Editor:
Don Callow VK5AIL #75
5 Joyce St. Glengowrie
SA 5044 Australia

THE JOURNAL OF
THE CW OPERATORS QRP CLUB

September 1992
Issue No. 35

Promoting the Use of Low Power
CW Mode Communication
and Homebrewing
in the Amateur Radio Service

Lo-Key

CONTENTS

CW NET CONTROLLER
Ted Daniels VK2CWH/QRP #89
TUESDAY NIGHTS
From 0945 UTC at 3529kHz or lower if QRM.
Daylight Saving -
From 0845UTC at 3529kHz or lower.

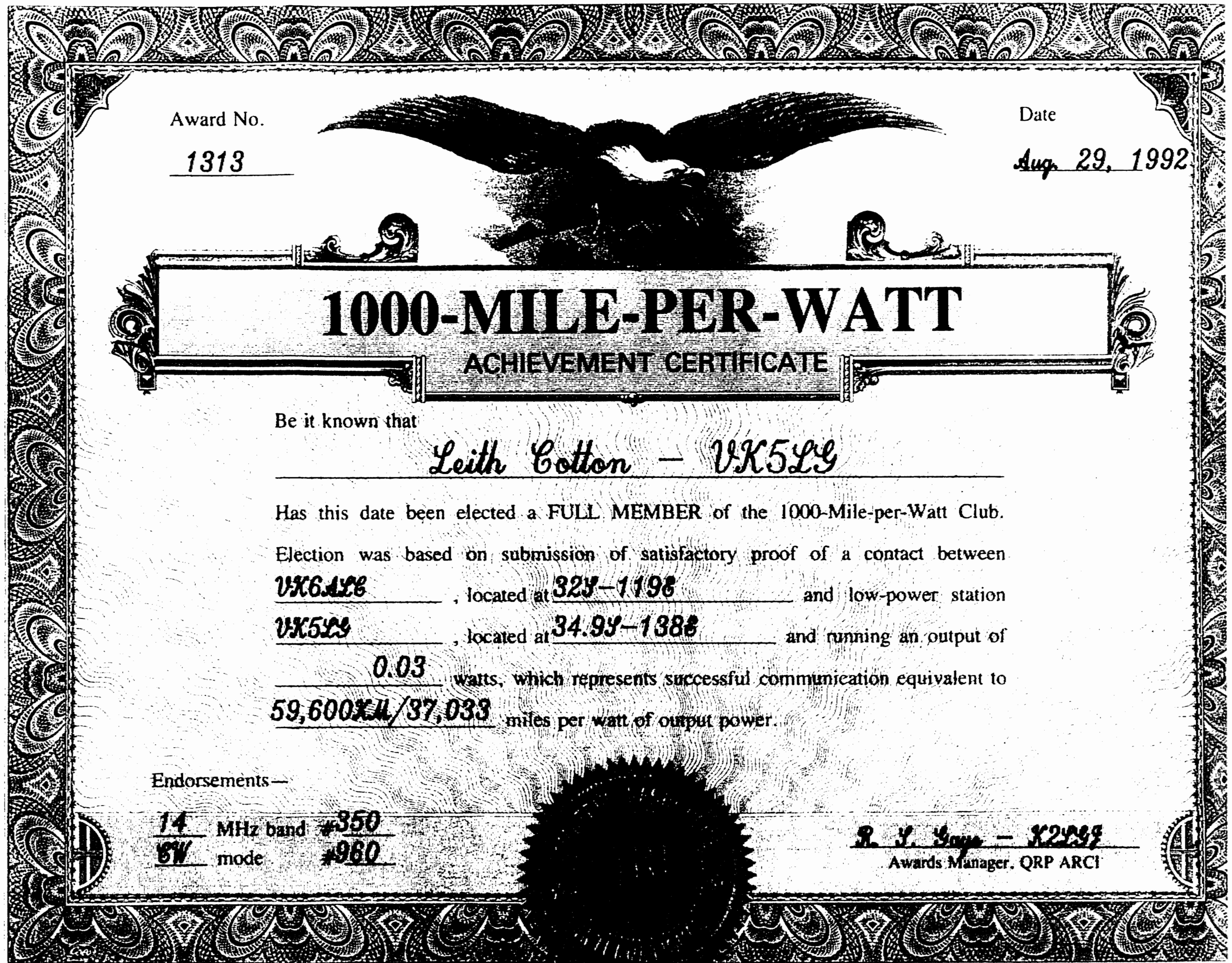
SSB NET - FRIDAY NIGHTS
From 1030 UTC near 3620kHz.
Daylight Saving / Summer Time -
From 0930 UTC near 3620kHz

Scramble #21 on 80m
Thursday 15 October

Scramble #22 on 40m
Thursday 19 November

VK5 Outing at North Adelaide
Sunday 25 October

920925 E:\PAGE\LK#35\LK#35


Award No. 1313

Date Aug. 29, 1992

1000-MILE-PER-WATT
ACHIEVEMENT CERTIFICATE

Be it known that Leith Cotton - VK5LG

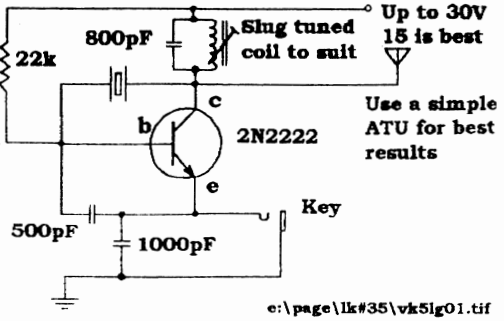
Has this date been elected a FULL MEMBER of the 1000-Mile-per-Watt Club.

Election was based on submission of satisfactory proof of a contact between VK6ALC, located at 32S-119E and low-power station VK5LG, located at 34.9S-138E and running an output of 0.03 watts, which represents successful communication equivalent to 59,600KM/37,033 miles per watt of output power.

Endorsements—
14 MHz band #350
CW mode #960

R. S. Gays - K2LGJ
Awards Manager, QRP ARCI

' The Monster ' - A 'Transistor 1' Tx



Leith Cotton VK5LG #164 has been honoured by **the QRP Amateur Radio Club, International** [QRP ARCI] through the issue of a **"1000-MILE-PER- WATT" Achievement Certificate** - Award #1313. The basis for this was a QSL in 1987 with **Jonathon Lockyer VK6ALC** whose QTH is at Goomalling, about 120km northeast of Perth, W.A.

Leith was operating CW on 14MHz using his 'Transistor 1' rig, described by him in Lo-Key Sep. 1989 p.9. Pwr output was 30mW, which gives communication equivalent to 37,033 miles per watt [59,600km], using the approved method of calculation. See SPRAT #57 page 8.

The photocopy of the award certificate on our Lo-Key cover does not do justice to the original, which is a beautiful piece of artwork.

Leith has provided some more notes on the rig:-

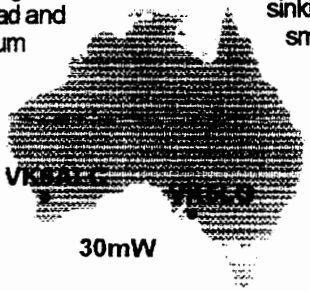
DESCRIPTION OF "THE MONSTER"

It is a one transistor crystal controlled oscillator designed for 1.8MHz but converted to work on the higher bands viz. 3.5 to 28MHz.

The cct was first described in the SPRAT circuit book by **G3YUQ Eric Elsley**. I saw the possibilities in this rig and with a few modifications I've used it ever since. The rig consists of 1 transistor, a 2N2222, 1 crystal, 1 coil slug tuned and 2 capacitors. Originally a BFY50 or 51 was specified, but as none were available the 2N2222 was used instead, with voltages from 30V DC to 1 volt ! No heatsink was required.

Testing consisted of connecting a 6 - 30 volt supply, morse key & dummy load and adjusting the coil slug for maximum output. If loaded too heavily the rig stops oscillating.

To change bands all I did was change the xtal and sometimes the coil ! The note was always clear and no chirps or clicks were noted. [VK6ALC in his letter said the tone sounded like a commercial rig.]



G3YUQ said that the rig would work with a 9 volt battery but I successfully used a rather flat type AA dry cell to work into VK6 and the same power to reach South Africa [although the ZS6 contact fizzled out - I wonder why - Hi !] Worked with various aerials but my favourite is the G5RV half scale one. Full credit to Eric for the circuit and to **Louis Varney G5RV** for his help in advising me how to get the best out of his famous antenna.

My Tx is built on unetched circuit board, but any resemblance to the original is purely accidental as I kept altering leads etc. to obtain better results. Housed in an aluminium box 5" x 2" x 3" [127x51x76mm], but my first - a prototype - was hung together on a breadboard.

When I made the DX QSO which led to the 1000-MILE-PER-WATT certificate the power was so low that I could not get any of the meters here to register, so I just monitored the note in my station receiver ! Later, the measurements were confirmed on a Hewlett Packard meter and an AVO as a back up - incidentally, borrowed from a reliable source [a friend].

The 2N2222 'monster' is fairly tough - I get results from 1 volt to 35 volts DC without heat sinking - although I do now use a small 'flag' on the transistor !

I have been experimenting for years on low power rigs, both valve and solid state, but I was rather surprised at the sensational results from this one !

ooqc

CLUBTIVITIES

Photo from *Amateur Radio* magazine

"HAVE NET, WILL TRAVEL"

Keith Williams VK6KC #25 and his XYL visited Adelaide for several weeks in July and Keith found his way to visit at least two members - **Malcolm Haskard VK5BA** and your Lo-Key editor - and contacted several others.

