

# G3EJS portable antenna for the IC-703

Following a comment I have received several emails requesting details of my antenna, so I have very quickly put this together, not very good, but sufficient for anyone interested to build one.

## Aims

To operate on 40m, 20m, 15m, 10m and 6m initially

To be able to be tuned by the IC-703 internal tuner under all conditions without adjustment

Cheap and made from easily available parts.

No telescopic whips to fiddle with

One control, no separate counterpoise adjustment

Variable configurations, hang from tree or building, use on "picnic table", use with a single vertical support, use out of an upstairs hotel/B&B window.

Quick to set up

Repeatable construction without fiddling

Light and relatively easy to carry

Not being impressed with the performance obtained for the price to be paid for commercial answers to portable operating, I decided to try and make something that suited my requirements.

For locations where there is sufficient space and suitable supports, a nest of dipoles fed through an air cored balun is my preferred antenna, so this antenna is intended for locations the dipoles are not practical.

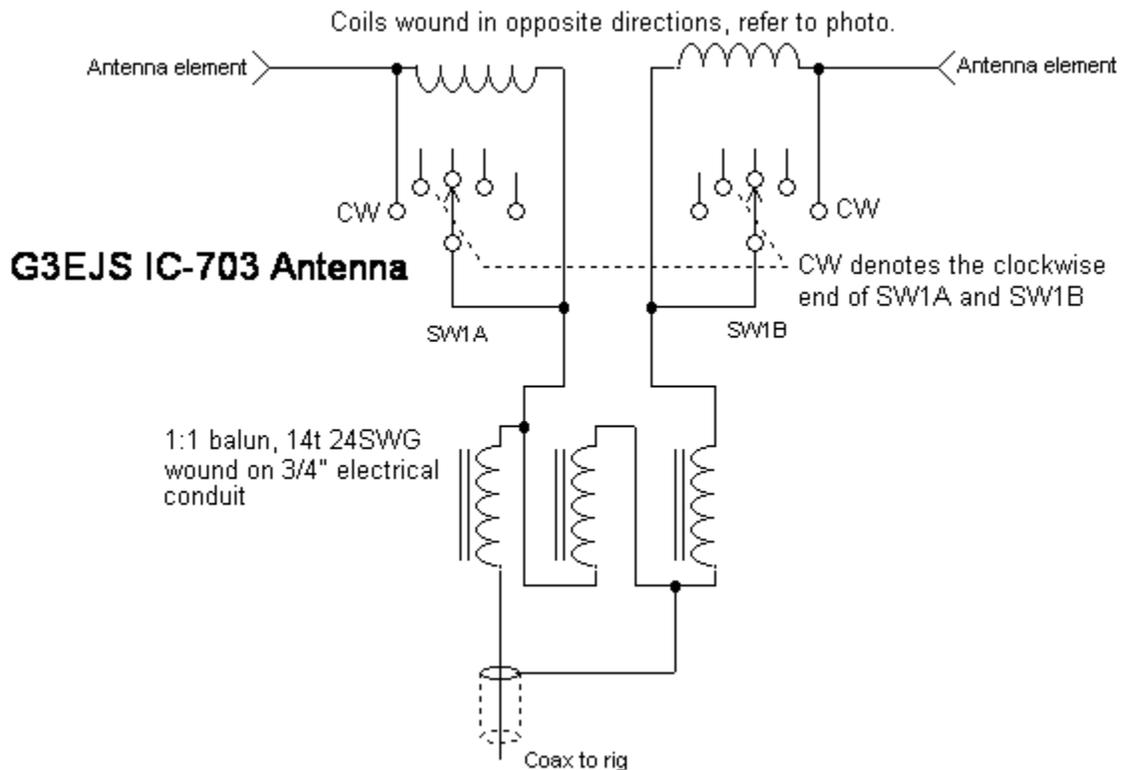
I tried various loaded random wires, and none gave repeatable results, changing position would take the impedance outside the range the 703 tuner would match.

Back to the dipole idea, but make it smaller.

The final idea is in effect two base loaded "whips" joined together at the centre and fed through a 1:1 balun.

