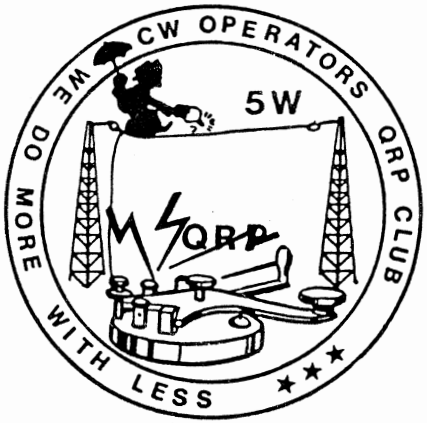
LO·KEY

NEWS BULLETIN



PUBLISHED QUARTERLY

CONTENTS

"WE DO MORE WITH LESS"!

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

Information centre

BULLETIN EDITOR Len O'Donnell VK5ZF
ASSIST. BULLETIN EDITOR Kevin Zietz VK5AKZ
ORGANISER Len O'Donnell VK5ZF
AWARDS AND CONTEST MANAGER Col Stevenson VK2VVA
PUBLIC RELATIONS Rai Taylor VK7VV
SCORE BOARD MANAGER Leith Cotton VK5LG
SECRETARY Leith Cotton VK5LG
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VK4	Paul Newman VK4APN	VK8	VACANT
		DX	VACANT

****

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 CW operating on ALL frequencies allocated to the Amateur Service.

ANNUAL MEMBERSHIP FEE

VK....$8, ZL....Lo-Key by Surface mail....$A9, ZL....Lo-Key by Air mail....$A10, DX....Lo-Key by Surface mail....$A9, DX....Lo-Key by Air mail.... $A12.

Please make all Money Orders and Cheques payable to the CW OPERATORS QRP CLUB.

****

QRP CALLING FREQS.

CLUB CALLING FREQS.

3530, 7025, 14059, 21130, 28125.

INTERNATIONAL CALLING FREQS.

3560, 7030, 14060, 21060, 28060.

CLUB QRP CW ACTIVITY

0930Z Tuesdays 3530(approx)

****

NEWS BULLETIN

The Club news bulletin LO-KEY is issued quarterly in March, June, Sept, and Dec.

****

CORRESPONDENCE

Please address all letters to the **SECRETARY**, CW OPERATORS QRP CLUB,
64 WEROONA AVE., PARKHOLME, S.A. 5043, AUSTRALIA.

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THE COMMITTEE

wishes

MEMBERS

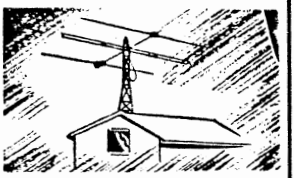
a

Joyous Christmas

and a

Happy New Year

DX MEMBER'S PAGE



ED SHIELDS VE3JFH MEMBER NO. 62

It is really great to have a member up there in Canada, and here are a few details about Ed's gear. My QRP rigs are a Heathkit HW8 and an Argonaut 515. The antenna systems in use are a TH3JR beam at 55ft. Next is a GEM Quad at 20ft, then there are trap dipoles at 35ft. Lastly there is a HYGAIN vertical on top of the garage. According to the Editor's reckoning the above have to be called an antenna farm, and Ed's tally of 109 worked and 91 verified supports this very strongly, considering it is on QRP CW. Congradulations to Ed, that surely is a mighty effort. Ed goes on to say that a few weeks ago he bought a KENWOOD TS130V at a Swap Shop in Detroit as he could not resist the $300 price tag. This is his QRO rig. The home QTH of VE3JFH is Sarnia Ontario, and he is also a member of the G QRP club, QRPARC, and RNARS. Ed is certainly a busy man.

****

JAY STURDIVANT KV7X MEMBER NO. 78

Here is a little of what Jay has to say about himself. I am very active with QRPCI, and have been a member for about three years. DX chasing and contesting, both with QRP are my main interests in Ham Radio. My DXCC/QRP tally starting in Jan. '84 have grown to 62/48, and hopefully the Buro cards will increase the percentage. I have four QRP rigs. but use only one antenna, which is a BUTTERNUT GROUND PLANE WITH SEVENTY RADIALS of various lengths. It has performed very well for me this last year, especially on 7 and 3.5mhz. The main rig here is an ICOM 730 complete with CW FILTERS. I also use my HEATHKIT HW8, and a 8P6 special redesigned for 30 meters. In the field I enjoy a little known commercial rig for 3.5mhz., which runs one watt out, called the TEDCO MODEL 1. My QTH is adjacent to a lake, which may be another factor of my QRP success. Correspondence for skeds with QRP is definitely encouraged.

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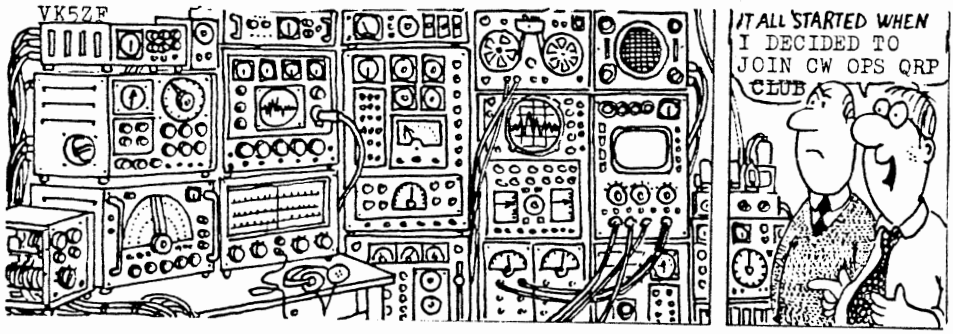


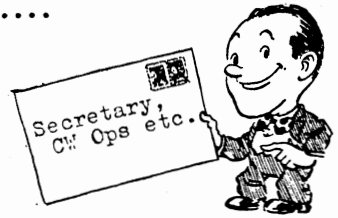
NEW MEMBERS

a hearty welcome to

74	K7DAP	ALAN MacALEVY	E660 PICKERING DRIVE, SHELTON WASH., 98584 U.S.A.
75	VK5NDC	DON CALLOW	5 JOYCE ST., GLENGOWRIE, S.A. 5044
76	VK3BCO	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 WASH., 98227 U.S.A.
79	SWL/ZL	MARK DONALDSON	P.O.BOX 899, PAPAKURA, N.Z.
80	VK6NQL	P. SCALES	B34, S.M.Q., PARABURDOO, W.A. 6754

.....

MEMBERSHIP RENEWAL



Renewing of annual membership fees will start in the next few months, and to help members to know exactly when this occurs, we have included a date on the address label of this issue (no.4) of Lo-Key. We are hoping that this will serve as a reminder, to those who have perhaps lost their initial receipts. The date shown on the label is the date that your particular membership is due for renewal. This is about the only way that the Club can notify its members of renewal dates, as the Club can not afford to send out individual notices to each member. We are hoping for members co-operation in this matter, as we do not wish to lose our members, because they have forgotten to renew their membership.

