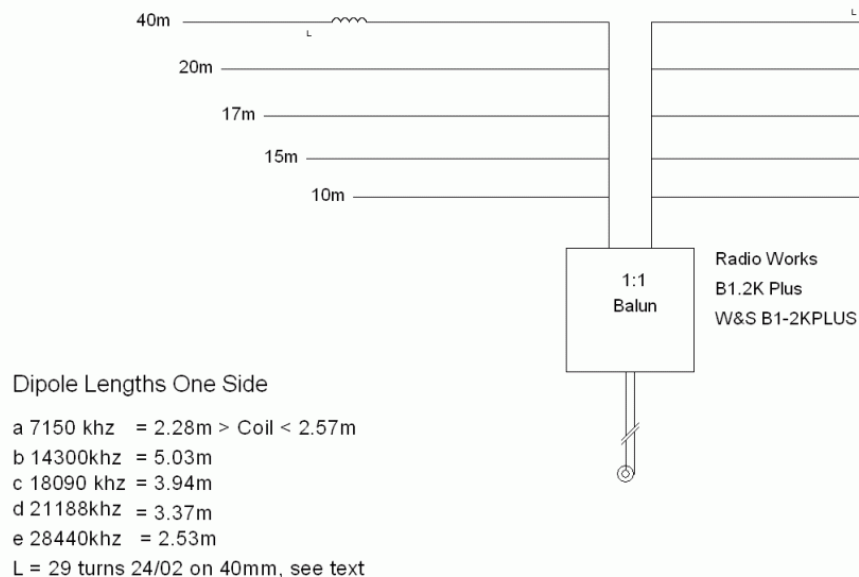


QRP Fan Dipole Multi-band MOWYM



Title Fan Dipole For Loft		
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		Sheets 1 of 1

The object of the exercise was to produce an aerial that would allow me to operate from 40 metres to 10 metres, specifically 40, 20, 17, 15 & 10 metres. The antenna was always going to be mounted in the attic as no external antennas are permitted at my QTH, the attic allows the antenna to 'beam' roughly northwest / southeast and the house is some 40 feet above sea level. Construction would be simplified by the fact that I intended to run a maximum of 10 watts which means that the antenna wires can be simply attached to the rafters. (Click on images for a larger version.)

The attic is just about 10 metres long, just short of the length needed for a 20 metre dipole so for that band around 250mm was bent down the rafter at each end before tuning. Obviously there is no room for a normal 40 metre dipole and I made full use of the design of [GM4JMU](#)). In my version I have made the coils from 29 turns of 24/02 PVC covered wire tightly wound on 40mm diameter PVC pipe. Both coils should be made as identical as possible (the dark strips are lengths of double sided tape that help to hold the wire while winding the coil). As can be seen, the 40 meter dipole runs along the apex of the roof, below that the 20 metre dipole is followed by the 17, 15 & 10 metre dipoles.

Rather than make my 1:1 balun I forked out for a commercial one, see diagram for details, and it's structure made for easy mounting. In order to terminate five dipoles I used two pieces of single sided PCB each drilled to accept six M4 bolts and a further one to connect to the balun (the sixth was added for further experimentation). Each wire making up the dipoles was crimped which made



attaching to the bolts secure and simple.

Horizontal spacing between each dipole was approximately 150mm and wires were attached to every other rafter using plastic headed staples. The ends, after tuning, were terminated with old fashioned galvanised staples. Please remember that I am only running a maximum power of 10 watts and would not suggest that these mounting methods be used at higher powers.

After assembly, the antenna was tuned using an MFJ-259 SWR Analyser connected to the balun by approximately 1.5 metres of coax. Starting from the the lowest band each dipole was tuned for resonance, see [Table](#) for detailed measurements. It will be seen that the results for the 40 dipole are not too good with a minimum SWR of 2:1 at resonance and that does need to be looked at. (It is still very early in the life of this antenna and I will put up actual working results over time so that some idea of it's effectiveness can be determined.

