SPRAT

THE JOURNAL OF THE G QRP CLUB

DEVOTED TO LOW POWER COMMUNICATION

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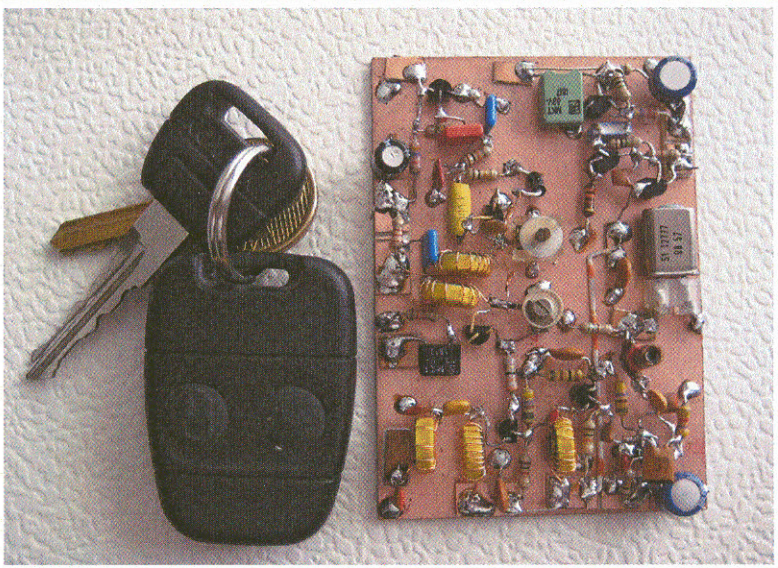

The SixBox - An ultra-simple 6m QRP AM transceiver
by Roger Lapthorn, G3XBM

WSPR – What and How ~ Low Voltage Valve Regen Receiver
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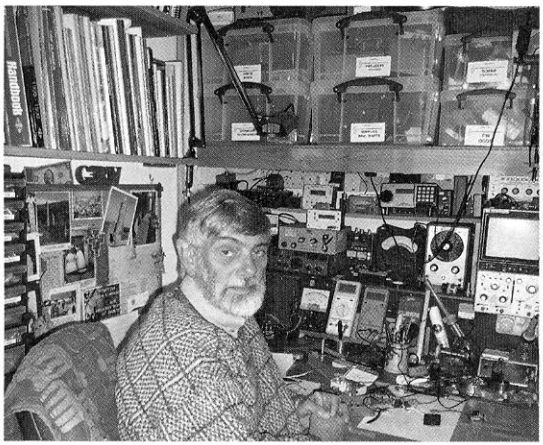
Experimenting with SDR ~ Favourite VSWR Bridge ~ NE602 Idea
Membership News ~ Convention Update
First QRP Valve Day ~ Antenna – Anecdotes – Awards
Communications & Contests ~ VHF News ~ Member's News



Rev. George Dobbs G3RJV

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Welcome to SPRAT 140. I hope that I may be able to meet many members at the G QRP Club Mini-Convention on October 24th. We have an impressive line up of speakers: W1REX, W4DU, G0UPL, G4GXO and the popular open question session by GM4ZNX. Further information about the convention appears in this issue and on the club website. The last issue also featured a map and full details of the convention.
The new SPRAT CD, covering every issue from number 1 to this issue will be available at the convention [see back page]. Our thanks to G3MFJ and G4WIF. Also available will be 'Radio Projects for the Amateur' Vol. 4. by Drew Diamond VK3XU [also see back page]. Drew has been very generous in allowing the club to reprint his excellent books.

72/3

G3RJV

The W1FB Memorial Award 2009/2010

The project is to **Design a QRP station (transceiver or transmitter – receiver combination) using a minimalist approach. Produce a log of 10 QSOs** Significant improvements on existing designs could be accepted. Please submit your design to G3RJV by the **end of March 2010**, with circuit diagrams, all values and brief notes.
The projects will be published in SPRAT and the winner will receive an engraved plaque.

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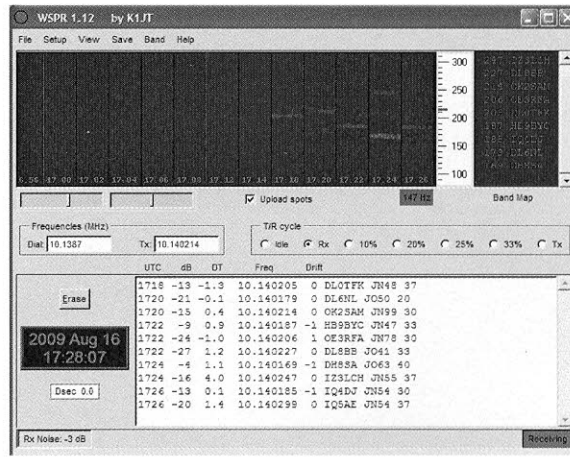
WSPR - what it is and what it can do

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

Quite a bit of excitement has been created in the last year by some new weak signal software from Joe Taylor K1JT, the Nobel Prize winning physicist, who brought us JT6M, JT65 and similar weak signal or transient signal data modes. WSPR (pronounced as "whisper") stands for **W**eak **S**ignal **P**ropagation **R**eporting. This powerful software can send and decode very weak signals that cannot even be heard by ear. It may best be described as **a method of QRP beaconing with automated worldwide reporting via the internet.**



A typical WSPR screenshot

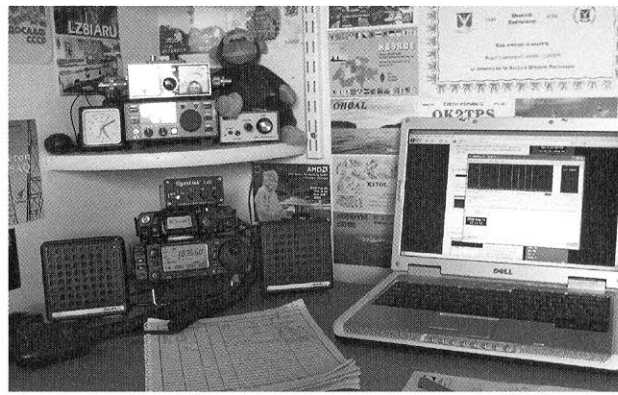
When any signals are successfully received and decoded the logs can be automatically uploaded to a webpage database where all users can see them as a table or on a map. So, you can see who is picking up your signal and how far they are away from you and how strongly they are being received. As the system can work with very weak signals indeed because of its clever signal processing, QRP powers only are needed. Indeed this is an ideal mode for QRPp experiments down to mW or uW levels.

The WSPR software is used to create a 6Hz wide FSK signal modulated with data (callsign, QTH locator and TX power in dBm) which it sends periodically in just under 60 seconds. Forward error correction is used to improve the robustness of the signal, making copy possible when signals are *extremely* weak (about 15dB weaker than ear-brain decoded CW according to K1JT). The WSPR software then analyses signals in a 200Hz band (often filled with many of these 6Hz wide signals) for two minutes for similar transmissions and uploads these to the internet database. A WSPR signal, if you can hear it at all, sounds like an audio tone which very occasionally wobbles. The start of each time slot is important, so the PC clock has to be set accurately. This can be done by synchronizing the PC clock to an accurate time standard before starting a WSPR session.

SETTING UP THE INTERFACE BETWEEN RADIO AND PC

If you already have an audio interface for PSK31 then you probably have all you need already. There are very many audio interface designs around on the internet and several commercial ones too, so I won't elaborate on these here. Essentially you need the following:

- An isolated audio signal from the line out of the PC to the radio audio input
- An isolated audio signal from the radio audio output to the PC mic input
- A means of PTT activation when the TX cycle starts (can be VOX controlled)
- A means of adjusting levels of audio in/out.



In my case, I use an audio interface unit called the SignaLink USB which, via just the PC's USB connector, allows audio in and out as well as VOX controlled PTT activation. The unit has a built-in sound card of its own as well as controls to adjust TX and RX audio levels and PTT delay. If using an external interface like the SignaLink you will need to select its own sound card from the menu on the PC for Sounds and Audio Devices. For receive only, you just need to connect your rig's audio into the PC. The picture shows my shack with the rig (IC703), Windows PC and SignaLink USB interface.

TRANSCEIVER OR RECEIVER FREQUENCY SETTING

Because WSPR signals are narrow it is important to set the frequency as accurately as possible, ideally to within a few Hz. The dial accuracies of rigs like the FT817 and IC703 are usually good enough. Too gross an error and you may miss the 200Hz wide WSPR sub-band altogether!

THE WSPR SOFTWARE

When installed and running, a screen similar to that shown above will open. At first there is a black console window which shows which audio ports are being used. Once these are set (via the **Setup**, then **Options**, tab in the main window) this can be minimized out of the way. The Options tab is also used to initially input your callsign, QTH locator, PTT port, audio in and audio out ports and your TX power in dBm. Remember to set the transmitter to the same power, as the interface does *not* control TX power on the rig automatically.

WSPR – RECEIVING

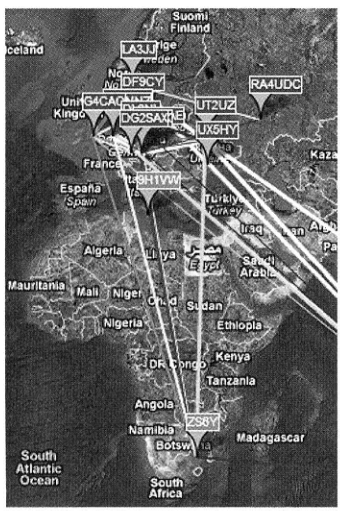
Having set up the interface between the PC and radio and checked the PC clock is accurate, try WSPR on receive only to confirm you can successfully decode signals. On the main WSPR screen select the **band** from the tabs and the dial frequency will appear in a box. Manually set the rig's dial frequency to *precisely* this frequency in USB mode. Then click the button on the WSPR screen for **Rx**. After a few minutes some noisy lines should appear in the waterfall and some messages will begin to appear on the screen. Callsigns of stations decoded will appear in the box called the **Band Map** with their

frequencies. WSPR's horizontal waterfall display shows a range of 100-300Hz (dial frequency plus 1.5kHz, +/- 100Hz) in which all WSPR activity is concentrated on each band.

WSPR TRANSMITTING

Hover over the waterfall and double click on a space where there are no lines showing active stations. This automatically sets the transmitter frequency. Select a T/R cycle percentage – say 20%. After some minutes, if all is well, the transmitter will key on and send a 54 second long WSPR message then go back to RX and continue to monitor for signals it can decode, display and upload to the database.

ON-LINE WSPR SPOTS DATABASE



This is the feature than makes WSPR *so* very powerful. See wsprnet.org/meptspots.php and choose the band on which you are operating. A screen will appear with details of all the logs automatically uploaded from PCs connected to the internet and on which the **Upload Spots** button has been clicked on the WSPR screen. With luck your signal will, after a few minutes, appear in the list and map (see left for an example of the map) and you will be very pleased!

Warning: it is *very* easy to change the band on your transceiver but forget to do this on the WSPR screen. Doing this means the software reports signals in the *wrong* band to the internet database, thereby messing it up. I know as I've done this now *three times*. You have been warned!

						Power		Reported		Distance	
Date	Call	Frequency	SNR	Drift	Grid	dBm	W	by	loc	km	mi
2009-08-15 17:42	K1JT	14.097175	-20	0	FN20qi	+37	5.012	CT1EKD	IM59ib	5458	3391
2009-08-15 17:42	IQ4DJ	10.140179	-22	0	JN54ks	+17	0.050	DL2LAU	JO44qr	1112	691
2009-08-15 17:42	HB9AFZ	10.140111	-1	0	JN46me	+33	1.995	DL2LAU	JO44qr	950	590
2009-08-15 17:42	HB9AFZ	10.140109	-8	0	JN46me	+33	1.995	SQ7DQX	JO91rr	977	607
2009-08-15 17:42	K1JT	14.097157	-19	0	FN20qi	+37	5.012	DH5RAE	JN68pv	6627	4118
2009-08-15 17:42	DH8SA	10.140240	-13	-1	JO63bt	+33	1.995	RA3ZSE	KO80ws	1773	1102
2009-08-15 17:42	OK2SAM	10.140229	-2	0	JN99du	+30	1.000	RA3ZSE	KO80ws	1390	864
2009-08-15 17:42	DF6MK	7.040090	-23	0	JN68ik	+30	1.000	VK8CH	PH57	13116	8150
2009-08-15 17:42	DF6MK	7.040142	-10	0	JN68ik	+30	1.000	PE1NNZ	JO32kf	591	367
2009-08-15 17:42	DF6MK	7.040098	-10	0	JN68ik	+30	1.000	G4CAO	IO91	1038	645
2009-08-15 17:42	DH8SA	10.140221	-8	-1	JO63bt	+33	1.995	G4ENZ	IO81vv	984	611

An example of the online loggings database showing stations with reports

USES OF WSPR

Although there is now a version of WSPR supporting a simple QSO mode, I've not yet tried this. The real use of WSPR is as a way of checking QRP signals and their propagation. For example, whilst in the shack, but busy with other things, you can put up a WSPR signal on a band such as 10m or 6m and leave it running for a few hours. An occasional check of the on-line database or map will reveal if propagation exists and anyone has received your signals. As importantly, the maps show who is listening but who has *not* received your signals. If the path is open, it may be time to try for a QSO by some other mode. Clearly for this to work there must be plenty of other stations monitoring the band. Over time, as the take-up of WSPR increases, this is likely to become less of an issue. On bands like 40, 30 and 20m there are already many stations active worldwide, but on the higher HF and VHF bands very few as yet. Another use is comparing antennas and experimenting with extremely low powered transmitters. On the internet there are several references to people who have made homebrew WSPR beacon TX and transceivers. A quick Google will find these as more are added every week. Clearly, a lot of fun could be had with a homebrew mW or uW WSPR beacon.

WSPR FREQUENCIES USED

Band	Dial MHz (USB)	TX Freq MHz
160m	1.836600	1.838000 - 1.838200
80m	3.592600	3.594000 - 3.594200
40m	7.038600	7.040000 - 7.040200
30m	10.138700	10.140100 - 10.140300
20m	14.095600	14.097000 - 14.097200
17m	18.104600	18.106000 - 18.106200
15m	21.094600	21.096000 - 21.096200
12m	24.924600	24.926000 - 24.926200
10m	28.124600	28.126000 - 28.126200
6m	50.293000	50.294400 - 50.294600
2m	144.488500	144.489900 - 144.490100

SOME USEFUL LINKS

wsprnet.org/meptspots.php	WSPR Spot Database.
www.g4ilo.com/wspr.html	Distant Whispers WSPR page.
www.physics.princeton.edu/pulsar/K1JT/wspr.html	WSPR download site.
wsprnet.org/drupal/	WSPRnet Homepage

CONCLUSIONS

Although, at the time of writing, I've only been using WSPR for a week with very poor antennas, my QRP signals have already been reported from all over the world. Best DX reports have been from VK (several times) on 40m when using just 2W to a low, 15m long, end-fed wire and from Europeans on 10m when using 50mW. Far lower powers are being used by some WSPR users: I know of one ham in the USA who is getting DX reports with his 50uW WSPR transmissions. It is not a substitute for real 2-way QRP QSOs, but it is a fascinating and fun way to experiment with QRP and propagation.

