

Burnham Beeches Radio Club

Construction Notes for 2M Tape measure Yagi

Parts List:

1. 70 cm boom with brackets and lid of diecast box attached
2. 4 lengths of tape Reflector ~~116~~^{105 cms}Cms, Director 90Cms and driven element 2 X 45 Cms drilled but ends of driven to be sanded/scraped to take solder
3. 5 M of RG58 coax.
4. 3 X 9-10 cm lengths of narrow tube drilled
5. 3 X 10 cms curved drilled (cradle) brackets
6. 4 X small and 2 X larger tiewraps
7. diecast box plus 4 lid fixing bolts
8. pack of 6 X M3 25MM bolts with nuts
9. 2 X sub min DPDT switches
10. 6 resistors - 390 Ohm, 100 Ohm, 82 Ohm (X2) and 56 Ohm (X2)
11. 2 X grommets
12. 2 X strips of white sticky velcro
13. bit of wire for the hairpin matching circuit.
- 14 Solder tag for earth line
- 15 some insulated hook-up wire
- 16 small 11 hole by 4 hole veroboard

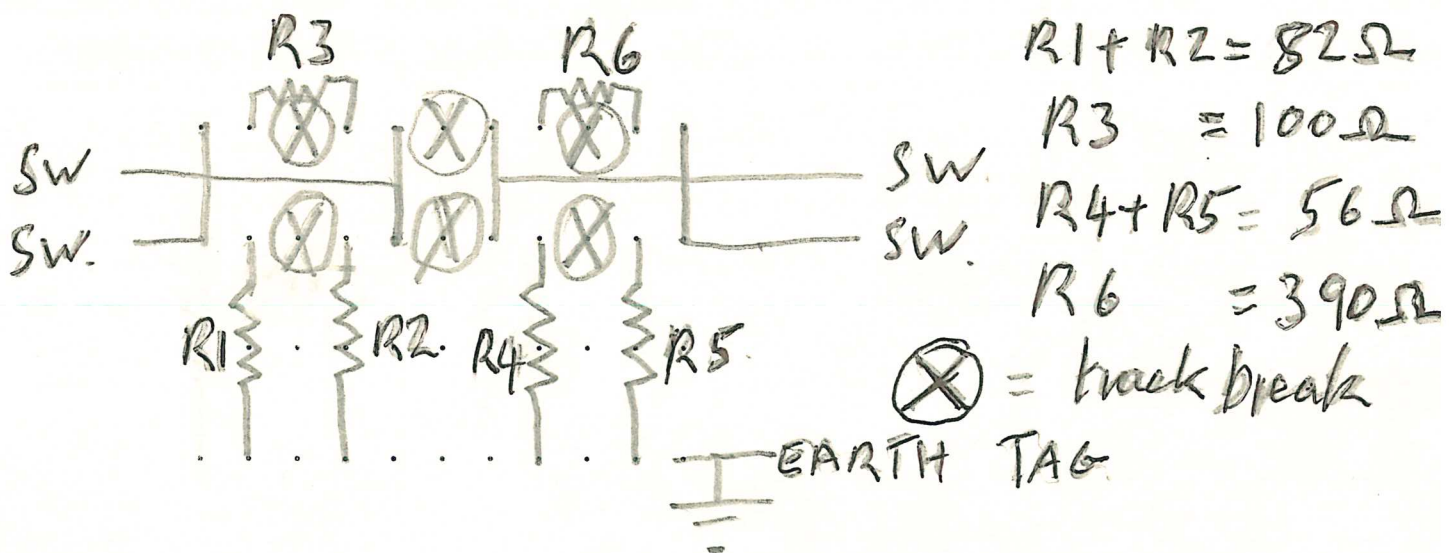
Method:

For the attenuator see attached separate instructions and paragraphs 9 and 10 below.

The resistors can be mounted directly to the switches, or you can use the piece of veroboard provided.

If using veroboard you will need to use a link wire to link the 4 blocks of 2 x 2 holes to give three holes for attaching eg. in the case of the first block R1, R3 and the switch.

The first stage of attenuation will be a bit more than 12 DB as I have used a higher resistor for R3 and slightly lower resistors for R1 and R2.



Construction of Antenna

1. Mount the reflector (116 Cms) and the director (90 Cms) at either end of the boom (the director goes at the very end whilst the reflector is about 17 Cms from the other end).
2. Use 4 of the 25mm bolts plus nuts , and 2 each of the cradles and the narrow tube sections items 4 and 5. The drilling was all done by hand so it may be necessary to redrill some of the holes if the sections do not exactly fit (I will bring a drill).
3. If the elements are not quite level with each other, I have some thick sticky tape to wedge the element up as needed.

