SPRAT

THE JOURNAL OF THE G QRP CLUB

DEVOTED TO LOW POWER COMMUNICATION

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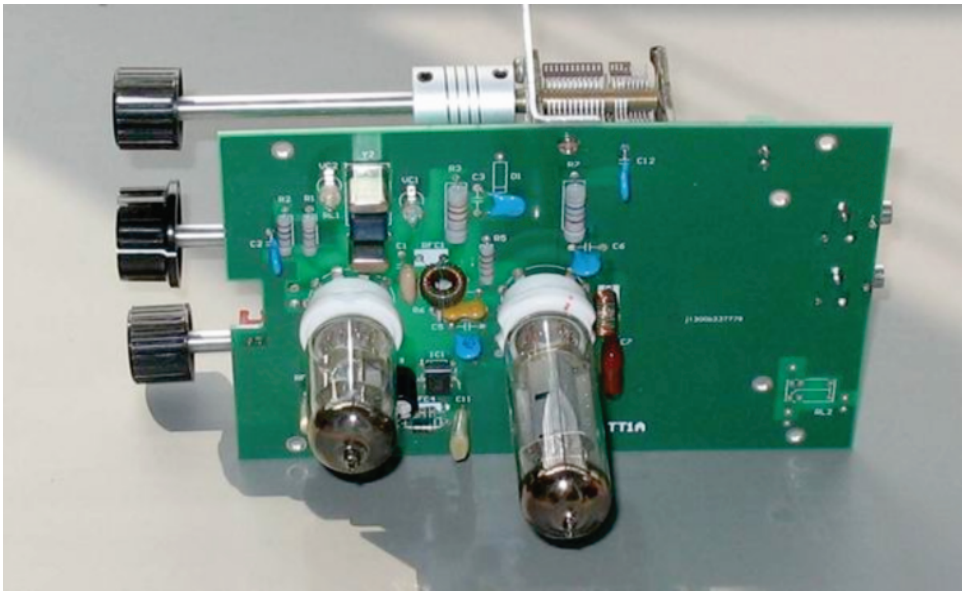

Youkits TT1A 2 Band CW Transmitter Kit,

Output: 4W on 7030 and 14060. Stockist Borden Radio, Houston Texas.
Also appeared recently on eBay for $129 (and $260!)
Have members experience of the “Chinese Kits”? – Let us know

Rishworth Convention~ 5 watt Linear Amp~ Real SDR Tuning Knob
Xtal Sockets~Club Awards~ PCB Layout~ 40m Add-on Linear~ Old Ball Mouse~
Tin Can 2~ Club Info~ Standing Order Form~ Antennas, Valves and Vintage
Communications and Contests~ Members News

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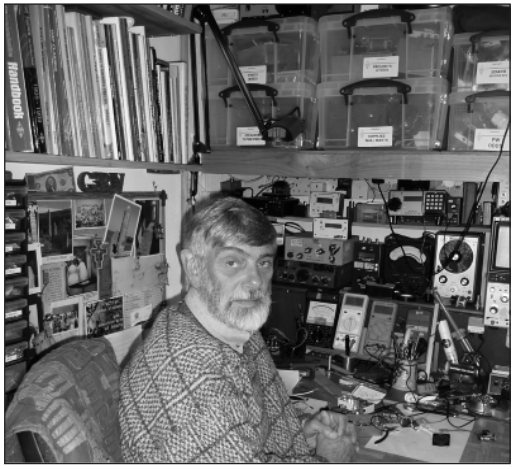

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Rev. George Dobbs G3RJV

The W1FB Memorial Award (for your favourite weekend project) is awarded to Peter Howard, G4UMB for his "signal injector and tracer"; a very simple but very useful item of test equipment (SPRAT 163). Peter is a very regular contributor to SPRAT and many of his past contributions could have taken the award.

Paul Darlington m0xpd has recently submitted articles to SPRAT introducing microcontroller-based QRP systems. As Paul suggests, "a technology that can offer economy of means allied with richness of result." For this fine introduction to digital techniques, he receives the Gordon Bennet Trophy (for SPRAT contributions). Even I have been encouraged to look over the parapet.

72/3

G3RJV

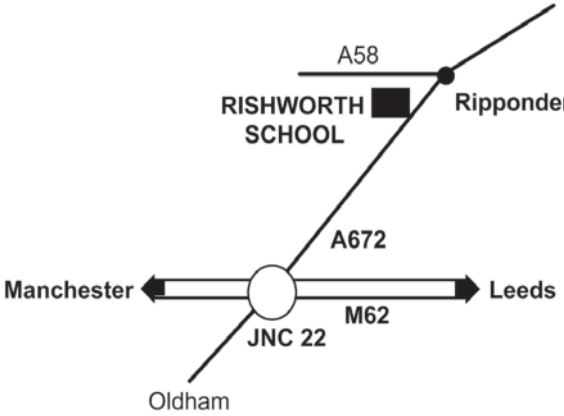
The two awards mentioned here illustrate the richness of members' contributions to SPRAT. SPRAT has been called "the backbone of the club" but for a while it has been "running on empty". Your contribution, however simple, will be welcome. I do have some material waiting for use. Please supply circuit diagram(s), full component values and brief notes. A SPRAT formatted page (MS Word) can be supplied on request but any format including hand written may be used.

Printed & Distributed by G QRP Postal Mailing

THE G QRP CLUB
MINI-CONVENTION

(in conjunction with the Halifax Radio Society)

Saturday 24th October 2015
The Rishworth School, Ripponden



OPENS AT 10.00am
ADMISSION £3.50
DOORS OPEN 10am
LARGE SOCIAL AREA
LECTURES ON
QRP SUBJECTS
BRING & BUY - SURPLUS
JUNK - COMPONENTS
KIT TRADERS
FOOD & DRINK ALL DAY

WITH THE FAMOUS PIE AND PEAS

The Rishworth School is on the A672 (Ripponden) road from Junction 22 on the M62. [Postcode: HX6 4QA]

Look for the G QRP Sign on the left after you have passed all the sheep!

CONSTRUCTORS EVENING (Friday Evening before the convention) Including a Buildathon to be held at the Premier Inn, Salterhebble Hill, Halifax, HX3 0QT. (Tel: 0871 527 8486) ww.premierinn.com/en/hotel/HALPTI/halifax-south

Our suggestions for local accommodation:
The Premier Inn, Milnrow. Junc 21 on the M62 (Tel: 0871 527 8936) www.premierinn.com/en/hotel/ROCTHE/rochdale
The Malthouse, Rishworth. Almost next door to the school – only 5 rooms (Tel: 01422 822382) www.malthouserishworth.co.uk
The Turnpike Inn, Rishworth, excellent but quite expensive. (01422 822789) www.turnpikeinn.com

Radio Constructor's Evening

Friday 23rd October from 7.30pm

(The evening before the Rishworth Convention)

Premier Inn, Salterhebble Hill, Huddersfield Road, Halifax, West Yorkshire HX3 0QT.

We will also have a social gathering in the same room on the Saturday evening for those who are still at the hotel – to talk radio and QRP

Buildathon
Want to build something but lack experience?
Join our Buildathon on Friday evening.
Our theme this year we are hoping, will be a simple regen receiver. This has still to be finalised, as is the cost, but it will be inexpensive. Bring your own tools if you can.
Book your place with G3RJV or G3MFJ as below.

- **Show and Tell**
  Bring along your favourite QRP projects – show them off and tell us about them. Swap ideas.

- **The Buffet Supper.** There will be a buffet supper on Friday evening as last year. We will make a modest charge for this. On the Saturday, we suggest that those still present eat at the on-site restaurant and there will be free tea and coffee in the meeting room

If you are interested in being part of the Constructor's Evening let George, G3RJV, **(g3rjv@gqrp.co.uk)** or Graham, G3MFJ, **(g3mfj@gqrp.com)** know (postal addresses are also in SPRAT).

Please note the club has booked every room in the hotel above. There may be limited spare rooms. Please contact Graham, G3MFJ (not the hotel) to check availability.

A 5 Watt Linear Amplifier

By Mike Small G4DVI GQRP Club #302

I needed a QRP linear amplifier for my latest project – a 14MHz SSB transceiver. I decided to base this on the IRF510 power MOSFETs available from the GQRP club. This article outlines what I built and the results that I obtained.

The driver stage in my transceiver produces around 100mW and, using power transistors designed for RF work, it is reasonably easy to obtain 20dB of gain from a single stage. However, getting this amount of gain is more difficult using the IRF510, which was originally intended for power switching at low frequencies. Researching the radio amateur literature on the internet I found a number for existing designs using these devices. Many of these designs were intended as add-ons to existing rigs and so only provided around 10dB of gain and required an input of between 1 and 5 watts. In addition most of the designs were for frequencies up to 7MHz – which is less demanding than 14MHz.

In the end I decided to base my project on the article by Mike Kossor, WA2EBY entitled "A Broadband HF Amplifier Using Low-Cost Power MOSFETs". This appeared in QST March and April 1999 editions. This article describes an amplifier using two IRF510 in push pull with around 50 watts output when run on a 28 Volt supply. I liked the design for a number of reasons: Firstly, I prefer a push pull design because it produces a cleaner output signal, even harmonics are much reduced and this simplifies filtering. Secondly the design provided good performance up to 28MHz with reasonable gain and efficiency. Finally the design is broadband and so would work on other bands.

One of the reasons why it is hard to get these devices to work efficiently at higher frequencies is the high input capacitance (around 180pF according to the datasheet). Many designs try to overcome this with an input step down transformer to use brute force. This is not my idea of QRP! Another approach is to use an input "L" network which uses inductance to tune out the input capacitance at a specific frequency. The WA2EBY design uses inductors (L1) whose value is based on many hours of experimentation to improve the input matching across the whole of the HF spectrum.
The input to the amplifier uses an input balun consisting of 6 turns of 27SWG bifilar wound on a club T37-43 toroid. This is fed from my preamplifier which uses a 2N3866 transistor to provide around 4 Volts peak input in 50 ohms. The balun

matches this to 25 ohms per MOSFET. The matching inductors L1 are made by winding 9 ½ turns of 24SWG wire around a 6mm (1/4 inch) drill. The 27 ohm resistor matches the input at low frequencies and reduces the 'Q' of L1 at 14MHz.

My "downsized" version runs off a 13.8 volt power supply to produce around 5 watts output. This means changing the output matching circuitry from the original design. Using the formula:

Rd = SQRT(2*Vp*P)
where P is the required power
Vp is the peak voltage at the drain
Rd is the load resistance at the drain

For 5 watts output and 11.2 volts peak drain voltage gives Rd = 12.5 ohms. This impedance needs to be matched to the nominal 50 ohms presented by the antenna and so requires a 4 to 1 step up in impedance. This can be done in various ways including a tuned circuit or a transformer. I have found that the most reliable way is to use two choke baluns – which has the added advantage of being wide band. Each balun isolates the output from the input at RF. The input to two baluns is connected in parallel and the two outputs are connected in series thus doubling the input voltage at the output. (This technique is described in application note AN479 from Motorola). Power is supplied to the drains of the two MOSFETS through a choke comprising 6 turns bi-filar wound on a club T50-43 toroid. The baluns are connected to the drains through 100nF ceramic capacitors. These capacitors must be able to carry the current without a high loss – I used a monolithic type see the parts list for details.

I made these baluns by winding 4 turns of RG158 coax through club T50-43 toroids. At the MOSFET end the two pieces of coax are connected in parallel and the outputs are connected in series. Calculations confirmed that these toroids are large enough to handle up to 10 watts SSB or CW when used this way. With 4 turns the inductive reactance is sufficient for use from 3.5 MHz upwards. However, it is not sufficient for 1.8MHz. As it is not practical to add more turns, if you wanted to use this design for 1.8MHz you would need to use a larger core and more turns.

