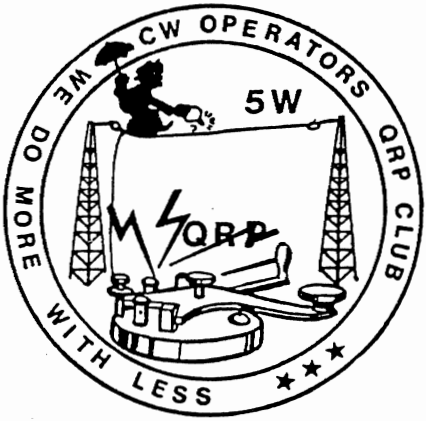
LO·KEY

NEWS BULLETIN



PUBLISHED QUARTERLY

CONTENTS

"WE DO MORE WITH LESS"!

33 LUCAS ST. RICHMOND, S.A. 5033 AUSTRALIA

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VK7 STATE CO-ORDINATOR Rai Taylor VK7VV (3)

****

MEMBERSHIP

The CW OPERATORS QRP CLUB is an International Club, open to Amateurs and Short Wave Listeners from any country. The Club was formed with the aim of promoting QRP using the CW mode, on ALL frequencies allocated to the Amateur Service.

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ANNUAL MEMBERSHIP FEES

VK....$8 : ZL.... Lo-Key by surface mail....$A9 : ZL....Lo-Key by airmail....$A10 : DX....Lo-Key by surface mail.... $A9 : DX.... Lo-Key by airmail....$A12. Please make all Money Orders and Cheques payable to the CW OPERATORS QRP CLUB. IRC's not acceptable.

****

CORRESPONDENCE

Please address all correspondence for the Secretary, CW Operators QRP Club, 25 12th Avenue, West Moonah, Tasmania. 7009. Australia All membership fees to be sent to the Treasurer, CW Operators QRP Club, 41 Tobruk Avenue, St. Marys, S.A. 5042 Australia.

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CLUB CALLING FREQUENCIES

1815:3530:7025:14050:21130: 28125

***

INTERNATIONAL CALLING FREQS

3560:7030:14060:21060:28060:

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LO-KEY

Published in March : June : September : December.

CLUB BUSINESS ☆

Before getting on with Club business for this issue of Lo-Key, I would like to apologise for the poor printing quality, of the Dec. '84 issue of Lo-Key. If I was to tell you about the amount of trouble, Kevin and myself had in putting that issue of our news bulletin, into our member's hands, you would not believe it. Suffice to say that the issue was printed by a Commercial Printer, and as we can see, it was not very well done. At present we are having a considerable amount of trouble in getting access to a copier that will reduce to our new format.

****

ELECTION

The election for the Club Committee has come and gone, with hardly any ripple on the surface of the pond. It can not be counted as a success, as the results still leave a number of positions on the management side of the Club unfilled.

Rai VK7VV (3) is our new Secretary, and I am sure that you will all join with me, in offering Rai our heartiest congradulations, and assure him of our full co-operation. Congradulations also to Kevin, on his appointment as Treasurer. I can assure members that he is the right man for this job. His immediate aim is to get this Club out of the red and back on its feet, just as soon as possible. What is more, he will do it. Rod Green VK6KRG has taken on the position of Technical Problems Consultant, congradulations and thanks OM. Congradulations to Jeff Wallace VK5BJF and Rai Taylor VK7VV for their appointment as State Co-ordinators for their respective States, and we also add our thanks.

On page 2 Information Center you will find the Committee positions, even including the still vacant positions. On reading through it you feel that you may now be able to assist in filling one of the positions, please get in touch with your Secretary, CW OPERATORS QRP Club, 25 12th. Avenue, West Moonah, Tasmania 7009, Australia.

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MEMBERSHIP

Your Committee is very concerned at the failure of a number of our members to renew their subscriptions.This could mean that they are either forgetful, or that they are no longer interested in the CW Operators QRP Club. Elsewhere in this issue, you will see the latest amended Membership List, and you will probably note that quite a number of members names are missing. Our membership reached 84, and now it is back to **59**. That makes me sad. It looks like we will have to build it up again steadily. I have my eye on the figure of 100 members and that is where we are headed for, and will accomplish if we keep at it.

****

CLUB BUSINESS (Cont.)

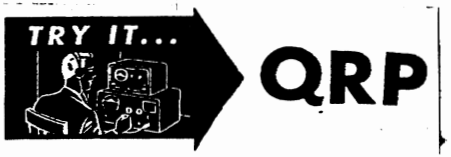
REJECTION OF A LETTER FOR PUBLICATION

The Editor, Acting Editor, or person publishing any publication, must have the right to reject or edit any letter for publication. and that includes Lo-Key. Lo-Key welcomes letters from members, and will be pleased to publish points of view etc., provided they are NOT a direct stir, or contain material deemed to be harmful to the CLUB'S best interests. Unfortunately we had a letter recently, which after reading, I rejected. This caused the member who wrote it to resign. It is the policy of this Club to allow the Editor of Lo-Key this right. After all, it is his responsibility, to maintain a standard and protect the members.

****

AWARDS AND CONTESTS

It is realised by the Club Committee, that some of our members are not particularly interested in awards or contests as such, and this of course is their right. There are others who are interested in such matters, so this item is directed toward those of our members who would like to see the club develope a program of this nature. The suggestion has been put to the Committee, that perhaps more members would become interested if they were more or less left to do their own thing, with regard to awards and contests. In other words a member is left to select his own goal of achievment in QRPing When this has been achieved, he notifies the Committee of this fact, and if the Committee considers the effort is worthy, then a suitably worded certificate can be issued to the member. This would give the member some recognition of his efforts in promoting the art of QRP. This sort of approach could be extended to include practicle building of gear, QRP experiments, antenna experiments, and many more aspects of QRPing. The Committee would like to get some feedback from the members on your views on this matter. If there is sufficient interest shown, then the suggestion will be included in club policy.



CLUB NET

There has been a number of requests to restart the information net again. Our Secretary Rai would like to hear from interested members, to discuss the best times, day, frequencies etc. The concept of a regular net is a good idea, as it enables the committee to give out more current information to the members, while it is revalent. Please give Rai your support on this matter, by calling him on air, or drop him a few lines through the post.

****

Club Business notes by Len VK5ZF (1)

NEW MEMBERS

a hearty welcome to

81 KA4LKH BARRY STRICKLAND, RT1 BOX 216, SYLVANIA, ALABAMA 35988 USA.

82 VK3BGH G. HARRIS, P.O. BOX 126, LILYDALE, VIC. 3140

83 WB6MTR WINFRED FRANKS, 1001 SYLMAR SPACE 107, CLOVIS, C.A. 93612 USA.

84 VK3CIG DICK McINTOSH, BOX 159, WHOROULY EAST, VIC. 3735

CLUB SCOREBOARD RULES 1985-86

1. Contest will be held on a yearly basis, from the 1st. April to 31st March, each 12 month period.
2. There shall be two sections of the contest, a. Novice, b. Full.
3. The contest is open to all members of the CW OPS QRP CLUB.
4. All bands open to amateur operation in both sections may be used.
5. The mode used will be CW, and our 5W output power limit will apply to all contacts for this contest.
6. Station worked does not need to be operating QRP, but must be using the CW mode.
7. Scoring
   a. Inside own call area..... 1 point
   b. Outside own call area, but still in own country..... 2 points
   c. Outside own country..... 3 points
   d. QRPp (1 watt or less) count double points.
   N.B. 24 hours must elapse before contacting a station you have previously contacted.
   Entrants in the contest are asked to send their progress log each three months to the Editor of Lo-Key. Quarterly progress scores will then be shown in Lo-Key in June, Sept., Dec., and March. Logs in each section will show Date, Time, Freq., RST sent, RST received, Points claimed for each contact, total points for the period of the log must also be shown. All entrants are asked to use a seperate page for each band, when submitting their logs.
8. In the March issue of Lo-Key (1986), winners will be declared for the 1985-86 year.
9. Certificates will be awarded for the 1st, 2nd, and 3rd place in each section.
10. All entrants are expected to operate under the terms of their licenses, and the honor system.

