NARS - August 2020 Roundup !

Hi all, just a quick recap of August. Another quiet month for me in terms of amateur radio. Other than some catastrophic wind damage to one of my antennas nothing else to report, more on that later. **Please read the 'Return to Clubhouse' section on page 10 and provide feedback if you have any ideas/comments.**

Space: Another look at some space news. SpaceX has been busy putting more Starlink internet satellites in orbit. Starlink is a global internet from space system, with low earth orbit satellites. It is touted as a domestic service, but I did notice that the US Air Force Research Lab made a 610mbps data link through it from a Beechcraft C-12 Huron aircraft in flight.

A long-retired NASA satellite burned up in Earth's atmosphere over the weekend. NASA launched the satellite, called Orbiting Geophysics Observatory 1, or OGO-1, in September 1964, the first in a series of five missions to help scientists understand the magnetic environment around Earth. OGO-1 was the first to launch but the last to fall out of orbit; the satellite had circled Earth aimlessly since its retirement in 1971.

An air leak in the international space station saw the crew move and sleep in the Russian segment whilst ground controllers searched for possible causes. Air leaks all the time from the station, and nitrogen is used to repressurise it, however an increase in the rate was noticed. NASA is still struggling to locate the source.

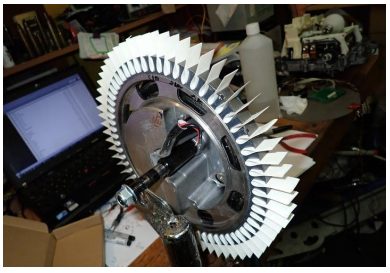
Garden : The beans I had grown became very stringy quite quickly. The main issue I think was that we could not consume the damn things quick enough and I let them all get too long. More give-aways and fewer plants next year ! The toms are still going strong and the blackcurrant jam is divine.

No reports from any other gardens this month.

A Quick visit : Ross was passing Brynglas house (previous club house) and took the picture. The antenna in is a slim jim on a scaffold pole, the last remaining antenna on site there now.

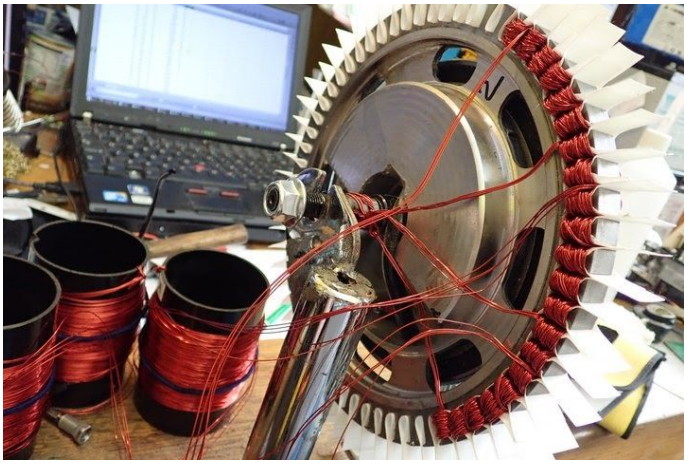
MW7RAT : Not a wind up - a project from Russell

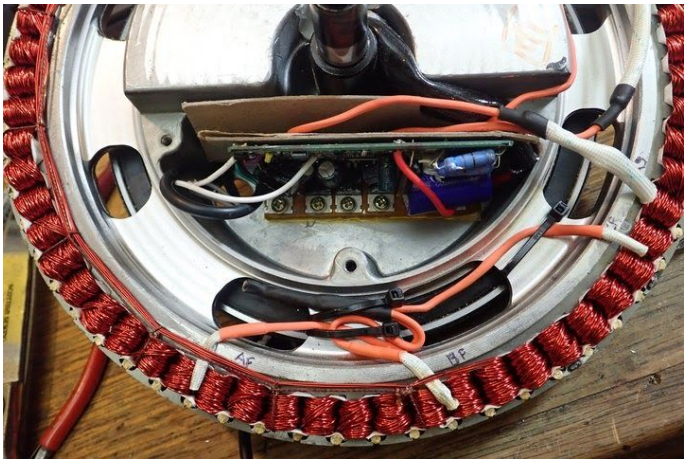
I bought the wheel with a damaged rim and spoke holes shortly after lockdown started for little more than the cost of postage and before all the ebike spares and accessories became expensive and highly sought after.

