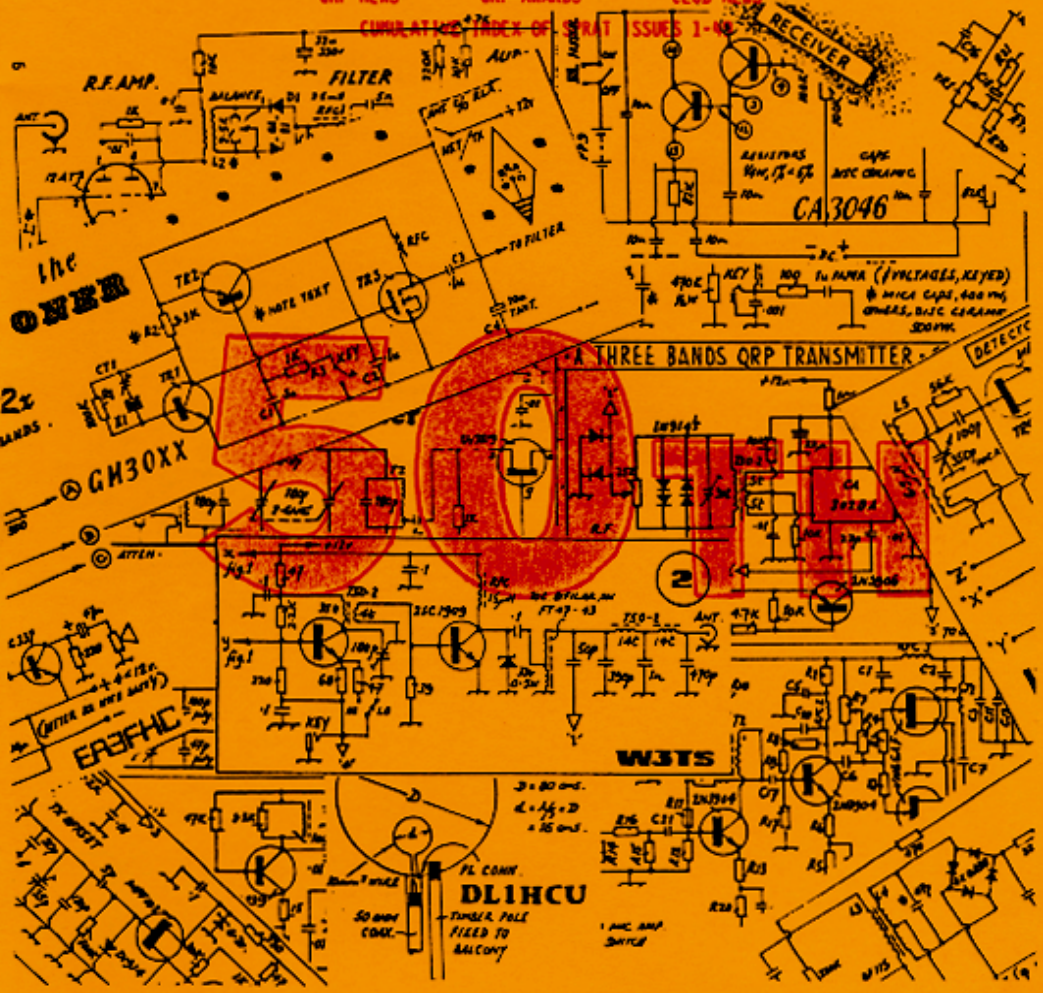
SPRAT

THE JOURNAL OF THE G-QRP CLUB

DEVOTED·TO·LOW·POWER·COMMUNICATION

ISSUE NR. 50 | © G-QRP CLUB | Spring' 87

DSB1 TRANSCEIVER G4VSO 50MHz TRANSCEIVER TOP 40 7MHz TRANSCEIVER
COMPACT Z MATCH ANTENNA TO IONOSPHERE HULA-HOOP MINI ANTENNA
VOXNER TRANSMITTER MEASUREMENT OF ANTENNA IMPEDANCE NIG RECEIVER
REDUCING NOISE ON 3,5MHz PRACTICAL MILLIWATTING AND MICROWATTING
QRP NEWS QRP AWARDS CLUB NEWS
CUMULATIVE INDEX OF SPRAT ISSUES 1-49



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Editorial

Welcome to SPRAT ISSUE FIFTY. This issue is big and FULL, so much so that I have had to hold over some of the Construction Competition entries to issue 51.

I have enjoyed producing the 50 issues of SPRAT, none more than this one. I hope that you all share in my enjoyment and that SPRAT continues to grow in excellence towards Issue 100.

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SPRAT 50 We hope you have noticed that this edition of SPRAT is larger than usual. We wanted to do something special for SPRAT 50 as it is a milestone in the history of the Club, hence the posh cover also! We have included some new construction designs and several one off interesting articles which we hope you will enjoy. Unfortunately SPRAT 51 will be back to the normal size as the additional cost of printing and postage is quite considerable. Let us know what you think of the extra size, so if the Club funds allow perhaps we can occasionally produce another bumper edition. One problem though, a SPRAT of this size takes more articles to fill, so we therefore need more from you. You do not have to have journalistic or artistic qualities, just jot your ideas, circuits and diagrams on a piece of paper, and we will do the rest for you. Mac G3FCK draws the circuits and diagrams while Chris G4BUE and George G3RJV check the text which Erica (see below) will type.

ADOPT A MEMBER

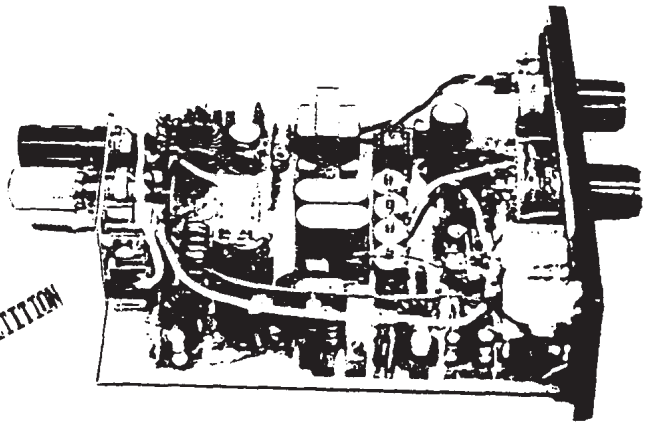
The club now has several members in Eastern Europe. In some of these countries, the members find it difficult, or impossible, to pay their club subscriptions because of local currency restrictions. The club has always accepted such members in spite of the fact they cannot pay. The numbers of such members is steadily increasing and although we are pleased to accept them into membership one alternative has been working for some time.
One or two members have, over the years, sponsored an Eastern European member by paying his subs and the outcome has been such members have to come to know the sponsored member, either by skeds on the bands or exchange of magazines or other things of interest by the sponsored member. It has proved to be a good way of forging amateur radio friendships. Would you like to sponsor such a member?, if so drop a line to G4BUE.

NEW CLUB OFFICER

From the 1st of January, 1987, Peter Linsley, G3PDL is to be the Club TREASURER in place of Alan, G4DVW.
We thank Alan for his services to the club over many years and welcome Peter into his new office. The change enables us to make the membership records and the accounts computer compatitable.

PLEASE NOTE: ALL SUBSCRIPTIONS ARE STILL PAID TO CHRIS, G4BUE. and please remember to quote your membership number.

SUBSCRIPTIONS The transition to the payment of subscriptions for everyone in January has met with the approval of almost the entire membership. One or two of you were a little concerned about the automatic deletions if subscriptions were not paid by the end of January. Obviously we do not want to lose members unnecessarily so as this is the first year of the new system we will send SPRAT 50 to all existing members before the deletions are made. We will enclose a letter to those who have not paid a subscription for 1987 telling them they will be deleted from the membership list unless they renew quickly. We hope this bumber edition of SPRAT will persuade them to renew and remain a member. The letter will also act as a form of receipt for those of you who have paid, in that if you do not receive a letter you will know you are paid up for 1987.



CONSTRUCTION COMPETITION

THE DSB-1: ONE WATT 80 M. DOUBLE SIDEBAND TRANSCEIVER

By VE7QK

Design Considerations.

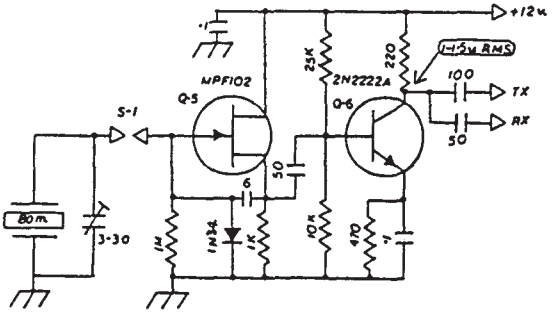
1. Simple Circuitry.
2. Readily Available Components.
3. Fit Standard Utility Box (no cramming or wasted space).
4. Minimal Battery Consumption (both RX and TX).
5. PTT, Internal Speaker, External VFO (desirable but optional).

To facilitate duplication as many parts as possible were purchased from Radio Shack. Unfortunately, the case is no longer listed in the 1987 catalogue, but is still available from other sources at a somewhat higher price. The only component which may present some problems is the small microammeter salvaged from an old RF indicator and approximately 1 inch square. It serves to indicate antenna curret on TX and B+ voltage on RX.

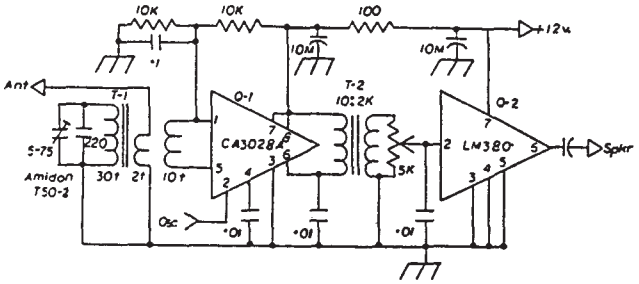
The rig in the form shown has provision for four Xtal channels. PTT is accomplished with a small DPDT relay. Whilst not so convenient, a miniature DPDT switch functions as well and saves battery drain on transmit. A 2.25inch diameter speaker slides between the case and the top of the relay with zero clearance. The case is 4.5inch X 1.5inch cast aluminum with plastic and covers.

The antenna is an inverted Vee centre fed with 75ohm twin-lead. In spite of its simplicity, VE1, 2 and 3, VK and ZL were recently received well on the speaker. However, communication is generally with stations in BC, Washington and Oregan. Fixed stations which cannot be heard at speaker strength are unlikely to hear a 1.1 watt signal. The rig performs well both from the home QTH and from wilderness areas within BC.

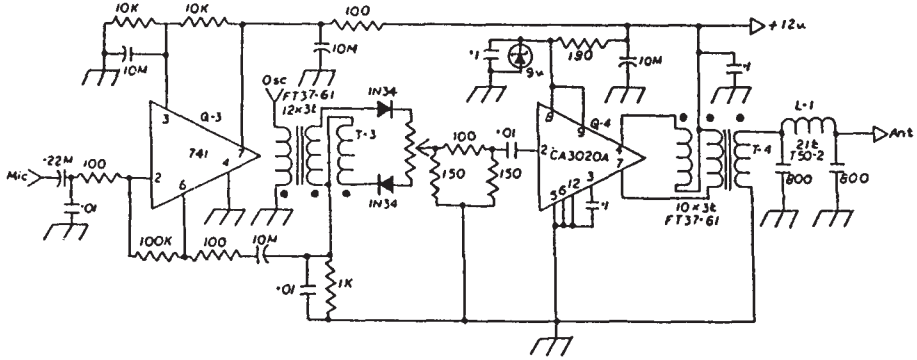
OSC/BUFFER



RECEIVER SECTION



TRANSMITTER SECTION



SUMMER QRP PARTY AT ALAMOSA Chris tells us that the date for the fourth Summer QRP Party at his QTH in West Sussex is Saturday 15 August. Early warning so you can mark it in your diary. As in previous years all Club members are welcome, Pam and Chris only ask that you let them know you will be going. More details in Sprat 51.

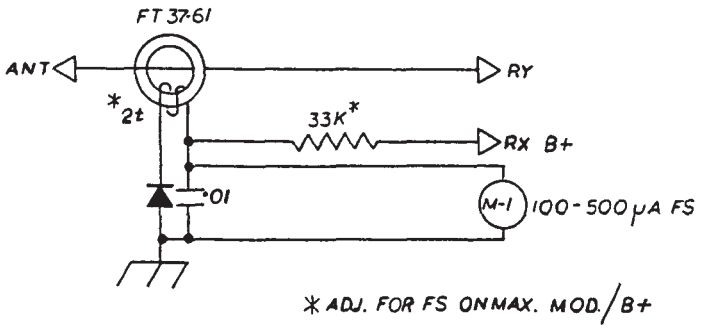
FOR SALE: CRT type 3BP1. £2 each to cover postage or FREE to callers. Also FREE to beginner who collects, valve superhet RX 1.6-5MHz and LW/MW. AM & CW/SSB with BFO.
Ian Braithwaite, G4COL, 28,Oxford Ave, St.Albans, Herts AL1 5NS.

FOR SALE: DRAKE 2C Receiver
Lindars, 41 Blenheim Gdns, Wallington, Surrey, SM6 9PJ 01.647.6157.

With the exception of the driver/PA stages (Q-4), the circuitry is essentially taken from various sections of the ARRL "Solid State Design Handbook".

Q-4 is an RCA CA3020A This remarkable little linear IC has a gain of 75dB and an output of around 1.1 watt. It is rated good to 8 MHz but will provide useful output up to 14 MHz. In this circuit pins 1, 10 & 11 are cut off; pins 5 & 6 go through the same hole. This greatly simplifies mounting. It requires a heat sink. Current to the CA3020A should be carefully monitored initially to balance the mixer and ensure that there is no parasitic oscillation. Total TX idling current is c.40 Ma (Zenor VR current included but not the oscillator) rising to over 200 Ma with speech (an equivalent class A DSB TX has a standing current in excess of 300 Ma). It shows no tendency to take-off when unloaded or mismatched.

METERING



COMMERCIAL POWER METERS

After the mention of the WELZ SP220 Meter in the last issue of SPRAT, Sandy (G3ZPN) tells us of another Welz Power Meter which he uses. The WELZ SP15M SWR/POWER METER has ranges of 2.5w/20w/200w and although a single meter model, Sandy finds it very useful for QRP work.

AN OLD FRIEND CHANGES.....

As readers may be aware by now, the SHORT WAVE MAGAZINE has gone into the ownership of PW Publishing Ltd, the publishers of PRACTICAL WIRELESS.
The Short Wave Magazine has been a firm supporter of the club since our foundation. In fact it was a letter on the SWM that began the club. We are not sure what the future of the SWM may bring but we are pleased that it is i the hands of Geoff, Dick and Elaine of PW who are also friends of the G QRP Club.

ROY HOPKINSON G4SQE Member 2073

We regret to announce the death of Roy, G4SQE. Roy was a keen QRP CW Operator. Roy was also a skilled musician and was for many years the resident pianist at the Piccadilly Hotel in Manchester.

CONSTRUCTION COMPETITION

50MHz DIRECT CONVERSION TRANSCEIVER

By Bob Carter G4VSO

Construction Notes
Having aquired a surplus 50.197MHz crystal, the idea of a rig monitoring the calling channel became very attractive. With this in mind I decided to have a go at a 6m rig. I hope that the following notes are of help.

Board 1
Audio amplifier board (TR7 and TR8), built on .1 veroboard, 30mm x 50mm. Classic design out of "Solid State Design", no problems with construction, liberal use of tantalum capacitors helps keep the size down.

Board 2
Mixer and audio preamp (SBL1 TR6), built on .1 inch prototyping board, similar to that shown in "Solid State Design". This type of mixer was used because one was available, and an increasing number of designs were using them. Lead lengths were kept very short and plenty of decoupling was used. Extra decoupling in the form of R21 and C31 was added to prevent microphony, in the form of noise picked up when the case was touched. A high pass filter was fitted to help with medium wave break-through, the filter has a cut-off frequency of approximately 35MHz. This also helped to reduce the microphony.

Board 3
Oscillator and buffer (TR1, TR2 and TR3), built on prototyping board 70mm x 30mm. The oscillator is similar to that out of the "VHF and UHF Manual", Edition 1, page 8.10. A VXO swing of approximately 10KHz was obtained, a switch was added to enable the crystal to be pulled up to 50.2MHz, but with much reduced frequency shift (this option could be omitted if required). More stable oscillation over the VXO swing was obtained at lower voltages, so a zener diode was added. TR3 is a simple class A buffer with approximately 20mw output. Transformer T1 splits the power between the PA and the mixer, 3dB attenuator is fitted in the local oscillator input to reduce the level to 7dBm.

Board 4
PA built on a prototyping board 40mm x 30mm, very simple circuit using 2N3866 transistor. No real attempt was made to match the output to 50R, R10 was adjusted to give a quiescent current of 50ma, so that the stage is running in class AB, 0.7 of a watt output was obtained (after low pass filter). Further power out could be obtained if a further matching circuit was added (L and 2 Cs).

In the original version only the PA was keyed, but it was soon found that the rig was radiating 15mw with the key up. In fact a report of S7 was obtained from approximately 15 miles away. A simple modification to the key both the buffer and the PA removed the problem.

Board 5
50MHz low pass filter built on double sided P.C board, appoximately 50mm x 30mm x 30mm, to form a completely screened box. Interstage screen was also fitted. Use of an FM receiver proved very useful to check the second harmonic, L5 and L6 were adjusted to give the best rejection of the second harmonic.

Board 6
Sidetone oscillator (TR9 and TR10), built on .1 inch veroboard 20mm x 15mm. TR9 and TR10 could be replaced by a simple unijunction transistor. Normal design values for R34 and R35 were 3.3K and 1K, but in my version the circuit would nt work until R34 was reduced to 1K. In fact I had more problems with this circuit than with any of the other boards.

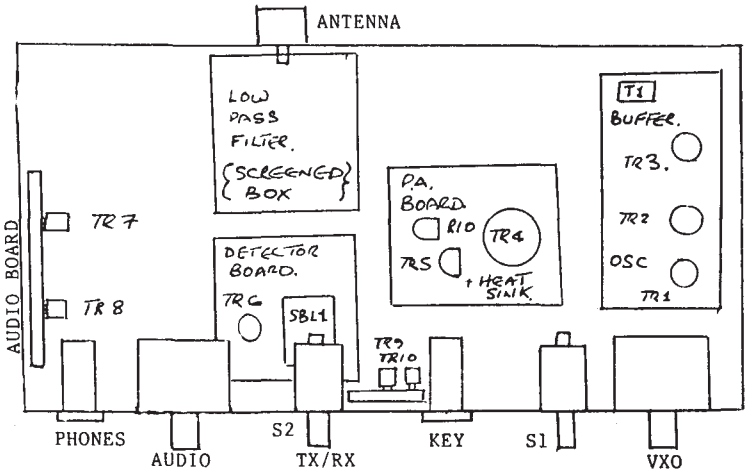
Tests
Both harmonic and sensitivity tests were carried out on the completed equipment, checking second and third harmonics on a spectrum analyser, both were found to be 50dB down on the main carrier. A signal of 1uv could easily be heard in the headphones.

Use
The rig has been in use for the last four months and several contacts have been had in the Reading area. The antenna is a dipole in the loft, 30 feet high.

