LO·KEY

NEWS BULLETIN

CW OPERATORS QRP CLUB
WE DO MORE WITH LESS
5W
QRP

PUBLISHED QUARTERLY

CONTENTS

WE DO MORE WITH LESS !

25 12th AVENUE W MOONAH, HOBART, TASMANIA AUSTRALIA

INFORMATION CENTRE

PRESIDENT. Len O'Donnell VK5ZF (1)
33 Lucas St Richmond
South Australia 5033

TREASURER. Kevin Zeitz VK5AKZ (43)
41 Tobruk Ave ST Mary
South Australia 5040

SECRETARY. Rai Taylor VK7VV (3)
25 Twelfth Ave
West Moonah
Tasmania Australia 7009

PROJECTS. Rod Green VK6KRG (28)
72 Yelverton St South
Donnybrook
West Australia 6239

CO-ORDINATORS

Lindsay Lapouple VK3DXH (47)
41 Ternse Road
Upwey Victoria 3158

Rai Taylor as above

EDITOR Rai Taylor as above

PUBLIC RELATIONS
Len O'Donnell as above

INFOMATION NET EACH FRIDAY 3.620mhz 1030utc VK5OS MAX (2)
CW NET EACH WEDNESDAY 3535mhz 1030utc Lindsay VK3DXH (47)
CLUB STATION VK5BCW Len VK5ZF (1) all bands CW and SSB

The standard of Amateur Radio home brew should be close to the professional, adding ENTHUSIASM and PREPARATION what is lacking in skill and money.

Rai Vk7vv (3).

LO-KEY PUBLISHED MARCH-JUNE-SEPTEMBER-DECEMBER

ANNUAL MEMBERSHIP FEES INCLUDING LO-KEY

VK $A10 ZL $A12 DX $A14

IRC'S NOT ACCEPTABLE.

MONEY ORDERS/CHEQUES PAYABLE TO THE CW.OPS QRP CLUB

RADIOTORIAL

I know you will find this issue full of some very interesting pages timed right to, winter time is the best time of the year to spend at the work bench, kitchen table or wherever you do your home brewing. A recent unplanned trip to the U.K. Wales to be exact has kept me out of of mischief during the last few months, I was able to visit Gus Taylor G8PG (50) and the Rev.George Dobbs (96) needless to say my visits where very enjoyable, educational, but unfortunatly much to short, both Gus and George send their regards to all members.
George who is the editor of SPRAT the G.QRP CLUB journal kindly gave me some very interesting articles due for the next issue of SPRAT I have included some of them in this issue of LO-KEY so you get to see them before they appear in SPRAT.

Members are still requesting copies of the G.QRP CLUB HANDBOOK long since depleted, plans are afoot to make some more available soon, how soon depends on when Len is able to purchase the Club copier, I believe that we are not far from the target amount neccesary, so those members who have thought about sending in their donation may care to put those thoughts into action, Len now retired does not have the use of a copier anymore, he does need one now particulry now he is retired and has a lot more time to devote to the production of the Travelling Circuit Book, QRP Downunder, and possibly in the not to distant future the production of LO-KEY.

Elsewhere in this issue you will be pleased to hear that Len will be active on all bands, using the Clubs call sign VK5BCW, this is a great idea Len, I hope all you members out there will keep a keen ear out for VK5BCW and have chat with Len. As this Club is CW oriented and Lindsay VK3DXH (47) has agreed to conduct a CW net (see page 4) you will no longer have to worry about the speed of the CW because the speed will be no faster than the slowest member on the net, so if you are a little hesitant, nervous, or just plain terrified don't be, Make the effort and join in. Suprising how quickly one getts over the nervousness, confidence grows and the joy of communicating in the CW mode well worth the effort.

Just a point in passing, during my overseas trip I quickly came to realise how little value our Australian dollar has become. One thing I am sure of is that even after removing the duty or V.A.T. from the purchase price of electronic goods, one can still buy cheaper back in Australia. We may have difficulty in getting hold of many things but what we can get is cheaper. HI.

Rai VK7VV (3)
EDITOR.

THINK ABOUT IT.

If a dipole, inverted V etc. is in the close proximity of trees, buildings, roof slooping ground it is obviously asymmetric and can no longer be considerd balanced. Whatever line currents a balun would have removed would no doubt re-appear due to the induction from the antenna and its suroundings.

BITS AND PIECES LOOK

From... President Len O'Donnell (1)VK5ZF

VK3 STATE CO-ORDINATOR

Congradulations to Lindsay VK3DXH (47), who has volunteered to take on this job. I know our VK3 members will all support him, as he tries to advance the art of QRP, and the aims of the CW Operators QRP Club in the Victorian area. At this point, I would like to thank Neil VK3CGE (19), who is stepping down, for all of his good work as VK3 State Co-ordinator. Neil has been a good friend to our Club, and I thank him for his efforts, on behalf of all the members.

VK5 STATE CO-ORDINATOR

While on the subject of State Co-ordinators, another good friend of the Club Jeff VK5BJF (57), the VK5 State Co-ordinator has decided to resign from the job. Jeff as all members know, has strongly supported QRP and the Club, where ever he was able. Thank you for a job well done.

URGENT HELP REQUIRED

I am looking for a number of articles, circuits, hints and kinks etc., for inclusion in our Club Handbook "QRPing Down Under". The sort of circuits and articles I am looking for, can deal with any information that would be of use to QRPers. I would like to see "QRPing Down Under" become a Club effort, by as many of our members as possible contributing something toward its content. What would you like to see appear in our Handbook ? Please write and tell me, and help me to find the information. Many of you have asked me previously, how you can help the Club, well here is a good way that will not only help the Club, but also help yourselves when the Handbook appears. It is going to take a bit of effort, and any thing worth while takes a little effort, to dig down in your pile of info that you have colleted over the years, and find some useful material. Here is your chance to share these circuits and articles with other members of the Club, through our Club QRP Handbook. It is going to be worth it when you see the result, and to know that you had a hand in its content, is going to make you feel proud. Any "Info" sent to me that I can not fit into the Handbook, will be used to put together a further two issues of our "Travelling Circuit Book". So then you can see that none of your efforts to help the Club will be wasted.

FORMATION OF A CW NET.

Lindsay VK3DXH (47) would like to advise all members, that he is organising a weekly CW Net on 3535kc., each Wed. evening at 1030 UTC. Commencing date will be 24/6/87, and the call used will be CQ CW OPS. From Lindsay I understand that the speed used on the Net, will be at the rate of the slowest member on the Net. This will enable all members to participate, whether you are an old hand or a newcomer to pounding the key. Please come up and support Lindsay to get this Net into operation, and get yourself some CW practice. It will be great to hear our Club practising what it preaches...CW...

CLUB LOAN RIGS

With regard to this project, I would like to up-date members with details of what progress has been made.... Jeff VK5BJF (57) has very kindly donated a 3.5 mhz valve type rig, for use by members, who need to borrow a rig to get themselves activated on CW QRP. As soon as a suitable xtal and power supply can be organised, this unit will be available on request. However anybody that already has a suitable 3.5mhz CW xtal, and a 5 amp 13.8volt power supply, who would like to borrow the rig, can do so by contacting Len VK5ZF (1). Postage both ways will be the responsibility of the borrower. Gus G8PG (50) also very kindly donated two basic "ONER" kits, as supplied by the G QRP club, to be also used for this project. In this case the kits will need to be wired, put into a box, build output filters, supply xtal, build power supplies, and build ATUs, before they are ready to be used. Never the less, it does show that our members are starting to get behind this project. The Club is still open to offers of help in this direction. Any help in getting our new members on the air, is a step in the right direction, and I sincerely thank those that are helping in this manner.

BITS AND PIECES Cont.

Contests and Award

May I take a little time to say a few words about our Contest and Awards program, that the Club has been running, through Lo-Key for some time now. During this last Quarter, there has not been any entries at all, for the VK Scoreboard or the DX Scoreboard contests. In our last scramble there were only three entries, including my own, so I have had to call our last Scramble a "Non Event", on the grounds of too few entries. Our last Oceania QRP CW Contest only had about 4 or 5 members taking part. So far there has been only one member apply for an award. It does appear that our members are not keen on contests and awards, so I feel that I can no longer justify, taking up 3, 4, 5 or 6 pages in an issue of Lo-Key. There are less than 7 out of a total of 96 members participating at present. For a trial period I will be cooling our contest and awards program, and there will be no further contest and award news in future issues of Lo-Key. I f I am reading the members interest in contests and awards wrong, then you write and tell me, and I will re-open any award or contest, if I receive an indication of 20 members willing to participate in it. IT IS UP TO YOU.

Copier Fund Update

The very latest and updated figure for the Copier Fund, received ftom Kevin our Treasurer only yesterday has reached the grand total of $531 . THAT IS TERRIFIC. I thank you one and all for your generous support. Please keep up the good work, and it will not be long before we have reached our target figure. Here is the latest list of donations....

(15).....VK4RE.....Roy.....$10
(36).....VK7JE.....Jerry.....$15
(02).....VK5OS.....Max.....$20
(94).....VK4ATZ.....Ted.....$10
(?).....ANONYMOUS HOME-BREWER.....$43:36
(55).....VK4FAL.....JIM.....$10
(26).....VK7FN.....Neil.....$03:95
(99).....VK3PKV.....Murray.....$10
(102)....VK2CSA.....L.W.....$10

THANKS again guys, it will be great to put that Copier to work on behalf of the Club.

