



SPRAT

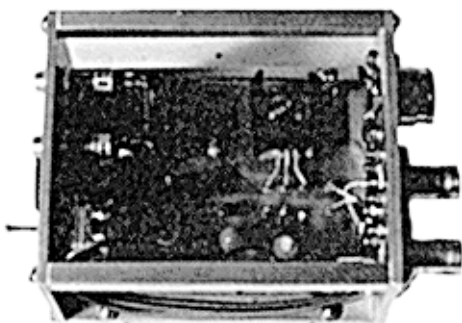
THE JOURNAL OF THE G QRP CLUB

DEVOTED•TO•LOW•POWER•COMMUNICATION

ISSUE Nr. 97

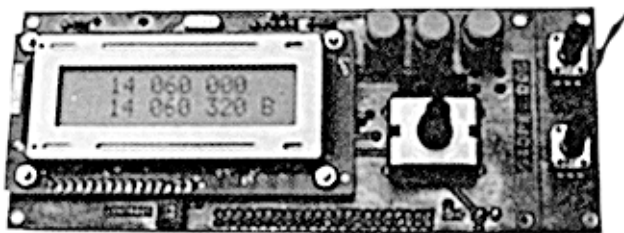
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WINTER 1998/9



The GM30XX
J.B.S. Transmitter

The G4OPE
DDS-3 VFO



THE JBS TRANSMITTER - SSB FILTER - LDG BALUN UPDATE
MB4 RECEIVER - IMPROVED DJ1ZB MINI ATU - A QUIET TUNER
F5LVG DC RECEIVER - DIPOLE SPACER - TENTEC PTO DRIVES
IAMBIC DF1KY KEYER - G3FCK 18MHz TRANSMITTER - THE DDS3
EPIPHYTE IN CHILE - EMMA'S CHALLENGE - A.A.A.
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JOURNAL OF THE G QRP CLUB



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Rev. George Dobbs G3RJV

EDITORIAL

Dear Member,

IMPORTANT ANNOUNCEMENT

In 1999 I am to take a Study Leave. I will be in the USA from May 6th to July 8th. It will be most helpful if members refrain from writing to me, or sending emails, over this period.

The following officers will deal with queries:

Membership & Subscriptions : G0BXO, Communications Matters: G3XJS, Novices: G4RAW, SSB: G0BPS, VHF: G8SEQ, Antenna Advice: G8PG, Circuit Advice: G3ROO.

These are as on page 3 of the Member's Handbook - please refer to the list in the left column.

But - please continue to send SPRAT submissions to me, although I will not be able to deal with them until my return. We do need to continue the regular flow of articles to maintain the input for SPRAT. Thank you in advance for your patience in this matter.

This issue brings more exciting projects to build, from simple to more complex. We have another transmitter from George, GM3OXX [of OXO, FOXX and ONER fame] and a new DDS VFO from Mick, G4OPE. Both are available in kit form.

A VERY HAPPY AND FRUITFUL 1999 TO YOU ALL

72/3

G3RJV

**EDITED BY GEORGE DOBBS G3RJV ARTWORK BY A.W. (MAC) McNEILL G3FCK
PRINTED BY SHOREHAM COPY, 4 Hyde Square, Upper Beeding, Sussex BN44 3JE**

The JBS Transmitter [JUNK BOX SPECIAL]
A Simple Transmitter Capable of a Full 5 Watts of RF Output
George Burt GM3OXX, 6 Glenside Ct. Armadale, BATHGATE. EH48 3RX
A W1FB MEMORIAL AWARD WINNER

The **Junk Box Special** is a simple transmitter which works on 6 HF bands and can almost be QRO on the lower bands. The prototype was built on blob-board but the PCB version is offered here. The chart shows the expected power levels for the various bands. The first day on-air using 80, 40 and 20 at the one watt level yielded 13 countries worked including 4X4PT and N4ROA/QRP with a 28 metre doublet in the plastic rain gutter only 2 metres up!

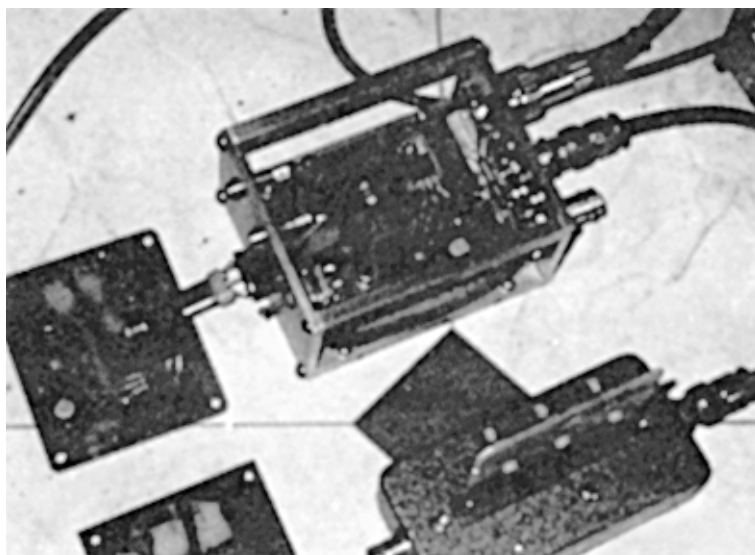
The transistors are available from Grandata: the 2N2905 at 20p and the 2SC2166 at 80p. The bad news is that the RF Choke is critical. The type I used is 1mH with a series resistance of 33 ohms. These are available from JAB Electronics [Cat. p.50 - part # RS228-208] for £2.70. If you use other RF Chokes with lower series resistance, add a small value resistor, up to about 30 ohms. I did try other chokes and obtained more power output but TR1 can overheat, so stick with 30 ohms. The trimmer is 9 - 90pF. The 470pF coupling capacitor was chosen as the best compromise for the 6 bands.

The use of a wide spaced PCB makes construction easy for the beginner. T1 is the most difficult part. I used an FT50-43 with 11 bifilar turns, using the technique described by Zack Lau [see later].

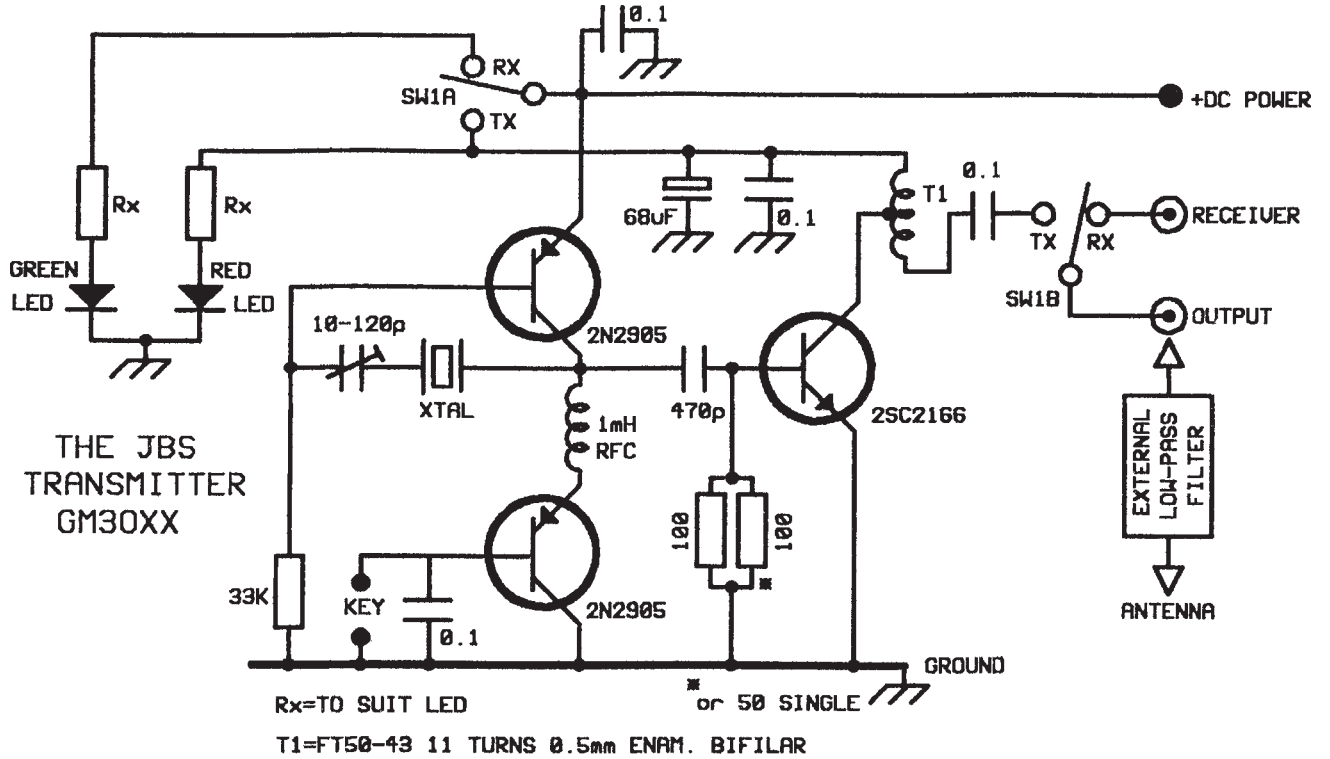
The LEDs can be omitted - they only indicate Transmit/Receive status. I used the ones with the built-in series resistors. Heatsinks are fitted to the PA and Oscillator transistors. A lowpass filter is required for the band in use. I used my plug-in lowpass filters.

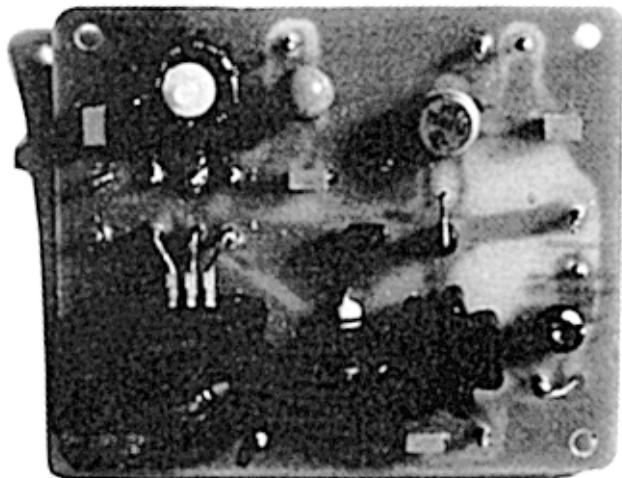
The operation is simple:

In receive mode [green LED] press key to net, switch over to transmit [red LED] and key to transmit.



**PROTOTYPE JBS
UNDER TEST
WITH
ANOTHER PCB :
LEFT
AND
PLUG-IN
LOWPASS
FILTER BOX :
FRONT**





Winding T1.

Wind each winding side by side with no cross - overs.

Strip the insulation from the two "centre" conductors closest to each other and verify with an ohmmeter that they are different windings.

Solder them together. You now have a correctly wound bifilar transformer."

Zach Lau, KH6CP/1, Hints and Kinks for the Radio Amateur, 14th Edition.

LAYOUT OF THE JBS TRANSMITTER

Outputs recorded from test JBS Transmitters [worse results quoted] using fundamental crystals and 3 section Low Pass Filter. Harmonic outputs all better than 40dB down.

The voltage required for a 1 watt output is quoted because I only ever use 1 watt of RF power output.

OUTPUT LEVELS FROM THE JBS TRANSMITTER:

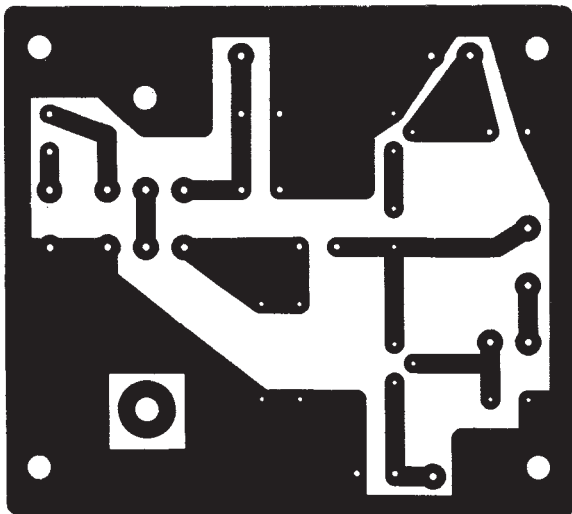
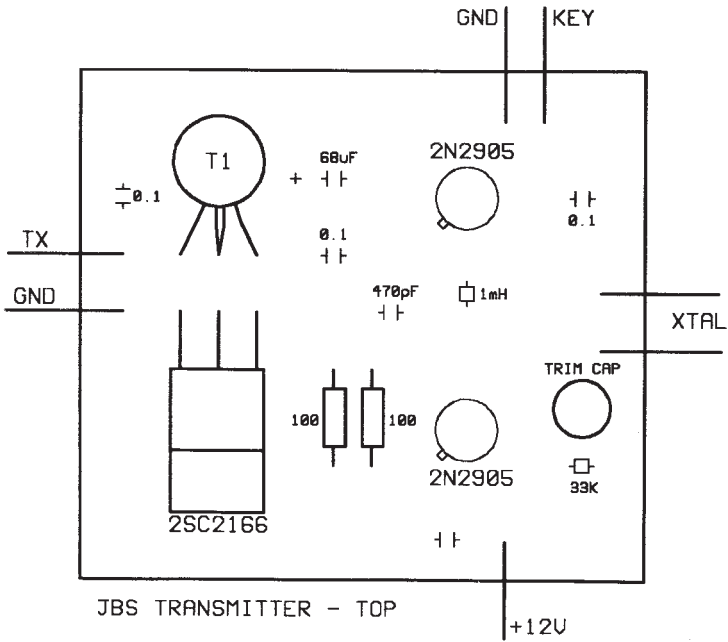
BAND	VOLTAGE	POWER OUT	AT ONE WATT LEVEL	
3.5	13.8V	7W	7V	1W
7	13.8V	6.5W	6.9V	1W
10	13.8V	4.5W	7V	1W
14	13.8V	3W	8.5V	1W
18	13.8V	2.8W	10V	1W
21	13.8V	1.9W	12V	1W
24	13.8V	50mW	Running out of steam!	

GM30XX JUNK-BOX SPECIAL KIT OFFER

**Kanga Products are offering a member's special on the JBS
Price for the first 100 JBS Kits ordered is 12.95 [+£2 p/p]**

**KANGA PRODUCTS, SEAVIEW HOUSE,
CRETE ROAD EAST, FOLKESTONE, KENT CT18 7EG**

JBS TRANSMITTER LAYOUT AND PCB - BOTH VIEWED FROM THE TOP SIDE

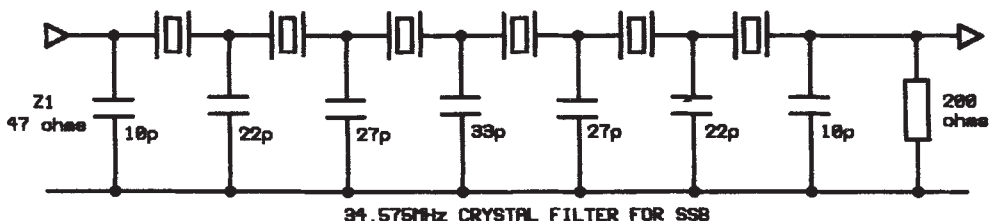


34.575 Hz Crystal Filter for SSB

Jan Verduyn G0BBL, 14 Ragleth Grove, TROWBRIDGE.BA14 7LE

A novel feature of QRP-PLUS transceiver is the use of a crystal filter at an IF frequency of 50 MHz with an Audio filter for additional selectivity. I wondered what the actual performance of such a high IF Crystal filter was and seized the opportunity to purchase a bag of a ten or so HC18 crystals all on 34.575 MHz at the Cheltenham radio rally last year for the sum of 54 pence.

