



# SPRAT

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DEVOTED TO LOW POWER COMMUNICATION

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SUMMER 2012



**MODGQ 40m Transmitter**

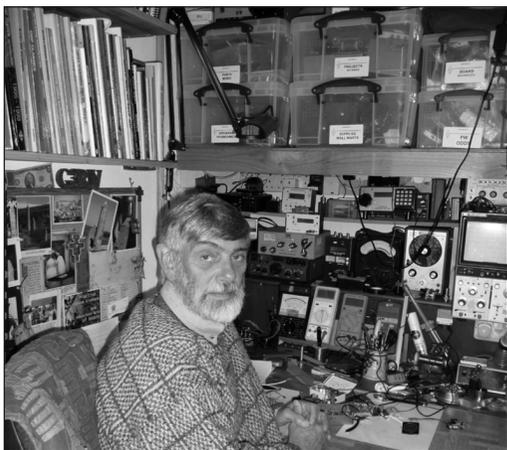


**Tiny Toy Transceiver**

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Antennas, Anecdotes, Awards ~ Communications and Contests  
Member's News ~ Club Sales

# JOURNAL OF THE G QRP CLUB



**Rev. George Dobbs G3RJV**



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Unable to attend Dayton this year, in May I attended the annual EA-QRP meeting in Sinarcas, about 100 Km from Valencia. Nando EA5AHN the EA QRP Club President was my host. It proved to be a delightful and informal weekend with lectures, a flea market and a club QRP station using homebrew and commercial equipment. Bernie GM4WZG, a fluent Spanish speaker, also attended with his wife. If you fancy a laid back weekend with fellow QRPers in a lovely part of Spain, I can commend this annual event. Two days of QRP that could fit in with a holiday in this area of Spain.

In this issue we have details of the Rishworth QRP Convention and the associated Constructor's Evening. I hope to see many members at both events.

72/3

G3RJV



## The W1FB Memorial Award 2011/2012

Rather sadly, for the first time ever, I had no entries for the annual W1FB Memorial Award. I need to think of a theme to attract more people to enter. I hope to announce this in the next issue of SPRAT.



# THE G QRP CLUB MINI-CONVENTION

(in conjunction with the Halifax Radio Society)

**Saturday 20th October 2012**

**The Rishworth School, Ripponden**

**OPENS AT 10.00am**

**ADMISSION £2**

**DOORS OPEN 10am**

**TALK-IN S22**

**LARGE SOCIAL AREA**

**LECTURES ON**

**QRP SUBJECTS**

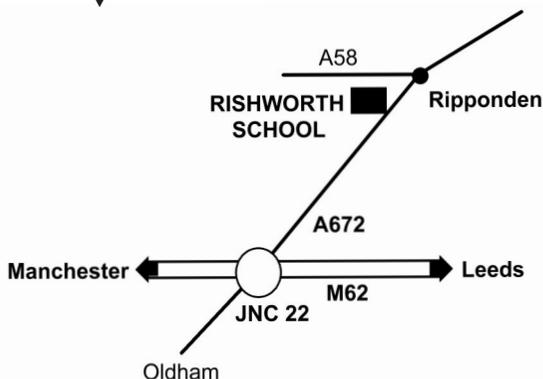
**BRING & BUY - SURPLUS JUNK**

**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 ("Stockton" Power/SWR Bridge) to be held at  
Premier Inn, Salterhebble Hill, Halifax, HX3 0QT. (Tel: 0871 527 8486)  
[www.premierinn.com/en/hotel/HALPTI/halifax-south](http://www.premierinn.com/en/hotel/HALPTI/halifax-south)**

**Other suggestions for local accommodation:**

**The Premier Inn, Milnrow. Junc 21 on the M62 (Tel: 0871 527 8936)  
[www.premierinn.com/en/hotel/ROCTHE/rochdale](http://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](http://www.malthouserishworth.co.uk)**

**The Turnpike Inn, Rishworth, excellent but quite expensive. (01422 822789)  
[www.turnpikeinn.com](http://www.turnpikeinn.com)**

## Chirpy 10m transceiver

Roger Laphorn, G3XBM, 37 Spring Close, Burwell, Cambridge, CB25 0HF

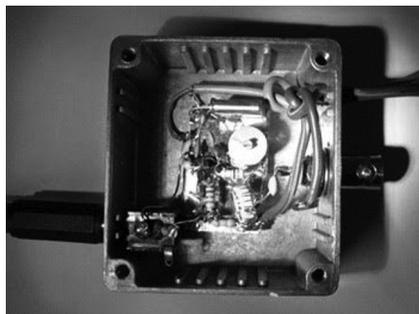
<http://www.g3xbm.co.uk>

<http://g3xbm-qrp.blogspot.com/>

This is probably the simplest, full break-in 10m CW transceiver possible. Based on my XBM80-2 design for 80m, this is essentially the same circuit redone for a 28.060MHz *fundamental* crystal. Power output is around 100-200mW, which is more than enough to cross the Atlantic on a good day. Unfortunately the keyed oscillator does produce a fair amount of chirp on the CW, hence the name. I've not yet overcome this so I guess one cannot expect perfection in something this simple.

The circuit is a crystal controlled Colpitts oscillator used on TX with the key down and as a direct conversion receiver with a single stage oscillator-mixer and separate audio gain stage with the key up. Very inexpensive, ubiquitous, 2N3904 transistors are used. One can argue whether this receiver is a direct conversion or a regenerative one: in a single stage it is probably not possible to say it is one or the other.

At least the receiver is crystal controlled and does not need a reaction control, so on balance it is more likely best described as a direct conversion receiver. The receiver audio output into the high impedance crystal earpiece is low, but it can hear down to around 2uV (-100dBm) in a quiet room. Your ears may be better than mine. This sensitivity has been checked on 3 different examples built. There is no real audio selectivity so you will need to use your "ear-brain filter" to select the 800Hz-1kHz received audio signal.



The frequency shift between RX and TX (about 1kHz) is just about right to listen for replies on the TX frequency. Broadcast breakthrough does not seem to be an issue at all, which is surprising as there is little front end selectivity or rejection of out of band signals.

The transmitter really needs the simple 3 component low pass filter (shown on the RHS in the circuit) adding for serious use, but this was omitted in the basic "no frills" version. It is possible that an ATU will provide the additional filtering in some set-ups.

Notice there is no supply decoupling in the basic version This should be added if the supply impedance is not very low but you can get away without (wishing to keep component count absolutely as low as possible) if using a low impedance battery supply and short leads. Don't try using a mains PSU as audio hum will be a problem.



# The 'Tiny Toy' – a 40m CW QRP transceiver

By Peter Parker VK3YE (Originally appeared in Lo-Key, March 2012)

## Introduction

You sometimes see circuits for so-called 'minimalist' QRP transceivers. These are typically crystal locked, run a few hundred milliwatts and have a rudimentary receiver. Such rigs prove that a transceiver needs only a few parts to function. Their intricate construction makes them great conversation pieces. And minimalist rigs are good for teaching the basics; starting simple and adding stages to improve performance is a legitimate design method. As is the opposite - or 'Muntzing'<sup>1</sup> - that removes parts from more complex circuits until they stop working<sup>1</sup>.

Minimalist rigs unfortunately often fall short as 'contact getters'. Fixed frequency combined with low power means certain failure, at least in VK. This is because most QRP contacts are made by calling other stations rather than calling CQ yourself. This means you must hunt for other stations on their frequency; they won't come to you. Frequency agility is probably worth at least a 10 or 20dB RF output power increase.

Simple receivers are another weakness. Wide selectivity can perhaps be tolerated as the brain is an effective audio filter. However broadcast station overload, hum, microphonics, poor sensitivity and low volume all make operating frustrating, especially when making the coveted 2 x QRP contact.

The 'Tiny Toy' presented here avoids the worst vices of the ultra-simple rigs. For a start it has a wide-swing twin crystal VXO that covers most of the 40 metre CW segment. And, instead of using the collector/emitter junction of the final transistor as the receiver detector, I've used a separate NE602 stage with some gain. I kept the battery power, but used 4 x AAs for a six volt supply rail. These are cheaper and have longer life than the small nine volt batteries.

## Circuit Description

Critical to the rig's success is the wide-swing VXO stage which uses two 7030 kHz crystals in parallel. I achieved 7005 – 7028 kHz coverage with 2 x 15 uH RF chokes in series with it and a plastic tuning capacitor. The crystals are cheaply available from Expanded Spectrum Systems ([www.expandedspectrumsystems.com](http://www.expandedspectrumsystems.com)).

The oscillator is followed by a driver and a keyed power amplifier stage. At 6 volts expect around 100 to 200 milliwatts. Those using a 12 volt supply should get nearer 500mW, but I would suggest a 6 volt regulator for the VXO and receiver stages.

The receiver mixer is a standard NE602 stage. I've found a fixed 4.7 uH RF choke and 100pF capacitor to form a satisfactory (and small) front end tuned circuit for 7 MHz, but you may wish to experiment with values to optimise.

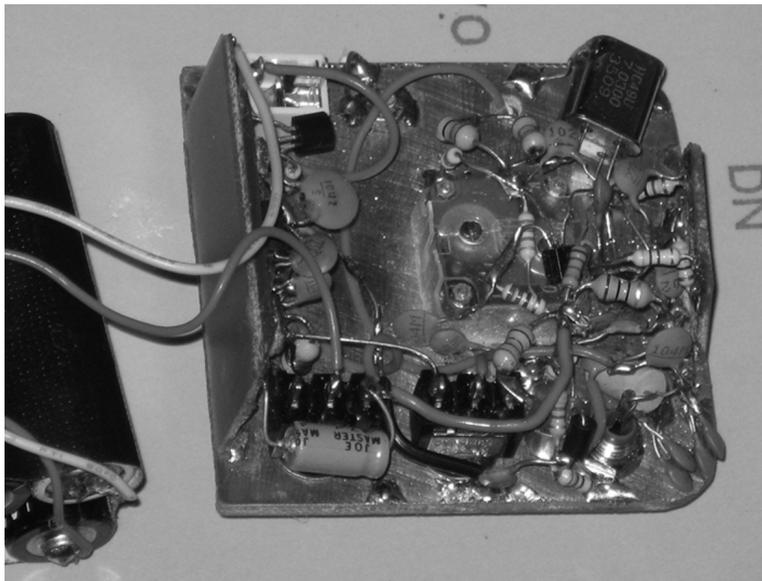
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<sup>1</sup> Named after the American TV engineer-salesman who built cheaper and simpler sets suitable for strong signal areas only. The legend goes that he snipped out any part that was not strictly required for the set to work in front of his factory technicians.

A BC548 audio stage drives a crystal earpiece to good listening volume. An LM386 stage and low impedance phones could be used instead but use more parts and power.

A low pass filter is permanently in the antenna lead. Transmit/receive switching is strictly manual. Change the switch and reset the frequency (no frequency offset being provided). While making the rig awkward for contesting or high speed operating, it aids simplicity. The Tiny Toy will also teach you to how to send Morse without sidetone!

### Construction



A shallow U-shaped chassis was formed out of printed circuit board material, with the largest piece being the front panel. This fits into a small food container which also houses the batteries (taped together with no holder).

Solder all components point to point, with grounded parts anchored to the chassis. The NE602 is soldered up side down with the earthed pin (3) carefully bent to touch the board. The faint of heart should use a socket as a damaged NE602 will ruin your day.

Build the VXO and buffer first. Optimising shift may take several hours but is well worth it. I used RF chokes available from Jaycar. Several smaller values in series may work better than one of an equivalent larger value. Short both sections of the tuning capacitor to maximise downward swing and set both trimmers to minimum to maximise top end coverage.

Experiment with inductor and capacitor values as even quite small changes greatly affect coverage. Carefully soldering the two crystal cans to each other and to chassis via a short wire offset improves mechanical stability and drops the frequency by about 2 kHz. Again don't attempt this unless confident. Aim to get the maximum VXO pulling range

consistent with stability and output; the more you pull a crystal the greater the risk of instability and/or chirp.

The transmitter PA and pi network can be built next. With the key down the output should sound clean without broadband hash or radiation on other frequencies. If this is not the case, tame the beast by experimenting with decoupling capacitors, ferrite beads, low value base resistors and the like.

Once happy, build the receiver. This should work first time. At least in urban areas sensitivity should be sufficient to hear band noise. If your audio output is low, try another crystal earpiece as I've found that they sometimes vary. Failing that (or if you don't have a crystal earpiece) use an LM386 stage instead.

In use the main differences between this and other rigs is (a) the lack of a sidetone, (b) manual transmit receive switching, and (c) the need to zero beat the other station before transmitting (there being no automatic 800 Hz offset). This takes a bit of getting used to and makes the rig less suitable for fast contest work.

More advanced builders may care to add automatic T/R switching and frequency offset. Obtaining a constant shift is difficult with VXO circuits. One possibility, successfully used by the author in another project, is to have two variable capacitors on the front panel, with the T/R switch or relay changing between them. This provides split frequency capability and the ability to independently tune the direct conversion receiver off to whichever side provides clearest reception.

