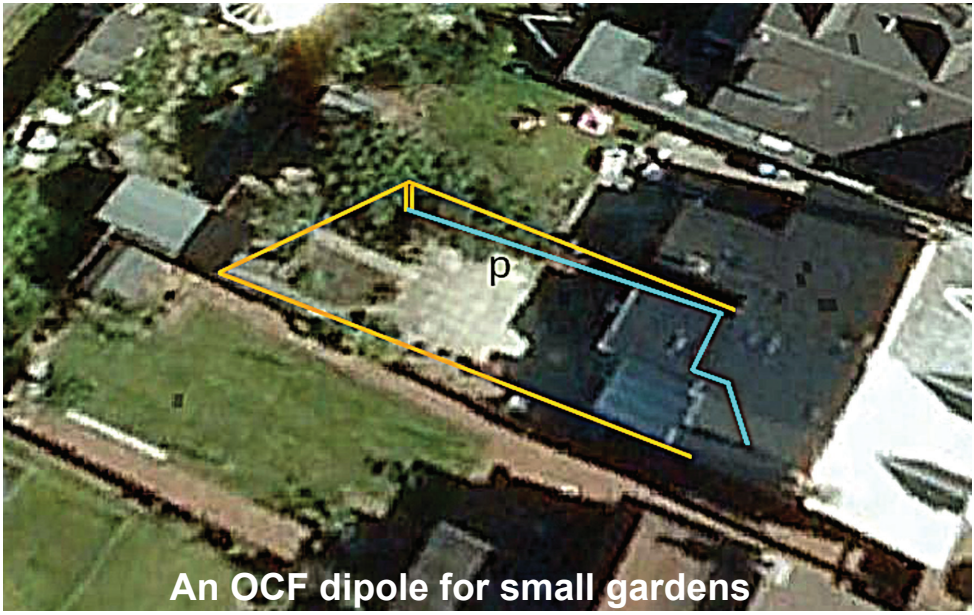
SPRAT

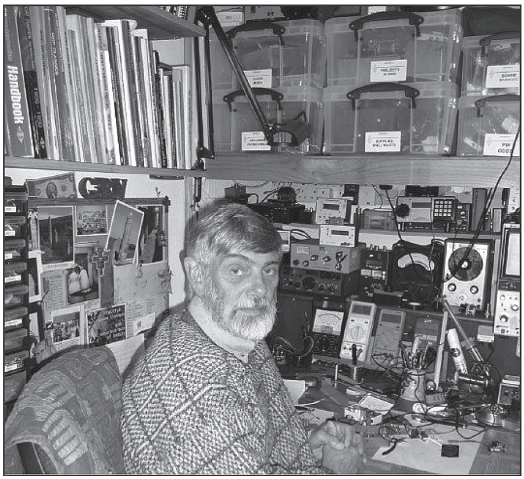
THE JOURNAL OF THE G QRP CLUB

DEVOTED TO LOW POWER COMMUNICATION

ISSUE 176	G-QRP–CLUB	AUTUMN 2018



JOURNAL OF THE G-QRP CLUB



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George is still experiencing some health issues and he has asked me, as the new Chairman, to do the Editorial this time around. I am sure all members would join me in wishing George a speedy recovery.

As I write this we are making preparations for this year's GQRP Club Convention at Telford. It was a great success in 2017 and I am looking forward to another cracker this year. The Telford Club have done a great job in sorting out the venue, the Buildathon kit and some excellent speakers.

As the new Chairman I have been meeting up with some of our key volunteers and whilst everyone has ideas for a few nips and tucks, the overriding sentiment has been that the basic format of the Club should stay pretty much as it has been from day one – stick to KISS principles, help each other out and maintain the balance between building and using QRP gear.

In the last SPRAT I asked for any suggestions from members on how they would like to see the Club move forward. There have been none, but I have received many welcoming messages from members who all said they thought the Club was in safe hands, or words to that effect. Thank you all, I will continue to work with all of the other Club Officers and volunteers to keep the GQRP ship well and truly on course.

From Membership Secretary Tony G4WIF

"Please note that the arrival of this issue is not a sign that it is time to send in your renewals. The Winter Sprat will announce what the 2019 rates will be – although they will also be posted earlier on the club website by November 1st.

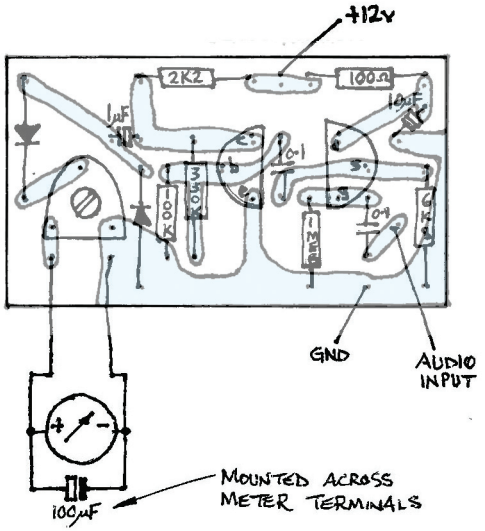
Please do not try to renew before then".

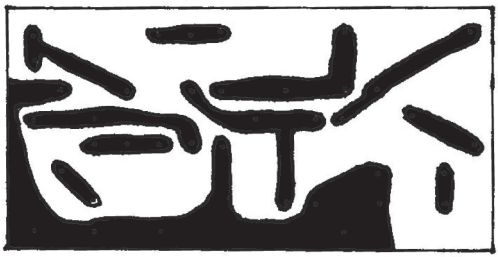
An Improved Audio S–Meter

Christopher Iles, G0VOE, Moon Cottage, Pawlett, Somerset, TA6 4SL christopher_iles@btinternet.com

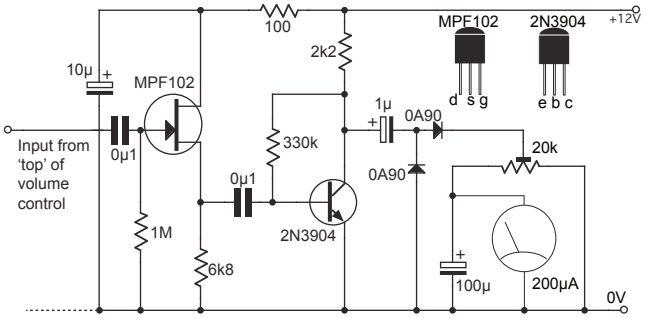
There's something nostalgic about seeing an S–meter dance around on the front of your homebrew rig. It's also very useful for monitoring band conditions too. Having used the excellent audio signal and power meter circuit by Bill Bartlett (Sprat 57 p8) for many years, I found that on some receivers the S–meter was dragging the detector down resulting in a substantial drop in audio output from the receiver.

I decided to add a suitable high impedance input buffer using an MPF102 fet to minimise this effect, meeting with great success (no noticeable drop in audio when connected). The BC108 transistor in Bill's circuit was also replaced with the more commonly available 2N3904.





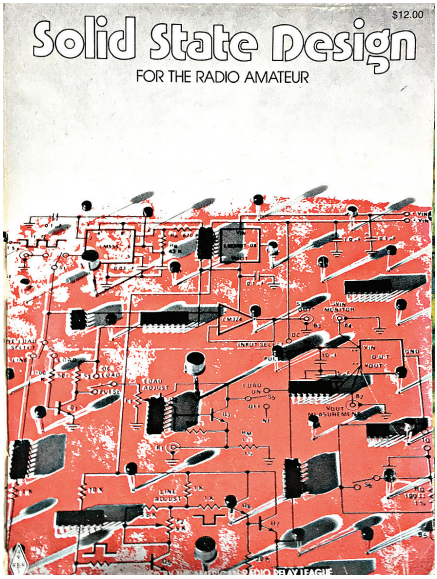
My unit (S-meter only – I use an l.e.d. to indicate Tx) is built on a piece of single sided pcb measuring just 22mm x 42mm and is fixed to the back of the s meter itself using double sided adhesive tape or glue; however construction is not at all critical and the circuit can be built on perfboard or made "ugly" style.



Actual size of the PCB is 22x42mm and is shown above as from the track itself, but the overlay is shown as if looking through the PCB

Testing small bipolar power transistors

Phil Stevens G3SES (philg3ses@gmail.com)

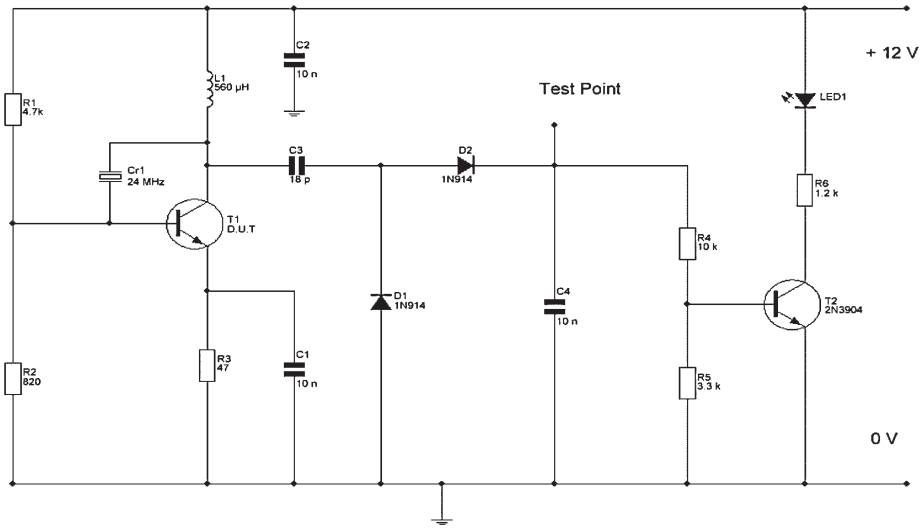


In SPRAT Nr. 168 I described how I had bought some new 2SC2078 CB PA transistors from a rally vendor only to find they were fake components.

I thought there must be a simple way to indicate whether a transistor is suitable for a 5W PA stage on the HF amateur bands. There have been a small number of test circuits published for finding out whether a small signal device can be used at RF by using the test component in an oscillator.

The circuit which most interested me was one published in 'Solid State Design for the Radio Amateur' by Wes Hayward W7ZOI. Yet the circuit design is specified for small signal transistors only using a small collector current.

I decided to raise the collector current in the Pierce oscillator to about 20 mA and hoped the small fundamental mode crystal would be happy with this and there were no problems.



The modified circuit from the ARRL's Solid State Design

The RF signal at the transistor collector was rectified, filtered and developed across a resistive load. It was initially hoped that the output would relate to the transition frequency (fT) of the test transistor but this was not so. The presence of oscillation is shown by a lit LED.

The prototype tester was used to examine a range of popular power transistors used in QRP transmitters with known values of typical maximum frequency fT.

The circuit components are not critical but good RF wiring techniques should be used and the leads kept reasonably short to the test transistor. The circuit was run off a bench 12V supply and the test point was connected to a DMM with the range set to 20V DC. The reading on the DMM was noted for each transistor, including one small signal transistor (2N2222A), one known LF power transistor (2N4923) and the results are tabulated below.

The 2N4923 was tested to show that it would be unsuitable in an RF PA stage. The circuit was constructed in a salvaged diecast box and a T05/T039 transistor socket fitted with the usual ECB wiring. This enabled rapid testing of a number of transistors with these types of cases. For flat plastic cased transistors, such as the MRF475, three insulated terminals were used but this requires the transistor to be soldered to the circuit. The centre terminal is connected to the collector of the transistor.

I am happy to discuss this circuit with readers and will be interested in comments

Transistor	DMM reading	LED state
2N2222A	18.6 V	On
2N3553	13.1 V	On
BFY51	13.8 V	On
BSY90	17.0 V	On
BD139	15.3 V	On
BDW59	14.3 V	On
2SC2078(fake)	0 V	**Off**
2N1307	5.8 V	On
2N4923(fT 5MHz)	0 V	**Off**
MRF475	5.4 V	On

Some of my test results from transistors that I had to hand for my initial tests

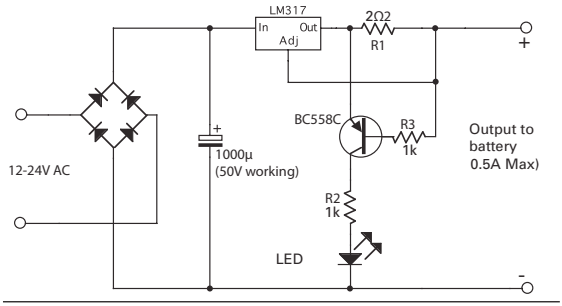
Oooops!

Updates on previous articles

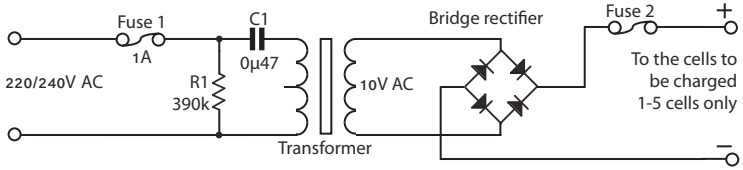
Mea Culpa!