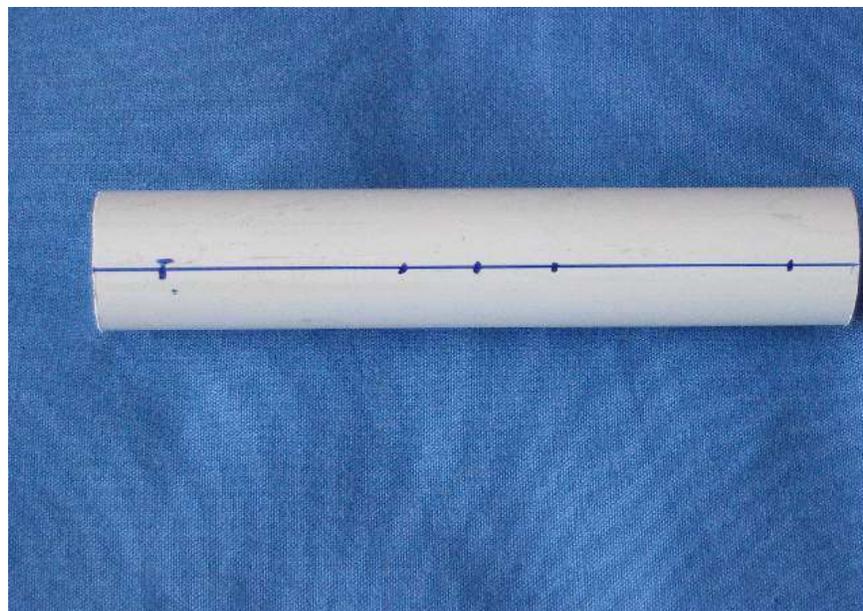
The antenna is based on a 10m dipole with base loading coils switched by a two pole rotary switch, to give resonance on 40m, 20m, 15m and 10m with 6m resonance obtained by unplugging a section of each leg of the dipole.

Three coil assemblies were built before I was happy I was as close as I could get to a good match on each band while using a whole number of turns on the coil.



The diagram is straight forward, but remember that the clockwise position each part of the switch goes to the antenna element end of the coils.

The construction details are going to be pictorial until I get round to making decent drawings.



First stage is to cut a 100mm length of 20mm OD conduit, and then mark the centre, and from the centre points 10mm and 42mm out from the centre. Then drill 0.8mm holes through the four outer marks. (ie not the centre mark). Drill right through both sides of the conduit.

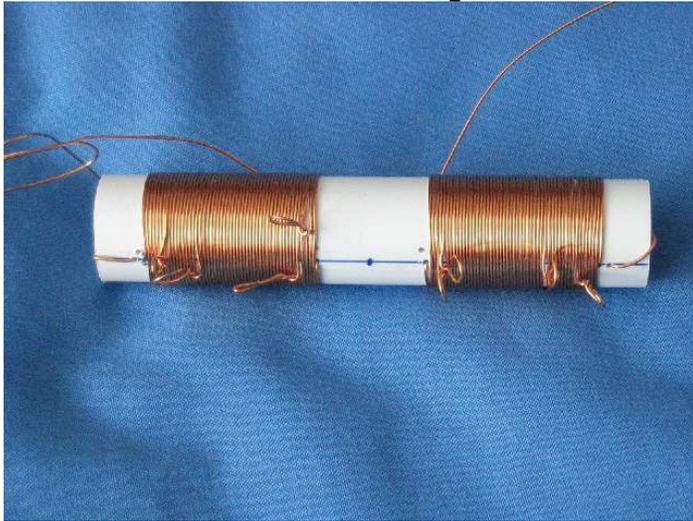
Then using 0.6mm enamelled copper wire feed the end through the outer holes and wind coils with taps at 7 turns and again at 16 turns. Then continue winding until you get to the second hole. Unwind four turns and make a tap, then wind two more turns and make another tap, you should then have two more turns until you cut the wire and feed the end through the inner holes, making a tap at the point the wire goes into the hole.

The band positions starting from the outer ends of the coils (where you started winding) are 0t (end of coil ) 10m, 7t tap 15m, 16t tap 20m and the last three are for 40m, select the one that works best under the conditions of use. (I didn't count the turns from the 16t position to the centre of the coil, just wound the 32mm length of the coil)

