DECEMBER 1989

ISSUE No.24

LO-KEY

THE JOURNAL OF THE CW OPERATORS QRP CLUB

Promoting the Use of Low Power CW Mode Communication and Home-Brewing in the Amateur Radio Service

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891214 COVER 565A/B4

**** Season's Greetings to All ****

<<< DON'T FORGET THE SCRAMBLE ON THURSDAY 1 FEBRUARY 1990 - SEE P. 19 >>>

POSITIONS

EXECUTIVE COMMITTEE - Administers Club policy for the benefit of members.

ORGANISER
Max Brunger VK5OS (2) 3 Durham Ave. LOCKLEYS SA 5032 Australia
Please send to Max membership enquiries, suggestions and comments and other mail concerning club business, except as specified otherwise on this page.

TREASURER
Kevin Zietz VK5AKZ (43) 41 Tobruk Ave. ST MARYS SA 5042 Australia
Please send to Kevin membership applications and subscriptions, other payments (except for kit-sets), requests for Club logo stickers, past issues of Lo-Key, other financial correspondence, changes of details such as address or call-sign.

EDITOR OF LO-KEY
Don Callow VK5AIL (75) 5 Joyce St. GLENGOWRIE SA 5044 Australia
Please send to Don contributions for Lo-Key and suggestions about this journal.

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PUBLIC RELATIONS OFFICER
AWARDS AND CONTESTS MANAGER
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Ian handles the promotion of the Club, general liaison and communications with other Clubs and with editors of radio/electronics magazines.
Also, please send award claims, scoreboard entries and Scramble logs to Ian.

STATE CO-ORDINATORS
VK7: Rai Taylor VK7VV (3) Lot 2 Daniels Rd. MAGRA TAS 7140
VK2: Garry Cottle VK2AGC (121) 22 Johnston Rd. BASS HILL NSW 2197

INFORMATION NET CONTROLLER
Max Brunger VK5OS (2). Identification is VK5OS. QRO SSB is used.
CW stations may call BK de (call-sign) to have their presence acknowledged.
You hear information about the Club and can take part in technical discussions.
MEMBERS AND VISITORS WILL BE WARMLY WELCOMED.
FRIDAY NIGHTS FROM 1030Z NEAR 3620KHZ.

CW NET CONTROLLER
Ted Daniels VK2CWH/QRP (89). Call is **CQ CW OPS/QRP de VK2CWH/QRP k**
QRP power is used i.e. no more than 5 Watts to ur antenna. Ted adjusts speed to suit the slowest operator in the Net and uses only simple abbreviations.
ALL WELCOME, PARTICULARLY THE INEXPERIENCED AND NOVICES.
WEDNESDAY NIGHTS FROM 0900Z AT 3529KHZ or lower if QRM.

CLUB STATION VK5BCW
Based at the RICHMOND South Australia QTH of Len O'Donnell VK5ZF (1).

KIT-SET ACTIVITY CO-ORDINATOR
Don Callow VK5AIL (75) 5 Joyce St. GLENGOWRIE SA 5044 Australia
Send to Don orders (with payment) for kit-sets, technical queries & suggestions.

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Radio projects for Lo-Key and kit-sets.

THE BOOKSHOP
Norm Lee VK5GI (139) 25 Ralston St. NORTH ADELAIDE SA 5006 Australia
Magazine and book reviews, circulation of circuits and useful information about home-brewing.

GENERAL INFORMATION

QRP CALLING FREQUENCIES
1815kHz.....3530kHz.....7030kHz.....10106kHz.....14060kHz.....21060kHz.....28060kHz

CLUB MEMBERSHIP SUBSCRIPTION
Due each January.....Australia $A10.....New Zealand $A12.....DX $A14

LO-KEY - THE CLUB JOURNAL
Published quarterly - March.....June.....September.....December.
QRP & CW home-brewing, operating, SWLing etc. **ARTICLES ALWAYS WELCOME.**
The Editor reserves the right to edit all material including letters sent for publication and to refuse acceptance of material without specifying a reason.

891203 P2 Z65A/C7

ORGANISER'S OFFERINGS By Max VK5OS (2)

And thus endeth the first lesson --
or should I say the first year.

Because this Committee "went public" with the December 1988 issue of Lo-Key, in spite of any misgivings we may have had as individuals. The team effort, spearheaded by Don 5AIL's work with Lo-Key (our public face), and assisted by the backroom boys Kevin 5AKZ, Jack 5FZ and Norm 5GI have taken up the challenge; it is for you to pronounce judgement.

Don's other pride and joy, the Kitset activity, has gone from strength to strength, demonstrating members' interest in homebrewing.

We overcame the inability (due to lack of time) to produce a Club built-and-tested Rx with some nifty footwork to import 10 kitsets which went within two months, like hotcakes, and at present are debating (still) how to cater for the demand with a local product. In the interim, see pages 21 and 23 for Don's notes on the current situation.

On Club functions which involve active participation, my thanks to members who joined in the Scrambles. We are too few to aspire to a convention at a common site, but when I remember the pleasure of meeting Reg 3BPG and XYL at a caravan park, Lindsay 3DXH (VK6??? shortly), Ken 3CUC at Mt. Gambier, I am moved to suggest that if you do travel, try to have an "eye-ball" (no matter how short) with a member; either on the way or at your new temporary location.

As I intimated in the September issue a "different look" group will emerge in 1990; we expect to include details from Len 5ZF in the March 1990 issue of Lo-Key. To Len we wish every success; my personal opinion is that the more people pushing the barrow for home-brewing, the better for us all. As amateurs we expect respect for our CW efforts and it would be churlish not to be supportive of any attempts to promote homebrewing, especially QRP, in other modes.

Finally, thank you to all members for your support during this past (passed ?) year.

Seasons Greetings to you and yours, BCNU de Max

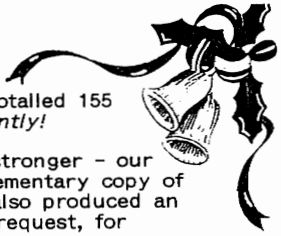
CLUBTIVITIES By Don VK5AIL (75)

Reward for Effort - Peter VK6BWI (66)

Congratulations to Peter for a great effort. In his own words:-

The reasons for my QRP inactivity recently have been twofold: school and a research assignment on 2metre propagation as an entry for a WA science competition. With this typewriter, as it is not a word processor with error correction facilities, many mistakes were made and 40+ pages typed for the 20 page assignment. In the end, it proved worthwhile as $350 was won as well as 1st prize. It was interesting to note that of the top 5, two were radio amateurs. The chance of this happening must be minute as 1% of hams are under 21 and the competition was for the under 18s. Although initially tempting, it was decided not to spend the money on a black box, and instead save it for next year. The purchase

WELCOME TO NEW MEMBERS !



Membership has continued to rise steadily this quarter - it totalled 155 on 1 December 1989. *Welcome to all who have joined us recently!*

As you pass on the word about the Club we will grow even stronger - our Organiser Max VK5OS (2) will be pleased to send out a complementary copy of *Lo-Key* to prospective members you tell us about. We have also produced an 8-page promotional brochure and will give you a supply, on request, for hand-out at places where Amateurs gather or for sending out.

164	VK3ED	Geoff Butterworth	Toolern Vale	Victoria
165	VK2KSD	Stan Dogger	Stokers Siding	New South Wales
166	VK2GJW	Jim Watson	Stokers Siding	New South Wales
167	VK5ABY	Barrie Brice	Fulham Gardens	South Australia
168	VK3XGR	Graham Runciman	Colac	Victoria
169	VK3AHU	Harvey Utber	Violet Town	New South Wales
170	VK5BVM	Mick Schmidt	Penola	South Australia
171	VK2CDO	Ype Timmer	Bowraville	New South Wales
172	VK5AQ	Brenton Zerbe	Whyalla	South Australia
173	VK2ETW	Trevor Wilkin	Coonabarabran	New South Wales
174	SWL	Philip McHugh	Cooma	New South Wales
175	VK3ASD	Don Smith	Box Hill South	Victoria
176	VK3PUI	Ian Boyd	Ballarat	Victoria
177	SWL	Lorenz Eckard	Flaxton	Queensland
178	VK3BDH	David Dunn		

Temporary VK5er ! Garry Cottle VK2AGC → VK5AGS (121)

is temporarily resident in South Australia and has a new call sign. All this will test Garry's abilities, as he is our VK2 Co-ordinator.

Contester - Ted VK2CWH (89)

Another side to Ted has been revealed - that of ***Successful Contester.*** A QSP has been received that Ted has succeeded in winning the 2nd Westlakes AR Club's QRP contest. Congratulations on a successful endeavour, Ted !

KEVIN'S KOMMENTS By Kevin VK5AKZ (43), Treasurer

It's Membership Subscription Time Again Yes, already ! Please do NOT send *CASH* for Membership subscriptions. Occasionally letters go astray and it is much easier to resolve any such problems if cheques (crossed 'not negotiable') are used.

Receipts Receipts are often held back until they can be enclosed with your next issue of *Lo-Key*. This way we save postage costs, so we hope you don't mind waiting.

Publishing of Street Name and House Number On your subscription account you are asked to let us know if you do NOT want your street name and house number published e.g. in our Membership List. If you specifically ask, we won't publish ANY part of your address.

Please Quote Your Membership Number in Correspondence This makes it easier and quicker for your Executive to fight the paper war !

Copies of Past Issues of Lo-Key These can be obtained for $2.00 each OR, if it is cheaper for you, use the price shown in the Kit-Set Activity Centre list: $1.80 each plus $2.00 per order for packaging and postage.

To order, write to Kevin VK5AKZ (43) or Don VK5AIL (75) - addresses on page 2. DX Members may send $US using the same figures as $A.

73 Kevin

The FORRESTFIELD 21MHz Tx - Part 3

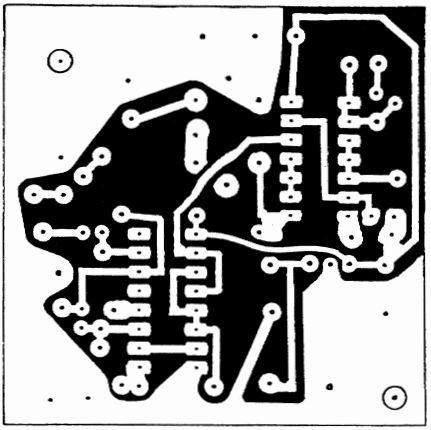
By Rod VK6KRG (28) and Don VK5AIL (75)

THE KDB BOARD

KEY DELAY,BUFFER Board:
Key Delay - Key Debounce - VCO Buffer -
+5V Regulator - PA Keying

DESCRIPTION See Fig. 10 KDB Circuit Diagram

FIGURE 8 - KDB PCB ETCHING PATTERN
Actual size
(White = copper)



The transmitter was originally a couple of experimental circuits built about ten years apart by VK6KRG. Some of the modules were salvaged from the old circuit and some from a design of more recent times. This shows the versatility of building experimental circuits using modules. However, there needs to be a place to put miscellaneous circuits, not provided for on existing boards. The KDB is that board.

The rig needs a 5V regulator, so that is included here, as is the VCO buffer, which passes the 21MHz continuous signal to the PLL. The delayed keying to the 1 Watt driver, mentioned in the Basic Circuit Description (*Lo-Key* #22), is also here, although it could have been included on the PLL board. In fact, a keen constructor could combine some modules into one board, with saving of space and perhaps construction time. But the modular approach is far more flexible and suits the experimenter.

The BC 548 collector feeds the 'standard' keying input of the PA. In fact the key itself has been connected to that point on all previous VK6KRG designs. The transistor simply turns on like key contacts or a switch.