New Members

I do not mind repeating myself in saying that it gives me the greatest of pleasure to welcome the following new members to our ranks.....

(10) Larry Rice VK6CP, P.O.Box 752, Cloverdale, W.A. 6105
(21) Don Stieler VK4VJT, 6 Image Flat Rd., Nambour, Qld. 4560
(25) Kieth Williams VK6KC, 47 Bailey Rd., Leamurdie, W.A. 6076
(29) George Cartwright ZL1BYY, 6 Haycock Ave., Mt. Roskill, Auckland, New Zealand.
(33) John F. Elliott VK3BZB, 1 Colin St., Rosebud West, Vic. 3940
(77) Frank Filby VK2 EFF, 366 The Esplanade, Speers Point, N.S.W. 2284
(99) Murray Young VK3PKV, 69 Kangaroo Grounds Rd., Warrandyte, Vic. 3113
(100) E.C. Crocker SWL/SDC 628, 5 Valda St., Parra Hills, S.A. 5096
(101) Wayne Watson WB8ZWW, 706 Torrence, Springfield, Ohio, 45503 United States America
(102) L. W. Marriott VK2CSA, 9 Darkwater St., Gladstone, N.S.W. 2440

WELCOME ABOARD fellas and I hope you will join in with any or all of the activities. QRPing and Home-brewing are lots of fun, and the members of our Club are a friendly group.

Club Station Activity

As you have heard, Max our Friday night net controller, does an excellent job of airing the Club call sign VK5BCW, and promoting the Club, which is great. However I am of the opinion that our Club should be promoting QRP much more than we do. With this thought in mind I will be up on the bands using the Club call sign both on CW and SSB. For instance the Club should be actively promoting the use of CW on the 3 WARC bands, and what better way is there, than to use those frequencies ourselves. By the time that you are reading this, I will be active on CW on as many frequencies as possible from 1.8mhz to 28mhz. Please look for VK5BCW and if you hear me, please give me a call. Besides,the CW activity I will be on SSB around 3575khz of an evening looking for contacts with club members, as I would like to meet as many members on the air as possible. This will NOT be a net, just a rag-chew type of QSO.

PLEASE SUPPORT VK5BCW TO PROMOTE QRP ON THE AMATEUR BANDS

AN 80M DIRECT CONVERSION RECEIVER. TONY WEBB G3KCJ

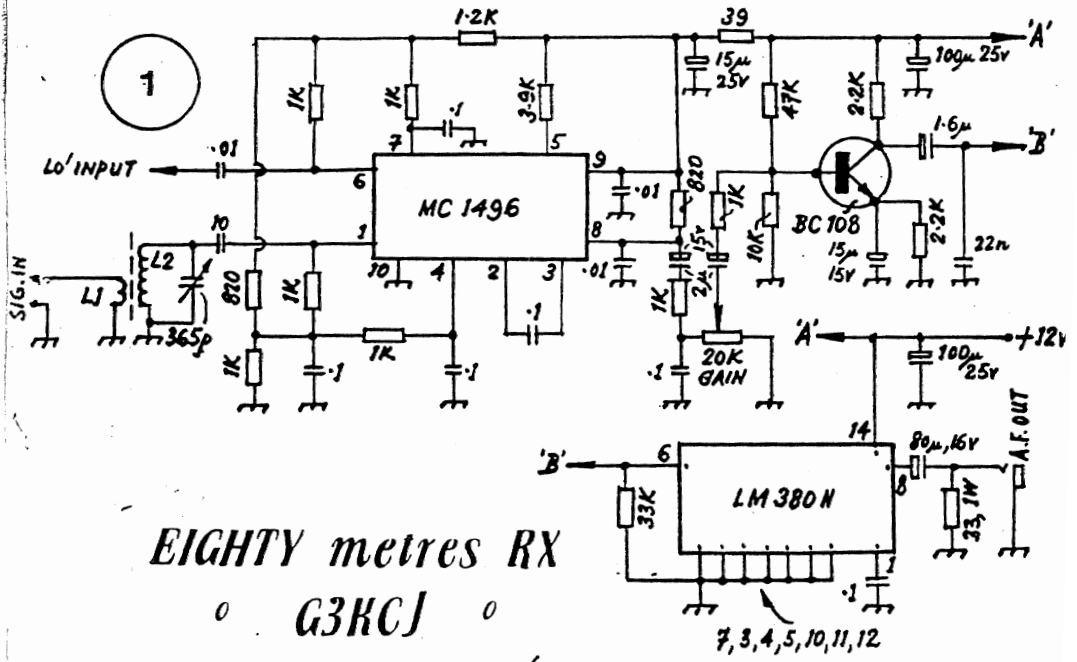
As you can see this circuit is basically from "Solid State, etc". However I could not achieve enough audio with the AF amplifier as published, this being due to all of my headsets being low impedance.

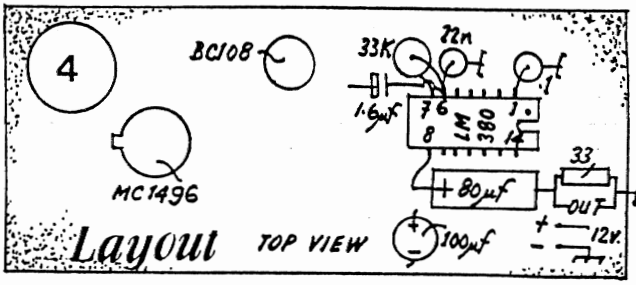
Feeding the AF output to a scope convinced me that the circuit was a very good one, the sensitivity being exceptional. Altering Q1 and Q2 to Q1 as my circuit and adding U2 I can now blast (sorry!) my ears with a lot of 80m CW and SSB signals. Why ganged tuning? Well why separate ANT and OSC controls as in the original? Why Aladdin coil formers for OSC and ANT? Well Amidon cores are fairly expensive and anyway I had a stock of Aladdin formers and they allow good ganged tuning over the amateur bands.

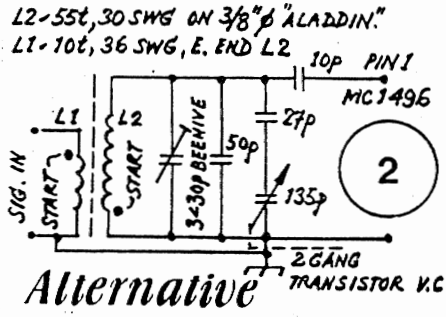
The capacitors in series with ANT and LO sections of the air-spaced two gang, (ex transistor), may need increasing or decreasing to achieve resonance, depending on the capacities of the tuning gang to be used. As a BY-THE-WAY, the circuit will work up to 10MHz, but above this the oscillator, (my one anyway), is not happy and is liable to stop working.

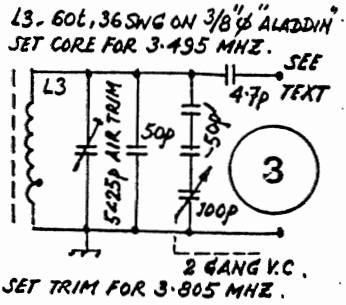
Using the signal generators, one as LO, and the other as input signal, the mixer works very well indeed, up to 150MHz, but I did not take any measurements of sensitivity.

Final tuning is done by adjusting LO coverage for 3.495 to 3.805 with a signal generator, so that the output gives a weak beat note in the phones. Set the 3-30pF trimmer at 3.8MHz and set the core of L2 at 3.5MHz, both for the loudest output. Re-adjust the trimmer and core until no improvement results. If the core or trimmer will not peak, replace the 27pF capacitor with a suitable value to achieve resonance at minimum and maximum capacity.







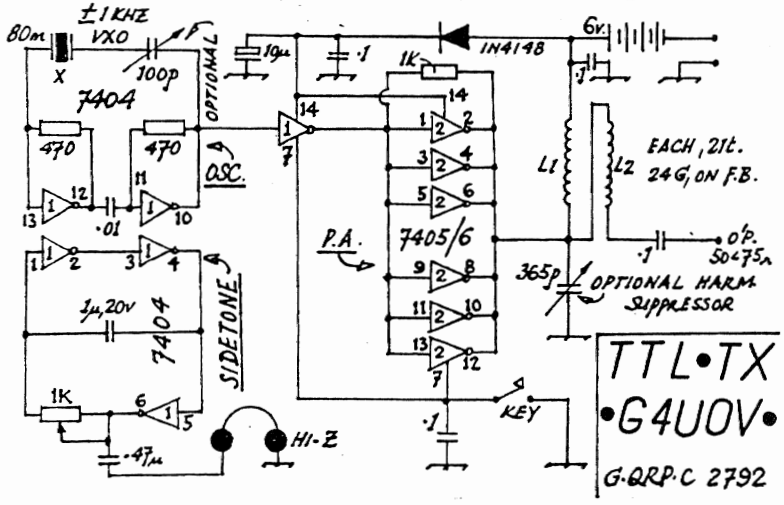


Oscillator

TTL TRANSMITTER FOR 80 METRES

By Derek Scofield G4UOV

e circuit is a TTL TXM for 80 metres with approximately 400mW output. It designed around two TTL inverted chips. The first 7404, two gates used as crystal controlled oscillator buffered by gate 3, fed to 7405 o/c invertors parallel. The circuit works very well. I have only tried it so far cally, but had 599 from about ten miles on a long wire