.....

1 YEAR OLD

On the 7th Dec. '84 the Club passed it's first birthday. Twelve months ago we had 1 member, and today we have grown to 80 members, so we have not done too badly. Looking back over the year, it has not been easy and we have had to learn as we grew. Financially we are in the red, but during the next 12 months that should improve when the revised fees begin to take effect. I am hoping that after the election of the Club Committee, we will have a full working committee to run the club. To those members who are helping to run the club and to others that are supporting our efforts may I encourage you to continue to give the club your support, over the coming 12 months. I also want to sincerely thank you for your efforts during our first year of existence. We URGENTLY need a President and an Editor for Lo-Key, so please give it your ernest consideration when the election takes place, and please advise our Secretary by the 19th. Feb. '85, of your nomination.

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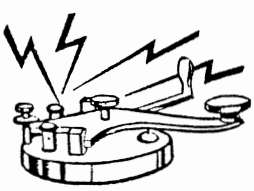


The Communications Department

CLUB BUSINESS

"CALLING ALL CLUB MEMBERS"

ELECTION

As of the 7th. Dec '84 the CW OPERATORS QRP CLUB is one year old, and that of course means that we must hold an Election, for the Committee positions to help run the Club. It is Club policy to hold annual elections, to allow members who have held a Committee position for twelve months, to reconsider their commitment and act accordingly. ALL positions will be declared vacant on Feb 19 th. '85, so any member currently holding a Club Committee position, must notify the Secretary (Leith VK5LG) in writing by this date, that he wishes to carry on for the next twelve months. Failure to notify the Secretary in writing by Feb 19th. '85, will be automatically taken to mean that the member no longer wishes to act in that capacity. This applies to ALL positions on the Committee, from State Co-ordinators to Organiser.

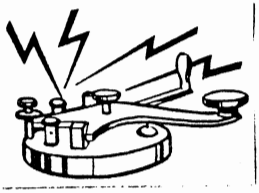
It is realised that the Club is not going to be overwhelmed with nominations, for any of the Committee positions. So in the unlikely event of the Secretary receiving two or more nominations for any one position, an election will be held for that particular position. In case there is any member who would like to help in running our Club, the positions on the Committee have been listed. Any person interested in filling any of these positions, can have full details of any position by getting in touch with the Secretary. It would be pointless filling up this issue of Lo-Key with pages of run-down on the various positions. Here is the list.....

1. ORGANISER
2. SECRETARY
3. TREASURER
4. PRESIDENT
5. EDITOR
6. ASSISTANT EDITOR
7. SCOREBOARD MANAGER
8. CONTEST AND AWARDS MANAGER.
9. PUBLIC RELATIONS MANAGER
10. WQP DELEGATE.
11. STATE CO-ORDINATORS
12. TECHNICAL PROBLEM ADVISER
13. TECHNICAL EDITOR

If you do decide to help in running the Club, there is some commitment required. Therefore if you are not prepared to freely make this commitment, there is little point in taking on the job in name only.

****

THE CW OPERATORS QRP CLUB PROMOTES THE USE OF BOTH QRP AND CW. WE ASK YOU THE MEMBERS TO SUPPORT YOUR CLUB IN THESE EFFORTS.



The Communications Department

CLUB BUSINESS

I am very happy to announce that at long last the Club, has some one willing to take on the Committee position of Secretary. Leith VK5LG Member no. 18 has informed me, that he will give it a go, and will carry on up to the annual election of the Club Committee on the 19th. Feb '85. As a matter of fact Leith started his new job back in early Nov., and is now engaged in answering the back log of Club correspondence. The position of course will be declared vacant on the 19th Feb, in line with Club policy, when it is hoped that Leith or somebody else will take the job on for at least the next twelve months. From now on please address all correspondence of a general nature to

SECRETARY,
CW OPERATORS QRP CLUB,
64 WEROONA AVE.,
PARKHOLME,
S.A. 5033,
AUSTRALIA

I would like to say thank you to Leith, for tackling the Secretary's job, which will ease the work load sitting on my shoulders at present. Correspondence for Lo-Key can still be sent direct to me (Editor) until the Election and then we will have to see, who comes up with the Editors job.

****

The above is not the end of the good news, no sir. It also gives me great pleasure to announce that the Club now has a Treasurer, who is Kevin VK5AKZ member no. 43. Kevin has kindly consented to look after the Club's finances, and will continue in this capacity until the election, when it is hoped he will nominate for a full year. Kevin also assists as membership list organiser and Lo-Key label printer, besides helping with the printing of Lo-Key.

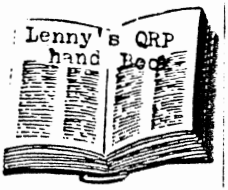
****

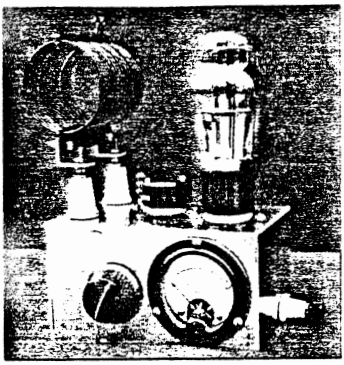
Now if we could find some one to stand as President of our Club, we would have a full three member Committee to run this Club. Combine this Committee with the State Co-ordinators, and we now begin to have a Club run by the members for the members. This is the ideal set up, rather than our present one man show. It would mean doing away with the Organiser position, which was really created out of necessity, because of one man having to do all three jobs, under the one title. This would mean a more democratic type of Club, which is a lot more satisfactory than what we nave got at present. Do we have ONE member who is prepared to STAND for the Committee position of PRESIDENT at our Feb 19th '85 election of a Club committee.

****

THE CLUB COMMITTEE ELECTION IS ON 19th. Feb. 1985. WE URGENTLY REQUIRE A PRESIDENT AND EDITOR FOR LO-KEY. PLEASE SEND YOUR NOMINATION TO THE SECRETARY AS SOON AS POSSIBLE.

A PAGE FROM LENNY'S QRP HANDBOOK





WITH CHASSIS AREA THE SAME AS THAT OF A POSTCARD, THIS LITTLE RIG PACKS QUITE A WALLOP

"THE QRP RUNT 5"

Having spent in excess of 50 years building circuits around valves, I trust that the members will forgive me for this return to the magical era of 1935 in Amateur Radio. Many "Old Timers" like myself will remember the "RUNT 60" and the QSL 40" described in QST. The results obtained from these little rigs were fantastic. So for my last effort as Editor of Lo-Key, I have taken the circuit of the QSL 40, and with suitable modifications arrived at what I have called the QRP RUNT 5. Layout and chassis size are not particularly important, and can be arranged to suit any old chassis you may have on hand. That shown in the photographs measures 5½" X 3½" the size of a QSL card (hence the name). Depth was 2½". The circuit of the transmitter is straight forward. Points to watch are the value of R1 (experiment), and voltage fed to the screen of V1. Correct voltage will be shown by the lack of chirping when the rig is keyed. V1 can be any valve such as 6V6G, 6AQ5, 6CL6, 6CH6, 6L6G, or even an 807. Coil and condenser values can be any combination of the two, that will resonate at the crystal frequency. This transmitter could be made to operate on 1.8mhz 3.5mhz, 7mhz, and 10mhz, or could be made to operate on all four bands by using plug in coils. Keep the DC input to about 7.5 watts and you should be somewhere near the required 5 watts output. Power supply is built on seperate chassis.