4 tubes low voltage regenerative receiver 3 – 19 MHz

Olivier Ernst, F5LVG, oernst@free.fr Web site : http://oernst.f5lvg.free.fr/

This SW regenerative receiver has only 12 V for B battery. However, its performance is similar or better than usual regenerative receiver. Output power is good for headphones. It is easy to listen SSB, even on 18 MHz. It uses 4 Russian electronic tubes (6N3P) very similar to ECC81 / ECC85, but with a different pin code. I suggest using tubes with a slope of 5 mA/V or more. The main characteristics are:

1. Ground grid RF amplifier to avoid dead spots, body capacity and tuneable hum, because there is great isolation of the antenna from the detector and the regenerative triode.

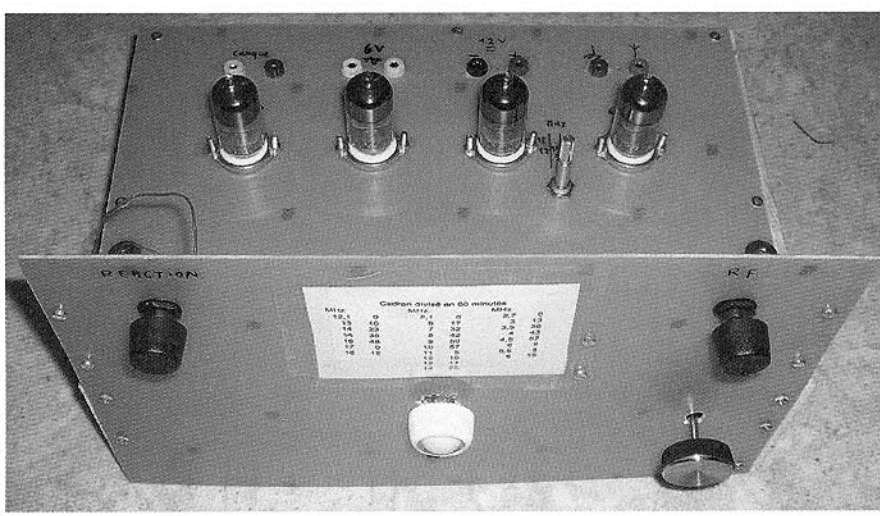
2. Unusual detector between diode and plate detector. This detector has a very good signal to noise ratio, but a low input impedance.

3. A separated tube for regeneration. Note that the grid leak resistor is connected to + B. Note the 220pF capacitor for the 12 – 19 MHz band to obtain good frequency stability.

4. Band set and band spread tuning capacitors.

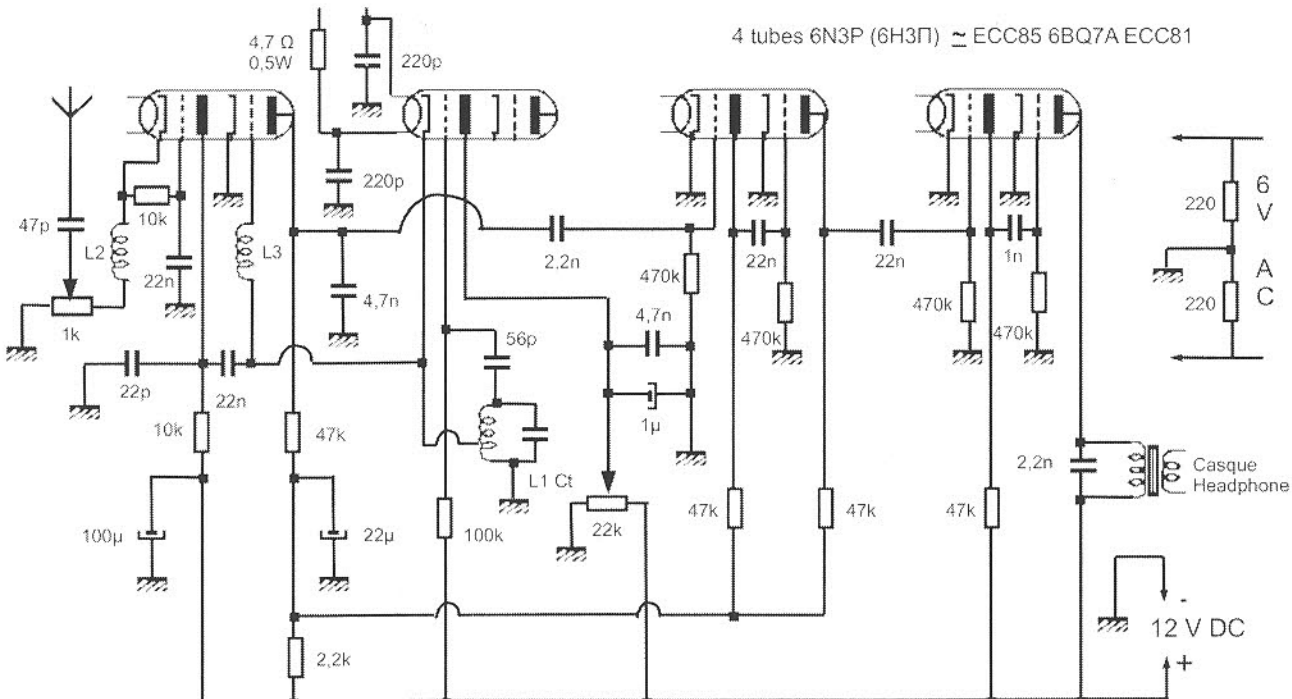
5. Four triode AF amplifiers. The output transformer is a small 230V / 6V transformer.

This receiver has a good signal to noise ratio, good frequency stability, a good output power (for headphones) and no dangerous voltages.
If you like regenerative receivers, try it !



Récepteur à Réaction Basse Tension - Low Voltage Regenerative Receiver 3 – 19 MHz

Olivier Ernst F5LVG

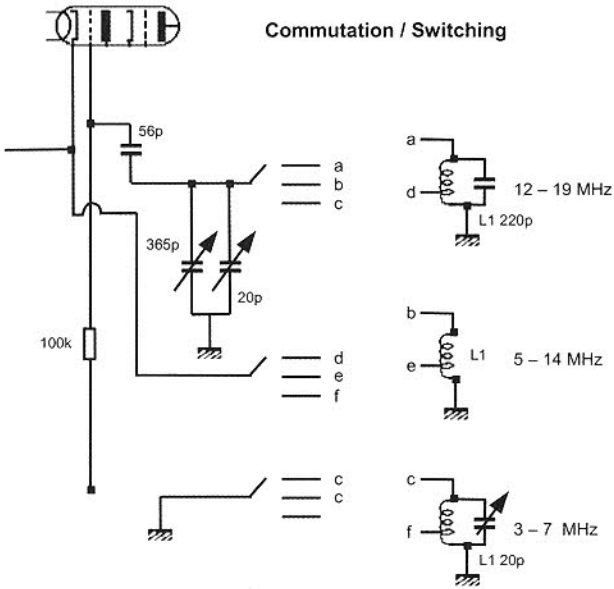


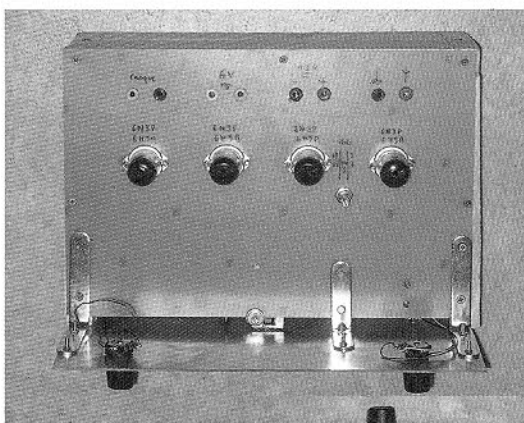
12 MHz – 19 MHz	L1 5 tours/turns (cathode prise/tap 2) Ø 12 mm	Ct 365pf variable + 20pf variable + 220 pf
5 MHz – 14 MHz	L1 10 tours/turns (cathode prise/tap 3) Ø 22 mm	Ct 365pf variable + 20pf variable
3 MHz – 7 MHz	L1 22 tours/turns (cathode prise/tap 6) Ø 22 mm	Ct 365pf variable + 40pf variable

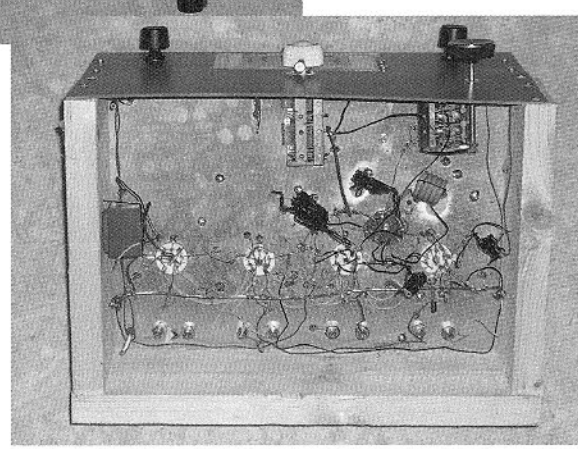
L2 & L3 choke VHF 10 tours/turns Ø 8mm

Openoffice.org Ubuntu Linux 2009

Commutation / Switching





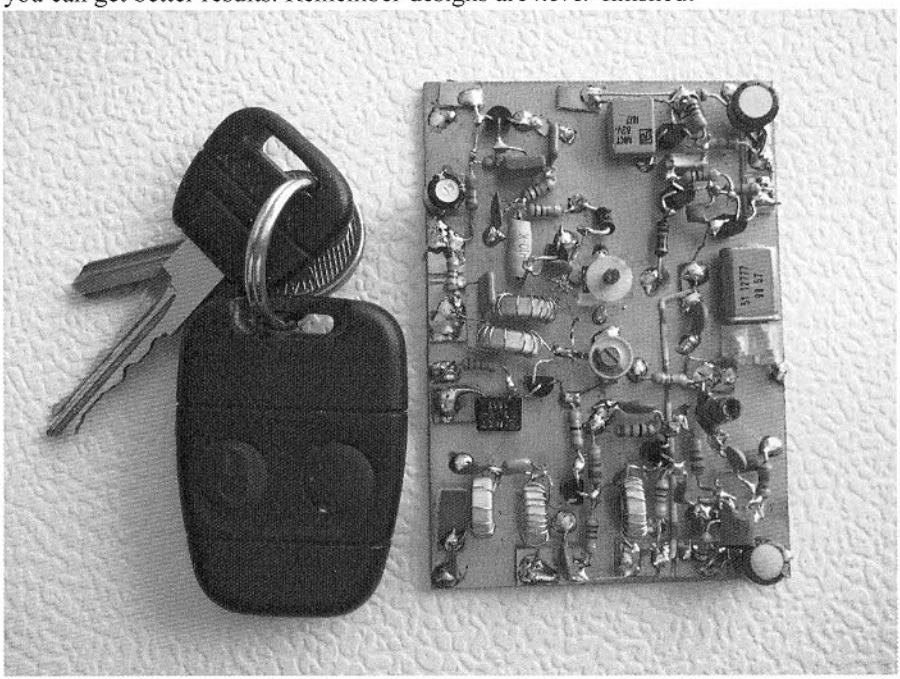


The SixBox - An ultra-simple 6m QRP AM transceiver

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

The SixBox had been in my mind for some time and is a derivative of my Fredbox transceiver which appeared in SPRAT 125.

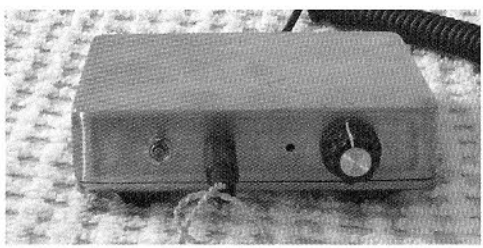
The receiver is a simple one and is only really suitable for AM: it is very sensitive, but lacks decent selectivity. Nonetheless, it should hold its own on 6m AM most of the time. The transmitter is very simple and is certainly capable of improvement. Use the ideas here as a springboard for your own version - don't be afraid to experiment: change values to see if you can get better results. Remember designs are *never* finished!



The SixBox produces around 50mW AM (200mW peak) from the 2N3904 series modulated PA when run from a 13.8V supply, slightly less from a 12V gell cell battery. From an internal 9V battery it produces around 20mW. The receiver is a super-regen using MPF102s with an isolating RF amplifier loosely coupled to the super-regen detector. Receiver radiation is minimal. The TX consists of a 50MHz 3rd overtone crystal oscillator and a series modulated buffer and PA. Ubiquitous 2N3904 transistors (a few pence each) are used throughout apart from the super-regen stages. It would readily scale for 4m although the T37-6 toroids would be a bit marginal this high. I was surprised how well they worked at 50MHz. A small polyvaricon tuning capacitor worked best to tune the super-regen stage. I did try varicaps but abandoned them. The RX covers around 5MHz with a 15pF in series. The whole rig is now in a small diecast box and is working nicely. At some point I plan to do a PCB for this design, but for now it has been done "ugly" style.

You don't have to spend much money or work very far to have fun. In fact a recent 16km contact with this rig gave me as much buzz as working sporadic-E DX with a 5W SSB rig. This QSO was to a station using a V2000 tri-band vertical, which appears to have *less* than unity gain. With a small beam at each end considerably further would be possible. Another QSO, this time with G3PTQ at 6kms, was achieved, despite Terry only having a low *horizontal* dipole. These QSOs and respectable reports (up to 59) have proved the rig is a viable one for cross-town or inter-village nattering on 6m. The receiver works well for something this simple and copies 0.5mW AM signals from Andrew G6ALB 3 kms away. It also makes a useful band monitor with 49MHz equipment, 6m SSB signals (envelope detected) and TV video signals copyable when tuning around.

Versions for 4m and 10m could be easily produced and with a small (10-16dB) gain linear it would make a very useful natter-box for these bands when there is no DX activity about. On 10m this is almost all the time at night and at most times around sunspot minimum. Working around 29MHz there would be no issues with using this simple receiver and transmitter.



A DSB version of this would be a better bet for more serious 6m band use.. Much of the TX line-up can be re-used for this, but I would use a direct conversion receiver. 200mW pep of DSB (equivalent to 100mW SSB) would be quite a useful power and would certainly work some European DX in the sporadic-E season.

My next project is to complete the DSB version, either for 6m or 10m.