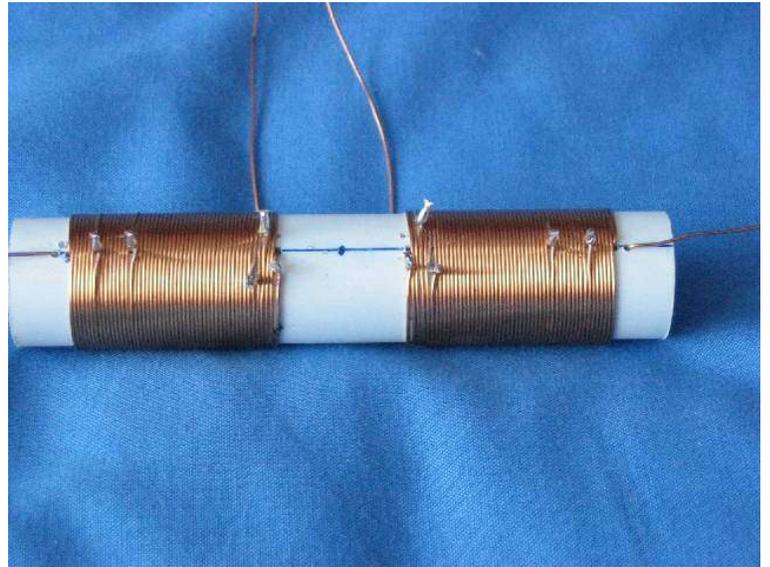
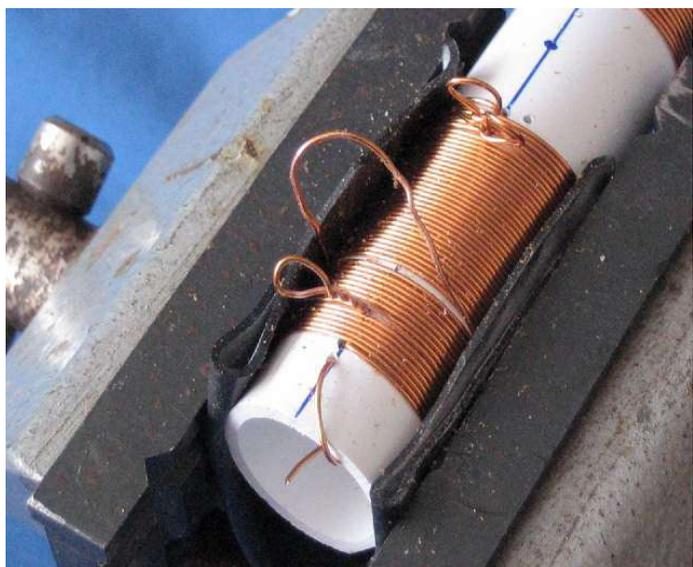
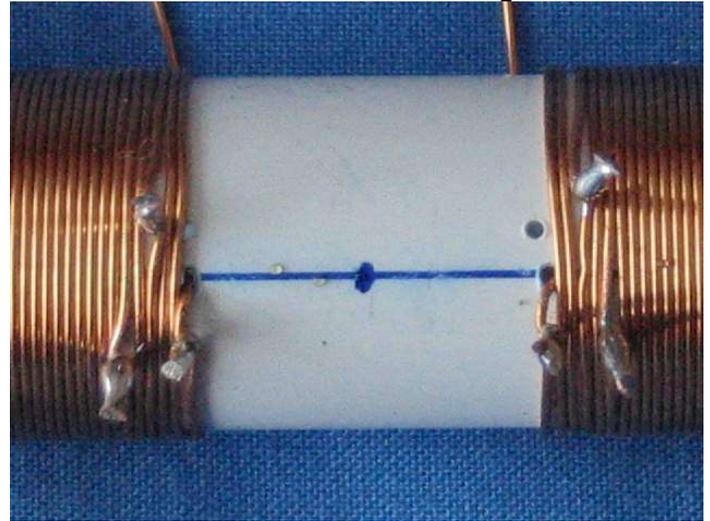
When making the taps, don't bother about making them look neat, just enough to hold the wire in place while winding the coils.

The two coils should be wound in the opposite direction to each other, the ends of the coils should both come from the bottom or top when looking down on them.