In working on my first issue of Sprat (175) I failed to spot some drawing errors, and also in the confusion of setting up my system and transferring the work over to me, I managed to 'lose' some drawings. What follows are updates and corrections to articles that appeared in that issue.

In **Fabio IK0IXI**'s battery charger article on page 10 of Summer's Sprat the LED is, of course 'the wrong way round' and the correct drawing is shown here.

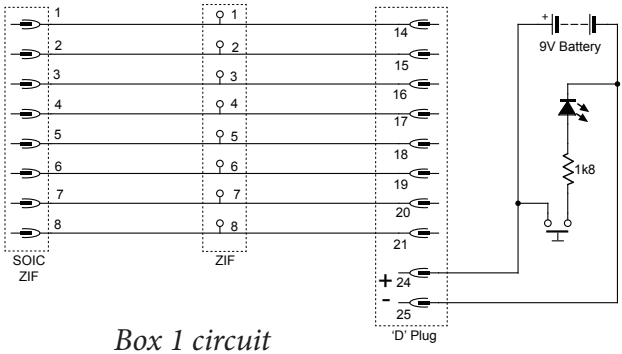


In the article by **Doriano IW1PAG**, "A very simple constant current 1 or 2 cell charger" on page 17 of the same issue, the safety capacitor discharge resistor (390kΩ) was shown in the wrong position and a corrected drawing is shown here below. **Keith G-QRP 4666**, said "in the circuit diagram, R1 is shown connected between C1 and the mains transformer. It should be between C1 and the fuse and to neutral. Also, being connected across the mains it will dissipate over one eigth of a watt (at 230volts), so some of the modern very low wattage resistors won't be suitable. A further point worth making is that you MUST use a full-wave rectifier in order to ensure the current through the capacitor really is alternating." My thanks for alerting me to the error and other comments.



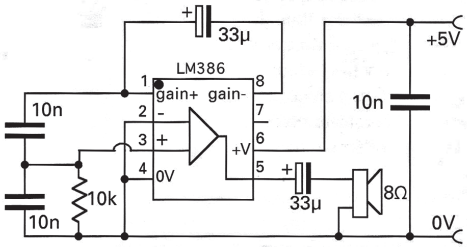
The "Scavenging for Test Purposes" article from **John Palmer G1CXE**, on pages 19–22 of issue 175 suffered the most in the transfer, One drawing of the test oscillator setup for testing LM386 amplifiers (page 21) had connection 'overlap'. On trying to 'tidy' up the layout, I didn't notice that the program re-routed one of the connections lines. The corrected drawing is shown over.

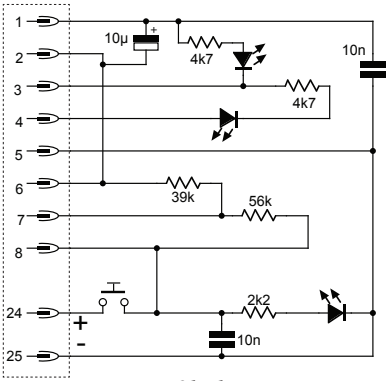
Sadly that wasn't the only problem suffered by John's article, in the transfer of files, some of the drawing failed to copy over



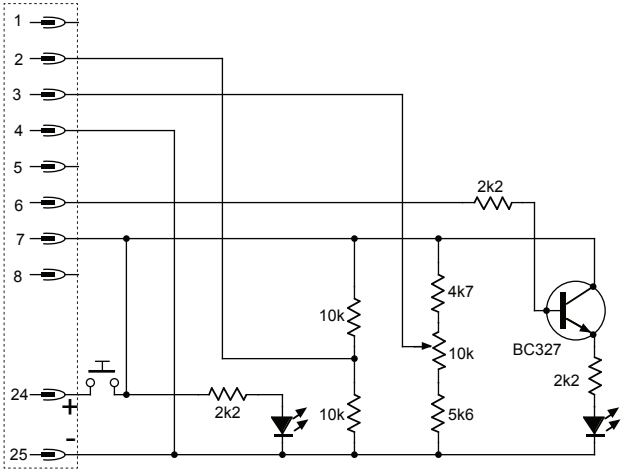
Box 1 circuit

and were not noticed. There are shown here.
Also, we forgot to acknowledge the photos for that article were by Philip G6DXH, so, many thanks to him.





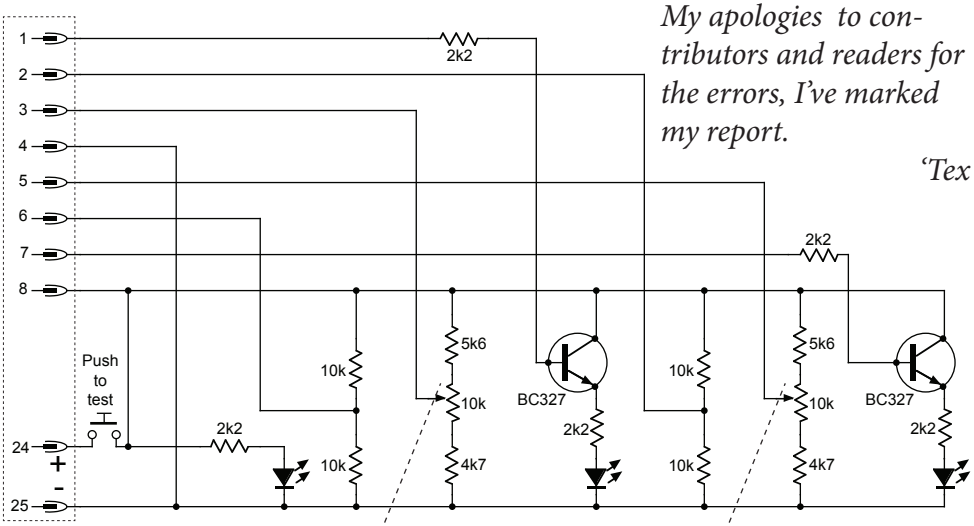
Box 2b the '555 tester



Above left: The corrected LM386 oscillator circuit.

Left: Box 2C Circuit of the single OpAmp test circuit.

Below: The dual OpAmp test circuit.



My apologies to contributors and readers for the errors, I've marked my report.

'Tex

G–QRP Club attendance at Rallies

Dick Pacoe G0BPS & Graham Firth G3MFJ

The Club is represented at quite a few rallies throughout the UK. These are generally staffed by volunteers who "show the flag" at rallies local to them. The volunteers have a stock of some club sales items, and as well as selling these, they enrol new members, and take renewals. Selling club parts can be a good introduction to the club as we are usually much cheaper than others.

We are aware that we often get invites to exhibit at more rallies around the country, so if members are considering exhibiting at a rally and advertising the club, it would help if we are informed, to enable this information to be published, either in SPRAT or on the web site (or both). Graham can also provide a stock of Club Sales items for you to sell if you wish.

Dick was our Rishworth Convention Manager and has now agreed to act as the Rally and Convention Liaison Officer. If you plan to exhibit at a rally please will you let Dick and Graham know? We are currently looking at attending a new rally in SE Kent next year and there are plans to have stalls at the West of England rally in Frome and the Chippenham rally.

The next rally we will be attending is of course Telford, and after that, the Rochdale Rally on 17th November.

Thanks

g0bps@gqrp.co.uk

g3mfj@gqrp.co.uk

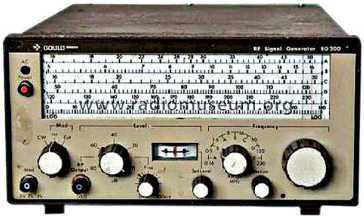
Member's Advert

For Sale:

Gould Advance SG200 signal generator. Covers 160 kHz to 230 MHz, cw or internal/external AM modulation. Mains powered but with provision for internal batteries. Handbook included. £20 or offer. Buyer to collect from north London.

Colin G0CEU 020 8801 1415

email: margaretcolinh@btinternet.com



Picture courtesy of radiomuseum.org

GM3OXX Memorial Challenge-Update!

Vic Winton GW4JUN email: GW4JUN@gmail.com

I am very pleased to report that the Challenge has stirred quite a lot of interest. I have heard from stations who are building OXOs and FOXXs and even re building some of GM3OXX's original rigs! Also some lovely stories about returning to the air after long absences, re-learning cw from scratch, spending time on the air at the 1W level to celebrate GM3OXX's life, and planning portable excursions to operate QRPp 1W on hills and seashores. Wow!

I have even managed to build an OXO myself, which worked first time despite two construction errors and a leaky transistor. Thanks to Peter LB0K for helping me to de-bug my prototype and to GM3OXX for designing such a robust little rig.

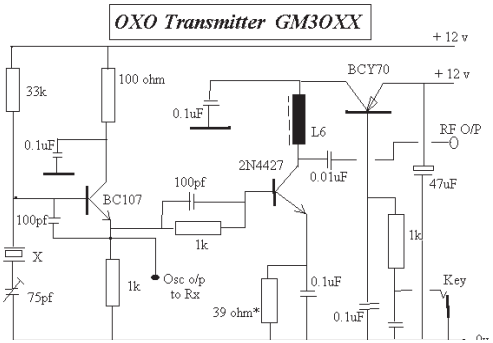
As we announced the Challenge part way through the year, we have decided to extend the end date to 31st March 2019. This will give constructors (and twiddlers) more time to finish their rigs and/or repair old rigs found deep in the shack drawer as well as to brush up on their cw.

Also the Club have offered to award a plaque to the station who puts in the best entry.

Entries should state what your personal Challenge was and what you actually ended up doing, and please enclose some photos if you can as I will be compiling a full article for Sprat for all to enjoy. All entries to ***GW4JUN@GMail.com*** by 31st March 2019 please. All entrants will receive a certificate of achievement and the best will also get that plaque ;-)

A quick reminder that the only rule is that your rig should be 1W maximum output. You can build any rig designed by GM3OXX (Oner, OXO, FOXX etc) or any other low power rig you like eg Tuna Tin, Pixie (that's a 'Son of FOXX'), Mighty Mite, Pebble Crusher etc or cobble something up yourself and give it a funky name.

If you haven't yet taken up the Challenge why not use this as a kick start for that QRP project you never quite got around to! And don't forget to post updates on what you are doing and how it's all going on the Club e mail forum. GM3OXX's rigs are reliable and easy to build so give it a go. If you have any trouble making it work then ask for help on the Club e mail forum.



Check out the Sprat Index at ***http://www.gqrp.com/sprat.htm*** for original rig articles from GM3OXX.

Triffid Receiver

Aren van Waarde, Boslaan 62, 9801HH Zuidhorn, Netherlands
a.van.waarde@hetnet.nl

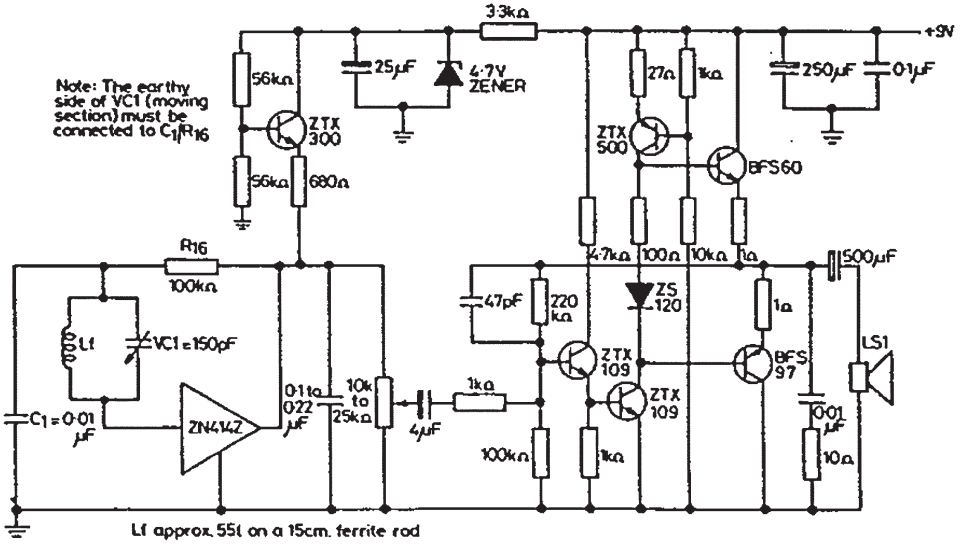
The "Triffid receiver" is a TRF from the early 1970s. It can be found in the Ferranti and GEC Plessey datasheets for the ZN414 i.c. (dating from 1973). I decided to build this RX when I received a few MK484 IC s (they were accidentally included in a shipping of electronic parts from an Australian company, and the company said I could keep them). The MK484 is an equivalent of the ZN414. The original creators of the IC, devoloped a radio circuit with their own labeled transistors in the 'ZTX' series as shown in the circuit diagram below.

The a.f. and p.s.u. sections of my 'Triffid' receiver were based on a circuit with currently unobtainable transistors. So, I replaced by more common items: 2N4401 for ZTX300, BC549C for ZTX109, BC327 for ZTX500, 2N2219A for BFS60, 2N2905A for BFS97 and an unidentified rectifier diode (0.85 V forward drop) for the ZS120.