The frequency of all crystals were measured with a grid-dipper/frequency counter. Six crystals had the same frequency within 500 Hz and used in the filter below. Crystals with the highest frequency are used for Y2, Y3 and Y4. Measure performance is quite useful: 2.5 kHz at -6dB, 4 kHz at -30dB and -6 kHz at -50dB. This will suit a single conversion all band QRP transceiver like the QR.P PLUS. Insertion loss is about 6dB, input impedance 47 Ohm, output impedance 200 Ohm. Capacitor/Resistor values can be scaled depending on your particular batch of crystals and your filter bandwidth requirements.



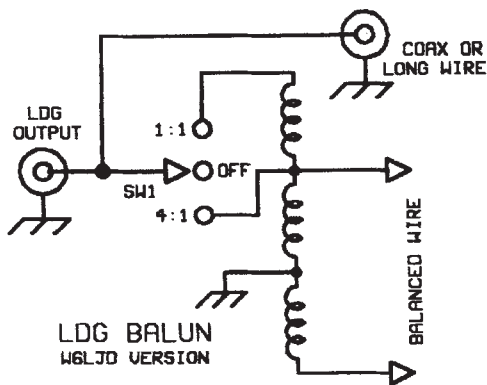
LDG Tuner Balun Update

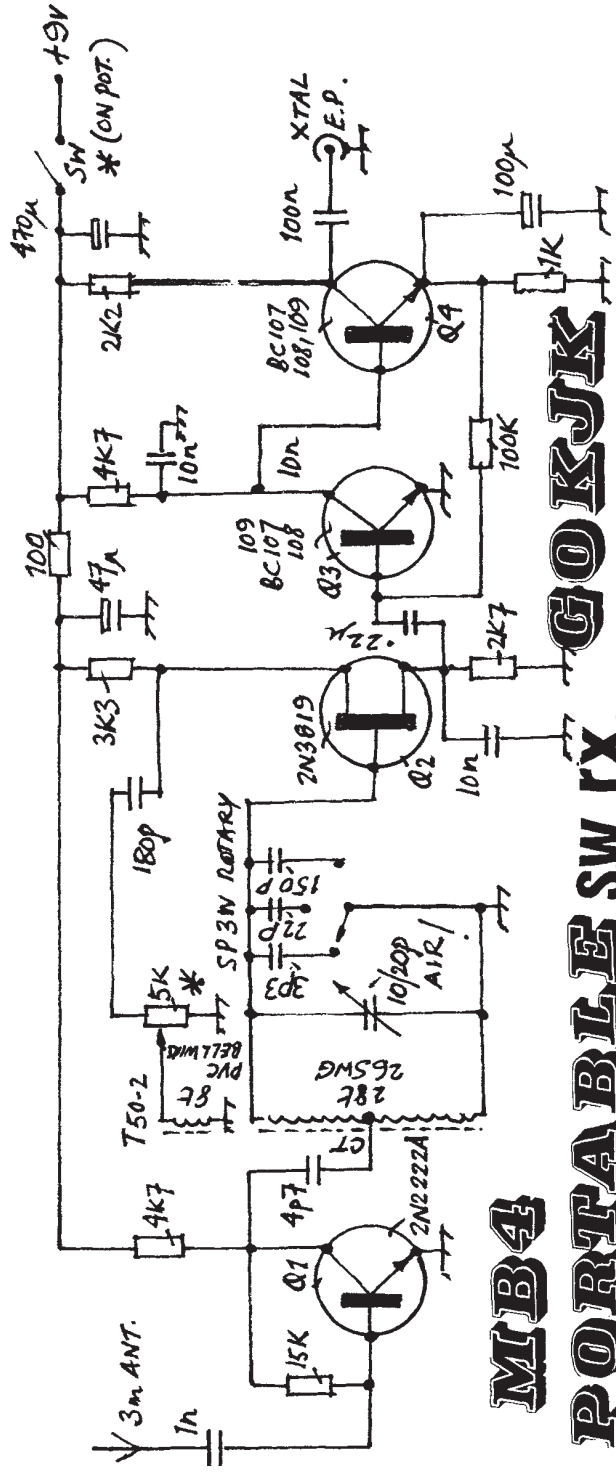
Frank Brumbaugh W4LJD, PO Box 30 Defendini,
SALINAS, Puerto Rico, 00751-0030 U.S.A.

A much simpler way to switch G3PDL's Balun [SPRAT 96 - p.19] after the LDG Automatic Tuner uses only a SPDT, Centre-Off [on-off-on] toggle switch. This is cheaper and easier to find than a miniature wafer switch. [See Diagram]

The centre-off switch position is used for coax or long wire. The 1:1 and 4:1 positions are used for balanced feeders.

This works because only one antenna will be connected at a time. The tiny toggle switch needs much less room than a rotary switch.

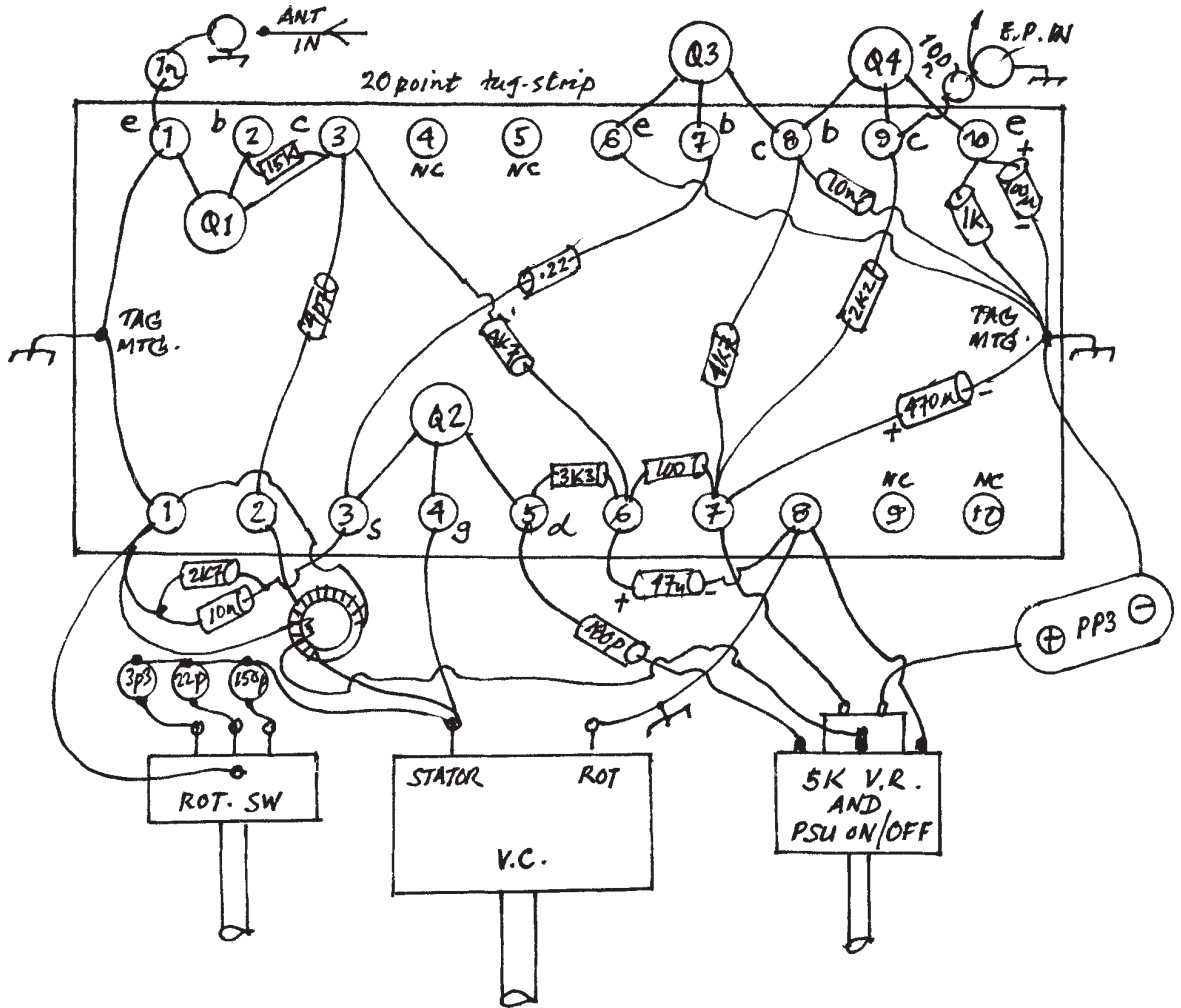




MB4 PORTABLE SW RX.

GOKJK

- KEITH RANGER -



The MB4 Portable SW Receiver

Rev. Keith Ranger G0KJK, 28 Charter Rd. ALTRINGHAM, WA15 9RL

Correspondence received has shown that a simple yet reliable DX receiver like the author's HF9 design (published in "Sprat" 82) is likely to be built and effectively used by not a few G QRP Club members. Some have requested point to point wiring diagrams to aid construction of such projects. This article offers such help and describes a circuit which pulled in a JA station at good strength the first day it was tested on 17 metres, the aerial being only a 3m throw-out wire lying in untidy coils on the floor. It is a simple, easily reproduced, sensitive, selective and stable, no nonsense design that can confidently be expected to pull in the DX when properly constructed.

The prototype was built in a very small aluminium enclosure measuring 100mm by 70mm by 60mm purchased cheaply from Maplin Electronics. This makes for very convenient portable use. With a current drain at 9v of only 4mA, a PP3 battery is all that is needed. I found I could squeeze one into this enclosure. The prototype happily accepted supply voltages of between 4.8 and 12 v without complaint or significant difference in performance. No hum worth reporting was noticed when a stabilised mains supply was used instead of a battery. Four clear miniature plastic and self-adhesive feet were attached to the bottom of the enclosure and labelling done using Dymo.

Only three panel controls are required for the MB4 (Multi-Band 4), compared to five for the earlier HF9. The output (to keep the truly portable emphasis) is to a crystal earpiece, which gives excellent reception (it is also XYLO/OM-friendly; should you so desire, you can listen to what she/he says with one ear and DX with the other, a feat less easy when wearing headphones!). High resistance headphones can also be used very effectively but please note that low resistance (e.g. 8 ohm) earpieces or headphones will prove disappointing. Do not use them for this receiver! A crystal earpiece gives correct impedance matching and very ample volume with this circuit without actually requiring an AF gain control.

This project can be built for very little expense but do not try to cut corners in buying the main tuning control, which must be a top quality air-spaced capacitor. Do not seek to economise here! A good sized tuning knob should also be used as tuning is sharp and especially so if your main interest is receiving SSB. Both SSB and CW are received with the circuit gently oscillating.

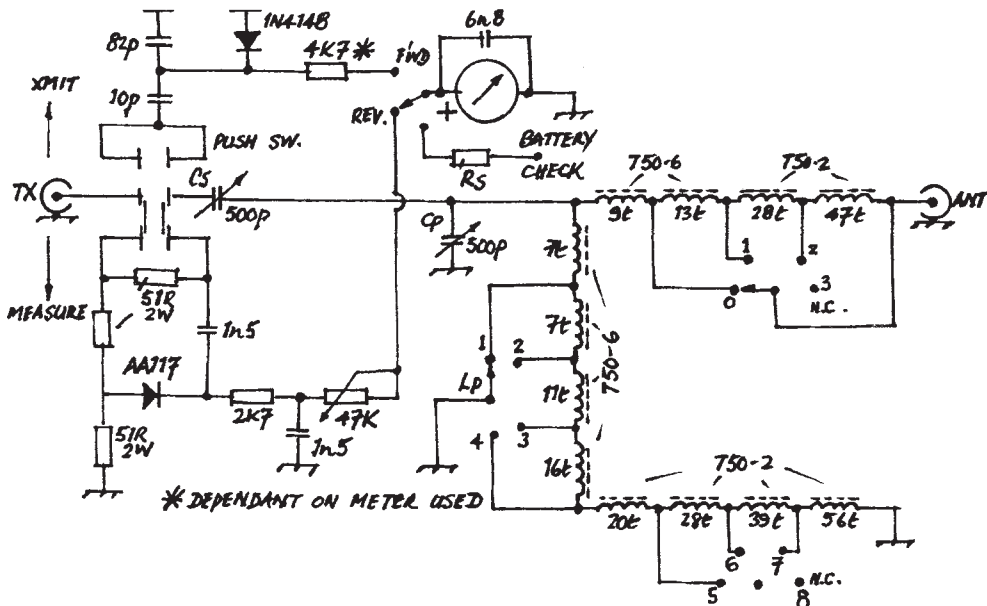
The only areas where difficulty is likely to be encountered is in winding the tuning coil and providing the exact amount of capacitance for connection to the rotary switch to cover three or more amateur bands. I offer the following for general guidance only - your version of this circuit could provide different stray capacitances to mine, so experimentation to cover the exact amateur frequencies desired must be an accepted principle. I decided that my own MB4 should cover the 17, 20 and 40m bands. I wound the tuning coil using a total of 28 turns of 26 swg enamel covered copper wire, centre-tapped (at 14 turns) for the input form Q1, on a T-50-2 red toroid core. The exact capacitance required to give me the three desired bands was 3.3pf (17m), 22pf (20m) and 150pf (40m). Had I wished to, a fourth position on the rotary switch with a capacitance of perhaps 68/100pf could have given me the 30m amateur band, but this is normally CW only and although all my HF transmitting is done on CW. I wanted just three DX bands where I could listen routinely to SSB as well. "Cut and try" methods WILL produce results - HAVE PATIENCE and the result will be coverage of three or more of your favourite bands with only one coil to be wound. If you wish to receive any two bands - for example, 20 and 40, the rotary switch can be done away with and a simple two-way miniature toggle switch used in its place.

For more experienced constructors, this circuit abounds with prospects for modifications! Some suggestions would be: - provide a 150pf polycon tuning capacitor for continuous coverage a do away with the need for rotary switch/capacitors for individual bands; try the use of an outdoor aerial. (Warning: you might need an eardrum transplant afterwards!). Change the three side by side panel controls

configuration described below to having the rotary control above the regen control with the tuning control/large knob on the left - in the interests of using a smaller aluminium enclosure (performance should be the same. I have tried it. Replace the 2.2K resistor in the collector lead of Q4 with a step-down miniature output transformer such as the LT700 (available from Cirkit) for 8 ohm earpiece or headphone use; via an AF volume control. Feed the circuit into a LM386 chip for powerful loudspeaker use (PP3 battery no longer sufficient). This modification will draw significantly higher current! Use a slow-motion dial to make SSB reception particularly, much easier. The experiments and refinements are over to you!