FIGURE 9 - KDB PARTS LAYOUT

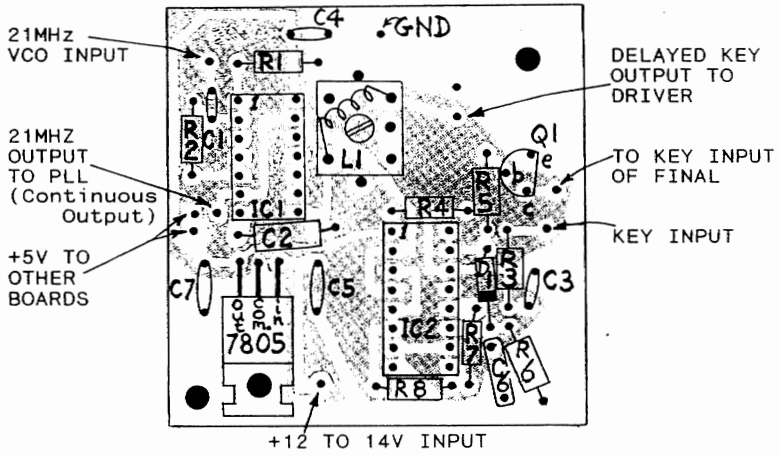
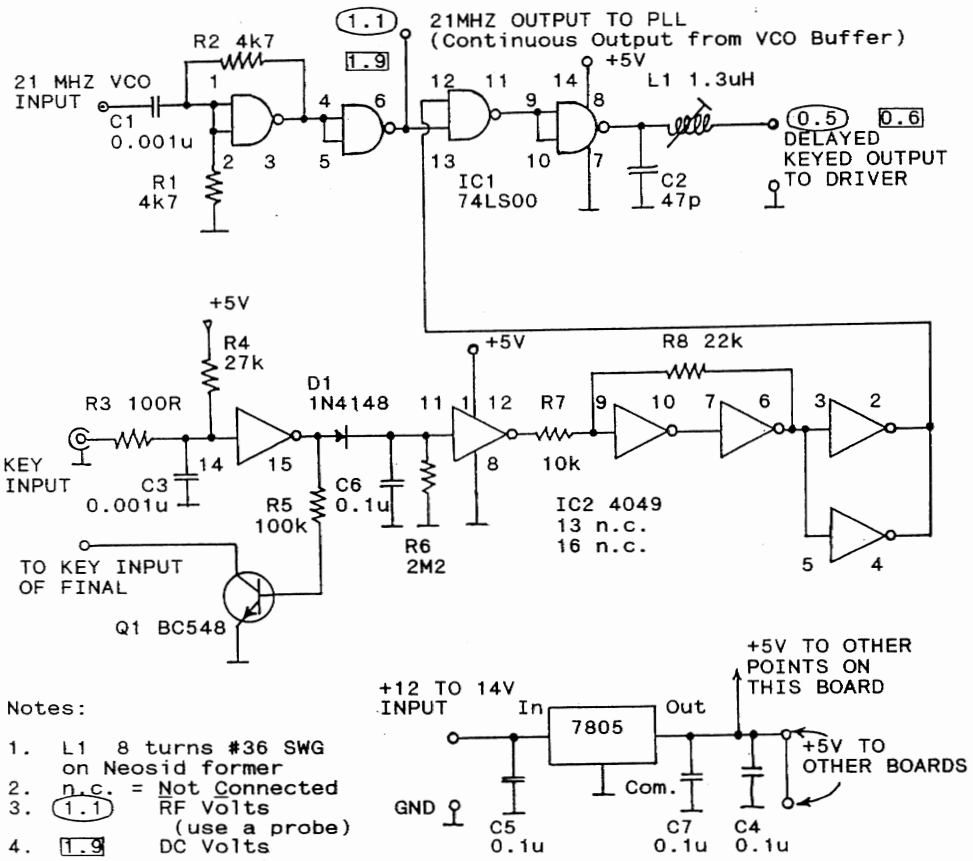


FIGURE 10 - KDB CIRCUIT DIAGRAM



Notes:

1. L1 8 turns #36 SWG on Neosid former
2. n.c. = Not Connected
3. (1.1) RF Volts (use a probe)
4. 1.9 DC Volts

CONSTRUCTION See Fig. 8 KDB PCB Etching Pattern and Fig. 9 KDB Parts Layout.

First install the 7805 +5V regulator, making sure only the centre pin touches the ground plane. The mounting plate goes against the ground plane, so run a thin layer of solder first. Then install the base of inductor L1 (after removing the redundant pin) and the two IC sockets for IC1 and IC2. Leave installation of the two IC's until the testing is part complete.

When installing components with leads connected to ground, don't forget to solder them to the ground plane also. The holes for their leads should not be countersunk. Make sure C2 is O.K., otherwise C2 and pin 7 of IC1 will not be earthed.

Keep the windings of L1 up near the top of the former, within 2mm of the end. Use an undersized (loose) screwdriver blade when adjusting the screw core or it may break.

If possible, check resonance with a GDO. Short the output side of L1 to earth then dip the L1/C2 combination (1.3uH/47pF) to see if it resonates at about 21MHz. If it doesn't, experiment with different slug positions or perhaps add or subtract a turn or try a different slug material. If the resonant frequency is slightly low, try opening out the turns spacing to reduce the inductance.

KDB PARTS LIST

Resistors...All 1/4W

R3.....	100R	(brn-blk-brn)
R1 R2...	4k7	(yel-vio-red)
R7.....	10k	(brn-blk-org)
R8.....	22k	(red-red-org)
R4.....	27k	(red-vio-org)
R5.....	100k	(brn-blk-yel)
R6.....	2M2	(red-red-grn)

Capacitors

C2..... 47pF polystyrene
C6..... 0.1uF greencap
C1 C3 0.001uF disc ceramic
C5 C7 &
C4..... 0.1uF disc ceramic

Colour codes:

blk	black	brn brown	red red
org	orange	yel yellow	grn green
blu	blue	vio violet	gry grey
wht	white	sil silver	gld gold

Semiconductors

D1..... 1N4148 or 1N914 diode
IC1.... 74LS00 Quad 2-input NAND gate
IC2.... 4049 or 4049B hex inverter/buffer
7805... 5V voltage regulator TO-220 case, with hardware
Q1..... BC548 transistor

Miscellaneous

1nbr... PC Board double sided KDB
2nbr... Stand-offs
L1..... 1.3uH Inductor - Neosid coil former with F25 slug
10nbr.. PCB pins
2nbr... IC sockets (one 14 pin & one 16 pin)

KDB TESTING AND ADJUSTMENT

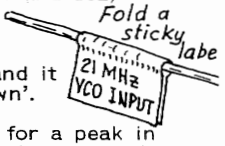
1. It makes testing easier if you temporarily mount all the boards made so far, plus the main tuning capacitor, on a sheet of thick cardboard, using stand-offs (the longer the better). The boards not yet made may be added later.

2. Wire the ground planes together. Solder a 50 or 47 ohm (1/4W) resistor from the KDB's terminal DELAYED KEYED OUTPUT TO DRIVER to ground. Connect a power supply in the range 12 to 14V to the +12V input points on the boards.

3. Check that a signal of at least 21.3MHz (if VCO CONTROL VOLTAGE point on VCO board is grounded) is present at the terminal RF OUTPUT on the VCO board.

4. Check the operation of the +5V regulator by taking a reading of the voltage at the +5V output terminals of the KDB board. It must be between 4.5 and 5.5V and preferably between 4.75 and 5.25V, because IC1 is a TTL IC.

5. Temporarily disconnect the +12V supply. Install the two IC's IC1 and IC2, taking the usual precautions with IC2, which is a CMOS.



6. Connect the RF OUTPUT terminal on the VCO board to the point 21MHZ VCO INPUT on the KDB. No need for coax during testing - and it helps if you label all leads. Earth the KEY INPUT, to give 'key down'.

7. Reconnect the +12V supply. Then adjust the 1.3uH L1 coil slug for a peak in RF output reading across the 50 ohm load, using the diode probe and meter. The peak may hardly be noticeable, but you should get an RF voltage about the same as that shown on the circuit diagram.

8. Release (open) the KEY INPUT. There should be a noticeable but slight delay before the RF output signal disappears. If you switch off the power supply the RF should disappear immedately. This is the 'delayed key output' signal.

9. Now read the RF voltage at the terminal 21MHZ OUTPUT TO PLL (Continuous Output), using the diode probe as before. It should approximate that shown on the circuit diagram. Also measure the DC voltage here. Check that the Q1 transistor switch to the terminal TO KEY INPUT OF FINAL is working.

10. This completes the adjustment of the KDB board.

THE PLL BOARD — Phase Locked Loop

DESCRIPTION See Fig. 11 PLL Block Diagram and Fig. 12 PLL Circuit Diagram

The whole purpose of this board is to keep the transmitter output frequency stable. There is no need for new Amateurs to get confused over this. The most interesting part of the circuit is the 'harmonic mixer', which is a little-known circuit developed by engineers at Motorola in the mid 1970's. It consists of only one IC, the TTL 7474 dual D flip flop (D = data), and works as follows. *(If you don't understand the terminology don't worry, just take it slowly !)*

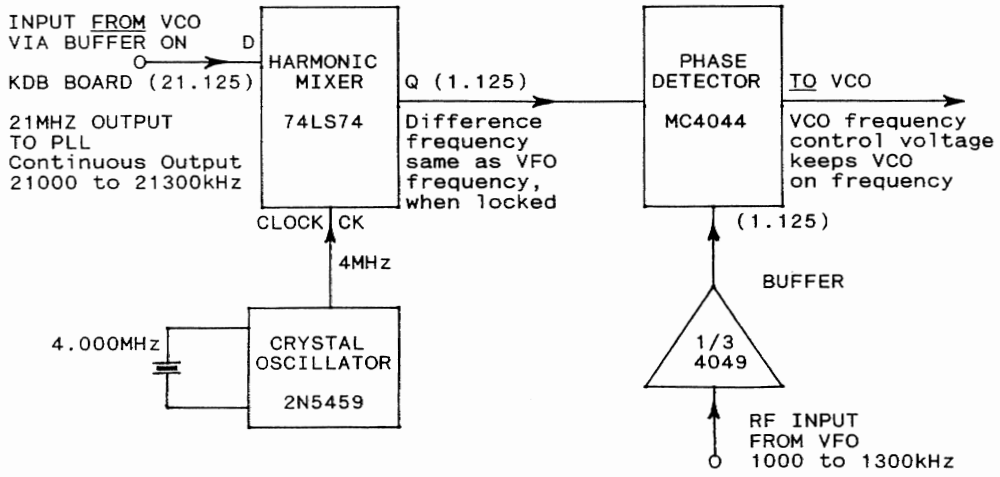
If one signal is fed to the clock input (CK on the diagrams) of one of the flip flops and another signal is fed to its D input (D), the difference frequency *only* will appear at the Q output (Q). This assumes both inputs are at TTL level. There is a lot more to this mixer than meets the eye and much is beyond the scope of this article. However there is one more trick up its sleeve which concerns us here. It will also give the difference frequency between the signal mentioned as being fed to the D input and the closest HARMONIC of the signal at the clock input. Hence the name harmonic mixer. So what does this mean to our transmitter ?