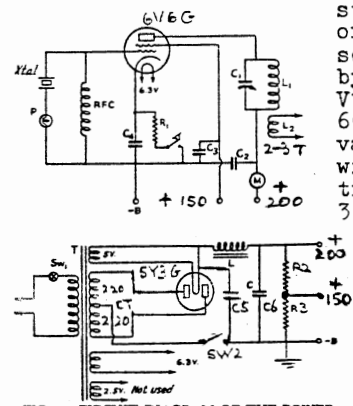
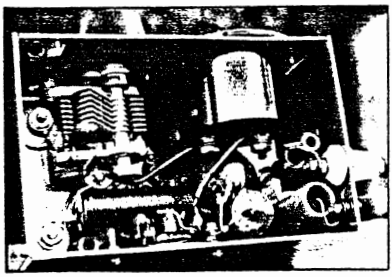


FIG. 3—CIRCUIT DIAGRAM OF THE POWER SUPPLY

PARTS LIST

V1...6V6G,etc, Coil &Condenser(L1 C1)suit Xtal C2,3,4, .1ufd. 600v..,R1 400 ohms 10W., RFC 2.5mh., Xtal to suit freq., M 0-100ma., P. 30ma pea lamp, Sundry hardware.
T. Transformer 220V-CT-220V Sec. 6.3V,5V, L. Filter choke 12H 50ma., C5,6, 8ufd 500V... SW1,2. off/on switches, R2,3 20W 10 K/ohm resistors,Valve sockets, wire, nuts/bolts etc.

Use this rig in conjunction with balanced type of ATU, and center fed open feed antenna, such as described in Antenna Farming section of this issue of Lo-Key. and you could be amazed as to how far it gets your signal out.

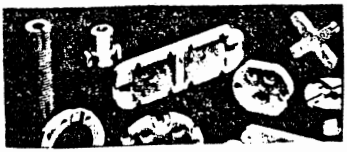


THE BOTTOM VIEW SHOWS LITTLE SPACE TO SPARE

The socket for the power leads is on the lower chassis edge, slightly to left of center.

HAVE FUN AND GOOD QRPING TO ALL

BITS 'N PIECES



TOP BAND(160m.)OPERATION

As there was no interest at all expressed, in a suggested Club involvement in exploring the possibilities of QRP CW DX on this band, the idea has now been abandoned.

****

CLUB JUNK BOX

As there was no interest at all expressed, in a suggested Club involvement in running a spare parts "Junk Box" for the benefit of members, locking for parts for "Home Brewing" projects, the idea has now been abandoned.

****

JOHN MOYLE FIELD DAY

On contacting the WIA National Contest manager, our Secretary Leith has been informed that there may be an alteration to the usual Feb. date for this event. There appears to be quite a deal of confusion going on at present, in WIA contest circles, so best we as a club forget the John Moyle this year. Apart from the confusion in regard to the date of the contest, it does appear that our members are not showing any interest in this event, as no support for it, has been received by our Club Organiser.

****

TECHNICAL ARTICLES FOR LO-KEY

I am very happy to report that there has been a good response from our members with articles for the News Bulletin, during the last few weeks. It appears that we will be able to run a high standard of the technical section for a few issues. To the members who have sent in articles, I say thank you very much indeed, and assure you that your efforts will be printed as space permits, in future issues of Lo-Key. To those members contemplating sending in an article may I say that the Editor needs all he can get, so please continue to support your Club in this matter. There is every chance of the Club putting out our own QRP Handbook, when sufficient information has been gathered. SO PLEASE KEEP THOSE ARTICLES COMING.

****

NEWS BULLETIN LO-KEY

You will recall that in the last issue of Lo-Key, my assistant editor and myself did ask the membership for some feedback, as to how you liked the new format. Unfortuneately not many members did let us know your views, which is a little disappointing. Never the less there were a few who did, and Kevin and myself thank you very much. Of the letters we did receive, they all liked the new format. As this could well be the last Bulletin that Kevin and myself will be responsible for (Election coming up), we both would like to say thank you to those members, who assisted us with articles and information, which made our task a little easier. We trust that you will give the same support to who ever takes the job on.

****

AWARDS

QRP WORKED ALL CONTINENTS AWARD (WAC)

By Fred Bonavita

W5QJM (31)

The International Amateur Radio Union (IARU) has finally approved a QRP endorsement for its well known WAC award, effective Jan 1 1985. A sticker endorsing the standard WAC certificate for low power operating, will be available for proof of contacts with Hams in the six continents, for QSOs on or after Jan 1. It is not available for contacts made prior to that date, according to the IARU rules.

Power during the contacts must not exceed 5 watts output, or 10 watts input the rules stipulate. The effort to secure the QRP endorsement began in July 1983 at the IARU meeting in Cali Colombia, when the idea was advanced by Carl Smith WOBWJ, vice president of Region 2, at the request of some union members. It won final approval at the IARU meeting last summer in Paris.

To qualify for the award, an applicant must submit QSL cards from amateurs in each of the six continental areas, as defined by the IARU rules, and as shown on the ARRL world map. No photo copies of cards are acceptable. QSLs must show contacts made from one station, in term of callsign (this rule is waived in the case of a change of callsign, because of a license upgrade.) From one location (an area or metropolis not exceeding 40 kilometers or 25 miles in diameter), and the mode and/or band used for any endorsement applied for.

The IARU offers this guideline in determining the area of a station located adjacent to a continental boundry. NORTH AMERICA includes Greenland OX, and Panama HP. SOUTH AMERICA includes Trinidad & Tobago 9Y,: Aruba, Curacao & Bonaire PJ2-4,: and Easter Island CEO,: ASIA includes Ogasawara Islands JD1,: Maldives 8Q,: Socotra Island 70,: Abu Ali Islands J2/A,: Cyprus 5B,ZC4,: and Ankara TA2.: OCEANA includes Minami Tori-shima JD1,: Philippines DU,: West Malaysia 9M6-8,: INDONESIA YB,: EUROPE includes all the 4th and 6th call areas of RSFSR UA4-6,: Instanbul TA1,: All Italian Islands I,: and Azores CT2,: AFRICA includes Ceuta and Melilla EA9,: Madeira CT3,: Gan Island VS9M,: French Austral Territory FB8,: Heard Island VK0,:

After verification QSL cards will be returned, and the award will be sent soon afterward. There is no application fee for WAC. However a self addressed, stamped envelope must be included for the return of all cards. If the cards are to be returned by registered or certified mail, sufficient remittance must be included to cover the costs. Check with local postal authorities to verify charges. Amateurs from the USA, Canada and those countries without IARU representation must use a special WAC award application form. Send a large self addressed, and stamped envelope to IARU, PO Box AAA, Newington, Connecticut 06111, USA. USA and Canadian applicants also must have a current membership in the ARRL or CRRL. All other applicants must apply through their respective countries member society in IARU.