Improved Mini-ATU

Ha- Jo Brandt DJ1ZB Eichenweg 7, FRONTENHAUSEN, D-84160, GERMANY



Some time ago, Kurt Fischer, DL4MBR, had asked me if the tuning range of my Mini ATU (SPRAT No. 57, Winter 1988/89) could be extended to cover 10m to 160m, so that he could use it with his QRP plus. Therefore I have calculated three additional coils, one in the series arm and two in the parallel chain. At the last Pottenstein meeting DL4MBR said that he built this extended version and is very pleased with it.

The new version is able to tune even aerial lengths of about 30 meters (less than a quarter wave) at 160m. Therefore I have amended the original SPRAT circuit to include the new coils, in addition to show some changes in the number of turns on the original coils, which have been necessary to improve the tuning range on 10m to 15m. With the exception of these changes, the other design rules of the original article still apply.

The circuit also includes another idea which I have found favourable when travelling and operating with mignon dry cells or nicads. If the switch of the meter instrument is given a third position, the ATU may also be used to check the voltage of the batteries. Resistor R_s must be dimensioned to operate the instrument as a voltmeter of the desired range.

A QUIET TUNER [based on the "Stockton Bridge"]

Tony Lymer GM0DHD, Gerson Park, Greendykes Rd. Broxburn, EH52 6PL

This device adapts the GM4ZNX power meter for quiet tuning of the antenna. By this I mean reducing the power radiated during tune-up to less than a hundredth of its original value, while not reducing the sensitivity of the measurement. It also ensures that the transmitter has a good 50 ohms load during the tune-up process. It incorporates an idea from an article by Underhill and Lewis (Electronics Letters 4/1/79).

The heart of David's power meter is a dual directional coupler. It consists of just two transformers. It has a through line connecting the RF input to the RF output, and a coupled line, to which the diode detectors and the 50 ohm loads (two 100 ohm resistors in parallel) are connected. The power flowing in the coupled line depends on the turns-ratio of the transformers. For 12:1 turns ratio the coupled line has a hundredth and forty-fourth of the through line power (-21.58 dB).

The first diagram shows the conventional method of measuring reflected power used in an ATU adjustment. The transmitter and antenna are connected to the opposite ends of the through line. So the antenna is supplied with the full output of the transmitter. The antenna is assumed to reflect a proportion of the incident power and the detector measures 1/144th of the reflected power.

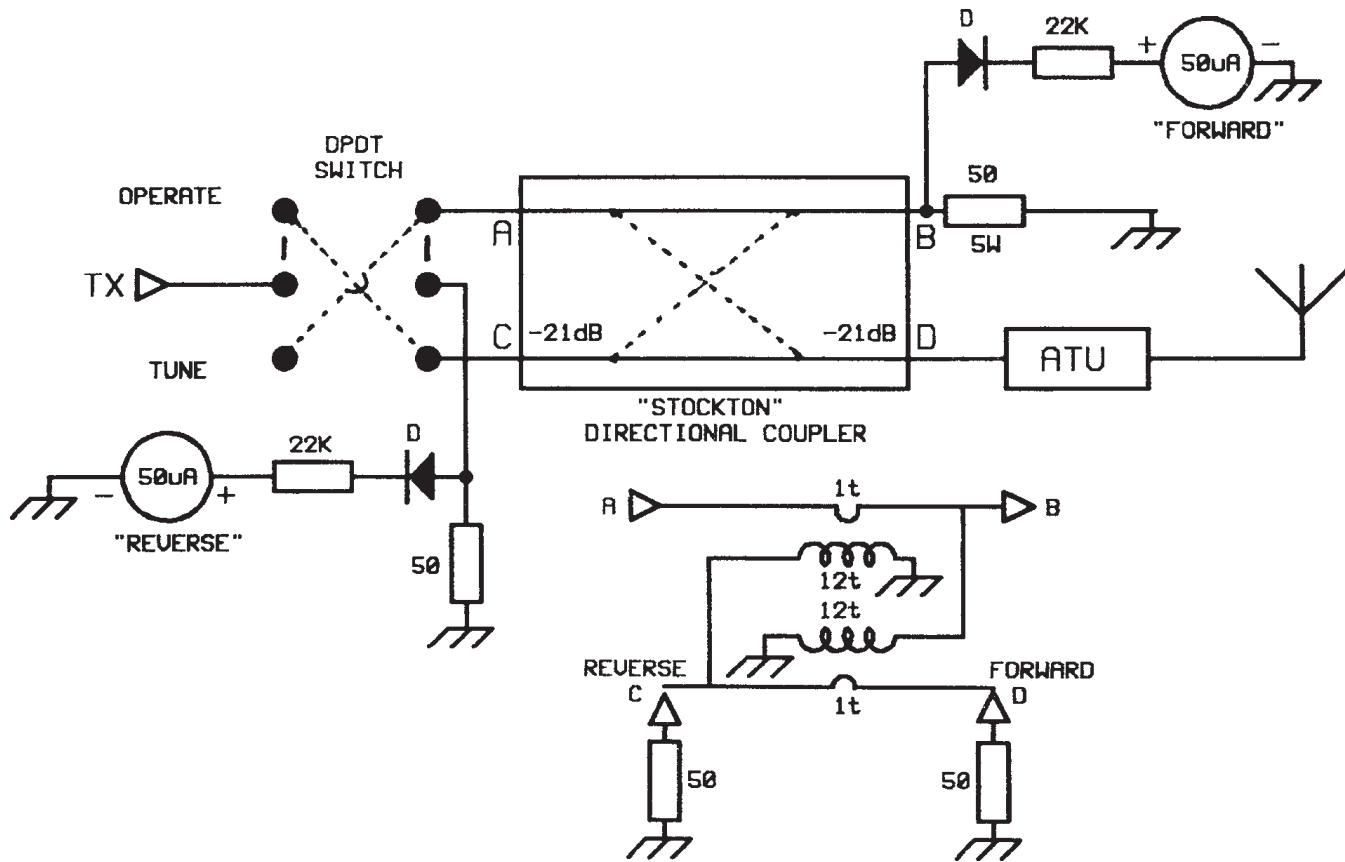
If the transmitter and the reflected power detector are interchanged (fig 2) then only 1/144th of the transmitter power arrives at the antenna. Since the antenna is still reflecting the same proportion of the incident power this is measured by the detector on the through line as the same power as in the previous case. The major difference is that only 1/144th of the previous power is radiated, and the major part of the transmitter power is dissipated in the 50 ohm load on the coupled line.

The modification to the GM4ZNX power meter consists of adding a switch to interchange the transmitter and one detector, and increasing the power rating of one of the 50 ohm load resistors to the full transmitter output power. The forward power meter will read the full transmitter power in the tune position, even though only a small proportion of this is being radiated. It used to read 1/144th of this power so an attenuator has been added to rectify the situation.

Although not strictly necessary, I have increased the power rating of the second reverse power sensing circuit to 5 watts in case the transmitter is inadvertently connected to the antenna jack.

Just a couple of comments....

- 1) I checked the output in the tune position for generated harmonics of the carrier under matched and 2:1 VSWR conditions, but I didn't see any greater than -60 dB below the carrier output in the tune position. This shows that the diode in the reverse power detector doesn't generate harmonics, which might cause TVI while tuning.
- 2) The user has to tune for minimum reflected power, not maximum forward power. In fact, the forward power should remain fairly constant, because the match should not vary very much. (This may not be intuitive to some people.)
- 3) Just because the power has been reduced by ~20 dB while tuning up, this doesn't mean that the signal won't be heard. Interference to other stations will still occur, albeit at a reduced level. Normal courtesies (QRL?) still need to be used.



A NEW DIRECT CONVERSION RECEIVER

Olivier Ernst F5LVG,

2 rue de la Philanthropie 59700 MARCQ-EN-BAROEUL FRANCE

Direct conversion receivers often suffer from AM breakthrough. Integrated circuits as a TDA7000, minimise this problem, but it still exists. Recently I bought all back issues of SPRAT and I discovered a very simple design: DC77 from PA0GBY (nr30; spring 82). A 3-band direct conversion RX from Martyn Lindars (nr35; summer 83) and IMP from G0EBQ (nr 53; winter87/88).

All the authors claimed that these small receivers, with only 2 diodes for the mixer, were insensitive to AM signal. Incredible. However I tried this kind of receiver and the results are exceptional. Reception of 40 m is always possible, even in the evening. Try to build it, you will be surprised.

T1 is an RF amplifier. L1 removes FM broadcast and C1 medium wave broadcast. On 3.5 MHz LIC1 is tuned in the center of the band. RA has to be adjusted to removed AM signal. The Colpitts oscillator is very stable, despite its varicap tuning. P1 is the RF gain and P3 the audio gain. If you want to improve this receiver, add a parallel resonant circuit inductively coupled to P1 and capacitively coupled to T1.

The receiver is built on a 15x20 cm board with glue and pad method.

Components:

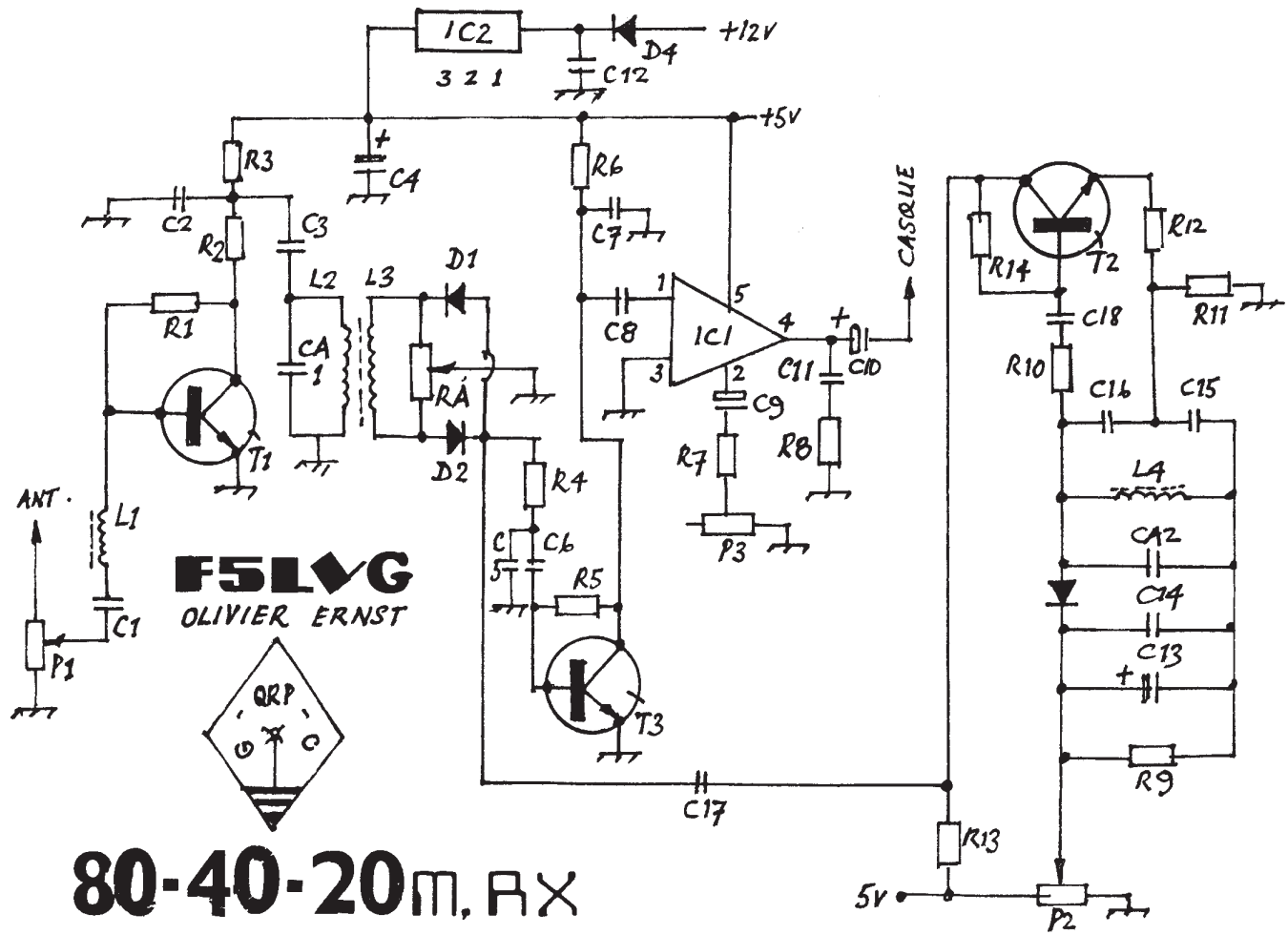
R1:2.2 Kilohm (7 and 14 MHz); R1:10 Kilohm (3.5 MHz); R2:100 Ohm; R3:100 Ohm; R4:1 Kilohm; R5:1 Mégohm; R6:4.7 Kilohm; R7:100 Ohm; R8:10 Ohm; R9:4.7 Kilohm; R10:220 Ohm; R11:1.5 Kilohm; R12:100 Ohm (14 MHz); R12:220 Ohm (7 and 3.5 MHz); R13:470 Ohm; R14:22 Kilohm;

P1:1 Kilohm; P2:20 Kilohm 10 turns; P3:4.7 Kilohm;

C1:22PF (7 and 14 MHz); C1:40 pFadjustable (3.5 MHz); C2:100 pF; C3:10 pF; C4:220 µF; C5:47 nF; C6:47 µF; C7:22 nF; C8:22 µF; C9:4.7 µF; C10:100 µF; C11:100 nF; C12:100 nF; C13:10 µF; C14:47 nF; C15:680 pF styroflex or NPO; C16:680 pF styroflex or NPO; C17:220 pF; C18:100 pF; CA1:90 pF adjustable; CA2:90 pF adjustable;

T1:BFR91A; T2:BFR91A; T3:BC549C; IC1:TDA2003; IC2:78S05 (régulator 5V 2 A); D1:1N4148; D2:1N4148; D3:3 RED LED 5mm (14 MHz); D3:2 RED LED 5mm (7 MHz); D3:1 zener 6.8 V, 1W (3.5 MHz);

L1:1µH (7 and 14 MHz); L1:100µH (3.5 MHz); L2:4.7µH (14 MHz); L2:22µH (7 MHz); L2:47µH (3.5 MHz); L3:4.7µH (14 MHz); L3:22µH (7 MHz); L3:47µH (3.5 MHz). L1,L2,L3: miniature coils (L2 stuck to L3). L4: 4 turns (14 MHz), 12 turns (7 MHz), 22 turns (3.5 MHz) 8 mm diameter.



PTO Drives in Ten-Tec Transceivers.

Brian Gibbs, G3MBN, 15 Moor Barton, Neston. Corsham. SN13 9SH

brian@brimar.demon.co.uk

As many QRPers are aware, most Ten Tec transceivers have a permeability tuned oscillator (PTO) as the VFO. This dispenses with the usual variable tuning capacitor, using the movement of a dust iron slug within the oscillator tuned circuit to effect changes in frequency.

