QRPp

Journal of the Northern California QRP Club
Volume #1, Issue 1, June 1993

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FROM THE EDITOR:

Doug Hendricks, KI6DS
862 Frank Ave.
Dos Palos, CA 93620

Welcome to the first issue of the Northern Calfornia QRP Journal. The purpose of this journal is to provide a means of communication for the members of the Northern California QRP Club, which was formed to foster the use and enjoyment of QRP operation via Amateur Radio. This club was a result of several things, conversations between Jim, WA6GER, and myself, and conversations with several of our fellow QRP enthusiasts that Jim and I met during our trip to Dayton in April. Hopefully, you will enjoy the contents of this journal. It is written to provide information for hams who are interested in QRP.

I am not a technical person, although I do enjoy building and have built several projects, both from kits and from articles in various magazines and journals. My goal is to have our members contribute articles for publication, but until that happens, most, if not all technical articles will be reprints of articles that have appeared in other publications. Full credit will be given to the author and publication, it is not my intention to plagarize anything, but to provide information.

This issue is a venture into the unknown. We do not know where the club is going, or if it will go. This is my first attempt at being an editor of anything. What I have tried to do this first issue is to provide articles that will have appeal to a large number. The "Pebble Crusher" transmitter article is complete with a follow up article. W3TS's antenna tuner is a project that I recently built. It is easy, and if you were at our June meeting, you had the opportunity to see my example.

Jack Gannon's Surface Mount Keyer project is not only a useful project, but it is state of the art construction. This article came from Sprat, the Journal of the G-QRP Club. I have never seen an article on surface mount projects in a U.S. ham magazine? Why not? The parts are available. All it takes is for you to write the article and become famous. This SM article was included to stimulate you and to show what is possible.

The Stockton Bi-Directional Wattmeter is reprinted here to correct an oversight in the QRP Quarterly article by Luke Dodds. Somehow, there were some important facts left out of the Dodds article. I built this wattmeter, and I used a FT50-43 toroid and 1N34A diodes. They both worked fine.

There is an "ad" of sorts in this edition. It is the policy of the journal not to accept paid advertising. We don't want another QST full of ads and no information. So why is the ad from Blue Rose Electronics included? It is there to provide information as to where you can obtain a kit of parts to build the project in the SMD articles.

Angel Gerasimov, LZ1SM, has an excellent article on building a wide range VXO. He is from Bulgaria, and this was included as an example of how world wide our hobby is.

The three short articles, "The Micro-80 Mini Transceiver",

"Finding the Internal Resistance of Unmarked Meters", and "HC6U Adapter" are here because they contain useful information, and also to demonstrate that an article doesn't have to be gigantic to be interesting and worthy of publication.

The review article on the OHR Wattmeter is just what it says, my opinion of that particular piece of gear. I welcome all such articles. Please include the price of the gear and where it is available. Other than that, I welcome your opinions.

I hope to see more articles like the one on the trip that Jim and I took to Dayton. Personal experience articles are interesting and fun to read. Share what you have done with others. DXpedition, getting your license, an unusual contact, whatever, if it has to do with QRP, write it up and submit for publication.

Another type of article that I think will interest our readers is the member profile. Tell us about your ham backround, what you have done, what you have built, and what your interests are. If you have an idea for an article that we haven't covered, submit it and I will give it every consideration.

Most of all, I hope that you enjoy QRP. See you in issue number 2. 72, Doug, KI6DS

Subscriptions

The first few issues of this publication are going to be free. Jim, WA6GER is paying the postage, and I am printing and xeroxing. When the club grows to such a size that we cannot afford it, then we will charge a small fee for postage and for the paper and copying fees. Until that time comes, enjoy with our compliments. To subscribe, fill out the form on the back of this issue and send to:

Doug Hendricks
KI6DS
862 Frank Ave.
Dos Palos, CA 93620

The Oak Hills Research WM-1 Wattmeter

A Review: by Doug Hendricks, KI6DS
862 Frank Ave.
Dos Palos, CA 93620

Last April I went to Dayton and while there I purchased a WM-1 Wattmeter kit from Dick of Oak Hills Research. This wattmeter is designed specifically for QRP operation, as it has 3 scales; 0-10 watts, 0-1 watt, and 0-100 milliwatts. Yes, that is right, 0-100 milliwatts. Now you can measure those QRPp rigs. It works great for the 1000/mile/watt award.

Dick did not have a kit with him at Dayton, but promised to ship me one on the following Monday, which he did. When it arrived, I was impressed with the way that it was packaged for shipping. First class

all the way, and all of the parts were grouped in bags. The manual is outstanding. Dick does a fantastic job of explaining exactly what you are to do. I did not have any problems at all, and that has only happened once before with a kit, also by OHR.

I unpacked the parts, checked them off the parts list in the manual and everything was there. OHR even prewinds the coils for you, a nice touch. All of the parts needed to produce the working meter are contained in the case. There is nothing for you to supply other than solder and tools. The parts all are quality parts, especially the case. It is heavy duty aluminum that Dick has custom made for his products. All of the holes are punched, and everything fits perfectly.

Construction took about 2 hours, with several interuptions from my wife and daughters. The instruction manual is easy to follow and very complete. I think that a complete novice at kit building could build this kit as long as he could solder.

Calibration of the meter is done with a digital volt meter, and is a 3 step process. You calibrate the 10 watt scale, then the 1 watt and finally the 100 milliwatt. When you finish, you clip a jumper and the meter is ready to use. I would suggest leaving the jumper a little longer than the instructions say, in case you ever want to recalibrate.

Operation of the meter is simple and straight forward. All of the controls and connections are screen printed on the case, and you have 4 positions on one switch; off, 10 Watts, 1 Watt, & 100 Milliwatts. The other switch is for reflected or forward power.