## Results

A couple of hours after dawn or before dusk seems to be good times to operate with milliwatts on 40 metres. Band noise and competition from DX signals is less than during the hours of darkness.

Mere milliwatts can be heard several hundred kilometres away. The first contact was with Tom VK7LF, followed by Mike VK2IG and Keith VK2WQ. Contact with VK2 (spanning distances up to 700km) was repeated the following weekend, this time from the beach. The antenna was a 22 metre end-fed wire, tuned by a small L-match coupler.

## Conclusion

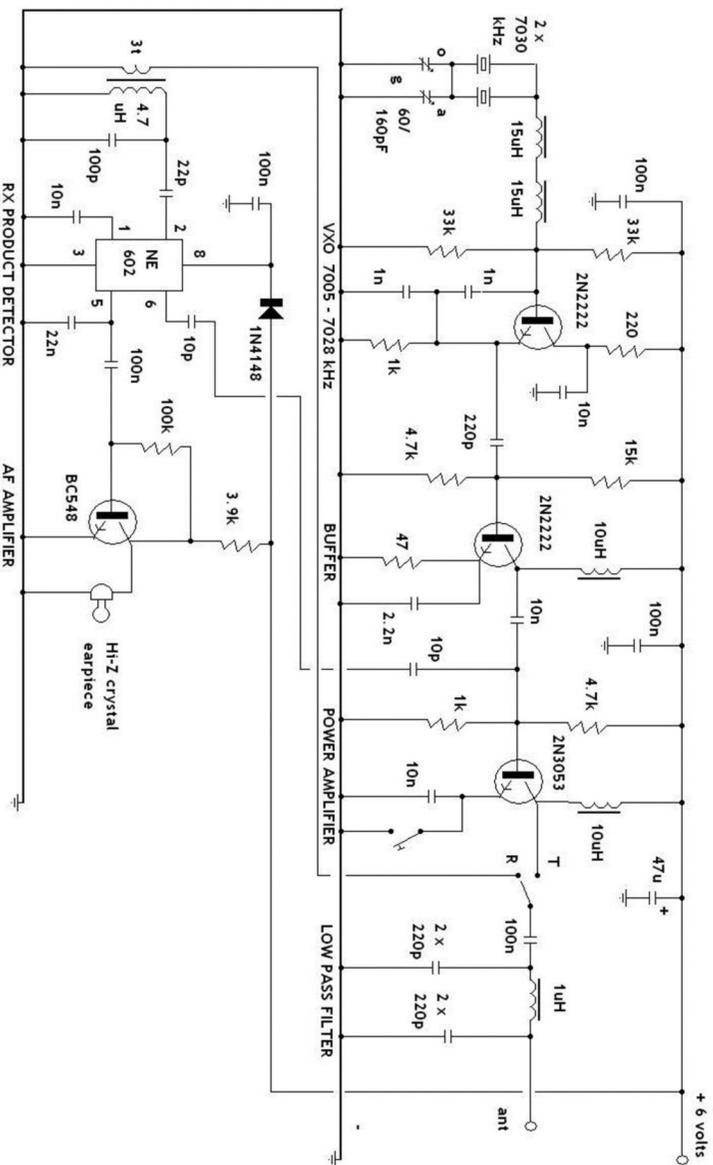
While its power still puts it in the novelty rig class, the Tiny Toy's wide frequency pulling range and reasonable receiver make it more usable than many. It's no DX machine but fun to build and use, with some amazing distances possible.

Tiny Toy on YouTube

[www.youtube.com/watch?v=DvHfRjvjUN4](https://www.youtube.com/watch?v=DvHfRjvjUN4)



# 'Tiny Toy' 40 metre CW transceiver



VK3YE

# A Light Transmitter/Receiver

John R. Hey G3TDZ, 8 Armley Grange Cres. Leeds. LS12 3QL

The interesting article by G3XBM in SPRAT 150 has woken me up. Last year after three pieces in RadCom, I got experimenting with light sensitive diodes, finding in a box marked LEDs certain types were sensitive to light, so two receiver circuits were tried, firing a 5mm red LED with a series FET and a bipolar, a moderately good waveform could be detected.

Deciding to try high level modulation, that is using a modulation transformer, driven from a small audio amp, a very much bigger and cleaner waveform was seen. The transformer was a scrap junk 240V winding plus two 20V windings. I neglected the primary winding and fed the audio into one 20V winding and the second 20V winding in series with the LED.

So pleased with the results, I decided to go for the real thing and build a complete transceiver using 100mm drain pipes. Using two 100mm lenses, from the Pound Shop, back to back in each tube, the much shorter focal length enabled the tubes to be reduced to 21.5cm. The lenses are held in the tubes with rings of PVC cable using PVC glue.

Slots were cut to allow focusing, with the bathroom door acting as screen. A 3W ultr-bright red power LED is mounted on an L-shaped bracket which can be slid forward and backward till a sharp, hardly diverging beam is viewed. DON'T LOOK INTO THE BEAM.

## The Transmitter

Having not done any electronics for a few years due to fading eyes and poor dexterity, the easy option was taken, employing a 5W module kit from Maplin driven from a Maplin variable gain pre-amp. The transformer described above was too large for the chosen box and one wound from a scrap audio transformer used instead. It was hoped to get a typical LS transformer, usually rated 5W, but all the ones found were securely varnished. A larger size (I think they were called 135) which had unvarnished loose laminations was tried, so winding 100 turns of 24 SWG for the primary and another 100 turns as secondary, and an old tag strip glued on as terminations, the laminations hammered back in and clamp refitted. The lash-up detector indicated a very good waveform and audio from a rally-bought microphone appeared to work well.

## **The Receiver**

Here I was forced to make a printed circuit. The layout proved an easy task, but I dare not show you the underside, it looks awful, but it worked. The light sensitive diode, this time bought from Maplin, is mounted on a similar L-shaped bracket in an LED holder, its focal point found by temporarily fitting a 5mm red LED which is the same size, and focusing on the bathroom door again, then replacing the LED for the light diode.

The receive pre-amp is a cascade using a 2N5457 FET with a bipolar BC548. Because the circuit is of very high resistance, hence sensitive to any background noise or hum, a screened wire is essential between diode and pre-amp; the L-shaped bracket must be earthed similarly. The network following the detector stage is a 50Hz filter to prevent hum from street lights. A variable gain amplifier, 1 to 84 gives sufficient control of sensitivity, then after a volume control, a common LM380N power amp and speaker. There is quite a bit of latitude in the values chosen, except those in the filter.

## **Assembly**

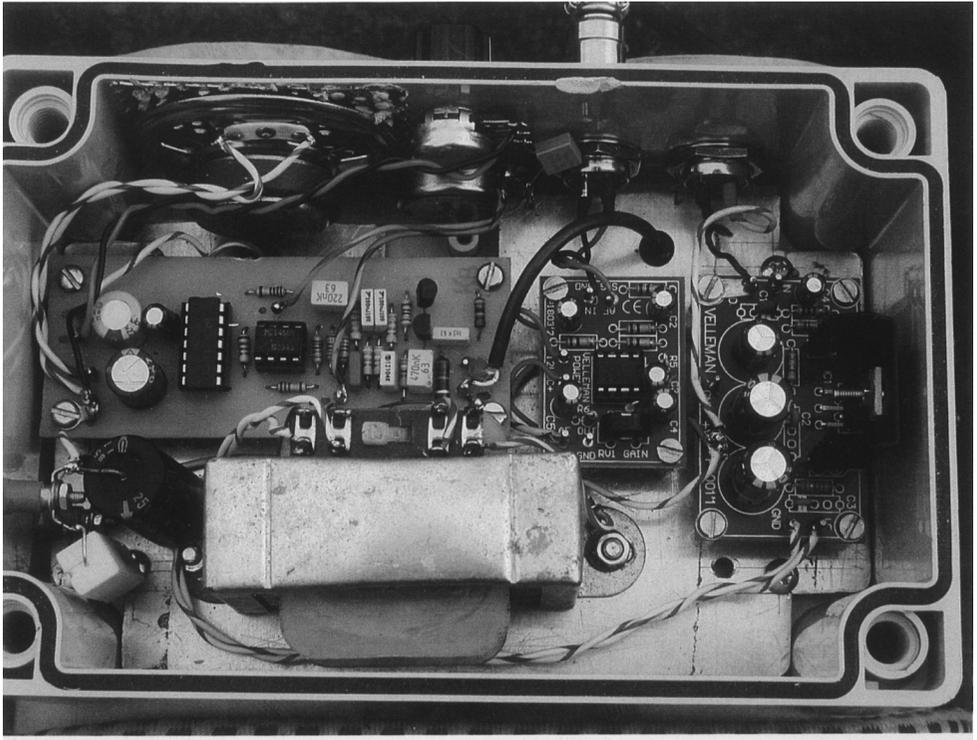
After choosing a suitable plastic box, an aluminium chassis was fitted to house all the electronics; holes with grommets allowing the Tx and Rx cables, routed into the drain pipes. All three PC boards are mounted on stand-offs or distance pieces. A chair leg socket from B&Q eases fitting to an industrial tripod with two pieces of plywood fitted with hinges and an 8mm screw with cross piece allowing pan and tilt.

Placing a mirror down the garden produced a loud howl when illuminated I think it works!

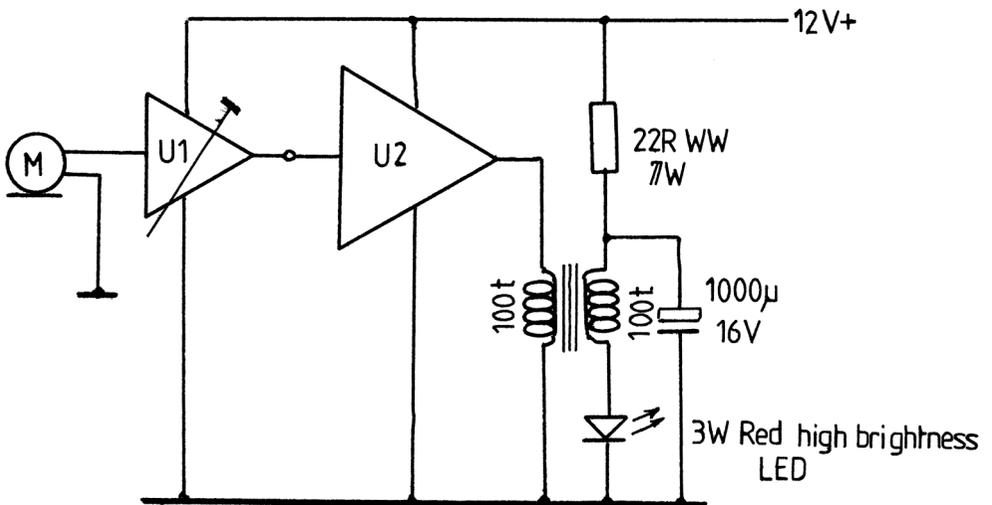
## **Action**

May a through SPRAT invite others to have a go; it is at 3W, QRP after all. I have HF on most bands, plus 2m VHF and my e-mail is [john.hey@talktalk.net](mailto:john.hey@talktalk.net). Less than 10 miles away we have a tall hill, 900 Feet asl. Otley Chevin, with good take off in every direction except due west where the hill becomes higher, a car park with good views to the North and the North York Moors and high spots in the Dales.