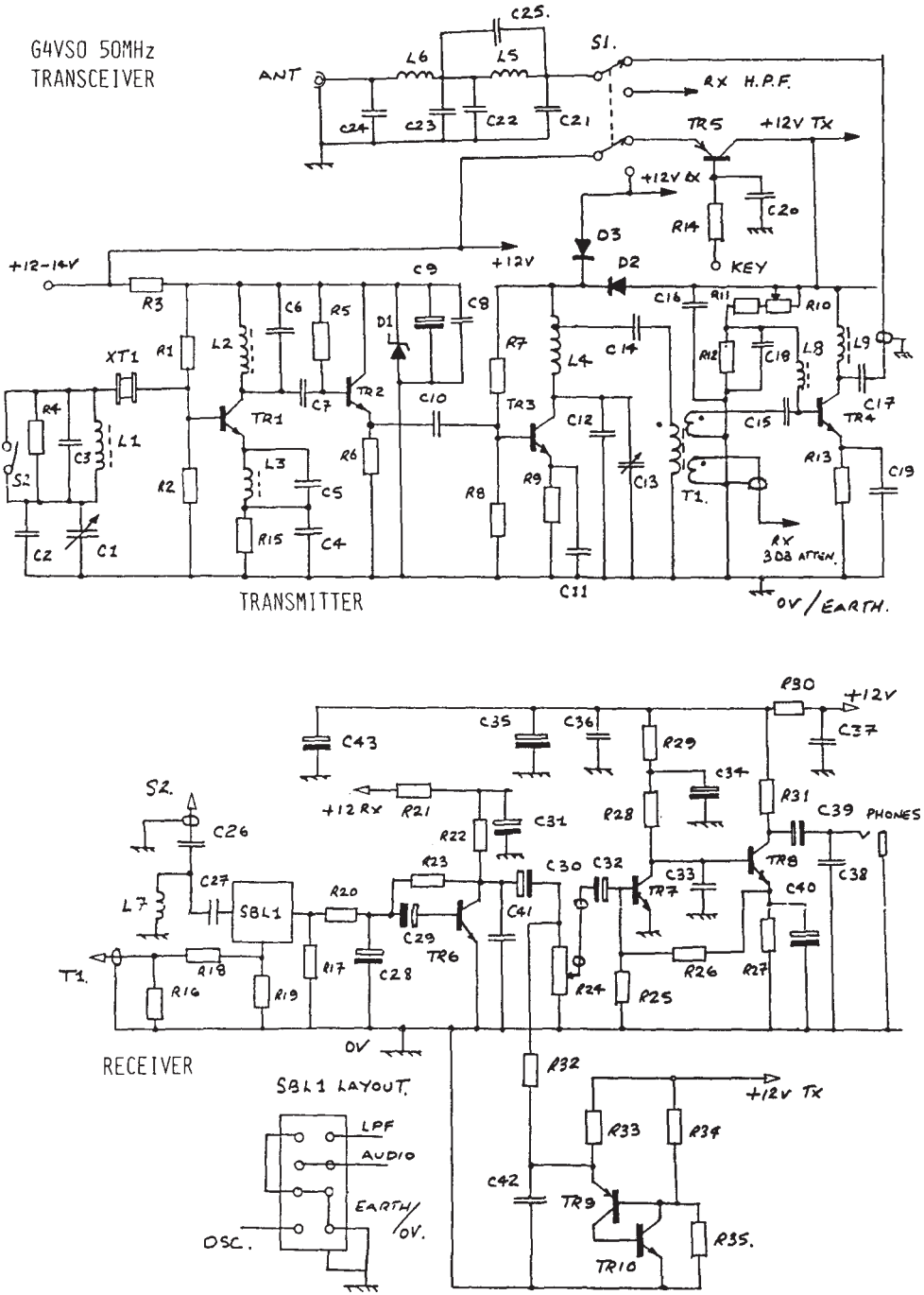
References
1. "Solid State Design", ARRL.
2. "VHF UHF Manual", RSGB.
3. "Radcom", January 1986, 'Direct Conversion Tranceivers'.

Improvements
1. Add a VFO with a control loop similar to that published in SPRAT, issue 48.
2. Add a Jfet preamp to improve sensitivity.

Alternative Components
Electrolytic capacitors could be substituted for tantalum capacitors to reduce the cost of the rig, but this would increase the size of the unit.



INTERNAL LAYOUT OF TRANSCEIVER


G4VSO 50MHz
TRANSCEIVER
ANT
C25.
L6
L5
S1.
RX H.P.F.
TR5
+12V TX
+12V RX
C24
C23
C22
C21
C20
R14
D3
D2
KEY
+12-14V
R3
+12V
C9
C8
C16
R11
R10
XT1
R1
L2
C6
R5
D1
R7
L4
C14
R12
C18
L8
L9
C17
TR4
TR1
C7
TR2
C10
TR3
C12
C15
R4
L1
C3
L3
R6
R8
R9
C13
T1.
R13
C19
S2
R2
C5
R15
C4
C2
C1
RX
30dB ATTEN.
TRANSMITTER
C11
0V/EARTH.
R30
+12V
C43
C35
C36
R29
C37
C34
S2.
+12 RX
R21
C31
R28
R31
C39
PHONES
C26
R22
R23
C30
C32
C33
TR8
C38
C27
SBL1
R20
C41
TR7
C40
L7
C29
TR6
T1.
R18
R17
C28
R24
R25
R26
R27
R16
R19
0V
RECEIVER
R32
+12V TX
SBL1 LAYOUT.
LPF
AUDIO
EARTH/
0V.
OSC.
R33
R34
C42
TR9
TR10
R35.

COMPONENT LIST

R1 33K 1/4W 5%	C1 50pF air spaced variable	L1 9 Turns on 4mm former slug tuned
R2 10K 1/4W 5%	C2 2.9pF Ceramic	L2 12 Turns on 4mm former slug tuned
R3 220R 1/4W 5%	C3 15pF Ceramic	L3 12 Turns on 4mm former slug tuned
R4 4.7K 1/4W 5%	C4 1n Ceramic	L4 4 Turns on 4mm former slug tuned
R5 150K 1/4W 5%	C5 47pF Ceramic	L5 .11uH 5 turns on T50/6 toroid
R6 1K 1/4W 5%	C6 15pF Ceramic	L6 .11uH 5 turns on T50/6 toroid
R7 10K 1/4W 5%	C7 3.9pF Ceramic	L7 .22uH axial inductor
R8 1.5K 1/4W 5%	C8 .1uF Ceramic	L8 4 turns on ferrite bead FX1115
R9 100R 1/4W 5%	C10 10uF Tant 25V	L9 3 turns on ferrite bead FX1115
R10 2.2K Preset	C11 1n Ceramic	T1 Primary 3 turns, secondary 2+2
R11 560R 1/4W 5%	C12 22pF Ceramic	on twin ferrite bead A0004X030
R12 56R 1/4W 5%	C13 22pF plastic variable	(electrovalue)
R13 3.3R 1/4W 5%	C14 120pF Ceramic	D1 10V 330mV zenner diode
R14 1K 1/4W 5%	C15 220pF Ceramic	D2 IN914 Switching diode
R15 1K 1/4W 5%	C16 .1uF Ceramic	D3 IN914 Switching diode
R16 270R 1/4W 5%	C17 10n Ceramic	
R17 68R 1/4W 5%	C18 1n Ceramic	TR1 BSX 20
R18 18R 1/4W 5%	C19 1n Ceramic	TR2 BF115
R19 270 1/4W 5%	C20 .1uF Ceramic	TR3 BSX20
R20 220R 1/4W 5%	C21 56pF Poly 2.5%	TR4 2N3866
R21 1.2K 1/4W 5%	C22 56pF Poly 2.5%	TR5 ZTX313(any PNP)
R22 4.7K 1/4W 5%	C23 56pF Poly 2.5%	TR6 BC109
R23 1M 1/4W 5%	C24 56pF Poly 2.5%	TR7 BC109
R24 10K POT LIN	C25 22pF Poly 2.5%	TR8 BC109
R25 10K 1/4W 5%	C26 82pF Ceramic	TR9 ZTX313(any PNP)
R26 47K 1/4W 5%	C27 82pF Ceramic	TR10 ZTX212(any PNP)
R27 2.2K 1/4W 5%	C28 1uF Tant 25V	
R28 4.7K 1/4W 5%	C29 10uF Tant 25V	Mixer SBL1
R29 1K 1/4W 5%	C30 10uF Tant 25V	XT1 50.2MHz 3rd overtone xtal HC25U
R30 15R 1/2W 10%	C31 10uF Tant 25V	
R31 2.2K 1/4W 5%	C32 2.2uF Tant 25V	HARDWARE
R32 4.7M 1/4W 5%	C33 .1uF Ceramic	S1 DPDT TX/RX
R33 100K 1/4W 5%	C34 10uF Tant 25V	S2 SPDT VXO swing
R34 1K 1/4W 5%	C35 47uF Tant 25V	1/4 inch key socket
R35 1K 1/4W 5%	C36 .1uF Ceramic	1/4 inch phone socket
	C37 1n Ceramic	Ant socket
	C38 1n Ceramic	Misc nuts and bolts
	C39 2.2uF Tant 25V	Diecast box 170mm X 120mm
	C40 10uF Tant 25V	.1 veroboard, copper clad board and
	C41 1n Ceramic	prototype board
	C42.022uF Poly 2.5%	TO5 heatsink
	C43 470uF Electrolytic 16V	

MEMBERS ADS

FOR SALE HRO-MX, HRO PSU and 80 thru 10 bandspread coils. Nearest offer to £65. Buyer collects please. G3LGX, QTHR.

WANTED Kenwood/Trio T-599S TX and/or any TX's, prefer SSB+CW monobanders, all HF + 2mtrs - anything considered. RAIBC member taking CW in New Year. Peter, G1TXI, 2 Huxley Close, Lakenham, Norwich, NR1 2JS.

WANTED HW7 and a small 160 metre CW/DSB transceiver
FOR SALE Large quantity of junk, some real good gear. SAE for details. Adrian, G4GDR, 227 Windrush, Highworth, Swindon, Wilts, SN6 7EB

THE TOP 40 TRANSCEIVER

CONSTRUCTION COMPETITION

By Miguel Molina EA3FHC

The TOP 40 is a full tansceiver for the 40 metre band including two tuning ranges, (7000-7100 and 7000-7040), RIT, 4w output, an audio filter (800Hz), sidetone and voltmeter dial. The VFO is controlled by varicap diodes, the VFO frequency being a function of the variable voltages.

A multiturn pot will provide excellent results as the main tuning control, (the 10 turn pot used in the prototype gives a 10KHz per turn or 4KHz per turn depending on the range). The other BA109, with the 5pF capacitor, provides the RIT with 15KHz of offset. A "memory" is obtained using a trimmer pot of 10K and switching it in place of the tuning pot, (I have it on the QRP calling frequency). A voltemeter to monitor the voltage on the tuning pot provides a very simple dial, which can be graduated with a frequency meter. The VFO requires polystyrene capacitors and a stabilised voltage.

The PA is a Japanese transistor often used in CB rigs, it gives about 4 watts out, although other types may be used, (BD226 gives 800mW, 2N5590 and MRF476 also work well). The VK200 is a commercial RF choke, if not available use 10uH.

The receiver is almost fully integrated, AN612 mixer, uA747 audio filter, LM386 audio amplifier with a 40673 preamplifier. The AN612 is used in many commercial rigs and is easy to find here in Spain, but if you cannot find it use another mixer, say SL641. The audio filter is from the Radio Handbook, and about 800Hz wide. The receiver has an RF gain control and automatic muting when the key is down. The prototype was built on four PCBs, TX, VFO, RX and auxiliary circuits.

L1	35t 0.2mm wire on 6mm former coil
L2 L3	14t on 6mm former coil
L4	5t 0.2mm on 6mm former coil with ferrite
L5 to L8	35t as L4

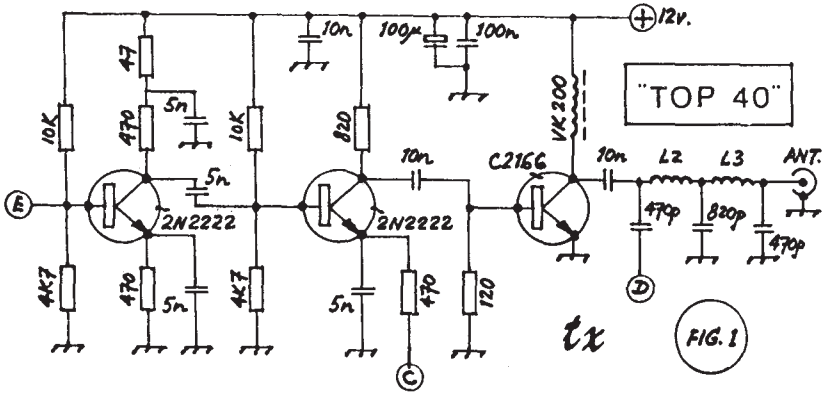
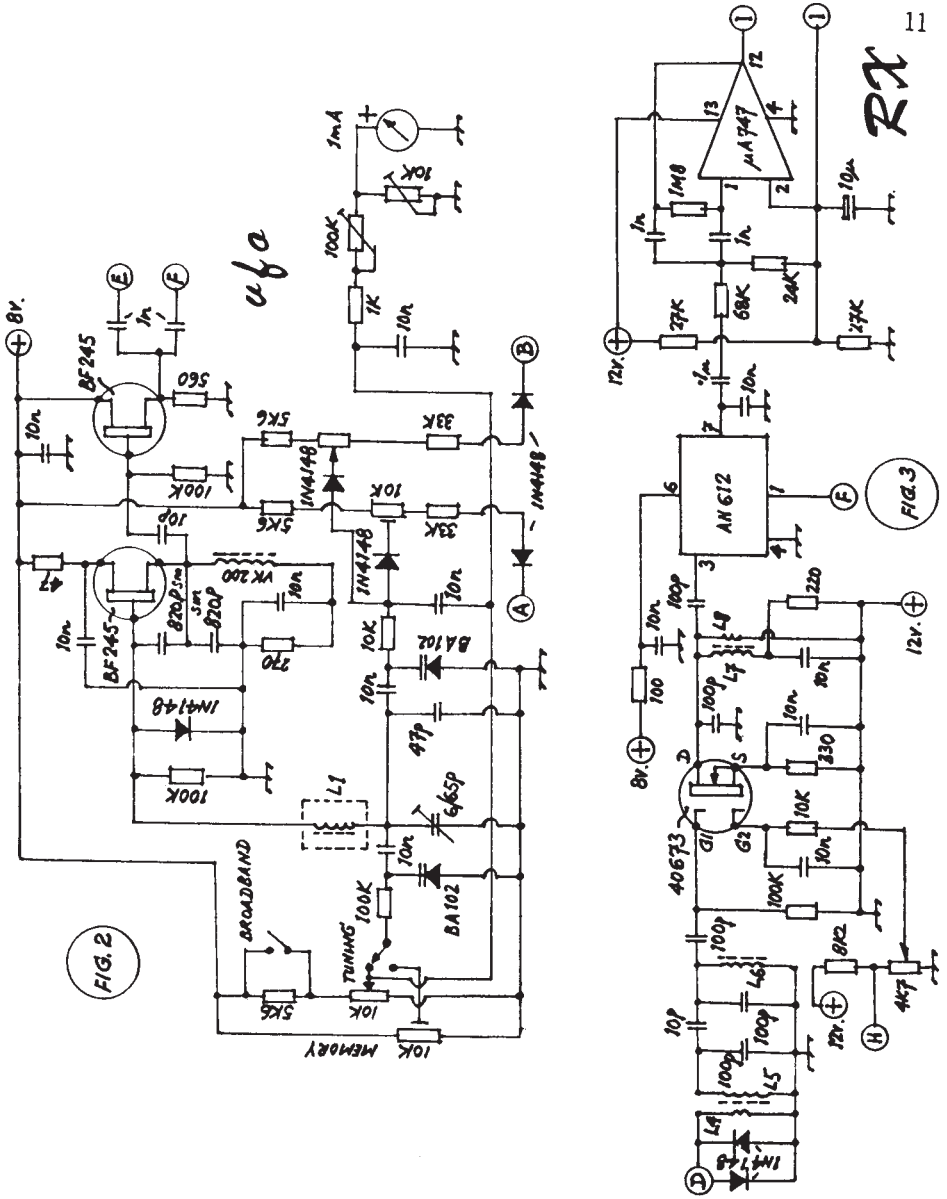
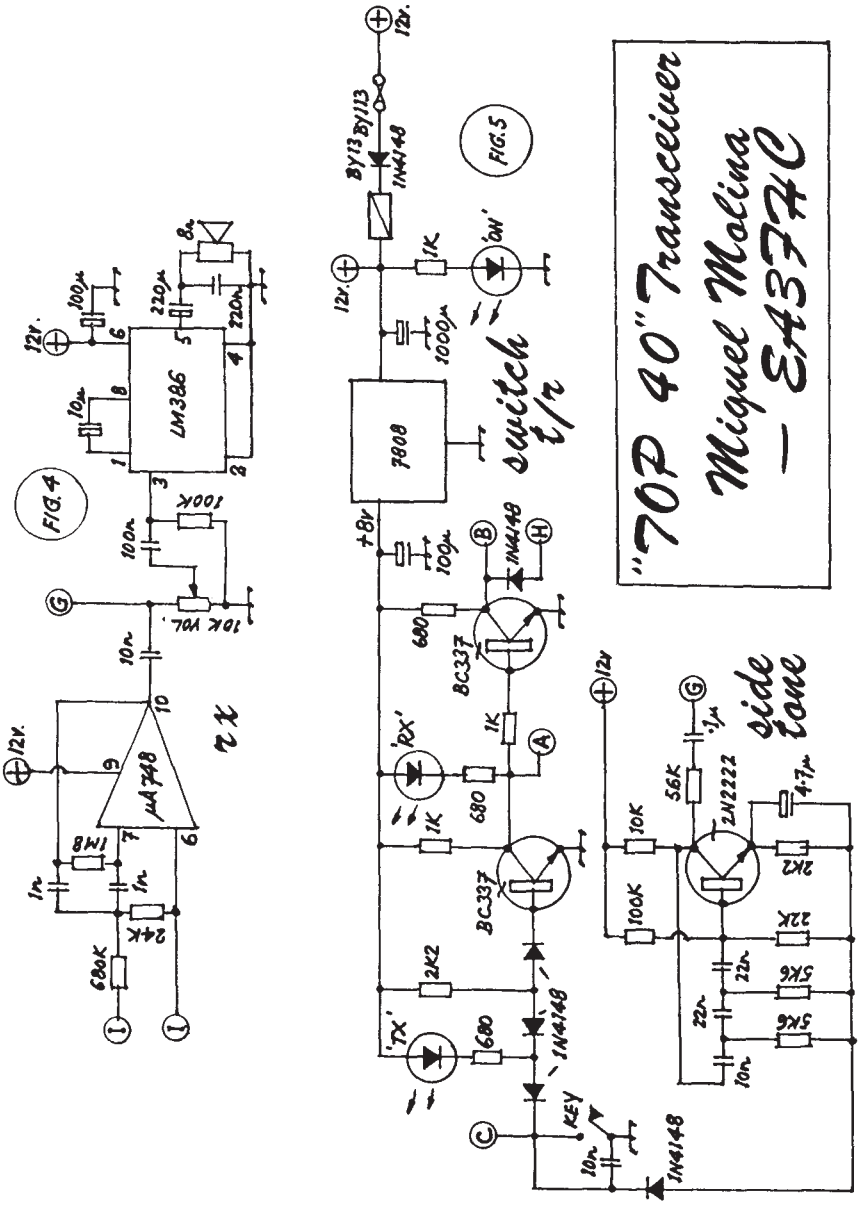


FIG. 1

MEMBERSHIP RECORDS Chris G4BUE says the transition of Club records onto his BBC micro-computer seems to have gone off with only a few hiccups. The odd errors in address labels pointed out when sending in subscriptions have now been corrected, but it is obvious one or two of you do not fully appreciate the problems of using a data base. There is a restricted amount of space, i.e. so many characters on each line of text, for each record and those of you who have very long addresses will find they have been abbreviated. In some cases the name of a road or town has to be spread over two lines, but this small disadvantage is outweighed by the many advantages of the system.



DAYTON 1987 Many thanks for all your letters and comments regarding the G-QRP-Club attending Dayton 1987. The overwhelming opinion is that the Club should attend, just a handful of members were opposed. Many thanks to those members who sent additional money with their subscriptions for Dayton. The Club have therefore booked a commercial stand and with a bit of luck it will be positioned next to the ARCI stand, thus making a bigger QRP impact. G3PDL, G3RJV, G3VTT, G4BUE and G4LQF will be representing the Club and will also be taking part in the QRP Forums. Look for a report in Sprat 51.



CLUB QSL BUREAU A reminder to newer members that the Club QSL Bureau is only for cards for other Club members. Cards should have the recipients Club number written on the top right hand corner and should be sent to Pam Page (G4BUE/2), "Alamosa", The Paddocks, UPPER BEEDING, Steyning, West Sussex, BN4 3JW. Pam sorts them and the cards are sent to members with their next edition of SPRAT. Please do not send envelopes, cards will only be sent out with SPRAT. Deadline for cards reaching Pam is the 10th of the month of publication.