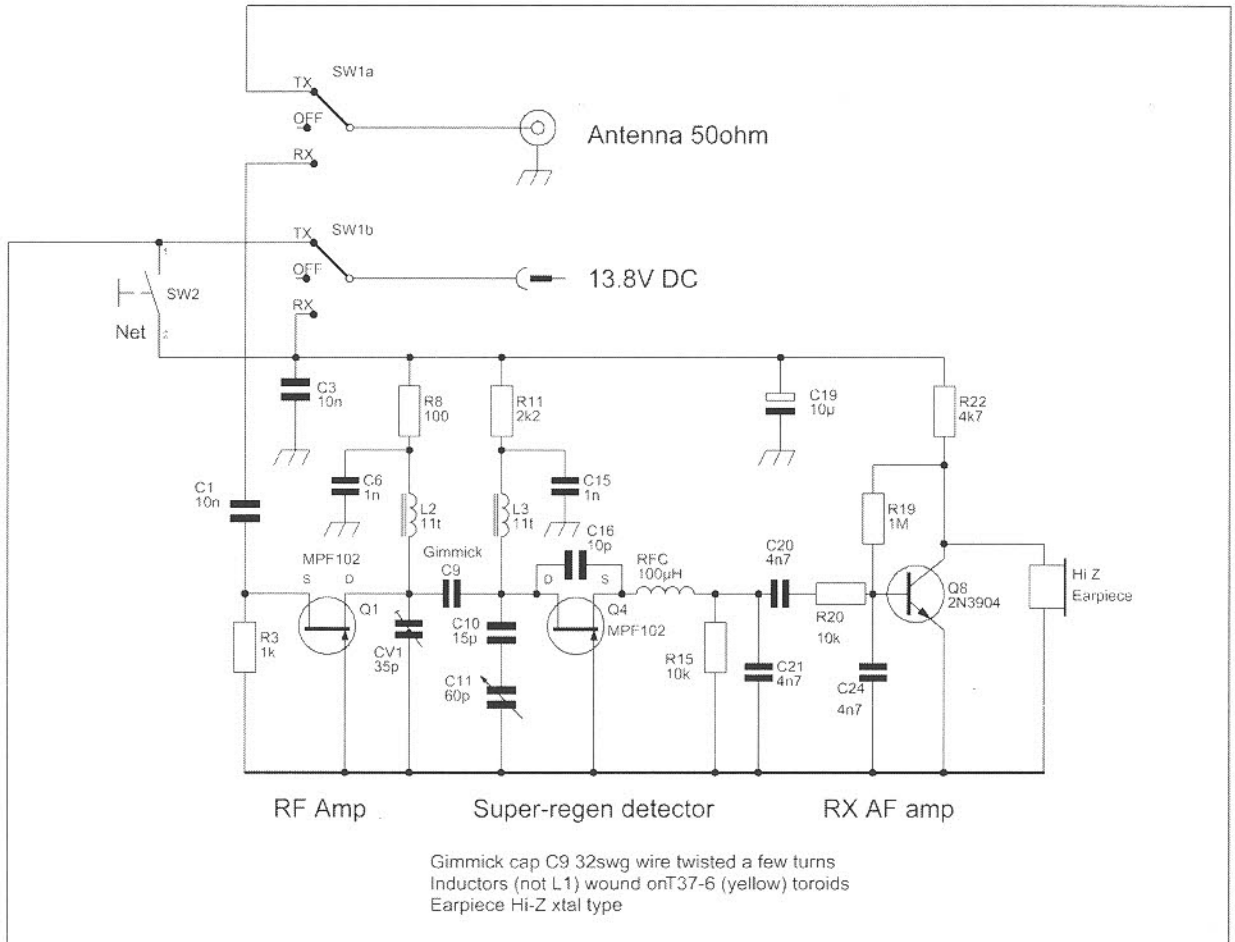
Editor's Note: Roger's circuit has been spread over two pages for greater clarity. The TX supply line [bottom in the diagrams] and RF output line [top in the diagrams] are connected.

MEMBERS ADS - MEMBERS ADS - MEMBERS ADS - MEMBERS ADS - MEMBERS ADS

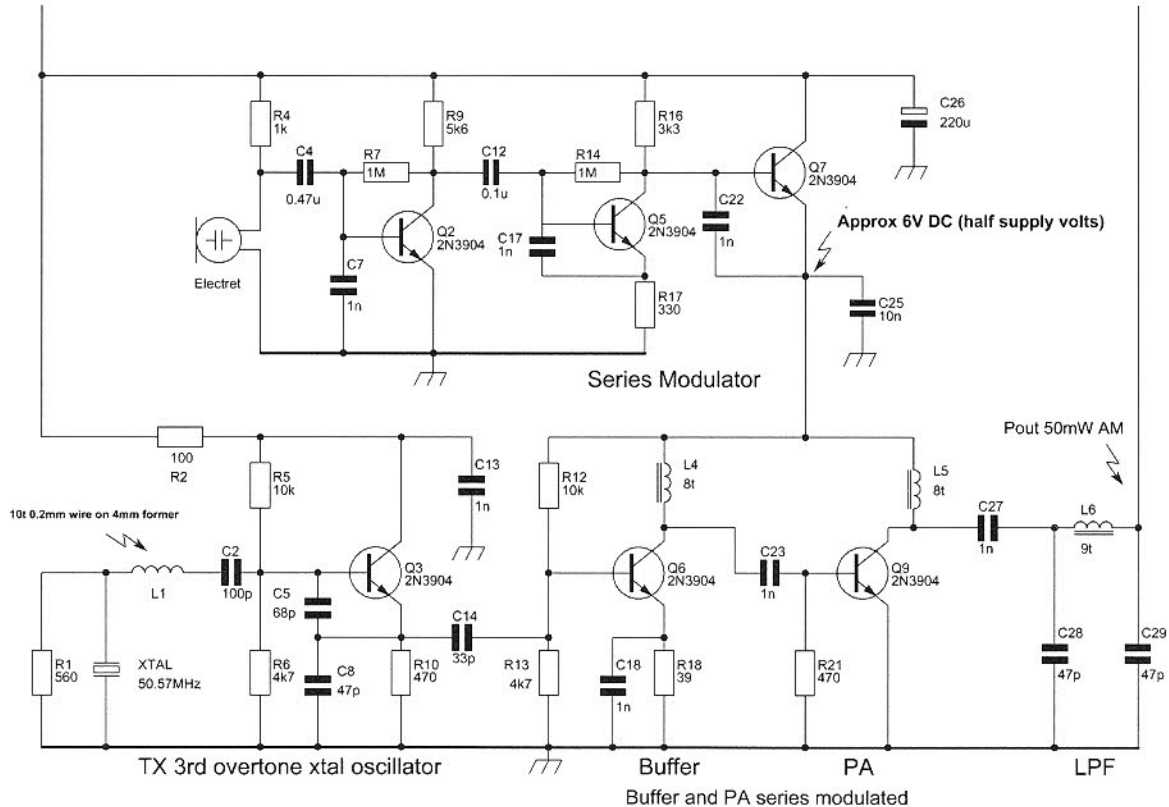
WANTED - Elecraft K2 in GWO, contact Jeff Dickson GM0IGJ on 01450 880206, or email at mujeffdickson@aol.com

FOR SALE: K2 Bits – all original Elecraft-made in good nick with supplementary manuals but untested (no K2!). KAT2 auto QRP ATU; KBT2 internal battery fittings with dud battery as size sample; rear case panel and top displaced by QRO PA with small PCB attached, believed part of transverter input/output unit. The lot £80 plus postage, half Elecraft prices. JOHN G3GTJ, 01963 240319 (Somerset).

FOR SALE: Surveyors Telescopic tripod [alloy] Would make ideal mast support . Offers please but it must be collected [Derby]. CIRKIT PA's. One completely built----another complete kit,still boxed. New. Offers please. Filters: One Yaesu XF112-C 500c/s for TS840 etc----Qty 2. 9Mhz C/F both with LSB/USB xtals----- Qty 1. 5.2Mhz - No xtals. Also have dozens of other Xtals All cheap if req'd by someone. Contact Alan 01332 735896 email: joalan2@ntlworld.com



Gimmick cap C9 32swg wire twisted a few turns
Inductors (not L1) wound onT37-6 (yellow) toroids
Earpiece Hi-Z xtal type



The SixBox

A very simple 6m AM transceiver

G3XBM Rev E (July 30th 2009)

The Sprite Regenerative Receiver

Tony Bowmaker, G0EBP,1 Hestham Dr. Morecambe. LA4 4QD

This receiver is a Armstrong regen - I've built a few of these and they are quite stable and sensitive. They can be built Manhattan or dead bug in an hour or so.
To make the radio easily switchable to other bands, make Cx (see diag) a spliced section of 4 pins of an I.C. socket. Those turned pin ones are best. Then you can use this to plug in capacitors for different ranges.

So, 300pF 1% polystyrene gives the 80m c.w. section.
160 pF1% poly gives 60m ham band coverage.
68pF zero temp ceramic gives 40m.
No cap at Cx gives 30m.
You will need to trim up the coil on each change.

The 1N4001 gives only a small tuning range on 80m - if you need more try using a polyvaricon with a suitable series cap. This minimalist radio doesn't have a volume control - signals do get quite loud though so add a 1k pot say in series with the phones if you wish.

The LM386 is run at a higher gain than usual (about 60dB) - The 10nF to ground from pin 3 needs to be close in to the chip.

The antenna terminals: efficient wires should be connected to terminals 2 or 3. Term 1 is for short lengths of 7 ft or so - only on low frequencies.

Please note the inset coil drawing showing the connections, this will insure you get the phasing OK.

Finally, the trimmer cap is one of those yellow film dielectric ones and controls the all important regeneration !

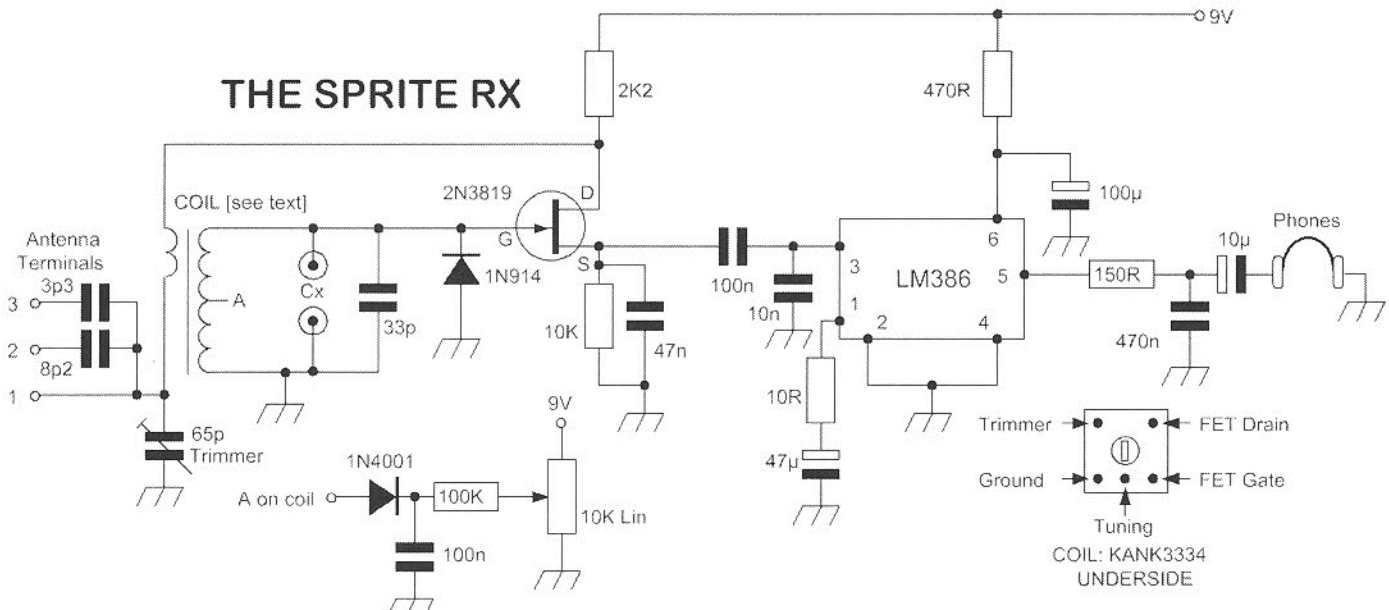
- -

GQRP CLUB WINTER SPORTS

EVERYDAY – DECEMBER 26th to JANUARY 1st

Call "CQ QRP" on the International QRP Frequencies

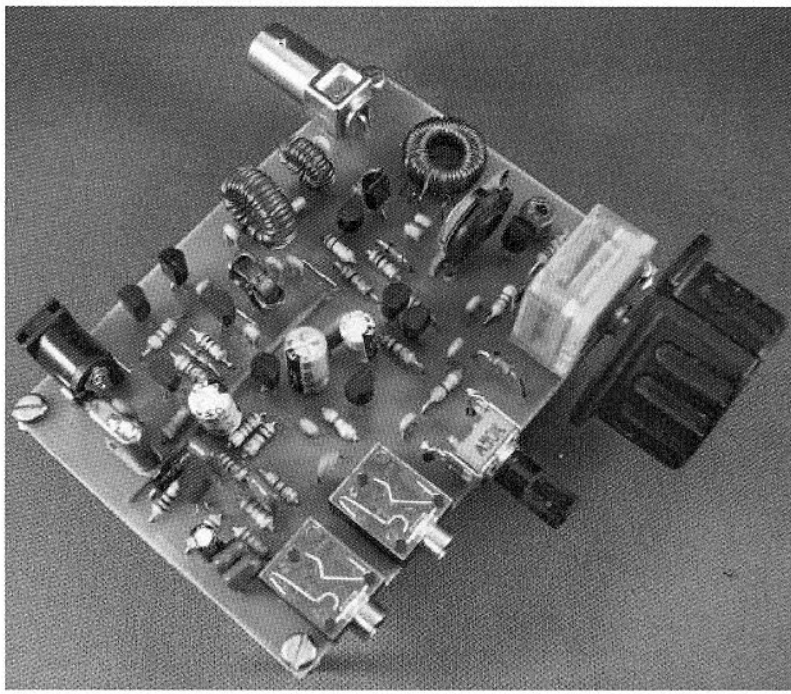
The Winter Sports is not a contest, although it is usual for operators to exchange their G QRP Club membership number. Those taking part are invited to submit logs and comments to the G QRP Club Communications Manager, Peter Barville G3XJS, Felucca, Pinesfield Lane, Trottiscliffe, West Malling, Kent ME19 5EN. email g3xjs@gqrp.co.uk. The G4DQP Trophy is awarded to the station making the best overall contribution.


THE SPRITE RX
9V
2K2
470R
COIL [see text]
2N3819
D
G
S
100µ
Phones
10µ
Antenna
Terminals
3p3
8p2
3
2
1
A
Cx
33p
1N914
10K
47n
100n
10n
LM386
6
5
3
1
2
4
150R
470n
10R
47µ
65p
Trimmer
1N4001
A on coil
100K
10K Lin
100n
9V
Trimmer
FET Drain
Ground
FET Gate
Tuning
COIL: KANK3334
UNDERSIDE

WIFB MEMORIAL ENTRY

A Rig for the MAS Contest

Steven Webber, KD1JV. kd1jv@moose.ncia.net



The M.A.S., (Minimal Art Session) is a contest started by Dr. Harmut "Hal" Weber, DJ7ST. (Now a SK)The idea behind this contest is to encourage Hams to build and operate a rig using a minimal number of parts. To be eligible, a transmitter must use no more than 50 parts (pretty easy to do) and a transceiver must use no more than 100 parts (a bit harder to do). To encourage the use of a very small number of parts, bonus points are awarded by the percentage of the actual number of parts used less than the maximum allowed number. Thankfully, things like hardware, knobs, connectors, headphones, key and the like are not counted as parts. Also, the transmitter low pass filter is considered to use 3 parts, even if in actual fact it uses more parts to ensure spectral purity of the transmitted signal.

