SPRAT

THE JOURNAL OF THE G-QRP CLUB

DEVOTED TO LOW POWER COMMUNICATION

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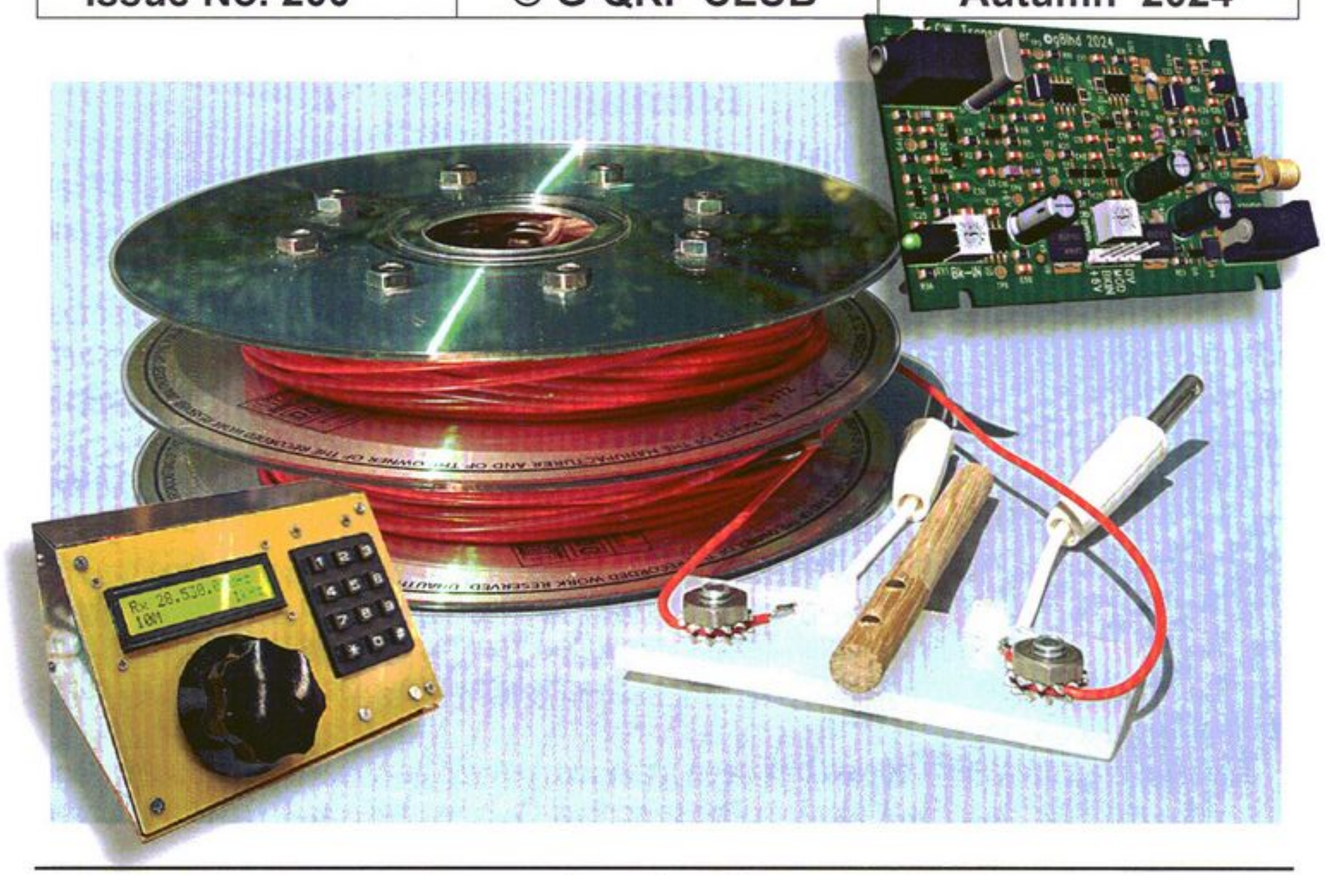

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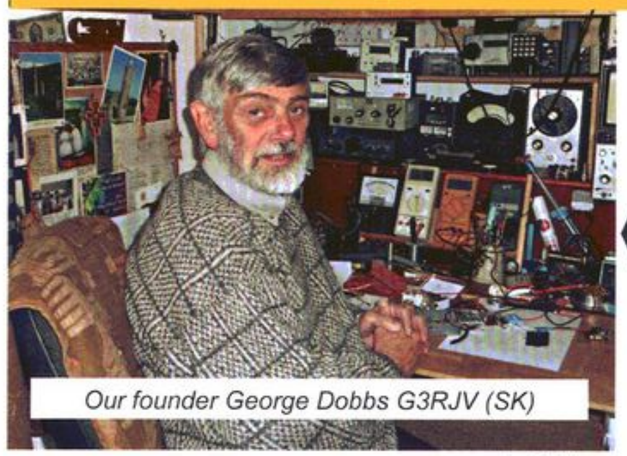

Our founder George Dobbs G3RJV (SK)

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Editorial

Well here we are; 200 editions of a quarterly journal must mean the Club is 50 years old! I can only claim 41 years of membership but I have enjoyed every minute and long may the fun and sharing of 'tribal knowledge' continue.

A calling notice to those interested in forming a G-QRP club appeared in the September edition of *Short Wave Magazine*. What was described by **George G3RJV** as '*a scruffy newsletter called SPRAT*' was first posted out during the Christmas holidays of 1974 with a circulation of just over 30.

Today, *SPRAT* goes to around 4000 paid-up members and we have issued over 17,000 membership numbers. Sadly, none of those original 30 are still members, but we do still have a few with 'double digit' membership numbers.

You will be able to read some of the memories of our longest standing members in a very special 100-page *SPRAT* extra which Tex has produced from his archives. It includes articles from *Short Wave Magazine* and *Practical Wireless* (reprinted with permission) as well as some of the members' musings.

A limited print run of 500 copies has been arranged. We will be changing £3 plus postage to cover our costs, but it is well worth it. Please contact Club Sales if you would like a copy. It will also be available as a pdf on future editions of our ***SPRAT-on-a-Stick***.

Philippe, F5SDT, has designed a 50th anniversary logo for us and that should now be available to download from the Club website for members to use. I think he has done a cracking job and we are very grateful for his work.

There is a new RSGB book to mark the Club's 50th anniversary. It has been compiled from the best of our 200 *SPRAT*s. See the advert on the back page of this *SPRAT* for full details.

One of several variations of the new logo available from our website

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

General News

Steve G0FUW email: g0fuw@gqrp.co.uk

Calling all Young Members

We have had a prize donated by one of our members. Over the next 12 months, the best *SPRAT* article written by a young member (under-21 years of age when *SPRAT* 200 arrives) will win a QRP Labs QMX kit to build. The article can be on any QRP topic; construction, experimenting, operating, SOTA, POTA, or antenna building.

The QRP Labs QMX rig shown fitted into a custom designed case

Just make it clear that it is from a young member when you send it to Tex.

The Club Committee will judge any articles submitted and make the award in time for Christmas 2025.

Sales Team Update

Members will recall that we have been making changes to the Sales Team in order to reduce the workload on Graham, G3MFJ.

Graham's eyesight continues to deteriorate and we have made the next step change; the main point of contact for Club Sales is now **Dan, M7JJO**, and his contact details are now listed on the Club website and will be included in all future Club Sales pages in *SPRAT*.

Although there's no club sales page in this issue, one with the new details will appear in the next issue of SPRAT. But in the meantime, the website is still available at:

https://www.gqrp.com/sales.htm

Dan is now in charge of the GQRP-Club's sales

Dan is now receiving members' orders and passing them to the appropriate member of the Sales Team, just as Graham has been doing since the turn of the year. The system works well (most of the time) but we ask that members bear with us if the learning curve causes any blips.

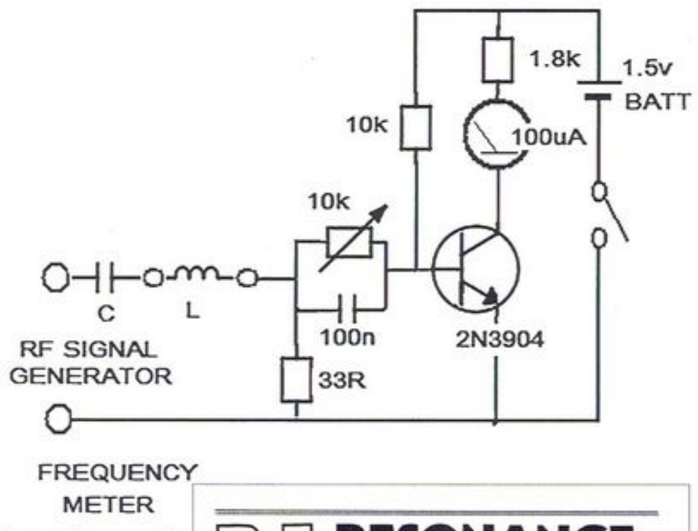
Graham will continue as Treasurer up to the end of this Financial Year when Dan will take on that role too.

Our sincere thanks go to Graham and everyone involved in keeping the Club Sales ticking over as smoothly as it does.

Check Inductance via Resonance

Peter Howard G4UMB

I found the basis of this useful circuit in the *Practical Wireless* of November 1997, written by D. King G3TQN. I have simplified the original idea to avoid using variable capacitors and a calibrated scale. I made it quickly on breadboard to check some inductors. The circuit works by increasing the current flow when, at a particular frequency the LC components resonate to give a lower resistance.

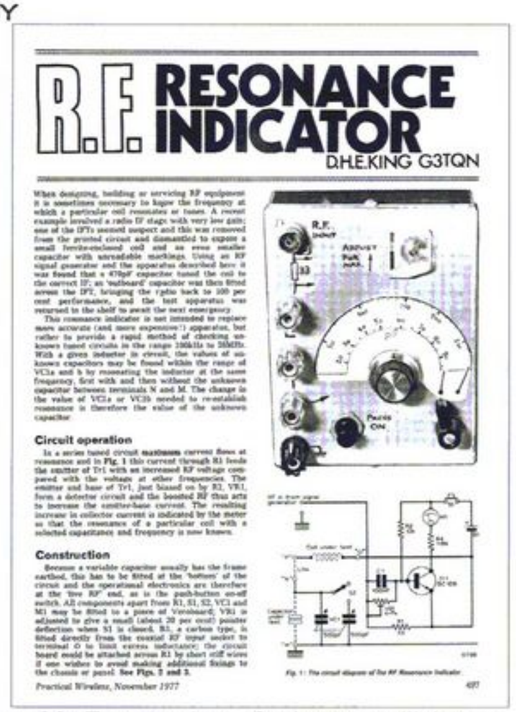


The circuit is set up by adjusting the 10kΩ pot. To give a small reading of current on the meter. I used a cheap meter I bought from a rally The meter scale is essentially unimportant, because all you are looking for is a peak in current.

Then by adding the L and C in series and connecting it to a RF signal generator with a frequency display you're ready to go. As the frequency is changed you're looking for the peaking current on the meter.

Let's assume we wanted to find the value of an inductor and we chose a C of 68pF then we can calculate the inductance value using the usual resonance formula, after having found the frequency of resonance with the series 68pF capacitor. Or better still let an Smart Phone App. do the calculating .

(I found a 68pF the good value for a range of inductors from 1uH to 33mH)


R.F. RESONANCE INDICATOR

D.H.E.KING G3TQN

When designing, building or servicing RF equipment it is sometimes necessary to know the frequency at which a particular coil resonates or tunes. A recent example involved a radio IF stage with very low gain; one of the IFTs seemed suspect and this was removed from the printed circuit and dismantled to expose a small ferrite-encased coil and an even smaller capacitor with unreadable markings. Using an RF signal generator and the apparatus described here it was found that a 470pF capacitor tuned the coil to the correct IF; an 'outboard' capacitor was then fitted across the IFT, bringing the ratio back to 100 per cent performance, and the test apparatus was returned to the shelf to await the next emergency.

This resonance indicator is not intended to replace more accurate (and more expensive!) apparatus, but rather to provide a rapid method of checking unknown tuned circuits in the range 100kHz to 30MHz. With a given inductor in circuit, the values of unknown capacitors may be found within the range of VC1a and b by mounting the inductor at the same frequency, first with and then without the unknown capacitor between terminals N and M. The change in the value of VC1a or VC1b needed to re-establish resonance is therefore the value of the unknown capacitor.

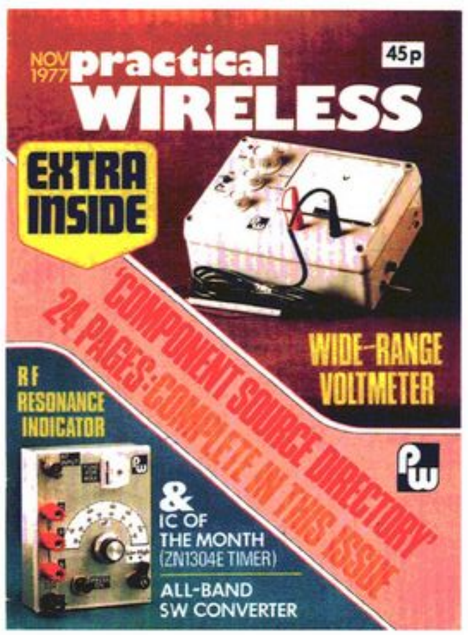
Circuit operation

In a series tuned circuit **maximum** current flows at resonance and in Fig. 1 this current through R1 feeds the emitter of Tr1 with an increased RF voltage compared with the voltage at other frequencies. The emitter and base of Tr1, just biased on by R2, VR1, form a detector circuit and the boosted RF thus acts to increase the emitter-base current. The resulting increase in collector current is indicated by the meter so that the resonance of a particular coil with a selected capacitance and frequency is now known.

Construction

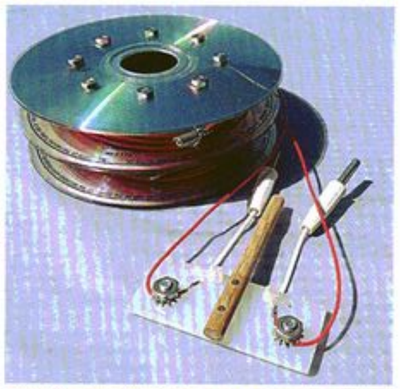
Because a variable capacitor usually has the frame earthed, this has to be fitted at the 'bottom' of the circuit and the operational electronics are therefore at the 'live RF' end, as is the push-button on-off switch. All components apart from R1, S1, S2, VC1 and M1 may be fitted to a piece of Veroboard; VR1 is adjusted to give a small (about 20 per cent) pointer deflection when S1 is closed. R1, a carbon type, is fitted directly from the coaxial RF input socket to terminal -0- to limit excess indication; the circuit board could be attached across R1 by short coil wires if one wishes to avoid making additional fixings to the chassis or panel. **See Figs. 2 and 3.**

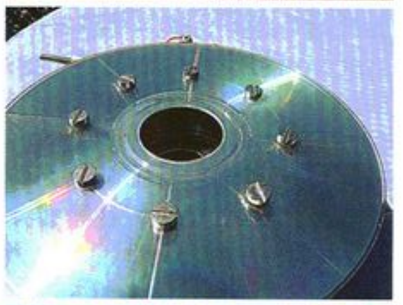
Practical Wireless, November 1977

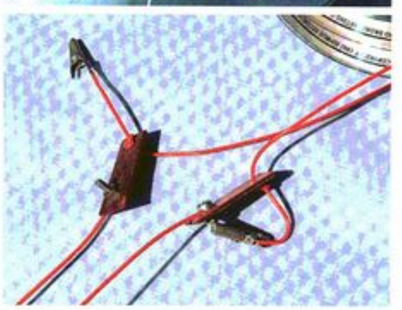


Alan's 20/40m OATS antenna

Alan G4UWS







I am writing this under duress. I had occasion to take my unfinished antenna to a **Poole Radio Society** meeting and as it lay quietly on the table Tex deserted the coffee, tea, biscuits and cake swindle he runs and homed in on it like a cruise missile. Then to my great surprise he demanded I write an article about it for *SPRAT*. So: order comes to write, order is obeyed!