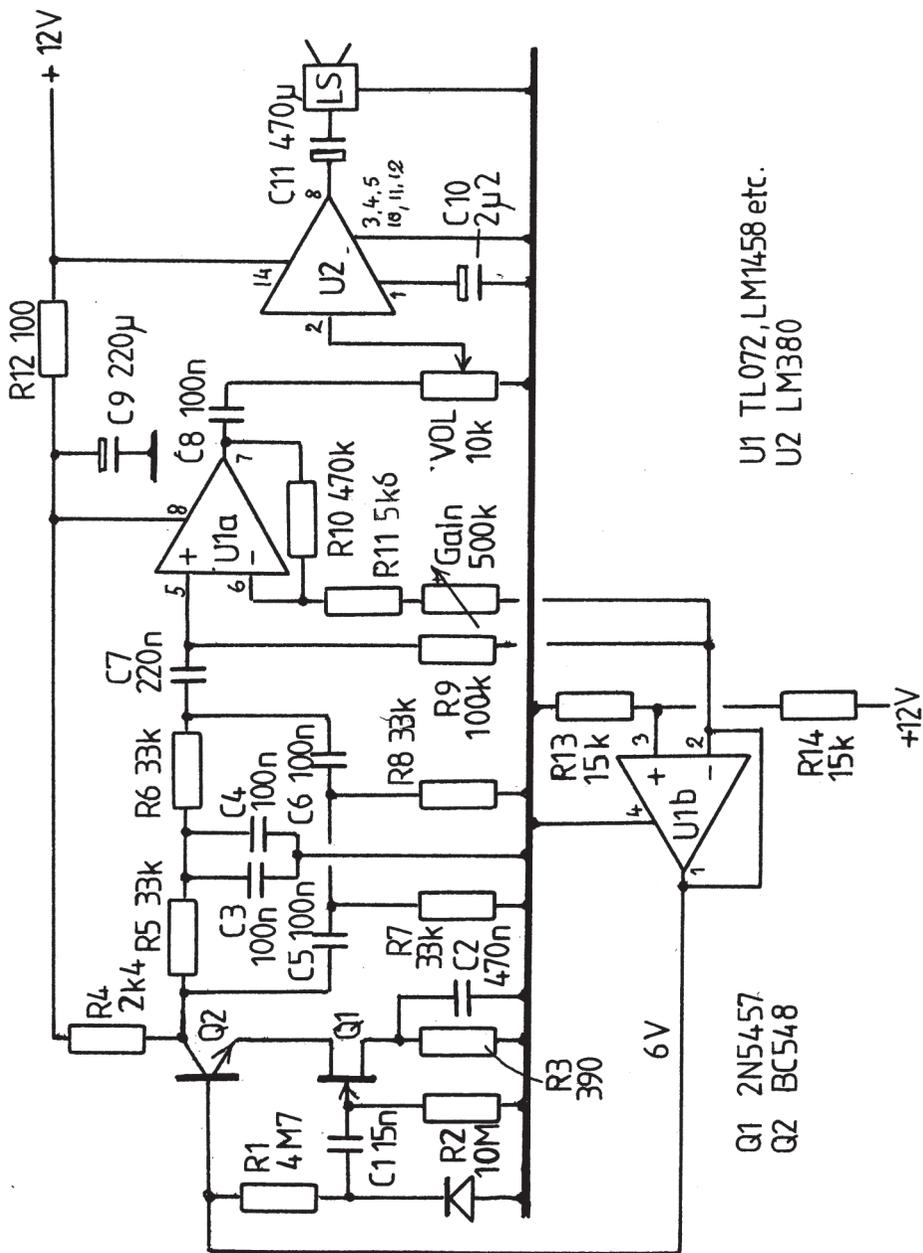




The Transceiver electronics



The Transmitter



U1 TL072, LM1458 etc.  
 U2 LM380

Q1 2N5457  
 Q2 BC548

# The Receiver



**Radio Constructor's Evening**  
**Friday 19th October**  
**The Premier Inn at Halifax from 7.30pm**  
**(The evening before the Rishworth Convention)**

After the successful Constructor's Evening last year, again we have secured the use of the large room at the Premium Inn at Halifax, some 6 miles from Rishworth for a "Constructor's Evening".

**Featuring:**

- **Buildathon**

Build a project under the guidance of experienced constructors  
The buildathon project will be a "Stockton" Bi-directional Power/SWR bridge. Two meters are included and the kit will cost £15

- **QRP Show and Tell**

Bring along your favourite QRP project – show it off and tell us about it. PowerPoint is available for those who want to show drawings and pictures.

- **A Free Buffet Supper.**

- **Large Meeting Area with bar and free tea and coffee**

To meet up and chat with fellow QRP Fans

The idea is to have an evening for anyone interested in radio construction – showing their projects, sharing ideas or joining the buildathon. If you are interested in being part of the Constructor's Evening let George ([g3rjv@gqrp.co.uk](mailto:g3rjv@gqrp.co.uk)) or Graham ([g3mfj@gqrp.com](mailto:g3mfj@gqrp.com)) know (postal addresses are also in SPRAT).

The location of the hotel is

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

<http://www.premierinn.com/en/checkHotel/HALPTI/halifax>

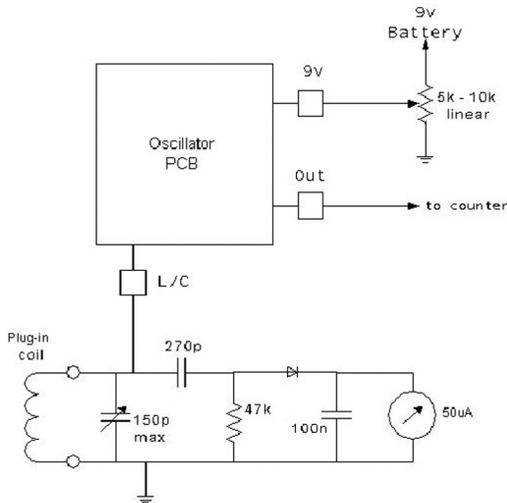
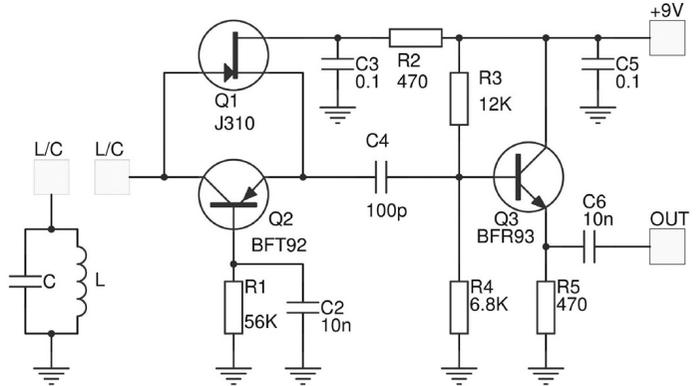
Bring and Buy Flea Market Exhibitors	Entry £3.00	Sunday 2nd September	Doors open 10:30	Catering Enginuity Museum Discount
	<b>Telford Hamfest 2012</b>			
	Enginuity Centre, Coalbrookdale, Telford, TF8 7DU			
	<b>Lecture Track: Stuart Wisher G8CYW (winner of RSGB Ostermeyer and G3BNL trophies) on</b>			
	<b>Adventures in Optical Communications</b>			
Come and join Stuart in the conference room to learn about his kit and the practicalities of operating with optical communications				
Traders, exhibitors and flea market Info: Martyn, 01952 255416			Talk In GB4THF-522 GB3TF 433.200	

# Cascode Oscillator Kit in SMD

Stefan Petrov, LZ10V, stefangp@yahoo.com

In a previous SPRAT, I described a cascode sine wave oscillator using a lambda circuit which does not need any taps on coils or feedback capacitors. Other articles from 9A2HL show how this oscillator can be used as a dip oscillator, or to measure the resonance of a tuned circuit with a counter on the output.

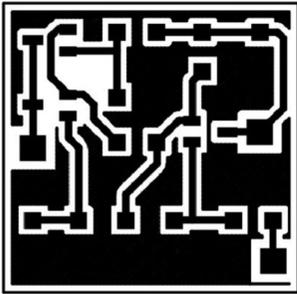
I have made a new PCB for a slightly different circuit and kits are available (see below) which contain the PCB and all components needed. The components are SMD, but I have used the 1206 size to make it as easy to build as possible. With the right tuned circuit, this oscillator will work from less than 10kHz to more than 100MHz.



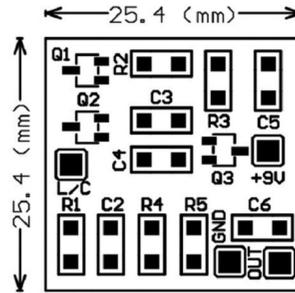
9A2HL's dip oscillator uses a 150pF (max) variable capacitor and plug-in coils, with diode detector across the tuned circuit to find the dip. You could add these components on to the socket for the coil or to the tuning capacitor.

He also has a potentiometer to vary  $V_{cc}$  and he says if you set this around the middle, the oscillations are quite even across the tuning range. The adjacent diagram shows how to make this dip oscillator using my PCB.

Oscillator Tracks (from top)



Oscillator Components (from top)

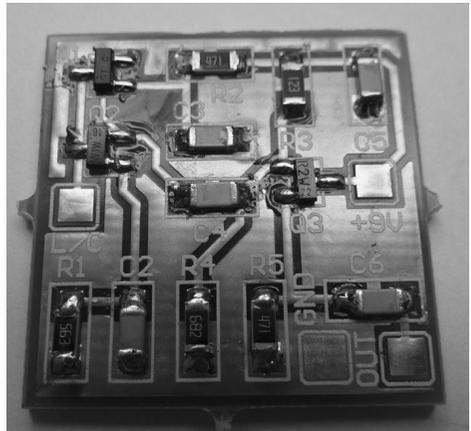


The parts in the kit are all marked with coloured lines or dots of colour; and the included slip of paper tells you what is what. The resistors also have the value in tiny writing, and the transistors have code numbers – but you will need a magnifying glass if you wish to read them. Capacitors are not marked at all.

To assemble the kit, it is best to put all the components into a shallow tray to prevent them jumping on to the floor, and to fix the pcb down with tape or blue-tack.

Start with the resistors, then the capacitors, finally add the transistors.

There are many ways to assemble SMD by hand, here is what I do: Take a few cm of the enclosed solder and gently squash it a bit flat. Now chop it into lengths of 2 – 3 mm and sprinkle them on the pcb. To solder a component, position it on the pcb and hold it in position. With a fine screwdriver, push a piece of solder so it's on the joint to solder – because you have squashed it, it won't roll away. Now apply the soldering iron and the joint is made.



If you are using the oscillator at high frequencies, you can keep the leads short by connecting the tuned circuit between the L/C pad and the end of R1 nearest the corner of the PCB

The kits are available from club sales. They are £10 each plus £1 postage. Address & payment info is on the back page of this issue. There are a limited number of kits available so, if the offer is oversubscribed, out will come the G-QRP hat. If you are ordering with other things, then as usual, postage can be combined, but if you are sending a cheque, send a separate one for the £10 for the kit – then it can be returned if need be.

The club is very grateful to Chris Bryant, G3WIE, for organising these kits for us.

# The Tiny Beacon

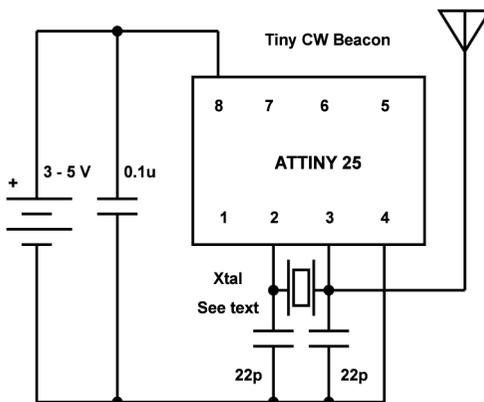
Rich Heslip, VE3MKC, 6656 Bluebird St. Box 19. Kars. K0A 2E0. Canada

At only seven parts including the battery and antenna the Tiny Beacon is probably the simplest beacon ever. It can operate in CW or RTTY mode and can be used as a wireless sensor. As I write this my coin cell powered Tiny Beacon reports that the temperature in my garage is -21 degrees C. FN25 is cold in the middle of January!

The Tiny Beacon was inspired by KD1JV and K7TMG's wireless HF thermometer designs. Both designs use an Atmel Tiny 13 microcontroller to read a temperature sensor and key a discrete oscillator to send temperature readings in Morse code. I used the newer Tiny 25 which has 2k of flash memory, 128 bytes of RAM and 128 bytes of EEPROM. It costs about \$2.

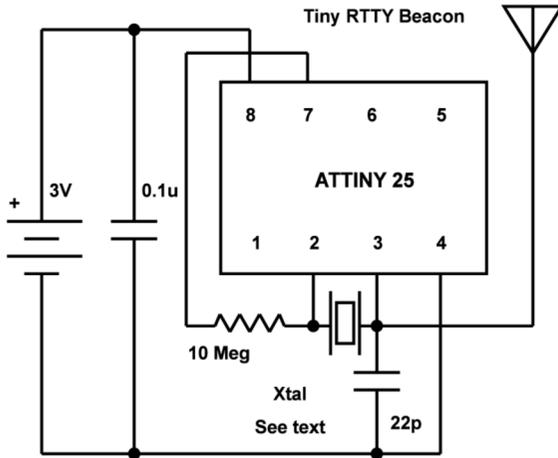
The Tiny 25 microcontroller has a couple of features that can reduce the parts count to a minimum – an on board crystal oscillator, a temperature sensor and a watchdog timer. In this design the crystal oscillator is used as the transmitter. Simple hardware and software allows the Tiny Beacon to transmit using on-off keying or frequency shift keying.

The crystal oscillator in the Tiny 25 can run up to 10mhz on a 2.7v supply and up to 20mhz at 5v. Radiated power from the crystal oscillator is very low – a few microwatts. With a foot or two of wire as an antenna I can copy the beacon quite well 100 feet from my backyard vertical. For “DX” operation you will have to add an RF power amp – later on in the article I'll describe how this can be easily done. The Tiny Beacon's power output is low but its power consumption is also miniscule – 800 uA while transmitting and 4 uA while sleeping. A small coin cell will power the Tiny Beacon for a month or more and two AA batteries will keep it running for a couple of years. A small solar cell and a supercapacitor will run it forever !



I wrote the Tiny Beacon software using the BASCOM AVR BASIC language compiler which supports most of the AVR family processors. The free Windows demo version can be used for programs up to 4k in size. The Tiny Beacon program only uses about 1k of memory so there is unused flash in the Tiny 25 to add more features. If that's not enough there are Tiny 45 (4k) and Tiny 85 (8k) versions of the chip.