OUR CLUB IS NOT ONLY A QRP CLUB, IT IS ALSO A CW CLUB. LO-KEY WOULD WELCOME ANY ARTICLES TECHNICAL OR OTHERWISE FROM MEMBERS, ON THE CW SIDE OF OUR ACTIVITIES. ANY MATERIAL CAN BE SENT TO LEN VK5ZF FOR INCLUSION IN FUTURE ISSUES .

DX MEMBER'S PAGE

I would like to appeal to all our DX members to put pen to paper and drop me a line about your activities, your gear, band conditions, in fact any info at all that you would like to share. Also I am looking for QRP technical articles for Lo-Key. This is your page, let's try to make it the best. If possible I would like to see our DX membership grow, as we are striving to be an international club, so please mention the club when you get an opportunity.

****

I received a note from Walt (ex KX6GO) that he has now returned to the States, and will be operating from his home QTH again. I was sure pleased to QSO with Walt from the Marshall Is., and hope I can make it to the States with my QRP. Hope to hear from you soon Walt, when you have settled in again. *

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WINFRED FRANKS WB6MTR (83)

Winfred is one of our newest members, a very keen QRPer, and I am very happy to present some extracts from a letter from him.....
I am aware that with QRP, and even QRO, I do not stand a chance of getting through to you even with the best of conditions, but in QRP you do not give up, just try a bit harder. I get through to the G QRP boys once in a blue moon, so I will keep looking for the land down under.
My main hobby is in building both Rx and Tx equipment. I find the G QRP club gathers to gether many new and interesting circuits. Two of these I am sending to you, in the hope that some of the members will like to try them out. (Thanks Winfred I have received the circuits OK, and they will be used in Lo-Key shortly, Ed.)
The following is a list of the QRP gear I use.

FRG-7 receiver
2 home brew receivers
Century 21 cranked down to QRP standards
1 7mc. home brew transmitter
1 21mc. home brew transmitter
2 Antenna tuners
2 Home brew Watt meters

I am one of the "Older Kids", 75 years young, being an architect for most of my life, but now retired. If I can be of service to the club, in finding hard to get parts, or State-side data on circuits, please let me know. See New members page for Winfred's address.

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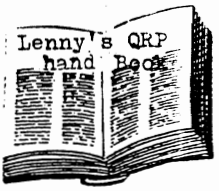
DX members notes by Len (1)

A PAGE FROM LENNY'S QRP HANDBOOK



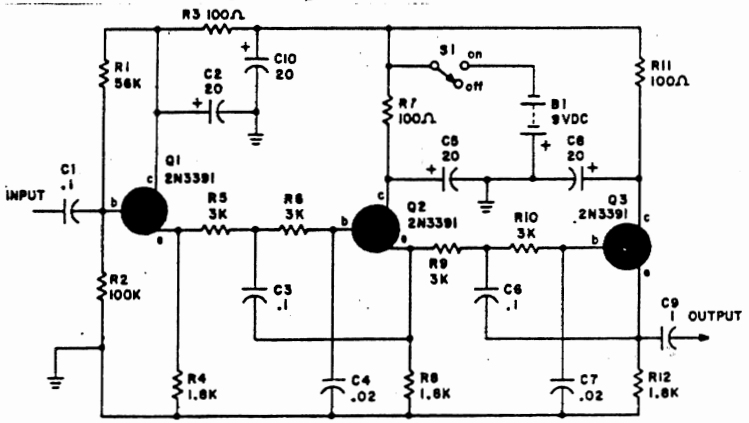
A HANDY AUDIO FILTER....for sorting out those weak QRP signals.

You are working a code station out of Greenland on an inexpensive shortwave receiver, when suddenly in fades a French newscast burying the di's and dot's. Sure, you need a better rig with tighter sensitivity and bandpass. You can get that for about $600 and your receiver as a trade-in, or you can build Code Loader. This circuit is a simple, low-pass, audio filter.

With the constants shown, Code Loader has a corner frequency of 1000 Hz—perfect for CW (code) reception. For voice only filtering (no music), reduce the values of R5, R6, R9 and R10 to 1200-ohms. The filter's voltage gain is unity (1) so it won't upset things no matter where you insert it in the audio chain. Input impedance is about 30,000-ohms—high enough to cause negligible loading.

To install Code Loader, break into the receiver's audio chain at some convenient point—preferably at a point where the audio voltage is small, say, 1-volt peak-to-peak or less. You may wish to include an audio bypass switch, too! This will allow you to shunt the signal around the filter and restore the original performance of the receiver.

Build this circuit on a piece of perfboard that will fit somewhere in the audio section of your receiver. Keep the leads short. Try to tap off from the receivers 9-volt DC supply (if any) or voltage-regulate down to 9-volts DC from a 12-volt DC supply, or higher. Then you can eliminate the need for S1 and B1.



PARTS LIST FOR CODE LOADER

B1—6 to 12-volt transistor-radio battery
C1, C3, C6—0.1-uF, 25-WVDC, mylar capacitor
C2, C5, C8, C10—20-uF, 20-WVDC, tantalum capacitor
C4, C7—0.02-uF, 25-WVDC, mylar capacitor
C9—1.0-uF, 25-WVDC, non-polarized, mylar capacitor
Q1, Q2, Q3—2N3391 NPN transistor
Note: All resistors rated ¼-watt, 5% tolerance

R1—56,000-ohm
R2—100,000-ohm
R3, R7, R11—100-ohm
R4, R8, R12—1,800-ohm
R5, R6, R9, R10—3,000- or 1200-ohm (see text)
S1—SPST toggle switch

THE "SCD"

PART 1

A LOW COST, LOW TECHNOLOGY, AMATEUR BAND QRP TRANSCEIVER PROJECT

BY REV. G.C. DOBBS G3RJV — SUBMITTED BY PAUL NEWMAN VK4APN

It is something of an irony, that at a time when technology is leaping ahead, at a pace that leaves most of us gasping for breath, groups have arisen in most sientific fields which emphasise simplicity. Most of us have read about the Appropriate Technology groups, and in America the slogan K.I.S.S. (Keep it Simple Stupid) has appeared. Certainly in the late '50s when I first became interested in Amateur Radio, all our Technology seemed appropriate, relying on the easily available and cheap Government surplus of the time and individual cunning. Since that time readily available commercial equipment, and some of the complex methods of modern communication have diverted the hobby away from the home constuction of amateur communication equipment.

The question remains, "Is it possible to enjoy communication on today's amateur bands with simple equipment?". Well at least several hundred members of the G QRP Club do so all the time, as do many others. There is still a satisfaction in communicating with fellow radio amateurs, using simple equipment built with one's own hands. Naturally QRP fans have their own axe to grind and like to win converts, but even if you are still going to run your QRO rig or 2 metre "grey box", I can promise you a lot of fun, at little expense from this project.

The S.C.D. is a complete simple amateur radio station, that can be built on a kitchen table with simple handtools, requiring no other test equipment than the average station multimeter. It can be built stage by stage, each stage representing a complete unit, so all or just part of the project can be made. The stages are.....