I think what appealed to him was the pretty interference colourings on the double barrelled reel it was stored on. It's made from three redundant CDs, with screws and nuts from the junkbox; On the first disc three layers of masking tape create a surface for marking the centre on, from that draw a circle for the screws and mark it at forty five degree intervals. Clamp it with the other two discs to a bit of scrap board, marking the centre on the board. Drill the screw holes and a pilot hole at the centre. I used a 'Conecut drill' to enlarge the discs' centre holes, but for a bigger opening I suggest using a hole saw. It could leave the discs welded together but they separate easily. To avoid wasted time, mark a corresponding hole on each disc. Smooth rough edges and assemble with screws spacers and/or nuts as you wish or the junkbox permits.

The double reel allows the two parts of a dipole to be kept apart as wound in; also the spacers can be helpful to fasten the ends. As a further anti-tangle ploy I used PTFE insulated wire, usually found under the tables at rallies, and very helpful when setting up and taking down. However fastening it is less easy. It can be a matter of soldering the bare wire or being cunning. On the centre insulator mine is clamped between pairs of the star style of lock washers which dig into the PTFE and leave it in no doubt who is in charge. The ends of the 20m sections are bare wire clamped to the insulator (a scrap of formica) by a 6BA screw which the 40m section's crocodile clip bites, being held in place by a knot in the wire when off duty. The other end has a single uninsulated terminal from a choc block gripping into the PTFE and held by a round turn and two half hitches of nylon line which ends in a loop for tethering by a six inch nail through a golf ball.

Finally, the centre insulator's wooden prong fits into the top but one section of a roach pole and the 4mm plugs are a very tight fit into the balun.

I'm sure you've all worked out why it's an oats antenna.

73 Alan G4UWS

QRP Experiments on the 630m Band

Bob Fontana AK3Y, GQRP #16729 (ak3y@arrl.net)

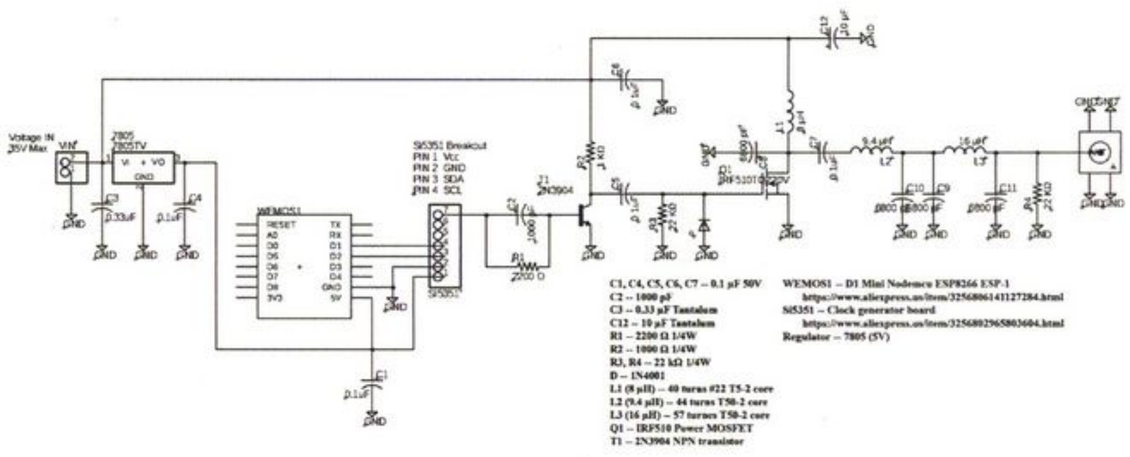
I thought it would be interesting to share the results of some experiments that I recently conducted with a very simple WSPR transmitter for the 630 metre band (472 – 479 kHz). "WSPR" is the acronym for Weak Signal Propagation Reporter, and was originally developed by Joe Taylor K1JT for probing MF and HF propagation paths. With the use of convolutional coding and burst error correction techniques, extremely low power transmissions can be decoded at signal-to-noise ratios as low as -28 dB in a 2500 Hz bandwidth.

In the United States, 630 metre amateur activity is regulated by the Federal Communications Commission (FCC) and coordinated by the Utility Technologies Council which oversees, in the case of the 630 and 2200 metre bands, the compatibility of amateur radio activity with such technologies as power-line communications which share that portion of the RF spectrum. On the 630 metre band, the maximum permissible equivalent isotropically radiated power (EIRP) is 5 Watts, so this is definitely a QRP band.

My transmitter uses an ESP8266 WiFi microcontroller to synchronize to an Internet-based time standard (in my case here in the US, the National Institute of Standards and Technology NIST), encodes my call sign, grid square and power level into a 162-bit WSPR transmission, and controls an Si5351 synthesizer module which drives a Class D single MOSFET (IRF510) output stage.

Much of the design for the transmitter is not novel, but rather reflects great ideas from several other hams -- GW3UEP's 630 metre Class D power amplifier design, VK3TPM's time synchronization approach using the WeMOS ESP microcontroller, JTEncode for generating the WSPR data strings and Si5351 control software by NT7S to name a few. My main contribution was in designing the printed circuit board which I had fabricated at JLCPCB in Hong Kong (5 day turnaround from Gerber files upload to having finished boards in hand!) I also made a small modification to the MOSFET drive circuitry to give a sharper transition to the excitation pulse which increased power efficiency and lowered power dissipation in the FET.

The schematic of the 630m transmitter is shown here:



The ESP source code and Gerber files for the printed circuit board construction can be downloaded from my website at http://ak3y.com

In Figure 2 here is a photo of the completed circuit board for the WSPR transmitter. The ESP8266 with integrated WiFi antenna is at lower left; the Si5351 synthesizer module is at upper left (with an SMA test port); driver stage and power MOSFET are across the top right; with the 630 metre bandpass filter and SMA output along the lower right edge of the board. Into a 50 Ω load, the transmitter puts out roughly 3.7 W at 12.6V DC with a power efficiency of 57%.

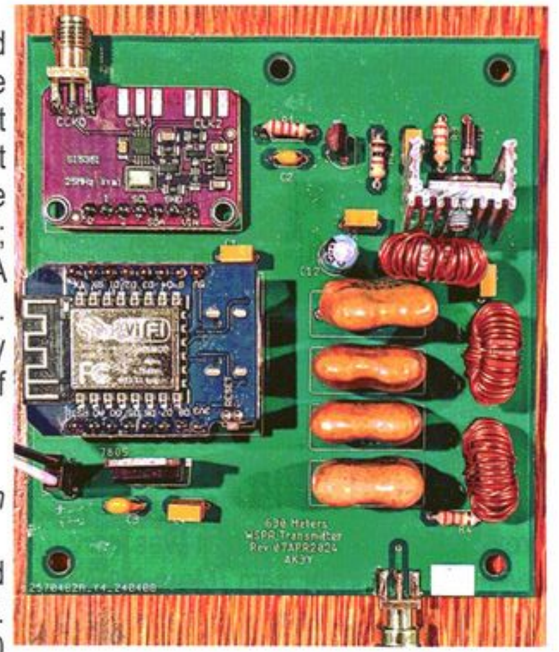


Figure 2. Printed Circuit Board Implementation

By far, the biggest problem that I encountered was coming up with an antenna for this band. The only existing antenna that I had was an 80 metre end fed half-wave (EFHW) fed by 50 feet of RG-213 which was a terrible match at 630 metres. Not only was the antenna physically short (0.06 wavelengths on 630 metres), but it also used a 49:1 toroidal transformer with quite poor magnetic properties at 475kHz. I could only hope for a tiny fraction of my transmitted power to be radiated with this setup!

Determined to at least try this wire antenna out, I needed some form of matching network as a direct feed resulted in an SWR of 22:1! The matching network was designed by capturing the S11 parametres of the antenna using my SAA-2N NanoVNA, and then using the application SimSmith to design a two-element network.

As the WSPR bandwidth was extremely narrow (roughly 12 Hz or so), a broadband network was not needed and a two element matching network worked just fine. As you can see from the SimSmith display below in Figure 3, the unmatched impedance of the EFHW was mostly inductive (upper left point on the Smith Chart), and a simple series C – parallel L matching network brought the VSWR at 475.7 MHz down from 22:1 to 1.05:1.

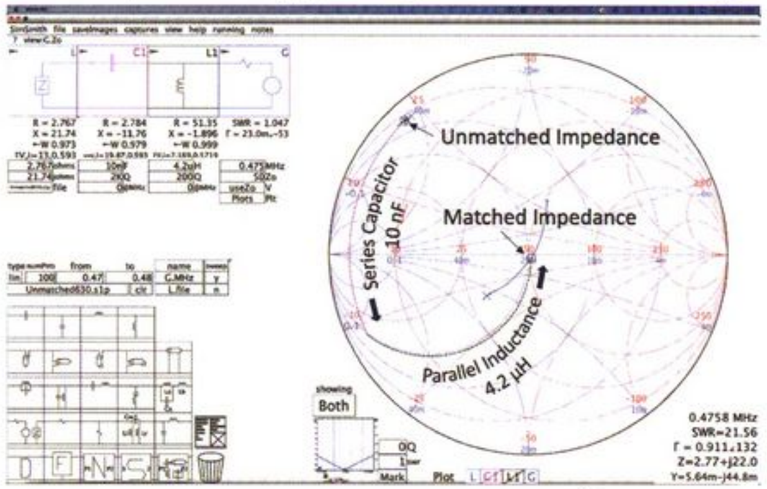


Figure 3. Smith Chart Matching of 80 metre EFHW

With the antenna matched as best as possible, I let it transmit over night and got some surprising results as

seen from the plot shown (Figure 4) from WSPRnet.org. My best "DX" was 980 km, and this with what could only be politely called a very lousy antenna!

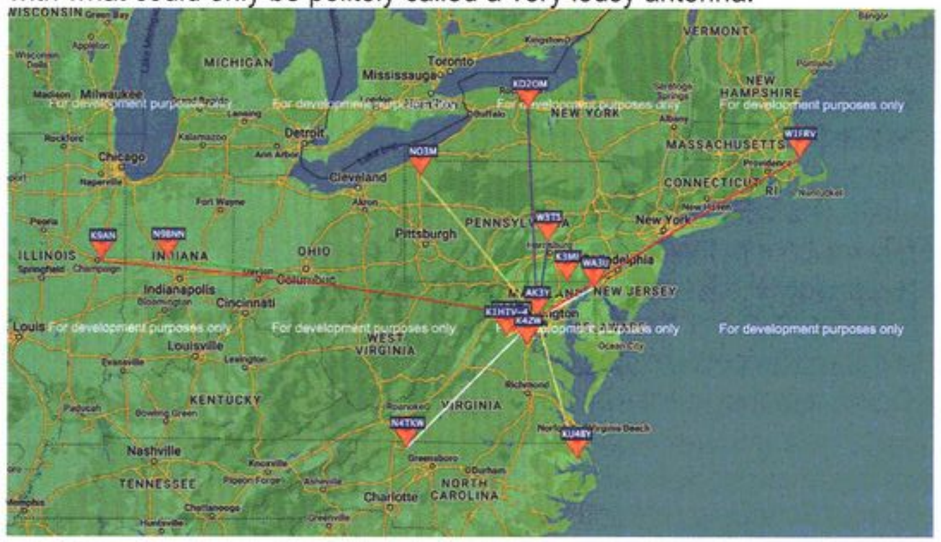


Figure 4. 63m "DX" Results

Perhaps equally fascinating to me was the effect of the sun on 630 metre propagation. All of us are familiar with grey line propagation, but it was very interesting to see this effect on a more microscopic level. With a local ham (Marc N4DR) approximately 9 miles away, we plotted my signal strength at his QTH as a function of time (see Figure 5 below).

About 2 hours prior to sunrise, signal strengths started to increase dramatically, rising from an average -15 dB to nearly 10 dB higher at -6 dB. Within moments after sunrise, the signal strength precipitously dropped nearly 15 dB. It was quite interesting to see this strong effect over such short distances.

In summary, 630 metres is a fascinating QRP band. It is strongly affected by solar activity and provides a very interesting glance into the effects of that giant ball of flaming gas that we see come up every day!

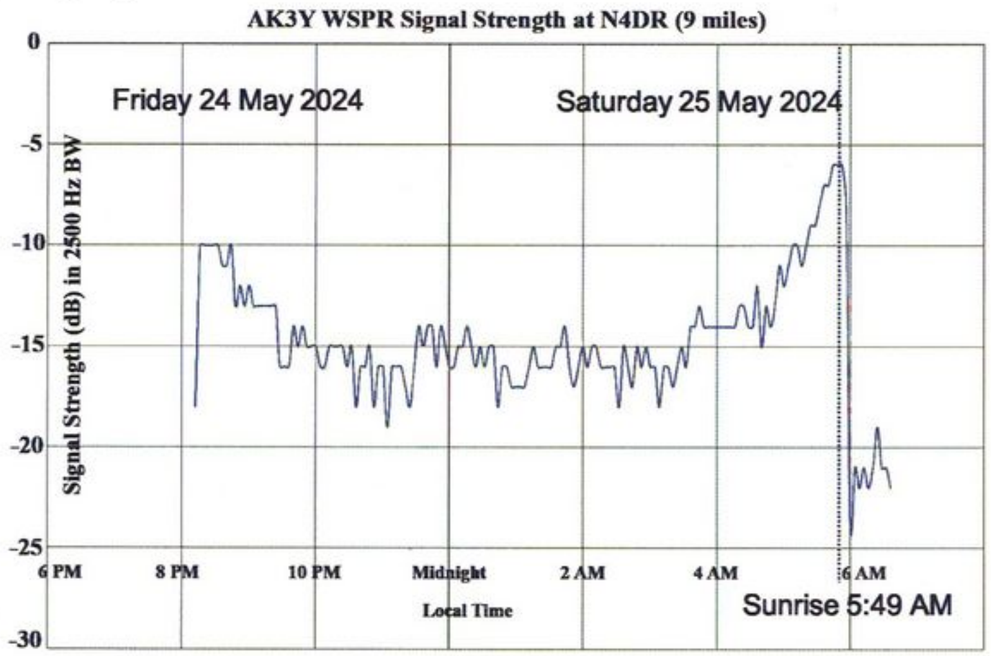


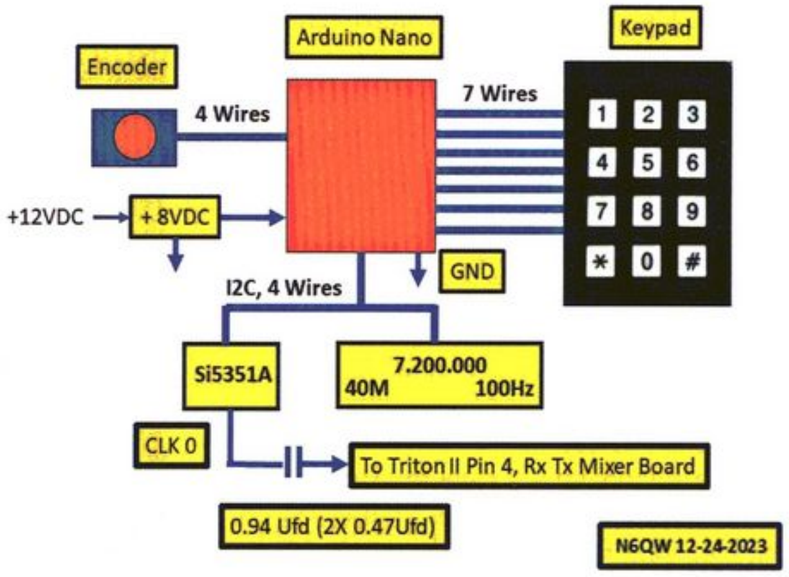
Figure 5. Effect of Sun Rise on 630m metreLocal Propagation

Arduino Magic - a Triton VFO

Pete Juliano N6QW email: n6qw@gmail.com

The SPRAT 199 article by **ON5FM**, whose 50-year dream of a Ten Tec Argonaut 509 restoration is related to this project. The Ten Tec radios are very suitable for restoration with the built in modules and test point to access.