The ICOM IC-703 is very happy with the antenna and, after tuning, indicates a SWR of 1:1 on 40, 20, 17 & 15, on 10m the SWR varies from 1.3:1 at 28.100 MHz to 1.1:1 at 28.800 MHz and 1.4:1 at 29.000 MHz to 1.1:1 at 29.650. In spite of the fact that the MFJ-259 puts the SWR on 80m in the red zone the 703's ATU gets it down to 1.4:1. At 50 MHz the SWR is 1:1 from 50MHz to 51.6 MHz.

Results

Reception: The antenna is lively on all HF bands with the exception of Top Band which is hardly a surprise! For example, today (May 13th, 2007) on 17 metres I have heard Japan, Malta and Brazil. Last week I heard Costa Rica on 80 metres and Cyprus on 15 metres. Not heard anything on 10 metres as of the time of writing (see below). Twenty metres reception is very good and I got to hear some good DX through some pretty awful pile ups! Overall, I'm pretty pleased with the level of reception using the fan dipole.

Transmitting: I only recently got my licence and have not made many contacts but I seem to be averaging reports 5-7 into Europe on 40, 20 & 17 metres. Countries include Slovenia, San Marino, Italy, Moldova, Russia and the Netherlands. It's far too early to make any conclusions on the overall performance on HF as conditions have been pretty bad this weekend but it does appear that the fan dipole works best on 20 metres which ties in with the flat SWR I measured on that band. Given that we are at the bottom of the sunspot cycle I expect great things of this antenna in the next couple of years! Some more results [here](#) (PDF file).

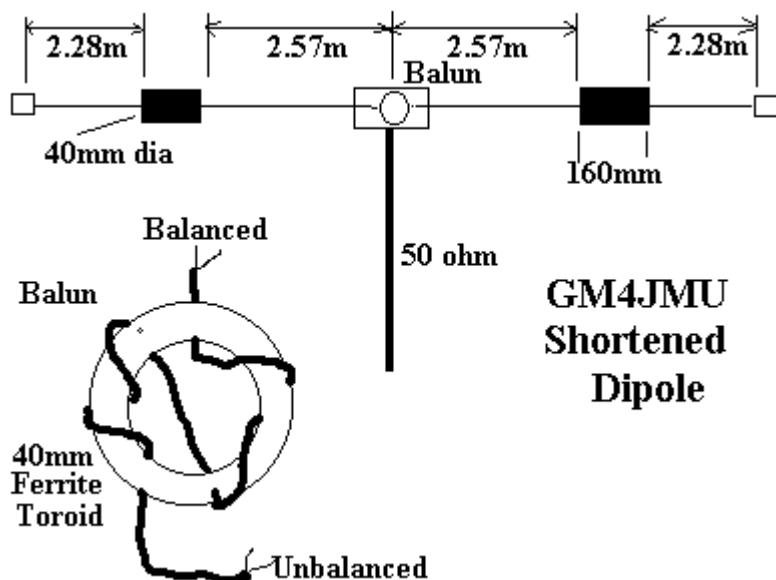
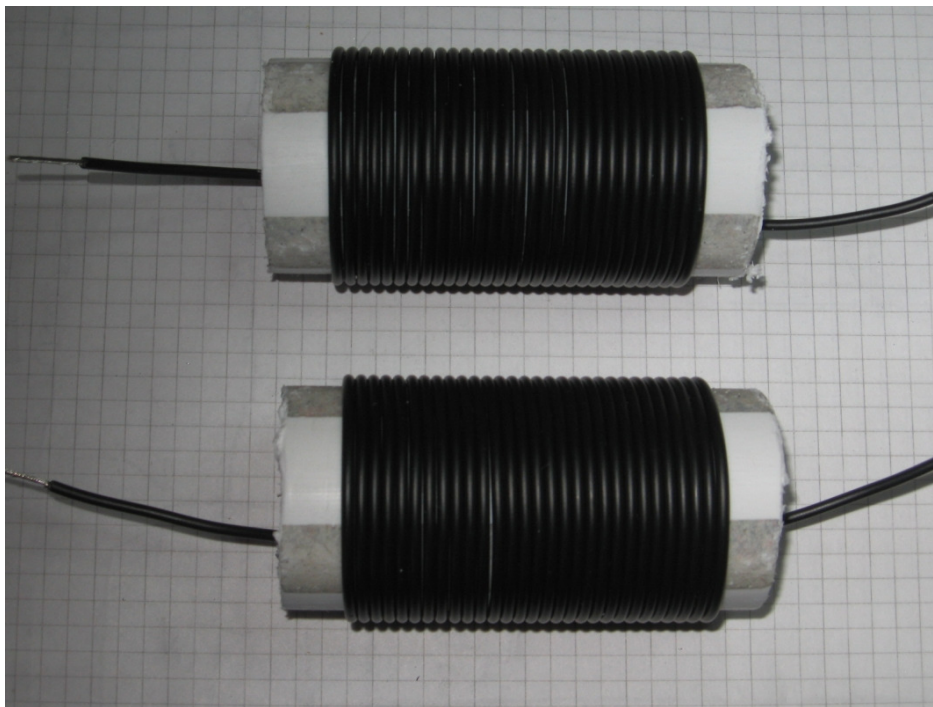
On 80 metres the fan dipole works fine on reception and will put out a signal on 80m but it's pretty useless with low signal reports so I will be looking at some other way of working on 80m. Given that my QTH is a first floor flat I am not too keen on strapping the coax and loading that on 80, perhaps I'll try a slinky dipole.