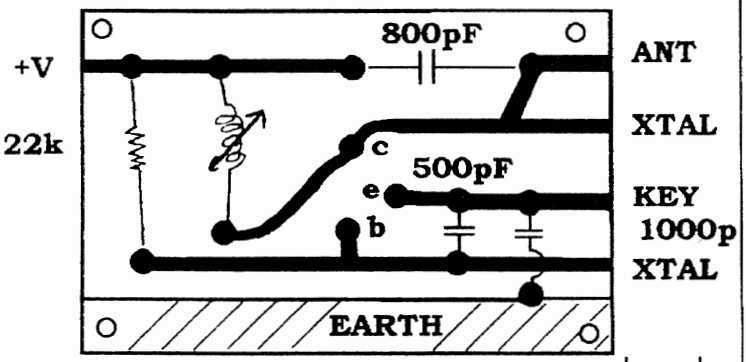
Those of you who have seen ***Amateur Radio*** magazine for July will have read that in 1969 Keith started an activity which subsequently became known as **The Australian Traveller's Net**. Later, Keith arranged for **Arthur Oliver VK6ART** to control the net, which at that time operated on 14.106MHz; now 14.116. The Traveller's Net has proven a life saver for some people over the 23 years it has operated and provides an important communication link for Amateurs travelling in outback Australia. ***Thanks from all of us, Keith.***

During his visit Keith came up on the Friday SSB Net one night to organise an on-air test of the 'Gemal' transceiver which he had borrowed from its designer/builder Malcolm VK5BA. The Gemal was featured in Lo-Key #21 and is only a little larger than the 9V battery which powers it ! Keith is a keen homebrewer and it seems he is deciding on his next project.

• • • • •

[Continued on page 24]

A PCB layout [copper side]



FULL SIZE CIRCUIT BOARD

e:\page\lk#35\vk5lg02.tif

Correction

'Reflex Receiver Terns Out OK' Lo-Key #34 p. 8

8" x 10" is a little larger than **20cm x 25cm**, not '20mm x 25mm' as the Editor managed to type into the article !

How many centipedes in a water meter ?

QQC

KEVIN'S KOMMENTS

By Kevin Zietz VK5AKZ #43 Treasurer and Membership Secretary
41 Tobruk Ave. St. Marys SA 5042 Australia

WELCOME TO NEW MEMBERS

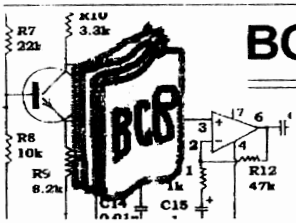
254	VK3SSB	Lex	HIBBURT	RED CLIFFS VIC	
255	VK3AWC	Bill	CURRIE	MORDIALLOC VIC	
256	VK2WQ	Keith	SHERLOCK	HAZELBROOK NSW	
257	VK5FE	Fred	WARD	ELIZABETH NORTH SA	
258	VK4FV	Peter	TAYLOR	RUNAWAY BAY QLD	
259	VK5ARG	Alan	RICHARDSON	WHYALLA SA	
260	VK3CDR	Ray	DEAN	MOOROOLBARK VIC	
261	VK3DWF	Bill	FANNING	MELTON VIC	
262	VK3ERS	Rob	SPALDING	COROROOKE VIC	
263	VK3NCM	Ray	TAYLOR	TANDARA VIC	
264	N8ET	Bill	KELSEY	FINDLAY OHIO	USA

We hope you enjoy your membership . . . .
. . . . and don't forget to spread the word about our club !

This time my report is more in numbers than text, well the important part that is.

I am upgrading the accounting system to keep better track of advance/outstanding payments, making more detailed individual reports possible. It is hoped that in the near future this data will be updated more automatically. Internal self checking has also been high on my agenda in an effort to get the computer to run better cross checks on yours truly. Alas, to err is human – I've often proved to myself that I am human! (with the computer's help).

Kevin cccc



BOOMERANG CIRCUIT BOOK

Dave VK3DVB #183 is first on the list for another circuit of Boomerang Circuit Book #3, which is now at the QTH of your Editor. So we will again take names for another circuit of #3. If you wish to see it please let me know and as soon as we get 5 or 6 names we will get it moving. You only have to pay postage [less than $3 at present] to the next person.

Articles are still being collected for BCB #4. ***Do you have any ideas, requests or input for the content of Boomerang Circuit Book #4 ?*** We can provide the usual mixture of subjects OR concentrate on only one or two aspects of Amateur Radio. **What do you think ?** cccc

TREASURER'S ANNUAL REPORT

STATEMENT OF RECEIPTS AND EXPENDITURE FOR YEAR ENDED 30 JUNE 1992

	RECEIPTS	EXPEND-ITURE)	BALANCE (1)	(1990-91)
VK5BCW	$****0.00	$***34.00	$-**34.00	$-**32.00
BANK CHARGES	$****0.00	$***20.44	$-**20.44	$-***4.86
ADMINISTRATION	$****0.00	$**242.06	$-*242.06	$-*682.72
POSTAGE GENERAL	$****5.00	$***57.76	$-**52.76	$-**47.24
LO-KEY	$**151.60	$*1388.84	$-1237.24	$-1548.64
LOGO STICKERS	$***10.00	$****0.00	$***10.00	
BANK INTEREST	$***84.08	$****0.00	$***84.08	$**181.51
SUBSCRIPTIONS	$*1886.66	$***10.00	$*1876.66(2)	$*1867.66
DONATIONS	$**142.50	$****0.00	$**142.50	$***10.00
KIT SETS	$*1452.72	$*1386.70	$***66.02	$-*721.60
SUNDRIES	$*1620.00	$1300.00	$**320.00	$-**65.88
SUB TOTALS	$*5352.56	$*4439.80	$**912.76	$-1043.77

CASH:

ORDINARY A/C	$**292.84
CHEQUE A/C	$*3500.17
SPECIAL PURP	$***54.49
IN HAND:	$**112.95 (at book close)

1991-92	$**912.76	CURRENT:	$*3960.45	
B/F BALANCE (6/91)	$*2182.76		$-*864.93	(o/s cheques)
SUB TOTAL	$*3095.52		$*3095.52	

1992-93 BUDGET:

BROUGHT FORWARD	$*3095.52	
EST LOKEY	$-1600.00	
EST STATIONERY +POST	$-*400.00	(includes some 1990-91 expense)
EST BANK+VK5BCW	$-**30.00	
BUDGET WORKING BALANCE 92-93	$*1065.52	

NOTES:

(1) These accounts are on a cash flow basis and therefore do not account for stock or liabilities; significant items are addressed in the notes. There are some expenses not claimed by 30/06/92. Allowance for these stationery/administration expenses have been made in the budget for the 1992-93 year.

(2) $89 included in the subscription accounts paid during 91-92 is in respect to advance subscriptions for 1993 and beyond.

(3) The Kit Set activity has stock of approx. $671 at sale price to cover the balance shown above.

(4) The membership stats for period ending 30/06/92 - 14 members left the club and 25 joined the club - with a financial membership of 192. Thank you to ALL those responsible for joining up new members.

(5) We have shown a cash flow profit for the 1991-92 year. This is partly because of carried forward stock, stock being purchased but not consumed during the previous accounting year, and some expenses not being claimed as at books close. Your committee has been keeping a close eye on budget matters during the year and whilst we have shown a "profit" the net position over the last two accounting periods still calculates to a net loss of approx. $130 plus the unclaimed expenses mentioned earlier. THANK YOU FOR YOUR SUPPORT.

(6) A total advance of $500 towards new kit batches and Lo-Key production has been made to the kitset manager / Lo-Key editor.

(7) A BIG THANK YOU for DONATIONS of both TIME and FINANCE.

K. R. Zietz
TREASURER 1991-92

By 'Doc' Wescombe-Down
VK5HP/VK4CMY #221

TILTOVER TOWER

My project is a tiltover tower which:

* costs less than $50.00 to build
* suits CLUB or INDIVIDUAL use
* is transportable (dismantled) and suits fixed or field day application
* is suitable for HF, VHF or UHF beams, quads etc.
* may be guyed OR unguyed
* assembles/disassembles in less than 30 minutes
* can be built completely in one day by one person
* can be handled and erected by one person
* suits 'temporary' residents including those in caravan parks
* is friendly to harp seals, dolphins etc. !!

The project starts with a 70cm diameter x 12 mm thick steel baseplate to which 2 x 30 cm long x 50 mm steel tubes are mounted. These will sleeve into the two 6 metre heavy-wall cradle section steel pipes and locate them in place.

A recycled 200 litre (44 gallon) drum has the top removed and 2 x 50 mm holes drilled in the base (along with other water drain holes around the drum base rim) so that it slides over, then sits on, the steel base plate with its 30 cm pipe locators.

Once the drum is in place, the 6 metre cradle section is lowered into the drum and located on the two 30 cm pipe locators. Large pieces of local rubble, buckets of gravel etc. may then be used to fill the drum - this provides the base mass for stability whilst the base plate adds both mass and surface area to the base.

After ensuring the cradle section is vertical, the hinge is assembled and the 6 metre lattice section bolted in place, tilted over to the ground. A stepladder is needed for this assembly.

The lattice mast section has a 90 cm concrete counter weight poured 'in situ' using 3 - ply or heavy cardboard taped to the mast for formwork. The formwork may be removed the following day and the concrete counterweight kept damp for a week or so.

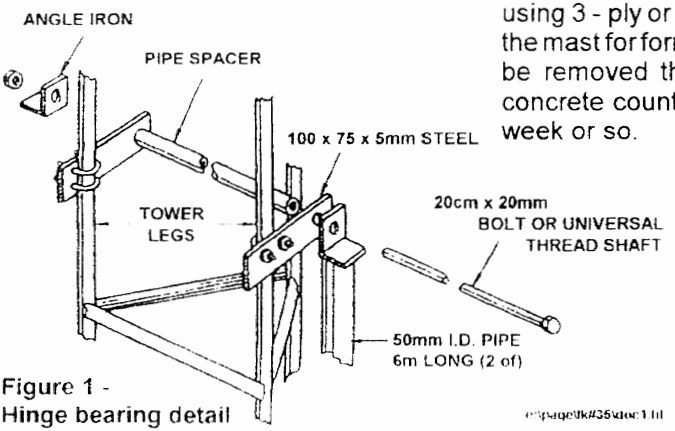


Figure 1 -
Hinge bearing detail

This counter weight offsets the weight of a large HF array and may be correspondingly smaller if VHF or UHF arrays are to be used.