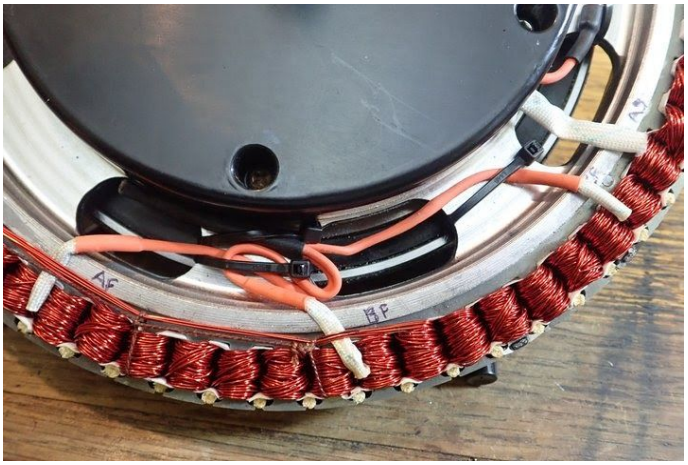


The rim was redrilled at half the spacing to take new spokes which were obtained from Ryans Spokes in Bristol. Lacing the wheel into a used replacement rim was reasonably easy and the trouble came after trying to power the motor. After much frustration I determined the winding pattern was wrong for the magnet layout and put it down to the seller mixing parts of several 'scrap' motors he had up for sale. Going on this hunch a new winding pattern was calculated by the online resource http://www.bavaria-direct.co.za/scheme/calculator/

A reel of wire bought from scientificwire.com and some high temperature polymer fishpaper from ebay to insulate the windings from the stator and the new windings were able to be started. With 63 magnets and 60 stator poles I had to use a tick list to keep track of where I was. The actual winding took almost a full day to complete and I had to use gloves to stop getting blisters on my hands.







The controller is a generic cheap 350W module from china that has been removed from its case to fit inside the motor as the original one had been removed before I got it. To continue the budget theme I powered it from several used 36V Hoverboard batteries I had left over from a past project.

All the hard work paid off as the wheel worked first time with no need to 'autotune' the control module !

Two days after mending it we went on a cycling camping trip to Middle Ninfa Farm near Abergavenny which is a round trip of some 40 miles where it performed flawlessly. The route is almost entirely on National Cycle Route 49 which follows the canal towpath which was 15 miles of stunning country and riverside scenery, well except for the last couple of miles where the cycle route planner took us off onto some sort of almost impassable hardcore mountain bike section.

Cheers, Russell.

GW3NWS Ross - 8877 Amplifier - Part 2

THE INPUT REQUIREMENTS.

For proper operation and linearity (low distortion) the amplifier input impedance should be matched to the transmitter that is driving it. This is usually 50 Ohms in modern transceivers. In a grounded grid amp this is not easy to do, mainly for two reasons, firstly for each positive part of the drive cycle the input impedance will be very high and for each negative part of the drive cycle the input impedance will be very low. (the grid and cathode act like a diode and a capacitor in parallel). To Correct for this some sort of input tuned circuit is required. Secondly, the overall effect of this will cause the input VSWR to vary dramatically from band to band.

At this stage you might be thinking, OK, there is an ATU in the transceiver, why can't I use that? Well, you might be able to on some bands but not on all. There are other reasons why this is a really bad idea but, as they say, “it is beyond the scope of this article”. The answer to both of these ailments can be satisfied in one of two ways. One is to use a series of low power Pi networks to provide a match or to use an ATU!! but NOT the one in the transceiver. It should be at the input of the amplifier. In a 9 band amp 9 individual low power (100w) switched Pi networks will be required. Not easy! In this amp a specially modified LDG auto ATU is employed to match the input requirements. This can be seen at the back of the amp in the photo. This ATU is automatically band switched by Rf sensing and it ensures a low input VSWR on all bands.