For the loudspeaker, LS1, I used a small oval (3 x 2 inch) speaker of 32 Ohm that was intended for a doorphone. In my copy of the 'Triffid', L1 was a ferrite rod antenna (MW/LW type) salvaged from a damaged Philips valve radio, and VC1 a 320 pF air variable of the East German company RFT. I designed a PCB for the receiver (size 105x58mm, copper side shown). There is a single horizontal wire link running right of the 100 ohm resistor to the connecting join of the two one ohm resistors.

I used coaxial shielded wire for the volume control, though simple twisted speaker wires are recommended. The voltage at the output pin of the ZN414 (MK-484/TA–7642) is critical. So is the 4.7V zener voltage, higher voltages resulting in excessive r.f. gain and reduced voltages in loss of sensitivity.

The reception quality of the Triffid was a pleasant surprise. For a TRF with a single



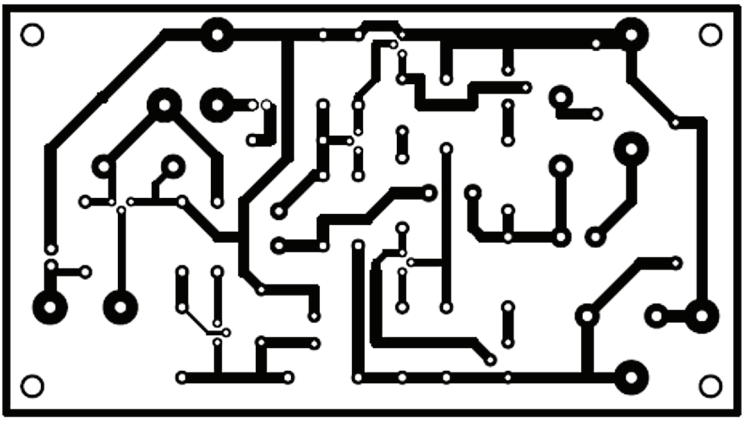
tuned circuit, the sensitivity and audio quality are outstanding, and the selectivity is usually adequate.

Many stations in the MW and LW broadcast bands come in “loud and clear”, particularly in the evening hours (Germany and the Scandinavian countries being absent since they have terminated their MW broadcasting, but transmissions from an area ranging from N.Ireland and Britain to Iran are well-received).

During daytime, many low power AM stations from the Netherlands (50 to 100W PEP in omnidirectional antennas) can also be monitored. Thus, the Triffid seems a fun project for kids (and 62-year olds that hasn’t really grown up!). Building an a.f. amp with discrete transistors may be a good learning experience...

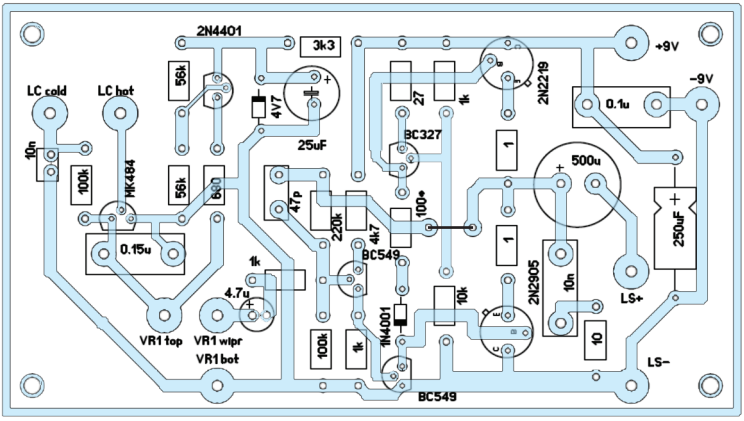
Editor’s Note,

Originally a Ferranti device the ZN414, was then made by GEC-Plessey, before becoming the MK-484 and ‘obsolete’. In spite of that history, it is still widely available as TA-7642 and may be found in club sales for the princely sum of 75p. This is a direct equivalent of the ZN-414/MK–484. If however, you’re thinking of using a ZN414 that you’ve found hidden in the ‘junk–box’ beware the 180° pinout differences between the different versions.



Not to Scale

The pattern of the PCB track, which is 105x58mm and is shown as looking at the track side of the board.



The overlay shows the track as it might look when viewing from the component side of the board. It’s now been flipped vertically.

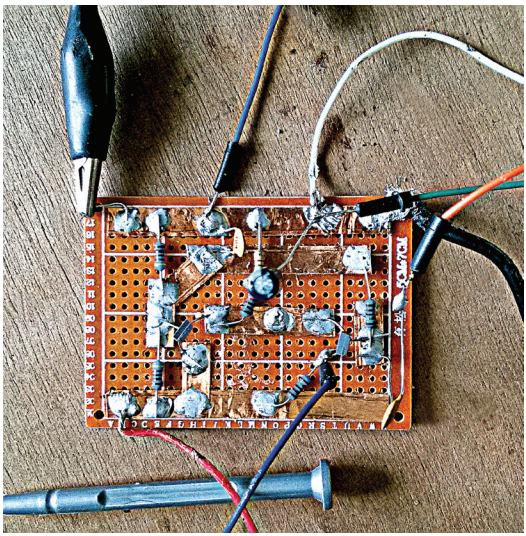
Low power amplitude modulator

Roger Green, MW0RJG: optoroger@yahoo.co.uk

AM is often considered a poor relation in comparison to other modulation methods such as SSB and FM on the amateur bands. It takes up more bandwidth than SSB, and is not very power efficient. However, it does have simplicity in concept, and in detection, certainly. This has prompted the author to encourage people to take an interest.

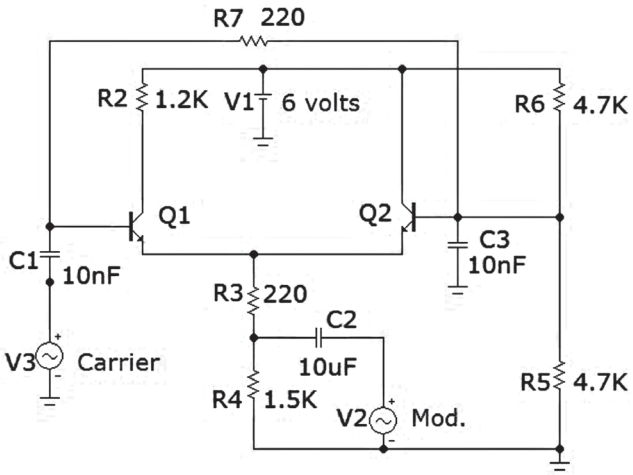
Using devices such as the SA602/612 (when available), and other techniques, such as collector modulation/cathode modulation, allows AM generation, but involves transformers or other additional components to permit this. The circuit I have devised essentially takes the core function of an SA612, when used for AM generation purposes, and condenses it down to a simple, two transistor circuit. The circuit works up to 15 MHz at least, and consumes around 2 mA of current for supply voltages from 4 to 6 volts:-

The circuit was simulated using Microcap 12, and then optimised from that. The output is taken from the collector of Q1. The transistors, Q1 and Q2, were general purpose ones such as the 2N2222, preferably the same type for each, but not needing to be matched. For the carrier, for frequencies between zero and 15 MHz, a peak-to-peak carrier voltage of 70 mV was the optimum level for operation with acceptable harmonic distortion at 4 MHz, with a maximum peak-to-peak modulation voltage of around 700mV. The output from the circuit as constructed is shown below, with a carrier frequency of fourMHz and a higher than audio frequency modulation signal to allow details to be seen:-



It consists of the AM signal required, and also a component at the modulation frequency, which is easily removed by using a high pass or bandpass filter on the way to a subsequent amplifier stage. In tests with a communications receiver set to AM reception, there

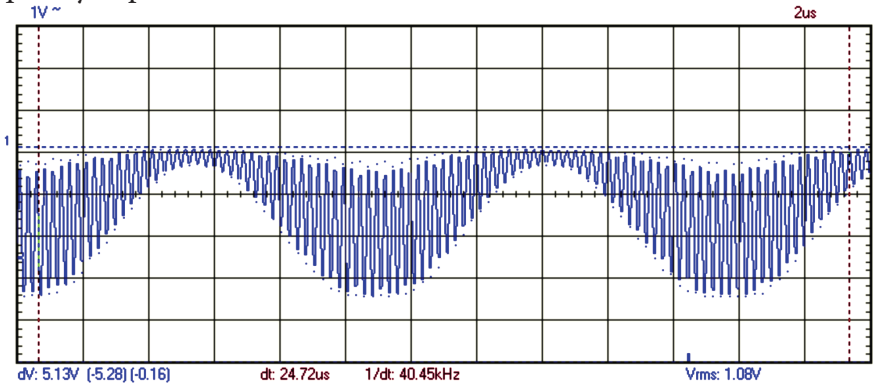
was no perceptible audio distortion. Modulation depths of nearly 100% are realisable. Because of the frequency response of the differential circuit using the transistors type ZTX108B, the required input carrier peak to peak voltage, for a constant 700mV peak to peak modulation voltage, needs to be varied. The circuit was characterised around the reference frequency of 4 MHz, as follows:-



F(MHz)	0.455	4	10	14	18	21	24	28
Carrier(mV)	62	70	150	250	390	390	390	390

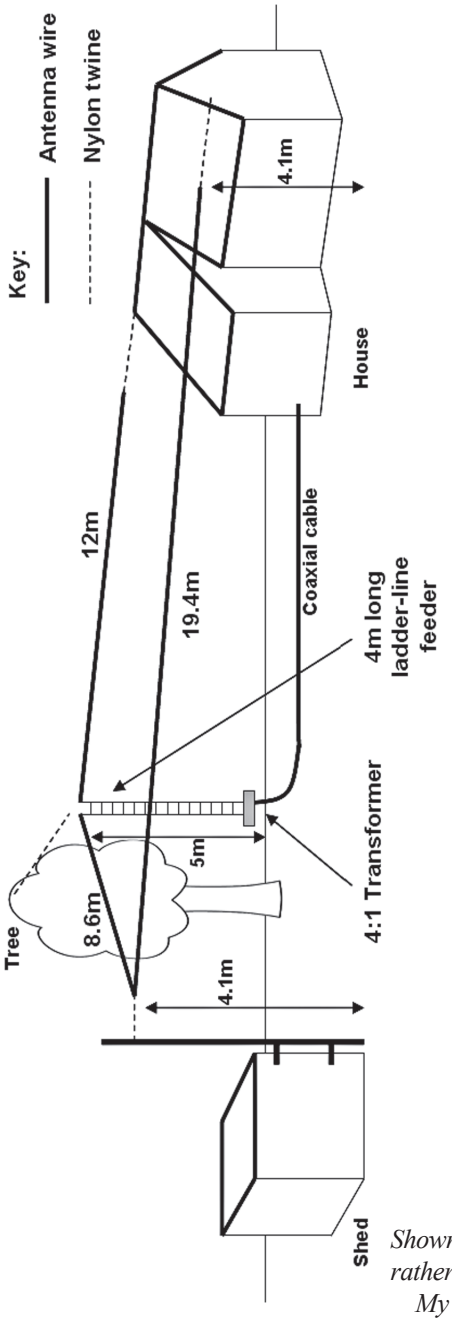
Measured in mV p–p voltage for fully modulated output, which is from the collector of Q1.

Of course, if readers uses transistors with a better high frequency response (i.e. a higher "fT"), then the required carrier p–p input voltage will need to be less than 390 mV for a wider range of frequencies. As oscillator circuits generally produce higher voltages than needed, a simple pre-emphasis circuit preceding the modulator carrier input will compensate for the frequency dependence.



An OCF dipole for small gardens part-I

Bob Towers, MM0RKT, email: mm0rkt@gmx.com



My back garden is approximately 60x30ft and the longest sides run north-west – southeast. I've been licensed 15 years and my first aerial was a half-size G5RV dipole with a 50ft RG213 coax feeder into the shack and a manual tuner at the rig.

It worked reasonably well but, like most of us, I started thinking about something better. I cut one half of the G5RV down to 22ft and added 19ft to the other half. I replaced the 300Ω ladder line with 5m of 450Ω (only because the original 300Ω ladder line kept breaking because it was unsupported) and supported the new off-centre with a wooden pole. I added a home-made 4:1 current balun at the bottom of the feeder and ran the 50ft RG218 coax to the manual tuner in the shack.

It was essentially a 40m OCF dipole and its radiation pattern – though I didn't know it at the time - was concentrated off the long end ie northwest. I was then able to work US west coast! 80m was just possible if I tied the two legs of the ladder line together and worked it against ground, in the style of the original Windom. Performance was pretty poor because I had only a single earth connection: radials were not a feasible option because half of them would have been in next door's garden.

I therefore extended it into a 44'+88' OCF dipole which gave me 80m, but I had to fold it around three sides of my garden. The vertical feeder was

Shown here, a drawing of the layout from 'ground level, rather than 'from the air' as in the front cover shot.

