SPRAT

THE JOURNAL OF THE G-QRP CLUB

DEVOTED·TO·LOW·POWER·COMMUNICATION

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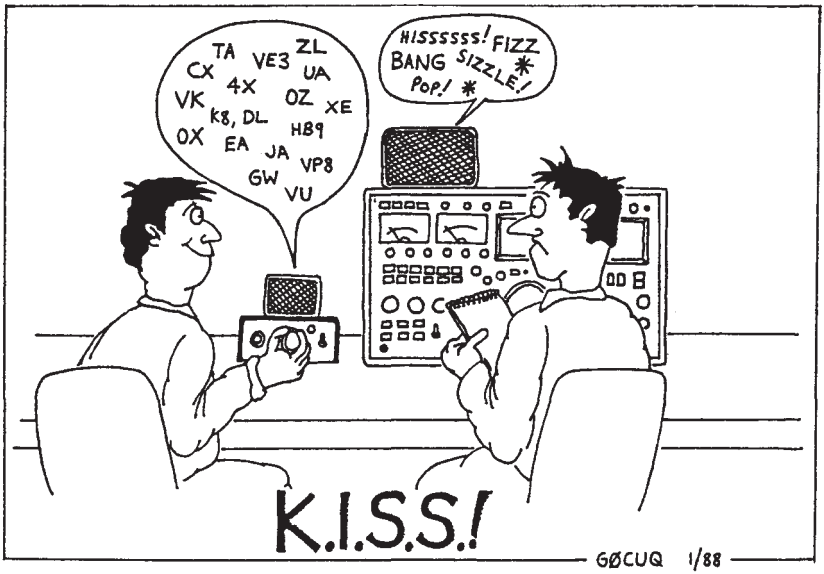
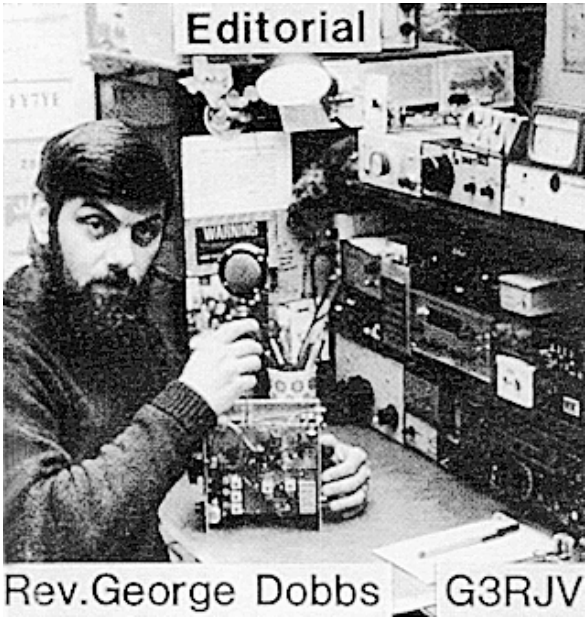


PROJECTS : ALPHA 80M TRANSCEIVER - UNICHIP REPEAT WITH PCB CLASS A BUFFERS - AUTOMATIC T/R SWITCH - ONE INCH RECEIVER HOVER LOOP ANTENNA - A TEETER TOTTER - PASSIVE CW FILTER CERAMIC FILTER BFO - 50MHz REFLECTOMETER AND ANTENNA TUNER G QRP CLUB STATEMENT OF ACCOUNTS - COMMUNICATIONS FORUM - SSB NEWS - VHF NEWS - MEMBERS NEWS - CLUB ANNOUNCEMENTS -

** IN CASE YOU DID NOT KNOW K.I.S.S. MEANS KEEP IT SIMPLE STUPID



JOURNAL OF THE G QRP CLUB

St. Aidan's Vicarage,
498 Manchester Rd
ROCHDALE,
Lancs,
OL11 3HE.
Rochdale [0706] 31812

INSTEAD OF WORDS FROM ME, THIS TIME WE FEATURE SOME OF THE MEMBERS WHO HAVE MADE THEIR CONTRIBUTION TOWARDS THIS ISSUE OF SPRAT :

GUS - G8PG

COMMUNICATIONS AND AWARD NEWS GUS HANDLES ALL AWARDS AND CLUB COMMUNICATIONS AND TEST ISSUES

JACK - G4ZQK

JACK'S DESIGN FOR THE UNICHIP PCB APPEARS IN THIS ISSUE

DAVE - G4WZV

DAVE RUNS THE CLUB QSL BURO & HANDLES OUR SALES ITEMS & CLUB QSL CARDS

BRIAN - G3SYC

BRIAN'S DESIGN FOR A SIX METRE ANTENNA APPEARS IN THIS ISSUE OF SPRAT LOOKING FOR MORE MEMBERS ON SIX

PETER - G3PDL

CLUB TREASURER OUR THANKS GO TO PETER FOR HIS FIRST SET OF CLUB ACCOUNTS WHICH APPEAR OPPOSITE

HOPE TO SEE YOU ON THE BANDS

73 FER NW.

G3RJV

CLUB ANNOUNCEMENTS:

G QRP CLUB ACCOUNTS Jan 1987 to Feb 1988

INCOME		EXPENDITURE	
b/fwd No.1 bank account	£ 4943.52	SPRAT printing costs	£ 4764.86
b/fwd No.2 bank account	£ 764.27	SPRAT mailing costs	£ 3579.82
Subscriptions	£ 19369.85	Components for kits & sale	£ 2352.64
Sales rally/conventions	£ 3009.15	QSL card printing	£ 619.50
Sales by post	£ 1728.24	*Officers expenses*	£ 487.43
QSL cards supplied	£ 770.02	Purchase of books etc	£ 1938.45
Morse tape service	£ 88.09	Capital equipment	£ 704.25
Miscellaneous	£ 222.32	Duplicating & copying	£ 325.03
		Stationery	£ 101.89
TOTAL	£ 30895.46	Large post items	£ 210.09
		Artwork for SPRAT	£ 50.65
		Rally & convention costs	£ 1708.25
		Miscellaneous	£ 374.11
		c/fwd No.1 bank account	£ 12449.03
		c/fwd No.2 bank account	£ 1229.46
		TOTAL	£ 30895.46

The club is in a fairly healthy position but please do not be deceived by the apparent £8000 profit! The beginning of February was chosen as an audit date because the dust would have had time to settle following the activity as subscriptions are renewed in January. The original intention was to aim for the end of the financial year but February allows inclusion in the Spring issue of SPRAT. The figure for subscriptions therefore contains more than a single year of dues. To put things into perspective, £6820 arrived in subs in Jan 1988 (*hands up all those who were late!*). Comparing bank statements shows that we are carrying forward in excess of £1000 more into 1988 than into 1987. This is the result of prudence, luck, meanness, ???

Services to members are not priced so that they make a profit, but to ensure that they do not incur a loss. That inevitably means a small profit. The figures above are a little distorted by bills expected shortly and by stocks of components and kits awaiting sale.

The Rally and convention costs appear to be very high because the club put in an appearance at Dayton last year and subsidised five people at £240 each. This represented about one third of their basic cost for the trip. This is offset by increased sales and membership subscriptions.

Capital equipment included a replacement duplicator for your Hon. Sec. and computer hardware for your Membership Sec. Postal costs form a very large part of the clubs expenses. Apart from SPRAT, most of the officers expenses bring a smile to the Post Office and stationery suppliers. This is necessarily a little brief - to leave room for circuits etc - and I am happy to expand for anybody who would like more details.

Dayton has proved to be very difficult to evaluate as it is tied in with so many other things, but here goes with figures converted to £ sterling at 1.7$/£:

INCOME		EXPENDITURE	
Subscriptions	£ 376.47	Subsidy to officers	£ 1200.00
Sales of kits & books etc	£ 2887.00	Stand charges	£ 216.06
Sales of xtal filters	£ 660.00	Box of xtal filters	£ 423.53
Sales of MLX parts	£ 419.00	Dentron / MLX parts	£ 247.06
Sale of HW handbooks	£ 120.00	RSGB Books	£ 770.00
		Howes for kits	£ 988.50
TOTAL	£ 4462.47	Ohio state tax	£ 58.69
		PW books	£ 131.07
		Xtals - Golledge	£ 174.47
		TOTAL	£ 4209.38

We are still to receive payment for some books left in the US. Speculating in Dentron and MLX boards saved our skins! What figure could be attributed to the goodwill generated? Many thanks are due to Peter and Betty Jackson, G3KNU and G1YNR, who audited the accounts. As they were kind enough to do the job for *nowt* we are making them honorary members.

G3PDL Feb 16th 1988

FROM G4HYY, MEMBERSHIP SECRETARY

Thanks to all those members who have renewed their subscriptions. Things were rather busy in January!

Some information about our record system.

You are stored in the data base under your QRP CLUB membership number. It is very important that you should try to quote this number on all correspondence, especially when renewing subs. A lot of time can otherwise be taken up trying to find you. Your callsign also helps.

The data base in my computer carries only the information which appears on the address label apart from a coding which tells us your postal area.

SPRAT despatching is a quite complicated affair! I print the address labels using the information on our Data Base. *This has to done about one month ahead of despatch date* to allow Cedric G4JBL and his team to sort out the labels and envelopes and, of course, any QSL cards which require sending to you. This means that any address changes notified to me within that month or subs sent during that time will not appear on the SPRAT label.

PLEASE CHECK YOUR SPRAT ADDRESS LABEL.

The SPRAT address label carries your member number, callsign (where applicable), and a code to show the status of your subscription. The subs code shows the year for which you are paid, e.g. if the label states 88, you are paid to the end of 1988. Please check your label for possible errors and if you have any problem let me know at once. *Don't forget the built in problem of the month before SPRAT delivery* Some members are, in fact, paid ahead for an odd year so you may be better off than you thought!

If you write for information a stamped, self addressed envelope is very helpful, although we realise that it is difficult for overseas members to provide this.

PAYMENT METHODS

These are the payment methods which seem to work.

1) From the U.K., normal cheques and postal orders.

2) From Europe, EUROCHEQUES or GIRO CHEQUES DRAWN ON THE BRITISH NATIONAL GIRO BANK (available from post offices).

3) From all overseas members, DOLLAR CHEQUES or cheques drawn in Sterling on *a bank with an "arrangement" with a British bank.*

4) Travellers Cheques in Sterling.

5) Cash in Sterling or Dollars only please.

6) For overseas members, Direct Transfer from your bank to ours. PLEASE write to tell me that you have arranged the transfer. Our bank account details are:- G-QRP CLUB, No 1 ACCOUNT, NATIONAL WESTMINSTER BANK PLC, ROCHDALE BRANCH (BANK CODE 01-07-44)

PLEASE DO NOT FORGET TO WRITE YOUR NUMBER AND CALLSIGN ON THE BACK OF YOUR CHEQUE.

ALL CHEQUES PAYABLE TO G-QRP CLUB. CURRENT RATE: £5 OR $US10.00

AN APOLOGY! Due to an error of understanding it was incorrectly stated that ALL cheques from overseas cost us £1.50 to cash. The payment methods outlined above seem to cost the CLUB nothing. Some members paid an extra £1.50. I have attempted to keep a record of these members. It is difficult to refund the extra. Will the members concerned PLEASE send less next year and REMIND me of the overpayment this year, or you can send a further £3.50 now and I can record you as paid for an extra year.

DAVID JACKSON,G4HYY,CASTLE LODGE WEST,HALIFAX ROAD,TODMORDEN,LANCS.OL14 5SQ

SUBS WERE DUE ON JANUARY 31st. IF YOU HAVE NOT PAID, PLEASE PAY BEFORE 1st MAY. IF I HAVE NOT RECEIVED YOUR SUBS BY 1st MAY YOU WILL NOT RECEIVE THE NEXT SPRAT.

G-QRP CLUB QSL BURO REPORT

Mr D Aizlewood G4WZY
Winterton, Scunthorpe, South Humberside, DN15 9TP.

Judging from all the cards which arrived in the first week of January the winter sports went very well. Like many members I could only dabble but I did get on each day and worked members in four new countries. I leave details of WS to Gus and Chris in their columns.
A number of members have complained that they do not get anything like 100% PC% return on the QSLs they send out. How do other members feel about this? One member has failed to get a reply even when a stamped addressed envelope was sent. At least one other society publishes a list of members who fail to QSL other members. I think that this is not desirable, but how do yoy feel about it.
As a new service to North American members we have arranged an address to which QSLs can be sent by local surface rate. North American members may send QSL cards to other G-QRP members only to:

David F Gauding NF0R
880 Judson Manor
St Louis, Missouri 63141, USA.

