

G3WSC
G6RC
GX3WSC

CARC News Bulletin

June 2015

Crawley Amateur Radio Club

Editor: John G4PEO

Meetings:

Every Wednesday: 8pm
Every Sunday: 11am -1pm
Formal events are on the last Wed of the month, 7-30pm for 8pm.

Associated Local Repeaters

GB3MH: 145.625MHz / 88.5 **GB7MH:** 439.6375MHz (D-Star)
GB3WS: 145.750MHz / 88.5 **GB3NX:** 430.850MHz / 88.5 (Input 438.450MHz)
GB3NS: 439.675MHz / 82.5 **GB7NS:** 439.1625MHz (DMR)

CARC Dates:

June 6th (Saturday)
Sussex Electronics & Radio Fair
June 24th (Wednesday)
Arduino Introduction M0WID
June 27th/28th (Sat/Sunday)
International Museums W/End
July 4th/5th VHF NFD
July 29th TBA (Wednesday)
Also of Interest/Other Clubs:
Crystal Palace REC
www.g3oou.co.uk
5th June: TBA
3rd July: 'Keep it Dry.' Prof Bill-ingham
Surrey Radio Contact Club
<http://g3src.org.uk>
15th June: Fix-It & Advice Clinic
12th July: 80th Aniv Garden Party
Sutton & Cheam & District
<http://scrs.org.uk>
18th June: CQWW 2014 - G4IRN
16th July: The Rosetta Mission.
Professor David Southwood
Dorking Radio Club
www.ddrs.org.uk
23rd June: Using an Oscilloscope
28th July: South Downs Evening
CATS (Coulston)
www.catsradio.org
8th June: DF Hunt
13th July: TBA

Sussex Electronics & Radio Fair
Eastbourne. (SERF) 6th June
<http://serf.org.uk/>
Newbury Radio Rally 21st June
<http://www.nadars.org.uk/rally.asp>

Updates to the CARC program check:
www.carconline.blogspot.co.uk
or contact John G3VLH:
[john.longhurst\(at\)hfcom.net](mailto:john.longhurst(at)hfcom.net)
News Bulletin items contact G4PEO:
[john\(at\)g4peo.net](mailto:john(at)g4peo.net)

Welcome to the June 2015 edition of the News Bulletin.

At last summer is virtually upon us; that's the good news... Unfortunately for some of us, it also a sign that compulsory grass and hedge cutting duties resume, to name but a few of the summer 'chores'.. Hopefully though, it also signals the return of external radio projects that can again be undertaken, such as antenna deployment, hopefully conducted whilst enjoying a reasonable chance of staying both warm and dry at the same time..! To that end this edition has a very interesting article on constructing a homebrew Cobweb antenna by **Bob, M0HQM**. Bob is very restricted in terms of space for antennas, so this article should appeal to the great number of us who are also in the same situation, but would like to have a reasonable chance of radiating a half decent HF signal, and as a bonus, for very little monetary outlay, something most radio amateurs have a reputation for adhering to!

The Cobweb has a deservedly good reputation as a very useful multiband HF antenna, that is small, lightweight, has the same performance as 5 full size HF band dipoles and doesn't require a rotator. So please take the time to read Bob's excellent article on how, through experimentation, he ended up with his version of the Cobweb.

A perusal of the events column on the left will show that, as summer has arrived, there are a number of events taking place involving **CARC**. We will be attending the inaugural Sussex & Electronics Fair (**SERF**) at Eastbourne in early June, where we hope to sell off some surplus equipment items, and later in June we are again participating in the **International Museums Weekend** event. This year it will be just for one weekend, and from a new location at the **Wings Museum**, between Handcross and Balcombe, as the Gatwick Aviation Museum are still undertaking renovation and building works.

In early July **VHF NFD** will be upon us, so please make a note of the dates, and see if you can help in any form, for which I'm sure **Mike GOKAD**, or **Alex, M1YAP**, will very pleased for offers of assistance.

Don't forget to keep an eye on the **CARC blog** for the latest info and any changes/additions to the meeting schedule.

