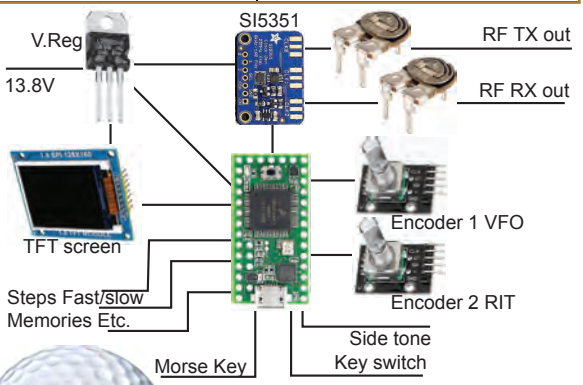
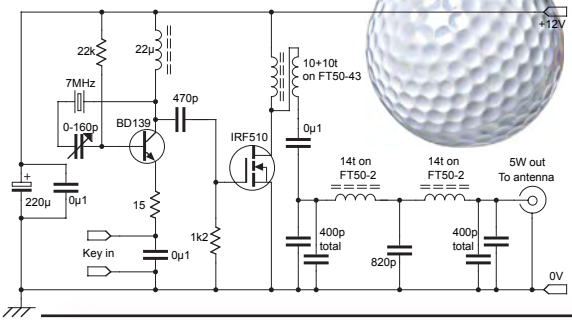
SPRAT

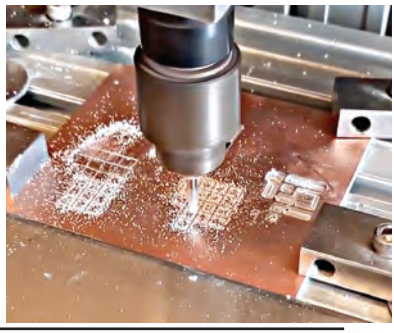
THE JOURNAL OF THE G-QRP CLUB

DEVOTED TO LOW POWER COMMUNICATION

Issue No. 188 | © G-QRP CLUB | Autumn 2021







Contents

Our founder George Dobbs G3RJV (SK)

Tel: +44(0)113 267 1070
Homepage: ***www.gqrp.com***

By the time you read this the Club's 2nd Virtual Convention will have happened. At the time of writing, it was still in the planning stage. The programme was put together to reflect the top 10 wishes from a members' survey and it was amazing to see how readily speakers agreed to present their specialist topics, many thinks to all who shared their 'tribal knowledge'. Three cheers also to the organising team, including **Nick G4lWO**, and **Bill K7WXW**, who helped keep the Committee on track and/or did lots of the backroom work, and to all those who helped by hosting presentations over the weekend. I am particularly looking forward to seeing how much QRP activity there was during the Convention On-Air Activity session.

I have had several requests for the return of the Members' Handbook, or an on-line Members' Database. The Committee have considered how this might be done without incurring additional work and addressing concerns over data protection. At this time, we are not able to offer this service. We'll keep it under review but meanwhille, exchanging G-QRP membership numbers on air or via QSL is still the best way to know that you have worked another Club member.

I am pleased to announce that we are now open for entries for our 2nd Construction Competition for the **G3RJV Memorial Trophy**. The project can be big, or small, it can be ugly, or very neat and tidy, but it must include some element of physical construction. Any member wishing to enter must e-mail details of their project to our Secretary; ***g0bps@gqrp.co.uk*** by the end of October. The details should include a circuit, a description and, ideally, some photos of the finished project. If short-listed, you need to be available to demonstrate your work via video conferencing during the first two weeks of November. The winner will be announced in the Winter SPRAT. Members who are unable to communicate via e-mail can send project details by post and, if short listed, will then need to post their project to one of the judges who will do the demonstration.

Steve Hartley, G0FUW
Chairman GQRP Club
g0fuw@gqrp.co.uk

Sudden goes digital!

Steve Hartley, G0FUW

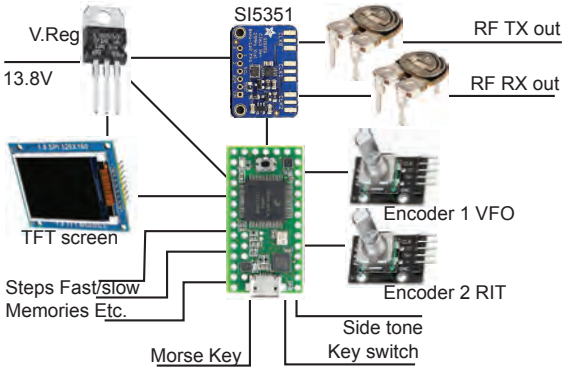
The Club has sold hundreds of the Limerick Sudden Receiver and Transmitter kits. The receiver is a great beginners kit and is capable of excellent results with good band coverage from a reasonably stable VFO. The transmitter has not been quite so popular, mainly because it is 'rock-bound' with a variable crystal oscillator. The two separate units can be used together by netting the receiver to the transmitter but you are stuck on, or near, the QRP centres of activity.

In working on a different project, Kevin, M0KHZ, helped me design a digital VFO to drive some reworked G3RJV SCD transceiver boards. It occurred to me that the same unit might be able to join up the Sudden kits to make a very stable transceiver so I set to work.

Initial tests showed it to be viable so some PCBs were ordered in Limerick black, but using through-hole components, and a test build was tried with my 20m Sudden kits. The receiver and transmitter modifications were fairly straightforward with good receive capability and a solid 2W out of the transmitter. What took a little more work was the transceiver interfacing. I ended up using the changeover and sidetone board from the reworked SCD project, which originated in another one of G3RJV's projects and was trotted out many times in PW and the like. I am sure others may be able to find a more elegant approach to allow full break in, etc.

The digital VFO uses a Teensy microprocessor, an Si5351 break-out board and a colour TFT screen for the frequency read out. Kevin researched previous VFO designs and came up with an excellent scheme where there are separate outputs for transmit and the receiver offset can be set to suit the operator, or you can use it with full RIT control. The software is currently set to a single HF band and there are two VFOs so you can jump around the band very quickly. Tuning step are selected using 'faster' and 'slower' push buttons. The software includes a keyer, with memories and a sidetone output if required. There is even an 'S-meter' display for audio derived signal strength. The RF gain pot for the receiver can be accommodated on the PCB so it makes a complete front panel to a transceiver (or receiver).

Beta testing has proved this to be a very useful addition to other direct receiver/transmitter combinations and units have been used between 80 and 15m. Unlike many other digital VFOs, this one is not configured for superhet receivers/ transceivers.



The Club is not intending to offer kits for this project but the first batch of PCBs are now available from Club Sales for just £2 each, plus the usual postage. Instructions and parts list should be on the Club website by the time you are reading this.

Mains power in outdoor sheds

David Holland G4LDT email: g4ldt@outlook.com

I recently wrote "Yet Another Aerial Article" and was pleased with all the good feedback emails that I received. There were a few queries in these emails; some of which concerned the mains supply to my shack.

Over the years I have seen many attempts at supplying mains to sheds, many of which were downright dangerous as well as being illegal. The methods used vary from a long mains extension fed through windows and doors to some truly horrific lash-ups using twin and earth that had been buried, hung without any support in the air or simply laid on the ground.

Of course you could employ a properly qualified electrician who would probably use a buried coaxial armoured cable etc. The downside of this approach is both cost and disturbance. So, there had to be a middle way, and this is how I did it. I am not saying that its the best way for everyone but it is safe and, as far as I know, legal.

If in doubt consult a qualified electrician!

Temporary buildings

Many years ago I had a hand in the design of a lighting and mains supply system for temporary buildings used by the military. It had to be safe, weather and squaddie proof. The basis of this system was 2.5mm "Arctic Blue" mains flexible cable and 16A male and female "blue" plugs and sockets.

These are what is used to supply mains to touring caravans at pitch sites. The usual system is a post with a 16A female socket. The caravanner supplies a cable with a 16A male plug on the end that connects to the post and a 16A flying female socket on the other. This is plugged into a 16A panel mounted male socket on the caravan. Inside the caravan there is usually a simple consumer unit.

As a caravan

It seemed to me that all that was necessary was to regard the shed as a caravan. In my case things were simplified by my kitchen wall facing the shed. There was an unused 13A socket

alongside my cooker connection point. I simply drilled through the wall from behind the socket to allow the passage of a short length of twin and earth.

The cable is connected in parallel with the 13A socket forming a spur. The other end is connected to a panel mounting 16A “blue” socket fixed to the wall over the hole.

In my case the routing of the 2.5mm arctic blue cable was made easy by the existence of a fence that simply asked for the cable to be run along it – see photos.

Others however may not be as fortunate. If I were in this position I would use a catenary wire to support the cable overhead. A catenary is simply a strong wire that bridges a gap and to which the cable is attached to avoid any strain on it.

Traditionally steel wire is used but I have used 16s.w.g. hard-drawn copper that I had spare from aerial projects. I have found it extremely strong. A ring bolt on the house wall and a screw in large eyelet on the shed could be used to fasten the catenary.

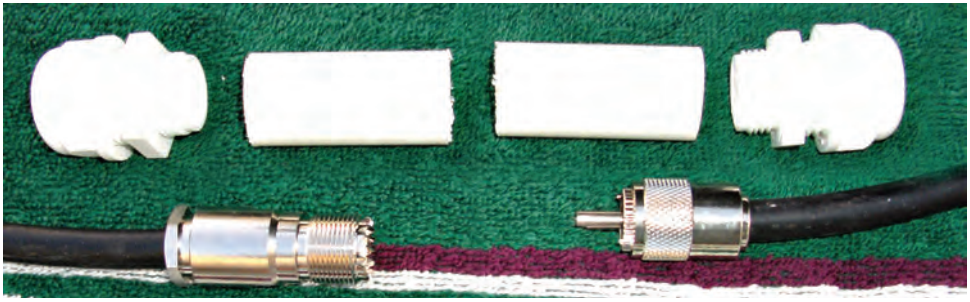
Inside the shed I fitted a simple two-way consumer unit. One RCB for the lights and the other for the mains sockets. The shed was wired with a lighting ring and a spur to a selection of sockets. In my opinion this is a temporary (permanent) arrangement and thus legal – as well as safe!

BUT, if in doubt consult a qualified electrician!

Waterproofing coaxial joints

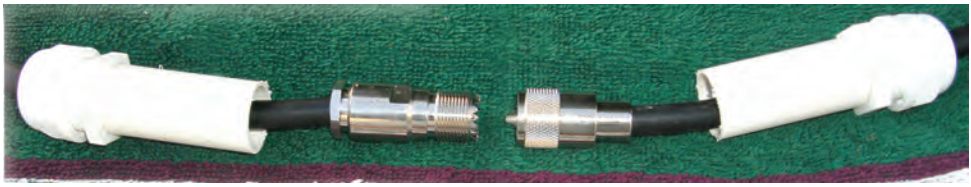
Mike G8NXD, 12A TR16 6LS UK email: pencoys@gmail.com

The device to be described is good for IP68 waterproofing of external connections using PL259/SO239 or other style connectors. The joint can be quickly made, confidently left out in the rain forever or during field days and equally quickly dismantled and re-assembled.



For each joint you will need two IP68 Nylon or plastic cabinet fitting Cable Glands with a 20mm hole, a short length of 'Hunter' 22mm coldwater overflow pipe and a 'Hunter' 22mm straight coupler. You will also need UPVC solvent cement and some Silicon sealant. I only specify the 'Hunter' manufacture as I know these will accommodate the SO239/PL259 connectors and the cable glands. Other manufacturers overflow pipe is usually too small a diameter.

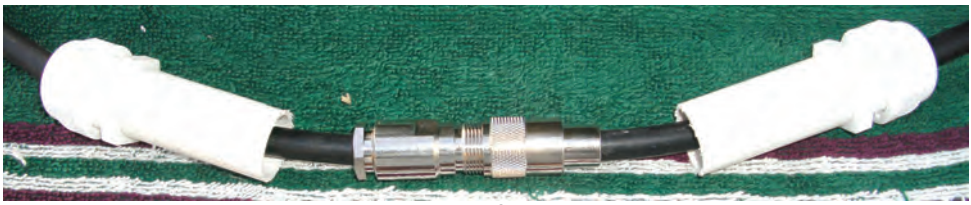
There are various manufacturers making cable glands of different clamping diameters



from 4mm up to 16mm while maintaining the 20mm fixing hole. The one you want for UR67, RG213 etc should accommodate 10.5mm diameter round cable, and for RG58 etc then it should be 5mm diameter.

Pick up one of the Cable glands and remove the fixing nut from the back of the gland and discard it, offer the gland threads to the pipe bore and you will see that it is a tight friction fit. Cut a suitable length of the 22mm pipe, clean one end with a degreaser and solvent weld one end of the 22mm straight coupler to the pipe and leave for a while to 'set'.

On the other end of this pipe. Clean and degrease the inner bore and the cable gland

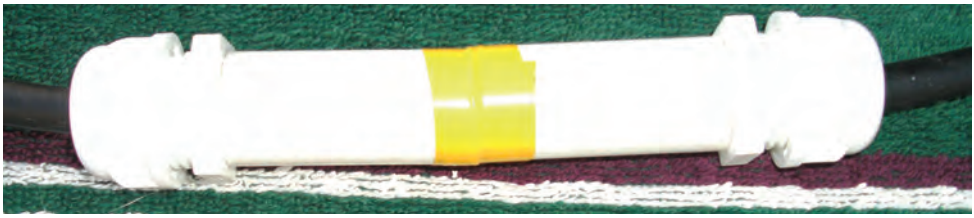


threads, apply a thin smear of silicon to the inner bore then quickly apply silicon sealant enough to fill the threads on the cable gland. Push the gland into the bore with a slight anti-clock twisting motion, this tends to drag the silicon from the threads into contact with the inner pipe. clean the surplus silicon from outside the tube and leave to 'set'. This is the female side

Take a further length of the 22mm pipe and repeat the silicon application on the second gland and fit it, BUT DO NOT solvent weld this pipe to the joiner. This obviously is the male side.