When I finished building and calibrating the meter, the fun began. First I hooked up the W7EL from OHR. It puts out 2.2 watts, not bad. Then I hooked up the Icom 735 on 30 meters to a Skelton Cone antenna and my antenna tuner. I put the switch on reflected power. Using the 10 watt scale, I got the reflected to 0, or just about, then I switched to the 1 watt scale, and saw that I had about .1 watt reflected. I tuned this out, and switched to the 100 milliwatt scale. Again, I saw that I was not quite at the minimum. I adjusted the tuner and got the reflected power absolutely flat! Talk about a sensitive meter, this was great. For the first time ever, I was able to be sure that I had my tuner adjusted right using a QRP rig. One word of caution. When you do this procedure, make sure that you switch to the 10 watt scale before you switch to forward power, other wise you will peg the needle really hard, and this is not good for the meter. By the way, my Icom 735 was running 4.8 watts out.

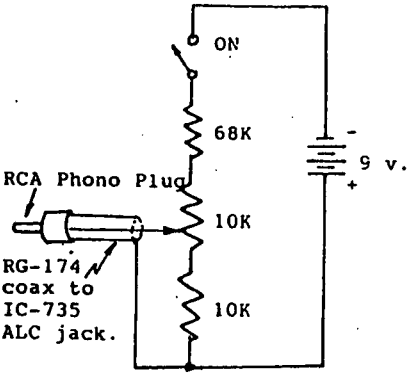
I am very impressed with the OHR WM-1 kit. It costs $79.95, but you get all of the parts that you need. It is very sensitive, and I have a friend, Jim, KA0IQT, who has access to very sensitive test equipment. He told me that when he tested his meter it was well within the 5% error range. I would recommend purchase of this kit for anyone, and believe that it offers excellent value for the money. I believe that if you want quality, you have to pay for it. Dick, at OHR, produces quality products, and provides excellent service also.

ICOM QRP

Editor's note: Two descriptions of ways to lower power output on several ICOM transceivers appeared recently in separate publications, and they are reprinted here for QRPers who may have missed them. The first appeared in the G-QRP Club's quarterly newsletter, "SPRAT," and is by Mike Michael, W3TS. The second is excerpted from an advertisement ICOM ran in some major Amateur Radio magazines. While the accuracy of these methods is not disputed, in no case does QRP ARCI endorse or warrant either.

By feeding a negative 1 to 4 volts into the ICOM ALC jack, you can turn the RF power down to zero watts. With the circuit shown, my IC-735 can run from 0-5 watts with the front panel power control set at any point (this overrides that control).

My 735 would go down to 6 watts with the front panel control. Now I can go down to 900 mW or less for milliwatting. —Mike Michael, W3TS.



(ICOM's transceivers') front panel RF PWR control puts QRP or QRO selection right at your fingertips. A one-time internal adjustment is required, however, to reset their front panel RF PWR control properly so exactly 5 watts output is produced at a fully counterclockwise position. Please note this change does not alter the control's fully clockwise setting of 100 watts. It simply recalibrates the control so you have instant QRP or QRO selection...

...First, remove any rings or watches when working inside any equipment. Although ICOM transceivers do not employ dangerous vacuum tube-type high voltages, metal objects can unknowingly create shorts in any unit.

Be sure you have plenty of light to see what you are doing and, if necessary, use a pocket magnifier for reading component numbers on circuit boards. Also avoid moving wires or cables that can become pinched after replacing rig covers.

...(The) IC-735 is easily reset for 5 watts minimum output on all modes as follows. Place the IC-735 upside down on a soft towel with its front panel and knobs facing you. Remove the eight (8) screws from the bottom cover and lift it off to expose the main circuit board.

Look in the upper right corner, and you will see four small potentiometers in an "L"-shaped pattern. Locate R-267 near the bottom of that "L". It sets the span of the front panel's RF PWR control. Plug an accurate wattmeter connected to your antenna or dummy load into the IC-735's rear socket, switch the transceiver on and adjust the RF PWR control to minimum.

Select CW operation and key the rig only long enough to read the wattmeter. Power output will typically be 10 watts. Place an insulated screwdriver on R-267 and again key the (rig). While watching the wattmeter, turn R-267 clockwise until the RF output drops to 5 watts. If more than 30 seconds are required for precise adjustment, switch the transceiver back to receive for 30 seconds before repeating (remember its air flow is restricted by the desk and towel).

Rotate the front RF PWR control to maximum, note full output, return to minimum and double-check for 5 watts output, then switch off and reassemble your QRP-ready IC-735.

A similar adjustment procedure applies to ICOM's IC-751 transceiver. In this case, internal potentiometer R-46 is reset so the front panel RF PWR control yields 5 watts at minimum. R-46 is located under the IC-751's top cover and in the center of the main circuit board. It is to the left of the large shiny shield in the board's exact middle.

ICOM's IC-751A and IC-761 do not include internal power adjustments for CW QRP, but reductions from 10 to 5 watts minimum output on SSB simply involve decreasing their RF PWR control to minimum. ICOM's IC-781 is QRP-ready via its front-panel controls. Rotate the RF PWR to minimum, then decrease the DRIVE control until 5 watts is indicated on the wattmeter.

Resetting ICOM's IC-725 for 5 watts minimum output is also a cinch. Set its front RF PWR control to minimum, then adjust R-208's setting until your wattmeter indicates 5 watts. When the IC-725 is upside down and its knobs are facing you, R-208 is located in the main circuit board's top right quadrant (near the UI-7 FM option's area).

Write ICOM or call its service hotline for QRP guidance on other units. Its mailing address is ICOM America, Inc., 2380 - 116th Ave. NE, Bellevue, Washington 98004. The hotline number is 1-206-454-7619.

The first image transmitted on experimental television in the 1920's was a cartoon cat.