Finally, if you are intending to go to the Newbury Rally, please note that repairs to the bridge at Junc13/M4 **will** affect your journey from/to the southeast. Diversion info: <http://www.nadars.org.uk/rallyroadworks.asp>

Club Dignitaries (Committee Members & Others)

President: Derek Atter (G3GRO)
Hon Treasurer: Howard Palmer (G4PFW)
Hon Secretary: Phil Moore (M0TZZ)
Programme Secretary: John Longhurst (G3VLH)
Committee Member: Alex Sheppard (M1YAP)
Shack Managers: Mike Davies (GOKAD), Rob Barter (M0ZAF)

Chairman: Keith Evans (G3VKW)
Vice Chairman: John Longhurst (G3VLH)
Exam Secretary: Phil Moore (M0TZZ)
QSL Manager/News Editor: John Pitty (G4PEO)
Training Lead Instructor: Malcolm Harman (G3NZP)
Committee Member: Richard Hadfield (G4ANN)

Calendar Items

Sussex Electronics and Radio Fair, (SERF), Saturday 6th June.

SERF is a brand new event being held in the recently built 1800 sq metres sports hall at the Eastbourne Sports Park. A small posse of CARC members will be heading south to the venue on the 6th June laden with surplus equipment that you might have noticed has been filling up the club room recently, but all for a good cause, as we hope to sell it on behalf of the club, and also for recently deceased members families.

For those intending to visit, further details can be found here: <http://serf.org.uk/>

An Introduction to the Arduino, David M0WID - June 24th.

The Arduino microcontroller created quite a stir when first introduced in 2005, and the interest was such that it now enjoys the support of a massive worldwide community, developing all sorts of amazing and diverse open source projects, including of course amateur radio based. Don't miss David's talk to discover more...

International Museums Weekend, Wings Museum, Bucklands Farm, Brantridge Lane, Near Balcombe, RH17 6JT - June 27th & 28th. 10am - 4pm each day. (Note only one weekend this year)

Following on from last years successful Museums Weekends at Gatwick Aviation Museum, this year, the Wings Museum have kindly allowed us to set up shop for the event in their dedicated radio shack, thanks to the

invaluable assistance of museum volunteer Barrie, G4OKB. The shack has the luxury of a mains supply, working vintage WW2 radios to admire, and, just as importantly, shelter from the wind which can make it's presence felt at times on the hill! We will again be running two stations, using the callsign **GB1WGS**. QSL cards will also be produced and a QRZ.COM page created. The 40m station will be employing the museums FT450 and existing wire aerial, whilst the 'HF' station will again make use of the CARC trailer mast/beam and FT1000.

If you would like to be involved in operating the stations, please contact **John, G4PEO**, or **Keith, G3VKW** ASAP. Just a reminder that this is definitely **not** contest style operating, and it would be nice to see as many members as possible take part, especially if you normally don't get the time or opportunity to operate HF but would like to!

The Wings Museum is only open at weekends, March to October, and if you would like to visit, further details can be found on their web site: <http://wingsmuseum.co.uk/index.htm>



Photos G4PEO



VHF Field Day - July 4th/5th.

VHF Field Day will soon be upon us once again. If interested in helping out in whatever way you can, the contest team would be delighted to hear from you ! Please speak to **Mike, G0KAD**, or **Alex M1YAP** to offer your services.

Previous Meetings & Events

Surplus Equipment Sale

Yet another successful evening, with a packed club house, and the proceedings ably managed by **Keith G3VKW** and **Phil, MOTZZ**, with **Richard, G4ANN** controlling the finances. Despite the amount of equipment for sale as can be seen on the LHS in the photograph, the 'auctioneers' are becoming just like 'old pros' as it was all done and dusted by 10-30pm !



Photo G4PEO

21MHz Four Square Antenna - Garth Swanson G3NPC

An extremely interesting talk was given by Garth detailing the procedures and maths required to ensure accurate phasing and matching of 4 steerable verticals on 21MHz. In particular it was very useful to see in detail the comparison between theory and practice and the subsequent compromises that had to be made as a result. Incidentally, Garth chose 21MHz because a similar array for the lower frequency bands wouldn't fit into his garden...