Updates:

During the recent six metre contest (June, 2007) I discovered that one of the elements of this antenna radiates pretty well on that band! I have been getting reports averaging 5-7 and have worked stations in Spain, Italy, Croatia and the UK. It looks to me as if the 17 metre element third harmonic resonates around 54 MHz and that is near enough to put out a reasonable signal.

Overall, the antenna is getting out a reasonable signal across the bands and this week I got good reports on 10m FM from Sweden and Denmark. See the [log](#) for recent contacts using the antenna. A 10 metre opening on the morning of June 24th saw my first contact outside of Europe (just) with a 59 from CN4P (1950 kilometers), as of August, 2007, I have worked 25 DXCC entities on ten. The antenna also got me 58 on 12 metres from France, not so far but not bad considering the aerial was never intended to work on 12!

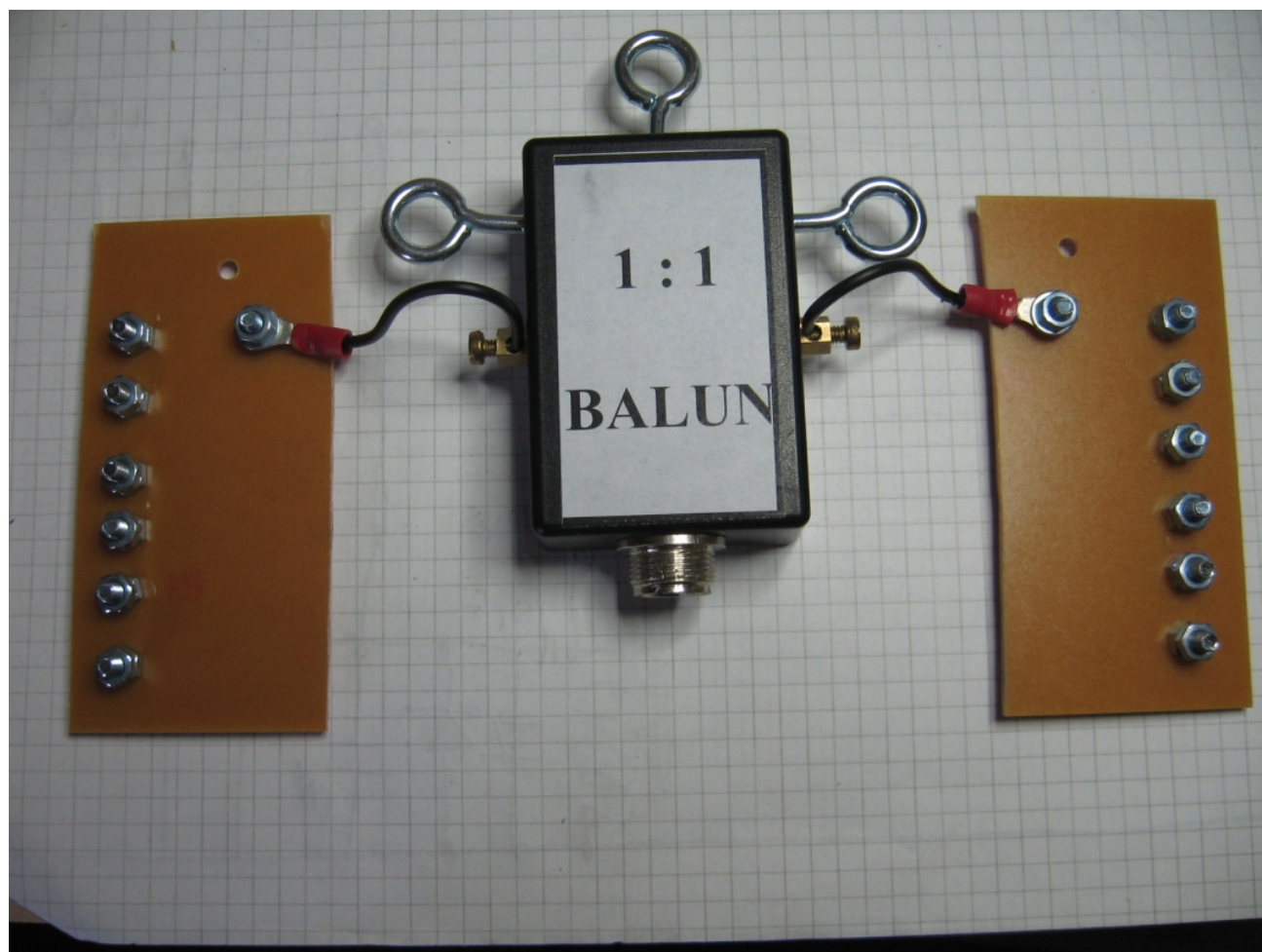




To construct each side of the antenna proceed as follows. Cut a 10.25 metre length of 24/0.076 insulated wire, and a 160 mm length of 40 mm o.d plastic tubing (white plumbers tubing). Measure a 2.75 portion of the wire and attach the wire to the plastic former. Wind 40 turns of the wire onto the plastic former, and firmly secure the end of the winding. Make the other half of the antenna in the same way. Attach the ends of the 2.57 metre sections to a suitable centre insulator, which should also mount the choke balun, connect the 50 ohm coax, then carefully waterproof the whole assembly.