Suppose we wish to transmit on 21.125MHz (sent to D from VCO - see figures in brackets). The closest harmonic of 4MHz is 20 MHz, so the difference frequency is 21.125 - 20.000 = 1.125MHz. This difference frequency is fed to a phase (frequency) comparator, the MC4044 phase detector, and is compared with the frequency from the stable VFO also on 1.125MHz. The PLL feeds a frequency control line with a DC voltage which tunes the VCO. Should the VCO try to change frequency - which it constantly tries to do - the phase detector notices a difference and sends a correcting voltage back to the VCO to cancel the drift. This is done with great precision, as the difference frequency must be exactly in phase with the VFO.

If the VFO is now tuned to (say) 1.000MHz, the phase detector now notes that the difference frequency has changed, and a correction voltage is sent to the VCO until the difference is exactly 1.000MHz. This means that the VCO must now be exactly on 21.000MHz because 20.000MHz from the crystal harmonic is mixed with 21.000MHz from the VCO to give 21.000 - 20.000 = 1.000MHz.

This completes the PLL description, the only part of the transmitter which you may find difficult to comprehend.

FIGURE 11 - PLL BLOCK DIAGRAM

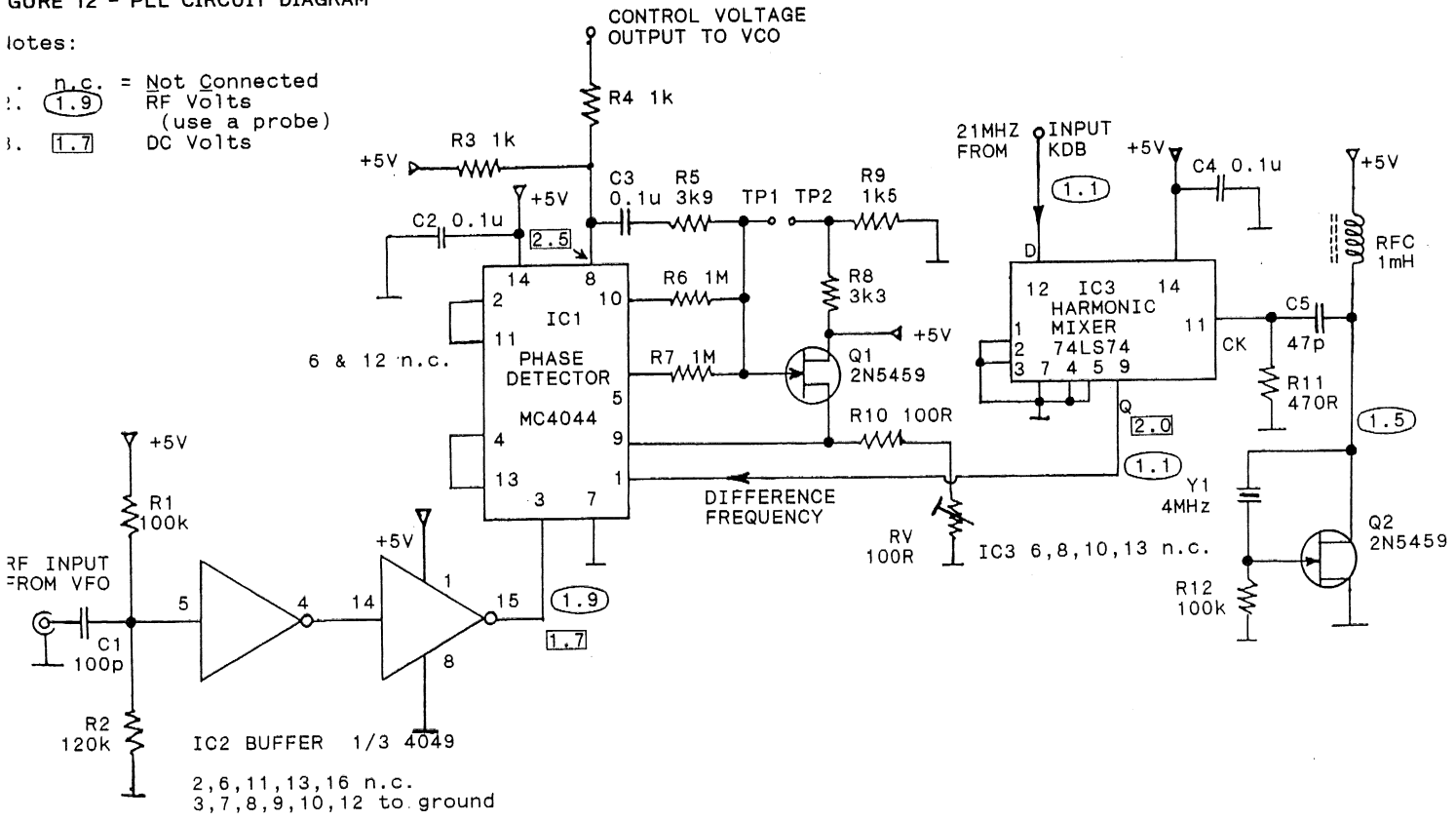


6A/A4

GURE 12 - PLL CIRCUIT DIAGRAM

lotes:

. n.c. = Not Connected
:. (1.9) RF Volts (use a probe)
3. [1.7] DC Volts



PLL PARTS LIST

Resistors...All 1/4W

R10.....	100R	(brn-blk-brn)
R11.....	470R	(yel-vio-brn)
R3 R4...	1k	(brn-blk-red)
R9.....	1k5	(brn-grn-red)
R8.....	3k3	(org-org-red)
R5.....	3k9	(org-wht-red)
R1 R12..	100k	(brn-blk-yel)
R2.....	120k	(brn-red-yel)
R6 R7...	1M	(brn-blk-grn)

RV..... 100R Trimpot (vertical)

Colour codes:

blk black	brn brown	red red
org orange	yel yellow	grn green
blu blue	vio violet	gry grey
wht white	sil silver	gld gold

Capacitors

C5	47pF	polystyrene
C1.....	100pF	polystyrene or NPO ceramic
C3.....	0.1uF	greencap
C2 C4..	0.1uF	disc ceramic

Semiconductors

IC1....	MC4044 Motorola phase detector (TTL) (*NOT* Motorola 14044 which is a 4044 CMOS IC)
IC2....	4049B or 4049 hex inverter/buffer (CMOS)
IC3....	74LS74 dual D-type edge triggered flip-flop (TTL)
Q1 Q2..	2N5459 or MPF105 transistor FET

Miscellaneous

1nbr....	PC Board double sided PLL
2nbr....	Stand-off set
RFC.....	RF choke 1mH (nominal)
Y1.....	Crystal 4.000MHz (prefer series resonant)
3nbr....	IC socket (two 14-pin & one 16-pin)
10nbr...	PCB pins

CONSTRUCTION See Fig.13 PLL Parts Overlay and Fig.14 PLL PCB Etching Pattern

The PLL uses a ground plane board. The earthed leads should be soldered on both sides of the PCB. Of course this is not practicable for IC socket pins. All other holes should be lightly countersunk on the ground plane side with a drill bit of about 3mm or 1/8" diameter. This ensures that non-earthed leads do not touch the ground plane. To be safe, mark the ground plane at all the non-earthed holes and check them, before doing any countersinking. PCB pins should be used at terminal points and test points.

The IC sockets should be installed first. Make sure that each is in its correct orientation.

When you install the trimpot RV do not push it down so far as to touch the ground plane, which would cause a short circuit.

Don't forget the three insulated links. One is on the circuit (non-component) side under IC1 7474, and is soldered to the copper pad without drilling it.

Now install the ICs, making sure they are the right way round and consistent with their IC sockets.

The power supply must produce a voltage in the range 4.5 to 5.5 Volts, as mentioned in the section on the KDB, which feeds to the PLL. TTL ICs will be damaged when subjected to more than 5.5 Volts.

FIGURE 13 - PLL PARTS OVERLAY

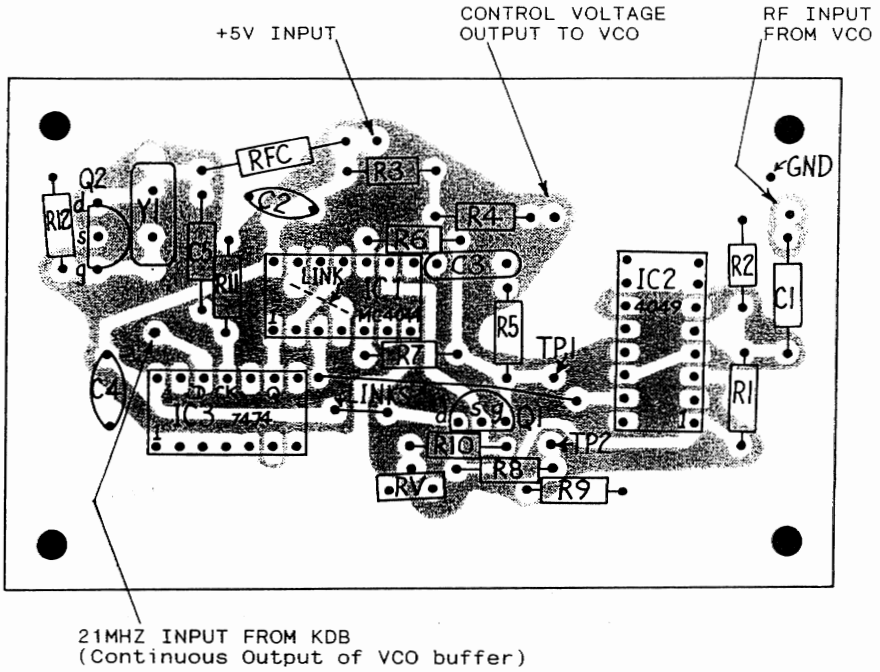
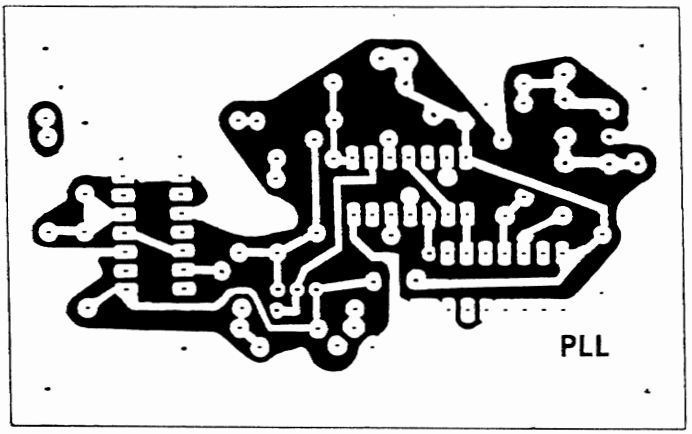


FIGURE 14 - PCB ETCHING PATTERN Actual size (White = copper)



PLL TESTING AND ADJUSTMENT

1. Connect a temporary jumper between TP1 and TP2. Connect +5 Volts where shown on the circuit. There is no need to apply any signal at this stage.

2. Adjust the 100 ohm trimpot RV for 2.5V at pin 8 of IC1, the MC4044. This value drifts a bit with temperature, so 'near enough' is O.K.

3. Remove the jumper. Now apply the VFO signal to the terminal RF INPUT FROM VFO and measure the RF voltage at pin 3 of the MC4044 IC1, using your diode probe (described in Part 1). It should be approximately as shown on the circut diagram.

Note that some RF probes are frequency sensitive and will give variable readings or even 0 Volts in some situations.

4. The crystal oscillator should also be working, and the output should be measured using your diode probe and should be approximately as shown on the circuit.

5. You are now ready to test the overall PLL operation.

·=··· until next issue.