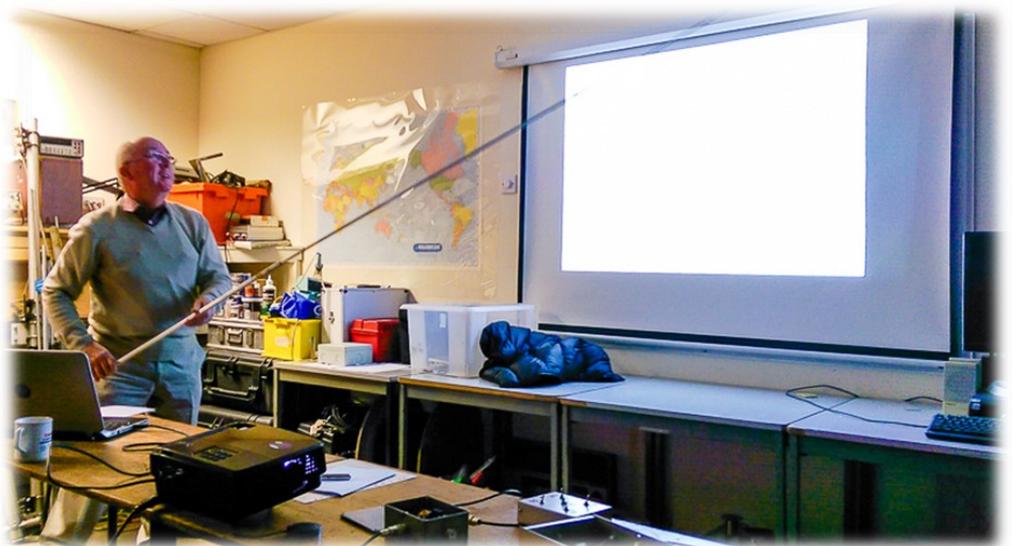


Photo G4PEO

As detailed in Garth's talk, further reading on the subject can be found in these publications:

- Garth Swanson, The Ground Mounted Quarter Wave Vertical Antenna, RADCOM, July 2011.
- Garth Swanson, A 21MHz Four Square Beam Antenna, QEX, Set/Oct 2013.
- Garth Swanson, (Realising) A 21MHz Four Square Beam Antenna, QST, Sept 2013.
- John Devoldere, Low-Band DXing, 2nd edition, ARRL, 1995
- Al Christman, Feeding Phased Arrays - an alternative method, Ham Radio, May 1985.

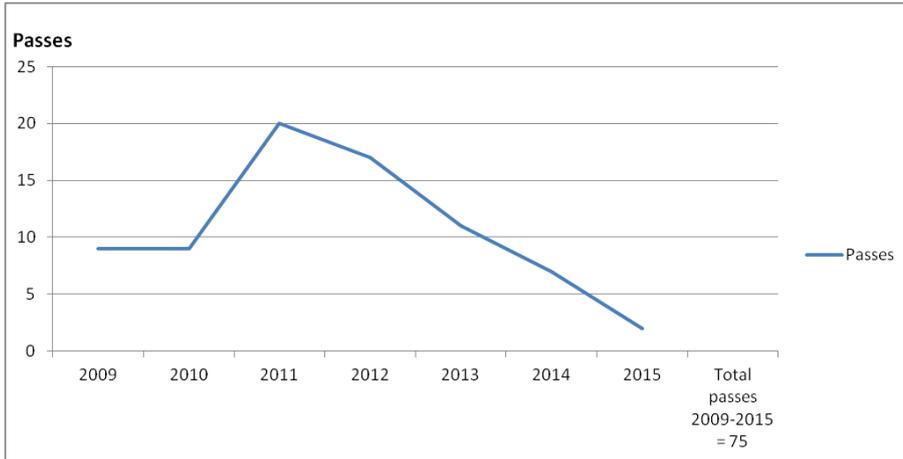
Member News

From **Derek, G3GRO**: **Lech, G3KAU**, was 94 in May. As well as a great home brewer on ham bands from LF to 10ghz in the past, he is also a great aero model builder. According to family info, he is building his next Dakota model, one type of aircraft which he flew for real as a commercial pilot during the Berlin Airlift after the end of WW2, during which he of course flew Spitfires & Mustangs for the RAF before coming to grief and finishing up in a German POW camp just after D-Day. Post-war he flew many aircraft as a commercial pilot before retiring from BA. Would you believe it but he is a great-great Granddad with 2 sons & 3 daughters !