The PTO schematic in #199 tunes the range of 5 to 19MHz starting with a basic 5MHz PTO. The baseline PTO is frequency shifted by adding of two inductors for four bands. One of the inductors is paralleled with the base PTO inductor and the other is series connected to follow on electronics. The paralleled inductor sets the frequency range and the series one sets the frequency spread. The Triton II uses the same approach. Truly ON5FM has the patience of biblical proportions as I gave up on my Triton II and built an external VFO Controller.



The PTO circuit operates straight through (20m) or doubles or triples the output. On 80/40 the LO is above and on 20-10m below. Thus, one BFO setting yields the correct sideband convention on 80-10m.

Essentially, my controller emulates the PTO assembly and has bonus attributes. The keypad buttons select the PTO range. Place the switch on 40m and punch button #2 and you are there. Two of the buttons enable up down tuning of the frequency while two buttons have presets for the step tuning range.

Really slick are the two buttons that let you transmit 10kHz up or 10kHz down for the DX split operation. Normal CW operation is unaffected. The only change needed in the TritonII (509) is to disconnect one wire from the "output" of the PTO and connect the output of the Si5351. The installed BFO crystal is used. The graphic shows what is inside the controller box. My website has all of the information on this modification including the Arduino Code and associated libraries.

https://www.n6qw.com

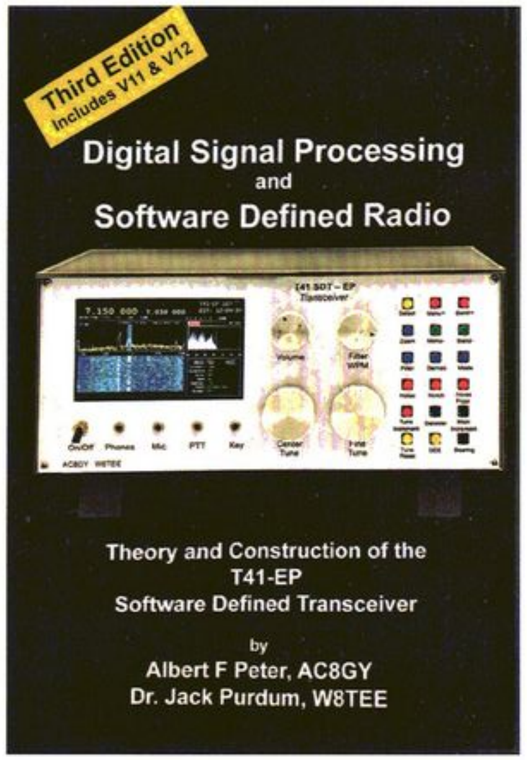
There is also a link to a you tube video showing the radio in operation. This approach could be used with other vintage radios like Hallicrafters, Swan, KW Atlanta and National radios.

73s etc N6QW

Book Review

Martin Evans GM5JDG

Digital Signal Processing and Software Defined Radio
(Theory and Construction of the T41-EP Software Defined Transceiver)
by Albert F. Peter, AC8GY and Dr. Jack Purdum, W8TEE



Full disclosure I was asked recently by Steve, G0FUW to review this book on behalf of the GQRP club and was sent a complimentary copy directly by the authors. The copy I received was the third edition, the first being released back in 2022. This latest edition contains up to-date information about the latest version, V12, of the T41-EP (EP for experimental) transceiver and runs to some 565 pages.

I would however offer a word of caution to anyone contemplating purchase of this book, a view emphasised by the authors, this is not a book for the beginner homebuilder or complete computer novice.

The authors have a clear relaxed writing style that makes for an easy read. Complex topics are broken into easily manageable chunks. Jack has authored a number of books and previously taught a number of programming languages during his time as a professor at Purdue University's College of Technology, and this shows in the clear and concise writing style.

Design & Implementation

The book is divided into a number of chapters covering the design and implementation of the software and hardware needed to produce a complete software defined transceiver. Additional chapters cover theory of operation, including an overview on digital signal processing as well as techniques on building, calibration and testing. References are given for further reading on specific topics for those wishing to explore more. Due to cost constraints the images are all in black and white however full size colour images can be downloaded.

Clear Readable Code

I particularly liked the emphasis on clear readable code writing as opposed to using coding tricks which can make understanding of concepts more difficult. The chapters covering Digital Signal processing and Digital Filters were really helpful in helping me understand some key concepts such as fast Fourier transforms and filter types.

The completed transceiver is capable of 20W, HF, 7 band, CW/SSB with additional features such as a spectrum display, ALP CW decoder and Bode plots. The main microcontroller is

a Teensy ver. 4.1, programmed using the Arduino IDE, and is coupled with a large screen of either 5, 7 or 9 inches. The size of the completed transceiver and power requirements makes it more suitable for use as a base station or possibly vehicle based as opposed to being fully portable.

The project is very much a work in progress and has been through a number of iterations. The modular design of the transceiver means boards can easily be swapped out. All hardware and software is fully open source so can make your own customised versions.

Excellent support and discussion of particular features is provided by the the "***softwareControlledHamRadio***" group on the website:

https://groups.io

From here you can get links to the latest code, download images and support with any hardware/software issues as well as access to potential groups buys of PCBs and components.

I have one minor niggle I was a little disappointed that this is the third edition and it still contains a number of typographical errors and description references to some images that have not been correctly updated.

Conclusion

I would highly recommend anyone with an interest in building a software defined transceiver or looking for an introduction to modern software radio concepts to obtain a copy of this book. I have already purchased a complete set of V12 boards and am in the process of ordering components to build my own transceiver.

Source of Crystals

Sébastien, F8CMH email: sebastien.ponsot@gmail.com

There are many crystals for HF frequencies from IQD available from Mouser. The problem is that they are not correctly referenced on their site, and it's necessary to search for them using the IQD manufacturer reference. I have noted the Mouser references below, and the corresponding description

- 449-LFXTAL017586BULK - Quartz 3.56MHz 30pF -10C 60C
- 449-LFXTAL015699BULK - Quartz 7.02MHz 30pF -10C 60C
- 449-LFXTAL011525BULK - Quartz 7.03MHz 30pF -10C 60C
- 449-LFXTAL020909BULK - Quartz 7.04MHz 30pF -10C 60C
- 449-LFXTAL011468BULK - Quartz 7.056MHz 30pF -10C 60C
- 449-LFXTAL012626BULK - Quartz 7.15909MHz 30pF -10C 60C
- 449-LFXTAL017587BULK - Quartz 10.116MHz 30pF -10C 60C
- 449-LFXTAL013480BULK - Quartz 10.14MHz 30pF 0C 50C
- 449-LFXTAL017588BULK - Quartz 14.05MHz 30pF -10C 60C
- 449-LFXTAL063932BULK - Quartz 14.07MHz 16pF -20C 70C
- 449-LFXTAL030199BULK - Quartz 18.08MHz 25pF -20C 70C
- 449-LFXTAL010213BULK - Quartz 21.05MHz Series -10C 60C

In France the shipping if free above 50€, but I don't know for UK . In addition, there are also 7.023MHz and 10.111MHz available from sellers on aliexpress (type "7.023M" or "10.111M" in the search bar.

Best regards, 73s Sébastien, F8CMH

Multi-band Helically Wound Antenna

Paul de Bono 9H1FQ

A 40 foot length of wire, is helically wound, pitched about one inch up and around a roof mounted 22ft (7m) fishing pole. The top part is wound slightly closer. It's fed by an external auto tuner. Mostly the ground return is not important, except on 80m, where here it's less than a quarter wave.

However, using just a piece of galvanized wire mesh, as a suitable earthy point, it did tune satisfactorily on the 80m band as well. I am using an SGC239 auto tuner, which gives a satisfactory match on all bands.

But there are plenty of DIY or ready-built Chinese auto tuners, with prices very low. Always check the ratings of the seller and the customers comments. I have successfully built one and happy with it.

I've had no problem with the wire changing position, as I did a very tight wind, secured by a tie clip. Should there be any movement, then a spot of silicone sealant, or even, Bostic should secure the winding.

Fixed to the wall with a flexible section of pipe, showing the wire mesh 'earth

The base of the fishing pole fits exactly into a section of 114.3mm (4.5in) diameter heavy duty PVC pipe, with hot water treatment to soften the plastic. Its important to have a flexible fixture at the base. It withstood gale Force–8 winds!

The stays are connected to screwed stainless steel hooks, attached to a push fit PVC water pipe connector. The stay-point should be placed up at around three quarters of the height, and kept loose.

Some minor tuning instability was observed on the 10 metre band, so a bit of trimming at the base may be necessary. A friend mentioned that I could feed it with a 9:1 UNUN, and then would not need the tuner. Though I've not tried that yet.

The various photographs should help to explain more.

A slightly loose fitted water pipe connector acts as a staying point

Compact Portable Antenna

Dick G0BPS

There has been a lot of discussions on our reflector recently about decent portable antennas. Some time ago I needed on that would fit on my car when out near the seaside.

Several options were tried and tested as an avid coarse fisherman I had a few rods and poles at my fingertips. A Seven Metre plastic pole was tried and tested with a base loading to bring it somewhere close to a decent matching. Not a really good match either. Then I spotted some goodies on THAT auction site. Six metre long extending whips that collapse to just over 50cm. Screw fit and a fair price. Two were quickly ordered along with several other items.

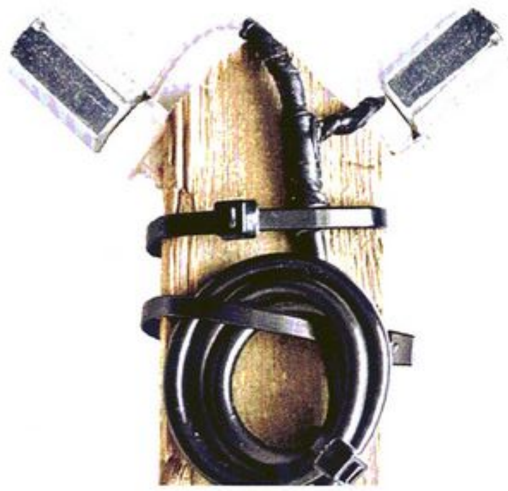
Nylon bolts 10mm wide and 50mm long were found as well as the joint unit to match the thread to the base of the whips. An offcut of timber was found in the shed and the lot put together as the photos.

The 45° angle of the whips enables it all to be put together with a length of wire fitted to the ends of the expended whips, giving a decent size delta loop.

Now all I had to do was get it up in the air above the car. Another fishing pole came into use here, one that attached to the net to land my (rarely caught) fish A hole drilled in the base of the timber to fit over the net handle.

The next job was to figure out how to hold it in place while operating. A van drove past me a few days later with large sheets of glass on the side. I remembered the clamps they used as a handles to carry sheets of glass. They clamped to the glass. Two were purchased and they clamped to the side of the car a treat and the net handle fitted through them easily. Total cost, under £20, build time, about an hour.

Does it work – YES!



GQRP "Mutz Nutz" loop

By Ian Simpson GM0SIM

Why "Mutz Nutz....."? simply because this is a complete mongrel cross of antennas that have gone before. There is nothing new about mongrel antennas-

- Take a vertical & put another close actively fed & you get a phased vertical array
- Double the vertical to get a dipole & passively resonate the reflector & you get a yagi.
- Gamma match the yagi & actively phase feed the reflector & you get the HB9CV
- Fold the dipole with a active fed reflector & you get the ZL special
- Not enough height for a full vertical, go inverted L... cross this with the 2 element yagi & get the Moxton rectangle.
- Ditto above but 3 element yagi with T top loading rather than L & you get the G6XN antenna in the RSGB Amateur Radio Techniques book.
- There is nothing to be ashamed of hybridising existing antennas.

The Problem

Modern gardens are so small & the environment is often noisy so what quiet 40m & above antennas could I go for?

- Balanced dipoles, loops & doublets are generally quieter than unbalanced verticals.
- I could go for a half size G5RV but could we go shorter than 51' across?
- There is the 37' across Shorty Forty with tapped centre coil but that is single band.
- Could we go even smaller & multi-band? (& can we do this without being a "rocket scientist" resorting to EZNEC antenna modelling software).

Quad loops are nice. One wavelength around for 20m is only 16.5' per side square which could fit almost anywhere... now what about using this on 40?... Unfortunately there it is a half wave loop which has a very high input impedance in the several thousand ohm range... "normal" ATUs certainly aren't going to cope with that.

Right!... time to start hybridising to create the mutant mongrel. Louis Varney had the great idea of using the feedline as part of the impedance matching in the G5RV (& he also didn't have a computer.... Brian Austin then developed things properly & computer optimised it with the ZS6BKW).

Let's look at using that on loops, a 20m quad, & try to feed line match that for 40m ("seat of the pants" without a computer).

What do we know?...

If a feed line is a half wavelength long then regardless of the feeder impedance whatever impedance is on one end it is duplicated on the other.

Also, if a feedline is a quarter wave long then Zin x Zout = Zline squared. OK, let's try 30' of 450 ohm ribbon (33' 20m half wave x 0.91 velocity factor of the budgie ladder).

On 20m the one wavelength loop will be around 100Ω & this will be duplicated at the end of the half wave budgie ladder.

On 40m, the 5K ohm (ish) at the loop terminals will be Zout = 450 x 450 / 5000 = 40Ω at

the end of the now quarter wave budgie ladder.

Both of these figures seem to be in a reasonable region for a "normal" ATU with balanced input... G5RV's original article also suggested that for optimum results a small ATU should be placed at the end of the budgie ladder... So where am I going to get a suitable balanced ATU these days,,, well just look on the back page of Sprat here as the £40 Sudden ATU is absolutely perfect (& I just happen to have one!).

What about the other bands?... who cares!... 40 & 20 should be a good starter & let's just see what other "bonus" bands the ATU can pull in. Yes I could break out EZNEC but playing with antennas is more fun than playing with spreadsheets. Let's just "suck it & see".

(If someone wants to do a ZS6BKW type in-depth computer optimization on this feel free.. I was just wanting to have a "proof of concept" fun play without computers).

Something thing to watch, one wavelength quads tend to fire perpendicular to the plane of the loop.... This is great for full size 40m horizontal quads about 6m high as the ground generally acts as a reflector so basically you have a 2 element quad beam firing straight up which is a lovely strong signal for NVIS but this isn't much good for 20m unless you are trying to warm the moon. For 20m slope it (chimney down to fence line) or go vertical (between tree & house or fibreglass fishing poles.... I went vertical).

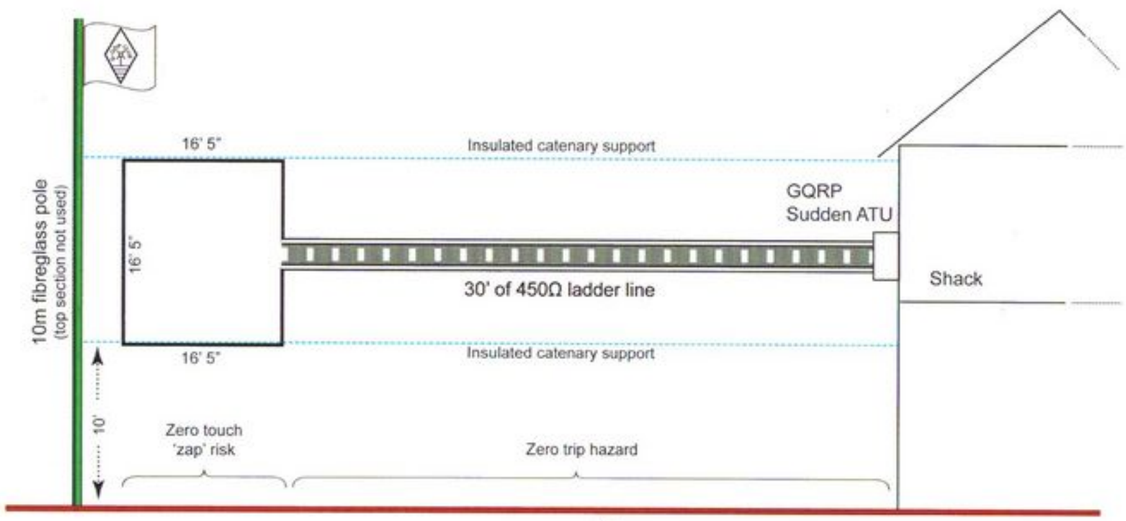
Costs

- 10m of 450 ohm budgie ladder = £9
- 5 B&Q white plastic contiboard"fixing blocks" as insulators at 10p each = 50p
- 20m of 10p/m 2mm electric fence wire = £2
- All in sub-£15 (or sub-£55 if you add the ATU!)... not bad for a small multi-band antenna suitable for modern gardens.