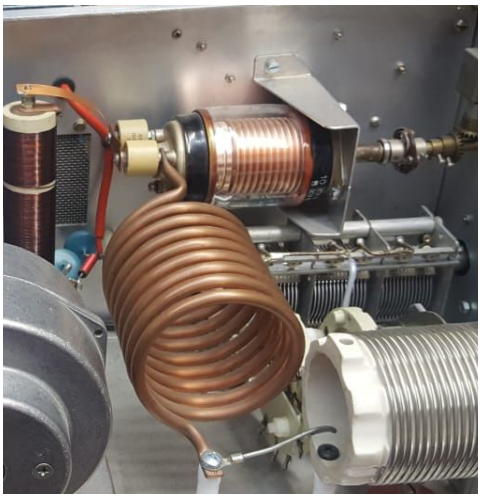
In a passive grid amp there are similar requirements but not for the same reasons and these are far more easily met. In the passive grid amp the input matching requirements are largely met by placing a 50 ohm load resistor between grid and ground. The trouble with this approach is that capacitance between the grid and cathode. This capacitance appears in parallel (across the input terminating resistor) and as the operating frequency rises the effect of this capacitor makes the input VSWR progressively worse. To correct this, a series of inductors are switched in, to effectively cancel this capacitance.

OUTPUT NETWORK.

The purpose of the output network (also called the Tank circuit) is to match the output impedance of the valve to the impedance of the antenna and to provide a measure of Harmonic filtering. Again this is normally 50 Ohms. The circuit usually takes the form of a Pi network or PiL network. The better and usually more expensive amplifiers always use the PiL network because it ensures better harmonic attenuation and a “cleaner signal” (Lower spurious signals being radiated.) than the same amp using only a PI network. These output networks when used in high power amps require very good band switches because they are subject to high RF voltages and currents.

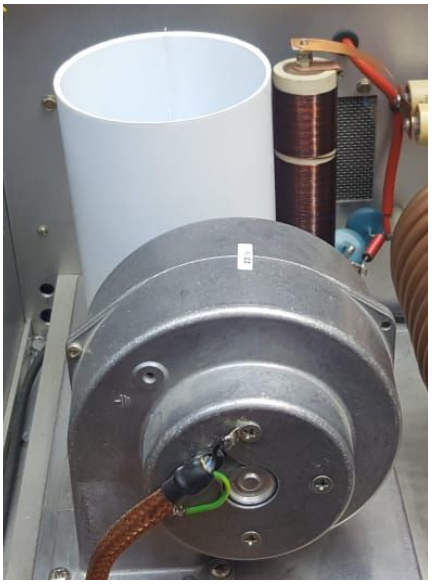
The use of the PiL network also requires more complex switching. In this amp the output network switches were made by stripping and remaking from two switches. Many cheaper commercial amateur amps still use just a Pi output network but the best will use the PiL arrangement.

The output network coils in this amp are made from seamless ¼ “ copper tube which was wound around a beer bottle as a former. These coils are tapped for the various bands and their positioning needs to be accurate. Once the network is finished it will be removed from the amp to be silver plated again some amps do not have the Network components plated. The best one do.



With valve amps there is almost always a compromise present in the output circuits because of a conflict of impedance matching on the 10 and 12 meter band In this amp this problem is largely overcome by the use of a vacuum variable capacitor. In almost all commercial amps this conflict is tolerated and nothing is done about it because the cost of a vacuum capacitor is very expensive indeed.

COOLING.



This amp uses a single 8877 (3cx1500a7) valve which requires forced air cooling. The cooling air is provided by a centrifugal blower mounted atop the input box. The blower draws air into the amp through a filtered grill cut into the outer case the blower then pressurreises the box on which the valve is mounted. The cooling air is blown up through the finned Anode with the aid of a chimney.

