

# HOW TO MAKE YOUR OWN TOTAL ENERGY PROBE

Chris Chapman provides instructions for building your own T E Probe. The construction is quite critical – the spacing of the holes from the end and the suction is influenced by the length of the sensor end and the radius of the bend.

**T**HE original Irving Probes used 0.25" OD thin wall Stainless Steel Tube. I have not found a source of this, so I bought 0.9mm wall 6.3mm OD Aluminium Alloy Tube from [www.metals4u.co.uk](http://www.metals4u.co.uk)

The first job is to degrease one end of the tube, particularly on the inside. I use Acetone for this. Plug the end with about 5mm of Araldite, or preferably BondLoc B3295 modified Acrylic.

It is necessary to finish the end of the tube flat and square. I turn the end flat in a lathe. Another method is to drill a hole in ~2" thick planed block of wood, using a drill press. If necessary, wrap the tube with a few turns of PVC Tape so that it is a tight fit in the hole. File the tube end face flat at right angles to the axis of the tube. Use a fine file to remove a few thou" of any sharp edge of the tube.

Using precision callipers, push the tube out from the surface of the block by a distance F and use a scalpel or a razor blade to mark a ring around the tube at the surface of the block –

the air holes will be drilled on this ring. Measure the actual diameter of your tube and calculate  $F = 1.5 \times D$ . Also calculate  $E = 10 \times D$ .

Wrap all but about 2" from the sealed end of the tube with many layers of newspaper or other insulating material. Fill the tube with water and place in a deep freezer to freeze the water from the sealed end up. I use a 50ml syringe. This is to support the tube while it is being bent.

Starting from 1.712" (or 40.12 mm for 6mm OD Tube) from the glued end, bend the tube around a suitable mandrel (a little less than 2" OD) to give a 70 degree bend. Heat the tube from the open end to melt all the water.

Measure the OD of the tube accurately with callipers. Calculate the periphery of a 50 degree segment = x. With an "envelope label", mark out the edge with three knife cuts spaced x. Cut off surplus paper to leave a strip about 1cm wide and ~4mm longer than the  $x + x$  marks.

Clamp the body of the tube in a vice, with the sensor end horizontal on the bench. Using a set square and callipers, mark the centre of the scribed ring. Stick the paper strip over the centre mark and use a scribe or similar to mark the +/- 50 degree points. Use a sprung marker to make dimple marks. Use a miniature centre drill to open the holes. Then drill out the two sensor holes 1/16" or 1.5mm diameter. The wide hole spacing is to give immunity from airflow at an angle to the axis of the glider.

Most modern gliders have 8mm OD Brass couplings fitted with an "O" Ring.

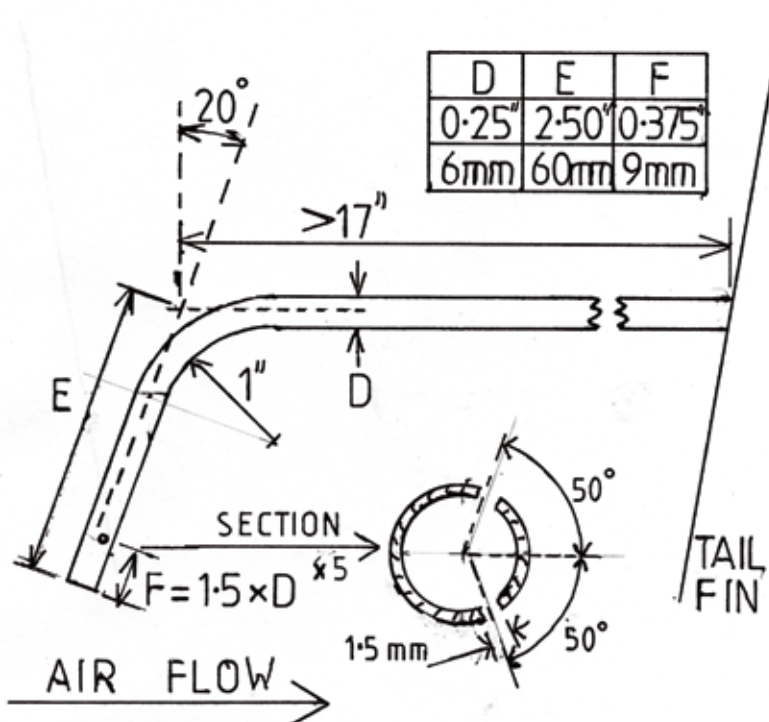


Illustration by Chris Chapman

■ This article accompanies *A New Total Energy Head* by Frank Irving, reproduced in the Oct/Nov 22 issue of *S&G* and first published in the Feb/March 1978 issue

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