The lattice mast, together with rotator and mast pipe if used, is then pulled horizontal and rested on a stepladder while the antenna is installed. The whole hinged section is then pulled vertical by a single hand rope and the locking bolt installed. More sophistication may be obtained by using a gin pole with boat winch, but it's not essential. Overall height is 10 metres (without masthead pipe) and I have used a 4 element 15 metre/6 element 10 metre quad on a 9 metre boom atop this unit quite successfully. Currently it supports (unguyed) a 2 element 20 metre spider quad.

Being 'in between' permanent residences prompted me to put one of these together. I hope you like the project.

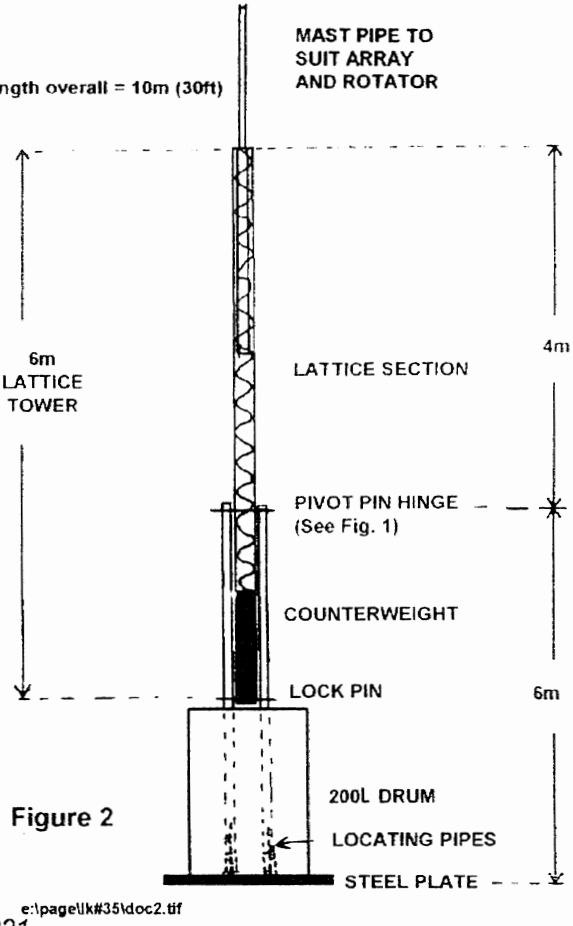


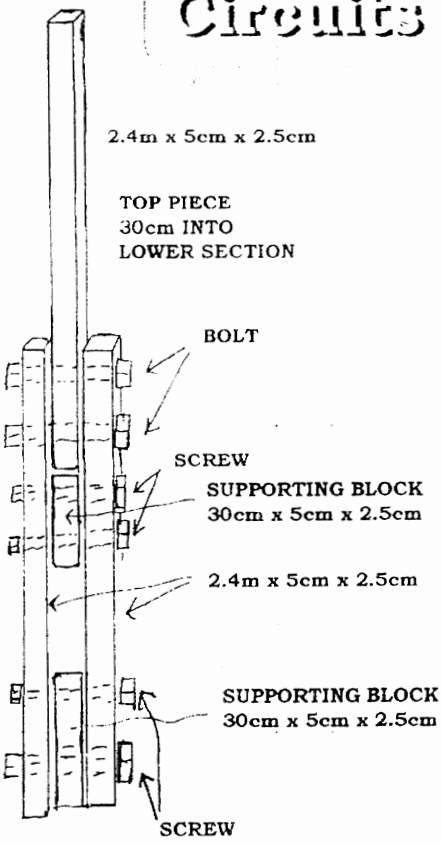
Figure 2

Cheers for now,
de 'Doc' VK5HP/VK4CMY No.221

PARTS LIST

1 x 200 litre (44 gallon) drum
1 x bag of concrete mix
1 x 70cm diameter x 12mm thick steel plate
2 x 30cm x 50mm O.D. heavy steel pipes
2 x 6m x 50mm I.D. steel pipes (2.5mm wall)
1 x 6m x 15cm triangular mast section
(OR single pipe mast as an alternative)
Assorted pieces of strap iron etc. for cradle section crossbracing (within 200 litre drum)
Hinge hardware (see Fig. 1), paint to suit, welding rods, packing tape to hold formwork.

Editor's Note on SAFETY:
In common with all such structural projects, this project may require an approach to the local council and certainly requires suitable assistance from experienced personnel in its design - construction - erection, as appropriate, to an extent depending on your own skills.
When in doubt, seek help.



e:\page\lk#35\vk3dxh01.pcx

Portable Antenna Mast

By Lindsay LaPouple VK3DXH #47

Here are the details of a portable mast I designed and made for the John Moyle Field Day Contest.

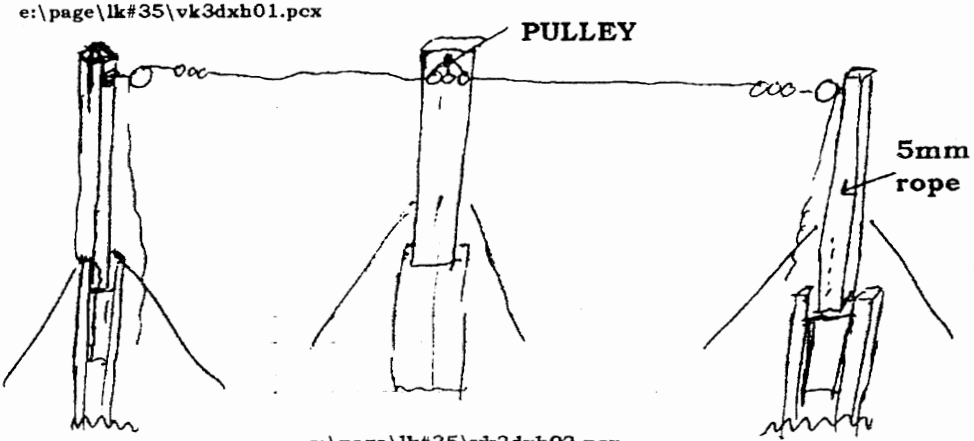
The masts [actually 3] were made out of pine for lightness and had to be not too long to fit on the roof rack of my small car.

Each mast had a small pulley tied to the top to assist in hauling up the antenna after masts were erected.

The antenna used was a dipole consisting of two legs each 40 feet [12.2m] long.

Three masts were used so that the centre of the antenna did not sag and some of the strain was taken from the end masts.

Masts and antenna were erected thus: Three guys per mast. 5mm rope over pulley 30 feet [9m] long to allow for lowering the antenna.



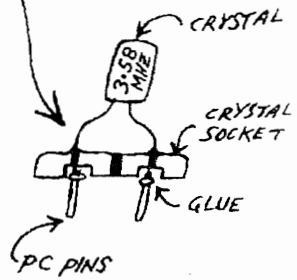
e:\page\lk#35\vk3dxh02.pcx

Circuits and Shortcuits

CRYSTALK

By Peter Parker VK6BWI #66

Most crystals QRPers seem to use are the large HC6/U type with 1/2" (12.5mm) pin spacing. Although these crystals usually give good VXO swing, there is sometimes the need to use the smaller type with about 1/4" (5mm) pin spacing. To allow these crystals to be plugged into the larger sockets an adaptor needs to be made. My adaptor is permanently soldered to a 3.58MHz crystal, but you may wish to add a crystal socket to make the adaptor more versatile.



You need:-

1 HC6 crystal socket
2 circuit board pins
1 tube super glue

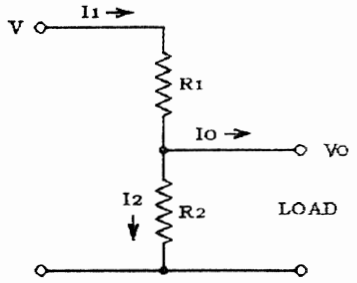
Firstly, remove both contacts from the HC6 type crystal socket. Thread one of the crystal's wires through one of the holes formerly occupied by the contacts and solder to the short end of a circuit board pin. Repeat for the other crystal lead.

Now glue the pins, making sure you have enough length protruding to make good contact with the crystal socket in the transmitter. Depending on the thickness of the circuit board pins, you may need to tin the pins to ensure positive contact.

Voltage Divider Formula

By Don Callow VK5AIL #75

If you need to build a voltage divider like that in the diagram below, it is often useful to know how much output current can be drawn without causing the output voltage to drop too far.



In the formula given, Io[max.] is the maximum output current that can be drawn without dropping the output voltage more than p% from its 'no load' or open circuit value. Units are amps, volts and ohms; and p is the percentage figure.

$$IO[max.] = \frac{P}{100} \times \frac{V}{R1}$$

For example, suppose your supply voltage for an amplifier is V = 13.8V and you want a bias voltage of 5V [and no less than 4.8V, so p is 4%] with a current of 12uA. Try R1 = 39k and R2 = 22k, which gives 5.0V bias.
IO[max] = 4/100 x 13.8/39k = 14.2uA, so the bias voltage will stay within limits when IO = 12uA.

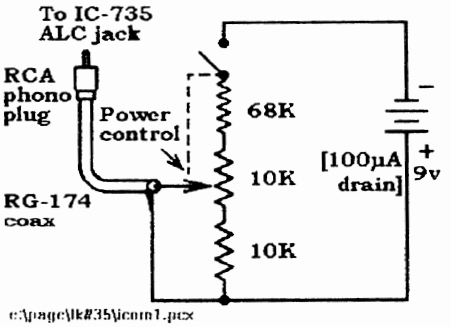
GREY BOX + POT = QRP

The following tips appeared in the June 1992 issue of *The Five-Watter* - Many thanks to the **Michigan QRP Club** ....

QRP controller for Icom rigs

This item was sent in by L.T. "Buck" Switzer, N8CQA, and he got it from the Idea Exchange by Mike Michaels, W3TS, in the April 1986 QRP Quarterly.