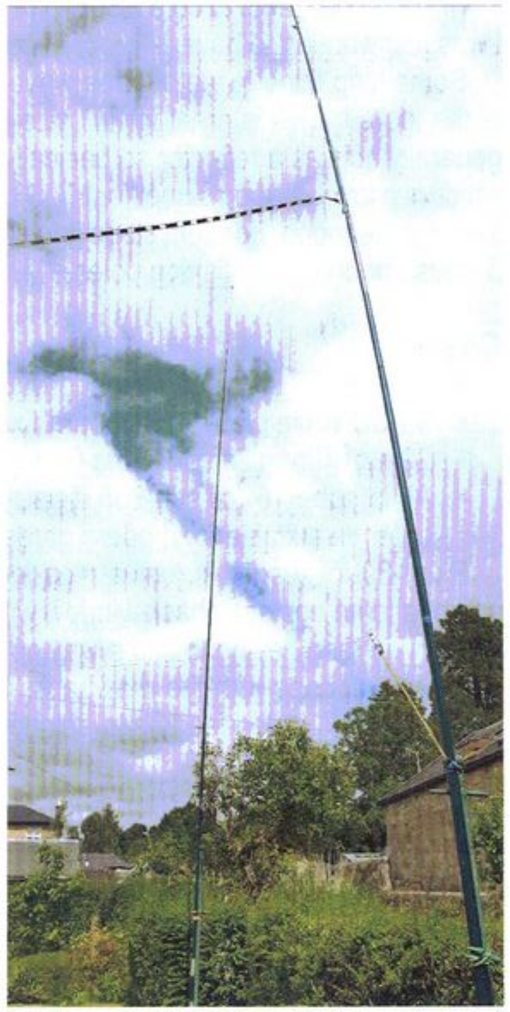
Plus, 30' of feeder is just a nice length to "fly" above head height from the elevated antenna to an upstairs shack window without having the trip hazard of running a co-ax along the ground then having to find a way up through the house.

If you can cope with the drawbacks there are MAJOR advantages for running balanced antennas to balanced feeders to balanced ATU (back to the original days of radio).

To quote Dr Frankenstein.... "IT LIVES!!!"



SWR (no ATU… not expected to work but interesting to see… measurements on trusty old MFJ antenna analyser)
3.7MHz no hope (as expected)
5.3MHz no hope (as expected)
7.057MHz 7.5:1 (6Ω with no reactance… looks like the loop Z higher than expected but we've certainly overcome that problem & this now looks "workable" for an ATU)
10.12MHz no hope
14.2MHz 3.6:1 (resonant 170Ω no reactance at 14.6MHz with 3.3:1 there)
18.1MHz 1.9:1 (95Ω with 30Ω reactance)
21.2MHz 1.3:1 (38Ω with no reactance…. Well there is a bonus!)
24.9MHz no hope
29.2MHz 4.1:1 (216Ω plus no reactance.. It was expected to work here as it is a 2 lambda loop with a "half wave twice" feeder so "normal" loop operation).
51.26MHz 7.7:1 (460Ω plus no reactance…. Well there is an unexpected bonus)



Disregarding the "no hope"ers the remainder all look within the Sudden ATU's capability.

SWR Achieved using Sudden ATU

7.1MHz 1:1
14.2MHz 1:1
18.1MHz 1:1
21.2MHz 1:1
28.5MHz 1:1
51MHz 1.4:1 (& had to flip to the hi-Z ATU i/p but considering the Sudden was never really intended for this band this is a "Brucie Bonus" we've still got something at all).

Workable Bands

So I had six workable bands in 17 feet & less than £60 even buying the ATU doesn't seem to be bad going for experimenting with some "seat of the pants" theory. Should easily fit most gardens & pockets.

Were the figures spot on?... No!… but they got us to where the ATU could cope.

Is this a high performance aerial?… No!... stacked & bayed rotatable rhombics will always beat it… but if you are pushed for space it seems to pack a lot of bands into a very small space so should certainly be of value to some.

YOU DON'T NEED TO CALCULATE TO 7 DECIMAL PLACES TO HAVE FUN!!!!...
Never be afraid to experiment.

Sensitive Wideband AM detector

Cor van Rij PA3COR email: corvanrij@gmail.com

Can also be used as RF-millivoltmeter

In many of our short wave radios the simple diode envelope detector is used for amplitude demodulation. It is build from a single diode and some passive parts. It is a very low cost and simple circuit block. Because of this favourable characteristics it can be found in many radios. However, it also comes with drawbacks. Detection of low signals are not handled very well. A Schottky diode has a turn on voltage of circa 0.2V – 0.3V and a standard silicon diode has a knee voltage of around 0.6V.

Although it is true that the diode will start to conduct before this, the transfer characteristic is highly non-linear (the so-called quadratic region). It will enable detection of lower level AM signals but at the expense of increased distortion at these levels. The proposed circuit seeks to remedy this.

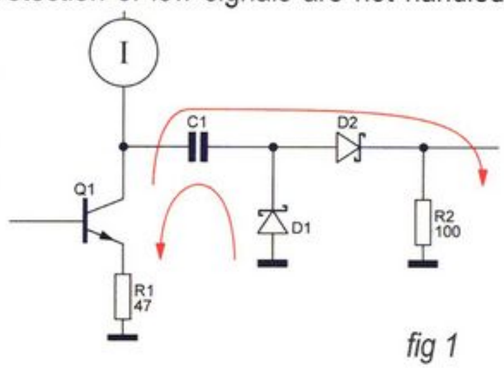


fig 1

Concept

The core of the problem is that the voltage to be rectified must be above the threshold value. However, when a current instead of a voltage needs to be rectified, the threshold voltage is no longer important.

In a common emitter amplifier stage, changes in input voltage are translated to changes in the collector current. These current changes are then translated by the collector resistor to changes in the collector voltage. If the collector resistor is swapped with a DC current source as load (figure 1), changes in the collector current (the AC current) will be forced to the load. In this circuit the load of Q1 is formed by a diode rectifier circuit.

Because this stage is current driven, the threshold voltages of D1 and D2 have become

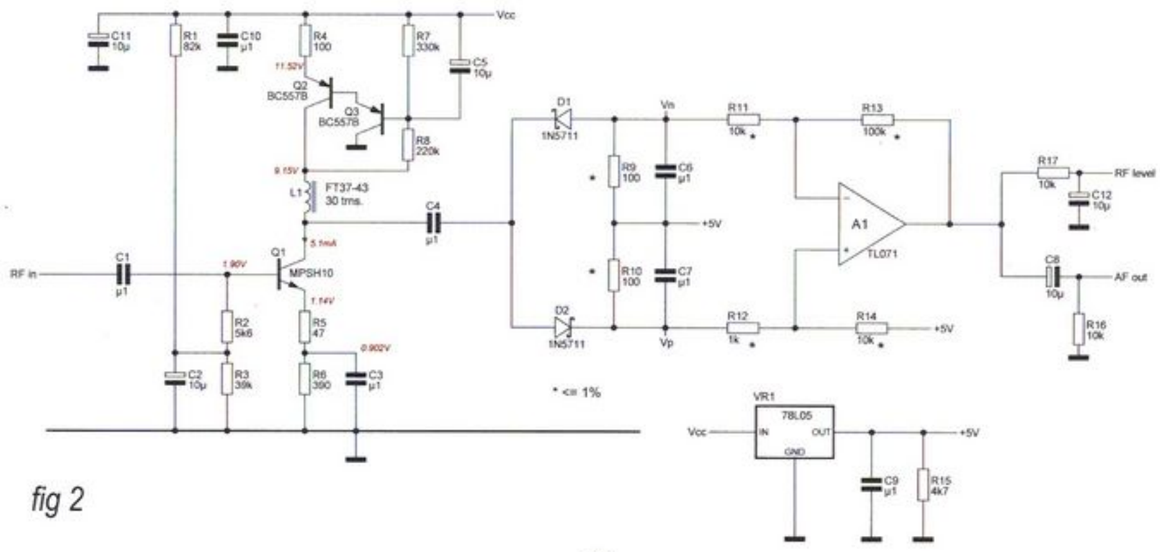
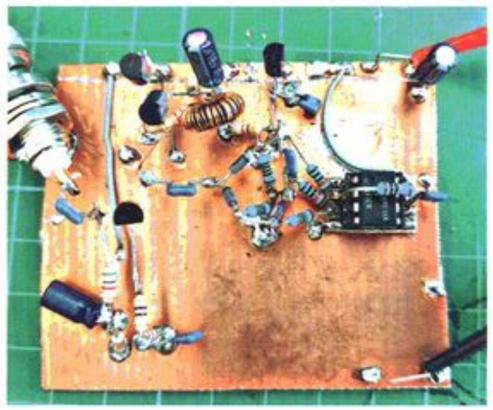


fig 2

largely irrelevant. The resistors R2 converts the rectified current back to a voltage. Another way of looking at this stage is to say that due to the high dynamic resistance of the current load, the open loop gain of Q1 is extremely high. The closed loop gain is determined by R2 and R1 such that Av = R2/ (rbe + R1). The values for R1 and R2 are chosen quit low to help in achieving a high bandwidth. With the current values, this translates to a gain of circa 2x.



Detailed Circuit Description

Please consult figure 2 for the implementation details. The circuit consists of a number of blocks: Q1 is a voltage to a current converter, Q2 and Q3 form a DC current load for Q1, D1 and D2 are the current driven balanced rectifier and A1 is the final amplifier stage.

The collector load of Q1 is formed by a DC current source build with transistors Q2 and Q3. This configuration functions as a static dynamic current source. Capacitor C5 keeps the voltage across, and thus the current through, R4 constant. Q2 and Q3 form effectively thus a current source. It is 'dynamic' because it automatically adjusts to slow changes in the standing current of Q1. It is 'static' because it does keep constant for rapid fluctuations.

For RF frequencies, the collector-base capacitance of Q2 might limit the impedance seen by transistor Q1. Inductor L1 helps to increase the collector impedance. A FT37-43 toroid based inductor was found to work quit fine in this application. A 220uH RFC choke was used but with less satisfactory results (see measurements below). Alternatively, L1 good be left out and Q2 and Q3 could be replaced with good (low capacitance) RF transistors. This ideas was not further investigated, however.

The maximum input voltage is determined by the DC emitter current and is Vi,max< Ie x R5 or 237 mVp with the current values

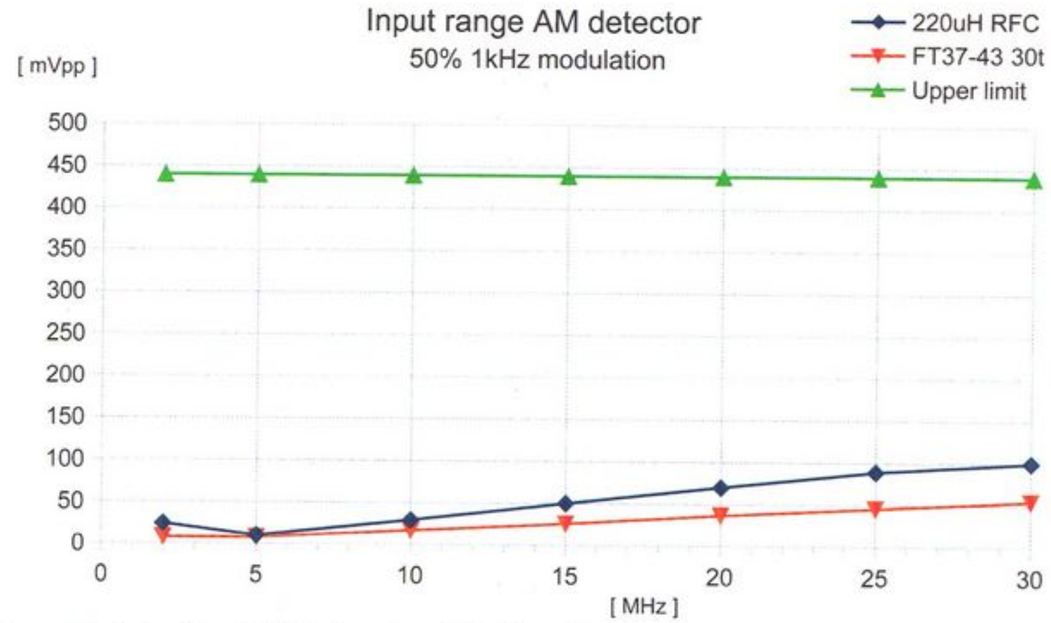
Capacitor C6 and C7 are the smoothing capacitors. With the values given, the corner frequency is circa 15 kHz. The average voltage after smoothing for a half wave rectified sine wave is given by the formula Vavg= Vp/ π = 0.318 xVp.

Operational amplifier A1 is setup as a difference amplifier with a gain of 10x. A1 has two outputs: the 'RF level' output gives the average output of the RF carrier minus the AM demodulation. This can be used to drive the AGC in an amplifier or to drive the meter circuit in RF-millivoltmeter applications. Keep in mind there is a 5V offset. The 'AF' output gives the demodulated output signal.

Even though it is a RF circuit, the properties of most parts are not very critical. However for Q1, D1 and D2 components with good HF properties must be used! Luckily enough the MPSH10 and the 1N5711 can be had from the GQRP club sales.

Measurements

Some measurements were done with regards to the AM detector sensitivity. The results are summarised in the table hereafter. Below 10MHz the minimum signal that can be



demodulated without distortion is < 20mVpp (!). Slowly rising with the frequency. As said before, the upper limit is set by the DC emitter current of Q1 and is conservatively set a ~5mA. This can easily increased by lowering resistor R6.

Also some measurement were done to test the circuit as a plain RF level detector. The results are shown in the graph below. It shows excellent linearity from very low voltages all the way to the maxim input voltage. There is some frequency dependence as might be expected. If the circuit would be calibrated at 15 MHz, the rectified output deviation between the lower and upper extremes of the frequency range would be circa 4%. For an AM detector, the small change in sensitivity would be irrelevant. To combat this affect a small capacitance might be added over resistor R5.

Preamplifier

If you want to use the circuit as a sensitive RF-millivoltmeter, the circuit of figure 3 can be used as wideband unity gain preamplifier. The input resistance is given by R1. If a high impedance is required, it is important to use proper HF construction to minimize stray capacitance. Of course you can also use the preamplifier to minimise loading of the AM detector on the previous stages.

The maximum input voltage is > 600 mVpp. The measured -3dB bandwidth is > 60MHz.