The output signal is filtered to remove the unwanted harmonics by the filter described in the WA2EBY article. This is a 5 pole Chebyshev design and is suitable for both 14 and 18MHz with an Fc of approximately 20MHz. This is adequate because of the low level of the second harmonic that is a characteristic of the push pull approach.

The two inductors in this are made by winding 13 ½ turns of 27SWG wire on club T37-6 toroids. I used polystyrene capacitors for the filter.

One of the benefits of power MOSFETS over transistors is the simplicity of the biasing circuitry. The temperature compensation required by power transistors is not necessary. All that is required is a stabilized fixed voltage and a potentiometer. I already had a stabilized 6 volt supply that was active on transmit – so I used this as the bias supply.

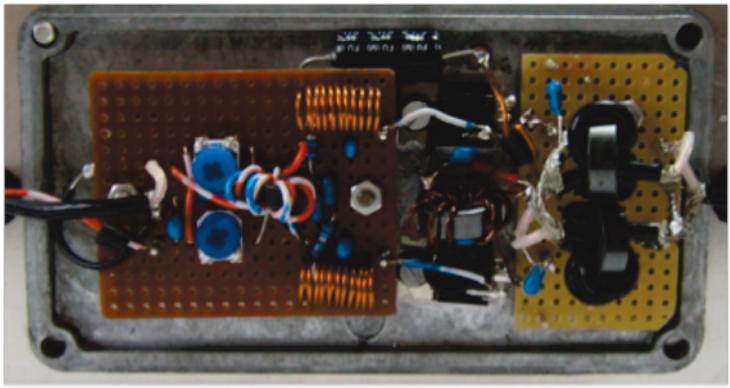
As an alternative you could use a low power 5 volt regulator IC such as the 78L05 to derive the bias supply from the 13.8 volt supply. This is connected to each gate though an individual 5K preset potentiometer. Adjust each MOSFET to have a standing current of between 10mA and 100mA. I set mine at 40mA per MOSFET.

Another consideration, discussed in great detail in the article by WA2EBY, is the heatsink required. When driven to 5 watts output my amplifier took just under 1amp from a 13.8 volt supply. This is around 14 watts input of which 5 watts goes into the load. So the MOSFETS dissipate 9 watts or 4.5 watts each. To avoid destroying the devices it is essential that they are attached to a heatsink.

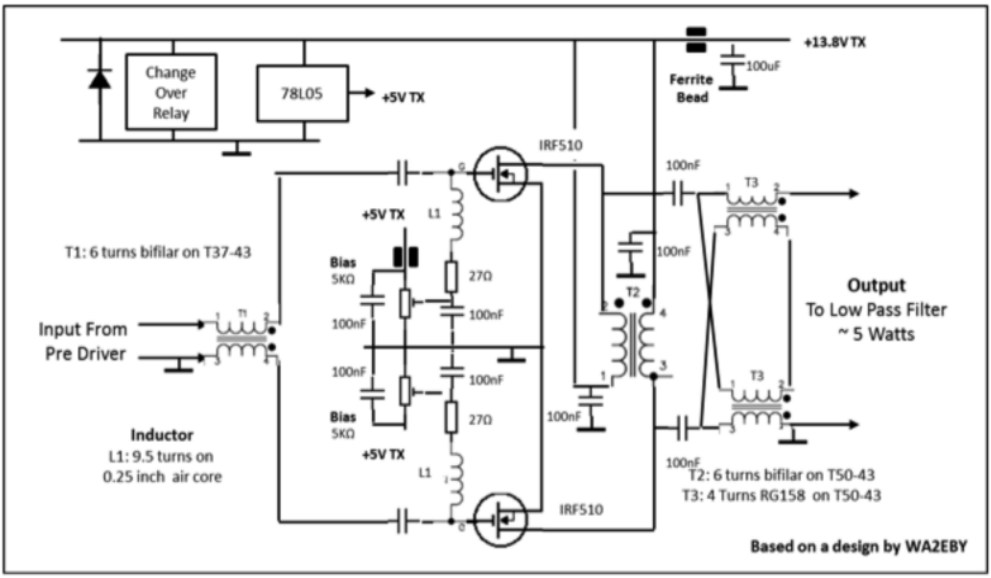
I built my amplifier in an aluminium die cast box (111x60x31mm from Maplin). The IRF510 MOSFETs are attached to the box using mica insulators and thermal grease and so the box acts as the heatsink. In practical terms – I ran the amplifier key down at 5 watts output for 10 minutes into a dummy load and the box became warm but not hot.

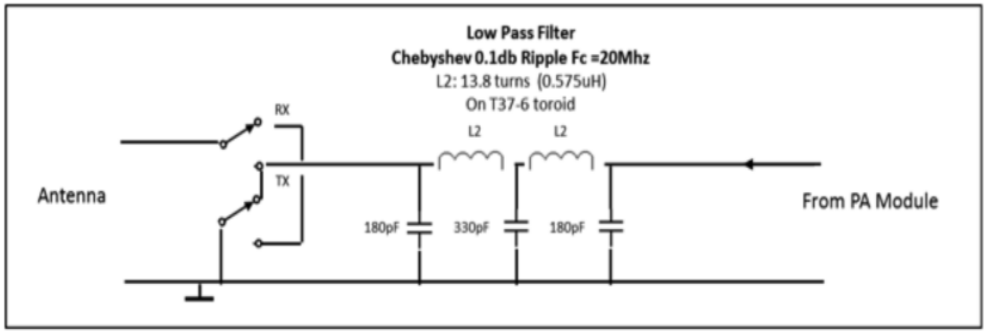
I built the circuitry on 2 pieces of Vero board – so I don't have a printed circuit to offer.

In conclusion – I am very impressed by this design. It provided sufficient gain for my needs and has proved to be very stable and efficient. I have made several contacts across Europe from Germany to Croatia using this amplifier feeding a 12AVQ vertical.



Circuit Diagram





Parts List

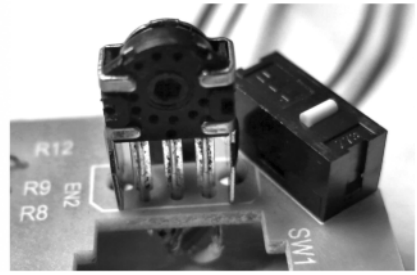
Part	Quantity	Source
Amplifier		
IRF510	2 off	GQRP Club Sales
TO220 Insulating bushes	2 off	Maplin RN91Y
TO220 Insulator	2 off	Maplin RN96E
100uF Electrolytic 35V	1 off	Maplin AT09
100nF Monolithic Ceramic	8 off	Maplin RA49D
27 ohm 0.6 watt	2 off	Maplin M27R
5Kohm preset potentiometers	2 off	Maplin WR41U
T1: T37-43 Toroid 6 turns 27SWG bifilar wound	1 off	GQRP Club Sales
L1: 9 ½ Turns 24SWG wound on 6mm drill	2 off	GQRP Club Sales
T2: T50-43 Toroid 6 turns 27SWG bifilar wound	1 off	GQRP Club Sales
T3: T50-43 Toroid 4 turns RG158	2 off	GQRP Club sales Maplin
Ferrite Bead	2 off	GQRP Club Sales
Diecast box	1 off	Maplin N89BQ
Filter		
T37-06 Toroid 13 ½ turns 27SWG	2 off	GQRP Club Sales
180pF Polystyrene	2 off	JAB
330pF Polystyrene	1 off	JAB
2pole C/O Relay	1 off	Maplin N17AW

A real tuning knob for SDR radios.

Tony G4WIF

In the previous Spring Sprat we featured a simple short wave conversion for a "TV Dongle" written by Ken G4IIB. The project turned out to be a lot of fun to play with - but there is something not quite right about tuning around by clicking on your screen. Users of SDR software like SDR-Sharp will have discovered that you can tune by using the mouse wheel - but even that seems like hard work.

I began to wonder if an alternative rotary encoder to the mouse wheel would work better – and it did. Shown below is a typical rotary encoder. Also shown are the innards of an inexpensive mouse showing the mouse wheel encoder.



As you can see, both have three wires, though some encoders have an additional pair of contacts for the shaft "push switch".

I simply connected the new rotary encoder across the contacts of the mouse wheel encoder and plugged the mouse into a spare USB socket on the PC. You can have two computer mice active at the same time on Windows PC's.

You should find that if you move your existing mouse pointer and select the tuning window of your SDR software it will allow the new tuning knob to adjust your frequency. It is also not quite as laborious as tuning using the mouse wheel.

Setting my SDR software to 1kHz steps I found that one rotation of the encoder produced 20 kHz shift, indicating a 20 step encoder but they will vary depending which one you buy. A slight issue is that they aren't all wired the same so some experimenting may be required.

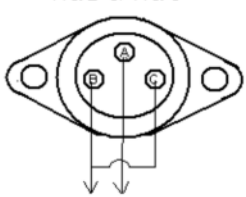
Connect the middle pin of the new rotary encoder to the middle pin of the mouse wheel encoder, then connect the outside two and test. If tuning turns out to be the wrong way around, reverse the outside two connections.

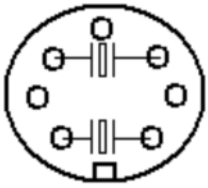
If that doesn't work then the ground (or common) connection must be the first or third pin. Rearrange the wiring and repeat the above test.
Box it all up and you have a simple, "real" tuning knob.

Crystal Sockets

Peter Howard G4UMB 63 West Bradford Rd Waddington Lancs

I thought I would share this idea I had with GQRP Club readers.
I have always had difficulty in finding suitable chassis sockets for the HC49U small type crystals. (I got the ones in the photo. from the GQRP Club sales but I don't think they are for sale any longer) I have found that a DIN socket can be adapted as a crystal socket by carefully twisting the connections in them so that they can be slid out of the socket and squeezed together to make them fit tighter to the crystal connections. If you use a 3 way DIN socket the holes can be wired as shown to enable a crystal to be fitted in either position. If anyone else can help me with an alternative solution to a socket I would be glad to know.





Further to writing this article, I have found that a 6 way DIN socket accommodates 2 crystals (see pictures).

Club Awards

Ryan Pike, G5CL, 63 Bishopstone Village, Nr. Aylesbury HP17 8SH.

It gives me great pleasure to announce that I have just awarded Chris Bisaillion VE3CBK (Member 14882) with a certificate for working 100 QRP Countries. Looking at his log, Chris achieved the feat using only 20m (phone) and can boast some excellent DXCC including Guadeloupe, Guantanamo Bay, Eastern Kiribati and Australia. Well done Chris, and I look forward to issuing more certificates as you knock off more countries!

Don't forget that the club website contains all the details about our club awards. Some of them are quite easy to achieve whereas others require a bit more time and patience, but if you don't get on air, you'll never work 'em! I notice from the records that we have not issued a QRP Master award for some years, so perhaps it is time to check your logs and QSL cards?

If you have any queries or need further information on club awards, please contact me at the address above or via email: RPike78088@btinternet.com

Getting your RTL2832 Dongle to work under Linux.

The Easy Way. By Ken Marshall G4IIB Ken.marshall1@btinternet.com

As a follow on from Ken's RTL-SDR Primer article in Sprat 162, Ken has written a sister article titled as above. The article has been published on the Sprat page of the GQRP web site and can be accessed via the link under the header Sprat 162. Several refugees from the "SolderSmoke blog" have followed these instructions and reported that it worked for them.