To send CW we use on-off keying. When the Tiny is powered up the oscillator runs which is “key down”. The oscillator stops when the Tiny is put into power down mode – “key up”. The watchdog timer is used to wake the chip from power down. By using software timing loops to produce the dits and dahs and the watchdog timer to generate proper spacing between dits, dahs, letters, and words we can generate perfect Morse code. The Tiny 25 has eight possible watchdog timeout values which limit the Morse speed options somewhat - I used 18 wpm. The watchdog timer is also used to time the interval between transmissions.



The FSK version of the beacon uses a resistor from one of the Tiny 25 outputs to frequency modulate the crystal oscillator. The resistor changes the switching threshold of the oscillator which results in a small frequency shift. In my tests a 10 megohm resistor shifted an 7.07 mhz crystal almost exactly 170 hz with a 3V supply – perfect for RTTY 45. I suspect the shift will vary with the parts you

use so experimentation may be needed to get the correct frequency shift. Alternatively you can use a varactor diode to tune the oscillator which involves a few more parts.

BASCOM can create a “soft UART” on any pin to modulate the oscillator. The code for a simple RTTY beacon is almost trivial:

```

$crystal = 883750          ‘ tell BASCOM what frequency we are using
                           ‘ in this case the external xtal is 7.07 mhz
                           ‘ fuses set for processor clock divide by 8
                           ‘ slow processor clock saves power !

```

```

Open “ComB.2:45,7,n,1” For Output As #1 ‘ create a soft UART on pin 7

```

Do

```

    Print #1, “VE3MKC Tiny RTTY Beacon”

```

```

    Waitms 1000           ‘ wait 1 second

```

Loop

```

    ‘ send forever

```

No power management is done in this example – the circuit consumes about 800ua.

The Tiny Beacon programs I wrote are somewhat more sophisticated than this example. My code transmits a temperature reading and then powers down for about 20 seconds before sending again. The CW beacon program has to generate timing for dits, dahs, letters and words which complicates things a bit more.

You will need some hardware to program the Tiny chip's flash memory. There are many Atmel AVR microcontroller programmer designs available on the internet or you can buy an inexpensive unit. BASCOM supports many of these with its built in programming tool. I use a very simple homemade PC parallel port programmer. It's important to program the fuse bytes on the Tiny 25 to use external crystal oscillator mode. The chip has an internal 8 mhz RC oscillator but its not stable enough for RF use. There is another fuse setting to clock the processor at 1/8 of the oscillator frequency which is helpful to reduce power consumption. If you tell BASCOM what the processor clock speed is it will adjust all the timing loops for you.

### **What else can you do with the Tiny Beacon ?**

There are lots of capabilities of the Tiny 25 we haven't even used yet! Pin 1 is normally RESET but it can be used as an input if you reprogram the fuse bits. Beware – once you do this you can only reprogram the chip with a special programmer (I learned the hard way). Pin 5 can be used as an input or an output and it can also wake the chip from power down mode. It could be wired to a switch for example and the Tiny Beacon could wake up and send a message when the switch is closed. Pin 6 is for general purpose I/O. Pin 7 is a general purpose I/O and is also connected to the chip's analog to digital converter which allows the Tiny Beacon to send voltage readings. Pin 7 can also trigger an internal timer/counter for frequency measurements and event counting.

The Tiny 26 microcontroller is quite similar to the Tiny 25 but has a 14 pin package with more I/O. One very useful feature of the Tiny 26 is a buffered oscillator output which is perfect for driving a small MOSFET class C or E power amp. It would be quite straightforward to make a QRP TX with keyer using the Tiny 26. A QRSS or WSPR beacon should not be too hard to do either. I have an idea for a QRP transceiver using a Tiny 26 and a couple of transistors...

Microcontrollers are a lot of fun and the tools to use them are not expensive. I hope some readers will be inspired to experiment with these incredibly versatile devices and come up with some interesting variations on the Tiny Beacon.

A free demo copy of BASCOM AVR which can generate up to 4k of code and has no time limits is available on the MCS Electronics website [www.mcselec.com](http://www.mcselec.com)

If you would like a copy of the Tiny Beacon source code and hex files email me: [VE3MKC@gmail.com](mailto:VE3MKC@gmail.com)

## 40m CW Transmitter

**Barry Zaruki M0DGQ, 26 Heathfield Rd, BIRMINGHAM. B14 7DB**

The G-QRP Club sells a good range of 40M CW xtals at a very reasonable price. Here is a very cheap and easy to build transmitter using these xtals. Power output is approximately

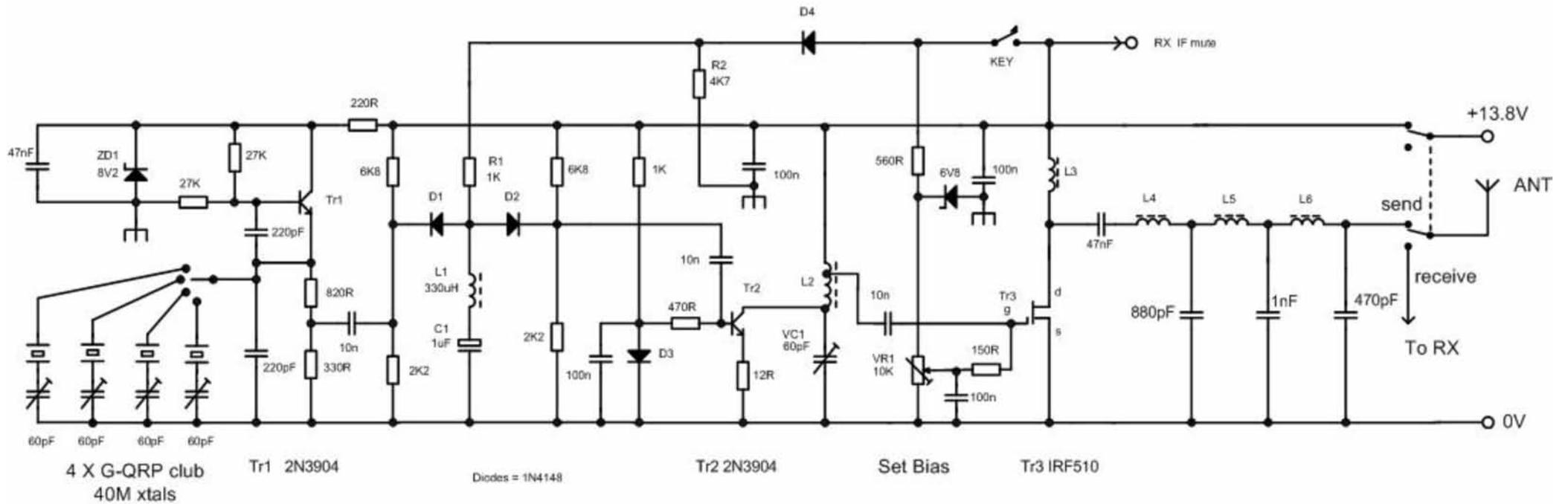
6 Watts for a supply voltage of 13.8 VDC (if you experiment with the Pi output values and FET bias then over 10 Watts can be had, but a large heat sink will be required for the FET Construction is made easy by using a pad cutting tool for the circuit board - this tool is also available from the G-QRP Club. Easy to obtain components are used throughout the design.

The circuit consists of a colpitts xtal oscillator TR1 followed by a diode switch D1, D2, a driver TR2 and PA stage TR3. A zener diode ZD1 stabilises the DC supply to TR1 stage, this oscillator runs continuously to avoid any chirp etc. The oscillator output is keyed by a diode switch consisting of D1, D2 and their associated components. Capacitor C1 provides some envelope shaping of the keyed waveform; it is isolated from RF by L1. On key down C1 gradually charges up towards the supply rail via D4 and R1, thus D1 and D2 become forward biased allowing the oscillator signal to pass to TR2 without a steep rising edge of the waveform. On key up, C1 discharged via R1, R2 the time constant of which eliminates a sharp falling edge of the waveform. Tr2 is biased to class B via D3. Its collector load consists of L2, VC1, a parallel resonant tuned circuit. A low impedance tap on L2 feeds TR3 gate. The gate is heavily swamped by low impedance bias network and L2 tap, this is to overcome the 150pF or so of gate capacitance that would otherwise be difficult to drive. TR3 is biased for a standing current of 200 - 250mA by VR1. The drain load for TR3 is a Pi network, the 80pF (approx) of output capacitance exhibited by TR3 is taken into account for the network component values. A low pass filter (L5 and L6) follows the Pi network.

A two pole two way switch is used for antenna switching, DC supply to the transmitter and also a mute voltage for a RX IF. A matching RX is currently under construction for use with this TX. As mentioned earlier, it is possible to obtain 10 Watts output simply by changing the 880pF capacitor in the Pi network to a 1200pF and increasing TR3 standing current to 800mA. However, I do not recommend this unless you fit a large heat sink to TR3 as it does run very hot at this power level. The receiving station is unlikely to hear any difference between 6 and 10 Watts Tx power, I run mine at 6 Watts for a total current drain of 750 mA, if you require 5 Watts exactly, reduce Tr3 bias voltage accordingly.

Alignment of the finished transmitter is simple, with no drive set the standing current of TR3 to 200 - 250 mA. Apply drive and adjust VC1 for maximum output power. Adjust the xtal trimmers for exact xtal frequencies, these trimmers were only included in case several of these transmitters are built for use in a net and all produce the same TX frequency. You may note an extra transistor on the circuit board, this is used as contact closure to ground

# M0DGGQ



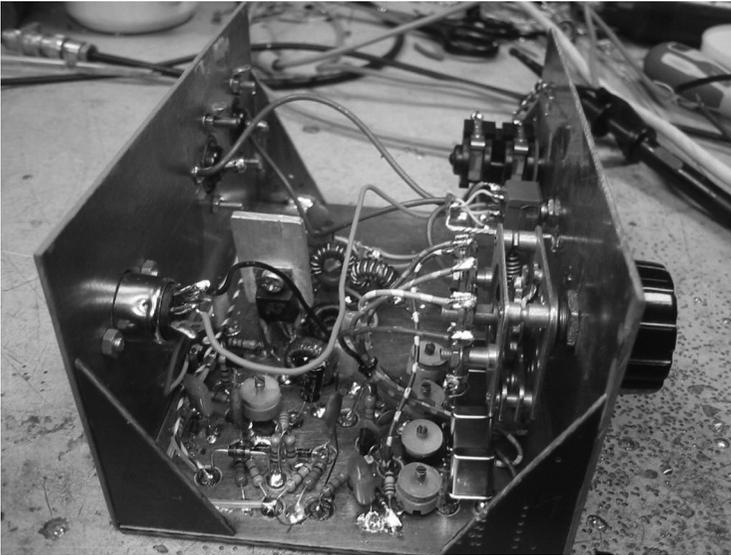
L2 = 36t, 6t tap from  
Cold end  
32 swg enamelled  
Cu on T50 - 2 core

L3 = 40t, 32 swg  
Enamelled Cu  
On FT50 - 43  
Ferrite core

L4 = 11t, 22 swg  
Enamelled Cu  
On T50 - 2  
core

L5, L6 = 14t, 22  
swg  
Enamelled Cu  
On T50 - 2  
Core

key switch so my electronic keyer can be used with this set. The front and back of the case is made from some copper clad board, the circuit board forms the bottom of the case. The lid of the case is made from a perforated aluminium ceiling tile.



## G-QRP Club membership

### Graham Firth G3MFJ

Like everyone, we were stunned by the latest price increase from the Royal Mail. I have spent some time looking at how this will affect the club. We spend around £2,500 to post Sprat each quarter, and looking at the projections from the mailing company, Royal Mail, and my own calculations, I can see this increasing by some £2,000 over a year, maybe more. We do use “bulk mailing”, so there are no savings that can be made there.

I do not want to raise subscriptions, so I have looked at other ways of saving money. Our Sprat magazine is an excellent magazine, printed on good paper, and is a credit to the club. It is also a credit to our mailing organiser – Mike Chapman – who, down in Worthing, looks after us, negotiates with the printer and the mailing company. Many thanks Mike for all you do.

We continue to help other organisations, e.g. Scouts, ATC, 3<sup>rd</sup> world hams etc. to get going in ham radio and again, we do not wish to stop this help. Neither do we wish to alter, in any way, our QSL bureau service. Dave GM3VTH does an excellent job and we thank him for looking after this service.

So, after a lot of discussions, we have decided to drop the annual member’s handbook. This will save us some £3,000 a year, and although this is a little more than we need to save, it will not be long before prices increase again – we have not had a Sprat printing price rise for quite a while, so probably one is in the offing. Club Sales continues to help, but we cannot rely on this of course.

We will have a pull out insert in the winter issue with all the club info – how to get awards, how to use the QSL bureau etc. – all the things that used to be in the handbook, and we are going to move the renewal insert and standing order form to the autumn issue, then members who wish to use this method of payment will have plenty of time to set up their standing order ready for the end of the year.