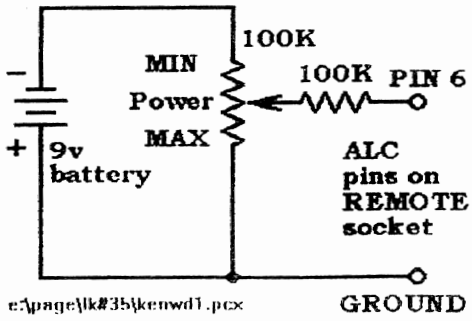
"As it came from the factory, my IC-735 could be throttled back to only six watts output. It's a great rig, but a QRPer wants more control over power output, so I made a simple outboard QRP controller, which requires no modification to the rig. It feeds a small controlled negative voltage [from 0 to 4 volts] into the rig's ALC jack, overriding the IC-735's internal power control. By means of the 10K pot in my QRP Controller, I can vary output at will from zero to 5 watts, independent of the rig's front panel power setting. It fits easily into a small box from Radio Shack."



Buck adds that this mod allows QRP operation on both CW and SSB. He says the mod "works with all Icoms, TS-830, T-4XC that I've tried, probably others with easy access to ALC line."

QRP controller for Kenwood rigs

This is by Andy Stafford, G4VPM [based on information from Lowe Electronics] and was "stolen" from The St. Louis QRP Society's "The Peanut Whistle", January 1992.



"I use the circuit with my TS-440S and find it excellent. It enables accurate and stable adjustment from zero to full power. I have found turning down the drive control inaccurate with a tendency to creep up. It is a simple job to include a toggle switch in the supply line to enable instant switching from QRO to QRP. The circuit is useful for reducing power for transverter driving [with a changeover circuit if required] and works on SSB too."

ooo

QRP CALLING AND LISTENING FREQUENCIES

This information is derived from a very useful table which appeared in the June 1992 issue of *The Five-Watter*, published by the Michigan QRP Club, and exchanged between editors under an ongoing arrangement we have. The Michigan Club referred to its sources as the G-QRP Club [based in UK], QRP ARCI [USA]and the CW Ops QRP Club.

BAND	MODE	USA	UK	VK
160m	CW	1825	1843	1815
	SSB	1825	N/A	N/A
80m	CW	3560*1	3560	3530
	SSB	3985	3690	N/A*2
	Novice....	3710	N/A	N/A
[*1 Michigan QRP Club Net frequency 3535]				
[*2 CW Ops QRP Club CW Net frequency 3529 & SSB Net frequency 3620]				
40m	CW	7040	7030	7030
	SSB	7285	7090	N/A
	Novice....	7110	N/A	N/A
30m	CW	10106	10106	10106
20m	CW	14060	14060	14060
	SSB	14285	14285	N/A
17m	CW	18080	N/A	N/A
	SSB	18130	N/A	N/A
15m	CW	21060	21060	21060
	SSB	21385	N/A	N/A
	Novice....	21110	N/A	N/A
12m	CW	24910	N/A	N/A
	SSB	24950	N/A	N/A
10m	CW	28060	28060	28060
	SSB	28385	28360	N/A
	Novice....	28110	N/A	N/A

Frequencies are in kHz and N/A = Not Available.

There appears to be room here for some rationalisation of frequencies, subject to the statutory requirements in each of the countries listed and to existing practices. Our club doesn't yet have frequencies listed for all bands.

If you have ideas or suggestions on this subject please let us have them so that we can tidy this up. And we'll also be monitoring developments in the other QRP clubs.

When you are working DX (or locally, for that matter) *mention you're in a QRP club and you may well meet members of other QRP clubs or groups with similar interests.*

Of course there are now other QRP clubs besides those listed - new clubs have and are being formed following the political changes in eastern Europe.

"LUNCHBOX" 80m CW QRP TRANSCEIVER

By Peter Parker VK6BWI #66
14 Marquis St., Bentley W.A. 6102

Here is a compact transceiver which is both simple and easy to build.

Only six active devices are used in this transceiver. All components can be bought new - a deep junkbox is not necessary to build this rig. Power consumption on transmit is 200mA for 1.5 watts output. While both the transmitter and receiver are crystal controlled, an 800Hz frequency offset on receive is provided by switching in VC1. A small plastic lunchbox houses the transceiver.

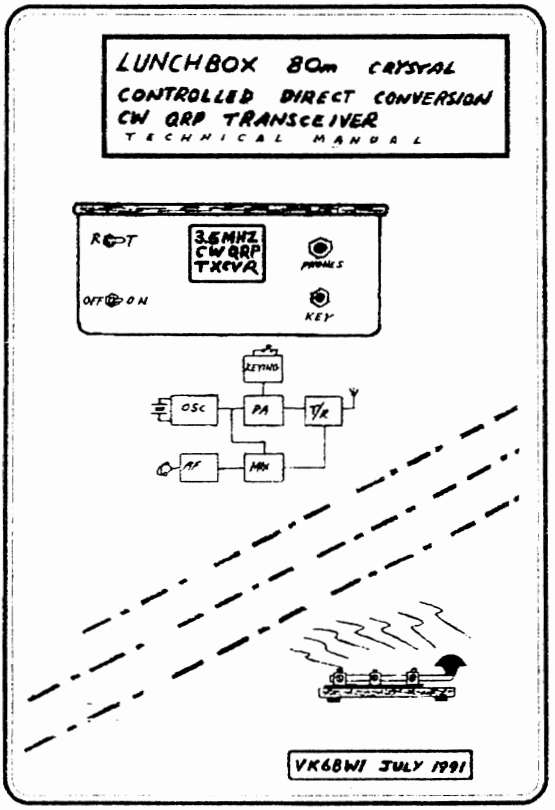
TRANSMITTER

The transmitter is a simple 2 stage crystal controlled design with a V-Mos PA keyed by Tr3. The oscillator runs continuously. The circuit is almost identical to the **GM3OXX** circuit [Ref. 2] with the exception of R2 which was reduced from 3.3k to 560Ω to give adequate power output. If this value was reduced further power output would increase, but at the risk of destroying Tr2 if impedance mismatch is present.

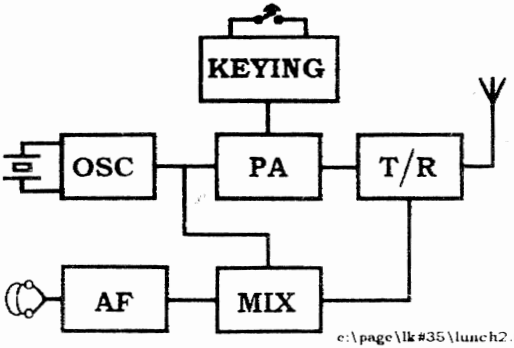
A PN4250 keys the VN10KM, but if you cannot obtain this transistor a BC640 worked equally well in a similar transceiver for 40m. Although untried, a 2N2222 should be a good substitute for Tr1.

On receive the trimmer VC1 is switched in to raise the crystal's frequency by 800Hz for the Rx offset. One improvement could be to use a front panel mounted 60/160pF variable capacitor to tune in stations who don't net properly. This mod. is almost mandatory if an outboard audio filter is to be used. Harmonic suppression is done in the ATU or with an external low pass filter.

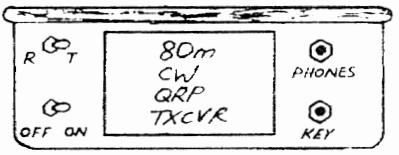
POWER OUTPUT:-	1.5W
FREQ. OFFSET:-	800Hz
	Tx Low (adjustable)
POWER CONSUMPTION:-	
Tx	200mA
Rx	25mA
OPERATING VOLTAGE:-	12V



E:\PAGE\LK#35\LUNCH1.TIF



c:\page\lk#35\lunch2.tif



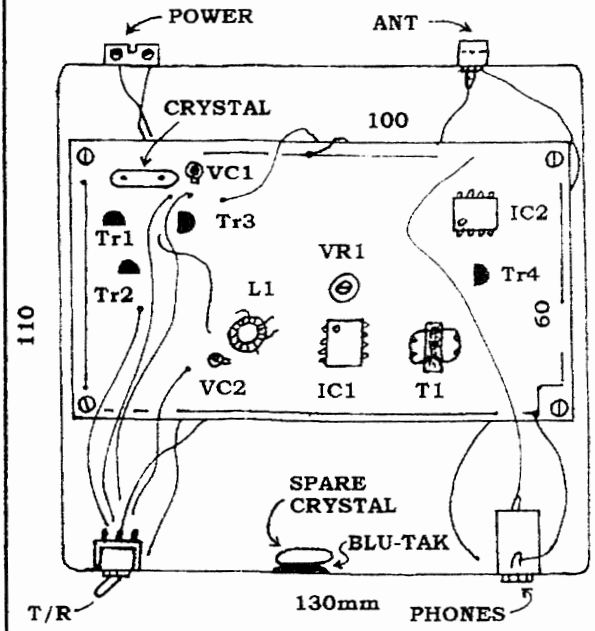
FRONT VIEW

RECEIVER

The receiver is a simple direct conversion type. Good immunity to broadcast station interference is provided by IC1, but audio selectivity is poor. This can readily be improved by adding an outboard audio filter. VR1 acts as an RF gain control, but can be set so that the voltage on pin 7 is 10 - 11V. VC2 is adjusted for maximum received signal. The circuit used came from Reference 3 and performed much better than a MOSFET mixer, which received the local AM station 800m away.

The audio amplifier [Reference 1] consists of a BC548 and LM741 and provides 70 - 80dB of gain. Headphones of any impedance can be used. Should the amplifier oscillate, try increasing the value of R9. For increased gain, R11 can be reduced in value.