When adequate time has passed for the silicon and solvent weld to have 'set', insert the cable through one of the glands and slide the assembly up the coax, solder the chosen connector to the cable. Then do likewise for the other gland.

And finally, connect the two cables. Slide the glands back towards the joint and slide the female side onto the male, tighten the glands until it is difficult or impossible to move them on



the gripped cable and carefully wrap good quality PVC insulating tape over the central joint. With care a good waterproof joint will be made after a couple of turns of tape and this will keep all water out for as long as the PVC tape maintains its integrity. If used vertically, have the female above the male for optimum seal.

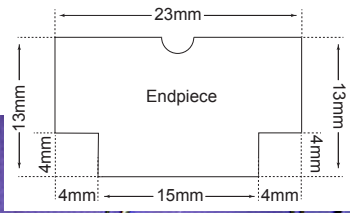
I have used this jointing method at the top of my mast and taped vertically to the mast between a beams coax tail and the down cable for over 5 years without leakage, and my QTH is at 650 feet ASL overlooking St Ives bay and the Bristol channel approaches, sited in a very exposed position. Hopefully, before publication date, there will be pictures showing each construction stage and links to the materials used on my webpage

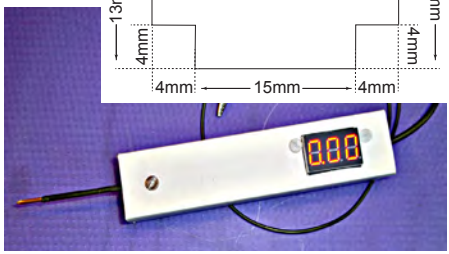
http://qrz.com/db/g8nxd

An easy-read voltmeter

Peter G4UMB

I thought this project will appeal to people who are more mechanical because this electronic DC voltmeter I bought comes ready made from a well known internet site. There are several types available . I got the 0-30v three wire model. Then it's a matter of making a case for it using a piece of 1" wide electrical trunking. A rectangular hole is made and the voltmeter fits with 2 screws. Next make two end coversas in the drawing. Then glue them in place. The probe is a 2mm diameter copper wire from a mains cable covered by sleeving and soldered to a ring terminal secured by a screw. It's now A voltmeter probe can be quicker to use than reading a regular multmeter.





A cheap 30A power supply

M0PNN

---- WARNING -----

We are dealing with mains electricity I take no responsibility should you damage yourself or your equipment. Please read the whole article before starting the modification. Watch out for the large capacitor.

I take no credit for this, as **G7RPG** tweeted he had modified a few HP HSTNS-PL14 power supplies and got nearly 13.8v out following the instructions of **ON5VL** on his website. The following details my attempts, failures, and mistakes so you don`t have to.

The £4 price tag piqued your interest no doubt, a switch-mode power supply. Calm down let`s not rush and nail crooked bits of wood cross the doors and run to the hills shouting heretic just yet. Small efficient cheap mass-produced computer server power supplies are available used very cheaply on Amazon, eBay, etc. Some of these supplies are very well made and can be easily modified to output 13.8V.

Switch-mode power supplies can generate a huge amount of noise I inspect any electrical item brought into the house powered by one and test it for QRM. The server power supplies I have modified are all very clean RF wise.

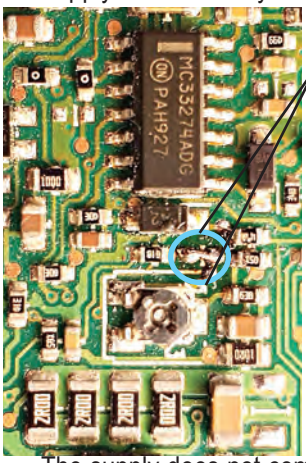
The Hewlett Packard HSTNS-PL14 will output 460 Watts at 12V at an output of 38A. At 13.8V there's 33A, more than enough to run a 100W rig. I paid £7.70 for a second-hand supply which included postage from eBay. And about three days later the supply arrived in a jiffy bag wrapped in bubble wrap in an electrostatic bag.

The HSTNS-PL14 is well shielded, and designed to be pushed and clipped into place within the computer server. Note the inner plastic cover which is inside both halves of the case. The first thing to decide is to keep or remove the latch that holds the power supply in the server.

The latch lever mechanism is pressed into the case. To remove it, use a drill bit slightly larger than the hole. Carefully drill out avoiding the plastic cover and the PCB. See the picture where I've drilled out the hole on the right-hand side.

There is also a small plastic handle used to pull the power supply out of the server that's held in place with two screws. Seven screws attach the top cover of the power supply to the bottom half. One at the far end of the latch side. Four on the top and two on the other side. Once undone hold the supply in your right hand with the fan nearest you. The top hinges over to the left when fully over pull the top slightly towards you wiggle it and the top cover will come off. Once the cover is removed it's time to get down to business. Lie the supply down on its side with the PCB facing

you and the fan end closest to you. Carefully fold back the yellow plastic at the top end of the supply out of the way.



You need to remove the 100Ω resistor circled and bridge the pads as shown in the circled point left. This will allow the voltage to be controlled by turning the variable resistor directly below and to the left of it.

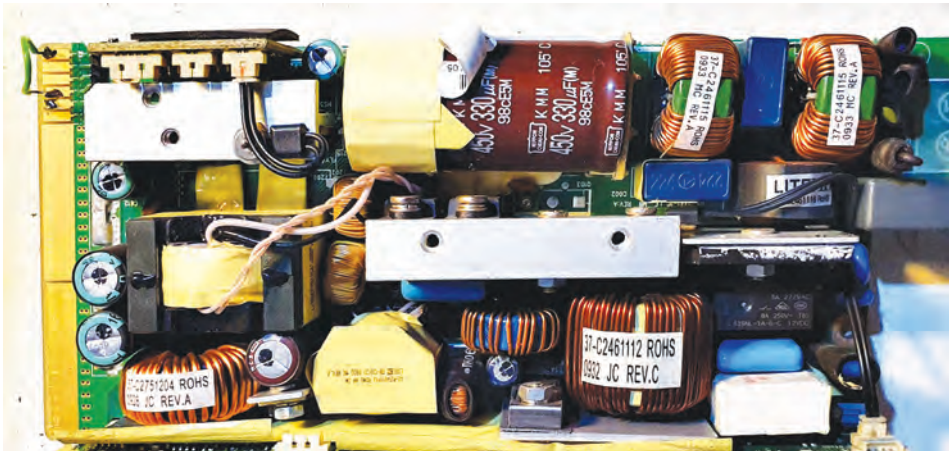
Like most modern circuit boards surface mount components with unleaded solder are used.

I remove the resistor by applying a little flux. Add a little 60:40 solder to each pad then carefully move the resistor off the pads. I am sure you have your own method of removal.

Once the resistor has been removed clean up the pads with some good quantity solder wick.

Bridge the pads with an off cut from a through the hole resistor etc. Thoroughly check for solder bridges. The components are small aren't they!

The supply does not come with a power lead you will need a three-pin lead as used in desktop PC`s, Monitors, Kettles. But before turning on the supply please take note of the following. When the supply is turned on at the mains it's live. You will hear a click and the fan which runs all the time will turn on. The DC output to the copper pads at the front of the



supply is triggered by shorting pads 1 and 4 above left in the picture. The picture, shows the pads successfully bridged. The variable resistor can now be used to adjust the DC output voltage but not just yet.

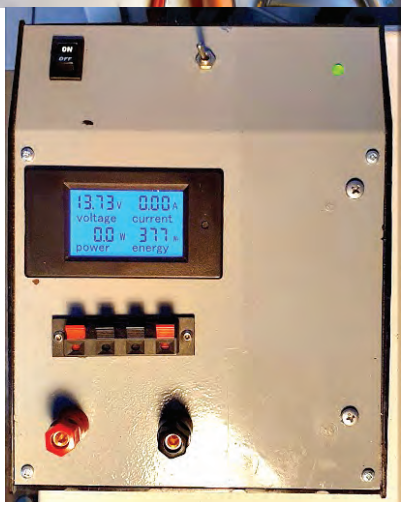
Please be careful to select the correct pads to short out or the supply will not turn on. Worse still let the 'magic smoke' out! Yes, I've done this as well!

Thoroughly check for solder bridges between pads. Now is a good time to add a toggle switch for on/off. A green led will illuminate on the back of the supply to indicate it's now in operation. The plastic covering that covers the inside of the case halves can fold over easily. It too will let out the 'magic smoke' if you forget to fold it back before replacing the bottom cover. Yes, I've done this as well. But thankfully the supplies are cheap.

One supply, I filed the PCB down a couple of millimetres on the corner to fit into an enclosure and didn't see the fine tracks that were ruined. The result was a supply that was dead.

When you're happy with your modification, it's time to hold your breath and turn it on, to adjust the variable resistor directly below the bridged resistor pad giving as near to 13.8v as possible. I use a ceramic blade tipped screwdriver for this. The DC output is from the two large copper pads at the front of the supply. Shown in the picture on the previous page.

It is possible to remove the supply from the bottom case, as it's held in place with four screws, with one to secure the earth lead. I would advise leaving the bottom cover on because the mains socket is difficult to get back in.



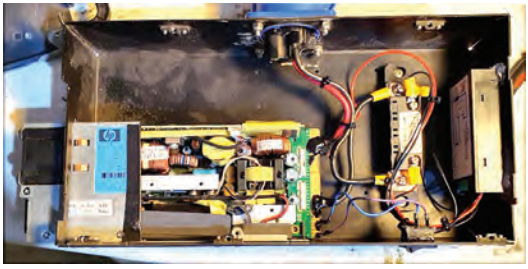
Once the supply has been modified the rest is up to you, to make it as simple or complex as you wish. Simple: just put the top cover back on add a couple of 48mm binding posts Black/Red an on/off switch and your good to go.

Complex: use a nice enclosure, with V/A meter with 50-Amp shunt two four-way push-to-release connector plate for low current devices, along with heavy duty binding posts.

The supply could also be used for a single task such as powering an external auto AMU in another location from the main station.

I have used these server supplies for various tasks. One I use on the bench with a 4-way push-to-release connector plate for low current devices and a ssome heavier binding posts. This has a 50A shunt and display showing voltage out current drawn power in watts and energy used in watts. Another supply is used for powering a 2.4GHz QO-100 transverter and small amplifier down a 12m cable.

The link below is to the website of **ON5VL** detailing the modification of a HP model HSTNS-PL18 to a 13.8V 54.5A supply. The modification is the same as the HSTNS-PL14. I purchased all my HSTNS-PL14 used from eBay seller "tech-cycle-solutions" at £4 plus £3.70 postage each. The HSTNS-PL18 is also available as 'used' on eBay at the time of writing for £11.50 including postage. You may not wish to run your top-notch HF rig from one of these but for a simple cheap no-frills PSU they work very well.



https://t.co/7ygdwFgF2u?amp=1

5W, Two transistors, 40m CW

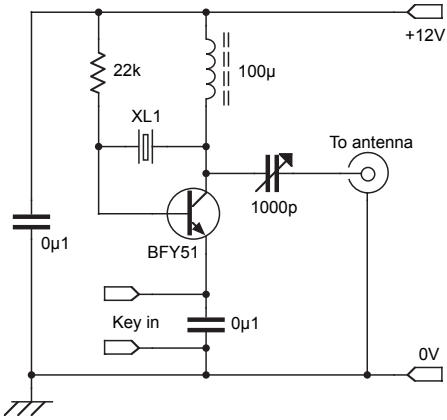
Peter Parker VK3YE email: vk3ye.com

Every now and then I get the urge to build a 'bare bones' QRP transmitter. But not too minimalist that contacts are difficult. Here's one to try.

My start in this endeavour came when I came across G4RAW's 'Ten Minute Transmitter' via G3YCC's website at:

http://www.zerobeat.net/g3ycc/tenmin.htm

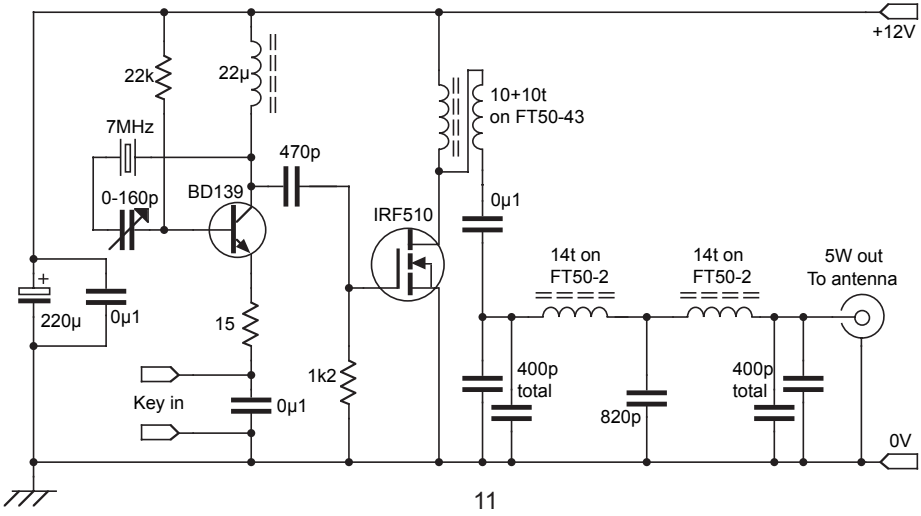
Originally published in Sprat 82, it used seven parts including one transistor and a crystal to generate a low power HF CW signal. So, I lashed one up, using a 7MHz crystal with a BD139 transistor rather than the original BFY51. It immediately sprung to life with about 200 milliwatts of output. A test with an online SDR about 700km away in the middle of the day gave a readable signal with only minor chirp.