Follow Dom's advice on page 34
and don't miss the best QRP operating party……

GQRP CLUB WINTER SPORTS

EVERYDAY – DECEMBER 26th to JANUARY 1st

Call "CQ QRP" on the International QRP Frequencies

Improving PCB layout transparencies printed by laser printers

Harry Brash, GM3RML

I usually use the Eagle layout program (free version) for creating printed circuit layouts from a schematic.
I used to have access to a very high quality ink jet printer which created very accurate opaque drawings on film for use with photo-coated PCB and other photo processes such as labels. Unfortunately, that printer was used only occasionally and the ink dried up to the extent that it was not economical to repair the printer. I tried using my Canon LBP-1120 laser printer with overhead projector film and thick tracing paper but the results were very poor despite selecting all the recommended options to make the toner as thick and opaque as possible. The problems usually showed up as pitting during etching and occasional lost tracks on fine layouts.

Large areas of black on the laser film printouts looked grey when held up to the light and, under the microscope, you could see that the toner was in clumps rather than spread evenly across the film.

I searched on the internet for possible solutions and eventually found a comment on a forum about spraying the laser printout with a cellulose lacquer and how this could improve the contrast. The explanation given was that the separate clumps of toner were dissolved and flowed together in the presence of the solvent in the lacquer.

I didn't have any suitable lacquer but decided to try neat cellulose thinners with a £5 airbrush I had bought from Ebay. A light spray is all that is required. The results were immediate and very impressive. I make surface mount PCBs involving ICs with small pin spacing and these layouts work well with this technique. Under the microscope you can see that there is some minor distortion of very narrow traces due to the solvent but, so far, no problems with shorts or interruptions.

FOR SALE: MLX board and paperwork. White Rose project selection of boards (Rx and Tx), some with components. W3NQN passive audio CW filter. Small number of Denco coils. Some valve holders (inc for 807) and anode connectors. 9 MHz filters 2 of them. 50 MHz receive converter. Some small project kits. A job lot. All for a donation to charity! To be collected or maybe meet somewhere near the M62.
G4HYY - David - East Yorkshire - 01964 612998.
WANTED: TenTec Century/22 CW transceiver. Preferably working.. Please contact Jim G4DKQ QTHR tel: 01462 674445

An Important Club Notice

Tony, G4WIF, asks, kindly that club members do not start sending renewals for 2016 until after November 1st.

Simple 4 Watt Add-on P.A. for 7MHz Micro Transmitters

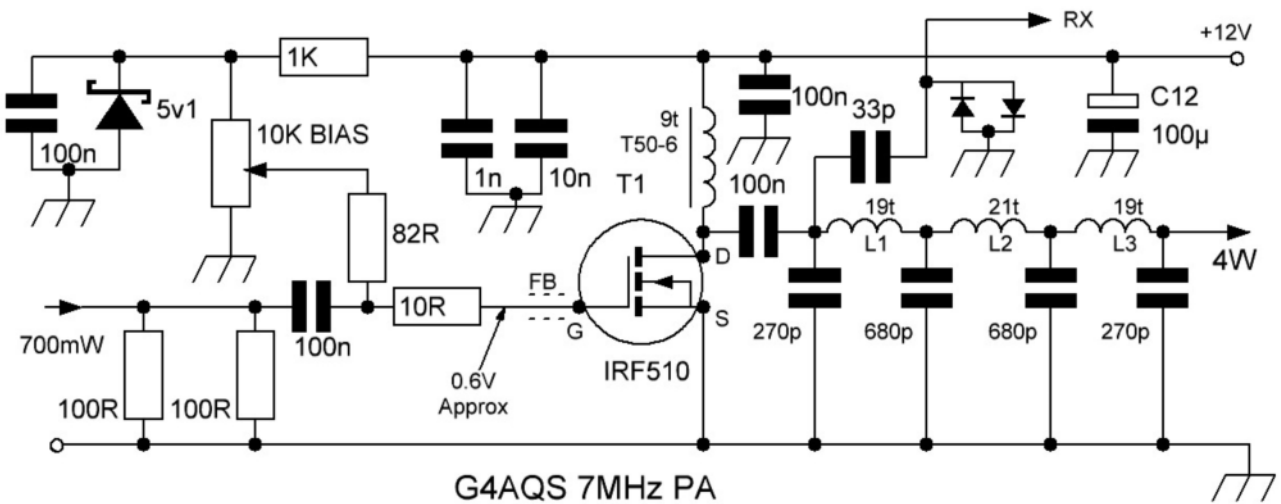
Michael Bliss G4AQS.

Needing something to encourage me to go out on my bike I struck upon the idea of some /P operating with a simple transceiver that would fit, along with the other necessary gear, into my rucksack. Looking for something suitable I happened upon a Forty-9er kit from Hong Kong at £8.99 including post! It arrived quickly and was soon built. I have to say the print and parts were much better quality than I expected, however the suggested 3W output was rather optimistic, only giving 700mW. I decided I would like rather more than that but without too much complication.

Having built the rather impressive MKARS80 a couple of years ago and influenced by its P.A. I came up with this very simplified version. It's as basic as I thought I could get away with! It was built on an odd scrap of double sided print, the lands being carved out with a chisel. (Yes, I told you it was basic!) The few components were added and a simple Pi output filter. Feeding it from the Forty-9er and switching on resulted in …nothing…..but turning up the bias to about 0.6V gave over 3W, it really did surprise me, honest. (Make sure bias is 0V before feeding in any RF). The output looked and sounded OK and the IRF510 remained cool even without a heat sink. A better filter was added before air testing and with everything strewn all over the bench, had a first contact with Jos ON6WJ, who was lurking with his Pixie on 7.023.

Like constructing with valves, components seem to be non-critical. The exception being the toroid material in the drain. The number of turns can be plus or minus a couple, the size and mix of the toroid makes little difference but it must be dust iron. Ferrite in any form doesn't give so much output. I suspect there must be a rather broad resonance involved.
To give some idea of its easy going nature: I put 10 turns through an old TV dust-iron IF tuning slug, the ones with the hexagonal hole though their middle and the output was only marginally down! The winding does get slightly warm so I think the bigger the better in that department. It gives a reasonable output when fed 500mW and better than 4W on a freshly charged battery and 700mW in.
Bear in mind that it is suitable only for CW; it's not a linear and there is a drastic drop in output if the key is depressed for a whole minute, although nothing gets hot. It's unlikely that you would do that in practice and it does recover very quickly.
Been too busy in the workshop to get the bike out yet……but….. look out for G4AQS/P sooner or later.

(NOTE)
I have tried to make it reproducible as possible, having varied the resistor values a little. I've tried T37-2; T37-6. T50-2 cores with varying numbers of turns with little effect on output and 3 different IRF510s of dubious pedigree. The bias can be increased without ill effect.



G4AQS 7MHz PA

What to do with an old 'ball' mouse?

Harry Brash, GM3RVL < harry.brash@gmail.com>

I was considering throwing out an old 'ball' computer mouse which uses a rubber ball, two spoked plastic wheels and optical detectors to provide X and Y coordinates for a PC. This is the kind of mouse which regularly requires the ball to be removed and the spindles cleaned of hairs and other debris.

The optical detectors use infrared (IR) from LEDs with associated detector diodes. To give rotation direction, for each axis an 'in-phase' and a 'quadrature' signal are required. Sometimes this is achieved with two IR transmitter/receiver pairs per axis and sometimes with one transmitter and a dual receiver containing two accurately spaced detector diodes. The mechanism is a good basis for a rotary encoder to drive, for example, a PIC controlling one of the Ebay AD9850 DDS boards as a frequency source.

The mouse which I used uses a single IR source and a dual detector for each axis. The spoked wheel has 37 spokes and each wheel turns in a slot cut in the mouse PCB with the IR source and diodes mounted on the PCB. Each spoked wheel has an integral plastic shaft of about 2.5mm diameter. A section of the PCB including one IR transmitter, dual detector and part of the slot was cut out including an additional piece of PCB to provide a mounting hole(s). This approach maintains the correct positions of the IR devices relative to the slot. All that remains is to position the wheel as closely as possible to how it was in the mouse. I was keen to give the encoder the flywheel feel of many Eddystone dials and attempted this by using a heavy brass knob.

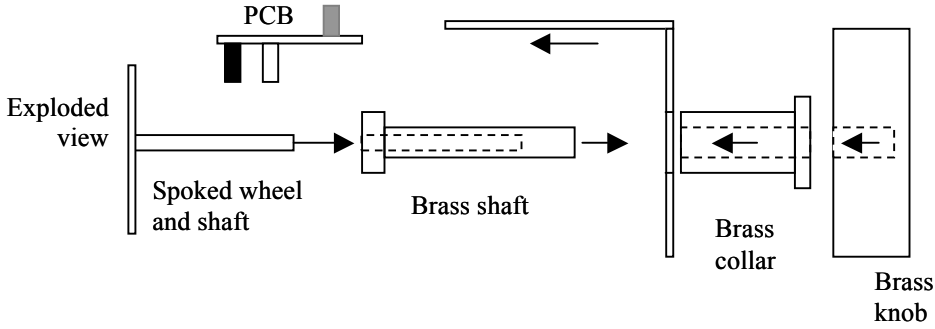
The diagram shows how the encoder is constructed. In my case the new mechanical parts were made from brass because I had suitable material but it can be built in many varied ways. As shown, the plastic shaft of the spoked wheel is a push fit in the hole in the main brass shaft which rotates in the brass collar with the brass knob holding the encoder together. The two grub screws in the knob are not shown. I soldered the brass collar into the supporting bracket. The cut out piece of mouse PCB is mounted by a single spacer so that the IR devices are located relative to the spoked wheel as they were in the mouse. This didn't prove too difficult. A couple of tapped mounting holes are provided for panel mounting the encoder.

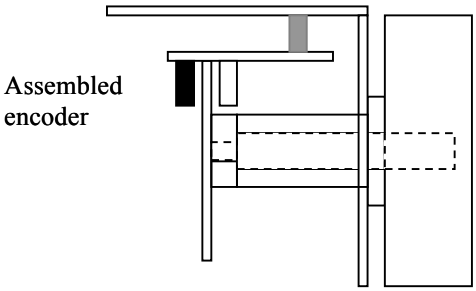
The single IR LED is powered from 3.3V via a 270R resistor and each detector diode has a 3k3 load resistor for 3.3V. The equivalent resistors for 5V supply would be about 560R and 4k7 respectively.

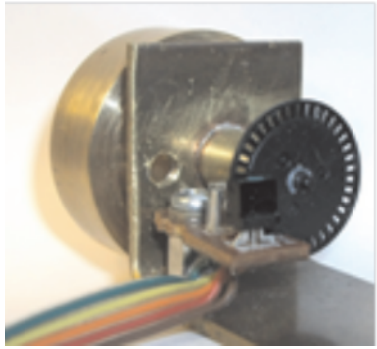
In my case, the detector diodes have a common connection to the positive supply so the 3k3 resistors go to ground for each diode. It worth checking the voltages on the original mouse before dismantling it as the IR devices may vary.
I connect one diode output to a PIC interrupt pin and the other to any digital input which is available. When the interrupt occurs, the level of the second input determines the direction of rotation and hence whether to increase or decrease the frequency or whatever you are controlling.

The encoder has a good feel to it. I haven't achieved Eddystone perfection but it's much nicer (to me) than the usual 'clicking' encoder. If you want, the PIC program can detect rapid rotation and increase the step rate to make fast frequency changes just by spinning the knob quickly.

I found a use for another old mouse. This time it was a mouse which used two separate IR LEDs and detectors per axis. I used the four LED/detector pairs to create a 4 bit Gray Code rotary encoder for an aerial rotator. Rotary Gray Codes are available on the internet such as at the link below. I printed one at a suitable sized onto laser film and mounted it on the rotator shaft so that it rotated between the four LED/detector pairs mounted side by side.







