

APRIL 2018

FROM THE EDITOR - G4CIB

I have a complaint to make! We have had two cracking talks at club recently - "Satellites as Digital Repeaters" by Dave G4BCA followed by "Embedded Systems for the BBC Micro:bit" by Mark Tanner MOMTT ably assisted by his daughter Sally M6LHY. My complaint? At my age I am rapidly running out of time left to keep up with these fantastic opportunities to absorb and put into practice these facets of our wonderful hobby. Opsimaths are welcome to join GARES!! I have downloaded and successfully used Direwolf and APRSIS32 software for packet radio, used N2YO's web page to track satellites, and purchased another BBC Micro:bit. Why another? I realised after our recent talk that one BBC Micro:bit is not enough!! In this month's Ragchew we have the third antenna article by Cliff G8CQZ, and this time he shows us how he built a dual band yagi for 2m and 70cm. I'm sure all the members will join with me in thanking Cliff for this series of articles on the practicalities of making VHF and UHF antennas. Tony G4HBV last month described the operation of a half-wave dipole under real conditions and in this issue discusses what is really happening when we adjust an Antenna Tuning Unit (ATU) for a minimum reading on a Standing Wave Ratio (SWR) Bridge.

Continuing with "And Here's One I Made Earlier" I describe a little receiver I made which won the GARES 1998 Construction Contest "Simple" Section (Stan Cook Trophy). It is based on a circuit which appeared many years ago in the **G-QRP Club's Journal "Sprat**" Do you still have a piece of equipment made years ago? If so, why not write an article for the next "Ragchew".

Articles from members on any aspect of amateur radio are more than welcome! Email your article to me at **g4cib@outlook.com**

73 and good DX!

Brian G4CIB

SWAR-GREES®

I have been advised by the RSGB that stocks of the SWAR-GREES® offered for sale in the current issue of "Radio Communication" are now running low and should you wish to avail yourself of this never-to-be-repeated offer you should act fast. As an RSGB Affiliated Society GARES members qualify for 10% discount. Quote discount code **AP-WRILL-FURST**

CONTEST ROUND-UP

<u>VHF</u>

The club is currently in 18th position in the **UKAC Local Clubs** table, our best band being 2 metres followed 70cm, 6 metres and 4 metres. **GOULH**, **MOXAC**, **G8CQZ**, **G4BCA**, **G4CIB**, **M0HFY**, and **2E0MFH** are all regularly contributing to the overall club score.

Special mention and congratulations to **Rita M6RYL** who was awarded a certificate as the leading Foundation station in the recent **March 144/432MHz Contest.** The club is in 30th position in the overall **VHF Championship AFS** table

80m Club Championship

Good performances by **Bob M0NQN** on CW and Data modes have put the club in 10th place in the **Local Clubs Table.** Other regular club participants are **Gary M0XAC, Mike G4IZZ** and **Tony G4CMY.**

GARES SPRING CHALLENGE

April 1st sees the start of the club Spring Challenge and this year members have the opportunity of operating on HF and VHF. It would be great to see some of our newer members having a go. You may not have the time or inclination to be competitive but it is still a good opportunity to test your operating skills.

Club Nets

Details of the club nets can be found on the GARES web page www.g4aym.org. Don't forget that when Monday is a Bank Holiday there is usually a "Club-on-the-Air" net on 2 metres at 19.30 local time, also on other Monday evenings when the school is closed for holidays.



Tony G4HBV working Top Band portable at Gamage Court, near Minsterworth, the QTH of **Noel G4PHF**, our NFD site for many years

From the GARES Archive

G4AYM/A - Jamboree on the Air - Apperley 1981



The above item appeared in the Gloucester "Citizen" and is scanned from the newspaper cutting I have in my "Archive" file - apologies for the poor quality.