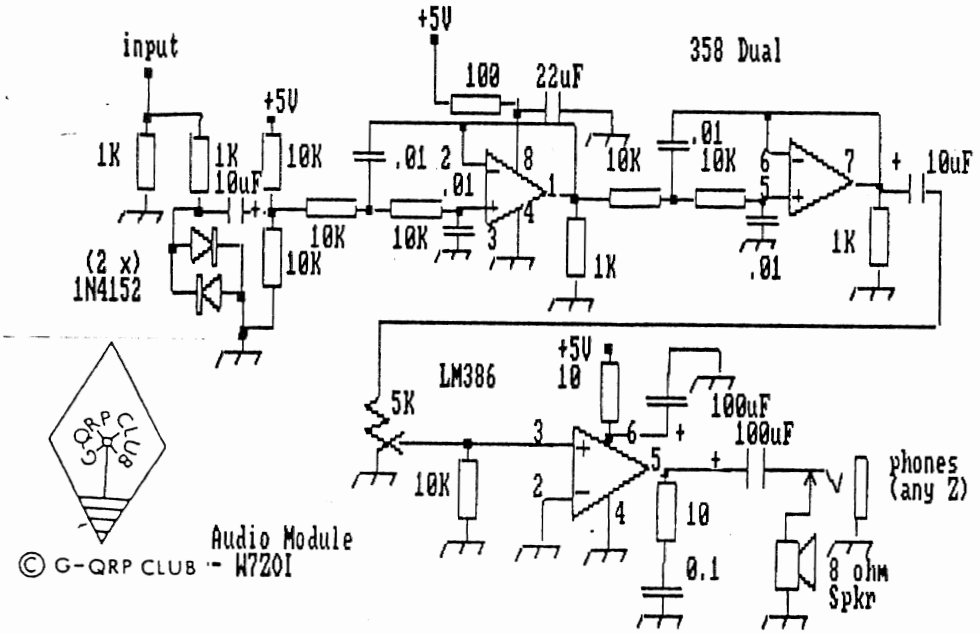
An Outboard Audio Module for Simple Receivers

Wes Hayward, W7ZOI

Most of the little receivers that we all build are used with our favorite set of headphones. We all have them. However, there is occasional need to drive a speaker, perhaps to demonstrate something to another club member.

Direct conversion receivers could sometimes use some gain limiting, a replacement for a more complete AGC. In other instances, we need a bit more audio gain, or some selectivity, or a quick tail end for the next receiver of the month.

The attached circuit serves these functions at W7ZOI/W7. The circuit begins with a pair of back-to-back silicon diodes. These operate as a clipper, limiting the peak signal amplitude. Odd order harmonics will be created by the clipping. These are, however, largely removed by the four pole RC active low pass filter that follows the clipper. The filter uses a small, dual op-amp. The filter then drives an output amplifier using the ever popular LM386. The resulting audio excites either an internal speaker, or external headphones. The circuit operates from 5 volts, supplied by four NiCad batteries. The no-signal current is 12 mA. The entire circuit, with batteries and speaker, resides in a 1 x 3 x 6 inch box. Not shown in the schematic is the off-on switch, a switch for the clipper, and circuitry for NiCad charging. A mylar cone speaker was chosen, for it is more tolerant of moisture.



PROTECT THAT METER

BY DON CALLOW VK5AIL (75)

Do you ever worry when the needle on a meter clicks hard against the end stop - and not at the zero end !? New meters are not cheap and even used ones are worth protecting against overload - also because of the time which would be involved in replacing them if damage occurs.

These notes give the approach to DC meter protection that I use, which is based on the methods in the RSGB Radio Communication Handbook (Fifth Edition P.18-3) & Test Equipment for the Radio Amateur by H.L Gibson G2BUP (Second Edition P.1-4). I have been unable to find a corresponding section in my copy of The ARRL 1985 Handbook. An actual example is worked through as a guide.

I would like to hear of other ideas on this subject so please contact me direct if you have any or better still let us all see them in Lo-Key.

Usually you would be using a sensitive ammeter with a low value shunt resistance to measure current or with a high value series resistance to measure voltage. Protection is needed from accidental high voltage across the meter terminals and especially from the consequent excessive current.

To provide reasonable protection it is usually suggested that two silicon diodes be installed back-to-back to limit the voltage (and hence current also) to no more than 2x that for Full Scale Deflection (fsd). Also, a 1000pF capacitor will help keep RF out of the meter circuit - shielding the meter and leads will be of even greater value.

Silicon diodes start to conduct at about 0.4V so will have no effect on meter readings if fsd occurs at 0.2V. And the meter should stand up to a 2x overload, after which the diodes start to operate. Normal readings will be upset if there is a significant amount of AC present, so diode protection is [illegible] for DC.

The trick is to arrange for the meter to be at fsd when the diodes have 0.2V across them. This will require a resistance in series with the meter if it reaches fsd at less than 0.2V. See Fig. 1.

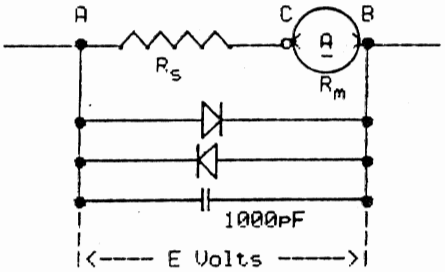


Fig. 1

To calculate series resistance R_s you need to know R_m the internal resistance of the meter and I_{fsd} its fsd current (or the corresponding voltage).

See ARRL Handbook P.25-2 and Gibson P.1.2 for methods to find R_m (and I_{fsd}). Or you may use an experimental method for the whole set-up, such as that shown under the heading MORE ABOUT METERS.

Now $I_{fsd} = E / (R_s + R_m)$

where E is 0.2V (aim). Suppose R_m is 1000 Ω & I_{fsd} is 50 uA. This gives R_s = 3000 Ω

If 3000 Ω is used then there will be 0.15V across the meter and 0.05V across R_s giving the total of 0.2V. Choosing 2.7k will give a little less protection i.e. more overload before the diodes come into effect, while 3.3k will give greater protection.

Referring to Fig. 1, points A & B are now the meter terminals for wiring-up. In calculations the total (R_s + R_m) should be used as the internal resistance of the meter. Note that changing the meter may require a different value of R_s.

NORTHERN PROPAGATION

Having been given the chance to move to Darwin for a six month period starting in June 1986 I decided that little was to be lost in such a move.

This was especially so when my wife, Jan, and I considered the enthusiasm of our three school age children, Karen, Derek and Graham.

Accommodation was to be a standard non-furnished rented house so I figured, hoped, an opportunity would arise to allow me to follow one of my favourite pass times, amateur radio.

One side advantage of this type of fixed term transfer was that I was able to give the Departmment of Communications accurate dates during which I would be working "portable 8". It seemed that everything INCLUDING the kitchen sink just had to go - all except blankets that is. Many cartons were despatched by road/sea to Darwin - it was like moving out but staying at the same time - picnic plates were to be the order of the day until we finally departed.

At the time of notification of my transfer my radio gear comprised a Tas Devil QRP 80m CW tranceiver, a newly built/ developed QRP 20m tranceiver, a Drew Diamond 80m DSB transmitter, an swr meter, a GQRP Club design ATU and a power supply. Trying to be p practical I decided to take only the two CW tranceivers and the minimum ammount of other items to get on air, these included a small roll of rather thin plastic covered wire, a multimeter and tools.

The small bag in which it was packed complemented the two large family suitcases with which we were to travel. I guess you can appreciate the aprehension I felt seeing all my homebrew endeavours being "chucked" onto the conveyer belt at the airport When we booked in on that chilly Saturday morning. Would I ever see it again$

Coupled with this concern was the awareness that the air hostesses seemed to feel that we all a little strange - just because we were sitting in the plane seats dressed in tee shirts and shorts, when the outside temperature was only 4 degrees C and everyone else was in coats and heavy jumpers!

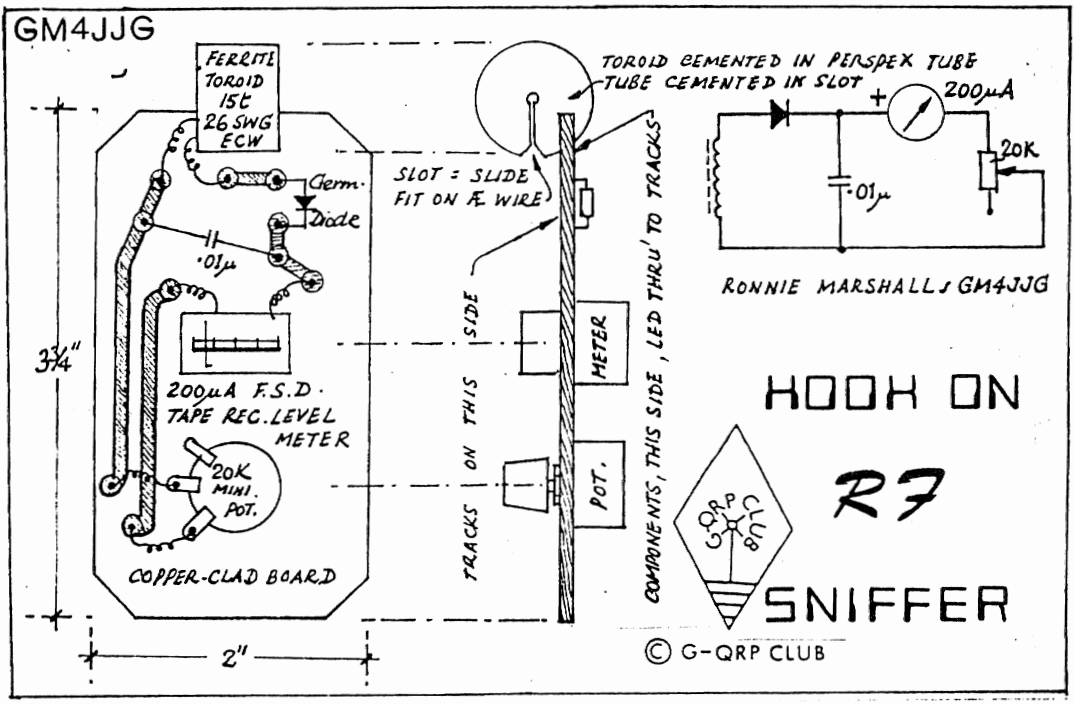
Our flight took us via Melbourne, Adelaide, Alice Springs and on to Darwin where we arrived at 3.30 pm local time. What a big country we live in! We were at last fully justified - our clothing now seemed very practical - even though the hostess would never know.