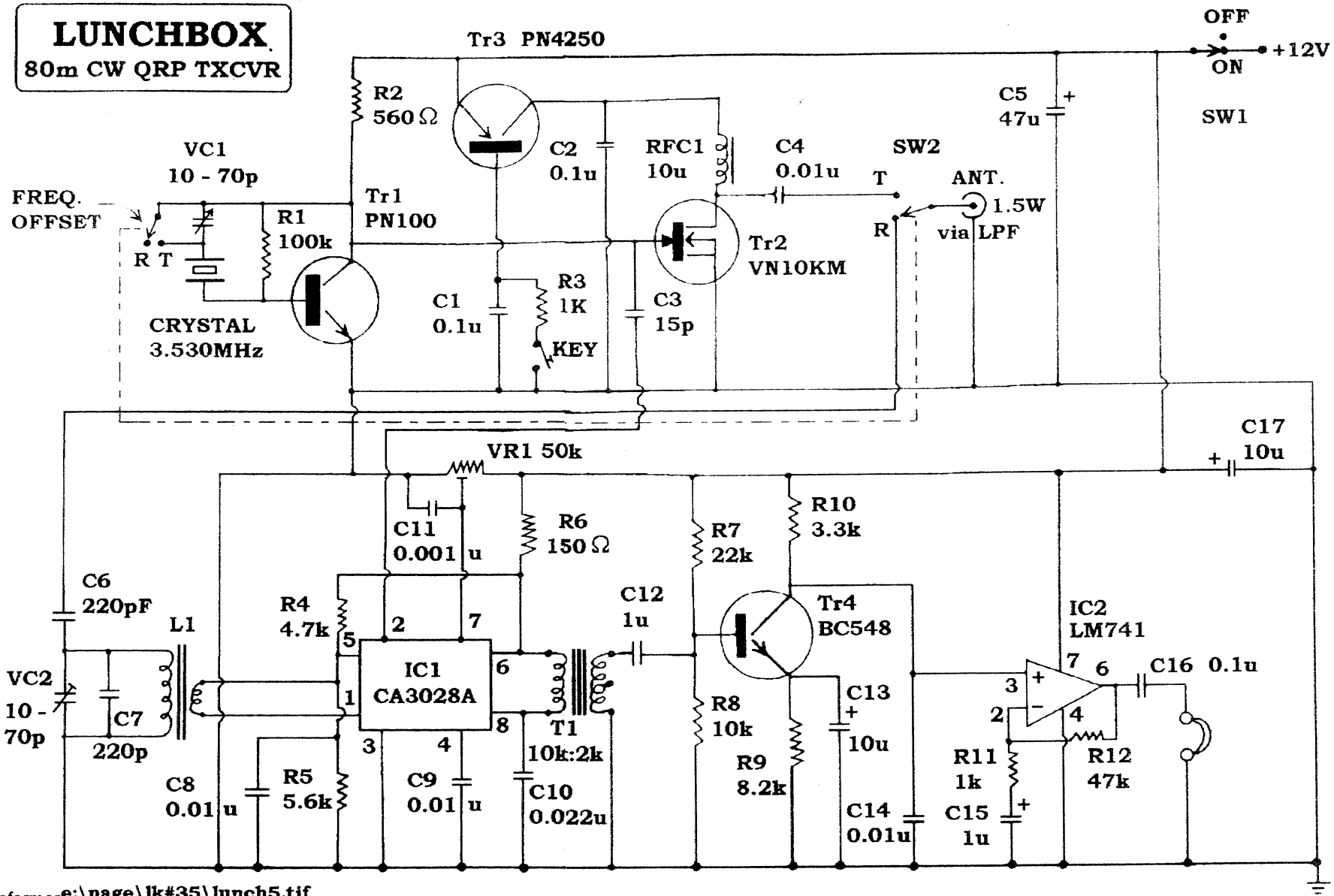
A volume control was found unnecessary in the prototype, but can be added between C16 and the headphones.



TOP VIEW - MAJOR COMPONENTS ONLY

c:\page\lk#35\lunch3.tif

LUNCHBOX
80m CW QRP TXCVR



e:\page\lk#35\lunch5.tif

PARTS LIST

R1	100k
R2	560Ω
R3	1k
R4	4.7k
R5	5.6k
R6	150Ω
R7	22k
R8	10k
R9	8.2k
R10	3.3k
R11	1k
R12	47k
VR1	50k Trimpot

C1	0.1uF
C2	0.1uF
C3	15pF
C4	0.01uF
C5	47uF
C6	220pF
C7	220pF
C8	0.01uF
C9	0.01uF
C10	0.022uF
C11	0.001uF
C12	1uF
C13	10uF
C14	0.01uF
C15	1uF
C16	0.1uF
C17	10uF
VC1/2	10 - 70pF

Tr1	PN100
Tr2	VN10KM FET
Tr3	PN4250
Tr4	BC548
IC1	CA3028A
IC2	LM741

RFC1	10uH RF Choke
T1	10k:2k Audio transformer
L1	9mm Toroid (Philips 4C6 available through CW Ops Club C013)
SW1	SPST Switch
SW2	DPDT Switch
	Plugs, Sockets, Circuit Boards etc.

age\lk#35\lunch6.tif

COMPONENT CONNECTIONS

Tr1	Tr2	Tr3	Tr4	T1	IC1,2	IC1
E B C	S G D	E B C	C B E	10k 2k	CA3028A	CA3028A
PN100	VN10KM	PN250	BC548		LM741	

CONSTRUCTION

Most components are mounted on a 7x10cm piece of blank matrix board.

The crystal oscillator should be constructed first. It is suggested that you initially use 2.2k or more for R2 and reduce its value later if required. If an RF probe shows output from Tr1, monitor the signal with a receiver to verify the operation of the T/R offset; when the rig is switched to Rx, any adjustment of VC1 should cause the frequency to change.

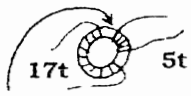
Now build the keying circuit. After checking that the collector of Tr3 is at 12V if and only if the key is depressed, assemble the PA. Connect a 6.3V light bulb to the antenna socket and key the transmitter. If all is well, the bulb should light.

Now substitute a 50Ω dummy load for the bulb and check for signal quality, using a nearby receiver with its RF attenuator switched in.

Construction of the receiver can now commence. Start with the audio amplifier. It is suggested that a socket be used for IC2. Apply power, plug in your headphones and touch the unconnected end of C12. A hum or other noise should be audible.

Wind L1 and build the remainder of the receiver. Connect the antenna and peak VC2 for maximum noise. With a weak signal, optimise the setting of VR1 and again peak VC2.

e:\page\lk#35\lunch4.tif



9mm toroid (C013)

0.4mm enamelled copper wire

L1 DETAILS

OPERATION

The main limitation of this rig is its lack of frequency agility. Nevertheless, many successful contacts can be had, particularly if skeds are kept so you know there is someone listening for you.

One other area where crystal control is not a major disadvantage is during the smaller contests where QRM is usually minimal and the pace of operating leisurely. This transceiver provided 10 contacts during the 1991 WA 80m CW contest.

GETTING THE PARTS

The CA3028 came from Rod Irving Electronics. The toroid for L1 came from the Club (C013). T1 (10k:2k) was bought from Altronics. The VN10KM was obtained from Worldwide Electronics in Perth (Ed. - Also available from DSE Cat. Z-1820).

If you wish to use a frequency other than 3.580MHz, crystals can be supplied by J & A Crystals (20 Delville Ave., Mentone Vic. 3194) for $15.

These are not the only sources of the components used in this transceiver. It is suggested you obtain as many catalogues as possible because prices and availability vary widely between outlets.

73 de

SOURCES:-

1. DeMaw and Hayward, Solid State Design, p.77, ARRL 1977
2. Burt, *Oner* Tx, Lo-Key #15, p.22
3. Batie, QST April 1975, p.28, ARRL

Amateur Radio PR - You Can Take Part

Tony Morris VK3CTM #199 shows us how to work QRP/PR !

Regarding QRP operation, I quite often operate from a well-elevated public park in Mitcham, about 20km east of Melbourne, using 5 watt S.S.B from a commercial rig, an HTX 100 and energising a half-wave dipole. I do this in part as a 'Public Relations' exercise for 'non-hams'. When people hear me in a QSO with, say, some UA0 on Sakhalin or one of those places where they 'know' there just **couldn't** be any other ham radio operators, I get some very strange looks ! I have had some people express absolute amazement and utter disbelief that my little "C.B." is so powerful. (I do not point out to them that it isn't one and that while it has only a very small 'bark', it does have very sharp ears.)

The onlooker usually only believes that I have been talking over a vast distance when one of the local hams comes on frequency or when I team up with a QRO station to assist me with the DX. I always take my 'DX atlas' and VK callbook with me as 'non-hams' often find these interesting. I don't usually work CW on these outings, but I do take my Bencher paddle and 8044 chip-based keyer along. I want to be able to answer any queries from onlookers and that is not easy if engaged in a CW QSO.

Actually, **a CW contest is a good time to demonstrate CW to a non-ham as it is very easy to explain almost the whole of the very short QSO** to him or her and then to whip in and hand out a few numbers. I did this last Sunday afternoon during the 10 MX competition.

I always stress to any person who expresses interest in amateur radio, that it is a hobby that can be carried on even from a villa unit and that the antenna can be very small and unobtrusive. The onlookers often spend a good deal of time looking up at the ridiculously small half-wave dipole hanging from my 8 metre tall bolt-together wooden mast.

I believe that amateur radio's ranks, and particularly those of the QRP Club would be expanded if non-hams realised how little gear is needed to get on air and how cheap that gear can be. The problem is, I believe, that the average person who is perhaps thinking of taking up amateur radio has seen a TH6DXX looming up on a 15 metre tower in the back yard of some house in the neighbourhood and knows that he has no hope at all of getting such a 'monstrosity' past either his wife or the local council. Perhaps he has also seen on T.V. the shack of some ham who has picked up a distress call from a yacht in trouble and that ham has a bewildering array of gear which tends to scare him off. He doesn't need to see price tags on it to know that it cost a small fortune !