Another small change is that we have now limited renewals to a maximum of two years. We were losing money on longer renewals so please, if you renew your membership this year, limit it to expire no later than the end of 2013. From the end of this year, it should expire no later than the end of 2014.

Unfortunately, due to the data protection act, we cannot put the database on line in any format, I know some USA clubs do this, but they don’t have the same restrictions.

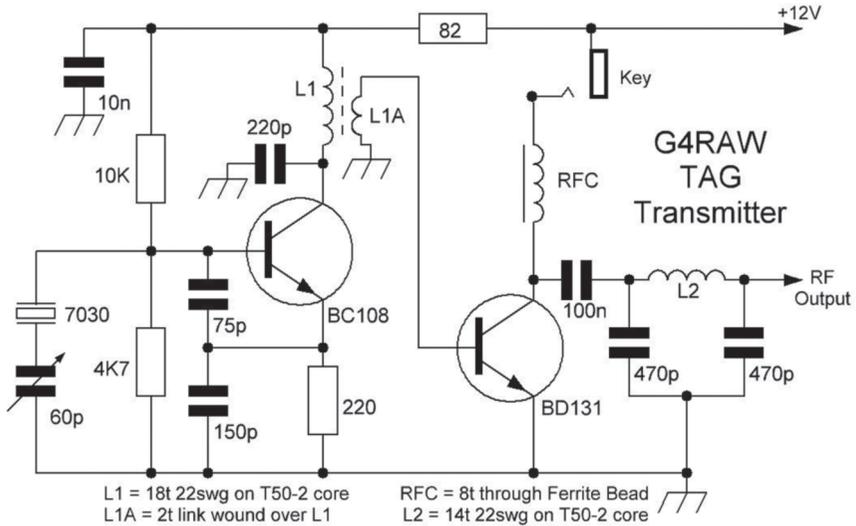
The above will impact on “family membership” for which some people paid extra to have spouse etc. listed in the handbook (but receive no Sprat). We are ending the family membership category but will honour QSL bureau benefits until the end of the year. In some case this will mean that a few UK members will have to alter their standing order payment.

Finally, a mention about the members that have “**underpaid**“ printed in their address on their Sprat label. In some cases this means that this is your last Sprat for 2012 unless you contact Tony G4WIF and pay the balance of the full subscription. We cannot afford to subsidise those who do not pay the full current subscription.

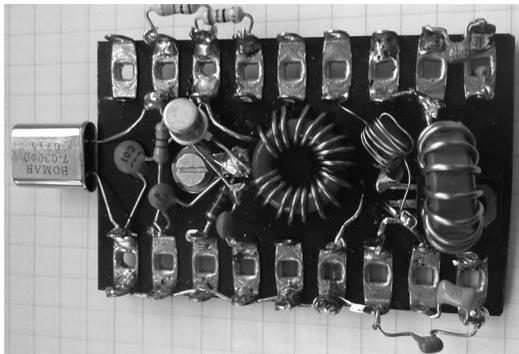
# The “Tag Transmitter”

## In memory of Steve Ortmayer G4RAW

It was with great sadness that I heard of the death of Steve Ortmayer, G4RAW, late last year. For many years Steve submitted the Novice Column to SPRAT and inspired many beginners to build his simple projects. In memory of Steve here is the popular “Tag Transmitter” from SPRAT for Spring 1990. (G3RJV)



Steve’s original text ran.... “Can’t see SMD? Hands too shaky for fine work? XYL cross because of ferric chloride on the carpet? Then try the TAG TX which is a 40m JU6 built on group board with transistors as in the EI0CF “Force 3”. I have had good reports of a clean signal in spite of the jumbled up appearance.”



## LC Meter kit review

David Smith G4COE, 54 Warrington Road, Leigh, Lancs.

The Avo LCR meter that I acquired has given good service but lacks the ability to read low values of capacitance or inductance; obviously in our work we need something with higher resolution that can measure a few pF's or micro Henries, so I ordered a LC meter kit from G4HUP originally designed by VK3BHR, you get the lot, a ally box, high class PCB and a template for cutting and drilling, along with a printed front panel to give it a 'professional look'.

This kit uses a handful of components and a ready programmed PIC chip, after switch-on the whole unit draws a measly 10mA from a PP3 9V battery, no backlighting is used as the display is easily read. The builder has two options; insert the components and wire links for a non-programmable version or the added components should you want to re-program the PIC chip, reprogramming shouldn't really be necessary.

Great care must be given to wiring the two switches, although not really necessary I would advise hard wiring the switches as well with via's (through holes) provided for solid connection purposes as the switches are soldered to the pcb

The unit worked straight from power up, do remember to turn the contrast pot almost fully on then back it off for enough contrast on the display or you'll think it isn't working when testing. The only difficult part I'd say is cutting a 'square hole' for the LCD, here I used a Dremel tool with a cutting disc, do remember to remove all burs with a file. I secured the template on the outside of the panel by double sided Sellotape along four edges, using a centre punch I marked the holes, and very CAREFULLY with a Stanley knife scoured inner marking for the LCD cut out, don't worry about marks and scratches the stick-on panel will hide the mistakes, concentrate on having the template secure and mark all the holes accurately, mount the front panel before the two test terminals and soldering them to the pcb.

There are no instructions with the kit, the instructions complete with a comprehensive fault finding procedure can be downloaded as a pdf file from the site given below. Parts are available separately, such as the pcb and ready programmed PIC chip etc.

### **The specs.**

PP3 9V @ 10mA.

0 – >100nF, resolution 0.1pF. 0 – >100 mH, resolution 10nH @ 1% accuracy.

Size. 120 x 103 x 30.5mm.

The cost is £44-50 cheque or £46.50 via Pay Pal, for ordering and manual visit:-  
<http://g4hup.com/LCM/LCMeter.htm>

## Antennas Anecdotes and Awards

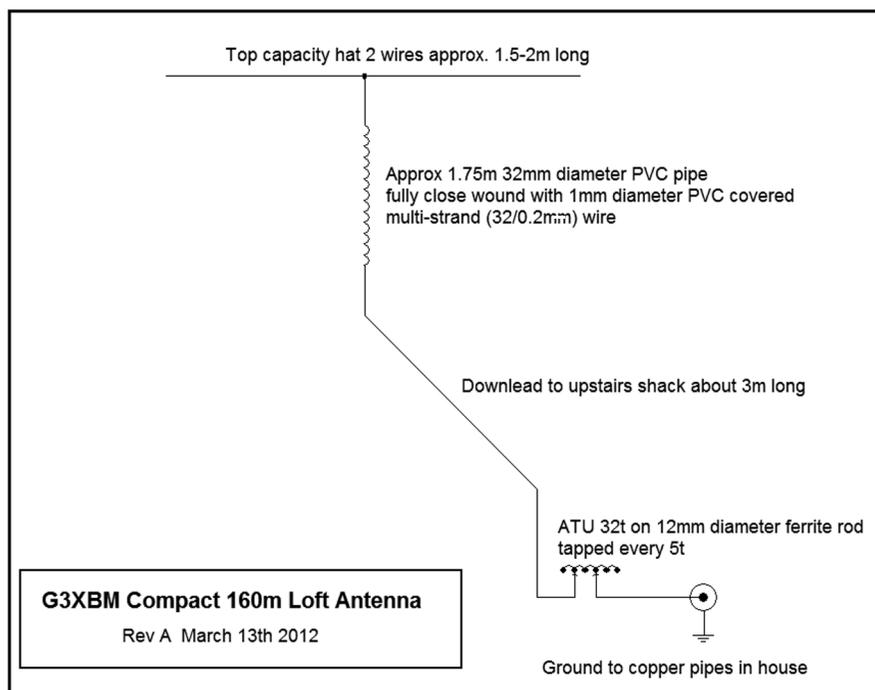
Colin Turner G3VTT 30 Marsh Crescent, High Halstow, Rochester,  
Kent ME3 8TJ. G3VTT@aol.com

Loft antennas are always of great interest with our limited space in modern homes. Roger G3XBM has submitted a fine article on a 160m antenna. There's no excuse now not to join the local AM nets that still seem to be flourishing! Later on there is some information on the Petlowany coil system. Read on!

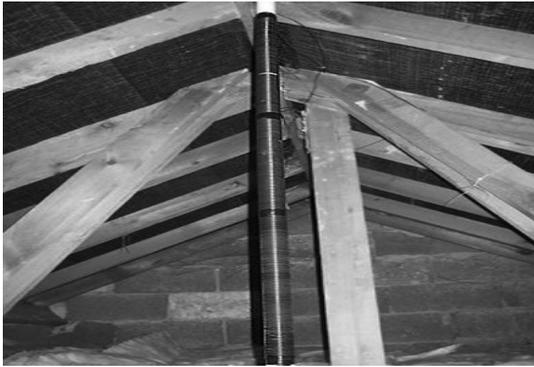
### A Topband Loft Antenna

Roger Laphorn, G3XBM, 37 Spring Close, Burwell, Cambridge, CB25 0HF  
<http://www.g3xbm.co.uk> <http://g3xbm-qrp.blogspot.com/>

Not having much space for external antennas I wanted a small antenna for 160m that would fit in my tiny loft space and that I could use in my upstairs shack. The basic idea came from "Practical Antennas for Novices" by John Heys G3BDQ, so no originality is claimed, however a larger diameter (32mm) coil former is used and my ATU is simpler.



The diagram shows the arrangement. The antenna coil is hung from the rafters. A ground connection is made to the copper hot water tank in the airing cupboard next to the



## The Loft Loading Coil

upstairs shack which connects, via copper pipes in the house, to the external ground. It works well. The top capacity hat should be as large as possible, but in my case it was just a couple of horizontal wires around 1-2m long hung horizontally in the top of the loft space. The ATU is just a small length of ferrite rod with a few

turns of copper wire tapped very few turns. An amount of series inductance brings the antenna to resonance and the VSWR is close to 1:1. Individual set-ups will vary and you may have to adopt a more elegant matching network if your earth losses are lower. Although the antenna has been used for local contacts on AM, the best results have been

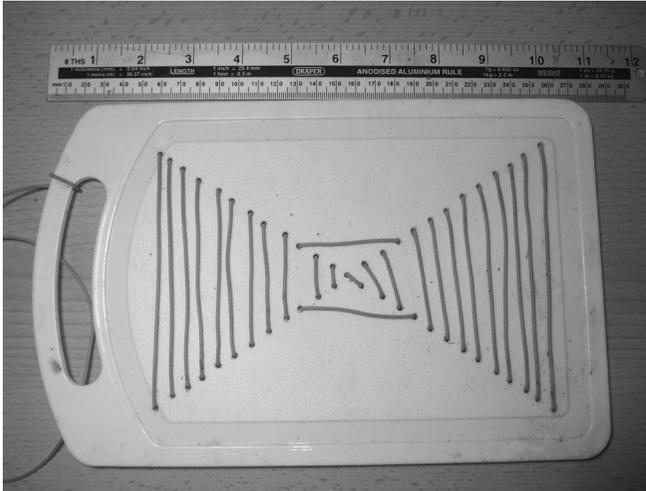
Timestamp	Call	MHz	SNR	Drift	Grid	Pwr	Reporter	RGrid	km	az
2012-03-06 23:54	G3XBM	1.838116	-29	0	JO02dg	5	SM6WZI	JO67mp	1007	49
2012-03-03 23:14	G3XBM	1.838071	-20	0	JO02dg	5	GM4SLV	IP90gg	896	354
2012-03-03 17:40	G3XBM	1.838080	-17	0	JO02dg	5	OZ7IT	JO65df	853	63
2012-03-06 23:40	G3XBM	1.838117	-22	0	JO02dg	5	DK6JUG	JN49cm	633	116
2012-03-06 22:16	G3XBM	1.838115	-21	0	JO02dg	5	F59706	JN07th	560	170
2012-03-06 22:44	G3XBM	1.838115	-21	0	JO02dg	5	GI4OYM	IO65qe	558	308
2012-03-07 19:32	G3XBM	1.838112	-21	0	JO02dg	5	DK1VC	JO31rg	505	100
2012-03-03 18:00	G3XBM	1.838073	-14	0	JO02dg	2	PA0O	JO33hg	440	73
2012-03-03 17:40	G3XBM	1.838081	-26	0	JO02dg	5	PA0A	JO33de	417	73
2012-03-07 19:14	G3XBM	1.838120	-20	0	JO02dg	5	ON7KB	JO21ei	299	108
2012-03-06 20:28	G3XBM	1.838118	-27	0	JO02dg	5	G0KTN	IO81ti	210	242
2012-03-03 18:00	G3XBM	1.838072	-30	0	JO02dg	2	G8JNJ/A	IO90hx	184	219
2012-03-07 05:26	G3XBM	1.838115	+7	0	JO02dg	5	G4KPX	JO02cj	15	338

with QRP WSPR where reports have been received from over 1000km away (see table).