A notable feature of this system is the hand capacity effect on the frequency of the PTO. Grasping the main tuning knob can produce a shift of up to several 10s of Hz. Diehard Ten Tec users have learned to compensate for this idiosyncrasy. The effect can be minimised by removing the metal trim (where fitted) from the front of the tuning knob.

The PTO mechanism does wear more rapidly than the bearings on a variable capacitor and will eventually lead to a dose of *mad VFO disease* where it becomes quite wobbly, even when one's hand is off the tuning knob (probably due to vibrations induced by the built-in loudspeaker). Fortunately Ten-Tec PTO reconditioning kits are available (from me!) and a rebuild will last a good few years longer.

The PTOs in Corsair models seem to succumb to Mad VFO Disease far more readily than those in other Ten Tec transceivers. I believe that the problem is rooted in an ad hoc modification introduced by KW Electronics who, for several years, imported and assembled Ten Tec equipment. In order to overcome the hand capacity effect, KW fitted a pair of sprung wipers between the front panel of the Corsair and the main shaft of the PTO drive. This eliminated the hand capacity effect but resulted, in the longer term, in another problem. The PTO drive is made of brass, the KW wipers of spring-steel (cut down safety pins, actually). After a while, the wipers wear a groove in the brass spindle, lose tension and a poor earth path results. This produces another mode of Mad VFO Disease. A short term fix is to bend the wipers so that they act on a different part of the spindle, but this will eventually lead to a recurrence of the same problem. I also believe that the pressure of the wipers accelerates the normal wear of the PTO mechanism.

My recommendation: remove the wipers and throw them away before it is too late! Use the radio as Ten Tec intended. Not all Corsairs will have had this mod applied - to check, remove the main tuning knob; the wipers will be visible through the aperture in the front panel. To remove them, you will probably need to take off the front panel. This is not a difficult task - good luck! (I also stock the miniature Allen keys needed to remove some of the control knobs).

Further notes Re PTO Drives in Corsair-11 Transceivers:

Having recently obtained a Corsair-11, I noted a potentially serious problem with frequency instability on both the internal and external PTOs (Permeability Tuned Oscillators). I soon discovered that this was a standard mechanical problem with the PTO drives mainly due to wear, and that a service kit was available, (see above).

The kit consists of a number of the moving parts for the epicyclic ball drive, some grease, and a full set of instructions to assist in the replacement of the worn parts. The instructions given are very comprehensive, but need to be read and fully understood before commencing the repair.

The drive itself consists of a worm thread driven from the main tuning shaft, and an anti-backlash spring which runs on a brass rod, bolted to the PTO enclosure front panel, the latter assembly being less than 1cm from the main tuning coil, and parallel with it.

Having fitted both service kits to the PTO drives in my rig, I was not amused still to find a considerable amount of the "mad VFO disease" mentioned by Chris above! Further investigation showed that the anti-backlash spring was making poor electrical contact to the brass rod on which

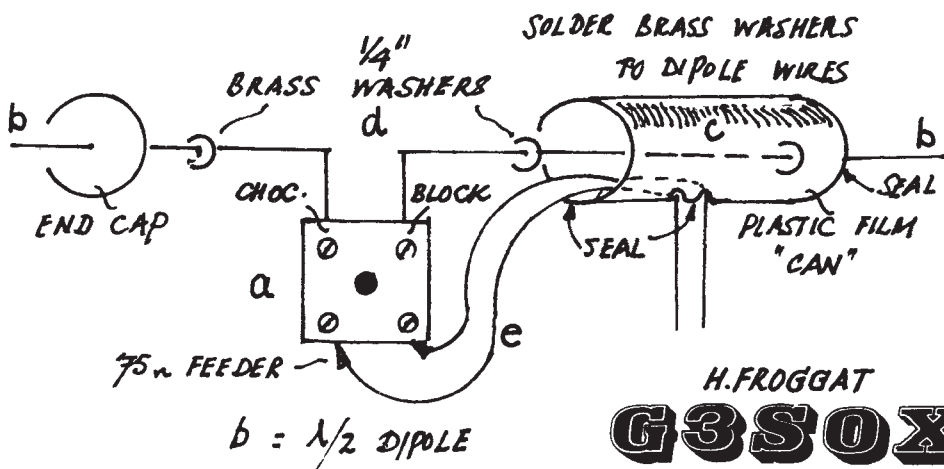
it runs. This had the effect of changing the oscillator frequency due to changes in the capacitance close to the main tuning coil.

It was obvious that some means of improving the poor contact between the spring and the rod was required. After a suitable amount of head-scratching, I decided the most elegant way was to clean the rod, and slightly squash both ends of the spring to give good contact with the rod, thus removing any 'variable capacitance' effects. I removed the spring/rod assembly, and thoroughly cleaned the rod, using a PCB rubber. This done, the spring was then deformed at both ends, using small pliers, before reassembling using a small amount of the grease. If the spring is squashed too severely, the drive feels stiff, and this should be avoided.

Having treated both my PTOs in this manner, I can now use the rig with the confidence that the PTO(s) stay on frequency, as intended.

Extra Light Weatherproof Dipole Spacer

Bert Frogatt G3SOX Ground Floor Flat 5 Goodwin Road. RAMSGATE, CT11 0LP



KEY: a] Small Choc Block, b] Dipole Wires, c] Plastic 35mm film canister, d] 1/4" brass washers, e] 75Ω feeder.

1] Solder brass washers to dipole wires, 2] Seal points of entry with waterproof sealant.

A MORSE KEY TIP by Albert Heyes G3ZHE

Four small blobs of Blutack [stationary putty] added to the base of a key will hold it firmly on the bench without the use of a heavy base and solve the "moving key problem".



Don't Forget....

The G QRP Club Winter Sports
Boxing Day to New Years Day (inclusive)
Call CQ QRP on the QRP Calling Frequencies
and enjoy working other members
Please send reports to G3XJS (see p. 32)

Iambic Mode Modifications for the DF1KY Keyer

Bruce Borrows GM0LLJ, 27 Craighimas Grove, Dalgety Bay, Fife, KY11 5XR

Looking round for an iambic keyer circuit to experiment with, I noticed the article in the Autumn '97 issue of SPRAT by DL9SCO and DJ6TE. This is based on an original design by DF1KY. This simple little C-MOS circuit works well but does not support iambic mode B operation. In this mode the circuit needs to remember that a dot has been pressed if the keyer is currently sending a dash and vice versa. This requires latches at the key input to optionally save the extra key presses. The input is also not required to latch if the keyer is only sending dots or dashes. In the original circuit the DOT and DASH paddles of the key are connected straight to the K and J inputs respectively of IC2B. Fig 1 shows the modified circuit of the new configuration for mode B keying and I used two latches made from cross-coupled 4093 NAND gates to provide the required memory. This worked out well since I wanted to build the keyer in a separate box and needed the key common connection to ground rather than the +ve supply. Note also that if a two pole switch is mounted in the two lines at "X" then the keyer can be changed between mode A and B by opening or closing these lines respectively as required. If mode B only is required then the lines should remain connected and resistors R9 and R10 omitted. Another modification to add "weighting" to the key function was tried by using the resistor RW. This pull-up biases the timing charge path and allows some control over the oscillator mark space ratio. For my own use I also reverted to a simple speed control pot.

Building: I built the prototype using "dead bug/ugly" construction on a piece of scrap copper clad board. This was managed at home in a single evening. The original circuit worked first time but it took a bit longer to design and simplify the new input latching. No component problems were experienced but I did use the Vbe junctions of transistors for the diodes as I had no suitable devices to hand at the time. I've since used just small signal silicon diodes for these. I also found I could just use a simple single transistor at the output to key my rig. I've now also built two more units, this time combining wire wrap and dead bug construction and these were built much faster during lunchtimes at work.

Operation: Running from 3volts and on the air the keyer works well and has an almost identical feel (to me) to the one in my ICOM 765. A point worth mentioning however is that in the interests of low battery consumption the input pull-ups are of a very high value (1M). This high impedance makes the keyer input (and hence the key itself) sensitive to the touch. For me this has not been a problem but these input resistor values could be lowered to lessen this effect.

N.B.T.V.A.

The Narrow Bandwidth TV Association (founded 1975) is dedicated to low definition and mechanical forms of ATV and introduces radio amateurs to TV at an inexpensive level based on home-brew construction. NBTVA should not be confused with SSTV which produces still pictures at a much higher definition. As TV base bandwidth is only about 7kHz, recording of signals on audiocassette is easily achieved. A quarterly 12-page newsletter is produced and an annual exhibition is held in April/May in the East Midlands. If you would like to join, send a crossed cheque/postal order for £4 (or £3 plus a recent SPRAT wrapper) to Dave Gentle, G4RVL, 1 Sunny Hill, Milford, Derbys, DE56 0QR, payable to "NBTVA".

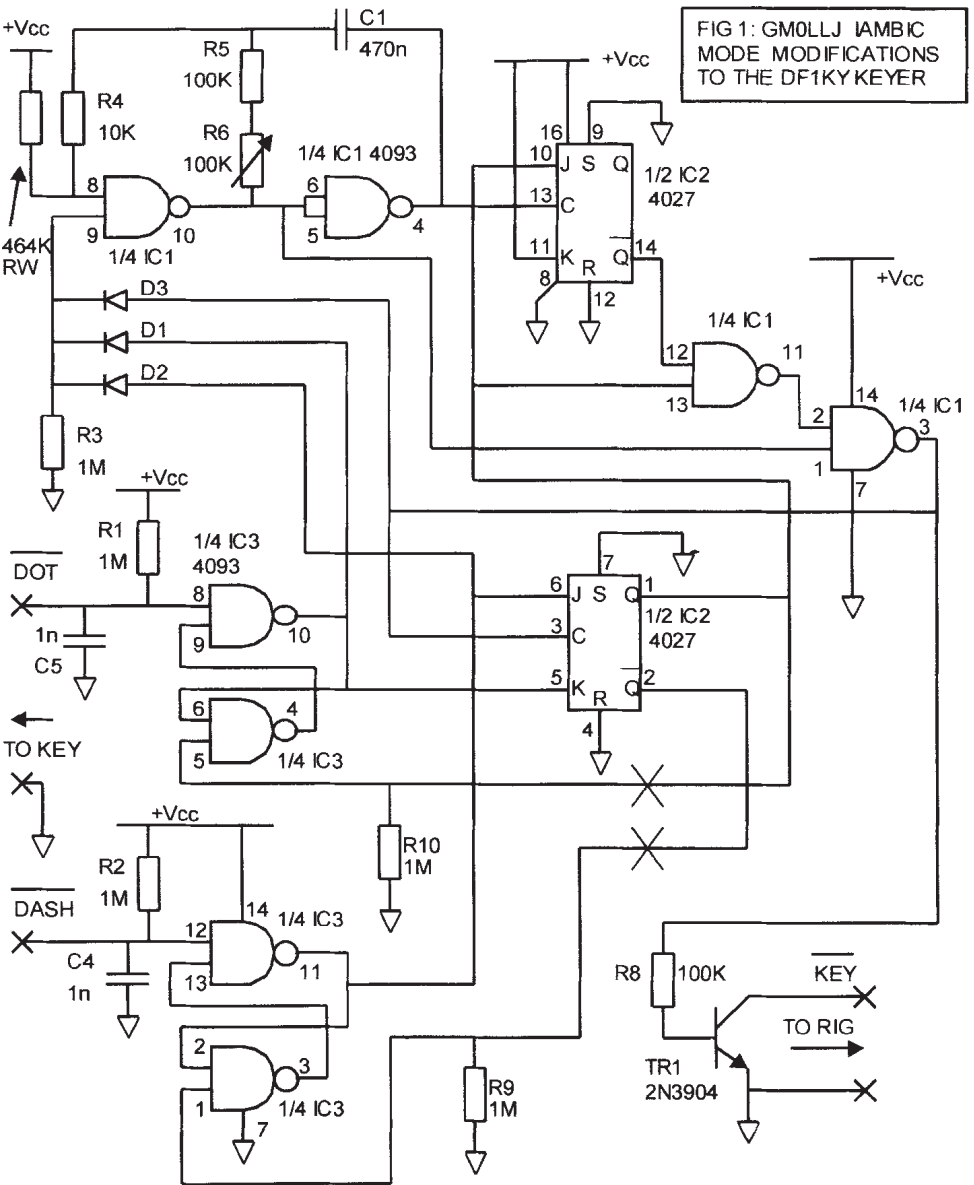


FIG 1: GM0LLJ IAMBIC MODE MODIFICATIONS TO THE DF1KY KEYSER

18MHz Wide Range Crystal Transmitter

A.W. (Mac) McNeill G3FCK, 40 Turnpike Rd. NEWBURY, RG14 2NF

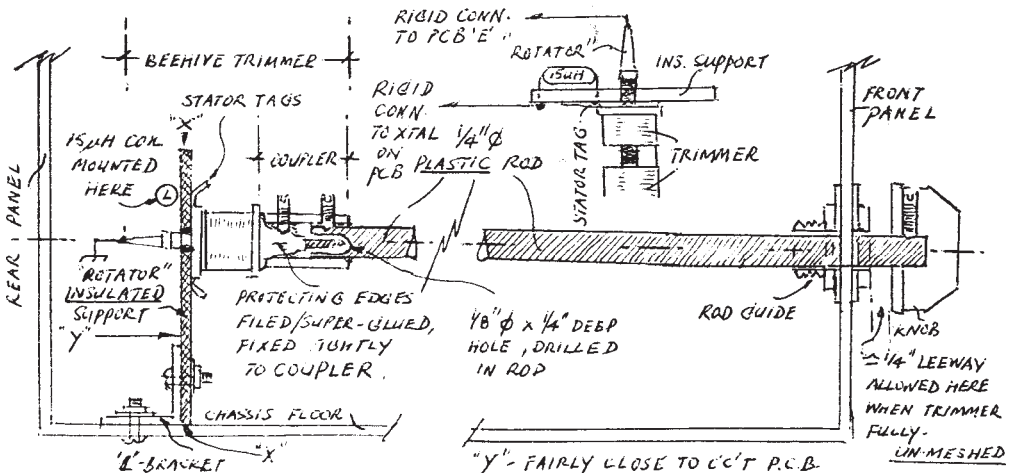
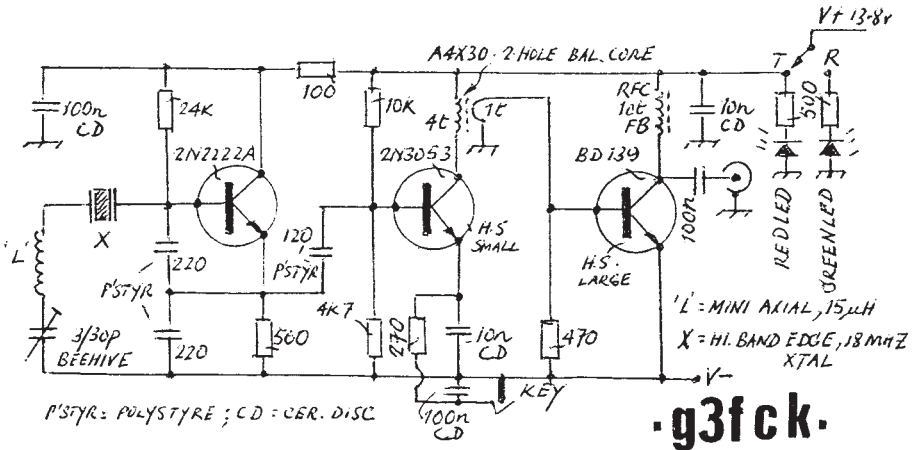
A hybrid unit, composed of parts from two circuits (G3ESP, SPRAT 95, oscillator and G0KJK, SPRAT 82, Driver/PA) has been found to deliver sufficient VXO range to enable cover of all the 18MHz band with one crystal. A suitable high crystal value was not available, but tests with three

XTAL	MHz	kHz
18.070	17.923<18.079	156
18.050	17.930<18.087	157
18.090	17.938<18.096	158

A suitable single xtal would seem to be band-edge [18.168] or higher

crystals in stock showed the wide ranges possible, with the power meter indicating a steady output. With a suitable broad-band PA this is a possible KISS unit for 18MHz when conditions improve. If a beehive trimer is used as shown, not slow motion drive is required.