A BI-DIRECTIONAL INLINE WATTMETER

DAVID STOCKTON G4ZNQ

GOOD ACCURACY FREQUENCY INDEPENDANT NO ADJUSTMENTS
LOW INSERTION LOSS WIDE POWER RANGE SIMPLE TO BUILD

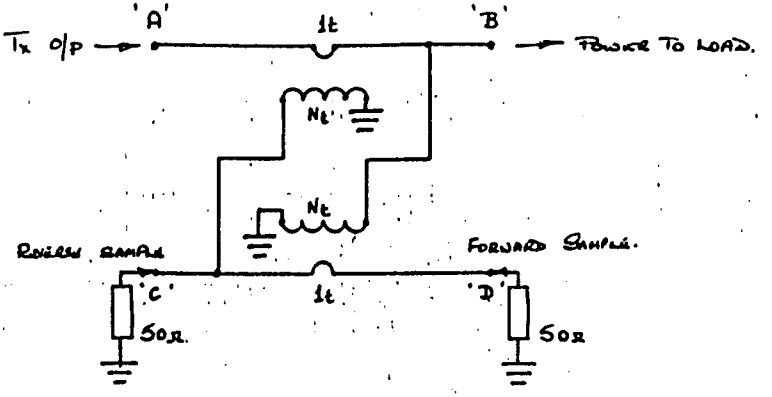
sked to build a "transmitter VSWR meter", my fancy was taken by two ariants of the Bruene circuit and I built one of each. The first ses a resistive potentiometer to sense the line voltage - found in he RSGB Manual. The second uses an autotransformer to sense the line oltage - found in an article by Ulrich Rohde in the US HAM RADIO agazine. Both proved to be less sensitive to stray than their ncestor, but I felt it might be possible to do better. The cause of heir sensitivity to stray capacitance is the high impedance which the etectors present. Some calculations also showed that this high mpedance was also limiting performance at the lower end of the range.

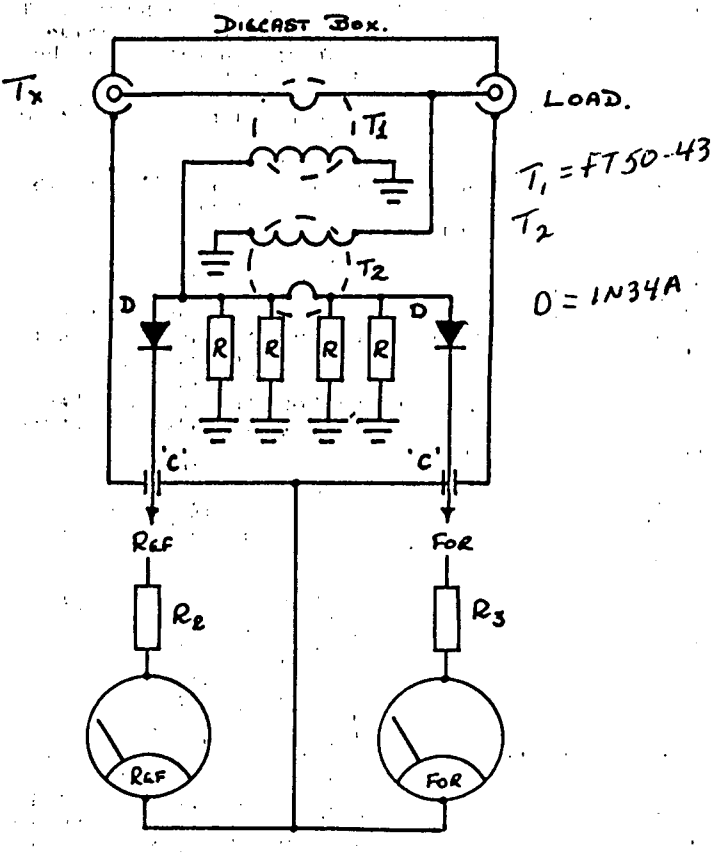
started thinking of low impedance alternatives and suddenly emembered some professional work I had done on return loss bridges ome 10 years ago. It happens that as circuit impedances are lowered, he bandwidth over which a transformer is usable increases, and I had esigned a transformer based bridge which was usable from 10KHz to 0MHz with laboratory instrument class accuracy. This made me suspect hat choosing a circuit with controlled, low impedances would be eneficial all round.

o experiment with transformer design I built a true 4-port Hybrid ntended for 50 ohm use. A hybrid is a very simple circuit - just 2 ransformers and 4 connectors - with some amazing properties. The connectors or ports are best thought of as two pairs. If a signal is assed in one connector and out of the other of a pair, into some nknown impedance load (say an antenna) then, if both of the other connectors are terminated in the intended system impedance (say 50 ohms) then the hybrid feeds a fraction of the power passing forwards through the first pair of connectors into one of the terminations. It feeds an equal fraction of the reverse power passing forwards through the first pair of connectors into one of the terminations. It feeds an equal fraction of the reverse power flow into the other termination. Hybrids can be designed to have different sampling fractions, usually quoted in dB, so a 20dB Hybrid diverts 1% of the flowing power to the appropriate terminated port. The really wild properties are that the circuit is symmetrical and the 2 pairs of ports can be reversed with no effect on function or performance, the signal can be fed through in the opposite direction in wbich case the forwards and reverse samples to the terminations are interchanged. Finally the hybrid itself contains nothing to set its operating impedance - the terminations on the sample ports do this. To convert a 50 ohm transformer hybrid into a 75 ohm one, just change from 50 to 75 ohm sample port terminations. If a large change of operating impedance is wanted, a transformer re-design may be needed to avoid some loss of bandwidth.

This circuit very nicely illustrates one of my favourite points. There is not necessarily any relation between number of components and "complexity". The operation of this circuit is extremely difficult understand, yet it only uses two components. Fortunately it is easy to build and easy to use.