PART 1.... VXO Transmitter, Side Tone Generator.

PART 2.... Receiver Section, VFO Facility, Transmit/Receive Arrangement.

PART 3.... Receive Filter, Incremental Tuning, SWR Bridge, ATU.

The simple design reduces constructional working problems, component types and values are reasonably open to variation, low cost and easy construction has been the aim throughout.

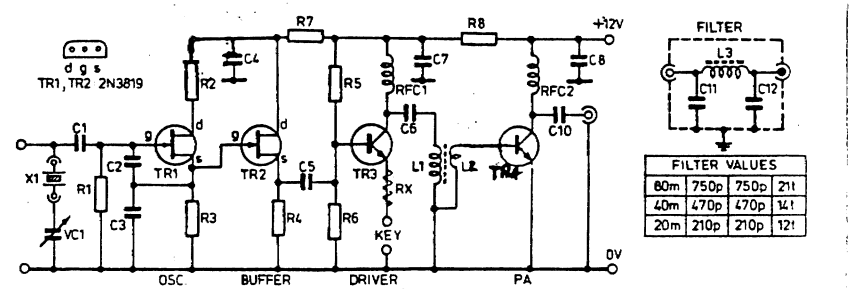
THE TRANSMITTER

In a simple transceiver, the transmitter forms the heart, and as such is most likely to give the most trouble for the constructor. The circuit shown in Fig. 1, is one of the most reliable simple circuits I have tried, and its basis has been passing around QRP circles for some years. This particular version is my modification of the W6YBP "Knobless Wonder". At a stage when building simple QRP rigs was almost an obsession with me, variations on this simple theme almost always seemed to produce good results. Apart from the ease with which this cir-

THE SCD (Cont.)

cuit seems to work, it has the distinct advantage of no critical tuned circuits. It is indeed possible to build a transmitter without a single knob control.

The oscillator (TR1) is a Colpitts circuit using a cheaply available FET, directly coupled into a FET untuned buffer stage (TR2). The basic transmitter shown here is crystal controlled, with some VXO swing of the crystal frequency allowed by VC1; this may appear to be a serious setback for amateur band operation, but it does allow this transmitter, in its simplest form, to be used on the 80, 40 and 20 meter amateur bands. It is quite an assat to have a four transistor transmitter that can work four bands. To change bands all one has to do is change crystal and change the output filter. In the next section of this project TR1 will be shown working as a VFO circuit, but it is easier to get the transmitter working as a VXO circuit first. There are many crystals around for the 80 and 40 meter bands, and at least one stockist still sells them at low cost. The transmitter is also simple to operate on the 20 meter band, but here suitable crystals can be more of a problem to obtain cheaply. Don't decry VXO working on the amateur bands. In the Spring of 1979, G3DOP using a VXO transmitter, even simpler than this one and one xtal, worked 30 countries in about as many days on 20 meters.



FILTER VALUES			
80m	750p	750p	21t
40m	470p	470p	14t
20m	210p	210p	12t

Fig 1 TRANSMITTER

The two stages described above use the cheap 2N3819 FET. Some problems have been experienced with several circuits using this device. They are produced with a wide tolerance of specification, and the drain current of individual 2N3819's can deviate widely. However I have yet to experience problems with this circuit, using the device bought from the cheapest source I know. The cautious constructor could explore the effect of trying several of the devices in TR1 and TR2 positions, or even be so rash as to buy the expensive MPF102 device. He could also spend £500 on a grey box.

The buffer feeds the signal via C5, to an untuned driver stage. This stage is a little more critical, as can be seen from the surreptitious marking of Rx, but itself is quite simple; RFC1 can be almost anything and is open to experiment. (Don't buy expensive new chokes unless you really have no alternative.) This is the keyed stage; in fact I have tried to key every stage in this circuit, including the oscillator, and all seem to perform the task without any real problem. Another good alternative keying point is the PA stage between the top Of RFC2 and the 12 volt line. Rx in the emitter line may be required to control the amount of drive, but more about that later.

The output from the driver stage is fed via C6, to the RF

Transformer L1/L2. This is a compromise, untuned arrangement wound on a T-50-2 Amidon toroidal core. The method of winding is shown in the detail in Fig. 1. The signal is then fed direct to the base of the PA transistor TR4; this Power Amplifier stage is a simple untuned circuit again.

The PA may not be sophisticated, but it seems to work well with an input of some 2 watts DC. It has been said that the transistor is the quickest fuse on three legs, and PA stages can put this to the test. This circuit seems to produce clean RF, a small claim to all but those who spent an evening or two with a solid state PA. Running this stage as an untuned PA feeding a broadband pi-output filter, really does make final results easier to achieve. RFC2 the collector load, is a simple home made choke which offers a fair RF load with little DC resistance. How does one get 8 turns through a small ferrite bead,? Struggle! The output from the PA goes via C10 to a screened output socket.

A wide variety of transistors may be used for the PA stage and the driver stage. The prototype worked well with the common 2N3053 and the BFY51, although some of the BFY51's in my surplus priced stock gave quite low output. Almost any suitable transistors capable of dissipating a few watts at the required frequency will work. Some of the best results in the prototype were obtained from some unknown computor switching transistors, with short leads, coded 00652. A reasonable heat sink is required for the PA transistor of the "star" or clip on kind; it is common for some transistors, even with heat sinks, to run quite hot in this circuit.

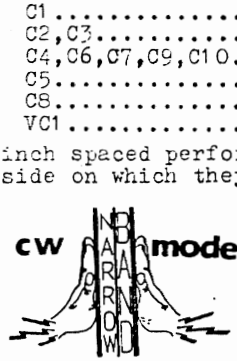
C10 feeds the output of the PA to a phono socket, and into this plugs a broadband pi-network for each band. This filter provides a clean 50 ohm output, tuned to the CW end of each required band. In the VXO mode the transmitter works well on 80m. 40m. and 20m. (The values for the filters are given in the table in Fig 1). The values for C11 and C12 should be as close as possible, but more than one capacitor may be used to make up the required value. Avoid using very small ceramic types, as these may then get too hot and cause power losses. L3 coils are close wound on a T-50-2 toroid core.

LIST OF TRANSMITTER COMPONET VALUES

R1.....82k	RFC1.....25-50uh
R2,R8.....100r	RFC2..7-8 turns30 swg wire on ferrite bead.
R3,R4.....1k	L1....22 turns 22swg enam. on Amidon T-50-2 former
R5.....27k	L2....10 turns 22 swg over L1 (see drawing)
R6.....1k2	X1....Crystal for band
R7.....680r	TR1, TR2....2N3819
Rx.....see text	TR3, TR4....BFY51, 2N3053
C1.....150pf	
C2,C3.....47pf	
C4,C6,C7,C9,C10..0.1uf	
C5.....500pf	
C8.....50uf 16v.w.	
VC1.....100pf	

CONSTRUCTION

At one time I built experimental QRP transmitters on a breadboard of 0.1 inch spaced perforated material, joining the components under the side on which they were mounted, rather like a printed circuit board.



This transmitter can be built in such a fashion, but the prototype was built on a printed circuit type of breadboard, which I have found ideal for such a circuit. In this system the components are soldered on to etched copper pads, these being on the component side, so no holes are required and component changing and experimentation is simple Some amateurs are wary of etching printed circuit

board, But the process used to produce this type of breadboard is very easy. The acid resist material is plastic adhesive backed sheet of the "Fablon" variety. To make the prototype I covered the piece of unetched printed circuit board material with white "Fablon", and sketched the circuit directly onto the plastic with a pencil. This is convenient because the component spacing can be adjusted by rubbing out with a normal pencil eraser. The solder pads required are then are sketched in, and tidied up with a pencil and ruler.

