



North Bristol Amateur Radio Club

S.H.E.7, Braemar Crescent, Northville, Bristol BS7 0TD
G4GCT, M0NBC, G6PNB

December 2020

Covid 19 Edition

We wish all our members a Happy Christmas and a Prosperous New Year. It is now over nine months since we have met in person at She7 and with a vaccine now available it may not be too much longer that this virus attacks the human race. I beg of you to comply with all restrictions and look after yourselves and your love ones and we will see you soon at the club house.



Let us hope that Santa brings you the gifts you deserve. If not, go out and buy what you want after Christmas and blow the expense. Don't tell the boss To continue our feature on Baluns and UnUns. Tony G4CJZ has added a column informing us of the different types of toroids and Paul G8YMM your chairman tells us what he gets up to on his days off.

It has been very difficult finding content to keep Q5 going on a month by month basis during this Covid era but, thanks to many of our members who have contributed, it has made the job easier for me. When I started Q5 in August 2019 it was because I had broken my hip and was very much house bound. It was quarterly edition and it was not too difficult to produce then, covid came along and to keep the club together, I decided to make it monthly. I will try my best to keep it as near to monthly until we are back meeting at the club again.

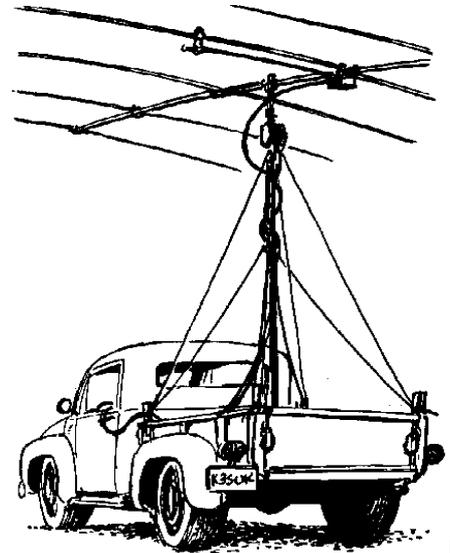
News about GB3AA

GB3AA is back on the air. After a spot of trouble earlier in October, Tony worked hard on sorting out the problem with him learning programming of the logic. Another string to Tony's bow.

If you that can't work this repeater, It's projection is mainly to the north of the City towards Gloucester. Don't expect S9 signal from Bristol.

Don't Forget VHF UHF

GB3AA being a 2m repeater takes me back to when I was first licenced. Then, 2m was the main band to use. 70cm was far too expensive to obtain with a typical handheld in 1988 for 2m being just over £200. dual band handies being £400+. Taking in to account inflation my £211 for my Standard C120 (now part of Yaesu) is well over £700 in today's money.



2m has largely been forgotten now. Yes we use it for mobile communication but what about SSB? Wind the clock back 30 years, with a small beam and a cheap rotator I managed to work around Europe. My first DX was Northern Ireland and a tiny 4 element beam. The radio was a Yaesu ft290 only 2.5w The station was calling CQ, my lad said “call back to him Dad”. “No son, I have only 2.5 watts”. Well I did try. He came straight back giving me 5/9+.

The point of this story, you can do a lot with a small station. Give the VHF or UHF bands a try, DX is not just for the HF bands and the antennas are so much smaller and easier to handle. A 2m beam can look like a FM domestic antenna and a 70cm beam looks like a TV antenna. Food for thought?

If you want more information on the types of beams, drop me an email and I will try to put something together. They are easy to make on a DIY basis with just a few tools and a plans of what to obtained from books such as Out of Thin Air.

Dave G7BYN

Baluns and UnUns

Some of the following information is taken from the ARRL handbook. Information in these books are rather sparse to say the least. The antenna “Bible” HF Antennas for all locations by Les Moxon, G6XN doesn't even mention an UnUn. The book was first published in 1982 so I guess a lot has changed over the decades. Incidentally, before I get slated by calling his book a “Bible” Bible is Hebrew for Book, nothing more and nothing less. It has no religious connotation.

A BalUn or an UnUn is a transformer with windings of copper wire over a Ferrite or iron dust core. It is used to transform the impedance presented at the connection point of an antenna to the Unbalanced 50Ω required by our transceivers.

A BalUn is used for connecting Balanced Antenna to an Unbalanced feed line. An example of this Is a dipole to coax.