My thanks for the drawing go to Mike Parkin G0JMI,

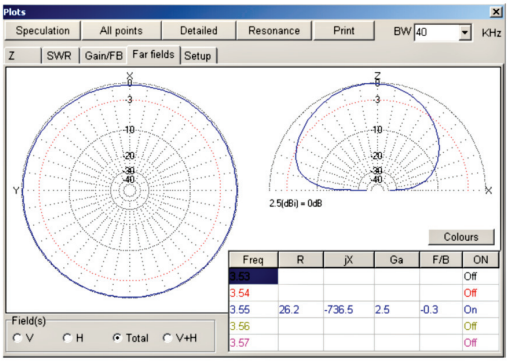
moved further away from the house and the RG213 coax feeder (p on the photo) extended to 60ft. I beefed up the 4:1 balun because I'd now got my full licence and was allowed to run up to100 watts.

The vertical ladder line, although a relic from my old G5RV, was deliberate. Most commercial OCF dipole designs put the 4:1 balun at the off-centre feed point and run a vertical section of coax to a 1:1 unun near ground and then to the rig. This is to avoid feeder radiation. I wanted my ladder line to radiate and give me some low-angle radiation, particularly NW-N-NE which is the clear direction from my QTH. The 4:1 balun at the bottom of the ladder line gives an approximate match to 50Ω coax and additionally minimised common mode currents in the coax to the rig.

The performance was a lot better than my old G5RV, as you would expect. It's almost omnidirectional on 80m and 40m, less so on 20m and above, with lobes towards N and S. Part 2 will elaborate on this and provide a solution and give more details of the balun.

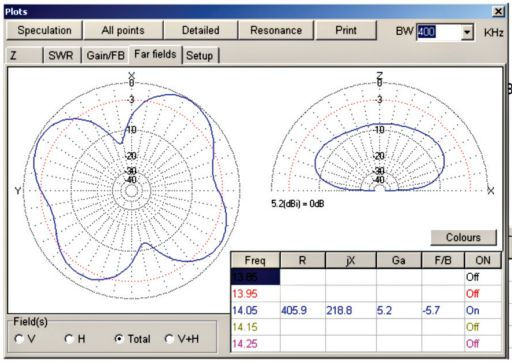
Below right
The home-made 4:1 balun in its weather resistant box.

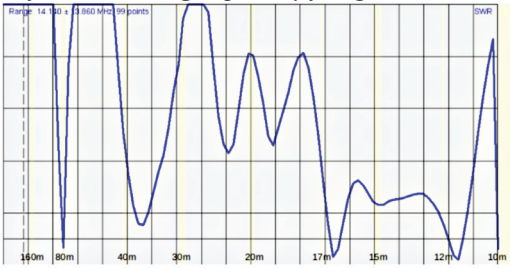
Below:
The SWR plot at the end of the 4:1 balun, is generally satisfactory, except for 30m and 20m. The relatively poor matches on those two bands means increased losses in the coax feeder to the rig, especially for QRP.

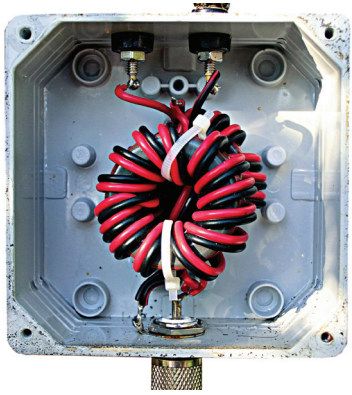


Above:
The radiation pattern in the vertical axis, shows the antenna has quite a high angle pattern although apparently not ideal for DX it seems to work.

Below:
The radiation pattern in the horizontal axis, shows the antenna has a butterfly like radiation pattern...



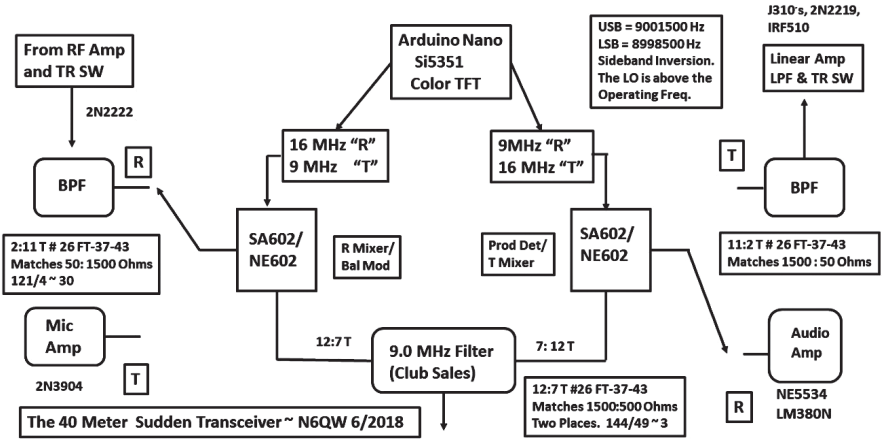




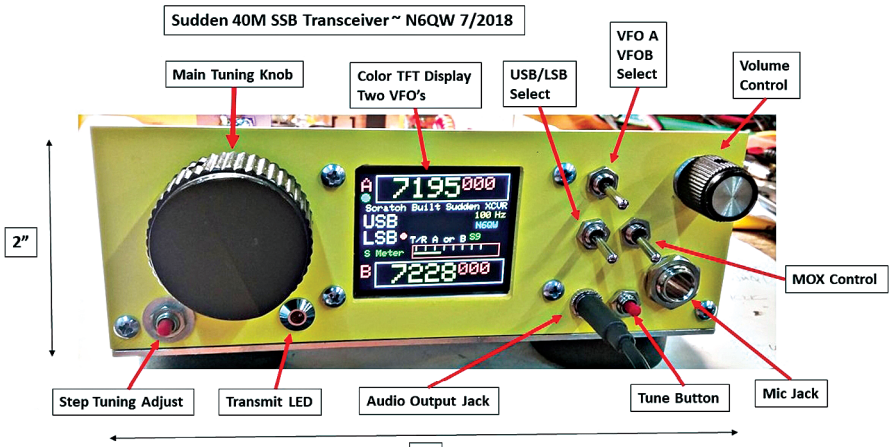
The Sudden Transceiver

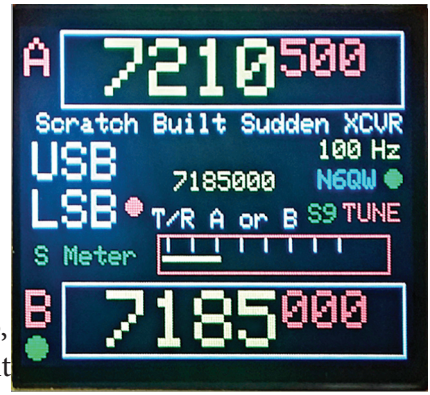
Pete Juliano N6QW, n6qwham@gmail.com

While perusing a back issue of SPRAT (#156), I saw an article by Steve, G0FUW, entitled Sudden PSK. I have no special interest in PSK; but what really caught my eye was the schematic. My first thoughts – why can't this be made into a simple SSB Transceiver? I answered my own question with the following block diagram.



Using two NE602s, with one ahead of, and one following a 9.0 MHz filter (Club Sales) this could be called an IF Module. This unit assembly on receive has the 1st NE602 acting as a receiver mixer and the 2nd as a product detector. On transmit the 1st is now a balanced modulator and the second a transmit mixer.





Two SPDT relays could swing the module between a band pass filter on receive and a microphone amplifier on transmit on the front end. On the back end, another relay on receive is connected to the audio amplifier and on transmit a second band pass filter. The IF Module and Band Pass filters fit on a board 4" X 4". There are external modules for the Microphone amp, Audio amp, Receiver RF amp and Transmit linear amplifier stages. Careful attention was paid to impedance matching. Four FT-37-43 cores provide the needed matching.

This will be a two-part article with the first covering the receiver and the second the transmit stages and the final integration into a complete transceiver. There is much information associated with such an undertaking, therefore full schematics, Arduino sketches, construction hints and test processes will be included on my website [www.n6qw.com].

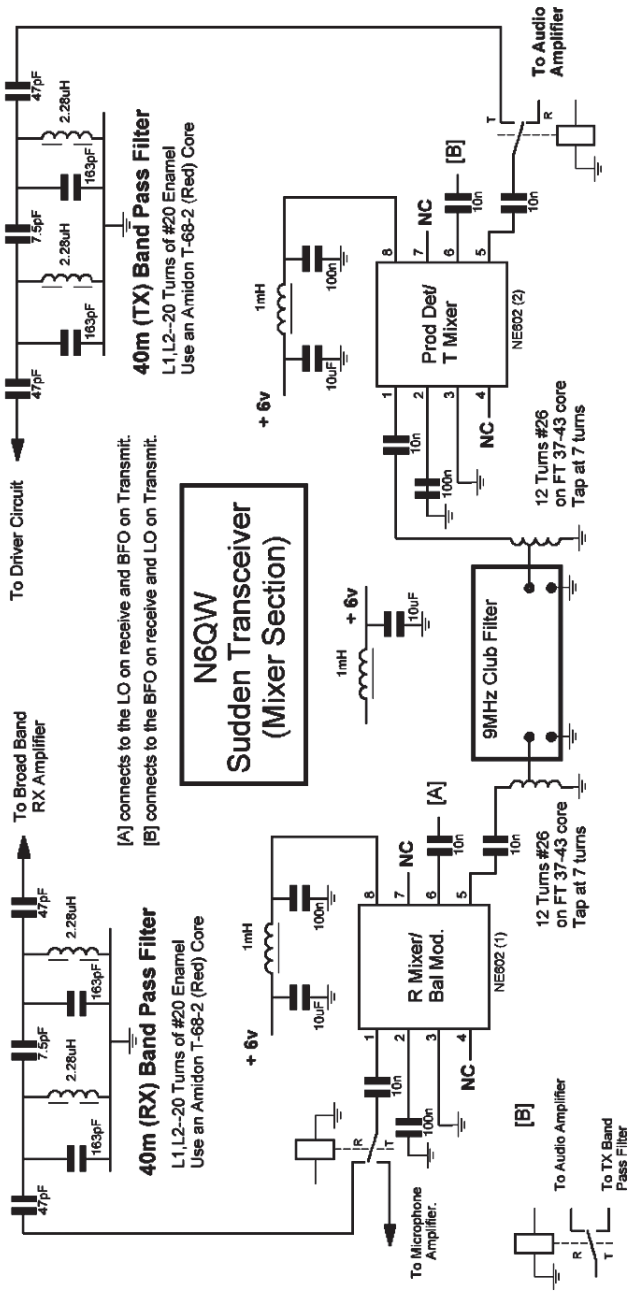
The Sudden Transceiver is simpler than my LBS transceiver that was built several years ago. The Sudden Transceiver uses less parts is easier to construct and most likely will have a greater attraction. While you could build this project using a homebrew 4 pole filter, while stocks last, buy a Club Sales Filter and call it a day.

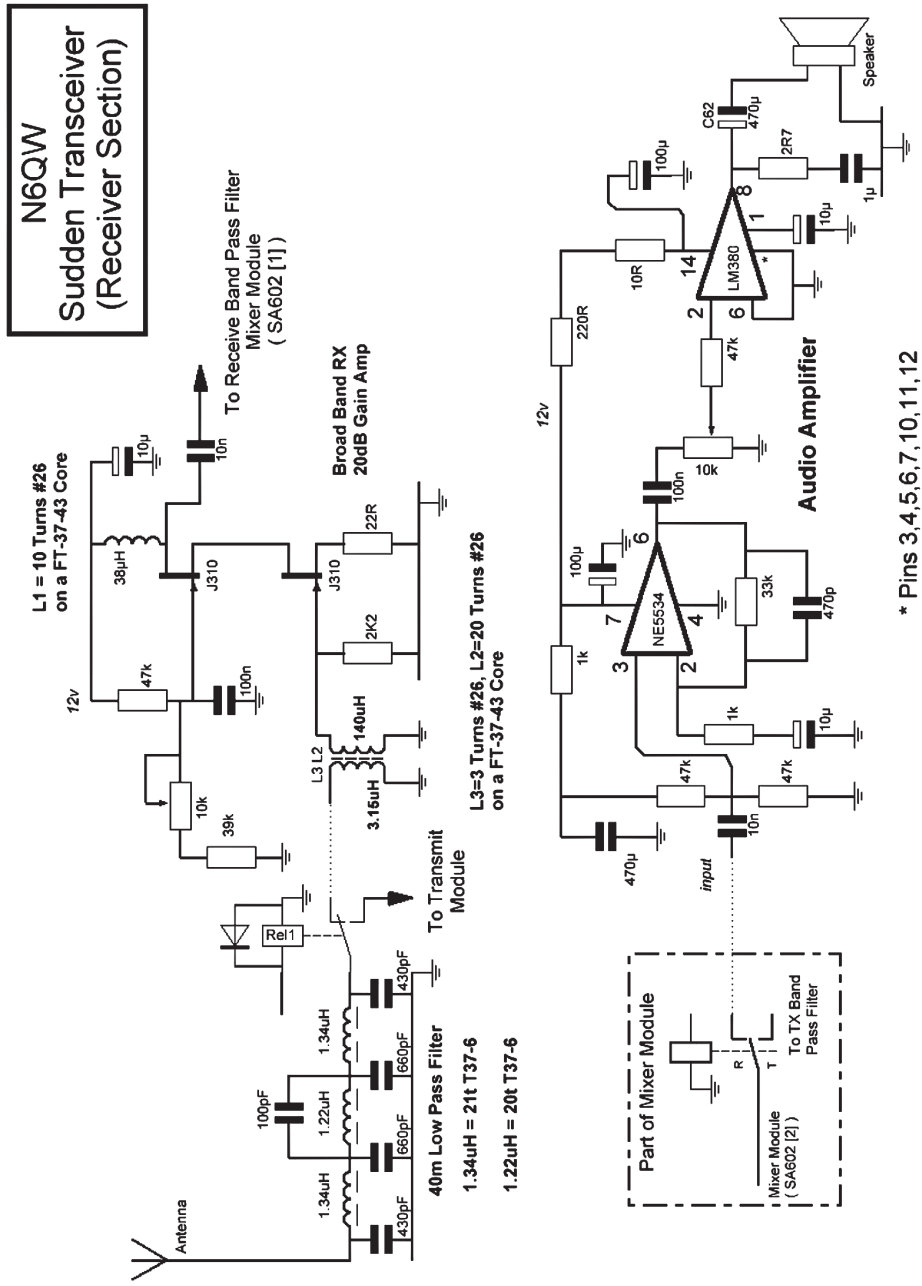
Splitting the project in two segments also addresses those builders who only want the receiver, but this also provides a milestone approach where you get the receiver working properly and then the transmitter rides along for free.