Kings Square, Gloucester - June 1983. A special event station for Scout Activity. From left to right **Pat G3MA, Olive G3MA XYL, Gerry G4LEX, Nick G6AWT** and **Frank G5BM**. Note the handwritten sign bottom left "No - it's not CB, it's Amateur Radio"

MORE FROM THE GARES ARCHIVES



Here we see **Dave G4HJV** (who donated the DF Trophy to the Club) presenting it to **Graeme G0EEA** at the GARES Christmas Buffet in 1986. I understand Dave called by the Club in March - unfortunately I was not there to meet up with him as Leta and I were down in Exeter for the Lundy Field Society AGM



Leta G4RHK operating at the GARES Club Picnic in 1984 held at the QTH of **Frank G5BM** on the outskirts of Newent. The club rig was an FT101ZD.

RF NOTES BY TONY, G4HBV

In the last "Notes" I discussed the problems that a non-resonant antenna presents to a transmitter. To recap, on a mismatched feeder, the load presented to a TX depends both on the terminating load (the antenna input impedance) and the length of the feeder – hence the need for an ATU.

Now imagine a typical installation, where a doublet (non-resonant) antenna is fed by coaxial feeder via an ATU and SWR meter (in that sequence) from the TX. In this case the feeder "transforms" the value of the antenna's input impedance to a new value, which then exists at the input to the feeder. Whatever instruments we use to measure the input impedance of this feeder, except where the feeder is a half-wave or multiple, will not directly give us the value of the antenna's input impedance.

One of the reasons for confusion about this topic lies in the use of the ATU where it appears to work miracles in reducing the SWR to very low values. However we know that SWR on the feeder is determined ONLY by the value of the antenna input impedance relative to the feeder characteristic impedance. So what happens when we adjust our ATU for minimum apparent SWR? We can split the ATU into three parts. The input side of the ATU allows the TX to deliver power efficiently (without reflection) to the feeder/antenna system by matching it to the "transformed" impedance of the antenna, The output side of the ATU allows reflected energy on the feeder, from the antenna, to return back again to the antenna along the feeder, rather than being dissipated in the TX output stage.

It does this by creating a mismatch at the ATU output so that reflected energy is re-reflected and sent, yet again, to the antenna. This is achieved by setting the output stage of the ATU to the conjugate of the feeder input impedance (this means if the input impedance has capacitive reactance, the ATU output is set to give the same amount of inductive reactance or vice-versa).

There is a very small time delay, which means that this re-reflected energy is not quite in phase with the originating constituent, though this is not normally of any consequence. This "re-cycling" of the reflected energy is a continuous process, which, considering an amount of energy being first reflected, carries on until it is all effectively accepted by the antenna.

And the SWR meter? Well it reads a low "SWR" on the input side of the ATU where it monitors the match between the TX and the feeder input. This measurement should, more correctly, be termed the reflection coefficient, since the SWR on the feeder REMAINS UNCHANGED. The third (middle) section of the ATU is adjusted to couple the transfer of energy between its I/P and O/P sections.

If you don't believe any of this, just transfer your SWR meter to the output of the ATU so that it is directly in the feeder. If you then carefully adjust the ATU controls you will see that this has no effect at all on the feeder SWR.

In summary, for this typical installation, the ATU does not change any conditions on the feeder or the antenna but enables the TX to work into a matched load.

The SWR meter does not read SWR on the feeder but monitors the match that the TX is working into.

For both items, the ATU and the SWR meter, the distinction to be made is between how the mismatched feeder alters the input impedance to the antenna system and the actual SWR on the feeder that remains unaltered.

So, in conclusion, we see that neither the SWR meter nor the ATU really live up to their titles, though it would now be quite difficult to stop such misrepresentation, It is, however, important to stop the misconceptions that this can lead to.

