VHF ATU Homebrew Design

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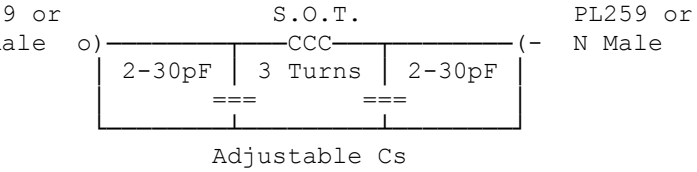
To : TECH@WW

Hi readers. (Updated Aug 05)
This is for use at those times when after setting up a /P (demos) station there is no time to sort out why the SWR is not quite right!

For VHF wire aerials where the Z is not around 50Û, see my bul on a 2M full wave loft dipole for the wire trombone matching system.

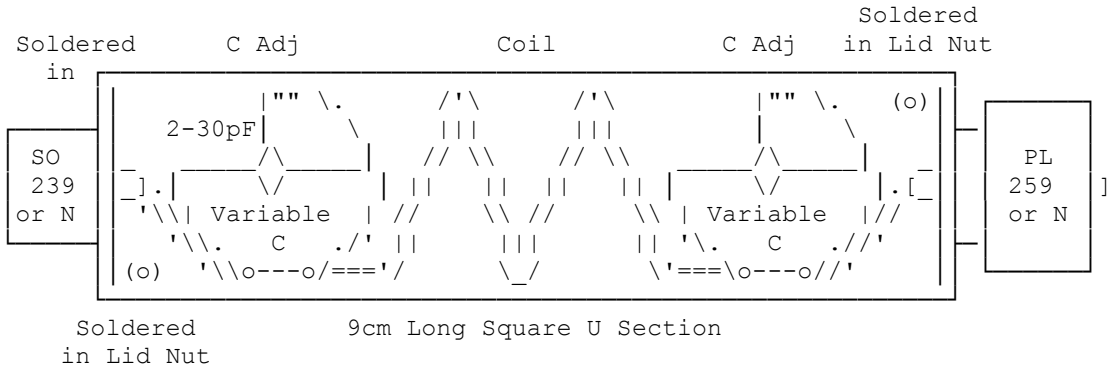
CIRCUIT
This is quite a straight forward pie section design using 2 variable air spaced Capacitors & a select on test coil between them.



The value of the variable C will need to be smaller than 30pF for higher bands eg. 220MHz, & as large as 100pF for 50MHz, if a good impedance matching range is going to be obtained.

By using a SO239 & PL259 or Female & Male N types for connections, adaptors are not need.

ATU LAYOUT



The box needs to be just long enough for all the components. I found that a square tube of the size of the square end chassis mounting SO230 was OK, but it was tight for the Caps. That is 9cms x 2.4cm x 2.4cm (3.6"x1"x1")

CONSTRUCTION
1/ Make a chassis PL259 or N plug by mounting a cutting down standard large cable plug & soldering it onto a cut down square SO239 base (or brass plate 1"x1") (see 5).

2/ Cut a sheet of thin brass/copper/tin can 9cm long to form the U section of the body.

3/ Bend into a square section U shape using a vice & a 1" former & a hammer.

4/ Punch/drill the fixing holes needed in bottom of U section for the 2 variable caps, making sure there is room for full vane rotation.

5/ Tin the ends of the U section ready to solder in the 2 connectors. Clean up the connectors ready for soldering. If the connector insulation is of the easily melted type drop water onto the inner while soldering. Use a hot small blow lamp if you don't have a huge electric iron, & solder the 2 connectors in place. Once done this gives a very strong U section box.

6/ Bolt in the 2 caps making sure the rotary vanes are well earthed. Wire the stators up to the external connectors with thick wire.

7/ In the corners, solder in 2 nuts to attach the lid.

8/ Make a lid using some more of the sheet metal 9cm long, but allowing for a 3mm fold over top & bottom to go out side the U section. Cut & fold it to make the shallow U section as before. Punch/drill 2 fixing holes to align up with the 2 soldered in nut locations.

CONTROLS
My capacitors had only screwdriver slotted ends, but I glued on 2 small knobs (e.g. toothpaste tube caps??) & marked them with max & min C positions.

COIL SIZE
This is found on test by setting the 2 Cs to halfway & trying different coils of fairly thick copper wire between the two caps until the SWR is OK into a good load. This gives you the optimum SWR adjustment range centred around 50Û.

INEAn aerial SWR of approximately 3:1 can be matched on 144Mhz, 2:1 on 70MHz
1.5:1
on 50MHz with 30pF capacitors.
Another benefit is that the Tx harmonics are reduced through the ATU as well as giving Rx protection from higher frequencies you may be using such as 432MHz.

Insertion loss should be quite low say 0.2dB, & power handing is 400W PEP SSB (Contest tested!). But this very much dependent on the thick wire used & air spacing gap of capacitors, as well as SWR in use. eg 250V @ 4A RMS ?

Why Don't U send an interesting bulletin?

73 de John G8MNY @ GB7CIP