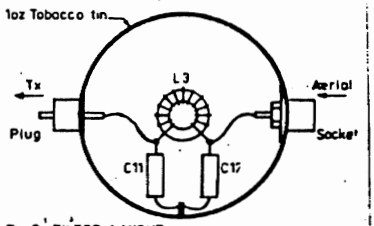


Fig 3 FILTER LAYOUT

For this transmitter, the constructor can follow my layout in Fig. 2. This shows the layout used in the prototype. The positions of the components between the pads are shown, note that each pad is in fact a small "island" of copper and as much copper as pssible is left on the board, in the non etched portions, to form an earth mat. This not only acts as effective screening, but also provides convenient earthing points, close to all the components for short earth returns when required.

To duplicate this board, the constructor will need to cover a suitable piece of single sided PCB with adhesive plastic sheeting. The layout of Fig.2 can then be copied or traced onto the plastic. The actual lines can be firmly can be pencilled in with the aid of a ruler. The areas which are to be etched are then removed by carefully cutting along the lines with a modelling knife and ruler; the plastic not required can then be peeled off. This may sound a rather fiddly job, but completed boards have been made by this method from the circuit drawing to the completed etched board in under an hour. The surplus copper is etched away in the usual ferric chloride solution. If the plastic has been evenly stuck down a very neat board can be obtained with good straight edges.

The transmitter is best built, then tested, stage by stage. All that is required for testing is the simple RF probe circuit of Fig.6. This can be built on a surplus piece of PCB, or a small tag strip. The range required on the multimeter will vary according to the point on the circuit to be measured and the multimeter used. Low DC voltage ranges usually give a good indication of RF output, but if the reading is low , a low DC current range can be used.

Build the oscillator first, or perhaps the oscillator and buffer together, and check that oscillation occurs by finding the output on the station receiver. This is best done without VC1, its position being shorted out. This can then be added and the VXO shift may be checked on the receiver. I have never failed to get a crystal to oscillate in the circuit, even large 10XJ types. However some large old 10XJ crystals do not respond well to the VXO capacitor, and oscillation may stop if extremes of frequency shift are required. Not much frequency shift can be expected from such a simple VXO arrangement, but the amount depends upon the type of crystal and the frequency. The few KHz of shift obtain-ed with most crystals is useful enough to make the VXO facility worthwhile. The transmitter can be built without VC1 and in this form has no control knobs at all. It should be possible to measure the RF output of

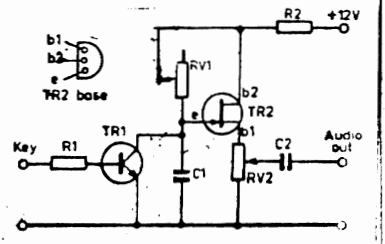


Fig 4 SIDETONE OSCILLATOR

THE SCD (cont.)

the buffer at the source of TR2. that is the top ofR4. One interesting experiment is to alter the value of R2 to see if oscillation can be maintained with a higher output. It is also possible to try a small RF choke in place of R2 and check oscillation and output.

TABLE OF VALUES FOR FIG.4

R1,R2 =3K3 RV2 =5K preset
C1,C2 =0.1uf TR1 =BC108
RV1 =22K preset(or similar)
TR2 =Unijunction TIS43 etc.
(E5557, UT46)

The driver stage can now be added. At first use a short circuit for Rx, this value might have to be increased to obtain the required drive for the PA. Short out the key position and check the RF output at the collector of TR3. The rest of the main transmit board can now be completed. A heat sink must be added to TR4. The PA stage should not be run without a load, as this will probably destroy the transistor. A simple load to place between the output of C10 and earth could be a 2watt or more, 50 to 100 ohm resistor. The RF probe is connected across this load, and the transmitter output can hopefully be seen. At this stage the drive can be adjusted. Since the filter is 50ohm impedance in and out, TR4 is run between about 1.5 to 2watts DC input, to give a suitable impedance at the collector.

Lift the top of RFC2 from the positive pad, and insert a milli-ammeter, or a multimeter on a 250ma range or similar is suitable. Key the transmitter into the dummy load. To give a DC input of 2 watts with a 12 volt supply, 166 ma is required. For 1.5 watts the current is 125 ma. A resistor may be added to the position Rx to give an input of this order, (this may be a small resistance of some 100 ohms or so.)

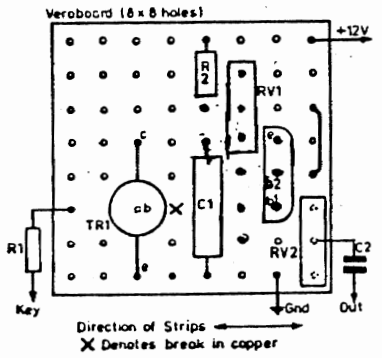


Fig 5 SIDETONE LAYOUT

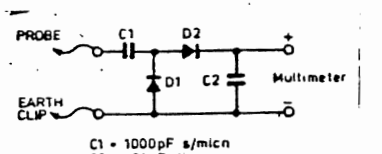


Fig 6 RF PROBE

The filter, which is built in a 1 oz. tobacco tin as shown in Fig. 3 can then be added. (Do not listen to idle rumours that these are now 25 gm tins, true pipe smokers will be asking for an ounce tin until they cough themselves into the grave.)A suitable dummy load can now be added between the output of the filter and earth. The checking of Rx and the DC power into the PA can be repeated with the filter in use. The transmitter can now be checked by listening on the station receiver.

Transistor PA stages are often noted for parasitic oscillations. Key the signal and listen to see if it sounds clean, tune around the sidebands of the signal and listen for "nasties". Many constructors believe in adding little ferrite beads to the inputs of PA stages... I just try to build tidy PA's and pray!. Although no problems were experienced with the prototype, a ferrite bead could be added either to the lead on the emitter side of C9, or the actual transistor emitter lead of TR4. The transmitter should sound clean on the receiver and key cleanly. Keying the positive to RFC2 could also be tried. The transmitter is now completed and can be air tested. The output must be matched in as near a 50 ohm load as possible, so a simple dipole for the band in question is quite suitable

THE SCD (cont.)
(long wires and many other aerials will require an ATU.) An L match is usually enough, a suitable circuit will be described later. Because the oscillator is on all the time, even with the key up, the receiver used will require muting on transmit in addition to simple aerial changeover. Since most of us do not like to key deaf, a sidetone oscillator is a useful item. A suitable circuit is shown in Fig.4. TR2 is a unijunction relaxation oscillator, the frequency being set by the values of VR1 and C1. TR1 acts as a transistor switch. The free end of R1 goes to the top of the key, if the driver emitter is keyed. In the key up condition, the voltage appearing at the collector of TR1 allows the transistor to short out C1 stopping oscillation. When the key is pressed TR2 oscillates; the output is taken via C2 from an audio gain pre-set VR2. It is convenient to just feed this to a high impedance headphone or even a crystal earpiece, placed near the transmitter. This gives enough audio to follow the keying. The sidetone circuit was built on a piece of 0.1 inch pitch Veroboard, as shown in Fig. 5. VR1 can be replaced by a fixed resistor of a suitable value to give the right pitch of note. If the positive of the PA transistor is being keyed, the sidetone can still be used. TR1 is removed and the +12v., line from R2 of the sidetone goes to the 12volts keyed to the transmitter PA. VR2 could also be a fixed value, but a preset will be useful when a matching receive section is added to the transmitter.