What makes this all work is the Arduino Nano, Si5351 PLL Clock Oscillator and a Colour TFT display. With a bit of shopping parts for the LO/BFO can be had for around $20 USD. But the big bonus is what is buried in the Arduino sketch. The rig has selectable upper and lower sideband, a TUNE function where a 988 Hz audio tone is generated by the Arduino, selectable tuning step rate and even an S Meter capability.

In part two of this article I will describe the transmitter section with schematics and full wiring details for the five relays that are used.

The following schematics for the receive and mixer sections provide the connection and coil winding data.

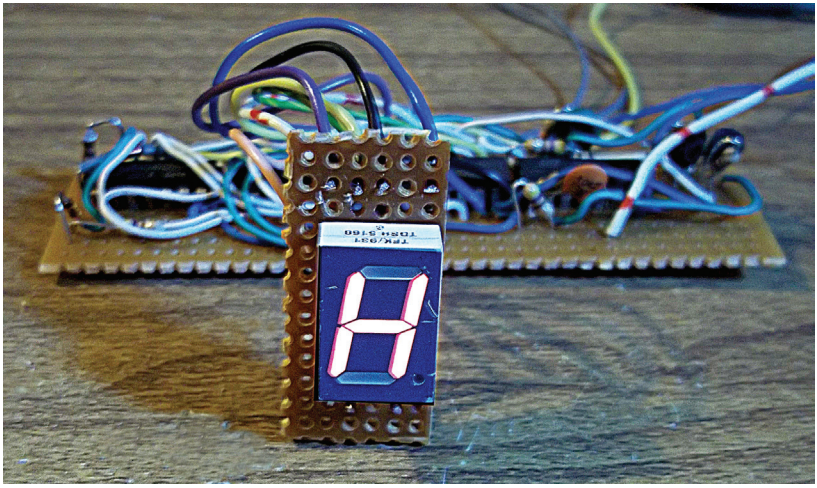




For the full details on the project construction method, and of the VFO module please refer to my website at ***www.n6qw.com***

A simple TTL & audio logic probe

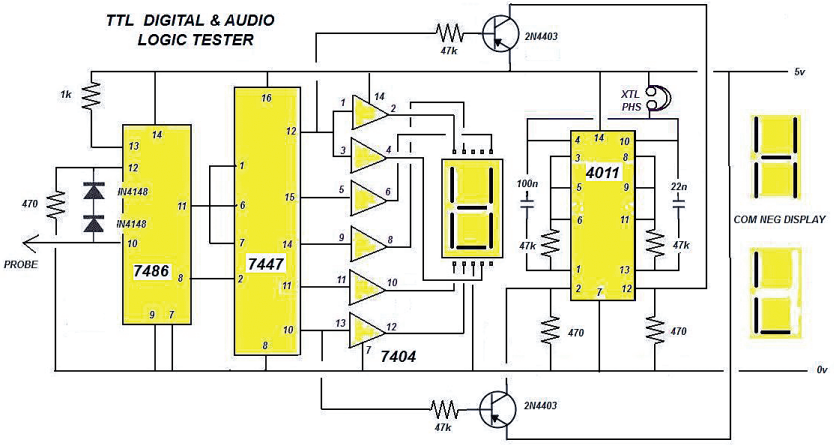
Peter Howard G4UMB



Sometimes we use digital integrated circuits (ICs) in our QRP rigs, working as transmitters or as more simply as switches. I've built this probe TTL logic tester probe that gives indications of a TTL logic input or output state in one of two ways.

A Digital seven segment display which shows an 'H' for logic 'High' (usually labelled as a '1') and an 'L' for logic low (usually defined as '0'). It also has an audio tone which has a high and low frequency difference. This function is useful if you don't want to look at the display while testing.

I made this circuit for use with a Crystal earpiece as I had made a pair of 'XTL headphones' from an previous article in Sprat. So, I have combined ideas from circuits I have seen in magazines from the 1980's for the project. If you use a common positive display you can probably delete the invertor IC 7404.



G4EHT- Tri-band 'Trap Moxon' 2, 4 & 6m

Bill Watson G4EHT G-QRP–558

This aerial evolved as a result of lots of trials along with many errors overa period of many months as a 'project' in an attempt to build a 'tri-band' beam using just one 50ohm feeder, for the three bands of 50, 70 and 144MHz.

First of all, my thanks must go to my lovely 'XYL' (Marilyn) as without her assistance in the construction and testing, this could not have been completed. I have a number of health problems and I lack mobility which doesn't help when playing with antennas, of which I've built many for all bands. Though in these recent years, particularly for 2, 4 & 6m, and I've had excellent results with many of them.

I've found that most aerials I've built for these bands have been 'Moxons' and quads. I've found that the quads working exceptionally well, many of which have been 'mono-banders'. I've also tried 'tri-banders' where all elements are fitted onto a single boom. In this latter instance, all the aerials have had separate feeders.

When building the various antennas, I've used both, bare and pvc covered wire, and different diameters of wire. All have worked, but you have to be aware that measurements do vary due to the velocity factor of the wire used for the elements.

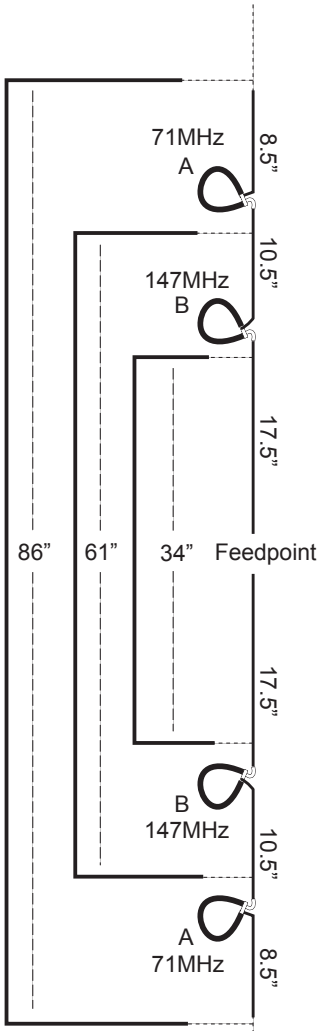
In the past, I have tried building 'Moxons' using just the one single feeder, but have always found that 'interaction' occurs between bands. One of the interections is that you often get resonance and matching well on one, or maybe two bands, but not at all on all three bands with a low 'SWR'.

Challenge - the Driven Element

So, my challenge really was the driven element, It was was to build a 2/4/6m beam, using just one single 50ohm feeder. Firstly, I decided to try and build a 'rotary trap dipole' for these three bands. And, after lots of trials and errors (emphasis on errors!), I finally managed to build and, resonate a rotary trap dipole on 2/4/6m. I was amazed with the performance, and the 'SWR' on all three bands was no greater than one point five to one (1.5:1). This single driven element is a excellent aerial in its own right and should be constructed first.

Next Challenge

After the driven element, the next challenge came the reflector 'problem'. With the driven element working so well, I attempted building a reflector, positioned on the boom, behind the driven element, but I was unhappy with the results. So, I gave it some thought, and suddenly came up with an 'idea' which afterwards, felt and sounded like a' brain wave'! I thought…how about adding three separate reflectors? All fitted on the boom at the correct positions behind the driven element, for 2/4/6m (like a Moxon). So, this is what did. On testing, I was delighted to find that no interaction occurred between bands, and also that there also appeared to be some form of 'front to back' ratio. I checked the resonant frequencies with my analyzer but found that all bands had dropped in resonance, as expected.



The lowering of the resonance came as no surprise of course. so, rather than 'tinker' with the driven element, I decided to construct another driven element, and make new coaxial traps, but to alter the lengths of wire between the traps until the whole thing was resonant on all three bands with the reflectors added. The 'tails' of the 6m section is added by the same amount of wire that has been removed from between the inner traps, so as to re-obtain resonance on 6m.

Trap Construction

I decided to use coaxial cable to make the four traps for two and four metres (two of each of course). As can be seen by the photograph, I had plenty of coaxial cable to 'play' with. I used RG-58 to construct the traps, but almost any coaxial cable will suffice, even 75ohm coax being fine (though some experimentation may be needed). The 2m trap is formed from a 7inch length.

Total reflector lengths		Reflector–driven distance	
2m	42 inches	2m	11 inches
4m	84 inches	4m	22.5 inches
6m	118 inches	6m	31.5 inches

of coaxial cable. The 4m trap uses a 13inch length of the same type of cable.

Basically, I simply stripped off about one inch of the outer insulation from either end and kept both inner and outer sections clear of each other. I then soldered the centre of one end, (see photo) to the braid of the other end. This will then leave you with two wires to your trap. I fitted solder tags to them for 'testing' and solder tags to the lengths of wire between them so I could be more accurate. The traps can be of any design you prefer of course, but make sure that they are resonated at 71MHz and 147MHz respectively my 2m trap (smaller one) is approx 1.25 inches in diameter my 4m trap (larger one) is approx 3 inches in diameter when constructed they must be weatherproofed as best you can.

I used my MFJ-259 analyzer as a GDO to check the trimming and tuning of the elements. Other construction information is really limited to the fact that I used fibreglass fishing rods for the main 'framework' along with a alloy boom. The wires were simply taped to the fishing rods. I also used an SO-239 socket at the feedpoint.

For all elements I used, 24swg bare wire, with RG-213 low-loss coaxial cable for the 50ohm feeder

Dimensions

boom length only	31.5 inches
longest element	86 inches

Distance between driven element and each reflector as follows:-

driven element to	2m reflector	11inch

driven element to	4m reflector	22.5inch
driven element to	6m reflector	31.5inch

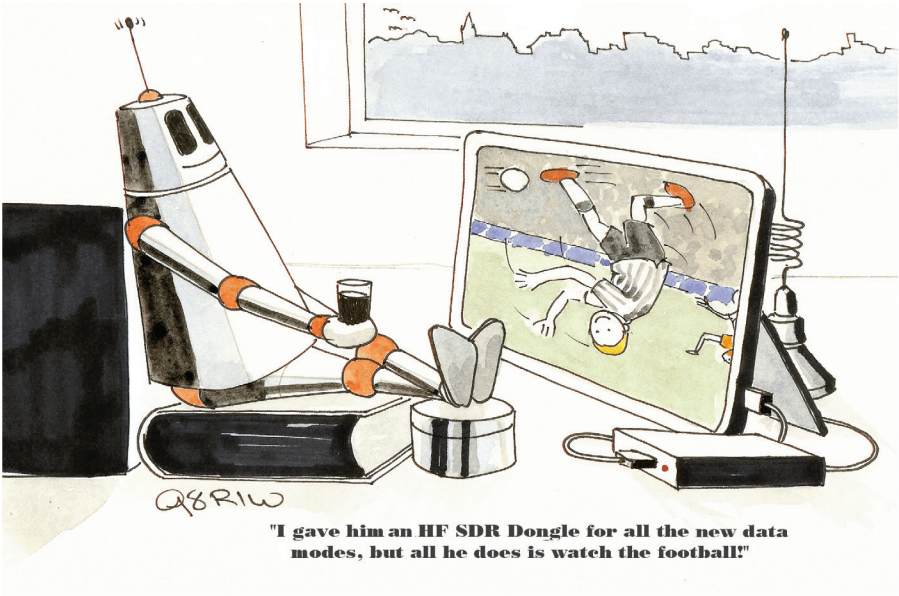
Performance Results

After construction was complete, I took down my home-brew tri-band quad, to evaluate the aerial I have been amazed at the performance for such a tiny aerial, and using just one feeder, which was my aim. I have been using it in the UK/AC events, each month and have been working plenty of stations.