Club News

Training Stats - Malcolm G3NZZ - Lead Instructor

Of the 50 Foundation passes over the last 7 years, 34% went on to Intermediate and 16% went on to Advanced. I understand from RSGB figures that this is above the national average.

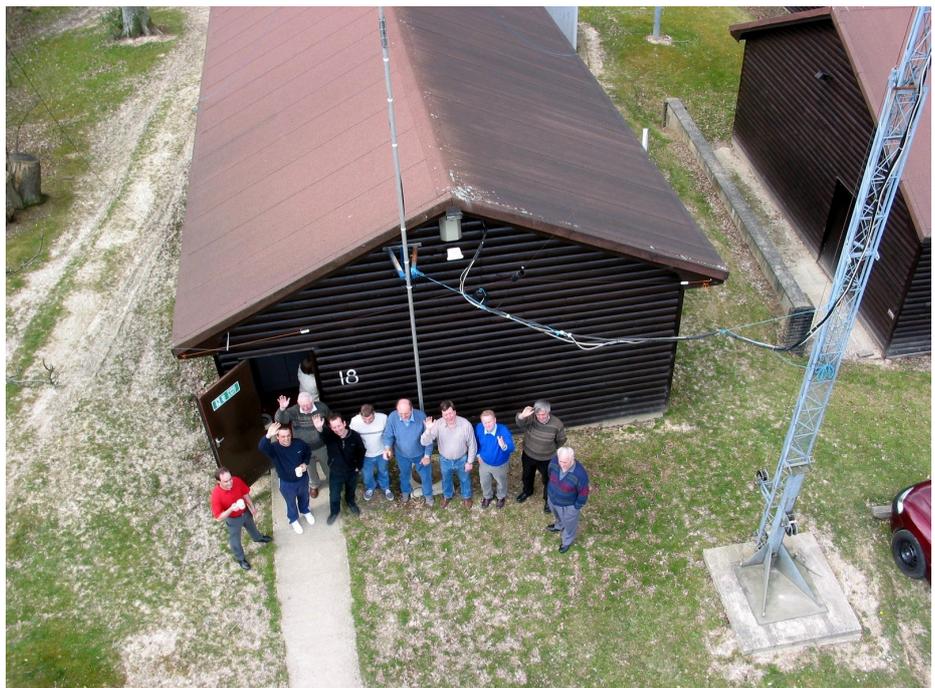


Demand for training at CARC peaked in 2011 but has slowly fallen away since then.

The RSGB have published the following: "About 3,000 amateur radio examinations are held each year and Carol [RSGB Exam Secretary] processes all of the paperwork. Part of her job is advising candidates whether they have passed or not and, thankfully, in 80 percent of cases its good news!".

Thus it would appear that nationally some 20% fail. Compare that with CARC figures, where although we have had 7 failures during my watch, 4 have gone on to retake and pass. So that would seem to indicate that only just under 4% of our students have dipped out, well below the national average.. 13 out of our existing 54 members have joined as a result of participating in the CARC training scheme, so it's also been worth doing from the Club's point of view.

**More CARC Vintage
Photography
Courtesy Adrian G3VJM**



A TALE OF TWO COBWEBB'S

M0HQM

Since I was issued with my M6 licence and progressed through to my full licence, I have been playing with various antenna designs to "get out there"; the first antenna installed was a 2/3 Windom which, with a little imagination fitted into my small 15' X 27' garden at 93m ASL up on the hill at Southgate. To the north and east I have an open view across Crawley and to the south and east the garden is surrounded by the block of flats I live in. The Windom proved to be more successful than I had anticipated as it was only 12' (3.5m) above the ground at its highest point and gave me QSO's as far a field as Vancouver and Israel. I then installed an end fed antenna driven through a 4:1 balun which I wrapped around the garden, again highest point was about 12' (3.5m) above the ground; this proved to be unsuccessful and was quickly ditched. To replace as it I installed a 33'(10m) G-Prowhip vertical roach pole antenna, this proved to be a great success allowing me to achieve QSO's into Indonesia and across much of the USA, however it was noisy with calling stations often buried in the noise.