The main issue with 160m operation these days is man-made noise and this, especially with a small indoor antenna, is the main operational limitation, especially at night. A small magnetic loop antenna may be a better solution on receive, but this vertical is small, easy to erect and to match. (See last Sprat Number 150! And the low noise 160m receiving loop)

*Chris Baker* G4LDS often drops me a line about his experiments and has drawn my attention to the Petlowany coil system. This is a method of coil winding which uses a smaller amount of space than a conventional coil rather like the ‘pancake’ coils of the

golden days of radio. He has been also playing with a 18' wire vertical for use from his limited home space or portable with his FT817 from around Morecambe Bay. The problem Chris always has is a lack of room for radials and he has tried 4 x 5m radials plus a homebrew 4:1 UnUn (unbalanced to unbalanced) balun at the base of a vertical plus an ATU which works well for him. Recently he came across information from another Internet group on verticals and a spiral radial called the Petlowany coil. First reports seem good and he is thinking of trying maybe two or more of these under the vertical making a compact system. Chris has attached a document and photographs of these compact coils plus a version he made on a old cutting board. He also points out these cutting boards are great for dipole centers, supports & end insulators.



Chris sent me a copy of another article by [Ron Bean KI5XX](#) which states *'The Petlowany coil first described by Bill Petlowany, K6NO, in World Radio Magazine back in March, 1998, is basically a flat, concentrically wound coil. Petlowany constructed a dipole using two of these coils. Other hams have experimented with various configurations using the coil, with good results. I recently built a homebrew version of the popular S7v31 antenna and decided to try using a Petlowany as a counterpoise at the base of the coil. I have been using the antenna now for a month and have had excellent results, working many DX stations in South America, the Caribbean and Europe.*

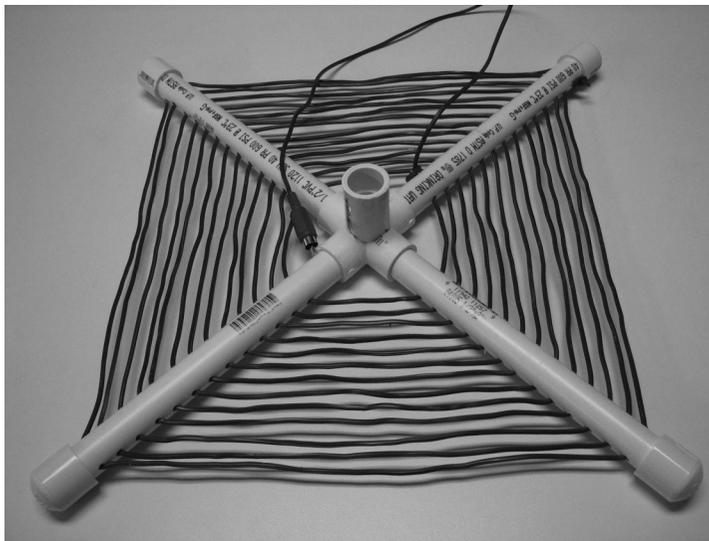
*Described here is the construction method I used in building my Petlowany coil.'*

#### **Parts List:**

1. Schedule 40 PVC 1 ¼" side-outlet 5-way cross (available at [pvcfittingsdirect.com](#), eBay and other suppliers) Note: May substitute 1 1/4 " 4-way cross, glued to a 1 ¼" coupler.(see below)
2. 40" Schedule 40 PVC 1 ¼" pipe
3. Approximately 35 feet of 20-22 gauge insulated wire

### Construction:

- Cut the 1 ¼” pipe into 4 equal lengths
- Using a 5/32” drill bit, drill holes through each pipe, beginning approximately ½” from the end, and then every ½”.
- Using a Dremel sanding bit, cut notches in the 1 ¼” coupler so that it fits on top of the 1 ¼” 4-way to make a 1 ¼” 5-way. Glue the 1 ¼” coupler in place with PVC glue.
- With the 5-way PVC lying flat (4 sections lying flat, with 1 section upright), using PVC pipe cement, apply glue to one end of one of the PVC pipes, and insert into one of the 4 PVC connections. Repeat for the other 3. Ensure that when gluing that the holes drilled are perpendicular to the upright (holes should be parallel to the surface the 5-way is sitting on).
- Beginning at the center of the PVC “X”, thread about 3’ through one of the holes. Leave this 3’ as a pigtail for later use.
- Begin winding the coil, moving from leg to leg winding from the middle and going out until all of the wire is used. This should make about 13 windings total for a 31’ section of wire. The picture shows it all. A lovely rainy Saturday afternoon project!



**Awards** Jack W7CNL has worked very hard over the last few years and has obtained the ‘Worked 100 Countries with 2 way QRP’ Certificate Number 328. Congratulations!



## Valve QRP Report April 2012 from G3VTT

*I received only two reports this time although there were plenty of others active. Pride of place in picture form goes to the vintage station of G3MJX. 'I decide to build a rig so as to be able to enter the GQRP 'Valve Day' events. I hadn't built any valve gear since the early 70's and fancied a bit of nostalgia. A simple rig was the answer so I decided on a single unit transmitter-receiver with an external power supply unit. It was to have a regenerative receiver, using plug in coils for the various bands and a CO/PA transmitter with a selection of switched and plug-in crystals. I just managed to get the rig QRV on 80m by the close of April 2012 Valve Day and worked a few stations including Colin G3VTT. The rig continues to evolve and improve and I'm looking forward to the next GQRP Valve Day' G3XIZ 'Being Sunday I was limited for time, but I worked the following:- GW3UEP (Thrice!), G3TXB (Twice), G3JKY and G3VTT. The station was all CODAR, CR70/AT5, with a doublet antenna and 10W DC INPUT' G3MJX*



Finally one or two comments regarding valve equipment. G4PKW who sent me details of his 40m transmitter receiver has reminded me the original was designed by G3EFY not G3EPY and that when John tried the circuit, (see Sprat 150), he put a 56 pFd capacitor in series with the reaction capacitor to keep the

HT from it and to tame the reaction further. He also tells me that 12 pFd was enough for adequate tuning range with the coil details given and a 50 pFd bandset capacitor.

GW8AWT has produced a single valve receiver using the Acorn valves but this time a type 957 with its 1.25 volts filament. A rare beast indeed compared to the popular 955 and 954 devices and he also writes he uses grid leak values of 1.8M and 200K in series from grid to ground on valve detector circuits permitting the use of an oscilloscope for precise observation and optimisation of the regeneration point on valve detectors. A simple but brilliant idea and on that cheerful note I look forward to the next Valve QRP Day in November. Details next issue. **72 G3VTT**

## COMMUNICATIONS AND CONTESTS

Peter Barville G3XJS, Felucca, Pinesfield Lane, Trottiscliffe,  
West Malling, Kent ME19 5EN. Email: g3xjs@gqrp.co.uk

### WINTER SPORTS

My sincere apologies to Carl GW0VSW for omitting his entry from the results in SPRAT 150. I overlooked the WS log details, which were included together with Carl's Chelmsley entry – which I better not omit from the results below!

### CHELMSLEY 2011 TROPHY

Entries were received from Ryan G5CL, Carl GW0VSW and Pete ZL4TE. Like last year, unfortunately just three entries, but my thanks to them all.

Pete describes his as a 'token log' with a total of 9 DXCC worked (all on 20m) and 3 DXCC worked 2-way QRP. He was running his FT1000MP Mk5 Field with 5W of CW and 10W SSB into a Cushcraft AV3, about 13ft tall. For Pete the nearest country to work is VK, about 2000km away! If condx are good, the ZL callsign really helps, but if not then it can be hard work. He was delighted to work into Europe (including G3KJX and G3ROO) with low power on several occasions.

Carl said he had a quiet year with only 438 QSOs made 80m-6m, with either his FT-857 or FT-817 running 5W (or less) with Z11 or Z817 matching units and a vertical antenna. As with many, local noise is a major problem for Carl, but he worked a total of 72 DXCC with CW, 8 DXCC with SSB and 7 DXCC with PSK31. His 2-way QRP DXCC score was 31. He also operated for one day from Aberavon Beach (Port Talbot) using the FT-817 on internal dry cells, a Z817 tuner and 20m mobile whip on the car roof. Running 1W or less he had a great time and raised 9A, DL, HA and I on CW, with DL, I, OE, SM, SP and YU on SSB.

Ryan said that his log was a 'labour of love' to organise and type up, but that's his fault for having so many log entries during the year! He was very pleased to have his first QSO into ZL in 27 years of amateur radio. Full marks for perseverance Ryan, Hi. Equipment used during the year include an FT-857, Elecraft K1 and various homebrew rigs. The main antenna was a 66ft end-fed, 8m above ground, fed via an LDG Z-100 auto matching unit. All QSOs were made with 5W of CW.

Band by band, Ryan worked 3 DXCC on 160m (nil 2-way QRP), 15 on 80m (2 2-way QRP), 34 on 40m (1 2-way QRP), 53 on 30m (3 2-way QRP), 77 on 20m (8 2-way QRP), 80 on 17m (nil 2-way QRP), 73 on 15m (1 2-way QRP), 59 on 12m (nil 2-way QRP) and 53 on 10m (nil 2-way QRP).

Comparatively few 2-way QRP QSOs, maybe, but otherwise a very impressive list of DXCC countries worked between 160m and 10m, and well deserving of the Chelmsley Trophy. Our congratulations to Ryan **G5CL** who wins the Trophy this year, and to Carl **GW0VSW** for being runner-up.

### **CZEBRIS 2012**

A few more entries for this event, I'm pleased to say, and my thanks go to the following for sending their logs: George **G3ICO**, Colin **G3VTT**, Chris **G4AKE** (on behalf of **G2DJ** Derby Wireless Club), Kev **G4CMZ**, Ryan **G5CL** and Tom **DM4EA**. Last year I received no entries at all, and am therefore delighted we have done better this year!

At this point I should say that there is some confusion as to whether contacts on the 3 WARC bands (30m, 17m and 12m) are allowed. The rules, as stated every year in SPRAT don't actually refer to the issue, and this is something I ought address in the future. Thankfully, whether or not WARC band scores are included does not affect the final outcome, and the winner has the highest score regardless. However, I do acknowledge that the operating practises of some stations during the event might have been different if the issue of qualifying bands had been made more clear.

Scores are as follows: G3ICO/24, G3VTT/109, G2DJ/28, G4CMZ/14, G5CL/26 and DM4EA/130. Even without WARC band QSOs Tom's score was 112. As a non-UK entry, Tom's should really have been submitted to Karel OK1AIJ, and would have put him in third position, behind OK1DMZ (152 points) and OK1DEC (127 points). Amongst the UK entrants **G3VTT** had the highest score, and is to be congratulated.

OK1AIJ and I must clarify in future on which bands qualifying contacts may be made, but we should recognise that WARC bands are non-contest bands.

### **SUMMER SIZZLER 2012**

In keeping with the idea of starting the 7 day event on the Saturday of the UK Summer Bank Holiday weekend, the 2012 Summer Sizzler will take place 25th August to 31st August (inclusive). Just like Winter Sports, no points to be scored/calculated – just an opportunity to have plenty of summer-time QRP Fun. Unfortunately, I omitted this event from the QRP Calendar, so please make a note in your diaries and get those rigs, keys and aerials tuned to perfection in good time and send me your logs by 1st October.

### **DL FUN-RUN Results**

You will recall that the DL section of G-QRP have revived the Yeovil Club's FunRun, and were rewarded with a very commendable 18 logs. The rules may be 'tweaked' for next year, but they enjoyed a successful first running of their semi-new event in March 2012. Best non-DL logs were from **G3ICO** George and **OE6WTD** Dieter. Let's hope the event is even more successful next year!

## INTERNATIONAL QRP DAY

Did you remember this annual event? June 17th every year. Hopefully you did, and will send me your logs (rules in the Members Handbook) by 31st July.

## RSGB LOW POWER CONTEST

Briefly:

0900-1200z and 1300-1600z Sunday 22nd July 2012

3510-3580KHz and 7000-7040KHz, CW.

Exchange RST/Serial Number/ power.

More details: <http://www.rsgbcc.org/hf/rules/2012/rqrp.shtml>

As I write this we are in the middle of a drought, and yet it seemingly won't stop raining. Therefore I assume summer must be approaching! HF band conditions may not be so good, but it's the time of year to get out and about and have plenty of QRP Fun. The deadline for inclusion in the next issue is the end of July.

72 de QRPeter



### Czech Army Morse Keys

#### ***EVEN BETTER PRICES!***

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## PCB Cutting Tip

**Dave Penny, G3PEN ([davepennyg3pen@yahoo.co.uk](mailto:davepennyg3pen@yahoo.co.uk))**

PCB, particularly fibreglass and especially the thicker stuff, is notoriously difficult to cut, although as you say one can use snips etc (although only on small or thin pieces, I suggest). I usually have used nibblers, which I bought back in 1959, and still use the original blade (and still have the spare I also bought with it!).

However, cutting long strips, or multiple pieces, is a chore. I have found that a motorised tile cutter, fitted with a diamond-coated blade running in a shallow water bath, not only cuts ceramic tiles beautifully but also cuts all PCB precisely and quickly. I have used the blade last used to finish my kitchen tiling (I only used 2 in total) to cut some 60 feet of PCB so far, and it seems everlasting. New blades are as low in price now as £3, which is very reasonable. At £30 the machine is absolutely essential for tiling work, but just a bit expensive for PCB cutting alone, unless doing a lot. I wouldn't be without it now though.