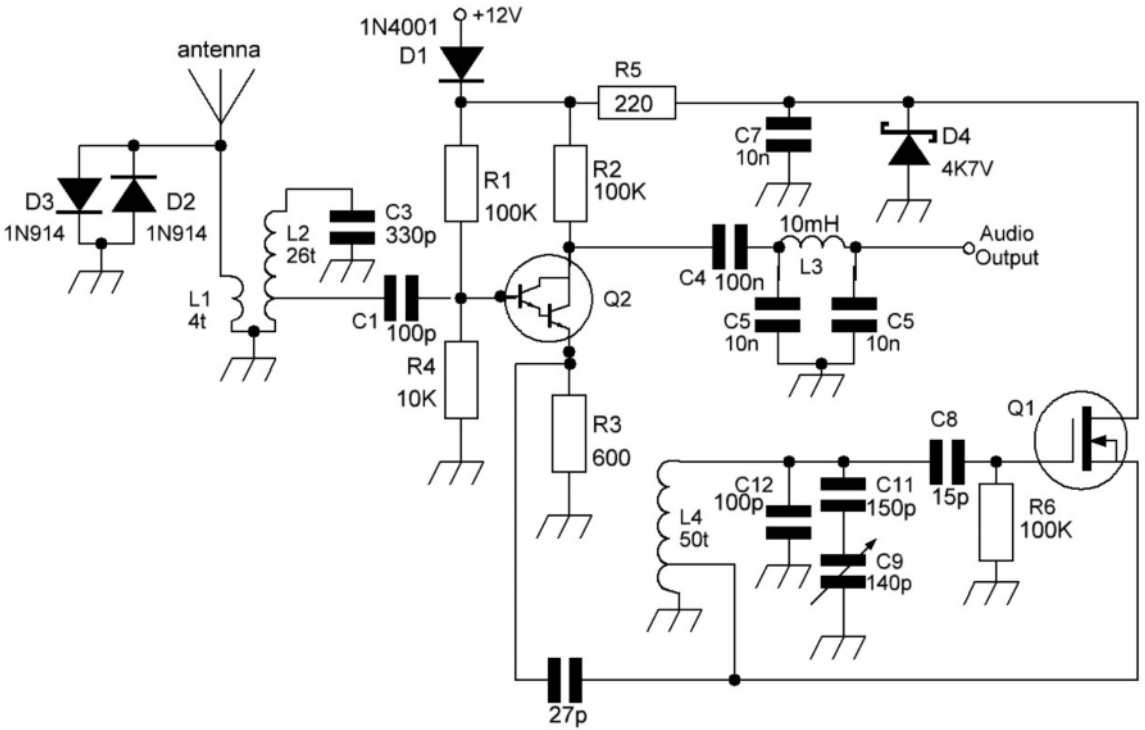
The Tin Can 2

A Two Transistor 80m Receiver by John Hale VK2ASU
Reproduced with thanks from Lo-Key No:102 (VK QRP Club)

The idea for this little receiver as a two active device contender had been in my notepad for quite a while. During a week of rain I was stripping a couple circuit boards when I found an MPSA 14 Darlington transistor. The notes came out and a two transistor direct conversion receiver for 80 metres using mainly junk box parts was built. Connected to my inverted V, it works so well that I figured it was worth sharing.

I built the circuit onto a piece of double-sided circuit board about 1 x 2 inches (2.5 x 5 cm) I cut one side with a hacksaw to form many copper islands – chess board style. Because the circuit board was double-sided the uncut side was earthed, and any perimeter island could then be earthed by soldering a piece of wire to it and the underside of the board. The components were soldered to the copper islands following the circuit schematic. The antenna input coil was made from an oscillator coil taken from a discarded transistor radio which also provided the polyvaricon tuning capacitor. The oscillator coil usually has a red adjustable ferrite core. This was carefully taken apart and the 100 turns of fine wire wound onto a pencil for rewinding the new coil. If this idea is followed take care not to kink the wire. The new coil was wound with 4 turns for the antenna input and its ends connected to the side of the coil base with 2 lugs. The secondary winding was in the same direction over the top of the first winding, and started at the earth lug (on the 3 lug side of the coil base). After winding on 10 turns a tap was formed by connecting to the centre lug and after another 16 turns the coil terminated on the remaining lug. I have made a few 80 metre antenna coils using these old oscillator coils and using the same number of turns. They have all worked well, and simply adjusted with the ferrite slug. If you try to build this receiver and coil doesn't resonate, increase or decrease the value of C3. If you have a signal generator and a CRO this is a snack, otherwise trial and error will eventually get you there.

The Hartley oscillator coil was wound with 50 turns of wire rescued from the yoke of a TV picture tube,. The winding filled the Amidon T50-2 toroid. The tap is at 12 turns. The reduction drive for tuning was made from an old long shaft potentiometer. The back was taken off and the middle pin removed so that the shaft rotated freely. The dial cord and tuning drum were retrieved with the polyaricon capacitor from the discarded (bedroom clock) radio. Unfortunately the tuning knob spindle was moulded into the case and was not recoverable. The dial cord was wound around the pot shaft 3 times and worked quite smoothly, to give a 6:1 reduction.


1N4001
D1
+12V
antenna
R5
220
C7
10n
D4
4K7V
D3
1N914
D2
1N914
L2
26t
C3
330p
R1
100K
R2
100K
10mH
Audio
Output
L3
C4
100n
L1
4t
C1
100p
Q2
C5
10n
C5
10n
R4
10K
R3
600
C8
Q1
C12
100p
C11
150p
15p
L4
50t
C9
140p
R6
100K
27p

The receiver worked great with a crystal earpiece, but I later decided to make an audio amplifier to drive bud style headphones. The headphone amplifier was built onto a piece of double-sided PCB about 1 x 1 inch (2.5 x 2.5cm) in the same way as the receiver board. Although BC547 transistors are shown, just about any NPN transistors will work in this circuit. A pair of bud style headphones was connected in series to give a 64 ohm impedance. I cut the stereo plug off and put a 3.5 mm mono plug on. The series connection was inside the plug and insulated to prevent shorts. Thin coax was used between the receiver and the amplifier.

Alternatives to the T50-2 toroidal coil and the polyaricon capacitor can be used. For the coil, get a drinking straw and wind on 75 turns of 26 gauge enamelled copper wire tapped at 19 turns. Then arrange a brass screw to screw in and out of the coil. Be careful soldering though, as it is easy to melt the straw. Remove capacitors C9 and C11 and replace them with about a 10 – 90 pF trimmer capacitor. Adjust to obtain oscillation at 3.5 MHz when the brass screw is wound out. As the brass screw is moved into the coil the frequency will rise – the opposite to the effect of a ferrite core. A bonus of this system is that further tuning reduction is not needed.

Alternatives for the Darlington are MLPSA12 and MPSA13, both of which I have tried and work fine. There would be many others. The MLPF102 could be substituted the a 2N3829 or a J310. Just try what you have. The 1N4168 diodes could be any small signal silicon diodes including 1N4148's. The 4.7 volt Zener would be substituted with a 5.1 or 5.6 volt one – I just found 4.7 volt first. Another option would be to add another active device, a 78LO05, and forget the two active device concept. The 10 mH RFC was one I had, but you could try a 1 or 2 mH choke. It is there with the bypass capacitors to stop RF going to the earpiece or audio amplifier and to shape the audio a little. As an afterthought D4 was added to ensure against damage from a wrong polarity connection.

My QTH is in Parramatta and only a few miles away are powerful broadcast band transmitters which often cause breakthrough in simple receivers. To my surprise there is no sign of broadcast breakthrough in the little receiver. This probably due to the amount of RF injected at the emitter, as well as the diodes at the antenna input reducing the maximum RF level to the circuit. The diodes have no effect on normal strength 80 metre signals.

I perceive the MPSA14 to be working with the first transistor of the Darlington pair working as an RF amplifier, while the second of the pair is mixing and performing an audio amplification function. This little receiver has given me much listening pleasure at nights in the shack while working on other projects. I hope there are others who will give a version of this receiver a go. Please email to me at vk2asu@wia.lorg.au for any help or to make comments.

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Club Information – Services and Awards

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

Club Awards: Our Awards Manager is Ryan Pike – G5CL, 63 Bishopstone Village, Nr. Aylesbury HP17 8SH.

Trophies are managed by Dom Baines M1KTA. 34 Bury Road, Stapleford, Cambridge, CB2 5BP

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

QSL Bureau: Managed by - Mr D S Coutts GM3VTH, 29 Barons Hill Avenue, Linlithgow, EH49 7JU.

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

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

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

North American members can send cards to:-
David Gauding, NFØR, 14220 Tullytown Court, Chesterfield, MO 63017, USA
David will send these in bulk to the UK bureau for distribution.

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

Technical Problems.
Ian Keyser G3ROO will give advice to members on circuit and construction problems. Please provide the fullest information possible. Write to Rosemount, Church Witfield Dover. CT16 3HZ

Antennas Valves and Vintage

Colin Turner G3VTT
17 Century Road Rainham Gillingham Kent ME8 0BG
G3vtt@aol.com

Welcome to AVV for the Autumn. As promised there is something on antennas this time thanks to Ken G4IIB who lives in the Cumbria Lakes area and has sent these pictures and details of his home made magnetic loop antenna which is mounted upside down. The reason is the control box needs to be low down for maintenance purposes. The plastic container is water tight and Ken said he found some of the so called waterproof boxes from the electrical suppliers to be leaky, and expensive I guess.

A Simple Upside Down Magnetic Loop by Ken Marshall G4IIB

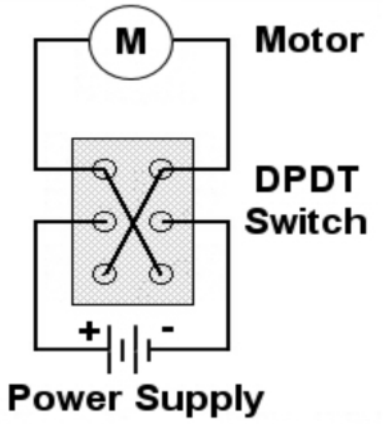
I live in a windy location in the English Lake District and I am a wheelchair user that values independence. So I need easy to build antenna solutions that are either robust or easy to take down when the wind picks up. In addition I am unable to climb ladders so something at or near ground level would be the ideal solution. After obtaining 3.5 meters of copper pipe 10mm in diameter for free I plumbed for a magnetic loop as I already had a reasonably spaced 10-130 pfd capacitor, the non-stop type, in my junk box. A magnetic loop operates on the magnetic rather that the electric component of an electromagnetic radio wave.

After using this site to check dimensions etc:
http://www.66pacific.com/calculators/small_tx_loop_calc.aspx
I decided to make the loop 1metre in diameter, circular with no joints, giving a circumference of 3.14m. The loop would tune the 20, 17 & 15M bands giving a bandwidth of 33 kHz at 73pfd on 20 M, 61 kHz at 44pfd on 17M and 98 kHz at 33pfd on 15M.

Next I needed a motor to drive the capacitor. I searched eBay for a "12V reduction drive motor" and found one brand new from China for £7 including Post and Packing. This is the star of the show! It is 12V, reversible, draws about 40mA and has a high torque 3rpm gearbox and measures 4cm diameter and 3cm depth. I opened this up and can confirm that it has metal gears. The gearbox is integral to the motor. It will turn two fairly large capacitors i.e. with their spindles connected together with ease however I only needed the use one. This motor will still turn my capacitor with only 5V applied as at this voltage the motor completes one revolution in about 50 seconds. It is therefore useful for many remote tuning applications.