The transmitter has been airtested with 270 milliwatts out to a low dipole and has, so far, contacted CT, EA, ES7, HA, I, SP, SV8, T95, US0, W1, W3 and ZB2.

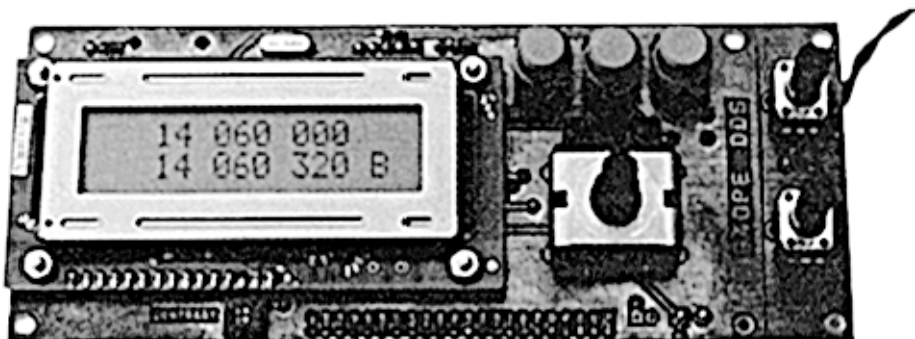


NOTE - X - EXACT LOCATION OF SUPPORT, DETERMINED WITH TRIMMER FULLY-MESHED AND KNOB BUTTING AGAINST FRONT PANEL.

DDS3 - 40MHz Direct Digital Synthesiser

A COMPLETE DDS VFO THE SIZE OF A POSTCARD

Mick Hodges G4OPE, 40 Ennersdale Rd. Coleshill. BIRMINGHAM B46 1EP



40MHz Direct Digital Synthesiser

This DDS was originally designed as the control board for the new GQ PLUS Multi-band Transceiver from Hands Electronics. However, care was taken not to limit it's use to a just one transceiver, the board could be used with any receiver or transceiver that requires a clean stable VFO below 40MHz.

Circuit description.

The output frequency is generated by the AD9850 from Analog Devices. Output level is around 400mV pk - pk but provision has been made for further amplification using any of the range of MMIC amplifiers. A 40MHz elliptical filter is fitted to secure a clean signal, limiting the usable output frequency to around one third of the maximum clock.

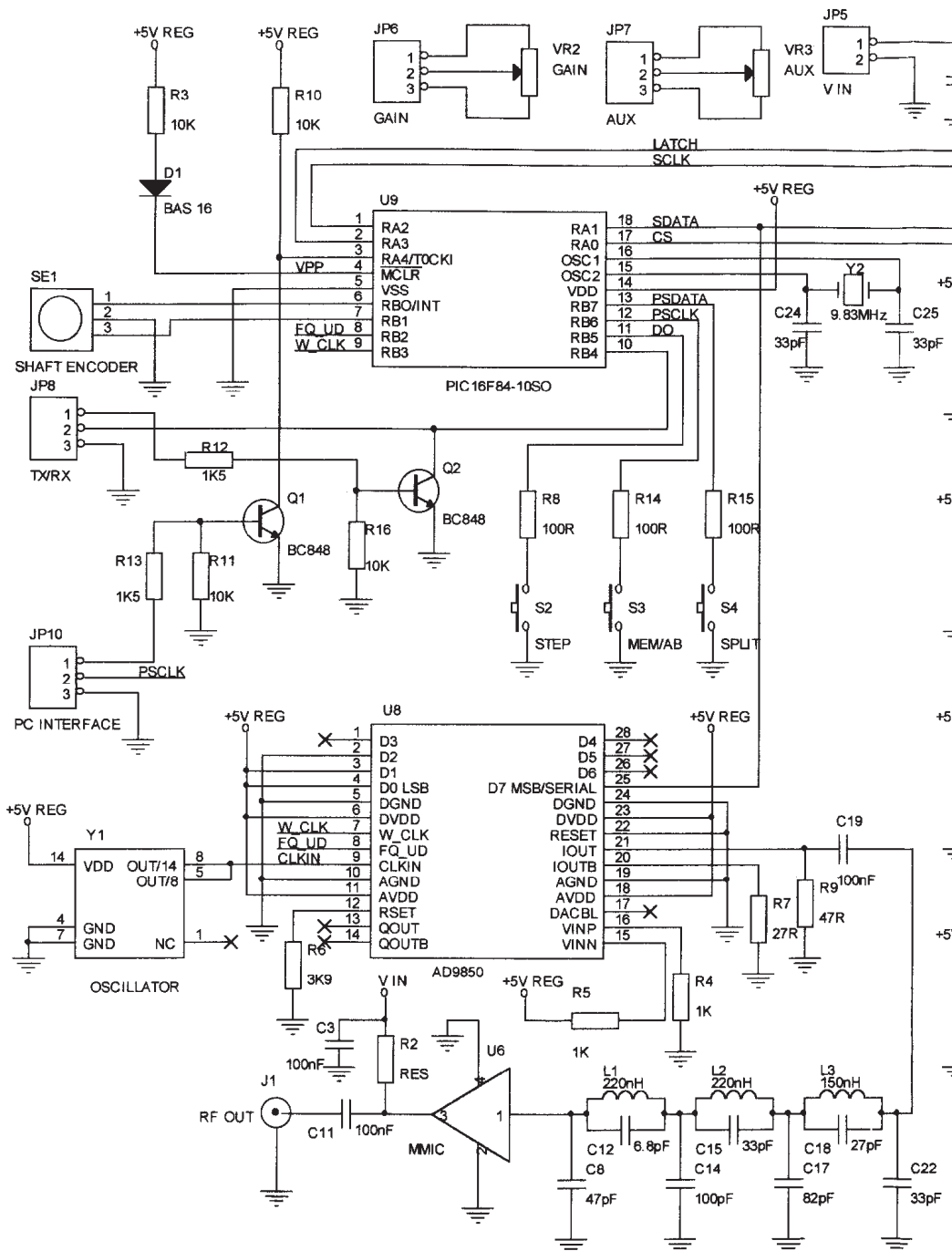
A PIC16F84 microcontroller converts user inputs to serial data for programming the AD9850, LCD and band switches. This MCU uses flash program memory and provision has been made for on-board programming. Software modifications can easily be made by simply plugging the programmer onto the board. This device also has on-board EEPROM storage, but an additional 1Kbit was made available using a 93C46.

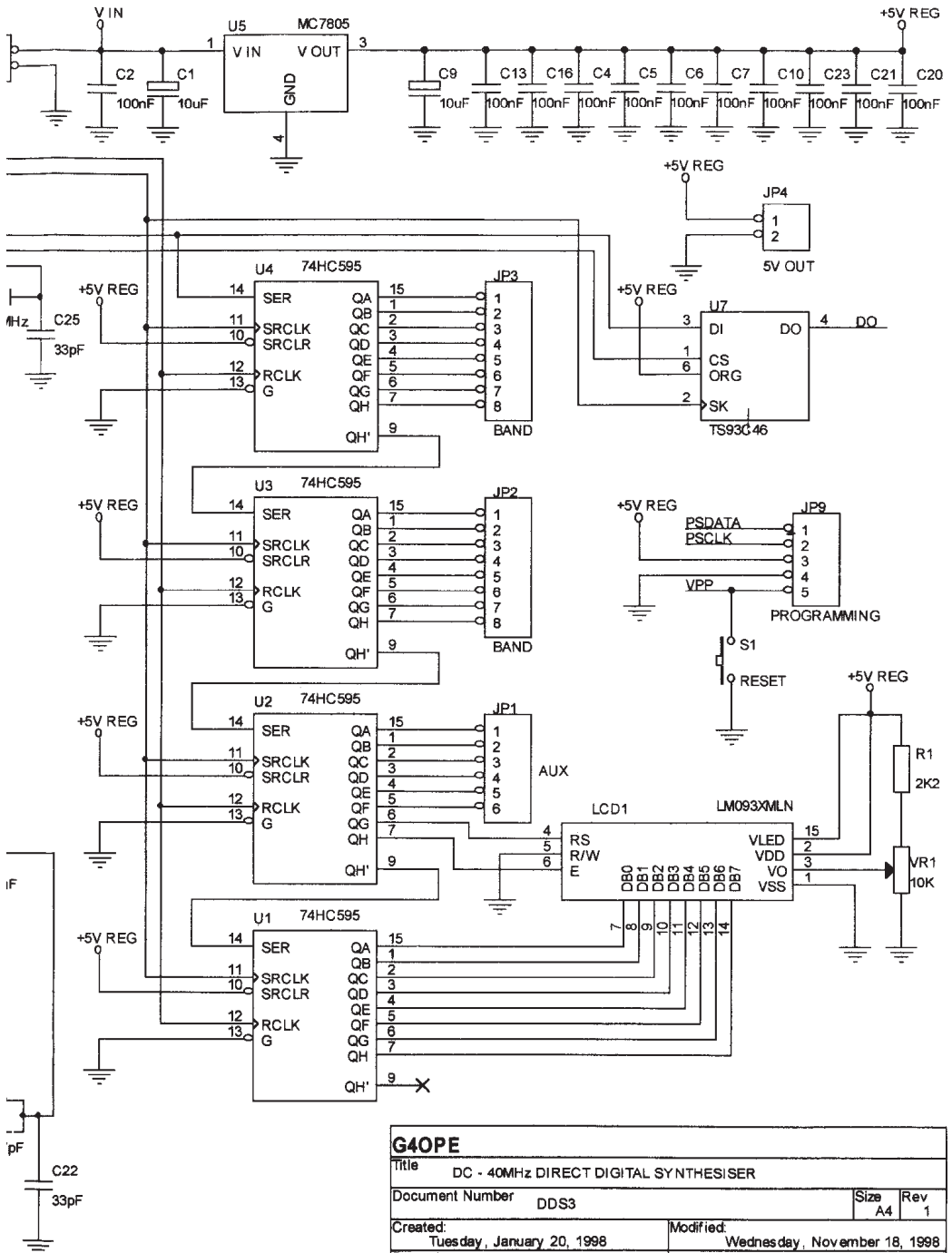
A two line by 16 character LCD is used, and provision has been made for either of two popular Hitachi LCD's, both backlit and non-backlit, to be mounted directly onto the board. Frequencies are displayed to the nearest 1Hz using up to ten digits with spaces between each three for clarity.

A simple contacting shaft encoder with 24 steps per revolution is used, and tuning is continuous from DC to half the clock frequency. Automatic tuning is possible by simply holding the encoder in-between steps. After about half a second, the DDS will begin tuning at about 100 steps per second, and continues until the shaft encoder is returned to the next detent.

Programming.

16 memories can be programmed using a simple three wire link to a PC printer port. Each memory holds the display frequency and offset frequency. Any offset can be programmed, from DC to over 4GHz in 1Hz steps and different offsets can be programmed for each memory. A push button switch will cycle through the memories, changing the display frequency and offset with each press.





G40PE			
Title DC - 40MHz DIRECT DIGITAL SYNTHESISER			
Document Number	DDS3	Size	Rev
		A4	1
Created:	Tuesday, January 20, 1998	Modified:	Wednesday, November 18, 1998
Drawn by:	Michael J. Hodges	Sheet	1 of 1

Two shift registers provide band change logic with only one of 16 outputs programmed high at any one time.

The PC link is also used to programme eight tuning steps. Any step size between 1Hz and 65KHz is possible. A second button cycles through the step sizes with each press.

Accurate calibration is possible by programming the clock frequency using the same PC link. This also allows any canned oscillator to be used up to a maximum 125MHz.

Transceiver use.

For transceiver use, split frequency operation simulates twin VFO's. When first selected, the current frequency is copied into the second VFO and displayed on the second line of the LCD. Either VFO can be selected for tuning, and a logic input is used to switch between VFO A or B. This logic input would normally be the transceiver TX voltage line.

Construction.

All passive components and IC's are surface mount and fitted to the underside of the double sided PCB. The shaft encoder, LCD and switches are also mounted directly onto the PCB eliminating all wiring and allowing easy mounting behind the front panel.

At the time of writing, Analog Devices have just released the AD9851 DDS. Pin for pin compatible with the 9850, this new device has a maximum clock frequency of 175MHz enabling a maximum usable frequency of greater than 58MHz.

**A FULL KIT OF PARTS FOR THE DDS3 IS AVAILABLE FROM
HANDS ELECTRONICS, TEGRYN, LLANFYRNACH, DYFED. SA35 0BL
Full kit with standard display @ £120.00 [post £3.50]
Supplement for Backlit Hitachi or Batron LCD 25.00**

ALBERT LIBBY KB1FK

We regret to announce the death, on September 14th, of Al, KB1FK. Al was member number 6039. An avid CW QRP operator. Al was QRP Master number 57 and had 131 QRP countries confirmed. In 1997 he was awarded the G2NJ Trophy for his services to QRP. A good friend and example to the G QRP Club, Al will be missed by his many radio friends.

RADCOM QRP COLUMN

Thank you to those who send me items from time to time for the RadCom QRP Column. From Jan 99, the column is to be bi-monthly rather than monthly [odd months] to alternate with the QSL Column.

...but please keep the odds and ends coming, only it may take longer to use them.

MEMBER'S HANDBOOK CORRECTIONS:

WRONG ADDRESS FOR MORSE TAPES

[Page 31] Correct Address is: Mr. Colin Turner G3VTT, Borkum Riff, 5 Hope Terrace, Lower Higham, ROCHESTER, ME3 7LH

WRONG WHO DOES WHAT

SPRAT Address Labels [page 3] should read G3MFJ.

AN EPIPHYTE IN CHILE Kenn Everard CE8/G0NKZ
Staple Lane West, Quantoxhead, Somerset, TA4 4DE
Adventure Network (Chile) Arauco 935, Punta Arenas, Chile

Punta Arenas is located at the bottom of Chile at the bottom of South America and it true when folk say it suffers four seasons a day! To say I am spending the southern summer getting brown may be the case but due to rust rather than sun. I set up and run radio stations for expeditions In this case Antarctica.