****

CHANGES TO VCO DETAILS in *The Forrestfield 21MHz Tx - Part 2* p.6 of *Lo-Key* #23

There are some changes to the Notes to Figure 5. Note 1 should have an oval around the 5.9. Note 2 should have a rectangle around 0.25. Note 4 should show 20 turns for TR1 primary, which will give a better result than the 23 turns originally specified. Also, it helps to keep the top of the PRImary coil near the top of the former, say about a millimetre or two clear.

On page 7, No.2 mentions using 0 Volts in testing. Don't just leave the VCO Control Voltage terminal floating, connect it to ground for this test. Also, the range 21.000 to 21.300MHz in No.4 should be 21.300 to 21.000MHz.

Another useful tip: Use an undersized (loose) screwdriver blade in the screw cores (in L1 and TR1) or they may break.

By the way, the Block Diagram on p.4 of *Lo-Key* #22 incorrectly showed the VFO OUTPUT as VCO OUTPUT.

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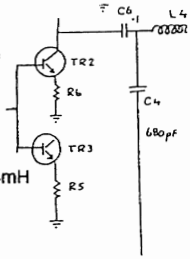
VK2/QRP ASSAULT By Garry VK5AGS/VK2AGC (121)



WESTLAKES RIG - Here are some details you will need if you are building the Westlakes Amateur Radio Club's QRP project. See Lo-Key #23 September 1989, page 11. The values of the inductors (with the colour codes referred to in the original articles in brackets) are:

L1 (BLACK) 8.4mH L2 2 windings on L1 L3 (GOLD) 30mH L4 (PINK) 2.4mH

Well, dig around for some suitable formers and get out the enamelled wire, needle point pliers and GDO .....

Editor's Note - Len VK5ZF (1) came up on the Club Info. Net early in November to say that he knows of the origin of the circuit used. Len also mentioned that the operating voltage required is 24V. And the collector of TR3 should be in parallel with TR2. (I thought it was a standby transistor in case of failure of TR2. Hi!)

CW OPERATORS QRP CLUB - MEMBERSHIP LIST - 1 DECEMBER 1989

NBR	CALL	NAME	SURNAME	ADDRESS
60		Trevor	THOMAS	BOX 150 RAVENSTHORPE WA 6346
174		Philip	McHUGH	P.O. Box 816 COOMA NSW 2630
100	(SDC 628)	Eric	CROCKER	BOX 158 P.O. PARA HILLS SA 5096
162	SWL	Wes	TYLER	PO Box 43 WEST GOSFORD NSW 2250
177	SWL	Lorenz	ECKARD	The Flaxton Inn FLAXTON QLD 4560
158	P29CG/ N9DXP	George	CAREY	P.O. Box 284 UKARUMPA VIA LAE PAPUA NEW GUINEA
52	P29IL	Ian	LESLIE	P.O. Box 175, GOROKA, EASTERN HIGHLANDS PROVINCE, PAPUA NEW GUINEA
132	PA3ELD	Jan	VISSER	Wethow Der In't Veldstraat 28 1107BJ AMSTERDAM HOLLAND
72	VE6AAO	Bob	ROLLHEISER	BOX 2609, PEACE RIVER, ALBERTA. TOH2XO CANADA
163	VK1BL	Ted	GARNETT	GPO Box 1164 CANBERRA ACT 2601
121	VK2AGC	Garry	COTTLE	22 Johnston Road BASS HILL NSW 2197
5	VK2AKE	Jim	EDWARDS	P.O. Box 385 BOWRAL NSW 2576
98	VK2AP	John	THURSTON	P.O. Box 44 BLACK HEATH NSW 2785
152	VK2ATJ	Thomas	KING	P.O. Box 140 KENSINGTON NSW 2033
32	VK2BBX	Bill	BALOGH	23 Bathurst Street LIVERPOOL NSW 2170
22	VK2BVH	Brian	HALPIN	5 Carramar Cres MIRANDA NSW 2228
161	VK2BWW	Bill	WATTS	P.O. Box 263 NAMBUCCA HEADS NSW 2448
16	VK2CBI	Ken	ELKINGTON	44 Boland Ave SPRINGWOOD NSW 2777
171	VK2CDO	Ype	TIMMER	BOX 18 BOWRAVILLE NSW 2449
11	VK2COH	Cec O.	HEALEY	121 Jamison Road PENRITH NSW 2750
102	VK2CSA	Warren	MARRIOTT	9 Darkwater Street GLADSTONE NSW 2440
36	VK2CVR	Vincent	ROBERTS	50 Edgar St FREDERICKTON NSW 2440
89	VK2CWH	Ted	DANIELS	Wombat Hole Bylong Rd RYLSTONE NSW 2849
159	VK2DCD	Maurie	CAMPS	Box 72 COLEAMBALLY NSW 2707
95	VK2DMV	Paul	IRELAND	109 Victoria Street COFFS HARBOUR NSW 2450
127	VK2DQR	Ron	BANNERMAN	1 Thomas Hennessy Cr WEST KEMPSEY NSW 2440
124	VK2DRL	Bob	JOHNSON	19 Britannia Road CASTLE HILL NSW 2154
144	VK2EPD	Peter	CANNON	"BINALONG" FORBES NSW 2871
126	VK2ERA	Rob	ABEL	6 Laurel Street KOOTINGAL NSW 2352
56	VK2ESR	Stephen	RAPLEY	20 Albion Ave PADDINGTON NSW 2021
173	VK2ETW	Trevor	WILKIN	BORONIA COONABARABRAN NSW 2357
35	VK2EXD	Col	McDOUGALL	"WOODLANDS" COOLAMON NSW 2701
133	VK2FEI	Greville	KNIGHT	C/O H.M.A.S. PLATYPUS MILSON PT NSW 2061
23	VK2FJ	Nev.	SHAW	16 Hynes Place CAMDEN EAST NSW 2570
73	VK2FJF	Phil	THOMPSON	LOT 23 Rifle Range Rd MS-5 DUBBO NSW 2830
128	VK2FNF	Jim	MCNEILL	15 Pacific Street ANGOURIE VIA YAMBA NSW 2464
81	VK2FNJ	Jose	SIQUEIRA	63 Tanbark Circuit WERRINGTON DOWNS NSW 2750
166	VK2GJW	Jim	WATSON	Smiths Creek Road STOKERS SIDING NSW 2484
156	VK2KB	Allen	FAIRHALL	7 Parkway Ave NEWCASTLE NSW 2300
165	VK2KSD	Stan	DOGGER	Tunnel Road STOKERS SIDING NSW 2484

CW OPERATORS QRP CLUB - MEMBERSHIP LIST - 1 DECEMBER 1989

NBR	CALL	NAME	SURNAME	ADDRESS
148	VK2LW	Les	GABORIT	347 MacQuarie Rd SPRINGWOOD NSW 2777
146	VK2MPW	Peter	WESTERMAN	31 Pacific View Dve HALLIDAYS POINT NSW 2430
41	VK2QB	Leo	PINKEVITCH	20 Cathrine Street KOTARA SOUTH NSW 2289
30	VK2VBO	Brian	O'BRIEN	14 Belgrave Street NEUTRAL BAY NSW 2089
140	VK2VJD	John	DUNN	P.O. Box 69 SPRINGWOOD NSW 2777
142	VK2WAS	Bill	SHORT	129 Simkin Cres KOORINGAL WAGGA WAGGA NSW 2650
131	VK2YA	Rex	BLACK	562 Kooringal Road WAGGA WAGGA NSW 2650
116	VK2ZDW	David	WHEELER	50 Bridge Rd GLEBE NSW 2037
85	VK3ADX	Merv	QUINN	104 Lane Street BALLARAT VIC 3350
169	VK3AHU	Harvey	UTBER	P.O. Box 40 VIOLET TOWN VIC 3669
125	VK3ANP	David	WARING	Banksdale Road HANSONVILLE VIC 3675
150	VK3APH	Tony	GOLDSWORTHY	1522 Main Rd RESEARCH VIC 3095
175	VK3ASD	Don	SMITH	25 Devon St BOX HILL SOUTH VIC 3128
20	VK3AYV	Howard	ANDERS	P.O. Box 197 MT WAVERLEY VIC 4020
111	VK3BBI	Bob	LUKES	22 Dorothy Street EAST BURWOOD VIC 3151
178	VK3BDH	David	DUNN	
82	VK3BGH	Graeme	HARRIS	9 Loma Street RINGWOOD EAST VIC 3135
149	VK3BIE	Douglas	PEARCE	C/O EPWORTH HOSPITAL 34 Erin St RICHMOND VIC 3121
97	VK3BMC	John	CARWARDINE	36 Barcelona Street BOX HILL VIC 3128
53	VK3BNC	Bob	TERRILL	7 Locksley St., WENDOUREE VIC 3355
7	VK3BPG	Reg	BEDFORD	45 Milne Street CRIB POINT VIC 3919
13	VK3BXA	Eric	ERVINE	P.O. THOONA VIC 3726
114	VK3BYA	Derek	MC NIEL	17 Manning Rd MALVERN EAST VIC 3145
157	VK3BYW	Frederick	PIESSE	61 Munro St EAST KEW VIC 3102
33	VK3BZB	Jack	ELLIOTT	1 Colin Street ROSEBUD WEST VIC 3940
76	VK3CBO	Rod	ADAMS	C/O POST OFFICE KIEWA VIC 3691
138	VK3CFI	Maggie	IAQUINTO	P.O. Box 285 COLAC VIC 3250
19	VK3CGE	Neil	EMENY	1 Beaumont Crt MONTROSE VIC 3765
4	VK3CQ	Gilbert	GRIFFITH	7 Church Street BRIGHT VIC 3741
134	VK3CQK	Ralph	ROBERTSON	P.O. BOX 23 KYABRAM VIC 3620
123	VK3CUC	Ken	SHIELDS	47 Sullivan Street INGLEWOOD VIC 3517
12	VK3CVF	John A.	ELLIOTT	8 Queen Street ROSEDALE VIC 3847
39	VK3DGE	Garry	NEWTON	12 Bayliss Place VERMONT VIC 3133
112	VK3DID	Ian	GODSIL	P.O. BOX 411 NORTH BALWYN VIC 3104
110	VK3DJI	Joe	LESLIE	79 Mitchell Street BENTLEIGH VIC 3204
47	VK3DXH	Lindsay	LaPOUPLE	65 Sorrento Rd NORTH BEACH WA 6020
164	VK3ED	Geoff	BUTTERWORTH	Lot 4 Coburns Lane TOOLERN VALE VIC 3337
141	VK3EHH	Harold	HARDY	1 White Parade CHURCHILL VIC 3842
55	VK3EII	Graeme	BROWN	RMB 8375 Pryor Rd DROUIN VIC 3818
24	VK3FML	Marlene	BROWN	Yan Yean Rd YARRAMBAT VIC 3091
122	VK3HG	Trevor	STARRITT	"JENALAN" RMB 2340 TATURA VIC 3616
108	VK3JQ	Liz	RANDALL	P.O. BOX 378 RINGWOOD VIC 3134
6	VK3JY	Steve	PHILLIPS	37 Mangarra Rd CANTERBURY VIC 3126
151	VK3KID	Clive	MORGAN	57 Morris St TOOTGAROOK VIC 3941
93	VK3KRL	Simon	ANDERSON	12 Range Rd BURWOOD EAST VIC 3151