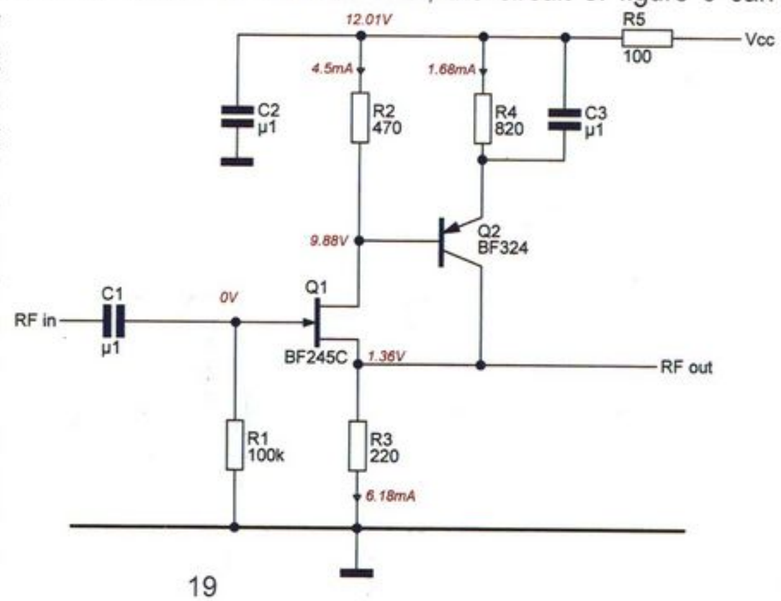


fig 3

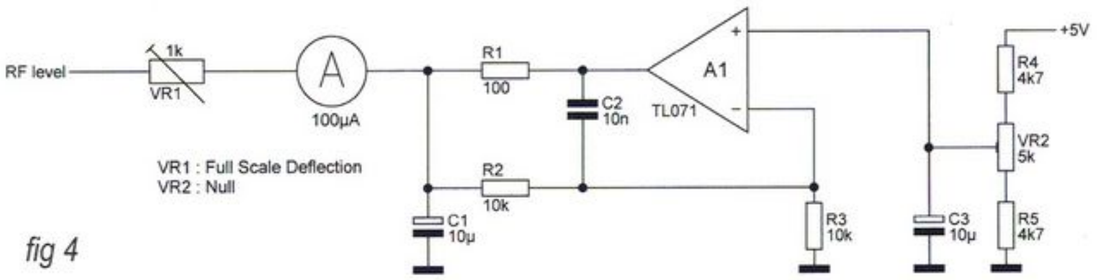


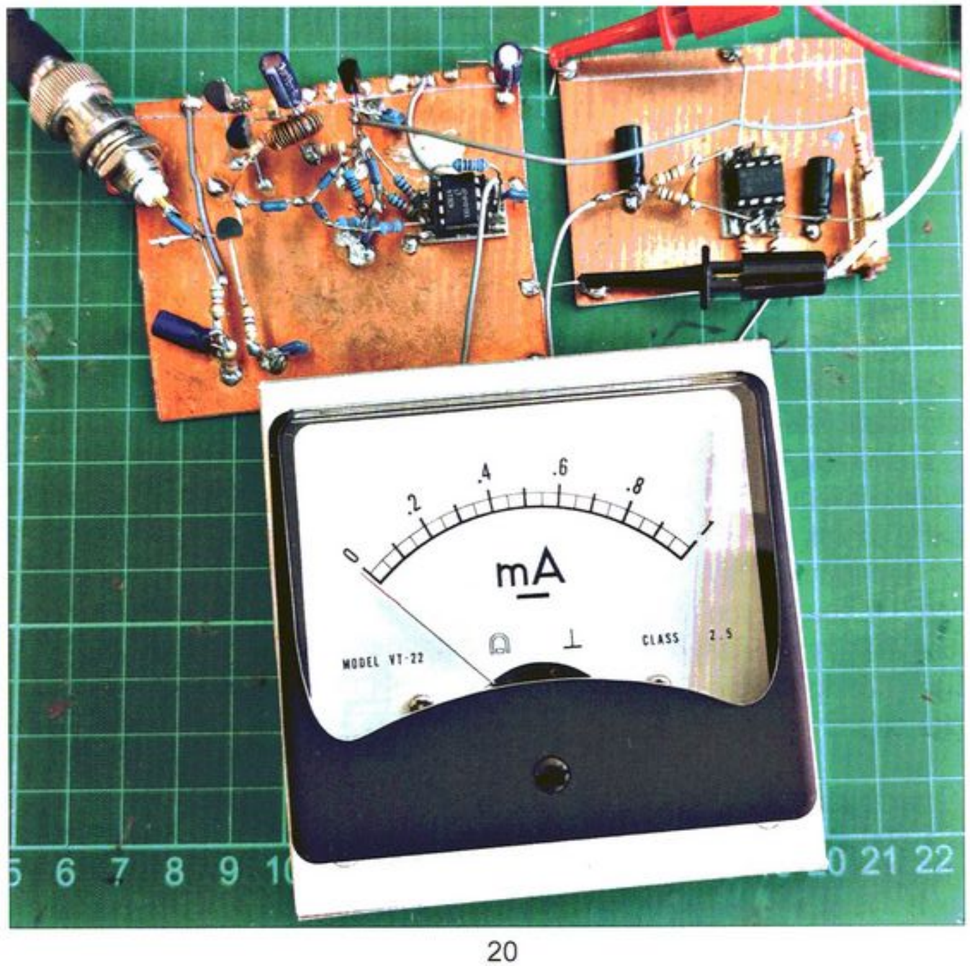
fig 4

Meter circuit

A possible setup for the meter circuit is given in figure 4. The actual resistor values might need to be changed to accommodate for different meter properties.

References

RF Diode Detector / AM demodulator:
https://crystal-radio.eu/diodedetector/endiodedetector.htm
AM synchronous demodulator:
Electronics & Wireless World, September 1989, page 858.- *Sensitive wideband linear a.c.-d.c. convertor*; Volume 122, Issue 3, March 1975. K.F. Knott

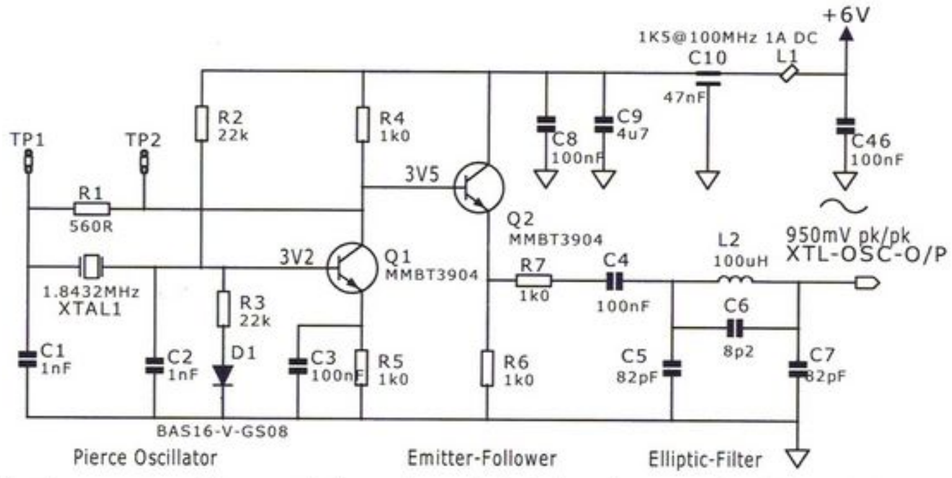


CW QRPp Transmitter

David Allen, G8LHD email: david.camtech@outlook.com

If you like constructing and have a panache for HF CW, this is for you. I enjoy designing projects and as an avid tinkerer, I thought this would be a great little project to try out some design ideas I'd had for a new modulator. Although the values given are for Top-band this circuit works equally well on 80m and 40m with some value changes.

The oscillator uses a Pierce crystal oscillator arrangement as it's the easiest to understand. The circuit performs a 360-degree phase shift around a high Q resonator (the crystal) and an amplifier. Fig.1 shows the general arrangement combined with a buffer amplifier.



Circuit values around the crystal can be calculated and as a rule of thumb C2 should be 0.18 x the Rs of the crystal. The Rs specification for the 1.843 MHz crystal is typically 560 Ohms, and the capacitor C2 reactance at resonance using our rule of thumb above should be 0.18*560 Ohms.

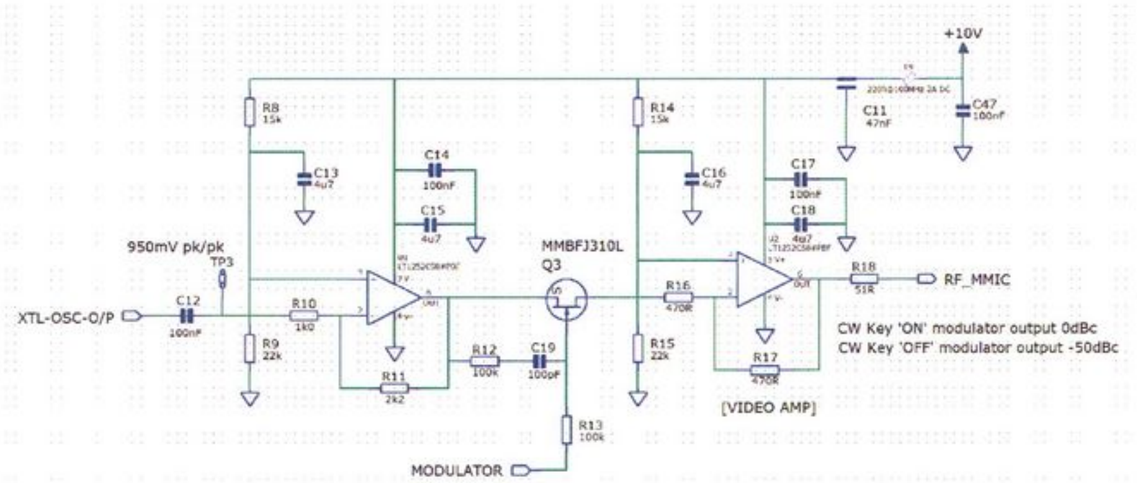
The capacitor value therefore is given by the equation:$C2 = 1/(2*\pi*f*X_{C2})$. Working the maths out, yields 820pF for C2, with C1 the same value as C2 and R1 should equal the Rs of the crystal.

To buffer the Pierce oscillator and obtain minimum loading to the circuit I opted for an emitter follower, Q2. The base of Q2 is DC-coupled to Q1 collector which sits at a nominally 3.5V bias point. With Q2 emitter current set by R6, the output impedance of the emitter follower can be proved empirically to be about 9 Ohms plus the value of R7, a 1k series resistor.

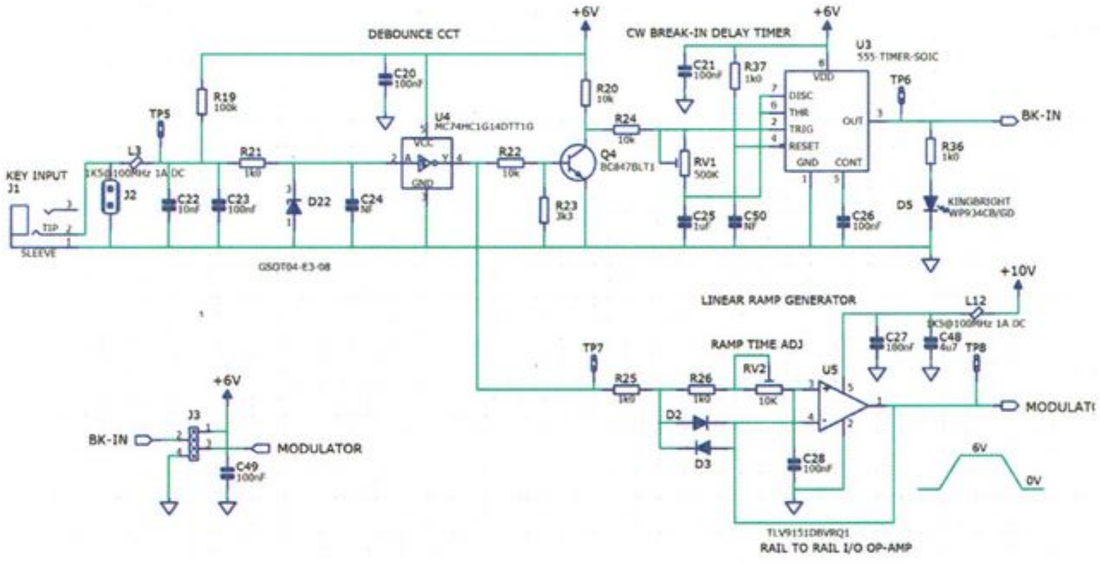
Thus Zout ~1Kohm. This ensures minimum loading on the oscillator. This buffer is followed by an Elliptic filter designed to match the 1k source and clean up the harmonics present in the output.

The modulator, shown overleaf, is designed to behave as a variable gain amplifier with minimal switching transients. Importantly the drain and source of the JFET are held at a fixed bias point and do not change with applied gate voltage, but enable modulation of the signal with minimal distortion.

The JFET dynamic range is typically greater than 40dB. To modulate without introducing keyclicks caused by rapid switching of the carrier, we need to control the rate of change of



the gate voltage swing. A value of 4 to 5ms will suffice and to achieve this I've employed a linear ramp generator U5, shown in the circuit below.



Control circuit

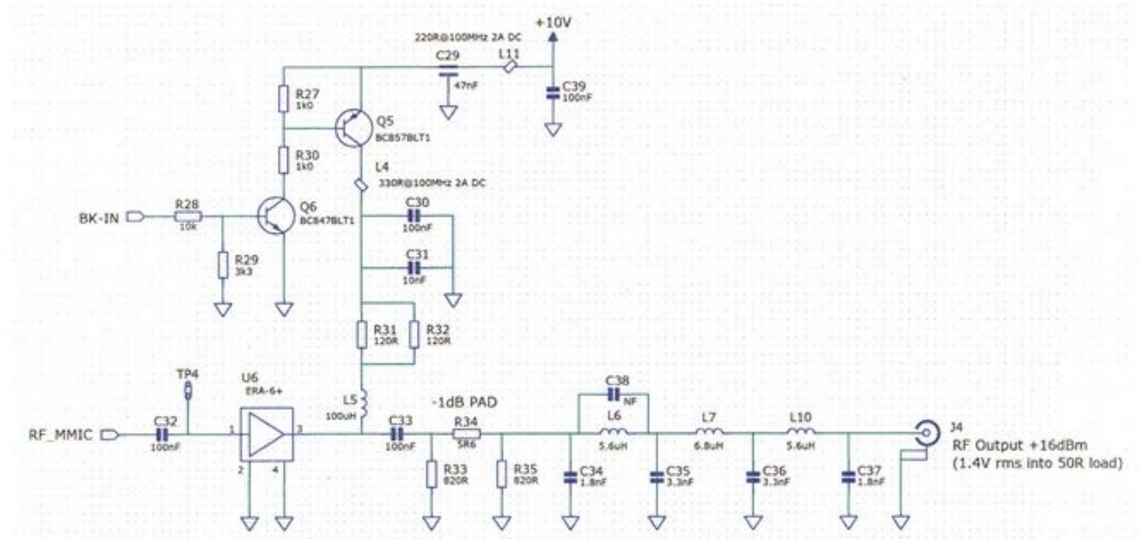
The control circuit takes care of Key switch debounce, shaping the ramp-up and ramp-down timing of the modulator signal, and also includes a break-in timer using the ubiquitous 555 timer IC.

In oversimplifying the timer circuit, I neglected that when triggered if RV1 is set below 10k the timer will oscillate.

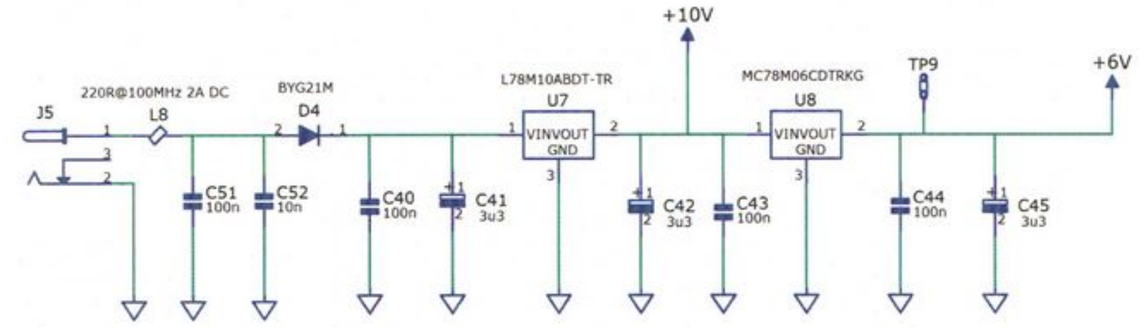
However, in practice, the value of RV1 is much greater than 10k. The reason for the break-in timer is twofold. First, the dynamic range of the modulator means we are still technically transmitting with the key-up, albeit -40dBc down. Secondly, it gives the ability to improve this dynamic range by keying a linear amplifier.

Output amplifier

The output amplifier, is shown at the top, overleaf. With Key down, the break-in timer is active high, biasing Q6 and enabling Q5 and U6, a 50 Ohm gain block with 12dB of gain and output



of +17dBm (50mW). In practice with Key-up, the carrier is -40dBc which falls to -70dBc after the break-in timer delay of ~300ms (set by the user). To clean up any harmonic distortion I've employed a 7th order Chebyshev low-pass RF filter, a bit overkill maybe, as I did suffer some loss achieving 33mW output, but harmonics were -70dBc. Losses could be mitigated by bypassing the first stage of the filter with the consequential increase in harmonics.