I made an 'L' bracket on which to mount the motor and connected it to the capacitor spindle via a plastic rod taken from the inside of a cheap Staples Biro. I housed the capacitor and motor, mounted on a piece of plastic chopping board, inside a plastic 18x25x9cm food container box. The size of the box you use would depend upon the physical size of your capacitor. The box has a water tight clip on lid and I use a cable gland to get the control cable into the box. The box is connected to both ends of the main loop via two stainless steel bolts (brass might be better but I had none). I drilled the holes in the box for the bolts slightly smaller than the bolt and tapped the holes with the bolts thus forming a water tight seal. Each bolt is secured with a lock nut and bolted to the ends of the main loop and connected via 2.5mm copper wire to each end of the capacitor. See image

Looking at the details of driven loop, for simplicity I opted for a shielded Faraday loop. This needs to be 1/5th of the circumference of the main loop so 20% of 3.14m = 62.8cm. Take a length of 50ohm coax (say 3m) and carefully remove a small section of insulation 63cm from the end of the coax cable and solder the centre conductor at the end of the coax to the braid 63cm in forming a loop. See image. Put a plug on the other end of the coax so you can connect to the shack via 50ohm coax. Make the connection watertight with self-amalgamating tape around the exposed braid. I use cable ties to position the driven loop at the top of the main loop. The mag loop is mounted on a 2.5m wooden pole and secured to my decking. The deck is 1m above ground so that the radiating part of the loop is 3.5m above ground. They work well in lofts too.
Because these motors are so good with loads of torque I have found that the control unit can be simple with no fancy electronics. I use a non-latching double pole double throw toggle switch to reverse the polarity on the motor shown in the diagram. In addition I use a variable power supply so that I can reduce the speed of the motor further by reducing the



voltage (see the paragraph on motor details). I have placed ferrite clips on both ends of the control cable to protect it from RF. Another trick I have adopted is to tune to the frequency I wish to use on my SDR radio first and then tune in the loop. You can see the pass band moving along the SDRs spectrum display and it is quite easy to place the middle of the passband on your desired frequency then switch the antenna to your rig ready to transmit. The SWR is 1.3:1 - close enough for military work don't you think?

Most designs on the web, (but not all), show the capacitor at the top and the driven loop at the bottom I have opted to turn this around for accessibility purposes. I asked Colin G3VTT our club representative on antennas if this could affect performance and Colin said that having the loop "upside down" would have no significant adverse effect, he hinted that it just might mean that I am a little louder down in Australia. "Fair dinkum" as I have reached Australia with 200mW via WSPR.

A Valve Kalitron Oscillator with 12 volt Supply.

A chance contact on 7.025 brought me in to discussion with Karl DJ5IL who has been experimenting with a Kalitron oscillator running from a low voltage supply. The Kalitron oscillator was well known for operation at VHF and in the early years of the last century. Karl explained in an email:

Dear Colin thanks a lot for the fine chat on 40m. Here comes the schematic of my cross-coupled tube oscillator as promised - please give it a try and let me know what you think about it! Actually this circuit is a copy of the 'Oscillation Generator' by Eccles & Jordan

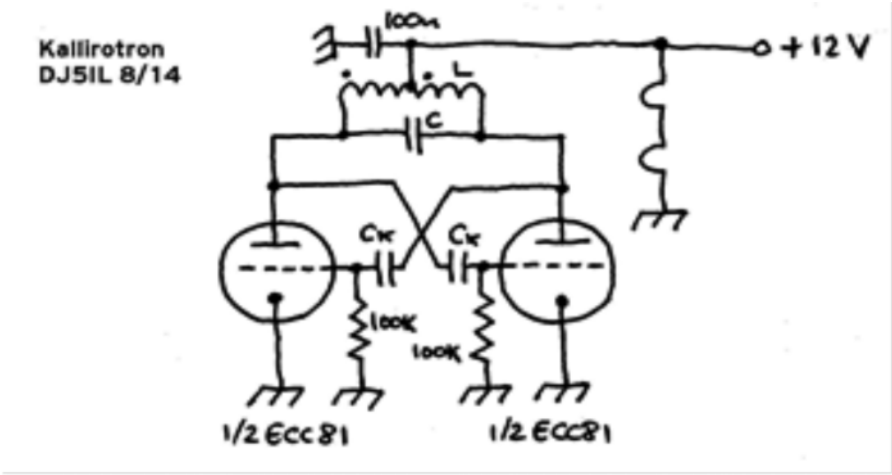
from the year 1912, a cross-coupled sinewave-oscillator which emerged as a derivative of their 'Trigger Relay'. L B Turner took this 'Trigger Relay' and added two resistors. The result was an aperiodic bistable trigger circuit with the title 'Kalitron - an aperiodic negative-resistance triode combination'.

It went down in history because it was the invention of the 'Flip-Flop' which made digital computers possible.
See **http://en.wikipedia.org/wiki/Flip-flop_%28electronics%29**

Eccles & Jordan wrote about their Oscillation Generator: 'It is found that these cross coupled circuits oscillate more freely than single circuits [...]'. In his book 'Theory and Application of Electron Tubes' (1944) Herbert Reich described this circuit in detail as a 'push-pull negative-resistance oscillator' and explains in detail the underlying theory of operation. In old times this circuit time and again appeared under the name Kalli(ro)tron. For example the famous 1930s British Political Mission to Tibet, during which Sir Evan Nepean (G5YP) operated the first amateur radio station from Tibet under the legendary call sign AC4YN, used a 'Kallirotron' power oscillator as a transmitter (see RSGB Radcom "Technical Topics" June 1989).

The ECC81 = 12AT7 is one of the few tubes which were originally not designed for but which allow operation at very low plate voltages. My circuit is designed for operation on 40m with L = 5.3 uH (2 x 16 bifilar turns on a T68-6 toroid), C = 90 pfd, Ck = 47 pfd.

Thanks to Karl for this research and basic constructional details. This could be a stable oscillator which would give you experience of valve construction without resorting to high voltages. With an extra valve high gain amplifier and a simple diode detector it would provide an interesting direct conversion receiver.



ATU Tuning

I like to include comments by members on antenna problems and Walt KF4YJQ has sent from time to time interesting comments. He asks: What are we really tuning up with an ATU? The quick answer would, of course, be the antenna. Really? Why then after our entire knob twisting and tweaking on the tuner to bring the "antenna" to resonance, can we install a totally different antenna (or antennas) and find that they too are now all in resonance on the same frequency?!!? Give this a try and you will see what I mean. This then would tend to suggest that we are actually tuning the transmitter to accept the frequency or the feed line and not as implied the antenna. I have experimented with the many times and the result is always the same. Does anyone have the answer? Walt Bullerwell KF4YJQ *Has anybody else noted this phenomenon?*

Valve QRP Days November 14th and 15th 2015

If you are a fan of the old time valve (tube) radio equipment then this is for you. To keep QRP activity up and to give the valves an airing you are invited to operate on any band any mode using your valve equipment at QRP levels. Note its **two days** this time in case anybody cannot get on the air due to work commitments. Judging by the amount of mail I get there is a strong renewed interest in both home brewing and operating simple valve technology. There are plenty of our colleagues in VMARS who operate military equipment that is capable of QRP power levels who need to be encouraged too.
What does it matter if your 5 watts, (or less), comes from a MOSFET or a 70 year old device perhaps designed for rugged war service? It has been suggested that this time we call 'CQ V QRP' on the QRP frequencies and remember to tune a kilohertz or two either side of our frequencies in case some folks are operating crystal control. Over the last few years I notice we congregate on 80 and 40m but 30m would be an interesting alternative and the club offers crystals for 14.060 so transatlantic contacts are quite possible. Please send *brief* details and perhaps a picture of your station to encourage others to me at g3vtt@aol.com.

Perhaps somebody with some free time could try the Kallitron oscillator as describe above and give some flexibility to the activity period.
I don't know what you are finding on the CW bands but I find activity is lower certainly throughout the summer months mysteriously improving when there is dx about or a contest about to start and throughout it too! Let's keep communicating and passing thoughts, greetings and ideas to each other.

Finally I forgot to mention Alan G3RMZ who gave capacitors and building tips to G0ILN for his valve transmitter described in the Summer Sprat. Well done.

'Doris suggest you make a start now and prepare for November 14th/15th'

The KR80 Short Aerial 20 Metre Band QRP Transmitter

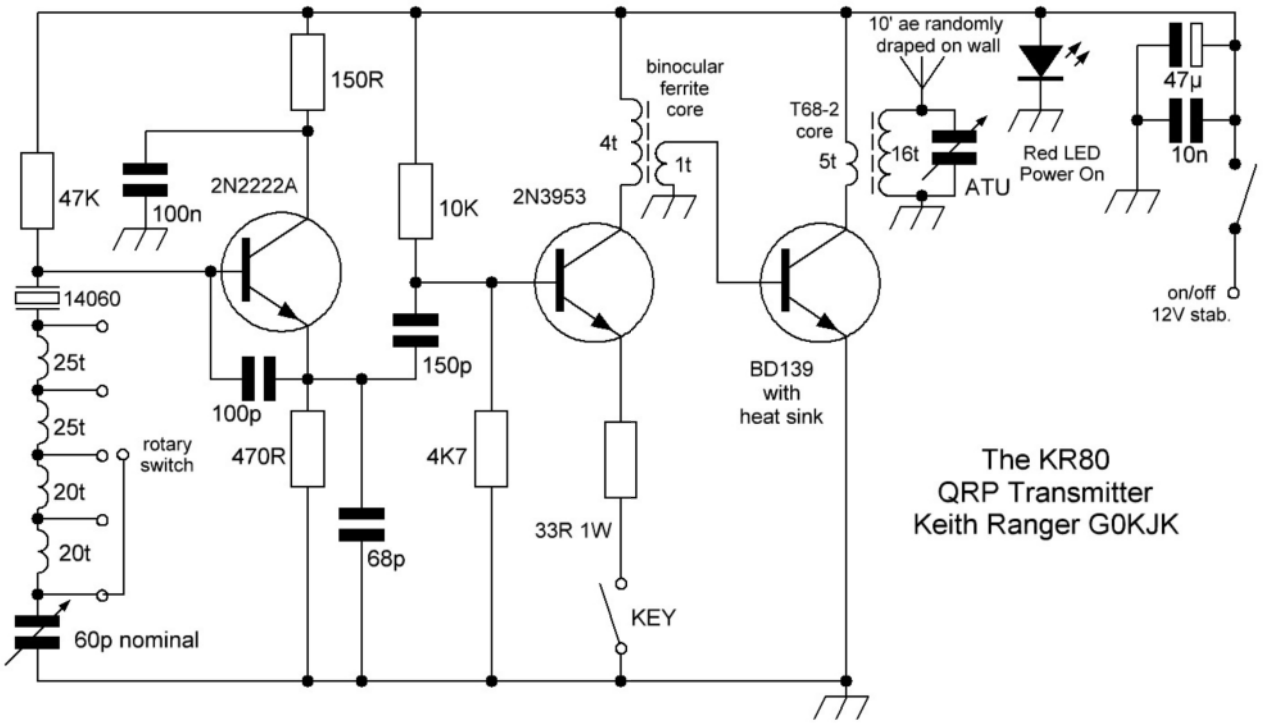
Keith Ranger G0KJK

Not few G QRP C members find themselves living today in circumstances where efficient outdoor aerials cannot be erected, perhaps because of a very small garden or specific local restrictions. So does this mean it is virtually impossible to get on the air with QRP and enjoy plenty of good QSOs? Not with the rig and aerial to be described, a simple home-brew three transistor circuit that puts out 1.8 watts on 20 metres CW for 12 volts and 250 milliamps power consumption with the key down, easily matched to an indoor aerial of only 10ft draped around suitable objects on the shack wall (in my case, two hanging pictures, see diagram) using the easily constructed inbuilt aerial tuning unit (ATU). Does it sound too good to be true? Try it! And let me know your results! See below the call-signs of, and reports received from, the last twenty entities contacted with this almost non-aerial set up (none of these QSOs were rubber-stamp exchanges, they were all information-sharing one hundred percent contacts):-

DF6EW 539, K3SEW 569, F3BNX 559, IK2LFF 599, OK1XZ 599, EU6AF 559, E74X 599, YO3FRI 339, 9A9C 599, UA1AML 569, ZB3MED 599, SP0VD 599, SM7ZKI 579, YU1AKV 599, OM2VL 599, OE7PET 549, EA5DNO 579, EA6UN 599, LY2PX 589, SP4LNV559.