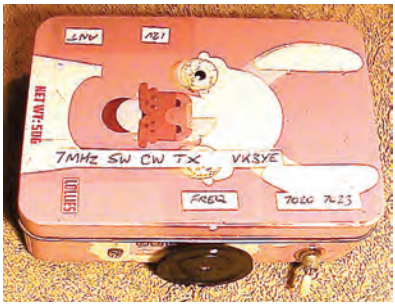
A variable capacitor in series with the crystal allowed a small frequency change. However keying quality deteriorated when it was set to too low a value as the keyed oscillator was slower to start.

There are so few parts that I didn't use a circuit board. The case was a metal sweet tin from a charity shop. Sanding the inside gives a solderable surface for the grounded sides of components.

The next experiment was to add a power amplifier using a simple IRF510 circuit. As this was a CW-only transmitter it didn't need to be linear. Hence there didn't need to be



the usual DC bias circuit with the zener diode and trimmer potentiometer. That may be desirable if you want a little more gain but adjusting the trimmer can be critical and going too far can result in FET overheating and destruction. It was easier just to leave it out.



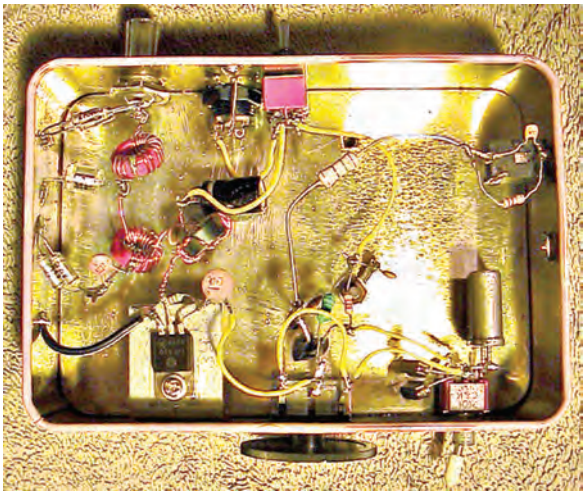
Output power originally read about 8W with a fixed 1000pF coupling capacitor between the crystal (compression trimmers as used in the original now being quite rare). I reduced it to 470pF to reduce loading on the oscillator and likely help keying quality. That cut power to a still good 6W.

Although neither the BD139 nor the IRF510 got hot on key down, I added a 15Ω resistor in series with the key. This slightly reduces the transmitter's output to 5W and likely further help keying quality.

Frequency agility is important, even if it's only a few kilohertz to dodge interference and find a clear frequency on which to call. A series variable capacitor provides about 3kHz shift with a slight power drop-off at the high half of the range. A HC6 crystal gives a wider range than newer style crystals in smaller cases. Though you can experiment with two or more same frequency crystals in parallel as I did for 7.023MHz (a common frequency in Pixie type kits).

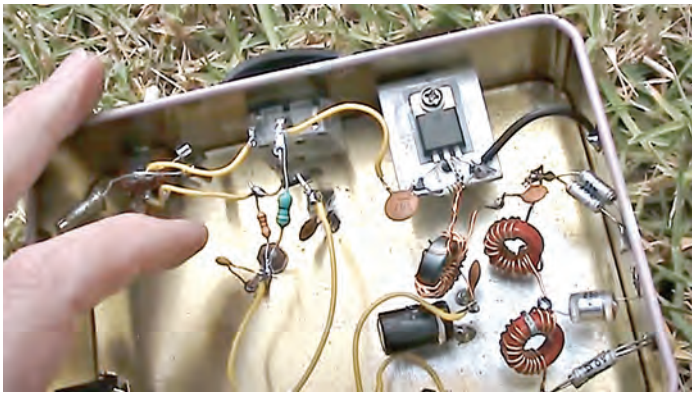
One or more added series inductors could give improved low-end VXO tuning range though note that the risk of chirp increases with a larger frequency range due to the oscillator being (i) keyed, (ii) being quite high power and (iii) not having a buffer stage between it and the power amplifier.

The first on-air session was from home. I was cheating on the receiver side, making use of a web SDR about 50km away. 15 minutes calling resulted in a reply and solid contact from South Australia, about 700 km distant. Having a signal strong enough to attract replies when calling CQ is my definition of a successful QRP rig and this one has certainly proved itself.



To prove this wasn't a one-off success, I set up portable in a local park on a warm afternoon. A 1970s era transistor radio with one short wave band acted as the receiver. A 10k resistor across the key contacts let the transmitter operate as a BFO to permit CW reception. Again the VXO came in useful to provide the 800Hz frequency offset needed.

As expected receiver selectivity was poor and, it being late afternoon with band activity building, multiple signals could sometimes be heard. Changing the BFO



frequency can partly compensate for this by separating the pitches of desired and undesired signals. That helps but you'd really only want to use this arrangement during the day when the band is quieter.

The session was successful with two good contacts were made. The furthest was Sydney, about 700km distant. My contact started with 4 watts but was still audible at 0.5W despite the crude receiver.

An L-match coupler provided impedance matching to a 20 metre long end-fed wire with a field strength meter used to adjust it for maximum deflection. A video of these contacts can be seen on my YouTube channel at:

https://youtube.com/vk3ye

Even in its two transistor form, this is still a very minimalist transmitter. Yet it gives the full QRP 5W in a configuration that is easier to build than a single transistor transmitter. The latter is typically less efficient, harder to key cleanly and may require experiments with a multi-coil inductor to get operating correctly.

What if you want to make improvements? You could try the following: (i) adding a one or two transistor buffer stage, (ii) not keying the oscillator, (iii) a wider range VXO and (iv) another section on the pi network (especially if not using it with an antenna coupler). Or, given it has already proved to be a successful 'contact getter', you could just leave it as it is and enjoy it for its slight chirp and crudeness.

3D Printing and ham radio

Wes Effner KN4NPH email: KN4NPH@gmail.com

Scenario One:

You have an idea for a new gadget. After a bit of 'napkin engineering', you begin searching through your junk boxes and parts reserves, gathering parts. Then, a trip to your favorite hardware/surplus/second-hand/junk store for that last part. But, wait, you can't find the exact part(s) you need. So you do some on-the-fly re-engineering for a new solution. But your new solution means further re-engineering. Soon, your original gadget has morphed into something you don't recognize and you feel that maybe your idea was an exercise in futility.

Scenario Two:

You have an idea for a new gadget. After a bit of 'napkin engineering', you begin searching through your junk boxes and parts reserves gathering parts. You have a 3D printer, so rather than visit your favorite hardware/surplus/second-hand/junk store, you design and print the final parts needed to make your gadget a reality and your QRP friends oh so envious.

3D printing as a tool. Your design or idea may be unique and parts to build it are too expensive or, not available. Or, you don't want to re-engineer a part that's available to make it 'fit' in your design. 3D printing is not the answer to all your design issues, but when it comes to the following parts, it's hard to beat.

Adapters, gears, collars, rings, liners, spacers, flanges, bands, levers, couplings, bearings, fixtures, actuators, shims, washers, sleeves, knobs, cylinders, nozzles, bushings, ribs, clips, braces, housings, containers, covers, brackets, cantilevers, blocks, clips, clamps. And of course, enclosures.

Is that all 3D printing can do? For me, one of the best parts of 3D printing is I'm not limited on hardware options; if an available part doesn't fit my design, I can likely print what I need. Want further inspiration of what 3D printing can do? Visit these sites and search for any ham-related topic.

www.thingiverse.com
www.yeggi.com

A friend, indeed.

The next best thing to having a 3D printer of your own, is a friend with a 3D printer. Additionally, there are designers and engineers ready to take your idea and make it into plastic (and soon, metal). The possibilities and potential are endless. The printers also come in a range of prices and capabilities.

A case in point for creating your own mechanical part occurred when I needed a simple 5V regulator that could be operated portable as well as in the shack. Enter the 2-piece 3D printed Ryobi battery adapter, a regulator that is rated at 2A. It has a variable voltage and is perfect for breadboard/prototyping away from a bench power supply or USB connection.

It all started when I needed a simple non-AC-powered bench power supply. One solution was to use some of the Li-Ion 18650 cells from my 'retired' electric bike. As I have a 3D printer, it would be rather easy to print some holders. But wait, then I'd need a battery management system (BMS) to monitor and protect my 18650 batteries, and a smart charger to top then up. Soon, my simple bench power supply wasn't so simple any more.

Looking around my eyes fell on a number of Ryobi battery packs that came to the rescue. I have an assortment of battery-powered Ryobi power-tools that would fit nicely into my idea for a bench power supply. My setup consists of:

- Li-Ion, so a consistent voltage.
- Built-in BMS with low-voltage cut-off.
- A charger.

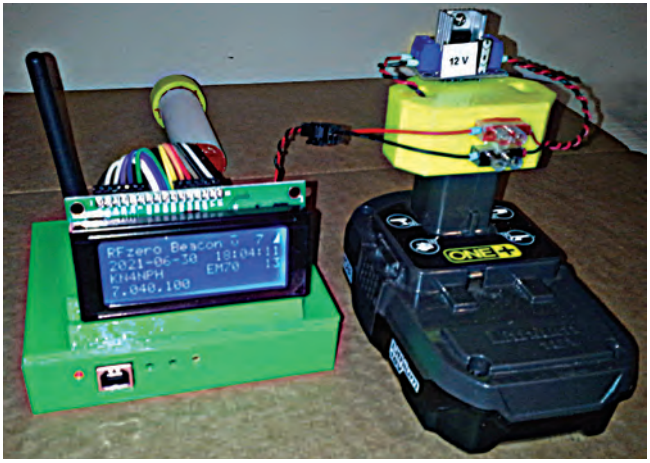
All I had to add were battery clips, a 'buck' switch mode regulator, some wire and to create a 3D printing physical adapter and I'd have a bench power supply.

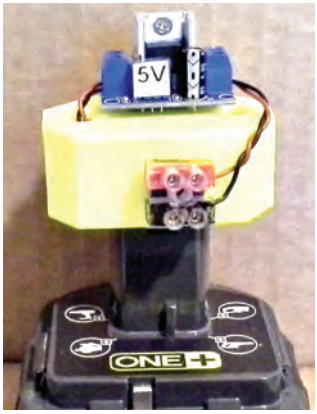
Some may question using a power-tool battery in such a way. I look at it thus , the pack is sitting there fully charged, waiting to DO something; why not expand the number of things the pack can do?

To keep this article short, if anyone is interested in building this adapter, email me and I will send the *.stl* files, a Bill of Material and some hints and tricks I learned while building the adapter.

Note that throughout this article, my adapter is mounted on the small Ryobi pack (P102, 1.3Ah). Know that this adapter fits all Ryobi One+ 18-volt batteries.

Ryobi battery pack powering my RFZero WSPR unit. Run-time is in excess of 4 hours. [Regulator is labeled, '12 V' so I remember to not connect it to a breadboard !]





On-air activity report

Peter Barville G3XJS email: g3xjs@gqrp.co.uk

Suffolk Trophy:

I was away in Somerset for this year's **International QRP Day** (17th June each year) but did manage some /P 60m activity using my K2, end fed wire and counterpoise. I was pleased to find good propagation on the band and enjoyed some very pleasant QSOs. However, **Valery RW3AI** and **Colin G3VTT** both put in a more serious effort and kept the QRP flag flying during the day across the bands. Valery used a variety of different rigs (G90 5W; G1M 5W; PFR3 4W; SW20 1.5W) to work more than 20 IARU region 1 countries.

The aerials in use were a vertical ECO and a LW. He tried to raise some QSOs with his PIXIE but, sadly, no responses. I'm pleased to say that Valery's efforts mean that RW3AI is this year's winner of the **Suffolk Trophy**, and our thanks and congratulations go to him for a fine effort, despite the difficult propagation conditions.

Our congratulations also to Colin **G3VTT** for his fine entry, which has earned him the **Runner Up Certificate**. Colin is a very enthusiastic and successful QRP operator on the bands and can always be relied upon to give great support to the Club's on-air activities. He has been going out portable on Mondays and now has a Super Whip MP1 vertical and with it has had a few contacts on 20m/30m with 3 watts.

He found a Miranda tripod stand in a charity shop for £4 then hacked the camera mount off and fitted a CB antenna fitting for the Super Whip. As he says, it sure beats the £300+ they want for the complete system from the dealers!

Rather sluggish

Chris G3XIZ says that he's found 80m activity rather sluggish, but perhaps that is to be expected during summer time. His local pal **Pete M0FMT** is often to be found calling CQ around 3560kHz and suggests we keep an ear open for him. Chris often calls and listens around 5262kHz but current propagation doesn't always allow UK QSOs.

He has recently dug out his old home brew QRP topband Tx and has been trying to raise some activity on 1836kHz, although often feels that he has the band to himself! However, he and I enjoyed a 160m Monday evening QSO recently with good signals each way. Chris's active loop aerial has greatly improved his reception and it's worth noting that perhaps we could all consider similar ways to improve our reception capabilities (reducing local noise etc).

Richard G3OTK took part in the RSGB International Low Power Contest in July, entering the "5W Fixed Station" section. He made 94 contacts over the 6 hours of the contest and achieved 4th place. He used his home made CW tcvr, tweaked to up the power to 5W. The aerials used were 80/40/20m fan dipoles with the centres 4m high (using a tall clothes line post with a pulley at the top) and the ends at 2m high tied to convenient bushes!

Logs via 'snailmail' to: Felucca, Pinesfield Lane, Trottiscliffe, West Malling, ME19 5EN.

Chilton Ionospheric Sounder

Using the Chilton Ionospheric Sounder (search for Jim Bacon's Propquest site) he could see that propagation was dominated by an E-layer, which at times extended up to at least 14mHz and so he was able to work UK stations on 20m as well as 40m. In fact, 40m proved the best band for contacts, including one with **G4PIQ** who was running 0.01W – QRPpp indeed! Well done Richard!

Monday Activity Day:

For some time now (at G3VTT Colin's suggestion) many of us have been treating each Monday as the Club's "Activity Day". Levels of activity have been variable, and very often dominated by 'the usual suspects'. There may be a slight difference of understanding as to whether the activity period extends throughout the whole day or whether it should be an evening only activity and, in addition, which band (or bands) is the best to use.