However, if you use any IC's, the number of parts integrated into the IC must be counted. It is impossible to determine how many resistors, transistors and diodes (capacitors are usually not integrated onto a chip, but sometimes there can be) are inside a chip since the manufacture usually does not bother to tell you and if there is a simplified diagram of the insides, it does not show all the parts. And even if this number can be determined, even a simple IC can have dozens of parts integrated. So, this effectively eliminates the use of any modern IC's in a rig designed for the MAS contest. Not being able to design with op-amps,

audio amps like the LM386, mixers like the SA612 or CMOS logic gates, is a definite handicap to designing a simple, but effective rig which is actually capable of making contacts.
Despite the limitations of not using IC's as noted above, I decided to give it a try. Some very simple and very low parts count rigs have been devised over the years, one of the most well known is the "Pixie". The problem with these overly simplistic designs is they simply do not work very well. The chances of actually making a contact with one of these rigs is slim to none. In my opinion, they are a waste of time and of natural resources. What good is a extreamly low parts count rig if you can't make contacts with it? If I am to spend time and effort to design and build a rig, I want something which at least has a good chance of actually talking to someone! If your gonna work a contest, you got to be able to hear people coming back to you!
The rig I came up with uses 51 parts for a complete transceiver, giving a 50% bonus. The transmitter puts out about 2 watts, the only supr is -50dBc at the second harmonic, and uses just 16 parts. The receiver is a regenerative type detector, with a RF pre-amp and two stage, high gain audio amp, for a total of 35 parts in its minimual configuration. MDS is about 0.5 uV if you have good hearing. Since the MAS contest is an 80 meter event, this rig is designed for 80.
Optional Parts: Parts marked with a "*" on the schematic below are optional parts. These are D3, a reverse polarity protection diode and a fine tuning control. Since the rig does not produce a side tone on its own, an optional side tone generator is also described. These parts are included in the printed circuit board layout to make the rig more useable in general use.

The Schematic:
The transmitter:
The transmitter is a simple crystal oscillator using a 3.579 MHz color burst crystal. A 2N7000 MOSFET is directly coupled to the output of the oscillator for the PA. Q3 is used to key the oscillator and PA on and off. Q4 is used as an inverter so that normal, active low keying can be used. Rise and fall time wave shaping is not included to reduce parts count, so this circuit will produce key clicks. C7 provides feedback so the circuit will oscillate. Normally, a second capacitor would be used from the emitter to ground, but the 2N7000 has enough gate capacitance to eliminate the need for that additional cap. Instead of the normal sine waves one would expect from a crystal oscillator, this oscillator was made to produce fairly narrow pulses. This improves the efficiency of the PA so that even though the 2N7000 is in a plastic TO-92 package, it does does not get alarmingly hot producing 2 watts of output. It is advisable the antenna load be preset to a low SWR before transmitting, as the 2N7000 has a 60V break down voltage and a high SWR can easily exceed this, causing the part to fail. The output low pass filter provides some impedance matching between the output of the PA and the antenna load. C1 in combination with L2 forms a trap at the second harmonic, other wise an additional filter stage would be required to meet FCC spectral purity regulations. Instead of buying a single 1500 pfd cap for C5 in the LPF, two 680 pfd caps could be used instead.
T1 is a bifilar wound transformer, which means two wires are wound around the core at the same time. (5 turns). Use an ohm meter to determine the ends of the wires A-B and C-

D, then connect the ends B and D together to form the center tap, as shown in the diagram in the schematic.

The Receiver:

The receiver is a regenerative type and is a slightly modified version of the QRPKITS "Scout" regen designed by Charles Kitchen. See http://www.qrpkits.com

Q5 is the QSK switching transistor. During transmit, this transistor is turned off to isolate the receiver input from the low pass filter. Q8 is a common base RF pre-amp to keep the oscillations from the regenerative detector from being transmitted and reduce pulling effects from the antenna. The resonant circuit made up of the secondary of T2 and C16 determines the operating frequency of the receiver. Ideally, the tuning cap C17 should be an air variable with vernier drive. If you don't mind adding a few additional parts, a pot tuned varactor diode can be added for fine tuning and a small value trimmer cap (C27) used to help set the tuning range. Making C16 150 pfd and using a 50 pfd tuning cap (jumper out C28) allows for pretty much full coverage of the 80 meter band, so a vernier dial is needed or the tuning is very touchy. The schematic is drawn showing the use of a polyvariable capacitor with the varactor fine tuning. Polyvariable caps are also available from qrpkits.com.

Stability of the receiver is directly related to the stability of the input tuned circuit. NPO or C0G type caps should be used and an air variable for tuning. Using a powdered iron core for the inductor is a liability, but an air core coil would be much larger and more difficult to manage physically.

In order to receive CW or SSB signals, the regenerative detector must oscillate. A feedback winding on T2 turns the circuit into an oscillator. V1 in combination with C20 is used to control the amount of feedback. Polarity of the feedback winding is important. If you can not get the detector to oscillate, reverse the feedback winding connections. When winding T2, wind the 43 turn primary first and leave as much of a gap as possible between the start and finish of the winding to have a place for the two 6 turn winding to fit onto. Then wind the two 6 turn windings next, continuing in the same direction as the primary turns. Now, pick on end of the 43 turn primary winding as the "hot end" connected to the tuning caps. The start of the 6 turn winding next to the end of the 43 turn winding should go to the j-fet and the other end to the 5.1V supply. The polarity of the winding going to the RF pre-amp does not matter, so you can pick either end for those connections.

Ideally, the regen control is set so that the detector just starts to break into oscillation. This gives the best selectivity and sensitivity. However, this point will change when returning the frequency for receiving, so in practice, set the control so oscillation is sustained over the tuning range.

R9 and C15 form a low pass filter to eliminate high frequency audio and any RF which is present on R10. Note that the drain and source terminals of a J-FET are symmetrical, so they can be interchanged. That is why the schematic looks different from the way it might normally be drawn. Q7 and Q9 form a high gain darlington amplifier. Q6 further amplifies the audio and has the headphones connected in series with the collector, so it is acting as a Class A amp. Doing it this way eliminates the need to make an amplifier which can drive a low impedance load and saves a significant number of parts. **NOTE: The mounting sleeve of the headphone jack is connected to the power supply, so must be insulated from a metal front panel!**

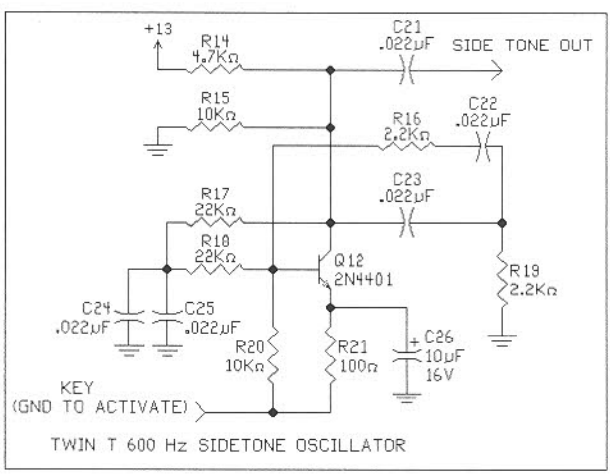
Keying the transmitter without any kind of audio muting circuit resulted in very loud clicks in the headphones. This was clearly not acceptable, so a mute circuit had to be devised. This resulted in adding R11, C19, C14, Q11 and D2. When the transmitter is keyed, Q4 is turned off allowing R3 to pull the gate of Q3 high, enabling the transmitter. D2 allows the gate of Q11 to also be pulled high, turning Q11 on and connecting C14 to ground, which by-passes the base of Q6 to ground. When the transmitter is un-keyed, the RC time constant of R11 and C19 delays the turn off time of Q11 to allow any voltage transits to dampen out and eliminates serious clicks from being heard. Some minor clicking is still audible, but it is of reasonable level and not at all annoying.

A 5.1V zener, D1 stabilizes the voltage to the RF pre-amp and regen detector. If no reverse polarity diode is used to save a part, one must be careful to observe correct polarity when connecting up power. Powering the rig with a regulated 13.8V supply is recommended, although a 12V gell-cell can also be used, though that might result in chirp, as the supply to the oscillator is not regulated. Minimum operating voltage is about 10 volts, with the power output dropping off to about 500 mw.

Note that a regenerative receiver is effectively a direct conversion receiver, so signals on both sidebands will be detected.

Since one will normally be using the receiver for CW or SSB it will be in the oscillating detector mode. There is enough RF signal present on R10 to add a sensitive frequency counter for a digital readout. This fact could also be handy in initially getting the receiver to tune in the desired frequency range. A frequency counter or a general coverage receiver can be used to help set the tuning range. I tried to make the crystal oscillator act as a "Spot" so you could tune to the transmitter frequency. However, the signal is too strong and blocks the receiver. A separate, outboard oscillator maybe made to provide a spot frequency.

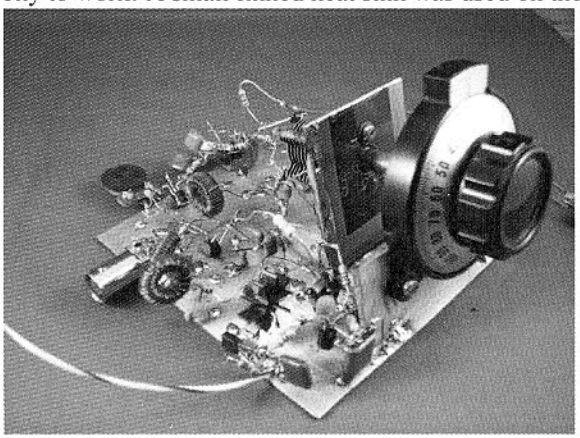
DSB transceiver possibility! It could very well be possible to buffer the carrier signal produced by the regen detector and use it to drive a balanced modulator to produce DSB (Double Side Band). The output of the modulator would then be amplified by some linear amps for transmit. This could result in a very low parts count DSB phone rig!



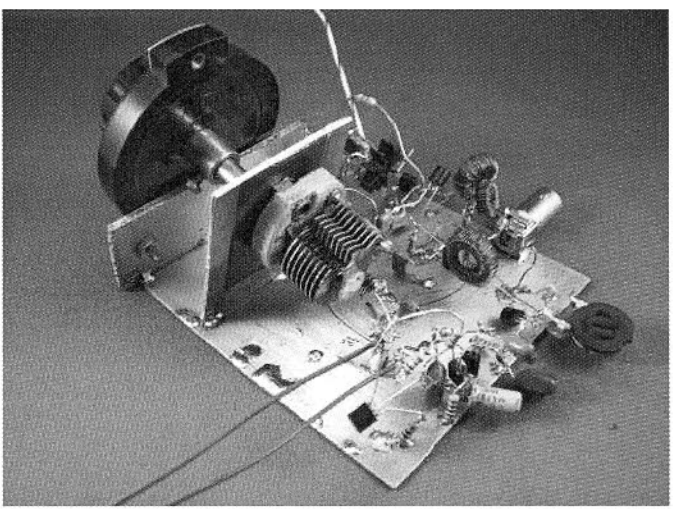
Side tone generator:

The "Twin T" 600 Hz side tone oscillator is included on the circuit board. If you have a keyer which can generate it's own side tone, these parts can be eliminated. The "side tone out" connection goes to the point labeled "ST IN" on the main schematic. C24 and C25 can be combined as one 0.047 ufd cap. Film type caps should be used for C21 to C25.

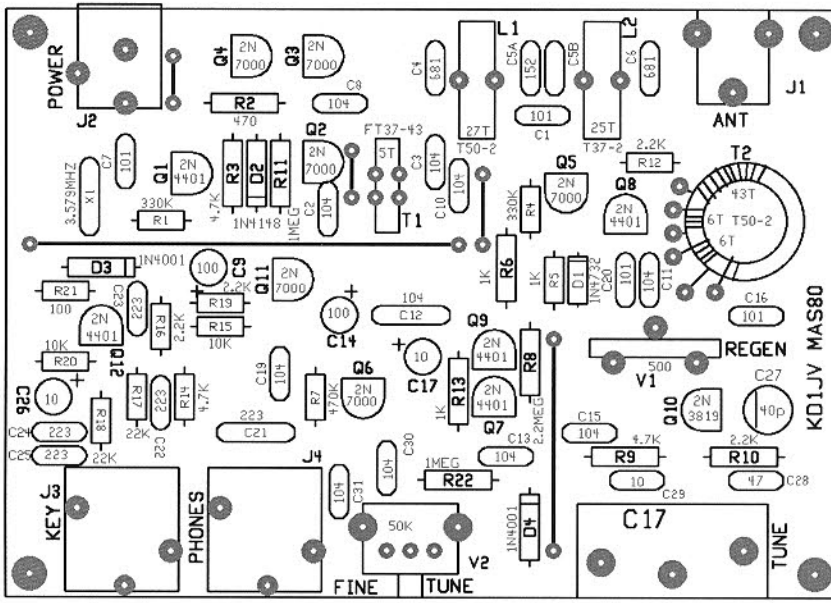
Pictures of the dead bug constructed prototype:(but is missing the audio mute parts, as these were added after the photos were taken) These photos prove it doesn't have to look pretty to work! A small finned heat sink was used on the PA in this version so that prolonged keydown periods could be done while testing.



PCB Construction and parts list: The printed circuit layout can be down loaded by clicking http://kd1jv.qrpradio.com/MAS/MAS_PCBOARD.pdf. It is a .pdf file and will print to scale. The view is through board, so it can be printed directly onto toner transfer film. The image is reversed when you iron the pattern onto the board.

