An Experimental Variometer

Dennis Wood G3EAY found that the variometer isn't dead - it can still prove to be an effective element in an antenna tuner

When I was building myself a loading and 'tuning' unit for my long wire antenna, I found that I required a 40-turn coil tapped every turn (to make it easy to adjust). I found this coil a little difficult to make and as to where I would find a switch for it! A roller coaster unit was also out of the question.

Whilst mulling over the problems I'd set myself, I read an article on variometers used in the Second World War and how they performed. I decided that this was the ideal solution and to make one out of up-to-date, easily available materials for use in place of the tapped coil.

Basically a variometer consists of two coils, with one coil fitted inside the other. The inner coil should be similar to the outer coil and able to rotate through 180°. This rotation allows the two coils to interact to give a range of inductance, from (L_1+L_2) to (L_1-L_2), created by rotating the inner coil.

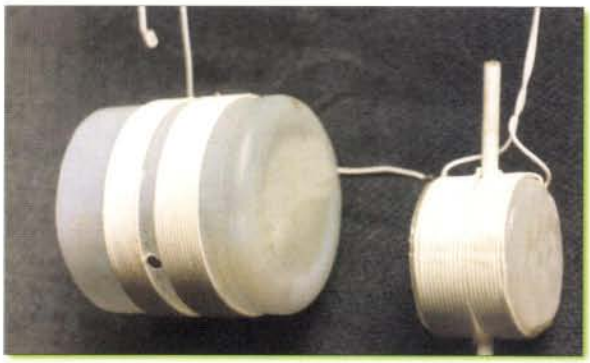

Fig. 1: The larger of the two coils is 85mm diameter and occupies a length of a little over 40mm. The smaller (inner) coil is wound with a diameter of 60mm and over a length of of 40mm. Both coils have similar numbers of turns.

I thought that this would be the nearest thing to a continuously variable coil and so it turned out to be. I have called it an experimental variometer because I have not the equipment to measure inductance and *Q* but in practice it seems to function like the desired 40-turn tapped coil and I am delighted with the results.

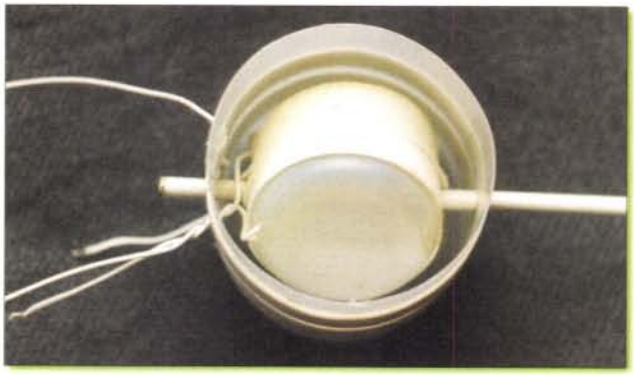

Fig. 2: Looking into the unit after construction. The shaft is made from a plastic knitting needle or a piece of wood dowelling.

No Special Tools

No special tools are required, just a pair of scissors or tenon saw and nails, the nails are held in locking-jaw pliers and made red hot to bore suitable holes in the plastic bottles used. As can be seen in the photographs I used two plastic bottles originally 'on loan' from my wife.

An 85mm diameter bottle was used as the former for the outer coil. The inner, rotating coil, was wound on a 60mm bottle. Both bottles were cut to size with scissors but a tenon saw could be used. Leave the bottoms of the bottles intact as this increases the strength.

Fix the first turns with vinyl bond cement, leave to set before continuing winding and the turns are less likely to fall off. (Have several cut pieces of sticky tape handy to hold wires in place temporarily). I used white coated standard wire for both coils and wound 20 turns on each former, reasoning that (L_1+L_2) equals 40 turns.

The rod controlling the rotation of the inner coil was made from glass fibre material (g.r.p.) as used in construction of kites, but wooden dowelling will do. Coat both coils with vinyl bond cement, as this also increases the constructional strength of the competed coils.

All holes were made with a suitable size red-hot nail (held in pliers heated over a gas flame until hot enough, but please take care during the procedure). The rotating rod is held in position by sliding on tight fitting pvc tubing. I also fitted two washers at each end.

When winding, don't be too concerned about the bottle formers tending to flatten out, as when coil is completed, reshaping is possible. Wire the two coils in series as per the photograph and adjust the wire tails of the inner coil so that 180° rotation is satisfactory.

The variometer took me two hours to make and seems to work extremely well, although I think a slow motion drive would be an asset. I am about to build an a.t.u. of the p-tank unit type and will use this variometer in place of the tapped coil.

PW

"DON'T 'BOTTLE UP' YOUR IDEAS...BUILD THEM INSTEAD" SAYS DENNIS G3EAY