You should then have something like this:-

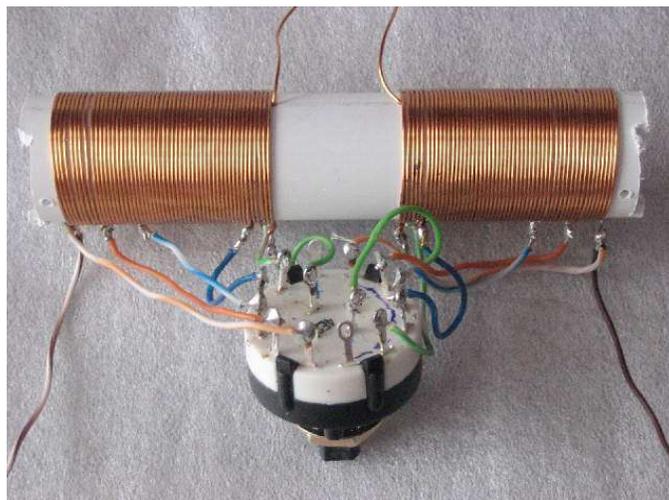


Notice direction of winding:-



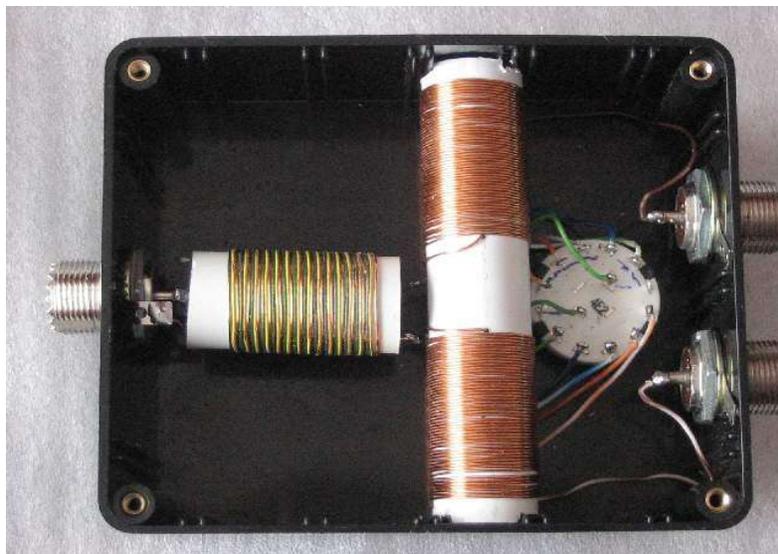
Once you have finished winding the coils, hold them in a vice with something to protect the enamel (I used a piece of bicycle inner tube) and one at a time, open up the taps, clean the enamel off the wire, and re-twist the taps making a neat job of it this time.

Connect up a 2 pole 6 way switch so that the most clockwise position of the switch will connect to the outer ends of the coils, the most counter-clockwise position to the inner ends, and the taps inbetween to the other positions. Make sure the switch is wired correctly.



Mount the coil, switch and balun in a suitable box, connecting the ends of the coils to suitable sockets for the dipole legs (I used SO239s, as I drilled the PL239's to take a key ring to accept nylon cord when using it as a "wire dipole") and the inner ends of the coils to the balun.

The balun is a trifilar 1:1 balun wound on the same size conduit as the coil, and I used about 14 turns which works well from 5Mhz to 40Mhz and acceptably on 52 Mhz (1.2:1 SWR)



Why use SO239 connectors when all I'm connecting is wire?

One convenient use of the antenna is to string from a tree or building, which would pull out banana plugs, and separate the parts of the antenna elements.

I drill the rear section of the PL259, put a sturdy keyring through it and attach some kite line, which then acts as the support and takes the strain. The wire elements are then fastened to the kite line.

Tuning is straight forward.

With the switch in the most clockwise position:-

Firstly start with a length of about 1350mm connected to each leg, and tune for best SWR on 51Mhz. (They will end up about 1250mm long, depending on the size of box you put it into, and of course the surroundings when you tune it)

Then fix an automotive bullet connector to each leg,

Take two pieces of wire of 1350mm and attach bullet connectors to plug into the ones above. Plug these two extensions into each leg and trim for best SWR on 28.5Mhz.

The next two switch positions anti-clockwise are the 15m and 20m positions, ie the 7 turn and 16 turn taps.

The SWR on these should be well within the range of the 703's tuner. Both on mine were under 1.5:1 at 21.2Mhz and 14.2Mhz

Then set the switch to one position from the most counter clockwise position (2 turn tap from the inner ends) and in this position short turns out just above the 4 turn tap from the centre until you have a low SWR on 7.05Mhz.

I shorted three turns and had a 1:1 SWR at 6.999Mhz.

You will then have 2 turns up and two turns down from this to play with as things like radiators, cars, people etc make quite a difference to the matching on 40m

How do I use it?

My favourite method is on a 4m telescopic fishing rod, I attach the box just under half way up with elastic bands, then extend the top two sections and attach the top leg to the tip with an elastic band, and just let the bottom leg hang down, or move it slightly forward to form a vertical "V". Takes about two minutes to set up.

In the back pack, I use a 3m (three sections of the 4m rod) attached to the back pack, with the box in one of the side pockets, and trail the bottom leg (only about 1.5m of it is on the ground)

(I now have the bottom leg zig-zaged on the back pack and it works fine)

I have tried it with two three metre rods stuck out of a window, and without any rods with the wires supported on nylon cord from a tree or building.

I also replaced the outer wires with a shorter wire attached to a 1m telescopic whip, which could then fine tune the SWR, OK for 817 owners, but not needed for the 703.

## Improvements?

The outer sections of each leg could be replaced by other lengths of wire to work other bands, or the extensions could include loading coils for other bands such as 60m.

6m could be covered by switching a capacitor in series with the dipole legs instead of the coil, then it you would not need to remove the extensions for 6m.

More taps could be added to cover more bands.



The completed unit



Attached to a fiberglass fishing pole for vertical use