I did not expect it to be as good as my quad of course, as that has more gain, and on 2m it has four active elements. So, as such, it can't compete with my quad, but nonetheless I have been amazed how well it has performed on all three bands.

Final Thoughts

Should more gain be required, then adding 'directors' in front of the driven element, and spaced at the correct positions on a longer boom should be an easy task, but this has not been attempted as I did not want a large array. I hope you find this a interesting and useful 'project' and I look forward to working you in the UK/AC events and during the sporadic 'E' season.



"I gave him an HF SDR Dongle for all the new data modes, but all he does is watch the football!"

Using Stripboard For Home Construction

Chris Osborn G3XIZ

For some reason there seems to be a reluctance on the part of many home constructors to use strip board. Many prefer the 'dead bug' method of assembly and I have heard it said that strip board is generally unsuitable for RF work.

Since I bought my first piece of 'Veroboard' back in the mid sixties I have used strip board for many projects and have built satisfactory transceivers ranging in frequency from 137 kHz to 30 MHz

I virtually always use the 0.1 inch board as this is the leg spacing of the most common ICs and is an ideal size for the smaller components. Very occasionally I will use the 0.15 inch variety if additional component separation and a heavier track is required. I have a set routine and a few tips which may be of assistance to the newcomer to strip board use.

Cutting To Size

It is invariably more convenient for the copper tracks to run parallel with the long edge of the board. Once the size has been decided upon score both sides of the board along the required hole-line using a steel rule and sharp Stanley-type knife.

Place the board on a straight edge and crack it along the score line with your hands. Remove the resulting serrated edge(s) by rubbing the the board along a piece of medium sand paper placed on a flat surface.

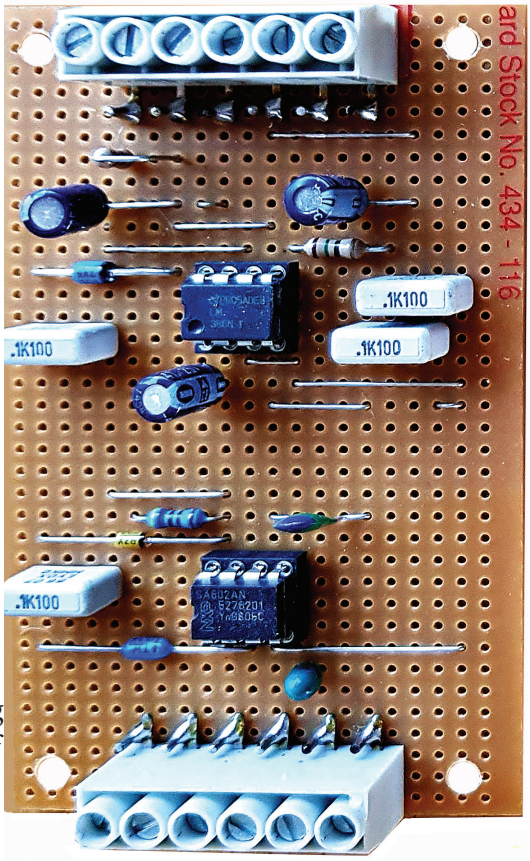
I have tried to standardise my boards to a few convenient sizes and this simplifies construction considerably. One can have a box of ready cut and drilled boards and the board's fixing holes are a useful template for chassis drilling for the stand-offs.

Fixing Holes

I always fix my strip board to the chassis or metal box using 4 stand off pillars, one at each corner and about the third hole in from each edge. If pillars are not available then long M3 screws with stand off nuts will do just fine.

The board should sit on washers with the screw part of the stand-off passing through the board. It should also be a loose fit on the stand-off pillars and if it's too tight then slightly open up the fixing holes using a small,

round needle file.M3 washers and nuts will hold the board in place; use shakeproof washers if the unit is likely to be subjected to vibration.



Earthing

I use the outermost tracks for grounding of the circuits and join 2-3 tracks with tinned copper wire at several placed along the board's length.

Initially only do this near to the fixing holes until the layout has been completed then add the other jumpers at convenient, unpopulated locations. The washers under each fixing hole ground the board via the strip board's tracking thence through the metal stand off pillars to the chassis.

Layout

This really does come with experience but keep the circuit layout as close as possible to the layout of the schematic drawing. Highlight the schematic drawing as the components and wiring are installed to keep track of progress. The aim is to have an even spread of components over the board.

Component Installation

Install IC sockets and semiconductors first, equally spaced and then insert their supply connections. Tinned copper wire of about 24 SWG is ideal for this and for other jumper connections. Initially grip the wire end whilst still on the reel and give a tug to straighten it.

The wire is then cut into convenient lengths of about 4 inches. Use small pliers to bend right angles in the TC wire so that it just drops into the appropriate holes.

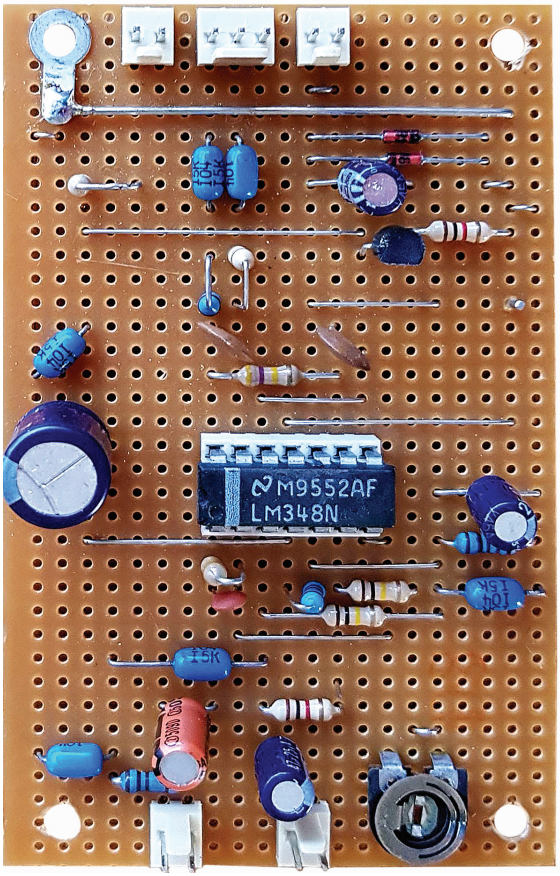
Once inserted put a slight bend on the wire (track side) to hold it in place for soldering. Other components are similarly fitted. Standardize the mounting of components such that colour codes run left-right or from top-bottom. This will simplify later inspection.

When it some to soldering I use a fine bit, temperature-controlled iron with a proper stand and a sponge, a good investment if you're likely to be building equipment regularly but I have used cheap irons without any problem. As you solder keep wiping and tinning the iron 's bit.

Caution

After soldering and when cropping a component's lead, place a forefinger over the end of the wire to be cut. This prevents it flying off into one's face or into other equipment.

Do not bend component wires too close to a component's body and stand resistors on end if necessary. Components which are likely to get warm should be stood off from the board, ideally using small porcelain or similar insulators.



Cutting Tracks

Cut the copper track as required using a proper strip board cutting tool although a small, sharp drill held in a pin vice will suffice. Cut all copper unused tracking away from components where stray capacitance may cause a problem

Board Inter Connections

In the past I have used vero pins for external connections to the board but have recently been a convert to 'header'

plugs and sockets. The header pin assemblies come in 2- (the most useful) 3, 4 . . . N - pin varieties.

Some of my boards may have up to a dozen header connectors and I find that different coloured nail varnish is ideal for matching the appropriate plugs and sockets. Header sockets are designed to be crimped onto their wires but soldering them is quicker, easier and requires no special tool.

Carefully hold the socket 'pin' by its sides in a small bench vice; tin both the pin's 'trough' and the connecting wire. Then, heating the pin's underside drop the tinned wire into place. Finally push the pin into its plastic assembly.

Final Inspection

Many problems result from tracks that are not fully cut so inspect the board's underside with a magnifying glass before even thinking of powering up. Microscopic short circuits may result between the tracks so I run a dentist's steel tooth pick along the space between tracks and finally scrub along the length of the board using a small bronze wire brush.

Check that ICs and transistors are correctly orientated and diodes, zeners and electrolytic capacitors correctly polarized. Clear the test bench of loose wire cuttings and ensure that the board is supported on an insulated surface.

Pre-Power Testing

Use an ohmmeter to measure and confirm the 'expected' and reasonable resistance between the supply rail(s) and ground. It's amazing how one can easily miss a track that needed to be cut and the resulting short circuit could prove expensive. Continuity check the connections to any IC at its socket before the IC is inserted.

Component Removal

Should an incorrect or duff component need to be removed ensure that its leads have been correctly identified on the solder-side of the board. If in doubt pass a piece of tinned copper wire through an adjacent hole on the component side and then invert the board to note the location.

Use a solder pump to remove the offending component's solder and then ease it from the board, loosely gripping it with small wire cutters.

Powering Up

This is always an exciting time so good luck!

Antennas Valves and Vintage

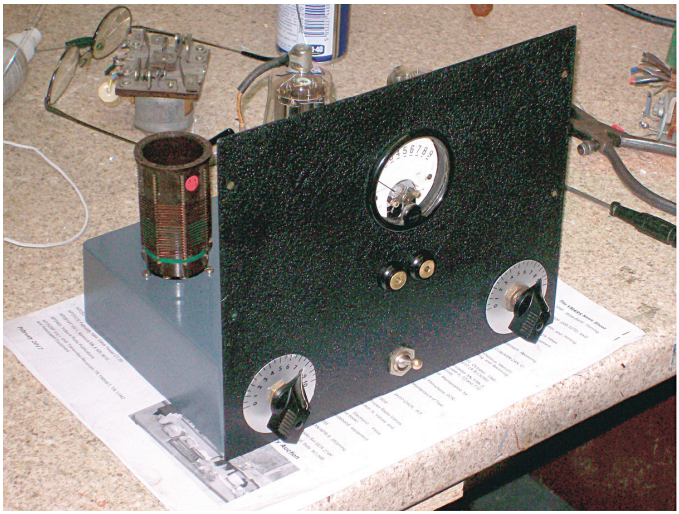
Colin Turner G3VTT
182 Station Road Rainham, Gillingham Kent ME8 7PR
g3vtt@aol.com

Welcome to the Autumn Antenna Valve and Vintage. It's been a long hot summer here in the UK with poor radio conditions and the shack too hot to be soldering during the day so it's been daybreak or dusk soldering sessions for me. A couple of strategically placed fans have allowed me to operate on the bands during the day. **Nigel G0EBQ** has been working on his receiver using the 12AL8 space charge valve and has perfected the circuitry.

He has also made a version of the G3YVF '*Skeleton*' transmitter which he will be using during the Valve QRP Weekend on November 10th and 11th 2018. Hi Colin, Having seen the simple "Skeleton" transmitter in the last Sprat I have finally succumbed to the glow of the valve. I've found Gerry at Crowthorne Valves a very useful source and he is an enthusiast as well as a business and very helpful. More importantly a good proportion of his profits go towards a local cat shelter which I know will be dear to your heart. All being well I hope to be on for the next Valve QRP Day.

I'm mainly writing to share my experiences with the 12AL8 space charge receiver from Sprat 162 which I have built to go with the transmitter and which I recommend. I couldn't find the valve in the UK but got it from Tube Depot in Memphis whose service is excellent. I found the regeneration very touchy to control. The oscillation was fine with a 60pF trimmer for the antenna coupling until I connected an antenna when it stopped working.

I took a 560pF randomly selected from the junk box and connected that between the trimmer and antenna and it now works fine-so experimentation is needed here. (Obviously the antenna coupling via the 60pF trimmer damped the tuned circuit preventing oscillation and putting a 560pF in series reduced the value even further. Always lightly load your antenna with a single tuned circuit receiver. Sometimes just a few inches of wire would suffice as a suitable antenna. G3VTT).



Again the tuned circuit also took a lot of experimentation but I ended up with 45 turns of 27gauge wire tapped at 11 turns on a T68/2 toroid with 100pF and a 60pF trimmer in parallel for 80m and I've added a small variable capacitor to tune around the QRP frequencies. The receiver is loud enough and doesn't need a volume control. I'm using an old SG Brown CLR headset of about 120ohm. It is strongly recommended that 12volts is the absolute max with these valves otherwise their life can be considerably shortened. I hope these notes are useful to others.