Success- the bagage arrived complete and in tact

The first week was mainly spent keeping cool in our Motel pool, I started work at 8am on the Monday so had to wait until the evening for that pleasure. We also had to organise schools and the rented house. Regarding the house ther were many selection criteria a few of which were- within walking distance of work, shops, church and schools (we had no car) enough room and most importantly away from power lines and with a big enough yard for a temporary antenna.

With our prayers answered, we settled down to life in Stuart Park in an old but well appointed house on a large block and just 2km from Darwin city.

Continued page 14 and 15.



MONITOR 3.580mhz PLEASE

When tuning around 80M, please make sure you tune up to 3.580mhz. There could be new amateurs and potential club members with home built equipment having to wait many days for their first contact just because 3.580mhz is out of the usual CW segment. 3.580mhz crystals are the only 80M crystals available and cheap for the beginner to buy. Peter VK6NNN (66)

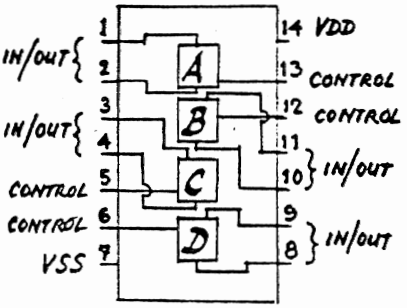
Peter is a 15 year old, very keen on home brewing, thank you peter for the circuits and ideas that you have sent, they have been passed on to Len (1) for inclusion in his Home Brewer's Corner segment when space permitts. ED.

Credit is due to Matt Volkert, DK4SQ, for the use of a 4066 as an RIT switch in Sprat 38, Page 12. I wanted to provide a variable offset during receive in a transceiver using a DC rx and the 4066 did the job beautifully. Since we first met, the 4066 and I have become firm friends.

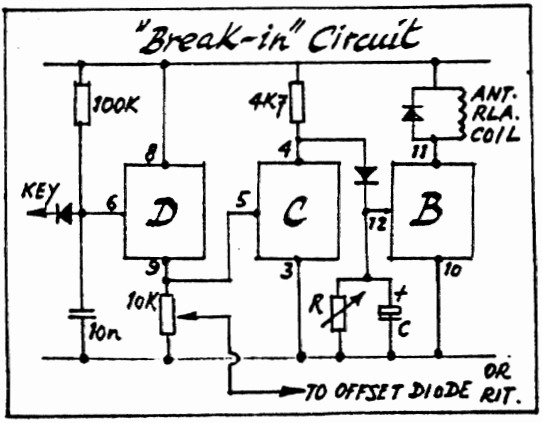
It occurred to me that I was only using a quarter of the chip and started looking for things to do with the rest. So what is a 4066? My chip book said it was a quad analogue switch. A bit more poking about and I began to see how useful it really is. Basically it is just four CMOS switches that can be turned on or off by putting a voltage on a control line. With 0 volts on this line the switch is open (well, 10000000000000 ohms anyway,) and with more than half the supply voltage on this line the switch is closed (80 to 270 ohms.) It can pass DC for switching RIT / relays etc, passes audio with low distortion, and handles RF up to 40 MHz. It switches on and off at up to 10 MHz and is certainly a QRP device with a supply current of 0.5 microamps. The peak voltage to be switched should be no greater than the supply voltage so don't try it on the mains! It looked like the answer to a lot of problems so I started looking for problems to solve.
The spare switches made LEDs blink on TX/RX. This identified a limitation. If you want to pass more than 5 or 6 mA through it, make pins 2,3,9,10 the negative connections to the four switches. The spare sections were then used to make a semi break-in system. When the key is down pin 4 goes high and charges C. The diode ensures that it discharges only through R. 2.2 uF and a 1 Mohm variable gave a recovery time of up to 2 seconds. If space is tight a 470K fixed resistor should do nicely. Relays with coils less than 300 ohms tended to make the switch latch on but not suffer damage so play with what you have in the junk box. Miniature reed relays work well and it is easy to switch one off as another comes on if you don't have changeover types for switching antennas from RX to TX. This worked very well with a ONER and a spare 'switch' was used to further isolate the RX. I don't don't know how it would work connected directly to the antenna as a solid state switch.

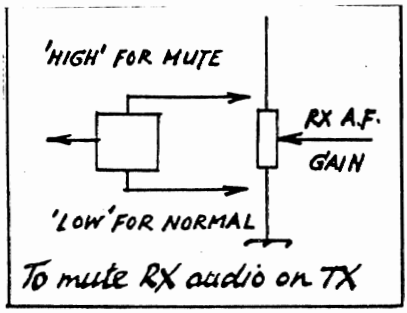
It works nicely as a multivibrator for sidetone, using the switches as transistors - not a waste if you have two spare sections. I played with it in the station big rig and it mutes IF and audio for full break-in without clicks if a 10nF capacitor is connected from the control pin to ground. When I find time I must try it to time AGC hang, as a noise blanker, as a remote AG filter switch.....

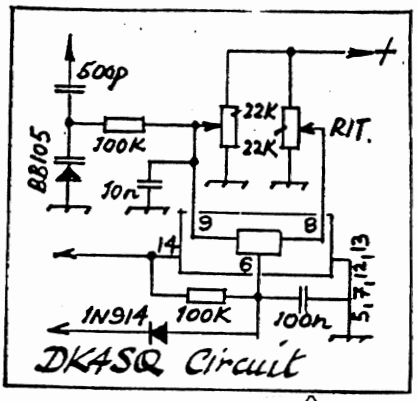
Incidently, 4066s are easily damaged by static unless buffered so use 4066Bs if possible. Having said that, my 4066s have all come from old computer boards, are not buffered, were unsoldered with a gas blowlamp (despite the awful smell,) and they all work fine so don't be put off experimenting.

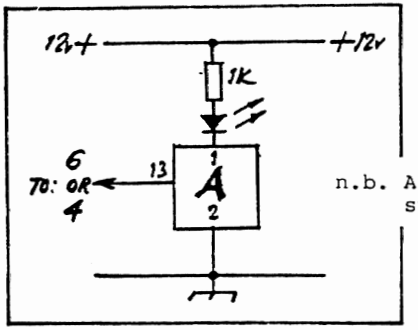


4066B

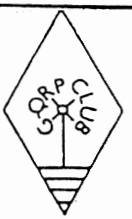




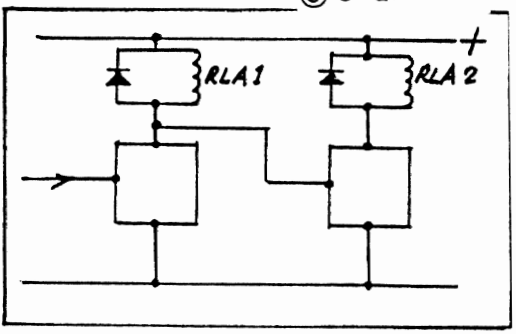




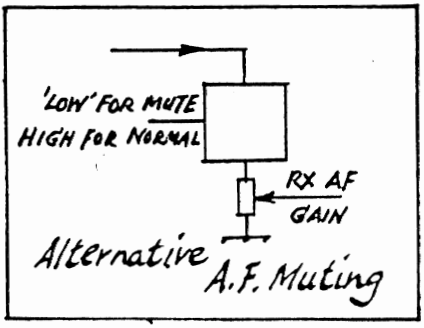
n.b. Always earth 7 and put + supply on pin 14

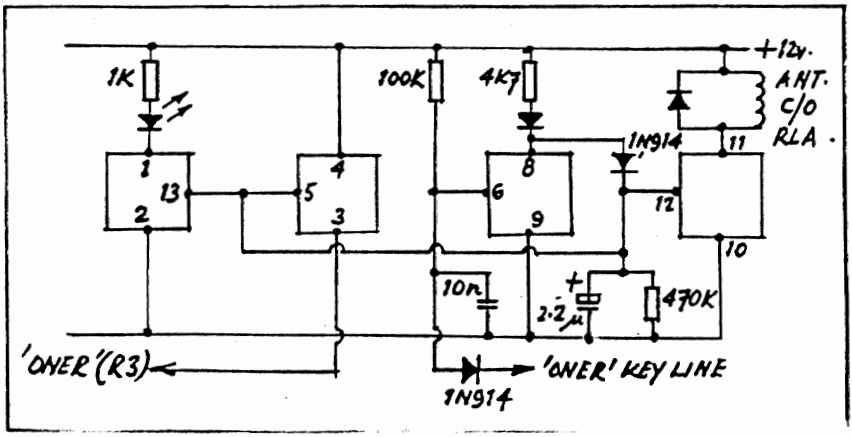


Connect 13 to 16 for LED ON - Rx
Connrct 13 to 14 for LED ON - Tx



RLA1 on when RLA2 off and Vice-versa. Allows change over with simple reeds





from page 10

Several weeks went by with little action in the AR area, and rightly so. However the hand was now beginning to tremble a little and I began to se the potential of putting up an antenna for 80. This potential was not reduced by the lengths of both copper and steel pipe left behind by the plumber cum landlord. How pleased I was when he kindly gave his permission to use the pipe as long as no damage was done.