Cards should reach Dave by the first day of March, June, September or December. They will then be sent in bulk to the main buro and sent out as usual via SPRAT. We hope that this will encourage QSLing and make for a better service for our North American members.
I would like to thank all those members who remembered to send cards to the buro with the membership number of the receiving member in the right hand corner of the card, and to sort the cards in numerical order. this greatly cuts down the time taken to handle the buro and allows me to spend more time on the air.
I look forward to receiving your comments and suggestions that you may have about the buro.
73s and gud DX. Dave G4WZV

4TH YEOVIL QRP CONVENTION SUNDAY MAY 8TH 1988 AT THE PRESTON CENTRE, MONKS DALE, YEOVIL, SOMERSET. LECTURES BY G4FAI & G3MYM QRP RIGS OLD & NEW IN USE COMPONENT STALLS - EQUIPMENT REFRESHMENTS - NATTER AREA TALK-IN ON S22 FROM 9.30AM	QRP BESIDE THE SEASIDE 1988 GREAT YARMOUTH SATURDAY, SEPTEMBER THE 10TH WATCH SPRAT FOR MORE DETAILS R.S.G.B. NATIONAL CONVENTION JULY 15TH, 16TH, 17TH 1988 THE G QRP CLUB WILL BE THERE

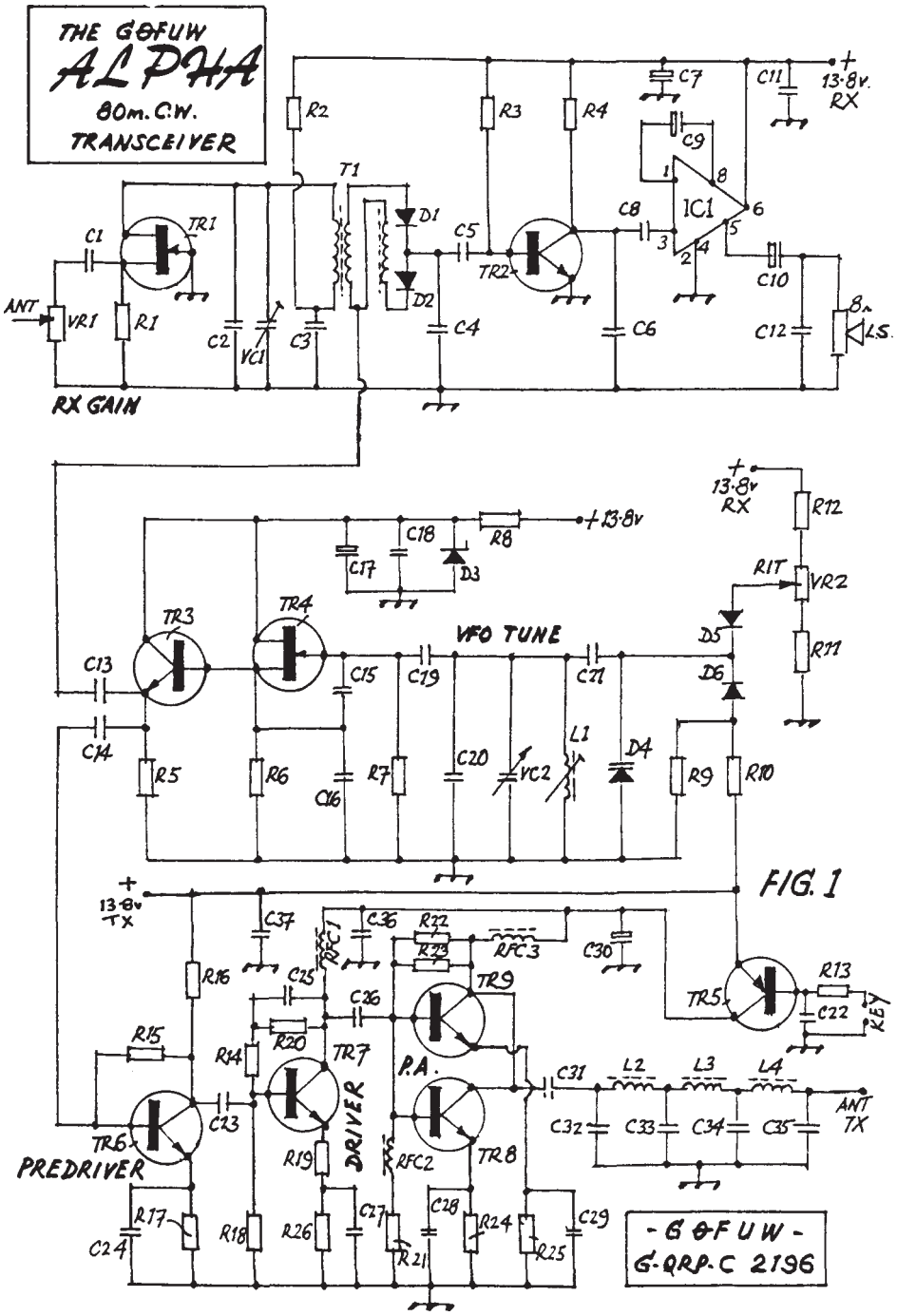
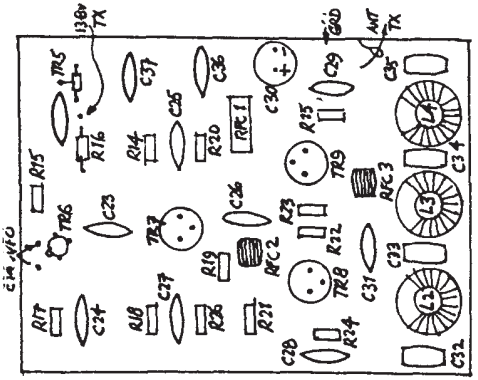
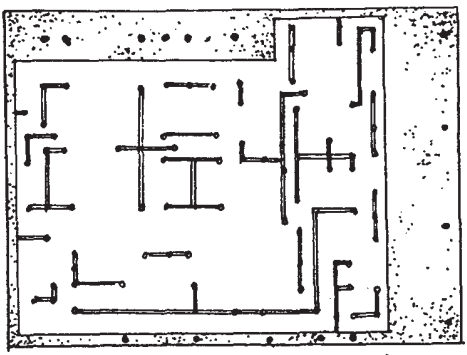

THE G8FUW
ALPHA
80m. C.W.
TRANSCEIVER
+13·8v. RX
ANT
VR1
R1
RX GAIN
TR1
TR2
T1
D1
D2
IC1
C1
C2
VC1
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
R2
R3
R4
LS.
+13·8v
TR3
TR4
VFO TUNE
C13
C14
C15
C16
C17
C18
C19
C20
C21
R5
R6
R7
R8
D3
D4
D5
D6
L1
VC2
R9
R10
R11
R12
R13
VR2
TR5
C22
KEY
+13·8v TX
C23
C24
C25
C26
C27
C28
C29
C30
C31
C32
C33
C34
C35
C36
C37
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
RFC1
RFC2
RFC3
TR6
TR7
TR8
TR9
PREDRIVER
DRIVER
P.A.
L2
L3
L4
ANT TX
- G8FUW -
G-QRP-C 2196

FIG. 1



COMPONENTS



TRACK

P.C.B. LAYOUT

Description

The "Alpha" is an 80 metre transceiver CW transceiver which features VFO control, RIT (receiver incremental tuning) and variable RF gain. The simpicity of the design keeps down the cost and ensures greater reliablity. The VFO covers 3.5 to 3.8mHz (with a 50pF variable capacitor) and the RIT gives a shift of 2 or 3 kHz either side of the transmit frequency. The receiver uses the familiar direct conversion principle to good effect, with an FET pre-amplifier to give lots of gain. Many European stations have been heard on both CW and SSB. The transmitter gives a good 2 watts output which is very usable on he band. The transceiver switching is effected by a double pole switch, shifting the antenna and the 13.8 volts from receive to transmit; a bit crude but it works.

Background

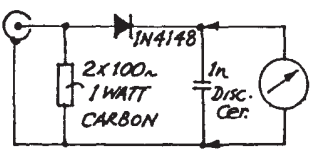
The rig came into being when I wanted something to leave at my parents house, to use /A, hence its name. 80M seemed a good choice as there is always some activity on the band. The basic building blocks came from various sources, RSGB publications, SPRATs and others. I have modified each of the boards slightly to suit this application and the DC receiver is a combination of a number of ideas. The information given here should be enough to put together a good working copy. I have included circuits, PCB layouts, component lists and notes for each stage of construction. If anyone needs additional information or requires an answer to a specific query, then please contact me.

Transmitter and Low Pass Filter

R15 10K R16 3.3K R17 390R
R18 330R R19 5R6 R20 470R
R21 100R R22, 23, 13 1K
R24,25 10K R26 39R
C22, 23 19nF Polyester
C24, 25, 26, 27, 28, 29, 31, 36, 37 0.1uF Polyester
C32, 35 470pF Polystyrene Close Tol:
C33, 34 1200pF Polystyrene Close Tol:
C30 100uF/25V
TR5 2TX751 TR6 BC108
TR7, 8, 9 BFY50
L2, L4 22T 26SWG T50-2
L3 25T 26SWG T50-2
RFC1 1m5
RFC2, 3 8T 32SWG on ferrite bead
TO5 Heatsink = 3

QRP addicts may recognise the basic transmitter from the PW Dart Top Band transmitter. I have used this modified version on 80 and 40M with good results. The PA and the driver transistors run all the time with 13.8V applied, with the pre-driver being keyed.

TEST EQUIPMENT



VOLTMETER

APPROX VALUES:

1w = 10 VOLTS
2w = 14 VOLTS
3w = 17 VOLTS

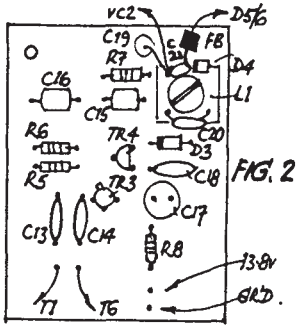
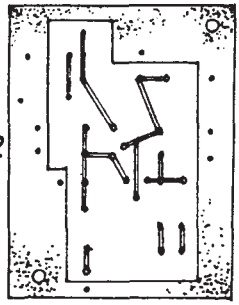
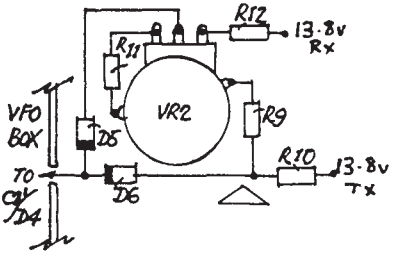


FIG. 2



P.C.B. LAYOUT



RIT Layout Component List

R9, 10, 11, 12 10K
VR2 10K Lin
D5, D6 IN4148

VFO and RIT PCB Component List

R5 1K
R6 820R
R7 100K
R8 390R
C13, C14 10n Polyester
C15, C16 220pF Polystyrene
C16 470pF Polystyrene
C17 33uF/25V
C18 0.1uF Polyester
C20 100pF Silvermica
C21 39pF Silvermica
VC2 50pF C804 or 25pF C804
L1 see notes

TR3 BC107
TR4 2N3819/J304
D3 5.6 Zenner
D4 BA102/105

Notes
L1 was originally 30T, 30SWG on a 3/8" former but I used 40T 32SWG on 1/4" former. Keep the leads short.
If only 3.5 to 3.6 MHz required VC1 = 25pF.

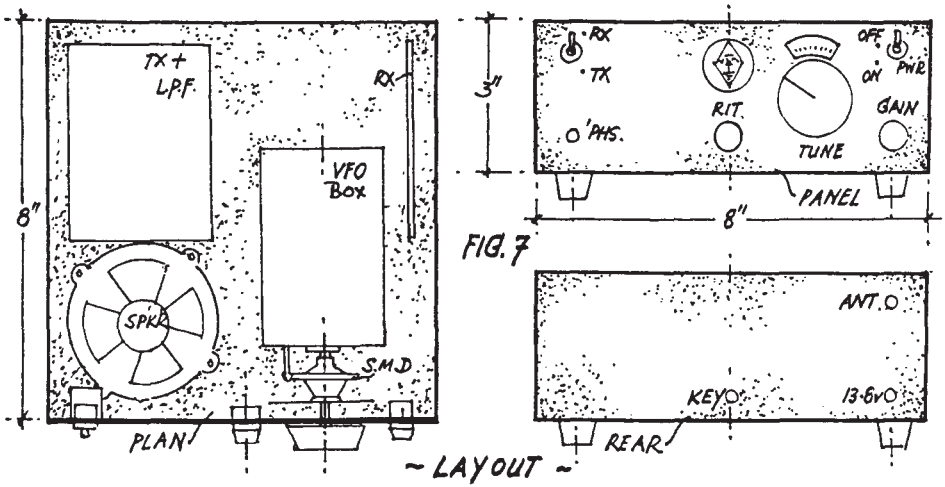


FIG. 7

~ LAYOUT ~

Metalwork

Case (8"x 8"x 3") e.g Minffords J19
Box (4"X 21/2"x 23/4") e.g Maplins AB11
DPDT Switch

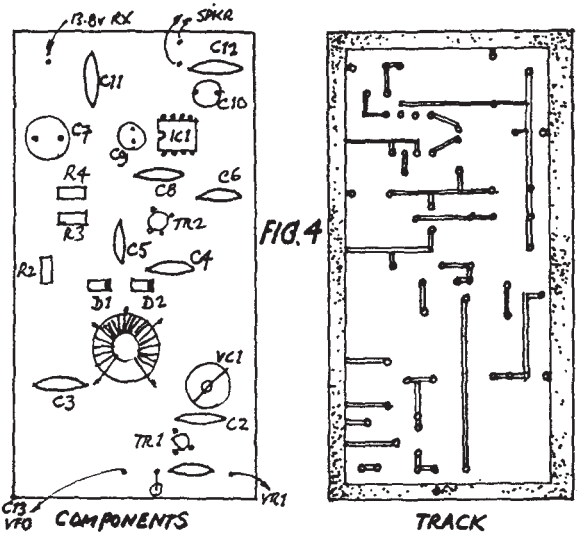


FIG.4

P.C.B. LAYOUT

Receiver PCB

R1 1K R2 3k R3 5M6
R4 10K
C1, 3, 4, 5, 6, 8, 11, 12, 0.1uF Polyester.
C2 180pF Silver Mica
C7 470uF/25V C9 4.7uF/25V
C10 47uF/25V TR1 2N3819/J304
TR2 BC109, BC549 etc
D1, D2 IN4148
IC1 LM386
VR1 220R Lin
VC6 60pF Trimmer
L1 40T 32 SWG + 2x6T 32SWG on T50-2 (see Notes)
LS Small 8ohm Loudspeaker

Notes
Try to get 2 IN4148 diodes well matched on an ohmmeter, or you may use a pre-set pot in between R9 and R10. Test by measuring the voltage at junction D5/D6 on the Tx and Rx before connecting the VFO. This voltage should be the same when VR2 is at its midpoint. Use short rigid wire.