A 'Z' MATCH UNIT

By David Jackson G4HYY

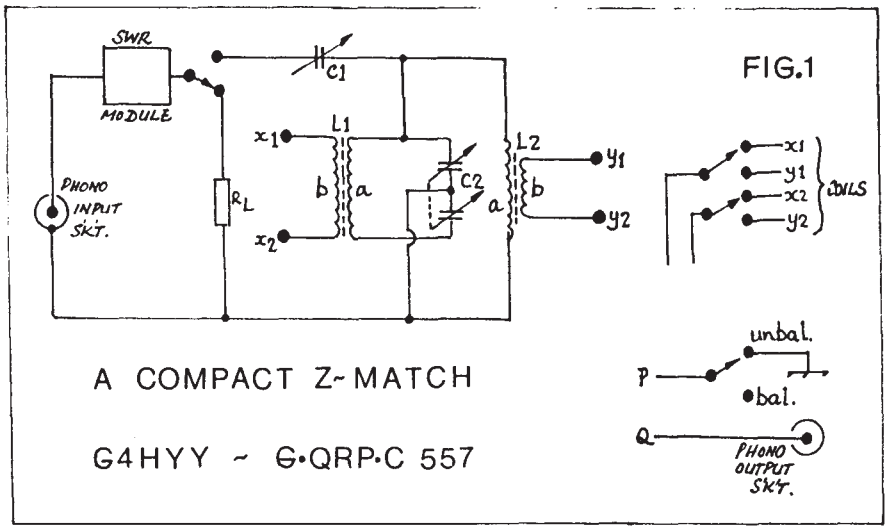
I make no claims for originality! - although I don't recall seeing a Z match using toroids. Necessity is the mother of invention, I needed a small, self contained aerial matched, SWR module, output power meter - particularly for /P work. It also had to be capable of connection to different antennas.

The prompt came from the "All Bands QRP Z Match" by Frank, G3YCC in SPRAT No.38. The matching unit is planned to feed coax fed antennas; twin feeder systems or end fed wires. It is used mainly with a TS120V and has worked successfully matching an inverted vee fed by 300 ohm ribbon from within my caravan.

At the home QTH the unit is normally used with open wire feeders to a doublet. At the time of writing the doublet, (which started life as the abiquitous G5RV), is fed off centre, (part of the top having been lost!).

The matching unit allows me to obtain a very low SWR from 10 to 80 metres, (although the new bands have not yet been tried), with both the doublet arrangement, and also by feeding the long side as an inverted L, with the short side earthed.

Give it a try - experiment a little with the number of turns on the coils. I have not done any calculations, preferring to operate by "suck it and see"!



MLX BOARD USERS

ONE OF OUR MEMBERS IS UNDERTAKING TO COLLECT CIRCUITS, TIPS AND IDEAS ON THE USE OF THE MLX SSB BOARDS. THESE WILL BE SHARED AMONGST USERS AND MAY APPEAR IN THE PAGES OF SPRAT. PLEASE SEND YOUR NOTES/CIRCUITS TO:

MIKE HADLEY, G4JXX, 143 DENVILLE CRES, BORDESLY GREEN, BIRMINGHAM, B9 5TS

Coil Data: L1a and L1b 9t)
L2a 15t) there is some room for experiment here.
L2b 8t)
Both pairs of coils wound (side by side) on 130-6 toroids. L2b starts at the earthy end of L2a.

Capacitors: C1 - one section of 500pF broadcast type air spaced, (both sides insulated from chassis). C2 - both sections of 500pF broadcast twin gang, (rotor earthed).
N.B. Coax (miniature 50 ohm) between SWR board and SWR/Load switch: also between this switch and dummy load.

SWR Module - from "The Joy of QRP" by Ade Weiss, W0RSP. The unit is calibrated to show output power; calibration is by use of the wattmeter from the same book. Calibration was carried out on 80 metres and is not absolutely consistent across all bands. I consider it to be "near enough".

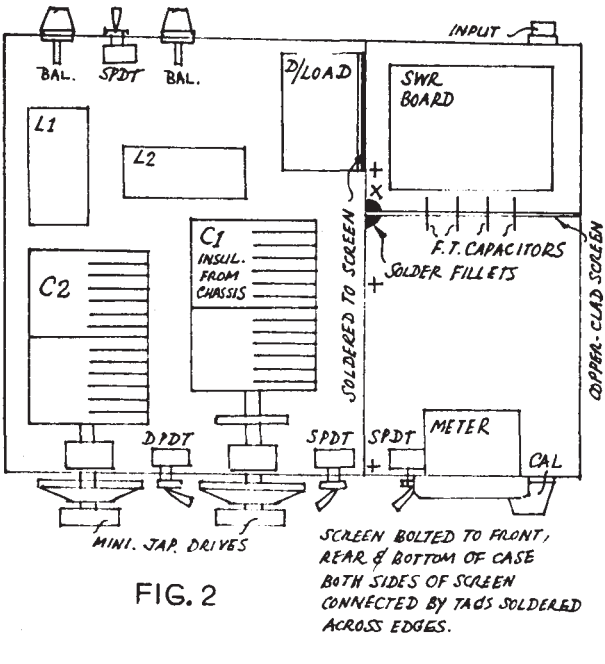


FIG. 2

SCREEN BOLTED TO FRONT, REAR & BOTTOM OF CASE BOTH SIDES OF SCREEN CONNECTED BY TAGS SOLDERED ACROSS EDGES.

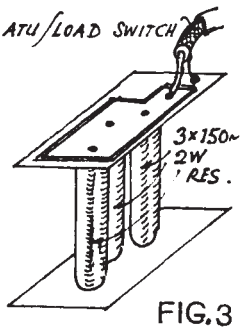
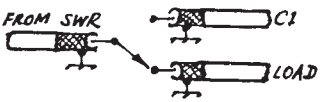


FIG. 3

END PLATES. DOUBLE-SIDED P.C.B. TOP PLATE CARVED, USING P.C.B. DRILL, AND MILLING TOOL



ATU/LOAD SWITCH

L1 and L2 are mounted on small pieces of PCB which are in turn mounted on plastic stand offs fixed to the base. A hole in the PCB screen in the SWR board compartment (X) is drilled to accept coax between the SWR board output and the ATU/Load switch. Coax screen is easily connected to earth by soldering to the PCB screen.

QRP CONVENTION AT YEOVIL The third Yeovil QRP Convention is being held on 10 May 1987 and more information can be obtained from Club member Eric Godfrey, G3GC at 60 Chilton Grove, YEOVIL, Somerset, BA21 4AW, (Tel. Yeovil 75533). The Club will be having a stand and the usual Club sales will be available. One or two volunteers to help man the stand would assist Chris G4BUE as he will also be giving a talk on construction techniques.

WANT TO JOIN A G/ZL CLUB SKED? G3ROO - ZL1ABS Tuesdays 0800z 14118 SSB

THE SUFFOLK TROPHY

Elegibility, any member of the G-QRP club.
When Annually on Region 1 QRP Day, 17th June
Period Any six hours during the day, taken in not more than two periods. Start/Finish times of periods to be shown in the log.
Contacts Contacts with any station in IARU Region 1 count
Form of Contact Normal QSOs, there are no special contest exchanges.
Bands Any bands for which the operator is licensed.
Power Not to exceed 3 watts RF output (CW) or 10 watts PEP (SSB).
Scoring Each Region 1 country contacted on each band counts 1 point. The claimed score should be the total of IARU Region 1 Countries contacted on all bands used. For example 6 countries on 7MHz and 16 on 14MHz give a score of 23. Only 1 contact per country per band is allowed, irrespective of mode.
Enries These should give name, address, call, power and mode used, brief equipment details, and the call sign, time and band of each contact claimed for scoring purposes. A summary giving the claimed score for each band and the overall claimed score must be included.
Entries to A.D. Taylor, G8PG, 37 Pickerill Road, Greasby, Merseysude, L493ND to be received by 17th July. Any received after that date will be disallowed.
Awards At the discretion of the Committee the winner will receive a memento trophy and a book token for £15. Second and third will receive merit certificates.

Put this one on your calender. QRP Day is OUR day!

AGCW-DL QRP PARTY

Open to any licenced radio amateur or SWL

Date May 1st of every year
Time 1300 to 1900 UTC
Bands 3510 to 3560kHz, 7010 to 7040kHz
Mode CW only
Categories A. Maximum input of 10 watts or maximum output of 5 watts
B. Maximum input of 20 watts or maximum output of 10 watts
C. SWL.
Call "CQ QRP"
Exchange RST + QSO number/class, QSO number starting at 001.
Example 579001/A
Scoring 1 point per QSO with one's own country. 2 points per QSO outside ones country. each QSO with a class A station scores twice. Each station may only be worked once per band. SWL-logs must show both the callsigns per QSO heard plus at least one complete report.
Multipliers Each DXCC country = 1 multiplier
Band Total QSO points x multipliers
Total Score Summ of band results
Logs to be submitted to

Wolfgang Kuhl, DL1DAL
Schultenstraße 12
D-4780 Lippstadt **List of results** Send with SAE and 1 IRC

....OOPS
SPRAT 48 Page 17, Para 4, reads
'A 2N3504 or BFY51 gives more drive and power...'
It should read
'A 2N3504 gives more drive and power, but a BFY50,51 or 52 can also be used'.
SPRAT 49 Page 14,"Further Evolution of the Double-D Beam" Table 1. This table is incorrect. It should read
A and B = 3350/f, C = 2370/f, D = 700/f, E = 1336/f. The table is correct in the original article, SPRAT 30, P10.
SPRAT 49 Page 9, "The Tenor RX".
The lower winding of T1 should be centre tapped to earth for D1 and D2 to function

I HAVE TO MOW THE GRASS TO FIND MY ANTENNA!

By John McDonnell G3DOP

On 22 October 1986 I received a 559 report from VO1KO when I was running 8 watts. Nothing very remarkable about that, except that my antenna on the front lawn was only **SIX INCHES ABOVE GROUND.** The same antenna has been used to work all round Europe on 14MHz and around the UK and over to France on 7MHz. The antenna is my version of the DDR, also known as the "Hula Hoop". It is made of a circle of RG123 coaxial cable, and is 4'6" in diameter. It is supported **6 INCHES** above ground by driving in short wooden stakes and lashing the cable to them with twine. Fig. 1 shows the general arrangement, and as can be seen the loop is fed from 50 ohm coax, and is series tuned by means of a 50pF capacitor.

The groundplane in my case is two large sheets of aluminium, but if possible I would recommend a ground plane made from galvanised wire netting (chicken wire), and covering an area slightly larger than the loop. I use a diecast metal box to house the variable capacitor and the terminations from the two ends of the loop and the feeder. Note that both the feeder connection and the connection from the loop to the 50pF capacitor should use 16 SWG insulated wire. The whole arrangement is shown in Fig. 2.

Other very important points to note are as follows. The capacitor must be of very high quality and have a low-loss connection to its spindle, (ideally a pigtail). All connections in the loop circuit, including those to the connectors in the box, must be made with great care to ensure the lowest possible ohmic resistance. All connectors, and the free end of the coax, must be very thoroughly waterproofed. If water seeps in the efficiency of the loop will be seriously degraded.

To adjust the loop, tune it carefully to 14MHz and check SWR. If it is not low, move the pisition of the feeder tap until the lowest SWR is obtained, re-resonating the capacitor after each change.

The loop wil also tune to 21MHZ and 7MHz. At 14MHz it will have an efficiency about 4dB down on a 16 feet vertical erected over the same groundplane. It will be more efficient at 21MHz, but on 7MHz it will be about 14dB down on a 33 feet vertical, (but a 9 feet diameter version 2 feet above ground should only be 4dB down on a 33 feet vertical on 7MHz).

In my configuration I am using the loop under the most difficult possible conditions, even local obstructions like small plants being higher than the antenna, but it still gives remarkable results. There is no doubt that, still using the same version, results could be considerably improved by mounting the antenna and chicken wire groundplane on much higher stakes, so that it clears most local obstructions, or by mounting it on a flat roof. Also, my version is designed to be fairly portable, so I used the fairly thin RG123 coax. The efficiency of a fixed version would be higher if RG8 cable was used, and of course if you want a deluxe version, then instead of coax use one inch copper plumbing pipe. If you use the latter the loop can be made in a series of gentle bends, such as an octagon, which means the pipe could be fairly easily bent using an ordinary electrician's conduit bending tool.

This antenna seems to have great possibilities. If you use it please report your results to **SPRAT.**

Loop is made of RG123 coax. Only the screen of the coax cable is used for connections, ignore the centre conductor. The 50 ohm feeder is connected as shown. A = 3", D = 4' 6", H = 6", X = 1.5" (this dimension can be adjusted for the best output). These dimensions are for 14MHz, but useful results can be obtained on 7 and 21MHz.

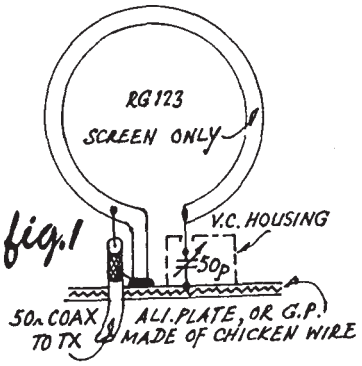


fig.1

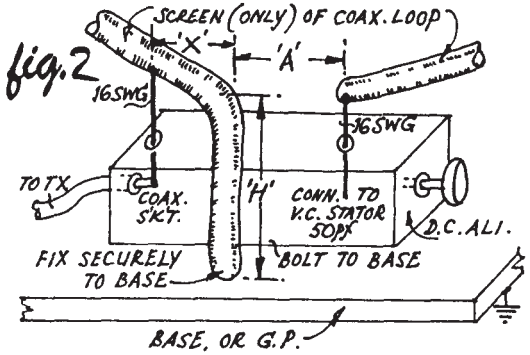
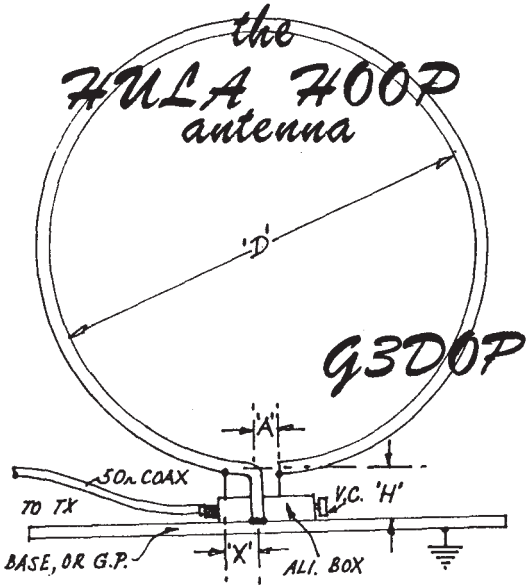


fig.2

the HULA HOOP antenna



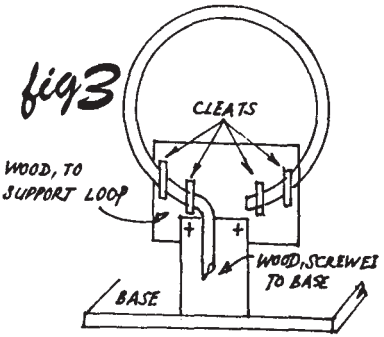


fig3

1. Ignore the centre conductor of the coax loop.

2. Dimension "H" is shown in the front of the diecast box for explanatory purposes only.

Note - the diecast box is mounted in front of the wooden support, as in Fig.2.
2.

OFFERS OF HELP Many thanks to those of you who offered assistance in the running of the Club after our plea in the last edition of SPRAT. Keith, G4SLE has offered to join up with Chris G4BUE, Pat G4UYA and Cedric G4JBL in mailing out your SPRATS and Erica, the charming XYL of Pete, G3LDO has offered to do the text typing for SPRAT. On behalf of all Club members many thanks Erica and Keith.

CORRESPONDENCE TO CLUB OFFICERS When writing to Club Officers it is esential you quote your membership number. It is included on your address label, so if you do not know it please ensure you make a note of it. All the Club records centre around your membership number and it can be very difficult to trace you without it. If you want a reply, then please enclose a stamped and addressed envelope.

ANTENNA TO IONOSPHERIC MATCHING

By Vladimir Ademov(1) BA. FFLE.

INTRODUCTION

The author, who holds a Amateur Radio transmitting licence(2), has made an academic study of amateur radio antennas and has come to the following conclusions.

1. The antenna should be efficent, enabling communication to any part of the world using the lowest attenuation path propagation conditions will allow.
2. The antenna should be able to operate on any of the high frequency bands allocated for amateur radio.
3. The antenna should be unobtrusive because most amateur radio operation is from suburban sites.

THE PROBLEM

Present existing methods of obtaining antenna efficency is to use a horizontal antenna as high as possible. This produces multiple vertical lobes, some of which have a low enough angle to match into long distance ionospheric propagation conditions; this results in a considerable wast of radio frequency energy. The author has observed the most commonly used method of overcoming this inefficency is to use a gain array, normally a Yagi-Uda. This in turn makes the antenna large and obtrusive. Further, designing such a sructure to operate on more than one frequency band results in compromise. Another method is to use a vertical antenna. Although the angle of radiation of a vertical antenna is low it has only one lobe and will only match a limited set of ionospheric conditions; in addition a considerable proportion of the radio frequency energy is absorbed in the surrounding earth and nearby metal objects. Vertical antennas are also more suseptible to man-made noise.

HYPOTHESIS

The author has, together with other workers(3)(4), noted that the vertical angle of radiation is determined by interaction with the ground. The horizontally polarized image in Figure 1 is in antiphase and cancels the radiation along the earth's surface. At appreciable wave angles the path length from the image is greater by a distance of 2h sin theta, resulting in a phase difference of 4h sin theta/lambda radians. The image of a vertically polarized antenna, illustrated in Figure 2, is in phase and supports radiation along the surface.

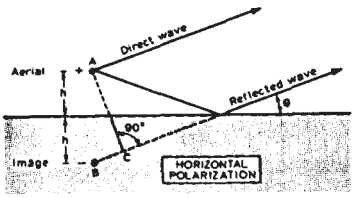


Figure 1 Horizontal Polarization

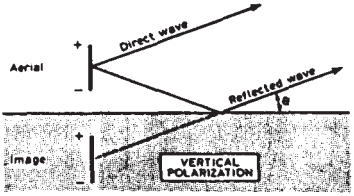


Figure 2 Vertical Polarization

Matching the transmitter to the antenna is well documented, however, matching the antenna to the ionosphere has been ignored in the literature or dismissed as insignificant. All that is required is an antenna system whose main vertical angle of radiation is controllable. How can this be done?

In the case of vertical polarization over a hypothetical perfect earth the 'optical' nature of these waves can be clearly seen. The authors hypothisis is that this earth/antenna interaction can be exploited to match the antenna optimum ionospheric propagation.

The hypothisis is testable as follows:
1. Modifying the profile of the earth where the earth currents are greatest.
2. Modifying the profile of the antenna.
3. Adjusting the height of the antenna to operate in conjunction with 1 and 2. The hypothisis predicts that exact angle of radiation can be produced to suit the ionospheric propagation path in use to exploit the chordal hop propagation phenomena.

SOLUTION AND DESIGN METHODOLOGY

The design evolved by the author is illustrated in Figures 3 and 5. It comprises two counter-clockwise triangular coil configurations on the same support. Although most of the element length appears horizontal the polarization is vertical because the elements are in fact large diameter coils; the same principle as the DDRR antenna.

The system is made to resonate on the appropriate bands by the use of capacity elements; often refered to as 'hats' in literature but the author found the devices illustrated more effective.

The elements are fed by a special matching system, invented by the author, and known as Y front matching. The Y, formed by V wires connecting the elements and the braid to the counterpoise are connected using a ferrite ring transformer illustrated in Figure 3.

For the purpose of the experimental work a wire earth system was arranged. A manual system of height adjustment was devised with suitable counterweights to allow easy adjustment. The maximum field strength at specific vertical angles could then be measured.