THE EDITOR'S PRAYER

LORD THOU KNOWEST BETTER THAN I KNOW MYSELF THAT I AM GROWING OLDER, AND SOME DAY WILL BE OLD. KEEP ME FROM THE FATAL HABIT OF THINKING THAT I MUST SAY SOMETHING ON EVERY SUBJECT AND ON EVERY OCCASION.
RELEASE ME FROM MY CRAVING TO STRAIGHTEN OUT EVERYBODY'S AFFAIRS.

MAKE ME THOUGHTFUL BUT NOT MOODY, HELPFUL BUT NOT BOSSY. WITH MY VAST STORE OF WISDOM, IT SEEMS A PITY NOT TO USE IT ALL. BUT THOU KNOWEST LORD, THAT I WANT A FEW FRIENDS AT THE END.

KEEP MY MIND FREE FROM THE RECITAL OF ENDLESS DETAILS. GIVE ME WINGS TO GET TO THE POINT. SEAL MY LIPS ON MY ACHES AND PAINS. THEY ARE INCREASING, AND LOVE OF REHEARSING THEM, IS BECOMING SWEETER AS THE YEARS GO BY. I DARE NOT ASK FOR GRACE ENOUGH TO ENJOY THE TALES OF OTHERS' PAINS. BUT HELP ME TO ENDURE THEM WITH PATIENCE.

I DARE NOT ASK FOR IMPROVED MEMORY, BUT A GROWING HUMILITY AND A LESSING COCKSURENESS WHEN MY MEMORY SEEMS TO CLASH, WITH THE MEMORIES OF OTHERS. TEACH ME THE GLORIOUS LESSON THAT OCCASIONALLY I MAY BE MISTAKEN.

KEEP ME REASONABLY SWEET, IDO NOT WANT TO BE A SAINT. SOME OF THEM ARE SO HARD TO LIVE WITH, BUT A SOUR OLD PERSON IS ONE OF THE CROWNING WORKS OF THE DEVIL.

GIVE ME THE ABILITY TO SEE GOOD THINGS IN UNEXPECTED PLACES, AND TALENTS IN UNEXPECTED PEOPLE. AND GIVE ME O LORD, THE GRACE TO TELL THEM SO.

****

Thanks to the unknown author, and thanks to the unknown person who sent it in. I know that it has got nothing to do with QRPing, but I like it, and wanted to share it with you, Editor.

ANTENNA FARMING

TAKING A DEEPER LOOK AT THE UNIVERSAL ANTENNA by Fred Bonavita W5QJW (31)

Drew Diamond WB2KUU has done an outstanding job compiling his QRP equipment handbook, and I hope most Club members have obtained a copy. There are several circuits in there with which I am familiar, and many others I have seen for the first time. There is a good deal of material there for the builder and experimenter.

The excerpt at pages 26-30 from Bill Orr's Wire Antennas is a good choice for this handbook. That antenna is a favourite with many QRPers in the U.S., and has been in use, or variations of it have been in use at W5QJW for several years, and with good results. There are however, a a few points about this antenna not covered by Mr. Orr, and which may be of interest to the QRPer. Look first at the accompanying diagram, which is the same as the one on page 26 of Drew's handbook but labeled differently. (I will be working here with measurements in feet, so bare with me). The most commonly used dimension for the flat top of this Universal Antenna is 102 feet (51 feet each side of the center feed point.) Feedlines come in a variety of types, but the most popular in the U.S. is 450 ohm line, either open wireline or an insulated ribbon line similar to 300 ohm twin lead, but with about 15/16ths of an inch spacing between the wires. (I will have more comments on the use of 450 ohm ribbon line in a moment.) The easist to obtain and least expensive feedline of course, is the 300 ohm television twin lead. This has been used successfully in temporary installations, such as a portable antenna hoisted up in a tree at a holiday campsite. 300 ohm twin lead tends to change impedance when it gets wet, so it generally is avoided for permanent installations here in the States.

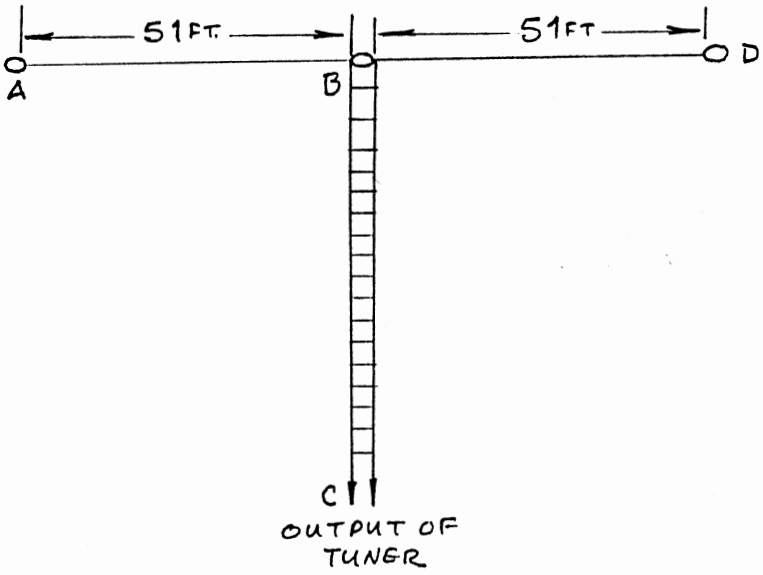
The 450 ohm line while commonly used, poses some physical problems because of its width. Even though the ribbon line has holes every few inches along its length in an effort to reduce windage, a stiff breeze can toss it around and put enough strain on the line to snap it, particularly at the center feed point. If 450 ohm line is to be run for more than say 25 feet, with out a support of some sort to keep pressure off the line, some means of extra support should be tried, so it does not flap around up there and cause problems. One solution is to thread a light nylon cord through the holes, tying one end of the cord to the center insulator, and the other end to a roof edge or similar support. Put the strain on the cord and leave some slack in the feed line.

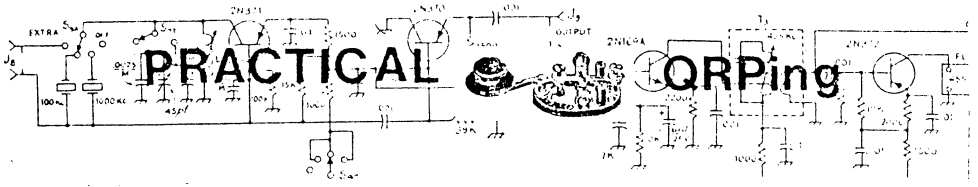
Getting back to the diagram, look again at the dimensions AB and BC. It is the combination of these lengths, one half the flat top plus the feed line as measured from the center insulator to the output of the antenna tuner, that is the secret of the success of this antenna, and makes it all band. It is here that I disagree with Mr Orr's statements on page 27, that these lengths are not critical. For optimum performance from this antenna, AB + BC should not equal a whole number when divided by 16 or 22. For example, if AB=51 and BC=45, their sum is 96. But 96 divided by 16 equals 6, and when divided by 22 equals 4.4. The first answer is a no-no, but the second is a little better. Now if BC is changed to say 53 feet, then AB+BC equals 104. 104 divided by 16 is 6.5, while division by 22 equals 4.7, two workable answers. The key to all this, as most of you have figured out by now, is avoiding feed lines which become resonant on any of the bands in use. The total length

AB + BC should not be a multiple of 16 for proper operation on 80, 40, 20 or 10 meters, and must avoid multiples of 22 for 15 meters. (This antenna works well on 30 meters 10.1 mhz, using this formula.)