The bottom of Chile is remote from the outside world and the common mode of comms is by HF radio. In the evening the 40m and 20m band is full of families possibly 1000 miles apart chatting and keeping up with the family news. I licence ? What's that!!

I have with me my Epiphyte with me and made a point of getting 3 local amateurs together to play with it . A toy expressed one used to running 500 +w. With a dipole cut for 3.75 I set it at 45 deg. the top attached to my station mast about 100 ft.up, the bottom a few ft above the ground with the advantage towards the North. The four of us between drinking my whisky tuned around the band and stations were heard maybe 20 k away but they were talking about that strange game football. Then to my friends surprise and my pleasure the first contact was made in Spanish with the accepted no of "cambio's" with a station just North of Santiago which is just about 1000 miles up the road. Not bad for 5w SSB in daylight (well almost it was getting dark).

The next night it was snowing and I had a lot of flight following towards the Pole. but just after dark by first calling on my station main set, the power of which is a bit higher, say add a K behind the 5 would be a bit high. I arranged a sked with 4Z5AD/50 and while not a great report at 4X4 it is a long way! and it was snowing.

In the next week after a lot of shouting I heard and worked LU5HY and had a part contact with PY5HOT.

So you all can work DX with an Epiphyte all it needs is a high mast a bit of snow and fairly rare location yourself. Maybe I will work you sometime from somewhere so keep hunting and 73 (since this was written down I have worked into the BAS site at Rothera in Antarctica with the great little set. I have started to gather some teenagers that are keen to have a go so next time down here we might have a QRP club !!)

SPRAT Reprints:

Reprints of back issues of SPRAT from Issue #1 are available.

The reprints are copies in 5 volumes in three ring loose leaf binders. :

Vol 1 issues 1 - 20, Vol 2 issues 21 - 46, Vol 3 issues 47 - 63
Vol 4 issues 64 - 77, Vol 5 issues 78 - 91, Each volume costs \$20.

Shipping cost in the US is \$5 for the first volume and \$3 for each additional volume shipped at the same time. Total cost for all 5 volumes shipped in the US is \$117.

Shipping cost for overseas locations is about \$25 for surface shipment and will be charged at actual cost.

Copies are available from: Kanga US, 3521 Sping Lake Dr. Findlay, OH 45840. USA
419-423-4604 (you will probably get my answering machine)

Email : kanga@bright.net

www.bright.net/~kanga/kanga/

Emma's Challenge.

Emma Constantine, 2E1BVJ, The Old Exchange, Burnley Rd. MYTHOLMROYD. HX7 5PD



A year ago, I challenged all Radio Amateurs to, "Come out of their shacks and help beginners and young people to discover Amateur Radio as an exciting hobby."

I didn't expect there to be any great rush, but during the time I spent as, Young Amateur of the year I tried to press this message home. I was also extremely fortunate to meet and discuss the future of Amateur Radio with a wide variety of people.

One thing that struck me very forcibly, on my travels, were the limited opportunities for Novice and newly licenced operators, not through the licence conditions but through the lack of scope for practical development. It seems that there are lots of projects around to build receivers, test equipment and simple HF CW transmitters. However, once licenced many beginners and particularly Novices are pushed into black box operating on the 70 CMS band.

Talking with people gave me the germ of an idea. Why not challenge those Amateurs, who don't want to come out of their shacks, to stimulate the hobby to produce something practical for beginners and the not so technical to build, that actually works! This idea snowballed and has met with overwhelming support and enthusiasm, wherever I have been.

The object now is to design and build a 6 metre, 3-watt FM portable transceiver, for less than £50.00. 6 metres has been chosen for a number of reasons including:

- 1 Construction technique is relaxed and within the scope of most novice builders
- 2 All licence classes can communicate with each other, on 6 metres, hopefully providing for greater co-operation, learning and interaction.
- 3 Reasonable range available from most locations, with possibility of lift conditions
- 4 Component costs and availability. (Cordless Phone & Alarm IC's etc.)
- 5 Simplicity of development of basic equipment i.e.; add on, mod's etc.

A typical example of what I mean (unless you can do better) might be as follows:

3 watt, 2 channel, Fm Transmitter - Simple, tuneable FM Receiver - Speaker/Microphone
Telescopic whip Antenna - Metal case with internal battery pack - Sockets for external Antenna & Power.

It must be possible to obtain all of the parts easily, from recognised sources and to cost less than £50.00. Of course, if someone produces the same rig, or a better rig, for less, then that is a point in their favour.

I just want to circulate and stimulate ideas, to see what Amateurs can really do. To encourage this, the competition will be run throughout 1999, January to December.

TO QUALIFY:

1. All practical designs must have been submitted for print, in a participating magazine, during 1999.
2. A component list, with sources and costs, for new components, must be included, together with a PCB layout design.
3. At least one unit must have been built and be available, if required, for evaluation. By the magazine or the judges.

At the time of writing the following magazines have kindly agreed to take part and look forward to receiving your entries: SPRAT, Radio Communication, Ham Radio Today, Practical Wireless.

The competition is open to all, with awards being made to, Single, Group and Club entries.

The Radio Agency has most generously offered £1,000 worth of prize money to actively support this venture. Other prizes include magazine subscriptions, memberships, books etc.

Most of all it now needs your participation. Please help me to make this challenge a great success for Amateur Radio I know it can be of benefit to many and I look forward to seeing the results of your labours, it should be great fun!

Entries from G QRP Club members can be made via G3RJV. Winning entries will appear in SPRAT and probably other magazines. Kits are also a possibility.

Many thanks... Emma

FROM THE MEMBERSHIP SECRETARY

John Leak GØBXO. Flat 7, 56 Heath Crescent. HALIFAX West Yorkshire.HX1 2PW.

Tel:- 01422-365025. Email:-G0BXO@BTinternet.com

SUBSCRIPTIONS 1999

Subscriptions for 1999 are now due. Please see the centre pages of this issue of SPRAT for details of rates and methods of payment.

A number of members who pay their subscriptions by standing order have STILL not amended their standing order to the present subscription rate of £6 introduced in 1995.

If you are one of the members concerned. PLEASE amend your order for 1999. A form for this purpose is included in this issue of SPRAT.

IF YOU ARE A UK MEMBER AND DO NOT PAY BY STANDING ORDER. PLEASE CONSIDER DOING SO IN THE FUTURE. THIS METHOD OF PAYMENT IS THE CHEAPEST AND EASIEST FOR US TO PROCESS

Final Warning To those who have not updated their Standing Order mandates from £5 to £6 (the change was in 1994!). In view of having supplied complete sets of SPRAT from that time until now, we have no alternative but to discontinue sending copies of SPRAT until the Standing Orders are changed. Members concerned have been notified by mail.

HIGHLIGHT YOUR QRP CONTACTS

by attaching a "Two Way QRP QSO" label to your cards. Black lettering on gold with club logo. 200 labels £2 inc post (overseas plus 30p) For Order Form (or to order now) M.L. Prickett, G3BSK, 260 Haslucks Green Road, Shirley, Solihull, West Midlands, B90 2LR. Cheques: M.L. Prickett. (The G QRP Club benefits from each order)

ANTENNAS - ANECDOTES - AWARDS

Gus Taylor G8PG 37 Pickerill Road, Greasby, Merseyside, L49 3ND

THE MOAJL MULTI-BAND VOLTAGE FED ANTENNA

M.A. EALES, MoAJL, 137 Heron Way, Upminster, Essex, RM14 1EE.

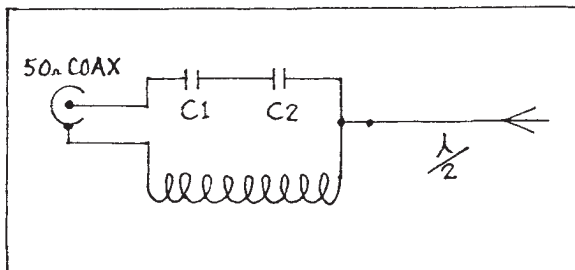


Fig. 1

The last two issues of SPRAT have both contained methods of voltage feeding a half wave antenna; this is yet a third method. It does not need a counterpoise and can feed any wire that is one or more half wavelengths long. Figure 1 shows the circuit arrangement. For 15 metres C1 and C2 are each 47 pF and L is 14 turns of 18 swg wire, spaced over 45mm on a 25mm diameter former. For 20 metres C1 and C2 are each 56 pF and L is 19 turns of 18 swg wire spaced over 45mm on a 25 mm diameter former. For 40 metres C1 and C2 are each 82 pF and L is 32 turns of 18 swg wire spaced over 45 mm on a 25 mm diameter former. The LC combination is in series resonance from the rig and parallel resonance with the antenna, so a high voltage is developed across the capacitors. My design used 500V working capacitors because they were available. A length of RG8 co-ax (1pF per cm) could be used to make a single high voltage capacitor. To tune, expand or compress the turns of L to obtain the lowest swr which should be less than 1.2:1. If it is not the antenna is not in resonance and its length should be adjusted until the required swr can be obtained. For other bands scale the capacitor value then wind a coil to give resonance, as the LC value is important. The 500V working capacitors are suitable for QRP. A QRO version for 20m using 4 KV working capacitors worked well also.

HOW ABOUT CURRENT FEED THEN ??

Illustration from the 1933 Edition of the ARRL Handbook
Text by SPRAT Technical staff.

Figure 2 shows some simple methods of current feeding an antenna at the ATU. What we do is to break the antenna at a point of reasonably low impedance, insert the ATU at that point and use the remainder of the antenna wire as a counterpoise. Provided we move far enough from the end of the antenna but not too far we will get a nice feed impedance and little effect on the radiating efficiency of the wire. If we have a half wavelength of wire feeding between half and three quarters the distance from the centre to one end will give us feed point impedances of around 70

to 300 ohms, easily handled by the atu. The counterpoise can be run at an angle to the main wire and inside the house if necessary, so that may help on cramped sites. Fig 2 shows parallel tuned circuits for the coupler as used in 1933. Today a Z-match or L-network should be used, with the counterpoise section of the wire connected to its ground terminal. NOTE. The 1933 handbook belonged originally to W1FSK who bequeathed it to Al, KB1FK. Al, who is terminally ill, has now given the book to G8PG. W1FSK was Al's uncle.)

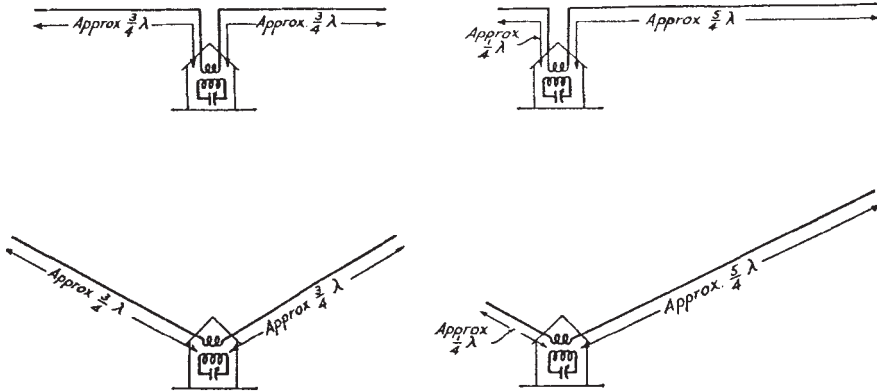


FIG. 2 — OTHER POSSIBLE CURRENT-FEED ANTENNA SYSTEMS

VERY BEST WISHES TO THE NEW UR QRP CLUB

This new club in the Ukraine is now in operation with Peter, US1REO as President and acting Secretary, Vladimir UR7IRL as Vice-President and Awards Manager (both G QRP C Members), and Vladimir UTOMK as Technical Manager. Subscription \$3 U.S. per annum. Address P.P. Grytsay, US1REO, 15-B Moskovska Street , Apt 58, Nizhyn, Chernihiv Region, 251200 ,Ukraine.

A REAL QRO CABALLERO

Keep an ear open around 14060 KHz for Jac, LU2YA, from Neuquen. Jac is a QRO operator, but one day each week he devotes his on - air time entirely to working QRP operators, giving many of them their first LU contact. Muchas gracias amigo Jac !

AUTOMATION IN QRP CONTESTS

Doug, VE7NH, agrees strongly with the remarks in the last SPRAT and says ALL contests should have a section for non-automated logs and keyers. Rudi, DL2RM says "Congrats on your excellent comment "Auomation Gone mad" in SPRAT. It is completely true!!"

=====

AL. T. LIBBY, KB1FK

With deep regret we announce the death of Al on 14th September, 1998, after a long illness bravely borne. He was only 58. An outstanding QRP CW operator, and a staunch supporter of international friendship through amateur radio, he gave many European stations their first W QRP QSO. He will be sadly missed by his many friends worldwide.

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CQ de G8PG = Can any reader supply a copy of an article on loop antennas by J. Lawson, W2PV, published in "Ham Radio", September 1980 ?

AWARD NEWS

QRP MASTER. We welcome DF1NH to the Worshipful Company.

WORKED G QRP CLUB. Correction. In SPRAT 96 read "300 G3ZHE" not "G4ZHE". 1280 GM30XX (Nearest thing to perpetual motion !), 1240 G4JFN (Coming up on the rails !), GOKCA 440; G3FCK 420; K4NK (ex-WN2V) 240; GoTUE 220, GWOMY DL1HTX.

QRP COUNTRIES. 75 DF1NH; 50 G3LSW.

TWO-WAY QRP. 20 DF1NH

A "MILES PER INCH " AWARD ?

Many years ago in the SWM there was a report about two locals working each other on 160 metres who gradually reduced antenna length, then started loading up other metal objects while still maintaining communication. They ended up, still in communication, with one loading up the lawn mower in his garage shack and the other , in a bedroom shack, loading up the metal bed frame. This is probably not a record for 160 metres. My locals G3LUG and G3BZT used to QSO over half a mile on that band with no antennas connected at all (in the days of valves - do not try a transistor pa with no load !). The G8PG claim to fame in this area came about quite inadvertently one Sunday in the 1960s. (pre-QRP days). Some work was being done on the rig when the call for lunch came floating up from downstairs. Nienty minutes and an excellent lunch later a return was made to the shack. The RX and TX had both been left on 28 MHz, and a W2 was audible, calling CQ. A quick call brought him back, but only with a 429 report. Despite this a short QSO was completed. Tuning round the band showed that received signals were well down, and a glance at the feeder milliammeter showed that all was not well in the TX department either. A quick visual inspection soon found the cause of the problem. While working on the rig the atu end of the co-ax from the rig had been unplugged, so the "antenna" used for the W2 contact had been 15 inches of unterminated co-ax! As the TX was not loaded properly the rf output was probably less than 10W. The distance Greasby to New York is at least 3,000 miles, so that works out at one inch of antenna for each 200 miles ! Now we are sure that this is not a unique experience, and that many Members reading this will have their own experiences of contacts made, either deliberately or accidentally, with "impossible" antennas. So why not let AAA have them ? To get fullest coverage, commercial or military experiences can also be submitted. Suitably ribald Certificates of Merit will be Awarded to the three best entries (which must be true; no Texas fertilisers please !). We could get some good stuff !