An UnUn is used for connecting an Unbalanced antenna to an Unbalanced feed line. An example of this is an end fed wire to coax.

When buying or making these transformers just to add to the confusion you will notice various ratios quoted. 4:1, 9:1, 1:1, 49:1 What one do you use? A bit of historical Knowledge comes into use here so I will list the impedance of few of the regular antennas that are in general use.

1. A Dipole generally regarded as 72Ω
2. Off centre fed Dipole 200Ω
3. The Long wire (Non Resonant) 450Ω
4. Half wave wire (Resonant) 3000Ω or 3k

Before some readers start the Christmas pantomime by shouting “Oh No It's Not”. These quoted antenna impedances are, as in all electronics a generalisation.

Baluns / UnUns Continued

Let us start with the Dipole. 72Ω is very near 50Ω that is required by our transceiver. So a 1:1 balun would be required. The mismatch is tuned out by an antenna tuner. (The length of the antenna could also be adjusted slightly to bring the feed impedance nearer 50Ω). The Balun will add important isolation. Some Hams wouldn't use a balun at all just connect the coax direct to the rig. Yes it will work but the RF does require isolating from the shield of the coax. If using high power you may also require an RF choke to stop RF coming back down to your rig giving rise to electric shocks from the microphone. But, as they say is another story.

The Off Centre Fed Dipole if fed direct via the coax there will be a total mismatch. As we previously stated the Off Centre Fed Dipole is about 200Ω . 50Ω as required divided into $200 = 4$ so the ratio is 4:1. If we use a 4:1 Balun this will bring the impedance from the 200Ω to 50Ω See, it is relatively easy to work out, isn't it.

The Long Wire has an impedance of about 450Ω so our ratio will be 50 into $450 = 9$ so we require a 9:1 balun. It gets easier as we go doesn't it.

Now the magic one that I have been working on. It is not my design, I, like most hams find these things on YouTube. The Theory is, if you have a resonant half wave wire on 80m, it will be a full wave on 40m, 2 wave lengths on 20m and 4 wave lengths on 10m and so on. All we have to do is feed it correctly. The Long wire's impedance was about 450Ω . If it were resonant then the impedance would be nearer 2000Ω to 3000Ω If we had a 49:1 UnUn we can feed to 50Ω 49 times $50 = 2500$ right in the midrange.

I will continue with this project next month, as I haven't had a great deal of time to finish and test my Un Un although it is wound and boxed. I just hope it works as intended.

This is just a simplified introduction to BalUns / UnUns it is not meant to be a full technical article. It is hoped this may be of some use to newcomers to the hobby who wish to experiment with bits of wire. If you want to make your own BalUn transformers, there are plenty of web sites with more details. So please take a look. If however you want me to help via Q5, send me an email.

Toroids for BalUns / UnUns By Tony G4CJZ

I noted that Dave G7BYN had , or was intending to make a matching unit using an FT240-43 device. A good choice for HF work. I thought that your Q5 readers may find some of the hints and tips below of interest.

Why do we use Bal-uns and un-uns? well in most cases to improve the match between the TX, or RX to the antenna when the built in ATU or other matching device struggles or indeed fails to provide the desirable low SWR at the rig end. There are loads of articles and construction details on-line, so I won't go too deeply into that direction.

With so many different types of toroids available, how do I know which one to choose? For starters the rule of thumb is : the bigger the power, the bigger the toroid! Small toroids are fine for QRP use and interstage coupling. Run a typical HF rig at 100W, in HF its best to use a toroid in excess of 1.5 inches in diameter. Most commonly available are the FX series and T series devices, such as FX180, 240 and T200 or even T300 sizes. The next thing is how to interpret the part numbers. That is fairly straight forward, really. FX is simply "Ferrite and Mixed" the x denotes that it's not pure ferrite. Then we see some numbers, such as 240 or 20, or 60, for example. These tell us the external diameter in INCHES. As most devices are American in origin they are specified in Imperial measurements. Being Americans have not grasped the Metric methods of measuring and counting.....240 means 2.4 inches diameter, while 58 will mean 0.58 inches diameter. Finally there are more digits that denote the Mix type. Again, the rule of thumb is the higher the number, the higher the frequency they can be used at. 2 is for use below about 7Mhz, 43 is below 25mhz and 61 is below 50Mhz. If you can afford them, type K can be used below 140Mhz. These frequency limits are NOT hard and fast when used in the Amateur service. All us Amateurs want extra performance or value for money, so for instance the 240 type toroids can be used at 30Mhz, with only a small drop off in efficiency. I have a K type Bal-un running 1KW on 2M and it only gets warm to the touch after a 20-30 minutes of TX time. Out of their spec range, toroids "Drop off" quite rapidly, mainly due to saturation and heating.