CW OPERATORS QRP CLUB - MEMBERSHIP LIST - 1 DECEMBER 1989

NBR	CALL	NAME	SURNAME	ADDRESS
135	VK3NCW	Ken	WILLIAMS	36 McCulloch Ave SEAFORD VIC 3198
155	VK3PBM	Dave	TOMPKIN	P.O. Box 78 LARA VIC 3212
62	VK3PUC	Mark	JEFFREY	311 PEEL St Nth BALLARAT VIC 3350
176	VK3PUI	Ian L.	BOYD	P.O. Box 337 BALLARAT VIC 3350
59	VK3VBR	Barry	RIDGEWAY	BOX 116 BEECHWORTH VIC 3747
168	VK3XGR	Graham	RUNCIMAN	P.O. Box 76 COLAC VIC 3250
49	VK3XU	Drew	DIAMOND	Lot 2 Gatters Rd WONGA PARK VIC 3115
143	VK3ZF	George	COVENTRY	Happy Hollow Drive PLENTY VIC 3090
94	VK4ATZ	Ted	WALTON	U42/56 Miller Street KIPPA RING QLD 4020
45	VK4BIL	Bill	RAHMANN	28 Fontayne Street ASPLEY QLD 4034
44	VK4BSD	Stan	DEAN	380 St. Vincents Rd NUDGEE QLD 4014
130	VK4EV	Ron	EVERINGHAM	30 Hunter Street EVERTON PARK QLD 4053
99	VK4GH	Murray J.	YOUNG	36 Raintree Bvde., Little Mountain CALOUNDRA QLD 4551
104	VK4LKF	Kerry	FIELDING	22 Ellis Street LAWNTON QLD 4501
113	VK4MUQ	Stanley	MARTIN	92 Clarke Street GARBUTT TOWNSVILLE QLD 4814
27	VK4NFE	Bob	NEVILLE	124 Roscommon Road BOONDALL QLD 4034
15	VK4RE	Roy	HILDRED	P.O. Box 387 TOOWOOMBA QLD 4350
14	VK4SF	Jack	FORD	222 Warwick Rd CHURCHILL IPSWICH QLD 4305
21	VK4VJT	Donald	STIELER	6 Image Flat Rd NAMBOUR QLD 4560
167	VK5ABY	Barrie	BRICE	21 River Way FULHAM GDNS SA 5024
58	VK5AGP	Graham	PHILLIS	413 The Terrace PORT PIRIE SA 5540
75	VK5AIL	Don	CALLOW	5 JOYCE Street GLENGOWRIE SA 5044
43	VK5AKZ	Kevin	ZIETZ	41 Tobruk Ave ST MARYS SA 5042
172	VK5AQ	Brenton	ZERBE	11 Searle St WHYALLA SA 5608
8	VK5BA	Malcolm	HASKARD	Bassnet Rd ONE TREE HILL SA 5114
57	VK5BJF	Jeff	WALLACE	Box 344 CLARE SA 5453
170	VK5BVM	Mick	SCHMIDT	37 Arthur St PENOLA SA 5277
118	VK5FZ	Jack	BURKE	25 La Perouse Ave FLINDERS PARK SA 5025
139	VK5GI	Norm	LEE	25 Ralston Street NORTH ADELAIDE 5006
154	VK5LG	Leith	COTTON	64 Weroona Ave PARKHOLME SA 5043
2	VK5OS	Max	BRUNGER	3 Durham Ave LOCKLEYS SA 5032
145	VK5PAS	Brian	COOPER	128 Queen Street PETERBOROUGH SA 5422
1	VK5ZF	Len	O'DONNELL	33 Lucas Street RICHMOND SA 5033
54	VK6ATM	Terry	MAITLAND	P.O. Box 88 WYALKATCHEM WA 6485
66	VK6BWI	Peter	PARKER	C/O P.O. WITCHCLIFFE WA 6286
25	VK6KC	Keith	WILLIAMS	6 Shelton St WAIKIKI WA 6169
80	VK6KHZ	Peter	SCALES	P.O. Box 1268 MIDLAND WA 6056
28	VK6KRG	Rod	GREEN	4 Rothsay Street FORRESTFIELD WA 6058
103	VK6MX	Warren	MEAD	347 Serpentine Rd ALBANY WA 6330
160	VK6NAM	Max	KELLY	P.O. Box 13 HILLIARYS WA 6026
61	VK6SA	REV.	SUTER	BOX 261 MANDURAH WA 6210
147	VK6XC	Ben	KOH	13 Sovereign Plce FORRESTFIELD WA 6058
42	VK6ZH	Milan	UDALL	11 Torwood Drive GOOSEBERRY HILL WA 6076
65	VK7AJ	L.	WILLIAMS	25 Gloucester St LAUNCESTON TAS 7250
26	VK7FN	Neil	FITZPATRICK	P.O. Box 7316 PENGUIN TAS 7316

CW OPERATORS QRP CLUB - MEMBERSHIP LIST - 1 DECEMBER 1989

NBR	CALL	NAME	SURNAME	ADDRESS
40	VK7JK	John	ROGERS	1 Darville Crt BLACKMANS BAY TAS 7152
38	VK7KBA	Arthur	BLACKWELL	"FAIRVIEW",Elderslie Rd BRIGHTON TAS 7030
37	VK7NRE	Bob	EDWARDS	205 Davey Street HOBART TAS 7000
48	VK7NXA	Stuart	BEAN	9 Sussex Street GLENORCHY TAS 7010
3	VK7VV	Rai	TAYLOR	Lot 2 Daniels Rd MAGRA 7140
69	VK7ZO	Graham	RANFT	315 Black Snake Lane GRANTON TAS 7030
91	VK8CW	Ian	SMITH	P.O. Box 4756 DARWIN 0801
96	G3RJV	Rev.George	DOBBS	498 Manchester Road, ROCHDALE LANGS OL11 3HE ENGLAND
50	G8PG/G W8PG	Gus	TAYLOR	37 Pickerville Road, GREASBY MERSEYSIDE,L49 3ND ENGLAND
74	K7DAP	Alan	MacALEVY	E660 Pickering Drive SHELTON WASHINGTON 98584 USA
78	KV7X	Jay	STURDIVANT	P.O. BOX 3027 BELLINGHAM WASHINGTON 98227 USA
107	KZ1L	Andrew	MORRISON	2 Joan Street PEPPERELL MA 01463 USA
120	LU6DW■■	Marcelo	FRANCO	23 Kokoda Ave BLI BLI QLD 4560
153	N6IG	Jack	FRAKE	P.O. Box 1153 BARNARD V T. 05031 USA
129	NR1A	Doug	STIVISON	45 Norman Rd., UPPER MONTCLAIR, NEW JERSEY 07043 USA
71	NW6F/X E21OF	Bob	JACOBS	APDO 73, MULEGE BAJA CFA. SUR MEXICO
9	W3TS	Mike	MICHAEL	P.O. Box 593, CHURCH LANE HALIFAX, PA 17032- 0593 USA
31	W5QJM	Fred	BONAVITA	P.O. Box 420321 HOUSTON TEXAS 77242-0321 USA
67	W6SKQ	Bob	SPIDELL	45020 N. Camolin Ave., LANCASTER CALIFORNIA 93534 USA
18	WA2YMW	Bill	BREARE	P.O. Box 867, HICKSVILLE N.Y. 11802 USA
106	WB0NQM	Richard	LUCAS	412 Cattleman Ct. LAWRENCE KANSAS 66044 USA
101	WB8ZWW	Wayne	WATSON	706 Torrence, SPRINGFIELD, OHIO 45503 USA
17	WF6U	Hollis	BUTTON	1025 Parr Ave CAMPBELL C.A. 95008 USA
34	ZL1ATW	Matt	MEENAGH	223 TE Tomo St TE AWAMUTA NEW ZEALAND
29	ZL1BYY	George	CARTWRIGHT	6 Haycock Ave MT ROSKILL AUCKLAND NEW ZEALAND

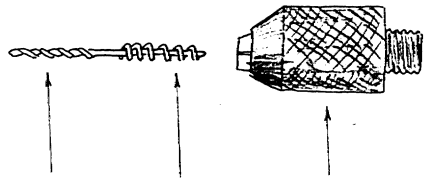
■■ LU6DW is now VK4DWA

OH NO ! THE DRILL'S SLIPPING IN THE CHUCK AGAIN !*◊[*=?¦∃*#!

DRILL.CHUCK Z65A/C3

Peter VK6BWI (66) sends a tip about a problem we all have from time to time. Some drill chucks do not adjust right down to 1mm, or less, to accept PCB drill bits.

To cure this, wrap a piece of thin solder around the end of the drill bit which fits into the chuck. This method can also be used to salvage snapped drill bits - if you can find them on the floor !



ROD'S REPORT ON THE NCRG HAM FEST

By Rod VK6KRG (28)

Dear Club Members,

Sunday 8 October was, I hope, excellent for our Club. Why ? The Northern Corridor Radio Group (NCRG) held its Annual Ham Fest.

I had the privilege of being invited to represent the CW Ops QRP Club. My twelve year old friend and I set up a working display of QRP equipment. This consisted of the *Forrestfield*, with covers removed, a dummy load and an oscilloscope. A square wave generator of about 3kHz was used to automatically key the transmitter and the resulting envelope was displayed on the CRO. Also, a receiver was connected as a monitor so that onlookers could hear the transmission. The *Club Communicator* was also displayed.

We met some of our Members - and many interested people were keen to accept a copy of *Lo-Key*. I placed all the literature I had with Amateurs who had a genuine interest in QRP and each was given a brief rundown on the Club kitsets. My hope is that there will be more interested people joining the Club.

I entered three QRP rigs in a home brew contest. The Drew Diamond VK3XU (49) Direct Conversion Rx kit won me a digital multimeter for best kit, so *Good One, Drew !* The prize for best original project went to a magnificent high current regulated power supply - so well built it took my breath away.

There were other clubs present, along with manufacturers and merchants. There was also a car boot sale. I saw one chap walk away with the biggest PCB I have ever seen, jam-packed with IC's. The PCB would have been two feet square ! Well, before closing I must say that the QRP rig which gathered the most interest was the *Forrestfield*, which is capable of true DX working, so our Club could be on a winner.

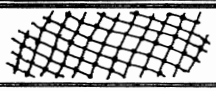
In closing, I would like to thank my friend Glenn who was my constant companion at the Ham Fest, and Rev VK6SA (61) for thinking of me when approached by the NCRG about the Ham Fest.

All in all, a good Sunday indeed.

73 Rod Green VK6KRG (28)

CW NET NEWS

By Ted VK2CWH (89), CW Net Controller



October - The CW Net continues to attract an average of about five starters per night - and it is nice to report that quite a few relatively new Members have checked in. These include Ken VK2CBI (16), Marlene VK3FML (24), Vince VK2CVR (36), Bill VK2BWW (161). *Great to hear from you !*

Matt ZL1ATW (34) has written to say why he has not been on air of late. After a house fire late in June his shack was needed for storage while repairs were made. Matt should be on air by the time this issue of *Lo-Key* comes out.

I hope to call in on the SSB Net while there is plenty of sun around to keep the battery full.

November - The Net is taking a caning lately from QRN, but still contact Matt ZL1ATW fairly frequently, but often have to give it away at about 8.30pm local, when the QRN *really* comes up !

Best regards to all, Ted

QRP TRANSCEIVER FOR 40M

By Richard WBØNQM (106)

Here is a schematic of a little QRP transceiver that is a lot of fun to build and it doesn't require a lot of knowledge in electronics. Anyone can build this and it is good for portable use. With a good antenna the little rig does quite well and requires only six volts to run it.

The Radio Shack #276-101 is a 100mH choke and any substitute will work. The output IC requires a heat sink to prevent the unit from burning up, particularly if you use a 6 Volt supply. This can be done by glueing a piece of aluminum, perhaps U-shaped, on the IC directly.

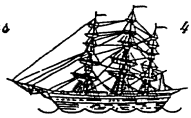
I can't think of any other problems with it, but you will find like all simple circuits you will need a good antenna system. The output of this little rig is 360mW and the signal is not chirpy.