# MEMBERS' NEWS

by Chris Page, G4BUE

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



In SPRAT 150 I reported that **G4HSO** used the call-sign **SV8/G4HSO/MM QRP** as that was my reading of the original report. However Peter assures me that was not the case and 'QRP' was not included as part of the call-sign. He agrees that the use of QRP as part of a call-sign (either as /QRP or space QRP) is not only bad practice but most likely, a contravention of our licence conditions. For clarity, Peter and I agree that calling 'CQ QRP' is entirely acceptable and helps encourage two-way QRP operation. I apologise to Peter for giving the wrong impression about the call-sign he used.

Congratulations to **G4FBC** on winning the Bill Sparks **G3DGJ** Memorial Trophy for amateur construction provided by the Warrington Radio Society. The photograph right shows Ron being presented with the cup by RSGB President **M00BW**, at the NARSA Rally at Norbreck Castle, Blackpool earlier this year. Ron's winning entry (photo below) was a second Paraset (his first one was featured in a previous *Members' News*) which he says is a, "More 'user friendly' version for the amateur bands in the light of experience gained, and realising the shortcomings of the 'original' set". Ron acknowledges the help and advice he found on the Paraset website at [www.paraset.co.uk](http://www.paraset.co.uk) and also much help from **G3YVF** and **G3VTT**.



Congratulations also to **MIKTA** for being awarded the **G4SST** QRP Trophy at the RSGB AGM (photo page 12 of June *RadCom*) and to **G5CL** on being awarded his 17 and 20m QRP DXCCs.

Our best wishes to **G0EBQ** after being involved in a nasty road accident when he two fingers. Nigel says, "Luckily it was the middle and ring finger on my left hand so I can still drive and do my job and, more importantly, solder! Metalwork could be tricky though and I reckon that my future projects will have to be in plastic boxes! Obviously I've had to reevaluate my projects; the multi-band BITX is on the back burner and I'm trying to finish the Sierra for 10-17m. I've had to give up on the Paraset project though I did manage to sell the parts that I had on eBay and gain us a new member in the process. At least I've had plenty of time to play whilst recovering and with the 800mW SSB on the BITX on 12m have worked some nice DX – **9K2UU**, **C5YK**, **6V7Z**, **EA9BI**, **CN8QN**, **TA3X**, **UA9UDX** and several USA stations, the best being **AB0RJ** in MO who was so impressed with my QRP that he reduced power from 700 to 25W and was still 33 here - another convert? I also managed a hard earned two-way QRP QSO with **SV1IZJ** near Athens running 5W". Nigel hopes to be QRV with QRP from a camper van at the Suffolk Rally on 1 July.



Dana A. "Mike" Michael 129 Church Lane Halifax, PA 17032-8372 USA		
Confirming QSO with G3VTT at 0626 UTC 28 Dec 2011		
Ur SIGs were RST 449 9 89N CW on 3.560 MHz		
TRANS-ATLANTIC 1215 SET QSO! 6-16-10	<b>W3TS</b>	VER-1 -PO -PP HEAR UR SIG 5/10!
QRP: 400-1515 • G-QRP-C #2387 • VK-CQD-QRP-C • Email: <a href="mailto:vd@qrp.net">vd@qrp.net</a>		
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The QSL received by **G3VTT** from **W3TS** following their two-way QRP QSO on 80m during the Winter Sports when Colin was using his Paraset 'lookalike' radio. For those with an interest in DSP **G4GXO** has made available a design application for 16 bit windowed sinc filters on his website at <http://www.cumbriadesigns.co.uk/DSP.htm>. Ron says he wrote it out of necessity to support his own DSP learning journey as he couldn't find anything freely available on the Internet that suited his requirements. Over the coming months he hopes to add further software to the DSP page to include a DSP IF

system, a denoiser, autonotcher and general filter routines. The target platform will be the well supported Microchip dsPIC33 processors for which the development software is available free from the manufacturer's website.

**WIREX** announced a new kit in March, the Pocket Electronics Lab (PEL), a 'handy dandy' solderless breadboard system complete with a triple power supply that fits in the ubiquitous shirt pocket friendly mini tin, see <http://www.qrpme.com>. The Four State QRP Group announced a new kit in March, the QRPometer, a sensitive and accurate power/SWR meter designed by NMØS. Complete specifications,

assembly manual, and ordering information at <<http://www.wa0itp.com/qrpom.html>>. **KI6DS** says the complete collection of *QRPp* is now available on the NorCal QRP Club website at <<http://www.norcalqrp.org/qrpp.htm>>. Doug says access is free, and always will be, “That is in the spirit of the NorCal QRP Club that Jim Cates and I founded in 1993. We do ask that none of the material be reposted anywhere in any form, and we especially ask that CDs of the material not be made or distributed in any manner, except for one copy for your own archival purposes. In other words, we want the only site that it is available to be the NorCal site. We thank you in advance for your cooperation”.

**DL2BQD** reports on the 20th G-QRP Convention of the DL group in Waldsassen City this spring when the event was open by the Mayor of the city. Dieter says the weekend was packed with interesting reports (including a new vector based antenna analyser by **DK4ARL**) and practical lessons on antennas and working techniques with attendees



from DL, G, HB9, OE and OK (above right). G-QRP Club member **DF1UQ** (pictured right) was the winner of FR 2012, and **OE6WTD** and **G3ICO** accompanied him from abroad. The guests from Czech Republic were Alex, **OK1RS**, and Ondra, **OK1CDJ**, (far right), and the photograph below shows Tom, **DM4EA**, demonstrating CW fun with **DK6SX**'s ATS. The bottom photograph is **DJ6SX**'s Master TRX for the forthcoming MAS QRP Contest.



**G3XBM**'s lightwave (481THz) experiments continue and thanks to **G4HJW**, Roger made his first two-way optical QSO over a 6½ mile path. He says this is small fry compared with the results achieved by **G8CYW** and others who have worked over 60 miles, but is a start. **G4GDR** has been “pounding the brass” on 80m using his one transistor transmitter and one valve receiver and has worked F, G, GW, GM, HB9, ON, and PAØ so far. Adrian says the one valve receiver uses an EL91 in an amazingly stable regen circuit and the TX uses an ex-cb transistor as a crystal oscillator with 2.5/3W out. He is also making QSOs on the SP1 TX, a **GM3OXX** design, and with 8V gets 800mW into the antenna.



On 25 March **G4CCQ** QSO'd Brunei on 30m but had to increase power from his usual 5W to 20W. Since coming back on HF about three months ago, Mervyn has been amazed at what he has worked, mostly on 40m and says, “My operating was rather rusty at first but slowly the confidence has come back. I enjoy working other QRP stations but can't resist the challenge of joining a DX pile-up and getting picked out is a great thrill. There have been many contacts I have missed, and many more were only just above the noise, but I can't remember a time when I did as well, even running much more power. Seems that conditions are not as bad as some people say they are”. **GWØSW** used 5W with a FT-817, LDG-Z-817 tuner and indoor ‘Crown’ loop antenna to make CW QSOs with 4O, 5H and ZS on 15m and C5 on 10m, plus European SSB QSOs on 15m. **KEØVZ** made his first QSO with his K1 with **HK1MW** on 40m on 6 May. Doc used 1W into his trusty homebrew wire vertical with four counterpoise wires.



**GM4VKI** joined his 13 others on 6 May to try and work DX QRP at 0500z portable, in Roy's case from Troon Beach (top left next page). He set up at 0450z to be welcomed by the sound of “stations thundering in” from W6 and VK4. Roy says the rest of the Sunday club were picking off the stations and although he got a, “There is somebody there but couldn't identify the station” from a VK5, he did manage QSOs with a VE3, S51 and Italians. The second photograph shows Roy's set up; a FT-817 barefoot to a 16ft vertical tuned with an Elecraft T1 and the ground plane tuned with a MFJ Earth Tuner. The battery



was a 7 amp gell cell. On 4 March ‘just for fun’ **GØFTD** attached a 15ft wire and a small L match to his FT-817 in his bedroom and draped the wire over a curtain rail. With no earth and running 5W Andy made a QSO with **G3HAL** in Somersset from his Kent QTH and says, “It is amazing how QRP and a very poor antenna still worked and gave me pleasure”.

On 31 March and 1 April **G4AKC** went bicycle mobile 0700-0900z on 20m for the first time for a few months following health problems, and found the long-path ‘amazing’. Dave QSO’d many VK and ZL stations on SSB both mornings plus a PY, C5 and USA stations with his full size quarter-wave vertical on the back of his bike and a home-made GTU (ground tuning unit) on the frame of the bike to couple himself whilst on the move to the surrounding area. Dave said he cycled very close to the sea water on the northwest coast and some contacts were initially made using up to 50W with power reduction to less than 5W made during the QSOs. One of the VK stations Dave worked was **VK3YE/P**, running 5W testing a Moxon rectangle, who recorded his signals at <<http://www.youtube.com/watch?v=Rui4Q8lwB8k>>. Peter says the audio coupling to the camera wasn’t very good and so the signals were better than on the recording.

**G4AKC**’s QSOs impressed **G7DIE** to ‘break out’ his pedestrian mobile kit on 2 April and, despite bad weather, with a 13ft antenna on his back Stephen QSO’d VK and ZL stations with 80W SSB before reducing power to 5W to QSO VK3 and VK4. A QSO with **VK6MV** encouraged him to reduce power to 500mW, receiving “a very clear 51 signal report” from Roy and a new personal best. Late last year Stephen made a long-path QSO with a 59 JA station and says he was so surprised by him returning his call, and by such a good signal report, that he completely forgot to try QRP but that thankfully he remembered when he heard **VK6MV**. **G3XJS** reminds us that for QSOs to be classed as ‘true QRP’ (and certainly if you ever want to apply for QRP certificates or awards) then the whole of the QSO – including the initial call – must be conducted at QRP levels throughout. Another bicycle (or tricycle) mobile operator is **K6BBQ** in Northern California who has posted a video at <<http://www.youtube.com/watch?v=Q1molUU62uc&feature=youtu.be>>.

**GØFUW** flew the QRP flag as part of the Wessex Contest Group’s **MSØWCB** mini-expedition to the Isle of Skye for a week in May. Steve made some two-way QRP QSOs including one with long standing Club member **GM3MXN**. The QRP set-up was an FT-817 and trap dipole whereas the main station used an **MØCVO** off-centre fed dipole to good effect. The group had built a set of **W3NQN** band pass filters to allow multi-station operation without cross-over that allowed Steve’s QRP to continue without causing any problems to the QRO station, or vice versa. Two FT-817s went /P for some of the time and the photograph shows “a very comfortable ‘bothy’ on just about the most northern tip of the island”. Steve says they had a cottage about two miles away for the main station and whereas the bothy was ok for a day’s /P work, he would not have wanted to stay there much longer; the cottage was much more comfy with a wood burning stove and the QSO equipment keeping the chill off the place! The Group made over 1400 contacts and worked all points of the globe, except Antarctica. QSL cards will follow.



**G3ILO** operates from a narrowboat with 5W from a K2 to a roof mounted 16ft vertical and logged JAs and WØ (ND) on 20m, 3B8 and CO on 17m, W7 (MT) on 15m, YN on 12m and OD on 10m. Steve left Gloucester at Easter and is hoping to reach Boston, Lincs this year. **G3JNB**’s wandering MFJ ‘Cub’ 30m rig came out of retirement in April; aided and abetted by **GM4JMU**, it was cured of the well

documented oscillator drift by converting to a VXO (see article in this issue). Victor was delighted with the first seven days of 2W into his doublet with 17 EUs worked and, a just few days later, its first QSO 'over the pond' with **W1MK** in MA. **G4FBC/P** was QRV in March around the lakes in Cumbria with his FT-817 (2.5W) and ATX walkabout multiband telescopic whip and at Lake Coniston with a multi-stand flat ribbon cable counterpoise cut for quarter-wave for each of the HF bands. Ron made SSB QSOs with 7X, 9K, OD, VE, USA and Europeans on 15 and 20m. **G3JFS** QSO'd **706T** with 10W SSB on 10m. Peter has not been so active this year due to ill-health which we hope is now behind him.