Chris G3XIZ wonders whether we should try and concentrate the times/frequencies a little in order that the stations who are active don't miss each other. You might be more inclined to participate if you felt more likely to find other stations to work, rather than having to spend extended periods of time calling and listening. Or you might prefer to keep the activity period as free of constraints as possible. At the end of the day, the object is to encourage members to use their radio equipment and get on the bands, making as many QRP QSOs as possible. But remember, this is NOT a contest!

If you have any comments, opinions or suggestions then please drop me a line and we can try to form some form of consensus.

My thanks to those who have sent logs and/or contributed to this issue's column. With no input there can be no column. In fact, with no on-air activity amongst members there can be no column, so please don't forget to switch on your radio equipment from time to time and make somebody else's day by giving them a QRP QSO!

It's hard for me to believe as I write this in August, but **Winter Sports** will be here before we know it! It's always a very popular event (activity period) so please don't forget to mark it in your diaries (26th December to 1st January inclusive, each year) and get those aerials ship-shape before the winter weather arrives. You might also want to consider beginning to compile a 2021 log as your entry for the **Chelmsley Trophy** (details on the G-QRP website).

There are numerous other Club awards for which you can easily apply (to Ryan G5CL) listed on the website, so let's have a bumper end to the year's activity levels!

72 de QRPeter G3XJS

These are the International QRP Calling Frequencies:

CW: 1836, 3560, 5262 (UK Only), 7030, 10116, 14060, 18086, 21060, 24906, 28060

SSB: 3690, 7090, 14285, 21285, 18130, 24950, 28360 kHz

But they are "Centres of Activity" so please spread out if activity levels are high.

Digital QRP power & SWR meter

Mike Dunstan G8GWY email: mike@dunstan.uk

This article describes an inexpensive digital QRP HF power meter that fits in a tobacco tin, complete with battery and charger. It displays average power and VSWR for inputs of 0.5 to 12 Watts and up to 50MHz.

To fit everything in the tin, I designed and made a double sided surface mount PCB. Leaded components and ugly bug construction will work just as well (but you will need a bigger box). All the information needed to make this project can be downloaded from:

https://g8gyw.github.io

The design utilises a Stockton Bridge (described in detail by **G4ZNQ** in edition 61 of the *Sprat* magazine). I used a BN-43-202 binocular core instead of the usual pair of toroids as this was smaller and easier to construct. A 10:1 turns ratio provides -20dB of coupling and up to 30dB of directivity.

The input waveform is half wave rectified by a 1N5711 Schottky diode and the resulting dc voltage on TP1 is:

$$V_{fwd} = (V_{inpk\text{-}pk} / 20) - V_{diode}$$

where V_{diode} is the 1N5711 forward voltage drop (typically 0.33V).

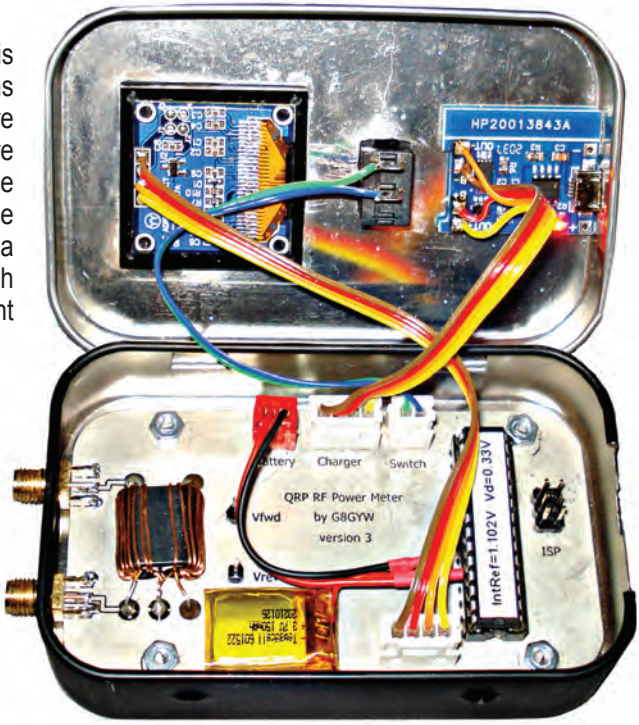
The forward and reflected voltages are fed to two ADC inputs on an Atmega328p processor, which converts them to forward and reflected power and calculates the VSWR. To save components the processor runs on its internal 8MHz clock and the internal 1.1V bandgap reference is used as the ADC reference. A third ADC input is used to monitor the voltage of the rechargeable battery. The display is a 3.3V compatible 0.96" 128x64 OLED.

The battery is a 3.7V 150mAh Lithium-Ion Polymer cell as used in many radio controlled models. This is charged by a module based on the TP4056 IC.

The software is provided as an Arduino sketch, and the Arduino IDE can be used to program the Atmega328 (or an Arduino module if you prefer).

Construction

Winding the transformer is straightforward. Pass 10 turns of 27swg enamelled copper wire through each hole in the core then strip, twist and solder the two wires at one end. With the twisted pair at the bottom, pass a single turn of 24swg wire through the left hand hole, bend the right hand wire on the other side across to meet it and solder together. Finally, pass a single turn of 24swg wire through the right hand hole, bend the left hand wire across and solder. The four stages are shown below.

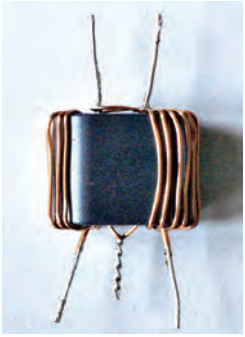


When assembly of the PCB is complete inspect it carefully for short circuits. If you have a VNA you can check the impedance of each RF connector with the other terminated; they should both be 50 ohms. Then, with RF out terminated, apply a signal to RF in. If you don't have another RF power meter to hand you can check the level with an oscilloscope and x10 probe connected to the transformer by using the formula:

Power = $(V_{pk\text{-}pk}{}^2)/400$. Measure the dc voltage on TP1 and compare the result with Table 1.

Power In (Watts)	Volts In (pk-pk)	TP1 (Vfwd)
1	20.0	0.65
2	28.3	1.06
5	44.7	1.88
10	63.2	2.81

Power In (Watts)

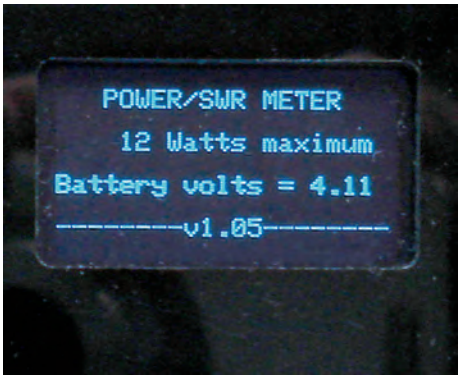


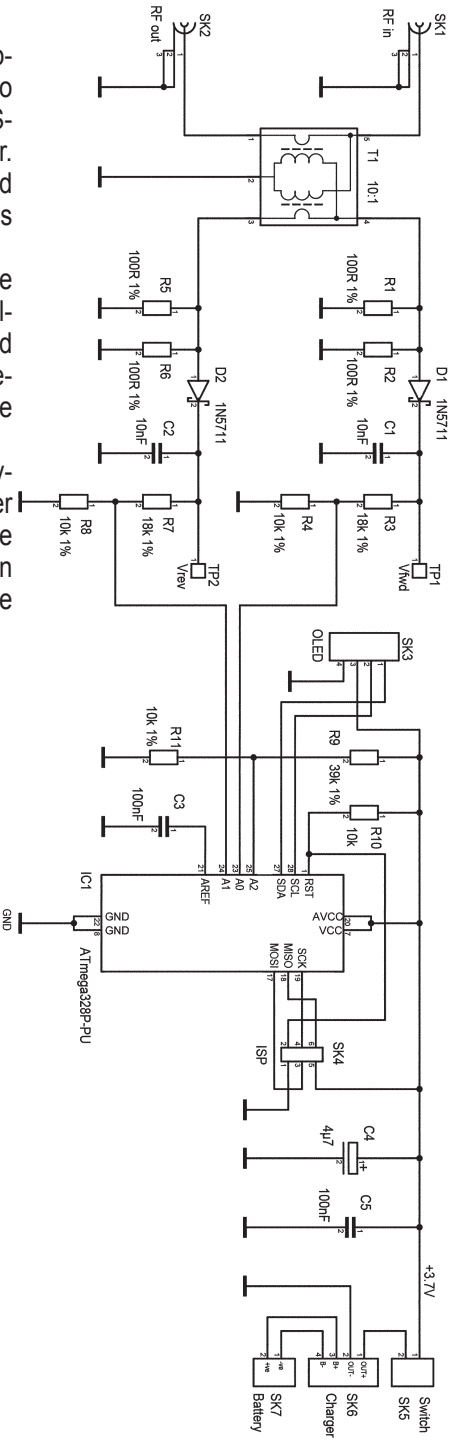
Programming

There are several ways of programming the processor. My preferred method is to use the Arduino IDE with the MiniCore Board Manager and a USBasp programming adapter via the ISP connector. When programming is complete the display should show the startup screen, followed a few seconds later by the measurement screen.

While still connected to your computer, measure the internal reference voltage on pin 21 with a multimeter. This voltage is stable but not accurate and can vary between 1.0V and 1.2V. Replace the default value in the program with the measured value and load the program again.

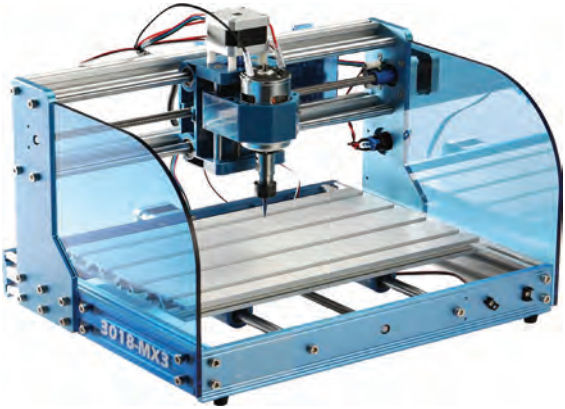
With a suitable 50Ω load on RFout, apply varying power levels to RFin and observe the power readings on the display. Check the accuracy of the VSWR readings using different loads. Calibration factors in the software can be used to improve the accuracy, which should be better than 5%.





CNC mill your next rig!

Pete Juliano, N6QW email: n6qwham@gmail.com



New innovations extend to the 'how' we fabricate our homebrew rigs. The usual 'dead bug', 'ugly construction', 'perf board', 'Manhattan style' and even possibly chemical etching are the standards. But there is a new kid on the block, the CNC Milling Machine.

The huge advantage of the CNC is the easy replication of circuit boards without the messy chemicals. Just punch the start button! Just like we share Arduino Sketches, I can supply G-Code so you can replicate my boards across the world. The other bonus: front panel cutouts and engraving

A suitable machine with excellent software (Mach III) can be bought from Amazon for $350. Certainly not cheap, but worthwhile.

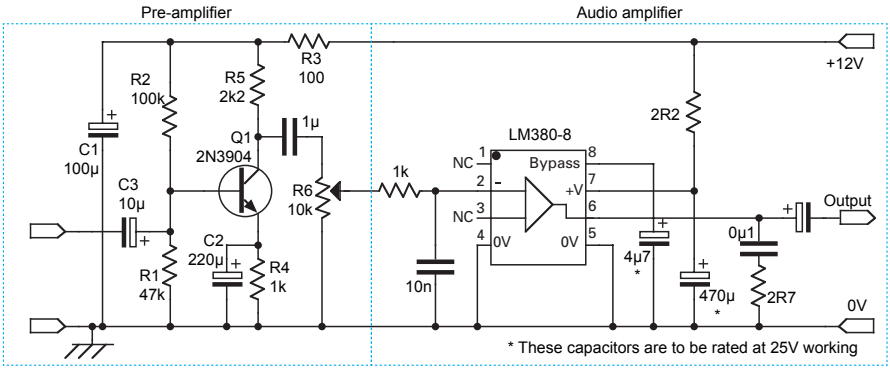
Application of CNC Technology can be as simple as creating a series of square pads arranged in a matrix and adding stock pads for ICs and other parts. Or you can use a program like *Eagle* essentially to mill a finished circuit board. My designs use both through-hole parts and SMD parts. All I have to know is 1/10 inch spacing for parts.

Starting with a schematic of a simple two stage Audio Amplifier consisting of the 2N3904 as a pre-amplifier which drives the 8 Pin LM380N-8 Final Audio Stage. Having and or creating the design is step one: Don't forget *LT Spice* to simulate your circuits first. But an added bonus is that changes are easily done in software.

I convert the final design to a graph paper layout which yields the numerical coordinates for the software program (free) called *G Simple*. You can get *G Simple* from a link on my website:

https://www.n6qw.com

Thus, our circuit design was translated to graph paper with the 4X4 matrix as home for



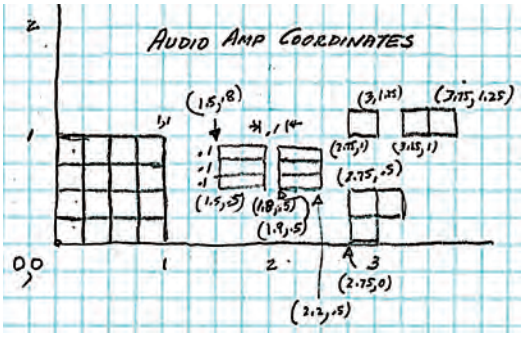
the 2N3904 and the 6 Pin Dip for the LM-380N-8. Actually, it is an 8 Pin device BUT pins 4 and 5 are grounded and so no pad needed and they are soldered to the top copper.