I started to research compact multi-band HF aerials that would fit into my garden and also would not be an eyesore to my fellow neighbours.

Among the many criteria I looked for it needed to:

- a. Cover operation in five bands, 14, 18, 21, 24 and 28 MHz
- b. Be at or above 95% radiation efficiency on the above bands.
- c. Have low losses.
- d. Low Interference.
- e. Horizontal polarisation.
- f. Omni directional as I did not want to use a rotator, as I wanted to keep the weight down.
- g. Because of the size of my garden I wanted it to be small and both strong.
- h. Finally low cost.

□

I firstly looked at developing a loop antenna based on something similar to Peter's G4FYY loop antenna but decided that it was not robust enough to withstand the frequent high winds that often blow around the block of flats I live in. I looked at a Hexbeam design but quickly realised that it would be too big for my garden. Also the Hexbeam really should be between 20-35 feet above ground level for best results; the nearby buildings would interfere with the SWR, whereas I wanted to maintain a low profile and not provide an excuse for my neighbours to complain to Crawley Borough Council.

Having read about the merits of the Cobweb antenna I found a lot of information on the internet. On Steve Webb's G3TPW website he has a good PDF describing his version; another website by Steve Hunt G3TXQ he described a different version, the main difference being that G3TPW version uses twin speaker cable and G3TXQ's uses single cable. Others had published their own versions on the internet, some frankly looked as though they had been slung together without thought to looks and design.

After some deliberation, and seeking advice and opinions from other club members, I decided to build based on G3TXQ single cable version, ignoring words of doom and gloom with regard to the single wire version.

The main part of the build which holds it altogether is the Base plate assembly. Onto this is mounted a cruciform formed from 2 x 25.4mmx16swg Aluminium Tube, 1m in length. Also fitted to the base plate is 1x25.4mm x16swg Aluminium Tube, 78cm in length, this tube carries the terminal block for the antenna web which is fitted to a length of 22mm fibreglass tube cut to slide into the 25.4mm aluminium tubing. This is set to bring the terminal tube assembly to 1m. The reason I have used fibreglass to support the terminal box, is to isolate it from the main support frame.

Whilst I have engineering skills, I decided it was easier to source a complete Cobweb Antenna hardware kit from Aerial Parts of Colchester www.aerial-parts.co.uk for £35 plus postage. The kit comprises one aluminium base plate, one aluminium support plate with V bolts for mounting on a suitable mast, Stauff clamps to hold the aluminium tube, three lengths of aluminium tube and all the necessary nuts and bolts.

Next on the list was what to use for the spreaders, visits to various DIY shops proved a waste of time, after checking out online suppliers I bought 4 - 2m X 22mm pullwound fibreglass tubing from a company in Wales called sandpiper Aerials. Which cost me £53.00 including P&P. <http://www.sandpiperaerials.com>.

The mark one single wire version.