The choke balun uses RG174AU coax and a 40mm Ferrite Toriod.

Once the antenna is erected adjust it to resonance on 7.030Mhz by folding back the ends, and adjust the length to provide minimum SWR.



Loft Mounted Fan Dipole, Coil Loaded For 40 Metres

Please note that this file opens fine in Firefox, Opera and Konqueror.

Internet Explorer garbles the text above the tables.

The file is an export from OpenOffice of a spreadsheet and strictly conforms to W3C standards.

If you are using IE and the page is badly rendered please complain to M\$ - better still get Firefox!

	RES in Loft Mhz	Res at TX Mhz	SWR	B'WIDTH SWR=1.5:1	B'WIDTH SWR=2.0:1	B'WIDTH SWR=2.5:1	B'WIDTH SWR=3.0:1
40 Metres	7.103	7.150	2.1:1	--	--	7.096 – 7.208	7.058 – 7.241
20 Metres	14.240	14.300	1:1	14.026 – 14.630	13.790 -- 14.850	--	--
17 Metres	18.118	18.090	1.2:1	17.900 – 18.470	--	--	--
15	21.220	21.188	1.5:1	--	21.030 – 21.380	20.930 – 21.530	--

Metres

10 Mts	28.380	28.440	1.4:1	28.370 – 28.490	28.250 – 28.630	28.160 – 28.760	28.000 – 29.930
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BANDWIDTH USING ICOM 703 BUILT IN ATU

	Mhz		
40 Mts	7.040	7.180	SWR=1:1
20 Mts	14.100	14.340	SWR=1:1
17 Mts	18.110	18.160	SWR=1.:1
15 Mts	21.150	21.400	SWR=1:1
10 Mts	28.100	28.800	SWR=1.3 – 1.1:1
	29.000	29.650	SWR=1.4 – 1.1:1

Measurements made using MFJ-259 SWR Analyzer. In loft using 1.5 coax lead from balun to MFJ-259
Coax feed to TX approximately 10m, almost vertical drop of about 3.5 metres.