Notes
Construction is fairly straight forward and the audio amp gives ample output. Extra care is required with the mixer transformer. Wind the main coil first then twist together the two lengths of wire and wind 6 turns over the centre of the main winding. Use an ohmmeter to identify the ends. Take the start of one winding and the end of the other to the centre hole (see layout).

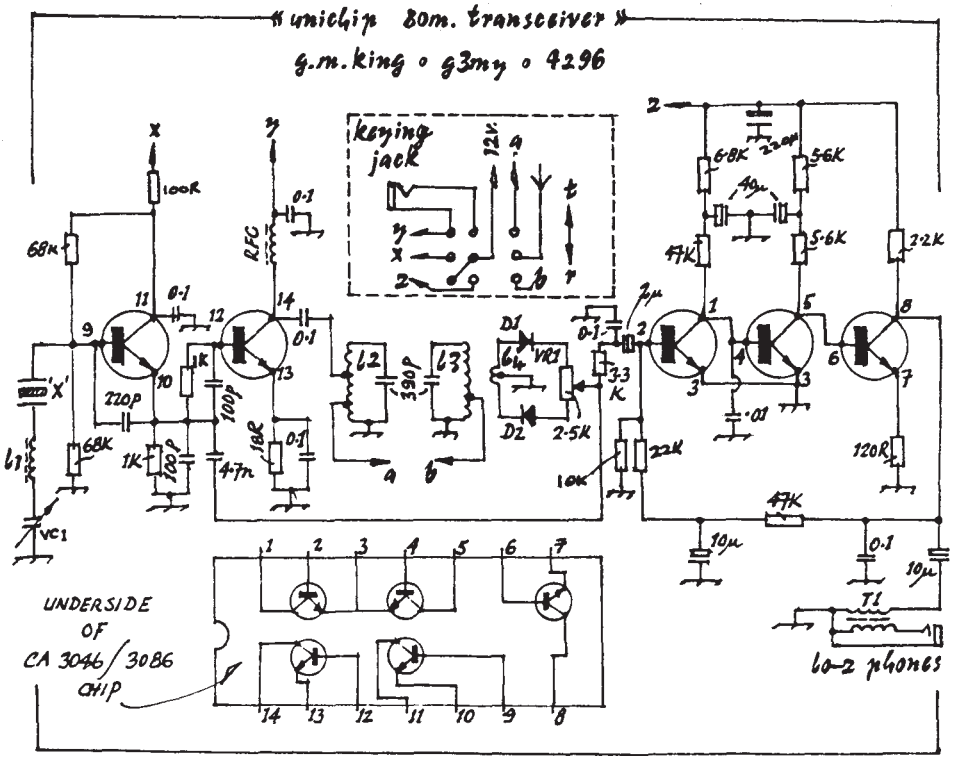
VC1 tunes the main winding of T1 to resonance at the centre of the VFO, or at any frequency of special interest (e.g. 3560kHz).
This circuit suffers less from BC breakthrough than many others I have tried.

THE UNICHIP

By Mike King G3MY

The Unichip is built around a single CA 3046 chip which is described as a differential pair plus three separate units. The layout of the pins makes the device very suitable for a design with the chip in a holder in the middle of the circuit board. The receiver is then layed out on one side and the transmitter on the opposite side.

The transceiver was designed as a simple no frills circuit and it is sufficient to say that it worked the minute it was switched on, only requiring the two slug tuned coils to be resonated. Input to the "PA" stage is 50/55 Ma at 12 volts and the measured output is just short of 300 milliwatts into a 50 ohm load. The VXO runs all the time on receive but is keyed along with the PA on transmit so that if needs be it can be used with a separate receiver without any sidetone and of course no drain on the Nicads except when the set is actually transmitting.
The transceiver was built on Veroboard because I am no great designer of Printed Circuits; although I am sure that it should be quite simple to produce a suitable board and thereby make construction very much easier. (and quicker).
I might add that the chips came from Birkett some years ago and were the usual untested devices but I am glad to say that 9 out of the original 10 work satisfactorily. I think they were 5 for £1 but the newer and equivalent CA3086 can be bought for 45p, as a top quality branded device.



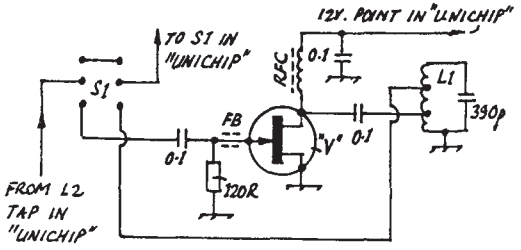
EDITORS NOTE: In an attempt to get Mike's interesting circuit into the the last issue of SPRAT, it was rushed through without an author's check. Naturally Murphy struck and it contained several errors. We reprint the whole article and add a club offer in PRINTED CIRCUIT BOARDS for the UNICHIP and "BOOTS"

Components

X Crystal 3560 kHz
L1 120uH iron core choke
VC1 100pf polycon or air spaced
RFC 7T 30swg enamel wire on 2 ferrite beads end to end
L2 30T 28swg close wound on 7mm slug tuned former, taps at 6T and 12T from ground
L3 Same as L2, tap 5T from ground
L4 3 bifilar turns over middle of L3

After winding the cores and the RFC sprayed with "Holts Ignition Sealer" plastic spray.

D1 D2 IN914 T1 = LT700. SI T/R switch 3 pole 2 way toggle switch



'BOOTS' FOR "THE UNICHIP"

By Mike King G3MY

The Unichip has grown a pair of "Wellies" in the form of an outboard VMOS PA, which is fixed to ther back of the little ABS. box used to house the transceiver. This PA can be switched in or out by means of a simple toggle switchas show in the circuit. In this way the function of the T/R switch in the transceiver is not effected.

RFC 2 Ferrite beads end to end 6T 28 swg enamelled wire.
L1 7mm slug tuned from 30T 28swg enamelled wire close wound, taps at 9T and 12T from ground.
S1 2 pole 2 way toggle switch (HI/LO POWER!)
FB Ferrite bead on the gate lead - right up at the device fixed in place with polystyrene cement.
V N Channel VMOS, VN10KM or VN66AF with 6sq cm copper heat sink. Bolted to small copper tab - 4BA bolt takes heat from tab through to external heat sink.
VN90AA also fine, more QRO, TO3 type mounting.

Built in a 60mm x 40mm x 25mm plastic box, heat sink external. Box glued to back of unichip box with Araldite.
VMOS PA cut off with no drive so there is no need to key the stage.
RF output 2.0 - 2.5 watts, d.c. input approx 300-350 mA at 12 - 14 volts.

UNICHIP PRINTED CIRCUIT BOARDS

A COMPLETE ETCHED AND DRILLED PRINTED CIRCUIT BOARD IS AVAILABLE FOR THE UNICHIP AND THE "BOOTS" AMPLIFIER FOR £1.75 INCLUDING POSTAGE.
DAVE AIZLEWOOD, G4WZV, 36 KING ST, WINTERTON, SOUTH HUMBERSIDE, DN15 9TP

NOTES:

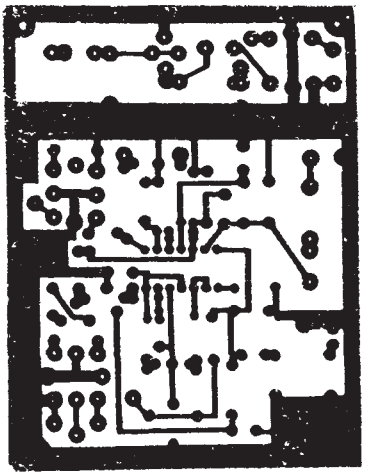
The PCB uses 5mm Formers (see note below)

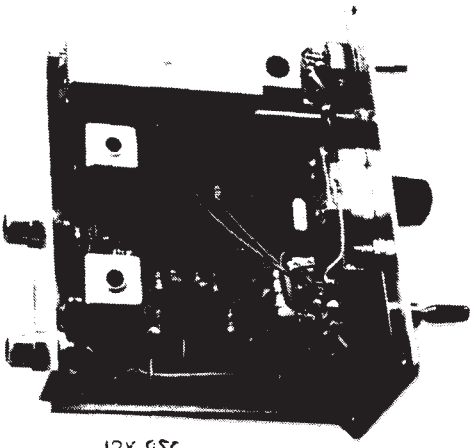
3 Pole Toggle Changeover Switches are available from ELECTROVALUE (UK)

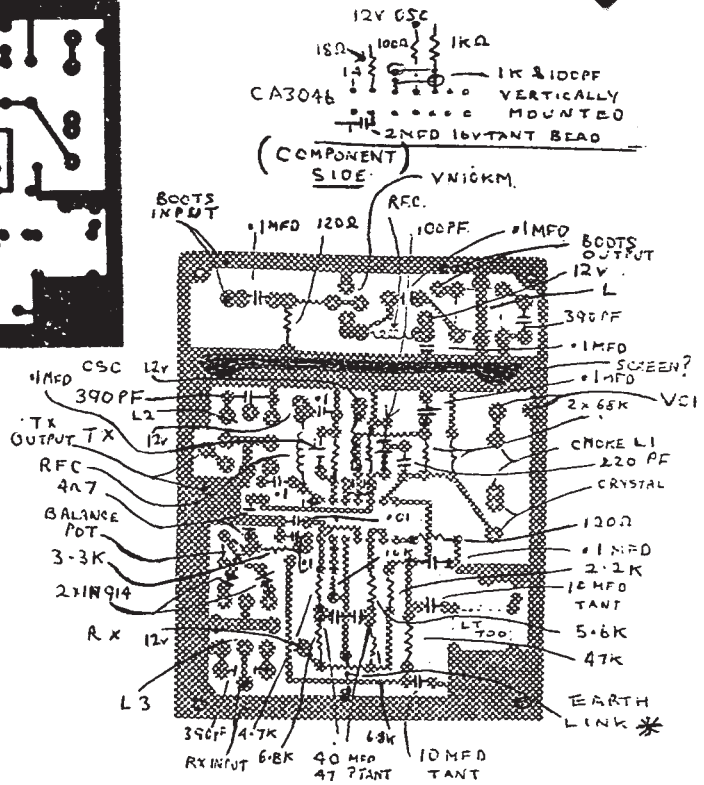
A TO92 Heatsink, suitable for the VN10K is available from MAPLINS
5mm formers + bases also from MAPLIN.

PCB DESIGN BY JACK G4ZQK

THE PCB IS SHOWN HALF SIZE







WINDINGS ON 5mm FORMER
(3/16" outer diameter)

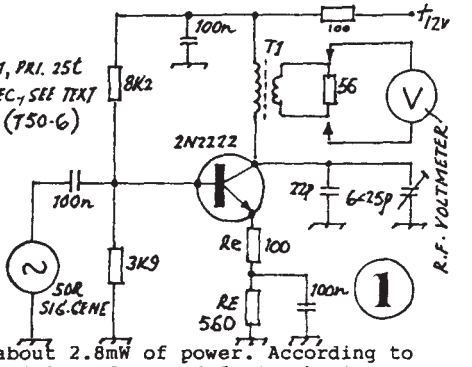
UNICHIP:
L1 = 40 turns tapped 9/16
L3 = 40 turns tapped 7
BOOTS:
L1 = 40 turns tapped 12/16

All wound with 32 s.w.g.

The problem first arose whilst developing a 20m dc receiver; a VFO was needed which would develop 300mV across 50ohm (to drive a MC1496 product detector). The QRPers bible (1) was duly searched and what seemed to be a suitable circuit was then constructed. The VFO itself used a BF256C FET in a W2YM circuit and the output was lightly coupled to another BF256C source-follower stage. I had long since decided that any VFO should be contained within its own rigid box, remote from the dc receiver's front end, and coupled to the product detector via 50ohm miniature coax. So there was the problem; how to match the output from the FET buffer (about 1V rms across the RFC) to 50ohm. A class A bipolar buffer with tuned output seemed a good solution, but what about component values? The circuit of figure 1 was lashed together and a number of tests carried out. Power was applied and all dc voltages were as expected...so far so good!
The maximum reading accross the output load was about 400mV rms; I could of course stopped there since I now had an output stage capable of providing the 300mV required. However, being a curious type, I decided to investigate further.