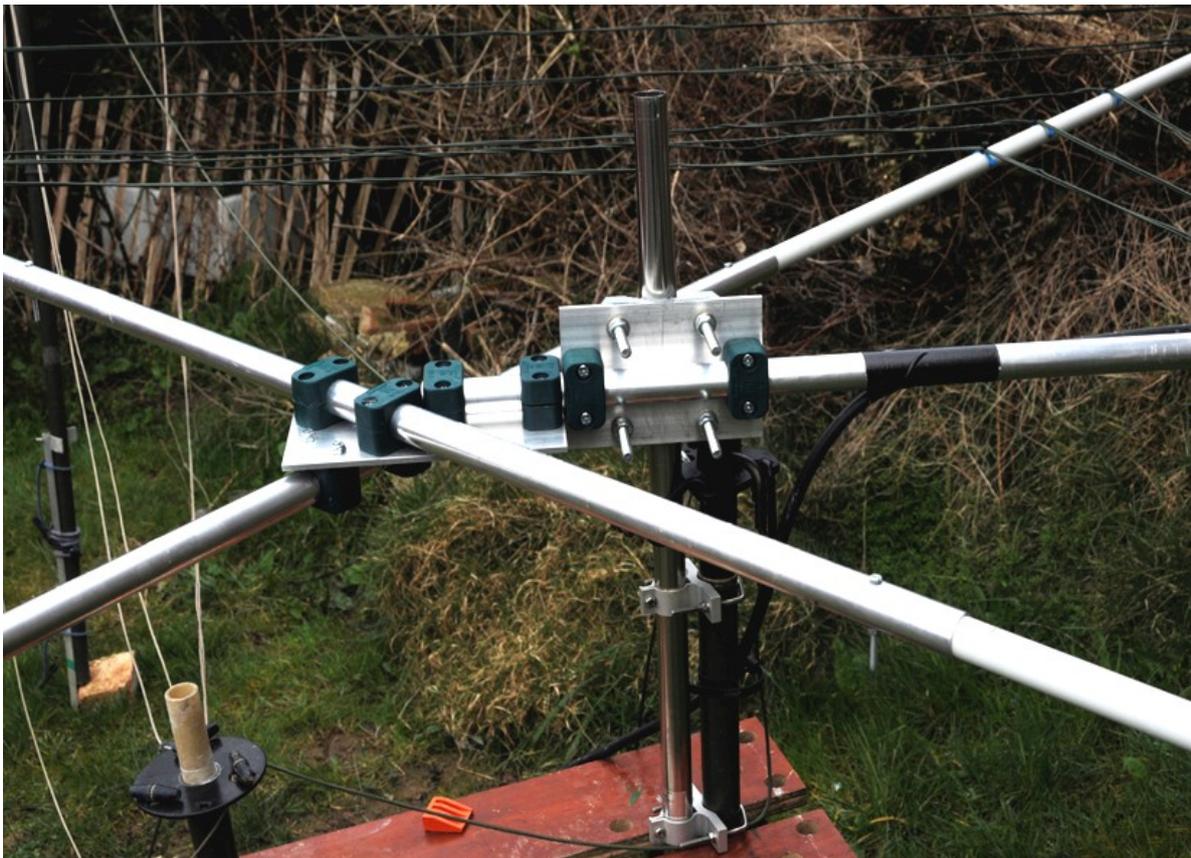
Once I had sourced all the necessary components, which also included a suitable box for the terminal box, I used a Hammond GP. ABS Plastic box 150x80x50mm and 3m Black sub-miniature coax cable RG174 A/U 50Ω both sourced from Maplin and two FT 140-61 Ferrite Toroids sourced from AMTOOLS.

I was ready to start the build. My first task was to construct the terminal box. As I had elected to build a single wire Cobwebb and not the twin wire version, I started to construct the necessary 1:4 Guanella current balun which will be mounted in the terminal box.

The 1:4 balun comprises two 1:1 baluns wound with 8 turns of RG174 coax on a FT 140-61 ferrite toroid; if I had needed to transmit at more than 100W I would have need to use something like RG 316 sub-miniature coax cable. I then bound the two 1:1 Chokes together with a couple of plastic tie-wraps.

The coax cable is required to have a characteristic impedance of 25 ohms. To achieve this I wound each balun with two 510mm lengths of coax cable, which are connected in parallel at each end, inner to inner, outer braid to outer braid. The two baluns are then connected in series at the 50 ohm feedline end, and in parallel at the antenna end.

The nice thing with using 22mm tubing for the spreaders is that they fits nicely tight inside of the 1" Aluminium tube.



The Picture above shows the base plate assembly; note the tight fit of the fibreglass booms into the 1" Aluminium Tube. The booms are held in place with a M3 screw, these will be replaced with a suitable R clip. This will make it easily dismantable to transport it if needed.



The above shows the Terminal Box; note that I chose to fix the box below the boom using 3mm screws. The boom at this point is 40cm long, and is adjusted inside the 78 cm x 1" Aluminium Tube so the total length is 1m

To cut a long story short, as was predicted the mark 1 single wire version did not perform very well. When I first tested it when it was still fixed into the workmate, the first call I made had a response from Spain, I then erected it at the top of a 3m mast, and I got a reply from a guy in Greece. But that was that, whilst the antenna was a brilliant receiving antenna, it did not seem to perform as I expected when transmitting. To check it I run my WSPR transmitter through it and over three day I did not get one report. I decided to restring it as the 2 wire version.

