SPRAT

THE JOURNAL OF THE G QRP CLUB

DEVOTED TO LOW POWER COMMUNICATION

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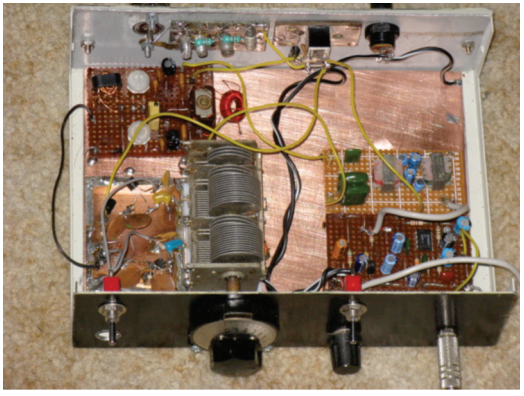
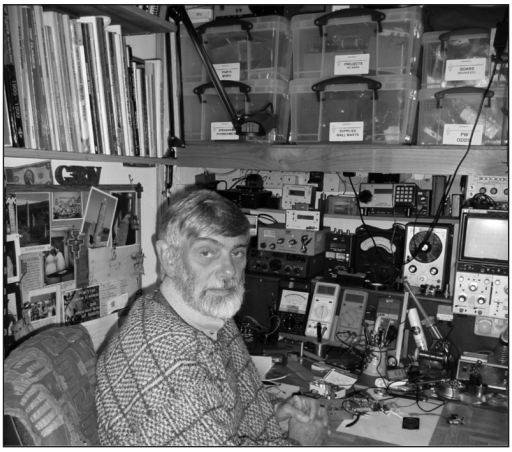


VK3YE Phasing Transceiver

IK0IXI “Q Line”

In this issue:

JOURNAL OF THE G QRP CLUB



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This issue contains details of the Rishworth QRP Convention. There is a slight increase in the cost of admission but we are paying a premium rate to hire the school. As in previous years there will be a Constructor's Evening and Buildathon on the evening before the convention. As before in this will be in the meeting room of the Premier Inn, Salterhebble Hill, HX3 0QT. In previous years, the Buildathon has been popular, so if you wish to join in this year, early booking is advised. See the next page.

Don't forget to look out your favourite small projects and enter the W1FB Award. The rules for this year are printed below. Lots of member's smaller projects will fit the criteria and entertain and inspire other members.

The W1FB Memorial Award 2014/2015

An easy topic this year - "My favourite weekend project". There are dozens of little construction projects laying around on member's work benches. So …. Describe your favourite little project for other members. It can be original work but I am happy to see existing projects that have been improved or updated.
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. A special plaque is presented for the best design.

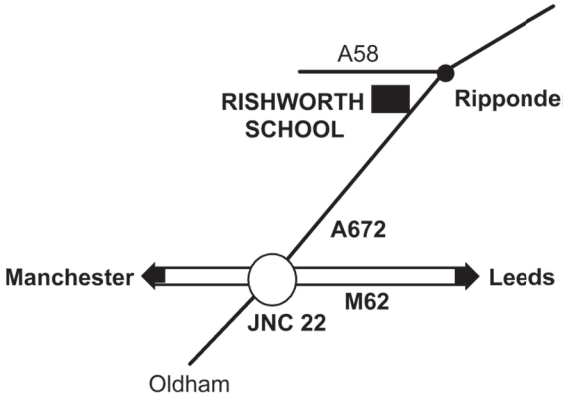
Printed & Distributed by G QRP Postal Mailing

THE G QRP CLUB
MINI-CONVENTION

(in conjunction with the Halifax Radio Society)

Saturday 25th October 2014

The Rishworth School, Ripponden



OPENS AT 10.00am
ADMISSION £3.50
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 (see overpage for details) to be held at Premier Inn, Salterhebble Hill, Halifax, HX3 0QT. (Tel: 0871 527 8486) www.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 24th 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 – talk radio and QRP

- **Buildathon**

Why is Dom so happy? Well, he has built a little QRP[p] 40m transmitter in about an hour at an open air buildathon in Sweden under the guidance of Johnny, SM7UCZ. You too could build this transmitter in the 2014 Rishworth Buildathon (and Johnny with be there). To add more interest the club is offering a special plaque to the member who submits the best log using the transmitter for 28 days from the time of construction.

Book your place with G3RJV or G3MFJ as below.

- **QRP Show and Tell**

Bring along your favourite QRP projects – show them off and tell us about them.

- **The Buffet Supper.** Last year it cost the club quite a lot of money for the Friday and Saturday buffets, so this year we hope to supply a hot buffet on Friday and make a modest charge. 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).

GOOD NEWS ITEM - Club member Steve Hartley, G0FUW, has been elected as a member of the RSGB Board of Directors. Steve is Chair of the RSGB Education and Training Committee. Many readers will know Steve as a pioneer of the Buildathon.

SAD NEWS ITEM - George Burt, GM3OXX, has asked me to mention the passing of Peter Park, GM3PIP (and GM3PJP). Peter was a keen a keen club member and a Morse enthusiast and had been chairman of the Aberdeen club for several years. He leaves a Wife, Hilda, and daughter, also Hilda, and granddaughter Rachel currently studying for an amateur radio licence.

WIFB MEMORIAL ENTRY

A Simple RF Voltmeter

Anthony Langton, GM4HTU, 71 Gray Street, Aberdeen, AB10 6JD

I have been playing around with a 100kHz crystal oscillator for use in a precision frequency counter. The time arrived for the final set-up, but there was a problem. I wanted to monitor the output voltage while checking the frequency as the output level was affected by frequency.

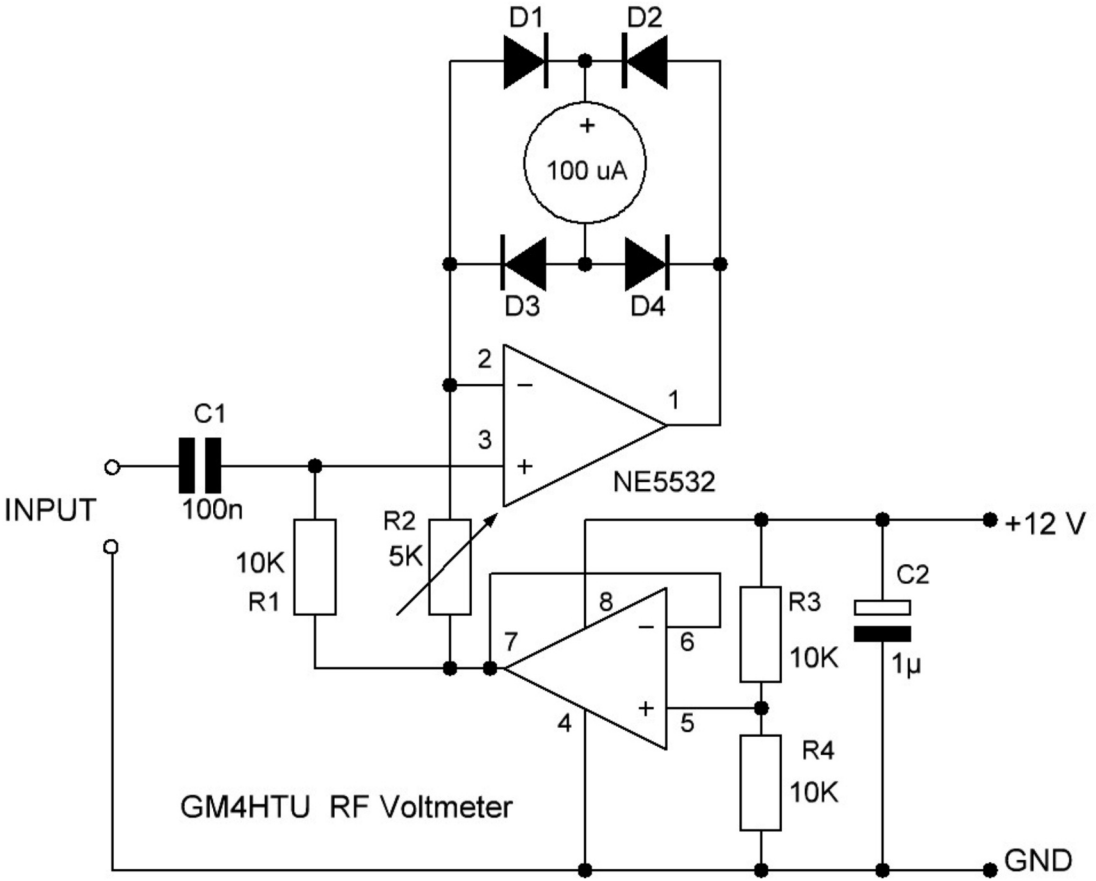
All three channels of my two-channel oscilloscope (x, y & z) were being used to configure it as a phase scope for comparison with Radio 4. The digital multi-meter runs out of puff at a few hundred Hertz. My RF power meters do not go down that low and are 50 Ohm inputs: I needed high impedance. My AF power meter can be switched to high impedance but does not go up that high.

So, in the best traditions of the GQRP Club I decided to build an RF voltmeter for use at that frequency. The circuit is standard text book stuff. Putting the rectifying diodes in the feedback loop linearises the response. The input impedance can be very high but I dropped it down to 10k ohms, high enough for the job in hand. The meter is traditional: black, circular, bakelite and probably older than I. Full scale is 100uA.

The current through the meter is equal to the average input voltage divided by the value of R2 but it has been adjusted to show peak to peak voltage as that is what I have been working with using the oscilloscope. Maximum reading is 1 Volt.

I have used a dual op-amp for simplicity but there is no reason why you cannot use two singles. Note, however, that the rectifying stage must use a device with a high gain-bandwidth product. The NE5532 is rated at 10MHz . The supply splitter can be just about anything, a venerable 741 would work here. The project has been built on a scrap of strip-board which has been secured to the back of the meter.

The whole job took only a few hours and much of that was refurbishing a third- or fourth-hand box with epoxy filler and paint. If you want to spend the entire week-end on the project you could add an input attenuator for a 10 V range, but that is not necessary at the moment.


D1
D2
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D3
D4
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3
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NE5532
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INPUT
100n
10K
R1
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8
7
6
4
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R3
10K
C2
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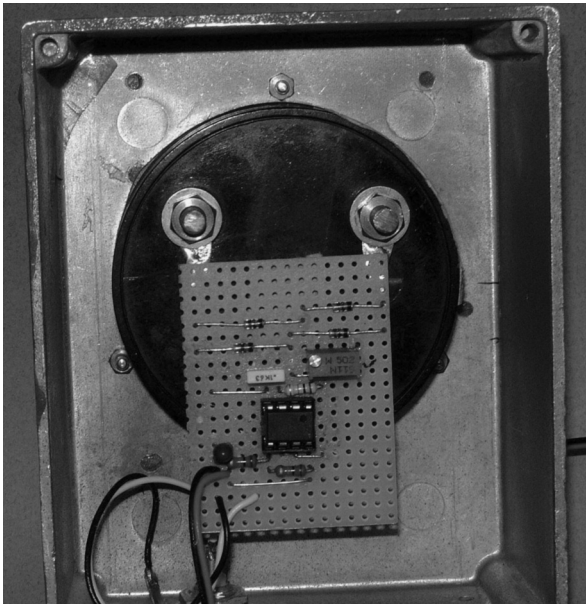
GM4HTU RF Voltmeter

GM4HTU
RF VOLTMETER
FRONT

GM4HTU
RF VOLT METER
INSIDE



Working CW from an SSB Phone Rig

Paul Darlington – mØxpd – 8 Uplands Rd, Flixton, Manchester

It wasn't long after I'd completed my first sideband rig until the novelty of phone operation began to tarnish. Honeymoons are – by their very nature – short-lived affairs. I reverted to type and asked myself "*What would I need to do to operate CW from this rig*"?

I could, of course, make the necessary additions to handle CW as a new mode – as indeed I shall do at some point in the future. But the immediate task was to consider how I might "jury-rig" the phone transceiver to work CW. These notes arose from answers to that question; I shall discuss three approaches to sending CW. One is the "standard approach", generally applicable to all SSB rigs, whilst the others rely on the additional flexibility available when the system is supervised by a microcontroller and has agile RF generators [1].