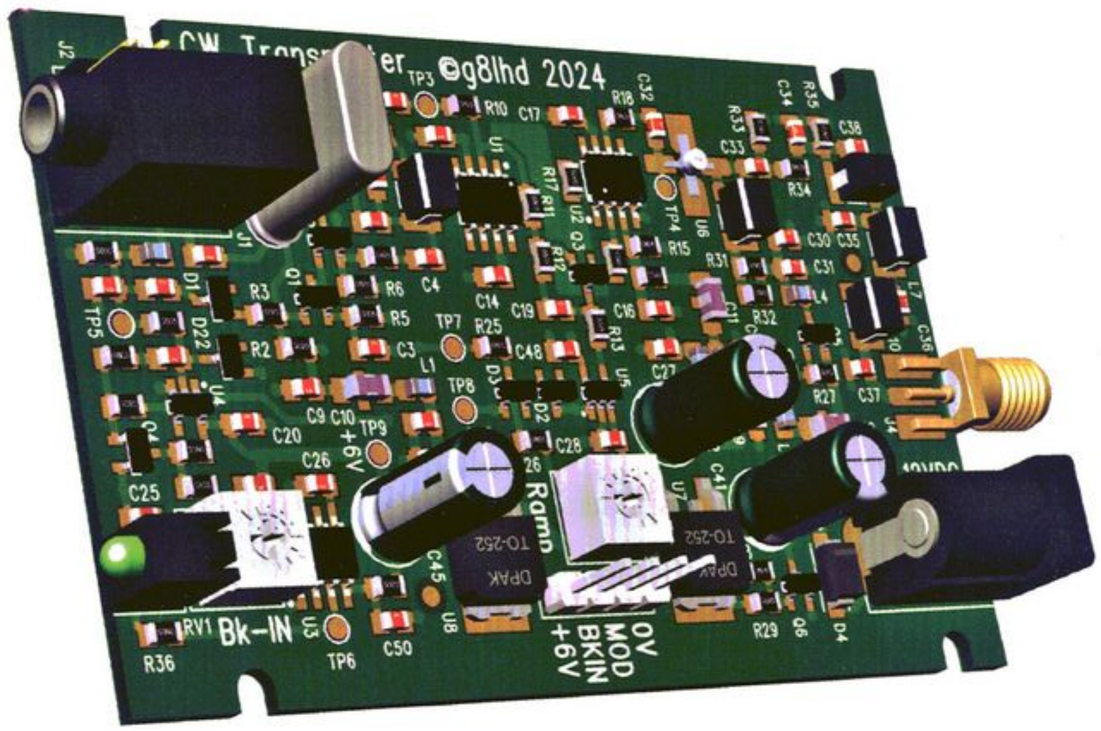
Power supply

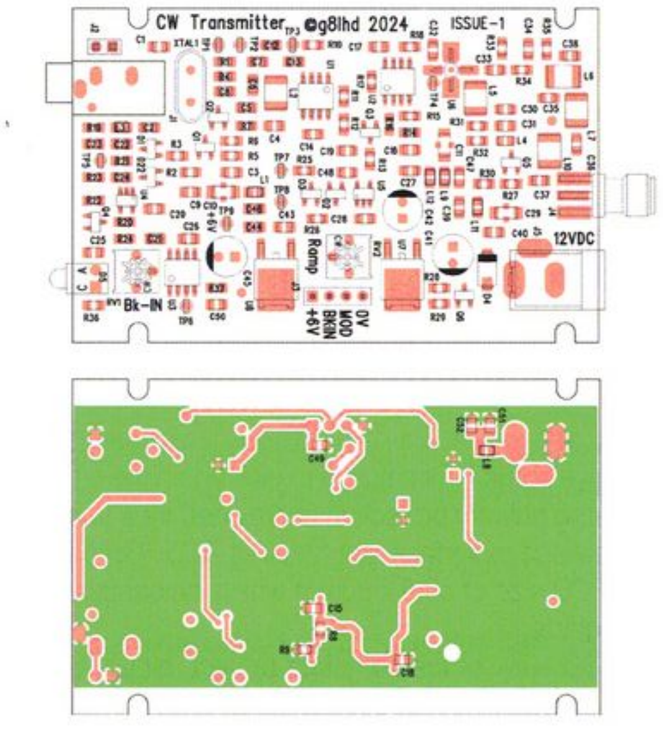
The power supplies circuit, above, use a pair of DPAK linear regulators to provide 10-volt and 6-volt power rails. To give some RF immunity to pick up on the supply lead, L8, and C51, C52 provide filtering. Reverse polarity protection is provided by a series diode D4.

The entire circuit was realised in surface mount using 2012 (0805 in old money) SO8 and SOT23-5 IC's, fitted on a PCB size of 50.5 x 80mm which incidentally slides into a screened Hammond aluminium enclosure.

A computer generated 3D view of the complete project, along with a track and overlay diagram are both shown overleaf. And Fig. 6; 3d CAD view below of the completed board.

Full Bill of materials and assembly drawings etc available from myself via email.





73s David Allen, G8LHD #17903
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Simple superheterodyne Rx. (3.5–30 MHz)

Olivier Ernst, F5LVG, email: oernst599@gmail.COM

A simple, high-performance superheterodyne receiver for amateur band reception from 3.5 to 30 MHz can easily be built using the following rules

1. Use modern bipolar transistors (BJT) because they are efficient, robust and cheap. Two exceptions: the audio output stage because AF integrated circuits require far fewer components than BJT circuits, and the mixer stage because BJT have very poor resistance to crossmodulation and saturation. A module with an AD831 is used in the mixer stage. Its resistance to crossmodulation is similar to that of a balanced diode mixer, while requiring very little power from the local oscillator.
2. Use of small AM-FM plastic variable capacitors (443DF), without any reduction drive system. Each frequency band is divided into 3 and a large tuning knob is required (A05). The variation in the voltage applied to the base of the oscillator transistor is used for fine tuning.
3. Choice of plug-in resonant circuits for easy assembly and excellent performance.
4. Use of a tuned input resonant circuit with high capacitance to improve selectivity and attenuation of the image frequency.
5. Use of NPO multilayer ceramic capacitors in the oscillator stage.
6. Choice of Seiler for the local oscillator with a high C/L ratio (high C) to obtain good frequency stability.
7. Use of a high intermediate frequency (4.5MHz) to strongly attenuate image frequencies.
8. Use of a 6-pole QER quartz filter for selectivity.
9. Use of a single active element per stage to avoid harmful auto-oscillations. For the IF amplifier, no regeneration can be tolerated at the risk of distorting the bandwidth of the quartz filter and obtaining an unbearable ringing effect.
10. Short RF connections.

The receiver is built into a wooden tissue box, the inside of which is coated with 5 cm of adhesive copper foil. The variable capacitors are fixed with cyanocrylate glue. 10M resistors are used as connection points. The coils, except for the oscillator coil, are miniature axial chokes. The antenna and oscillator resonant circuits are on 3 or 4 pin DIN plugs.

The receiver uses 2 SMS BFG541 transistors. These large SMS transistors are easy to use. First, cut pin 3, which corresponds to a second emitter output. Then wrap a 30AWG stripped wire around pins 1 and 2 (emitter and base). Apply a soldering point to pins 1 and 2 and finish by cutting the wire between these 2 pins. The collector (pin 4) is large, so it's easy to solder a resistor or capacitor to it.

The input resonant circuit is coupled to the antenna by a capacitor if the oscillator frequency is lower than the received frequency (10m-17m), and by an inductor if the oscillator frequency is higher (20m-80m). This coupling improves image frequency rejection.

The oscillator coils are made from 10A (1.5 mm2) mains wire. They are attached directly to the DIN plug pins. The coils are glued with cyanolite glue when everything is ready. To increase frequency stability, the capacitor Cp is an assembly of several NP0 capacitors, with each capacitor limited to 220 pF. The higher the value of Cp, the more stable the oscillator frequency. The value of Cs is determined to cover only the desired frequency range.

This receiver isn't perfect. There is no automatic gain control, the bandwidth is not adjustable, there is no S meter and the frequency display is inaccurate. On the other hand, the noise figure is good, reception is single-signal and frequency stability is good, even over 10 m. On a 2 x 10 m antenna, I've received JA, CE, VE and many other countries from the north of France. Don't forget to visit my website (https://oernst.org/hamradio/index.html). 73/2 F5LVG

80 m Lant 47µH, L1 10µH, L2 4 turns ϕ 22mm, Cp 880pF, Cs 470pF

40 m Lant 10µH, L1 2.2µH, L2 2 turns ϕ 22mm, Cp 1222pF, Cs 100pF

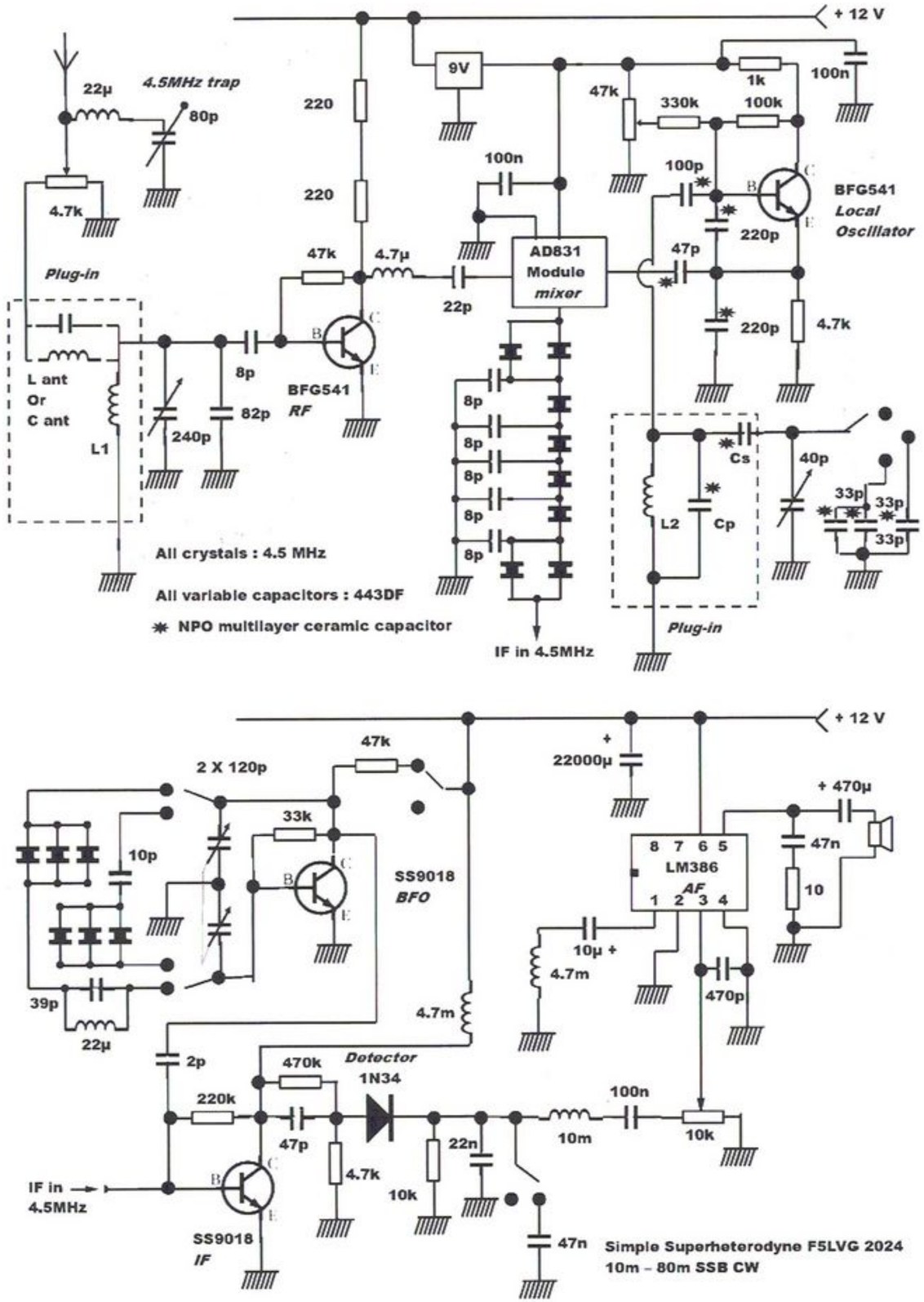
20 m Lant 4.7µH, L1 1µH, L2 2 turns ϕ 10mm, Cp 980pF, Cs 100pF

17 m Cant 8pF, L1 0.47µH and 1µH in parallel, L2 2 turns ϕ 14mm, Cp 1380pF, Cs 69pF

15 m Cant 8pF, L1 0.47µH and 1µH in parallel, L2 2 turns ϕ 14mm, Cp 850pF, Cs 100pF

12 m Cant 8pF, L1 0.22µH and 1µH in parallel, L2 2 turns ϕ 10mm, Cp 893pF, Cs 27pF

10 m Cant 8pF, L1 0.22µH and 1µH in parallel, L2 2 turns ϕ 10mm, Cp 682pF, Cs 100pF



Communication & Activity Report

Enzo M0KTZ email: m0ktz@katolaz.net

About 50 years ago a British OM was fiddling with a little second-hand CW-only rig, which would have put out about 1.5W of nominal RF power on a good day. He had been away from the hobby for a few years, after having sold all his ham stuff, and had got that tiny 'thingie' from a friend. He connected a random length of wire to the rig, but he had no tuner, and the "antenna" wire was just hanging around his garden door. He did not even have a Morse key any more, so he decided he would have called CQ by shorting the key connector with a strip of wire.

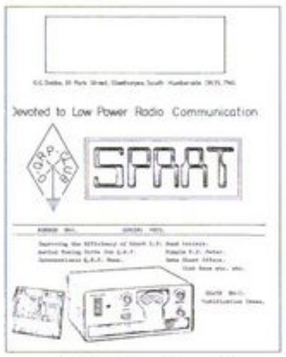
QRP-Basics versions 1-3

He dropped a couple of slow "CQ CQ de G3RJV G3RJV", just for the sake of it. There was no way anyone could have heard his puny signal, put into an improbable un-tuned length of wire, keyed literally by hand. Nevertheless, physics had made the trick of bringing that minuscule amount of RF power to another station back in Sweden, hundreds of miles away. None of us was in that room that day, but we can all relate deeply with the great excitement of that little OM in getting a call back from SM-land with a reasonable signal report!

That was just impossible. Or, better, improbable. Bewildering. Unbelievable. Confusing. Mesmerising. Fantastic. Exciting. Almost no RF power, almost no antenna, almost no key, and literally no hope of making any contact. Yet, a QSO had just happened. That was just the magic of QRP.

Impossible or Improbable?

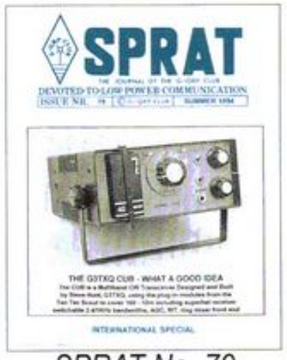
This episode was, as **George Dobbs G3RJV** himself admits in his book "*QRP Basics*", what made him fall terminally in love with QRP. That was the day when the spark was ignited. An improbable QSO, made by an improbable station calling an improbable CQ and getting an improbable reply. This is where the seed for our Club germinated: on-air activity.



SPRAT No. 2

It does not come as a surprise, then, that the "Communication and Activity Column", under different names, has been an integral part of *SPRAT* and of the Club life at large in the last 50 years. I thought it would have been interesting to look at the history of the activity column using the standard internationally-recognised time reference of our Club: *SPRAT* issues. Already in *SPRAT* nr. 2 we saw the first "Contest and Test Manager" appointed: Gus G8PG.