Notice that no less than nine entities gave the little rig 599 and only one a report of less than R5(and even this QSO~ was successfully completed). This shows that if you build this kind of a rig and use a well-matched short aerial you should get in reasonable conditions QSOs all around Europe, the Mediterranean islands and even on occasion into further afield places like North America. So we need not collapse in despair if we cannot erect a G5RV of Yagi antenna! Minimalist stuff does the trick and as out Club slogan puts it – “It is vain to do with more what can be done with less”!

The circuit of this little 1.8w power-house (called the KR80 after my initials and current age!) is hereby given. The VXO stage uses a series of T 50 2 inductors connected to a rotary switch. You may need to experiment with the total number of turns but this should give you full coverage of the 14060-14000KHZ CW section of the 20 metre band. Contrary to expectation, this rotary switch-selected set of inductors can provide stable results on all frequencies and with 1.8w still going into the aerial even near the band edge. I work many stations around 14010KHZ with this configuration. The ATU coils on the T 68 2 toroid are very straight forward in their winding. (please see diagram), the one turn on the binocular or pig-nose two hole ferrite balun core secondary should be tightly twisted as in the diagram. If this kind of a core is not available, the easily acquired FT50-43 ferrite ring can be substituted, with a twelve turn primary and a three turn secondary, for roughly comparable performance (and greater ease of winding). Again, please see diagram.


150R
47K
100n
2N2222A
10K
2N3953
binocular
ferrite
core
4t
1t
T68-2
core
5t
10' ae randomly
draped on wall
16t
ATU
Red LED
Power On
47µ
10n
on/off
12V stab.
14060
25t
25t
20t
20t
rotary
switch
60p nominal
100p
470R
150p
4K7
68p
33R 1W
KEY
BD139
with
heat sink
The KR80
QRP Transmitter
Keith Ranger G0KJK

Extra Notes

Further to the article itself I would like to add this for your information:-

1. The wide-range VXO is based on an article I once read in SPRAT (I cannot recall which issue) on how a series of small inductors can produce stable wide-ranging frequency change when a large inductor of the same total value will not so work (I think the article was about 80m). This works very well in the KR80 (its name is based on my initials and current age!) circuit. The only caveat is that with all the inductors brought into play by the rotary switch the crystal might not fire unless the variable capacitor vanes are fully disengaged. After that the vanes can be fully engaged and stable results expected right to the band edge in terms of power output and T9 note. I work many stations in the lowest 10KHZ of the band.

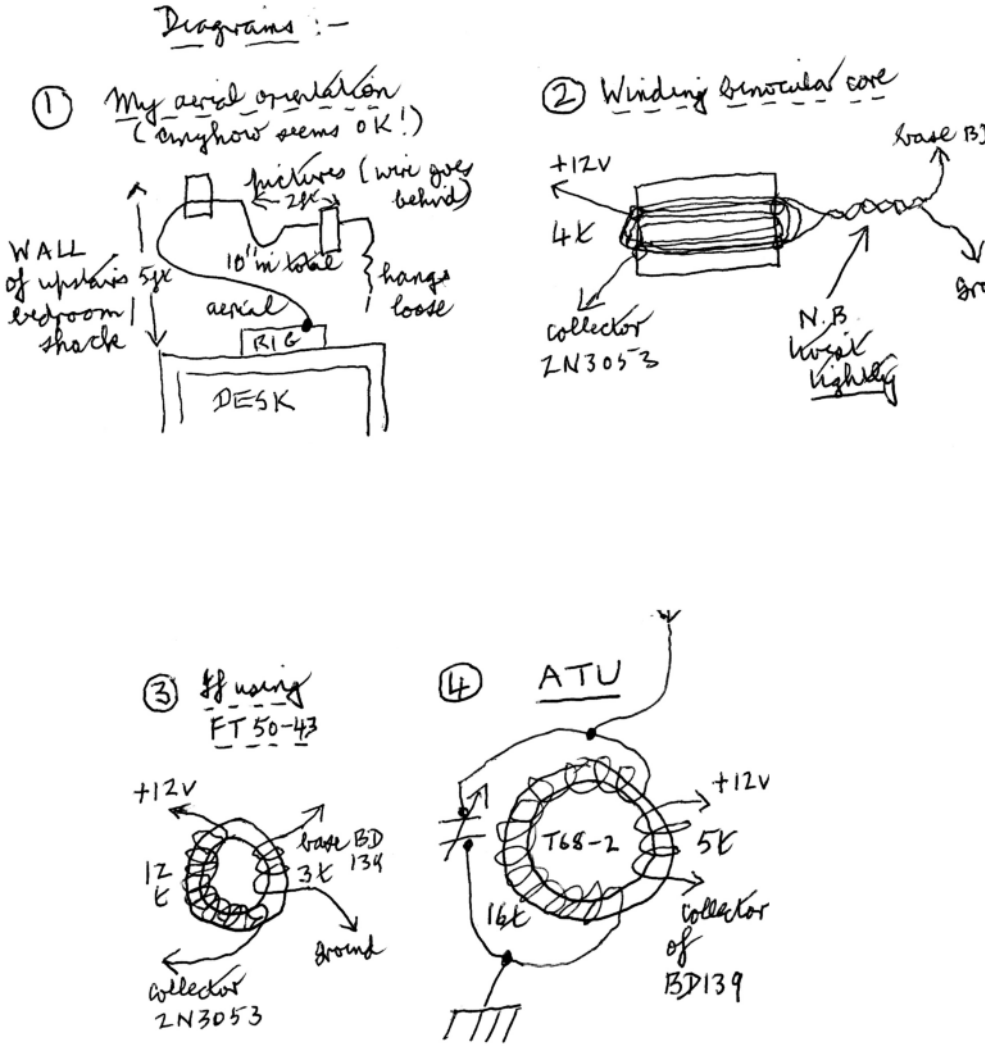
2. The inbuilt ATU, configured as shown, is undoubtedly the secret of the consistently good reports I receive, very rarely less than 559. If a ferrite bead wound with about ten turns and a 0.1 capacitor takes the RF out of the BD139 collector instead, with or without a LPF, output power and matching are much poorer and on air results also not nearly as good. I worked all ten call areas of Japan from Hong Kong (some of them 2000 miles away) when I was with the church as VS6US and with only 1w of output power. What once worried me was absence of further filtering, but both there and here I have nbot had a single complaint about TV1 of BC1. I have recently noticed that the G3IGU transceiver on page 202 of The Low Power SPRAT Book uses a very similar aerial coupling circuit. I am lost for an explanation of how and why this works so well with short indoor randomly orientated antennas but it sure does (does it perhaps function like a base-loaded whip?! Yesterday evening I reduced the aerial length to only 8 ft and totally changed aerial orientation around my two picture frames. Here is my resulting log for 8ft (only one of the a rubber stamp contact and in one case with a follow-on QSO giving that station a poorer RST than mine):-

HG30CW 1950hrs 599, E74X 2005 599, YT4T 2115 579, HG5DX 2128 599. I had a narrow miss with A45HR in Oman!

A hot tip for finding cheap variable capacitors – hunt around at the rallies! I find plenty there, more than I would ever expect to need to use!

If you hit any problems in putting the rig/ATU/aerial together, please feel free to contact me at keithcath@ranger144.fsnet/co.uk I am more than happy to explain points I have made as clear as mud!

Extra sketches



COMMUNICATIONS AND CONTESTS

Dom Baines, M1KTA, 34 Bury Road, Stapleford, CAMBRIDGE. CB22 5BP
m1kta@gqrp.co.uk

Thanks to all GQRP members for the contacts both inside and outside the RSGB IOTA contest at the end of July whilst I was qrv as SD7B. Hope to have heard several on the bands over the bank holiday w/e in August.

Winter Sports
Christmas and the New Year are months away and operating from a freezing shack might seem very distant as we have a mini heat wave and you are probably operating from the beach. However, when this copy of SPRAT arrives you will probably be ready to start to think about Winter Sports. The dates as always are between Boxing Day and New Year... 26th December to 1st January.

Operating for all these activities should take place on and around the International QRP Calling Frequencies.

CW: 1810, 3560, 5262, 7030, 10116, 14060, 18096, 21060, 24906, 28060

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

I recommend if there are a few stations on frequency spread out a bit if you can.

It is usual for operators to exchange their G QRP Club membership number when making QSO but it is not essential. Those taking part are invited to submit logs and comments to the G QRP Club Communications Manager, Dominic Baines, M1KTA, email at m1kta@gqrp.co.uk, Dom Baines, M1KTA, 34 Bury Road, Stapleford, CAMBRIDGE. CB22 5BP.

Jon Iza: Correction for last issue

In the last SPRAT, Member news, there is a typo on the webpage where you can download all the relevant information for an ILER-40 Buildathon in 4 sessions. The URL is http://iza.gandi.ws/ and the English version is down the page.

The info has not been updated yet for the MkII version, which includes now the AGC and some refinements on board.
In any case, if you plan to build it, the buildathon_2013_iler40 document as well as the annexes may be a good reading.

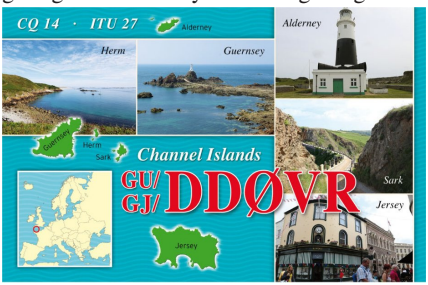
Time allowing I will try to prepare an updated version by the end of the Summer.
Be well - jon, ea2sn

MEMBERS' NEWS

by Chris Page, G4BUE

Highcroft Farmhouse, Gay Street,
Pulborough, West Sussex RH20 2HJ
E-mail: chris@g4bue.com

We start this time again by saying congratulations, first to **G5CL** who writes, "I have finally done it after 18 months of trying - 200 QRP DXCC!". Ryan worked **FY5FY** on 20m in the CQ WPX CW Contest after being stuck on 199 DXCC for what seemed like an eternity. "Patience and perseverance wins the day again (and flea power!)", he says. **G3YMC**, who achieved 200 DXCC in 2005 and is now on 252, congratulates Ryan and says it is getting harder to get any higher in current conditions. Dave managed 650 QSOs in the WPX CW Contest QRP section, including **FY5FY** after Ryan's posting on the Club Mailing List alerted him, and then added **5K4R** and **HSØZIA**. Dave says, "It is interesting how determined some are to pick out us QRP boys and the HS scored well in that regard sticking at the G3 until he had everything. The same couldn't be said for an EW station on 80m who got my serial number no problem but could not be convinced after five minutes trying that I was not an F3xxx station!". **MØHDF** found five new DXCC in the WPX CW Contest. Congratulations also to the SolderSmoke podcast (<http://www.soldersmoke.com/>) who celebrated their tenth anniversary in August. **N2CQR** thanks all the listeners and to *SPRAT* for giving them so many interesting things to talk about over the years.