The three approaches may have some limited practical interest in their own right. They may also represent means to provide a "tune" mode for those not interested in CW, avoiding all that undignified whistling whilst matching the antenna. But it is the real purpose of these notes to point to what seems to be a general principle; a lemma for the "Occam's Microcontroller" thesis [2]. That emerging general principle states that it is possible to trade additional complexity in software for a reduction in complexity of the required hardware. Software is infinitely reproducible and – in some sense - "free" whereas hardware consumes space, time and energy so this trade-off is a saving!

Before we consider the three methods, it is necessary to prepare the ground by establishing some points of commonality.

Background

We wish to transmit a single tone, switched by the action of our key / paddle and we expect to receive similar tones AT THE SAME FREQUENCY from the far-end station. We shall suppose that frequency fixed throughout these notes, and name it f_{out}. The far end is totally agnostic as to how the RF signal at f_{out} is generated and, specifically, s/he neither knows nor cares if it is a switched carrier or one sideband in an SSB transmission. Irrespective of "conventions" for working CW, for the purposes of these notes we shall assume that it arises in a phone SSB rig and that, in consequence, it is USB at frequencies above 10MHz and vice-versa. This requires that our methods work for BOTH upper and lower sideband configurations.

When we transmit our single RF tone, it is easier to operate the key / paddle if there is provided audible sidetone. We shall require that our methods use a fixed-frequency sidetone, which we shall call f_{CW}. Tuning to receive replies from the far end (which we generously assume to be sent at f_{out}) is facilitated if the modulation scheme is arranged so that f_{out} and f_{CW} are directly related by the "dial frequency":

$$f_{out} = \text{dial frequency} + f_{CW} \qquad (1)$$

Then tuning / netting to a station simply amounts to matching its CW frequency to the local sidetone frequency – easy for those with a musical ear.

In those radios where RF generation is performed digitally, under control of a microprocessor, the derivation of the "dial frequency" component of equation 1 is supremely easy. Additionally, it is simple to generate a (square wave) audio signal directly from the microcontroller – this will be used as the basis of our both our sidetone signal and (after appropriate filtering and modulation) the transmitted RF. The square wave can be processed by a number of means to produce the sidetone, which can conveniently be injected into the speaker of a typical rig as shown in Figure 1.

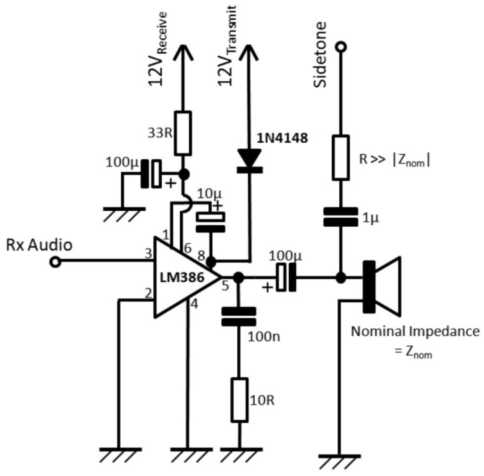


Figure 1 Injecting Sidetone

Figure 1 shows a conventional LM386-based receive audio section (with the muting arrangement described by g6ueb [3]). The audio stage drives a low-Z speaker or headphone of nominal impedance Z_{nom}. Sidetone, from any of the circuits to be described below, is injected through the series resistor and capacitor shown. The high value of the resistance compared to the speaker's nominal impedance (and that of the Zobel network) places the sidetone amplitude at an appropriate level and prevents the sidetone circuit from disturbing the Rx audio.

With these preparations completed we now consider the three methods for working CW, starting with the "obvious" approach.

Method 1: Linear

The simplest method for working CW from a phone rig is to replace the voice signal with a keyed tone at the desired frequency (f_{CW}). In our case, wherein the microcontroller is able to produce square waves with ease, that tone can be derived by a filter, such as that shown in Figure 2. After initial experiments with passive filters, it was found necessary to use an active structure to achieve sufficient rejection of the harmonics present in the square wave – Figure 2 shows a Kerwin-Huelsman-Newcomb (KHN) bandpass filter tuned for a quality factor of approximately ten.

As op-amps come in quad packages, a further first-order stage and voltage follower have been added "at no extra cost" to provide additional attenuation of the unwanted spectral content of the square wave. The precise centre frequency is tuned using the trim pot (the 210kΩ value shown gave f_{CW} = 600Hz in my build of the circuit) and almost any quad op-amp will work – I used a TL074.

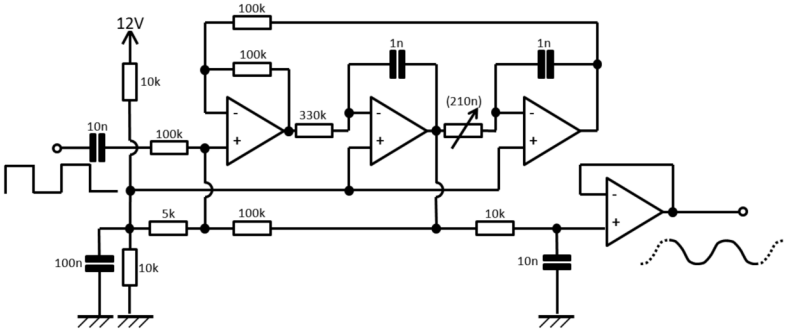


Figure 2 Filter for recovering the fundamental of a 600Hz square wave

The (almost) pure tone produced by the filter of Fig 2 is used as both sidetone and as input to the superhet modulation scheme, as shown in Figure 3.

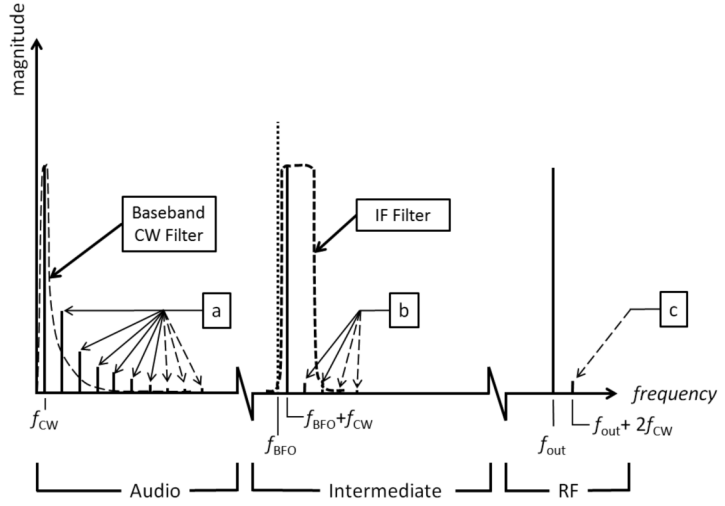


Figure 3 CW Generation by Method 1

Figure 3 shows the square wave's fundamental at f_{CW} = 600Hz and the harmonics (a). The frequency response of the filter of Fig 2 is suggested in Fig 3 by the dashed line at AF; it passes the fundamental, but attenuates the harmonics.

On mixing to IF, the square wave's fundamental has been shifted up to $f_{BFO} + f_{CW}$ where f_{BFO} is understood to be the frequency of the Beat Frequency Oscillator, tuned appropriately for use of the IF filter (whose magnitude response is shown by the dashed line at IF) as a USB filter. Note that the heterodyned fundamental appears within the IF filter's passband but so too does the (third) harmonic, imperfectly filtered by the baseband filter. On second mixing up to RF, the fundamental is shifted to the desired output frequency, f_{out}. The IF harmonics (b) have been largely removed by the IF filter's

response, with the exception of the third harmonic, (c), which appears in RF at $f_{out} + 2f_{CW}$. The response of the baseband filter (Figure 2) at 1.8kHz is around 37dB down on the (600Hz) fundamental, so this spurious RF emission if of little practical importance, particularly at QRP powers.

Notice that this first method of sending CW involves no more non-linear operations than those implicit in the superheterodyne scheme – therefore I have named it "Linear". The remaining methods will exploit varying degrees of frequency shifting...

Method 2: Single Shift

In method 1 (above) an additional filter was required (Fig 2) and the filtering action of the IF filter (which, given its crystal-based architecture is likely to be the best band-pass filter available) is under-exploited. In this second method, we shall make more use of the IF filter.

On key down, instead of generating a square wave at f_{CW}, we deliberately make a similar signal at the higher frequency $3f_{CW}$ (which, for my taste, is 1.8 kHz), as seen in Figure 4.

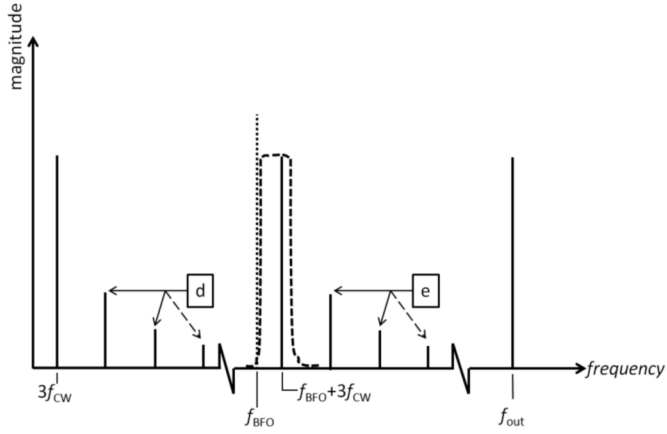


Figure 4 CW Generation by Method 2

Note that the increase in frequency of the square wave is reflected by increased spacing of the harmonics (d). When the baseband signal is modulated to IF (by the same BFO frequency as used in method 1) only the fundamental component is within the passband of the IF filter, the others (e) falling well in the stopband. This means that on second mixing, we generate a purer RF signal although the VFO signal must be slightly changed to maintain the correct output frequency, f_{out}. In fact, to preserve the correct output frequency we must reduce the VFO frequency by $2f_{CW}$ on transmit (for "USB" operation). This is easy to arrange when the VFO is realised as a DDS device under microcontrol [2]. However – the sidetone is now at the wrong frequency...

The correct sidetone pitch can be restored by a simple divider circuit operating on the $3f_{CW}$ square wave. A suitable circuit is shown as Figure 4, in which the "minimal solution" is

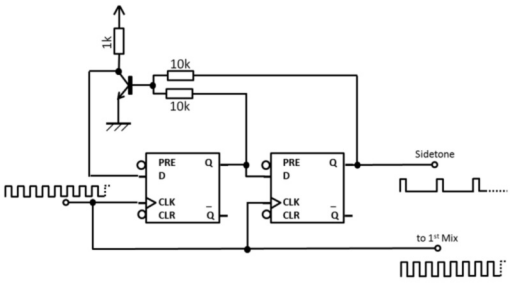


Figure 5 Divide-by-3 for sidetone generation

sought – this minimal solution produces a pulse train with the correct fundamental frequency (f_{CW}) but with increased harmonic content and (importantly) non-zero even-order harmonics as compared to the square wave case. A divide by three circuit with square wave output would require an additional flip-flop stage. The transistor is any general-purpose npn (e.g. 2N3904) and the D-type flip-flop similarly was selected by junk-box contents (mine was a 74LS74).

The mild shortcomings of the sidetone pulse train in Figure 5 suggest an additional elaboration of the transmit modulation scheme which "costs nothing" in software but reduces hardware complexity and produces a better sidetone signal...

Method 3: Double Shift

In this final method, we exploit the full flexibility of the RF generation scheme [1] to our advantage. On key down, the microcontroller now generates a square wave at $4f_{CW}$ (2.4kHz), as shown in Figure 6.

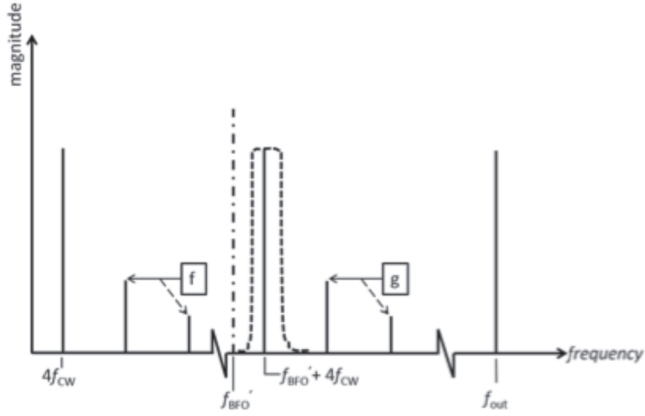


Figure 6 CW Generation by Method 3

The increased square wave frequency is reflected by its widely-spaced harmonics – but notice that the fundamental would now fall OUTSIDE the IF filter's passband as depicted in Figure 3 (or, at best, on its edge – my homebrew IF filter is disappointingly narrow). We can't change the crystal filter on the fly – but we can easily change the BFO frequency! This has been done in Figure 6, where the new BFO frequency, f_{BFO}', is chosen to place the fundamental of the IF copy of the square wave in the IF filter's passband. This double-shift (of both VFO and BFO on transmit) yields the correct pure-tone RF output,

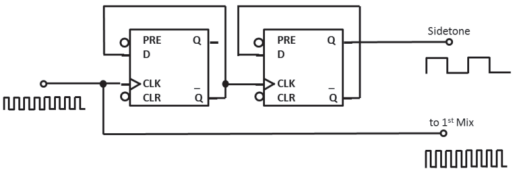


Figure 7 Divide-by-4 for sidetone generation

but leaves us with a sidetone two octaves above the preferred pitch – easily corrected by a divide-by-four circuit such as that in Figure 7.