Nigel wrote to me again and suggested that using a larger total capacity, say 180pF, and reducing the coil turns to 41 with a tap at 9 turns will improve the L/C ratio. Incidentally the circuit in Sprat 162 is wrong and there should be a 22K resistor between the anode of the detector stage and the regeneration slider control which will boost the audio output. I've also been informed and mentioned last time in AVV that Gerry Horrox of Crowthorne Valves has changed his website to 'Crowthornetubes.co.uk' so please take a look at this useful site. If you have a Codar CR45 TRF receiver and want to make your own coils or even try the receiver yourself from scratch the coils have been reverse engineered by G3YVF. The original Codar circuit is available on line at:
http://vintageradio.me.uk/military/cr45_info.htm

The website provides the receiver layout and a suitable power supply.

More details of the replacement Denco coils are shown on the next page

The Codar CR45 front panel.

Image courtesy of the vintage radio site

For one heart stopping moment. I was informed we were making valves again in the UK! Chris G3XIZ informed me that the old Brimar manufacturing company were making valves again. Investigation proved they were supplying audio valves such as the EL84 which I believe were imported and branded Brimar but a number of engineers had got together to start the production machinery rolling again. Take a look at: **https://brimaruk.com/menugbvp/great-british-valve-project/**

They are requesting any engineers with the correct skills contact them to help the project get started. I remember a similar call many years ago to get the Bletchley Park deciphering machines working again.

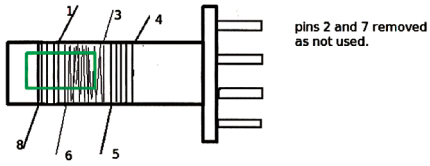
The G3ORP Optimised 160 and 80m Trapped Vertical.

Peter G3ORP has sent me details of a trapped semi vertical he has optimised to give good results on the 160m and 80m bands. The SGC tuner reduces the SWR further on these bands and permits operation on HF as well as LF. I fancy the trap will choke HF and the tuner will match the 44 foot lower section on 40 to 10 metres.

Finally, you should receive Sprat in time for the GQRP Valve Days over the weekend of November 10th and 11th 2018. Just be active using your homebrew or commercial valve or tube equipment on the QRP frequencies to bring back a taste of the good old days. Call 'CQ VQRP' for contacts and don't forget to tune either side of your frequency to hear those who may be crystal controlled. This is your chance to make something simple and get on the air. Most of the participants operate CW but any mode can take part. Just how far can you work with a few watts of AM on LF from your location? Remember this activity period supports all that GQRP is about, building rigs and operating with low power. See you there and have a good Autumn.

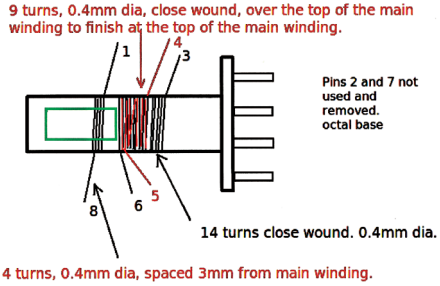
green denco TRf coil, range 3 approx 1.7 to 5MHz.

Wind all coils in the same direction. No gap between the coils. Middle coil scramble wound, outer coils slose wound.



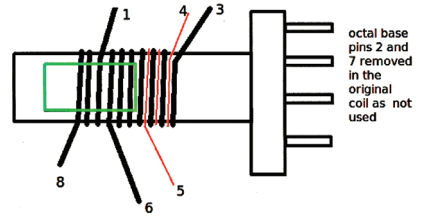
Ten turns on the outer coils and 37 turns on the middle coil. When correct tuning range established a light doping of varnish applied.

green Denco trf coil range 4, 4 to 9MHz approx

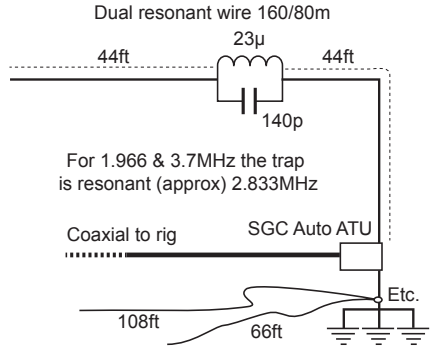


green Denco TRF coil. range 5 approx 10 to 30 MHz.

Winding direction is critical to correct operation. Black windings approx 1mm thick wire, spaced one wire diameter. Red wire wound between winding as shown, diameter of wire to fit between turns.



Slug shown in green. Light doping of varnish when completed.



MEMBERS' NEWS

by Chris Page, G4BUE

E-mail: chris@g4bue.com

We start this issue with a suggestion from **G3OOU**. He writes, "Could the G-QRP Club bring together members with highly specialised skills as a resource to other members without them being overloaded? For example, I have a fairly good test equipment set-up and mentor a number of enthusiasts on the Internet but could use the services of someone who knows a PCB layout package very well, while I get on with a miriad of other design issues". What do you think of Bob's suggestion? Please let me know your thoughts and if there is sufficient interest, I will put something together for the Committee to consider. I would imagine if the Committee like the idea, they will ask for a volunteer to co-ordinate it, so can I ask in advance if anyone is willing to do that?

VE3IPS reports after the Ontario VE3 SOTA activation list was finally approved by the SOTA founders, he went out to activate the first VE3 SOTA summit on VE3/SO-101. John said, "I had a fun day out in the freezing cold activating this summit that is a ski resort and was closed, but I was able to summit to the peak to activate it. I was on 40m SSB with 11 HF contacts and one on 2m simplex, before trying to seek shelter and warmth as it was windy and very cold, -2° but colder with the wind chill. I used the FT-891 mobile HF radio, a Bioenno 1209 battery, and a PackTenna linked dipole. I used the FT-817 for band spotting and to make a 2m simplex contact at 5W with a $^{5}/_{8}$ whip. I am also looking at a 20m vertical and a linked dipole set up to take advantage of local 40m daytime contacts, and a better scenario for 20m, and am thinking a simple coax switch to do an A/B would do the trick. I am also experimenting with various military antenna designs and purchased the RSGB's *Antenna Topics*. I also acquired a Ft Tutthil 80m QRP TCVR and a CW only military man pack radio".

Some thoughts on the uBITX from **G4DMH** who says it is excellent value and has the four 'Ss': Stability - thanks to the Si5351a frequency generator; Selectivity - thanks to the **G3UUR** style eight pole crystal ladder filter; Strong signal handling - thanks to the balanced diode mixers, no DG mosfets or NE612 here, and lastly Sensitivity - thanks to the double conversion architecture and distributed gain. However, says Malcolm, the uBITX lacks any form of AGC, some can do without it, but not him. He says there are various ideas at <http://ubitx.net> along with loads of other modifications and ideas. Malcolm writes, "The RF/IF amplifiers do not seem to lend themselves to gain control, so audio AGC has been tried. I am experimenting with both a Plessey SL6270 circuit that I had success with in a DC receiver many years ago and a MAX9814 module, intended as an electret microphone pre-amp. Both are designed for very much smaller input levels than those found in the uBITX, so it is easy to overload them. I also like an S meter and found a Howes DCS2 module in an old DC project. The major modification I've made is a 3.5 inch colour touchscreen display using an Arduino Mega2560 rather than the Arduino Nano. This is the work of **VU2SPF** and **VE1BWV** and uses the Adafruit Si5351a module. One addition planned is a switched LPF for 160m. The receiver is general coverage, but the on-board TX LPFs only cover 80m - 10m. I am making a PCB case for the uBITX, approx 8 x 4 x 9 inches".

GØFTD went on a /P holiday in the July to the Isles of Scilly and says it was very hard going during the daytime with poor propagation despite some great summer weather. Andy is now looking forward to the winter when propagation should be better. He took his FT-817 and a 23 feet fishing pole and used exclusively CW (he didn't even pack a microphone!). He worked the following stations on 40m: **MØUKR** and **MØVAL**; on 30m: **IRØUN**, **LB8IG/P** (Firkinstad); on 20m: **F2QJ**, **OH73ELK**, **CU5/CU3AK/P**; and on 15m: **KA2HTV**, **DL2UKW**. One thing he learnt was never forget to bring a pair of headphones! Andy writes, "I was perched under the flight path of the airport on St Marys, and every ten minutes I had to endure the racket caused by those little Otter propeller planes! Never enough audio from the poor FT-817 speaker in such circumstances, so I made sure I only did rubber stamp QSOs to avoid conversations getting mangled. This year I found a great little spot to operate from, nice and quiet away from everyone. A piece of drift wood was used to mount my fishing pole and I gathered a few rocks to provide support for it and then used electrician tape to attach the pole to the drift wood. There was an old wooden pallet left on the beach too, so I used that to form a sitting down base".

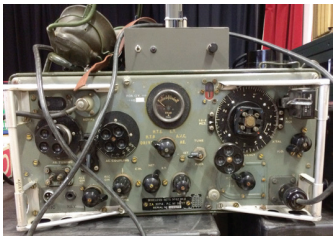
Between 10 April and 18 July **GM4CXP** worked 17 DXCC on 6m QRP CW (the best being EA8) plus some on SSB, with 5W from a new FT-818ND and a SQBM1000P tri-band vertical. Del is now registered blind with very little sight, meaning his homebrew days are over. He says he even keeps burning his nose when simply soldering on a PL259! He is also QRV on VHF/UHF QRP on 2m and 70cms and has a 2m/70cms horizontal duo-band yagi as well as the tri-band vertical. He has been dabbling with FT8 QRP for the first time and worked three OZs on 2m tropo, plus **GI6ATZ** on 70cms. Del says CW is still his first love and he will only use FT8 when even CW cannot get out. **MØLVR** was QRV as **F/MØLVR** for few days near the end of July in JN06uf with 2.5-5W on his FT-817ND using a length of wire strung between a couple of trees in his uncle and aunt's farmhouse yard!

G3OTK entered five of the six RSGB CW Club Contests earlier this year using his home-made 3W TCVR with a low dipole (ten feet high) put up for the contest, and averaged about 60 contacts during each 90 minute session. Using the same TCVR, Richard entered the RSGB Low Power contest in July and managed fifth place in the 3W fixed location section. He says that for many of these contests, he is the only entrant using home-made equipment and is hopeful he might see a QCX or two among the rigs in the future. Congratulations to **RX3G** and **R1LB** who completed a QSO on 14060kHz over a distance of 600 miles with each using 80mW (*thanks **G8FRA/M5FRA***).

G4EDX bought a Hands GQ40 transceiver in a SK sale that he says is built and looks complete with what appears to be an LC audio filter added, but there is no documentation with it. John asks if members have a copy of the instruction manual for this 40m version, or any other band, they could let him have, costs covered of course. He found the article in *SPRAT* 83 but there is no mention of how to set the driver and PA bias currents. **ON4BCA** has been QRT for 25 years when he was QRV from Germany as **DA1JZ**, but is now QRV again from Belgium. Since being back he has noticed two things haven't changed: the amount of poor cw sending and the amount of 'rubber stamp' QSOs. What has changed is

that Patrick now has to order most things to do with amateur radio, including components, from abroad, whereas it was all available within Germany. He says /P activity has boomed since his DL days (eg SOTA). He will now be QRV with an Aerial 51 Sky SDR and an Alberto Frattini bug. Due to his local situation, the antenna will be a magnetic loop.

G4FBC was lucky to find some more military radios to join his collection. Restoration work has been carried out to bring two VHF manpack sets to full working order. The picture far right is of the fully restored Italian forces ER 95-A/1 which covers 26Mhz to 71.95Mhz in FM mode, so it is good for the 10, 6, and 4m bands. Ron says these sets have modular plug-in units, which greatly help with servicing and repairs. The biggest job was to fabricate two new battery packs to replace the long decayed ones (picured above). Transmit and receive tests were satisfactory, with 1.75W into a 50 ohms load. Ron's other 'find' was a fully working Clansman PRC344 UHF manpack, used for ground-to-air communications (pictured right). Although not covering any amateur band he says it is still an interesting addition to his collection. Finally, a trip to the Durham district radio rally featured lots of military and well constructed homebrew pieces on offer, and Ron gave into temptation with the Wireless Set No 62 Mk II pictured below, and his pockets were emptied! He says it has been a very good year for him with hopefully more to come.

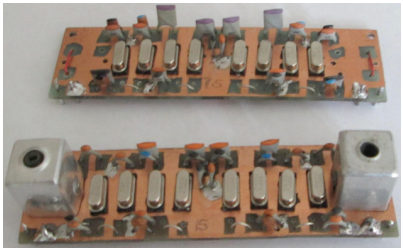


In June **GØXAR** managed to, "Regain my workshop in the garden. It was on loan to a family member for a while. I'm planning to move all of my electronics activities there, so the lab will share it with the station. I came across this paper from the RSGB which gives advice about earthing: <http://rsgb.org/main/files/2012/11/UK-Earthing-Systems-And-RF-Earthing_Rev1..3a-.pdf>. I'm probably going to follow its advice and not install a separate earth for radio use. My one concern is the amount of noise that might be present on my domestic supply. So the question is it worth having a separate earth for radio use? As my equipment runs of 12V or batteries, I can easily isolate it from the mains earth without danger".