2m/70cm Antenna by Cliff G8CQZ

The rehearsal was over. I think that I could count the 6m/4m dipole build as a success so it was onto the main event: the combined 2m and 70cm yagi. Actually, there had never been any doubt in my own mind so I had purchased all of the materials for all of the aerials at the same time. I started the way as I had for the dipole, cutting the 2m driven element long and then trimming it to length without worrying about the actual SWR. Once again I used a square boom and electrical conduit to join the parts of the driven element. Then came the bit that I hadn't had to tackle before: adding the other elements. I used the element clamps from www.aerial-parts.co.uk (which is where I got the aluminium from) and they seemed to work well.



2m/70cm Antenna (completed)

Measuring the length of the driven element allowed me to work out the velocity factor of the aluminium. That, in turn, allowed me to work out the required lengths for the other elements and these were cut directly to length. It was then a case of adjusting the spacing between the elements to give me the best SWR. The combination of a square boom and a day without wind helped enormously in that respect. I found that the first director was the most important although I only had to adjust it a few millimetres from the position given in the RadCom article that I was following. Having fixed all of the elements in position, the 2m part was complete so it was onto the 70cm part.



Mountings for the various elements (Balun, Reflector, Driven Element etc)

There was no problem finding the correct length for the driven element even though it has no physical connection. I did have to use an elastic band to hold it in position as the wind had risen slightly. The problem came when I tried to space the elements for best SWR. With six elements there was no way that I could get the SWR below 3:1 but with five elements it went to less than 1.1:1 so a five element it was.

One problem that I hadn't foreseen was how to mount my vertical colinear above the yagi and 4m/6m dipoles. The balance point was right on the 70cm driven element and any attempt to run my 2"

mast alongside it seemed to get tangled in the elements no matter where I positioned it. In the end I mounted the yagi on the top of the mast and ran a 4' length of fibreglass tube up through the elements to mount the vertical on.

On the air I am extremely pleased with the performance on 2m. 16 contacts in my first UKAC and 19 in the second. Directionality seems good without being too sharp. 70cm is not so brilliant but there is no way that my 5 element can compete with the 20+ elements that some people are using. I just wish that there was more SSB activity of the 2m and 70cm bands outside the contests.



Completed installation

So what have I learned from my experience of building these aerials?

- 1. It is essential to use an Antenna Analyser (or, at the very least, a good SWR meter) and NOT just cut it to the length given in the book or article.
- 2. Be prepared to tackle problems that you have never considered before.
- 3. Think about how the aerial will be mounted on the mast and how it will relate to other aerials, not just about building the aerial itself.
- 4. Take it slowly. It will always take longer than you think no matter how long you think it might take. If you rush it, you'll only have to redo it.
- 5. Put it together with Sellotape and rubber bands first. Then test it thoroughly before using screws and glue.
- 6. You can make a cheap aerial or a quality aerial but don't try to make a cheap quality aerial.

September 2017 70cm Lundy (G4CIB/P) - Isles of Scilly (G4BCA/P) QSO attempt

Leta G4RHK and myself recently attended the Annual General Meeting of the Lundy Field Society in Crediton and one of the regular presentations is an analysis of the migrating birds observed on the island. Traditionally the lecture is concluded with all the "rarities" noted and one date mentioned caused me to sit up and take notice. The date was Monday 11th September 2017 when a buff breasted sandpiper was noted on Lundy. This bird normally migrates between South and North America but this specimen found itself being blown off course. The speaker showed the synoptic weather chart for that date and I have since tracked a web site down where this information can be obtained:-

http://willandweather.org.uk/mycharts.php

Scroll down to the bottom of the web page and you will see that daily charts are available back to the beginning of 2017.

The chart for noon on 11th September 2017 shows that it was a very unsettled day with a large area of low pressure centred over the United Kingdom. You may recall **Dave G4BCA** struggled in bad weather to set up his /P station on the Isles of Scilly and likewise on Lundy we struggled with high winds on that day.