CLASS A BUFFERS
(THEORY VERSUS PRACTICE)

BY G3ZOM



Now 400mV across a 56ohm load represents about 2.8mW of power. According to the dc measurements that I had made (Vce = 8.5V and Ic = 4.5mA), the input power to the transistor was about 38mW. There was something wrong? after all, an efficency of 7% is a bit worrying!. Back to the text books!
According to SSD (1) the peak output power would be about 38mW (19mW average) assuming perfect conditions (50% efficency).
By now I had started to question not only the text books but my own measuring equipment, techniques, calculations and anything else which might take the blame. There was only one way to put my mind at rest... the ancient art of trial and error (mainly error!).
Firstly, the number of turns in the secondary of T1 was altered, with some success. The maximum output was now 470mV rms when 7 turns were used (representing some 3.9mW). Better but not good. Next, the effect of a different value of emitter resistance was tried. RE was increased to 1K5. This gave dc measurements of Vce=8.5V and Ic=1.9mA; a dc input power of 16mW. The maximum RF output was achieved with 4 turns to the secondary of T1 and it was, strangely (to me anyway), 470mV, the same as before. Now an efficency of 24% is a little more believable. Any further increase in the value of RE caused the output to drop.
Up to this point very little notice had been taken of the value of the input rf voltage. It had been adjusted to give the largest undistorted output during each test. Linearity within the amplifier was assertained by then backing off the input emf by 6db and checking that the output had decreased by the same ratio. On turning my attention to the emf from the signal generator it soon became clear that the maximum undistorted output was obtained with an input emf of 200mV rms in each test. The effect of varying Re, the feedback resistor was not seriously tried, since its purpose is to provide the stage with a reasonably high input resistance (approximately beta X Re). I must admit to having shorted out Re on one occasion, just to see the effect; although the gain of the stage appeared to increase, the maximum output increased only slightly, so I turned back to the job in hand.
Different types of transistor were also tried, the best results being obtained with high FT types such as the 2N918, BSX19, 2N222, etc. (the text books were correct!). BC108 and similar types worked but the output was down and could not be predicted.

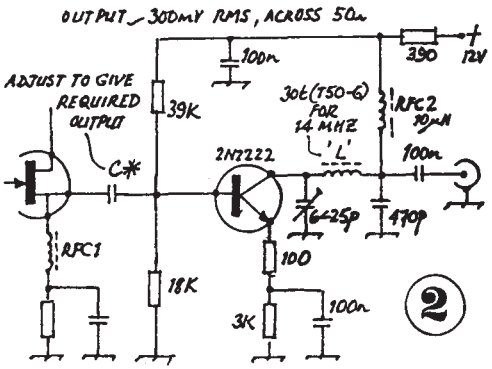
To cut a long story short, after may hours of experimentingand much hair tearing, I came to the conclusion that an efficency of 25% was reasonable for the circuit I had chosen. So with this in mind I present the following design procedure, the results of which have been tried and tested.

(A 12 Volt supply is assumed)

1. required output power in mW = Pout
2. dc input power Pin = 4/Pout (25% efficency)
3. Ic (mA) = Pin/8.5 (Vce = 8.5V)
4. Rt = 3/Ic (Kohm) (Ve = 3V)
5. RE = Rt - 0.1 (Kohm) (Re = 100ohm)
6. Ibias = Ic/5 (mA) (for 'stiff' bias)
7. R2 = 3.7/Ibais (Kohm) (Vb = 3.7V)
8. R1 = 7.8 / Ibias (kohm) (V across R1 = 7.8V)
9. R3 = 0.5/(Ibias + Ic) (Kohm) (V across R3 = 0.5V)

The nearest preferred value resistors are then selected for R1, R2, R3 and RE and the turns ratio adjusted to give the maximum Pout. The rf input should be kept well down below the 200mV rms level to maintain linearity.

As a worked example, If we require an output of, say, 500mV rms across 50 ohm then:



1. Pout = 1000 X 0.5 X 0.5/50 = 5mW
2. Pin = 4 X 5 = 20mW
3. Ic = 20 / 8.5 = 2.35mA
4. Rt = 3 / 2.35 = 1.28kohm
5. RE = 1.18kohm
6. Ibias = 2.35 / 5 = 0.47mA
7. R2 = 3.7 / 0.47 = 7.87kohm
8. R1 = 7.8 / 0.47 = 16.6kohm
9. R3 = 0.5 / (0.47 + 2.35) = 0.177kohms

Use: RE = 1k2, R2 = 8k2, R1 = 18k, R3 = 180R.

The original problem (300ohm across 50ohm) required an output power of about 1.8mW, so I assumed 2mW to err on the safe side. In order to avoid the need for an output link winding, a pi-network output was adopted in the final circuit. The performance did not appear to be affected by this move. Relevant circuit details are shown in figure 2.

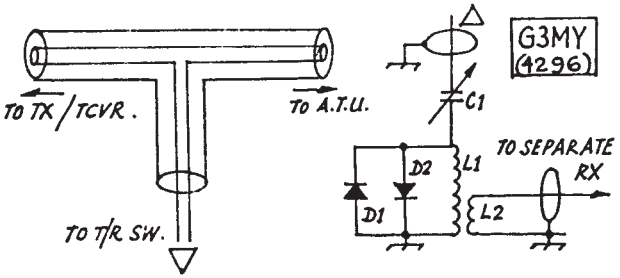
Some of you are, no doubt, wondering why I bothered to go to all this trouble just to design a single stage buffer. Well, I suppose it was all down to curiosity, but I happen to enjoy experimenting; to me it is an essential part of our hobby.
One thing I haven't yet tried is using this circuit as a transmitter; 1.8mW on 20m could well prove interesting.
I've only used the design procedures for outputs up to 10mW, since the circuit would have to provide a very large power gain for higher outputs (remember, the input limit is about 200mV rms for class A operation).
For larger outputs SSD has some good circuits.

References:
(1) Solid State Design for the Radio Amateur.

AUTOMATIC T/R SWITCH

By Mike King G3MY

This is a simple but highly effective automatic T/R switch which has definite advantages over the often quoted W7ZOI circuit and is a modernised version of the T/R switch which I used in the early days of SSB in the 1950's. Originally, the coil was shunted by a neon bulb which of course would strike on transmission and thereby limit the RF. Voltage developed across the coil.
In this version, I ave used back to back PIN diodes across the coil, and the signal output to the receiver is taken from a link winding on the coil rather than by feeding the "cold" end of the coil into the low impedance input of the receiver. The advantage of this method of feed is that the RF.voltage fed into the receiver on transmit is further reduced and in addition the considerable selectivity of the series tuned circuit, link coupled to the receiver, especially a direct conversion receiver, gives a good deal of extra protection against breakthrough by off channel broadcast and commercial signals.
In days gone by, I had a series of these switches built into small Cornish cream tins and the appropriate one would be selected for whichever frequency was to be used.
In this updated version, the RF. voltage fed to the receiver is less than 100. m.volts so there is no danger to the most delicate Front End of an expensive commercial receiver.



CLUB ANNOUNCEMENT : G QRP CLUB MEMBERSHIP LIST
AT PRESENT THE CLUB OFFICERS ARE LOOKING INTO THE POSSIBILITY OF MAKING THE CLUB MEMBERS CALLSIGN/NUMBER/NAME LISTINGS AN ANNUAL FREE HANDOUT TO ALL MEMBERS TOGETHER WITH OTHER INFORMATION TO FORM A SMALL HANDBOOK
WE HOPE TO BE ABLE TO ANNOUNCE THIS IN THE NEXT ISSUE OF SPRAT.

THE "ONER IMP" Rx.

de 'ROO

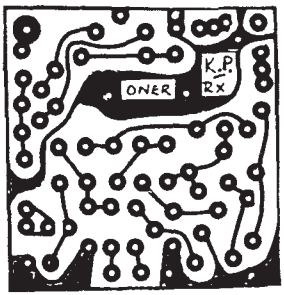
A ONE INCH SQUARE RECEIVER BOARD !

Having built the ONER VFO George informed me that several people had asked for a receiver on a one inch PCB! Of course I could not make a complete receiver with the VFO but the receive section was a possibility, the local oscilator signal could be taken from the ONER TX crystal oscillator or from the ONER VFO.

Sprat arrived at this time and on looking through it Nigel Flatman's "IMP" receiver caught my eye, this had been a compilation of several designs and as far as I could see it was a nice balance of features. A board was quickly produced and the performance was good and so this formed the basis of this unit. I changed component values to suit stock and tried it out... very satisfying on all bands 160 to 20 metres.

To save valuable board space I have had to omit pads where possible and even use resistor leads as terminations! The effect is very pleasing however and should not produce any problems. There is one "under board" component and that is C10 (22nf) and this should be soldered between the long wire of R7 (to which the top end of the coil is connected) and the ground plain below the trimmer. There was no room on the board as the to roid got in the way!

Setting up is simple, connect the aerial, phones and VFO/XO and peak the trimmer for max signal, then adjust VR1 for the null in any broadcast breakthrough, this was only found on ours when the set was in use on 40 metres at night and could be completely eliminated.
Of course coils depend on the band in use. For 80 metres we have used 40 turns on a T50/2 and a 270 pf capacitor in parrallel with the trimmer. For 20 metres a T37/2 with 26 turns resonated with the trimmer fully meshed. If more time had been available I could have completed this data but George is waiting on this to get it into SPRAT, will include any updates in "SSB NEWS" as and when available.



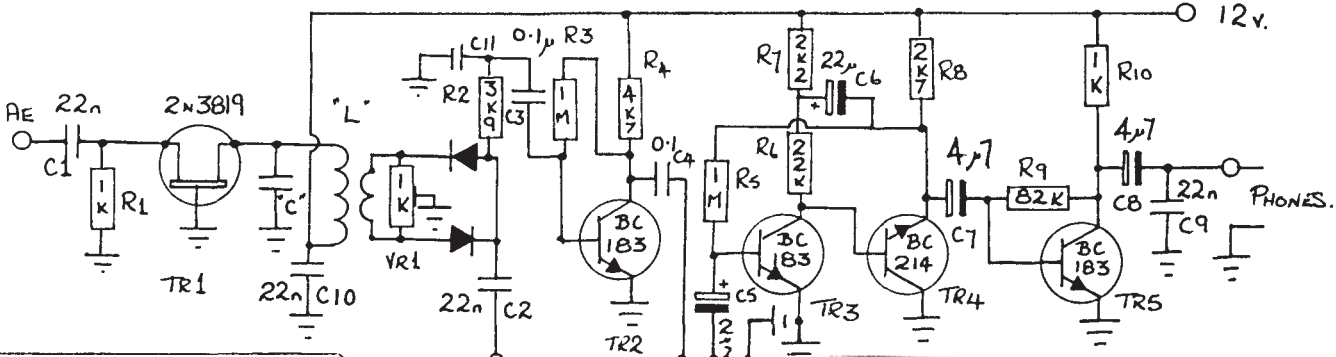
A kit of parts is available from Kanga Products at a special club price of £7.93 inclusive (£8.85 - 20% = £7.08 + 0.85 p/p =£7.93) but remember that if you purchase any other kit the postage has been paid!

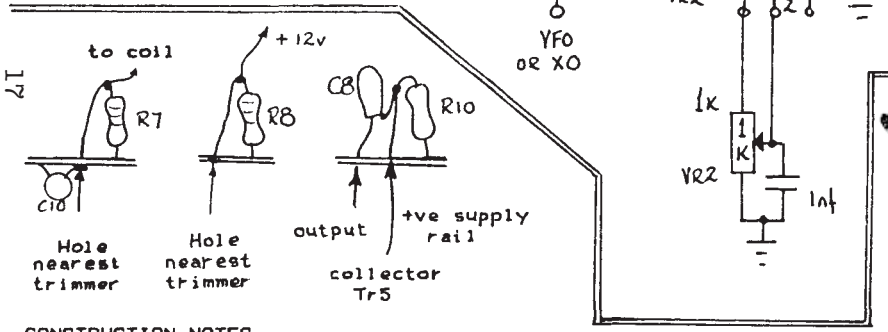
COMPLETE THE ONER SYSTEM

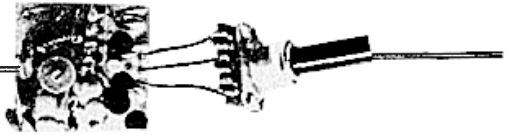
I have the urge to do a "ONER" QSK Aerial Changover and Sidetone system. This will be marketed by KANGA PRODUCTS and expected price to club members to be about £7.00 plus P/P. If interested order with receiver (£14.93) and we will despatch as soon as it is ready postage free.

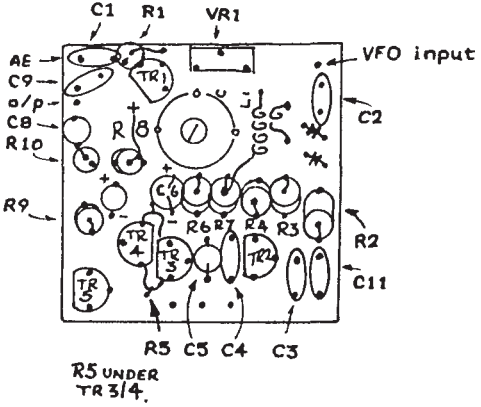
NOTE FROM G3RJV : The prototype ONER receiver board I built worked very well. The simple tuned circuit (abt.800Hz) shown here helps a lot. C is 0.47uF and L is 82mH (TOKO 181LY-823) available from CIRKIT. Connect across the volume control track.