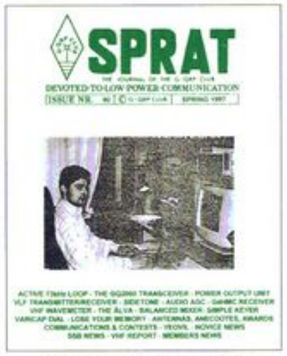
Gus served as the Club activity manager for two decades (and in other roles for 15 odd more years), on top of being an avid operator and a very active experimenter. By SPRAT nr. 10 the Club had in place a varied offer of operating awards (some of them survive to these days), and by SPRAT nr. 16 (Autumn 1978) the Winter Sports were there, and the Club



SPRAT No. 79

ran a variety of "Activity weekends" throughout the year. Through the 1980s the Club membership grew in the thousands. Gus G8PG and George and other members were very active in fostering the formation of other QRP clubs abroad, in maintaining stable links with their members, and in encouraging collaboration on common themes, including the "agreed" definition of QRP and the selection of QRP Centres of Activity (CoA) on each ham band.

Just before the 20th Club Anniversary (*SPRAT* nr. 79), **Gerald G3MCK** had taken up the role of Communication and Activity Manager from Gus, at a time when the Club was growing stronger internationally. At that point Gus G8PG started a column on "Antennas - Anecdotes - Awards", that he would curate for more than 15 years, handing it over to **Colin G3VTT** in the end. A few years later (*SPRAT* nr. 90) **Peter G3XRJ** took over the role, and managed the Club activities, contests and awards until *SPRAT* nr. 152. In *SPRAT* nr. 153 Dom M1KTA had got the baton from Peter, and he served the Club in this role until *SPRAT* nr. 181 (Winter 2019). At that point **Peter G3XRJ** got back on the Activity and Communication manager seat, and passed over the torch to your humble scribe for *SPRAT* nr. 195.



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SPRAT No. 153

Changes

Really a lot has changed in the hobby in the last 50 years. But on-air activity has remained a central aspect of the Club life. After all, the proof of any RF pudding we bake in our shacks is in putting it on air to make contacts HI.

We all are indebted with those activity managers, who put so much of their time and dedication in fostering on air activity for the Club, and in making sure that there were enough "petit puissance" signals out there. And we are also grateful to all the members who have participated to those events, flying the QRP flag, showing that it is indeed possible and fun "to do more with less", and making the same miracle that mesmerised George G3RJV happen again and again, everyday.

SPRAT No. 181

SPRAT No. 195

50 Years Low and Clear.

The GQRP Club will celebrate its 50th anniversary in September 2024, with a special on-air activity called "50 Years Low and Clear". All the members are welcome to participate. Details below and more information at https://gqrp.com:

The activity will run between **1st and 30th September 2024**. The goal is to contact as many of the "LOW" or "QRP" Special Event Stations that will be active during the month.

The list of Special Event Stations includes all the regional

variations of the Club callsign: G5LOW, GM5LOW, Gi5LOW, GW5LOW, GJ5LOW, GD5LOW, GU5LOW, plus seven overseas stations: OE50LOW, OH50LOW, TM50LOW, DM50LOW, IR3QRP, YP50QRP, EG5LOW. All those stations will run at QRP power levels, and will be active on different bands and modes.

Each QSO on a different band-mode slot with one of those stations is worth one point. So contacting G5LOW on 40m CW and then G5LOW on 40m SSB counts as 2 points.

Four Cerificate Levels

There are four levels of certificates available, according to the number of band-mode slots covered, namely: Bronze (5 points), Silver (10 points), Gold (15 points), and Platinum (contacted all the active stations at least once, on any mode).

Chasers can run any power level. Two special chaser endorsements are available, namely QRP (all contacts made with no more than 5W CW/digi or 10W PEP SSB) and QRPp (all contacts made with no more that 1W).

There will be prizes available for activators and chasers, kindly offered by our regular *SPRAT* advertisers and by some members.

All the logs must be sent to Enzo M0KTZ ***m0ktz@katolaz.net*** by the 15th of October. Logs must indicate at least Date, Time, Call, Band, Mode, RST, Power Level (for QRP and QRPP endorsements). Digital formats (ADIF/Cabrillo) are strongly preferred but not enforced.

Summer Sizzler and Suffolk Trophy.

The results of Summer Sizzler and Suffolk Trophy 2024 will be announced in *SPRAT* 201.

Weekly QRP Activity Slots.

GQRP Club members convene on the bands twice a week to have friendly QSOs with fellow QRP enthusiasts. The two slots are as follows: "QRP Activity Slot" on Sundays 17:00z-20:00z, and a "Mid-week QRP gathering" on Wednesdays 17:00z-19:00z. All bands, all modes, any type of QSO, no scores, activity focused around (but not restricted to) the QRP Centres of Activity (CoAs, see at the end of the column). Logs and short reports are welcome.

Join the GQRP Reflector.

Members are welcome to join the GQRP email Reflector at: ***https://groups.io/g/gqrp.*** The reflector is a high signal-to-noise venue that hosts interesting discussions about all sorts of QRP-related topics, from antennas to circuits to components to operating techniques. This is also the place where many of our members announce their QRP activities, experiments, and results, and where periodic reminders about Club Activties are circulated.

Join the GQRP Club reflector!

72 de Enzo M0KTZ

These are the International QRP Calling Frequencies:

CW: 1836, 3560, 5262 (UK only), 7030, 10116, 14060, 18086, 21060, 24906, 28060kHz
SSB: 3690, 7090, 14285, 21285, 24950, 28360 kHz
Notice that these are Centres of Activity, so please spread out when activity levels are high (and use those CoA to make sure we all need to spread out!)

Valved QRP News

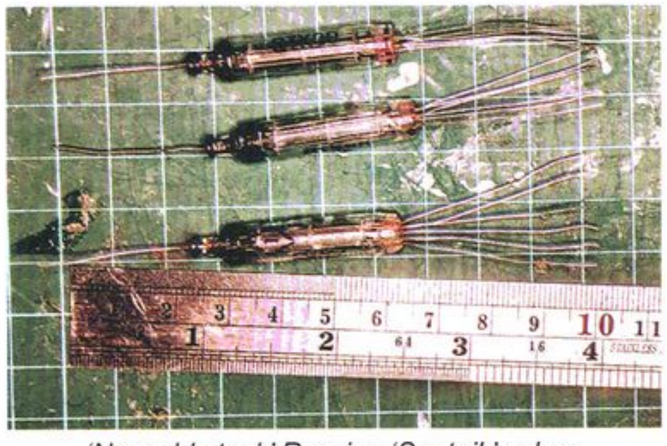
Paddy O'Reilly G4MAD email: g4mad@gmx.com

Welcome to the latest valve column, and a big thank you to the contributors who have sent contributions! SPRAT 200 is promised to be a bumper edition, so I'm trying to squeeze a lot in - I hope I've not offended any members by trimming their stories.

G0FMY's 1T4 Regenerative Receiver

Steve, G0FMY has built a valve regen for 40m- a 1T4 with Denco Green coils wired as a "Heard All Continents Receiver" but he's also included also two OC71 transistors so he can to turn it into a Codar Mini Clipper. He fondly remembers that the Codar advert said, "Built in one evening....bring the World to your fingertips at low cost"

The 1T4 Rx HT is a PP3 stack supplying up to 90 volts. Steve tells me the 1T4's were bought from Germany via Ebay about 6 years ago! This pleases me - showing that I'm not the only one who has long pauses between buying parts and using them!



'New old stock' Russian 'Sputnik' valves

Like most of us, Steve is a little cautious of high voltages, and doesn't like going above 90V - saying unless he can find some 'Sputnik' Valves, building a valve transmitter is unlikely.

By some strange coincidence I picked up 3 NOS 1Zh37B Russian Subminiature Valves at the Rugby RATS rally in mid August. So maybe there's the seed of an idea.

Roy GM4VKI has been exploring valve QRP at audio frequencies - a valve stereo audio amp was one of his bucket list projects. Rummaging through the valve box a couple of 6L6s and some 6SL7 double triodes appeared. The latter are in cascade feeding the 6L6. With the HT about 300 volts it gives a lovely sounding 5 watts of power into a couple of Warfdale Ditton 3 speaker.

I'm quite impressed that he managed to source output transformers from Amazon! His project leads me to wonder if any members have used valves to get on-air on 630m or 2200m

Roy GM4VKI's Valved audio amplifier

Roy's next job is RA1-B receiver to strip and rebuild.

Colin G3YHV and **Paul G0OER** bought two ice cream containers full of EF91 valves (yes, read that and weep!). With about 100 tested valves the EF91 challenge was born, and they decided to build a QRP transmitter each as a friendly competition between themselves.

Colin's hybrid design features a AD9850 VFO covering 80m and 40m with a PIC processor and OLED display. This drives an EF91 tuned buffer stage driving two parallel EF91s. He admits he made it too small and struggled to fit it all in - but it works fine.

His chassis and VFO box are die-cast while the front panel is 5mm acrylic cut and engraved by CO2 Laser. The engraved text is in-filled with polyfilla "just one wipe and it's done". He's thinking maybe a matching receiver will follow.

Paul also has a hybrid circuit - he's also not keen on using valve VFOs so the frequency source will be a si5351 driven by an Arduino nano.

The hollow state end will have an EF91 driver and he's also going to try running two

Two views of Colin G3YHV's rig

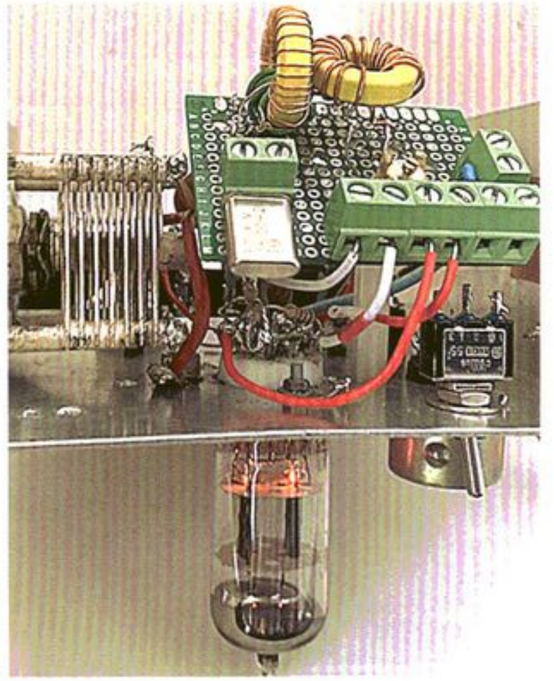
in parallel for the PA. He's also opted for a di-cast box for the VFO, but has made a chassis from copper-clad circuit board. I'm quite impressed by this technique since there's acres of ground-plane to solder to, and no need for solder tags and hardware, typically found when using a steel or aluminium chassis. At the time of writing Paul's was a work in progress, whilst Colin had managed three QSO's on 40M running one watt output.

In the Spring 2024 GQRP Club Chairman **Steve, G0FUW** announced the 2025 Construction Competition would be for a 50MHz project.

Ahead of the curve, **John, G0UCP** wonders if he's the only one thinking about vacuum

tubes for next year's challenge? He's already built an ugly prototype of a Butler oscillator with a 25MHz fundamental crystal followed by a doubler. He used an ECC91 double triode and found his VXO can cover the the cw section from 50.0050 to 50.01 with a suitable inductor to pull the crystal

Variations of the Butler oscillator circuit can be found in older editions of the RSGBs Radio Communication Handbook using twin triodes and overtone crystals,



A close up of John G0UCP's 50MHz VXO.

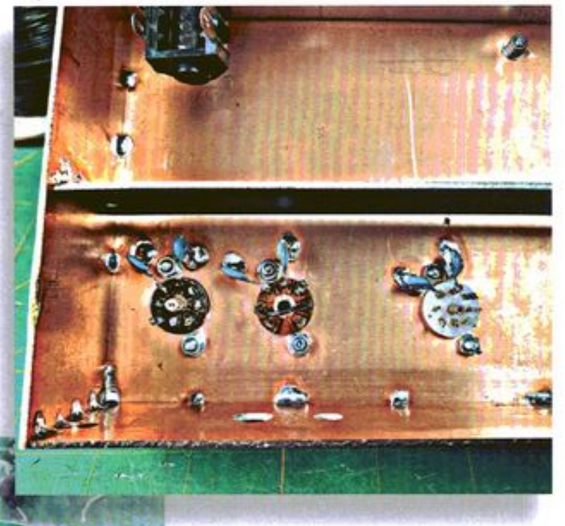
To close _a couple of reminders...

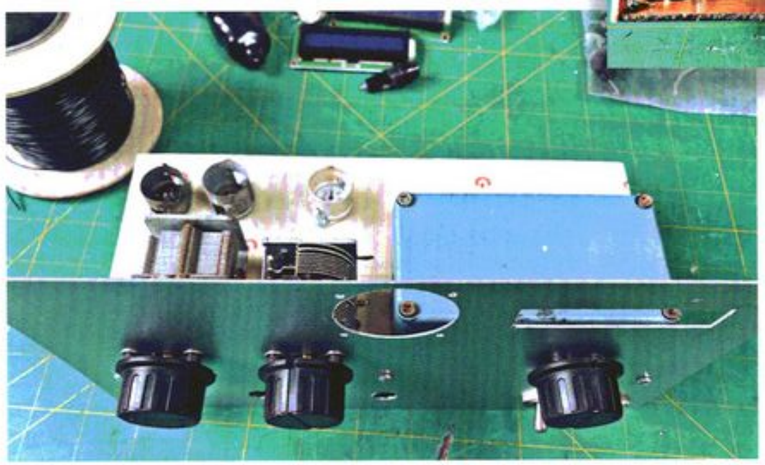
The next Valve Weekend is Friday 1st to Sunday 3rd November 2024. Yes, I know it's normally Saturday & Sunday, but with the nights drawing in, why not spend Friday evening with the filaments glowing too!

And don't forget valve activity is also encouraged during the Winter Sports which runs from Boxing Day until New Years Day inclusive.

And note neither of these activities are contests - instead they're more of an informal gathering on or around the QRP centre-of-activity frequencies.

'Shave and a haircut....'
Paddy. G4MAD



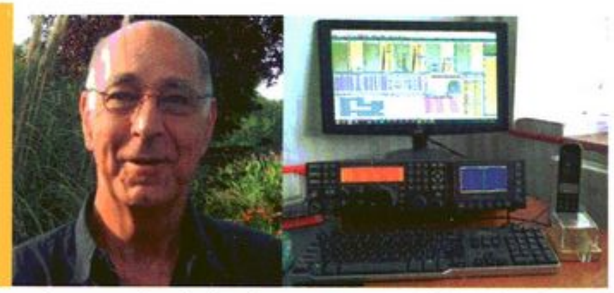


Above and left:
Paul G0OER's more 'traditional box-making'

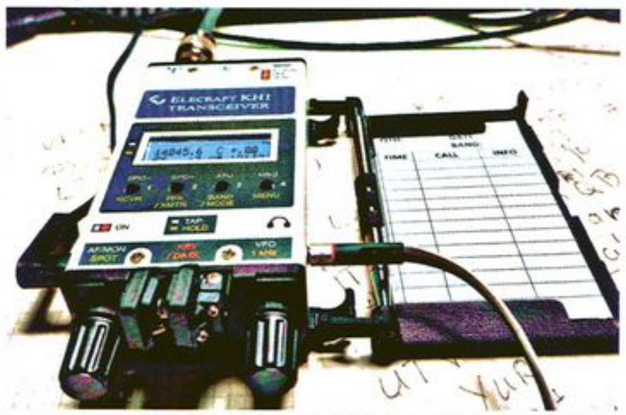
MEMBERS' NEWS

by Chris Page, G4BUE

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

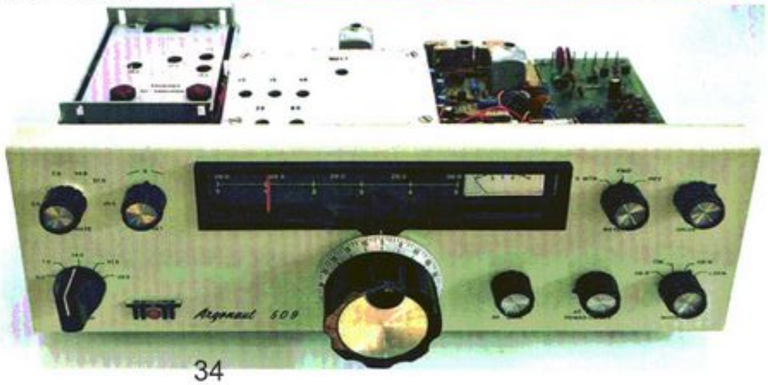


Sprat 200 edition! Who would have thought way back in the summer of 1979, when I wrote the first news from members in *Sprat* 19, I would still be writing the same column for *Sprat* 200 in 2024! Where have all those years gone?