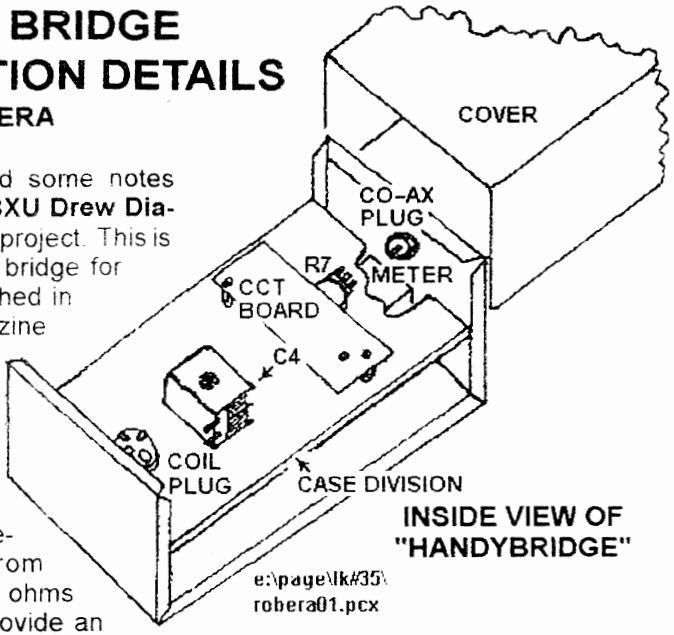
I will tune down the low end of the band and explain to those who are interested that there are a lot of morse signals on the bands - and why that mode is used. I often take along one of my QRP CW rigs and take off the covers to show just how little there is inside the small metal box.

One final point, and it's not about QRP operation. Most non-hams, when told there is such a thing as an 11 year solar cycle and that it has been plotted & analyzed for the last couple of centuries or so, simply will not believe that yarn until I show them the graph in my copy of the "USER TRAINING MANUAL" published by IPS Radio and Space Services.

73, Tony, VK3CTM
16 Dec. 1991

IMPEDANCE BRIDGE CONSTRUCTION DETAILS

From Rob Abel VK2ERA

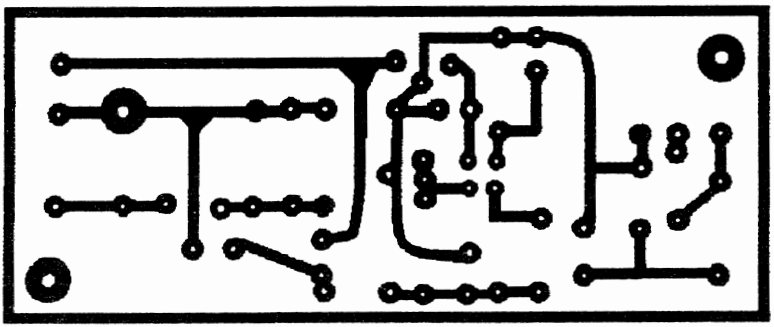


INSIDE VIEW OF "HANDYBRIDGE"

e:\page\lk#35\robera01.pcx

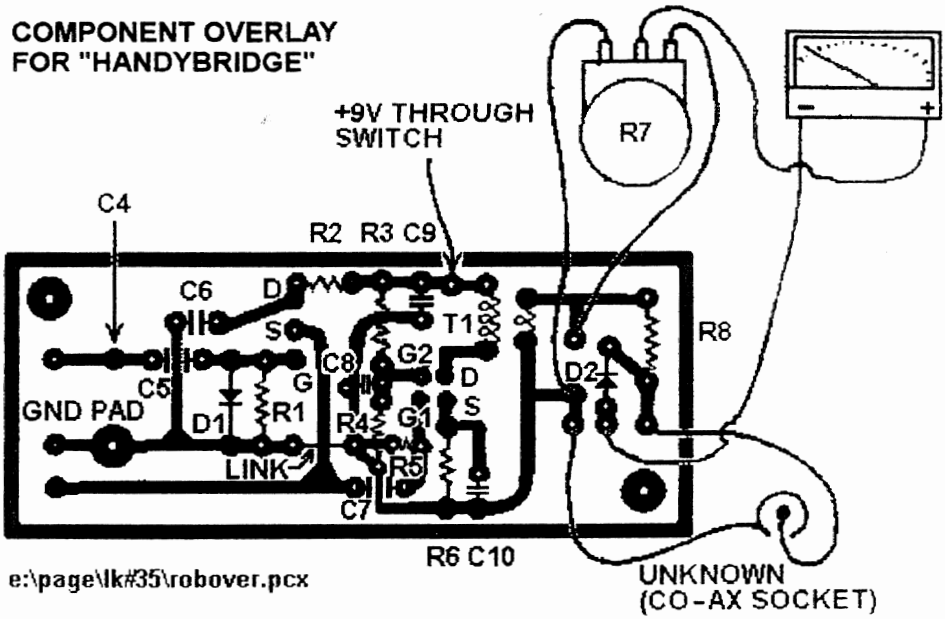
Rob has provided some notes about his work on **VK3XU Drew Diamond's** 'Handybridge" project. This is a portable impedance bridge for H.F., which was published in *Amateur Radio* magazine August 1991 page 7 - a most useful piece of test equipment indeed. Quoting from *AR* : "This bridge has at least three functions; it can measure resistive impedance from about 10 ohms to 600 ohms over 1.8 to 30MHz, provide an HF oscillator signal source, and can be used to find the value of small coils and capacitors." Rob chose to develop a printed circuit board for his bridge, although the original article specifies a tag strip to assist those constructors who decide not to attempt a PCB. The notes should be read in conjunction with the *Amateur Radio* article, of course.

"This is the copper side artwork for the Drew Diamond Impedance Bridge. I have built the bridge using this board and it works very well. The component overlay, sketches and notes may also be of help to constructors.



e:\page\lk#35\royspcb1.pcx

10mm



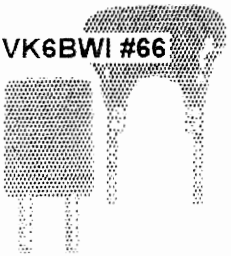
1. The case folded from scrap aluminium obtained at scrap metal dealers ---- cheap !!! My metal folder is one of those small folders Jaycar used to sell. I strengthened the clamp bar on it and deepened the cross grooves to allow for edge flanges.
2. Division "pop" riveted in after all case holes and cutouts are done.
3. C4 dual gang BC capacitor adjusted to correct values by removal of gang plates one at a time. [I have an L-C-R meter, but various other options are available for measurement of capacitance.]
4. R7 [the linear pot] was fitted first, then the circuit board fitted on stand-offs, partly covering back of R7.
5. Note that in this instance the cover is fitted from the back of the case.
6. To cover edges of the large hole at the front of the box where coils are inserted I carefully split a piece of insulation from some earth wire and fitted it around the circumference of the hole. Looks quite neat and doesn't even need gluing.
7. For the scales base I used a piece of 3mm thick display sign plastic [nice and white and shiny -- again cheap, obtained from the local tip]. Used sharp dividers to scribe the arcs in and then used an Artline 200 fine black pen to black the fine grooves. Doesn't matter if you slip because after darkening the grooves just wipe the surface over with a clean rag pad and "hey presto": lovely sharp black scale lines.
8. Make sure the printed circuit board is thoroughly earthed to the chassis. At first I used a plastic stand-off under the big earth pad, then wondered why I couldn't get a null on the meter !!!

73's Rob Abel VK2ERA

MORE THOUGHTS ON CERAMIC RESONATORS

and some observations on an experimental crystal filter

By Peter Parker VK6BWI #66



1. Extending the coverage of the Ceramic Resonator Transmitter.

Include an 8.2uH RF choke in series with the variable capacitor, 'A' section only. This will provide a coverage of about 3.518 to 3.557MHz. Stability appears unaffected by this modification. Increasing the inductance of the series choke, or the capacitance of the variable capacitor in an effort to lower the VCRO's minimum frequency of coverage will result in the oscillator dropping out.

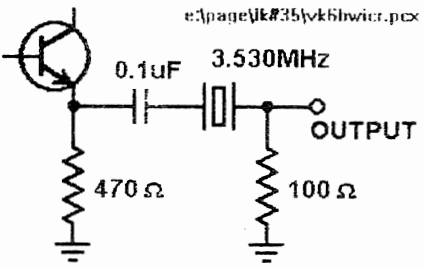
2. Extending the coverage of the Transistor VCRO.

The circuit in June Lo-Key (Fig. 3) could only oscillate above the natural frequency of the ceramic resonator. The addition of capacitance between the base and the emitter of the BC548 (up to a couple hundred picofarads) will permit oscillation down to 3.530MHz, and possibly lower with experimentation. This oscillator may sometimes be sluggish when there is no load across the output of the oscillator. To ensure reliable starting, connect a small-value (47pF or thereabouts) ceramic capacitor across the C-E of the BC548. This may affect frequency coverage, however. The insertion of a 1 or 2k-ohm potentiometer in the transmitter's emitter to ground lead permits a 'fine tuning' frequency adjustment in the order of 5kHz, although output will vary and frequency stability is uncertain.

3. Some preliminary experiments with crystal ladder filters using ceramic resonators.

Experiments were carried out, but results were inconclusive; perhaps impedances were mismatched or output from the 'carrier oscillator' was too high, overloading the filter. In contrast, a single quartz crystal for 3.530MHz operating into a 100Ω load resistor provided a -3dB bandwidth of about 400Hz, a -20dB bandwidth of 1.5kHz, & a -40dB width of 5kHz. Below 45-50dB, the curve fans out because of almost non-existent shielding.

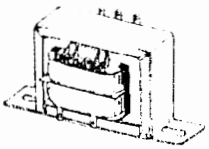
The carrier oscillator used was actually the VFO/buffer of my Drew Diamond 80m DSB Tx (Reference 2) and produced an output of about 0.4V as measured by an RF probe and DMM. 0dB represents 0.13V, so our single crystal filter is not lossless. The curve produced by the filter's bandpass characteristics corresponds well with that shown in Reference 3, page 85, despite the 1kHz resolution frequency counter used.