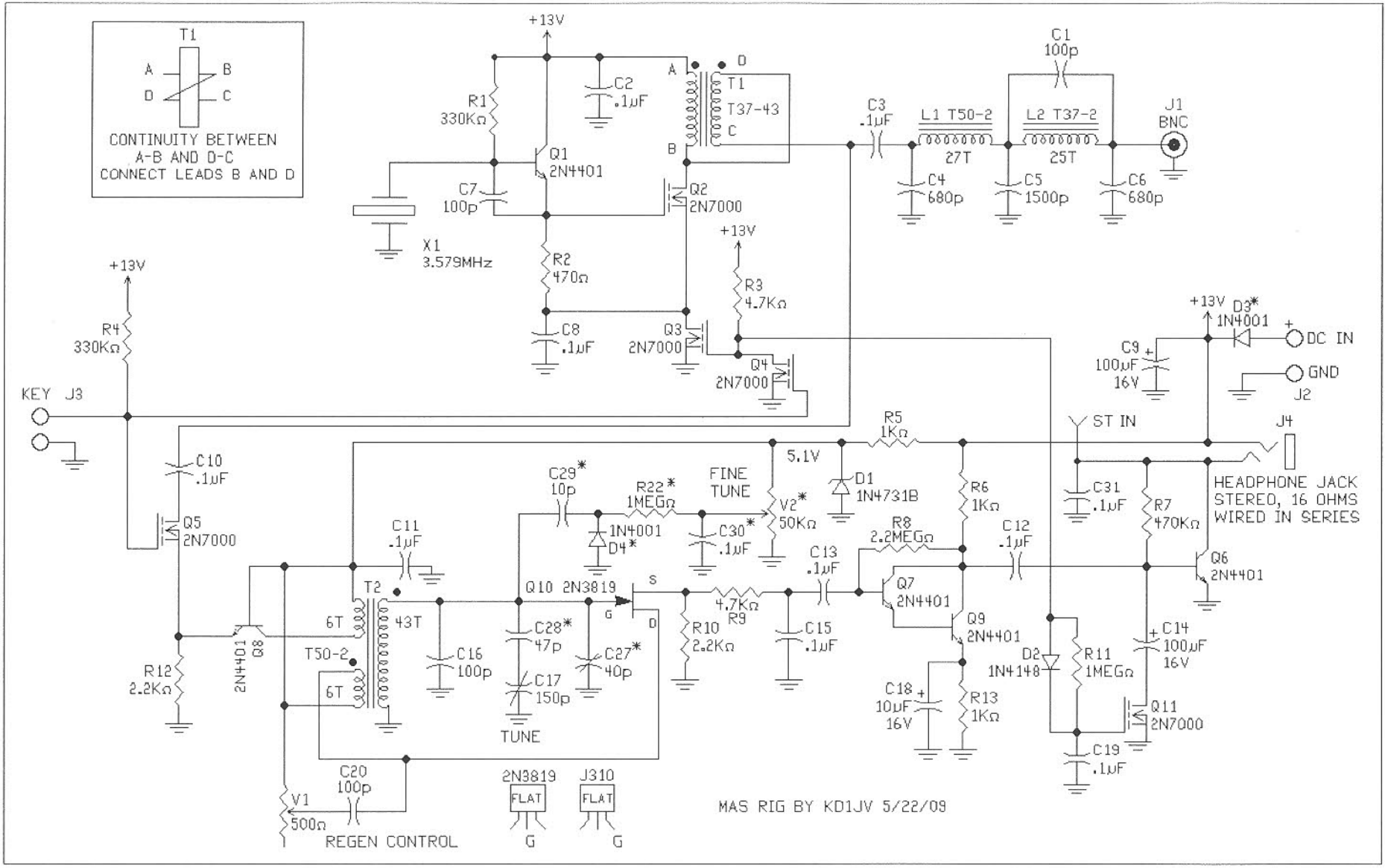


Parts subsitution:
I used 2N4401 NPN transistors, as I have a lot of them. Other NPN's such as 2N3904 or PN2222A should work as well. The J-FET I used is a 2N3819, but other N channel J-FETs such as the J-310 can also be used. Note however, the position of the gate lead is different in most other J-FETs, as shown on the schematic. The diode used for varactor fine tuning is shown as a 1N4001 on the schematic. I used a 1N4753B, a 47V zener diode. The 1N4001 may result in a smaller tuning range and C29 may have to be made larger in value to compensate. A red LED also makes a good varactor diode. The Main tuning range is about 200 kHz, from 3.5 MHz to 3.7 MHz. If you want increased range, make C27 larger in value and compensate with the trimmer cap to put the tuning in the band. Values used in the side tone oscillator should not be changed, as this will change the oscillator frequency. Also, the values used in the transmitter low pass filter need to be as shown. You do have some leway in the other resistor values, going +/- one 5% step should not be a problem, though common values are used.
Parts list



INSTALL JUMPERS BETWEEN PADS INDICATED BY BLACK LINES.

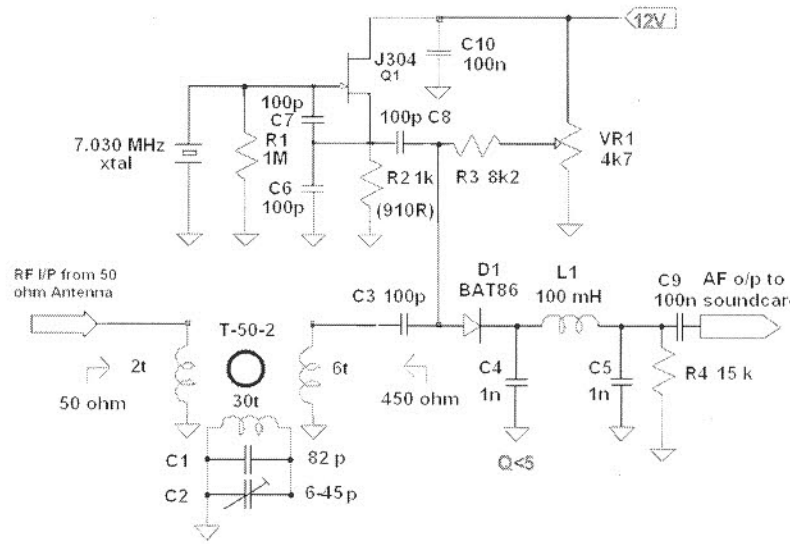
Q1	2N4401	NPN	R1	330K 1/4W 5%	C1	100p COG	
Q2	2N7000	T-FET	R2	470	C2	0.1 ufd	X7R, 50V 0.1" ls
Q3	2N7000		R3	4.7K	C3	0.1 ufd	80-C320C104M5R
Q4	2N7000		R4	330K	C4	680p COG	80-C315C681J1G
Q5	2N7000		R5	1K	C5	1500p COG	80-C315C152J1G
Q6	2N4401		R6	1K	C6	680p COG	
Q7	2N4401		R7	470K	C7	100p NPO/COG	80-C315C101J1G
Q8	2N4401		R8	2.2MEG	C8	0.1 ufd	
Q9	2N4401		R9	4.7K	C9	100 ufd 16V ALUM ELECTRO	
Q10	2N3819	J-FET	R10	2.2K	C10	0.1 ufd	
Q11	2N7000		R11	1MEG	C11	0.1 ufd	
Q12	2N4401		R12	2.2K	C12	0.1 ufd	
D1	1N4731B	5.1V	R13	1K	C13	0.1 ufd	
D2	1N4148		R14	4.7K	C14	100 ufd / 16V	
D3	1N4001		R15	10K	C15	0.1 ufd	
D4	1N4001		R16	2.2K	C16	100 pfd NPO / COG	
			R17	22K	C17	POLY-VARIABLE 150p	QRPKITS
T1	FT37-43	5T	R18	22K	C18	10 ufd / 16V	
T2	T50-2		R19	2.2K	C19	0.1 ufd	
L1	T50-2	27T	R20	10K	C20	100 pfd NPO/COG	
L2	T37-2	25T	R21	100	C21	0.022 ufd	
			R22	1MEG	C22	0.022 ufd FILM	140-PM2A223K
	MOUSER	R's 291-VALUE-RC (10 MIN)			C23	0.022 ufd FILM	MOUSER
J1	BNC	USE PANEL MOUNT			C24	0.022 ufd FILM	
J2	PWR	CP-102A-ND 2.1mm DIGI-KEY			C25	0.022 ufd FILM	
J3/4	STEREO	161-3507-E MOUSER			C26	10 ufd / 16V	
					C27	40 p TRIMMER	659-GKG40015
V1	500TRIM	201XR501B-ND DIGI-KEY			C28	47 pfd NPO	
V2	50K LIN	317-2091F-50K MOUSER			C29	10 pfd NPO	
X1	3.579MHZ	559-FOX036-LF MOUSER			C30	0.1 ufd	
					C31	0.1 ufd	


T1
A
B
D
C
CONTINUITY BETWEEN
A-B AND D-C
CONNECT LEADS B AND D
+13V
R1
330KΩ
C2
.1µF
Q1
2N4401
C7
100p
X1
3.579MHz
R2
470Ω
C8
.1µF
Q2
2N7000
T1
T37-43
C1
100p
C3
.1µF
L1 T50-2
27T
L2 T37-2
25T
J1
BNC
C4
680p
C5
1500p
C6
680p
R3
4.7KΩ
Q3
2N7000
Q4
2N7000
R4
330KΩ
KEY J3
C9
100µF
16V
D3*
1N4001
DC IN
GND
J2
J4
ST IN
HEADPHONE JACK
STEREO, 16 OHMS
WIRED IN SERIES
R5
1KΩ
5.1V
D1
1N4731B
C10
.1µF
Q5
2N7000
C29*
10p
R22*
1MEGΩ
FINE
TUNE
V2*
50KΩ
D4*
1N4001
C30*
.1µF
C11
.1µF
R6
1KΩ
R8
2.2MEGΩ
C12
.1µF
C31
.1µF
R7
470KΩ
C13
.1µF
Q6
2N4401
T2
6T
43T
6T
T50-2
Q10 2N3819
S
G
D
4.7KΩ
R9
R10
2.2KΩ
C15
.1µF
Q7
2N4401
Q9
2N4401
C28*
47p
C17
150p
TUNE
C27*
40p
C16
100p
R12
2.2KΩ
Q8
2N4401
D2
1N4148
R11
1MEGΩ
C14
100µF
16V
C18
10µF
16V
R13
1KΩ
Q11
2N7000
C19
.1µF
C20
100p
V1
500Ω
REGEN CONTROL
2N3819
FLAT
G
J310
FLAT
G
MAS RIG BY KD1JV 5/22/09

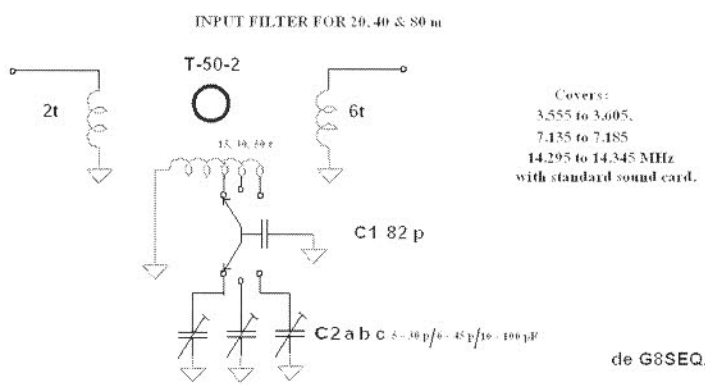
Experimenting with SDR

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

SDR Rx by John G8SEQ. based on an idea by Eduardo EA3GHS



Notes: The T-50-2 is a powdered iron core by Amidon. When wound with 30 t this will have an inductance of about 5.5 uH. The 2t and 6t windings form an impedance matching transformer. These are wound over the resonant circuit. Together these windings act as a narrow band pass filter. L1. C4 & C5 form a low pass audio filter with a cut-off frequency of about 100 kHz.
The DC bias on the diode is fairly critical. but once set need not be adjusted again.
Using a single 3.58 MHz xtal. a three band version is possible:



After reading Eduardo's article in SPRAT 134, my local club decided it would make a good construction project and starting point for SDR. We liked the simple approach and I set about re-designing parts of the circuit to suit components I had at hand to keep the cost

down. I couldn't get Eduardo's audio filter to work with my sound card, so opted for a pi filter and DC blocking capacitor. I think there is a problem with the sound card wanting to supply a DC voltage to an electret mic at a fairly low impedance. After building 14 kits using the small watch xtals from G-QRP Club Sales, it was realized that it was possible to extend the range of the set by using different RF filters and 3.58 MHz xtal, so it can now cover parts of 20, 40 & 80 m bands. Unfortunately this only includes one QRP calling frequency, but if you have a deluxe sound card covering 96 kHz this just pulls in the USA novice frequency at 7.110 MHz and phone on 14.285 MHz.
A PCB layout is available & if there is enough interest a batch of PCB's could be run off.

Further having heard that someone in the HuffnPuff group has made a fast version of a stabilized VFO which has locking points of 25 kHz, I am considering a version with VFO which will cover the whole of any particular band in 25 kHz steps.

My Favourite VSWR Bridge

Mitchell Lee, KB6FPW, 686 North Twentyfirst Street, San Jose, CA 95112-1626

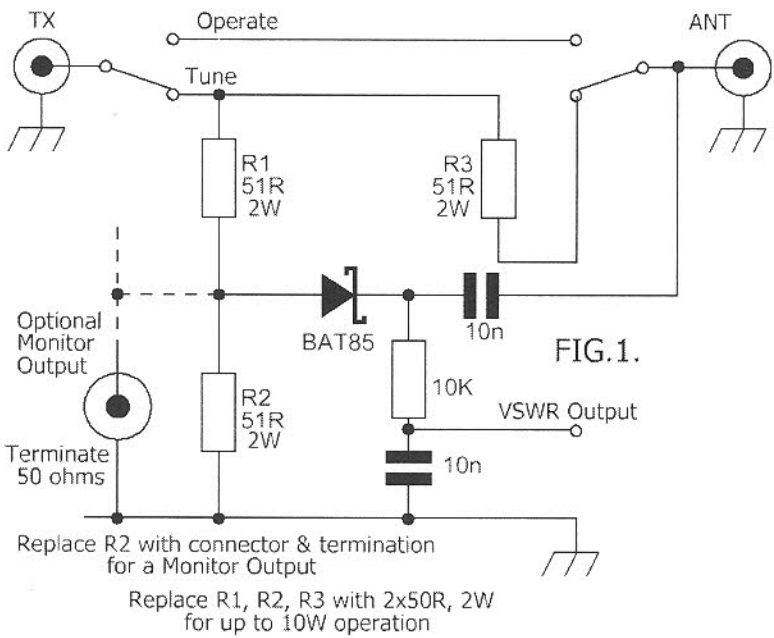


FIG.1.