USING THE TRANSMITTER

Operating QRP can be apleasure or a frustration, and whichever depends partly on attitude, and partly on technique. I have never used over 5 watts (DC input) for many years, and always worked into dipoles or matched long wires. This little rig can be set up quite simply with a normal station receiver, at first with a manual aerial changeover, and some form of receiving muting. There are recognised QRP calling frequencies, which for the bands in question are 3560, 7030, and 14060 khz. However crystals for any CW frequency on the required band should be OK. The QRP frequencies being mainly used for two-way QRP contacts, which as they say these days is a different ball game.

It is unlikely that much will be achieved by simply calling CQ. Try it if you like, but a far better technique for QRP working is to prowl around for stations to call. Listen for CQ calls or wait for contacts on the frequency to finish, and then "Tail-end". Naturally the signal strength will be down, but expect reasonable reports. The first excursion onto 20 meters with the prototype brought an almost instant 599 report from a UV3 in Moscow. Reports of S5 and S6 will be more common. Great fun can be had by using simple equipment made by ones own hands. The next part of this article will add a receive board to this simple rig and give it VFO capabilities.

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PART 2. OF THE SCD WILL BE FEATURED IN THE JUNE ISSUE OF LO-KEY

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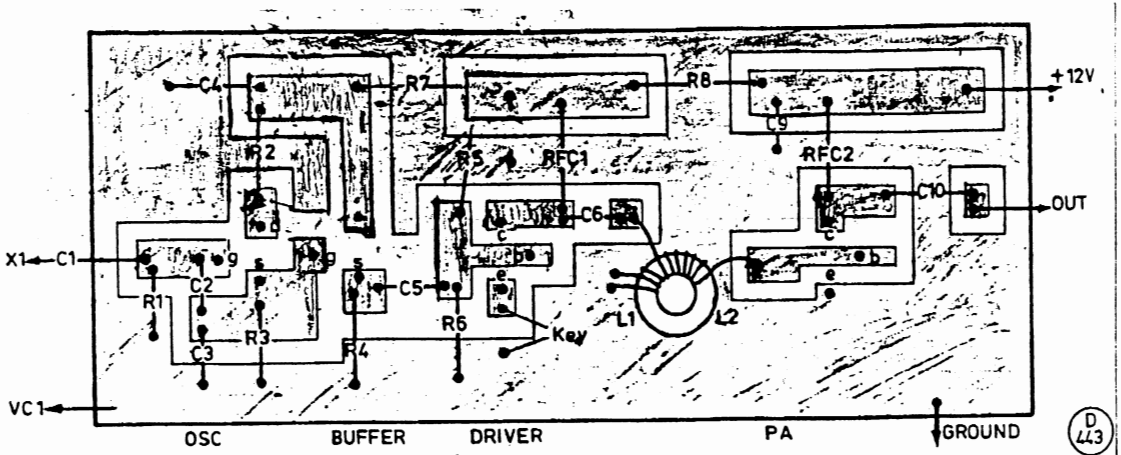
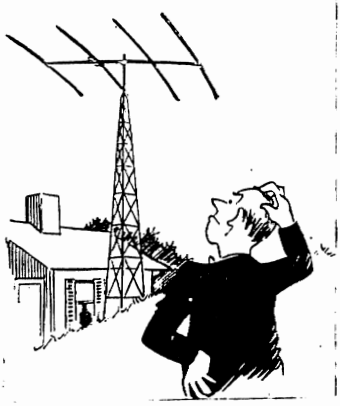


Fig. 2 TRANSMITTER LAYOUT (Actual size)



ANTENNA FARMING

HOW TO ADJUST ANTENNAS by Lew McCoy W1ICP

After looking over the current literature on antennas, I can well understand why all the questions. There are loads of articles about antennas, but none that I could find on how to adjust them, assuming that one wants to experiment on one's own. This of course led to this article. I can't say how thorough it is, but it might help some would be experimenter who could profit, from some of my experience.

Before I discuss testing and adjusting antennas, I think we need to get some basics out of the way. In today's world 50 ohm coaxial cable seems to be the only feed line amateurs want to use to feed antennas. This is not to say that open-wire and other types of feeders are not good infact, they are better in many installations. However, coax seems to be what everyone wants, so this article will be based primarily on using coax feed line.

IMPEDANCE AND ALL THAT STUFF

I think most newcomers have a problem understanding what coax is, and how it should be used. Coaxial feed line is made up of two conductors, an inner conductor that is surrounded by a dieletric (insulating) material, which in turn is covered by the outer conductor, usually coppe r braid. There is of course an outer covering over the braid for weather protection. The impedance of a coax line is determined by the spacing between the conductors and the composition of the dielectric material, used to separate the two conductors. In amateur radio the popular types of coax are RG8 and RG58, and other varieties that are all in the order of 50 ohms impedance. Actually this figure can vary a little, but we refer to it as 50 ohm cable.

One must keep in mind that the impedance of the coax does not change when feeding an antenna, it always stays at the same impedance. This is a very important fact when it comes to adjusting and tuning antennas. By using standing- wave indicators or power bridges that are designed for 50 ohms, the fact that we are dealing with a 50 ohm line makes our adjustments a lot easier. In the good old days, whenever they were, amateurs had to do a lot of groping in the dark because it was nigh onto impossible to do the things we take for granted today. We didn't have S.W.R. bridges to put in our 50 ohm line, so making antenna or feedline adjustments was hit or miss.

Let's assume we make a simple dipole, one half wavelength long say for 14 mhz. We go to the handbooks and find that the formula 468 divided by the frequency will provide us with the approximate resonate length for our half wave. If we study the handbook a little further, we find that the impedance of this dipole should be 70 ohms. Suppose we feed this antenna with 50 ohm coax. What should our match be?. It should be 50 divided into 70, or 1.4 to 1. The standing wave ratio is determined by dividing the impedance of the coax (that is always 50 ohms) into the impedance of the antenna, which as we will see, can vary considerably.

There is one other important point I should inject at this time. For all practical purposes, most of the S.W.R.

HOW TO ADJUST ANTENNAS (cont.)

indicators of the power bridge type are very accurate for our use, as long as the readings are below 3 or 4 to 1. (All but the very expensive bridges tend to lose accuracy above 3 to 1.) So if we put such a bridge in the 50 ohm coaxial line feeding our 14 mhz dipole, it should read 1.4 to 1. More impotant it should give that figure at the resonant frequency of the dipole. In other words, if one cuts the dipole to be resonant at 14250, it should read 1.4 to 1 at that frequency with the mismatch increasing as we go up or down in frequency. Unfortunately, life is never that simple, particularly in amateur radio.

The problem is that the impedance of a dipole depends on several different factors, how high it is above true ground, its proximity to nearby objects, and other things. However this article is about tuning and adjusting antennas, so there are ways to check and possibly correct the dipole impedance.

Let me first say that a matched dipole (1 to 1) S.W.R. is not normally important, at least it wasn't back in those good old days. When I say it isn't important, I mean that an unmatched dipole will radiate power just as well as one that isn't matched, assuming of course, we can get the power into it. However our problem is not with the antenna, but rather with the transmitters as they are designed today. We find that if our antenna load is not 50 ohms, or an S.W.R. of say less than 1.5 to 1, the transmitter will shut itself off. Therefore the main reason for having a matched system is not so much that it will peform any better, but simply we need a match to get our rig to work.

You will hear many amateurs make the statement that a resonant antenna is always better than one that isn't resonant. That is pure hogwash! As long as you can get the power into an antenna, the antenna will radiate just as well, whether it is resonant or not. There are exceptions, but as a rule you can take the above statement to the bank. Of course, if the above is true, then why bother to match and adjust antennas ? Why not put a Transmatch in the system and forget about matching ? Believe me, in many instanc-es the best and simplest way is to make a wire dipole, feed it with open wire line, and use a Transmatch. However this article is primarily about tuning and adjusting antennas.....but don't sell the Transmatch route short !