Again, component selection is dictated by what's in your junkbox – the circuit is simplicity itself!

In Closing

Three simple instances of generating CW signals from an SSB rig have served to illustrate the way in which software complexity can be traded for hardware simplicity in a rig using agile RF generation (such as DDS) and micro-control.

The methods have shown that existing resources in a typical SSB rig (the IF filter) can be used to perform the filtering task inherent in producing clean CW at RF from a "buzzing" square-wave signal. When the IF filter appeared too wide to clean up the harmonics of the square wave, we simply stretched those harmonics further apart, allowing the filter to do a great job. In principle, we have extended a simple SSB phone rig to a near-viable phone / CW transceiver and in practice I have now had QSOs on CW with Europe and North America using this scheme [method 2] on my modified "BITX" [4]. It won't compete with a purpose-built CW rig but it was almost "free", it taught some interesting lessons and it was a lot of fun!

References

[1] "RF Generation for Superhets", P. Darlington, mØxpd & P. Juliano, n6qw, SPRAT 158, pp. 4 – 11. Spring 2014.

[2] "Occam's Microcontroller", P. Darlington, mØxpd, SPRAT 156, p 13, Autumn 2013

[3] "Muting an LM386 on Transmit", D. Rowlands, g6ueb, SPRAT 155, p 26, Summer 2013

[4] "BITX - An easy to build 6 watts SSB transceiver for 14MHz", A. Farhan, vu2ese, downloaded from: http://kambing.ui.ac.id/onnopurbo/orari-diklat/teknik/homebrew/bitx20/bitx.htm

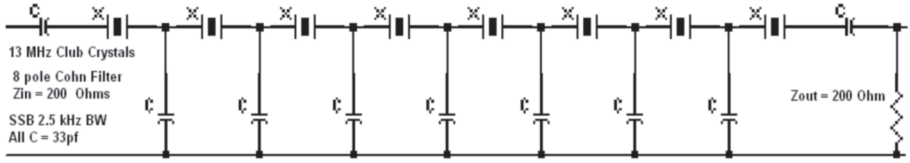
13 MHz SSB Crystal Filter using Club Crystals

Jan Verduyn G0BBL - Trowbridge UK – Jan.Verduyn@gmail.com

Recently quantities of 13.000 MHz HC49 wire-ended crystals are for sale from G-QRP club sales. These crystal have successfully been used to build CW or SSB ladder filters. A design of a 8 SSB pole filter is shown below here and offers good performance.

After obtaining a batch of crystals, the first step is to sort the crystals in groups which each are within 50 Hz tolerance. This can be done by plugging the crystals in a oscillator and measuring the frequency with a frequency counter or by noting the "zerobeat oscillator" frequency on a stable receiver with a accurate frequency read-out. Of course the easiest way is to measure Crystal Parameters is with a Vector Network Analyzer.

Once a quantity of 6 or 8 identical crystals has been found then an experimental filter can be built from the circuit shown below. This filter is known as a Minimum Loss or Cohn Filter. It has the advantage that all capacitors are the same value and the value of the Capacitor sets the Bandwidth! I used a value of 33pF to assemble a 2.5 kHz wide 8 pole SSB filter. If you only have 6 Crystals in the batch with similar frequency then just leave off the last two sections, each consisting of the series Crystal and the parallel capacitor.



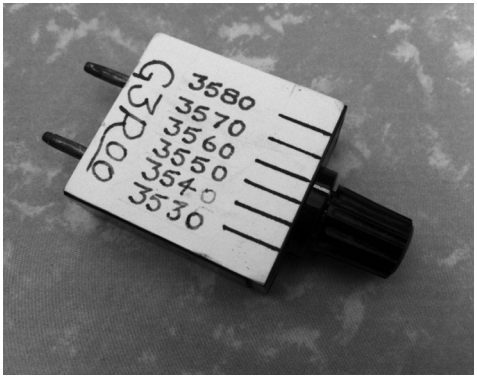
8-pole 2.5 kHz SSB Filter using Club 13 MHz Crystals selected to be within 50 Hz, All Capacitors are 33pF, Zin & Zout = 200 Ohms

If you like to design or simulate a Cohn filter with different parameters, then have a look at Jack Smith's article (ref 1.) which uses the free AADE Software program (ref 2.). Having measured the parameters of some 60 pcs 13 MHz club crystals at random, I would suggest using the following "average parameters" in the program: Q=70000, Ls=0.0232119134 Henry, Rs = 30 Ohm, Co= 3.77pF, Fs=12995844 Hz and Cs = 6.461306424E-15 Farad. As long as all crystals in the batch are within 50 Hz then actual filter bandwidth and other parameters should be close to simulation results, except of course the actual frequency of the filter which will depend on the actual Fs of the batch of crystals selected.
Good luck and happy experimenting!
13.000 MHz crystals (thanks to Jan) are available to club members at **12 for £2 plus postage**. See the back page of SPRAT.

Ref 1. http://www.cliftonlaboratories.com/cohn_crystal_filter.htm
Ref 2. http://www.aade.com/filter32/download.htm

Six in one!

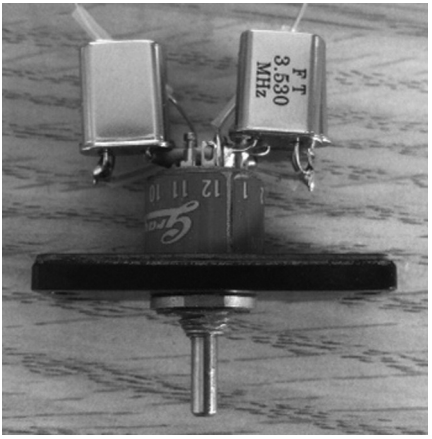
Ian Keyser, G3ROO. g3roo.ian@gmail.com



I love playing with my spy sets on 80 and 40.... even 20m but although I have a big collection of crystals it was always a hunt to find the one I wanted. I have found by default that the HC25 crystals will, contrary to all comments on the various reflectors, will survive in power oscillators such as the Paraset.
The big problem is finding the right crystal!

On eBay I noticed that there were crystals for sale.... six for about £8 plus postage.
I bought six and decided then to make a switched unit in an 10x crystal case.
I found a miniature switch salvaged from an old scope.... the result is the 'Six in one"!

Of course no circuit is required! The single pole switch selects one side of each crystal and the other side is common.



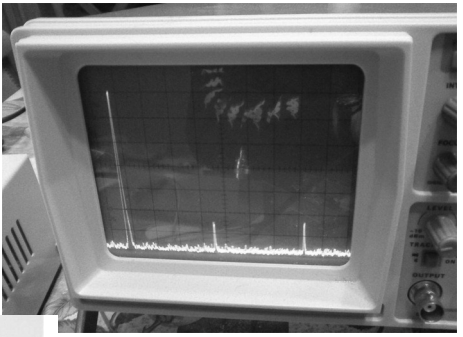
A 40m Transmitter

Fabio Bonucci, IKØIXI - KF1B, gqrp-italy@ik0ixi.it
G-QRP Representative for Italy

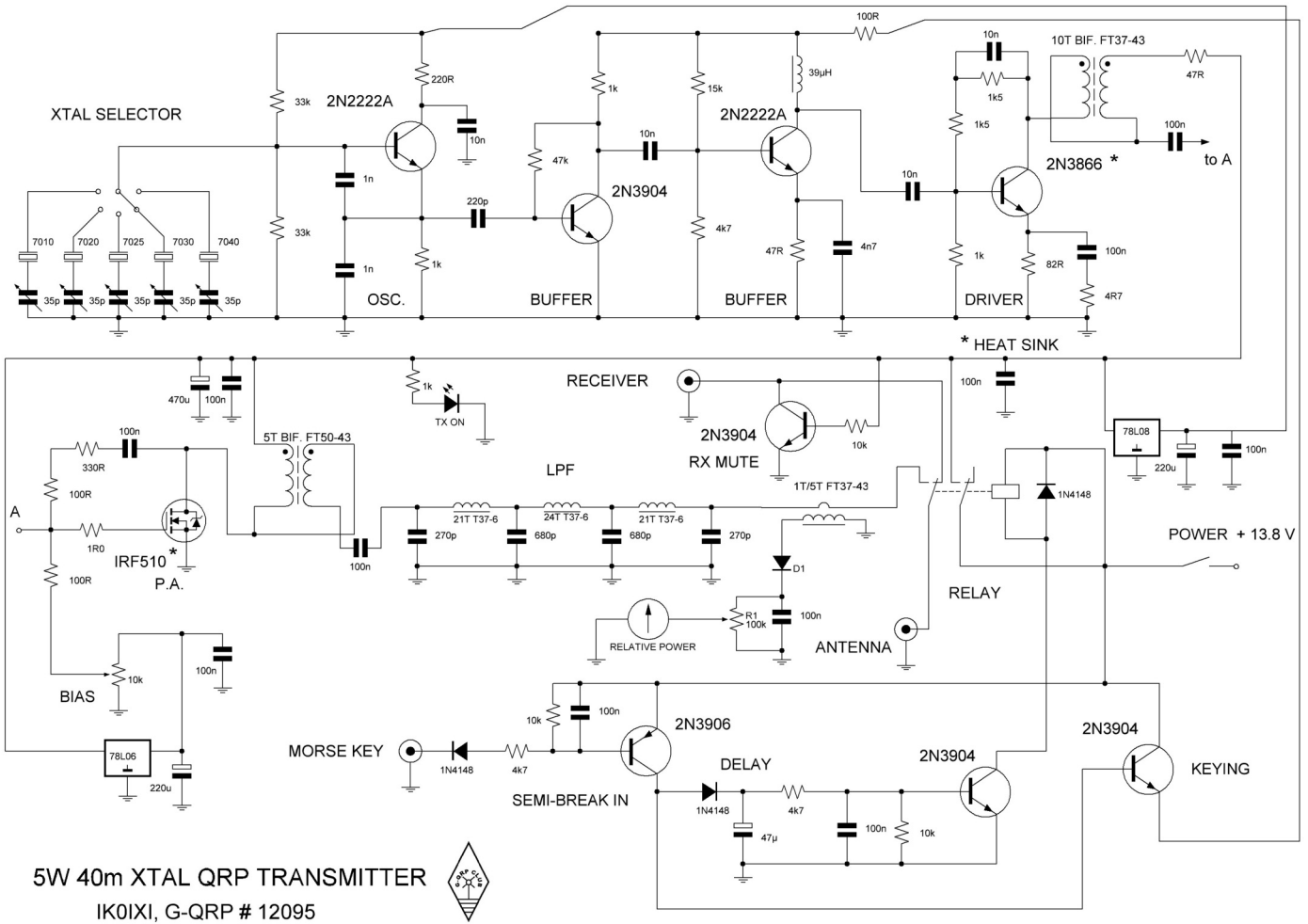
Nothing new, just a simple Xtal transmitter to use together my DCR and other receivers. It is based on Colpitts oscillator made by VK3YE and an amplifying chain using a classic 2N3866 and IRF510 capable of 5 W out. But I like to use 2W max and BIAS is regulated for this output power with very clean spectrum. The oscillator is not keyed but powered by relay to avoid a continuous note on receiver. Keying is obtained on intermediate amplifying chain.

I built this TX for portable use, side by side to my DCR receiver. But when at home I use it with any other receiver. This is thanks to built-in semi-break in and antenna switching circuits. It has worked many QRP stations through Europe including a long chat (about 30 min.) with Ron G3KTZ on 7030.