By the way, those Grey toroids that seem to be in abundance at rallies (When we had them...) are only good if you are into the very lowest Amateur bands, such as 136khz Don't even think that they will work at HF, even on QRP rigs, unless, of course, you want a quite efficient dummy load!

Toroids Continued

I always wrap my toroids in Plumbers PTFE tape first, before apply the windings. Why? Well some of the toroids can have some rough and quite sharp edges and can easily scratch or damage the enamel on most enamel copper wires. Ferrites and Iron dust cores are conductive and can cause all manner of obscure problems with your newly constructed BalUn or Unn. PTFE or PVC coated wires are fine if you are not looking for the last drop of efficiency. Bi-filer or Tri-filer windings are best for coupling. It's not compulsory to use these more complex wiring methods. You can use "Conventional" windings, such as a separate primary and secondary that are found in mains transformers. For higher power use I use 1.5mm mains wire or even 2.5mm for KW devices.

When winding the primary and secondary be aware that the more wire you use, the more the losses. For secondary windings at HF I find that a maximum of 8-13 turns are best. For the primary windings 2-8 turns. If you want say, a 4:1 device, then 12 turns on the secondary with 6 on the primary will give you the desired ratio. Again, with 12 turns secondary, a 4 turn primary will produce a 9:1 ratio device. Never use metal boxes for your matching device. Metal in close proximity to the toroid will alter the flux density locally and cause "Hot spot" heating, which could lead to damage. Never put a nut and bolt through the centre of the toroid for fixing purposes unless its nylon, when that's fine, but steel copper or brass bolts just act as a shorted turn and wrecks the transformer action and possibly your rig dangling on the other end of the device! If you want KW power matching, its fine to stack two, or more devices, but cover them as one device, not individual as this will detract from the coupling between cores.

Finally, use sturdy plastic, waterproof boxes if your device will be used outdoors. Electrical junction boxes, from places such as B&Q are just fine. Use stainless hardware. Never mix hardware types such as brass, copper, steel or aluminium. In an outdoor environment electrolytic action will be vigorously active and will damage the integrity of the connection to your device. Always solder (tin) the wires before crimping and use forked connectors for ease of use.

Well, I hope that the above will help Q5 readers when they construct their devices.