Look at the symmetry of the circuit - due to a balancing effect of the transformers we can turn the circuit upside down, sway left for right, (or both) and it would still work the same.
Let us arbitrarity choose to feed our power into connector 'A' so our power passes through the transformers and 99% of it comes out of 'B' and goes to our load (the antenna) 1% comes out of connector 'D' and into its 50 ohm resistor.





METERS MAPLIN 50uA - 2 Needed
(not supplied in Kanga Kit)

R= 100 ohms R2 = R3 (22K for 5W FSD. 56K for 20w FSD)

the antenna does not present a perfect 50 ohm impedance, some power ill be reflected and will pass backwards through the hybrid from B to only 99% of the reflected power reaches 'A'.
% is diverted to connector C and is dissipated in its 50 ohm esistor. In order to work, it is essential that C and D are erminated with good 50 resistors. The hybrid relies heavily on the atch of ports 'C' and 'D')

prototype was built. The transformers were made with toroid cores f type S1 ferrite made by SEI (Salford Electrical instruments, eywood, Lancs.) (Colour code: YELLOW) This ferrite is quoted for se to 2 MHz. Such statements usually refer to the range over which igh - Q inductors can be made. Transformers are much less demanding Ad the usable frequency range is extended. The controlled impedance evels of the two transformers is very favourable and operation is ood to about 50 MHz.

he prototype transformers had a single "primary" (with faraday creen) and a 12 t "Secondary".

ith 12t, the coupling factor is - 21.584 dB. The prototype was easured at -21.59 ± 0.01 dB over 1.5 to 50 MHz. This flatness is xcellent and the proximity to the calculated value for the first ybrid made (no adjustment or selection was done) shows the degree of confidence which can be placed in this type or circuit.

lots of through path attenuation (<0.1dB 1.5 - 30 MHz) Coupling actor (21.59 ± 0.01 dB 1.5 - 30 MHz).

Directionality is the measurement of how well the hybrid can separate forwards and reverse samples. >23 dB directional power meter, we need only to add two termination resistors (50 ohms) and two diode detectors.

With a 21.6 dB (12:1 turns ratio) coupling factor the forwards termination dissipates 0.69% of the forwards power so two 100 ohm 1/2W resistors in parallel would be ideal for use with up to 150w continues carrier transmitters (580w PEP, unprocessed).

A good match gives zero reflected power. Interchanging the RF ports just causes the function of the two meters to be interchanged.

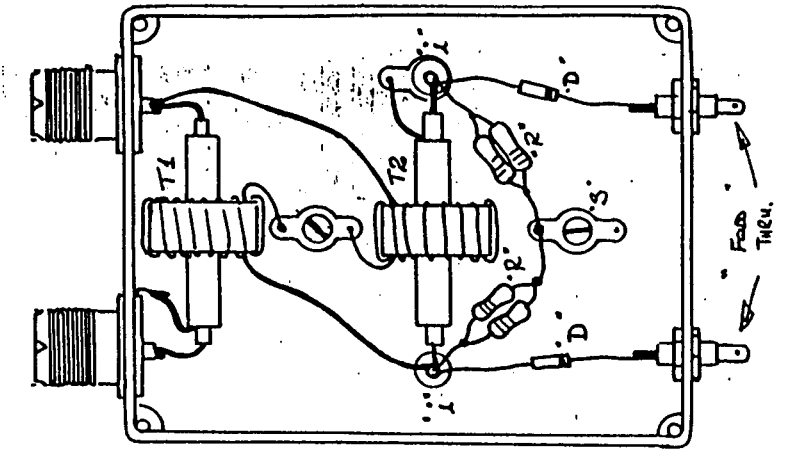
Two meters are really essential in this circuit, switching one meter merely detracts from the usefulness of the principle. Note that the principle of individual forwards and reflected power meters which do not have a VSWR scale not do Bird Thruline meters, not in one needed. If you know Forwards and Reflected power, you can esily convert to Return Loss (or VSWR) if you really wish.

$$\text{Return Loss} = 10 \log \left(\frac{\text{Reflected Power}}{\text{Forward Power}} \right)$$