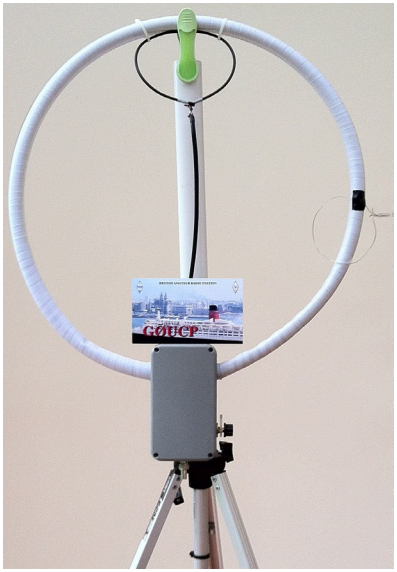
The QSL card (left) for **DDØVR** and **DE3BWR**'s three week IOTA operation as **GU/DDØVR** and **GJ/DDØVR** from Guernsey, Alderney, Herm, Sark and Jersey using power from a solarcell, <www.cntopsolar.com> and a 20Ah LiFePo accu <www.batteryspace.com> to an Elecraft KX3. The antenna was a homebrew end-fed vertical 33 feet long on a two feet glass fibre telescop-erected 33 feet long <www.dx-wire.de> with a tripod <www.ukw-berichte.de>. Heli and Bigi had much fun with 10W SSB to make 207 QSOs, including **PY1SX**, **PY5DK** and **PY2LED** to the south, **VA3DXA** to the west and **A45XR** to the east. Heli says, "Not bad for QRP operation with tent and backpack, cooker and foldable table/seat. Each time we had the camp-site on top of a hill, which kept us healthy!".

M1KTA was QRV 23/27 July (including the RSGB IOTA Contest) as **SD7B** and **SM7/M1KTA** including 60m outside of the contest. **M5KVK** was planning to take his KX3 and a collection of EFHW antennas and a short pole from SOTA Beams with him to Sifnos (SV8) in June. **IKØIXI** plans to be QRV 25/27 August from locator JN51XX (Macchiatonda Reserve) with **PA2CHR** who will try meteor scatter on 2 and 6m. Fabio will be QRV with QRP on the HF bands. **GØUBE** spent a very frustrating 14 hours on 4 July comparing three antennas in his back-yard to see if there was any difference in the noise level between them. John spent all afternoon answering calls and making calls with 3W around the QRP QRGs on all HF bands but didn't make any contacts, despite the RBN reporting him 18 times in DL, HA, SM, EA, I and even VE. **MØHDF** was QRV on 6 July as **EA/MØHDF/P** from the beach in EA5 with 5W from a FT-817 and GP antenna. Angel made 55 QSOs including JA, W4, UN and a partial with FK8.

On the right is **G4FBC** at this summer's portable operation in the Lake District using one of his military manpack transceivers, a Fuchs B25 set used by the South African armed forces, with 25W

and 10W of LSB/USB, CW and AM. It features interchangeable units for a battery or vehicle PSU (for 12 to 24V supplies), an auto ATU unit switchable for use with a 7.9 feet whip or long-wire antenna, a SWR/power/output unit for 50 ohm coax fed (dipole) antennas and remote operating capability for up to 1.2 mile. Ron worked **OE9MON** for a nice ragchew and a few SV stations on 14285kHz but the biggest surprise was listening to **JA9LJS** on 17m. He easily copied him at S9+ on just the 7.9 feet whip but as usual his QRP signal was swamped by the QRO calls to him. Ron sys you can see a *youtube* video of the B25 in operation at <https://www.youtube.com/watch?v=z_BTtXVEMY0>.

G3XIZ has been experimenting with balloon supported antennas with a view to getting 200-230 feet of vertical wire up in the sky for LF and MF operations. Chris is making his own hydrogen gas and filling four 12 inch party balloons which are enough to support the thin copper wire at that height. He says, "Initial results are very encouraging and received signals show up to 15dB improvement over my usual 40m end-fed inverted L antenna".



Recent activity at **GØUCP** has been with (increasingly small) loops, the idea being that QRPp is becoming too easy! The picture left shows one of two 18 inch diameter portable loops for 15-20m fed from the homebrew TX LPF, either directly or via a current balun (no difference detected), that John uses indoors. The mini loop visible at 3 o'clock has a bright white LED in series as a tuning indicator that lights with as little as 100mW. He says using power levels of under 1W is difficult on 20m but relatively easy on 15m and above. Contest QSOs have been made with European stations plus some pleasant surprises like **3V8SS** and **J42T** using 1W. Outside of contests John received a 599 report from **UA1CE** in St Petersburg on 20m and WSPR made it to the USA with 200mW but, he says, these are not DX antennas and depend entirely on a robust ionosphere.

GW8RAK recently bought one of the Chinese Forty-9er transceiver kits off *eBay* and found it worked well on RX but the TX only delivered 800mW instead of the claimed 1.8 - 3W, and the driver transistor got very hot. There weren't any spurious oscillations (a problem he has had before) and Graham wondered why the tranaisator was getting hot? **VE3GTC** suggested it was due to the PA transistor, a 2SD882, which is, "garden variety audio amplifier transistor at best" and suggest replacing it with somethingbetter suited to RF duty, such as a 2SC1971, but avoid the cheap fake ones offered on *eBay* and buy good quality like Eleflow. **M1KTA** says the original design used a 2N3866 VHF transistor and a BD139 should also work. **G3MFJ** reminds us that 2N3866 transistors are free from G-QRP Club sales, just postage to pay (£1.20 for UK, others ask Graham). **GI7RWT** has three versions and says they work well and are good fun. The best transistor combination he has found is a BC238C VXO driver and 2N3553 for PA, and another good combination is 2N3904 and BD139.

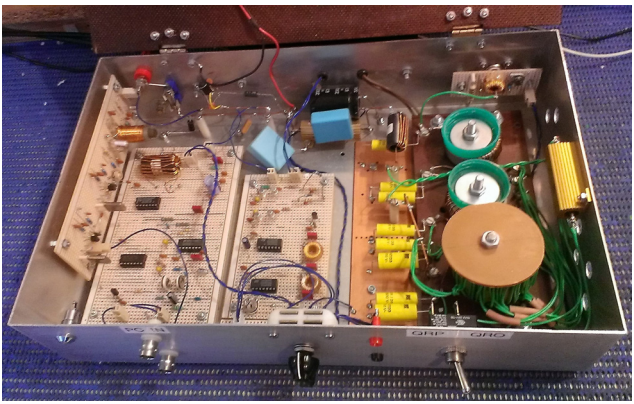
After many years of wanting a valve TX but really never having the time to tackle one, **G4YVM** gave in and bought one on 14 July (pictures right). David does build a lot of stuff, all 12V, and gets a huge buzz from it, his last project being an OXO made from parts

gifted to him by **G4LQF** that he says works fabulously, but he managed to get **G4XWD** to part with his old TX he made 25 years ago. It has a pair of 6BW6s for about 5W CW on 40, 60 and 80m but as David only has two crystals (7010 and 3519kHz) he is asking if any members have a spare crystal or two, particularly for 3560, 3558, 7030 and 7028kHz in 10XJ or 10XJA styles for the valve set, that he can buy? He says the TX works a treat and that as Jim is essentially QRT these days, his old radio is now having a new lease of life in his shack where Morse is a daily event! David now has a shack that is almost all home-brewed, the exception being a TS-590 and an old Yaesu FT101ZD he fixed.

My apologies to **EA2SN** for the typo in the last *Members' News* (page 35) of the URL of Jon's notes about the ILER-40 Buildathon - it should have read <http://iza.gandi.ws/>. He writes, "The information has not been updated yet for the MkII version, which now includes the AGC and some refinements on board. If you plan to build it, the buildathon_2013_iler40 document as well as the annexes may be a good reading. Time allowing I will try to prepare an updated version by the end of the Summer". My thanks to **F5VLF** (**G3PAI**) who points out my reference to **G3RJV** being awarded the Calcutta Cup in the last *Members' News* (page 35) should have read Calcutta Key. John correctly says the Calcutta Cup is for rugby, not amateur radio! I obviously didn't have a very good day when I wrote page 35!

M6FKR, a relatively new member, has not long obtained his first callsign but at 58 years old is more interested in building and operating CW at low power levels than black boxes! To hone his Morse skills, Guy obtained a Kent Morse Practice Oscillator and the picture right shows how he hooked it up to an ex-army Morse key being advertised in *SPRAT*. The key has an odd two-pin connector but is a beautiful relic of the cold war that weighs a ton and will not budge during use! He found a banana-style binding post fits neatly over each pin of the key connector and used the solder tags on these to connect the plug from an old crystal earpiece skulking in his component box. This plugs in to an adaptor that converts it to a standard headphone type plug resulting in a rather nice Morse practice setup.

On behalf of the West Manchester Radio Club, **G4HZJ** thanks those who supported the 19th Red Rose QRP Festival at Atherton on 6 July. Les says special thanks are due to **G3RJV** and **G3MFJ** for giving up their time to represent G-QRP and to the record number of traders who attended. He writes, "This may be the last time that Formby Hall is used as the venue for this event as it comes under new ownership soon. Details of the new venue for 2016 will be publicised when known". **GØEBQ** was pleased to raise over £65 at the East Suffolk Wireless Revival Rally at Ipswich in June, and enrolled three new Club members. Nigel took his Cub copy along and was pleased to receive comments like, "real amateur radio" but the 'icing on the cake' was working W1 with 1W. **GM4VKI** says once again the intrepid duo of **GM3WIL** and himself braved an early start to head up to the Scottish Crianlarich Rally on 5 August, and whilst the rally could be classed as small in size, the camaraderie and banter was just great. From an attendance of 122, 42 signed in at the G-QRP stand and Roy says it was nice to see quite a lot of MM6s in the list. Sales were brisk, especially the Kanga and QRP-Labs kits, two new members and a renewal for the Club, and there must be a surge in the supply of tea as they completely sold out of tea mugs! The next outing will be to Galashiels on 18 October.



G3XIZ made this LF WSPR TX that is now fully operational and worked virtually straight away. It uses an up-converter requiring a stable 544kHz input which is generated from mixing two crystal oscillators. The PA uses a pair of IRF510 FETs in

push-pull and the output power is adjusted using an old 'variac' auto-transformer on the unregulated DC supply. Chris was surprised that with only 5W of RF his signals were being picked up by **PA7EY** at a distance of 216 miles. **GØEBQ** finished a Pixie2 that gives out 100mW with the Nimh battery and although it receives plenty of signals, he hasn't made a QSO as nobody has come close enough. Nigel found that if he put variable capacitance in series with the crystal, the output dropped to almost nothing, which is strange. Also it is actually working on 14055kHz despite keeping all the leads very short. He is now working on a Norcal Sierra which is coming along slowly, and is looking forward to having more time when he retires soon. Having more time when you retire is a myth, Nigel! Despite having retired way back in 1993, I am now busier than ever as I get involved with new hobbies and interests, and the old cliche "I don't know how I ever found time to go to work' is very true!

Above left is **SV3AUW** at the base of the dipole he installed to cover all bands (160 to 10m) with only one antenna at **SV1AIA**. Each leg is 72 feet and it is fed in the centre via 13 feet of ladder-line and tuned with a Furuno AT-5075 ATU at the base of the mast. Takis says most of the time there are mismatches and high SWR but this has almost no importance because in most cases, as the feeder is ladder-line, the losses due to SWR are minimal. Also the transceiver sees an impedance of 50 ohms at the input of the ATU and delivers maximum power while the ATU, being almost in the centre of the dipole, assumes the role of a gamma match, tee match, hairpin match, etc! Small mismatches, because of the length and impedance of the ladder-line, are minor and the final result is not affected. He says this is a true multi-band antenna with more than 98% of the power reaching the input, while the ATU overcomes the losses of the coaxial cable. To those who have automatic ATUs, he highly recommends they build this antenna because the ease of matching/tuning and performance will amaze you!