The closer your answer is to .5, i.e. 6.5, 7.5, 8.5 etc. the better off you are. The feed line or the flat top length can be trimmed as needed. The beauty of this antenna is that it has no set dimensions. Success on bands from 40 meters and up has been reported with a total flat top length of 50 feet on a small urban lot. This antenna can be used in the Inverted V configuration.

It is essential of course, to use an antenna tuner with this sky wire. The tuner must be capable of tuning balanced lines. If yours can tune only unbalanced coaxial lines, try a 1 : 4 balun at the output of the tuner, to couple your signal to this all band antenna.





★HOW TO DESIGN QRP RF POWER AMPS★

by

Rod VK6KRG

Part of the fun of Qrping is to be able to use readily available componets in what we build. Sometimes a Power Transistor may be available which may be useful, and the only things known about it, may be maximum frequency and case dissipation. This may well be all that is needed for a power amplifier.

The first thing I will assume is that the power input to your amplifier is known, and that your driving source is matched to 50 ohms. This makes designing easier, as most test equipment is for use at 50 ohms. Lets assume you have 1 watt into 50 ohms at 21 mhz. If no power meter you can measure power by using a diode probe, and a DC meter to measure the RMS voltage on your 50 ohm dummy load. Use the formula Power = $\frac{V2}{R}$ where V2=RMS voltage squared, and R is load resistance (50 ohms) for 1 watt. This represents approximately 7 volts RMS into 50 ohms ($\frac{V^2}{R} = \frac{7^2}{50} = \frac{49}{50} = 1$.

The next thing to do is to have a guess at the gain you can get from your amplifier. At this power level most transistors will have a power gain of at least 10. This means that if you really wanted it, your amplifier could give 10 watts. However we only need 5 watts, so we will design the output tuning accordingly. It should be remembered that provided a stage has enough INPUT DRIVE POWER, the output power depends on only the output matching network design, and the supply voltage.

Here now is where power dissipation of the power transistor comes into the picture. Sometimes good transistors will convert DC power to RF power at efficiency of 80% or more. This is unusual and 50 - 70 % is more common. We can use the worse case in our design, which means half the DC input power is converted to RF power, and half is converted to heat in the transistors output collector or drain. Which means that if your output power is 5 watts, then the input power would be 10 watts. This means that your transistor will need at least a 5 watt collector dissipation. Having said this, the actual circuit efficiency is determined by your transistor used, and not by circuit design. You could well get 70 or 80%, which means you could use a lower dissipation device, but you run the risk of doing it in if you have a bad load match e.g. accidental short circuit. If your transistor turns out to be less than 50% efficient, you might want to substitute another type, especially if you need to conserve power. As a matter of interest, if you did get 80% efficiency for 5 watts out, your input would be 6.25 watts, and your transistor would only dissipate 1.25 watts. Now we have the basics let us do some designing.

We know the following INPUT POWER = 1 watt
OUTPUT POWER = 5 watts
SUPPLY VOLTAGE = 13.8 volts

First we design and build the output network. The transistor must see a load resistance of RL and RL = $\frac{VCC^2}{2PO}$ where VCC = supply voltage and PO = output

power desired. This formula is standard for Power Amplifiers. Supply volts = 13.8 .. RL = $\frac{13.8}{2 \times 5}$ = 19 ohms. This impedance must now be transformed to 50 ohms. This is best done with an L network.

Look at Fig. 1 The DC supply must get to the transistor via the RFC. Its value is not critical, but its impedance should be at least 4 X RL or 75 ohms in this case. For 21 mhz this would be $L = \frac{X}{2\pi F} = \frac{75}{1.32 \times 10^8} = 0.6$ uhy.

Next to actually work out the network. see fig 1. If you have a copy of "A Course in Radio Fundamentals" by A.R.R.L., complete L network design is covered on page 70 and it is a piece of cake. But here is a shortened version. By the way x = reactance in ohms. Rp = highest of the two impedences (in this case 50 ohms). Rs = lowest of the two impedences (in this case 19 ohms).

Now $\frac{RP}{RS} = Q^2 + 1 \therefore Q^2 + 1 = \frac{50}{19} = 2.63 \therefore Q^2 = 1.63 \quad Q = 1.28$

Now $XL_2 = Q \times RS \therefore XL_2 = 1.28 \times 19 = 24.32$ ohms $\therefore$ L at 21mhz =

$\frac{RL}{2\pi F} \therefore L_2 = \frac{24.32}{6.28 \times 21 \times 10^6} = \frac{XL}{2\pi F} = \underline{0.184H} =$

L_2 FOR 21MHz. The value of Q is only used in the calculation, just use good construction and all will be O.K.

Solving for C_2

Now $X_{C2} = \frac{Rp}{Q} = \frac{50}{1.28} = 39.1\Omega$

Now $C_2 = \frac{1}{2\pi F X_C} =$

$\frac{1}{6.28 \times 21 \times 10^6 \times 39.1}$

$C_2 = \underline{194\ pF}$

This value of capacitance is part of C8 and C9 in Fig 2 of page 20 of issue 3 of Lo-Key. The rest is made up of the input capacitance of the standard 50 ohms Low Pass Filter. That concludes the output network description. Remember that it is simple. Just take it a bit at a time, you can do it.

INPUT NETWORK DESIGN..... This was a real problem at first, but as it turned out, a simple method was invented to cope and here it is..... You will need a receiver, R-X noise bridge, ATU, and to actually make it, Winding Wire and Capacitor as you will calculate. Basically we need to know what impedence the amplifier input sees, with the input drive power connected. Unfortunately this is not the same as small signal input impedence. So first you must put your drive signal (1 watt) into your amplifier via an ATU. The reason being that an ATU will match any antenna to 50 ohms, so it should also do it for an amplifier input. Set up equipment as in Fig. 2. Use very short leads into the amplifier from the ATU. Adjust SWR meter for minimum SWR, with power supplied, the amplifier should deliver full power into the load, around 5 to 7 watts in our case. Now logically if the ATU is removed, and the input from the SWR meter is terminated in 50 ohms, then a measuring device connected to the unknown or output side of the ATU will see a complex impedence, which is opposite that which the transistor is. Now a RX noise bridge will see this as a series circuit of R and L or R and C. Supposing your bridge tells you that the unknown impedence is 15 ohms in series with some inductive reactance.