TX 2nd and 3rd harmonics are -55 dBc @ 4W out

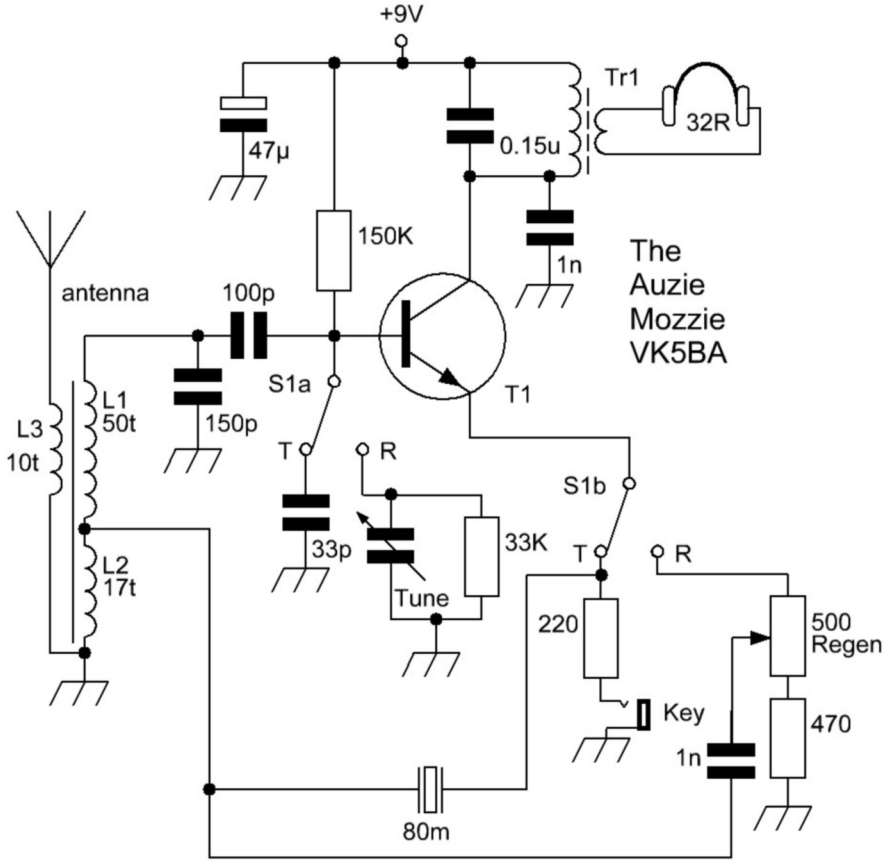


The transmitter together with the DCR receiver forms part of my QRP-Line.


XTAL SELECTOR
7010
7020
7025
7030
7040
35p
33k
2N2222A
220R
10n
1n
33k
1n
1k
OSC.
220p
47k
2N3904
BUFFER
1k
15k
2N2222A
39µH
100R
4k7
47R
4n7
BUFFER
10n
1k5
1k5
10T BIF. FT37-43
47R
100n
2N3866 *
to A
1k
82R
100n
4R7
DRIVER
* HEAT SINK
470u
100n
1k
TX ON
RECEIVER
2N3904
RX MUTE
10k
1T/5T FT37-43
100n
78L08
220u
100n
1N4148
POWER + 13.8 V
A
100n
330R
100R
1R0
IRF510 *
P.A.
100R
5T BIF. FT50-43
LPF
21T T37-6
24T T37-6
21T T37-6
270p
680p
680p
270p
100n
D1
RELAY
RELATIVE POWER
R1
100k
100n
ANTENNA
BIAS
10k
100n
78L06
220u
MORSE KEY
1N4148
10k
100n
4k7
2N3906
SEMI-BREAK IN
DELAY
1N4148
4k7
47µ
100n
10k
2N3904
2N3904
KEYING
5W 40m XTAL QRP TRANSMITTER
IK0IXI, G-QRP # 12095

The Auzie Mozzie

Malcolm Haskard, VK5BA. Reproduced from Lo-Key June 2009.
(The Journal of the VK QRP Club)



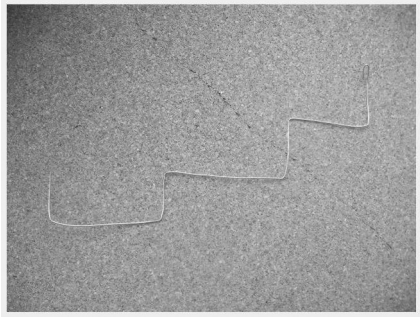
EDITOR'S NOTE: In this novel one transistor transceiver for 80 metres, Malcolm uses some local Australian parts. It is offered as a circuit suggestion leaving readers to experiment and find local equivalent parts for themselves.

To save me from readers comments ….
I must admit that I would have written "Ozzie Mozzie" but these VK fellas should know what is right!

Through a Double Glazed Window

Peter Head G4FYY (g4radioham@gmail.com)

If you don't fancy drilling holes in walls or window frames to get your antenna feeder indoors, then here is a simple solution.



<Fig.1.

1. Shut the window onto a length of bare solid wire to make a template, (fig.1).

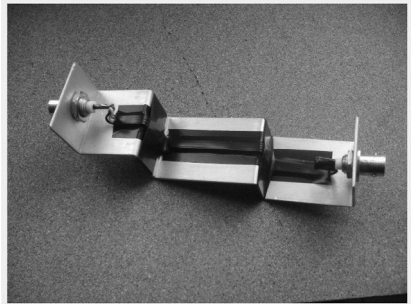


Fig.2.>

2. Cut a strip of aluminium approximately 35mm wide, bend it in a vice to match the shape of the wire and fit BNC connectors at each end. A ribbon cable comprising 4 wires is then taped to the bracket to form an approximation to a microstrip line. Connect the wires in parallel and to each connector, (fig. 2). The characteristic impedance should be close to 50 Ohms but you can easily check this by terminating one end of the bracket with a 50 Ohm load and connecting the other end via a length of 50 Ohm coax to an antenna analyser (or low power TX and VSWR meter). I started with a ribbon comprising 8 wires and peeled off one wire at a time to obtain a VSWR of 1:1 at 30MHz. As shown, the bracket gives a flat VSWR of 1.1:1 to beyond 70MHz and could probably be tweaked for use at 2m.
3. Figures 3 and 4 show the bracket installed in a double glazed window.

<Fig.3 (outside)

Fig.4> (inside)

Please note that this bracket has not been tested at, nor is intended for use at QRO power levels. But if your windows are all the same as mine are, this simple bracket will allow /P QRP operation from any room in the house - hi

The 'Unpolished'

An eight transistor 80 metre phasing SSB Transceiver

By Peter Parker VK3YE <parkerp@internode.on.net>

A previous Sprat (157) presented my experiments with the receiver section of SP5AHT's Mini Transceiver (details at http://sklep.avt.pl/photo/_pdf/avt2906.pdf - use Google Translate if necessary).

Because so much of the circuitry is shared, just four more transistors were sufficient to make it into the SSB transceiver described here. It puts out about 1 watt and under good conditions has attracted readability 5 reports from 300km away.

Changes made

The receiver's performance was already good so few subsequent changes were made.

The main one was to substitute a 10 uH RF choke for the T50-2 toroid before the balanced mixer. In place of the toroid winding's tap for the transmitter amplifier I used a winding of thin enamelled copper wire over the RF choke. Another similar winding provides coupling to the balanced modulator etc. This substitution was made while troubleshooting unrelated transmitter problems and is optional.

Transmitter section construction started well enough, with a good sounding low level SSB signal being produced when the microphone amplifier was built.

Unfortunately the problems started when this signal was amplified. While it sounded fine on a local receiver, there was good carrier null and some contacts were made, the RF power meter indicated what seemed to be self-oscillation. Changes to the RF amplifier strip made no difference and the project was put aside.

Several weeks later with fresh eyes the problem was found. Removing the receiver RF preamp's connection from the 33pF capacitor cleaned the transmit output. Even though power was not applied to the RF preamp on transmit there was some sort of coupling. My theory is that this created a feedback loop between the input of the power amplifier strip and its output, possibly via capacitance in the transmit/receive relay.

Experiments with diode switches to increase isolation were not successful so a second relay was placed near the balanced mixer board. This cured the problem. Its normally closed contacts are broken when the PTT is pressed, isolating the balanced modulator from the receiver RF preamp.

The other difference compared to the receiver alone is that the pi filter was moved to be next to the transmitter final stage and is not in the receiver antenna line. This was to separate it from the balanced modulators when trying to cure the abovementioned

feedback problem. The change leaves the front end with no filtering; if a problem restore the pi filter to the common antenna line and/or use a narrow band antenna coupler such as a Z-match.

A DPDT relay switches both the antenna and 12 volt rail when the PTT is pressed. The local oscillator and buffer are the only stages that receive power all the time. The others have power applied only if necessary.

Image rejection and carrier suppression

The article for the receiver described one way of measuring image suppression. I've since been using the free FrequenSee Android mobile phone app instead. This is an audio spectrum analyser, with calibrated dB and frequency scales. Use it by applying a local carrier, tuning the same number of kilohertz above and below it and comparing the strength of the desired and image signals. Adjust the phase shift control for best null of the opposite sideband. This app has been found invaluable when aligning this and other phasing projects and is demonstrated on the author's YouTube channel.

The main difference between aligning a phasing transmitter and receiver is that the transmitter needs attention to carrier suppression. Monitor this on a nearby receiver while making adjustments. There is interaction between the both balanced modulator trimpots and with the phasing trimpot but it will be possible to find a point where the carrier is almost nothing and the opposite sideband is well down.

Stations worked have reported clean audio. Only the closest stations have been able to detect a weak presence of the opposite sideband. However I would not amplify the output beyond about 10 watts unless the opposite sideband rejection was improved.

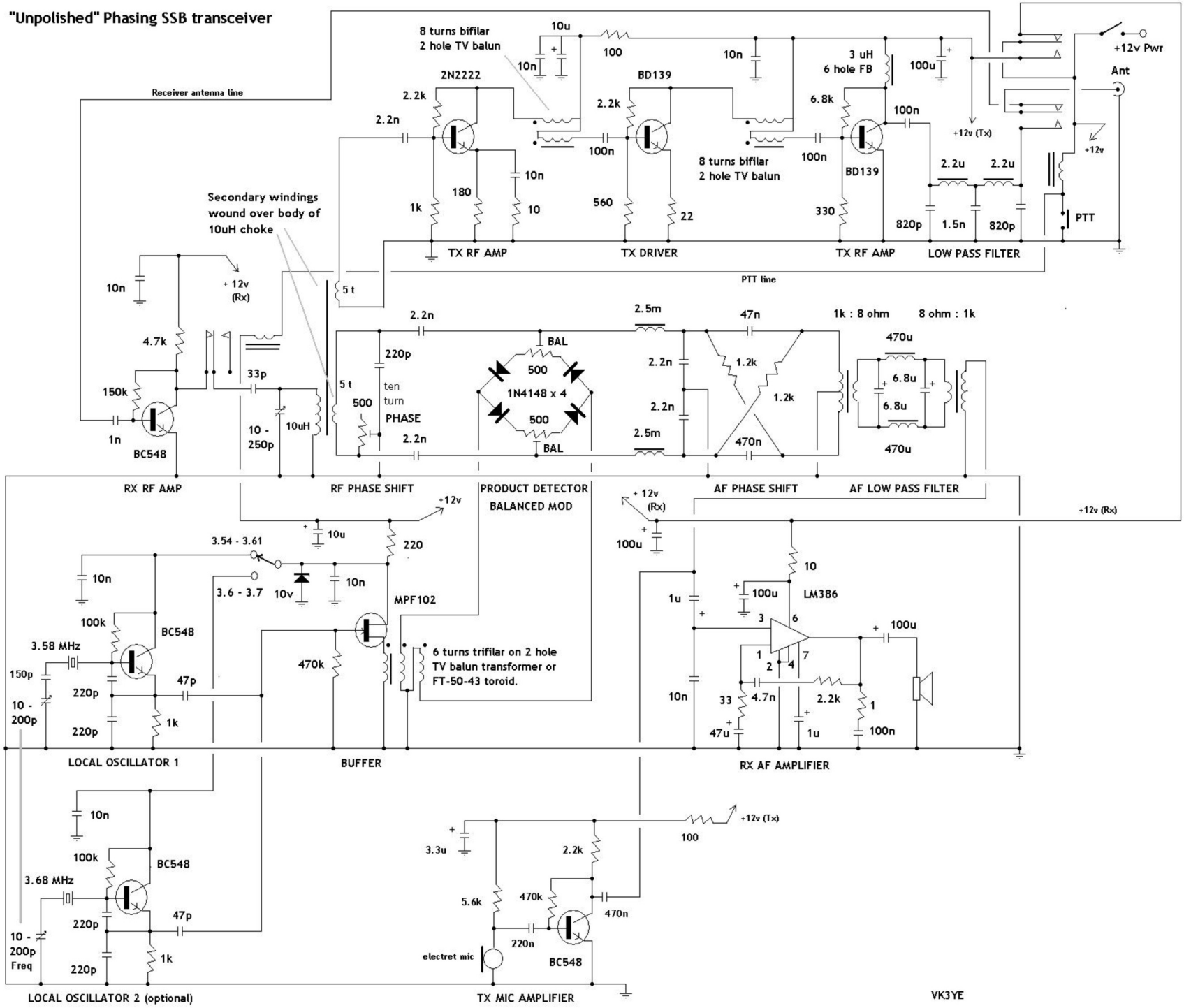
Simplification and additions

Removing the second local oscillator and having just one tuning range can save one transistor. Do this if you only need to cover one frequency segment.