DDØVR sent the picture above of his shack in June that includes the new Elecraft KH1 five-band hand-held TCVR (see <https://elecraft.com/products/kh1-transceiver>). Heli says, "It is very small and light for the field, and for SOTA/IOTA it is better to use the logging paper in the plastic holder to write in bad weather conditions", the KHLOG1 Log Tray. He also has a CTX-10 (right) that he says is a very good 10-80m all-mode TRX. Heli and Bigi were QRV from Cornwall in June and the Scilly Isles in July, including Tintagel Castle with their KX3 (right) and EF vertical (see last page). **G4TGJ** has been continuing his regular SOTA activations and is making slow progress with his Raspberry Pi Pico based SDR TCVR. Richard has spent quite a lot of time on the software for the display and now needs to complete the transmit board.

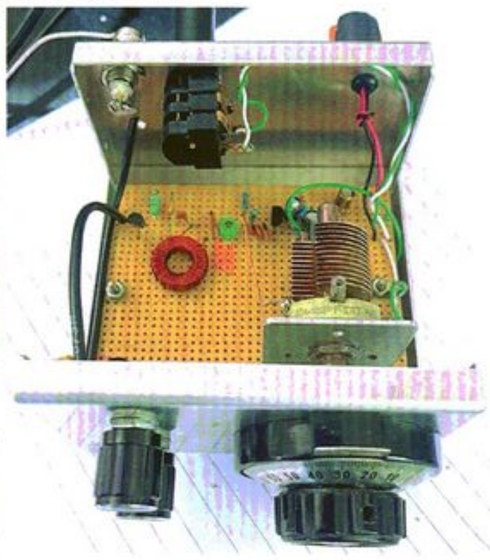
Inspired by **ON5FM**'s article in *Sprat* 199, **G8GYW** made enquiries on-line and was offered a Ten-Tec Argonaut 509 (right) by a fellow G-QRP member. After a few weeks of restoration, Mike was QRV with it and received a 59+ report from **2EØTKK** in Cambridge, using 3W SSB into his EFHW. He says, "I'm going to have



a lot of fun with this radio!" **GØDJA** has been QRV on Tuesday evenings from 1800z on 2m with 5W and an 8-element yagi, and has had a couple of two-way QRP QSOs, including **G4ALG/P** running 5W on 30 July. The following day using 5W to a 5-element yagi above the roof during a 6m event, Dave QSO'd **G3YPZ** and **F5JRX**. He has been trying different antennas on HF, a 80-20m linked dipole and a 40m OCFD that he used /P for the 'Flight of the Bumblebees' event with 5W from his KX3, and worked three stations on 40m and one on 20m.

Pictured right are two QRP CW kits from QRP Ham Radio Kits designed by **EA3GCY** and built by **EI5EM**. The top one is the EGV+3 for 20, 30 and 40m and the bottom one is the EGV-9B covering nine bands from 10-80m. Tony made the top case from copper plate and the bottom from an old project box he had in the junk-box for many years. They are both superhets, with Arduino controlling menus and settings. He added a selectable CW AF to the nine-bander, along with a TX indicator LED, and redesigned the front panel to provide more spacing of the controls. Tony recently QSO'd **ZL2LI** with the EGV-9B on 20m with his homebrew single wire Cobweb antenna, and says, "Construction was easy, as the PCB is not crowded and the few SMDs are already factory-fitted. A novel feature is that there are four front-end RX filters; three have varicap diodes and cover more than one band. Each band is tuned by a potentiometer controlled preselector on the front panel. I'm so pleased with them that I am contemplating selling my IC7300 to go fully QRP. My builds are on my *YouTube* channel, for anybody interested. Just search under EI5EM."

G1ZXH sent the pictures right and writes, "I am very very late to the Fetler party (*Sprat* 191), but I finally got round to building one. I had to invest in a pair of 600 ohm headphones to bring the volume to an adequate level and I'm delighted with the performance. The front panel needs a lick of paint but that's for another day. In June, **GØXAR** "found an interesting article from Japan about a QRP ammeter and voltmeter", at <https://www.fbnews.jp/202303/w_shortbreak/>. **GØEBQ** has built a copy of the QRP Guys DS1 antenna using a bit of dowel and a whip antenna. Nigel says it will work without an ATU on 20m, and with one from 10-17m. He has, "Got well into Eastern Europe with it with just a watt. Like Richard, my ATU is a copy of the ZM2 and I find it will match practically anything. **MØNTV**'s new video at <https://youtu.be/c25D5Is4FbI> is about his next project, another DC RX. But this one, says Monty, will have an adjustable RF preamp and an analogue VFO!

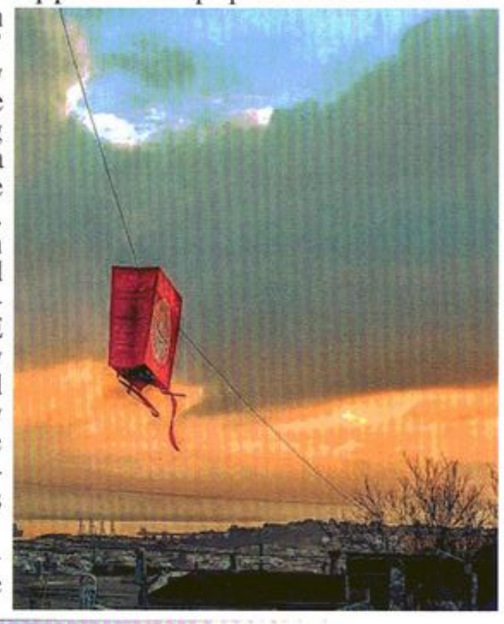


G4USI's latest project (top of next page) is a transmitter, the Parker1 (named after his home Lower Park Farm). Daimon says, "It is a homebrewed VFO, with home-grown Arduino code, homebrew PA and internal L Match ATU and 3S battery pack. I used QRP Labs LPFs and the Kanga SWR bridge. Fitted into a black alloy Hammond Case, which I laser engraved, the rig covers 160-10m (all ten bands) with 5W from 160-20m, 1.5W on 17-12m and 800mW on 10m. The homebrew L Match is very effective with a LW. Features include built-in CW keyer

(variable by pot), auto CW message sending, auto detection of straight or paddle key, internal key and SPOT facility. The 3S battery is internal and can be charged in situ, with voltage display (and keyer speed) displayed on the OLED display. It has solid state TX/RX switching and works really nicely with my Belka DX and Malahit DSP2 RXs." Daimon's best DX with the rig is **HS72KING** on 40m from an 80m EFHW.

DL2KI has put together a documentation with pictures of his One Project on his website at <http://www.dl2ki.de/prj01_oner-trx.html> (use an on-line translator for English). **W1REX** writes, "I got my start in QRPme kitting in 1997 with some Altoids stuff and bought 624 Kits from a retiring ham in South Carolina. I bought 624 primarily for his Oner offering and inventory. I never did add the Oner to my lineup as I got fairly distracted with my tuna can endeavours. I've been at it for 25 years and still love the simple designs. This Sunday night (18 August), I'm holding a live stream Buildathon with a kit I call the x-1er-O, which is a Oner built in Limerick style and setting in a lovely little anchovy tin from Italy. I spread the design out over 7.07 square inches, alternate name is the 7.07er, so it is much easier to build in a single online session. link <https://qrpme.com/?p=product&id=LS4>."

KDØFNR and **KO6BTY** started the summer in June with a POTA expedition with 'Project TouCans' in NV, UT, CO. 'Project ToucansA' is now completely wireless! There is no feedline and no lines for the keyer controls or the power supply. Everything 'Project TouCans' needs is housed in the antenna and so it is a flying rig, a recent picture (right) of the rig. More details at <https://copaseticflow.blogspot.com/p/project-toucans.html>. The POTA expedition made more than 193 QSOs with HK, JA, LU, VK and W in a month of camping. After a short break, Hamilton and daughter Hamie went to LobsterCon in ME (organised by **W1REX**), where they saw the new RockMite. They stayed for 16 days and added G and CT to their QRP DXCC. On 12/19 September they will camp in a POTA forest near Boulder, CO while attending the COSMIC2 Workshop, and will continue 'Project TouCans' looking for club members on 20m.

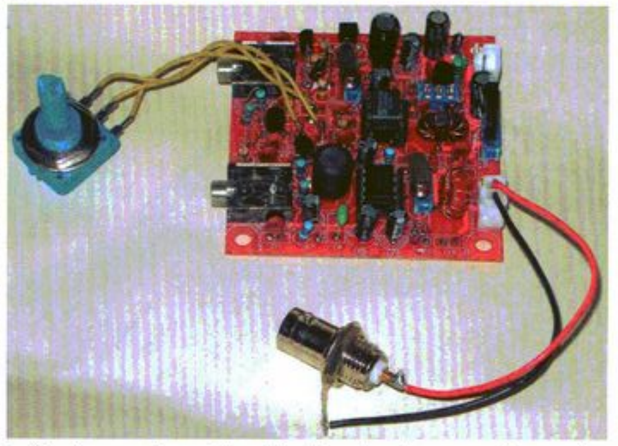


F5NZY was pleased to have won the QRP category of the 2023 SAC and received this lovely plaque (right). Steph sent the picture (top of next page) of his Hexbeam with a 7/14 element dual-band 2m and 70cm antenna below it. He continues to update the QMX firmware regularly, and says these updates are going in the right direction. He hasn't been very active since the start of the summer, but his log shows 143 DXCC this year with 5W or less. On 13 June Steph QSO'd **VK3CWB** on 20m LP with just 300mW to his Hexbeam, receiving a 429. As part of the Club's 50th anniversary, **OE5ØLOW** will be QRV 1/30 September. Your scribe QSO'd **M3KXZ** on 20m

(ground-wave) on 7 August while Pete was /P sitting in his garden using his homebrew copy of the Bushcomm Mil-1 and 5W from his LAB599.

Pictured right is a corner of the bench in **G4COL**'s shack showing a stack of rigs assembled for the photo. Ian says, "From this you may get the idea I am a fan of QRPLabs kits. Starting at the bottom is my venerable Hands Kits multiband GQ Plus which I built, then comes the IC-703. I believe I've had both for over 20 years. I reckon the IC703 was ahead of its time. Then we have the QMX+ 160 to 6m multiband, and a set of single band QCX+ rigs for 40, 30, 20 and 17m, all completed this year. A particular pleasure was completing three QCX+ in quick succession, having built them in parallel, which proved efficient. None of them developed my fault-finding skills as they all worked first time. All the rigs in the image have excellent RXs." He still has a tiny QMX to complete for 20-10m, but find this more taxing on finger dexterity and deteriorating eyesight. Ian would be interested to know if any fellow member has a GQ Plus.

GØFMY will be QRV with a pair of Chinese 49ers on 7023 and 7030kHz with 2W output and says they will enable him and his friend, who is studying for his Foundation Licence, to have fun together when he has a callsign. Steve has finished the first one (pictured right) and says it has been spotted on RBN all over Europe. He will be QRV with it as soon as it is boxed. On 26 May, **GM4VKI** and the Ayr ARC activated Dundonald Castle as **GB5DC** and **GM5LOW**. **DJØIP** has been reading about members attempts to be QRV on 80m and mentions the short centre-fed vertical dipole fed with 300 or 450 ohm twin-feeder which, with the right ATU, will tune on any band, including 80m, see <https://www.dj0ip.de/vertical-antennas/simple-multi-band-vertical/>. At a previous QTH, Rick had a 40m dipole fed with 300 ohm twin-feeder and matched in the shack on an Annecke symmetrical coupler. One year in the CQWW CW Contest, **DL6RDR** used his station and antenna with 5W from an Argonaut 509 and was placed second in Europe in the QRP Class.

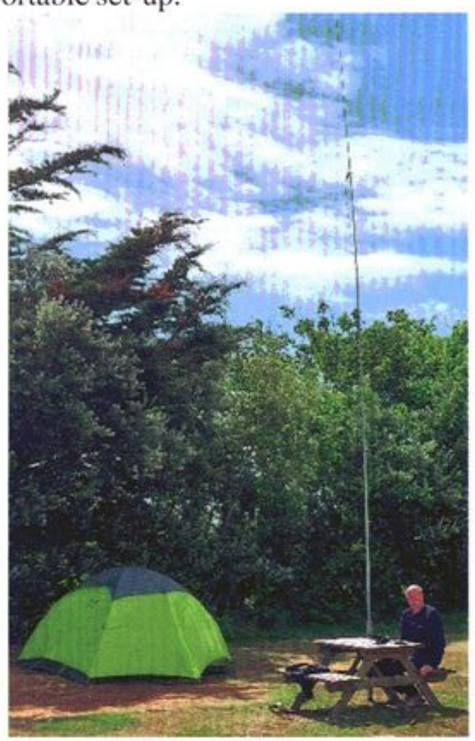


Starting on 24 May at Erwin, TN, USA, **OE5EEP** hiked a section of the Appalachian Trail for three weeks finishing in Bland, VA activating eight SOTAs along the way (pictures top of next page). Heinze took his QMX CW TCVR, built from a kit just in time for the trip, and gets 4W on 20-10m. He uses a EFHW for 20 and 10m and vertical wires for 15 and 17m. More info

at <https://reflector.sota.org.uk/t/oe5eep-on-the-at/35450>. **G4CWH** was QRV from Texel Island, North Holland in the RSGB Low Power Contest on 21 July as **PA/G4CWH/P**. Colin was a good signal on 40m with his 5W when your scribe QSO'd him.

CT7AOX (ex-**G8CYE**) says he is finally QRV after moving to Portugal, but only on 20m, mainly FT8 but some SSB, with 4W from a uSDX. Steve's antenna is similar to **G8GYW**'s but he hadn't thought about the position of the common mode choke, so is going to try shifting it. His house is on a 45 degree slope, with the shack at the top. The distant end of the antenna is tied to an existing concrete post, but he plans to put up a mast. From September, **G4EDX** and three others will build **GØXAR**'s CDS Revisited TCVR for 40m as published in *Practical Wireless*, then starting a local net when they are all working. **MØKTZ** was QRV 5/7 August from the Aeolian Islands (IOTA EU-017 and some SOTA and POTAs as **I/MØKTZ**, CW only. Your scribe was pleased to get Enzo in his log on 20m on 5 August. In September, he will be QRV covering any **G5LOW** slot (if any) that remain unmanned and around 20 September will attempt to activate **GU5LOW** with a portable set-up.

Pictured right is **DDØVR**'s antenna when he was QRV from Cornwall in June, and far right when he was QRV in July from a camp-site on top of St Marys, Scilly Isles (EU-011). where, despite QRN from a local radar station, Heli made 33 QSOs. He used the KX3 and an Aerial-51 model 404-UL from Spiderbeam. and a 11.5m GFK Midi mast from DX-Wire.



Thanks to all the contributors. Please tell me how your autumn goes for the Winter 2024/5 edition of *Sprat*; what you have been building, what equipment and antennas you have been using, what stations you have been QSOing with QRP, where you have been operating from and anything else to do with QRP, together with pictures, by 12 November. Finally, please let me know if you intend operating from somewhere other than your home QTH during the winter and spring months, especially during the Winter Sports, so I can let other members know to listen out for you.

Membership Secretary News

Daphne G7ENA (g7ena@gqrp.co.uk)

French Representative.

After many years of sterling service, **Richard** has decided to step down. On behalf of the whole Committee, I would like to thank Richard for all his time and hard work.

I would like to introduce **Michel JACOB - F5MKD** who is taking over from Richard, I have enclosed his email address F5MKD67@gmail.com details on how to send payments will be in the winter edition.

As in previous years 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:

GQRP Club account,No.: **04109546**
Sort Code: **01-07-44,**

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.
I will be accepting renewals for 2025 from 31st October.