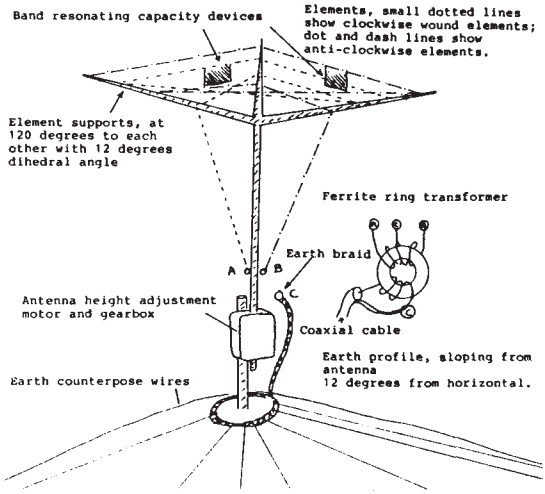


Figure 3 Antenna Constructional Details

RESULTS

The antenna was energized using a transmitter/receiver sounding system devised by the author and illustrated in Figure 5. A pulse of radio frequency energy was transmitted and any returned energy was displayed on an oscilloscope. As expected, short range signals were reflected back from the ionisphere when the antenna's height was low. As the height of the antenna was increased these short range signals disappeared. At one critical height a weak signal was observed having a 77Ms delay, and is illustrated in Figure 4.

Figure 4 Oscillogram of Echo Signal

This weak signal was found to be the transmitted signal having travelled round the world in a chordal hop mode with very little attenuation. Obviously this angle of radiation only has to be modified slightly to allow communication with any part of the globe. The final design will have the height remotely controlled by an electric motor and gear box. The control unit for this height system can then be calibrated in terms of distance, with appropriate corrections for propagation conditions, of course.

Figure 5. Prototype Antenna
(Illustrates the author with assistant Miss Con: StRude making measurements of his equipment)

CONCLUSIONS

These experiments proved completely the authors hypothesis and a Patent for the antenna design has been applied for.
The reader will note that no data is given regarding feed impedance, relative polar diagrams and antenna dimensions following normal practice in some literature describing experimental work. If the reader feels that this has raised more quesions than it has answered then he should be philisophical; there is still a wide open field for the experimenter.

Notes

(1) Academy of Ionospheric Research (AIR), Bionik. MASS.
(2) Amateur Radio callsign KN 1 CKER, a special four letter suffix issued to acedemics involved in experiments of a new and different kind.
(3)Miss Con: StRude MA(y) BE
(4)I.V. Shotitov, L'Accademie des Sciences de Sans Serif

CONSTRUCTION COMPETITION

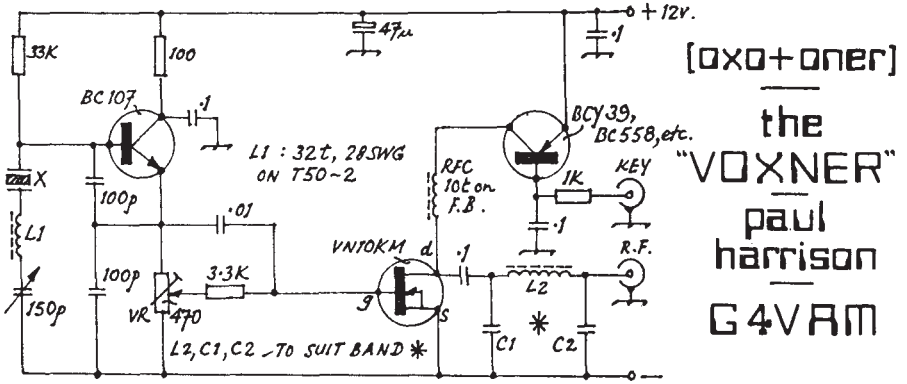
THE VOXNER

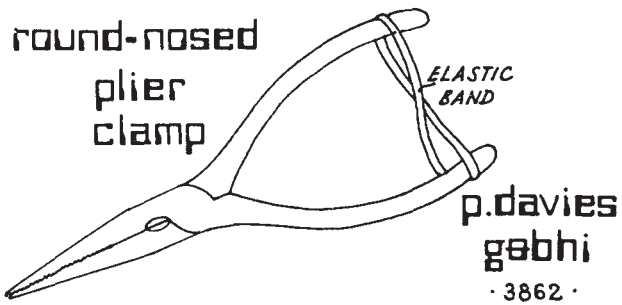
By Paul Harrison G4VAM

This circuit is offered as an experimental union of the OXO and ONER of GM3OXX fame! L1 has been included to increase VXO shift on 40 metres and higher bands. VR1 is adjusted to allow the VN10KM Vmos power fet to produce about 1 watt power out. Be careful to adjust the VR1 slider from the earthy end of its track; watch either the power input to the VN10KM or its power output. Advancing VR1 too much may destroy the output device! Values for the pi-network may be pulled from other issues of SPRAT which include suitable values, e.g. for 80 metres C1 and C2 = 750pF and L1 21t of 22 SWG on a T-50-2.

The rig which I constructed has been used regularly on 80, 40 and 30 metres with many solid contacts accomplished. The keying is clean and the PA stable, even under mismatch conditions. There is appreciable VXO shift on 30 and 40 metres, and at least 2KHz shift when using my 3560 crystal - with little variation in output power when the 150pF capacitor is at maximum C. The important thing to remember when designing the circuit layout is to keep the leads to the VXO tuning components as short as possible to minimise stray capacitance.

PS - the VN10KM can be purchased for 50p from J. Birkett. I soldered a copper terminal to my VN10KM to act as a heat sink!





MEASUREMENT OF ANTENNA IMPEDANCE

by Peter Dodd G3LDO and Tom Lloyd G3TML
(Figs 1,2 and 3 from QST June 1965)

When experimenting with antennas the preferred way of finding out what is happening is to measure the antenna impedance. This method employs a simple resistor capacitor bridge, a digital or electronic high impedance voltmeter, a transmitter and a pocket or home computer using BASIC.

The method used of measuring complex impedance was described by in June 1966 edition of QST by Doyle Strandland, W8CGT. It has the advantages of simplicity and accuracy. To recap on the original article, only two fixed components are used and calibration is unnecessary. The method of measurement is illustrated in Fig 1 and 2.

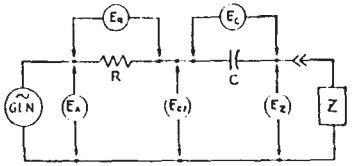


Fig. 1—Block diagram of impedance-measuring system, showing the various voltages of interest.

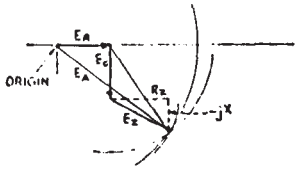


Fig. 2—Vector diagram illustrating the method of determining the resistive and reactive components of a complex load from the voltage readings of Fig. 1.

A signal at the measurement frequency applies power to Z via R and C. The voltages across R and C are measured together with the input voltage Ea, the voltage across Z and the voltage across Z plus C. The input signal is adjusted until Er is 5 volts then all the other voltages are measured. The results are used to produce a vector diagram as shown in Fig 2. A compass and a ruler are necessary and the complex impedence is identified as the point where the arcs intersect.

The voltages are measured using diode probes and are selected with a switch. These probes measure peak volts and require a high impedance voltmeter. A digital voltmeter is ideal. The full circuit is shown in Fig 3.

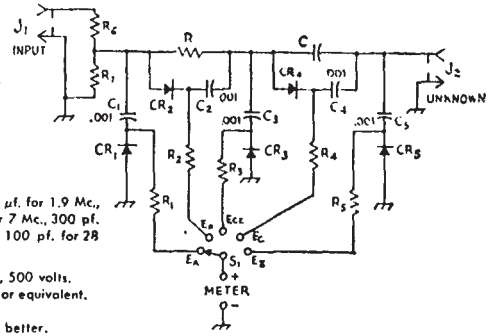


Fig. 3—Circuit of the impedance-measuring network.

C—Silver mica: Suitable values are 0.002 μf. for 1.9 Mc., 0.001 μf. for 3.9 Mc., 500 pf. for 7 Mc., 300 pf. for 14 Mc., 200 pf. for 21 Mc., 100 pf. for 28 Mc. through 50 Mc. See text.

C_1–C_5 inc.—0.001-μf. disk ceramic, 20%, 500 volts.

CR_1–CR_5 inc.—Germanium diode, 1N191 or equivalent.

J_1, J_2—Phono jack.

R—51 ohms, ½ or 1 watt, carbon, 5% or better.

R_1—R_5 inc.—Resistances should be as nearly equal as possible, but the common value may be anything from 1 megohm to 5 megohms.

R_6—Five 220-ohm 2-watt carbon resistors in parallel.

R_7—10 ohms, 2 watts, carbon.

S_1—Single section, single-pole, 5-position rotary switch, phenolic or ceramic.

A voltage divider is used at the input so that a transmitter can be used as a signal source; it also isolates the transmitter from the variations of impedance. The ratio of these two resistors can be changed if a QRP (less than 10 watts) transmitter is used as a signal source.

The value of C is not critical; the original article suggested a reactance value of between 25 and 50 ohms, although values of up to

100ohms still give good results. The capacitor value has to be changed for different bands and it is preferable that it is soldered in place to minimise the effect of capacity that could be caused by any plug-in system.

Since 1965 the electronic calculator and the home computer have become a fact of life and the rest of this article shows how the computation can be done using a BASIC program. The BASIC keywords must include Arc Cosine (ACOS or ACS) to work with this program.

The program listing shown is a called TOMSMALL. It is a derivitive of an original program TOM, which not only computed the results but also calculated the errors. TOMSMALL has been designed specifically for the Casio PB110 pocket computer but will work on any home computer with a little modification, provided it has functions ACOS or ACS.

```
10 b=50
20 INPUT "a",a
30 INPUT "c",c
40 INPUT "d",d
50 INPUT "e",e
60 f=(b*b+c*c-a*a)/(2*b*c)
70 g=ACOS(f)
80 h=(c*c+d*d-e*e)/(2*c*d)
90 j=ACOS(h)
100 k=(a*a+b*b-c*c)/(2*a*b)
110 l=ACOS(k)
120 m=(d*d+e*e-c*c)/(2*d*e)
130 n=ACOS(m)
140 q=ATAN(b/d)
150 t=b/SIN(q)
160 p=ACOS((t*t+e*e-a*a)/(2*t*e))
170 s=p-q
190 i=e*m
200 y=e*COS(s)
205 o=a*k-b
210 IF h>0 THEN w=d-a*SIN(l)
220 IF h<=0 THEN w=d+a*SIN(l)
230 m=e*SIN(n)
240 u=e*SIN(s)
250 x=(w+i+y)/3
260 r=(o+m+u)/3
270 IF x>=0 THEN GO TO 360
280 x=-x
290 p$="-"
300 r=INT(10*r+5)/10
310 x=INT(10*x+5)/10
330 PRINT r
340 PRINT  p$;x
350 STOP
360 p$="+"
370 GO TO 300
```

The voltage designations by W8CGD have been changed as follows; Ea = A, Er = B, Ecz = C, Ec = D and Ez = F. This is because they are used frequently in expressions later in the program. Also the PB110 only allows single letter variables.

The listing is done on a Sinclar QL to emulate the PB110. Use capital letter variables for the PB110 (the QL changes variables to lower case when the line is entered). Also replace STOP with END.

In the original article W8CGD noted that above SWRs of 3:1 the angles of the intersecting arcs get rather narrow introducing errors in measurement. The program was also found to give greater errors if the SWR was high.

F	-.6674713
G	2.301604
H	.7577303
J	.7109684
K	.8576984
L	.54002
M	8.907833E-2
N	1.4816
P	2.110354
Q	.6135561
S	1.496797
T	86.83893

Input Parameters

A	C	D	E
126	87	71	57

Test data for checking the program. Insert PRINT statements as required and enter values for A,C,D and E.

Antenna Impedance Measurement Program
G5RV with Z match, set for lowest SWR at transmitter output

	Input Parameters				RESULTS		+/-Errors	
Freq	A	C	D	E	Res	jX	Res	jX
14	119	101	70	34	19.8	-27.3	7.9	6.4
14.05	114	93	71	28	20.5	-19.6	2.3	2.1
14.1	109	82	70	28	27.3	-7.8	.8	.8
14.15	113	75	71	50	47.9	+13.8	1.5	1.7
14.2	159	110	71	106	104.2	+34	3.5	11.6
14.13	110	77	71	38	37.9	+4.4	1.1	1.1

Impedance measurements of a G5RV antenna with Z-match. These results were obtained with another program derivitive, TOMBIG.

THE NIG, A Simple Superhet for 3.5 and 7 MHz

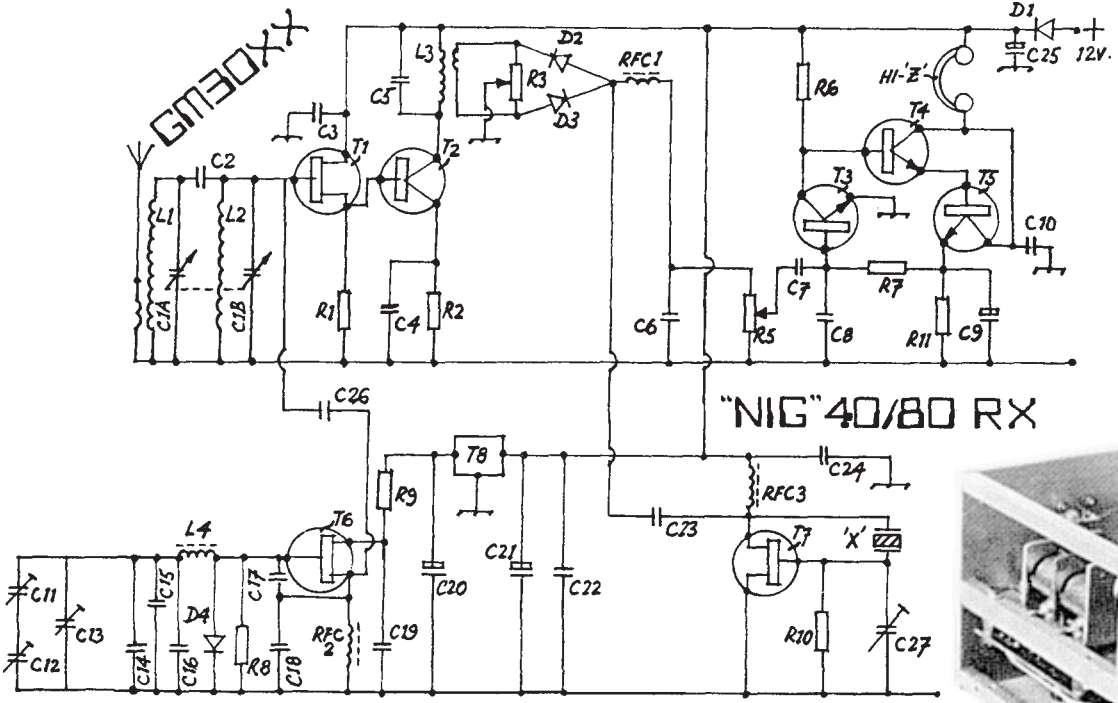
By George Burt GM3OXX

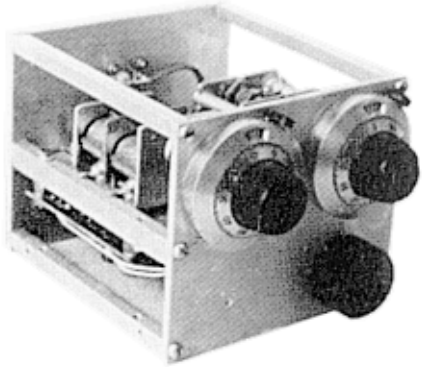
After last summers holiday, when GM3RKO, 4HBG and 3OXX, were all /P in the highlands, Nor (G3RKO) issued a wee challenge to Iain and my self, lets see who can built the best simple RX for 3.5 and 7 MHz.
The NIG is my attempt, and to cheer up those who have a bin full of abandoned projects, not my first attempt; Hi.
There are lots of circuits around for 3.5 and 14MHz using the 5MHz VFO and 9MHz IF to cover two bands with one VFO. A look at the ideas for 3.5 and 7MHz seemed full of pitfalls. It needs a VFO on 1.7 to 1.8MHz with an IF of 5.3MHz to cover both bands with one VFO, the VFO birdies make this idea unusable, so next a look at making the IF on 1.7MHz and the VFO on 5.25MHz to 5.35MHz. This still has it problems, the BFO harmonics fall in the band.
Next thing was to shift the IF to get rid of the BFO birdies.
An IF of 1.735 was picked and a VFO of 5.235 to 5.335MHz, the enabled both bands to be tuned with one VFO, along with two good points no birdies, and, the best one, both 3.560 and 7.030 are on the same spot on the dial. All one has to do to go from one band to another is to tune the front end. USA QRPers use 1.745IF and 5.245 to 5.345 for 7.040 and 3.560MHz.
The circuit is quite simple as illustrated. The circuit could of course be improved by a suitable filter in the IF.

Construction notes
If you dont want to buy a crystal use a free running BFO. In the prototype the RF and VFO are driven by 10-turn dials, with the small jackson 10:1 slow motion drives. make a nice simple slow motion drive.
When tuning the front end several other frequencies will be covered, these are caused by harmonics from the VFO. As much fun was had trying to find a name as building the receiver and NIG comes from Nor,Ian,George. So many thanks to Nor for the challenge.

CONSTRUCTION COMPETITION

C1a/b	350pF Twin	R1	3.3K
C2	3.3pF	R2	330R
C3	.1uF	R3	1K Trim
C4	.1uF	R5	10K Volume
C5	820pF	R6	10K
C6	.1uF	R7	180K
C7	2.2uF	R8	100K
C8	.1uF	R9	100R
C9	15uF	R10	100K
C10	.1uF	R11	470R
C11	25pF Bandspread Set	D2&D2	Hot Carrier
C12	50pF Band tune	D4	IN194
C13	.25pF Band set	RFC1,2,3	1mH
C14	.22pF Silver mica	T1,T2,T3	J300
C15	.33pF POL	T2,T3	BC123L
C16	.1nF NPO	T4,T5	BC123L
C17	1000pF	T8	8V Stab(100mA)
C18	1000pF	Xtal	1.736MHz
C19	.1uF		
C20	2.2uF		
C21	2.2uF		
C23	.001uF		
C24	.1uF		
C25	1000uF		
C26	3.3pF		
C27	60pF		



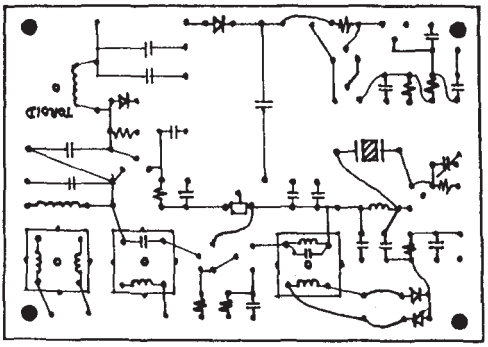


Frequency Mixing Chart

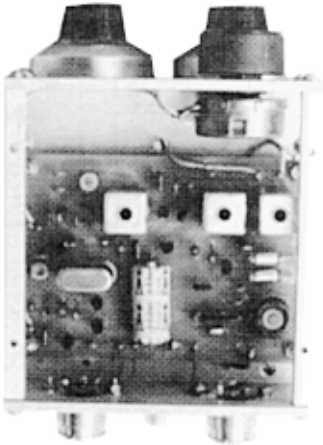
							Both QRP Frequencies *				
3.5	3.50	3.510	3.520	3.530	3.540	3.550	3.560	3.570	3.680	3.590	3.600
7.0	6.970	6.98	6.990	7.000	7.010	7.020	7.030	7.040	7.050	7.060	7.070
VFO	5.235	5.245	5.255	5.265	5.275	5.285	5.925	5.305	5.315	5.325	5.335

IF 1.735MHz

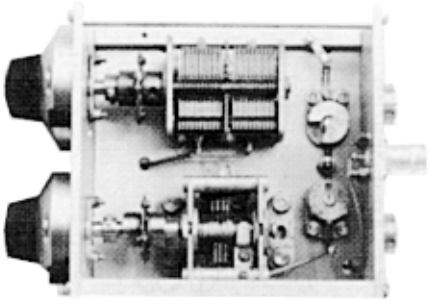
L1 43Turn .25mm Aerial 4T .25
L2 43Turn .25mm
L3 60T 30SWG. SEC 6T 30SWG On cold end
14 45T .315M to .56
L1 L2 L3 wound on 5mm dia formers, 15mm long in a 14mm square can, all with core.
To track front end tune to 3.560 and adjust the cores for max signal.
Formers can be brought from Maplin along with C1a-C1b (the capaciter is expensive).
With C13 - C11-C12, these can be set to any desired range.