THE "ONER IMP" Rx.









CONSTRUCTION NOTES

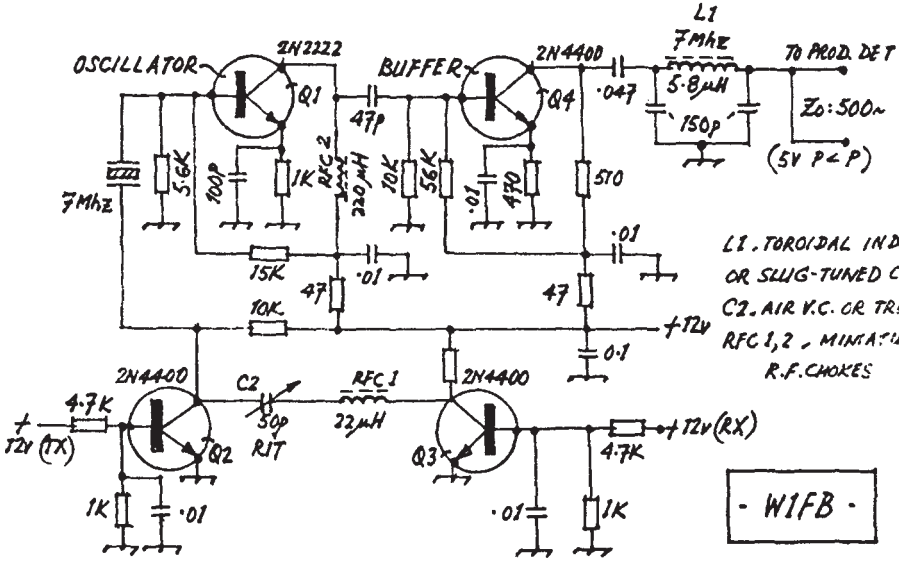
1. R5 (1M) should be placed on board first as this lies under Tr3 and Tr4.
2. R7 is used for terminating the 'cold' end of the coil. The long wire must enter the hole nearest the trimmer and a 22nf (C10) capacitor placed on the underside between the long lead and the groundplain under trimmer capacitor.
3. R8 is used for the +ve supply input and the long wire should also be inserted in the hole nearest to trimmer.
4. C8 and R10 are joined in the sketch and the junction enters the hole connected to the collector of Tr5.

THE 'HOVER' LOOP ANTENNA
By Mike King G3MY

The HOVERLOOP is basically a fullwave wire loop antenna cut to the usual loop formula L = 1005/f, where f is the the frequency in Megahertz and L the length in feet.
The physical form of the loop is an inverted V with the apex at 60 ft. Each leg of the V is about 60 ft long with an apex angle of about 110 degrees. The rest of the length comprises a low horizontal V at some 12 to 15 ft above the ground.
The feedpoint is at the apex of the inverted V. The feeder comprises two equal lengths of low loss UHF TV coax, giving a screened balanced 150 Ohm feedline. Measurements have shown that the loop has a radiation resistance of about 110 Ohms on 3.5 MHz, rising to around 220 to 250 Ohms on 28 MHz. I have not measured it on 50MHz.
If a valve type PA is used the two feeders can be brought into a simple 1:1 bauln on the back of the transceiver and the Pi network will match it satisfactory. When using a solid state PA I use a small QRP 'Z' match to tune out the reactance on the higher frequency bands.
On 160 metres it is possible to use the antenna in one of two modes:
1. as a 'fat' quarter wave against earth with the two feeders in parallel to give a 37.5 Ohm feeder.
2. The lines can be tuned at the bottom end to give a voltage feed to the two free ends of a halfwave antenna, and although this puts a high SWR on the line the losses do not seem to be too excessive.

I hope this will be of some interset to you...it has brought me 65 DXCC countries since September 1987 so I am happy with the results so far.

HOVER LOOP comes from HOrizontal/VERtical of course!!



A TEETER-TOTTER LO FOR DC TRANCEIVERS

By Doug DeMaw, W1FB

Perhaps you Sprat readers may be interested in a local oscillator circuit that permits RIT operation in a fixed frequency, crystal controlled DC transceiver. The same crystal is used for both transmit and receive.
In the transmit mode, an NPN dc switch places the crystal in the path to ground. When the TR voltage is applied to the base of the remaining NPN switch (03) the oscillator becomes a VXO and Q2 shuts down. With the Q1 circuit shown, the VXO part of the circuit allows a 40-metre AT cut crystal (30 pf load capacitance) on an HC-6/U holder to be shifted approximately 2kHz above and 2 kHz below the marked frequency.
The frequency shift for an 80 metre version of this circuit will be substantially less...roughly +500 Hz and -1kHz if RFC1 is 50uH and the series variable capacitor is 100 pf. For 20 metres, RFC1 is reduced to 12uH, and the variable capacitance has 25pf maximum capacitance.
There is no reason why a VXO type of circuit cannot be used for both the transmit and receive modes. The Q2 circuit can be changed to allow VXO operation during transmit. A second RF choke and variable capacitance would need to be added. I developed this circuit for a very compact, emergency type 40-metre transceiver, hence the fixed-frequency mode during transmit.
Care must be taken with this circuit to avoid the oscillator starting when either Q2 or Q3 are not conducting. Double-sided PC board should not be used for this circuit. The small stray capacitance to ground from the crystal holder will cause Q1 to operate, even when there is no forward bias on Q2 or Q3. Single-sided PC board is essential.
The only problem that I see when using a VXO for both transmit and receive is trying to have both VXO circuits track. In other words, the receiver may be on one frequency while the receiver may be on another. Dial calibration should take care of that problem owing to the presence of two tuning controls.
The buffer/amplifier is designed to look into a 500 ohm load, such as the base of a class-A driver stage that is keyed. The pi-section collector network for Q4 is used to "launder" the output waveform. This helps to provide a cleaner waveform for injecting into the DC receiver detector. The advantage of a keyed class-A driver stage is that it provides a better keyed wave shape (less clicky) than can be obtained from a class-C driver.
Q2 and Q3 may be activated by means of a manual switch, or you can use solid-state switching to turn the NPN switches on and off. Although 2N4400 transistors are specified you can use 2N222s or equivelent devices. The 10K resistors to the +12V supply are needed at Q2 and Q3 in order to bias them for non-conduction when they are in the turn-off mode.
If you build this LO for bands other than 40 metres you will need to find a suitable value for C1(feedback capacitor). The constants for L1 and the associated capacitors will need to be changed also, along with the value of RFC1.

USA MEMBERS
Some US members have asked about certain European designations in some of our **circuits. For** example 4K7 and 100n etc.
It is common practice to insert the unit at the decimal place - dots are sometimes difficult to see or get missed out.

e.g. 4.7K = 4K7 1.5M = 1M5

The Microfarad, uF = 10(-6), Nanofarad, nF = 10(-9), Picofarad, pF = 10(-12
e.g. 0.01uF = 10n = 10,000pF etc.

HILLTOPPER, SPRAT 52. Ken GM4JMU
In error I put the value of 3-30pF on the trimmer capacitors. While these would be suitable in most cases a 7-65pF trimmer is a better choice (yellowplastic casing in UK). Alternatively an additional 22pF across the 10mHz trimmers should solve any problems.

80M QRP PA SPRAT 52. Mac G3FCK
A 120pF fixed capacitor should be shown between the output and the junction of two 100pF capacitors and the coil.

EASY-TO-BUILD ONE-STACK C.W. FILTER HAS HIGH PERFORMANCE AND LOW COST
(For use with 8-ohm audio systems)

By: Ed Wetherhold, W3NQN
102 Archwood Avenue
Annapolis, MD 21401

August 1987.

INTRODUCTION -

This inductor-capacitor c.w. filter uses one stack of the familiar 88-mH inductors and two 44-mH inductors in a five-resonator circuit that gives high performance at low cost. The center frequency is fixed at 750 Hz because most transceivers use this side-tone frequency, but side tones between 700 and 800 Hz can be received with less than one dB attenuation relative to the center frequency. If you need a design for a different center frequency, send a stamped self-addressed envelope to W3NQN.

The 236-Hz 3-dB bandwidth is narrow enough to give good selectivity while broad enough for easy tuning with no ringing. Five high-Q resonator circuits provide good skirt selectivity that is equal to or better than most commercial active filters costing more than $80. In comparison, this c.w. filter costs less than $15. Simple construction, low cost and good performance makes this filter an ideal first project for the novice operator. Details on design, construction, and installation follow.

DESIGN -

Figure 1 shows the filter schematic diagram and component values of the one-stack c.w. filter. These values were selected for a center frequency of 750 Hz and for a filter impedance level of 230 ohms. The filter sees a 230-ohm source impedance consisting of the 200-ohm transformed 8-ohm source, a 22-ohm transformer winding resistance and an 8-ohm inductor resistance. In a similar way, the filter sees a load impedance of 230 ohms. This particular design was selected so that only one turn needs to be removed from both windings of a 44-mH inductor to give the required L2 and L4 values.

CONSTRUCTION -

Figure 2 is a pictorial diagram showing the 44-mH lead connection and the connections between the capacitor leads, the 88-mH stack terminals and the 44-mH inductor leads. Figure 3 is a photograph of the filter installed in an aluminum box. Before beginning construction, obtain one 88-mH five-inductor stack with a mounting clip and two 44-mH inductors, and then follow steps 1 to 5.

1. Remove one turn from each of the two windings of one 44-mH inductor to get 43.5 mH (total turns removed is two). Carefully scrape off the film insulation and connect the start lead (with sleeve) of one winding to the finish lead (no sleeve) of the adjacent winding to make the center tap as shown in Figure 2. Do the same for the second 44-mH inductor.

2. Fasten both of the 43.5-mH inductors to opposite ends of the 88-mH stack using ELMER'S Silicone Rubber Sealer-Clear. A 2.8 Fl. Oz. tube is available for about $3 at most hardware stores.

3. Position the 43.5-mH inductors so their leads can be easily connected to the rest of the circuit. Solder the cap leads to the stack terminals as shown in Fig. 2.

4. Obtain a suitable box and make holes for the inductor mounting clip, the DPDT switch, and the phone jack and phone cord. Install transformers T1 and T2 and the inductor stack with capacitors in the box. Fasten the transformers (with leads pointing up) to the bottom of the box with silicone rubber sealer. Secure the stack to the bottom of the box with a 1-3/8-inch component mounting clip and two 6-32 X 5/16-inch screws. Instead of the 8 X 3 X 2-3/4-inch aluminum box shown in Fig.3 (MOUSER Stock No. 537-CR-880, $7.25), a small cardboard box may be used to minimize cost.

5. Complete the wiring of the transformers, the DPDT switch with resistor R1, and the phone jack and phone plug. Then check the correctness of your wiring by measuring and comparing the filter node-to-node resistances with the values listed in Table 1.

INSTALLATION -

Transformers T1 and T2 match the filter to your receiver low-impedance audio output and to an 8-ohm headset or speaker. If your head-set is high impedance, omit transformer T2 and connect a ten percent, 1/2-watt resistor from node 9 (C5 output lead) to ground so the parallel combination of the head-set impedance and the resistor gives the correct filter termination impedance within ten percent of 230 ohms. Resistor R1 helps to maintain a constant audio level in the headset or speaker when the filter is switched in and out of the circuit. The value of resistor R1 is determined by trial and error, and its value will range between 10 and 200 ohms depending on the characteristics of your audio system.

PERFORMANCE -

The measured 30-dB and 3-dB bandwidths are about 511 and 236 Hz, respectively, and the 30-dB/3-dB shape factor is 2.17. This factor can be used to compare the performance of this filter with others. The measured insertion loss at 750 Hz is less than 3 dB, and is typical of passive filters of this type. This small loss is compensated by slightly increasing the receiver audio gain. More than 700 hams have constructed this five-resonator c.w. filter (using either the 2-stack or the newer 1-stack arrangement) and many have commented on its excellent performance and lack of hiss and ringing.

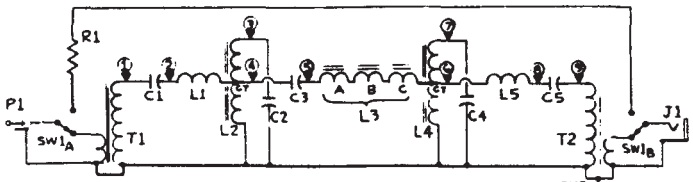
REFERENCES -

The 1987 ARRL HANDBOOK for the Radio Amateur, 64th edition, M. Wilson, ed., p. 28-1 (2-stack design).

Radio Handbook, 23rd edition, W. Orr, editor, p. 13-4 (1-stack design), Howard W. Sams & Co., 1987.

CLUB OFFER

A COMPLETE KIT OF PARTS TO BUILD THE CW FILTER, INCLUDING ONE PERCENT MATCHED CAPACITORS, ALL INDUCTORS AND TRANSFORMERS IS AVAILABLE FROM :
DAVE AIZLEWOOD,G4WZV,36 KING STREET,WINTERTON,SOUTH HUMBERSIDE,DN15 9TP.
THE KIT COSTS £12.00 PLUS £1.50 POSTAGE CHEQUES "G QRP CLUB"



C1,5 - 0.512 uF
C2,4 - 1.036 uF
C3 - 170.7 nF
L1,5 - 88 mH
L3 - 264 mH
L2,L4 - 43.5 mH
Use 1% tolerance capacitors for best results.