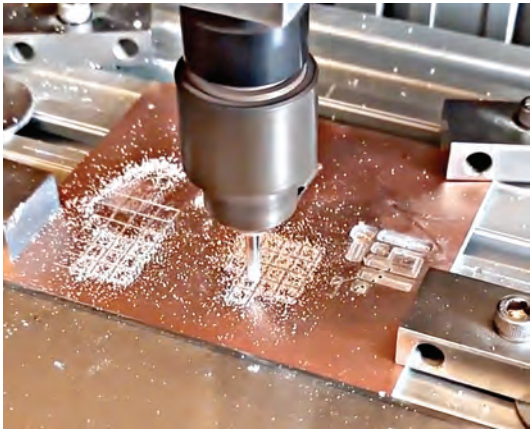
Start with 0,0 as the bottom left square of the Matrix. All other dimensions are referenced from the 0,0 point. The graph paper information is entered into the design system (*G Simple*) where the functionality of the software lets you make one square and then replicate it.

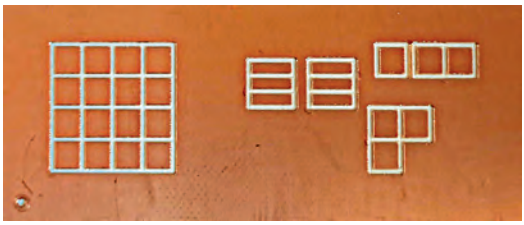
I started with the square at 0,0 (0.25 X 0.25 inches) and then made three X direction copies to complete the first row. That first row was copied in the Y direction three times. The same applies with the DIP device and the other pads. Designing is made easy and quick to implement. DIP pads are 0.1 inch by 0.3 inches.

The *G Simple* Program does two things, the first is to create the design and the second is to convert that design to what is called a '.dxf' file which is a stepping stone to creating a G-Code (text file in Notepad).

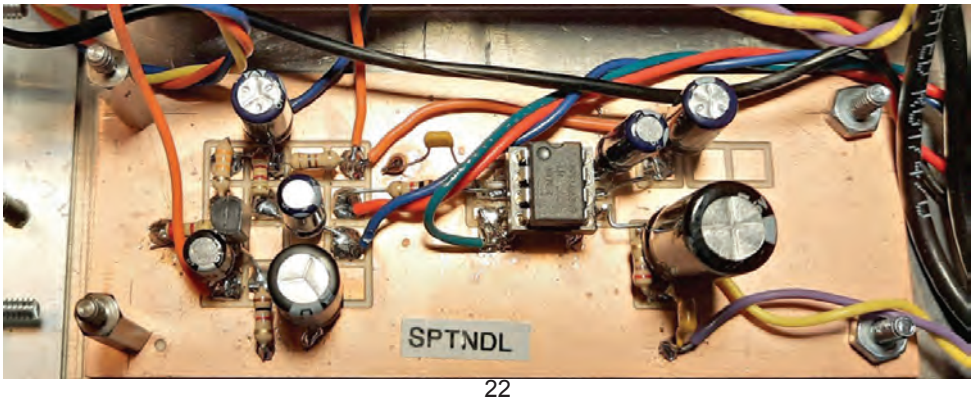
You will need a program‡ to create the G-Code from the '.dxf' file for the actual milling. The graph paper layout was translated to the *G Simple* design.



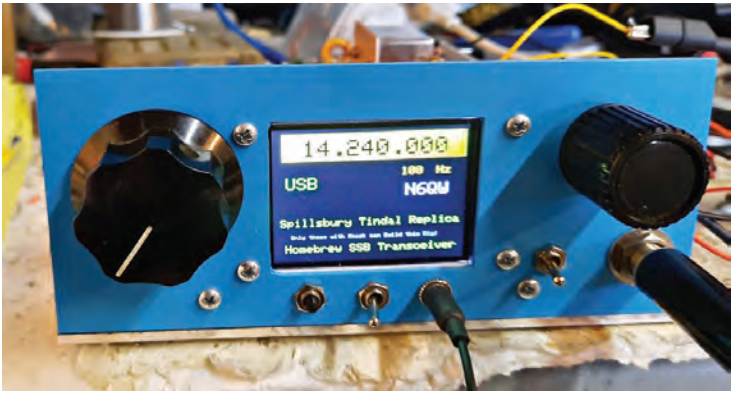




The amplifier board installed in a radio which I call the Spilsbury Tindall Replica



Finally, after the conversion to G-Code and loading onto the CNC Mill, this is what results. So, you can compare the graph sketch to the final Board and see the process. Here we have the board installed in a radio which I call the Spilsbury Tindall Replica. Now if I want a 2nd Board it is a simple matter of chucking a piece of stock in the CNC Mill and pressing the start button.



Panel cutouts.

I cannot possibly cover everything in this article so I created a webpage that gives more details on the application and use of a CNC Mill on radio projects.

(Right)

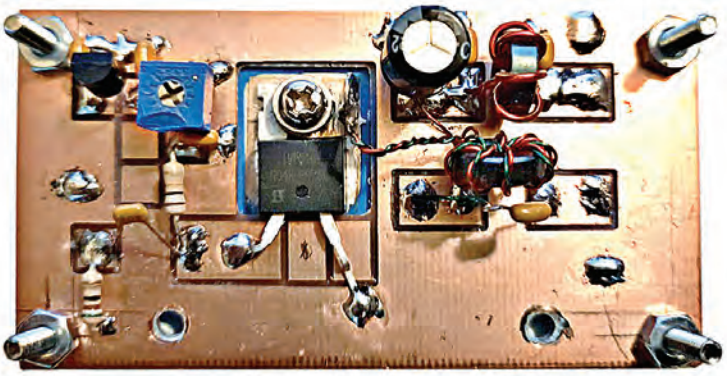
an IRF510 PA board

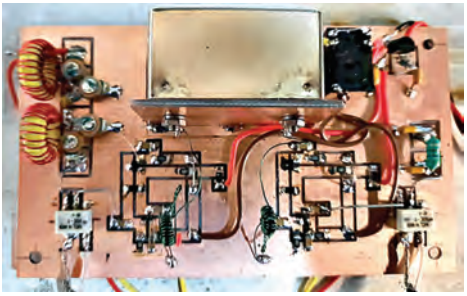
Below(L)

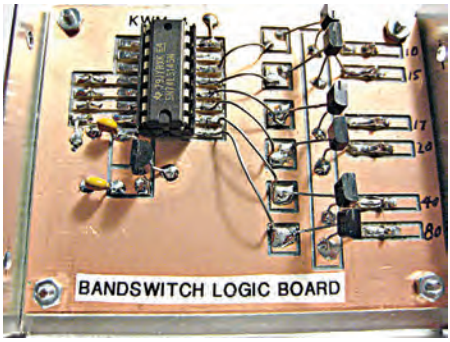
a bidirectional crystal filter board

Below(R)

a bandswitch board







I also detail a different software package called *Carbide Create* ,all in one from the design to G-Code. It is imperative you visit:

73 Pete N6QW

https://www.n6qw.com/CNCMILL.html

‡ https://sourceforge.net/projects/dxf2gcode/

A magnetic antenna mat

John VE3IPS@gmail.com

I have been looking at a Diamond MAT-50 magnetic antenna mat for some time but never found any “real” information on it or even a supplier who stocks it for a chance to see one in the bag.

I decided on a rainy Saturday Lockdown afternoon to just try to fashion something similar but use it as a base for an antenna tuner. I chose a small plastic cutting board that is 15 by 22 cm that would form the base for my antenna tuner. I am using the brilliant Elecraft T-1 with hopes of using my other LDG tuners with it as well.

I used a plastic cutting board, copper foil sheets, magnetic sheet and some twisted wire and a ground lug.

I placed a sheet of copper foil tape on the bottom of the board. I drilled a hole to allow a wired ground lug to pass though the board from the top and then fanned out the wires on top of the foil. I then put another copper sheet on top. This foil and magnetic sheet came from a crafts store and has adhesive on one side. I then put a magnetic sheet on top of the foil and that now makes the magnetic pad complete.

I connect the ground lug on the board to the T1 and then place it on top of my car using a 20 cm lead connected to the same lug.

Thus I have a magnetically coupled ground pad to increase the ground effect of a mobile

magnetic mount HF antenna or for a longwire.

I have done several tests with the Comet HFJ-350M Toy Box antenna and a long wire and it seems to make an improvement. I will seek to do more scientific testing but by then I am distracted to build something else.

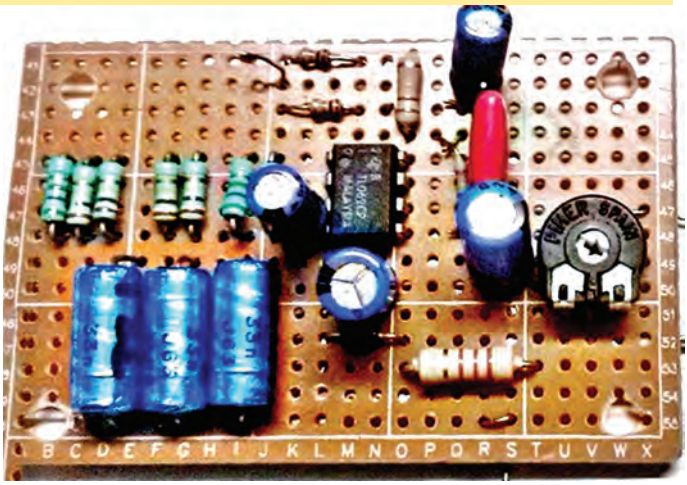
I made a second mat without the cutting board and just sandwiched the wire between the sheets and used a 3/8 " lug.

I trust aluminum foil and card board may make a quick prototype and a simple jumper lead.

John VE3IPS

An analogue CTCSS generator

Gert de Gooijer, GQRP-11286, pa3crc@peopleskills.nl



Most of the gear I work with consists of homebrew or very old second-hand gear. No logical reason for it... just like it far over making QSO's with a Yeacom or Alinwood. And I 've got the feeling lot of GQRP-members do feel the same. And on two metres I personally prefer direct QSO's, without repeaters. And for the weekly local round table, a repeater is very practical.

For repeaters you often need to modulate a CTCSS sub-tone and my set cannot do that. You find a lot of good designs for CTCSS, making use of a small micro-controllers. These enable you to choose out of many different sub-tones and they produce a really nice sine-wave. However, only needing one tone for the Eindhoven repeater (71.9Hz) I prefer an old analogue solution for my 40+ years old TS700.

Design considerations

When used indoor, it is not very difficult to obtain 0.5% frequency stability with an analogue RC-oscillator. That means a few hundred milli-hertz accuracy, which will be adequate. You need of course to use stable resistors (wire wound or metal-oxyde) and good PP- or PS-film capacitors or NP0 ceramic, the latter being rather scarce for the high capacitance values.

I do not know what it will do in a car with inside temperatures from -10 in winter up to +60 'C in full sunshine in summer. But well, my goal is comfortable use in the shack (+10...40'C).

Besides frequency accuracy there is another specification of importance: the tone must be free of harmonics. In an FM-communication channel the speech channel is cut off somewhere below 300 Hz, so you will not hear the CTCSS tone. But in case the very same tone, e.g. 71.9 Hz has a strong 5th harmonic, which is the case with a square wave, you will not only modulate the 71.9 Hz, but also the 5th harmonic around 360 Hz. And that will produce an annoying whine.

The circuit

The CTCSS generator proposed here was built entirely out of components already in my junk box, so actual values do not hit the optimal theoretical value. But it works fine. It all is very low frequency, so perf board is ideal.

The circuit is simple and make use of two opamps in one DIL8 encapsulation. I used

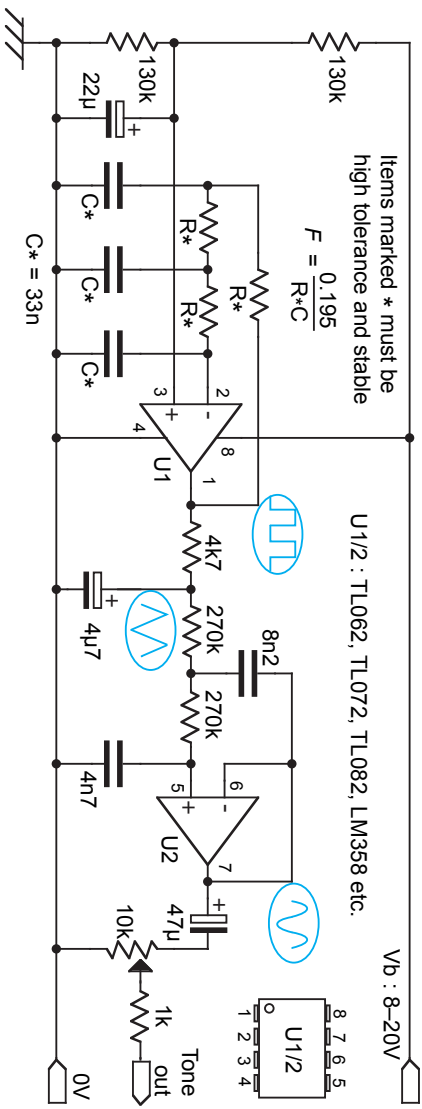
a TL062, but I guess a TL082, TL072, LM358, LM747, or two separate 741 opamps will also do. Or a LM324, leaving you with two other opamps to make a speech amplifier and a 3kHz low pass filter for the speech channel.

One opamp from the package forms an RC-oscillator with a feedback network consisting of three resistors and three capacitors. These six component should be of good stable quality. The output of the oscillator is some kind of square wave and due to the opamp this is a low impedance output. Because of the defined edges, it is ideal to measure the frequency at that point.

In the picture the three feedback capacitors are blue and look like axial electrolytics, but they are not (electrolytics are notoriously unstable!). They are film capacitors and are junkbox items from long, long ago. Finally they can go to work. And note, it is not just capacitors: many low cost carbon resistors drift a lot and are not suited. Use metal-oxide for these three resistors. Not all components are visible, some are below the perf board,

The amplitude at the output of the oscillator is too high (almost rail to rail) and we could use filtering of harmonics, so the signal is first integrated by a series resistor and a shunt capacitor. This leaves us with a triangular waveform of lower amplitude and the higher harmonics already attenuated.