This was the case for our amplifier. It means that in fact the transistor must look like 15 ohms in series with some capacitive reactance as the ATU had to cancel the transistors input reactance, and also transform the 15 ohms to 50 ohms. This is precisely what we must do, i.e. make a tiny fixed frequency ATU or matching network. Here again an L network is best, as it is the simplestto match any two complex

impedences. To measure your ATU unknown impedence, set up your equipment as shown in Fig 3, and follow your bridge instructions. If you now look at Fig 4, you will see that the transistor looks like Rin and Cin in series as described. We now need Lc to cancel Cin and an L network L1 and C1 to match the 15 ohms to 50 ohms. Now you can see that Lc and L1 are in series and can thus be wound together onthe same form. In the case of our amplifier, Lc was so tiny that I just wound 2 extra turns on to the coil L1. Since I have already described how to make an L network, I will not re-describe how to do it. When you have construct-ed your input network attach it to your amplifier, and check for a 1:1 SWR on the input when fed with 1 watt.

NOTES AND ERRATA

1... In issue 3 of Lo-Key, in the article on the QRP MAXI AMPLIFIER, it showed Diode D1 reversed. This is indeed a bad blue on my part, because if built like this, it will mean instant destruction for your amplifier, with power applied.

2... The circuit board and component overlay as shown in issue 3 of Lo-Key is much smaller than the original actual size. I will supply full size photo copy if you can send me $2. Do not forget your address, and I will send back immediately. The photo copy is on graph paper, and 2 copies will be sent, one for your file, and one to work with. (As can be observed there is a full size circuit board and component overlay included in this article, and I apologise for the reduction produced in issue 3 of Lo-Key. I had run out of time and could not delay printing any longer. Editor.)

3... There is provision on the board to add extra diodes in series with Diode D1 to increase bias if needed, otherwise a strap should be put in place of the extra D1's.

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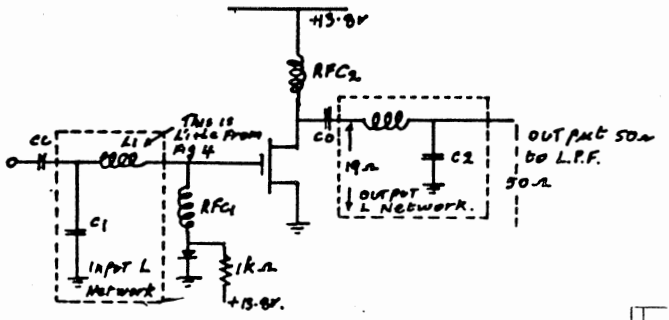
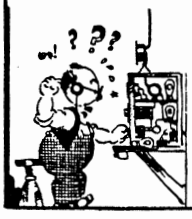
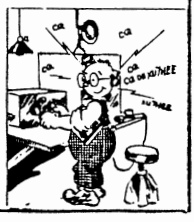


Fig 1 Input and output Networks





PRACTICAL QRPING

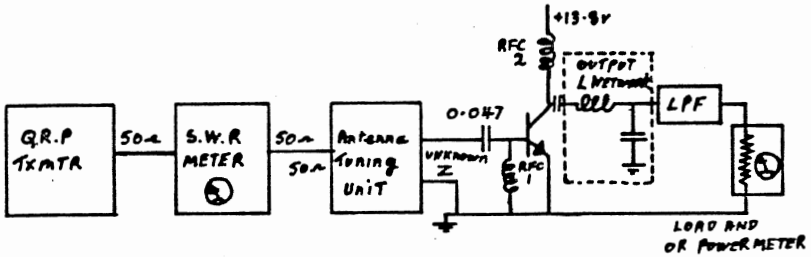
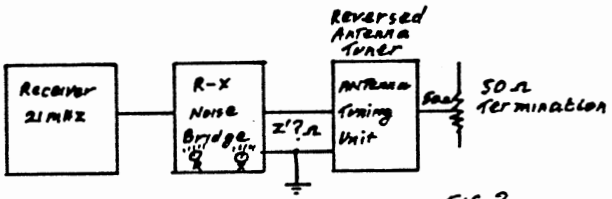
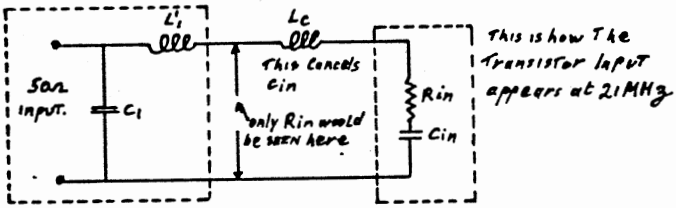


FIG 2 Design of Input Network Step 1



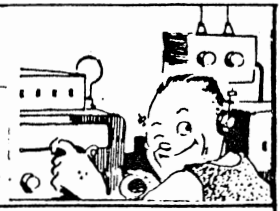
Design of Input Network Step 2. FIG. 3.

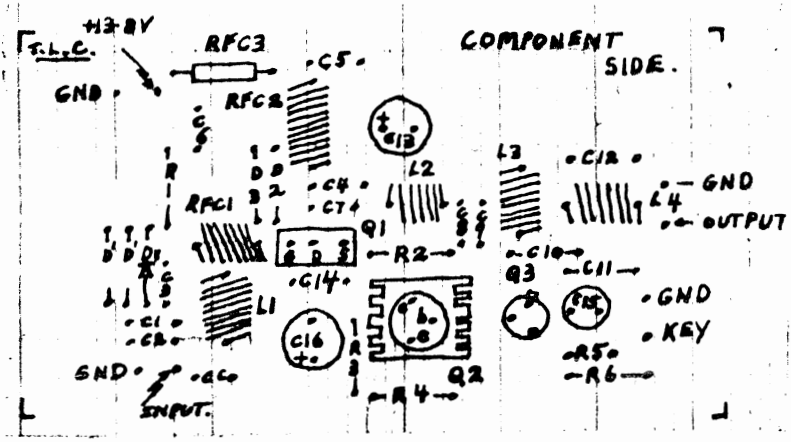


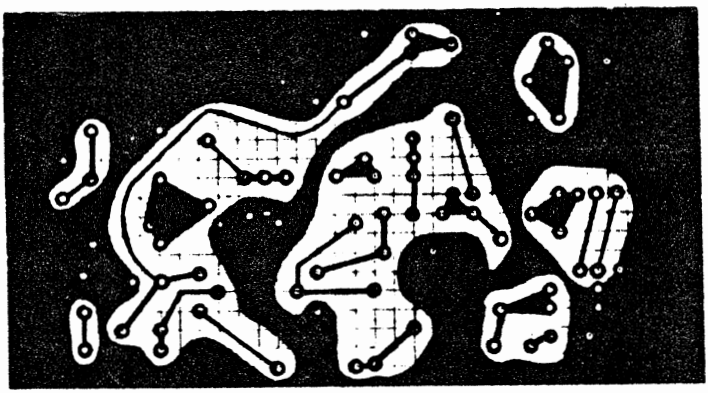
L network converts Rin To 50Ω

Fig 4.