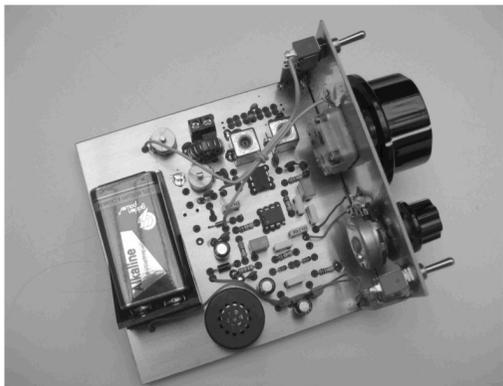
Radio time has been limited for **ZL4TE** as he is catching up on chores after breaking his leg, but says he has made more QRP than QRO QSOs this year, including SSB to 3D2, E5, EA (best DX), P29, VK9, VP8 and USA and CW to CE. Pete was in the UK for three weeks from 11 May and QRV as **M0/ZL4TE**. **DD0VR** and his wife **DE3BWR** will be QRV 11 June/6 July from campsites in southwest USA using an FT-817, Elecraft T2 tuner and 33ft glassfibre mast with **DK1RP**'s new Premium wire <<http://www.dx-wire.de/>>. Heli uses the wire at home for a 275ft lazy delta-loop and says it is very weather resistant. They will also be QRV 14 December/4 January from Vietnam, hopefully as **XV0VR** or **3W0VR**, from several locations including Phu Quoc Island AS-128, with a new Elecraft KX3 (QRP) and amplifier (QRO). From home, Heli has made SSB 5W QSOs with **V25WY**, **6V7Z**, **ZP5DBC**, USA stations, and **PT2ZZR** after gradually reducing power to 1W, with his quad antenna for 6-20m and lazy delta-loop at 20ft for 20-160m. He intends experimenting with the Fuchs antenna for QRO and the **DL1VU**'s Stromsummen antenna for QRP. **G3KJX** anticipates being QRV 4 September/9 October from CT1 on HF, 6 and 4m using a collapsible Moxon antenna. **M1KTA** will be QRV 15/22 August as **6W/M1KTA** and 22/29 August from C5 (call to be issued) QRP SSB and PSK and possibly CW.

**G3UGF** sent the above photograph of his Swan Astro line-up. Richard wrote, "This isn't QRP but I have this thing about putting old stations back together and have recently branched out from my KW Kleptomania into the realms of Swan gear. Back in the 1980s I sold quite a bit of it in my shop, even though it didn't have the WARC bands, it had its devotees. I enjoyed /M with their solid state gear and have recently renewed my interest in mobile operation as I now live in a very poor home location. I found an immaculate Swan 20 amp PSU on eBay and when I received it, it still had my original handwritten bill of sale in the box! This led me on a hunt to find the rare Swan Astro 150 80-10m TCVR and then the matching tuner unit. Last week (1 May) and 12 months later, I made it – the full line-up re-united! The final piece, the ATU came from the estate of **GM4GNB** and with a little TLC it's QRV again. The Astro is unusual in that it uses jog tuning; the main dial controls the scan and the rate increases as you turn the dial, up/down on the mic, very advanced for its day – built to professional spec with excellent CW performance with Collins filters. The rig is small for its day, 9 x 11 x 4 inches and runs 5-100W – and I'm loving it! Now I'm looking for the older manual version Swan 100MX and the Astro 151 160-15m version. I think I'm incurable!". While waiting for his new Elecraft KX3 to arrive, **M1KTA** is building a Sussex valve tester, finishing repairs to a HRO-5 and starting a R1155L restoration.

**F5NZY** replaced his **DL9ZI** Hexbeam with a **G3TXQ** Hexbeam at the beginning of May and says, "It is splendid and works very well". Steph QSO'd for the first time **JA4FKX** for a two-way QRP QSO. He was running 3W and Steph 5W. **G3XBM** has converted his Homebase-10 10m halo design to a dual-band 10/6m design in time for the Es season and improving F2 DX conditions. Roger says it works very well with good reports on 6m around Europe and 5W WSPR reports on 10m from all continents including Antarctica. **N2CQR** is finally finishing an 80m DSB rig that he started building in the UK in 2006. It is based (literally) on a kitchen cutting board purchased at a Dyas store in Windsor. Next up for Bill is a BITX 20/80 using a 9MHz filter from an old dead Yaesu.

Thanks to everyone who sent me information and photographs; without you this column cannot exist. Please let me know how your summer goes, by 20 August, for the Autumn edition of *SPRAT*, in particular what you have been building, who you have been working, and any other information, news, ideas, suggestions or opinions about QRP. Also interesting photographs please, so 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 look like! Don't forget to let me know if you intend operating from somewhere other than home during the autumn and winter months, so I can let your fellow Club members know to listen out for you.





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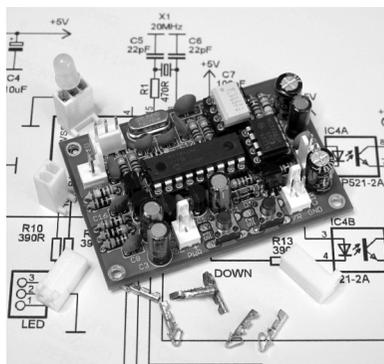
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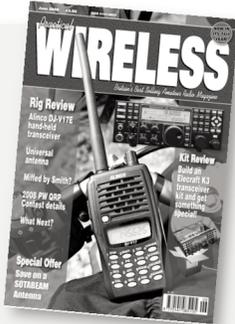
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# GQR Club Sales

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

<b>Antenna Handbook – 2<sup>nd</sup> edition</b> – members £6.00, non-members £10.00 plus post	} £1.60 (UK); or £4.50 EU
<b>Radio Projects volumes 2, 3 &amp; 4</b> – by Drew Diamond – members £5, non-members £10	} or £6.80 DX <u>per book</u>
<b>6 pole 9MHz SSB crystal filter 2.2kHz @ 6 dB, 500ohm in/out £12 plus post</b>	} £2.50 (UK); or
<b>Polyvaricon capacitors</b> – 2 gang (A = 8 to 140pF, O = 6 to 60pF) c/w shaft ext & mtg screws – £1.20 each	} £1.60p (EU); or
– 2 gang – (both 8 to 295pF) c/w shaft ext & mtg screws – £1.20 each	} £2.20p (DX)
<b>Pair LSB/USB carrier crystals HC18U wires</b> - [9MHz ± 1.5kHz] <b>£4 pair</b>	} <b>All components</b>
<b>HC49U</b> (wire) crystals for all CW calling freqs – 1.836, 3,560*, 7.015, 7.028, 7,030*, 7,040, 7,0475, 7,122, 10,106, 10,116*, 14,060*, 18,096, 21,060, 24,906, & 28,060 all are <b>£2.00 each</b> (* = also available in low profile HC49/S)	} plus <b>postage</b>
<b>HC49U</b> (wire) crystals – 1.8432, 3.500, 7.00, 7.159, 10.106, 10.111MHz – <b>50p each</b>	} <b>(ANY quantity)</b>
<b>HC49</b> (wire) crystals – 2.00, 3.00, 3.20, 3.579, 3.5756, 3.5820, 3.6864, 4.0, 4.096MHz 4.1943MHz, 4.433, 5.0, 6.00, 7.6, 8.0, 10.0, 11.0, 12.0, 13.50, 20.0, 24.0, 25.0MHz	} £1 (UK), or
27.0, 28.0, 32.0, 35.50, 43.0MHz – <b>all 35p each</b> (Some of these are low profile types)	} £2.20p EU, or
<b>Ceramic resonators</b> – 455kHz, 2.0, 3.58, 3.68, 4.00 & 20.00MHz – <b>50p each</b>	} £3.30p (DX)
<b>Schottky signal diode – 1N5711</b> low fwd volts for up to vhf/uht <b>20p each</b> }	} <u>Post free</u>
<b>General Purpose silicon diode – 1N4148 10 for 10p</b>	} <u>if ordered</u>
<b>Varicap diodes</b> – <b>MVAM109</b> – 40pF @ 9v, 500pF @ 1v. <b>50p each</b> } max of 2 of	} <u>with heavier</u>
– <b>MV209</b> – 5pF @ 12V, 40pF @ 1V <b>35p each</b> } each per member	} <u>things like</u>
<b>SA602AN</b> – <b>£1.50</b> (note – I may supply NE or SA, 602 or 612 as available. All are <u>fully</u> interchangeable.)	} <u>binders,</u>
<b>MC1350</b> – <b>£2.00</b> These are getting in short supply now so max of 2 per member	} <u>toroids,</u>
<b>PICAXE-08M</b> – <b>8pin</b> – <b>£2 each</b> ; <b>CA741</b> op-amps 8pin DIL – <b>5 for £1</b>	} <u>or filters.</u>
<b>LM386N-1</b> – 4 to 15v, 300mW, 8pin DIL – <b>£0.40 each</b>	} <u>Use just</u>
<b>LM386M-1</b> – 4 to 15v, 300mW, 8pin <b>SMD</b> [0.2" (4mm) x 0.25" (5mm)]- <b>£0.35 ea</b> }	} <u>that</u>
<b>TDA7052A</b> – 4.5 to 18v, 1W 8pin <b>DIL</b> low noise & DC vol control – <b>£0.60 each</b>	} <u>postage</u>
<b>TA-7642 Radio IC</b> – direct equivalent of <b>MK484</b> (& ZN414) – <b>75p each</b>	} <u>if ordered</u>
<b>2SC536 transistors (npn)</b> fT – 100MHz, hFE-320, VCBO +40V – <b>5 for 50p</b>	} <u>with books</u>
<b>MPSH10 transistors (npn)</b> fT – 650MHz, hFE 60, VCEO 25V – <b>8p each</b>	} <u>or CDs</u>
<b>2N3904 transistors (npn)</b> fT – 300MHz, hFE-150, VCBO +40V – <b>10 for 50p</b>	} <u>add this</u>
<b>2N3906 transistors (pnp)</b> fT – 250MHz, hFE-150, VCBO -40V – <b>10 for 50p</b>	} <u>postage</u>
<b>FETs – IRF510</b> – <b>50p each</b> ; <b>2N3819</b> – <b>12p each</b> ; <b>2N7000</b> – <b>10p each</b>	} <u>as books</u>
<b>Pad cutters</b> – new stock 2mm shaft – 7mm o/s, 5mm i/s diam – 5mm pad with 1mm gap	} <u>or CDs do not</u>
<b>10K 10mm coils</b> – 1u2H, 1u7L, 2u6L, 5u3L, 11u0L, 45u0L, 90u0L – all <b>80p each</b>	} <u>travel well</u>
<b>Magnet Wire – 18SWG – 2 metres – 60p, 20, 22 SWG – 3 metres – 60p;</b>	} <u>with parts.</u>
<b>24, 25, 27SWG – 4 metres – 40p; 30, 33, 35SWG – 5 metres – 30p.</b>	} <u>Postage</u>
This is solderable enamel insulated max of 3 sizes per member	}
<b>QRP heatsinks – TO92 – 30p; TO39/TO5 – 40p; TO18/TO72 – 60p</b> (pics in Sprat 148)	} <u>as for</u>
<b>BACK AGAIN!</b> – Diamond pad cutter – 2mm shaft, 7mm o/s & 5mm i/s dia – <b>£4.50 each</b> }	}
<b>Axial lead inductors</b> (they look like fat ¼W resistors) these are low current – a few hundred mA	} components
<b>4.7uH, 6.8uH, 10uH, 15uH, 18uH, 22uH, 39uH, 47uH and 100uH</b> – all <b>17p each.</b>	}
<b>Toroid Cores</b> – 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; T130-2** – £1.50ea; T130-6** – £2.00ea.	}
FT37-43 – 80p; FT50-43 – £1.20; FT37-61 – £1.20; FT50-61 – £1.20; FT140-43** – £2.50 ea; FT140-61** – £2.50; BN43-2402 – £1.20; BN43-202 – £2.00; BN43-302 – £2.00; BN61-202 – £2.00.	}
<b>Ferrite beads</b> – FB73-101 (3.5mm dia x 3.2mm long, 1.2mm dia hole) – <b>40p for 5</b>	}
All toroids are plus postage – up to 5 packs = £1.00 (UK), £2.20 (EU), £3.30 (DX). Each additional 5 packs, please add 50%	}
** <b>Except</b> <b> items</b> – they are heavy and each counts as 2 packs (ask for quote if you want more than 2 of the large toroids)	}
<b>Limerick Sudden kits</b> RX (80 through 20m); TX (40m only) <b>£34.00 each plus post</b> UK – £2.50, Eu – £4.00, DX – £7.00	}
<b>Sprat-on-DVD</b> – 1 to 148. <b>Only £4 each to members plus postage, UK – £1, EU – £2.30, DX – £3.50</b>	}
<b>Sprat Binders</b> – nylon string type – Black with club logo on spine -16 issues per binder – <b>new stock</b> – £4.50 each plus postage (one: UK – £1.40, EU – 3.00, DX – £4.00. More – add £1.10, £1.50, £2.50 each)	}
<b>Cheques (UK) and payable to G-QRP Club.</b> Sorry, but cheques in other currencies are uneconomical to us due to bank exchange charges!	}
<b>MINIMUM ORDER for cheque or PayPal payments is £5</b> For orders less than £5 – please use postage stamps (any denomination £1 or less please) - any quantity of stamps is OK, or cash. I can accept cash in GBPounds, or US\$ / euros (at the current exchange rates) – but please send securely! You can order via e-mail and pay by PayPal. Use g3mfj @ gqrp.co.uk – pay me in GBPounds and you <b>MUST</b> include your membership number and address please. PayPal charge us about 4% so a contribution towards that is always welcome - thanks	}