GETTING LOW SWR ON A DIPOLE

While I stated a moment ago that a resonant antenna is no better a radiator than a non resonant one, there are other considerations. For example, if we make a dipole resonant in

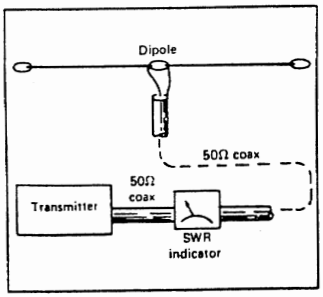


Fig. 1- Details of the arrangement for checking dipole resonance and s.w.r. Be sure to use the minimum amount of power for any s.w.r. readings.

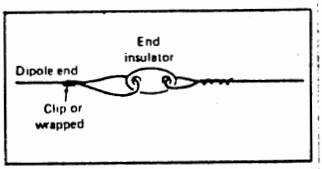


Fig. 2- The end of the dipole is run through the end insulator and then back to the antenna wire. The end wire can have a clip installed or just twisted back onto the antenna wire.

HOW TO ADJUST ANTENNAS (cont.)

the center of a desired portion of a band, usually (not always) the dipole will have a broader (lower S.W.R.) response across the entire band. How do we check to see if an antenna is resonant, where we desire it to be ? The simpest method, and one that is reasonably accurate, is to make a frequency run on the antenna with an S.W.R. bridge in the line. Let's say we cut a dipole 14250 khz, and get it up in the air. First install an S.W.R. meter in the coax line going to the antenna as per fig. 1, and don't have anything else in the line between the bridge and the antenna. Next set your V.F.O. to 14000 khz and feed enough power to the antenna to get an S.W.R. reading. Write down the reading. Let's say it's 2 to 1. Move the V.F.O. up to 14050 and take another reading, and write it down. Say it's 1.7 to 1. Do this every 50 khz across the entire band.

For the sake of our discussion, let's say that the S.W.R. goes as low as 1.3 to 1 at 14150 and then climbs up to 3 to 1 at 14350. For all practical purposes our dipole is resonant at the point of the lowest S.W.R. reading, or about 14150 khz. We could assume (by working backwards) the impedance of the antenna is somenear 65 or 35 ohms (65 or 35 ohms would give us an S.W.R. of 1.3 to 1). However the important thing we have discovered, is that even though we cut the antenna to the formula, it appears to be wrong for 14250 khz.

As I said earlier, there could be many reasons why the antenna impedance doesn't come out to be what the book says. However we are now at the cut and try method of correcting the error. Actually, if the antenna is resonant lower than desired, it means that it is too long for the frequency. By the same token, if it is resonant higher than desired, it is too short.

In our example, cut a few inches off each end of the antenna, measure it again, and see how far the S.W.R. curve is moved. If you don't like cutting off wire, there is a simpler trick. Make the dopole a few feet longer than required, and then loop the ends of the wire back through the end insulators and short the ends to the antenna wire itself. This method is shown in fig. 2.

In any case, the object is to get the right antenna length so that it is resonant on the desired frequency. If you are very lucky and everything happens in your favor, you may wind up with a dipole that matches the cable exactly with a 1 to 1 S.W.R. However don't be disappointed with an S. W. R. of 1.2 or 1.3 to 1 at resonance. Check your rig and see if it loads up to full rated power. If it does, there is no point in looking for any better match. Your antenna system for that dipole is as good as it is going to get.

There are many dipole matching methods described in the handbooks. However, my advice to anyone new to amateur radio is that it is not worth the time and effort (and probably expense) to get an exact 1 to 1 match for a simple dipole. If you can not achieve a close enough match for your rig to load properly, then you probably should install a Transmatch in the system. However, on 40 through 10 meters you should be able to come up with a satisfactory dipole to cover the band. The 80 meter band is another subject. I don't know of any home made dipole that will cover the entire band with a low enough S.W.R. for modern equipment. Typically, a dipole cut for 3750 khz and matched exactly 1 to 1 at resonance, will be radically different at the band ends. The S.W.R. will rise to very high values 8 to 1 or so, at the band ends.

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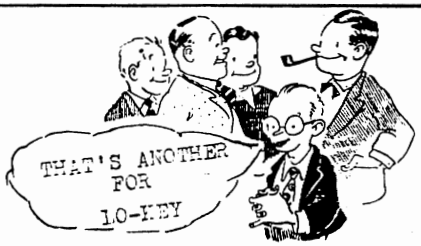
NEXT ISSUE OF LO-KEY WILL FEATURE.....

HOW TO ADJUST BEAM ANTENNAS (ANOTHER WORLD)

In the mean time Good Farming with your QRP antennas.

BITS AND PIECES



CLUB SCOREBOARD 1985-6

The new 1985-6 Club Score-board starts as from 1/4/85, and I am sure you will agree with me, that last year's Score -board, although getting away to a slow start, developed into a very interesting and fun activity. Elsewhere in this issue, you will find the rules, so that all members new and old start off even. At present there is no Scoreboard Manager, so I will ask all participating members to send their first progressive score sheets to Len O'Donnell, VK5ZF, 33 Lucas Street, Richmond, S.A. 5033, Australia. Please make sure these score sheets reach me by the 20th. June, which will give me time to get them into Lo-Key, in time for publication. Good Luck to all our members, I hope you all enjoy this years "Fun Run".

****

A THANK YOU

May I just say a few words of thanks, on behalf of the Club Committee, to the very thoughtful members who have included a donation to club funds, when renewing their annual subscriptions. It is particularly appreciated as the Committee is striving to get the finances out of the red. Thank you Gentlemen.

****

CLUB QSL CARD

At long last we are a little nearer to producing a QSL design, that would be suitable as a club card. Below is a design I have had made up for my own QSL purposes, and the artwork for this design has been completed. I would like to get some feedback from members, as to their thoughts on this particular design as our official club QSL card. As yet I have not had any fixed quotes from a printer.

AUSTRALIA

VK5ZF/QRP

OPERATOR: LEN O'DONNELL

Q.T.H.: 33 LUCAS ST., RICHMOND, S.A. 5033, AUSTRALIA

CONFIRMING QSO WITH

CALL SIGN	DAY	MONTH	YEAR	TIME (GMT)	FREQ Mhz	MODE	R	S	T

EQUIPMENT: ..... ***POWER OUTPUT:*** .....

ANTENNA: ..... ***PLSE QSL*** ☐ ***TNX QSL*** ☐

"WE DO MORE WITH LESS"

BITS AND PIECES (Cont.)

LATE ISSUE OF LO-KEY

I would like to apologise for the late issue of this issue of Lo-Key, as it is over a month late. This is due to several factors. Firstly I can no longer use my own personal typewriter, for typing up the copy for each issue, as the type is not consistent enough. It presents problems when the typing has to be copied on a copying machine. I am hoping the club can afford a reasonable secondhand typewriter by the next issue. This Lo-Key was typed at work durig my lunch break twenty minutes each day. When you take into account the fact that my typing skill amounts to using one finger, and a LARGE bottle of correcting fluid, you can see that it becomes quite a tedious exercise. Not withstanding the above mind shattering problems, I also have a developing health problem, that has caused me to be off from work for a week, and I could find myself in hospital before I am much older. From this explanation and apology, I think you will see that the delay had a genuine cause. Your Committee is looking for a new Editor at the moment, and hopefully with less excuses than I have. In the meantime please be as patient as you can, we are working on a solution.