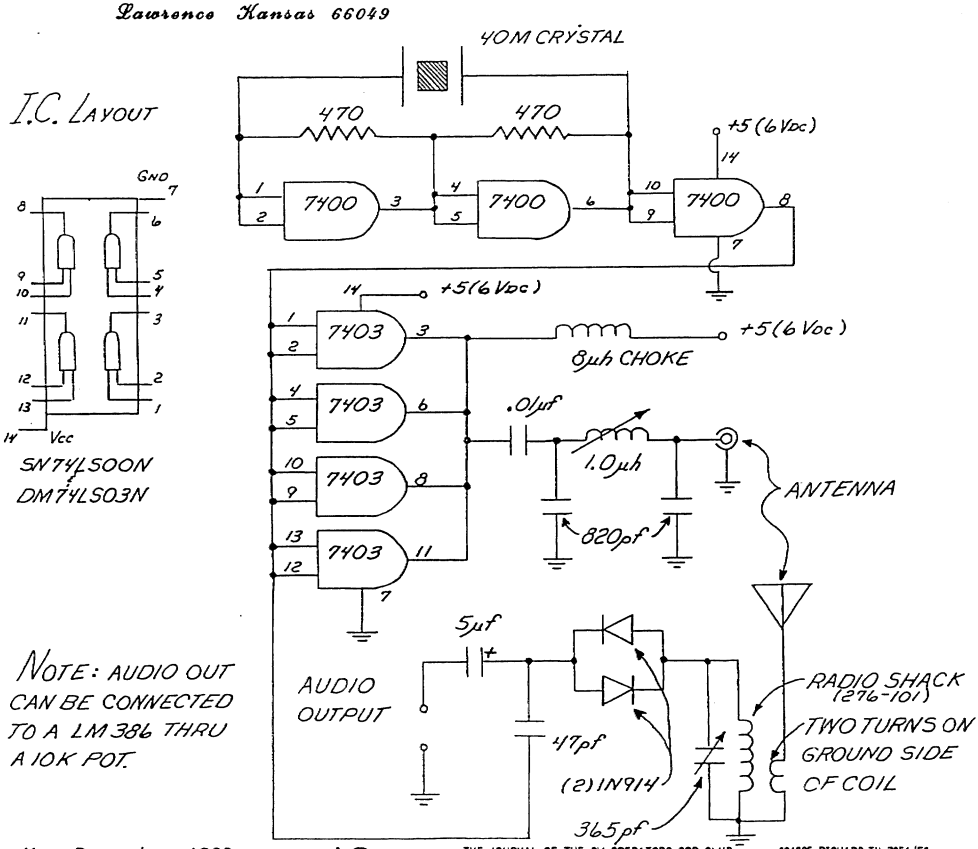
The audio circuit (opposite) is one of many that will work with the little unit.

73's Richard WBØNQM (106)

Richard Lucas *412 Cattleman Ct.*

Lawrence Kansas 66049





SCRAMBLE TIME 1990

It's been a quiet time for your Awards and Contests Manager. This is about to change !

CLUB CW SCRAMBLE #11 is to be held on **80m on THURSDAY 1 FEBRUARY 1990.**
From 3535kHz down towards 3500kHz. We hope to have the Club Station operating. Use homebrew Tx & Rx if possible. *Special WELCOME to DX Members - QRN and other conditions permitting.*

RULES

OBJECT: To score points by working as many stations as possible - for maximum enjoyment.
DURATION: 2 hours, starting at 1030Z and finishing at 1230Z.
MODE: CW only. Club Members to use QRP (maximum 5 Watts output).
CALL: No Control Station to check in to, JUST COME UP AND START CALLING. The call to use is CQ QRP TEST and Members should use the /QRP suffix. No need to exchange QSO serial numbers.

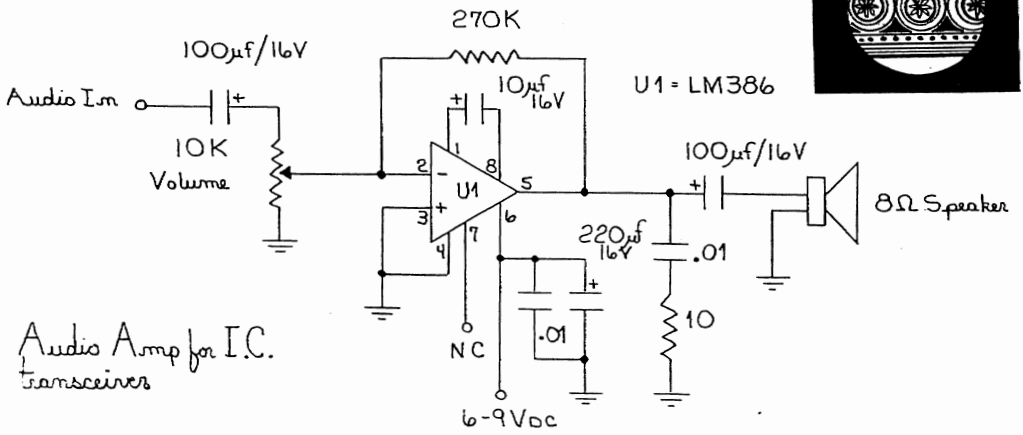
SCORING:

CW STATION WORKED	POINTS SCORED
QRO VK	1
QRO DX	5
QRP VK	5
QRP DX	15
CLUB STATION VK5BCW	15

PUT IT IN YOUR DIARY *NOW* !

RESULTS: Results including certificate winners will be in March *Lo-Key*.
ENTRIES: Send log extracts (*without delay* please) to:

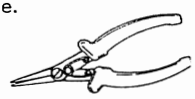
Ian Godsil VK3DID (112)
Awards and Contests Manager, P.O. Box 411 NORTH BALWYN Vic 3104



KIT-SET ACTIVITY CENTRE By Don VK5AIL (75)

KIT-SETS The Club has a number of kit-sets available to Members:

* The *Club Communicator* CW QRP 3.5MHz (80m) transmitter by Rod VK6KRG (28).
* Kits for individual modules of the *Club Communicator.*
* Kits for individual modules of the *Forrestfield* CW QRP 21MHz (15m) transmitter by Rod VK6KRG (28). VFO, VCO, PLL and KDB are available.
* Sensitive SWR Meter by Drew VK3XU (49). Includes a 5W dummy load.
* *"Sudden"* Rx by George G3RJV (91), from G-QRP Club's journal *SPRAT.*



Prices are on the list which follows.

CLUB COMMUNICATOR KIT-SET

The Club Communicator is an 80m band QRP CW transmitter, power output up to 4W, according to skill of builder. More than thirty have been sold to our Members in two years. The strengths of this kit are its simplicity and the good quality of the kit-set - including a manual which has been the subject of much favourable comment. The rig works well too !

The Full Kit-Set comprises four modules and a set of parts for the assembly into your case. The modules are -

VFO Variable Frequency Oscillator 7.0 - 7.4MHz range, adjustable by you. It runs continuously and does not interfere with your receiver.
BDT Buffer,Divide-by-two,Timer Output is 3.5 - 3.7MHz.
PA Power Amplifier Recommended target output is 4W.
QSK Keying Board Does T/R switching between transmit and receive modes.

The original concept and design was by Rod Green VK6KRG (28). Information about the *early* version appeared in *Lo-Key* #14 June 1987 (p. 21) and *Amateur Radio* March 1988. Development in kit-set form was by Don VK5AIL (75). Our kit-set includes some new PCBs and a new, comprehensive instruction manual, *written with beginners in mind.*

This kit-set will suit those who wish to learn more about radio AND it will suit the more experienced who wish to experiment with the modules, develop them or use them in other rigs.

Each module is supplied as a PCB plus the parts to be mounted on that board or which are part of that circuit. PCB size is about 52 x 52mm (2"), except the PA which is about 78 x 78 (3").

No cases are supplied as this would increase both the cost of the kit and the postage, so you can choose your own or use the sizes recommended in the manual.

The kits are set up in small batches, so if you just miss a batch delivery will take more than a month. If you have queries, contact me on the Club Info. Net (SSB), telephone or write. I will also try to help with technical queries you may have when building the rig.

SENSITIVE SWR METER & QRP DUMMY LOAD

To assist Members who are setting up stations for QRP operation we offer a short-form kit-set for building a sensitive SWR meter, which can also be calibrated to give QRP power readings, plus the parts for a very compact 5W dummy load.

The design and construction of this SWR meter is the subject of an article in *Lo-Key* No. 19 September 1988. The original article by Drew Diamond VK3XU (49) appeared in the Wireless Institute of Australia journal *AMATEUR RADIO* in April 1983, having originally appeared in the *VK CW QRP$_p$ Club Bulletin.*

The meter is particularly sensitive, unlike many meters designed for higher power, which hardly move the needle when QRP powers are used. It can be left in-line during QSO's - normally set so that the reverse reading can be monitored. It has a sensitivity control for use when higher power causes the needle to exceed full scale deflection.

Parts are also supplied for building a 5W dummy load in a PL259 coaxial plug, similar to that described in the *ARRL HANDBOOK* (chapter on Test Equipment).

An instruction manual is included. The only significant items not supplied in this short-form kit-set are the main case and the 50uA meter.

This is an ideal first project for a beginner.

"SUDDEN" RECEIVER

This is a design by the Reverend George Dobbs G3RJV (96), featured in SPRAT, the journal of the G-QRP Club. See *Lo-Key* #23 & 24. We are now having to produce kits locally, as the imported kits sold out and the cost was excessive, due to duty and tax. The co-operation of the G-Club and Kanga Products is much appreciated.

SUPPLY OF COMPONENTS

We also have available for purchase by Club Members a range of components, particularly items hard to get from normal sources. If you are having difficulty finding parts we may be able to help, so please come up on the Club Info. Net or write to me. The items are brand new except where stated otherwise. We cannot guarantee availability and may have to limit quantities sold to individuals. The items listed are only a small fraction of those available.

ORDERING OF KITS AND COMPONENTS

Orders and payment should be sent to Don VK5AIL (75), or to Treasurer Kevin VK5AKZ (43) if you apply for membership at same time. Addresses are on page 2.

Please make out the cheque to CW OPERATORS QRP CLUB. For small money amounts up to $A 10.00 it is alright to send the equivalent value of postage stamps (as long as they are unused Australian stamps valued at $1 or less !). The receipt will come with your next copy of *Lo-Key*. If you don't receive a packet within a month please contact me on the Club Info. Net or write - things may have gone astray.

The PRICES of the items listed below are PER PACK. The list shows how many of each you get in one pack. Prices may change at any time without notice. PLEASE ADD $A 2.00 TO THE TOTAL VALUE OF YOUR ORDER, TO COVER POSTAGE & PACKAGING ETC.

'N' means it is a new item on the list.
'D' means that a simple data sheet will be provided with each order.
'H' means that a set of insulated mounting hardware is included.