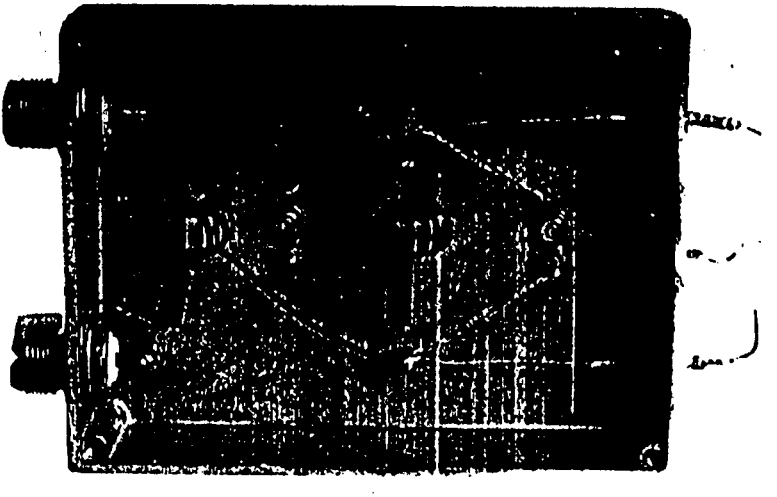
KANGA KIT VERSION

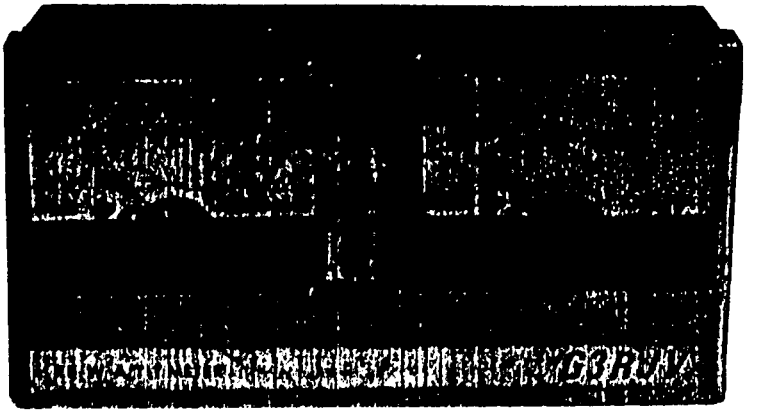
The protographs and diagrams refer to the Kanga Kit version of the Power Meter. This kit includes all that is shown in the "head" of the meter including the case, the special cores for T1/2 and all components. Two self adhesive scales are provided for the kit with two ranges: 5 watts and 20 watts FSD. This scale is designed for use with the MAPLIN 50uA Meter type FM98G. This meter is amongst the cheapest quality meters available. Several prototypes built with these meters showed excellent accuracy.

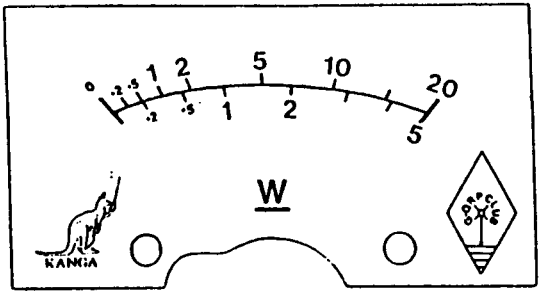
KIT PRICE TO CLUB MEMBERS (exc meters) £13.95 (post £1) from Kanga.



i = Standoff Insulators
T1/T2 = 12t. PVC covered wire - see text
Fit a tag on outside of case at S for Meter Negat
R = 100 ohm Low Inductive Resistors
D = Schottky Diodes
Feed Thru Capacitors - any value 1000 - 20,000pF







WATTMETER SCALES (5w & 20w FSD) Stick-on Scales 2 supplied with kit These are for use with the stated values of R2 and R3 in the article. Alternative higher (up to about 200w) or lower full scale deflections can be had by changing R2 and R3.

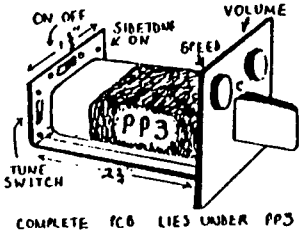
AN S.M.D. IAMBIC KEYER SYSTEM (PART 1)

Jack Glennon G4ZQK and Bill Mooney G3VZU

Jack : My interest lies in simple miniaturised QRP transceivers but I was not happy about the accessories (keyer ATU etc) being larger than the rig. Having built several rigs with internal keyers, I decided to build a keyer and touch paddle which would form the basis of any future project.

I obtained SMD components through Bill of Blue Rose Electronics and designed the layout to be as small as possible. The size of my keyer section is just 1 1/4" x 1 3/16" - I left enough room for a thermos flask!

Footnote: If G3ROO builds this on a 1" square PCB then I will jump in the canal (I also lied about the Thermos Flask!!)



COMPLETE PCB LIES UNDER PP3

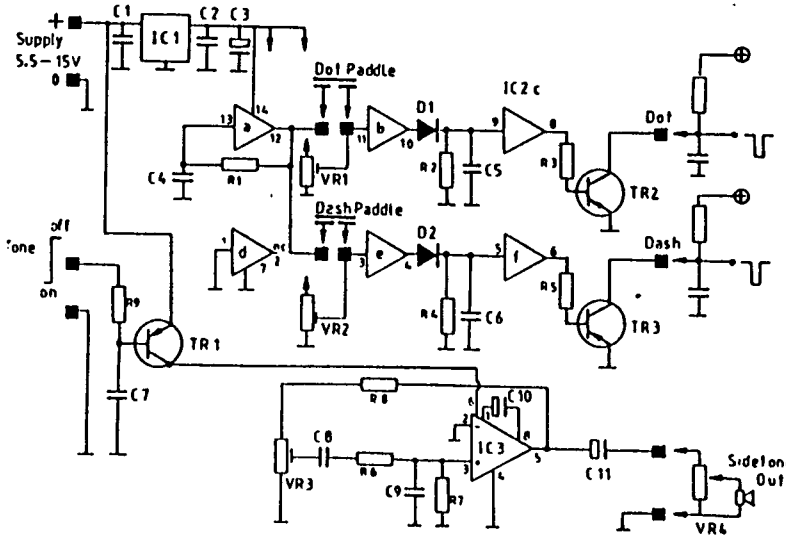
PROTOTYPE OF G4ZQK KEYER

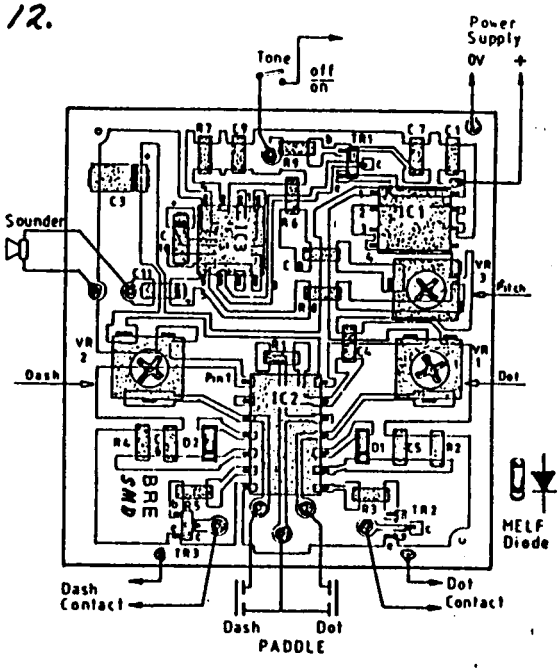
S.M.D. CAPACITIVE TOUCH PADDLE : G3VZU

This Touch Paddle unit to the PCB designed by Jack (G4ZQK) will run most IAMBIC circuits, a sidetone is included and would normally be keyed on and off by the IAMBIC circuit