REFERENCES

1 Parker, P.: Lo-Key, June 1992 p.5-7
2 Diamond, D.: Amateur Radio, March 1985 p.15
3 DeMaw/Hayward: Solid State Design (1986) p.85

[Ed.- Also, article by Al Helfrick K2BLA in *ham radio* magazine June '85 p.18-26.]



QRP KIT-SET CENTRE

Don Callow VK5AIL #75
5 Joyce St. Glengowrie S.A. 5044
Telephone (08) 295 8112 (day/night)

A full Club Sales Price List was printed in June Lo-Key so in this issue there are mainly changes and additions to the list.

Postage Charge Now $4

The charge for Packing & Postage etc. is now $A 4.00 per order for delivery within Australia. ZL members should allow $A 7.00. As always, ***it's best for you to make fewer, larger orders*** rather than a series of small orders.

To reduce your 'overhead' expenses, we will now accept up to **$20.00 worth of stamps as payment for small orders**, in lieu of the previous figure of $15.00.

Additions to the List

MC1349 & MC1350 Intermediate Frequency Amplifiers are now on the list. The 1350 is very popular but if you want more features (particularly the extra gain) then you may decide the extra expense of the 1349 is worthwhile.

C064 1 per pack $4.20 Data
MC1349P IF amplifier IC Improved, high gain low noise version of MC1350P. Same pinout except pin 3 is used (not to be earthed). Normally operates from +15V DC (max. 18V)

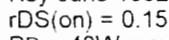
C065 1 per pack $1.20 Data
MC1350P IF amplifier IC. Pinout as MC1349P, except does not use pin 3. Normally operates from +12V DC (max. 18V)

MC1496 Balanced Modulator/Demodulator
Like the 1350, these are frequently found in receiver circuits - with good reason, as they are extremely versatile.

C066 1 per pack $1.10 Data
MC1496P Balanced modulator/demodulator. Functions include modulator, product detector, double balanced mixer and frequency doubler.

Reed Relays Ideal for QSK boards. These are very neat and compact 5V units, ideal for QRP - and by providing a series resistor you could run them from 12V. Normal retail price each would probably be about $5.

C067 2 per pack $3.00
Reed relay, Normally Open, PCB mount, fully enclosed, 5V, coil resistance about 1k35



NEC URH-902B

MTP3055 MOSFET power transistor as used in VK6KRG Rod's amplifier project Lo-Key June 1992 p.18. V(BR)DSS = 60V min. rDS(on) = 0.15Ω max. ID = 12A max. PD = 40W max. (at 25C)

C068 2 per pack $4.50
MTP3055E n-channel enhancement MOSFET power transistor (not same as 2N3055 or MJE3055) TO-220AB case.

C093 1 25.00
Custom-designed QSL card master sheet, for reproduction. Layout as required by you. See Lo-Key #34 June '92 p.3.

Notes on Bits

LM386 Low Voltage Audio Power Amp.
Be careful when buying these IC's because there are several **variants with different power outputs**. So, check the coding on the chips if you are looking for best audio power.

Coding	*Typical POUT*
LM386N-1	325mW
LM386N-3	700mW
LM386N-4	1W

Our version is the N-3. C037 is $4.70, with 2 per pack and a data sheet is supplied with each order. A couple of sources of cheaper LM386's were checked and the IC's found to be the lower power N-1 type.

AWARDS AND CONTESTS

By Ian Godsil VK3DID #112
25 Monaco St. PARKDALE Vic. 3194

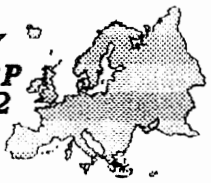
Well, the RD is over for another year and the Club's Winter Scrambles for 1992 (Nrs. 19 & 20) have come and gone. Again I suspect that those who took part had a good time and I thank you for your logs, although not very many of them were received.

I would like to thank **Ivor (VK3XB) and Mavis (VK3KS) Stafford** for responding to the VK3 WIA Broadcast note and joining in Scramble 19 on 80 metres. Their help is always much appreciated, especially after their move into retirement in much smaller quarters.

For Scramble 19 there was general favour for the narrower bandwidth, but some thought that 10 kHz was not enough. OK - fair comment. So let's try 20 kHz next time.

Reading the logs I was pleased with the DX worked in #20 on 20 metres. It shows that it is there, but perhaps time differences make it hard for some. Anyway, many thanks to all who participated.

Don't forget
Europe for QRP Weekend 1992
in October -



Rules in June Lo-Key p.27.

Results of Scramble 19

1st	VK3BPG	Reg	#7	34	points
2nd	VK2AW	Basil	#180	28	"
3rd	VK3AAM	Phil	#224	25	"
4th	VK4RE	Roy	#15	24	"
5th	VK6BWI	Peter	#66	1	"

Results of Scramble 20

1st	VK2WES	Wes	#162	25	points
2nd	VK6BWI	Peter	#66	11	"

Scramble for Spring 1992

For this next quarter I suggest the third Thursdays in October and November as follows:-

Scramble 21 on Thurs. 15 Oct.
1030 - 1200Z on 3.535 - 3.515 MHz

Scramble 22 on Thurs. 19 Nov.
1030 - 1230Z on 7.035 - 7.015 MHz

Hopefully this will give a spread of opportunities. I look forward to seeing the results. Keep up the good work, especially now that the "no code" debate has been refuelled.

Scoring and Rules are unchanged from those in Lo-Key #33 p.27.

73, Ian VK3DID #112

p.s. Scramble 19 & 20 Winner's Clothespeg Key trophies and certificates for the first three will be in the post soon.

Tnx *FOCUS*

ooqc

SSB Net

The 'Natter Net'

By Steve Mahony VK5AIM #184
19 Kentish Rd. Elizabeth Downs SA 5113
Telephone (08) 255 7397 (H)

A roster of Friday SSB Net Controllers is now in operation - and a good time is being had by all! **Peter Cannon VK2EPD** led the charge from the Eastern States on 28 August [more to come] followed by other 'new' Net Controllers including **Barry VK5BLS and Brenton VK5BZ**.

To those people who I invited to join the roster: It would be appreciated if you would let me know if you can't or don't wish to stay on the roster. Some advised that they couldn't participate in the first round, but I am not sure if you are available for the new round starting in October.

This net operates for at least an hour each Friday night at 3620kHz +/- QRM. Normal starting time is 1030 UTC and we will change to 0930UTC from 30 October, when Daylight Saving Time is in operation.

cxxc

CW NET NEWS

By Ted Daniels VK2CWH #89
Wombat Hole
Bylong Rd. Rylstone NSW 2849

The CW Net has been attracting an average of four to five starters per night, with a good spread of participants from ZL1, VK2, VK4, VK5 and VK7. Conditions have been quite good with signals from ZL1 at 54 to 5 on the mainland, and generally excellent between VK5 and VK2 at 56 to 7.

This year I will stick with 80 metres through the Daylight Saving period (at least until the end of the year when a new Net Controller may wish to change that). Starting times from October 27th 1992 will be 7.45pm Eastern Summer Time [0845 UTC].

72 from Ted.

cxxc

FOR SALE

A CSP "Can't Stand the Pace" 20 metre SSB/CW QRP transceiver by G3ROO & G3RJV. Details in SPRAT 67 pp21-29. Complete kit comprising four PCB's and components including filter, crystal. Purchased new from G-land in 1991, but owner unable to start the project because of health reasons.
Stored and available for inspection at the QTH of **Steve Mahony VK5AIM #184**
19 Kentish Rd ELIZABETH DOWNS SA 5113 Telephone [08] 255 7397

$200 or nearest offer ..... *Be quick!*

CLUBTIVITIES

Continued from page 3

Ex-SWL Rex Bunn VK2NRX #245

Congratulations to Rex who recently made it onto the bands. *FB !*

1940 - Yes, 52 years ago !

Rex Black VK2YA #131 included the following interesting piece of information in a postscript to a recent letter: "**Basil VK2AW** and I were on the first RAAF Wireless Op Course conducted at Marconi School in Sydney in 1940....almost 52 yrs ago. Where have the years and decades gone?" *Where indeed !*

Rex mentioned recently that "the CW Net which meets on 7025kHz on Sunday mornings will soon reach it's 1000th weekly session, which seems a very worthy contribution to the PRO-MORSE movement . . ."

We hope to get more info. on this and, if so, will feature it in Lo-Key #36.

p.s. Rex has kindly donated a quantity of miscellaneous crystals to our Club. I don't think they are in amateur bands but there are still plenty of applications for them. The plan is to list them in the December issue in the QRP Kit-Set Centre column.

DX OPPORTUNITY

Bob Spidell W6SKQ #67 [of Lancaster, California] has advised . . . .

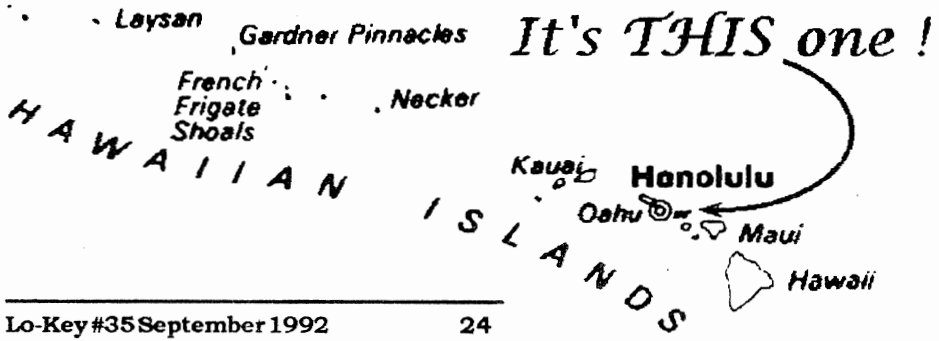
"My XYL and I will be going to Molokai Island [Maui County] in the Hawaiian chain from **October 18 to November 1, 1992** and I will be operating **W6SKQ/KH6** QRP on bands 80-10 meters. I plan on monitoring the QRP calling frequencies each hour on the hour plus five minutes for possible QRP contacts otherwise I will be roaming the bands.