1999 QRP CALENDAR

1 Jan	Last Day of Winter Sports
1 Jan	0900-1200z AGCW Happy New Year Contest
2-3 Jan	1500-1500z AGCW Winter Contest
6 Feb	1600-1900z AGCW HTP (Straight Key) Party
7 Feb	Last Day for Winter Sports logs to G3XJS
15 Feb	Last Day for Chelmsley logs to G3XJS
26-28 Feb	1500z 26th - 2359z 28th CZEBRIS 99
27 Mar	(4 hour period between 1700-2359z) Somerset Homebrew Contest
5 Apr	(every Easter Monday) 1400-2000z Slovak Low Power Spring Sprint
6-9 Apr	1900-2100z each day Yeovil Fun Run
17 Apr	Last Day for CZEBRIS logs to G3XJS and OK1CZ
17 Apr	Yeovil QRP Convention DINNER
18 Apr	Yeovil QRP Convention
1 May	1300-1900z AGCW QRP/QRP Party
17 Jun	IARU Region 1 International QRP Day Contest
3-4 Jul	1500-1500z Original QRP Contest
17 Jul	Last Day for International QRP Day logs to G3XJS
17-18 Jul	1500-1500z AGCW Summer Contest
4 Sep	1300-1600z AGCW HTP (Straight Key) Party
21 Nov	HOT Party (DJ7ST)
11-12 Dec	1800-0559z 9A QRP CW Championship
25-26 Dec	1500-1500z Original QRP Contest
26 Dec-1 Jan	G-QRP WINTER SPORTS

CLUB OFFERSWHILE STOCKS LAST

Last Few NE602 Chips at £1.75 ea. inc. postage [SA602]

MC1350 at £2.25 each inc. postage in the UK

SBL1 MIXER at £4.00 each + 50p postage

G QRP CIRCUIT HANDBOOK [usually available from the RSGB]

Non-RSGB Members [UK & EU] £7.50 + 75p [UK] £1.25 [EU]

Book available in the USA via Kanga[US]

RADIO PROJECTS FOR THE AMATEUR by Drew Diamond, VK3XU,

Available for £6.00 (plus UK postage £1.25, EEC postage £2.00)

LOW POWER COMMUNICATIONS, VOL.3. [QRP Hardware] K7YHA

Last few copies at £8.00 + £1 [UK] £1.50 [EU]

W3NQN AUDIO FILTER KITS

Parts for the popular W3NQN Passive filters [Inductors + matched Cs]

SSB : £9 +£1.50pp CW: £8 +£1.50pp

WHITE ROSE PHASING RECEIVER PCBs [SPRAT 71]

Main Board: £5.58 inc postage. Converter Boards: £2.25 inc postage
Original RX PCB [SPRAT 61] £3.75 Exciter Board [SPRAT 66] £3.75

Cheques to "G-QRP CLUB" (an address sticker is helpful)

Orders to: Frank Lee G3YCC, 8 Westland Road, Kirkella, HULL. HU10 7PJ

COMMUNICATIONS AND CONTESTS

**Peter Barville G3XJS, 40 Watchet Lane, Holmer Green,
High Wycombe, Bucks HP15 6UG.**

E-mail: peter@barville.demon.co.uk Packet: g3xjs@gb7avm

Firstly, let me offer my thanks to all who have responded on the subject of the RSGB's proposal to remove the need for compulsory Morse testing as part of the UK HF Licence. There have been too many letters for me to reply individually, but an interesting discussion on the wider issues of the amateur licence, and its future, took place during George's Rochdale Mini-Convention. I think it true to say that we all have the best interests of the hobby at heart, and seek to provide a suitably structured licensing system for the future. A significant number have expressed the opinion that better regulated band plans should form part of that future.

WINTER SPORTS

That favourite time of the year is with us again! Along with the Christmas festivities, and those of the New Year, we have our annual festival of QRP to celebrate. Don't forget to come on the bands and join the fun around the normal QRP frequencies - you will be particularly popular if you happen to live in a rare Dx location! If you've not participated in the event before, you will be pleasantly surprised at the number of QRP operators from around the world contributing to one of the most popular (if not the most popular) QRP events in the QRP calendar. Winter Sports takes place each year from 26th December to 1st January (inclusively), and because it is not a contest there are no rules. Simply come on the bands and have some fun - you will be very welcome. Send me your logs/comments by 7th February and you could be in line for the G4DQP Trophy.

YEOVIL QRP CONVENTION and FUNRUN

Another favourite annual event is the Yeovil QRP Convention, and its associated FunRun. The 1999 Convention will take place on Sunday 18th April at the Digby Hall, Hound Street, Sherborne. Doors open at 9am, and there is talk-in by GB2LOW on 145.550. The usual traders and catering will be in the main hall, with QRP related talks in the Lecture Room. For the first time, Morse Tests will be available on demand. The Convention Dinner will take place during the evening of 17th April, in the Three Wishes Restaurant.

FunRun 1999 Rules:

1. 6th Apr to 9th Apr (inclusive) 1900z-2100z
2. 3560 and 7030kHz (both +/-)
3. Contacts to be between QRP stations with a maximum of 5 watts O/P. However, contacts with QRO stations are permitted but with reduced points value. All stations may be worked only once each evening, on each band. FunRun Bonus Stations (GB2LOW, G3IXZ and G3LSW) will be operating each evening randomly for one hour on each band.
4. Call "CQ FR"
5. Scoring: each qso with another QRP station scores 10 points.
Each qso with any FunRun Bonus Station scores 25 points. Each qso with a QRO station scores 3 points. All duplicates must be marked and no points claimed. Points will be deducted for unmarked duplicates at twice that particular qso score.
6. Exchange RST, Serial Number (see below), output power and name.
7. Your three figure serial number must start at any random number of your choice not less than 100, and MUST then be incremented by one for each qso throughout the whole of the contest. However, the three FunRun Bonus Stations will all commence at 001.

8. Submit: separate log sheets for each band, with sub-totals for each evening, preferably in the RSGB format. A separate signed RSGB style cover sheet stating the rig, power output and aerial. Entries by 15th April to G W Davis G3ICO, Broadview, East Lanes, Mudford, Yeovil.

9. Certificates will be awarded for the highest score for any three evenings out of the four, on each band - and also for the highest overall total score for any three evenings on both bands. These evenings do not have to be the same on 80m as 40m.

A certificate will also be awarded to the station consistently using the lowest power. Certificates to be awarded at the Convention.

10. SWL logs will be appreciated, and a certificate awarded to the listener submitting the most comprehensive report.

Further details of the Convention, or FunRun, are available from G3ICO.

SOMERSET HOMEBREW CONTEST

Thanks to Tim Walford's very kind offer, the leading entrant will win a £50 voucher, which can be exchanged towards any current Walford Electronics product. There is no questionnaire this year, but otherwise the rules remain as before:

1. The contest is open to all single operator QRP stations using homebrew equipment. Either (or both) Tx and Rx must be home-made, but it is not necessary to have built the equipment yourself.
2. Activity: around the normal QRP frequencies on the 80m band ONLY. Any mode is permitted, and cross mode contacts are allowed. Any station may only be claimed once.
3. When: any continuous 4 hour period between 1700z and 2359z on Saturday 27th March 1999.
4. Call "CQ HBC Contest" (ssb) or "CQ HBC Test" (cw).
5. Exchange: RST, SC serial (you must start with any random number of your choice not less than 100), Power (eg 579/SC231/3W). Stations not in the Contest can send any serial number (eg 579/001/2W).

6. Scoring:

Points	QRP/QRP	QRP/QRO
Within own continent	5	1
Outside own continent	10	2

The final score is the total number of points (there are no multipliers), BUT deduct 25 points from your total if you did not build either the Tx or Rx yourself.

7. Entries by 30 April to G3XJS, with log sheets showing times, stations worked, reports sent/received, and points claimed. Please supply details of equipment used, power and antenna, together with a declaration that your station was operated in accordance with the rules.

8. In the event of a tie, the winner will be drawn from a hat.

This contest is one of the few promoting the use of homebrew equipment, and Tim has been very generous with his offer of a £50 voucher for the winner. I hope we have chosen a date clear of the UA cw contest which gave so much qrm last time, so may I suggest you give last year's winner (G4MQC) a run for his money - it is a golden opportunity to add to your range of QRP equipment.

CZEBRIS 1999

1. 1600z 26 Feb to 2359z 28 Feb
2. CW only on 3560, 7030, 14060, 21060, 28060kHz (all +/-)
3. Power not to exceed 5 watts O/P. Stations unable to measure O/P can calculate using half their DC input (eg 10W DC = 5W O/P).
4. Call "CQ QRP"
5. Exchange: RST/Power/Name
6. Scoring: Stations may be worked only once per band. Only QRP/QRP contacts may be counted.

Your Location	QSO with QRP stn in			
	UK	OK/OM	Eu	Non-Eu
UK	2	4	2	3
OK/OM	4	2	2	3
Eu	4	4	1	2
Non-Eu	4	4	2	1

No multipliers, final score is total number of points scored.

7. Logs: separate sheets for each band showing (for each qso) Date, Time, Call, Exchanges (RST/PWR/Name) sent/received. Also include a summary sheet showing your name and callsign, claimed score for each band, and brief details of your station.

8. UK logs to G3XJS. All other logs to P Doudera (OK1CZ), U1 Balerie 1, 16200 Praha 6, Czech Republic. All logs to be received by 17 April.

The number of entries was disappointingly low for CZEBRIS 1998, so let's make good use of the improving band conditions and give the 1999 event our support.

CHELMSLEY TROPHY

This was another event not too well supported last year, so please have a look at the rules printed in the current Members' Handbook, look through your log for 1998 and send me an entry. I had intended to produce a more precise scoring system for this year, but time has defeated me again!

O QRP CONTESTS

I have been asked by the organiser of these popular contests, Hartmut DJ7ST, to mention that he has the valued support of many 'co-sponsors' in the running of the contests. For the cost of ten times the postage fee for a letter, you can join the list of co-sponsors, which currently stands at around 150 callsigns from around Europe. He can be reached by packet at "DJ7ST@DB0ABZ.#NDS.DEU.EU", or by post: Dr Hartmut Weber, Schlesierweg 13, D-38228 Salzgitter, Germany. I can supply rules/results of the contests (and sample log sheets) on receipt of an ssac. He also points out that it is the same organisation which now organises the annual HOT contest, and not AGCW.

The deadline for the next issue is the beginning of February, but in the meantime may I wish you fun filled and successful QRPing in 1999.

15th Annual Yeovil QRP Convention 1999

Sunday April 18th, The Digby Hall, Hound Street, Sherborne, Dorset

15th Yeovil QRP Convention Constructors Challenge

The challenge for the 15th Yeovil QRP convention is to construct the most stable Free running Variable Frequency Oscillator, to tune from 5 to 5.5 MHz, calibrated in 100 KHz steps using a maximum of 15 components.

Each entry will be expected to hold the test frequency, (to be decided on the day) for a 5 minute period, starting 30 seconds after initial switch on.

The test equipment will be a good commercial Frequency counter and a timing device.

We will provide a regulated 12v DC power supply and a load resistor of 10K Ohms, one side of which will be connected to the 12v DC negative supply.

The unit having the lowest drift will be the winner. In the event of a tie, the unit having the lowest component count will be the winner. A circuit diagram of your entry should be provided. The entries will be judged at the convention, and a certificate and prize awarded.

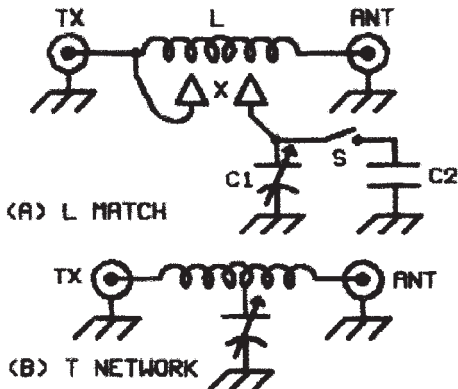
NOVICE NEWS Steve Ortmayer G4RAW

14 The Crescent, Hipperholme, Halifax. HX3 8NQ. Tel: 01422-203062

I have not received any news from novices this time, please let me know what you are up to.

L-MATCH

You may like to try this variation of the ever popular L Match ATU. By having two sets of croc clips as shown it is possible not only to switch the capacitor from the input to the output but also form a T Network. You may need to switch in extra fixed capacitors as shown for some bands.



The details come from an old CQ magazine by W4FA.

**L = 12 turns 16 swg tinned copper wire
1.25" [32mm] dia
spaced 1 wire thickness
between turns.**

**X = pair of crocodile clips
C1 = 300pF, C2 = extra fixed
capacitance if required [say 330pF]
S = switch to add C2**

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

FOR SALE: A flying start to TWO White Rose Transceivers! Due to circumstances, two partially built phasing receiver boards and exciter boards and a stack of unused Converter PCBs with most of the passive components [no splits] £30. PW Robin Frequency Counter PCBs, still sealed, £12.50.

WANTED: Crystals, type T25 [HC6U sockets] in range 11.94444-12.11111 MHz, in particular 12.041667 & 12.01875, may consider up to 12.2222 if falls into a 70cm channel when x36. Keith, G0OZK, QTHR, or messages via pensioner ansaphone 0161 477 5303 eves/we

REQUEST: I have an old Argonaut 505 into which I wish to fit an IF narrow(ish) cw filter, & wonder if anyone knows of any standard type of filter that would do the job. I don't particularly like AF/DSP stuff & would prefer to do it 'real'!! Mike Hutchins ZLIMH. , Taheke Private Bag, KAIKOHE 0400, New Zealand.

WANTED: Book - "Secret Warfare" by Pierre Lorain/David Kahn. London 1984. Peter Karrais DF6JN Jungbuschstr 25, MANNHEIM 1, D-68159. GERMANY

WANTED: Collection of SPRATs preferably [nearly] complete. I need a book for my QRL : "Reference Data for Radio Engineers", ITT, 1977 or later, both for reasonable price or swop. Andree Knott, DD3LY, Hardenbergstr. 4, 24105 Kiel, Germany. Tel: +49-431-89353

FOR SALE: Part built "GQ40" with parts, case, manual and carr. £33, Also part built PW "Robin" Frequency Counter with parts, case, manual and carr. £35. GODWJ. Tel: 01926-422754

WANTED: ARGONAUT 509 or 505 or HW8. Adrian Heath, 227 Windrush, Highworth, Swindon, SN6 7EB. 01793 - 762970

SSB COLUMN : Dick Pascoe GØBPS

Seaview House, Crete Road East, Folkestone. CT18 7EG. Tel: 01303 891106

Email : Dick@kanga.demon.co.uk.

via packet to GB7RMS

A letter from Rune SM0GKF. He tells me that he has been quite active recently and was pleased to bag a new country on QRP SSB. The new one ZB9BV goes well with others worked recently VK, HS0, HL, ZS, VO, SU, VU, 5A, VA V63 and F5. Rune uses a homebrew 18MHz rig from Sprat 91. He is also very interested in trying an SSB - QRP contest, perhaps on 10m, what are your thoughts? You will find Rune on 14.280 - 14.300MHz.