PCB LAYOUT - TOP - HALF SIZE



UNDERSIDE WITH PCB



TOP SHOWING TUNING CAPS

REDUCING NOISE ON 3.5 MHZ

By Ian GM4HBG and Gus G8PG

If a licenced amateur causes interference to his neighbours he must, quite rightly, either cure the cause or stay off the air. Unfortunately when neighbours cause interference to the licenced amateur there is no reciprocity, and he has to suffer from endless noise from TV timebases, electric drills, leaky power lines etc with little hope of redress. Many 80M QRP operators face the situation, and are often left wondering whose side the DTI and RSGB are on. Sadly at the present time G QRP C are unlikely to be able to mount an effective campaign for cleaning up our befouled electronic environment, but what we can do is to suggest ways of reducing the local noise pollution in the reciever, thus allowing one to enjoy QRP/QRP contacts which would otherwise be impossible. Basically the name of the game when trying to copy signals in a noisy environment is readability (539 is much more use than 279)so what we must aim for is a system in which we trade off a very large reduction in unwanted noise for a much smaller reduction in the strength of the wanted signal. A simple and effective way to achieve this result is to use some form of loop antenna for receiving, and to switch over to the normal station antenna for transmitting. Both the loops to be described in this article have the following important properties (a) they mainly respond to the magnetic component of an incoming signal and (b) their polar diagrams have a very sharp nul. As they are both small enough to rotate easily this means that the nul can be placed so as to greatly reduce the strength of an incoming noise signal. The lack of response to this signal is often further increased by the non-response to its electrostatic component, as many noise sources are vertically polarised. As an example, tuning on to a S9 TV time base harmonic with the ferrite rod antenna to be described, then swinging the antenna to its nul position reduces the signal on the S-meter to zero; the wideband hash between harmonics is similarly reduced. Figure 1 shows the polar diagrams of the two loops to be described. Note that, because of its smaller size, the signal pickup on the ferrite rod loop is considerably less than that on the larger loop, so it incorporates its own rf stage to provide additional gain. A further important point is that readily available ferrite rods are only efficient up to around 4.5MHz, so the ferrite antenna is a 1.8/3.5MHz system only. The air core loop, on the other hand, could be adapted for use at higher frequencies.

The GM4HBG Screened Loop

The version described is for 3.5MHz. Constructional details are as follows. Obtain a 350cm length of RG8U co-axial cable. Very carefully remove 30cm of the outer insulating sheath at the centre of the length, then remove the exposed copper braiding. Do not damage the inner insulation. Next fit a BNC connector to each end of the cable (Fig 2). In a small metal box mount a good quality 400p varible capacitor (a twin gang 470p with the two sections in parallel is suitable) and 3 BNC sockets. Wire these together as shown in Fig. 3. Make up a suitable mounting frame, screw the metal box to it, and tape the co-axial cable to it as shown in Fig. 4. Make up and fit a suitable length of RG8U to connect the loop to the RX or changeover switch. Ensure that all three connectors are inserted and screwed up. To resonate the loop use either a GDO or a signal source such as a crystal calibrator. For DX work resonate to 3520KHz, and for QRP to 3560KHz. To null out a noise source, tune it in, then rotate the loop for minimun signal. If you only have one troublesome noise source the loop can be mounted in (say) the loft, oriented for minimum noise pickup, then left. If there is enough room to mount the shack, on the other hand, operation will be much more flexible. It can then be used to nul out either local noise or, at periods when there is no noise, QRM from other stations. As described it has been successfully used when making QRP contacts with VK, VE, and W on 3.5MHz, the power at the GM end being 3 watts.

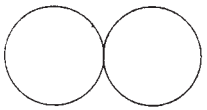


FIG.1.

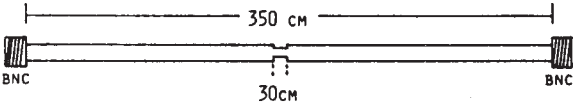


FIG.2. OUTER SHEATH AND BRAID REMOVED

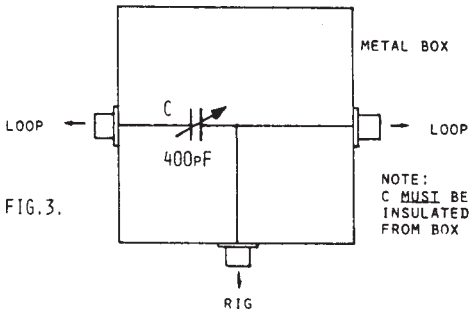
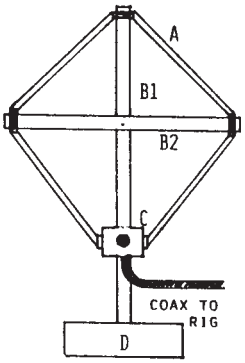


FIG.3.



A. LOOP TAPED TO FRAME

B1/B2 WOODEN FRAME

C. CAPACITOR BOX SCREWED TO FRAME

D. HEAVY WOODEN BASE

FIG.4.

The G8PG Screened Ferrite Rod Loop

Space is at a premium at G8PG, operator and equipment having to fit into a space 1m x 1.5m, so there was no way in which the excellent GM4HBG loop could be accommodated. Instead, it was decided to experiment with a screened ferrite rod loop. As the longest rods obtainable locally were on approximately 4 1/3 inch long, three of them were butted together and secured with Selotape to make a rod approximately 13 inches (32 cm) in length. A winding of 18 turns of 26 SWG wire was then wound on this rod at the centre. To make a suitable electrostatice screen a slot was cut for the full length of a 14 inch long, 1 inch diameter cardboard mailing tube, using a hacksaw blade while wearing a working glove. This slot allows the leads from the coil to be brought out from the centre of the tube. The tube was then covered with metal foil, leaving an air gap along the full length of the slot. The foil was secured by Selotape, and a suitable pigtail was attached to it to allow the foil to be earthed. This set-up allowed strong signals to be received on 3.5MHz, but it was obvious that more gain was required, so an amplifier was built in heavy, diecast box of 6 x 4 x 2 inch dimensions. This box is heavy enough to provide a base for the loop assembly as shown in Fig 5. The whole assembly is small and easy to lift, and it can be put at the back of the bench when not is

use. The electrical circuit of the loop and amplifier are shown in Figure 6. A simple changeover switch allows the co-axial input to the Century 22 main rig to be switched either to the station ATU or to the loop unit. With the loop switched in, S9 local tv timebase noise can be reduced to zero on the S-meter by turning the loop to its nul position, and local noise is generally greatly reduced. Sensitivity is adequate for two-way QRP working, and the loop has allowed many contacts of this type to be made which would have otherwise been impossible because of the local tv timebase interference. At night stations such as JTO, A9, U18 etc have been heard. On occasion, when the local tvs have not been in full cry, the null has been used to greatly reduce interference from QRO stations.

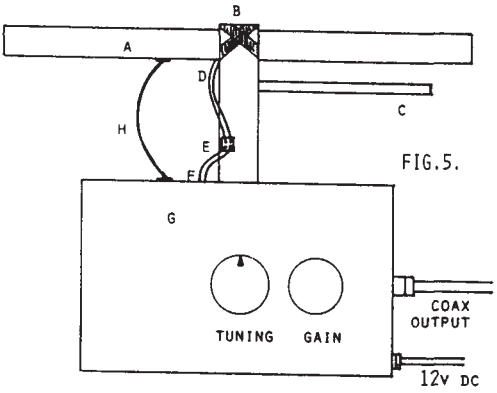


FIG.5.

A SCREENED LOOP

B 4 INCH x 1 INCH DOWEL ROD SECURED VIA HOLE IN CENTRE OF METAL BOX WITH WOOD SCREW AND WASHER

C THIN DOWEL ROD TURNING HANDLE

D LEADS FROM LOOP COIL

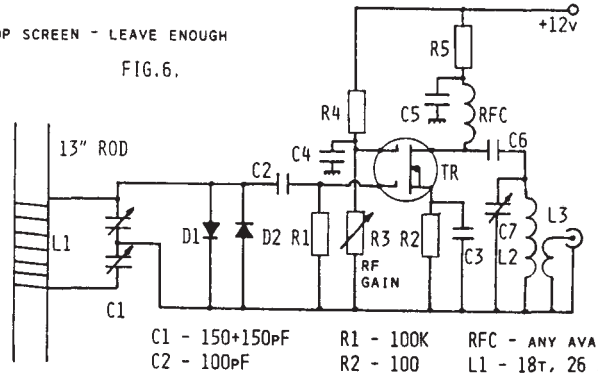
E JUNCTION CONNECTOR

F LEADS TO TUNING CAPACITOR - USE STRANDED INSULATED WIRE AND LEAVE ENOUGH LENGTH FOR LOOP ROTATION

G METAL BOX

H PIGTAIL WHICH EARTHS LOOP SCREEN - LEAVE ENOUGH LENGTH FOR ROTATION

FIG.6.



C1 - 150+150pF
C2 - 100pF
C3 - 0.1
C4 - 0.1
C5 - 0.1
C6 - 22pF
C7 - 50pF

R1 - 100K
R2 - 100
R3 - 33K VAR
R4 - 100K
R5 - 100

RFC - ANY AVAILABLE
L1 - 18T, 26 SWG
L2 - 50T, 28 SWG
L3 - 20T, 28 SWG
L2/3 WOUND ON T50-2 CORE

MILLIWATTING AND MICROWATTING

By Chris Page G4BUE

The propogation experts are divided as to whether we are yet into the new cycle, but what is certain is that if we aren't we are not very far away. Sunspots will soon start increasing and with them come better HF conditions, so now is the time to think of milliwatting again. Milliwatting is the name given to working DX with milliwatt power levels, and it became very popular during the peak of the last sunspot cycle.

A quick look at the theory first. A reduction in input power from 5 watts to 150mW is a reduction of 15dB, and assuming 6dB per 'S' point, is equivalent to a drop of 2.5 'S' points. So whatever signal report you get from the DX station with your 5 watts, 150mW will only drop you between 2 and 3 'S' points.

Now the technique, just concentrate and improve on everything you already do to work DX with QRP! Seriously though you must concentrate even more on the matching and efficiency of your antenna, keeping the feedline as short as possible, and removing everything between the TX and the antenna, such as antenna switches, SWR bridges, etc. - they all have a slight insertion loss. You must make sure that you send CW perfectly, whether you are sending at 10 or 30 wpm. Finally a study and knowledge of propogation will be rewarded by knowing the best band and time of day to work particular areas of the world. I have found that DX which can be easy to work with 25mW can be very difficult to work an hour later with 5 watts as the propogation changes.

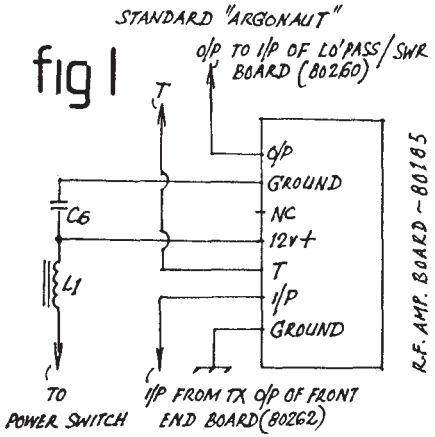
A big advantage in paying attention to the areas mentioned above is that if you adopt the lessons learnt whenever you operate, whether with QRO or normal QRP, you will find your success rate increases considerably and you become a better radio operator. For instance an antenna that can work the USA with just a few mW of RF has got to be working properly. I often use milliwatting to test new antennas or when making adjustments to them.

My own interest in milliwatting started when I read an article by Brice Anderson, W9PNE in SPRAT No.16, way back in 1978. Brice had been using milliwatt power levels for some time, and had obtained WAC, WAS and worked 36 countries with only 500mW input. He used an outboard valve (6AU6A) PA with his Drake T4XB transmitter. With 3v negative bias supply on the grid, 500mW input was achieved with 90v at 5.5mA plate current. Brice was able to vary the plate voltage so that 45v at 2.7mA gave 120mW and 22.5v at 1.2mA gave just 27mW.

The thought of working DX with the absolute minimum amount of RF necessary appealed to me, and I began wondering just how low in power one could go and still work DX. The results I achieved absolutely staggered me and far exceeded my expectations. I am now looking forward to the improving HF conditions, especially on 21 and 28MHz, to continue where I left off in 1981. If you are looking for something different, or seeking a new challenge, then read on and get ready for the new sunspot cycle.

The first thing is to decide what the source of your milliwatt RF is to be. The simplest way is to just reduce the drive of your existing QRP transmitter, but soon you will want to know exactly what power you are running and so something more sophisticated has to be used. Many good simple TX circuits have appeared in SPRAT over the last few years, and many of them are suitable for milliwatting. My OXO and STX transmitters both work at 600mW input, and have given good accounts of themselves with milliwatting at that level. Their disadvantage is that you cannot change quickly from one power level to another. One way of getting over this is to use an outboard PA with variable voltages like Brice, or, as I did, modify the existing QRP black box.

At that time I had just purchased a Ten-Tec 509 Argonaut for general QRP work, and decided to modify it for milliwatting as it has an excellent receiver and QSK. There is no reason why any other QRP black box cannot be



successfully used for milliwatting with similar modifications. The problem with the 509 Argonaut, (and also the later 515 model), is that in its standard form it has no provision for measuring input power, see Fig. 1. The dual purpose meter is used as an "S" meter and SWR bridge and has switched forward and reflected ("FWD" and "REV") positions. The operator's manual, under the tune-up procedure, directs the operator to set the switch to the "FWD" position and advance the drive control to indicate full scale deflection with key down. This should represent an input of five watts, and as there is 12 volts on the PA, we can therefore assume that the current is aproximately 417mA.

In order to accurately measure input power the installation of meter(s) in the +12v line to the PA to read current was therefore essential. I decided that 1A and 100mA meters would enable me to measure input power from the standard five watts down into the milliwatt range. These were installed in an external cabinet and wired into the 12v line to the RF Amplifier Board (80185) as shown in Fig. 2. Note the use made of the "AUX" and "REC ANT" sockets to get the wiring in and out of the Argonaut without drilling more holes in the rear panel. Simply disconnect and tape up the existing wiring to the sockets and re-connect one to the +12v line and the other to L1.

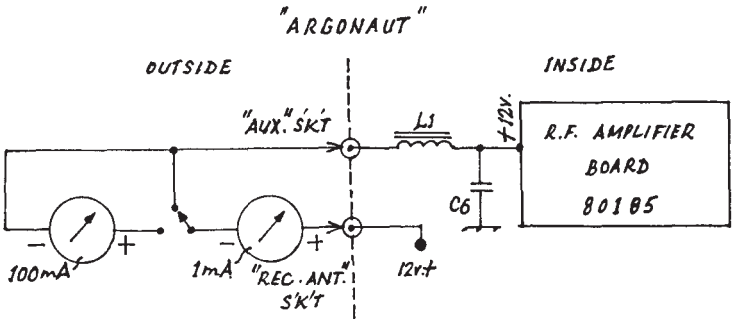


fig2

"ARGONAUT" - 1ST. MODIFICATION

I checked the +12v line and on finding it to be exactly 12v calculated the following values:-

5 watts input = 417mA	1 watt input = 83mA	750mW input = 62mA
500mW input = 41mA	250mW input = 20mA	150mW input = 12.5mA

It is not possible to measure current much below 12.5mA as the standing current of the Argonaut is 10mA.

I was now ready to see what 500mW input could achieve, but before trying it I checked to see how much RF was indicated on the Argonaut's meter - nothing! I could not see how such a small amount of RF, that did not even register on the meter, could be capable of making a QSO. The moment had come to try milliwatting - 21MHz and there was an SP station calling CQ - swing the beam east and "SP2HZB DE G4BUE QRP PSE" and Wow!, he came straight back and gave me 589, and I was hooked!! I couldn't believe it and had to check the meter readings to confirm that I really was only using 500mW. There then followed a UB5 who gave me 559, and then after lunch WA2PJG gave me 559 for my first trans-Atlantic milliwatt QSO. During the next few days I got used to having QSOs without any reading on the Argonaut's meter, and gradually reduced power as my confidence grew with each QSO. Finally in the 1978 ARRL 28MHz Contest I worked a W2 station at 150mW input.

I eventually became even more ambitious and wanted to go lower still, as I wanted to see how low one could go and still work DX. Being unable to reduce the drive any further, I decided the only alternative was to reduce the voltage while keeping the drive at 12.5mA. I then added a 25mA meter and a 25v meter to the 1A and 100mA meters, and substituted the 12v line to the RF Board with a variable PSU, as shown in Fig. 3.

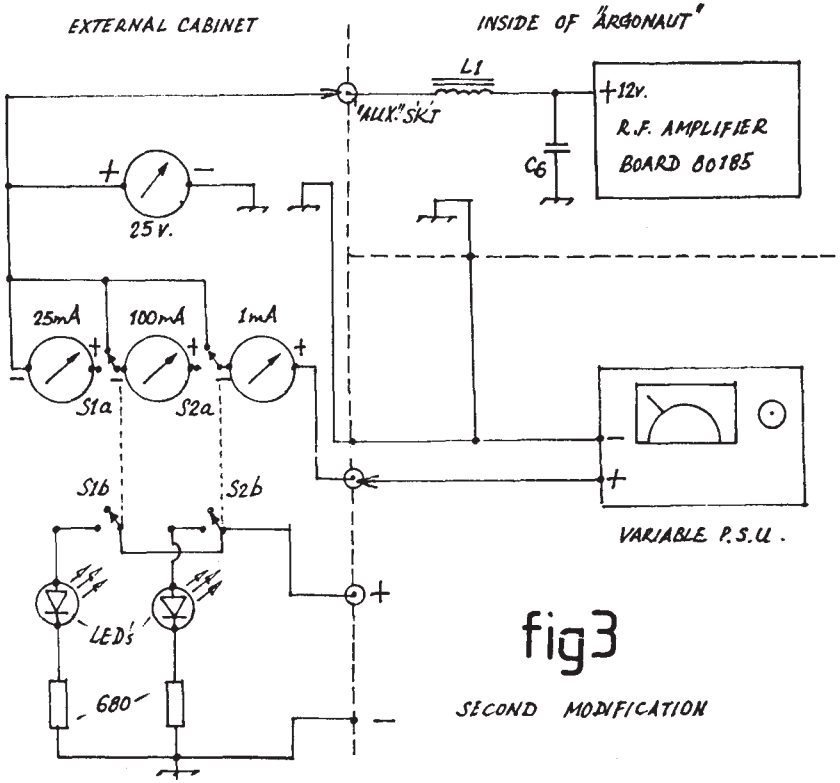


fig3

SECOND MODIFICATION

The existing external cabinet was replaced with a larger one to accommodate the additional meters, and LEDs were fitted to the front panel as a safety feature to indicate which meters were switched into circuit. This was to prevent damage to the 25mA and 100mA meters if the Argonaut was accidentally operated at 5 watts with these meters still in circuit! The variable PSU can be built into the same cabinet, but I prefer mine separate, as I use it for other things. A separate 12v line is required for the LEDs.

The lowest input power I was then able to run with the second modification was 12.5mW. This was achieved by reducing the voltage to 1v and the current to 12.5mA - real milliwatting. With this set-up I worked three USA stations on 21MHz in the 1979 ARRL Contest.

During a conversation with a local amateur about milliwatting the question of PA efficiency came up, and I was ashamed to admit I had no idea what it was. The amateur worked in a test laboratory and had the use of a very expensive oscilloscope on which he offered to check the RF output when running the Argonaut at these low power levels. On 21MHz the Argonaut gave just over 2 watts out when running at 5 watts input, which is about right, whilst at the 12.5mW level the output was only 576uW. Two things amazed me. First it dawned on me that I had QSOd the USA three times with just 576uW of RF, and it seemed incredible that such a small amount of RF had managed to span the Atlantic. Secondly the efficiency of the Argonaut's PA at that level was only 4.6%!

The Argonaut is designed, biased and filtered for efficient operation at 5 watts input, (about 2 watts output), and the optimum load resistance changes with output level, unless the voltage to the collector is also changed. Reducing the output to 576uW was obviously drastically changing the load resistance and resulting in a poorer efficiency. The next step was to find the correct voltage and current combinations which would result in the most efficient operation of the PA, after all it is the RF output that enables QSOs to be made.