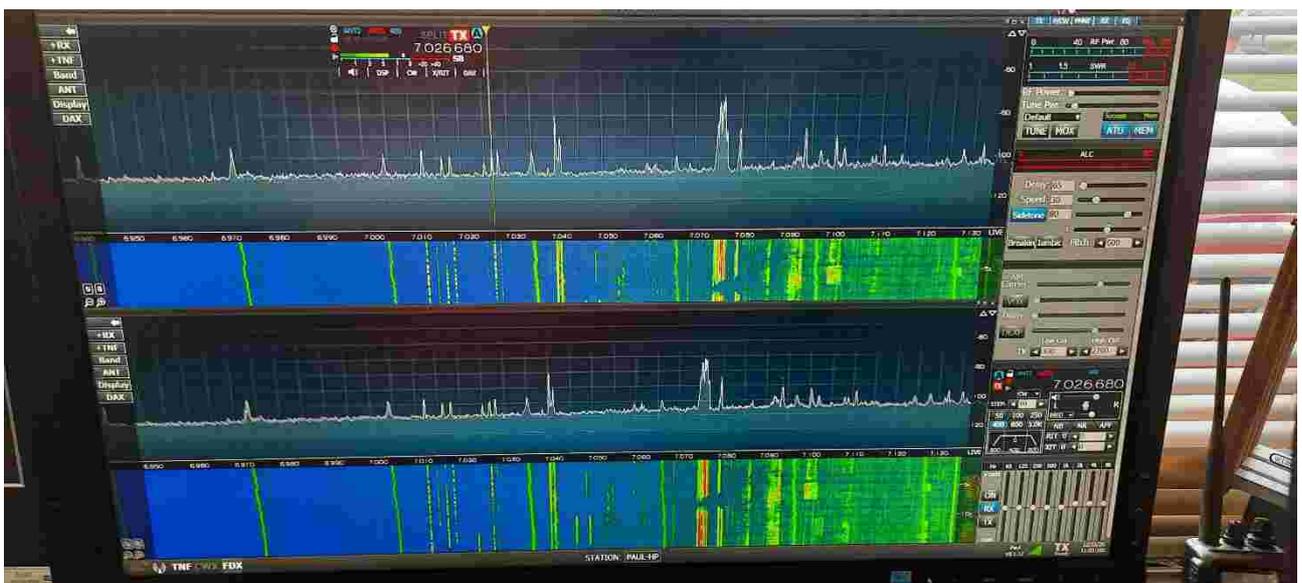
Tony G4CJZ

A Happy Christmas and New Year

Well as you all know; nothing really has changed regarding the Covid restrictions being lifted and allowing us to open the club. I only hope that the vaccines will aid a quicker resolution, as soon as we know about an imminent return, we will let you all know. For now, it's just a waiting game I afraid.

Radio wise during the days when I am at home and not in London I have been operating on 40m using WSPR (pronounced "whisper") stands for "Weak Signal Propagation Reporter" It's very interesting to see particularly with a Panoramic Adaptor or visual radio spectrum display how the bands simply rapidly drop dead from a full spectrum of activity to nothing apart from the high power AM commercial signals after Sunset. I know the reasons but will let you look that up if you don't know as part of your homework!!

The HF radio set up I am using at home for WSPR is the Software Defined Radio (SDR) Flex 6400 with dual PC monitors. This allows me to see and use many of the apps I have integrated virtually to the radio using the computer. See below.



What I mean Virtually, is that I have no inter connecting control or audio wires so it's all done in software. Some of the programs are not known and can be tricky to set up if you are not computer savvy but most I have sorted over time. The Flex software allows you also to remote log in over the internet so I can operate from another location which is useful sometimes.

One of the programs I have running is a DJ's mixer music deck !! what you may ask am I doing mixing music on my Flex!! wrong I am using the DJ deck as the hardware control for my Flex tuning using the knobs and associated buttons mapped to the Flex functions. What I have is a £60 DJ deck controlling Two receivers on my Flex Radio instead of their basic proprietary single tuning dial that's twice the price, plus my deck looks rather flash with its orange back lit display.



Also, I have integrated other third-party applications such as a Morse decoder, the DJ control software and meters to name a few. See the first screen shot.

It is noted, that other new HF radios on the market are now coming with built in spectrum displays as standard plus they have the ability to connect audio and data control via USB ports giving the user virtual controls via their computer and indeed simple memory programming. The SDR technology has allowed manufactures to produce some really cost-effective HF and Handheld radios going forward.

When the Flex Radio when launched it was purely a basic box with no controls on the front so the controls or integration of their hardware rotary tuning knob were all via your computer. Needless to say, they now market a separate portable head unit called the "Maestro" which has a large built in touch screen with a selection of multifunction knobs so you don't necessarily need a computer to operate the Flex. However, it's very expensive if you want to purchase one as an add on.

There are other options for portability such as the Apple (IOS) flex control app £50 and a selective few free Android apps from the Flex user forums that offer minimum control but great fun to use on an old tablet.

So, with that brief update I wish you a happy Christmas and New year.

Club Nets

NBARC NETS

Our nets are going from strength to strength very often 8 or 9 stations. Alas not all are members but, we welcome all stations be it members or not

Wednesday net GB3BS 20:00 to 21:00 Local

Friday net GB3AC 19:00 to 19:30 Then QSY to GB3BS 19:30 to 20:00

Saturday DMR Net GB7BS 19:00 to 20:00 South west cluster TS2 (950)

Sunday morning 80m Net 3.65mHz 08:00 to the start of the News. This net is run by Dave (M0HDJ)

Sunday Evening Net Dave, M0RKE ran this net on GB3AA for a while but, the Sunday Net now reverts to GB3AC 20:00 to 21:00 clock time.

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Next Q5

End of January Beginning of February

Dave G7BYN