

### Centre Of Gravity Rig

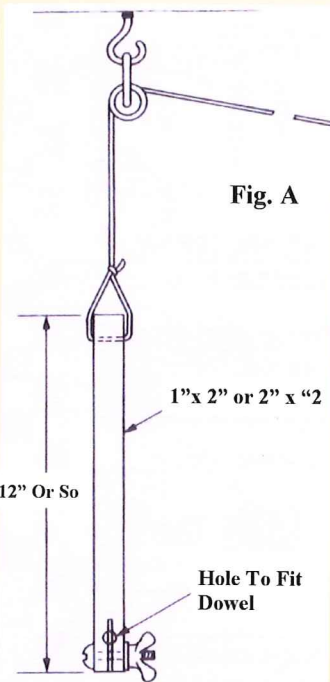
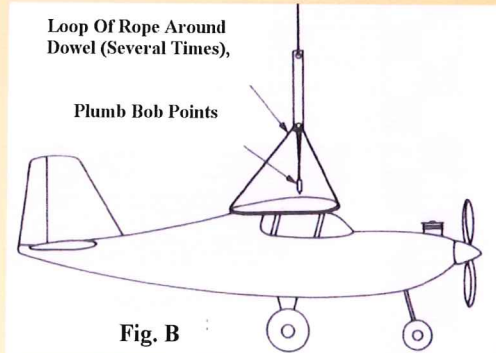
Recently, Norman Hunt and myself have been asked on several occasions to test fly new or re-furbished models. After checking out all the normal things like control throws, correct sense, airframe and engine integrity, only a rough estimate can be gained on the field with regard to centre of gravity position, and this is probably the most critical adjustment of all affecting the handling of the aircraft. (Great flying model - Or - Handful, sometimes leading to Black bag syndrome.)

So with that in mind and in response to several enquiries about accurately finding C of G positions, here is some information on a set up that I have been using since 1990 that was published in RC Modeler magazine from America.

With this system I have accurately found the C of G of all my aircraft including my PZL 104 - Wilga 35 weighing in at 32lbs.

It works every time, is simple to use, is accurate to within 1/16", and can be made from basic bits & pieces found around the workshop. The requirements are:-

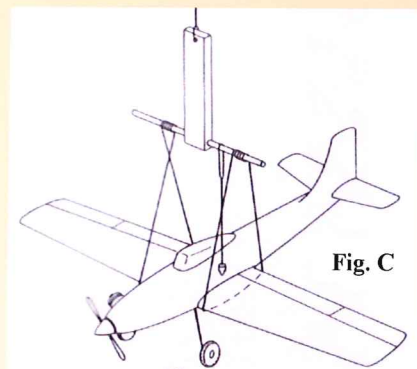
1. A piece of 1"x 2" (or 2"x 2") wood about a foot long.
2. A piece of 1/4" or 3/8" dowel also about a foot long.
3. Some flexible but strong rope about 1/8" dia. (like cotton drape cord).
4. A decorator's plumb bob, or make something similar yourself.
5. A hook (and optional pulley wheel) to secure it to the ceiling.



Drill a hole parallel to the long dimension near the end of the 1"x 2" and insert the dowel. 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 bolt with a wing nut as shown in Fig. A so that it can be adjusted by hand. A hole in the other end is needed for the "hanging rope" and this 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. sized models. Pull them both over your index fingers to make sure that the loops are of equal size, then put a drop or two of Cyano on each knot to assure they stay put. Either make or buy a small plum bob and attach about 18" of string or thread tied in a slip knot to allow you to adjust it's height.

To use this Marvellous device mark the required C.G. position on the model (usually given as a measurement back from the leading edge of the wing at the root), with a soluble felt tip pen or similar, position the

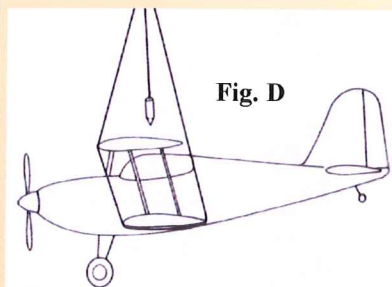


fully assembled aircraft below the ceiling hook, place the 40" loops one round each wing as shown in Figs. B & C and wrap them around the dowel 4 or 5 times. (the same on both sides). Since the C.G. is normally well forward of the centre of the chord of the wing, their will be more weight on the forward 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 fuselage or wing root.

Usually it is more convenient to have the plum bob on the inside of the loop, hanging over the fuselage or wing root.

Hang the rig complete with model on the ceiling hook, (or hoist it up if you have incorporated a pulley system.) steady it until it reaches a state of equilibrium. By rotating the dowel in the hole, adjust the model to a level or slightly nose down attitude. An important detail in using this device is to have the dowel parallel to the wing spar. Adjust the slip knot on the plum bob so that it hangs just above the model and - VOILA - it points to the Centre of Gravity. Since all of the weight of the model is being supported by the dowel, the C. of G. will be directly beneath the dowel (where the plum bob is pointing). This is when you get to know the good or bad news.

Whilst on the rig you can move equipment about (if possible) or add weight to the nose or tail then rotate the dowel to achieve the



correct balance point at the correct attitude.

**Versatility.** Fig. B shows a high wing trainer, but the device works well with low or mid wing pattern type aircraft Fig. C. With a bi-plane just loop around both wings Fig. D. 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, make a single large loop of rope and sling it under the fuselage fore and aft of the wing as shown in Fig. E. Tape the rope to the bottom of the fuselage far enough behind the wing to keep the rope off the trailing edge. A delta wing configuration can also be balanced by this method.

Take a few minuets to put one of these things together and take the guess work out of C. of G. location. The dimensions and materials are almost unimportant. It's the configuration and gravity that do the job. From then on you will know exactly where the Centre of Gravity is. Where it should be or where you would like it to be is your problem !!!

Bob F.