T1,2 - 8/200-ohm, .4-W xfmr
S1 - DPDT switch
P1 - Phone plug
J1 - Phone jack
R1 - 10 to 200 ohms (see text)

Figure 1. Schematic diagram of 750-Hz c.w. filter.

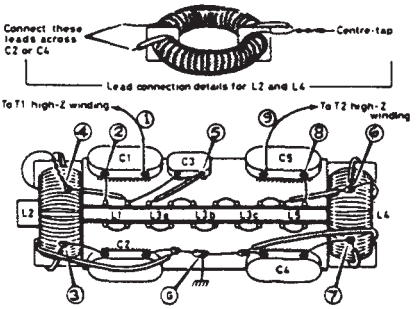


Figure 2. Pictorial diagram showing L2 and L4 lead connection and wiring of inductor stack.

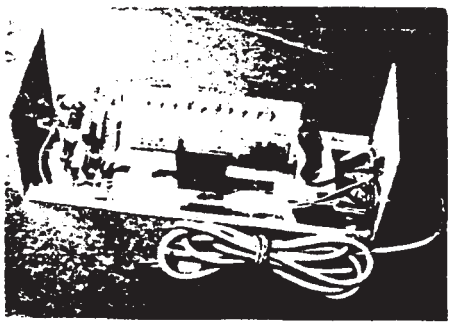


Figure 3. The assembled filter is shown installed in a CR-800 aluminum box. The thru/bypass switch and input/output transformers are at the left end of the box.

Table 1. Node-node resistances.

NODES From	To	Component(s)	Resist (ohms)
1	GND	T1 Hi-Z Windng	12
2	GND	L1 + 1/2(L2)	10
3	GND	L2	4
4	GND	1/2(L2)	2
5	GND	L3 + 1/2(L4)	26
6	GND	1/2(L4)	2
7	GND	L4	4
8	GND	L5 + 1/2(L4)	10
9	GND	T2 Hi-Z Windng	12
2	4	L1	8
5	6	L3	24
6	8	L5	8
2	3	L1 + 1/2(L2)	10
8	7	L5 + 1/2(L4)	10

NOTES:

1. See Figures 1 and 2 for the filter node locations.

2. Check your wiring using the resistance values in Table 1. If there is more than 20% difference between your measured values and the table values you have a wiring error that must be corrected.

3. For accurate measurements, use a digital volt-ohmmeter or an analog V-O-M (Triplett Model 630 or equivalent) that has a scale center of about five ohms on the X1-ohmmeter range.

U.S.A. MEMBERS SHOULD ENQUIRE ABOUT KITS FOR THE FILTER FROM W3NQN.

We regret to announce the death of Jack Mansfield, G3BVO, Member 3953

FOR SALE : HEATH HW8 in very good condition, Hot Water Handbook and owners manual etc. Tel: GM4VGU on 0555 - 892370

HELP REQUIRED: G3LGX, Alex Gledhill is rebuilding an HRO-MX and requires a UX6 base for replace the original 6C6 BFO valve

WANTED : ARGONAUT - G2CYN, Myles Hely, 25 High Street, Olney. N. Bucks.

FOR SALE : RAE Maths from Technical Software for Spectrum £6 Tel:0734-507976

FOR SALE : DRAE PSU 12v. 24A. £100. YAESU FT757GX/100w PA £500 ono
Will consider swopping FT757 for FT101ZD or similar
VHF Crystals £2.50 each ex FT2FB.
Roger Jones, Apartment 11, 26-28 Aberdeen Walk, Scarborough. N. Yorks

WANTED : 6146, 6AQ5, AUY10 prices to G3FCK. Tel: Newbury 40750

WANTED : TR2200 Philip Le-Brun, GØHHN. Tel:(0452)419087

FOR SALE : TEN-TEC CENTURY 22 CW Transceiver. 80-10 inc 30m with internal calibrator and matching protected PSU MFJ-901B + Versatuner ATU as New The lot for £425.
MK 328 SPY RECEIVER Modern equivalent of MK 301 £100.
WANTED : Spares Box/Spares/Key/Steel Case for PSU/Spares Box to complete a B2 restoration. Also 121 or 122 Set. Also TS-120/130V + CW Filter.
Tel. 01049-5231-35266 after 8pm or write Maj. Kemp,4 ARMD Workshop BFPO 41.

PETER COLESON G3VAZ. We regret to announce the death of G3VAZ, member 2985, on November 5th 1987, and extend our sympathies to his wife Georgette and son Andre.

EXCHANGE Pye P 5002 Pocketphone 4 channel xtal on S16 in like new condition with manual and many extras for a hambands RX i.e. Drake 2B, KW77, HR1680 or WHY? Also have rotator new in box. Would suit VHF or UHF beam. Wanted SEM Z match. Jerry G0AED, QTHR or 0485 43074

AGCW - DL QRP/QRP PARTY CONTEST RULES

Date	May 1st of every year
Time	1300 - 1900 UTC
Frequencies	3510 - 3560, 7010 - 7040kHz
Mode	CW only
Participants	Any licenced radio amateur and SWL
Call	A = input max 10 watts or output max 5 watts. B = input max 20 watts or output max 10 watts. C = SWL
Call	"CQ QRP"
Exchange	RST + QSO Nr./class, Example 579001/A
Scoring	1 point per QSO with one's own country 2 points per QSO outside one's country Each QSO with a class A station scores twice. Each station must be worked once per band SWL logs must show both callsigns per QSO heard, plus at least one complete report.
Multipliers	Each DXCC land = 1 multiplier
Band results	QSO points x multipliers.
Total Score	Sum of band results.
Logs	To be submitted by May 31st (postmark to: Fritz Bach Jn, DK1OU Eichendorffstr. 15 D-4787 Geseke For a list of results send SAE plus IRC

THE HISTORY OF QRP : A NEW BOOK FROM WØRSP

Many radio amateurs in the UK will know Adrian Weiss, W0RSP, from his writings on QRP in the CQ magazine, and from his fine book "THE JOY OF QRP", which ia available from RSGB Sales. Ade has recently produced another book with the mammoth title "HISTORY OF QRP IN THE U.S., 1924 - 1960". The book traces the history of low power communication from spark transmission to early solid state designs. It contains well documented accounts of the major advances in QRP communication with special reference to work in the United States. It is well illustrated with photographs and circuit diagrams of the equipment used by these pioneers of amateur radio. The book is a nice blend of good scholarship (WORSP lectures in Shakespearian Literature at the University of South Dakota) and the "folksy" style we have come to know from Ade. The first chapter named "The K8EEG STORY" describes his own early dabblings in amateur radio and the enthusiasm that has been with him to this day. This is a little gem of amateur radio writing! It shot me straight back to my early introductions to the hobby and revived the motivations and pleasures that have kept me active in the hobby for so many years. Throughout the rest of the book I enjoyed reliving the early trials and joys of keen amateurs working against the odds with little theoretical knowledge. This book is a must for those who enjoy finding out more about the pioneers of our hobby.

The HISTORY OF QRP is a well bound paper backed book of 200 pages and is available in the UK from G4WZV, David Aizlewood, 36 King Street, Winterton South Humberside, DN15 9TP for £7.20 plus £1 postage. Cheques should be made out to the G-QRP CLUB

SSB NEWS
By Ian G3ROO

I have not had much feedback from SSBs and so SSB NEWS, perhaps a dig now and things will get moving again. In fact it would have in SPRAT 53 but due to an admin problem it did not make the mag....not my fault either!!! But what is this I see in October 'RADCOM' PAGE 745... centre col, eight lines up, a new unit of power? But what is one "Dobbs", I think 3 watts!

Myles Hendly (London) is the only person to have written to me in months and that was about balloons. I used to play with them but they are fairly expensive. Hydrogen, not helium, as we used to make it with zinc and sulphuric acid for production and silica gel in a long tube for drying, but storage is difficult. I used to pump up car inner tubes with a fridge compressor... the other problem is finding suitable material for the balloon. We used polythene joined with selotape and that lasted fairly well, but problems with gas migration through the film meant that it only lasted a day or two before topping up. Perhaps this metalised film would be better or perhaps even one of these display balloons you see over shops might not be too expensive. it is supprising how small the balloon has to be, our design used to be about eight feet long and two feet in diameter. Tape was run from the top to the bottom to reinforce the material.

I have just had a further letter from Myles with more information about balloons, it is in the form of a letter from Mr Brian Naylor of "BALLOONS AND THINGS" 27 Essex Street, Birmingham, B5 4TR, pointing out that balloons were very expensive for the job...he recommends a kite for the job using the same method as I suggested last year. Fly the kite from a site removed from the operating position where the string will pass over the transmitter, the aerial is then suspended from the kite string allowing the kite to fly on a long free line.

A suitable kite for the job appears to be the DOUBLE CONYNE as it has good lift and the ability to fly in light winds. the cost is £14.95 and you would need 400 feet (min) 100lb line at a further cost of £3.50 (plus the dreaded VAT and P & P of course). The Sled (Sked?) kite in SPRAT 30 page 5 is well worth a try though and have managed many good days flying with this for a few pence. Back in Summer when Dave and Jenifer (G4HYY G6---cant remember it Jennifer, something about wild women!!) were down here we were playing with kites, 600 feet of wire up one minute and the next wire on the ground and kit over the fields!! Either the wind was blowing a gale or no wind at all... REMEMBER MAX HEIGHT ALLOWED IS 200 FEET WITHOUT PERMISSION.

CONTINUED...

have just had a letter from Larry, 1258, G0HTR, wanting to get the old SSB sked going again. So would I but being on the south coast means that I can be heard but I cannot hear anything!! larry does not suggest a time so i think to try and beat the high power sked keepers what about 0900 local time on 3690 LSB on Sunday mornings. I will try to keep this sked each week after SPRAT54 comes out and then we can change times and frequency to suit. Please let me know your news, gripes etc and lets let the others know what is going on. 73s for now, Ian.

QRP COMMUNICATION FORUM
Operating, DX, Propagation, Antennas, Awards.

WINTER SPORTS 1987 - THIS WAS THE BIG ONE!! With good conditions and at least 33 countries active on QRP the 1987 Winter sports turned out to be the most spectacular so far. Let us take the 3.5 mHz trans-atlantic scene first (yes I do mean 80 metres!). Pete G3PDL MADE it with VP2IM and Randy, AA2U made it to G3PDL, GM3OXX/A and G3NIJ; he worked a number of QRO Europeans. There was much European activity on the band. Turning to HF, GM4HBG logged two-way QRP contacts with ZL, VK, VU and AP2 using a back yard antenna of novel design (SPRAT later we hope). David VS9VT caused a stir and is known to have worked GM4YLN, GM4OXX/A, G3PDL and G8PG. There were too many contacts with USA QRP stations to report them. On the European front there was, literally, activity from northern Norway right down through Romania, with Vit, UP2BFE and others representing the USSR. A large number of excellent logs have been received, many of which would have won awards in previous years, but this year only super DX could provide entry into the frame. The G4DPQ trophy goes to Iain, GM4HBG for his outstanding DX performance. LF band merit certificates go to Randy, AA2U and Pete, G3PDL. HF merit certificates go to David, VS6VT, for putting Hong Kong on the QRP map, and Andy, WB2RZU, for outstanding trans-Atlantic performance. Special Merit awards go to G0DJA for the first station ever to submit an all VHF log for the Sports, and GM3OXX/A for not taking advantage of his huge antennas and only submitting a check log. It was some event; let us hope 1988 will be better. Late reports say G4BUE, G3BFR, EA3EGV and G4EZF (indoor antenna!) also worked VS6VT, as did G3XJS, but not necessarily in the Sports.

G2NJ TROPHY 19888 - PETR, OK1CZ, HONOURED. By unanimous vote of the Committee the 1988 G2NJ trophy goes to Petr, OK1CZ (ex-OK1DKW) for his services to international QRP. Petr is active in all club events, founder and leader of an ever growing Czech QRP group, and a member of the Czech CRC HF Committee. His QRP work is well known. Petr is an expert home constructor and very active in the work of organising international QRP. No doubt all members will wish to congratulate him on his well deserved award.

USA WORKED ON 80M WITH 950 mW! At 0749 GMT on 29/11/87 G3CQR received a 559 report from W3PDL on 3.5mHz, the contact having since been confirmed by QSL card. Peter was running 950mW cw output from a HB VFO/PA rig to a 150ft wire ar 20 ft. He has been issued with a special certificate to commemorate this outstanding QSO.

THAT FIRST QSO. Some members have asked for advice on the following problem. I have just passed the morse test and can send 14WPM from printed text, but how on earth can I remember what to send during a cw QSO, paricularly as I am going to be scared stiff!". The simple answer is during the early stages do not try to remember it - write it down. Your first cw contacts will be fairly "rubber stamp", so before you start write down the following in large block letters so that you can read it easily. "R TKS THIS IS MY FIRST CW QSO = UR RST --- = QTH --- = NAME----- = HW" This is preceeded by the call of the other station sent twice, DE, and your own call sent twice, and ended similarly but with the call signs sent once and ending in K. Where dashes appear such as "QTH---" insert the appropriate information and where " = " appears send BK as one group. For the second over use "R TKS = MY RIG----- = WX------ = HW etc, calls and K being used as in the first over.