This signal is passed through a second order Sallen Key low pass filter around the second opamp. On internet you'll find online calculators for these kind of opamp filters. If you choose the cut-off frequency of this filter just above the CTCSS frequency, it will adequately remove the harmonics (as long you do not overdrive the filter). The filter outputs a clean sinusoidal output signal. The trimmer pot adjusts the signal amplitude.



Setting the frequency

The values in the schematic will give something around the 71.9Hz tone. But of course you'll get another frequency by altering the values of the three resistors and/or capacitors in the feedback circuit of the oscillator.

You can fine tune the frequency by adding a small parallel capacitor to one of the capacitors (lowering the frequency) or paralleling one of the resistors with a high ohmic one (increasing the frequency) Paralleling is easy, you do not have to cut traces, or remove com-

ponents. I had to parallel two times a 5.6Meg resistor, 6.8Meg would have been better, but these were not in the junkbox. This procedure is better than using a trimmer pot: more stable.

Use in a transceiver

Best to couple the CTCSS tone directly to the frequency (or phase-) modulator, with enough amplitude to cause some 10...20% deviation. In most cases this means you have to open the lid of the set and dive into the intestines to find the right node.

Do not couple the tone into the microphone input, which might look the easy way to go. The low-cut filter in the speech channel, cutting everything below approx 200...300 Hz will completely attenuate the CTCSS tone, so you will need to overdrive the mike amplifier tremendously in order to get enough frequency deviation. This overdriving will almost certainly cause audible harmonics and distort your speech signal.

Keep the circuit switched on during receive; it takes some seconds for the working point, and frequency, to settle.

Measurements

These are real life measurements, not software simulations. With an 8V supply I got a 71.95Hz tone of maximum 1100mV and a frequency drift of max. 100mHz (mHz, not MHz!) from 4 seconds on after switch-on. Second and the third harmonics were 35dB down, all others are better then -45dB. The circuit took less then 1 mA from the supply, but this heavily depends on the type of opamp you use. I tested the circuit up to 20V supply, it simply works.

Hope more and more people will use “that old 2m-set” or a home brew one for local QSO’s over repeaters, showing that you do not need the newest Kencom or Iwood for that. Most of the time it is just the CTCSS that is missing that prevents getting your old, venerable radio on air over the repeater...

The pawnbroker antenna launcher

Jerry G0AED GQRP: 912

Forget compressed air, sling shots and any other method of getting a line up in a tree. Three reclaimed golf balls from a charity shop, three 55x12mm screw eyes and some polypropylene string are all that is needed. Drill the golf balls with bit that’s a little smaller than the screw size but not all the way through.

Wind the screw eyes into the balls. Put a loop in the end of the string and attach the first ball. Other balls are attached by passing the string through the eye and looping around the ball. Launch by windmilling the golf balls by your side and releasing at the right moment. Wear gloves. I put the line over a forty foot tree in my garden after four tries. It takes a bit of practice but is soon mastered. This weight combination seems the best combo for most applications.

Jerry G0AED

MEMBERS' NEWS

by Chris Page, G4BUE

E-mail: chris@g4bue.com
gc4bue@gmail.com

This is the worst issue for reports from members I have had for years. Why is that? I would have thought because of the recent lock-down, I would be inundated with reports and picture from members having to spend more time at home. If you wish this column to continue, then please make a contribution. The column only exists because of you, the members. Those of you on the club's mailing group will notice I have taken one or two news items from there to help fill this issue's column.

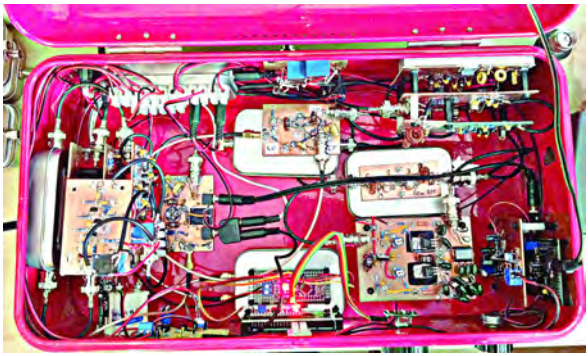
On 13 June, **G4UDG** spent a while listening for **GI5TKA**, a commemorative station marking the anniversary of the first airdrop of weapons to the French resistance on 13 June 1941. Chris said, 'Radio conditions were good to Europe but not so good to Northern Ireland, however I heard **EA4BL** replying to **GI5TKA** and knew I was on the right frequency. Roger was in deep QSB and I asked him to send me the five-letter codes and the letter shift (key), which he did many times and, straining to hear those dits and dashes in my SG Brown headphones, I finally had all the codes'. He used the home-built Eddystone AW-2 replica regenerative RX (pictured right) that would have been used in the early part of WW2 by the VIs (Volunteer Interceptors). He said initially, the role of the VI was to monitor for secret service agents located in Britain sending radio transmissions back to Germany. Later the VIs discovered and monitored the encrypted communications network of the Abwehr, the German Secret Intelligence Service. Chris got up early the next morning and decrypted the coded letters to reveal the message. He added, 'It was a great evening, the little two-valve receiver performed very well for such a simple design. I felt very honoured to walk in the footsteps of those unsung VI heroes all those years ago'.

R2AUK, inspired by QCX, has built the QRP CW 20-40m TCVR (pictured below). David says. 'It is a superhet with a single IF and the main components are: STM32F103 MCU, Si5351, LM386, 0802 LCD. The AGC schematic was found in *The Low Power Sprat Book*, to be precise, in the article *A Simple 20M QRP SSB Transceiver* by Robert Seiler, **HB9TSE**, who attributes the idea to **WA7JHZ**. I used 3 dBm mixers ADE-1L+ and HFD2/012-S-L2 latching relays, which allowed to reduce the current consumption. When powered from 13.8V

the rig consumes 150 mA. The LCD backlight can be turned off, which saves another ~20 mA. The rig produces 1.5-8W depending on VCC, which can be in 9-17V range. It can be powered from 4S Li-Ion battery. The efficiency is not great, somewhere between 30 and 40%, because I re-used the class AB amplifier from my previous SSB rig. I also used BPFs for both RX and TX to simplify the schematic, and to save the space in the enclosure. On the bright side, the rig fits into a homemade 15x15x5cms aluminum enclosure and weights only 594 grams. I did a *YouTube* video <https://youtu.be/2ATBznUBotA>'.

Writing on 7 June, **GØXAR** says, 'I just arrived home to find a package in the porch, the Hermes Lite had arrived. I was expecting to pay VAT and the inspection fee but no charge! So the total cost came to £245 delivered. It took six days from ordering to arrival and it's very well packed. Those of you wanting to put the proverbial toe in the water of software designed transceivers might want to try the Hermes rather than spend more than double the amount on a product from Icom etc'. In June, **G6YBC** wrote, 'The new owner of Kanga UK is Jason Woodman, **MØNYW**, <hamradiojason@gmail.com>. He will be back open in the next few weeks once he has sorted the stock'.

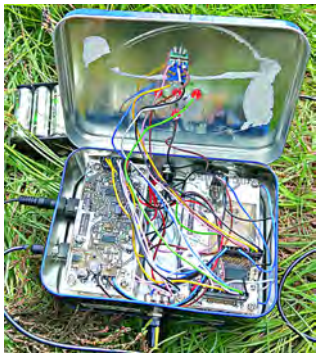
N2CQR writes, 'Legend has it that our "LSB below 10. USB above 10" convention began with a 9MHz IF 5.2MHz VFO rig that put us on 75m LSB and 20m USB without the need to shift the carrier oscillator frequency. But that just doesn't work. It *does* work if the filter is at 5.2MHz and the VFO at 9MHz'. Bill is building that kind of rig, using a homebrew 10-pole crystal filter and the VFO out of an old Yaesu FT-101. He calls it 'The Mythbuster' (right) and has a video series on the S*olderSmoke* blog. The rig is now on the air on both 75 and 20m.



Writing on 1 August, **MØNTV** said, 'We're just about to move house so I'm going to be QRT for a while. I have now finished my 'Optimiser' scratch-built tri-band SSB TCVR in the last *SPRAT* (right), and been QRV on 80, 40 and 20m. On 80 and 40, I've been operating barefoot at QRP levels with some great results and very favourable reports. There are more details available on my QRZ.com page <www. qrz.com/db/m0ntv> plus a couple of videos on my **M0NTV** Homebrewing *YouTube* channel. By the time I'm set up in the new QTH I'll be itching to fire up the iron again!'.

G3NKS has not been on QRP as much as he would like of late but did enter the International Low Power Contest on 18th July with a part-time entry. Derek made 39 QSOs with his 5W crystal controlled valve TX on 80m and 40m, a Drake R4C RX and a **G5RV** antenna 20 feet high. He says, 'Luckily I had a couple of xtals for each band so could just sit and call CQ. One crystal (of the newer type) produced a distinct chirp which caused a couple of locals to remark that I had the most interesting signal on the bands!'.

G4TGJ has finished his two-band portable TCVR (right) and successfully activated two local SOTA summits with it. Richard also built a centre-loaded half-wave vertical for 20m which he says is a bit easier to deploy than his usual EFHW, and that also seemed to work well. He is now working on



a superhet and experimenting with dual gate MOSFET amplifiers and mixers. Richard is also trying to use 13MHz crystals from club sales to make a crystal filter. **GØFUW** refers to **W2NDG**'s radio kit guide at <http://radiokitguide.com> and says, 'The kit list is the most comprehensive I have ever seen and is a terrific resource for anyone looking for something to scratch that itch' [to build something].

Writing on 24 June, **G3CWI** says, 'One of the big advantages of QRP is that the radio equipment is highly portable. For a while now I have thought it might be an interesting challenge to operate from a motorway/freeway roundabout. This week I went out and did it. The operation certainly included some challenges along the way. The video is at <https://youtu.be/9NlsClDZbgI>. **GØXAR** says, 'Those of you interested in buying the C programming book, mentioned in the editorial of the last *SPRAT*, and self-published by **W8TEE**, will find it on *Amazon*. The paperback is £21, and the Kindle edition about half that. I don't have any connection with Jack but it seemed worth mentioning it, given the increasing popularity of microcontroller projects in the QRP world.

G3XIZ and **G6XDK** recently had a most pleasant visit to **G3MCK**. Chris says Gerald generously filled their car boot up with choice components, which should enable him to keep building projects for the foreseeable future. He is currently building an interface unit to enable him to use his SDRPlay RX whilst transmitting. Chris says, 'Until now, the SDR turns its toes up and crashes as soon as it sniffs the slightest RF. Has anyone else had, and then solved, this problem?'.

PH2LB has been working on his /P QRP QO-100 set-up (pictured right). Lex says, 'The uplink is FT-818 pushing 0.5W into a AMSAT-DL 70cm/13cm QRP upconverter. Antenna is a five-turn helix antenna in a PET storage jar placed in front of the LNB on a 60 cm offset dish. The helix is kept in place by a 3D printed holder. Downlink is a standard LNB using a Pluto SDR with *SDRConsole* on a laptop. Next step will be a DIY 10MHz GPS reference source'.

DL6MHC finished building the Hardrock-50 kit at the beginning of August and says he now has the possibility to get a 'little extra punch' of 50W whenever he needs it. Michael says, 'Signal/audio reports have been very good so far. I wrote a few lines about the building process and posted some pictures on my website at <https://qrz.is/building-the-hardrock50/>.

G3XIZ says, 'Our 0900 Sunday morning MF net is still going strong and any callers or reports are very welcome. Would anyone like to have a cross-band QSO with me on MF and them on, say 80m? If so, then drop me an e-mail <g3xizchris@gmail.com>'.

GØUCP says his recent work has all been with valve rigs, one all-band and the other a 20m MO/PA, pictured above. John says, 'Both use 1.4V filament 3A5 double triodes as an oscillator and buffer or frequency changer. The PA uses two 3A4s and on one, a 3B4 beam pentode can switch in to put out a healthy 2W on 80m. The present challenge is to use ceramic resonators in parallel with the crystal to increase frequency span'. In June, **GØXAR** watched a *YouTube* video by a user called Les'slab, and says, 'If you are interested in lasers and other optical work, he is worth a look. In the link <https://youtu.be/NEHiv4lv68U> he shows how to convert a wire ended capacitor to a doorknob one.

GM4VKI still has his head in a Hallicrafter, believing it was an SX11 but turns out to be a cross between a SX11 and the IF section of a SX16. Roy says, 'All IF trannys have been removed and trimming cap replaced after some previous owner used a hammer to adjust them!' He bought a new FT-891 for the motor-home that is working very well on 40m with a fishing pole antenna, with the power turned down. He also bought one of the cheap Chinese auto ATUs and says as long as you tune-up at low power, it has stood the test of time quite well so far. Finally, Roy writes, 'Nothing on the rally front up here in Scotland so far, but still swithering as to restarting the club sales if they do start up again, as not being a youngster anymore and with the passing of my pal **GM3WIL**'.

In May, **M5AML** finished his new QO-100 set-up and says, 'Outputting 2W to a 3½ turn helix feeding a 60cm dish, I can get a good-enough signal into the satellite for SSB and SSTV QSOs. QO-100 is 24,000 miles from my QTH so all contacts are DX! (right). The helix now needs weather-proofing because it is affected by rain. Also, my FT-790R tuning step varies for some reason, meaning I cannot tune to certain frequencies! Keeping up the spirit of 'trying something new', I have also been enjoying the magic of 6m. 5W SSB into a much-too-long loft dipole, 1.5:1 SWR, has given me 9A, CT, EA, F, I and OE. One evening I heard Canada!'

Thanks to all the contributors of this column. Please tell me how your autumn goes for the Winter 2021 edition of *SPRAT*; what you have been building, who you have been working, and any other information about QRP, by 12 November. Also, interesting pictures please, don't be shy in letting members see what you have been building and/or where you have been operating from, your antennas, who you have been meeting, and even a shack picture to let other members know what you and your equipment look like. Let me know if you intend operating from somewhere other than your home QTH during the winter and spring months, so I can let members know to listen out for you.