It may be possible to delete the buffer and free another transistor. However you will likely need a higher power local oscillator circuit and a change to crystal control (or a VXO) to maintain stability.

Skimping on the AF filter by using a 3k to 3k transformer saves some capacitors, RF chokes and the second audio transformer. However it will broaden receive selectivity and transmit bandwidth so is probably false economy.

Similar Russian designs have combined the transmit and receive audio stages. The fancy switching required would add more complexity than the one transistor saved. However the


"Unpolished" Phasing SSB transceiver
8 turns bifilar
2 hole TV balun
10u
100
10n
2N2222
BD139
3 uH
6 hole FB
100u
+12v Pwr
Ant
Receiver antenna line
2.2k
2.2n
6.8k
100n
+12v (Tx)
+12v
2.2u
PTT
Secondary windings
wound over body of
10uH choke
180
1k
560
22
330
820p
1.5n
TX RF AMP
TX DRIVER
LOW PASS FILTER
PTT line
5 t
+ 12v
(Rx)
4.7k
150k
33p
1n
BC548
10 -
250p
10uH
ten
turn
PHASE
500
220p
BAL
1N4148 x 4
2.5m
47n
1k : 8 ohm
8 ohm : 1k
1.2k
470u
6.8u
470n
RX RF AMP
RF PHASE SHIFT
PRODUCT DETECTOR
BALANCED MOD
AF PHASE SHIFT
AF LOW PASS FILTER
3.54 - 3.61
3.6 - 3.7
10v
220
MPF102
100k
3.58 MHz
150p
47p
470k
6 turns trifilar on 2 hole
TV balun transformer or
FT-50-43 toroid.
LOCAL OSCILLATOR 1
BUFFER
LM386
1u
33
4.7n
2.2k
47u
100n
RX AF AMPLIFIER
3.68 MHz
10 -
200p
Freq
LOCAL OSCILLATOR 2 (optional)
3.3u
5.6k
electret mic
TX MIC AMPLIFIER
VK3YE

discrete component purist should be able to replace the LM386 with a two transistor audio amplifier for adequate headphone (but not speaker) reception.

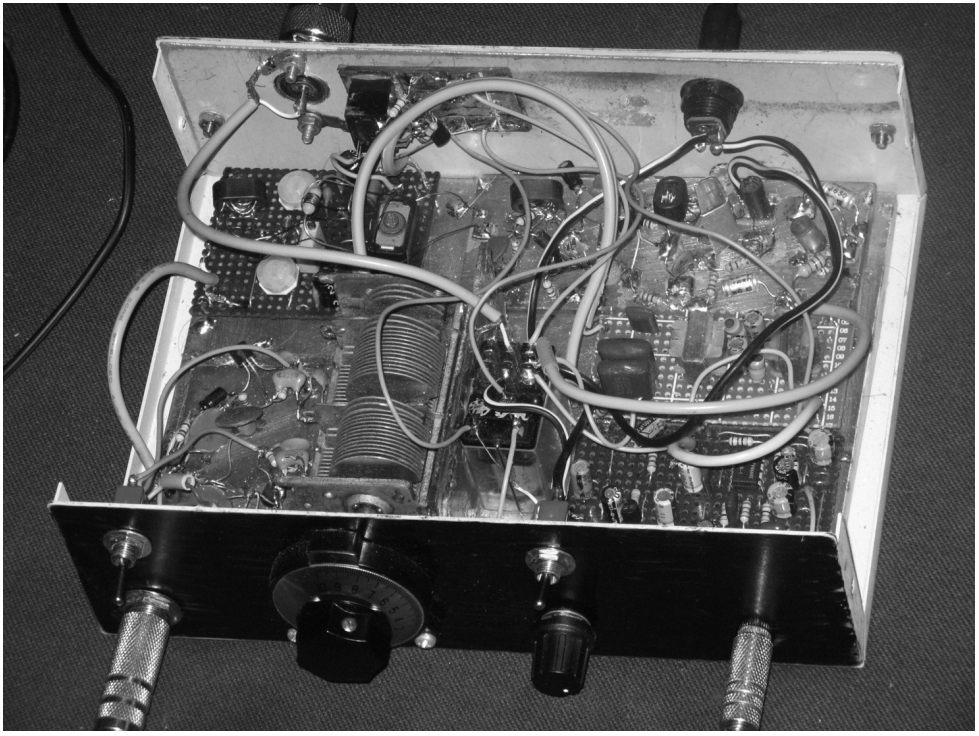
Slightly more transmit power would be the feature most desired. BD139s are capable of 2 watts so tweaking some values may allow this. Using an IRF510 as a final may also increase output. At these sort of power levels even a small improvement will greatly increases the number of readability 5 signal reports given on SSB.

CW has not been tried but should be possible by unbalancing one of the balanced modulators and providing a frequency offset. I would not recommend the other method of feeding a keyed sine wave tone into the microphone unless opposite sideband rejection was improved.

Conclusion

The Unpolished receiver and transceiver addition have both been satisfying projects. While its one watt signal is not strong, stations worked have commented on its clarity. Its simplicity and low current consumption would make it a fine portable station.

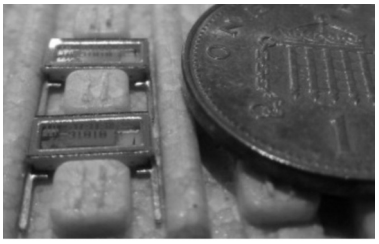
Inside the Unpolished Transceiver



G-QRP Club Sales News

Graham Firth G3MFJ

Firstly, the items from the last few issues are all still available.
This issue's new offerings:



We have been given a quantity of miniature crystals (our thanks to G3NIJ), I don't know what the official size is, but here is a picture with a penny coin. I have 2 frequencies, 1.8432 & 14.3818MHz. These are free to members, but you must send postage (£1.20). I still have the 13MHz crystals that came from Jan G0BBL – they are £2 for 12, and there is a crystal filter article in this issue of Sprat.

We have also been given some BB204 diodes (our thanks to Fred Wilson) – these are dual (back to back) varicap diodes (T092) and can be used as single, or in parallel or series mode, and they are 50p each. Fred also kindly sent some MVAM109s, so the stock of these should last much longer.

It's not just UK members who send us parts – thanks to Kare YU7AE, I can offer some 40822 dual gate MOSFETs at 50p each. These are equivalents of the NTE422 and are in TO18 metal cans. Limited stock so a max of 2 per order please.

I often send out orders in more than one packet, so if only part of your order arrives, please wait a day or two before asking why. Once I put them in the mailbox – it is out of my hands and orders can, and do, get really well separated, so have patience please.

Finally, can I make a plea for members to send their communication to the right person please, and, not to expect an instant reply. We are all volunteers and we all have lives outside the G-QRP Club. If you do not get a reply by return either email, or snail mail, please be patient and wait a week or two before chasing the recipient. Thanks.

G-QRP Membership News

Graham Firth G3MFJ

Since the last issue – the postal prices have gone up yet again and I have spent some time with our accountant working out what we should do. I do not want to increase the subscription at present because without the costs of the member's handbook, we are keeping our heads above water. However, I have decided for the moment to limit renewals to only one year.

So if your membership expires at the end of 2014, in January 2015, you can only renew for one year (to the end of 2015).

If your membership already extends to 2015 (and beyond) <u>you may not add any years at all</u> - and this applies also to UK members who pay by standing order.

So to be perfectly clear, if you are a UK member paying by standing order and the expiry date on your summer Sprat exceeds 2014 then you must cancel your standing order payment until you have caught up.

Antennas Anecdotes and Awards

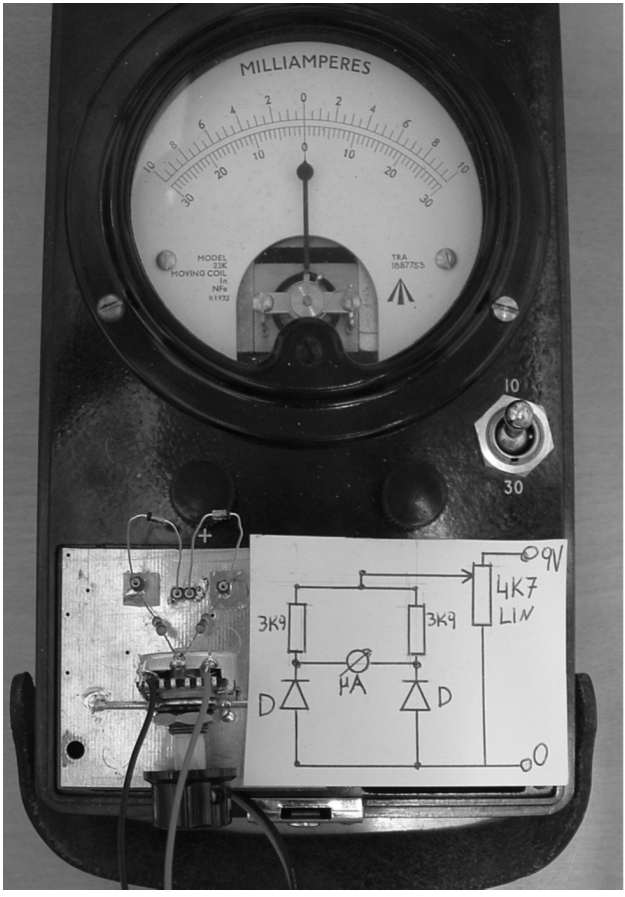
Colin Turner G3VTT 17 Century Road Rainham Gillingham 1Kent ME8 0BG g3vtt@aol.com

Welcome to the Summer AAA. How did you get on in the Valve QRP Day over Easter? Have you been working on antennas in the fine weather? Are you ready for the Summer Sizzler QRP Activity Period? There's a lot going on in QRP these days and the highlight of my Spring this year has been meeting the ARCI QRP gang again over in the USA with G3RJV. A transatlantic air trip to Chicago and over a 1000 miles by car through Illinois, Indiana and Ohio made it worthwhile. There's plenty of construction going on still in the QRP world so let's make a start with some simple test equipment for that homebrew SWR Bridge or perhaps a balanced mixer.

A Diode-Matching Unit.