Armed with this knowledge, a roll of junk bin coax and the words of encouragement received in a letter from Rai "shin up a palm tree" I managed to errect a faily respectable pole. This incorporated the use of an old barge board T.V. antenna mount, one length of water pipe, one length of copper pipe and much poly rope. Total height was about seven metres.

to this pole I attached an iverted vee sloping dog legged 80 m dipole, insulated with toothbrush handles. Thi is were the ATU came into its own - the swr was brought down to a very respectable figure.

I make no excuse for being a CQ chaser and my first contact was Lindsay VK5GZ/8, all very exciting- "your QTH ON", "Nightcliffe", well 6 km is not bad for 1.5 watts hi! The setup proved to be very workable giving me two contacts into VK6 and three into VK4. I tried on many occassions to callback to the VK5 CW practice broadcast but to no avail. Stations from all over Australia could be heard- except from VK7, and this led me to a profound awareness of the advantages we have living in Tasmania with having so many close-at-hand operators.

After a month or so of working on 80 I beganto look with greater interest to the ,yet unproven, 20m rig. This rig used many different design ideas breadboarded and did not prove to be a success. Having, fortunately, taken a blank Tas Devil circuit board with me , I decided to use the exsisting components to produce a 20m version. The reconsruction was done in a real homebrew environment- on the kitchen table- I more than ever appreciate the workshop at home. I used a cut down Pablo coffee tin to shield the VFO, this fact caused much laughter at the Darwin Radio Club when inspected by the members, "true homebrew!"

While purchasing a few additional components Idiscovered that MRF549 transistors were on special. This device subsequently proved to be excellent in this application, giving a full 1.5 watts output. A few modifications were needed to fit the now completed circuit board into the existing cabinet and once completed all was ready for air-testing.

The 80 metre dipole gave good reception on 20m with many DX and long-distant VK stations being heard. A decision had to be made - 80 or 20. I was convinced 20 was the way to go so the antenna system was downed and a new "you beaut" 20m inverted vee dipole errected, this time without any restrictions.

With tropical perspiration running down my neck and out from under the headphone cushions I waited to hear a good strong CQ -VK5ATU /VIS - tap tap oh boy! back came my call sign. From that time on I seem to go from strength to strength or QRP to QRP! My first DX was JI6LIL and the report a rather wonderful 5,7,9. In all 35 DX contacts were made and contact was made with JA,UA,7J,DU2,SM,VU,BV,RB,4S,RL,HL,F2(569 to Paris)9V,9M,OH, however

Having worked these stations, even from an ideal location more fully understand the thrill of QRP and have a clearer concept of the aims of our Club. I'm wrapped!

As the end of the year drew near it became obvious that one hazard of being an operator in the Top End was the danger of lightning strike! It was hard to tell nature to hold on because there was a very important contact taking place hi! ZZAPP. The equipment was always disconnected and the coax rolled up and left outside , I didn't fancy a megavolt discharge onto the steel bed frame.

Being responsible for the whole of N.T. I was required to travel to Alice Springs for a week and on my return Jan informed me that on the previous night a huge flash and crack had taken place over the house. A quick check revealed no obvious damage and having said good'ay to the family I dicided to relax. Just as a precautoin I checked the swr and it looked suspisciously flat 1;1 - not good. Unsrewing the coax plug (phono) produced much water (I had sealed the top of the coax). So where had it come from?

Close examination of the coax next day revealed numerous holes which looked like hot pins had been pushed out from the inside. It had been very close indeed. There was no apparent damage to the di-electric so I chose to dry the cable out. Fortunately all returned to normal.

During the entire stay I made only one contact with VK7, a two way QRP. You can imagine how excited I was when the CQ was followed by '7VV. A not-so-easy QSO but thats the challenge of low power.

It was a sad day when the time came to drop the tower and roll up the perferated coax but with good suntans all around, happy memories established for the children, one less winter for my wife and a couple or so pages filled in the log book who could be really sad?

After the very enjoyable stay we journeyed south, arriving home just before Christmas. Since that time my DX activities have fallen dramatically- not for the lack of trying, but 1.5 watts and a dipole do have there limitations. To help a little I have developed a 5 watt linear amplifier and this has made a tremendous difference. When I announced that I was using a linear I was asked "have I gone QRO?" "no" was my reply ,I have just moved a little further away from QRP hi! With this I have had good DX and made my first USA contact on 20m into New York with a 339 report Walt was using 600 watts and a 5 element yagi so all is not lost.

I take this opportunity to say thanks to one and all for the contacts, friendship and encouragement. Thanks Rai for your effort with LO-KEY.

I give thanks to God for the privillege of being able to use the airwaves for the enjoyment of "meeting" others.

Best wishes

Ian Smith VK7IJ No.91

QRP TTL TRANSMITTERS

BY DL1ZB

Last year a 40 metre QSO with DL1KS initiated me to experiment with TTL transmitters myself. His transmitter was similar to that shown in the Winter 1982/3 edition of SPRAT, using a 7400 as an oscillator and a 7438 as a PA delivering about 500mW output. However, DL1KS had stated that he was not too lucky with the 5 volt supply, and that the harmonic suppression of the pi output filter was just 10dB.

I decided to look for open collector drivers which could be operated at 12 volts and to employ 78L05 for the TTL 5 volt supply. The first IC I tried was the 7407, which I found more suitable than its logic counterpart the 7406 due to simpler internal circuitry, and hence less current consumption. Driven by a 7400 oscillator and all buffers paralleled the 7407 delivered 2 watts, but was easily destroyed by mismatch conditions. To provide some means of current limiting and equal current sharing I inserted a 47 ohm resistor into each collector output lead. This made the output drop to about 1.2 watts, but the circuit was stable and safe, and the resulting power still sufficient for QRP work. Fig. 1 and Fig. 2 show the complete circuit.

7400 Oscillator - The gates following the oscillator section must be connected in such a way that with the key open all 7407 inputs and outputs are high (no output current). Note that one gate input of the oscillator input section is pulled high by a 1K resistor to 5 volts, (as recommended by TI). This is to reduce the oscillator input current and thus the crystal current and dissipation.

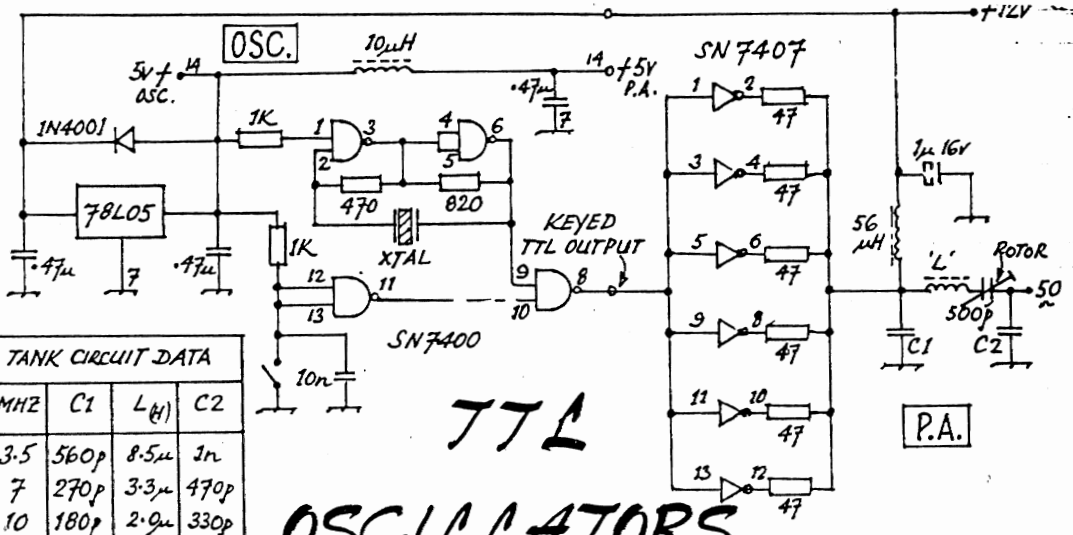
Output Tank - The harmonic suppression of the output tank could be improved to over 30dB by replacing the small pi coil by an LC series circuit, making a much higher coil possible without changing power match. At this power level, the correct match between the IC output and the 50 ohm load is mainly determined by the output capacitor C2. The input capacitor value is a compromise between high efficiency (C1 low) and low peak collector voltage (C1 high).