The mark two twin wire version

Things were easier this time around, as the base plate assembly was built and complete, with the booms suitably drilled at the required fixing points on the booms, whereas on the single wire version the antenna wire had passed through these holes. I would now use two cable ties to secure the antenna strings to the booms at these points.



The above picture shows how the antenna strings are fastened to the Fibreglass spreaders. Steve Webb G3TPW who designed the Cobwebb antenna uses twin speaker wire for his version, whereas I have plenty of MOD Kevlar Antenna wire and had already strung the mark one version with it; it seemed to me easier to use more of the same to make the modification.

I started the modification with the terminal box, out went the 1:4 Guanella current balun, this was replaced with a balun made from winding 6 turns RG58 co-axial into a 3" (76.2mm) diameter, which I then compressed into the Terminal Box. This loop acts as a co-axial choke balun at the common feed point, to prevent any current from flowing down the outside of the co-axial cable feeder. Within the terminal box are two copper bus bars, one on each side of the box. 10 x 5mm screws are passed through the bus bars and through the bottom of the box to become the terminals for the antenna strings. One end of the co-axial cable balun is soldered to the bus bars, braid to the left one, inner to the right one. The other end is soldered to the input socket, inner to the centre pin, braid to the outer terminal. After a short time the SWR went crazy, when I opened the Terminal box it was full of water, my solution was instead of having the bus bars sitting onto the bottom of the box, I raised them on 1/4" (6.35mm) spacers, and drilled 3 small drain holes in the bottom of the box.

Whereas the antenna strings on the mark one version were split at the terminal box with the twin wired version, the new wire antenna strings for each band would be passed in an endless string under the terminal box and heat shrunk to both the right and left hand strings.

Having restrung the antennas, I needed to tune it. In Steve Webb's version he created Gamma tee's by stripping about 1/2" (12.7mm) of the coating on both wires at suitable points of the antenna strings, then twisting them together, before soldering the joints and finally covering them with heatshrink. With MOD Kevlar antenna wire, you cannot solder it, so my solution was to use dressmakers pins push them through both wires, crop them to the width of both wires and cover with a short length of heatshrink tubing.



The picture above shows the method I used to make the gamma tee's. A. shows how I used dressmaking pins through the Kevlar antenna wire. B. shows the pins cropped tight to the antenna wire. C. Shows the gamma tee's sealed with heat shrink to weather proof the joint.



The above picture shows how the new antenna string passes under the terminal box in one continuous length and secured with heatshrink tubing.

BAND	WIRE LENGTHS	BOOM-WIRE FIXING HOLES	GAMMA TEE INSERTION PT. FROM TERMINAL
20m	201" (510.54cm)	0.78" (20mm) From outer tip	107.8" (272.0cm)
17m	157.5" (400.05cm)	13.38" (340mm) -"-	90.6" (230.0cm)
15m	135" (342.9cm)	26.77"(680mm) -"-	82.7" (210.0cm)
12m	114" (289.56cm)	33.85"(860mm) -"-	70.9" (180.0cm)
10m	100.5" (255.27cm)	39.37"(1000mm) -"-	61.8" (157.0cm)

The chart above shows the approximate measurements for the main components for the spreader and wire assembly. The spreaders as bought were 2m long, I reduced their length by 16.5" (42.0cm) to 62.20" (158.0cm) I then inserted 8" (20.32cm) into the tubes of the cruciform; this gave approximately a spreader tip to tip distance of 8.9' (270.0cm).

In Summary

If you feel that the Cobweb Antenna is something that might be of interest, I would suggest you look at the various versions that others have built, I personally have found that my Mark II version is a very efficient antenna system for its small size. I have been running WSPR through it. On 20m I have been getting reported from state side, across the whole of Europe and Russia and up into Greenland. With phone on all the bands it performs well, very low on noise, it is achieving an SWR of 1.1.1 to 1.3 other than 10m were it appears to have a very narrow band of resonance, for this I just switch the ATU, at this point in time I don't feel inclined to bring down to play with adjusting the Gamma tee's. It is currently at a height of 15 feet on a mast comprising 5 section of a mod lightweight mast, which is more than man enough as the Cobweb antenna is very light but strong.

I am happy to answer any questions regarding its build, etc.

Robert M0HQM