A Useful Idea from Paul deBono 9H1FQ

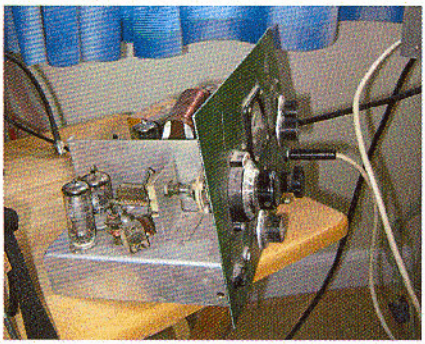
Playing around with the NE602/612, discovered that the output of the local oscillator of the chip can appear at output pins 4 & 5. This is achieved by bypassing the input pin 1 by a 10k resistor to earth ! Thus a simple NE612 based DC receiver, such as the SUDDEN, can be converted to a simple transceiver by adding a PA stage, such as a BFY51 driven from pin 4 or 5

Report on the First Valve Day

Colin Turner G3VTT, 30 Marsh Crescent, High Halstow, Rochester, ME3 8TJ

By all accounts this was a successful first 'Valve Day' although there were one or two transistor stations evident and even one QRO station. At least it got some folks on the air with QRP and the QRO station had an outstanding home brew valve rig. Promoting activity and home brewing rigs are the focus of this event with a bit of nostalgia thrown in. The event will be run again during the winter with the permission of our Communications Manager and will focus on an evening event to improve operating conditions and the number of QSO's. Here in Kent it was another grand day out down on the beach with G3YVF and I along with two 6V6's, a couple of 6SG7's and a battery/inverter system, a pot of coffee, some rolls and some soup. The following reports were received. 'Here in Mansfield, 80m was very quiet during the day, (apart from the usual background noise level), the only stations heard were Colin G3VTT and Dom M1KTA, both very weak. As propagation conditions improved later in the day may I suggest the next valve "day" to run from say 16:00 hrs to 22:00 hrs?' **G4DFV** 'Heard G3NCU, G3UGF, G3JFS and G3VTT. Checked 80 a few times today again but still dead here at least. Band virtually dead during the day. **M5AKY** 'That was the idea to stir up a bit of fun and drag out that old gear that's in the shed/attic and see if it works. I had a blast, even if I didn't work too much. I had forgotten just how big everything use to be and just how long it took to string everything together, with changeover relays , muting , sidetones and stuff to worry about. I've suggested to Colin that we try a 1 transistor day. That could be either the TX, RX or both. Anyone got any other bright ideas and we can make a calendar for next year?'**G3UGF 'bringing memories back above'**'Good idea though - perhaps we ought to try it in winter when the lf bands might be more lively?' **G3MFJ** 'I used my CO/BA/PA 3 valve TX for the day, running 35W from a 6146 so not exactly QRP. For receive I used an Eddystone EA12. Besides Colin and several Gs on 80 I worked quite a lot of stuff on 20 in the IOTA contest. Best DX was JA3AOP. I thought it was a good outing.' **G3XAQ** 'Just back from holiday so not much time on air. I put out several CQ calls on 80 m around 1900GMT but had only one reply from G3UGF. No other stations heard before QRT at 1945. Rig: Single valve CO with 3 watts out from a 5B/254M (a 'miniature' 807) with 250 V HT. Antenna a bent 100'long E/F wire tuned with a Smartuner in a shed at the far end of my garden.' **G3JFS** 'QRV with a 'Paraset' type transceiver with 4 watts from a 6V6 and a single 6V6 rig from G3YVF. As usual the beach was electrically quiet, reception only marred by the audio coupling capacitor to the AF amplifier valve going leaky!. Best DX Liverpool but the best contact was working PA3EQB with his 'Paraset' **G3VTT** 'Thank you for being so patient and putting up with my rusty and slow CW. We hooked up the homebrew TT paraset with 4 W output. The key was a J-37 and phones were modified R-30U, both surplus. Power was supplied by a 12V/16Ah gel-cell. When I called CQ I didn't expect you to come right back to me, but there you were! I could hear you at first with a

579 signal, but it quickly dropped to 339 with QSB and a strong DL was pounding CQ next to our frequency, which wasn't very helpful. Anyway, the TT Paraset came through and the QSO was made. **PA3EQB** 'From what I read on this reflector, a successful event, and I hope the logs come flooding in to you!' **G3XJS** 'I know very little about the TX The valve line up is: CVJ832 + ECF80 (Vreg & osc./buffer in VFO), ECC82 (I think this is a mic pre-amp, but half of it may be used as an RF stage). It has two 6BW6 valves, one used as the PA and the other as the modulator.'**G8SEQ 'the unknown radio to the left'** 'I don't have a straight key and the paper clip thing I made gave me a few zaps during construction (building valve kit is no fun when you get bitten a few times!) so I built an isolation keyer using some IRF610 Mosfet and an opto-isolator chip'



M1TKA 'Thanks for the Vacuum Day, it was quite a struggle ,more due to the high noise level, but we did our best at various times over the day on 40 and 80 meters. I was running 5 watts to a modified Heathkit DX 40u and a Drake r4c receiver and a doublet antenna also a copy of the Vandal Tx with 3 watts out put, Sprat 61. I worked G3VTT and G4NCU. I could hear other stations low down in the noise but hard to work in the high noise level. I had a go on 40 meters but did not work any one so I hope for better conditions next time. **G3UZU** I resurrected my old Eddystone 640, repaired an intermittent fault and put it on the air with my Top Band/80 TX built originally about 1966: EF91 (VFO), EL91 (buffer/doubler) & 6CH6 (PA), used with a HB L-match ATU to a W3EDP antenna with 66' counterpoise. RF output: about 4W. I settled for 80m and almost straightaway and worked M3NFU in Shildon. Interestingly, the band seemed quite open, as I heard a GU4 station. Thought the achievement in terms of QSOs was minimal, I enjoyed using the valve rigs again - so thank you for the incentive to air them. I also intend to complete a "junk box" RX which has been standing about for too long! I hope you had a successful day. **G3NUA** Made a co/pa rig and a 1-V-1 TRF and operated on 7030 but nothing all day. Checked conditions on a steam radio and still no luck – long skip as only 4 G stations heard **G4PKW** It was great to make contact with you on the first vacuum day event, However apart from your good self and Alan/G3UZU I heard no other stations, indeed I only worked two other stations on 80mtrs all day and they were non valve. It was great fun using the old gear again and I hope the event will run again next year. I see no point in submitting a log but thought you would like to know my operating conditions- A home brew 3 valve Tx line up-ef80 vfo ef80 buffer and an el84 pa, just 4 watts output. Rx 9was) an old R1155 much modified by me over the years. The aerial was a doublet. Thanks very much for the event and hope to work you again. **G4NCU.** This event will be run again so watch either the G QRP reflector or Sprat for details. Finally - I noticed an increasing number of French stations using AM in the CW portion of 80m. *Why* do they do that? Are *their* licenses different? Have they not heard of the *band plan*? **G3VTT**

The G-QRP Club Mini-Convention 2009

Graham Firth G3MFJ

Plans are firming up for this event on October 24th next.

Most of the tables have been booked – there are one or two left, so if you want one of these – contact Dick G0BPS 01303 894 390 or dick @ pascoes.plus.com.

Plans for the buildathon are progressing well. The main project will be a Manhattan version of George's Sudden receiver. This is an improved design based on the successful buildathon in Dayton this year. If you would like one of the places, please contact George or I. We would like you to bring your soldering iron and a few hand tools – we will supply the board and parts although there will be a small charge for these.

If there is anyone who would like to help with this, we would really like a couple more helpers please. We also hope to have a PICAXE-athon. We will have some of the kits mentioned in the PIC article in Sprat 138, Rex, W1REX, will be here – he is one of the speakers, and he will also have his full range of Tuna tin and PICAXE kits. You will be able to build and/or program a PICAXE.

Talking of speakers, we have the usual excellent range of speakers who will be using the well-equipped lecture theatre at the school.

Thanks to Drew Diamond, we will have a club edition of his latest projects book – volume 4 – this will be on sale at the convention, and from club sales afterwards. We are really grateful to Drew for allowing us to be able to sell his excellent books at affordable prices. For those who ask "whatever happened to Projects 2?" – we also hope to also have this "missing" (to us) edition available.

Bring along a QSL card – there will be a board by the door for you to stick it on, and to look and see if there is any DX attending!

Don't forget to buy a raffle ticket – we will have some excellent prizes.

As mentioned in George's editorial, there will be a new Sprat-on-CD – all issues from 1 to 140 (this issue). This will be the last Sprat-on-CD – we have just managed to get them all onto a CD – if there is ever another – it will have to be Sprat-on-DVD!

I asked in a recent issue of Sprat, for help with a homebrew competition. We have a volunteer (thanks Dom) to run this, so if you have built something – and are proud of it – bring it along and enter it – win the "Rishworth Home Brew" trophy, and maybe a prize!

You will be able to renew your subscription – Tony, G4WIF, will be there to take renewals.

The "famous" pieman will be bringing his meat pies and peas – and the "pudding" – apple pie with custard – was wonderful last year, and promises to be good again this year. We will also again have the invaluable help of the Halifax Club members – we couldn't do it without them.

So far, we have filled one hotel with conventioneers, but there are other hotels – including one that is a short walk from the school, so if you want to stay, contact George or I for details.

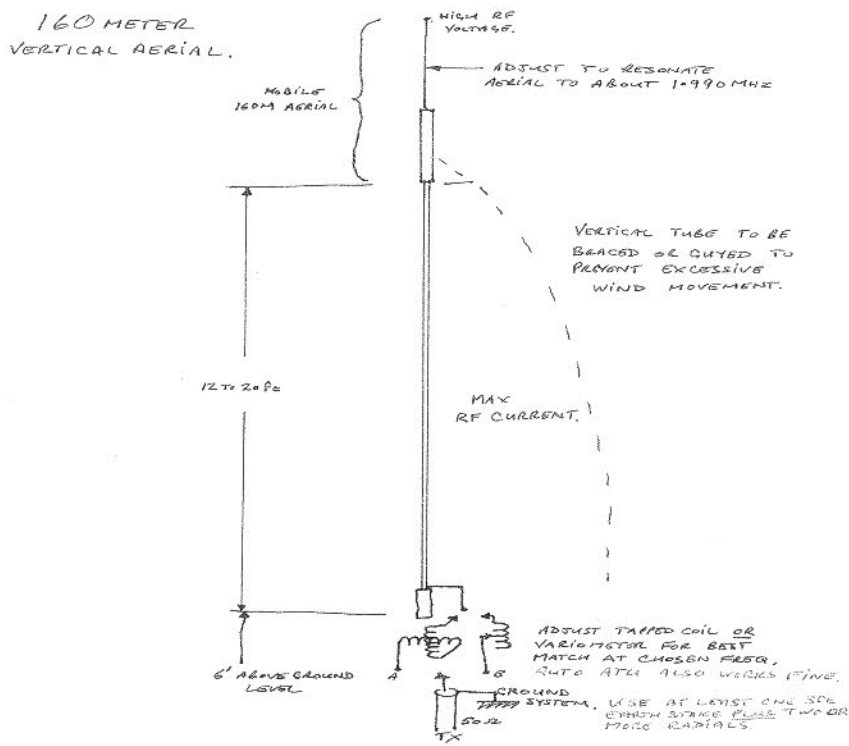
Remember – October 24th - put it in your diary – now!

Antennas Anecdotes Awards

Colin Turner G3VTT
30 Marsh Crescent, High Halstow, Rochester, Kent ME3 8TJ
G3vtt@aol.com

A 160m Vertical, Gardening on the Roof, Coils, Loops, More Verticals, Black Cats and VALVES!

A big thank you to all of you who contributed to the recent **'Valve QRP Day'** there will be write up elsewhere in this issue. With the permission of our Communications Manager can I suggest we try again during one winters evening? Many of you have suggested an afternoon and evening event and, having checked the contest calendar for a clash with '5NN bash', may I suggest **Sunday November 15th from 1600z to 2400z**? If you are outside of Europe then just send me a report of the activity at these times in your area. Remember it is not a contest but a chance to get on the bands with your valve/tube QRP equipment. I suggest the 15th as on the 14th it's the FOC Bill Windle QSO Party which you are all invited to join and on the 15th it's the German HOT QRP party which should boost activity. Please send me your reports via email at g3vtt@aol.com suitable for publishing not later than November 20th 2009.



Alan G3TCI, one of the top band AM net controllers around the Thames Estuary, has kindly contributed this 160m antenna system idea he is currently using. It's the old 'Minooka' idea from the US, a mobile whip for 160m with a large vertical section beneath and a roller coaster or variometer to bring the whole thing to resonance. The secret is in the radial system and as he suggests you need at least one 3 foot stake plus two or more radials. I suggest you put as many radials down as you can from the earth stake and don't forget to adequately cover the coils at the bottom before winter sets in. I can testify this set up is effective as I can hear Alan on AM and SSB when on holiday across the sea in Holland.

and.....talking of Holland - from Gert PA3CRC 'Gardening on the roof'

"Chimneys are fine for fixing a pole which in turn holds your wire antenna high up. But galvanized steel pipe with the hardware to fix it to the chimney are expensive. A good and easy alternative is using impregnated wooden poles sold for gardening, like making fences and gates. They last for many, many years outside and come in lengths that allow you to put the antenna some 7 to 8 feet over the top of the chimney. Just drill two holes at the low side of the pole and use two long screws and plugs to fix the pole directly to the brick/stone chimney. Easy, fast, durable and very inexpensive." **Bedankt Gert!**

Baluns from G3TXQ

Following the publication of KC8AON's switchable balun design in SPRAT 139, Steve Hunt G3TXQ contacted me to point out that *"winding two 1:1 Guanella baluns on a common core prevents them from forcing current balance in some types of load. For a detailed proof take a look here: http://www.vk1od.net/balun/gsc/index.htm. Put simply, in order to drive equal currents into an unbalanced load the two 1:1 baluns need to be able to operate independently, which they cannot do if they are linked by a common magnetic circuit. For proper operation, each 1:1 balun needs to be wound on a separate toroid; alternatively they can be wound through the separate holes of a binocular core - that's the approach taken by Elecraft in their BL2 switchable balun."* Good point although the switched balun worked fine for KC8AON Steve has a valid point.

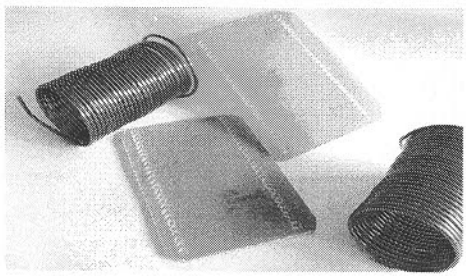
More from Holland – 'Making Air Coils for Antenna Tuners Look Nice' from Gert PA3CRC

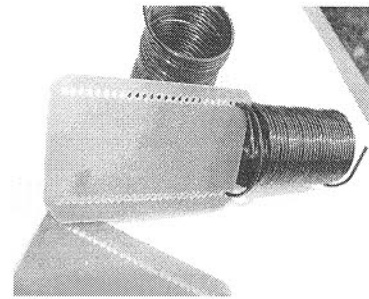
In Electron (The "Dutch PW") 1952 you find an method for making large air coils looking nice and sturdy. Air wound coils, specially the larger ones, are often floppy when not supported by a former. But good ceramic formers are scarce and buying one in the exact dimensions you need is very expensive. For example: I needed two identical coils with taps for a symmetrical antenna tuner and used the technique from this article. The pictures tell most of the story, but still there are some things to think about.