Valve QRP reports July 17/18th 2021

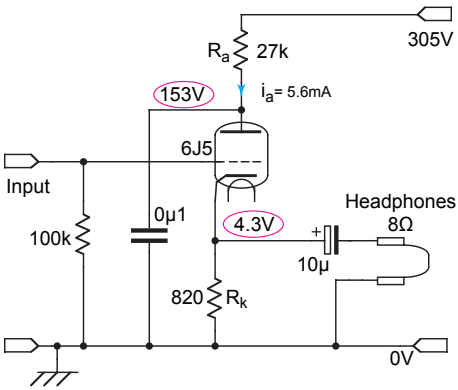
Colin Turner G3VTT email: g3vtt@aol.com

I received a report for the first time before the event from **Chris G5VZ** who constructed a transmitter especially for the event sending me a picture of the rig he intended to use. I was very pleased to work him and the other newcomers for the July weekend. Thanks to all of you who took part. Chris told me 'After a pleasant QSO with Chris, G3XIZ back in June, I was spurred on to complete a project begun quite some time ago.

In fact this story really begins at the start of the first UK lockdown when I was encouraged to clear our garage. As well as filling two skips, I found a great deal of useful-looking stuff that needed keeping including a nice 250-0-250 transformer in rather better condition than its brown box with a yellow and red Radio Spares label and having LT windings that would be good for heaters.

Being only a one-valve transmitter why did I buy two? In case I broke one! I completed the transmitter and then had it working on Saturday 17th July and made three contacts, G4GIR, GM0OBD and G3XIZ.After a quiet day on 80m conditions really picked up making the QRP process rather easy. I was using an elderly WT 8AMP key and struggling after easy going months with a Begali Sculpture and a keyer.

On Sunday 18th July began late afternoon having a QSO with G4ARI which rather drifted into the noise using the USN Flameproof Key I got from George, G3RJV (SK) when he downsized from Rochdale to Littleborough. Then in the evening hearing G4GIR again I managed to tail-end his QSO with Colin, G3VTT and notch up five contacts for the July G-QRP Valve Weekend'. Chris's transmitter is shown above.



Gerald G3MCK was once again active with a co/pa and worked a few stations but he did find time to send me a copy of a circuit he has been experimenting with. It uses a cathode follower arrangement using a triode permitting the direct connection of low impedance headphones and it has been used following a regenerative detector to good effect.

Regular **Ian G4GIR** had a good weekend both on and off the radio with a BBQ underway with plenty of liquid. He managed 17 QSO's on the LF bands using a Codar AT5 and an AR88 and found the Low Power contest helped.

Mike G0JXX has kindly written some notes about his operations. 'I just thought I'd send my report to you as a returning member of the GQRP community! Briefly, you can see my in-

terest in vintage WW2 kit and I regularly use the TCS set up on 1980 kHz AM on a Wednesday night so I try and keep everything working. I have a collection of Codar AT5 transmitters, about 4, one of which was used on a medium wave frequency in the 60s, not by me!), and I decided to use a partly built reconstructed one and optimise it for 80M CW and couple it with one of my AR88 receivers. It worked quite well but I will build the RX mute switching (Sprat 187) as the manual switching wasn't very user friendly. Although I heard quite a few stations I didn't manage to have any QSO as my large loop is optimised for 160 and it's mediocre at best on 80m. I'm not put off though and will get a better set up for next time'

Regular **John G3TYB** reports, 'Not a very successful weekend I am afraid. Firstly all my antennas were down for a long needed maintenance session so I had to scrabble around putting a temporary one up and the weather turned out to be rather hot. However I had seven QSO's in all, two on eighty, two on 60, two again on top band and one on 20 with a QRO Italian station. Four of the seven were valve to valve, two each with G4GIR and G3XIZ. I used my homebrew CO/PA transmitter and regenerative receiver on 60m and a homebrew superhet receiver and MK119 Spyset transmitter on 80 and 160. The antenna was an inverted L. 73 John G3TYB'

'Activity was reasonably high considering it was the hottest weekend of the year and I managed to work 23 stations using my new 8 valve transceiver' reports **Chris G3XIZ.**

'As usual I spent more time fiddling with the circuitry than actually operating but the rig is now almost

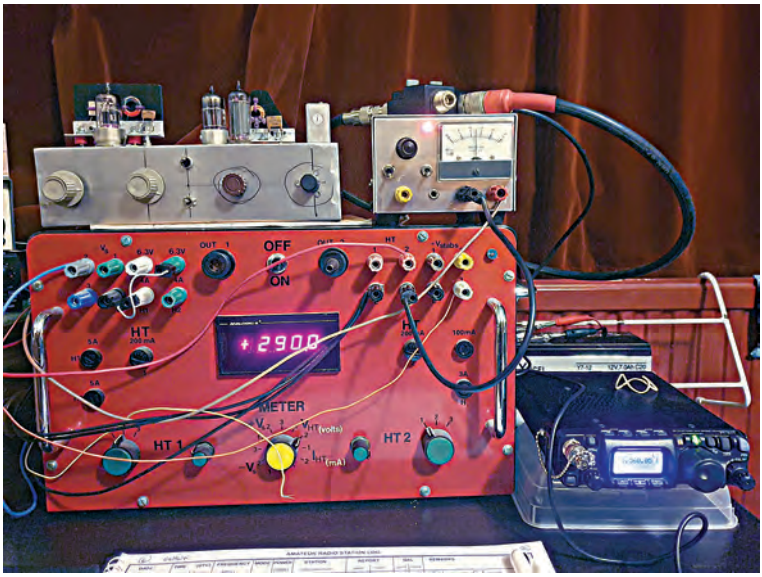
working to my satisfaction. At present I'm only QRV on Top Band and 80m but I've just obtained suitable crystals which should add 60m and 40m in time for the next event. I changed the original EF80 PA valve for a meatier EL84 which gives me 4W of RF.

The VFO is 'reasonably' stable and the direct conversion RX could resolve signals down to S3 if my noise level wasn't so high. Using my SDR Play receiver as a poor man's spectrum analyser shows that harmonics and birdies are well below the level of the fundamental frequency. Of those stations worked 16 QSOs were valve to valve with 10 unique valve stations - G3NKS, G3TYB, G3VTT, G3XJS, G4AQS, G4ARI, G4GIR, G4ZXN, G5VZ and M0FMT. Thanks to John G3TYB, Ian G4GIR and Gordon G4FGJ for contacts on 160m as I seemed to have that band all to myself apart from the ubiquitous FT8 signals.72 / 73 Chris G3XIZ'.

'Once again I was only able to make it properly onto the bands on Sunday and, once again, limited my activities to 80m and 160m. Although my Drake 2B will cover 60m I still don't have a valve transmitter to go with it. So I stuck with the Drake T4XC and R4B and made QSOs with the usual suspects on 80m (G3XIZ and G4GIR) and then just managed to scrape a 160m QSO with Ian G4GIR on 160m, despite the weak signals - it being the middle of the morning. In fact I did have a 60m QSO on the Saturday with John G3TYB using my K2. He was operating from his garden and running a valve CO/PA (4w) and a regen receiver.

Sorry I missed you during the weekend but suspect you were QRV earlier than I managed!' 72 **Peter G3XJS. Derek G3NKS** writes: 'Five QSOs, all valve to valve transmitters and all on 80m were all I managed. They were with GM4OBD, G3XIZ, G3VTT, G3XYF/P and G4ZKN, Too many distractions including a very hot QRP shack/shed. On the Sunday morning I did make 39 QSOs during the RSGB Low Power contest on 80m and 40m using my trusty Drake R4C receiver and my home brew CO/PA using two 6V6s and a selection of crystals, some of which produced a distinctive chirp which I hope didn't offend the contest organisers!

All the main bits for my long promised vfo/buffer/pa transmitter are now on the workbench

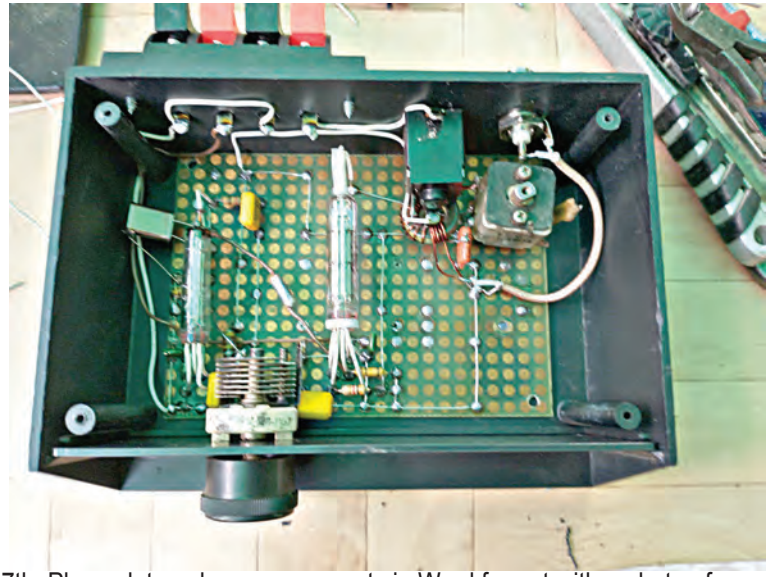


so I've no excuse for not getting on with the build. Thanks for all your efforts Colin and I'm looking forward to the next valve weekend'. **GM4OBD** has reported on his efforts. 'On the two previous valve QRP weekends I had little success.

Various factors were at play such as a contest, wrong choice of band and wrong choice of time. I had just finished constructing a dedicated 80 m crystal controlled TX on the Saturday and was keen to try it on the air. I decided that the evening would be the best time to work 80 m. I was pleased to work Markus DL1MKJ at reasonable strength, Derek G3NKS at a weaker level and Chris, G5VZ at very good strength.

All were using valve TX gear. This was very encouraging. On the Sunday evening I had QSOs with Martin, G4ZXN and Tim, G4ARI, the latter at very good signal strength. Again, both stations were using valve transmitters. The experience was great fun and I am looking forward to the next event. A photograph of the transmitter is attached. It uses an ECF82 as the oscillator, an ECC82 as a buffer and a 6BW6 as the PA. It is sitting on top of the rather large variable HT power supply and the receiver is an FT817.

Finally regular **Kare YU7AE** has submitted his short report using two unusual valves. 'Due to family obligations I had very limited time for activity. The last night I turned on my 'Sputnik' valve transmitter with a VXO around 14.060KHz. The valves are 1sh24b and 1p24b Russian military types used in the first sputnik transmitter in 1957. With an anode voltage of 110v and 1.2v on the filaments the output power was 1W. My receiver was a Yaesu FT817nd with a 350Hz CW filter and the antenna was a double Windom. In the activity I worked 3 QSO's with DL3NAA Peter 579/549, OO7Z Peter 449/119 and I3VFJ Vic 579/559. The propagation conditions were weak with strong short skip. I hope that the next valve day I will have more time and that I will report with some new valve equipment'.



Finally the next activity period is the weekend of November 6th and 7th. Please let me have your reports in Word format with a photo of your station or perhaps a circuit of your transmitter to encourage others to build and operate. Thanks to you all for being there and keeping the filaments lit.

Reports to me via email or via 'snailmail':

Colin Turner G3VTT, 182 Station Road, Rainham, Kent ME8 7PR

Membership Secretary news

Daphne G7ENA email: g7ena@gqrp.co.uk

Following on from last year we have decided not to put a standing order form in this issue of Sprat. As we have 4000+ members who already pay by various methods, to have it to take up 2 valuable pages of Sprat seems unnecessary. If you wish to set up a standing order then please do it online if possible, the info you will need is below.

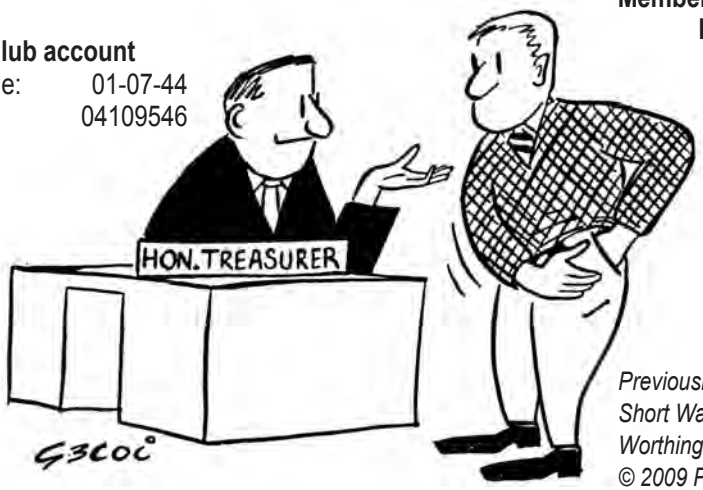
You **MUST include your membership number as the reference**, and our preferred date is 15th January. If you do need the form, then I can email it to you, or, if you send an SAE to me, I will send you a copy.

A standing order authorises your bank to make automatic annual subscription payments for you. It is not a direct debit, I cannot make alterations to the payment and I cannot even cancel it. It remains under your full control. This means that if the membership rate rises, you have to alter the payment amount.

Full information about renewals will be, as usual, in the next issue of Sprat.

Membership Secretary
Daphne G7ENA

GQRP Club account
Sort Code: 01-07-44
Account: 04109546



Previously published in Short Wave Magazine and Worthington's World

Mea Culpa!

Peter G4UMB

I am sorry to admit, that I made an error in the article *The Combined Paddle Keyer & Tx* in the Sprat issue 187.

The common of the key for the paddle connections should be connected to **negative not positive**. I had a Email from a builder who told me it why it would not work as shown!

Mea Culpa, my thanks for that.

Peter G4UMB

Club Information – Services and Awards

We have a number of Awards and Trophies which are described in detail on the club website.

** (address/email on the Club Officers page in this issue of Sprat).

Club Awards: Our Awards Manager is Ryan Pike – G5CL, **.
Operating Trophies are managed by the On-Air Activity Manager, Peter Barville G3XJS, ** and the Sprat trophies are awarded by the club committee. Nigel G0EBQ ** manages the production and distribution of the actual trophies.