****

WOULD ALL MEMBERS PLEASE CHECK THE DATE ON THE ADDRESS LABEL OF EACH ISSUE OF LO-KEY. THIS IS FOUND ON THE ENVELOPE IN WHICH THE JOURNAL IS INSERTED FOR POSTAGE. THIS IS THE CLUB'S ONLY MEANS OF ADVISING THE MEMBERS OF THEIR PARTICULAR RENEWAL DATE. WE DO NOT WANT TO LOOSE YOU BECAUSE OF FAILURE TO RENEW. WE JUST CAN NOT AFFORD TO KEEP SENDING OUT INDIVIDUAL REMINDER NOTICES.

HELP US TO HELP YOU

****

HISTORY OF QRP

Before you toss away those old radio magazines, after your latest shack clean up, check them for any articles on early QRP activity or circuit diagrams etc. I am looking for any revalent information, that that could help trace the history of QRP over the years. If you do happen to come across any such information, please get in touch with Len VK5ZF (1). Thank you.

****

Lo-Key is looking for circuits etc., for simple QRP gear suitable for the new amateur frequencies, such as 10, 18 and 24 mhz. We as a QRP CW club should be encouraging our members to fly the flag on these bands. I am hoping to run a series of articles in Lo-Key on transmitters, receivers, antennas, etc for use on these frequencies. One of our members scored a total of 708 points in the Scoreboard contest. Not bad on a band that most of us are still to hesitant to operate on. That of course was 10 mhz, so let us start to organize some gear to operate on these bands. Along the same line I believe that we should also be organising and promoting the use of both QRP and CW on the VHF bands. As a lot of our activities include the art of "Home-brewing" our gear, it should not be too hard for us to put together some simple QRP CW gear for VHF use. If I have stired your interest, and you have some suggestions, circuitery etc. please get in touch with me.

****

Bits and Pieces notes by Len(1)

1984 - 5

CLUB SCOREBOARD

NOVICE SECTION

STN		3-5					21		28				TOT
VK3PGE		393					14						407
VK3PEX		44					6						50

FULL CALL SECTION

STN	1-8	3-5	7	10	14	18	21	24	28	52	144	430	TOT
VK7VV	3	82	190		788		50						1113
ZL1ATW		192	66		244		255		72				829
W1JVY				708									708
VK3CBO		58	2		517		92		2				671
VK3CGE		330	73		25								428
VK4SF		107	93		88		3						291
VK5BJF		84	59	14	59	3	29	26	4				260
VK3CVF		17	8		8		6						39

HERE ARE THE WINNERS...

CONGRADULATIONS TO...

NOVICE SECTION...VK3PGE NEIL... 1ST. PLACE...407 POINTS

VK3PEX JOHN... 2ND. PLACE... 50 POINTS

FULL CALL SECTION...VK7VV RAI.... 1ST. PLACE..1113 POINTS

ZL1ATW MATT... 2ND. PLACE.. 829 POINTS

WA1JVY MARK... 3RD. PLACE.. 708 POINTS

Certificates will be issued to the place getters, and they can be justly proud of their efforts. It was a terrific and close finish, with Neil's combined scores totalling 835 points. Second place could have been interesting had Neil a Full Call for the whole year. Mark's effort of 708 points on one band, was particularly good. Thanks to all the entrants for making "Scoreboard the success that it was, and thanks to Kevin for his compiling of these results.

THE 1985-86 SCOREBOARD STARTED ON 31/3/85

BE IN IT

CONTESTS

VK VERSES THE WORLD CONTEST RESULTS

Here are the results of the 1984 contest, sponsered by the CW OPERATORS QRP CLUB.

1ST. PLACE WORLD, 1ST. PLACE QRP 24HR. SINGLE OP. MULTIBANDAND 1ST. PLACE G/LAND

Congradulations to.....

Gus G8PG (50)

****

1ST. PLACE VK 24HR. QRP SINGLE OP., 1ST PLACE WORLD SINGLEBAND AND 2ND. PLACE OVERALL WORLD

Congradulations to.....

JACK VK4SF (14)

****

1ST. PLACE JA 24HR. QRP SINGLE OP. MULTIBAND, AND 3RD. PLACE OVERALL WORLD

Congradulations to.....

WATANABE JR3SQZ

****

The individual scores were.....

G8PG...QSOs..23.....POINTS 125 X 11 MULTIPLIERS.....= 1375POINTS

VK4SF..QSOs.. 3.....POINTS 13 X 2 MULTIPLIERS.....= 26POINTS

JR3SQZ.QSOs.. 2.....POINTS 12 X 2 MULTIPLIERS.....= 24POINTS

****

It was most unfortunate that band conditions could only be described as disasterous during the contest, and this probably accounts for the few entries. Heartiest congradulations to our three certificate winners, perhaps conditions will be a little better next year.

****

Thanks to Col VK2SX for conducting the Contest and tabulating the results. Col has intimated that he has resigned from the club, so of course he has ceased to be our contest and awards manager. We thank him for his efforts, and wish him the very best for the future. Finally we congradulate Col on his new full call. Great OM. Do we have a member willing to take on this job ?.

WQF NEWS

A PAGE OF INTERNATIONAL QRP ACTIVITIES & INTEREST

Here is a list of QRP Contests and Activities for the rest of 1985. It has been gleaned from the "BOLETIN INFORMATIVO", of the EA QRP Club.

20/21	April	A.R.C.I. Spring QRP QSO Party.
21	April	R.S.G.B. Low power Contest (QRP Sect.)
1	May..	ACGW-DL QRP/QRP CW Contest.
4/5	May..	G-QRP-Club Late Spring QRP SSB Activity week-end
15/16	July.	AGCW-DL QRP summer contest
21	July.	R.S.G.B. 3.5mhz Field Day
28	July.	ZS QRP Contest
21/22	Sept.	Scandinavian Contest (QRP Sect.)
28/29	Sept.	G-QRP-Club Late Summer QRP CW Activity week-end
5	Oct..	AGCW-DL Straight Key Party (QRP Sect.)
12/13	Oct..	A.R.C.I. Fall QSO QRP Party
20	Oct..	R.S.G.B. 21mhz CW contest (QRP Sect.)
26/27	Oct..	CQ WW SSB Contest (QRP Sect.)
1/7	Nov..	HA QRP CW Contest (Check date seems odd)
16/17	Nov..	VK versus the World QRP Contest
23/24	Nov..	CQ WW CW Contest (QRP SECT.)
7/8	Dec..	TOPS 3.5mhz CW Contest (QRP Sect.)

****

In the area of WQF information and activities, there has been nothing received by me, even though the CW OPERATORS QRP CLUB has applied for membership, to the WQF, over twelve months ago. Actually I have not received any confirmation that the Club has been accepted as a member of WQF as yet. This is not very encouraging to new clubs. Seeing that the position of WQF DELEGATE is one of the areas that has not been taken... at the moment, I have written to the President of the WQF, asking why we have not heard any thing from WQF HQ. Hopefully I will have received some answers by the time that the June issue of Lo-Key is published. Please do NOT hold your breath.

****

Is there any Club member who would like to have the imposing title of WQF DELEGATE after his name. The Club is looking for an ENTHUSIASTIC member to take on this position on the Club Committee. It is not a hard job, and consists of liaising by letter with WQF HQ, and the various world clubs, who make up the WQF. Organising a two way flow of information, and even have a page of your own to write up in each issue of Lo-Key. Do I have a member prepared to give this job his best shot, and so become one of the team trying to make our Club more interesting for our members. The job is up for grabs, be in it.