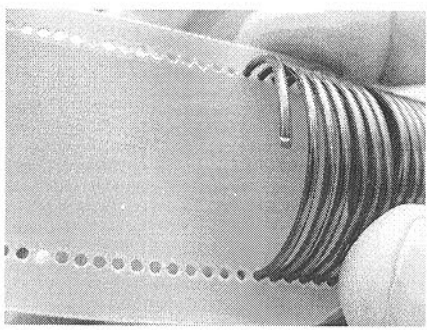
- It takes patience to make a nice coil, but the result is one to be proud of.
- Use perforated board as a mask for drilling the holes: they will line up nicely.
- Drill the holes slightly larger than the wire and use a countersink to avoid sharp edges.
- Wind the "floppy coil" on a tube or bottle, diameter slightly smaller than the final coil.
- Push, turn, and squeeze the coil gently through the holes, carefully - not forcing the coil.
- Every now and then, bump the PCB on the table in order to release tension in the

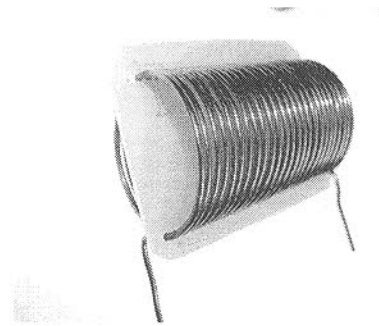
construction that will cause too much friction.
- Instead of etched PCB you can also use other kinds of plastic.

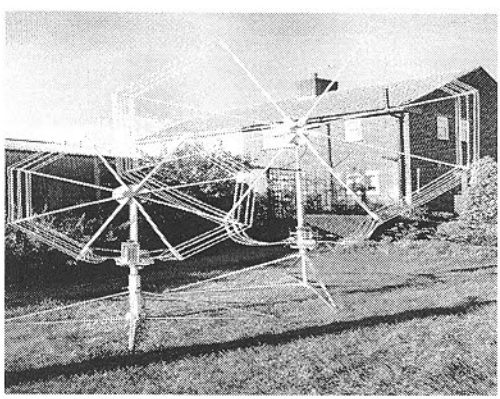
In the example you see 1.5mm wire and 2 mm holes, about 5.5mm apart. Diameter is about 45mm.





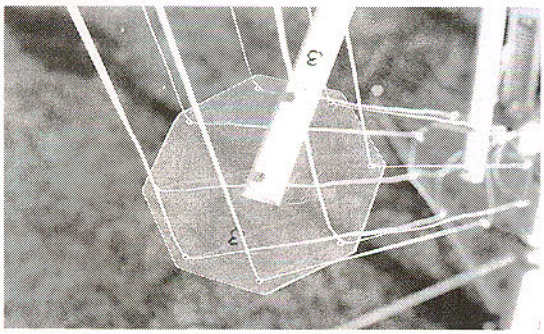




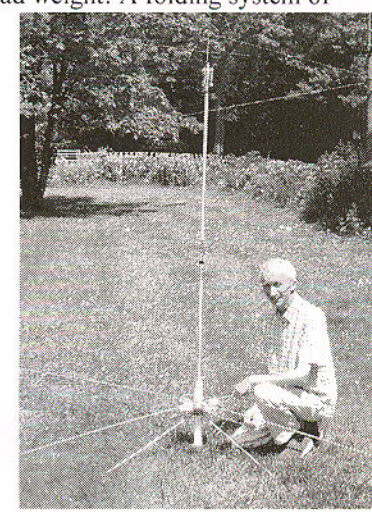


From Francis G4ALD Hi Colin. Having seen the picture of you /P in the recent issue of SPRAT, I thought you would like to see the result of some 'research' done here on making some portable antennas. The first are based on an article which appeared in the Radcom some years ago. The idea is based on the magnetic loop, but having a wire cage instead of a solid tube for the loop element. This was done primarily to increase the bandwidth (a well known problem with this type of antenna). My versions follow similar construction to the published article, but with one major difference. I could not get the Faraday feed coupling loop to work, so I resorted to a simple parallel tuned circuit across the loop itself, with the feed coax just tapped on to the coil for the lowest SWR. This works surprisingly well, and resulted in two versions being constructed. The smaller loop in the photos covers 10 to 40m, and is 1m in diameter. I extrapolated the idea to produce a larger version to include 80m. This is a giant, at 2m in

diameter! Both seem to work, and I have worked into Europe with them at the elevation shown (a couple of feet off the ground!). Reports of 559 to 599 have been received under daylight conditions. Directivity is uncertain, and I suspect not that precise, as they are so near the ground. Probably a lot of high angle radiated! Still, an idea for a quick set-up for /P (both take just minutes to erect - the larger one folds away for transport. Both stands also fold). I include close-ups of one Polystyrene cage spreader, and the 10-40m loop tuning assembly. Note the low loss connections!



The other project I laboured under was a multi-band vertical, covering 10-40m. This was designed to be compact and easy to erect, and more importantly, pre-tuned to various bands by means of loading coils and top resonating whips - thus eliminating a base ATU. The hardware consists of a total of four aluminium tubes, three loading coils covering 12/15/17/20/30 and 40m, and a selection of 'plug-in' top whips with capacity hats. (A loading coil is not necessary on 10m, as it is possible to erect a full quarter-wave, using just tubing and a resonating whip). These components form a 'mix and match' type of assembly, and enable some parts to perform on more than one band, thus saving payload weight! A folding system of four tubular radials (only about 2m each in length), are supported a few inches off the ground by means of a central hub, slotted over the vertical supporting structure. The vertical elements and radial system dismantle to two packages, 1m each in length, for transport. This antenna has been very successful, and I have worked W8 on 20m in the evening, with it standing on the lawn at home ! (Total antenna length on that band is a mere 2.4m!). European stations have given excellent reports on a number of bands, and it seems that given a good /P site, I can expect even more success! On 30 and 40m, the full 3.4m of available tubing is used, and this is base loaded, using a single large tapped coil. The set-up in the photo of the vertical shows the antenna assembled for 20m. Hope these ramblings are of interest.



Awards

Congratulations to G3WWS for gaining his Worked GQRP Club 20 members.

Going to Norfolk anytime?

Maybe it is a bit late in the year but as an anecdote could I direct you to the Muckleburgh Collection near Sheringham in North Norfolk if you are considering an East Anglia holiday next year? This is a first class trip out if you like military vehicles and radio equipment. I ended up spending a whole day in July this year along with G3MJX and his staff at their Amateur Radio exhibit and managed to do a bit of operating from GB2MC. They have a TS850S and an MFJ QRP transceiver plus the biggest selection of military and amateur radio equipment this side of the Rio Grande (well almost). They are open on Wednesday and Thursdays most of the year. Not only are they are encouraging young people to learn CW and enjoy radio on a weekly basis by teaching them to send their names in Morse and giving them certificates, but the station is open to all visitors to the museum and is a good example of promoting our hobby to non radio folks. What are you doing to promote our hobby to young people and QRP to other operators? An excellent effort all round chaps – you earn this season's cat, a Military one, from the famous 'PBY **Black Cats** Squadron'. Keep your ideas rolling in and don't forget **Valve QRP Day** on **Sunday November 15th 1600 to 2400 on the QRP frequencies. Reports to G3VTT@aol.com by November 20th.**

Membership News

Tony G4WIF, PO Box 298, Dartford Kent. DA1 9DQ

With this Sprat you should find the new members handbook. Hopefully the errors that crept in last year will not reoccur. As occasionally you find with Sprat articles, the file leaves us OK but something goes awry in the typesetting when it reaches the printers.

If you are not listed it will be for the following reasons: Your details reached me after the database file went to the printers. Or we do not have either your callsign or first name. You won't be listed unless we have at least one of those.

DX members please note the retirement of some of our representatives who will be missing from the handbook.

I mentioned in the Spring issue that David Simpson VK2DBS was no longer able to represent Australian members. Sadly I have to report that Dave passed away in August after a long illness. Dave was a most reliable club representative and will be much missed.

We also regretfully announce (that as sometimes happens), personal responsibilities has prevented Henning Mikkelsen OZ4XF from continuing to represent members from Denmark.

Both posts are now vacant so if you feel you would be able to help I would be pleased to hear from you. In the meantime, members from Australia and Denmark should renew through me.

As always, the most up to date information can be found on the club website www.gqrp.com including how to pay on-line.

COMMUNICATIONS AND CONTESTS

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

As I write this, it is a warm sunny day and I hope plenty of you are taking the opportunity of good summer weather to do some /P QRP operating. Colin's recent Vacuum Day events may not be ideally suited to the use of valve equipment, but he certainly manages very well from his beach location in Kent!

INTERNATIONAL QRP DAY

It would be great to see plenty of entries for this event, but usually there are only a handful. This year I received logs from **Bob 2E0ATZ, Peter G3JFS, Mads LA1TPA** and **Valery RW3AI,** for which many thanks. Valery also enclosed check logs from EV6DX, RA3PNC, RK1NA, RW3XS, RX3ALL, UA1ASB, UA1CEX and UU7JF, none of whom are current members of G-QRP and therefore not eligible to enter the event. However, it is a sobering thought that I've received more logs from non-members than I have from members! In terms of QSO's made, and separate Region 1 countries worked, it was a close-run thing between Valery's log, and Bob's, but Valery's log spans a period of greater than 6 hours and is spread across more than the two periods specified in the event rules (Club Members Handbook). Peter's log was, by his own admission, a "small one" but Mads managed the highest score of all. He was using SSB during a Summits On The Air operation with his FT817, Elecraft T1 matching unit and 88ft doublet. Our congratulations go to Mads for his fine effort.

EUCW Bulletin

LZ1PJ has sent me the EUCW Bulletin 2/2009, which I will be pleased to forward to you if you drop me a line.

WSPR

Roger **G3XBM** sent me an email advocating WSPR (Weak Signal Propagation Report Network) as an ideal mode to monitor propagation conditions. As an example, he received several reports from around Europe, and from Afghanistan, on his 5W WSPR 10m signal which he'd left running one night. This is not a mode of which I have any experience (or knowledge), but you will find plenty of information on the Web.

Brian **G3KJX** is planning to be back in CT1 in time for **Winter Sports** and should be active on most bands. During his recent stay in Portugal he found HF conditions pretty poor and has been having a bit of fun on 6m, working 11 DXCC with his FT817 and three half-wave dipole.

Hopefully the bands will improve during the Autumn, and in good time for **Winter Sports** (26th December to 1st January inclusive). So, don't forget to put aside time over the Christmas period and have some QRP FUN on the bands. In the meantime, the deadline for the next SPRAT is the beginning of November.

72 de QRPeter

VHF Managers Report

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

Roger G3XBM has been experimenting with very low power- 50 mW AM on 6m. He calls this the SixBox and is a derivative of the Fredbox 2m TRx featured in SPRAT sometime ago. Details of the new rig can be found on his website: http://www.g3xbm.co.uk/ . It uses 7 X 2N3904 bipolar and 2 X MPF102 fets, including the superregen Rx driving a high impedance earpiece.
(see this issue – G3RJV)

Roger has also been experimenting with WSPR ("whisper") mode. This stands for Weak Signal Propagation Reporting and relies on some software written by K1JT
http://www.physics.princeton.edu/pulsar/K1JT/ (also see this issue! – G3RJV)

Roger has been using this mainly on HF bands but has also tried it on 6m, where he has looked at aircraft scatter and meteor trails in the recent Perseids shower.

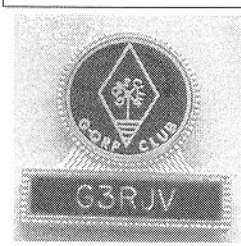
I'm hoping to get on 6 & 4m AM soon, using a homebrew 2w Tx, initially with an FT-817 Rx, but will do a sortacopy of Rogers superregen later. However, I got distracted by Valve QRP day which ended up with me spending hours rebuilding the VFO/Buffer amp of the Tx I acquired.

Lastly, has anyone apart from me & Dave G0DJA had any experience of using an HF antenna on 2m? Dave has used an ATU in the past, but my antenna loads up nicely without one (probably because the E2002 coax I am using is lossy at 145 MHz). So far I've only worked FM stations up to a few miles away using a couple of watts

De John G8SEQ.

G QRP Club Callsign Badges

G3RJV



For some years we have sold Callsign Lapel Badges and recently we have had to buy a stock of new badge blanks. These proved to be twice the cost of our original stock. So I regret to say the new price of the callsign badges will be **£6 + postage** (60p UK, £1.00 EU, £1.50 DX). PayPal orders are possible via the instructions on the back page of SPRAT.

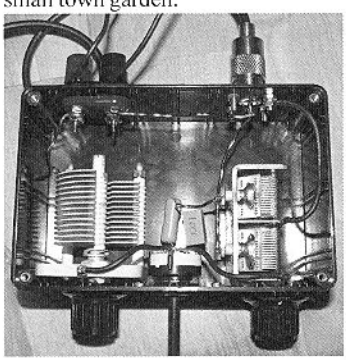
MEMBERS' NEWS

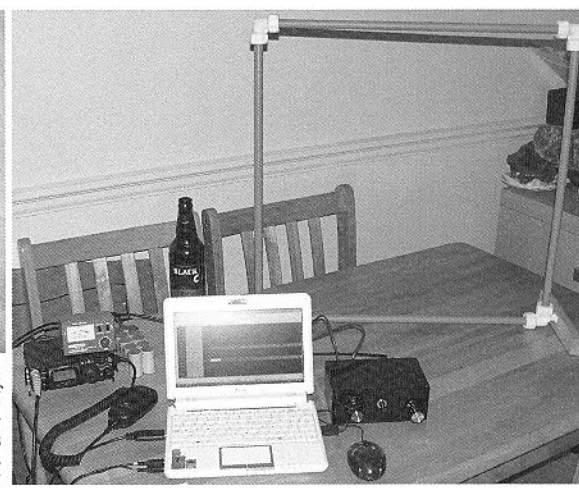
by Chris Page, G4BUE

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

At the end of May I read with dismay on the Feld Hell Club web-site <http://sites.google.com/site/feldhellclub/Home/feld-hell-faq> that in April they had changed their 20 metre calling frequency to 14063kHz. I sent a polite e-mail to all the club directors pointing out that the IARU has shown 14060kHz as the "CW QRP Centre of Activity" in their Region 1 and Region 2 Band Plans for many years, and would they please consider changing their recommended frequency further away from 14060kHz. Sadly, the two replies I received, from **KZ1Z** and Lou (who didn't give his callsign), indicate they have no intention of doing this. A very sad situation for QRPers.

2EØJCA says that with a little e-mail help from **GM3UWX**, he has built a 21 inch loop version of Jim's loop described on page 16 of SPRAT 139. It has a tuner to cover 20, 30 and 40m and James is very pleased with the results so far. His plan was to put together a portable QRP station for PSK activity while on holiday in September, and the picture below right shows the portable set-up with the tuner (below left), FT-817, a small SWR meter and an Asus EEE PC netbook. The loop is made from 15mm water pipe and the joints are all push fit so it can be taken apart for transport. Initial tests were promising with James' first PSK31 contact being **RD3BD** in Moscow! He now plans to build the 80m and 160m loops to use at home as he can't normally operate on these bands due to a very small town garden.