This chimney has to be able to withstand the heat generated by the Anode and the very intense RF fields around it. I made this chimney from some conveniently sized UPVC toilet waste pipe which I tested for suitability in the kitchen. A small annular piece if this pipe was cut, I borrowed my wife's frying pan and with the aid of a drop of cooking oil and a thermometer I proceeded to fry it to ensure it would withstand a 200 degree C requirement. It softened a bit but was OK so I knew it would withstand the expected temperatures. To check if it would withstand the intensity of the RF field, I put it into the microwave and cooked it for 5 minutes. This test was passed with flying colours.

Unfortunately, these proceedings were closely watched by my wife in utter disbelief and total amazement. At one stage she thought that I had lost it completely and should be committed to a suitable hospital!!

CONTROL CIRCUITS.

Basically, the control circuits are quite simple. They consist of a 3 minute timer, a 200 millisecond timer and some sequenced RF changeover relays.

The three minute timer ensures that the valve cannot have RF drive or high voltage applied to it until the cathode has reached its proper emissive temperature. The 200 mS timer prevents the high inrush current due to the discharged high voltage reservoir capacitors blowing the mains input fuses.

The sequenced RF relays are necessary to prevent RF drive power being applied to the valve before the antenna is connected to the output network.

THE POWER SUPPLIES.

THE VOLTAGES USED IN THIS AND MOST OTHER VALVE AMPLIFIERS CAN BE LETHAL. DEATH MIGHT BE MOMENTS AWAY!!

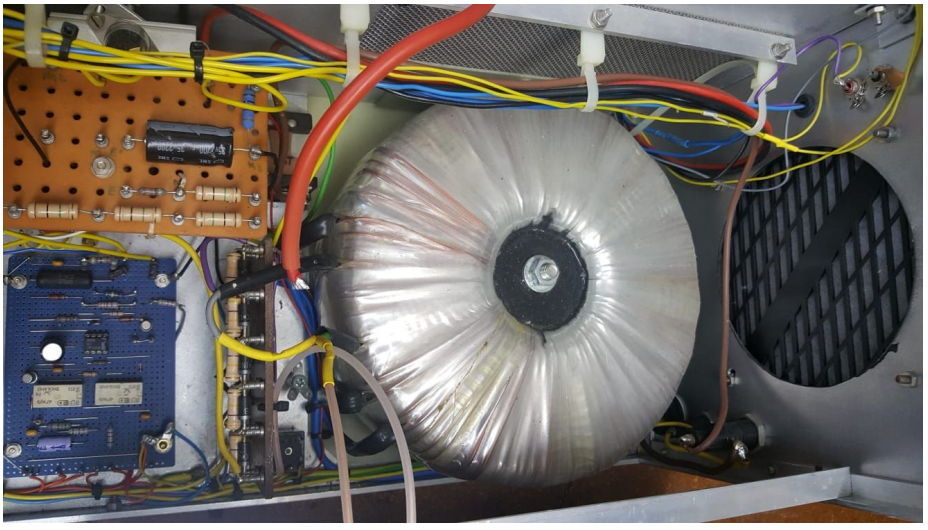
Do not be tempted to “fiddle” with equipment that uses high voltage. Amateur radio is full of experts some of whom became silent keys prematurely. Be very careful!!

This amp uses very high voltages. The power supply provides 4000 volts DC at 1 Amp, 24 volts DC at 1 amp and 5 volts AC at 15 amps. The power supplies are conventional in every respect.

I recall that when I was a lad of nineteen and newly licensed, I decided to build an amplifier with a pair of 4-250 valves that I had obtained. These valves required an HT supply of 3000 volts. Eventually I built the PSU in my shack of the day which was a shed at the bottom of the garden. The power supply was eventually built from very dubious components and ready for switch on. Switching on this seemingly giant power supply in my tiny shack at the bottom of my dad’s garden filled me with terror! but I had a cunning plan!

The mains for the shack came from a socket in the kitchen which faced the shack door down the garden. I switched the mains off in the kitchen, the power supply was dragged to the shack door, and switched on. I went back to the kitchen and, with the aid of a pair of binoculars observed the power supply at a safe distance while my mother switched on in the kitchen. Nothing happened! there was no smoke and the shack did not catch fire!!