An email from Juanjo EC5ACA came as a surprise, he is an active QRP operator, but what made his comments interesting is that he is learning Welsh. The mind boggles a little at this, Welsh spoken with a Spanish accent? (is this upstaging Faulty Towers?) Juanjo also asks that any member sending in circuits or diagrams to George also add their email addresses.

Several members took the opportunity to play with the newest version of the SGC 2020 rig whilst at Rochdale. I had it on loan from W&S for an HRT review. Several SSB contacts were made and a lot of fun was had. We even got Peter G3PDL on the mic. A review will appear shortly in HRT of all my, and others thoughts.

This column relies on your input. So please let me have these thoughts.

Finally, I would like to put on record our thanks to George G3RJV and Jo-Anna G0OWH for all the extremely hard work they put in to ensure the convention went so well. Remember they had only been home from California a couple of days before the event this year. I think that this is the 11th (or is it the 12th) convention and whilst several members give up time to get things set up it does still all revolve around George and Jo. So a public thank you to both from all members.

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

FOR SALE: GQ-20 (20m cw trx) kit; only partly built due to lack of time. £65 plus p & p. Richard G3RWL, QTHR, 0181 366 4297.

FOR SALE: The following - VC300DLP ATU T match circuit, cross needle SWR bridge and and 4 way aerial switch £85. Heathkit QRP wattmeter HM-9 good condition £40. Heathkit HW9 PSU with power plug and spare socket £40. CB converted to 10FM (band open now but i've got my big rig for that!!) £18. Icom IC240 2mFM VGC no mic. £85. DYMAR PMR in attractive wooden base unit with built in PSU, wired for packet... epromed for 144.5 up repeaters reverse repeaters very versatile with 6 watts out (should be 10 watts but my power meter says six!) £85 on. Ian G3ROO 01304 821588

FOR SALE: Walford 'Taunton' SSB rig, with card for 20/40m, 5w PEP. Built in nice Maplin case with digital readout, mic and manual. Price 100.00 PLUS postage. GQ2000 CW rig. Covers 1.8 - 18.0 mhz. DDS VFO with memories, scanning etc, built in K1EL keyer, manual and complete with PSU/ATU in identical box. Essential you inspect and collect. A brilliant rig, now surplus to requirements. Frank G3YCC (QTHR) tel: 01482 650410 or email g3ycc@g3ycc.prestel.co.uk.

FOR SALE: TRIO JR-60 Communications Receiver, 550kHz-30MHz +2m, Amateur Bandsread, 15 valves, Q Multi, Calib. (circa 1964) with Mauratron Circuit etc. £35 Richard 01376 584478

HELP REQUIRED: Can anyone undertake to re-align an Eddystone EC10 MkII Receiver? Service information is available. I could deliver and collect in Devon, Somerset or Dorset and will pay for the work done. Doug. 01460 - 75838

MEMBERS' NEWS



by Chris Page G4BUE

Highcroft Farmhouse, Gay Street,
Pulborough, West Sussex RH20 2HJ.

Tel: 01798 815711 Fax: 01798 813054

E-mail: g4bue@adur-press.prestel.co.uk

Packet: G7DXS on UK DX PacketCluster

We start this column with a remarkable QRP achievement reported by G3MJX, who recently received a QSL card from VE3JC for a two-way QRP QSO on 20m. "So what you may so", says Tony, "John was *bicycle mobile* at the time. It's for sure the first time I have had a DX CW QRP QSO with such a station and I think he is to be congratulated for his enterprise". John used 5W to an Outbacker Perth antenna mounted on an extension to the crossbar of his bicycle (a photograph for SPRAT will be nice John), and Tony used 3W from a homebrew transceiver to a G5RV antenna at 30 feet. Congratulations indeed to John, and to Tony for being the 'good ears' on the other end of the QSO. I wonder what other QSOs John has made from his bicycle set-up?

DJØGD has been using a complete station in a suitcase for the last 15 years, although he has



Peter, DJØGD, operating his station in a suitcase (see text).

made many changes during that time. Peter is currently using a Ten-Tec 509 Argonaut with a PSU, keyer and ATU in the suitcase. This year he has worked ZL2TX, OX3FV and TK5GK on two-way QRP to bring his two-way QRP country total to 78. He recently QSO'd 80 year old Tom, WB3JJK, who was using 800mW, for his first 10m two-way QRP QSO with the USA of the new sun spot cycle. For the last five years, Peter has been stuck on 39 zones for his QRP WAZ, and is hoping to QSO Mexico in the CQ CW Contest for his last zone. GWØVSW uses a QRP Plus at 4W and QSO'd OZ/DL9GTI on Falster Island (EU-029) who was also using 4W, EA8/G3RWL using his 5W MFJ 9020 and Howes ATU, and CTI/G3KJX. Carl also QSO'd ZL4SEA on 30m with his FT101ZD at 4W, and OHØ/DJ7ST on 40m with his 4W.

GØAYD was able to be QRV from his car on five bands for £13 by using a CB whip. Dave says "reports have been very encouraging and I've worked VK, JA and W and most of Europe too". The whip is a Solarcon triple load and is sold by Truck King in Watford, and you only need to change the top whip to change bands between 20, 17, 15, 12 and 10m without an ATU. The top whip lengths for each band are 10m - 4 inches for 200kHz bandwidth at 28500kHz, 12m - 6.25 inches for 24900kHz, 15m - 13.25 inches for 21200kHz and 17m - 22.25 inches for 18120kHz all to cover the whole band, and 20m - 44.24 inches for 150kHz each side of 14200kHz. Dave says it is far more efficient than his Hustler whips - and a lot cheaper!

DL2RM stayed with DL6DQW in Dresden for a few days in August and used his 500W into an eight element log-periodic beam 15 metres high. Rudi says "It was a new experience!" After that he stayed with friends in Regensburg where he used to live, and put up a 50 metres long wire which he fed with 5W from his SEG 15D. Rudi worked about 60 European stations, including a few members, and says "In my opinion

the simple wire antenna plus QRP power brought a better feeling of success into my head that the big gain rig in Dresden." He has ordered an R7000 vertical and hopes to put it on the roof of his garage. DF2OK is using a KnightSMiTe transceiver from the KnightLites QRP Club in the USA. It is a part reduced SMD version of the well known Pixie 2 designed for 80m. The output is about 200mW with an internal 9V battery and 400mW with an external 13V supply. Mike has QSO'd DL, OK, PA and ON5UP with a 80/40m dipole eight metres high.

G3MXN is finding data modes in the portion 14060-14070kHz, packet on 7030kHz and during the CQ SSB Contest,

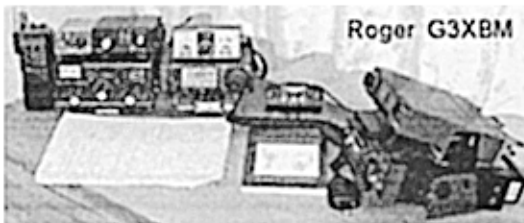
phone stations were creeping down into the CW end of 40m to 7025kHz. Tom says his letter is "nothing but complaints I am afraid and I am of the opinion that if we don't use the top end of the CW portion it will be completely taken over." I agree with Tom about data modes encroaching into the top of the CW portion of the 40 and 20m bands, but the CQ SSB Contest is only once a year and listen to the SSB portion of the band during the CQ CW Contest when then ball is on the other foot!

G4LQO says it would be nice if the annual club Handbook showed which members do not send QSL cards, perhaps by putting an asterisk next to their call, and if members who do not QSL would say so during the QSO. Bill is waiting for over 60 QSLs from members and has sent second cards to many of them. He recently traded in his QRP Plus for a FT840, which with the drive reduced to zero gives "a nice steady 3W, is very stable and gives steady accurate power outputs for QRP from 3 to 5W. On SSB it is accurate for QRP work up to 10W". Bill is using a MFJ 1786 mini loop nine feet high, which has solved "my problems with neighbours and DX is there when I want it."

ZL4SEA had two-way QRP QSOs with **G3RJF**, **US7MM**, **OM2ZZ**, **ON5AG** (twice) and **G3VPW** on 20m, and with **DL5GT**, **DJ6FO/P**, **GMØUTD** (twice), **G3ATM** (twice) on 30m between 16 August and 1 November. George also had QSOs with a number of non-members. Spurred on after reading in the last SPRAT that **ZL4SEA** was QRV on 10137kHz at his sunrise, **GMØUTD** started checking for



This could have been IK3/DL4NSE when Tom was on holiday at Lake Garda in Italy, but he was unable to get it set-up. It is a complete station for 30m QRP designed by DK6SX.



The G3XBM shack which Roger says is "more accurately described as our bedroom table!"

George. Harry eventually found him and was pleased to receive a 339 for his 3W to a Window antenna. **DL4NSE** is using a FT7 and a FOXX for QRP work from his new shack, built into the roof space immediately beneath the wooden roof. Tom says, "the tx out is the beginning (feed point) of the dipole. I don't need any centimetres of feeder and a fishing rod holds the second half of the antenna. It works well!"

G4BXN has rejoined the club after a lapse of three years. John is QRV as **VK3JJDY**, mainly on 20m CW with a sloping 50 feet long wire antenna from his Australian QTH, and says "but even with this set-up I'm staggered how easy it has been to work world-wide. This has less to do with superb antenna engineering, than for once living in an almost ideal HF QTH, with lots of boggy coastal heath-land around and only being 300 yards from the Southern Ocean, with an almost perfect take-off in that direction, which is great for long path Europe and USA QSOs. The other advantage in these parts is just how quiet the bands are, so that the 539 or 519 signal level QSOs are easier to complete successfully than they were on a crowded band in UK". **F5NZY** asks if we have any members who were active during WW2 for Special Operation Executive (SOE). Contact Stephane direct if you can help.

DF2OK spent his holiday on the Island of Föehr (IOTA EU-042) in September and took his Sierra with all modules except 12m, equipped with the well known DL-QRP-PA giving 5W out. Mike used



Michael, QRV as DF2OK/P, from Föhr Island on holiday.

two antennas: an inverted vee G5RV up eight metres behind the house and DF5MS's kite-zepp-system from SPRAT 78. An ATU, battery, earphones, Morse keys, paddle, tools and kite equipment completed the system. While on holiday on the Texas Gulf Coast about 70 miles south-east of Houston, Texas, **W5QJM** fired up his Ten-Tec Argonaut 556 at 5W into the infamous KISS antenna fed with 300 ohm line via a tuner. In addition to the usual assortment of USA contacts, Fred "snagged" a VE9 (two-way QRP), a ZX4 and an SM7, all on 15m; a ZL2 on 30m; and a DJ2 on 17m. The DJ2 was running 500W to a log periodic, but his signal wasn't all that impressive. Only the ZL had trouble believing I was running only 5W to an antenna literally tossed up in some trees".



The DL2BQD/P station at Wernigerode in the Harz Mountains, where Dieter used a OHR 30m SPRINT with MFJ 16010 ATU. Note the Hasseröder beer can, Dieter is trying to get them to sponsor his QSL cards!

DL2BQD used his DTR7 to a long wire antenna while on holiday on the Isle of Sky and in Northumberland. Dieter says that next year "I will look for a heavy metal ground foot for the little **GÖBZF** key; it's not necessary to minimise all of the equipment when you can put your rig into a car, as I found out in Northumberland. I put a beer can onto the key and a large tuning knob is a good support for convenient and comfortable work." **GWØNSR** is now QRV from his new QTH with a home brew 5W transceiver and a 'Dipole of Delight' antenna that Tony found in a car boot sale for 50p! **DJØPJ** will be QRV again as **FY/DJØPJ** in December, back home in Germany for Christmas, and QRV from **FY** again in January. **G3XTJ** QSO'd him for the first time on 10m in October when Dave was running his QRP Plus and balcony antenna.

Last February *Elektor* magazine published a 'huff and puff' stabiliser for VFOs which included a digital frequency display using a 16 x 1 'intelligent' LCD and a PIC. **G4EDX** bought the software but has only just started playing with

the circuit. It is meant to be used with an existing VFO (John uses an old Mizuho VFO7), but can be programmed for any IF, above or below incoming frequency, and it has an upper/lower sideband switch. A momentary switch turns the lock on and off, and when locked the display shows the size of the error and the direction of correction. John's tested it at work and measured the drift at 7030kHz as seven Hz in four hours. Whether locked or not the display shows the frequency to the nearest 100 Hz. The original code was written for PIC16C54 but a colleague has modified it to work in the PIC16C84 which, having EEPROM, is more convenient for the experimenter to use. Obviously the code is copyright protected so he doesn't feel at liberty to distribute it, but it is still available from *Elektor* (along with the PCB and programmed PIC) and John is happy to tell anyone else how to change the code for the PIC16C84. It is a useful little board (4x2 inches) with only four chips, a regulator and a transistor, and he thinks it should be more widely known.



EA8/G3RWL, Costa Teguisse, Lanzarote, Canary Islands. Rig is an MFJ-9020 20m single-band CW transceiver which fed a dipole via a Howes CTU-30 ATU. Best DX was VK!

GM4XQJ had a lot of fun with QSOs to North and South America from the Island of Fuertaventura in August. Back home Brian QSO'd **ZL1ALA** on two-way QRP for a new country on 20m, (this was John's first QRP CW QSO), and **ZL2BIF**. He called **ZL4AS** on 15m SSB with 8W and was very surprised to get a reply from Cliff first call. Watch for Brian to be QRV in March as **EA8/GM4XQJ**.

Thanks for all your news, information and pictures during the year, this column only exists with your help. June and I wish you and your families a very Happy Christmas and good QRPing in 1999.

Rig Broken or needs alignment?
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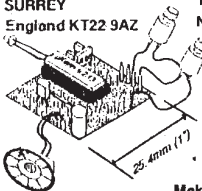
see March 96 RedCom for review of μ Keyer by G3RJV

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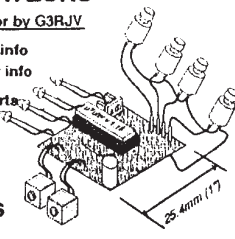
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S.A.E. for datasheets



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The Sparkford

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See the article, photo and offer in Autumn 98 Sprat.

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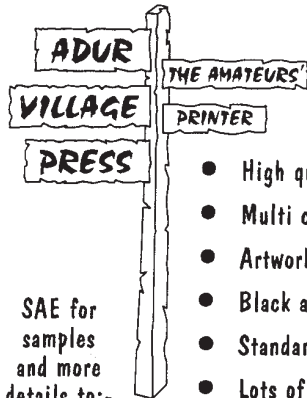
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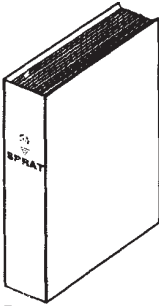
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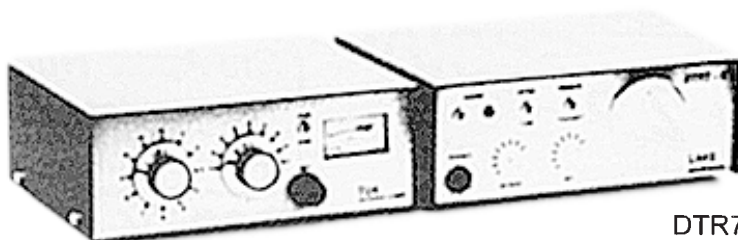
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