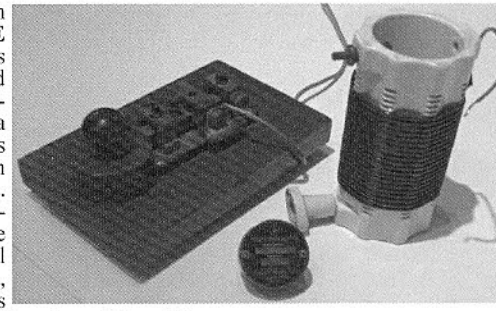




Congratulations to **GØBPS** on completing his term as President of QRP ARCI on 1 July. Dick was succeeded by Ken, **W4DU**, who was Vice-President, and in turn was succeeded by Kathy, **WQ5T**. **W4DU** mentions the 'Worked All ARCI Challenge' that started on 1 August, see <http://qrparci.org/> and click on 'Worked All ARCI Challenge'. My thanks to **G3YMC** for pointing out the mistake in my column in SPRAT 139 when I said **G3XJS** was the holder of the G4STT Trophy in 2008. I should have said the holder was **G3YMC**. My apologies to both Dave and Peter for the error. Congratulations to **G3CWI** who is the holder of the Trophy for 2009, and also to **GM4YLN** for receiving QSLs from YL, EK, VK9, 4S7 and 4U1 taking Chris to 280 DXCC confirmed after 26 years of QRP DXing.

My apologies also to **G3JNB** regarding my report in SPRAT 139 about his 15/17 August transmissions on 1875kHz, that turned out to be a hoax! Victor says, "The announcement in the last *Members' News* of **G3IEE** and my intention to run CW transistor transmitter tests on 160m in August came as something of a surprise. Apparently those particular 'cutting edge' events were planned 55 years ago! The information had been 'lifted' from an old copy of *Radio Constructor* by a member and

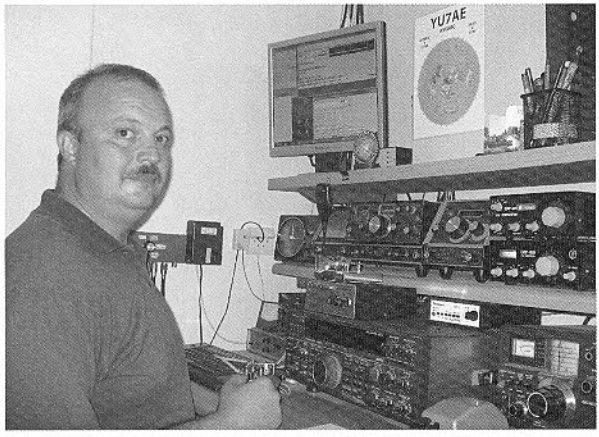
posted on the G-QRP Reflector as a joke. In fact, the tests did take place at that time. **G3IEE** had 'acquired' some preproduction OC51s from his place of work, passed them out and three crystal controlled transmitters were constructed. Mine was built in the middle of a vast steel chassis 'liberated' from an old mains BC set, soldered up with a colossal Solon iron and radiated milliwatts to a long wire antenna. In true amateur spirit, and despite the intervening years of culls and QTH moves, I have found the original Eddystone coil, the actual key and the 1874kHz (kcs) crystal that I used, in my junk box! (see photograph on previous page). I guess the OC51 went the way of all three legged fuses?".



DL2BQD reports the sad news that Will, **DK5RY**, became a Silent Key in July. He was one of the first overseas members of G-QRP Club (143) and our condolences go to his wife Anna Maria and family. **ON4NIC** came out of hospital after minor surgery in June after he had, "Retrieved some interesting items from the bin in my room". Nick says he has now hooked a fine drip feed to his soldering-iron station to keep the sponge wet. He refilled the little bottle with water (used for liquid Paracetamol) with a medium size syringe. **GØXAR** mentions an interesting method of etching PCBs described at <http://www.instructables.com/id/Sponge-Ferric-Chloride-Method-Etch-Circuit-Bo/> introduced as, "How to etch a circuit board with about a tablespoon of ferric chloride etching solution and a two inch square sponge".

WAØITP says the first run of the NS-40 transmitter has sold out and another run was being organised at the beginning of June. Terry says several new kits are being developed and to check his web-site at <www.wa0itp.com> for details of them. **SMØJZT** says the new six band QRP rig 'QROlle II' kit photo on right) is now available for €450. Tilman says the web page at <www.qrolle.se> describes the rig and allows you to download the building instructions.

The picture below is **YU7AE,** an electrician at Radio Novi Sad's medium wave transmitter site and an amateur since 1984. Kare was **YU7MIN** for two years and QRV with QRP on 80m. From 1992 he only used RTTY, and other digital modes since 1999, but is now using QRP CW again with a TS-950DX, Atlas 210/215 X, a transverter for 6m, a military PRC320L and some homebrew QRP rigs. He has inverted vees for LF, a two element quad for HF and a three band UHF/VHF MV2000 vertical. Kare was QRV as **4O/YU7AE** in June while on holiday in Montenegro with his family and made about 850 QSOs (RTTY and CW) from **4O7A**'s QTH. He is now thinking of making QRP DXpeditions to 4O for some of the QRP contests, possible the HA QRP Contest in November. Kare has built the QRP-808 kit (photo below).



PA1DSP received his third delivery (toroids, varactors and NP0 capacitors) from **W8DIZ**, 'The Toroid King' at <http://kitsandparts.com/> in July and says all the parts were neatly packed, clearly marked

and arrived in a sturdy box. Niels says, "His service is excellent and he is very quick indeed". **EI3IZI** says the new T-2 SSB mixer by **G4GXO** of Cumbria Designs, <http://www.cumbriadesigns. co.uk/>, with AGC, product detector and AF amplifier on one neat PCB, is ideal for QRP.

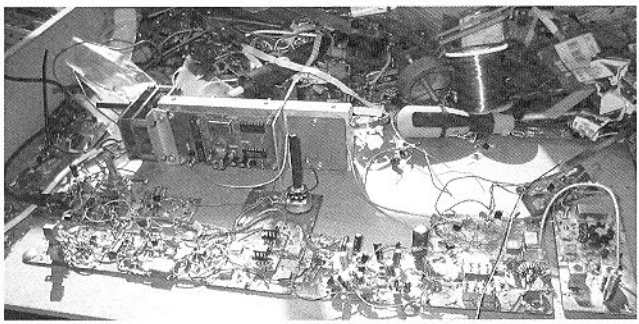
EA3GHS reports the annual meeting of the EA QRP Club was held 6/7 June near Valencia. Eduardo and **EA3FXF** talked about minimum parts transceivers and says the presentation can be downloaded at <http://www.ea4rct.org/trx_pocos_componentes.pdf>. **GM4XQJ** reported the **DK32DEKT** beacon on 7032kHz being 599 at times in June and wondered if it was legal. *QRZ.com* shows the administrator is **DL1BFU**, is located in the Bremen Radio Museum, is QRV 1 May to 31 December 2009 on 14032kHz with 9W to a vertical. **G3CWI** later reported **DL1BFU** closed the 7032kHz beacon on 11 June. **AKØB** mentions a new Yahoo Group for the discussion of simple antenna construction at <http://groups.yahoo.com/group/Radio_Antenna/>.

MØCDD has built and evaluated the Walford RS speech processor and Kingsdon transmitter and Midney receiver kits. He has used the processor on AM and SSB and says it, "Has generated unsolicited report stating how clear my transmitter audio is". Chas built the Kingsdon and Midney on two PCBs and says, "The generous proportions of the PCBs make construction quite straight forward and suitable for the less advanced constructor". **G3XBM** has come up with a better TX strip for the SixBox 6m AM transceiver using few parts. Roger says the strip works very reliably and stably using a third overtone oscillator plus modulated buffer/PA producing 50mW of AM. The revised schematic is on the blog of his web-site <http://g3xbm-qrp.blogspot.com/>.

The photograph on the right is **GU3TUX**'s entry for the 'ham number plate' gallery (page 38 SPRAT 139). Chris says, "All Alderney registrations have the prefix AY, followed by up to four digits. I was just lucky that 599 was available to fix to my ancient and QRP pick-up truck. The lifebuoy reflects another interest - boating. The vehicle is rigged for an outing in one of the RSGB's Backpacker contests. Chris recently built another kit purchased a long time ago: a 4 metre transverter that he bought in 1997!

GØUPL was QRV 15/28 July from Grenada (VP2G) with a 150mW beacon operating on 10140.07kHz to a dipole orientated to Europe. Hans saw the beacon on the on-line QRSS grabbers of **G8NXD**, **ON5EX** and **W1BW** so knew the signals were getting out. **M1KTA** was QRV with battery power from a dynamo on 20 and 80m SSB (2.5W) to a W3EDP or MPX-100 fitted to the cycle while on a bicycle trip between Cambridge and Lincoln. Dominic made a two-way 6V6 QSO with **G3VTT** in the G-QRP Valve Day and thanks, "**G4DFV**, **G3JFS**, **G3OOU**, **G3GNR**, **M5CHH** and a few others who helped me get on the air using filaments". Pictures and notes on all Dominic's activities are on his blog at <http://m1kta-qrp.blogspot.com/>. **G3VTT** says the next Valve Day is 15 November (1600-2400z, 5W maximum with valves as any part of the rig). **G3UGF** notices this day is also AGCW-DL's Home Brew and Old Time Equipment QSO Party.

The photograph on the below shows **G3RYP's** 'Third Method Receiver'. David says, "There is ugly construction and there is **G3RYP** ugly construction! Actually it works pretty well. I would do well in a 'Scruffy Shack' competition too!".



G3XBM recently started using WSPR on 40, 30 and 20m and says it is amazing! Roger writes, "I have only been able to use my (ATU tuned) 10m halo as an antenna (four feet square), yet the signal has been received all over Europe. With a longwire or dipole the same would be possible with a few milliwatts as others are finding. WSPR uses some very clever modulation techniques and DSP

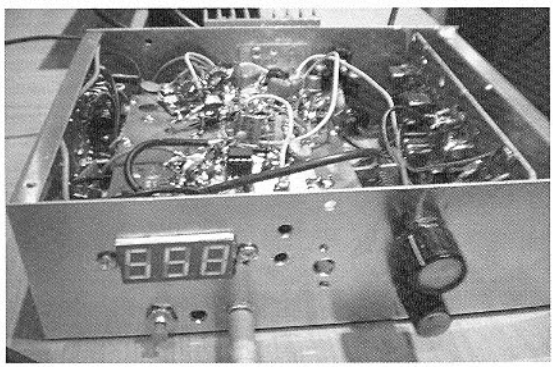
processing on the PC to extract signals some 30dB below noise level, clever stuff". Roger has been working DX on 6m, the best in 2009 being **EA8CQS** with 5W SSB. For those wishing to know more about WSPR, **GØKTN** says there is a useful tutorial at <http://www.g4ilo.com/wspr.html>.

DK3RED was planning to be QRV 21 August/5 September as **ZS/DK3RED** with his K1 at 5W. More information on Ingo's web-site at <www.qrp4fun.de/en/s0.htm>. **GMØOAA** was QRV in August as **I5/GMØOAA/P** with his 2W and dipole "slung between two trees". **DE3BWR** and **DDØVR** will be QRV 10 December/8 January from Australia while touring between Sydney (VK2), Kangaroo Island, Adelaide (VK5 OC-139), Tasmania (VK7 OC-006) and Melbourne (VK3). Bigi and Heli will use an IC-706mkII and HL-1.1KFX PA for SSB QRO (400W) and a FT-817 and Elecraft T1 for CW QRP (5W). Their antennas will include a DX-Wire six-band windom

G4DFV's latest project was inspired by his interest in WW2 'spy sets' and wanting something to operate in future club 'Valve Day' events, so he built a two-band all-valve transmitter receiver, housed in a beautiful dovetailed wooden cabinet that was once home to a laboratory-style voltmeter (see photograph). The two-valve transmitter features a straightforward CO PA arrangement with grid-block keying and the two valve receiver is a straight TRF featuring bandpass filtering into a grounded-grid RF stage feeding a regenerative detector followed by a two-stage RC coupled AF amplifier to phones. It has a built-in key and covers 80 and 30m. Output power is around 5-6W on 80m and about 3.5W on 30m. Using it with a 132 feet doublet, Duncan has worked a dozen British stations on 3560kHz, all giving him good signal reports.

GM4VKI has received his Chinese HB-1A three-band QRP radio and is very please with it. Roy says the circuit is basically the same as the PFR3 and the KX1. He has started a new Yahoo group for them at <http://groups.yahoo.com/group/HB-1A_QRP_RADIO/>. **MI5MTC** says there is a review of the HB-1A by **WA6L** in the Summer 2009 edition of *QRP Quarterly*. **MWØCZP** says the HB-1A covers three bands and cost $215 whereas the KX1 is lighter, covers four bands, has to be built and, although is more expensive between $299 and $450 (depending on options), looks more professional.

While at the Yeovil QRP Meeting, **GØIAX** bought **GU3TUX**'s OHR 500 and used it on holiday at Bude, Cornwall in late May. Running 5W into a simple dipole with the centre only about 8 feet high, one of Richard's first QSOs was with **K2IH** near Boston, MA, receiving a 579 on 20m. **M5AKA** mentions *The Art & Skill of Radio Telegraphy* by NØHFF, a 241 page publication on learning the Morse code that can be downloaded at <http://tinyurl.com/LearningMorse>.



GØBAK built the LCK transceiver for 80m (left) but modified the PA by using an IRF 510 instead of the VN66AF mosfet. Unfortunately Bill couldn't manage a full 5W out using this combination with the output being clean and is now running the PA at 1W and feeding it into a linear amplifier he built some years ago from a circuit by **WA2EBY**. The amplifier uses two IRF510 mosfets and with 12V DC converts just under 1W into 5W.

That clears the files again but please let me know how your autumn goes - including what you work and build, together with some photographs, by 20 November, please.

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	} £1.20 (UK);
Radio Projects volume 3 – Drew Diamond – members £5, non-members £10 plus post	} £2.30 EU;
Radio Projects volume 4 – Drew Diamond – members £5, non-members £10 plus post	} DX - £3.90 per book
6 pole 9MHz SSB crystal filter 2.2kHz @ 6 dB, 500ohm in/out **£12 plus post**	} £1.00 (UK); £1.20 EU
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– **MV209** – 5pF @ 12V, 40pF @ 1v **35p each** } per member	} use that
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CA741 op-amps 8pin DIL – **5 for £1**	} 10%
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Binders for Sprat - the original 'nylon string' binding type back in stock again! Black with club logo on spine **£3.75 each plus postage** (one: UK – £1.00, EU – £1.80, DX - £2.40. More – add £1, £1, £1.20 each)

Back issues of SPRAT are still available at 50p each. I have most issues from 78 plus a few earlier ones. UK Postage is 1st magazine – 50p, each additional magazine add 40p.

Sprat-on-CD V4 – 1 to 140 (see Sprat 140) – members price - £4 plus post UK - £1.00, Eu - £1.20, DX - £1.70

Please note - I only have stock of the above items – I do not sell anything else. Anything in previous advertisements not shown above is out of stock – if it becomes available again – it will be in the next magazine.

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