'Thanks to SARC club members, *(writes SV3AUW/M0LPT*) I have a lot of old RadCom and Practical Wireless magazines to get construction ideas from. One of these homebrew ideas is about a very simple diode matching unit based on the G3HGZ "offer to real home-brewers". The circuit is very simple and very cheap! He writes: "Users of this circuit who have wondered why their home-brewed double-balanced diode ring mixers (or indeed any balanced diode mixer) have underperformed will have it revealed that diodes selected for "balance" by simply comparing their forward resistances at any single voltage (the voltage being applied by the ohmmeter) usually differ widely at different forward voltages. (*The need for balanced diode characteristics applies to SWR bridges particularly of the Wheatstone type*.) The circuit comprises a simple bridge with the two diodes under examination forming the lower arms. The two 3K9 resistors should be selected by measurement on a digital ohmmeter. Although their exact value is unimportant they must be of identical resistance. The 50μA meter shows zero reading when the two diodes are passing identical currents (ie they are matched at that applied voltage). The 5K potentiometer allows a voltage varying from zero to approximately 9V to be applied. A current flows when the bridge is unbalanced by different forward resistances of the diodes. Ideally the meter should be of the centre-

zero type but an end-zero meter is usable though not so convenient since it requires the diode to be interchanged when it is a negative reading. I believe that most users will be astounded by the spread of characteristics between diodes bearing the same type number and will be driven to seek a pair of diodes where the needle virtually fails to move throughout a full sweep of the potentiometer. I have found that a meter reading of less than 1μA throughout the range indicates a match far better than that obtained by purchasing so-called "matched diodes". Due allowance should be made for the fact that germanium diodes do not start to conduct until approximate 0.2V is applied. The corresponding figure for silicon diodes is about 0.6V"



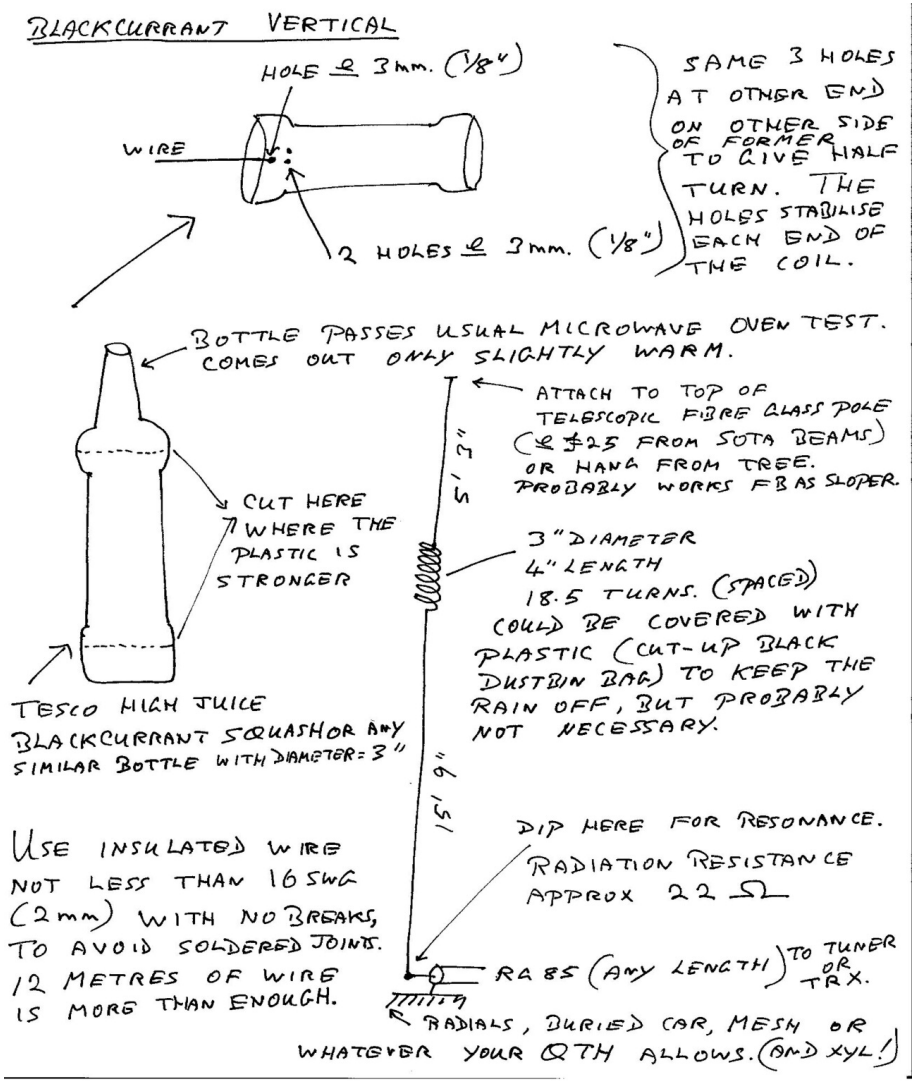
(*SV3AUW/M0LPT says)*
I made it and it works although I made a mistake. Can you tell what it is? Well the schematic calls for a μA meter where I used a mA meter! I repeated the circuit to demonstrate that I can use my DVOM as a centre-zero meter. I just have to rotate the potentiometer slowly .All you need for this handy gadget are two matched-value resistors, one potentiometer, one PP3 battery with clip and your imagination! Oh, and your DVM of course. I guess you have one! 73, Panos SV3AUW/M0LPTGQRP – 12766

Thanks for that Panos and also G3HGZ. You will be surprised at the lack of test equipment possessed by radio amateurs these days. A decent DVM, maybe an analogue meter too, are a prerequisite for any construction. Plus an oscilloscope, signal generator, audio generator, crystal checker, variable bench power supplies, counter, diode probes, the list goes on.

The Blackcurrant Vertical

I think this article has been shown before in Sprat but it is worth repeating. It comes from documents found in the records of G8PG I have been reading and shows a novel form of antenna for HF that permits operation certainly on 7 MHz but no doubt other bands with a decent tuner. The merit of this simple design is that it uses items that would have been thrown away in its construction. The original text comes from David G8ULM in a letter to Gus some seven years ago. He describes his design thus.' Members might be interested in my version of an antenna described by W2FMI. The original antenna was designed to operate at 7.21 MHz, a bit high for us, and is made of thin tubing. I have used plastic covered wire, (half of that 10 amp transceiver power cable, and aimed for resonance around 7.070 MHz This has resulted in a length of 15ft 9 inches for the bottom three quarter section and 5ft 3inches for the top section. *(Don't you just love those old style dimension? Remember feet and inches are better by miles for antenna work than meters!).* These dimensions do not include the coil former which in the original case was a BW 3029 coil which apart from being expensive was not probably available in the UK. I used a 6 inch section of a Tesco version of a Ribena bottle for the coil former which is easily sawn with a hack saw or a bread knife and is readily obtainable. The bottle former is 3 inches in diameter and I have calculated that 18 and a half turns are needed spaced over 4 inches are required. The antenna and coil uses one continuous piece of wire to avoid unreliable joints and breaks in the insulation. I bought 12m (feet!) and had some left over. Not including the cost of the SOTA Beams mast which I already had and the bottle of sickly blackcurrant squash the antenna cost me £1.56 to make and easily outperforms any other loaded verticals on 40m. *Peter goes on to describe the outstanding performance he obtained with this antenna and how he used a sheet of 6 foot by three foot metal as a ground plane. I get the impression this antenna would work in a limited location with some*

radials cut to length or even a tuned radial wire in a favoured direction perhaps using a radial tuner. Thanks to Peter and sorry for any delay



Hello Colin, B&Q are selling 50 releasable tie wraps (295mm by 8mm) for just under a fiver (£5). These are very handy for lashing up fibreglass poles and many other uses around the shack. They are green and they can be used many times. Jerry G0AED GQRP 912

AWARDS

This is important! The new **GQRP Club Awards Manager** is Ryan Pike G5CL. Please send your applications to him at: 63 Bishopstone Village, Nr. Aylesbury, Buckinghamshire.

We would like to thank Ryan for taking on this task leaving me more time to work on AAA and the Valve QRP theme. Please refer to the GQRP Club website for further details.

'Just waiting for the Summer Sizzler' says Doris

Valve QRP Day Report – April 19th 2014

Colin, G3VTT [g3vtt@aol.com]

The latest Valve QRP Day saw many of the regulars active with a variety of transmitters some using ex WW2 equipment which is something of a minor miracle when you consider the long passed on designers must have designed in 70 plus years ago. Gerald **G3MCK** was active with his 5 watts co/pa on 3560 working G4ZZB for his only QSO a 45 minute chat listening on his home made valve superhet receiver. Derek **G3NKS** writes *'it was Easter Saturday and I didn't get too much time to play radio but I did manage 7 contacts on 80m and 40m and these were proper chat type QSOs. Only one of them, Rupert G4XRV, admitted to using a valve TX. Heard G3VTT but couldn't attract his attention as I didn't have a crystal nearer enough to his frequency. I was using my CO/PA TX using a couple of 6V6s (see Sprat No 154), a Drake 2C receiver and a G5RV at 15ft. Looking forward to the next one!* Meanwhile, holding the fort on St Mary's Island Chatham, **G3YVF** was active with *'11 QSO's using the TCS on AM and the Paraset on 160m and 80m CW for a good deal of fun and not a bad day'*. Geoff thinks G0OTE enjoyed it and he has encouraged G4BBZ to repair an old Codar AT5 and join in next time.

Kare **YU7AE** reports *'here is a short report of my Valve day activity. Using my old trusty AN/GRC-9 on low power I have slightly more than 5 watts (about 8W on power meter. The aantenna is an inverted vee for 80/30m and Windom for 40m band. I made 20 QSO`s, which is 2 on 40m and 18 on 30m. I worked 12 DXCC only European stations and I got*

a couple of T8 report but with this equipment that it is quite OK. Till the next activity then and best wishes from YU7AE' Finally from **G3XIZ** *'Hello Colin OM,I was wondering why I never heard any valve stations after I'd dusted off my home brew TX-RX and only later realised that I'd been active on the wrong day! Last week a chap (who shall remain anonymous) told me not to forget the GQRP Valve Day on* ***Sunday.*** *I'd groped around on the loft and dug out my valve TRX, HT PSU and associated cables. I hadn't powered that rig up since April 2012 so I was half expecting a loud bang at switch on. I even managed to work Matt G4ZZB in Uxbridge on my one and only available band – 80m before turning in for the night. On Sunday morning I worked G4XRV Rupert / Chesham and G4ARI Tim / Leicester after which 80m conditions dropped off as usual. I then spent a good time 'improving' the TRX and wound another plug-in coil for my RX, this time for 40m.After some troubles I got QRV on 40 and managed to work G4ZZB (again), PA1MAX, G0RAX,G4LRG, G4ARI (again) and DK9PD. So my valve TRX has had a total of 9 QSO's this year (7 being 2-way QRP), but only 1 on the actual Valve Day. My valve rig was built in April 2012 specifically for your Valve Days and uses 4 valves plus a neon stabilizer: RX: ECC82, EF80, TX: EF80, EL84 + OA2 stab The RX has a regen detector plus audio stages and drives headphones via a transformer. The TX is an XO / PA with switched crystals. It gives about 2 watts of RF. (the rig's photo appeared in Sprat in Autumn 2012 p38) I shall be ready for your next Valve Day, having the kit set up in good time and actually operating on the correct day . . .73 Chris G3XIZ.* Keep an eye on Sprat for the November Valve QRP day but it looks like I've won as the reason for the day was to get as many of you as possible out and on the air! **72 Colin G3VTT**

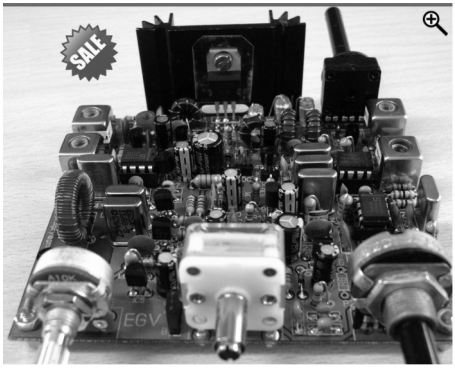
COMMUNICATIONS AND CONTESTS

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

As I write this the rather soggy second May bank holiday is now a memory. I hope some managed some QRP or /P operating. The CQ WPX contest was on during this weekend and on the Sunday you could hear many stations active.

The GQRP calander has a number of weekends of activity both contest and non contest right through to September.

GQRP-EA EA3EGV Memorial Contest
Don't forget this long term contest for EA station qso's



Towards the end of 2013 George (G3RJV) was sent a couple of EGV-40 kits from Javier Solans EA3GCY from the EA QRP club, these he sent over in memory of his friend Miguel Montilla EA3EGV and these will be awarded to G-QRP members at Rishworth. (You do not have to be there to win one).

The EGV is a 40m superhet transceiver, with an IF frequency of 4.915 MHz, and a very low standby current (25mA) making it useful for portable work. The transmitter RF output is in the range 0 to 3.5 watts. The tuning uses a VXO (Variable Crystal Oscillator) that will tune any 40 kHz segment of the 40m band. The printed circuit board is of a very high quality and all controls are mounted directly on the board. Details of the EGV-40 and a free download of the manual are available at http://ea3gcy.blogspot.co.uk

There are two possible entries so that means two possible prizes:
1. Those G-QRP members that manage the most contacts within the EA DXCC in the period 1st March to 30th September.

2. Those G-QRP members that manage the most contacts with DXCC outside EA in the period 1st March to 30th September.

General rules similar to the G-QRP Winter sports, basically any band or mode my be used as long as it is radio and 5W or less. Members from inside EA can only enter for the second category. Please submit logs to me BEFORE 1st October 2014.