PRACTICAL QRPING







PRACTICAL QRPING

TWO-BAND QRP TRANSMITTER

Drew Diamond VK3XU

This transmitter first appeared in the QRP Bulletin a few years ago. Since that time, a number of comments and suggestions have been made as to how it could be better presented. So the following is an attempt to provide a simple, easily reproducible rig which provides good performance and spectral purity with minimum parts count. At the time of writing, all the parts were readily available. A list of known parts sources is provided.

PERFORMANCE- Bands; 3.5 and 7MHz, with the option of 10.1MHz. VXO; (2kHz on 3.5MHz, 7kHz on 7MHz, and 9kHz on 10.1MHz). Power output; at least 1.5W, typically 2W into 50 ohms. 100% on/off ratio, with no click, chirp or whoop. Stable even with a poorly matched load (>3:1). 12-14V supply (will operate satisfactorily down to about 9V).

CIRCUIT- The crystal oscillator is keyed in a shaped manner by Q2. Broadband amplifier Q3-Q4 raises the power level to about 2W. The output amplifier uses a CB type transistor; MRF-475 with feedback. It is very tolerant of poorly matched loads, although the load SWR should be generally less than 2:1 for correct operation of the low-pass filter. The filter is necessary to remove any harmonic energy from the signal before it is applied to the antenna. The method of antenna changeover from transmit to receive has been left to the individual.

CONSTRUCTION- All components except C1 and L1 are soldered to the copper side of a double sided circuit board. No holes are drilled for components, as they are simply soldered to the pads. Other methods of construction may be employed, but all signal carrying conductors must be kept as short as practicable. Details of toroidal inductors and transformers are provided for the two readily available brands- Neosid and Amidon. Broadband transformers T1, 2, 3 are made as follows: Fix the ends of two 20cm lengths of 24 B&S enam. wire together in a vice. Twist the other ends together and place them in the chuck of a hand drill. Whilst keeping the wires taut; turn the drill until you have about three twists per cm. Now give the drill a tug to 'set' the twists. Carefully thread the pair through the specified core until there are about 13 loops. Cut off the excess wire leaving about 2cm at each end. Remove about 1cm of enam. from each wire end. Use a multimeter on ohms to identify the windings. It is essential that the end of one winding is connected to the start of the other winding to form the centre tap. Miniature coax may be used to connect the filters to the band switch. A solder tag under the switch mounting nut will provide a point to solder the coax braids. If only one band is required; the output at C22 is simply jumpered to the appropriate filter. After checking that all components are correctly placed and oriented, +12V may be applied with bias pot R14 set to minimum resistance and a dummy load/power meter connected to the output. R14 is adjusted so that the current drawn from the supply is about 200mA with the key open. When the key is closed the current will rise to about 450mA and the power meter should indicate about 2W. Listen to the signal on your station receiver. It should sound clean and free of click, chirp or whoop. Check the VXO range by varying C1. This should not cause significant change in output power.

PRACTICAL QRPING

PARTS LIST FOR THE QRP TRANSMITTER

C1: >200pF max. variable.
C3, C4: 220pF Styro/poly.
C5, C8: .047uF disc cer.
C6, C11, C13, C14, C16,
C17, C19, C20, C22: .1uF disc cer.
C7, C15, C18: 10uF tantalum >16V.
C10, C21: 1000pF disc cer.
C24, C25, C26, C27, C29: 1000pF styro/poly (not ceramic).
C28, C30: 470pF styro/poly.
C2, C12, C23: Deleted.
D1: 6.8V, 400mW zener.
D2: 1A diode.
Q1: 2N2222 or 2N3904.
Q2: 2N3638 or 2N3645.
Q3: 2N3053 or 2N3866 or 2N5109.
Q4: Motorola MRF-475.
S1: DPDT min. toggle.
Y1: Crystal- your favourite frequency.

R1, R5: 10k 1/4W
R2: 5.6k 1/4W
R3, R16: 470 ohm 1/4W
R4: 22k 1/4W
R6: 470 ohm 1/2W
R7: 1.8K 1/4W
R8: 2.2k 1/4W
R9: 1k 1/4W
R10: 2.7 ohm 1/4W
R11: 68 ohm 1/4W
R12 10 ohm 1/4W
R13 100 ohm 1/4W
R14 100 ohm trimpot R15 270 ohm ½W
R17, R18: 5.6 ohm 1/4W R16 470 ohm ½W
L1: Same as L4.
L2, L3: One turn #24 B&S thru 6-hole ferrite bead (Amidon or Neosid).

L1, L4, L5: 7 turns #18 B&S on Neosid 4327R/1/F25 toroidal core or 17 turns #22 B&S on Amidon T68-2 toroidal core (2.2uH).
L6, L7: 5 turns #18 B&S on Neosid 4327R/1/F25 toroidal core or 11 turns #22 B&S on Amidon T68-2 toroidal core (1.1uH).
For 10.1MHz; L6, L7: 4 turns #18 B&S on Neosid 4327R/1/F25 core or; 10 turns #22 B&S on Amidon T68-2 core. Then C28, C30 will be 330pF styro/poly and C29 will be 680pF styro/poly.
T1, T2, T3: About 13 loops twisted bifilar on Neosid 4327/2/F25 toroidal core or Amidon FT50-43 toroidal core.
Hardware: Connectors, circuit board material, heatsink for Q4, miniature coax, enam. and hookup wire, crystal socket, case etc.

PARTS SUPPLIERS:
Variable capacitor: M, DS, E, W, T. MRF-475: E.
Neosid Cores: M, W. Amidon Cores: T, U.
Transistors, diodes, capacitors, resistors: M, DS, T, E, S, R.
DS: Dick Smith: See magazine adverts.
E: Ellistronics: 289 LaTrobe St., Melb., 3000. Ph 03 602 3499.
M: Magraths: 55 A'Beckett St. Melb., 3000. Ph 03 347 1122.
R: Rod Irving: 50 A'Becket St., Melb., 3000 03 347 9251.
S: Stewarts: 44 Stafford St., Huntingdale, 3166, 03 543 3733.
T: Truscotts: 30 Lacey St., Croydon, 3136. Ph 03 723 3860.
U: U.S. Imports: Box 157, Mortdale, 2223.
W: Watkin-Wynne: 32 Falcon St., Crows Nest, 2065. Ph 02 43 2107.

All resistors $\frac{1}{4}$ W, 5% unless otherwise shown in parts list.
All capacitors disc ceramic 63V unless otherwise shown.