28 MHZ SUMMER Es IN CZECHOSLOVAKIA. A log received from OK1CZ covers many days in June/July 1987. It shows good agreement with G logs, big openings being noted on the same days. As one would expect the log shows a high number of USSR stations worked/heard including UL7 and UZ9, but he also did well in western Europe, showing the advantage of activity in both directions, east and west paths both being open at the same time; it also shows very widespread Es clouds at such times. Petr worked 36 countries, including 9J2, ZC4, YB, UL7, UZ9, some obviously Es/F (or even sporadic F?).

NO ANTENNA, 3W, 5 DAYS, 20 COUNTRIES! It was so simple I should have thought of it long ago! Alongside my operating position there is a central heating radiator. The pipe feeding it was cleaned and a wire clamped to it and taken to the antenna terminal on my Z match. A 4ft counterpoise was then attached to the Z-match ground terminal. It loaded beautifully on 14mHz, and in two minutes I was working a DL4. Over the next 5 days 20 countries in three continents were worked with the central heating system as "antenna". These included UA9 and UL7 on 28, and a very solid QSO with a W8 on 21, DL, I, and OH on 10mHz, and Gs on 7, although the radiation angle was very high in that band (most of the pipes in the system only 12ft above ground). HF band reports were very good. The heating system is about 15 years old, and mainly uses copper pipes with most of the joints soldered. Just one warning; ONLY USE THIS SYSTEM WITH 5 WATTS RF OR LESS. At higher powers some part of the system may be "hot" at rf and cause rf burns. Also check for TVI. My own 3 watts gave no problem in this respect. No replacement for a big outdoor antenna, but a system allowing lots of contacts with visible antenna at all.

AWARD NEWS. Congratulations to the following.
QRP MASTER. GM4YLN. Well done Chris!
QRP WAC; 5N9GOM, GM4YLN.
QRP COUNTRIES. 100 OK1CZ (OK1DKW); 50, all 3.5mHz, G3XJS.
WORKED G QRP CLUB. 620 GM3OXX; 560 G4JFN; 120 G4XVE;
100 KH6CP/1, LZ1SM; 80 G4VPV, G0FTO;
20 GW0DNR, G0HTR, G0EXF, OK1DKR, OK3CUG.
TWO-WAY QRP. 20 G4SXE; 10 G4WZV, GW3SB, PA0YF, GM4OSS.

The OK/G ACTIVITY WEEKEND seems to have been a great success with many more OKs making it to the UK. A full report next time.

LATE FLASH. THE PARTRIDGE TROPHY for 1987 has been awarded to Iain, GM4HBG and Gus, G8PG for their article "Reducing noise on 3.5 MHz" in SPRAT No 50, Congratulations lads!

1988 SUMMER QRP PARTY

Pam and Chris have given early notice that their Summer QRP Party, (the fifth), will be held on Saturday 13 August at their QTH at Upper Beeding in West Sussex. All members are invited and the arrangements are the same as in previous years. Please let them know you intend going and if you have any control over the weather - please lay on a nice day! It starts at 2pm and finishes when everyone has gone!!

The QRP Parties started as their was no event like NEC in the south of England where members could meet each other and exchange ideas, views and opinions. Several of the Club's Committee will probably be there as will some of Chris's local DX friends.

Although the party is on the Saturday PD0MAM, PE1LIF and PA3DWZ will be staying over the week-end and a few other overseas members and those travelling long distances can also be accommodated, depending on what standard of comfort you are expecting!! If in doubt give Pam and Chris a ring. What is essential is that you bring your latest home brew project, gear/components for sale, photographs, QRP articles, stories, news, pieces of gossip, jokes etc etc.

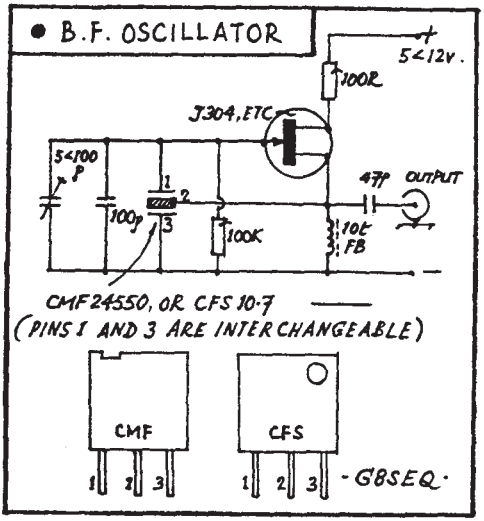
Pam and Chris can be reached by telephone at 0903.814594 or by post to "Alamosa", The Paddocks, Upper Beeding, Steyning, West Sussex, BN4 3JW.

VHF News

G8SEQ 124 BELGRAVE RD; WYKEN, COVENTRY, CV2 5BH

The report this time consists of two circuit ideas. One method of getting out on a VHF band is just to throw out a wire and use an ATU The circuit offered here is a 50 MHz ATU from Brian, G3SYC.

The circuit on the right is a simple way of using a ceramic filter to b uild a BFO.



BFO OSCILLATOR USING A MECHANICAL/CERAMIC FILTER

By John Beech G8SEQ

Wishing to make a BFO one day and having no resonator avaiable I decided to use a three legged ceramic filter. The circuit is shown using an FET although it will also work with a bipolar device, i.e. BC109 or BSX19, with suitable bias resistors. It is basically a Hartley oscillator with pin 2, normally grounded in filter applications, being used for the feedback tap. The output is quite high (some 3-5 volts peak-to-peak) making it sutable for driving simple diode product detectors.
The output frequency tends towards the bottom edge of the filter bandwidth i.e. 450kHz. If a 10.7mHz filter is used (type CFS) the circuit oscillated at the top end of the bandwidth, i.e. 10.87mHz. Using the 455D as an oscillator, in conjunction with a 455D IF filter, USB is effectively demodulated.

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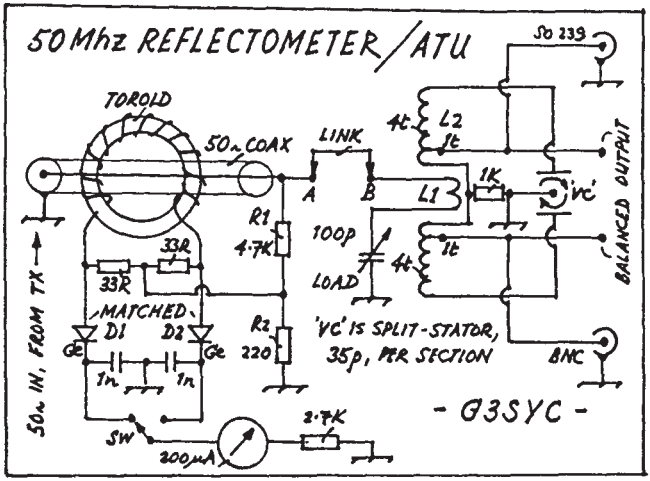
Late news from Brian, G3SYC : an Aurora took place last Sunday between 1400 and 1700 GMT in which he worked EI,GJ,GW,GM and LA3EQ and LA9UX all with 2½ watts.

The White Rose 50MHz Converter Boards (see last issue) are still available but at £1 plus an SAE. Also a companion board for Transmitter at £2.50. This uses a double balanced mixer and two stage PA to give 1 watt output using the oscillator drive via a buffer from the receive converter. Board and details from G8SEQ.
I have not received any reports for 70MHz...so who is active?

73 fer nw de G8SEQ



50 MHZ REFLECTOMETER/ATU
By Brian G3SYN, QRP Nr 478

This unit was built for use with an FT690/11 to provide a match facility with various aerials for /P operation. It has in fact been been used principally at the home QTH. Besides use with 75ohm twin feeder, provision has been made to match low Z coax with both PL239 and BNC termination (you never know what you have to accommodate).
Initally the reflectometer is set up by removing the link AB and connecting a 50ohm dummy load from A to earth. Power is fed in, and with the swutch in the reflected power position. R1/R2 are chosen to give zero reflected power. The resistor in series with the meter must be chosen to suit the FSD on the forward power position. this scale can then be calibrated to suit your own needs. The link is replaced and the dummy load replaced. A 100 pF capacitor was used for loading but a 50pF capacitor would probably do.
Taps at 1 turn have been used in this unit and has proved satisfactory so far. However, 300ohm feeder or even open wire can be accommodated by using tapping points further out from the centre.
The reflectometer and ATU can be built as separate units but a complete unit is more conveniant to use. A twin meter version can be constructed, eliminating the switch, and allowing forward and reflected power to be viewed simultaneously. The unit is easily accommodated in a box 3 x 3 1/2 x 6 inches. If you require more information please contact me.

D1 D2. Germanium diodes matched for forward and reverse resistance.

L2. 8 turns 1inch inside diameter, 16SWG enamelled wire. 1/2 inch gap in centre for L1.

L1. 2 turn link coil, 16SWG.

TOROID. 13 turns on small ferrite toroid having good HF performance. (the pototype toroid was of unknown origin).

The 1K resistor from the centre of the coil to earth is to leak away any static.

G4AAO, G3IGU, G4RAW, G3SYC are all active on 50mHz looking for members - Where are you?
Best so far for G3SYC was G0AFH in Gravesend 175-180 miles under flat band condx. (2watts to a dipole)

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

Fred, W5QJM advises the dates for the 1989 ARRL Convention in Arlington, Texas are 2-4 June and not 3-5 June as previously circulated. The ARCI will sponsor a Technical Forum and have its annual awards banquet in conjunction with the event. Fred would like to hear from anyone wishing to present papers to the Forum or take part. He can be reached at PO Box 12072, Capitol Station, Austin, Texas, 78711, USA.

I have not yet received any further information on the Yeovil QRP Convention on 8 May. I assume it is still on and suggest you get in touch with Club members G3GC or G3CQR for more information. I won't be able to go this year as I shall be in the USA. I shall be attending the Visalia DX Convention in California, Dayton and the FOC Dinner. Colin G3VTT is not coming after all, as he is visiting our OK members in June. Whilst on the social scene let me tell you that the Summer QRP Party will be on 13 August. Three of our PA members have already said they are coming. Before that is the RSGB National Convention at the NEC in July - see you there? Finally G3OEP says the 1988 "QRP Beside the Seaside" will be on 10 September at the York Road Drill Hall, Great Yarmouth. It starts at 2pm and more info can be obtained from Dave.

From your letters there is no doubt that HF conditions are continuing to improve. Most describe DX on the HF bands as opposed to local two-way QRP QSOs on the LF bands. G0EBQ is starting to find DX with his Imp transceiver featured in the last Sprat. Nigel has worked 15 DXCC (including UA9), and is hearing JAs through the 20m Eu QRM. G8QM worked 34 USA stations in the CQ WW Contest with his indoor W8JK folded dipole. Vic made his first USA two-way QRP in the Winter Sports to KH6CP/1, and QSOd VK2AFN on 20m to complete WAC with the indoor antenna. He is thinking of modding his HW7 for 18 and 24MHz in addition to 10MHz.

I7CCF has worked VS6 on 15m and WA2ALY/MM in the Arabian Sea who was also QRP with 4w. KB2OR worked EI5DR on 15m two-way QRP and WA4NBE was pleased to work GM3OXX on the same band. OK1CZ only needs 10 countries on 10m for a three band DXCC (10-20m) and G4JFN has worked KP2, TZ6, ZF, 5L7, HS0, TI2, 9Q5, VS6 and YK in recent months. Bob's neighbour and rival G3XJS offers J56, TR8, VP5, VK9, 8R1 and AI5AA. Peter describes the Winter Sports as the best yet and VE3ABT says he heard more Europeans this year. G0FIU is using 5w on 10m SSB /M and almost worked VK3 recently. ON4KAR was QRV in the UBA Contest at the end of January and made 65 QSOs for 29 DXCC on 7MHz from UL7 to W8.

GM4NNC is the secretary of MARK and says the Club will be QRV in March and April with QRP as GB8PX from their site on the Solway Firth. G4TMO is moving to DL land where he will be active with a B2 and 123 on 80m. G0FUW is moving to GM and looking forward to meeting the McSprat gang and G0CJM may be returning to 9V1 at the end of the year. W0RSP has QSYd to Florida for the Summer and G4FSP is returning to ZL. WF6U is intending to visit the UK this summer, (note the 13 August Hollis). Hollis uses an Acorn 955 pushpull final and a 569 report from Kansas at 2w is the best yet. He uses a converted BC454 for a receiver on 20m. WB9TBU, W1FMR, K6MDJ and NU4B will be QRV from VP2M during July and G0FKX will be combining his hobbies of radio and boating in being QRV as G0FKX/MM. OK1CZ had a great time on his visit to the UK. Petr managed to get an FT101E back and is busy modding it. On the way back to OK he stopped off in Paris and met F6IVT.

Congratulations to W5QJM on being elected Vice-President of ARCI. Fred is playing with his Argosy II which he says is a "Christmas present from me to me"! Congratulations also to G4FAI on being elected President of FISTS. G0HGA says they now have almost 200 members, details about FISTS can be obtained from G3ZQS. Finally congratulations to G0HGA herself. Angela has won the 144MHz award from AR endorsed "First YL CW Only". She has been trying to improve her CW speed and is now up to 30wpm and 25wpm on a hand key.