PRICE LIST

From 15 Dec 1989

Code No.	Nbr in a pack	$A Price per pack		Description
K001	1	77.00		Club Communicator Full Kit-Set 3.5MHz CW QRP Tx complete with 52 page manual C010. See Lo-Key #14 June 1987.
K005	1	16.00		QSK relay module (full break-in), as in Club Communicator. You will also need to obtain the manual C010.
K006	1	24.00		Sensitive SWR meter. Short-form kit. Plus 5W dummy load. Manual included. See Lo-Key #19 Sep 1988 & AR Apl 1983.
K007	1	27.00		VFO for Forrestfield 21MHz CW QRP Tx. Short-form kit. Instructions in Lo-Key #22 June 1989.
K010	1	19.00		VCO Voltage Controlled Oscillator for Forrestfield 21 MHz CW QRP Tx Short-form kit Inst'ns in Lo-Key #23 & 24.
K011	1	34.00		"Sudden" receiver 80m, 40m or 20m version (choose one). George G3RJV (96) design. G-QRP Club. Short-form kit.
K012	1	31.00	N	PLL Phase Locked Loop for Forrestfield 21 MHz CW QRP Tx. Short-form kit. Inst'ns in Lo-Key #24 Dec 1989
K013	1	18.00	N	KDB Key Delay, Buffer for Forr'field. Inst'ns in *Lo-Key* #24
C001	1	5.00		Ammeter edge type 500uA f.s.d. (DC) Kyoritsu EW-40 Needs a 14mm x 42mm cut-out in your panel.
C002	2	3.50	DH	IRF510 transistor N-channel MOSFET (Replaces IRF511) Used in some of VK3XU (49) Drew's projects.
C004	4	2.30		BAT85 Schottky (hot carrier) diode Voltage drop is 0.2 - 0.3V. High sensitivity - can replace germanium types.
C007	2	3.00	D	BS170 transistor VMOS N-channel FET.
C008	2	5.00	DH	VN88AF transistor.
C010	1	6.00		Manual, as supplied with Club Communicator Tx (K001). Comprehensive coverage; 52 pages.
C011	2	6.00	DH	IRFZ32 transistor V_{DS} 50V P_{DS} 75W I_D cont. 25A TO-220AB

C013	2	1.10	Toroidal core 9mm od x 6mm id x 3mm ht Philips 4322 020 97170 material 4C6 ferrite (violet)
C014	2	1.40	Toroidal core 14mm od x 9mm id x 5mm ht Philips 4322 020 97180 material 4C6 ferrite (violet)
C015	4	1.70	BA102 equivalent: 1S2688 varicap (varactor) diode
C018	2	0.60 N	Toroidal core 6mm od x 3mm id x 2mm ht Philips 4322 020 97160 material 4C6 ferrite (violet)
C022	10m	0.20	Enamelled copper wire 0.17mm diam. approx. 34B&S 37SWG
C025	1m	0.70	Enamelled copper wire 1.25mm diam. approx. 16B&S 18SWG
C026	5	7.50	TIP31C transistor V_{CEO} = 100V (TIP31,31A,31B = 40,60,80V)
C031	1	Free N	Crystal (for experimenting) Large Y3 10X W type ex RAAF You nominate frequency 6561.111, 7810 or 8036.25kHz Postage and Packaging charge only.
C032	1	3.50 ND	NE602 double balanced mixer & HF oscillator for Sudden Rx
C033	2	3.60 N	Reed switches, miniature, as in Club Communicator QSK & C028
C034	2	3.00 ND	IRFD1ZØ FET (Replaces IRFD1Z3) For GEMAL transceiver.
C036	2	2.00 ND	BF981 Si N-channel dual gate MOSFET SOT103 case (Replaces 40673, MPF121 and MFE131, but case different).
C037	2	4.10 ND	LM386 audio power amplifier. N3 version 4-12V (Replaces N1).
C099	1	1.80 N	Past issue of *Lo-Key*. You nominate month/year or issue number.

You must take the responsibility for any results of using replacement transistors, diodes etc. suggested in the list.

DONATIONS - The bedstead formers donated by ***Malcolm VK5BA (8)*** have all gone to good homes (presumably with equally tiny bedrooms ?).

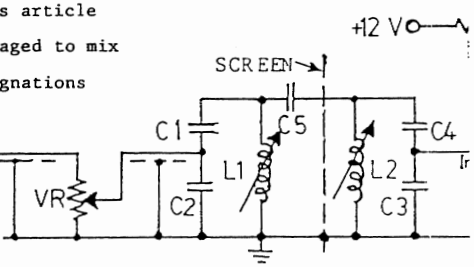
Rob Gurr VK5RG has donated a quantity of crystals for use by Members. See C031 and the U CAN HELP column.

Thanks to both of you !

The 15 dB Amplifier - a continuation !

By Ian Smith VK8CW (91) P.O. Box 4756 Darwin NT 0801

In view of enquiries from members I have decided to provide the values for the band-pass filters for the amp. Values for 3.5,7.0and 14MHz are directly from Drew's article other values have been extrapolated. (somehow I managed to mix up the labelling of the components - sori) The designations given here are for the article in "Lo-Key" # 23.



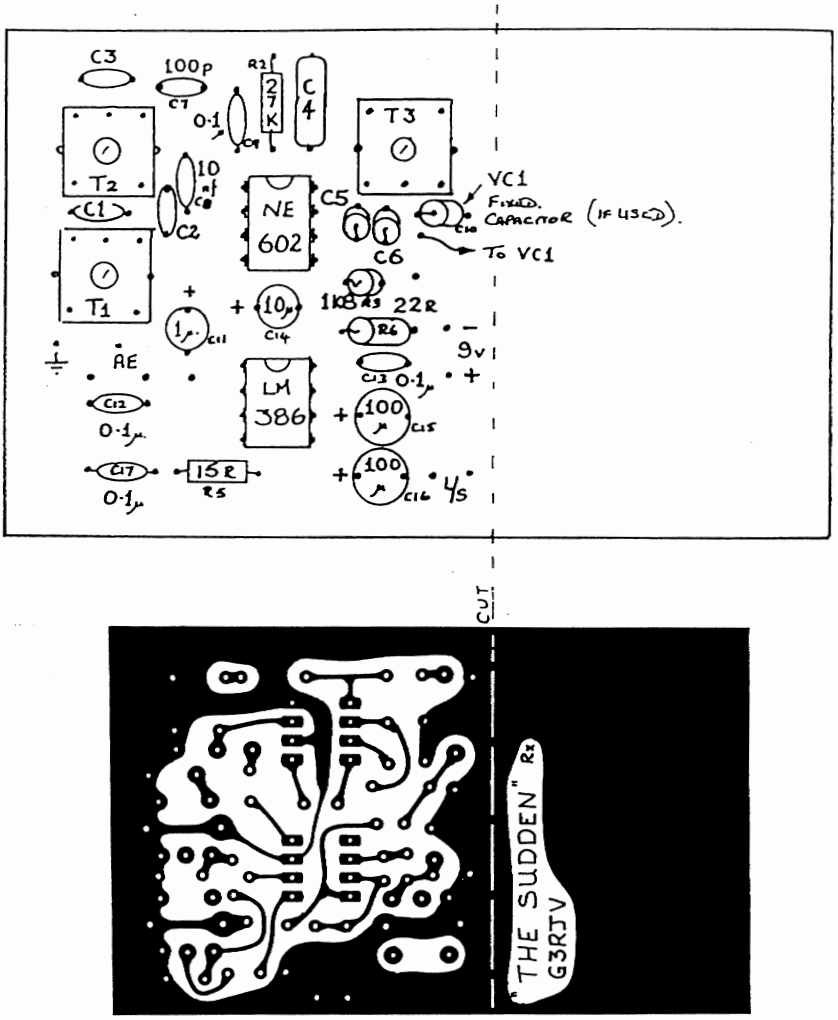
BAND	C1,C4	C2,C3	C5	L1,L2
3.5 MHz	470 pF	2200 pF	18 pF	4.2 uH
7.0	220	1000	10	2.1
10.0	150	720	6.8	1.4
14.0	120	470	5.6	1.0
18.0	100	470	4.7	0.9
21.0	68	330	3.3	0.7
28.0	56	220	2.7	0.5

A "SUDDEN" END

Here is the remainder of the article *The "Sudden" Receiver* (see page 18 of *Lo-Key* #23 September 1989. The article is from the G-Club journal *SPRAT*, reprinted with the permission of the author, the Reverend George Dobbs G3RJV (96).

The PCB etching pattern is actual size. The right hand end is available, if required, for mounting the air-dielectric variable capacitor.

If you know of a supplier in Australia of the Toko coils listed under T1, T2 and T3 in the table next to the circuit diagram on page 19 of *Lo-Key* #23, please let Don VK5AIL (75) know - address on page 2.



QRQ PCB By Merv VK3ADX (85) and Don VK5AIL (75)

Most home-brewers are familiar with the style of PCB construction in which simple rectangular outlines are used for the copper, most of which is left in place. You have the option of soldering the components onto the copper side without drilling the board. It is a good idea which works well, especially for simple circuits and for prototypes.

This style of construction is often used in projects in ARRL publications, generally using a large number of equal size pads. The gaps can be cut with a high speed cutter or a (low speed !) hacksaw. Many VK amateurs have been introduced to a similar technique by Drew VK3XU (49), who uses 'one-off' layouts in many of his projects, usually suggesting that the PCB be etched rather than cut mechanically.

One of the difficulties - particularly if you want a neat job and are not good at drafting - is the task of actually getting the layout onto the copper. The aim is to get the material which is to resist the etchant onto the copper in the precise shape the design requires.

We have a suggestion which could make the drawing of the pattern quicker and easier. It is even more useful where multiple copies of the same layout are to be produced, such as in kit-sets or for homebrewers using a layout with an article.

The idea is to print the pattern on adhesive-backed vinyl 'paper', which is impervious to etchant. You remove the backing, stick the paper onto the copper and strip the paper from the areas of copper which are to be removed. You can then either etch the copper or mechanically remove it using a high speed miniature grinder (e.g. Dremel or Arlec brand tools).

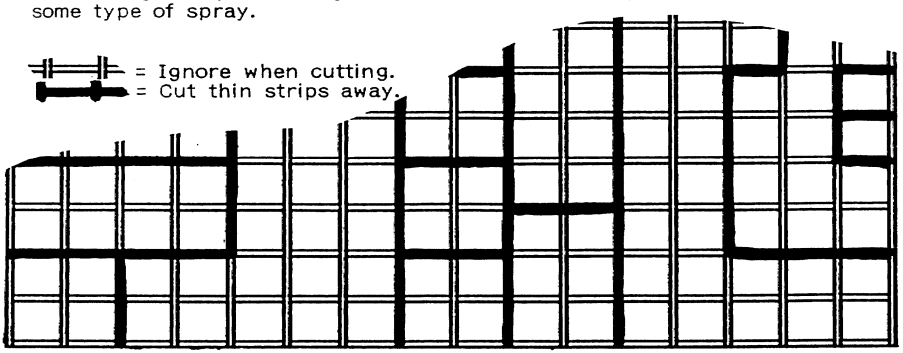
Part of a sample all-purpose layout is shown below (71% full size). You can use all the lines or you can pick which ones to etch. Of course layouts can be done for specific circuits. If a number of identical boards are to be done it is worthwhile using a computer to print the layout. But getting the layout right is very slow and is not worthwhile for a one-off job. Only the actual printing is easy !

For a one-off you may copy the layout onto grid-patterned material, if it is based on a grid. If not, trace it using non-patterned material with a light behind it.

There is an adhesive-backed material which can be put through a photocopier, but unfortunately the price of a sheet is very high, making the price of a box of 100 astronomical.

The suggested process for using a layout sheet, once it has the pattern on it, is:

* Handle it with GREAT CARE if the pattern is printed on a shiny material, such as Con-Tact brand Self Adhesive Vinyl or other similar brands, because a touch of the finger may be enough to wipe the pattern off, unless it is protected with some type of spray.



* Practice where you are going to put the material on the copper. When satisfactory, mark the size, then cut the material a little oversize.

* Carefully remove the adhesive backing and apply the material to the copper. Trim to final size.

* Using a SHARP blade and not too much pressure, cut along the lines where copper is to be removed. You may not need to use all the lines on the pattern. If this is the case, mark them with a colour so you know which is which, before cutting.