Summer Sizzler
Hope everyone is looking forward to the Augsut bank holiday week when the Summer Sizzler will be taking place. I am hoping many members might take part and activate the WARC bands (12m, 17m and 24m) as well as the more usual HF (20m, 30m, 40m and 80m) frequencies.

60m Colin G8TMV has just helped me add 60m to the ATS-3B he finished off for me last year, and I expect I will use this on a few cycling trips this summer. Graham G3MFJ has 60m crystals for the QRP Centre of Activity (CoA) on 5.262MHz. I wonder how many others might manage some 60m activity from the odd SOTA, IOTA or beach this summer.

RSGB IOTA – 26th/27th July quite a few will be off to various places for this annual contest and you will see some rare IOTA islands activated this summer. I'm off to Sweden and will be operating /P from one of the island light houses in the Baltic it isn't that rare IOTA EU-037. I am sure I'll be having a beer or two with SM7UCZ and some of the Kalmar club if they are about. Please let me know if you managed to get out and operate somewhere away from home this summer or let G4BUE Chris know about it.

John M5AML dropped me a note, "... you might like to consider adding the (annual) W.A.B. 144MHz Low Power Phone Contest to the GQRP contest list. **The date this year is 13th July and it runs from 1000 to 1400 UTC**. Maximum power is 10W and exchange is RS report, Serial Numer, and WAB square."
See
http://wab.intermip.net/Definitions.php
http://wab.intermip.net/Contest%20Dates.php and
http://wab.intermip.net/Contest%20Rules.php

John M5AML came second last year!

Operating for all these activities should take place on and around the International QRP Calling Frequencies.
CW: 1843, 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 numberwhen 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.

VHF Managers Report

John E. Beech, G8SEQ 124Belgrave Road, Wyken, Coventry CV2 5BH
e-mail: john@g8seq.com Tel.: 07958 777363 Loc.:IO91gk

In case you were wondering where I'd got to, things have been very quiet on the VHF front for some time although I did manage to stir up a bit of activity on 2m side band by arranging a few skeds with one of my ex-pupils. He has an IC202 (remember those?) so is limited to CW & SSB. These skeds brought a few others out of the wood work but generally speaking 2m sideband is very quiet here in the Midlands. Still quite a bit of local activity on FM though. Of course the other way to drum up activity is to run a Special Event Station such as G100RSGB. When it was my turn I put on four stations on 6m, 4m, 2m & 70 cms and timed it to co-incide with the Tuesday night contest on 4m. The most recent one I was involved with was GB8TH which celebrated the 90th birthday of Tony Hancock. We worked about 45 stations on a modest 2m set-up before generating an enormous pile-up on 40m. I was amazed how much interest was generated by the event. We activated the call for one day only from TH's birthplace in B'ham. It generated a lot of publicity in the local papers and TV news. The BBC sent an OB unit to film us. They were with us for over four hours compiling a 2 minute slot in the news. I think it also made at least one national Sunday newspaper. I know Hancocks send-up of AR did not go down too well with a lot of Amateurs, but we got nothing but positive comments on the day – one person said it was the Hancock sketch that got him into amateur radio! I was only twelve (therefore unlicenced) at the time the sketch was first broadcast & it didn't put me off.

I currently have a couple of Raspberry Pi projects on the go. One is to breathe more life into an old Pye Cambridge I have by using the 'Pi to as a local oscillator to replace a pair of the xtals in one of the channels. This should allow the Pye Cambridge to work in any part of the 2m band.

The other Pi project is to use it as the local oscillator, replacing the crystal in Eduardo's circuit and extending the range right up into the UHF band. (See SPRAT 's 134 & 140 – if you don't have these – buy a copy of "SPRAT on DVD" from club sales. For these higher frequencies I will use a broadly tuned RF amp instead of the input filter. This will decouple the mixer from the antenna and prevent in-band radiation. We think it is possible to use the same RasPi to run the SDR software and display the signals on a waterfall. A usb sound card is a necessary addition to the 'Pi to do this. When it has been de-bugged I'll publish the software in use on my website: www.g8seq.com

No doubt an Arduino could be used instead of a RasPi & LO injection will also work with other xtalled PMR rigs.

One word of caution, the output pin of the Pi must be DC isolated with a capacitor or buffer amplifier otherwise the shortest of short ciruits will render the RasPi permanently useless. To this end I have purchased a PiFace from Farnell which buffers all the o/p pins.

References: SPRAT 134; Eduardo Alonso, EA3GHS "Very simple Software Designed

DSB Radio “SPRAT 140 G8SEQ “Experimenting with SDR”
http://www.icrobotics.co.uk/wiki/index.php/Turning_the_Raspberry_Pi_Into_an_FM_Transmitter
http://www.instructables.com/id/Raspberry-Pi-Radio-Transmitter/
http://www.raspberrypi.org/forums/viewtopic.php?f=72&t=69519
http://pe1nnz.nl.eu.org/2013/05/direct-ssb-generation-on-pll.html

As I was in the middle of writing this, I received an e-mail from Peter Thornton G6NGR who is experimenting with the clubs 10 MHz xtals: “Hi John, I’ve been experimenting with 10.106 / 10.116MHz xtals on 5th.and 7th. overtones to reach 6 & 4m; the SPRAT shop xtals work really well in a simple 74HC logic gate overtone circuit Tim Walford came up with.”. So hopefully a construction article will appear in next SPRAT 73 de John G8SEQ

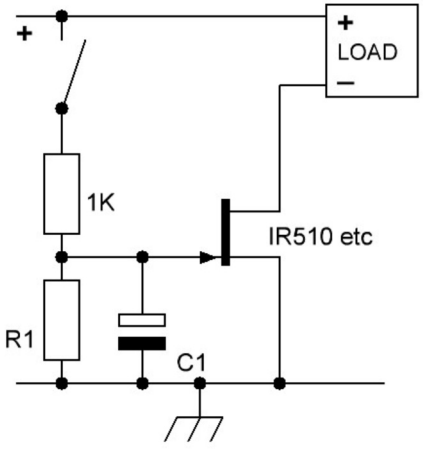
Another Timeout Circuit

David Perry, G4YVM, Address (bumbledp@gmail.com)

In a recent SPRAT there was a small article with a circuit for a timeout device, which I built.

What the circuit and text did NOT make clear is that it will supply a maximum of around 40mA before the voltage drops right down...not much use for what I needed anyway.

This is another circuit which I am assured will do the job. It is not my circuit, I was handed this from Jim, G4NWJ, and I don’t know whether he created it or borrowed it. In any event it might help some readers who were perplexed, as I was, about why the timer didn’t work when popped into a device



R1 (megohms) X C1 (micro-farads) = seconds

MEMBERS' NEWS

by Chris Page, G4BUE

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

DXpeditioning can be very lonely, as the picture left of **C5/M1KTA/P** shows. Dom was QRV 27 February/10 March CW/SSB from The Gambia, including here from AF-060 IOTA, about two miles off shore on a rock and sand bar (the sea covers it sometimes!). Your scribe made six QSOs with Dom including two with two-way QRP on 20 and 17m. **GØIAX** will be QRV from 16 August from Poites Charente in France. In April **G4GXO** was in Northern Spain operating as EA1 and **EA2/G4GXO/P** on 20m and 17m SSB using an FT-817 at 2.5W PEP and a short ATX whip during daylight. Ron managed QSOs with several European stations including **GMØDJG**, **SMØOWX** and **ISØDCR**.

GØHUZ was QRV from early January/end February as **GØHUZ/MM** whilst slowly cruising down the west coast of Africa from Southampton to Cape Town and back. Tony operated from the open deck with his aging FT-817 powered by a 7ah gell cell feeding 5W into a 5ft Sandpiper (10-20m) helical mobile whip on magmount. He made about 350 QSOs (85% CW) with the best two-way QRP contacts while he was off St Helena (ZD7) to W6, VU2 and a VK6 /MM sailing off the coast of P29. Tony says it was, "Great fun and I would recommend it to anyone!".

IKØIXI/P was QRV 28 April/3 May from Lake Trasimeno, CW/SSB, with his FT-857D and Outback 1899 whip antenna on his Ford Focus SW. Fabio made 120 QSOs, mostly QRP, and 20 with two-way QRP. His best DX was WØ (MN) on 40m and best two-way QRP with **G4RSP** on 20m. He will return there 14/24 July. **AA5TB** was QRV April/May as **I1/AA5TB** in Arona on 20m CW. **GØFUW** was QRV from GD at the beginning of May with the Wessex Group as **MTØTCB**. Steve is looking forward to the Buildathon in June at the Bath Royal Literary & Scientific Institution as part of their Young Science workshops. He says, "It is oversubscribed and they want another later in the year, who said young folk don't want to build radios?".

DF2OF was QRV for two weeks as **5B/DF2OF** during their holiday using his homemade Tramp-8 TCVR from DL-QRP-AG and end-fed vertical dipole on a fibreglass mast (pictured left). Calling CQ with 5W, Matthias made more than 140 QSO on 20, 17 and 15m. He says it was, "A lot of fun and for me a small DXpedition! I even had a small pile-up at some time".

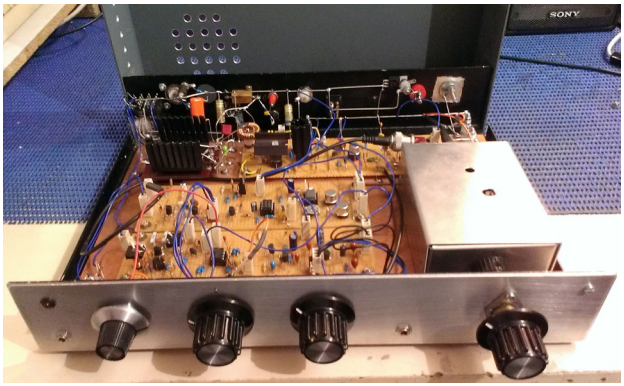
M3KXZ QSO'd **9H3AL**, **VP2MXI**, **ZF2XF**, **VE2LJ**, **VK6VZ** and **VK6LW** in the BERU Contest with his 5W to a 13ft whip on his jeep parked on the cliff tops at Brighton Marina. **G3YMC** made 80 QSOs in BERU including VKs and a ZL4 on 20m. Dave was pleased to QSO **G3TXF** disguised as **ZF2XF** on 40, 20 and 15m and **VP2MXI** on 20m. On 9 March he QSO'd **ZL1BYZ** on 12m for a new band-slot and on 11 March broke the huge pile-up

for **KL7G** on 17m with his 5W to a long-wire antenna. Operating in the ARRL DX SSB Contest with his FT-817 at 5W to a 40m vertical loop, **KA8SYV** QSO'd **JE1LFX**, **KH2/N2NL** and **XE1EE** on 10m and **CN2AA**, **CR6T** and **PX2B** on 15m. Franks says it was fun to work six continents in less than an hour with a modest station.

GØFTD has been busy with QRSS and WSPR modes, mostly building more little rigs, based upon the **GØUPL** kits, and then adding the rest to make them his own. Two transmitters are pictured far right, a Jumbo U2 mainly for 30m and the smaller one for 10m. The other picture shows the Jumbo 2, as Andy calls it, complete with PA and output monitoring meters. Over Easter, he decided to send some Slow Hell on it to wish all the users a Happy Easter. Meanwhile, back with traditional QRP, during a recent CQ Contest he took the FT-817 to the beach with its little homebrew 5ft whip and made plenty of very easy contacts to North and Central America with 5W SSB.

Welcome to newcomer **2EØDLV** who recently got his Intermediate Licence and has started building ready to make his first QSO. Cesar has finished the ILER-40 and built a regulated PSU out of an old laptop brick and a LM317 that seems ok in terms of noise. He is using an AMPRO-40 helical wound mobile antenna for 40m connected to a magnet mount with RG58 coax that goes directly into the ILER 40. Welcome also to **OH1UP** who has re-joined the Club after a break. Suikki reduces power to QRP with his FT-847 after selling his FT-817. Finally, welcome again to **G6HUI** who is back after 14 years of little to no activity. Brian had a Softrock Ensemble SDR TX/RX for Christmas and has been running it at 1W to a 40m inverted-vee dipole. Best DX is **CN8EAI**. The rig wetted his appetite again so he has started to build a CW QRO rig (5W) using a 6V6.