NJ3D says the QRP boys are alive and well in northwest PA. Carl has recently returned to amateur radio after 20 years and is using QRP from milliwatts to microwatts. G4XAF became

disillusioned a few years ago with megawatts and the aura of high finance in amateur radio and reverted to SWLing. Richard came across 3560 recently and has been "born again". He is now QRV with a Howes TX with 2w on 80m. G1HQF has passed the CW test and been allowed to take his late father's call of G2FZ.

G0CJM is QRV on 14030 at 0730 daily using 800mW and ON4KAR is looking for UK contacts on 20m. Rene has is TH3 at 15ft pointing north. LA7CF listens for members on 7MHz every night. G0BVZ recently worked SP6GVU on 3563 and Andy told Vic he is QRV on that frequency every evening. AA2U is looking for a two-way QRP QSO with Europe on 80m. I can testify that Andy's 40m QRP signal is getting into the UK, as his 3w was a good 569 at 0914 on New Years Eve. Another member I have worked recently on 40m is Salin, VU2LID operating from VU40IIT in Kanpur, North India. He hopes to be QRV from his home in Trivandrum in a few months. PD0MAM is looking for members on 50.160, now that PA stations can use the band. G4ZXN suggests a Club Activity Week-end for WW2 equipment. Anyone like to organise something?

G0HGA congratulates Enzo IK2HLB on his CW. Angela recently worked him on 80m for her first QSO with Italy. She has had to return her Club's HW9 as she is no longer regarded as a novice, and is now only QRV on VHF. G0BQI would like to meet other members in the Islington area of North London. He is QRV on 80m with a Howes TX and 66ft long wire.

W7ZOI says his winter project was to complete a monoband CW superhet TCVR on a 4x7ins PCB. NF0R reports the formation of the St. Louis QRP Society. Dave describes KC0PP's Oner which he built in a clear plastic box with the wires suspending the PCB in the middle of it. G4VPM says the Torbay ARC have started a club project of an 80m QRP TX with G3LHJ organising things. HB9ABD has built the G3DOP Hula-Hoop antenna and first tests on 20m gave Hans QSOs to UA0 and OX with 5w. G0FKX visited G3DOP to see the Hula-Hoop and David says you really do have to mow the lawn to find it! As a result of a visit to the Club stand at Dayton last year WB8IJN had his interest in amateur radio fired up again and is using the Howes 40m TX.

G0DJA agrees with G0HGA's comments about 144.060 and suggests 144.085 for QRP. Dave also suggests 50.095 as a good QRP spot. He is using an indoor delta loop and has made 17 QSOs on 50MHz with 3w. Dave has also worked DJ, F and ON with 2.5w and a 5el yagi at 10ft from Birmingham. G1YEM is QRV from Sheffield with 1w SSB on 144m and 70cm and G6BRU is building a Howes QRP20 ready for passing the CW test. G3FVC has re-activated his 1949 1w TX and is enjoying QSOs with 2w on the LF bands. EA3ERT has to do 12 months national service, but will be keeping in touch with his VM14 RX as he will not be allowed to transmit.

G4ZNV would like advice from anyone in the Crediton area. Geoff is mostly confined to a wheelchair and is using a TS530 to a W3DZZ at 27ft and finds it difficult to operate under such conditions. G3XJS says it is good to see so many G0s joining the Club, coming up on low power CW and having a go at building rigs. Peter's own homebrew TCVR is almost finished.

With the improving conditions I have been turning my thoughts to milliwatting again - the art of working DX with milliwatts. AA2U has been doing the same as he has built an 11 stage attenuator for milliwatting. Randy has worked F5IG at 12mW and SP9DBA at 45mW on 20m, AY6EF at 27mW on 10m and 8R1J at 230mW on 15m. Andy has also tried microwatting in the shape of KJ0H at 43uW on 10m! That QSO equates to 19,600,000 miles per watt - any takers? I used the recent ARRL CW Contest to see if conditions were good enough for trans-atlantic milliwatting. Using a maximum of 100mW I had 90 QSOs in 35 different States including three in CA, OR, NEV and NEB. I also made six 100mW QSOs on 40m, the best being to GA. I had previously never been able to work USA with less than 2w on 40m and put it down to the phased Butternuts I am now using on that band.

During the Contest I worked several USA stations with only 1mW which is the lowest I can measure on my Welz RP120 meter. I felt I could have made QSOs with even lower power, and Randy's 43uW QSO with KJ0H tends to confirm this. Can anyone suggest something we can use or build, similar to the RP120 meter, that can accurately measure RF power levels from 100mW down to a few uW? Let me know and I will publicise it in Sprat. Let me also know what you are doing in the way of milliwatting or microwatting. You may like to read my article about it on page 30 of Sprat 50, but bear in mind it was written in the days when we were using input power levels as a standard whereas now we use output power.

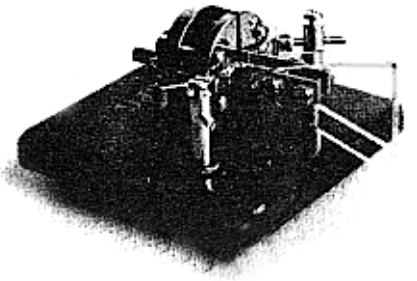
Finally, congratulations to G3XJS and G4MQC. They have now worked each other on two-way QRP on eight bands - have they any challengers? Thanks again for all your letters and news. Please keep them coming and let me know how your Spring goes, (by 20 May please).

Best 73 Chris

DONT FORGET THE EARTH.... DAVID BUDDERY G3OEP

Ever since the rise in popularity of the pi section output tank, a theory has arisen that centre fed dipoles are tuned against themselves and an earth connection is unnecessary. Balderdash!, each section of a centre fed dipole is, in my opinion, tuned against ground and an earth connection, or where the ground conductivity is poor, a counterpoise, is needed to obtain best results.

Recently the Great Yarmouth Club, G3YRC, entered the 80 metre Field Day using a commercial trapped dipole antenna erected as an inverted vee. The first 40 minutes were dreadful, few contacts and poor reports. An RF sniffer indicated radiation from the braid of the coax feeder. A three legged counterpoise was quickly rigged and run out. Then we commenced to make a few contacts including GM3OXX, and the sniffer did not record any measurable radiation from the braid.



HARLECH ELECTRONICS

HARLECH ELECTRONICS, NODDFA, LOWER ROAD, HARLECH, GWYNEDD LL46 2UB
Following the success of the kits advertised in the previous issue of SPRAT I am pleased to announce I am continuing the offer of a 30% discount to members of the G-QRP Club for all kits and computer tapes. I have also expanded my range to include some new kits and I now have added two new computer receiver kits and one transceiver.

1. SILVER TERN Modified version of this RX kit contains PCB + all mounted components. £5 to all SPRAT readers. See G-QRP Handbook, page 44 for details.
2. SHORTWAVE RECEIVER KIT FOR EXPERIMENTERS. Usually TRF receivers only have one RF stage. Mine has 5 for maximum sensitivity + 2 tuned circuits, dual ganged capacitor and an AGC with loudspeaker output. May be converted to a DC-RX if required. £19. Sprat readers £12.70.
3. DC RX 80 OR 160M with audio filter and loudspeaker output, pre-wound coils and dual gang receiver. Special SPRAT readers price £9.95.
4. TRANCEIVER CW 160 OR 80M Only £19.95 to SPRAT readers.
5. ACTIVE ANTENNA. An impedance transforming FET amplifies the signal from the whip antenna to a similar level obtained from the normal one. The whip antenna may be collapsed to attenuate signal or a longer wire attached to pep up the performance of an older insensitive receiver.
SPRAT readers price £14.70.
Deduct £4 if you do not require box or antenna.
6. PRESELECTOR. Commercial units cost over £90 with posh case. The cheapest kit (til now) £50. My price to SPRAT readers £25.
The kit includes box and dials (deduct £6 if not required).
7. AUDIBLE SIGNAL STRENGTH METER. Forget about minimum SWR readings which can be very deceptive. Our field strength meter will tell you the strength and direction your signal is radiating whilst keeping both eyes free to concentrate on more important tasks. Can be used as side tone, rain alarm or light meter with additional LDR. Built £29. Kit £16. SPRAT readers price £10.70.
8. POWER SUPPLIES Low ripple, sutable for powering DC-RX TX 13.8V 7amp. £35 +£5PP and insurance.
9. SPECTRUM COMPATABLE COMPUTER TAPES. Especially developed for the home brew enthusiast. SPRAT readers price £4.75. See Ad in SPRAT 53 for details.

PLEASE ADD £1.50 P&P THANK YOU. 73s

DTR3 CW TRANSCEIVER for 80 METRES

This compact and lightweight TX/RX is an ideal QRP rig for the popular 80 Metre band. Great for portable and holiday operation!

Transmitter - Mode : CW
Range : 3.5 - 3.6 MHz
Power : 1.5W output
Receiver - Direct Conversion
Selectivity - 250 Hz @ 6dB
Sensitivity - Better than 1uV
AF Output - up to 250mW to 8 ohm headphones
Power requirements - 450mA (key down) at 12 - 14 Vdc.

ALL parts are included in the Kit. Not only the case, slow motion drive, good quality variable capacitor, knobs, hardware etc.,but important features which, in some kits, are regarded as extras - stable VFO, Audio Filter, RIT - PLUS ready printed front and back Panels for that "Professional" finish.

In fact, the only other things you'll have to find are a morse key, headphones and the price - £74.25 plus £2.00 postage and packing.

For further details of the DTR3 and other kits in our range, send SAE to

LAKE ELECTRONICS
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or, ring Alan, G4DVW, (0602) 382509

SPECIAL SPRAT OFFER

C R Y S T A L S

GOLLEDGE ELECTRONICS

BAND	QRP CALLING CHANNEL	OTHER FREQUENCIES			MODE	PRICE
160m	-	1850			Fundamental	£4.00
80m	3560	3540	3550		"	3.50
40m	7030	7025			"	3.50
30m	10106				"	3.50
20m	14060	14030	14040	14050	"	3.50
17m	-	18080	18090		"	3.50
15m	21060				3rd Overtone	3.50
	21060				Fundamental	4.00
12m	-	24910			"	4.00
10m	28060				3rd Overtone	3.50
	28060				Fundamental	4.00

All HC-25/U, 30pF.

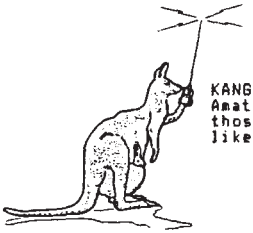
Converter and transverter crystals: HC-18/U, 3rd Overtone, Series resonant. 22.0, 24.0, 31.333, 38.6667, 42.0 MHz, £3.50 each. 65.0(HC25) 94.0 MHz 5 O/T £4.00.

SAE please for lists of stock crystals and TTL oscillators for microprocessors, radio crystals, plus Crystal, Monolithic and Ceramic Filters on 455 kHz, 9.0, 10.7 and 21.4 MHz etc.

VAT and UK postage included. Overseas members please add £1.00 per order.

73 G3EDW

Merriott Somerset TA16 5NS England Telephone: (0460) 73718



KANGA PRODUCTS

KITS FOR THE AMATEUR, BUDDING AMATEUR AND THE LISTENER

KANGA PRODUCTS offer a range of semi-complete kits for the Radio Amateur and the Listener. The kits are supplied complete with all those harder to get bits but leaves out those you or your friends are likely to have in the junk box.

SPECIAL OFFER TO G-QRP MEMBERS ALL ABOVE PRICES DEDUCT 10%
ITEMS MARKED *** DEDUCT 20%
BUT TO QUALIFY YOU MUST QUOTE YOUR MEMBERSHIP NUMBER !!!
(PLEASE add 85p P&P to total order)

DUAL BAND RECEIVER KIT Designed for mainly 20 & 80 but can be used on any of the HF bands. See SPRAT 53 for details and the picture of George's! Our kit just £35:95
(A less complex, single band version is available for just £19:95)

THE V.F.O. The VFO comes complete with RIT and an FM mod! and is complete with the essential diecast box. (Not included are the capacitor & coil) The VFO...£9:95

THE ONER V.F.O. *** (See SPRAT 53 for full details) cost just £6:00
(The ONER TX kit @ £4:50 *** (comming soon, the ONER RX !!!

WANT SIDETONE ??? This kit just sits on the bench with a small wire antenna layed out and it will pick up the RF from any rig in the room. (tested to 2M) The kit £5:95

DIGITAL DIAL / FREQUENCY COUNTER Four offsets available for USB, LSB, CW and if you connect the last of the these to a socket you can use it as an external frequency counter! Guaranteed to 45MHz but mine works up to 64MHz. NEAT EH? THE KIT £19:95

MARKER UNIT. A nice clean output on 10Kc, 100Kc, 1MHz and on 10MHz, and a 1:1 mark space ratio. To quote George, "A CUT ABOVE THE REST" the kit £9:95

POWER SUPPLY CONTROL Our two little kits solve all the problems of the prospective PSU builder. The VOLTAGE CONTROL kit @ £4:95 and the PROTECTION kit @ £4:95 (Both for £9:00)

Our other kits include..
CRYSTAL OSCILLATOR @ £9:45, TX/RX CONTROL BOARD @ £7:95, AF BOARD @ £9:95, 160M FOR THE FT707 & 77 @ £27:50, Resistors, all E12 values @ 50 per 100

FOR YOUR FREE COPY OF OUR 1988 CATALOGUE SEND A LARGE SAE TO:
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Props:I.H.Keyser G3ROO & R.A.Pascoe G0BPS