The additional circuitry in Fig. 4 in parallel to the PA collector choke, (diode, load capacitor and zener diode), may also be added to this tank circuit to limit high RF voltage peaks during tuning, (and to roughly measure the peak collector voltage to ground with the zener diode removed).

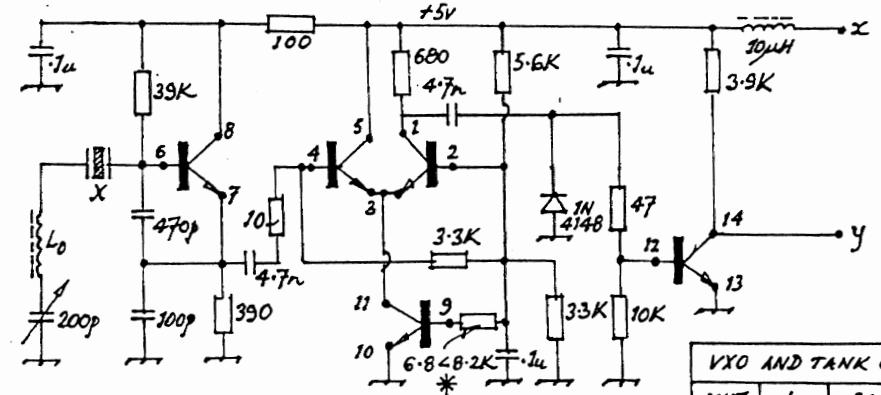
Compared to a simple two stage transmitter with discrete transistors, there is no need for interstage tuning or matching, and there is no sign of crystal pulling when the PA is tuned because the TTL circuit offers the advantage of a multistage transmitter. However, a slight frequency shift may be introduced via the 5 volt supply depending on the key open or closed, especially noticeable at 14MHz. To avoid this, each TTL circuit should have its own blocking capacitor of the 5 volt supply, and the 5 volt supply of both ICs must be separated by an RF choke.

SN75453 - Another IC suitable for QRP PA purposes is the lesser known 75453 from the TTL line of peripheral drivers. Due to the cooling conditions it will deliver about the same power as the 7407, but it has several advantages. It has two outputs rated at 30 volts and 300mA, an OR gate input and less driving requirements for the same output current. The optimum collector series resistor seems to be 18 ohms. Keying may be transferred from the oscillator circuit to the PA, and up to four 75453 may be driven by a single 7400 oscillator to achive the 5 watts output level of the US QRPers. As the 75453 is housed in a 8 hole dual in line case, two of them may be plugged into a 16 hole dual in line socket and cooled by a common cooler. Fig. 4 shows a PA circuit with two 75453 delivering an output in excess if 2 watts.

Cooling - Cooling the PA ICs is a question of the duty cycle in practical CW operation. There are IC coolers on the market for 14 and 16 pole ICs which may be glued or clamped onto the 7407 or two 75453 or a common socket.

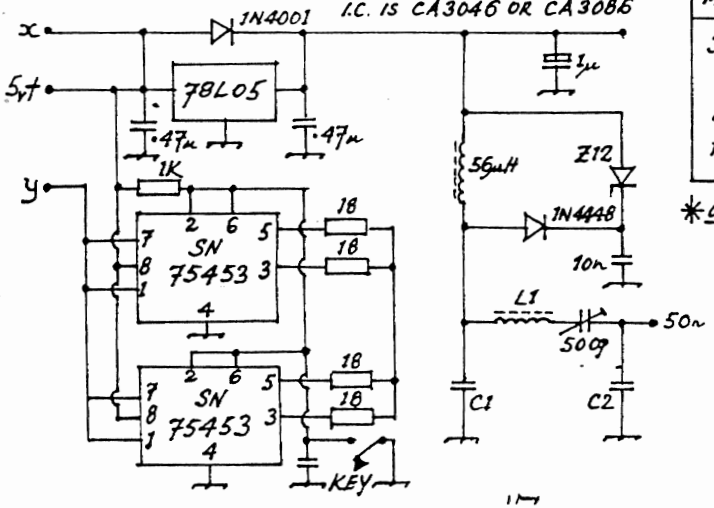


TANK CIRCUIT DATA			
MHZ	C1	$L_{(H)}$	C2
3·5	560p	8·5µ	1n
7	270p	3·3µ	470p
10	180p	2·0µ	330p
14	100p	1·3µ	220p



VXO AND TANK CIRCUIT DATA				
MHZ	$L_{O\,\mu H}$	C1	$L_{1\,\mu H}$	C2
3·5	60/120	1n	8·5	1·5n
7	25	470p	3·5	680p
10	22	270p	2	470p
14	8	150p	1·3	330p

*OPTIMISE FOR 14 MHZ OPERATION IN VXO CIRCUIT.



2 watts qrp tx

requency Limitation - Both the 7407 and the 75453 will work with almost qual power output from 1.8MHz to 14MHz. There seems to be a little hope, owever, that the development of faster logic families like HCMOS will rovide suitable PA ICs for up to 30MHz, because until now no open collector ersions for higher voltages and currents have been announced.

XO Circuit with CA3046 or CA3086 - In one respect however, work on TTL scillators was very disappointing. I was unable to find a way to achieve he same pulling range on the TTL circuits, (which use the crystal series esonance, which I had realised with discrete transistor VXOs, (which use the arallel resonance of the crystal). To get a VXO with the same visual ppearance as the PA circuits, I designed one around a CA3046 (or CA3086) ransistor array, see Fig. 3.

he first transistor is operated in the same way as in the Lagos QRPeter and similar circuits, (SPRAT Summer 1980, Summer 1982 and Winter 1982/3). The ext three form a symmetrical limiter with constant emitter current, elivering a 1:1 rectangular wave form to the final transistor which can supply up to 10mA of single ended TTL output. For optimum pulse to pause ratio at 14MHz the resistors designated "X" must be optimised according to the load presented by the driven circuit.

Molded RF chokes may be used for the VXO coils. For band switching these coils, care must be exercised to use wiring and switches with a stray capacitance as low as possible, otherwise the achievable pulling range may be limited. I used separate miniature switches (SPDT) for each band.

As the VXO operates on the transmitter output frequency, it must be well screened to avoid instabilities and frequency pulling.

I have built a transmitter from the combination of Fig. 3 and Fig. 4 with good results on all bands between 3.5MHz and 14MHz. If the PA collector choke is doubled in value, the circuit may also be extended down to the 1.8MHz band.

TTL Frequency Generation - Finally I would like to mention the contribution of Gig Dragulescu, YO6HQ, in the Autumn 1982 edition of SPRAT, page 7. In his transceiver ideas he presented an exciter which may replace the crystal oscillators of Fig. 1 or Fig 3 to form a 4 band VFO controlled TTL QRP transmitter.

Tank Circuit Data

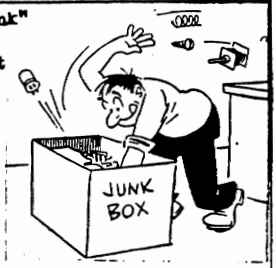
MHz	C1	L	C2
3.5	560pF	8.5u	1000pF
7	270pF	3.3u	470pF
10	180pF	2.0u	330pF
14	100pF	1.3u	220pF

VXO and Tank Circuit Data

MHz	Lo	C1	L1	C2
3.5	60-120u	1000pF	8.5u	1500pF
7	25u	470pF	3.5u	680pF
10	22u	270pF	2.0u	470pF
14	8u	150pF	1.3u	330pF

HOME - BREWER'S CORNER

From... Len VK5ZF/QRP (1)



Most of us "Home-brewers" have "junk" boxes, and if you don't have one, well here is a good reason to start one. I would like to share with you an idea, that started with my own "junk box". Recently I was rummaging through my junk, looking for a particular part, when I began to think along these lines..... Here I have a box full of parts, that just lay around in the box, till I need something. The junk would be much more useful if I could put it to work, in some permanent manner. This was the birth of what I call my "QRP-MATE", as it has become the handiest QRP tool I could ever own. Basically the the idea is to mount your surplus electronic "bits and pieces", on a permanent chassis, box etc., complete with front panel. In this manner you have a permanent experimental chassis, with the parts already mounted, ready to wire up with any circuit you wish to try out. Every new circuit you see in your favourite QRP magazine (Lo-Key I hope), you can now knok-up with very little expense to yourself. That has to be a step in the right direction.

Another thing to remember is that your QRP-MATE, will be totally different to every other one, as no two "Home-brewers" "junk boxes are the same. Also you can make it as simple, or as complicated as you wish. Like wise as large or as small as you please. In other words you can fashion it around the contents of your "junk box". Here at last is a project that you can make, that just has to work, you just can not fail with this one. There is no point in giving you details of measurements or placement of parts, with my particular QRP-MATE, as you will not have the same parts as I have used. So what I will give you is some thoughts, that may be a guide for you, as you plan your own QRP-Mate.

When it comes to the size of the chassis, my advice is to make it as big as possible. Remember that the more bits and pieces you can mount on the chassis the more versatile the unit will be come. Another reason to keep it as large as possible, is to give yourself room to experiment, while you are wiring up various circuits. The chassis should be made out of a piece of alluminium of suitable gauge. If you are not into rolling your own chassis, there are a number of two piece boxes available from a number of electronic stores. For my circuit boards I have used blob boards available from Dick Smith with the part No. H5610. In my unit I have used four of these boards, making them interchangeable, if I wish to use a wired up board in a project I am building. This adds greatly to the versatility of the "QRP-MATE", by proving the reliability of a circuit, before you transfer the board to particular project. Get yourself a numberof H5610 boards and stick with them.