Despite the usual deterioration in HF conditions in the summer, **G3JFS** manages to make a few QRP contacts each day but has noticed more frequent QRM on the QRP frequencies. Whilst Peter thinks some is deliberate, on other occasions QSOs have been spoilt by people tuning up or calling CQ without checking the frequency first. He finds this happens more on the accepted QRP frequencies than on other parts of the bands. At the end of April he took part in the European CW Association QRS week and was placed 3rd in the QRP section, only a few points behind the leader. Peter's IC-706 died on him recently and as Icom said it was uneconomical to repair, he replaced it with an IC-7100. First impressions are that it is a fitting replacement for the 706 with features he would love to have on his main rig, and once you get the hang of the menus and operating controls, is fun to use. He says there have been some reports of issues with the transmit audio (just as there were with the IC-706) but as he is a mainly CW, RTTY and other data mode operator is yet to investigate this.

G4JQT uses a Heathkit HW9 with various mods, making it much better than when he first built it, with a 148 feet random wire antenna between 20 and 40 feet high. While tuning around an almost dead 17m band at 1800z on 15 January 2014 (yes 2014), Ian heard a weak 'CQ DE **RI1ANR**' and, thinking it was just a Russian station, exchanged reports (sent 579 and received 559) and thought no more about it. He later looked the station up on *QRZ.com* and found it was a Russian station located in Antarctica! Ian also looked up the UK-Antarctica path on **GØKYA**'s excellent propagation prediction site at <http://www.infotechcomms.net/propcharts/> and found there was a theoretical path open - but only just. Ian is able to tune all bands with his antenna using an earth and counterpoise with

the ATU in the shack at one end, but found it quite noisy. This summer he tried a doublet (each leg about 69 feet), but like many radio amateurs, his shack is inconveniently located at one end, not nicely in the centre as shown in all the doublet antenna pictures! Feeding the antenna was a problem as he couldn't trail the ladder-line about 98 feet behind sheds, along the ground, through trees and bushes into the shack. One option was to use a remote ATU at the bottom of the vertical drop of the ladder-line (or at the top centre of the doublet) and feed to the shack with coax, but remote ATUs are very expensive! Then Ian read about the *Comudipole* which has as much open-wire feeder as convenient with a 4:1 balun where it joins quality low-loss coax that is much easier to route to the shack and ATU. Without a side-by-side comparison of the two antennas he says it is difficult to ascertain the differences, but the doublet seems quieter. Unfortunately the new arrangement means no 160m - without a lot of faffing about strapping the feeder and working the lot against earth. Ian says it might be just luck or conditions, but he now works into the USA, Canada and the Caribbean a little more often.

Pictured right is **DDØVR** in his shack where he is building a K2. In December he and wife **DE3BWR** plan to travel from Capetown on a roundtrip to Namibia where Heli hopes to be QRV as **V5ØVR** (callsign to be confirmed). Heli and Bigi will use a rental car and small boarding houses and return in January. They will use the same TRX and antenna used on their 2015 Channel Islands trip but with QRO SSB and QRP CW like they did as **S79VR** in 2014. **W2APF** was planning to travel around Australia in August and be QRV /P and **C6APF/MM** near 4W and YB with his KX3. **K9JWV** says the Oceania DX Contests in October now have a QRP category. The main event for **M5AML** this summer was his casual entry in the RSGB's VHF National Field Day to see who he could work from Derby on 2m with 5W SSB to his indoor five element yagi. John's best GW contacts were with stations near Welshpool, Llangollen, Llandrindod Wells and Manorbier and he made his first 2m contact into GM (near Kirkcudbright) and into EI (near Killann), plus some good QSOs with G stations, the more distant being near Walton-on-the-Naze and Dewsbury. He also participated in the WAB 144MHz Low Power Phone Contest and came third in the Fixed, UK category with 100 points.

G3XBM writes, "There are some *really* kind people in the world. I have received so many kind and caring emails in the last 18 months all wishing me a speedy recovery from my stroke. Thank you all. Today (5 August), in the post, was a small package containing a professional PCB with a built preamp for 136/472kHz. There wasn't even a postmark on the stamp and no note inside. Some kind and generous person just posted me this anonymously. I honestly can't thank you enough, this is *so* kind, and it will definitely get used. When you see all the hate and cruelty in our world it is easy to think that most people are unkind. They are *not*. My stroke has taught me that there are very very many kind and caring people in this world. This very kind person did not even want to reveal his identity. Thank you. I really really appreciate your kindness". Because of the stroke Roger tends to use WSPR quite a bit and avoids speech modes, and has a WSPR-AXE-CW 10m beacon (needs no PC, 500mW and randomises the TX frequency within the WSPR window changing every two minutes), that has been copied in every continent, including Australia and Antarctica, all with a poor low wire antenna covering 10m. On 6m he uses 1W ERP to a V2000 vertical omni antenna and the best spots on WSPR (TX mid WSPR sub-band) are by **4X1RF** (3519km) who has copied him many times. His only SSB activity has been with QRP in the Tuesday 2m and 70cm UKAC sessions where he can usually work 200km with 5W PEP and a very small hand rotated beam or even a halo, but after about an hour his voice has had enough and he has to go QRT.

Thanks to the contributors to this column. Please let me know how your autumn goes for the winter edition of *SPRAT*, what you have been building, who you have been working, and any other information about QRP, by 10 November. Also, interesting photographs 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 photograph 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, including the QRP Winter Sports, so I can let members know to listen out for you.

QSL Cards from Nasko - LZ1 YE

LZ1YE has sent me details of some attractive QSL cards including the Club Log.
Members can make their orders by sending samples, explaining what they want to print, and sending the materials: photos, files...etc via e-mail: qsl@qslprint.com or qsl@kz.orbitel.bg or if no internet access via the postal address: Atanas Kolev, P.O.Box 49, 6100 Kazanlak, Bulgaria. Examples of cards and prices can be seen at **www.qslprint.com**
For people need QSL cards urgently LZ1YE dispatches three days after the payment is made. UK Members can pay via a UK address: Please send your cheque / cash via recorded delivery to: LZ1YE QSP Print service, c/o Melanie Rowe, St. Leonards House, 35 St. Leonards Road, Exeter, EX2 – 4LR, Devon. e-mail: m0mja@aol.com (make cheques payable to : Melanie Rowe)

The Mountains, the Sea and Miles of unspoiled Beach . . plus amateur radio

G3RJV has a Wooden Lodge situated in the Dyfi Valley in central Wales close to the Irish Sea and in the Snowdonia National Park. Well maintained with a large living area, conservatory, double bedroom, twin bedroom plus a double bed sofa in the living area.

Naturally there is a small amateur radio station with a QRP HF transceiver and a 2m multimode. An easy to use station in a quiet location with lots of local places to visit and a vast open sandy beach only 3 miles away all set in wonderful walking country.

Enquire via G3RJV or email g3rjv@gqrp.co.uk
Google "***acelticlodgeforrent"*** to find pictures and further information.

GQRP Club Sales

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

Antenna Handbook – 2nd edition – members £6.00, non-members £10.00 plus post } £2.00 (UK) or £5.50 EU
Radio Projects volumes 1, 2, 3 & 4 – by Drew Diamond – members £6, non-members £12 } 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 - **£1.50 each** } £3.50p (EU); or
– 2 gang – (both 8 to 285pF) c/w shaft extension & mounting screws - **£1.50 each** } £4.50p (DX)

Pair 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, } plus **postage**
7.028, 7,030*, 7.040, 7.0475, 7.122, 10.106, 10.116*, 14,060*, 18.086, 18.096, } (ANY quantity)
21.060, 24,906, & 28,060 all are **£2.00 each** (* = also available in low profile HC49/S) } £1.20 (UK), or
HC49U crystals- 1.8432, 3.500, 5.262, 7.00, 10.006, 10.111, 14.00MHz – **50p each** } £3.50p EU, or
HC49U crystals – 2.00, 3.00, 3.20, 3.579, 3.5820, 3.6864, 4.0, 4.096, 4.1943, 4.433MHz } £4.50p (DX)
4.5, 5.0, 6.0, 7.2, 7.6. 8.0, 9.0, 10.0, 11.0, 12.0, 13.50, 15.0, 16.0, 18.0, 20.0, 24.0, 25.0MHz }
26.0, 27.0, 28.0, 28.224, 30.0, 32.0, 33MHz – **all 35p each** (Some of these are low profile) } Post free
Ceramic resonators – 455, 480kHz, 2.0, 3.58, 3.68, 4.00, 14.32 & 20.00MHz **– 50p each** } if ordered with
Diodes - Schottky signal diode – 1N5711- 20p each; 1N4148 GP Si – 10 for 10p } with heavier
Varicap diode – **MVAM109** – 40pF @ 9v, 500pF @ 1v. **50p each** } things
SA602AN - £1.50 **(note – I may supply NE or SA, 602 or 612 as available. All are fully interchangeable.** } like binders, 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 - £0.40, LM386M-1 SMD – 35p** } or filters
TDA7052A - 4.5 to 18v, 1W 8pin **DIL** low noise & DC vol control – **£0.60 each** } Use just
TDA2003 - 10w Audio amp 5pin – **£0.25 each (Stocks now low – 2 maximum please)** } 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 **- 8p each** } with books
2N3904 transistors (npn) fT - 300MHz, hFE-150, VCBO +40V **- 10 for 50p** } or CDs
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** } postage
FETs - IRF510 – 50p; 2N3819 - 22p; 2N7000 - 10p; BS170 – 8p - all each } as books
BF981 – Sorry – all gone – I am looking for more } 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. }
This 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 }
4.7, 6.8, 10, 15, 18, 22, 33, 39, 47, 56, 100, 150, 220 and 1000 - all uH and all 18p each. }

Toroid Cores – **priced per pack of 5 – max of 2 packs of each per member**
T25-2 – 50p, T25-6 – 60p, T30-2 – 60p; T30-6 – 70p ; T37-2 – 75p; T37-6 – 80p; T50-1 - £1.00; T50-2 – 90p;
T50-6 – £1.10; T50-7 - £1.20; T50-10 - £1.20 ; T68-2 - £1.80 ; T68-6 - £2.20; T130-6** - £2.00ea. FT37-43 – 90p ; FT50-43 - £1.20 ; FT37-61 - £1.20 ; FT50-61 - £1.60; BN43-2402 - £1.20; BN43-202 - £2.00; BN43-302 - £2.00; BN61-202 - £2.40. Ferrite beads – FB73-101 (3.5mm dia x 3.2mm long, 1.2mm dia hole) – 40p for 5
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** ** **items** – they are heavy and each counts as 2 packs (ask for quote if you want more than 2 of the large toroids)

SBSS PCB clamps – single - £12, two - £20 all plus post (£3.50 UK & EU : DX – order direct from Rex please)

MeSquares & MePads - £6.50 each plus post (£3.00 UK & EU : DX – order direct from Rex please)

Limerick Sudden kits RX & **TX** both single band (160 through 20m); **ATU** (80 through 10m) **£38.00 each plus post**
UK - £3.50, EU - £5.40, DX - £8.00

Sprat-on-DVD – 1 to 160. Only £5 each to members plus postage, UK - £1.20, EU - £3.50, DX - £5.00

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 – 3.00, DX - £4.00. More - add £1.10, £1.50, £2.50 each)

Cheques (UK) and payable to G-QRP Club. Sorry, but cheques in other currencies are uneconomical to us due to bank exchange charges!

MINIMUM ORDER for cheque or PayPal payments is £5 **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 g3mfj@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