I then did a lot of experimenting to find the most efficient way to operate the Argonaut at different power levels, and came up with the following:-

5 watts	= 10v	500mA	1 watt	= 4.25v	235mA	750mW	= 3.5v	214mA
500mW	= 3v	166mA	250mW	= 2.25v	111mA	100mW	= 1.6v	62.5mA
50mW	= 1.15v	43.4mA	15mW	= 0.65v	23mA	5mW	= 0.4v	12.5mA

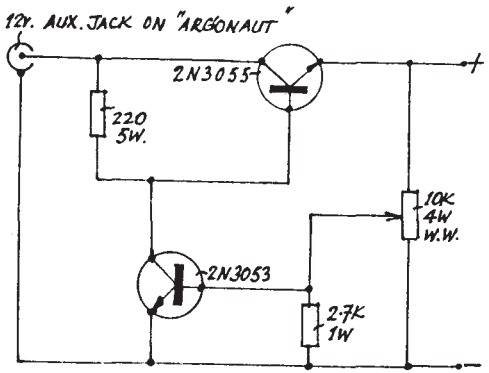


fig4 W9PNE – VOLTAGE REGULATOR

It will be seen that the most efficient way of running the Argonaut at 15mW input is with 0.65 volts to the RF Board, whereas I had previously been using one volt for an input of 12.5mW. Another interesting point is that running the Argonaut at its standard 5 watts input is more efficient with 10 volts to the RF Board, instead of the 12 as per the original design. With the above values kept handy on my operating desk I am able to quickly alter the voltage and drive settings and change from one power to another. Depending on conditions and how much of a challenge I want, dictates what power level I use!

An alternative to building a separate PSU for the RF Board was described by Brice, W9PNE in SPRAT No. 28, and I'm sure he won't remind me repeating it here. The regulator was designed for the 515 Argonaut and provides from 0 to 11 volts. The circuit is shown in Fig. 4. The 515 requires lower voltages than that for the 505 or 509 models, and Brice found the following to be the most efficient:-

1 watt input = 3.3v 300mA	500mW input = 2.5v 200mA
250mW input = 1.7v 140mA	100mW input = 1.1v 90mA

Be sure to monitor the output power as an increase in drive past the optimum point causes a drop in output power. Brice uses external meters, but the regulator and meters can be built into a small cabinet.

I found the international DX contests great fun for milliwatting, as I was able to discover which of the big contest stations achieved their big signals from antennas and those who did it with power! Most big contest stations stay on one frequency for long periods and let other stations call them. I call first with 5mW and if unsuccessful gradually increase power until contact is made. Ignoring the usual 599 contest report that is received, my call sign being copied correctly is confirmation I am getting through at the particular power level used. I make a note of the power used in my log book, and after several contests I realised it is the same stations who copy my 5mW calls and the same who do not hear me until I get up to a watt or so, i.e. the difference between good operating and antennas as opposed to power!!

The path between the USA and the UK seems to be particularly good for milliwatting, and one of my goals is to achieve Worked all States on 28MHz with an input of 750mW. By the end of the good conditions on 10 metres I had worked 43 of the 50 States. Another goal is to achieve a Worked all States with an input of 100mW, but not on any particular band. 26 States have been worked at this level, including California.

With the measurement of QRP power levels going over to output power from input power, I decided it would be easier for future experiments to use output power. An output power meter based on the W0RSP and GM3OXX design had been constructed to conduct the efficiency experiments described above, and another visit to my friendly amateur with the test laboratory enabled me to accurately calibrate it.

The CQ WPX Contest in 1981 coincided with ideal conditions for milliwatting, and during the Saturday evening between 2000 and 2130, when 21MHz was "wide open" to the USA, I made the following QSOs, gaining in confidence as I went and going from Milliwatting to Microwatting in the process:-

2017 W90A 15mW	2023 W0WP 4mW	2033 W1RX 1.5mW	2039 K8HV 625uW	
2046 VE3PCA 450uW	2123 KB8SX 200uW	2139 AB2E 200uW		

Apart from the 559 report from W90A, all reports received were the usual contest 599!, although I accept, of course, they were a lot lower in reality.

In the same contest during the Saturday I worked KH6XX, PY2DLK, OH9UW, JH3LPT, K1XA and EA8TY with an input of 250mW for W.A.C. KG6DX was worked with an input of 150mW and on the Sunday further QSOs with UK8MAA, ZW4OD, EA8TY, K4KZE and UK2PCR completed a W.A.C. at the 150mW level. All QSOs were on 21 and 28MHz. Besides being a very satisfying week-end for milliwatting, it proved that given the right band conditions, world-wide communication can be conducted with low input levels, and on particular paths with very low output levels, even amongst the QRM of a major contest.

Having reached such low power levels I decided to dispense with the RF Board altogether. This is easily done by simply not switching the variable PSU on!, i.e. not applying any volts to the RF Board. Many QSOs have ben made using just the driver stage of the Argonaut. The output of the driver stage at maximum drive varies from .0992 watts on 28MHz to 0.221 watts on 7MHz. Obviously more output could be obtained by bypassing the RF Board and taking

the output from the driver stage direct to the Low Pass Filter/SWR Board. I wonder who will be the first to have a DX QSO using just the TX Mixer Board of the Argonaut!!

Another amateur who experimented with milliwatts was Petr Doudera, OK1DKW. His favourite power is 300mW and I have given him a 559 report on 3.5MHz at this level. Petr also tried Microwatting by using a valve transmitter with only 3.72 volts on the PA. With only 600uW Petr worked a G4 on 21MHz.

If you want to make things even more difficult for yourself, try two-way milliwatting. In the 1980 QRP Winter Sports I was calling CQ QRP on 28060 using 750mW when Andy, WB2RZU heard me. Knowing I was into milliwatting he reduced his Argonaut to 500mW and called me. We had a great QSO and made a two-way milliwatt QSO across the Atlantic.

I hope the above has wetted your appetite and you will give milliwatting a try. It will certainly force you to take a good look at your antenna system. Whether you are using yagis, quads, verticals or long wires the essential thing is to have the antenna working as efficiently as possible. I know my four element yagi has obviously assisted me to achieve the results described, but it only gives a forward gain of about 9dB which is the equivalent of 1.5 'S' points. If you are using a dipole you may not be able to get down to the levels I did with the yagi, but you can still achieve some remarkable results.

My old power meter has lost its accuracy and at Dayton this year I saw the new QRP Wattmeter made by Welz, the model RP-120. I bought one as they are not available in the UK, and I understand from Waters and Stanton they do not intend importing them. That is a shame as they are ideal for QRP, and milliwatting in particular. The meter has three ranges, with maximum readings of 20 watts, 2 watts and 200mW. UK members may be interested to build the Sensitive Microwatt Meter designed by Wes Hayward, W7ZOI and described in Sprat 38. It is built around a CA3140 and full scale sensitivity is -10dB or 0.1 milliwatt when silicon diodes are used, (IN4152, 1N914 etc). By using a coupler, like the one shown in Fig 23 on page 151 of Solid State Design for the Radio Amateur, the unit can be used as an in-line power meter. The system is calibrated with a step attenuator and a higher power indicator, such as the meter shown in Fig. 9 on page 147 of the same book.

One person who has done a great deal to support milliwatting is Ade Weiss, W0RSP. In addition to promoting his DXCC Milliwatt Trophy, he issues certificates to the winners of a special milliwatt section in the annual Spring and Fall QRP Contests of the QRP Amateur Radio Club, International (ARCI) in the USA.

The DXCC Milliwatt Trophy is awarded for confirmed QSOs with 100 DXCC countries whilst using an output power of less than one watt. The programme commenced in 1971 and to illustrate the difficulty of the award Ade's recent book, "The Joy of QRP", lists only the following winners:-

1	W8ILC	Ronald Moorefield	June 1978
2	GM3OXX	George Burt	December 1978
3	G4BUE	Christopher Page	December 1979
4	KI4W	Margaret Williams	February 1980
5	W4IV	William Montgomery	November 1981
6	EA8EY	Martin Montero	April 1983
7	JA1MCU	Jiro Manaka	April 1983
8	GM4ELV	Daibhidi Dhuglas	May 1983

So there it is, "The Ultimate Challenge", as Ade describes milliwatting. With the approaching new sunspot cycle to look forward to, and those great DX openings on 21 and 28MHz lasting late into the evenings, join me on 21060 and 28060 with milliwatting, and even microwatting.

50MHz ALL-MODE TRANSCEIVER

By John Beech G8SEQ

This design uses the DC-30-P (see SPRAT No 39) as the 'mother board', with a few minor modifications make it work at 50 MHz. The receiver amplifier is built on a small PCB which then replaces the attenuator. The VFO, frequency doubler, bi-directional amplifiers, crystal filter, mixer and local oscillator (shaded components) are built on another PCB. The result is a superhet receiver capable of all band operation although slope detection is employed on FM.
Two novel features of this design are:

1. Two bi-directional amplifiers. On transmit:
   BDA1 is common base to common collector
   BDA2 is common collector to common base
   On receive:
   BDA1 is common collector to common base
   BDA2 is common base to common collector
   These bi-directional amplifiers facilitate impedance matching between the crystal filter and the other components and eliminate the need for coupling transformers.
2. The output circuit of the transmitter. This single toroid acts as an impedance matching transformer and output pi-filter.

The new board converting the DC receiver to a superhet occupies about one third of the the area of the mother board and is located above the AF amplifier; allowing the same box to be used.

50MHz CW/RTTY TRANSCEIVER

By John Beech G8SEQ

This is a modified DC-30-P

In this case the modifications are:

1. VFO retuned to cover 8.3 to 8.37 MHz
2. VFO output amplifier retuned to act as a tripler at 25MHz output.
3. DRIVER stage retuned to double at 50 MHz
4. PA stage-transistor change and retuned output filter.
5. MIXER altered to "Russian" back-to-back harmonic mixer.
6. RF amplifier added to receiver.

A kit of parts will be available when the 50th SPRAT is published. They will be as DC-30-P, i.e. complete with box, knobs, controls but minus phones, key antenna socket PSU.

THE VHF COLUMN BY JOHN IS HELD OVER UNTIL THE NEXT ISSUE OF SPRAT.

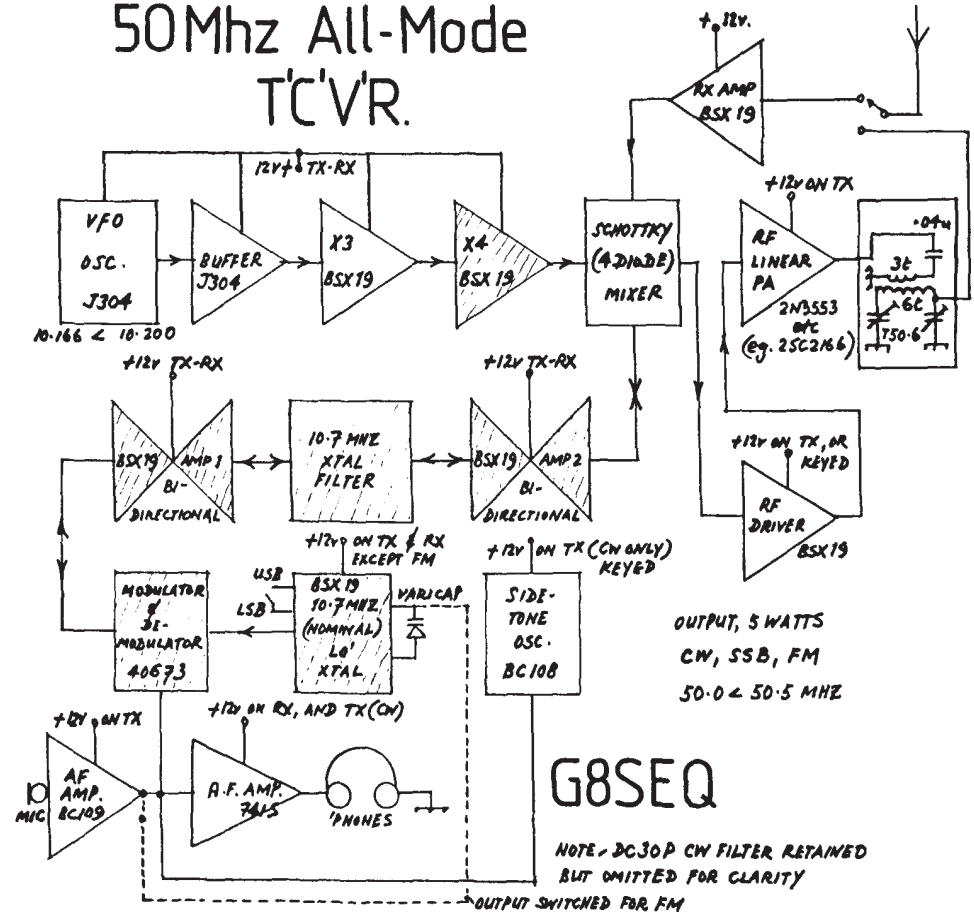
PONTEFRACT ANNUAL COMPONENTS FAIR

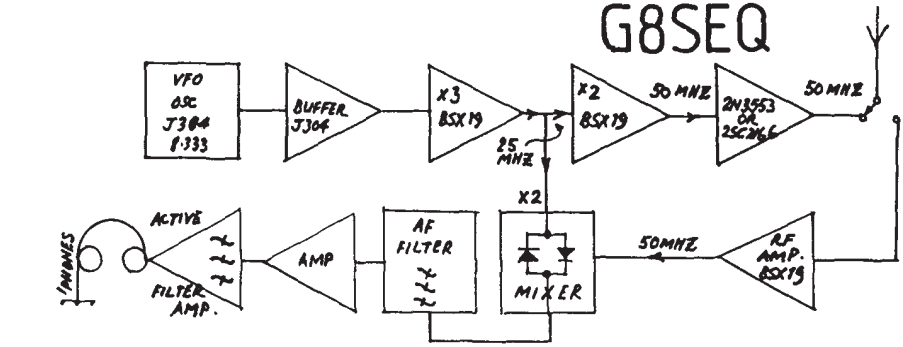
Sunday April 5th 1987

Carleton Community Centre, Carleton, Pontefract. THE place to buy those bits and pieces for the constructor...
The Radio Rally that allows no stalls which sell "black Boxes". The venue is conveniently situated near the M62 and M1 motorways.
Deails from Colin (club member G0AAO) on 0977 43101.

HISTORIC QSO

1st May 1937/0840/7MHz/G8PG/OZ4UF/339/339
Happy 50th Anniversary Gus
Enjoy the next 50


50Mhz All-Mode
T'C'V'R.
+12v.
RX AMP
BSX 19
12v+ TX-RX
VFO
OSC.
J304
10·166 < 10·200
BUFFER
J304
X3
BSX19
X4
BSX 19
SCHOTTKY
(4 DIODE)
MIXER
+12v ON TX
RF
LINEAR
PA
2N3553
or
(eg. 2SC2166)
·04u
3t
6t
T50·6
+12v TX-RX
+12v TX-RX
BSX19
AMP 1
BI-
DIRECTIONAL
10·7 MHZ
XTAL
FILTER
BSX19
AMP 2
BI-
DIRECTIONAL
+12v ON TX, OR
KEYED
RF
DRIVER
BSX19
+12v ON TX & RX
EXCEPT FM
+12v ON TX (CW ONLY)
KEYED
USB
LSB
MODULATOR
&
DE-
MODULATOR
40673
BSX19
10·7MHZ
(NOMINAL)
LO'
XTAL
VARICAP
SIDE-
TONE
OSC.
BC108
OUTPUT, 5 WATTS
CW, SSB, FM
50·0 < 50·5 MHZ
+12v ON TX
+12v ON RX, AND TX(CW)
MIC
AF
AMP.
BC109
A.F. AMP.
741S
'PHONES
G8SEQ
NOTE - DC30P CW FILTER RETAINED
BUT OMITTED FOR CLARITY
OUTPUT SWITCHED FOR FM


G8SEQ
VFO
OSC
J304
1·333
BUFFER
J304
X3
BSX19
25
MHZ
X2
BSX19
50 MHZ
2N3553
OR
2SC2166
50 MHZ
X2
'PHONES
ACTIVE
FILTER
AMP.
AMP
AF
FILTER
MIXER
50MHZ
RF
AMP.
BSX19
50 Mhz CW-RTTY T'C'V'R.

ACTIVITY AND AWARD NEWS.
Gus, G8PG, 37, Pickerill Road, Geasby, Merseyside L49 3ND.

DIFFICULT LOCATIONS WEEK
This generated a great deal of activity, though most of it was not from difficult locations. Ireland as a whole was quite well represented, with EI4DZ, GI4MBO GI3PCY appearing in logs, but there seems to have been a great blank from northern Scotland. This may have been due to conditions, as even stations in southern Scotland report hearing nothing from the north. Next year we will try a different approach - allocating specific days to EI, GM, GW,G and GD/GJ/GU. This will hopefully give the other countries something to listen for on those days. Frequency planning is difficult at the sunspot minimum, but it is significant that although no rare stuff was heard at G8PG during the week, two days after it ended GM3RFR (Shetland) was audble on 10 MHz during the afternoon for 30 minutes. Maybe we should look hf a bit more.
The dates for 1987 will be 4th to 11th October, and we will designate days for specific areas and ask you to move all non-remote area working to the 3570-3575 area for the duration of the event. See our Summer edition for full details.

WINTER SPORTS 1986. PRELIMINARY REPORT. QRP MEN KICK SUNSPOT MINMUM INTO TOUCH.
Twenty countries and four continents active on QRP, VE3ABT working across to G/GM with 5w to an indoor antenna, UP2BFE putting Lithuania on the QRP map, CT4RL/P belting it out from the seaside, 18 countries on two-way QRP in the check log from GM3OXX, and even an swl report... these are mome of the events in an extremely successful Winter Sports. An awful lot of people had an awful lot of fun, old friendships were renewed and new friendships made, and while the QRO brigade were weeping and wailing about bad conditions the QRP boys, many only recently licenced, showed them how it should be done. Owing to the early deadline for this issue of SPRAT all the logs are not yet in, so watch this space for fuller details in our next issue. But we must mention that Tom/2795 made history by being the first of our swl members to report in. He heard G8PG, so he must be good. Late flash; G8JR worked 5N2KRC/QRP on 21 MHz.

AWARD NEWS.
Congratulations to the following on the Awards indicated.
500 up for the Clermiston Keyer.
George, GM3OXX, now has the distinction of being the first to work 500 members on cw. Well done.
Worked G QRP Club. 500 GM3OXX, 120 G3IQF,100 G8JR, 80, G4RAW, GM4OSS, G4SXE, G4NVF, 60, G4UGC, 40, G4WZV; 20, G0FAH, G4GKW, G3MBO, G4YNU

Two way QRP. 20 GM4UYE; 10 G4ASL

ANOTHER QRPp DXCC TROPHY FOR THE UK

Trophy No 75 has been awarded to Gus, G8PG.

G2NJ TROPHY
The trophy will be awarded for the best QRP log covering the period 1st January 1986 to 31st of December 1986, submitted to G8PG by the 31st May 1987.
The log should show; Total DXCC countries worked; number of DXCC countries worked on each band; total number of countries worked on two-way QRP. Total number of countries worked on two-way QRP on each band. These totals should take the form of an alphabetical prefix list with the numerical total at the bottom. Any outstanding contacts should be mentioned separately, and details of the station and equipment and antenna(s) must be included.

NO CHEQUES WITH APPLICATIONS **PLEASE. Send only UK stamps or IRCs;** surplus stamps are used for club correspondance. Cheques only mean unnecessary work for our Treasurer.

Members News

"Alamosa", The Paddocks, Upper Beeding,
Steyning, West Sussex, BN4 3JW

I asked in my last column for news and you've not let me down. My only worry now is if George can allow me enough space to publish it all! Although this is a bumper edition of SPRAT to celebrate the 50th edition, George rang me this evening and said he was having a job to find enough room to fit in all the articles, so here goes...

First a request from G4XOM. Bob would like the address of the German D.I.G. Club as he is an avid award chaser. Secondly can anyone tell him if he is listed in the 1987 International Call Book? Spare a thought for SM6AWZ, an Autumn storm blew down Erik's beam. He is noticing the difference as he is now using a W3DZZ with his HW8. Another to suffer storm damage was WA2KSM, losing his tower in a hurrican. On antennas can anyone tell GOFJN how to get an 80m antenna into his 16 x 32ft garden? John is using a vertical but wants to improve it.