In this amp the 4000 volt supply is provided by a toroidal transformer in a full wave doubler circuit. It provides a secondary voltage of 1600 volts AC RMS which when rectified and filtered equates to approximately 4500 volts DC off load. A power of about 4 kilowatts from the mains!



This amp will, when completed, provide 2.5 KW “key down” of clean SSB or CW RF Power in any mode on all the HF amateur bands.

THE FRONT AND BACK PANELS.

This was a difficult and very time consuming part of this build.

The panels were cut to size from 1/8” sheet half hard aluminium. Marking out was done with ordinary compasses steel rule adjustable try square and scriber. The meter and air inlet holes were cut by hand using lots of perimeter drilled hole cutting deburring and filing. Serious chassis bashing!

After cutting, the panels were keyed, (dulled) and thoroughly cleaned using an Isopropyl alcohol cleaner in a dust free atmosphere, trying to keep it all clean. The panels were then sprayed vertically, First with an aluminium etching primer and finally using three coats of mat black car aerosol paint. Mat paint was used because the printing was done with “Letraset” rub on letters and from past experience, the letters adhere to a mat paint best.

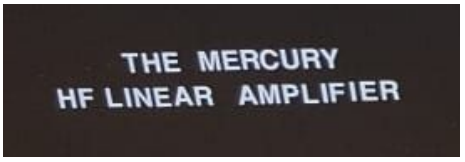
Finally, the panels were dried from the rear (the non painted side) by using a fan heater. This dries the paint quickly and if left for a while will harden it. The panels are now ready for lettering. I used a mixture of text sizes as can be seen.

The lettering is a slow job and demands precision of placing if it is to look right. It would be difficult to give a blow by blow account of this procedure, but here are a few tips:

Having decided where all the controls etc. will be located on the panels it is vital for a professional looking panel to have the wording level and centrally located about the control.

Begin by writing the word on paper and deciding if a letter or space will be central to the Knob or switch.

For example, the word READY will have the letter A central to the control so print the word outwards from the letter A working to the left and right keeping the letters level and straight at all times. This needs great care! You can use the Letraset sheet as a guide for straight and level.



Some hours later the panels will be ready for several sealing coats of clear lacquer. Take care not to spray to heavily keep the coats thin. Allow to dry naturally one coat at a time.

By this time, you might well have lost the will to live!

If you manage to read this without falling asleep I will be pleased! If you would like further explanation or expansion just ask.

73, Ross, GW3NWS.

MW6WHL - John - A Quick Update

I've been experimenting with D-STAR on the IC-9700 these last few months and came across many people experiencing the same issue I was, so wrote a little pdf which I posted on one of the IC-9700 forums and seems to have been used a few times. All the Youtube videos I have watched and followed to the letter did not work the way they show, and though I was able to hear all stations, I wasn't able to be heard at all, so together with an amateur radio enthusiast from Neath, Darryl Mellow, we came up with a workaround and figured out what was different in all those videos and worked out how to get out on D-STAR with the 9700.

I have also started a little foray into mobile HF and have bought a few AmPro whip type antennas; a 20M and a 40M, which I use on the car with a large mag-mount. I am amazed at the incredible difference experienced when mobile and away from the myriad of devices that cause RFI noise when at the QTH. I've been out on the side of Twmbarlwm mountain, towards Cwmbran way, and with my 10W have had QSO's with Florida, all over UK and Europe of course, Trinidad & Tobago, and actually clearly heard stations in Oman and Saudi Arabia - though didn't managed to get through to have a QSO with them. I have also used the NanoVNA to measure and adjust the SWR on each of the antennas - nice little piece of kit once you figure out how to get through the menus!!!

I have also just bought a sleeve antenna from a chap who builds them - basically it's a long wire antenna embedded in a 7M nylon sleeve that is hoisted on a 8M pole. Not tried it yet, as Gareth may be fabricating a drive on plate for me to use - but I am sure it will give good results when out mobile HF.

Will also be registering a new call sign soon, passed the Intermediate with 40/46.