As for the parts you mount on your "QRP-MATE", that of course is up to you, but I will say that any money spent on parts for this unit will repay you many times over, as your knowledge of "Home-brewing increases. On my front panel I have mounted three meters, an ammeter measuring 0 to 5 amps, a voltmeter measuring 0 to 30 volts, and an 0 to 1 ma meter to read base current for xtal oscillator experiments etc. Also on the front panel there are a number of different size xtal sockets to take care of the odd useful xtals I have in stock. I then added a switch and coax connector to control which xtal I wished to use, or through to an external VFO. If you have some variable condensers, add them to the unit, as they are very useful to resonate circuits, especially when you are experimenting at various frequencies. On the back panel if you wish,,you might like to add a terminal strip or a couple of small sockets to allow the output of your power supply to

19

HOME-BREWERS CORNER Cont.

be connected to your "QRP-MATE". An earth and antenna terminal may also be placed on the back panel, if you wish. I will leave the rest up to your imagination, as there is no end to the ideas that you can come up with. My intention in this article has been to show you how easily you can make and own a QRP-MATE, because the rest of this series of articles in "Home-brewers" Corner will be written around experiments carried out, using this type of unit. If possible I may be able to include a couple of photos of my "QRP-MATE" in the next issue of Lo-Key.

From this point it is my intention of taking each stage of a typical solid state QRP rig and describe and experiment with each section in great detail. One way of doing this is to select a well known circuit, and use that as the basis of our experiments. The circuit I have chosen is the "UNIVERSAL" QRP transmitter, from the ARRL publication Solid State Design for the Radio Amateur. I urge all of our QRPers to get hold of a copy of this handbook, as it represents extremely good value for money. As we go through this circuit I hope to be able to show you the many variations in design and parts an experimenter can use. Layouts and construction methods can be changed radically, without de-grading the performance of the little rig. With a little effort it is possible to make this little rig operate on most of the HF bands by changing xtals and coils. For now here are the details of the basic circuit for the "Universal" QRP rig, and the Coil and Output Filter table.....

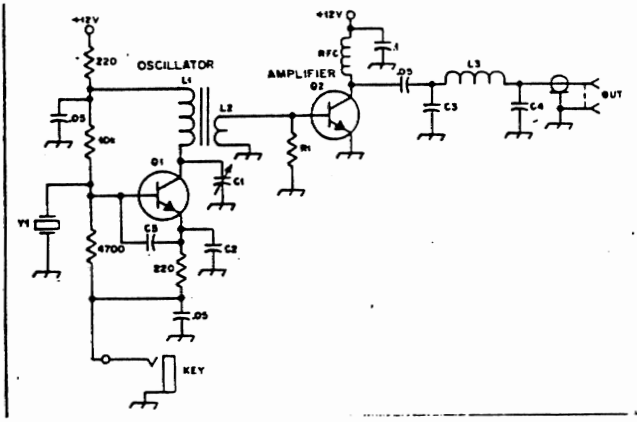


Table 1

	C1	C2	C3	C4	C5	L1	L2	L3	R1	RFC
160 M	400 pF MAX	1800 pF	1800 pF	1800 pF	360 pF	73t No. 28 T-50-2	8t	30t No. 26 T-50-2	18Ω	50 µH
80 M	400 pF MAX	100 pF	750 pF	750 pF	200 pF	43t No. 26 T-50-2	5t	21t No. 22 T-50-2	39Ω	25 µH
40 M	180 pF MAX	100 pF	470 pF	470 pF	–	35t No. 26 T-50-2	4t	14t No. 22 T-50-2	39Ω	15 µH
30M	120pf	68pf	330pf	330pf	–	30t	3t	13t	47	15uf
20 M	60 pF MAX	33 pF	210 pF	210 pF	–	27t No. 24 T-50-6	3t	12t No. 22 T-50-6	47Ω	15 µH
15/10 M	60 pF MAX	33 pF	105 pF	130 pF	–	17t No. 24 T-50-6	3t	9t No. 22 T-50-6	47Ω	15 µH

Remember to get your H5610 boards by next issue of Lo-Key, and we will start to go into and experiment all the technicalities of this QRP rig. With a little bit of luck I may be able to get our Editor Rai, to let us have four pages for Home-brewers corner next issue of Lo-Key.

THE CLUB COMMUNICATOR

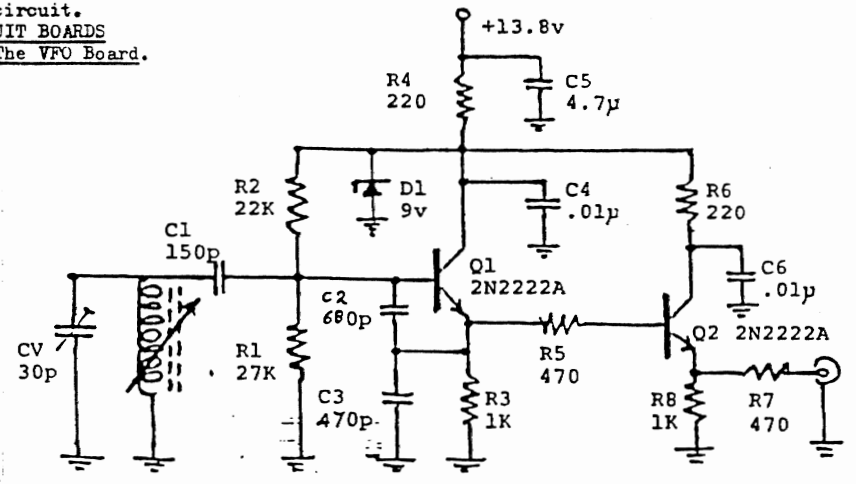
A REVIEW OF A 3.5MHZ CLUB PROJECT TRANSMITTER

This little transmitter should have wide appeal because of its many features. These have been incorporated whilst keeping costs to a minimum, and include.....

(1) Full 3.5mhz coverage....Using a very stable VFO.
(2) VFO tuning can be restricted to any one portion of the band.
(3) Full maximum output for QRP....5 WATTS.
(4) Only two presets need to be adjusted. This ensures good reliability, and should suit novice constructors.
(5) Four small, and easily constructed boards. This brings versatility in, that some boards will be common to all the rigs Rod designs, so that "Standard Boards" will become popular.
(6) Full break-in is incorporated. That is, the receiver operates as the key is lifted.
(7) As a cost saving measure, no frequency readout is provided. You must NET the transmitter to your receiver, with the netting button. This puts an S1 signal into your receiver, thus tuning the transmitter to the frequency, at which you can hear the signal. Therefore you will need either a calibrated receiver, or a crystal calibrator. A frequency counter readout would raise the cost too much initially. To use a receiver is only a minor inconvenience. A frequency counter option will be made available soon.
(8) If you are using an ATU, you might notice a vvery small frequency shift, whilst tuning your antenna to resonance. This is due to the enormous impedance changes while tuning. This shift in frequency is in the order of 200hz, and does not prove to be a problem. The on-air stability after this tuning is excellent. The extra cost and the complexity, to prevent this was not considered necessary.
(9) Much care has been taken to eliminate spurious transmitter products, such as key clicks and TVI, by the careful use of envelope shaping and output filtering. There is no compromise here, as our very reputation as Amateurs is at stake. Signal reports have never been anything but a 9, for the last digit of an RST report, and that is how it always should be.
(10) Very fast reed relays are used for antenna switching, because Rod found that diode switching caused TVI on his own nearby TV receiver. This could cause real problems for a novice to track down, so it was found best to steer clear of that type of circuit.

CIRCUIT BOARDS

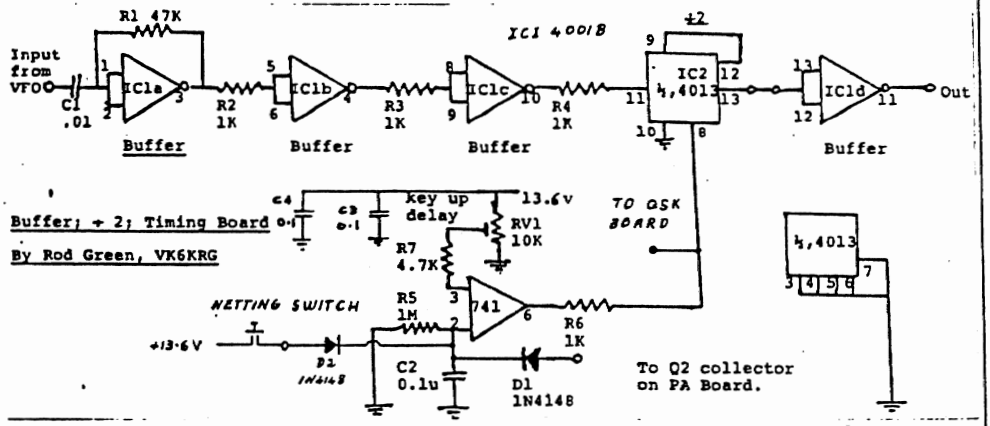
(1) The VFO Board.