When **G7VFY** goes to radio rallies, he often sees small collections of matchbox size WW2 crystals but they are rarely on a useful frequency, and wonders if anyone has tried hollowing one out and putting a pair of smaller crystals inside and adding a trimmer? Stephen says the circuit is not the problem but hollowing out the old crystal is, and on his first attempt the bakelite started to crumble and disintegrate. He asked on the G-QRP Forum in July if there is a technique for working on bakelite; does he need a slow drill, like a dentists' drill or something very fast? **G3OOU** suggested a sharp high-speed routing bit might be better, but says bakelite is very brittle and so you need to remove very small amounts at a time. Also, be careful using modern

sub-miniature crystals in old WW2 valve circuits as their maximum power dissipation is very small compared to FT243, 10XJ and older crystal types where the piece of quartz was very much larger. **G4GZG** replied, "I've done this with one of the older 10X bakelite crystal cases. I replaced the case top with aluminium plate and mounted the crystal and small trimmer on this. This saved cutting the brittle plastic". Finally **W1REX** wrote, "I like to play with FT243 crystals too, but I took a different approach. I first started to find 243s just *below* the band of choice and then took them apart and reground the crystal *up* into the band. A little tedious in the 'grind-reassemble-test-disassemble-do it all over again' loop, but it works pretty good. **WA3OPY** and **AC5UR**, who worked for International Crystal Manufacturing in Oklahoma City, introduced me into the fine art of grinding crystals and we did a workshop together at Ozarkcon many years ago where we took FT-243 crystals at 6970kHz (or so) and reground them up to 7030kHz. We had about 30 QRPers in the work shop and just about everyone was successful in walking out with a FT-243 crystal on 7030kHz". Stuff for playing with crystals is available on Tex's QRPme website.

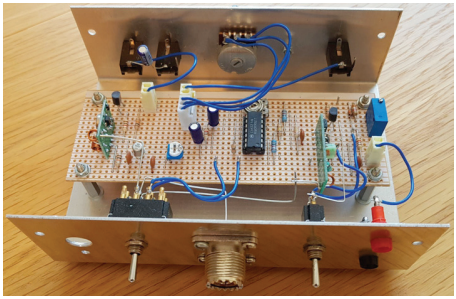
Eagle eyed readers will have noticed pages 38 and 39 of *Members' News* in the hard copy of *SPRAT* 175 were round the wrong way, due to a layout error with the *SPRAT* artwork. I hope you were able to work that out and the error didn't spoil your reading of the column. A correction to *SPRAT 175* is **GM4CXP** has a brand new FT-818 and two old FT-817s (not FT-818s). He uses the FT-818 as a base station rig, one of the 817s to monitor whatever else takes his fancy at the time, and the other 817 lives in his rucksack for /A work. Del uses either a Moonraker whizz whip or a whizz loop for /A and has QSO'd I and YU on 20m CW, and SP on 10m, from Kelso Gold Club using the whizz whip. He says, "It is very hard under the present conditions to work anyone on these antennas, but it sure is fun!". His home antennas consist of an 80/40m inverted vee plus Elecraft T1 auto-ATU 80-10m with near 1:1 on all bands, and separate dipoles for 60, 20, 12 and 10m.



G3OOU has just finished developing and constructing two x eight section 37.5MHz roofing filters with 2:1 6/60dB shape factors (pictured right) for a new rig and is currently investigating how to bend aluminium covers with curved corners for the rig. Bob will try to do his own metalwork and finishing with fairly limited facilities, although he says mechanical engineering is not one of his better skills or favourite occupations. Some while ago he developed the latest version of the H-Mode mixer by **PA3AKE** into a stand-alone module. There are seven SMT ICs on the underside (solder side), although they are not very clear in the photograph (bottom right), but the component side is much clearer (top right). He says, "The performance is amazing in terms of signal handling, I can just see distortion commencing at 2V peak-peak input signal level on the HF bands. The ICs are less than 50p each but the wideband transformers are quite expensive at £7 each. I also treated myself to a Seig Micro lathe which I thought would get used just now and then, but in fact it is incredibly useful for both metal and wood turning and is in regular use".

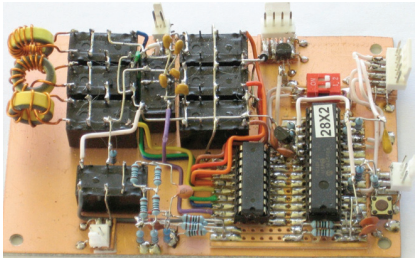
Welcome to new member **G6PNM** who was licensed in 1982 but has been QRT for the last 15 years. Mark's interest has always been QRP, in fact he has never logged more than 5W! He is slowly returning to the hobby, having dusted off his soldering technique with a little Pixie kit, and is awaiting delivery of a QRP Labs QCX TCVR for 17m with the aim of

making all his own gear. **G1HSM** used the 2N5109 many years ago for broadband HF RX pre-amps with diode DBMs. Motorola isn't making them any more and Leon says they are now made by Central Semiconductor Corp and are availaible from Digi-Key for £2.41 each. He says, "It's a very nice device - TO5, low noise and good IP. I've still got my PCB design for a home-made board. Digi-Key a SPICE model which I've downloaded. I might simulate the circuit I used - I think it came from an ARRL publication".



G3XIZ finished building his 40m CW transmitter and incorporated a simple home made SDR in the same box, so now it is a stand-alone TX/RX. His target of 100 QSOs with it was easily achieved and he has now moved on to one or two new and smaller projects. Chris has been 'playing' with the tiny QRPP 433MHz TX and RX PCBs which sell on *e-bay* for literally 50p per unit. They are of the type used in car key fobs, door bells, etc and he mounted one of each board on a small chassis to make the 433MHz QRPP TX/RX pictured above. The receiver is a super-regenerative type and he says it is only really useful for local and strong signals. However, by using the small TX boards with separate SDR receivers, he achieved a two-way CW QSO with **G4FGJ** in the neighbouring village, a distance of 2.25 miles. Chris writes, "Our signals on 433 MHz were quite strong and perfectly readable although somewhat 'chirpy', and as the TX output power is in the order of 20-50mW, it's real QRP! I've subsequently copied and been copied by **MØFMT** at 6.25 miles but have yet to have a full QSO. I'm toying with the idea of using these modules to remotely operate my /A shack's equipment, which is only 0.6 mile distant, and if I'm successful there may the potential for a *Sprat* article".

G3OTK couldn't resist buying a QRP Labs 20m QCX TCVR kit and says it went together easily and worked first time. Richard chose the 20m version because he doesn't have a permanent outdoor antenna and often just uses 26 feet of wire hung up in the shack. Random length antennas usually require an ATU and so he built the auto-ATU for the QCX pictured right. To avoid stressing the PA, a 50 ohm bridge is switched into circuit whilst it is tuning, and so the PA never sees an SWR worse that 2:1. The ATU uses a PICAXE micro-processor programmed to find the best balance of the bridge. Once again the intrepid duo of **GM3WIL** and **GM4VKI** took the G-QRP stall to the Glasgow Rally. Roy says, "31 members signed in at a busy and well filled event. We managed to prise six new CW transceivers out of Hans which flew out the door as soon as we arrived. General stock was well sort after and a great day was had by all our members. Next rally will be Crianlarich at the beginning of August".



Thanks to the contributors to this column. Please let me know how your autumn goes for the Winter 2018 edition of *SPRAT*; what you have been building, who you have been working, and any other information about QRP, by 10 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 home during the winter and spring months, especially during the Winter Sports, so I can let members know to listen out for you.

GQRP Club Sales

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

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

6 pole 9MHz SSB crystal filter (2.2kHz) £12 plus post (max of one) } £3.50 (UK); or
Polyvaricon capacitors – 2 gang (A = 8 to 140pF + O = 6 to 60pF) c/w shaft extension & mtg screws - **£1.75 each** } £3.80p (EU); or
– 2 gang – (both 8 to 285pF) c/w shaft extension & mounting screws - **£1.75 each** } £4.50p (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, 24.096 & 28.060 all are **£2 each** } (ANY quantity)
HC49U crystals- 1.8432, 3.5, 5.262, 7.0, 10.006, 10.111, 11.5, 14.0, 22.0, 29.0MHz – **50p each** } £1.20p (UK), or
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 } £3.50p (EU)
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 } £4.00 (DX)
26.0, 27.0, 28.0, 28.224, 30.0, 32.0, 33, 40, 48MHz – **all 35p each** (Some of these are low profile) } Post free
Ceramic resonators – 455, 480kHz, 2.0, 3.58, 3.68, 4.00, 7.37, 14.32 & 20.00MHz **– 50p ea.** } if ordered with
Diodes - Shottky signal diode – 1N5711- 20p each; 1N4148 GP Si – 10 for 10p } with heavier
Varicap diodes - MVAM109 – 40pF @ 9v, 500pF @ 1v. **50p each** } things
- BB204 – twin diodes, common cathode, 15pF @ 20v, 50pF @ 1v **50p** } like binders,
SA602AN - £1.50 (note – I may supply NE or SA, 602 or 612 as available. **SA612AD – SMD SOIC-8 £1.40** } toroids
MC1350 - £2.00 These are getting in short supply now so max of 2 per member } polyvaricons
LM386N-1 - 4 to 15v, 300mW, 8pin **DIL - £0.45, LM386M-1 SMD – 35p** } or filters
TDA7052A - 4.5 to 18v, 1W 8pin **DIL** low noise & DC volume control – **£0.60 each** } Use just
TDA2003 - 10w Audio amp 5pin – **£0.25 each** } that postage
TDA2822 - 1.8 to 15v stereo amp – can be bridged. 0.5WAudio amp 8pin DIL – **£0.20 each** } that postage
TA-7642 Radio IC – direct equivalent of **MK484** (& ZN414) – **75p each** }
2SC536 transistors (npn) fT - 100MHz, hFE-320, VCBO +40V **- 5 for 50p** } If ordered
MPSH10 transistors (npn) fT - 650MHz, hFE 60, VCEO 25V **- 10p each, 10 for 80p** } with books
2N3904 transistors (npn) fT - 300MHz, hFE-150, VCBO +40V **- 10 for 50p** } or DVDs
2N3906 transistors (pnp) fT - 250MHz, hFE-150, VCBO -40V **- 10 for 50p** } add this
BC517 Darlington (npn) fT - 200MHz, hFE-30,000, VCBO +40V **- 13p each, 10 for £1.10** } postage
FETs - IRF510 – 50p; 2N3819 - 24p; 2N7000 - 10p; BS170 – 8p - all each } as books
BF981 – dual gate MOSFET – 40p each } or DVDs
Pad cutter - 2mm shaft: 7mm o/s, 5mm i/s diam, gives a 5mm pad with 1mm gap **£6.00** } do not
10K 10mm coils – 0.6uH, 1u2H, 1u7L, 2u6L, 5u3L, 11u0L, 45u0L, 90u0L, 125uL – all 80p each } travel well
Magnet Wire – 18SWG – 2 metres – 60p; 20 & 22 SWG – 3 metres - 60p; } with parts.
24, 25 & 27SWG – 4 metres - 40p; 30, 33 & 35SWG – 5 metres - 30p. }
Bifilar wire – 2 strands - red & green bonded together. Solderable enamel. }
21SWG (0.8mm dia) – 2metres - £1; 26SWG (0.45mm dia) – 3metres – 70p }
Litz wire – double silk covered multi-strand wire 7/.04mm -12p, 14/.04mm. 25p. Both for 3 metres. }
All our wire is solderable enamel insulated. Max of 3 sizes per member per order }
QRP heatsinks - TO92 – 30p; TO39/TO5 – 40p; TO18/TO72 – 60p (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 – max of 2 packs of each per member

T25-2 – 50p, T25-6 – 60p, T30-2 – 70p; T30-6 – 80p ; T37-2 – 80p; T37-6 – 80p; T50-1 - £1.00; T50-2 – 90p; } Postage for
T50-6 – £1.10; T50-7 - £1.20; T50-10 - £1.20 ; T68-2 - £1.80 ; T68-6 - £2.40; T130-6** - £2.40ea. FT37-43 – 90p } toroids includes
FT50-43 - £1.20 ; FT37-61 - £1.20 ; FT50-61 - £2.40; Ferrite beads – FB43-101 (3.5mm dia x 3.2mm long, } postage for all
1.2mm dia hole) – 40p for 5: BN43-2402 - £1.20; BN43-202 - £2.00; BN43-302 - £2.00; BN61-202 - £2.40. } 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 (ask for quote if you want more than 2 of the large toroids)
MeSquares & MePads * - £6.50 each plus post (UK & EU as parts for up to 4) : will DX please order direct from Rex)
STIX board * – 3" x 1", 80 x 0.15 square pads plus 2 x SOIC pads. £3.75 each. Will post with parts for no extra postage.
QRPme Brass sets * – PCB feet to lift the board off the table - £10 plus post as for components - DX 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 - £5.40, DX - £8.00

Sprat-on-DVD – 1 to 172. Only £5 each to members plus postage, UK - £1, EU - £3, DX - £4.00

Sprat Binders – nylon string type – Black with club logo on spine -16 issues per binder – **new stock** - £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 numbers you will need to do that are - 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 charge us about 4% so a contribution towards that is always welcome, or, send as a gift to friends/family - thanks