On the personal front - it's great to get to see the grandkids again and have at last been able to spend loads of time with them. I have also built several home brew moth traps as all UK suppliers have sold out due to many folk taking up the hobby during lockdown. Many suppliers are not able to deliver any trap until September!!! So, I decided to build some myself and have made a few iterations of emulations of various trap types with varying degrees of success. In a month I've managed to capture, identify and photograph over 100 or so species from a total of 2,500 species in the UK, all can be seen on my website if anyone is interested - www.reflectingme.uk - then navigate to the moths section.

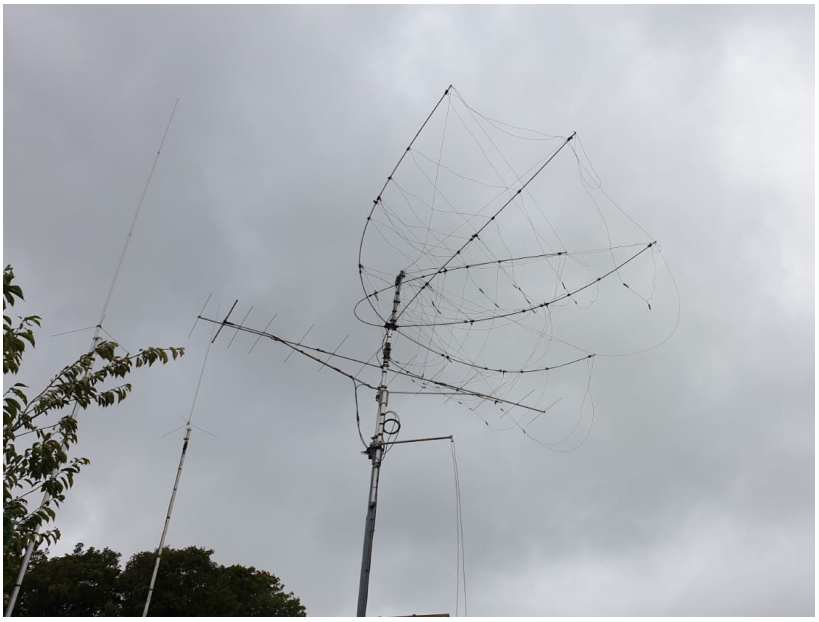
73 John.

MW0LGE - Excess wind !

Well, the middle of the month saw an unseasonably strong extratropical cyclone hit the UK and Ireleand. It was the remnants of the US tropical storm Kyle which combined with an upper low coming from Greenland. What I didn't foresee was the damage that would be caused to my portable ultra lightweight hex beam.

The day before I had lowered the mast (not tilted over) to its lowest setting, around 5m above the ground, however the hexbeam and associated rotator, stub masts and whatnot meant that the top of the hex would sit around 25 ish foot above ground. This would be ok I thought, how wrong I was.

Through the morning the winds increased slowly, and the hex held fast, no problem I thought. Just after 2pm I heard a rather loud gust in the office and proceeded up to the kitchen to take a look outside at the antenna.



Oh dear, the hex had given way. The spreader that is looped over the top in the picture was essentially pulled up and over by the two nearest neighbours. This hexbeam is not really intended for 24/7/365 use but as a portable antenna, and certainly not rated for 50-60mph gusts.

Jules, my brother, and I quickly dropped the mast in the wind, the tenna-mast easily tilting even with the crazy wind load. It was put to 'rest' onto a short step ladder. All the spreaders were pulled from the base plate and it was left in a tangled sorry mess.

The next day, investigation revealed that the lowest section of the bent spreader had split and a replacement would need to be ordered.

I have since been in conversion with Ant (MW0JZE) the manufacturer who was amazed the portable was even being used as a permanent antenna. A replacement spreader section has been ordered together with him providing me with some information regarding storm cords. The storm cords will stop the spreaders being pulled up over the top and will hopefully enable it to weather these sorts of storms. Time will tell.

Richie.

IMPORTANT - Return To Clubhouse

Ross has been in contact with St.Julians learning centre to enquire about the availability of the room.