I do not have equipment for the WARC bands, as I will be operating with a Ten-Tec Argonaut 515 into a planned 135 ft dipole & 300 ohm twin-lead feeders into a small antenna tuner.

We are staying in a small cottage set in a coconut grove and do not know the height of the trees, but will get the antenna up as high as possible.

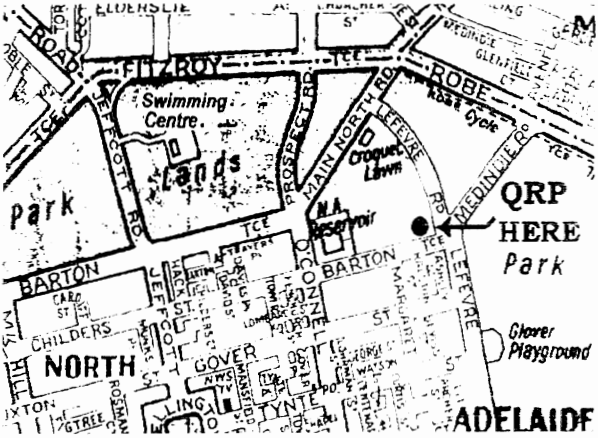
Oh yes - by the way, I will be operating 99% CW and 1% SSB."

72/73 Bob W6SKQ QRP #67



VK5 OUTING

By Steve Mahony VK5AIM
Tel. [08] 255 7397
[address on p.23]



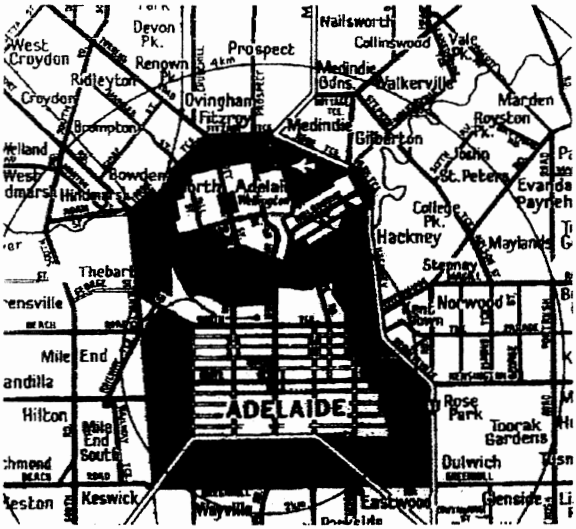
All members - VK5 and any interstate visitors who may be in Adelaide at the time - are invited to a social/ radio outing to be held in October at North Adelaide. This is a chance for members to get together and maybe meet for the first time.

We will meet in the Parklands on the northern side of Barton Tce near LeFevre Road in the north-eastern outskirts of North Adelaide on **Sunday 26th October** at or after 11am.

This is an opportunity for members to meet socially and, hopefully, some will have their cameras.

We expect to be there for 2 or 3 hours, depending on the turn up and, of course, the weather.

It would be helpful if you would ring me in advance on the number at top of page, to say if you are coming along.



Bring your family or friends or both ! And of course bring along your barbecue or lunch etc.

Also, bring a piece of portable or other QRP equipment to show and don't forget the antenna if you wish to do some operating.

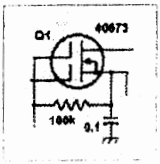
• • • • •

54 Years of QRP

Early this year **Jim Edwards VK2AKE #5** wrote us a note about his background in Amateur radio and QRP:

"I am not as active as I once was, due perhaps to the fact that I will be 81 years in about 4 weeks. My QRP operations goes back 53½ years - "B" batteries etc. Still run skeds CW , with three of the QRP group of those days." Jim has a very low membership number and was one of the initial group of members already in the Club when Lo-Key was first published.

FB Jim !



Receiver Notes

By Basil Dale VK2AW #180

MC3357 & 3359 Experimenting

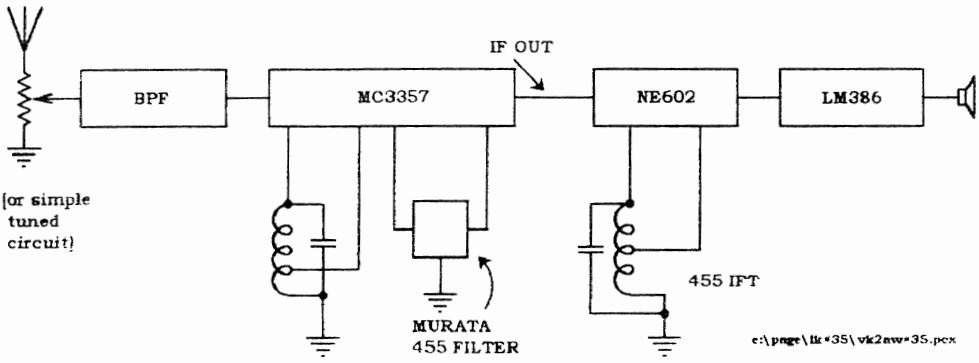
As you may know, I'm keen on receivers and I've been spending a fair amount of time on using the **MC3357** chip in a simple receiver. You will recall correspondence from myself and others on the **MC3359** which featured in ***Silicon Chip*** magazine in December '89 in a circuit by Garry Cratt VK2YBX, based on the "SIMPLEceiver" in ***QST*** Sep. '86 [by Bruce O. Williams WA6IVC]. Boards were available from R.C.S. Radio.

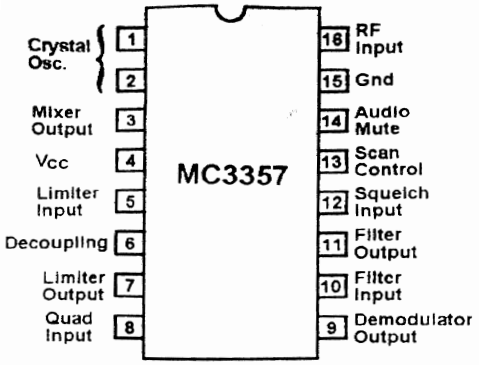
Judging by comments from various members, it had a mixed reception - **no pun intended** !! [Ed. - See ***Lo-Key*** #26 p.25 & #27 p.26] I didn't have much success and eventually, after trying the MC3357 I 'packed it up'. However, I have found that the main problem is that the mixer seems to be prone to overload and that the IF [limiter - 5 stages] is rather noisy with too much gain.

By fitting a 'brute force' RF gain control in the antenna lead to the mixer coil, reducing the gain of the IF and using an NE602 as the product detector/BFO, I have developed a reason able HF receiver using the MC3357. The advantage of this chip over the MC3359 is that pin 7 is the limiter output, which is not available in the 3359. I've had it working on 3.5, 7 and 14MHz, so it would be OK on 10 megs as well.

As I am using a 400pF twin gang in the mixer BPF I just changed the oscillator coil - this could be made a plug-in without too much trouble, as could the mixer BPF, as in the Club's 'Sudden' front end [Ed. - See Flexi-Sudden article in Lo-Key #25 pp.6-9]. I have found that a Hartley oscillator [tapped coil] is better than the Colpitts in that the latter requires the two capacitors to be changed for different frequency bands, whereas the Hartley is not restricted. So it just means changing a coil - much simpler.

So, basically the receiver consists of 3 chips:-





This is just as simple as the 3359 version which used an MPF102 quad. det. [which is not used in my version] and gives better performance and gain from the 602. There is plenty of audio; I find I don't need the 10uF capacitor between pins 1 & 8 of the 386, which reduces the noise. The 3357 is cheap [about $1] which makes it a good substitute for the NE602 mixer/osc. in simple receivers and has the advantage of providing the IF stages as well.

One could make up a general coverage receiver for AM just by using a diode detector [for SW listening] instead of the 602 prod. det./BFO.

I've kept to the 455kHz IF filter; but I have also tried a 9 meg ladder filter into the 602 and it works, but gain is down. So probably a ladder filter using 2 meg or even 4 meg crystals could be OK. I suspect the IF limiter stages level off at about 1MHz, but there is plenty of gain there when coupled to the NE602 product detector/BFO.

I used a 455kHz ceramic resonator in the 602 BFO section which worked OK but, as the Tandy ones [2 for 99cents] are not available, I used an IFT [ex DSE yellow core from Cat. L-0260 set] which is better because one can adjust the osc. to the slope of the IF.

The purpose of the above *rambling on* is to find out if members would be interested in an article on this receiver. [Ed. - *Yes pse !*]

No doubt there are a few members who put aside the original project and the components could be used in this. The 3357 is 16 pin, the 3359 18 pin. I've had a look at the circuit board diagrams in the ***Silicon Chip*** article and this board could be used with a few changes e.g. ignore BFO and audio outputs, a couple of extra resistors, tapped coil etc. The 3357 should be easily available.

MC3362 Receiver

I have been interested in a receiver in ***QST*** December '90 which uses the **MC3362** [Gary A. Breed K9AY - A Portable QRP CW Transceiver - Dec. '90 & Jan. '91]. I obtained one of these from Stewart's in Melbourne, via Drew VK3XU at about $3.50. This is a double conversion FM IF receiver which in the article is used as a single conversion Rx with an 8 meg ladder filter, using the 2nd mixer/oscillator as a prod. det./BFO; no i.f. but then into the AGC, S-meter and audio outside the chip.

I haywired up the first mixer/oscillator and it works O.K. but I put it aside while I worked on the 3357 project.

Another Rx from WA6IVC

There is also a neat little Rx in ***73*** magazine April 1991 using NE602 mixer/osc., **MC3340** IF at 455kHz, another 602 prod. det./BFO & LM380 audio. The author is Bruce Williams who developed the "Simpleceiver" using the 3359. He calls this one the Simple SUPERX !! He also uses the Hartley osc. in both oscillators.