(1) VFO Board Cont.

The lack of suitable variable capacitors, has led to the development of this permeability tuned oscillator. It was found that most ferrite cores, cause excessive drift due to temperature change, so that brass was then chosen. A brass rod instead of ferrite proves far superior for for temperature stability. The brass slug is screwed in and out to change the frequency. A threaded brass rod is used here, and extends from the inductor out to the front panel, by the coupling shaft supplied in the kit. Transistor Q1 is the oscillator, and it is supplied with regulated supply voltage by zener diode D1. The oscillator is quite stable even if the supply voltage is not regulated. The emitter of Q1 feeds the buffer transistor Q2 via R5, which seems to improve oscillator frequency stability, causedby changes in load capacitance. The output of Q2 feeds the next stage via R7, also used to reduce drift. All the important circuit voltages are listed in the appendix.

(2) Buffer, Divide by 2, Timer board.

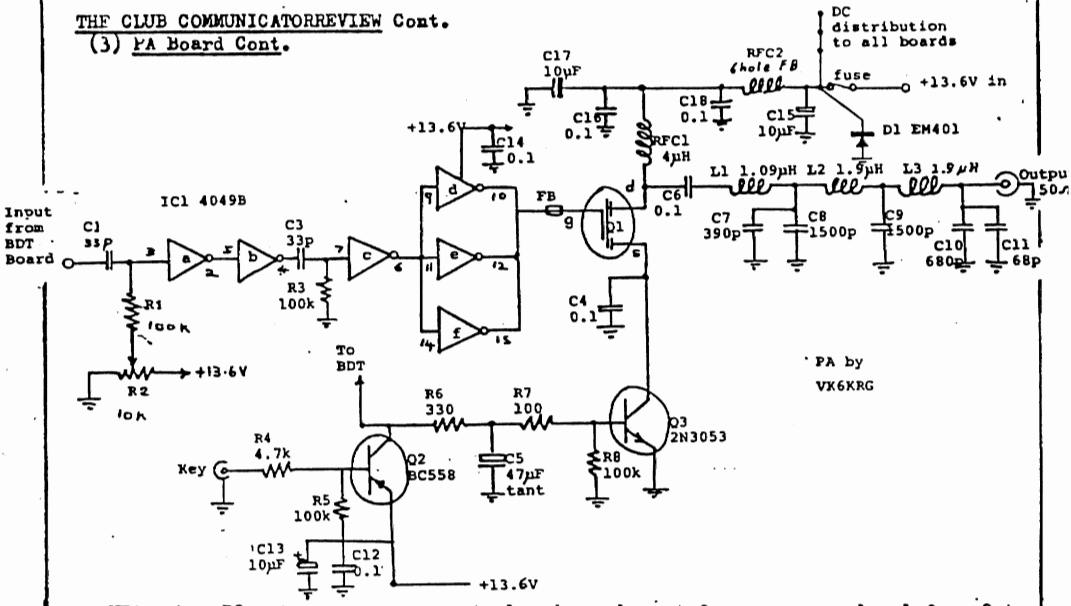


We will call this board the BDT board from now on. The output from the VFO feeds the input of this board. The first stage IC1a, is set up as a low level voltage amplifier. This brings the oscillator RF level to about 12 volts peak to peak. The next two stages IC1b and c add extra isolation. The VFO is 7mhz, so it will not get into the receiver, when you are listening. In this way the oscillator can be kept running all the time, which aids frequency stability, long term. From IC1c the now square wave Cmos signal passes on to IC2. This a frequency divider, dividing by 2. Basically it is enabled by the morse key. When the key is down, IC2 is turned on, generating 3.5mhz at pin 13. When the key is up, the divider is turned off and pin 13 reverts to +12 volts. There is therefore no 3.5mhz when the key is up. Although the key controls the operation of IC2, a delay is introduced such that after the key is lifted, IC2 continues to generate 3.5mhz for a few milli-seconds. The amount of time delay is controlled by the setting of RV1. Delay is necessary so that once the key is lifted, the CW envelope shaping network around the RF final transistor, does not instantly turn off the final, but decays over a few milli-seconds. To allow this to happen, the full RF drive to the final must be supplied until the RF envelope has completely decayed. If the final RF input to the final transistor was suddenly removed as the key came up, there would be nothing for the network to shape. The envelope would suddenly collapse causing severe key clicks. A further function of of the BDT board is to supply the netting signal mentioned earlier. It does this by turning on IC2 without keying the final. A small amount of this signal, leaks into the receiver for netting. Finally the BDT board is not directly controlled by the key, but from Q2 on the PA board. This transistor is directly controlled by the key.

(3) PA Board

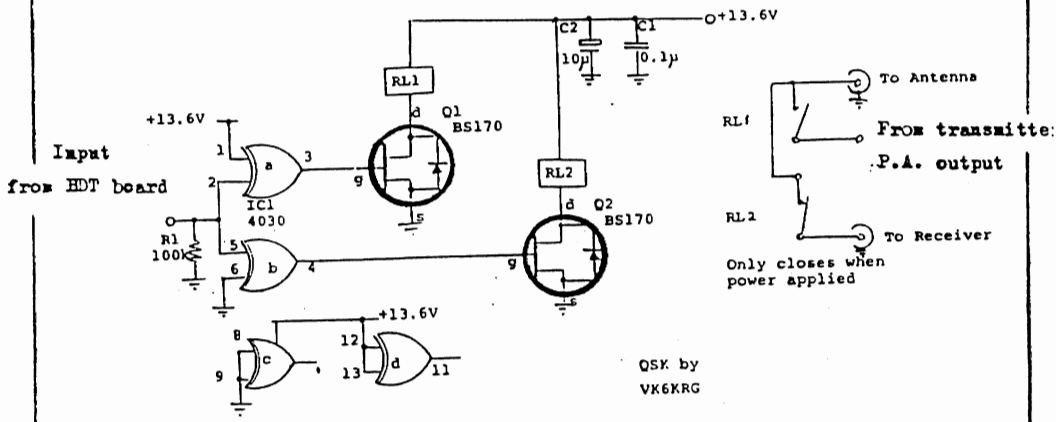
This board is also very versatile in that it can be used with other QRP transmitters. For instance, it can be directly fed from a well isolated VFO. The signal from the BDT board passes to IC1 via C1. Potentiometer R2 sets the operating point of IC1a. R2 has only little effect when fed from the BDT board

(3) PA Board Cont.



wave VFO, then R2 acts as a power control and can be set for any power level from 0 to 5 watts. This feature is dispensed with in this model. Capacitor C3 couples the signal to IC1c, and R3 is used to ensure that transistor Q1 is turned off in the unlikely event of RF drive failing with the key down. Transistor Q1 is the 5 watt final. L1, C7 and C8 form a matching network, to convert the drain impedance of 19 ohms to 50 ohms. The remainder of the inductors and capacitors to the right, is the 50 ohm low pass filter. Transistor Q3 is the main keying transistor, and is used in sequence with the key to gradually turn the final on and off. The time taken for the rise and fall of the envelope, depends on the components of the envelope shaping network R6, R7, R8 and C5. Transistor Q2 is used to interface between the key and the envelope shaping network. This entire keying network has proven to be both simple and very effective. I expect you will see it on QRP Club rigs in the future.

(4) QSK Board.



THE CLUB COMMUNICATOR REVIEW Cont.

(4) QSK Board Cont.

This board does the job of transmit/receive switching. With the key up, +12volts will be applied to the input. This turns on Q2 via IC1b, relay RL2 operates and switches the antenna jack to the receiver jack. When the key is down, IC1b turns Q2 off and releases RL2. At the same time IC1a turns on Q1, which operates RL1 thus switching the antenna jack to the transmitter output on the PA board. The input control voltage to this board comes from the output of IC3 on the BDT board and should be +12 volts for receive and 0 volts for transmit.

CONCLUSIONS

The review was compiled from a draft copy of the very comprehensive instructions supplied with each kit. As I have had the opportunity to test a completed model of this kit, I can assure members that all of Rod's claims are not exagerated in any way. The "Club Communicator" kit is very good value for money, and I can thoroughly recommend it to all club members. To be quite honest I have only one dislike with the kit as supplied, and that is with regard to the cake-tin it is housed in. I believe that cakes should be put in cake-tins, not transmitters. This is of course my own personal opinion, as the cake-tin supplied does house the little transmitter very well indeed. Work you on 3.5mhz very soon with YOUR "CLUB COMMUNICATOR".

Review by Len VK5ZF (1)

****

THE 3.5 MHZ CLUB COMMUNICATOR

DESIGNER AND KIT SUPPLIER

Rod Green VK6KRG (28) 72 Yelverton St. South, Donnybrook, West Australia 6239.

PRICE OF KIT

$75 POST PAID ANYWHERE IN AUSTRALIA.

TO ORDER A KIT

ALL ORDERS TOGETHER WITH THE REMITTANCE MUST BE SENT TO THE TREASURER

KEVIN ZEITZ VK5AKZ (43) 41 Tobruk Ave., St. Marys, South Australia 5042.

Please do NOT send order or money to any other committee person.

Rod wishes it to be known that there will probably be a delay of some 3 to 4 weeks after he receives the orders from Kevin, because of the time factor in assembling and obtaining the necessary items for each kit. Please be a little patient, because I can assure you that the kits are well worth waiting for.

OUR OWN CLUB

KITS AT LAST