****

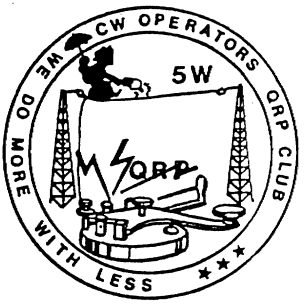
By.... Len O'Donnell
VK5ZF (1)

United We Stand . . .

Have You Signed Up Any New Members Lately?

MEMBERSHIP LIST

AS AT 31/3/85



1 VK5ZF Len O'DONNELL 33 Lucas St., RICHMOND S.A. 5033
3 VK7VV Rai TAYLOR 25 12th Ave., WEST MOONAH TAS 7009
5 VK2AKE Jim EDWARDS P.O. Box 385 BOWRAL N.S.W. 2576
7 VK3BPG R. BEDFORD 45 Milne St., CRIBB POINT VIC. 3919
8 VK5BA Malcolm HASKARD Bassnet Rd., ONE TREE HILL S.A. 5114
10 VK2KSA Stan BROOKS 2/10 Blight St., WOLLONGONG N.S.W. 2500
11 VK4BML Ted LECA 5 Clement St., WOORIM, BRIBIE IS. QLD. 4507
14 VK4SF Jack FORD 222 Warwick Rd., CHURCHILL IPSWICH QLD. 4305
15 VK4RE Roy HILDRED P.O. Box 387 TOOWOOMBA QLD. 4350
16 VK5FN Marshall EMM G.P.O. Box 389 ADELAIDE S.A. 5001
21 VK2ECB Tony BADGER U1/28 Brooks St., NEWCASTLE N.S.W. 2300
25 VK6AHM Harold MOORE C/O P.O. LAVERTON W.A. 6440
28 VK6KRG Rod GREEN 72 Yelverton St. South, DONNYBROOK W.A. 6239
29 VK3DJV Glyn GIBBONS-JOHNS R.S.D. Forrest Rd., BARWON DOWNS VIC. 3243
33 VK5BVJ Murray JONES Pelican Point C/O P.O. CARPENTER ROCKS S.A. 5291
34 ZL1ATW Matt MEENAGH 23 Herbert St., KIHIKIHI TE AWAMUTA NEW ZEALAND
41 VK2QB Leo PINKEVITCH 20 Cathrine St., KOTARA SOUTH N.S.W. 2288
43 VK5AKZ Kevin ZIETZ 41 Tobruk Ave., ST MARYS S.A. 5042
44 ZL1BRK David STEWART 11 Kerry Dell HOWICK AUCKLAND NEW ZEALAND
45 VK3BMJ Col REID 16 Fyfe Ave., RINGWOOD VIC. 3134
46 W1TUG Walt MILLS 15, HAWTHORNE AVE., NEEDHAM MASSACHUSETTS 02192 U.S.A.
47 VK3DXH Lindsay LaPOUPLE 5/10 Gurner St., ST KILDA VIC. 3182
48 VK5ANL Norm LEE 25 Ralston St., NORTH ADELAIDE. S.A. 5006
49 VK3XU Drew DIAMOND 43 Boyana Cres., CROYDON VIC. 3136
50 G8PG/GW8PG Gus TAYLOR 37 Pickerville Road, GREASBY MERSEYSIDE, L49 3ND ENGLAND
51 WIA-L20944 C. POPE 17 Goode St., DUBBO N.S.W. 2830
52 VK3KGY Fred KOLB 6 Claronga Street, SOUTH OAKLEIGH VIC. 3167
53 VK7SA Maurie POTTER 19 Blessington St., SOUTH ARM TAS. 7022
54 VK6ATM T. MAITLAND P.O. Box 88 , WYALKATCHEM. W.A. 6485
55 VK4FAL Jim LYALL 8 Queen St., MARYBOROUGH. QLD. 4650
56 ZL3PM Paul deH. McGEE, 1 Craigieburn St., DARFIELD. NEW ZEALAND
57 VK5BJF Jeff WALLACE Box 344, CLARE. S.A. 5453
58 VK5AGP G. PHILLIS 413 The Terrace, PORT PIRIE. S.A. 5540
59 ZL2BJC Iain HILL 29 Holdsworth Ave., UPPER HUTT NEW ZEALAND
60 VK4AXA J. PETERSEN 181 Brisbane Rd., BOOVAL IPSWITCH QLD. 4304
61 VK5AWS W. STEPHENS 34 Threadgold St., PT. PIRIE. S.A. 5540
62 VE3JFH Ed SHIELDS 412 Talfourd St., SARNIA ONT. N7T IR6 CANADA
63 N7DGZ Bob BROWN 504 Channel View Drive, ANACORTES. W.A. 98221 U.S.A.
64 KA5IVA Louis SMITH 4013 S. Sandusky Ave., TULSA, OKLAHOMA 74135 U.S.A.

MEMBERSHIP LIST (Cont.)

65 VK3OX Mark CAMPBELL 20 Bostock St., WARRNAMBOOL VIC. 3280
66 VK5PH Eric STEELE 13 Third St., MINLATON S.A. 5575
67 W6SKQ Bob SPIDELL 45020 N. Camolin Ave., LANCASTER CALIFORNIA 93534 U.S.A.
68 WB2OUQ David WERNER 68 Gordon Ave., LANCASTER. NEW YORK 14086 U.S.A.

69 VK7ZO Graham RANFT 3 Newlands Ave., LENAH VALLEY TAS. 7008
70 WA1JVY Mark PEREIRA 4633 Acushnet Ave., NEW BEDFORD MASSACHUSETTS 02745 U.S.A.
71 NW6F Bob JACOBS P.O. Box 2122 CAPISTRANO BEACH CALIFORNIA 92624 U.S.A.
72 VK2AW Basil DALE 20/112 Shirley Rd., WOLLSTONECRAFT N.S.W. 2065
73 YU3XL Krizanic KONRAD (RADO) Bezenskova CELJE 63000 YUGOSLAVIA
74 K7DAP Alan MacALEVY E660 Pickering Drive, SHELTON WASHINGTON 98584 U.S.A.

75 VK5NDC Don CALLOW 5 JOYCE St., GLENGOWRIE S.A. 5044
76 VK3CBO Rod ADAMS 6 Hague Rd., WODONGA VIC 3690
77 VK3CPC Peter COOKE 44 Broadway ELWOOD VIC 3184
78 KV7X Jay STURDIVANT P.O. BOX 3027 BELLINGHAM WASHINGTON 98227 U.S.A.
79 SWL/ZL Mark DONALDSON P.O. Box 899 PAPAKURA NEW ZEALAND
80 VK6NQL P. SCALES B34 S.M.Q. PARABURDOO W.A. 6754
81 KA4LKH Barry STRICKLAND RT1 BOX 216 SYLVANIA ALABAMA 35988 U.S.A.
82 VK3BGH G. HARRIS C/O P.O. BOX 126 LILYDALE VIC 3140 Station EAST RINGWOOD
83 WB6MTR Winfred FRANKS 1001 Sylmar Space 107 CLOVIS, C.A. 93612 U.S.A.
84 VK3CIG Dick McINTOSH BOX 159 WHOROULY EAST VIC. 3735

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PLEASE NOTE....

With regard to the above current membership list...
(34) ZL1ATW Matt, as from 14/5/85 QTH will be, 82 Kemp Road, KeriKeri, Bay of Islands, N.Z.

(46) W1TUG Walt, used to be in Marshall Is. (KX6GO), has now returned to the U.S.A.

The list shows all FINANCIAL members as of 31/3/85

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