G0DJA has built the PW Meon 6m transverter using 300mW to a quad loop taped to the wall of his shack! Dave has worked GW, and is very keen on UHF. He runs 5mW to a 16" dish on 10GHz and 5mW to a 16" dish on 24GHz. Another UHFer is WB2ONA, Warren has worked 38 miles with 80mW on 10GHz. KZ1L is QRV on 6m and says you will find it is the best QRP band. Andy says you won't believe what you can do when F2 propogation occurs.

The Howes kits continue to be very popular giving members a lot of pleasure. G3YHO says the last few months on CW with his have been the most enjoyable of his 18 years on the air. G2ATU describes himself as an "Old Timer" who is new to QRP. Brian has been pleasantly surprised what the Howes kits can achieve with their flea power. G0BPA uses A Howes TCVR for 40m and finds it easier to drive than the DSB80. Bernie has worked around West Europe with it. G0CYF has been practicising CW but doesn't like competing with the QRM from the EA Trawlers on 80m with his Howes. G0CWQ has converted a CTX80 for Top Band. Only problem is that while getting 3w on 160m, Alex also gets half a watt on 80! G0FKX picked up a frequency counter at his Club junk sale and now has digital readout on his Howes TX. G0FKX has fitted the Kimuski Technology audio CW filter to his Howes 80m TX and although it rings a bit, David says he has made a few QSOs which would have been inaudible in the noise without it. G4XNP had the 20m TX as a gift for Christmas. Dave intends using it with his 20m Sloper system, which works quite well off a 36 feet mast, W and UM8 in the log with his Argoisy.

LA7CF has been QRV on 40m for just over a year with 3w input to a multi-band trap vertical. Stein has worked 46 countries in that time. VK5LG has worked Asia, ZL and W with his 30mW rig and has 65 DXCC at 3w. 5N2KRC uses a TS120 at 4w into dipoles. Yennis has worked CT4RL and G8JR so far and his week-end operating times are 0530-0600 on 7030, 0600-0800 on 14160 and 1000-1430 on 21060. G3KKA also uses a TS120 but to a HF5 vertical. Jim has worked CE, OA, PY and W. GM4XQJ is pleased with his Century 22 having worked a W8 in the Winter Sports with his Delta Loop. Brian is planning a 40ft tower and TH3. He asks that members who answer CQ QRP calls make sure they are also running QRP, a request echoed by several members. If you need Delaware K3AS hopes to be active shortly with his HW8. Arthur, G4BYA has worked around Europe with his DC40P and a 45ft end fed wire, and KM0Y has been having a lot of fun operating his Oner on 30m. G4MLI has been giving SSB a bash, Brian hasn't worked any members but got out to LZ on 15m with his G5RV and Argonaut. N8CQA is using a TR4C at 2w for QRP but is trying to get more stability for 10 and 15m. Buck uses a Butternut HF-2V with 24 radials for 80m and is impressed with the DX he has worked with it. To make a change from chasing members, Bob, G4JFN is chasing DX for his Milliwatt DXCC. New ones include 3B8, 5T5, ZS and LU, not bad for the bottom of the sun spot cycle. G8JR likes working 5T5, he worked 5T5XX on 10 and 20m and 5T5CJ on 10. Pete suggests 24906 and 18086 as QRP frequencies for those bands.

Talking of sun spots many of you mention the lousy HF conditions, but hasn't 80m been great this winter? Although I was operating QRO, one week just before Christmas I worked W6 and W7 every morning. G3ZPN worked NR8J in Detroit with his HW8 at the end of December. Sandy was using a random wire at only 30ft. G8QM worked W1CFZ at 0900 one morning over Christmas in between keeping a daily sked with G3IAG, who was operating as EA7FSF. G4YZO called CQ QRP on

80 and was answered by member and QRP ARCI Vice President W1FMR for a two-way QRP across the Atlantic - great going guys. Another to work W1CFZ was G3SYC, who did it five times! During one QSO Brian reduced power to half a watt without losing contact. Brian says G3DOV also worked W1CFZ. W9SCH has been using 1w o/p to a Zepp and has worked the East and West Coasts plus VE and CM. G4IXL says 80 is almost "verboten" because of VCR/TVI. Even 1w gets into the next door VCR which Bob says they seem to use 24 hours a day. OK1DRQ is up to 51 DXCC on 80m. Finally G3XUO says he finds that 80m CW past midnight seems to take on a different pattern of operating - a bit specialised with higher speed contacts.

G8CMH tells me of a very good CW net called the 700 Club, in the Manchester area on 144.700 at 1930 every evening. It is ideal for beginers. Congratulations to G3JNB for winning the G2NG Trophy presented by TVARTS for constructing a QRP TX in 1986. Victor built a Oner for 80, 40 and 20m and worked UZ6AYG in the Black Sea on 20m for the best DX with it. A correction to DL1HCU's address printed in the last SPRAT, it should have read Ellerbeker Weg 107, 2084 Rellingen, West Germany. Udo would like to hear from members interested in solar power. G4VBC tried all modes but has decided CW is his favourite. Roy uses a TS520S but is building a Howes TX for QRP. G4ITA has found it possible to set the output of the TS520S down to 800mW for QRP work. G4NFR finds a KW2000 with a burnt out HT transformer makes a good 3w QRP rig! KH6CP is QRV on Top Band from W1 with 4.4w from a second floor apartment which doesn't lend itself to a good antenna system! Zack is now working for the ARRL, hence the move to CT. ZL1ABS tells me he skeds G3ROO between 0800-0830 on Tuesdays on 14120 SSB.

G3YCC is building a 10m superhet RX to be followed by a TX, for better times to come! W9SCH is also thinking of better times, Rockey has rebuilt his Fishin-Box for 15m. EI0CF is building the ZL2BMI DSB TCVR and appreciated the help from G4RAW in an hour long telephone QSO. G3TVK found his Ben to be very successful. Ted uses other homebrew gear and can recommend the G4DCV CW filter in the May 1985 SWM. GM4EFR has breadboarded an 80m TCVR, VFO with the RX based on a CA3028. GW4KUS obtained the Heathkit ATU, SWR/OP meter and accessory coil pack to put the HW9 on all bands. Bert recommends the meter, it has two ranges 0-5 and 0-50w. GM1RHV has built the Howes speech processor and says the results are amazing and it's worth every penny. WB4KLI built the Oner, took it to his local DX Club in KY where it was a hit. Larry worked 6 States before the PA went dead. He asks if anyone can suggest a USA equivalent for the PA. G4SCT recommends the JEP Keying Unit with the Spectrum for those whose hands are no longer able to make good CW on an ordinary key. Jim says it works great with his Argonaut. I3MDU has moved house but is now QRV on RTTY QRP. G4LKT has built the DSB80 with the Ambit CW Filter. Peter says he learnt a lot through making mistakes (haven't we all!!), and would welcome an article in SPRAT on some of the basics of construction, layout etc.

G4MEW moved into a new bungalow and is using a G8PG type 66ft loop in the loft. Charles had to bend the horizontal sections to fit it in, but has worked the USA with it. An indoor dipole 18'9.5" long with 3ft loading wires for 15m yielded PY, CE and ZS. He overcame the LF problem by taking one of the open wire feeders of the loop and connecting a 66ft counterpoise running under the lounge carpet. It works as a W1 on 80m is in Charles's log. GM4YLN made 56 QSOs from GJ and GU at the begining of December, and Chris intends being QRV from C31 this Summer. G4FMH received ON5AG's QSL card for a QSO in August, when they were both using Argonauts to G Whips from their /P holiday QTHs. Bill said the card went via PA3DED who Frans had referred to on the card as causing QRM. Moral - don't mention third party calls on your QSL cards! G3CSC spends two months in France each year working /M. This year Sam will be at a 4000ft asl site with his Argosy on QRP. G3BOK has become interested in 10m CW and uses a two element yagi. Bill looked on 80 and worked Rudi OK1DKR on two-way QRP. SM0KSM mentions the QSOs he continues to have with OK2BMA and G4MIJ, and his visit to Rod's QTH last summer. Rod tells me he taught Per cricket and is learning Czech for a planned visit to Pavel's QTH. G4ASL did not get to SP for Christmas, but Steve says he will be there this summer as SO5ASL with a 40m TCVR he is building. Congratulations to Del G4TBL and Linda G4TNI, they recently got married and moved to a new QTH. Sounds good as they have worked JA on 20m with 2w so far. Congratulations also to Bob, NM7M who has been appointed the new Secretary/Treasurer of the ARCI. Bob would like to hear from members interested in propogation programming. G0FUN asks if there is anyone on the south coast interested in trying RTTY on 10FM? Steve can be contacted on Gosport 527694. G4EHU continues with his Creed 444 and ST5MC tu working around Europe. G4ETJ appreciated the DF4SQ article in SPRAT 46 on keying and T/R switching, and recommends it to anyone having trouble with homebrew keying circuits.

G3ZJJ has been QRPing 5 years with a G3SYC 1 valve (EEC82) TX from SPRAT 29. He also uses a Oner on 40, but it didn't like 80m. G3MBN suggested adjusting the inductance of the RF choke and Mike says it now goes like a train. G4KUQ has moved and swopped his 60ft tower for a dipole to his Argonaut. Mark says the name of the game is to do the best you can with what you've got - we agree. N5BA has moved to Houston after completing (QRO) 5BDXCC from his Austin QTH. G4GXI has been travelling a lot and using the time spent in hotel rooms to build

an 8 digit frequency counter. G4MQC says he, with G3NCL and G0AZU run the RSGB slow morse sessions on Friday nights on 2m from the Chiltern ARC, G3CAR and G4INM says that Class B members in Herts, Essex and Kent may like to know he runs the slow morse sessions on 145.250 week nights from 2000. Tom says put your beams on Chelmsford and learn CW. G4WBN erected the GW3ZFY three band antenna from SPRAT 47 and says it completely out performs the G5RV. Trev says it also radiates on 30m so his is a four band version. Best DX for VK3CBO is JA on 1w and LA on 2w, Rod using a VK2ABQ tri-bander. G4EBO found 5T, 6W and 9Y for new ones and made a two-way QRP QSO with a W5 in Mississippi. G4XFD is active with 100mW on 4m and VE3ABY changed his Argonaut for an Argosy which he likes very much. G0FAH also changed to an Argosy and would like information on any mods for it. He has built the Ten-Tec designed PSU and can recommend it, he has details for any member interested.

G4KKI built the DSB80 and a Teme 20/40 and says a rig for 15m is next. G3LHJ is having fun with his Teme, Derrick made 100 QSOs on 20m in the ARRL Contest. After upgrading to G0FIX, Colin uses a Teme but is building an all band rig. G1MWD has built the Teme and is now already for passing the CW test. G3BMO uses an assortment of home brew gear on 80m and G3NNK recommends the G4BWE CW filter from Rad Com with his Micron. GM0CJT worked a W9 on 20m with his Micron to an 18AVT. Although WP0 says the maximum output is 18w, Ron can get 20w on 40m and 22w on 80m with his! PA3BHK is building a new PA, a pair of BD135s driving two 2SC1306s. Robert is QRV with a homebrew 4w TX on 2m and has worked over 700Kms with it. G3WWS has completed an 80m version of the MLX and wants SSB skeds on 80m. G0FBG/PA uses a HW101 with reduced drive but an MLX is being built for 20m. Godfrey has 20 DXCC with a dipole just 7ft above his roof. G3KBQ has a problem with a relay which switches the HT on his DSB2. It gives a loud thump and Peter would like advice on how to cure it. G4ZJT's main interest is 2m FM/SSB/CW with a FT290R and an HB9CV in the rooftop. G4DMH also likes 2m FM along with 10m, Malcolm uses loft antennas and is doing lots of building, hopefully he will let us have details for SPRAT articles. G1PBD says during flat conditions his limit seems to be about 177 miles from an FT290R into a 9 elm Tonna on 2m and Rob would like to know how this compares with other 2m stations. W2JEK is on 99 DXCC with his HW8 and is building the Simpleceiver from September 1986 QST which he got for Christmas. GM0EKK built the Squeeze Keyer from SPRAT 48 and after Harv noticed the deliberate mistake, found it works well, (IC1c pins 4 and 5 should be reversed). G4KLS is building an all band superhet RX with all parts from the junk box and K9PNG says he and K5VOL are building the W7ZOI Progressive RX. G0FTO is having a great time with a DSB80 and doublet with open wire feeders, and G0EBQ is using an OXO at 600mW on 80m with a long wire. Nigel has also worked OH on 20m. WB8ZWW only worked EA8 on 15m in the Autumn.

GW3PYD says several QRPers at his local club are building QRP gear and can be found on 80m most evenings. Contender for the "Cramped QTH" competition is G3IJV. Bob uses a vertical for 10-40m lashed to the end wall of the house above a yard just missing telegraph lines. He worked D68 on 15m with his Argosy so he's obviously got it right. G4FRL makes a plea for a member to contribute an article on coil winding and several of you have mentioned the RAFARS recommended net frequencies coinciding with the QRP ones. We have written to them.

That's it, but to fit in what I have written I will have to increase the type pitch from 10 to 12 cpi. You can see the difference by looking at the remaining text in SPRAT. Let me know if you find it ok to read and we can use it to get more text in future SPRATS. Many thanks for all your leters and news and let me know how your Spring goes. Don't forget to make a note of 15 August - see you at Alamosa?

73, Chris

MEMBERS ADS

WANTED Dow Key (Bug) mfd in Warren, Minn in late 40s. Has adj. paddle angle. WF6U, 1025 W. Parr Av, Campbell, CA, 95008, USA

WANTED Top Band QRP rig in good condition, SSB/CW. G4EHU, 34 Monmouth St, Bridgwater, Somerset, TA6 5EJ.

WANTED Circuit and alignment data for HW7, buy, borrow or copy. G0FJN, 16 Patricia Close, Oulton Broad, Lowestoft, Suffolk, NR32 3NT.

160 Metres QRP Frequency

Colin, G3VTT says the only reply to his note in the last SPRAT is from G3TUX, who suggests 1843KHz. Chris says while it is far less susceptible to SSB QRM there is a possibility of QRM from local computer clock oscillators on 1843KHz. Colin agrees with the comment about SSB, but wonders whether computer clocks have caused any members problems. In the absence of further comment, Colin proposes keeping 1850KHz as the QRP frequency but we should remember that some European stations will be operating between 1825 to 1835KHz, particularly the Dutch.

CUMULATIVE INDEX OF SPRAT NOS. 1 to 49

By Chris Page G4BUE

The following pages list all the main constructional articles that have appeared in the first 49 issues of SPRAT, and therefore make up the history of the G-QRP-CLUB. In this special 50th edition of SPRAT it seemed fitting to include them to enable articles to be found quickly, especially by those few members who possess a complete collection! In addition more recent members will be able to see what they have missed by not having joined the G-QRP-Club earlier!!

One of the things that amazed me, as I was going through my back issues of SPRAT compiling the listing, was the very large number of different members who have contributed articles. They are the people who have caused SPRAT to become the very popular and respected magazine that it is today. Contributions have come from many overseas members, with all continents being represented, resulting in SPRAT becoming a truly international magazine. As you browse through the names and call signs be thankful they have taken the trouble to put their ideas down on paper to share with the rest of us. I would like the listing to be a tribute to them all, and on behalf of all past and present members of G-QRP-Club, I say a big thankyou to them all.

One result of this listing is that many of the older articles, especially those dealing with mods to the popular QRP black boxes, are going to be in demand by members who joined the Club later. Let George, G3RJV or me know which articles you would like to see reproduced in SPRAT, or possibly in a new edition of a Club Circuit Handbook.

Title	Author	Call	Sprat	Page
Transceivers				
004 Transceiver	John McDonnell	G3DOP	43	11
10Mhz Transceiver	Keith Coates	G3IGU	31	11
20/20 Transceiver	Peter Dodd	G3LDO	33	6
80m QRP Transceiver	Keith Coates	G3IGU	3	4
40-20m Transceiver	Keith Coates	G3IGU	18	4
160m DSB Transceiver	Derek Edmunds	G3MJW	44	3
All Weather (Novelty) Signaller	S. Garner	G3WSL	42	17
CW Transceiver for 20	Frank Lee	G3YCC	21	3
DC-30-P Transceiver	John Beech	G8SEQ	42	4
Ebor 3.5MHz Transceiver	Norman Spivey	G3GWI	19	15
Force Three 7MHz Transceiver	Finbar O'Connor	EI0CF	36	3
FOXX Transceiver	George Burt	GM3OXX	35	13
HF Transceiver	Norman Spivey	G3GWI	34	3
JU6 7-14MHz Transceiver	John McDonnell	G3DOP	20	5
JU6 Plus	John McDonnell	G3DOP	27	10
Laim 10MHz Transceiver	Ha-Jo Brandt	DJ1ZB	36	12
Micron 6 Band Transceiver Kit	George Dobbs	G3RJV	43	17
Miniature 40m Portable Transceiver	Roy Lewallen	W7EL	24	7
One Tube Amateur Station Complete	C. Rockey	W9SCH	7	6
Phoenix Transceiver	Carl Wood	G4XOG	45	8
PW Dart as a Transceiver	Ron Marshall	G4GIQ	40	16
QRP-4 Transceiver	John Smith	SM6DWO	31	3
QSK-1 One Transistor Transceiver	Bob Culter	N7FKI	49	18
RIT for the DSB80 Transceiver	Rod Young	G4MQH	44	18
Rock's Fishing Box	C. Rockey	W9SCH	46	8
Snowshoe Mountaineer 7MHz TCVR	Wes Hayward	W7ZOI	30	12
Super OXO All Bands Transceiver	George Burt	GM3OXX	32	12
Superhet Transceiver for 20m	Nino Paglialonga	I7ZCZ	49	13
TMX Transceiver for 10MHz	Thom Davis	K8IF	29	5
TOT 20 Transceiver	Petr Doudera	OK1DKW	32	14
TOT 30 Transceiver	Petr Doudera	OK1DKw	34	12
Transceiver for 7/14/21MHz	Arthur Parsons	G2PS	47	4
Transceiver for 80m	Frank Lee	G3YCC	43	3
Transceiver Ideas	Gig Dragulescu	YO6HQ	32	7
TSC Mk.I 40m QRP Suitcase TCVR	Mike Michael	W3TS	42	9

TSC Mk.II Transceiver	Mike Michael	W3TS	44	8
Tunbridge SSB/CW Transceiver	Ian Keyser	G3ROO	26	3
Twinnyset Transceiver	Ha-Jo Brandt	DJ1ZB	34	9
Wee Rig	George Burt	GM3OXX	33	4

Receivers

80 to 2 Metres Receive Converter	John Reynolds	G3PTO	35	18
160 and 30m Receive Converter	Maurice Selby	G4LV	38	4
CQC Dual Bander Receiver			47	3
DC Receiver for 80 Metres	Peter Brent	G4LEG	22	8
DC-77 Receiver		PA0GBY	30	3
Direct Conversion RX Front End	Mike Southall	G3WWS	38	9
FET Regenerative Receiver	Ha-Jo Brandt	DJ1ZB	4	13
HF Preselector	Ha-Jo Brandt	DJ1ZB	33	10
IC 1.8-2.5MHz Receiver	Ian Keyser	G3ROO	17	3
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Pocket Receiver	Mike Molina	EA3FHC	47	14
ROO 10MHz Receiver	Ian Keyser	G3ROO	31	16
Silver Tern Super Reflex Receiver	Emil Tenlund		15	7
Simple 14MHz Receiver	Ian Braithwaite	G4COL	37	4
Simple Straight 2.5-28MHz Receiver	Don Benham	GW3ZFY	34	8
Special Purpose Receiver	Wes Hayward	W7ZOI	44	12
SR-1.5-4 Receiver	W. Jones	GW8PLV	14	5
Tenor 80m DC Receiver	Phil Hobson	G4HOJ	49	8
Three Band DC Receiver	Martyn Lindars		35	3
Top 'n' Eighty DC CW Receiver	Peter Brent	G4LEG	40	6