4. Cut about 93 Cms of the RG58 coax from your 5M length and then leaving about 5 Cms free at the end next to the driven element for connection, which you should now strip, wind 8 turns of this short coax tightly round the boom and secure with tape.
5. You should then have sufficient length at the free end pointing towards the diecast box to take it into the box through the grommet and connect it directly to the attenuator circuit.
6. when soldered in use 2 of the small tiewraps on the inside next to the grommet to secure the coax from being pulled out.
7. Clean off the paint on the back of the driven elements (45 Cms) beyond the fixing holes to enable the coax and the hairpin to be soldered to the back of the tapes.
8. The hairpin is formed by using about 13-15 Cms of wire either bare or insulated in a small half loop directly across the elements. This is likely to need adjustment for best SWR.
9. When all soldered, mount the two driven elements to the bracket in the centre of the boom in the same way as for the reflector
10. Strip about 4-5 cms from the longer coax and then pass it through the grommet at the other end of the diecast box and attach the centre conductor to the centre pole of the switch which is connected to the 390 Ohm resistor ie the second stage of attenuator.
11. The screen of the coax goes to earth on the veroboard or to the earthy solder tag under one switch.
12. Note that the two switch connections on the other side from the resistors are shorted together to give a

straight through signal path when the attenuator section is out of circuit. Likewise, the centre poles of the switches nearest each other are shorted to put the switches in series.

13. Fix an appropriate plug for your rig to the other end of the coax.

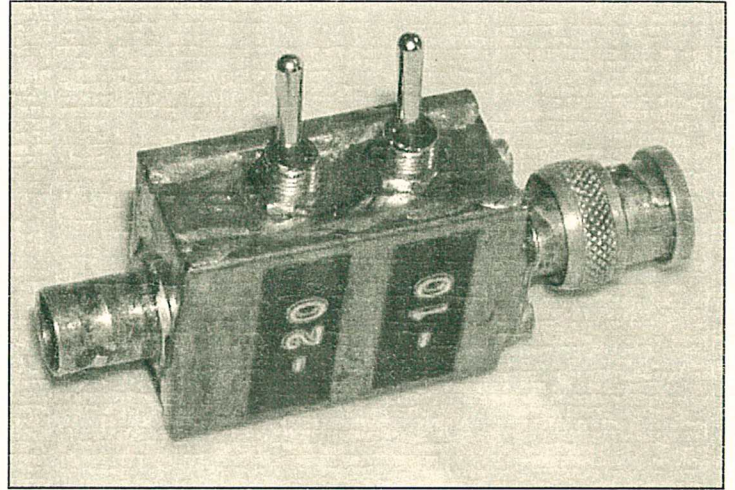
14. The antenna when adjusted correctly for minimum SWR should give you 7-8 dBs of gain and so is a useful add-on for a handitalkie to give you extra range. I worked the contest site at Basingstoke from outside my house at Farnham Common on my Wouxon with this type of aerial on simplex.

15. Happy foxhunting.

⊛ Probably optimistic!

Construction of Attenuator

- 1 Suitable for fox hunts at 144mhz
- 2 Good screening
- 3 Attenuation selectable to suit S meter on radio
- 4 Easy to make with no special tools
- 5 Low cost approx £5.00 if parts have to be bought



One of the most essential tools required to perform well on 2 meter DF hunts is a good-switched attenuator to reduce the RF level received within the range of the radio S meter to enable peaking of the incoming signal.

I have now built three attenuators and have found a two-way PI-network unit to be the most practical with 10db and 20db switched attenuation. This gives three settings up to a maximum of 30db. Previous experiments suggest that greater attenuation ahead of a handheld radio typically used on DF hunts the incoming signal would bypass the attenuator anyway and get straight into the rig through the plastic case. Pi-network configuration was chosen rather than T-network as Pi gave a smaller neater unit with less lead lengths. The chosen attenuation values were selected to give optimum performance with the dynamic range of the LCD S meter in my Standard C500 handheld. I tried various values by experimentation and found a value that when the S meter was just hitting maximum, switching in the lowest value reduced the S reading just above minimum so further peaking of the incoming signal could be done. This is what I refer to as the dynamic range of the S meter. This arrangement gives four ranges of hitting full scale on the S meter with just two switches!