If you don't have internet access and you would like to find out more - then please write to Ryan (awards) or Peter (trophies) enclosing return postage.

The club QSL Bureau is managed by - Dave Coutts GM3VTH, **.

QSL cards are sent out at regular intervals, in February, May, August, and November, in stamped addressed envelopes, paid for by the club. We no longer need to receive envelopes or stamps from members. All cards for the bureau should be sent to GM3VTH at the address above. Please help to speed up the service by following the following dispatch procedure:-

1. Put the receiving stations membership number on the top right of the card.
2. Sort cards in ascending number order.
3. Do not include cards with no number, or for non-members.

Unclaimed cards and those of ex members will be destroyed after 6 months.

North American members can send cards to:-
David Gauding, NFØR, 137 Wyndgate Valley Drive, O'Fallon, MO 63367, USA
David will send these in bulk to the UK bureau for distribution.

Technical Advice Antennas:
Colin Turner G3VTT ** will advise members on antennas to fit their location. Please send a plan, with dimensions, of your site and required bands, type of equipment and location of shack.

Technical Problems.
Ian Keyser G3ROO ** will give advice to members on circuit and construction problems. Please provide the fullest information possible.

Club Information – Officers/Contacts

Chairman Steve Hartley G0FUW 5 Sydenham Buildings Lower Bristol Road BATH, BA2 3BS g0fuw@gqrp.co.uk	**Treasurer & Club Sales** Graham Firth, G3MFJ 13 Wynmore Drive, Bramhope, Leeds. LS16 9DQ g3mfj@gqrp.co.uk
Membership Secretary Daphne Newsum G7ENA 33 Swallow Drive Louth LN11 0DN g7ena@gqrp.co.uk	**Sprat Editor** Tex Swann G1TEX 9 Alexandra Road Parkstone, BH14 9EL g1tex@gqrp.co.uk
Secretary Dick Pascoe G0BPS 12 Oak Rise, Terlingham Gardens Hawkinge, CT18 7SS g0bps@gqrp.co.uk	**On-Air Activity Manager** Peter Barville G3XJS Felucca, Pinesfield Lane, Trottiscliffe, ME19 5EN g3xjs@gqrp.co.uk
Awards Manager Ryan Pike G5CL. 63 Bishopstone Village, Nr. Aylesbury HP17 8SH g5cl@gqrp.co.uk	**QSL Manager** Dave Coutts, GM3VTH 29 Barons Hill Avenue, Linlithgow, EH49 7JU Scotland. gm3vth@gqrp.co.uk
Publicity & News Chris Page, G4BUE Highcroft Farmhouse, Gay Street, Pulborough. West Sussex RH20 2HJ g4bue@gqrp.co.uk	**Technical Advisor (Antennas)** Colin Turner, G3VTT – g3vtt@gqrp.co.uk **Technical Advisor (General)** Ian Keyser, G3ROO - g3roo@gqrp.co.uk
Website Manager. Tony Fishpool, G4WIF g4wif@gqrp.co.uk	**Technical Advisor (VHF)** John Beech, G8SEQ - g8seq@gqrp.co.uk

Other Contacts - limited space precludes including all contacts, please refer to the club "who does what" web page. Some of the above titles have changed, but the people are the same.

Note from the Membership Secretary Daphne G7ENA

We used to put the standing order form every year in this issue of Sprat but we felt that there was no need for 4000+ members who already pay by various methods, to have it to take up 2 valuable pages of Sprat. If you wish to set up a standing order. then do it online, and the info you will need is: GQRP Club account, 01-07-44, 04109546. **You MUST include your membership number as the reference**, and our preferred date is 15th January. If you do need the form, then I can email it to you, or, if you send an SAE to me, I will send you a copy. A standing order authorises your bank to make automatic annual subscription payments for you. It is not a direct debit. I cannot make alterations to the payment and I cannot even cancel it. It remains under your full control. This means that if the membership rate rises, **you have to alter the payment amount**.

Full information about renewals will be, as usual, in the next issue of Sprat.

Phoenixkitsonline.co.uk

Low Cost High Value Kits Designed in The UK

Just one of our popular kits... many More on our site

uCPO Advanced Code Oscillator /Tutor

The uCPO is a practice oscillator for both straight and Paddle keys, also a built in 6 Mode Morse Tutor. Internal 50mm speaker and fixed low level output for Zoom etc. Many Features make this the go to practice oscillator! **Reviewed in May 2021 Practical Wireless** £38.00 (plus P+P)

Special Offer to Clubs! This is a great little project for clubs and Build-A-Thons. A multimode Morse tutor with built in practice oscillator. Easy to build in a evening session and a useful bit of kit after the event. Offered in minimum orders of 10 units Price Only £13 per unit (Plus P+P)

Contact Paul@phoenixkitsonline.co.uk for more information on this as not on the web site yet.

QRP Labs

Kits & modules for QRP enthusiasts!

NEW! QCX-mini 5W CW tcvr kit!

New version of the best-selling QCX transceiver (over 14,500 sold!)

- Optimized for portable operations
- Optional enclosure $20 / £14 / 16.50€
- TCXO option $8.25 / £6.40 / 7.60€
- Only 95 x 63 x 25mm, weighs 200g
- Controllable LCD backlight
- Only 58mA receive current (backlight off)
- Available for 80, 60, 40, 30, 20 or 17m
- CW Decoder, Iambic keyer, VFO A/B/Split
- All SMD components pre-assembledHigh performance receiver, 200Hz CW filter, Full or Semi QSK operation
- WSPR and CW beacon mode, Preset frequencies and stored messages
- CAT (computer) control, built-in test and alignment tools, and more! Only $55 / £39 / 45€

See http://qrp-labs.com/qcxmini

Order online at http://qrp-labs.com using PayPal or bank transfer.

Note: US $ based in US $. Prices in £ or € correct at time of writing but vary with exchange rate fluctuations.

(sales@gqrp.co.uk) **GQRP Club Sales** *(sales@gqrp.co.uk)*

Graham Firth, G3MFJ, 13 Wynmore Drive, Bramhope, LEEDS. LS16 9DQ, UK

Antenna Handbook – 2nd edition – **members price £6.00 plus post** } **£2.00 (UK) or £5.50 EU**

Radio Projects volumes 1, 2, 3 & 4 – **by Drew Diamond – members price - £6 each book + post}** } or **£8.00 DX per book**

Polyvaricon capacitors –2 types - 2 gang (A = 8 to 140pF + O = 6 to 60pF), and 2 gang – (both 8 to 280pF)
Both come complete with shaft extension & mtg screws, and both are **£1.75 each.** **Postage is £3.50 (UK), £5.50 (EU) and £6.00 DX**

A Pair of LSB/USB carrier crystals HC49U wires - [9MHz ±1.5kHz] **£4 pair** } **All components**

HC49U (wire) crystals for all **CW** calling freqs – 1.836, 3,560*, 7.015, 7.028, 7.030, 7.040, 7.045 } plus **postage**
7.122, 10.106, 10.116*, 14,060*, 18.086, 21.060, 24.906 & 28.060 all are **£2 each (* also in LP)** } **(ANY quantity)**

HC49U crystals- 1.8432, 3.5, 5.262, 5.355, 7.0, 10.006, 10.111, 11.5, 14.0, 22.0, 29.0MHz – **50p each}**

HC49U crystals – 2.00, 3.00, 3.20, 3.579, 3.58, 3.60, 3.6864, 4.0, 4.096, 4.1943, 4.433, 4.5MHz } £1.20p (UK), or
5.00, 6.00, 7.2, 7.6. 8.0, 9.0, 10.0, 10.70, 11.0, 12.0, 13.50, 15.0, 16.0, 18.0, 20.0, 24.0, 25.0MHz} £3.50p (EU) or
26.0, 27.0, 28.0, 28.224, 30.0, 32.0, 33, 40, 48MHz – **all 35p each** (Some of these are low profile) } £4.50 (DX)

Ceramic resonators – 455, 480kHz, 2.0, 3.58, 3.68, 4.00, 7.37, 14.32 & 20.00MHz **– 50p ea.** }

Diodes - Shottky signal diode – 1N5711- 20p each; 1N4148 GP Si – 10 for 10p } Post free

Varicap diodes - MVAM109 – 40pF @ 9v, 500pF @ 1v. **50p each** } if ordered

- BB204 – twin diodes, common cathode, 15pF @ 20v, 50pF @ 1v **50p** } with heavier

SA602AN - £2.00 (note – I may supply NE or SA, 602 or 612 as available. (Max of 2 per member) } things

MC1350 - £2.00 (Max of 2 per member) } like binders,

LM386N-1 - 4 to 15v, 300mW, 8pin **DIL - £0.50 10 for £4.75** } toroids,

TDA7052A - 4.5 to 18v, 1W 8pin **DIL** low noise & DC volume control – **£0.60 each** } polyvaricons,

TDA2003 - 10w audio amp – 5 pin **£0.25 each** } or filters

TA-7642 Radio IC – direct equivalent of **MK484** (& ZN414) – **75p each** } Use just

BC109B (metal) (npn) fT - 100MHz, hFE-320 **- 10 for 50p** } that postage

MPSH10 transistors (npn) fT - 650MHz, hFE 60, VCEO 25V **- 10p each, 10 for 80p** } If parts are

2N3904 transistors (npn) fT - 300MHz, hFE-150, VCBO +40V **- 10 for 50p** } ordered

2N3906 transistors (pnp) fT - 250MHz, hFE-150, VCBO -40V **- 10 for 50p** } with books

BC517 Darlington (npn) fT - 200MHz, hFE-30,000, VCBO +40V **- 13p each, 10 for £1.10** } or DVDs

FETs - IRF510 – 50p; 2N3819 - 24p; 2N7000 - 10p; BS170 – 8p - all each } add this

BF981 – dual gate MOSFET – 40p each (max of 2) } postage

Pad cutter - 2mm shaft: 7mm o/s, 5mm i/s diam, gives a 5mm pad with 1mm gap **£6.00** } as books

10K 10mm coils – 1u2H, 1u7L, 2u6L, 5u3L, 11u0L, 45u0L, 90u0L, 125uL – all 80p each } or DVDs

Magnet Wire – 18SWG – 2 metres - 60p; 20 & 22 SWG – 3 metres - 60p; } do not

24, 25 & 27SWG – 4 metres - 40p; 30, 33 & 35SWG – 5 metres - 30p. } travel well

Bifilar wire – 2 strands - red & green bonded together. Solderable enamel. 3 sizes } with parts.

21SWG (0.8mm dia) – 2metres = £1; 26SWG (0.45mm dia) – 3m = 70p; 30SWG – 3m = 60p }

Litz wire – double silk covered multi-strand wire 7/.04mm -12p, 14/.04mm. 25p. Both for 3 metres. }

All our magnet wire is solderable enamel insulated. Max of 3 sizes per member per order

QRP heatsinks - TO92 – 30p; TO39/TO5 – 40p; TO18/TO72 – 80p (pics in Sprat 148) }

Axial lead inductors (they look like fat ¼W resistors) these are low current }

3.3, 4.7, 6.8, 10, 15, 18, 22, 33, 39, 47, 56, 100, 150, 220, 470 and 1000 - all uH, all 20p each. }

Toroid Cores – priced per pack of 5 – you may order 2 packs only if you actually need them.
I will no longer supply 2 packs of everything – order only what you need please.

T25-2 – 50p, T25-6 – 60p, T30-2 – 70p; T30-6 – 80p ; T37-2 – 80p; T37-6 – 80p; } **Postage**
T50-1 - £1.00, T50-2 – £1.40, T50-6 – £1.60; T50-7 - £1.20, T50-10 - £1.20; } **for toroids**
T68-2 - £2.20, T68-6 - £2.50, T130-6** - £2.60ea; } **includes**
FT37-43 – 90p, FT50-43 - £1.20, FT37-61 - £1.20, FT50-61 - £2.40; } **postage**
Ferrite beads – FB43-101 (3.5mm dia x 3.2mm long, 1.2mm dia hole) – 40p for 5; } **for all**
BN43-2402 - £1.50; BN43-202 - £2.40; BN43-302 - £3.40; BN61-202 - £3.40. } **small parts**

All toroids are plus postage – up to 5 packs = £1.20 (UK), £3.50 (EU), £4.50 (DX).
Each additional 5 packs, please add 50% **** Except ** item** – these are heavy and each counts as a pack
Standard MeSquares (0.25"), Little MeSquares (0.15") & MePads for SMD - £6.00 each plus post (UK & EU as parts for up to 4) :
I can include up to 3 of these with parts for no extra postage.
I can supply UK & EU, will DX please order direct from Rex. ***These items from Rex's stock are pictured on the website.***

Limerick Sudden kits RX & TX both single band (160 through 20m); **ATU** (80 through 10m) **£40.00 each plus post** UK - £3.50, EU - £6.50, DX - £9.00

Sprat-on-DVD – 1 to 184. Only £5 each to members plus postage, UK - £1.20, EU - £3, DX - £4.00

Now also available as Sprat-on-a-stick - on a USB stick – same price and post, but they will travel free with parts

Sprat Binders – nylon string type – Black with club logo on spine -16 issues per binder – **£6.00 each plus postage**
(one: UK - £2.00, EU – £4.00, DX - £5.00. More - add £1.10, £1.50, £2.50 each)

Cheques (UK) and payable to G-QRP Club. MINIMUM ORDER for cheque or PayPal payments is £5
You can also pay by BACS. The info you will need to do that is – G-QRP Club Account, sort: 01-07-44, and a/c: 54738210. I can accept cash in GBPounds, or US$/ €uros (at the current exchange rates) – but please send securely!
You can order via e-mail and pay by PayPal - use sales@gqrp.co.uk – and pay us in GBPounds and you MUST include your membership number and address please. PayPal are getting greedy and charge us about 5%, so a contribution towards that is always welcome, or, send as a gift to friends/family – thanks. Maximum quantity of any item is 20.