Which brings me on to

Lundy 2018

Leta and I will be on Lundy Island for 2 weeks from Saturday 1st to Saturday 15th September. This will give plenty of operating opportunities including SSB Field Day, 144MHz Trophy, 144MHz Baackpackers, 144MHz UKAC and 432MHz UKAC contests. We will be in Castle Cottage - a property we were last in during 2002. There will not be enough room to erect my 80 metre dipole so for HF we will be using a vertical. The cottage is on the edge of a vertical cliff face rising to some 100 metres above sea level so it will be interesting to see how the signals get out. On the VHF side the take-off is excellent from north through east to south-west.

Nearer the time I will advise members of our operating schedule but do let me know if you would like a sked.

Here's One I Made Earlier

I think most of the more senior members in the club will agree with me that there is nothing to beat the thrill of hearing signals on a radio receiver you have built yourself.

The circuit for this little receiver which is the subject of this article was culled from the G-QRP's club Journal "Sprat" No 82, Spring 1995. The first stage is a 2N3819 FET regenerative detector in source-follower mode followed by three stages of audio amplification using BC108s. The tuning coil was originally wound for 80 metres but I found that by adding extra capacitance across the main tuning capacitor that it would cover Top Band (1.8-2MHz). This is achieved by a small slide switch on the front panel. The main circuit is built on tag board and the tuning and fine tuning accomplished with good quality air-spaced capacitors which happened to be in my junk box. The original article states that with three switched coils, the receiver will cover all amateur bands from 10m to 160m. I never did get round to making some better labels but a label still stuck on the back of the case reminds me that this receiver won the "Simple" section of the GARES 1998 Construction Contest. If any member would like to have a bash at building this little receiver I am more than happy to supply the circuit details etc.



From the R.S.G.B and GARES Archives

Scanning through the RSGB archive recently, I came across the item below (left) in the July 1938 "T & R Bulletin" under District 5 News. Older members will remember **Pat G3MA** as a stalwart member of the club for many years. His obituary can be found on our web site in the Library section.

DISTRICT 5 (Western)

National Field Day went off without a hitch at the four District Stations, and if the scores were not so high as they might have been, those who took part thoroughly enjoyed themselves.

The 7 Mc. station was honoured by a visit from the Duke of Beaufort, on whose property it was situated. The services of all those who assisted are acknowledged with thanks. The support accorded by many of the newer members was very good, whilst the publicity resulting from the Press notices brought forth a number of enquiries regarding the Society's activities.

Bath members are obtaining good results with W8JK beam aerials on 14 Mc. Many of the Bristol members availed themselves of the opportunity to visit Bristol Airport on June 19, and were very interested in the transmitter and D.F. apparatus. Mr. Johnson, the Engineer-in-Charge, ably explained the superiority of the particular D.F. system in use, error due to night effect being eliminated by the use of vertical aerials and screened feeders. Thanks are due to G21K for arranging the visit.

At the June Bristol meeting G5JU demonstrated a new transmitter subsequently used at the 3.5 Mc. N.F.D. station.

A discussion regarding a 1.7 Mc. D.F. Field Day took place and a fresh treasurer was appointed in the person of 2FBW (late BRS1657) who has just obtained his AA licence, as also has 2DW1 (late BRS3143), 2AYP of Gloucester is congratulated on obtaining his full call, G3MA, also 2AKR of Cheltenham, who is G3LZ. The other Cheltenham stations are active in various directions, mainly on the 14 and 56 Mc. bands; 8DA is steadily pursuing his QRP and magnetic effects studies.

R. B. Stewart, ex EI5M and late of Cheltenham, is getting married soon and mentions that invitations to the ceremony will be issued through G5BM.



National Field Day (NFD) - June 1973 **Pat G3MA** operating the club station on the Gordon League Rugby Ground at Hempstead. On Pat's left is **Arthur G3EKD** acting as logger



Pat G3MA and **Brian G4CIB** manning the GARS Junk Stall at the Longleat Rally 1995. For quite a few years our stall at Longleat was well known for selling "bespoke junk". We had several regular customers who restored old radios and found our stall useful for stocking up with components. We always aimed to leave with nothing left to sell! This photo was taken by **Reg G3GMN** (now Silent Key)

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