> 'Jo tells me that it will reopen last week in September and our room will be available for us on Thursday 24th. We will be responsible for sanitising before we leave on Thursday nights. (I would also want to sanitise before we enter. would not rely on other people cleaning). All cleaning materials will be provided. The 2 metre rule will apply at all times and our seating arrangements and general movement plan will have to be approved by Jo before our first night of occupation. We will have to provide a risk assessment. If we do not take "possession" of the room we might lose it.'

I have started to put together a document regarding the return to the club house. Please could you have a read and provide feedback/ideas of how we might proceed, or any other considerations/concerns you would like to add. It can be read here :

https://docs.google.com/document/d/1z7evw1ieNOmtOZq7CsHSmJp4KLdFMNG3x1yozmpopy0

Unfortunately, at time of writing this round-up and the document linked above, unless someone else confirms otherwise I can not see how we can legally return until restrictions change here in Wales. I would hope the learning centre would not let the room to another group if we are not legally able to return? If in the event that we need to financially secure the room even if we are legally unable to return, we will make the necessary rent payment. Please advise if you would not like this to happen. **An email regarding SUBS (which are normally due on the 1st of September) and the room will go out when we know more from the learning centre, hopefully by the end of next week.**

Information from the RSGB

Paul has received some information from the RSGB regarding online exams and training, the RSGB web pages have been updated.

> **Online exams and training – RSGB web pages updated**
>
> We've updated some of our web pages to reflect online remote invigilation exams and online training processes whilst physical meetings are still restricted.
>
> The Student Information section on the Society's website has full Candidate Instructions for the remote invigilation exams, information about how to book your exams as well as a new page listing the online training providers that we are aware of.
>
> If your club is providing online training at any licence level and is not listed, please send full details to exams@rsgb.org.uk and we will add you to the new web list.
>
> For details of all the licence levels visit the Student Information web pages

News & Info

Congratulations to Russell (new call not known at time of writing) and John (2W0JVB) who both successfully passed their intermediate exams and join Declan (2W0KYH) in being the newest intermediate ops in the club, making it 3 for 3 during covid restrictions. Good work guys and look forward to working the new calls.

Dale is working on a HF setup using an SGC-239 in a loop configuration. Hopefully he can make a report next month.

Ken had some issues with his G5RV during the storms and is possibly changing to something else. Let us know how you get on Ken.

Solar farms are due to be installed around Magor, will we get an increase in noise floor?

RSGB SSB Field day weekend of 5th/6th September : https://www.rsgbcc.org/hf/rules/2020/rnfd.shtml

The Worked All Britain 144MHz QRO Contest is this Sunday : http://wab.intermip.net/default.php

RSGB Online Talk: Portable Adventures with SOTA : https://www.youtube.com/user/TheRSGB

International Space Station 70cms repeater : https://amsat-uk.org/2020/09/02/iss-fm-repeater-activated/

Star Trek fans, work the Enterprise ! : https://www.qrz.com/db/GB5ST

Railways On the Air 26th - 27th September : https://rota.barac.org.uk/

Nets and Keeping In Contact

As you know, we have three nets running at the moment for you to keep in contact and hear what we have all been doing. I have heard that they have been a bit quiet recently so let us have a go at getting on more often, myself included.

- Tuesday VHF net, 8pm local. 144.700MHz
- Thursday Club Night net, 7pm local. 144.700MHz
- Sunday HF net, 10am local. 3.705MHz +- qrm

Other Nets

- Cwmbran DARS - GB3RT net, Monday 7.30pm
- Cwmbran DARS DSTAR net - DCS 005P, Tuesday 7:30pm
- Cwmbran DARS HF net, 3.722, Thursday 7:30pm
- Carmarthen ARS - 80m ssb, Sunday, 2.30pm, contact GW0JLX on 0776 828 2880
- Bristol ARC - Nets on GB3AC Sun 8pm, Wed 8pm. Fri 7pm

If you need an invite to the whatsapp group, drop me an email with your phone number and I can add you.

Also, drop me an email/sms/message with anything you get up to during August that you feel may be of interest and can be included in the next roundup.

Stay safe, take care.

73 for now, Richie. MW0LGE