* Peel off the material where you want to remove copper (NOT from where you want to keep the copper !). If you need to protect the edge of the board, use ordinary masking tape.

* Of course you haven't forgotten to use the same material to mask the ground-plane side if the board is to be double-sided, *have you ?*

* Etch the board or, if you choose, carefully remove the unwanted copper mechanically.

If you have any ideas about this process or other suggestions, please let Merv VK3ADX or Don VK5AIL know. Or you may wish to suggest patterns to be produced by Don on the computer, in case there is a good demand for a particular layout.

Sheets of a simple grid pattern are available at stationery shops e.g. Magic Cover self-adhesive vinyl, used for covering school books, is available in 1m rolls with a 10mm square grid pattern. You can take photocopies for use when planning layouts.

U CAN HELP ! By Don VK5AIL (75) 5 Joyce St. Glengowrie SA 5044

Thanks to **Rob VK5RG, Peter VK6BWI (66)** now has a crystal for the QRP calling frequency on the 20m band. You may recall that Peter used this column to ask for crystals for 20m. Rob has gone further and donated a quantity of crystals for experimenters - See Kit-Set Activity Centre article.

Still on crystals and Peter's request, **Bob VK2DRL (124)** says "I have been obtaining mine from J&A Crystals; they charge $11.50 for xtals 5 to 17.999MHz and $12.50 for xtals 18.00 to 65MHz. From memory, their 80m crystals are similar in price. I usually send a SASE to them to obtain a quote before ordering a crystal.

The address is: J&A Crystals 20 Delville Ave. Mentone Vic 3194

Ted VK2CWH (89) knows of a NSW supplier for MRF237 transistors as used in the Heathkit HW-9 PA (two used) and another hard-to-get transistor - 2N3553. V.S.I. Electronics, 16 Dickson St., Artamon NSW 2064 (telephone 02 439 8622) will supply these. Minimum order $20.00, packaging and postage $6.50. MRF 237 is $6.32 and 2N3553 is $2.77 - add 20% sales tax to these prices.

Leo VK2QB (41) asked about combining the Club Communicator VFO and Westlakes 80m QRP Tx circuit. A couple of people suggested it would work but only if the VFO frequency of 7MHz was halved using another Club Communicator module, the BDT. Peter VK6BWI (66) says: "VK2QB may be better using the VFO and BDT board with the Westlakes Tx like I have done with the *Oner*. Note that a coupling capacitor is essential. TR1 could be converted to an amplifier and the crystal taken out. Should work, but experimentation is needed."

S/H Pot Bushes Several Members answered my call in September for s/h pots for use in kit-sets. Thanks to Jeff VK5BJF (57), Peter VK6BWI (66), Neil VK7FN (26) & Peter VK2EPD (144) we now have sufficient for at least another year. (But don't throw them away, will you !)

Tom VK2ATJ (152) has 'helped us', but not because of any request in this column ! Tom contributes articles on various subjects to a number of radio and electronics magazines. "Australian QRP Is Alive and Well", which Tom has been working on for quite a time, appeared in *Electronics Australia* in November. It's good publicity for QRP in general and for the CW Ops QRP Club. Definitely worth reading - *Well done, Tom !*

HERE ARE SOME MORE REQUESTS. Perhaps **U CAN HELP**, so if you have the answer contact the person direct or, where the answer may be of use to other Members, let the the Editor know and it may appear in *Lo-Key*. See the centre 'lift out' section for addresses.

John VK2VJD (140) and other Members building simple receivers are interested in circuits for audio filters. Gil VK3CQ (4) has also raised this subject in *Pounding Brass* in *AR*. So, can YOU recommend anything ?

Graham VK7ZO (69) asks "Is there anyone in the QRP Club who is QRP on VHF and/or works RS10/11 satellites ?"

Marcelo VK4DWA (120) formerly LU6DW (M. Franco 23 Kokoda Ave. Bli Bli Qld. 4560) asks for anyone interested in exchanging ideas about Coherent CW (CCW) to contact him.

Several Members, including **Ian VK8CW (91)**, are interested in obtaining NE602 ICs, as used in G3RJV's "Sudden" RX. So we have done 'the right thing' and you will see them on the Kit-Set Activity Centre list in this issue.

Richard WBØNQM (106) was on frequency for the sked mentioned on page 4 of *Lo-Key* #23, but no signals heard. Please let Richard or me know if you heard him. He is keen to try again. Any ideas on times and frequencies ?

Neil VK7FN (26) has mentioned a problem that a number of us will face soon. Neil has achieved fame/notoriety by building a *Sudden* Rx into (I quote): "a BOSTON CORNED BEEF WITH CEREAL net 340g tin. (Ed. Contents removed ?) Carefully unzipped, the lid becomes the front panel, just the width of the circuit board, which is mounted on it together with the controls. Sockets at the back. Looks fine and a nice shape but until it gets a coat of paint it may tend to make one a bit peckish."

Neil also writes "A little attenuator problem crops up where I wish to use it with Club/Com Tx and QSK - particularly when gain is fully advanced to copy QRP sigs. Hence the thought perhaps to drive an additional muting relay in the Rx from the QSK board. There is probably a more elegant solution."

Any ideas, anyone ?

Peter VK2EPD asks how the cheap solid dielectric variable capacitors (e.g. DSE R-2970 60/160pF) would perform in QRP equipment, compared with the rather expensive air dielectric types such as the ALPS sold by DSE (R-2980 50pF). If you have compared them, please let us have comments, as this could reduce the cost of setting up certain kits. Please contact Peter or Don VK5AIL (75) about this.

EQRPMENT BUY-AND-SELL

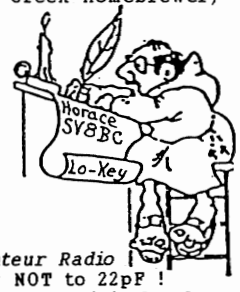
The two *Roadmaster* transceivers donated by **Jeff VK5BJF (57)** went to new shacks soon after the offer in the *Now Hear This .....* piece in September *Lo-Key*. The extra dollars in our bank account are appreciated. If we hear something about the end results of work on these rigs, then that will be a further bonus. p.s. I might even be inspired to try to restore mine !

FOR SALE - Icom R71A comms. Rx As new, bargain at $900. Kenwood TH-45A 70cm H/H. Brand new $495. Telephone 088-422085 or write to Jeff VK5BJF QTHR. (J. Wallace P.O. Box 344 Clare SA 5453)

TECHNITORIAL

By Don VK5AIL (75)

He has half the deed done who has made a beginning
Horace.
(Obviously an early Greek homebrewer)



An Electronic Morse Code Keyer (*Lo-Key #22* June 1989)

Ted VK2CWH (89) writes another chapter in the never-ending story, so over to you, Ted -

"I use this keyer and have done so with it as published and also with modifications. I don't know all the reasons for the mods, but here are the ones I know about !

Firstly, an error appeared in VK3CQ (9) Gil's information in *Amateur Radio* magazine. C2 should be changed from 47nF to 22nF - definitely NOT to 22pF ! The change of R4 from 270k to 150k increases the speed range. The original only covered from about 10 w.p.m. to 29 w.p.m. After the mods you can expect from about 8 w.p.m. to 50+ w.p.m. (Ed. - In the same QSO !?).

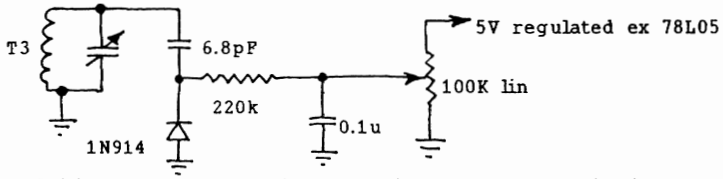
The original was designed to run on 9 - 12V. By changing R1,2 & 3 to the values given it operates on 5 - 6V, so if operation on higher voltage is required these changes need not be made. It still works with them, but uses heaps more current !"

Thanks, Ted - now we know how you adjust your CW speed to suit callers into our CW Net and we guess you are careful not to waste battery charge when running on solar power.

The "Sudden" Receiver (*Lo-Key #23* September 1989)

Ted VK2CWH (89) has built this and advises about his experiences -

"... considering its simplicity, it goes quite well. Even with a reduction drive I found it too coarse to resolve SSB easily, so I added a R.I.T. I removed the 100pF in parallel with the tuning gang and added 6.8pF in the R.I.T. section, using a 78L05 regulator (TO-92 case, 100mA) to provide the R.I.T. voltage. This allows easy fine tuning and, after realigning T3, covered from 3.5 to about 3.75MHz.



I used additional audio boost, incorporating an active audio filter, which also helped."

Mystery Gear on Cover of *Lo-Key* #23 Len VK5ZF (1) and Rex VK2YA (131)

know all about this rig. Len gave me a circuit diagram (now I remember where that photograph came from !) and Rex quoted valve types without hesitation.

It is a regenerative detector and one stage of audio - very popular in the early 1930's, according to Len. Your Editor wasn't here then, but would not disagree anyhow ! There are two valves (6D6 or type 58 pentode and type 76 or 56 triode) on the left side of the photo, with a plug-in coil.

I had a fb eyeball chat with Rex when he was in Adelaide for a week in November. It was very nice of Rex to contact several Club Members during his stay.

NEXT ISSUE - Well, it's the 25th issue of *Lo-Key*, which is quite a milestone. Your Editor and Len VK5ZF (1) will cook up something, for sure.

INTERESTED IN JOINING US ?

IF YOU ARE A NON-MEMBER, THEN THIS PAGE IS FOR YOU !

THIS COMPLIMENTARY COPY OF OUR CLUB JOURNAL has been sent to give you an appreciation of the scope of activities of the CW OPERATORS QRP CLUB.

In each issue of *Lo-Key* we include as many technical articles as possible on all types of QRP equipment and we encourage our members to make their own gear. Many articles are written with the inexperienced builder in mind - as are the instructions with the Club's kit-sets.

We promote the use of CW mode to show support for a skill that has been part of Amateur Radio since its inception - and we are proud of it.
Our Club is possibly the only Radio Club in Australia that actively supports CW exclusively.

Using low power and homebrewing our own equipment gives QRPers a great feeling of achievement and satisfaction. It certainly gives us a direction and purpose in holding an Amateur Licence and enjoying our hobby.

We are saying to Amateurs that you can enjoy your hobby just as much as at present - in fact more - without having to spend thousands of dollars.

*Would you like to join us in putting the **AMATEUR** back into Amateur Radio ?*
Would you like to use more of the Amateur skills you have acquired ?
Would you like to become enthusiastic about your hobby again ?

If so, fill in the application form (or a copy of it) and post it to our Treasurer at the address shown on the form.

Cut along this line

CW OPERATORS QRP CLUB

Promoting the Use of Low Power
CW Mode Communication
and Home-Brewing
in the Amateur Radio Service

Please post this application to:

Kevin Zietz VK5AKZ (43)
41 Tobruk Ave.
ST MARYS SA 5042
Australia

*I would like to apply for Membership of the **CW Operators QRP Club.***

With this application I enclose $A10 for VK Amateurs or $A12 for ZL Amateurs or $A14 for DX Amateurs, which is the annual membership fee.

(please print)
FIRST NAME & CALL SIGN ....

INITIALS & SURNAME ....

ADDRESS .....

....

....

I agree to the required details being held on the Club's data base.
I DO/DO NOT (strike out one) agree to publishing of my street name and number.

SIGNATURE . . . . . DECEMBER 1989 891203 OBC Z65A/C6
A receipt and your membership number will be sent with your next *Lo-Key*.