Most of the work is done by a single 4046 IC. IC1a is a 60kHz oscillator fed to the touch paddles. Each paddle is two capacitors in series made from double sided PCB. The connection between these capacitors is the touch plate. Touching (grounding) the plate reduces the 60kHz signal going to IC1b or e. D1 and D2 rectify the outputs such that gates IC1c and f have a "1" on their inputs inverting to turn TRs 2 & 3 off. VR1 (& 2) is adjusted to the point where the schmitt will switch to a low output state in absence of AC (touching paddle). This gives a high output on pin 8 (or 6) turning on TR2. The low dropout regulator gives excellent battery life. The sidetone oscillator is really an independant circuit on the same PCB switched by the main keyer board.

THE CIRCUIT AND THE SMD PCB LAYOUT ARE FOR
THE BLUE ROSE ELECTRONICS KIT VERSION (SEE ADVERT THIS ISSUE)
THE SMD IAMBIC KEYER WILL APPEAR IN THE NEXT ISSUE



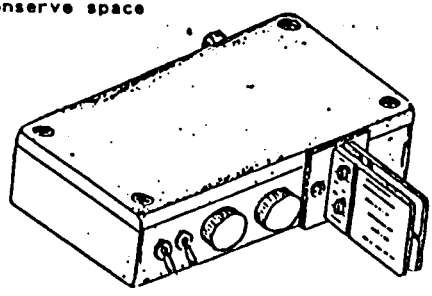


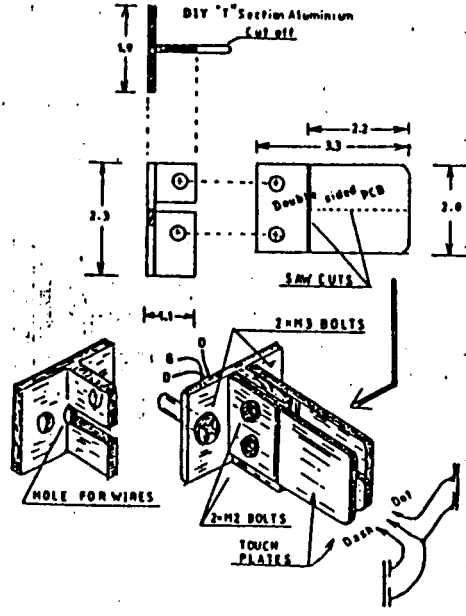
TOUCH PADDLE COMPONENTS

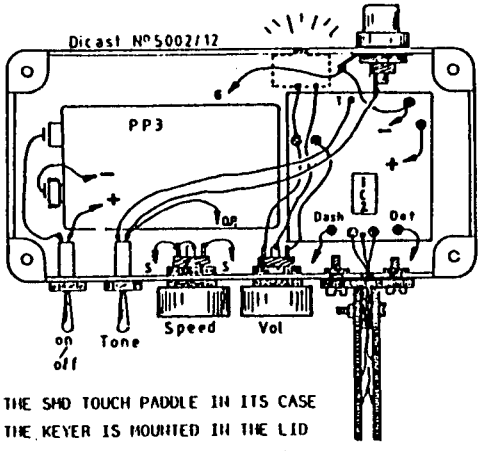
Resistors		
R1	10k	1206 chip
R,4,	470k	1206 chip
R3,5	47k	1206 chip
R6,7,8	3k3	1206 chip
R9	4k7	1206 chip
VR1,2,3,	50k	Trimpot 3204
Capacitors		
C1,2,5,6,7,8,9	47n	1206 chip
C3	22uF	Tant
C4	3.3nF	1206 chip
C10,11	4.7uF	Tant
Devices		
D1,2	BA532	MELF SMD
TR1	BCW30	PNP SOT23
TR2,3	BCW32	NPN SOT23
IC1	LM2931	SO8
IC2	40106	SMD
IC3	LM386	SMD

SIMPLE PADDLE UNIT

A sturdy paddle unit may be built as shown from two pieces of double sided PCB and a short length of T Section DIY aluminium extrusion. The PCB spaces are made with saw cuts. A hole in the centre of the aluminium support carries the leads, almost out of sight, into the box. Polish the copper and spray with PCB lacquer. A diecast box Bimbox 5002 will take the paddle and a PP3 Battery and will also hold the SMD IAMBIC keyer board. P16 Knobpots are used to conserve space



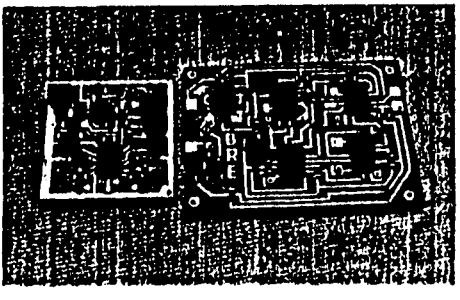


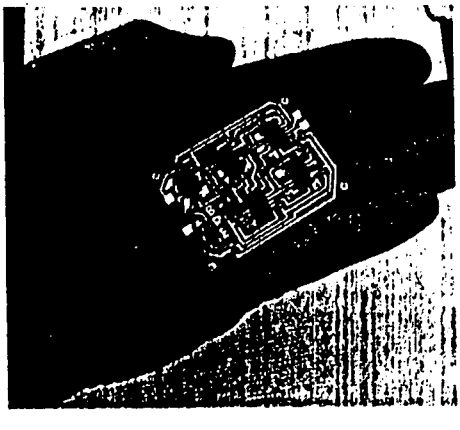


THE SHD TOUCH PADDLE IN ITS CASE
THE KEYER IS MOUNTED IN THE LID

THE SHD PADDLE KEY PCB
(LEFT)

