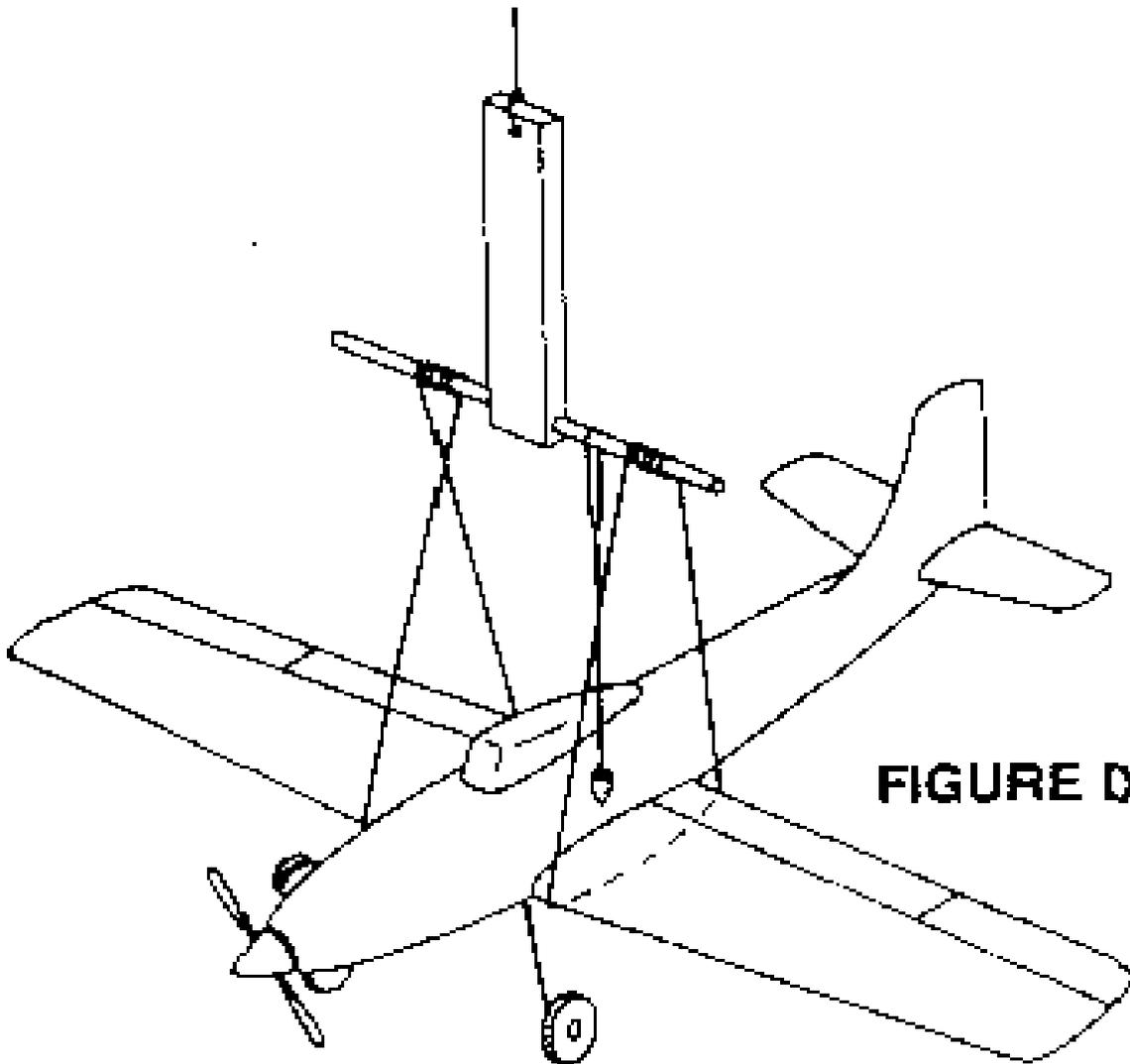


FIGURE D