Transmitters

2 Bands CW QRP Transmitter	Drew Diamond	VK3XU	41	10
6K8 QRP Transmitter	Dug Woodford	G8IB	12	10
10MHz VXO Transmitter	Ha-Jo Brandt	DJ1ZB	31	9
10m VXO Transmitter	Benelux QRP Club		28	9
18/24MHz Version of the Lagos QRPeter	Ha-Jo Brandt	DJ1ZB	33	8
40m TTL QRP Transmitter	Joseph Lauricella	KL7JHM	33	15
40m Mini TTX Transmitter	Leonardo Boselli	I5WUO	40	15
80m Transmitter	Gordon Pope	G3ASV	49	16
80m Transmitter Based on the JU6	Peter Brent	G4LEG	29	15
80m VMOS Transmitter	Paul Harrison	G4VAM	43	18
80 - 160m Transverter	Ian Keyser	G3ROO	19	13
160m Main Station Transmitter	Roy Rowntree	G3ZQA	28	3
160m Transmitter	Paul Harrison	G4VAM	49	6
A Watt Plus on 160	C.Caringella		11	10
Basic VXO for 3.5MHz	Al Santucci	I0SKK	32	11
Bren 160m DSB/CW Transmitter	Colin Turner	G3VTT	28	7
Class A Amplifier for the Tunbridge	Ian Keyser	G3ROO	27	12
Daily Telegraf QRP CW Transmitter	Siegi Hari	DK9FN	8	8
DSB1 - Double Sideband Transmitter	E. Elsley	G3YUQ	4	3
Fag Box(0) Transmitter	Chris Page	G4BUE	45	11
Full BK Top Band Transmitter	Ian Keyser	G3ROO	25	6
Grilo 3 Bands Transmitter	Carlos	PY2FNE	38	8
Howes CTX80 Kit	Colin Turner	G3VTT	47	18
Jubilee 80 SSB/CW Transmitter	Art Smyth	GM3XNE	14	7
Lagos QRPeter	Ha-Jo Brandt	DJ1ZB	23	3
Mac Modded Super OXO Transmitter			35	20
Malin Head TTX	Finbar O'Connor	EI0CF	16	6
Mini Tener DSB Transmitter for 10m	Art Smyth	GM3XNE	23	12
Mods to the G3ZVC Transmitter	Ian Keyser	G3ROO	12	8
Nor's 20m Transmitter	Nor McIntosh	GM3RKO	40	18
One Knob 80m TTX	Harold Smith	G3IVF	17	7
One Valve 3 Bands QRP Transmitter	H. Acomb	GM4CCV	44	10
Oner Transmitter	George Burt	GM3OXX	45	4
OXO All Bands Transmitter	George Burt	GM3OXX	28	12
Phoenix CW QRP Transmitter		PA0FKP	34	14
Piccolino Transmitter	Ha-Jo Brandt	DJ1ZB	42	7
Prolegomena to QRP Transmitters	C. Rockey	W9SCH	4	9
Prolegomena to QRP Transmitters	C. Rockey	W9SCH	22	3

QRP 2 Watt Transmitter	R. Mackrell	G3AEP	48	17
Reverse Hybrid 40m QRP Transmitter	Mac McNeil	G3FCK	35	15
Roarin Mick - 80m Transmitter	C. Rockey	W9SCH	6	15
Santista Transmitter	Paulo Moser	PY2TU	30	7
Single Valve 80m QRP CW Transmitter	Brian Booth	G3SYC	29	3
SSB Transmitter for 14MHz	Frank Lee	G3YCC	48	3
SSB 80 Transmitter	E. Elsley	G3YUQ	9	3
STX Transmitter	George Burt	GM3OXX	35	12
Transistor 1 160m Transmitter	E. Elsley	G3YUQ	5	15
TTL Transmitters	John McDonnell	G3DOP	10	10
Vintage Valve Transmitter	Alan Lake	G4DVW	39	11

Accessories

3 Watts Output Meter	D. Plumridge	G3KMG	47	13
7MHz Crystal Bender	Mike prior	G3XMI	21	13
Active Filter	George Burt	GM3OXX	11	3
Active Audio Filter	Harold Smith	G3IVF	23	15
Auto Keyer	Bev Branden	G4TDU	46	16
Capacitance Touch Paddle	Bob Newson	G4EEM	28	10
Capacitive Touch Paddle	Roy Lewallen	W7EL	26	10
Cheap CW Filter	Des Vance	GI3XZM	10	17
CMOS Keyer	Gerry Farrance	G3KPT	5	13
Crystal and Frequency Checker	Chris Warwick	G8DSO	29	10
Crystal Calibrator	Dave Powell	G3ZXK	20	13
CW Crystal Filter	Adrian King		45	3
GDO	Ian Keyser	G3ROO	24	14
Helping Hand	Walter Farrar	G3ESP	48	22
High Impedance DC Voltmeter	Brian Booth	G3SYC	39	3
High Performance CW Filter	Ed Wetherhold	W3NQN	32	3
Low Power SWR Indicator	George Dobbs	G3RJV	1	7
Max Box - Surplus Crystal Checker	Mac McNeil	G3FCK	17	13
More Audio Filters	Des Vance	GI3XZM	15	5
Odd Frequency Xtal Calibrator	Cop MacDonald	VE1BFL	21	7
Peak Reading RF Probe	Reg Lyddon	G4ETJ	46	7
Pin Diode Attenuator	Ian Keyser	G3ROO	12	13
Portatest for /P Work	Gus Taylor	G8PG	12	13
Power Pack for QRP Work	George Burt	GM3OXX	6	5
Product Detector for QRP Use	Edgar Janes	G2FWA	1	3
QRP Power Meter for the HF Bands	Ian Braithwaite	G4COL	48	18
QRP Power Pack	Dug Woodford	G8IB	11	5
QRP Squeeze Keyer	Dave Powell	G3ZXK	20	7
QRP SWR Indicator	George Dobbs	G3RJV	12	11
Rock's Test Box	C. Rockey	W9SCH	48	11
Simple Auto Keyer	Gus Taylor	G8PG	12	7
Simple CMOS keyer for QRP Rigs	Roy Lewallen	W7EL	22	11
Simple Speech Processor	M. Salmon	G2CKM	12	6
Simple Squeeze Keyer	Matt Volkert	DF4SQ	48	8
Simple Transistor Tester	L. Ivin	G5IC	14	3
VFO Netting Circuit	Gordon Bennett	G3DNF	1	6
Wattmeter	George Burt	GM3OXX	22	13

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2 Element 2 Metre Beam	Stan Percival	G3BGR	12	10
2 Metre 3w AM Transmitter	John Dodd	G8EPE	5	5
2 Metre ATU	David Ackrill	G0DJA	49	23
2 Metre DC Receiver	John Beech	G8SEQ	43	24
2 Metre FET Pre-amp	John Beech	G8SEQ	44	24
2 Metre FM Transmitter	Ha-Jo Brandt	DJ1ZB	24	3
2 Metre J Antenna	D. Jennings	G3ZAI	41	17
2 Metre Pocket Zepp Antenna	Herbert Hanrider	DL7MAM	33	4
2 Metre Portable Antenna	John Beech	G8SEQ	37	18
2 Metre Pre-amp	John Beech	G8SEQ	45	24
2 Metre Wavemeter	Geoff Gardner	G6MCZ	37	17
3 Element HB9CV Beam	A. Morgan	G8PON	29	22
5 Element Quad for 2 Metres	John Stevenson	G8ZRY	32	8
50MHz FM TRX	Mike Sheffield	ZL1ABS	36	20

50MHz RX Converter	John Beech	G8SEQ	46	20
144-14MHz Converter - Part I	David Johnson	G4DHF	26	12
144-14MHz Converter - Part II	David Johnson	G4DHF	27	5
Dummy Load and Power Indicator	John Beech	G8SEQ	47	23
Miniature 2m FM Transmitter	Mike Tooley	G8CKT	36	16
Simple 2 Metre CW/FM Transmitter	John Beech	G8SEQ	42	22
Using a Liner 2 on CW	Eric Calvert	G4EIC	45	17

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3 Band Mini Ground Plane	Stan Walker	G3MPW	31	4
3 Band Vee Beam	John Hackett	LA2QAA	39	15
10m J Pole Antenna	Ian Keyser	G3ROO	47	19
15m Helical Antenna	Ben Johansson	CT4CH	36	10
15m Monoband Yagi	Frank Lee	G3YCC	31	7
20m Asymetrical Antena	F. Handscombe	G4BWP	22	14
20m DX Sked Keeper	Dave Smith	G4JIM	26	7
40m Top Loaded Vertical	Brice Anderson	W9PNE	40	9
Bobtail Curtain	Jim Fitton	W1FMR	40	10
Capacitive Tuning for Loop Antennas	Ha-Jo Brandt	DJ1ZB	25	8
Double D Beam	Peter Dodd	G3LDO	22	10
Double Inverted Vee	Tim Cook	G5DEH	24	12
End Fed Bruce Array	Gordon Bennett	G3DNF	41	4
Feeding the Whip	Chas Bryant	GW3SB	30	8
Further Evolution of Double D Antenna	Peter Dodd	G3LDO	49	14
HB9CV 2 Element Beam	Petr Doudera	OK1DKW	23	14
Horizontal Beams	Brice Anderson	W9PNE	38	6
Improving Short LF Antennas	Gus Taylor	G8PG	2	5
Kite Antenna	Roy Rowntree	G3ZQA	27	8
Loop and Leg Antenna	Gordon Bennett	G3DNF	8	9
Magnetic Delta Loop Antenna	Udo Velten	DL1HCU	46	17
Mini Loop	Petr Doudera	OK1DKW	21	8
More Ideas on Shortened Dipoles	Ben Johannson	CT4CH	38	14
More on the Double D Beam	Peter Dodd	G3LDO	30	10
Multi-band Delta Loop	P. Swarbridk	G3ZGN	41	18
Phased Verticals for 15 and 20m	John Hackett	LA2QAA	28	13
Portable Whip Antenna	G. Wheeler	G3ZOF	17	15
QRP Vertical Antenna	Ralph Burch	W8LCU	20	17
Rhombiquad	Ian Keyser	G3ROO	22	10
Rizzou Antennas	Andy	WB2RZU	24	11
Schh....Quiet 30m Antenna	Ed lappi	WD4LOO	47	8
Scotsman's 3 Bands Antenna	Tom Sorbie	GM3MXN	37	13
Skeleton Cone Antenna	Bob Spidell	W6SKQ	34	16
Skeleton Cone Revisited	Bob Spidell	W6SKQ	43	20
Sled Kite Antenna	Roy Rowntree	G3ZQA	30	5
Sloper That Needs no Tuner	Jerry Bartachek	KD0CA	44	20
Sloper System	Chris Page	G4BUE	25	3
Spider Quad	Bob Spidell	W6SKQ	37	14
Toast Rack Antenna	Stewart Cameron	GM4UTP	45	18
ZL Special	Gus Taylor	G8PG	19	15

A.T.U.

ATU	John White	G4BCY	11	8
ATU for the FOXX Transceiver	Donald Younger	W2JEK	45	8
ATU Unit for the HW7	Keith Simpson	G4DQF	2	12
Benelux QRP Club ATU			40	9
Bren TX ATU	Colin Turner	G3VTT	32	6
No Cost ATU	Tony Haas	G4LDY	28	5
QRP Z Match ATU	George Burt	GM3OXX	25	14
Simple ATU for QRP Transmitters	Ha-Jo Brandt	DJ1ZB	7	4
Suggested ATU	Dave Dabinett	G4DEP	18	14
Switched All Bands QRP Z Match	Frank Lee	G3YCC	38	5
The Rock-O-Nator	C. Rockey	W9SCH	3	16
Taking the Mystery out of ATUs	Gus taylor	G8PG	6	9
Three Way ATU	Ron Howe	G3PLB	12	6
Tuned Balun ATU	Alan Chester	G3CCB	33	3

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10MHz Quickee Converter	Frank Lee	G3YCC	31	17
10MHz Transverter	Tom Sorbie	GM3MXN	31	10
10MHz Transverter	Ken Maxted	GM4JMU	35	7
14MHz Transverter	Elmar Voller	DL2QA	49	4
30m for the HW8	Howell Ching	KH6IJS	39	16
40m VFO	Wes Hayward	W7ZOI	40	3
50 ohm Low Pass Filters for Transmitter	Ed Wetherhold	W3NQN	37	10
128 Set for QRP	Martin Swan	G4LDG	30	4
160m Transverter	Malcolm Horton	G4DMH	45	6
160m Transverter for the Argonaut	Colin Turner	G3VTT	26	9
Antenna Changeover	Gunter Dengler	DL1HS	41	17
Adding 10MHz to the Argonaut	George Scholter	LX1BK	36	11
Argonaut Transverter Switching	George Dobbs	G3RJV	32	10
Attenuator for the Argosy	Tom Sorbie	GM3MXN	40	11
Automatic Internal/External VFO Switch	Ian Braithwaite	G4COL	47	10
Basic 160m Converter	George Dobbs	G3RJV	28	8
Bi-directional Mixer	Mike Koblic	GW4GIU	42	3
Broadband Amplifier and Drivers	Ha-Jo Brandt	DJ1ZB	8	5
Broadband PA for 20 metres	Ha-Jo Brandt	DJ1ZB	9	19
Century 22 Appraisal	Colin Turner	G3VTT	49	19
Cheap Hi - Z Headphone Idea	Geoff Pollitt	G4NPQ	45	10
Cheap SSB Generator	Ian Keyser	G3ROO	15	3
Coherent CW - Part I	John Stockley	G3FMW	10	4
Coherent CW - Part II	John Stockley	G3FMW	11	6
Converting the Argonaut to 160m	S. Mattson	SM6AOQ	34	6
Converting the LCL2740 CB to 10m FM			38	11
Converting the HW7 for 10MHz	George Scholter	LX1BK	36	11
Copying the HW8 - the HMW8	Pavel Cunderla	OK2BMA	28	14
Crystal Possibilities for QRP Work	Ha-Jo Brandt	DJ1ZB	5	7
Dandelion Seeds in the Wind	John Trent	KL7DG	46	19
Dayton Hamvention 1985	Chris Page	G4BUE	44	13
Digital Readout for DC Rigs	Chas Bryant	GW3SB	43	19
Diode Peak Detector for QRP	Graham Lambert	ZS6HV	44	17
Fitting an Attenuator to the Argonaut	Mark Goodfellow	G4KUQ	37	9
FT7 Modification	Colin Turner	G3VTT	35	17
Hints on Making PCBs	Ian Keyser	G3ROO	17	6
Howes RX on Multiband	Mac McNeil	G3FCK	44	7
HW8 Improvements	Mike Perry	PA3ASC	24	13
HW8 Mac Mod Squad	Ken Maxted	GM4JMU	38	10
HW8 Mod	John Spinks	G4GIE	17	15
HW8 RIT Control	Peter Schaufel	HB9IK	23	9
HW8 'S' Meter	Benelux QRP Club		39	4
Icom ICB-1050 for 10m FM	John Reynolds	G3PTO	34	7
Impressions on the DSB80		EI7EH	38	16
Improving the HW7 - Part I	Ha-Jo Brandt	DJ1ZB	9	10
Improving the HW7 - Part II	Ha-Jo Brandt	DJ1ZB	10	5
Input v Output Power Standards	Ade Weiss	W0RSP	19	3
Jaggy Noise LImiter	Mel Evans	GM6JAG	45	21
Keying and Switching with CMOS ICs	Matt Volkert	DF4SQ	46	4
Linear and Stable VFO for 14MHz	Matt Volkert	DF4SQ	48	6
Make your PM3A into a PM3X	Gus Taylor	G8PG	7	10
Milliwatts from an Argonaut	Chris Page	G4BUE	18	9
Mods to the IC720A for QRP Operation	Brice Anderson	W9PNE	40	15
Mods and Improvements to the TS120V	John Croxford	G3OIC	41	7
Multiband VFO	Mike Staunton	EI3DY	39	5
Notes on Milliwatts from an Argonaut	Chris Page	G4BUE	19	11
PA Design Idea	George Burt	GM3OXX	20	15
Pass That Band	David Reynolds	G3ZPF	20	16
Premix VFO for 10 and 14MHz	Matt Volkert	DF4SQ	38	12
Propogation Notes	Mike Molina	EA3FHC	47	22
Proven Mixer Circuits	Martyn Lindars		30	9
Q Multiplier for the Drake 2C	Colin Turner	G3VTT	37	12
QRP DX from Grand Cayman	Fred Bonavita	W5QJM	38	18
QRP Final	Brice Anderson	W9PNE	16	9
QRP on 10m with a Liner Two	J. Harkin	GM4HLM	19	11
QRP on 10m FM	Rich Arland	K7YHA	32	16

QRP Transmitters and Harmonic Output	Doug DeMaw	W1FB	35	5
Receiver Offset	Dave Logan	G4EZF	41	12
Relayless RIT	Ian Keyser	G3ROO	25	13
Re-using Old Panel Meters	Dave Logan	G4EZF	44	21
RF Actuated Changeover Switch	Ian Braithwaite	G4COL	39	8
RF Fired CW Monitor	Dave Dabinett	G4DEP	38	7
RF Gain Control for the Argosy	Jim Lyon	VE2KN	47	17
RF Pre-amp	Mike Michael	W3TS	46	3
RF Relay Driver	Mel Evans	GM6JAG	43	19
Semi-Breakin T/R Switch	Graham Ranft	VK7ZO	49	17
Sensitive Microwatt Meter	Wes Hayward	W7ZOI	38	3
Shift those Rocks	Gordon Bennett	G3DNF	3	7
Sidetone Oscillator	Bill Cooper	G4CIA	29	9
Simple HW8 Modifications	Tom Sorbie	GM3MXN	18	7
Simple PSU	B. Goodger	ZL2RP	40	5
Simple QRP with the TS120/130	Brian Austin	ZS6BKW	46	18
Sine Wave Sidetone	Ray Greenwood	G4OQQ	45	20
Solar Power Regulator	John	W6PQZ	16	3
PLL Circuit for SXI Upper QRP Channels	Gig Dragulescur	YO6HQ	36	6
Three Good HW8 Mods	J. Livingstone	GM4FDD	20	5
Threshold Gate Noise Limiter	L. Ivin	G5IC	12	12
Transverter	George Burt	GM3OXX	28	17
TS120V Modification	Doug Hill	G3ZWH	28	18
Two Watts out with an FT7	Felix Carbonara	I7CCF	22	10
Universal Sidetone	Walt Legan	KA4KXX	27	3
Using Cheap Old Meters	Brian Castle	G4DYF	20	4
Voltage Regulator for the Argonaut	Brice Anderson	W9PNE	28	17
VXOx for the 30m Band	Ha-Jo Brandt	DJ1ZB	31	8
WARC Converter	Ha-Jo Brandt	DJ1ZB	35	9
Wide Band Untuned Preamp	Len Colley	G3AGX	37	12
Yet Another 10MHz Converter	Nor McIntosh	GM3RKO	39	17
Yet Another Sidetone	Ken Maxted	GM4JMU	33	15

SOME FACTS ABOUT SPRAT

The G QRP Club was formed at the end of 1974 as a result of a letter to the SHORT WAVE MAGAZINE by G3RJV asking for interested amateurs to write to him. G3RJV produced the first issue of SPRAT over the Christmas of 1974 using a spirit duplicator at a local school. 34 copies were issued on old quarto size paper.

From issue 2 SPRAT was produced on A4 paper with a front cover designed to fold into three, a third of the front page being an address label for direct posting. By issue 2 the membership was 60. A complete Membership List, issued in 1977 showed 240 members.

The now familiar A4 folded format began with issue 20, Autumn 1979, the front of which showed George Burt, GM3OXX, as the first non-American Milliwatt DXCC Trophy Winner. G4BUE's popular Members News Column began in that issue and the membership was up to 615.

Issue 21 was an oddity, with a blue front cover and brought the membership to 700. The G QRP CLUB CIRCUIT HANDBOOK was hand produced by the club as a limited edition in 1982 but by 1983, the R.S.G.B. had taken over the printing and distribution.

My thanks to all who have contributed to SPRAT over the years. Please keep the articles coming. You need not be a technical author, all we required are rough drawings and notes, but please mark all the component values clearly.

HOT WATER HANDBOOK

That well known book which is a compilation of articles on the modification of the Heath HW8 QRP Transceiver is back in print. The Second Edition has been prepared by Michael Bryce, WB8VGE. Full of useful mods for the HW8, which incidently are worthy circuits for any QRP library of circuit ideas, the book costs $7.00 Airmail, payable in US Funds, from Michael Bryce, 2225 Mayflower N.W., Massillon, Ohio 44646. U.S.A.