THE SHD IAMBIC KEYER
(RIGHT)





THE SHD IAMBIC KEYER
SHOWING THE RELATIVE SIZE

This Keyer will be described
in the next issue of SPRAT

AN SMD IAMBIC KEYER SYSTEM (PART 2)

The Iambic Keyer Board
Bill Mooney G3VZU

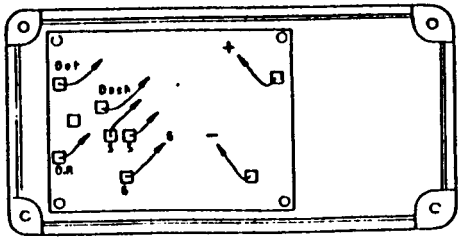
The keyer follows the circuit offered by G4ZQK in a previous SPRAT and will give full IAMBIC operation with positive keying output from an open collector. This is easily modified for negative keying. The unit is very small and along with the touch paddle unit can be incorporated into every rig you build. CMOS operation ensures very low current in the microamps range. In the circuit positive pull up resistors are included so that grounding the inputs will produce the required dots or dashes. It will work with all mechanical IAMBIC keyers but works very well with the capacitive touch paddle described in the last issue of SPRAT.

SETTING UP AND TESTING

Arrange to monitor the output from TR2. Its collector needs a load connection to +ve. The control input to the sidetone oscillator on the paddle PCB would provide such by way of R9. A small bulb or LED with 1k resistor would also suffice.

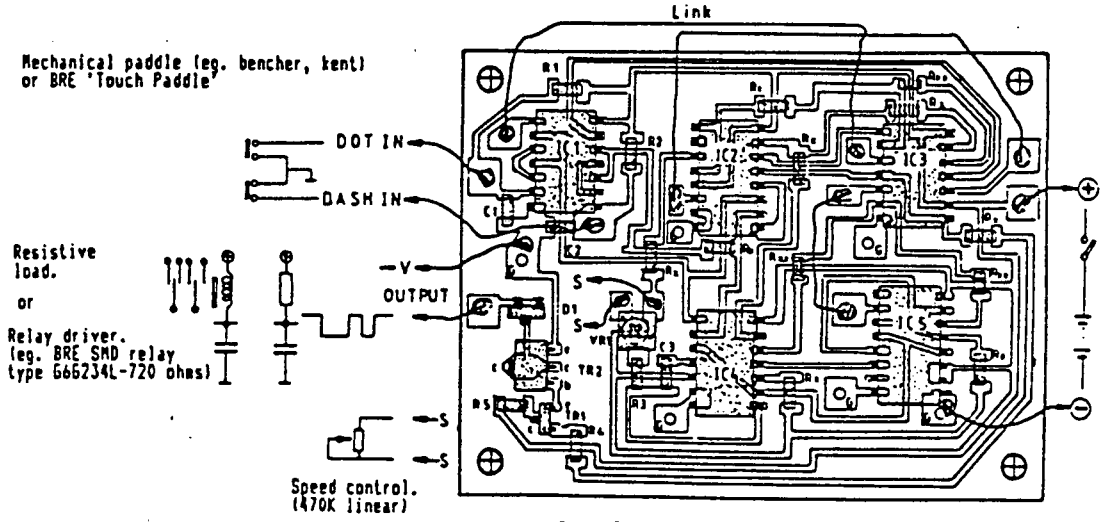
IAMBIC KEYER COMPONENT LIST

Resistors			
R1, R2, R3	100k	size	1206 chip resistor
R4	10k		1206 chip resistor
R5	4k7		1206 chip resistor
Rx	zero ohm jumper		1206
Rxx	zero ohm jumper		1206
Capacitors			
C1, C2,	1nF	size	1206 multilayer COC Diel
C3	100nF		1206 multilayer X7R Diel
Diodes			
D1	1N4148	in	SOT23 package
Transistors			
TR1	BCW32		SOT23 NPN
TR2	BCX54		SOT23 NPN
Integrated Circuits			
IC1, IC3	4011		SO8 SMD
IC2, IC5	4027		SO8 SMD
IC4	4001		SO8 SMD