Due to supposed good 10m conditions, **G3XIZ** rebuilt his homebrew 10m TCVR, pictured right, only to have the band die on him! Chris has been experimenting with Huff Puff frequency stabilisers and has had some success with his MK VI model, using it to stabilise his free-running VFO on 30m, and has thus been spotting WSPR signals. He still participates in the regular Sunday morning MF CW net and says any callers or signal reports are always welcome. **G3DXZ** and **MØJXM** are regular attendees with **G7NKS** and **MØFMT** calling in when they can.



Congratulations to **GJ7RWT** on making his first non-sked CW QSO, and only his fourth ever CW QSO, with **G3AAQ** on 28 February. Andy used his own version of the Hamcan TCVR from the Four-States QRP Club design, putting out 600mW on 40m. He says, "I was chuffed that the little board sat on the bench in front of me was able to provide communication". Congratulations also to **VK5GI** on making the first QSO with his little QRP MFJ to downtown Manhatten (W2).

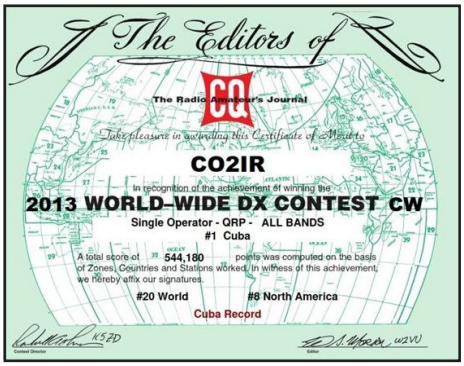
Congratulations to **G3YMC** for QSOing **TX6G** on 20 and 30m with his 5W, and to **G3JNB** also with 5W on 30m. Victor says the QSO was, "An all-time best QRP DX QSO, with 5W to my low doublet. It was really entirely due to the all British team's amazing Golden 'G' Ears. Much joy ensued!". Congratulations also to **M1KTA** who made a 30m QSO with **TX6G** on their last day with his KX3 at 5W to a, "Wire taped to a vertical with two raised radials", and to **UA3LMR** who worked them operating as

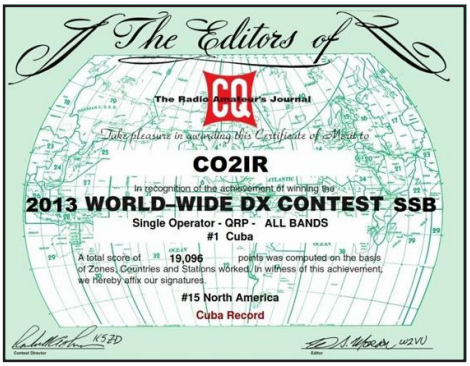
RD2A, on 12m with 5W and a long-wire antenna. Your scribe also QSO'd **TX6G** with 5W on 20m.

Pictured right is **JA9MAT**'s latest homebrew project: the '90-degree Key' made from popular DIY shop items, with variable speed 15-25WPM plus. Hide says it works well with his QRP rigs and you can see it in operation on his Tumblr Blog at <http://hp5451.tumblr.com/>. **WAØITP** reports QRPspots.com has a great new look, thanks to **WØOTM**. Terry says it was time for an update since the original page has been in existence for over five years and has had over 368,700 visits. The new page is at <http://www.qrpspots.com/>.


JA9MAT's Handmade Bug Key on the Woodcut Plate ,Apr.2014

DL2BQD reports on the annual meeting of the DL branch 25/27 April in Waldsassen. Dieter says it was fun to send with a 'real paddle' (pictured right). It was made by Bernd, **DK3WX** (right) and is being tested by Hans and Dieter from OE. **DL1RNN**, the organiser of many contests of the QRPCC, visited the meeting, pictured above right with **DJ3KK**, one of the organisers of the meeting.





Pictured above are **CO2IR**'s certificates for the 2013 CQWW CW (left) and SSB Contests, Single-op - QRP - All Bands #1 Cuba.

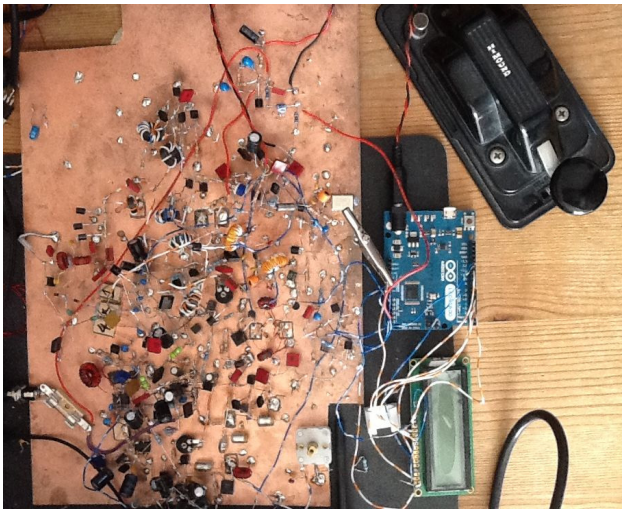
M5AML has been using a Kenwood TR-751E at 5W into an indoor five-element beam on 2m SSB and has QSO'd **2WØBTR/P** on both Pen-y-Fan and Fan Fawr but hasn't managed any mainland Europeans yet from his new QTH. Not having a loft antenna for HF, John lashed a 16ft long dipole just 8ft high clipped to the extension and garage guttering using clothes pegs. With this and 5W from his Alinco DX-

70TH and ATU he QSO'd **TC1ØSWAT**, **7X3WPL** and **7X4RJ** on 15m and **TK1R** on 17m. He then extended the dipole to 22ft and added more stations to the log, including **AO4EU**, **RV9DC**, **ZD8RY** and **PJ2/PF4T** on 15m.

On 7 April **IKØIXI** QSO'd **3B9FR** on 10m SSB for a new DXCC, and **FK8DD/M** on 20m with 3W to a Windom antenna. **G5CL** QSO'd a JA on 10m on 27 March and earlier that week a SV9 and CU on 30m for two new DXCC on the band. On 24 April, five minutes after obtaining his NOV for 60m from OFCOM, **GØKJK** CQ'd on 60m with his homebrew three transistor TX at 5W to a "Less than ideal 66ft end-fed and ATU", and had an immediate reply from a GW, who then sank into the noise so no QSO. During the next two days, Keith had several good QSOs and was left wondering why he hadn't bothered to get on the band before!

2EØBFJ ran a G-QRP Club table at the Yeovil QRP Convention on 27 April and says it was a very enjoyable day, meeting new faces as well as the regulars. As well as making some Club sales, Gary signed up a few new members. He hopes to be at the West of England Rally in Frome in late June. **GM4VKI** attended the NASRA Rally at Blackpool with **G3RJV**, **G3MFJ**, **G3ROO** and **GM3WIL**. Later this year Roy will be at the Livingston, Crianlarich and Galashiels rallies, possibly NI and of course, Rishworth, with **GM3WIL**.

Stopping on the way home from work at Newhaven cliffs on 24 March, **M3KXZ** made 5W CW QSOs with **3B9FR** and **KW7D** (NM) on 10m, **ZS1CT** on 15m and then a two-way QRP QSO with **JA4FKX** on 20m. On 25 March Pete got **9M2TO** on 10m CW, and on 22 April his first ZL QSO with **ZL4PW** on 17m. **G3VTT** continues to work on LF with his one valve 12A6 transmitter, but recently also worked **JA4FKX** using his K1. Colin was idly listening on 14064kHz and chanced a call, getting a 559 report with his 5W and home-made Windom antenna.

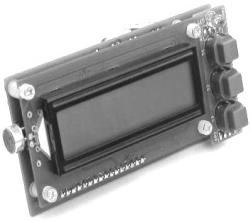


MØVVC's Kennet receiver has now evolved into a TCVR (pictured left). Matt says he is, "Absolutely delighted with its performance so far, and it was a fantastic moment when I had my very first QSO with it. It features full QSK using electronic switching, 5W output at 12V and I'm having a lot of fun using it on 30m".

Thanks to all the contributors to this column. Please let me know how your summer goes 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, by 10 August 2014. 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 autumn and winter months so I can let members know to listen out for you.

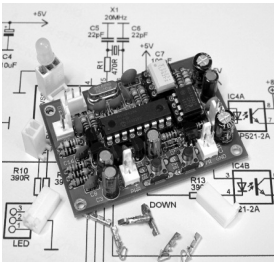
KITS FROM CUMBRIA DESIGNS

Microcode DSP Morse Reader



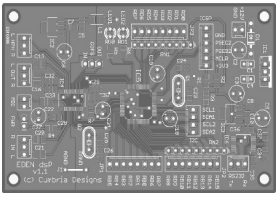
Place near a speaker or connect to a receiver audio output to decode and display Morse Code at up to 45wpm.

X-Lock VFO Stabiliser



Banish drift from that VFO, valve or solid state. Crystal referenced stability with tri-colour LED status indicator. Push button configuration. The X-Lock even copes with RIT!

The Eden "dsP" card



Bare PCB for dsPIC33E/F processor and CODEC. *Look, no PC!* Use with SoftRock or similar direct conversion radio to make a self contained SDR transceiver! Yahoo Groups Support site; "eden_dsp"

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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)

Look at 'www.celticpilgrim.com' for Amateur Radio in a Lovely Place

G3RJV has a Wooden Lodge situated in the Dyfi Valley in central Wales close to the Irish Sea and in the Snowdonia National Park. It has been completely refurbished with a large living area, conservatory, double bedroom, twin bedroom and 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.

Look on the webpage above or for leaflet write to G3RJV or email g3rjv@gqrp.co.uk

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 £5, non-members £10 } or £8.00 DX per book

6 pole 9MHz SSB crystal filter (2.2kHz) £12 plus post (max of one) } £3.00 (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 295pF) 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, 7.159, 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, 4.096MHz } £4.50p (DX)
4.1943, 4.433, 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, 20.0, }
24.0, 25.0, 26.0, 27.0, 28.0, 32.0MHz – **all 35p each** (Some of these are low profile types) } Post free
14.070MHz – 20m PSK – set of 3 crystals - **£2.55** } if ordered with
Ceramic resonators – 455, 480kHz, 2.0, 3.58, 3.68, 4.00, 14.32 & 20.00MHz – **50p each** } with heavier
Diodes - Schottky signal diode – 1N5711- 20p each; 1N4148 GP Si – 10 for 10p } things
Varicap diode – **MVAM109** – 40pF @ 9v, 500pF @ 1v. **50p each** } like binders, toroids
SA602AN - £1.50 (note – I may supply NE or SA, 602 or 612 as available. All are fully interchangeable. } polyvaricons
MC1350 - £2.00 These are getting in short supply now so max of 2 per member } or filters
LM386N-1 - 4 to 15v, 300mW, 8pin **DIL - £0.40, LM386M-1 SMD – 35p** } Use just
TDA7052A - 4.5 to 18v, 1W 8pin **DIL** low noise & DC vol control – **£0.60 each** } that postage
TA-7642 Radio IC – direct equivalent of **MK484** (& ZN414) – **75p each** } If ordered
2SC536 transistors (npn) fT - 100MHz, hFE-320, VCBO +40V **- 5 for 50p** } with books
MPSH10 transistors (npn) fT - 650MHz, hFE 60, VCEO 25V **- 8p each** } or CDs
2N3904 transistors (npn) fT - 300MHz, hFE-150, VCBO +40V **- 10 for 50p** } add
2N3906 transistors (pnp) fT - 250MHz, hFE-150, VCBO -40V **- 10 for 50p** } this
BC517 Darlington (npn) fT - 200MHz, hFE-30,000, VCBO +40V **- 13p each** } postage
FETs - IRF510 – 50p; 2N3819 - 17p; 2N7000 - 10p; BS170 – 8p - all each } as books
Dual gate MOSFET – BF981 - SOT103 - 1GHz (diode protected gates) **- 85p each** } or CDs
Pad cutters – 2mm shaft – 7mm o/s, 5mm i/s diam – 5mm pad with 1mm gap **£6.00 each** } 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 } Postage
QRP heatsinks - TO92 – 30p; TO39/TO5 – 40p; TO18/TO72 – 60p (pics in Sprat 148) } as for
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. } components

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; T130-2**- £1.50ea ; T130-6** - £2.00ea. FT37-43 – 80p ;
FT50-43 - £1.20 ; FT37-61 - £1.20 ; FT50-61 - £1.60; FT140-43** - £2.50 ea ; FT140-61** - £2.50; 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 148. Only £4 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** - £5.00 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 For orders less than £5 – please use postage stamps (any denomination) - any quantity of stamps is OK, or cash. 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 - thanks