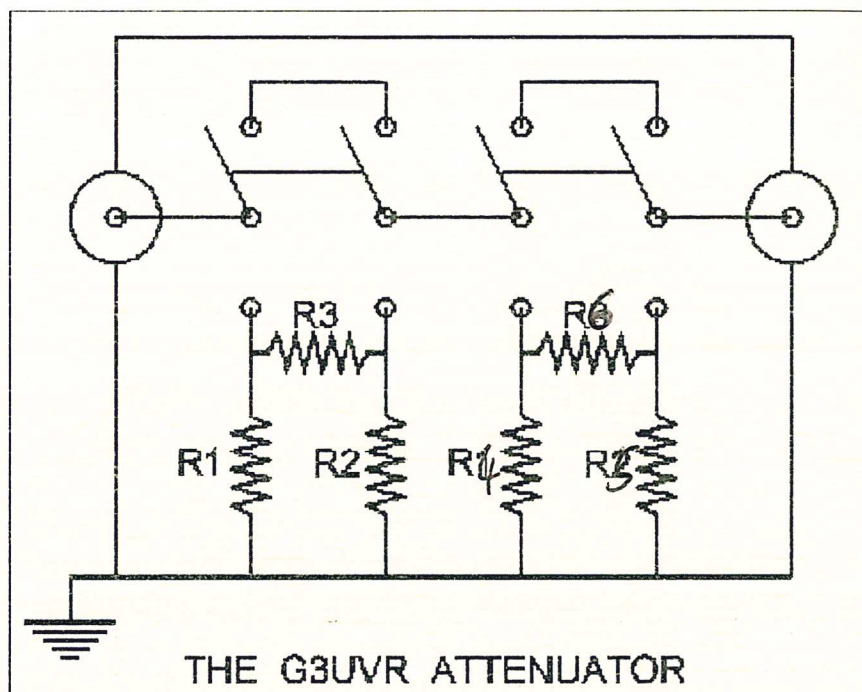
Parts required are a chassis BNC plug, chassis BNC socket, 2 DPDT (double pole double throw) toggle switches and 6 resistors values selectable to suit the dynamic range of the S meter on your radio. The box was made as small as possible out of double-sided PCB and an old Duckhams oil can cut up and soldered to the PCB to complete the screening. The overall size of the finished housing is unit is 37mm 27mm 17mm excluding sockets and switches. This enables the input and output connectors to be directly soldered to the switch poles and keeps all leads as short as possible. If a chassis plug is used this means that you don't need a patch lead to connect it to the rig. Connectors can be chosen to match the rig in use.

Cut the top, bottom and ends out of double sided PCB and drill the holes for the switches and sockets.

Solder your chosen R3 resistors and the shorting links on the back of the two switches and fix to top PCB. The ends can now be soldered in place and the input output connectors fitted and soldered. The bottom piece of PCB can now be soldered into place and the R1 R2 resistors fitted as shown in the picture. The open three-way attenuator shown in the photographs containing three, six and twelve db steps was built for the purpose of varying the Tx RX drive to a transverter but other wise is the same construction as my two-way DF unit. I used tin snips to cut up an old oil can to make the side screens. After degreasing and when you are happy with your chosen attenuation values solder the sides on to the PCB frame to complete the screening.

Table of resistor values for Pi network 50ohm attenuator.

	<u>R1</u>	<u>R2</u>	<u>R3</u>
3db	292	292	18
6db	150	150	37
10db	96	96	71
12db	84	84	93
15db	72	72	136
18db	64	64	195
20db	61	61	248
24db	57	57	395



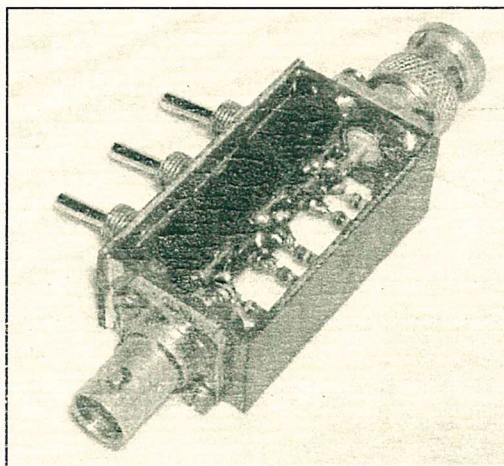
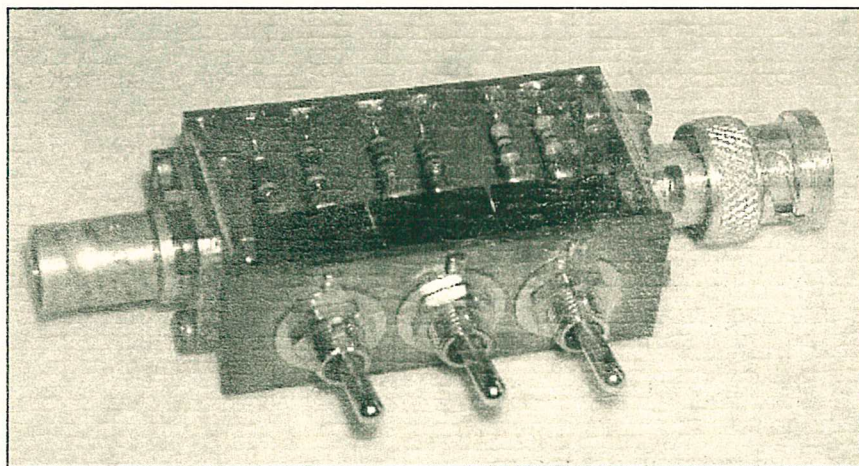
Use the nearest preferred values available e.g. in the case of 10db use 100 ohm instead of 96 and 68 instead of 71. It does not matter that it ends up as 9.6db and 51.9 ohms impedance.

Now this construction page has been added to the clubs web-site it is hoped that other members may upload articles about their home construction that may be of interest to others locally or further a field.

In a future article a "sniffer" will be described for use when within 100 meters of the fox.

My thanks to Colin G3RLA who kindly took the photos

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