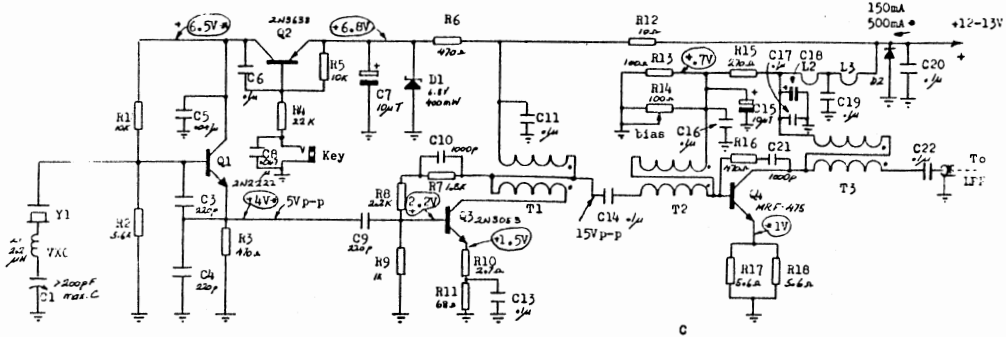
* Measured 'key down'. 20kΩ/V multimeter.

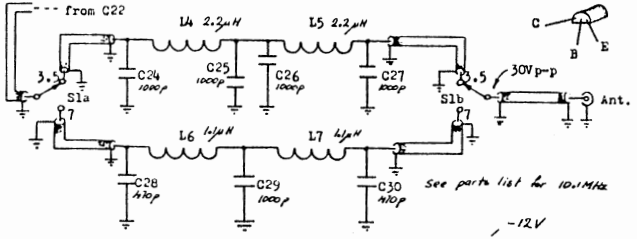
See components list for values
µA has TO-220 heatsink attached. Must be insulated from grnd.

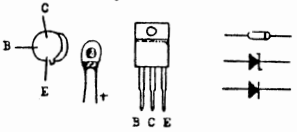

T1, 2, 3.


example
L5, 6.


L2, L3



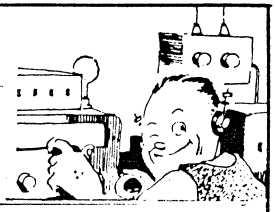


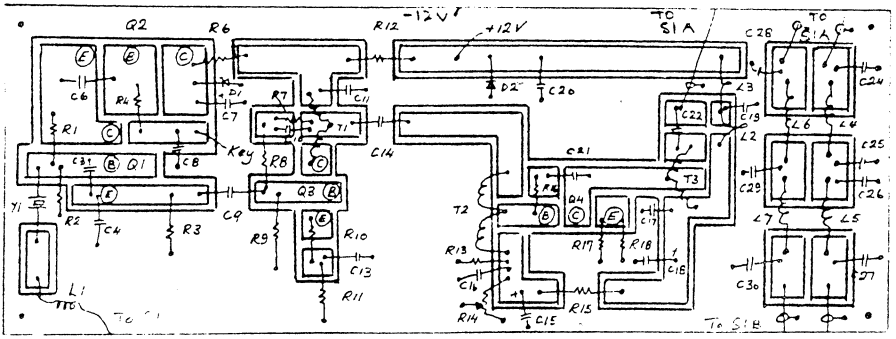


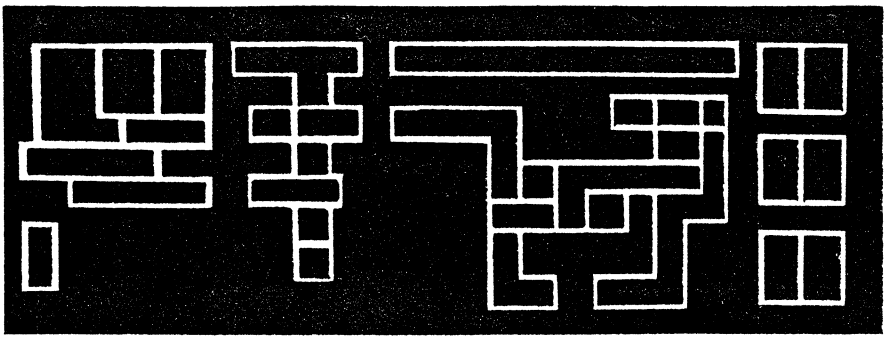
Two-band CW QRP Transmitter 1984
VK3XU

To S1a To S1a

PRACTICAL QRPING







STATEMENT OF RECEIPTS AND EXPENDITURE FOR YEAR ENDING NOV 84.

RECEIPTS			EXPENDITURE	
BALANCE BROUGHT FWD.		$0.00	ASSETS stapler/punch	$7.70
SUBS 1984	$405.00		LO-KEY 4 issues	$407.12
1985	$ 23.50	$428.50	REFERENCE BOOKS	$ 5.50
LOAN FROM L.O'DONNELL (VK5ZF) (1)		$466.41	STATIONERY (inc photo copies, petty cash, postage etc)	$180.59
			BALANCE CARRIED FORWARD	$294.00
TOTAL RECEIPTS		$894.91	TOTAL EXPENSES	$894.91

NOTE:

1/. Separate 1985 subscriptions ie. renewals have not been included in the above statement. To date $34.00 dollars received.

2/. The above dollar values includes remittances in foreign currencies and as such is subject to exchange rates, collection fees etc.

3/. The above does not include numerous items purchased by the organiser to perform club functions eg. typewriter, magazines as resource material for Lo-Key.

4/. The club has the liability to produce certificates and awards already promised.

5/. The above statement has not been audited. I have only recently accepted the position of treasurer (until the elections) and have produced this statement from the book work kept by the organiser.

It should be abundantly clear however that the club has been kept financial due solely to the generosity of Len O'donnell our organiser. The increase in membership dues which occurred during 1984 is expected to offset the cost of running the club.

K.R. Zietz.
TREASURER.
VK5AKZ (43).

1984 - 5

CLUB SCOREBOARD

NOVICE SECTION

STN	3-5					21		28				TOT
VK3PGE	378					14						392

FULL CALL SECTION

STN	1-8	3-5	7	10	14	18	21	24	28	52	144	430	TOT
VK7VV		16	21		283		11						331
ZL1ATW		136	12		3		21		54				226
VK3PBX		9					6						15
VK3CGE		116	5										121
VK5ZF					14		30						44
VK5BJF		74	22		43		11						150
VK3CBO		41	2		168		75						286

Here we are at the three quarter mark of the 1984-85 Club Scoreboard Contest, and it is good to see two more new entries. Welcome to Jeff VK5BJF and Rod VK3CBO. I would think that from the look of these two new entries, that the boys mean business. It could be that the Contest is building up to an exciting climax. As it stands at present Neil VK3PGE/VK3CGE would seem to have a firm grip on the first place spot in the Novice section. With his upgrading to full call, and already totalling 121 points in the full call section, I think perhaps Neil is considering taking out both sections of the contest. What a fantastic effort if he does. What Neil does not know yet is that if he does make it a double header, he automatically becomes President of the Club for the next five years. Rai, Matt, Rod, and Jeff all have scores good enough to go on and take out the Full call section. GOOD LUCK BOYS all is set for a great finish. Remember the Closing date is 31/3/85.

LEADERS AT DEC. '84 are....

NOVICE SECTION.....VK3PGE/VK3CGE..392... POINTS

FULL CALL SECTION.....VK7VV.....331... POINTS

VK3CBO.....286... POINTS

ZL1ATW.....226... POINTS