PCB MOUNTED IN LID OF BOX
See The Layout in SPRAT 62

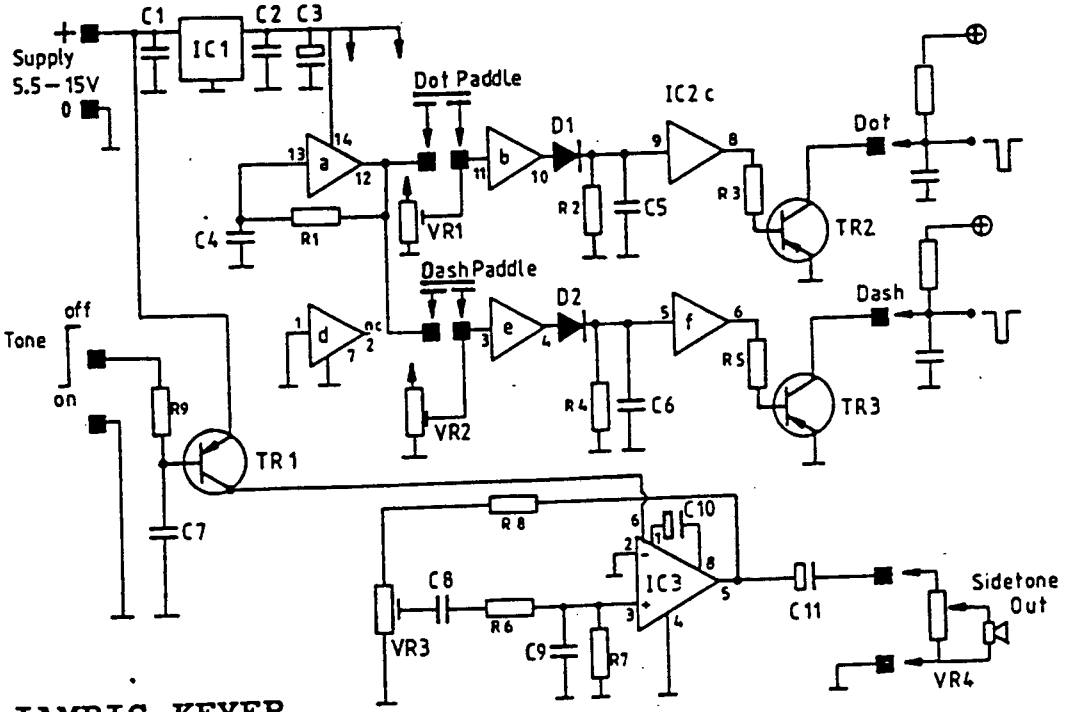
FULL KIT OF PARTS FROM BLUE ROSE ELECTRONICS : SEE ADVERT



Rx = 1206 0 ohm jumper, Rxx = 0805 0 ohm jumper.

G = Through-PCB pins, connection to rear ground plane.
(eg. Maplin FL82D)

SMD IAMBIC KEYER : PCB LAYOUT



IAMBIC KEYER

THE "PEBBLE CRUSHER 2"

by Doug DeMaw W1FB

I designed the circuit in figure 1 with high performance and low cost as my objectives. A number of published circuits that reflect simple circuitry are dreadful performers in a number of ways. For example, the output waveform is anything but the desired sine wave. Also, the efficiency is poor and the CW note is often chirpy, clicky or both. There is also the matter of instability, which is all too common. The principle cause of inferior performance is poor design. Some amateurs attempt to apply vacuum-tube design concepts to transistors. Dismal performance results. clicky and chirpy signals are frequently heard from homemade QRP equipment, owing to design faults. The circuit in figure 1 overcomes these common maladies. It produces a good output sine wave, it does not chirp and it has a keyed output waveform that is shaped to avoid clicks.

The Circuit

A Colpitts oscillator is used at Q1. The output network is designed for a loaded Q of 5 to help suppress harmonic currents. It is designed to match 1000 to 50 ohms. C1 allows approximately 4 kHz of frequency shift at 7 MHz. A plated AT-cut crystal is used (less shift for a surplus FT-243). C3 rounds off the sharp corners of the keyed waveform trailing edge to eliminate clicks on the break. R3 suppresses VHF parasitics which were observed on the output waveform from Q1 prior to adding the resistor. A ferrite bead may be used in place of R3.

Q1 and its associated circuitry can stand alone as a QRP transmitter. The 50 ohm antenna connects to C7 and all circuitry after C7 is omitted. Power output varies from 30 to 80 mW, depending upon the setting of C5. The cleanest waveform occurs when C5 is nearly at full mesh. A dip in collector current indicates circuit resonance. The Q1 output power may be reduced by making R4 larger in value, should you want to reduce the power below 30 mW.

Up to 0.5 watt of output power is possible by adding T1 and Q2 circuit. T1 provides an approximate match between the oscillator and the input of the class C amplifier, Q2. This ensures maximum power transfer and proper performance of the Q1 tuned circuit. A ferrite bead on the base lead of Q2 prevents parasitic oscillation of Q2. This is important if your transmitter has fairly long RF leads. The Q2 output filter has a low-pass response and is designed to match the 144-ohm collector impedance to a 50-ohm antenna. The loaded Q of this network is also 5. The design cutoff frequency is 7.3 MHz. I specified the nearest standard capacitor values for C10 and C11. Output power from Q2 varies from 300 to 500 mW, depending upon the setting of C5 and the values of R4.

The 2N4400s were chosen for this circuit because they are rugged and cheap. They can be purchased in the USA for as little as 9 cents apiece. You can ruggedize the Q2 stage by using two 2N4400s in parallel. Q2 in my transmitter does not feel warm to the touch, even at 0.5-W output, key down for 5 minutes. The 2N4400 and 2N4401 transistors (both are suitable) are rated at 625 mW maximum dissipation. Maximum continuous collector current is 600 mA. The fT is rated at 200 MHz minimum. Maximum Vceo is +40 V dc. It is okay to substitute 2N2222A transistors for the 2N4400s. There are numerous other low-cost transistors that may be used in the figure 1 circuit.

Summary Comments

There is no reason why this circuit can't be modified for use on other HF bands. I tested it on 80 and 20 meters, and good performance was had. The value of C2 should be scaled in accordance with the capacitive reactance (XC = 150 ohms). This the feedback capacitor and its value is critical to reliable oscillation and a chirp-free note.

The Q1 tuned circuit and the Q2 output filter constants may be scaled also by using the reactance values for those parts. no other circuit changes are necessary. This transmitter may become a bit "contrary" with regard to chirp if it is used on 15 and 17 meters. It depends to a greater extent upon the fundamental crystal used and the value of C2.

My first QSO with this circuit was on 7015 kHz. A W7 in Seattle, WA answered my CQ and gave me an RST 569 report at 1900 Z. I was using my 160 meter horizontal loop (at 50 feet) with tuned feeders and an ATU. Not bad for a 1500-mile path in early afternoon!

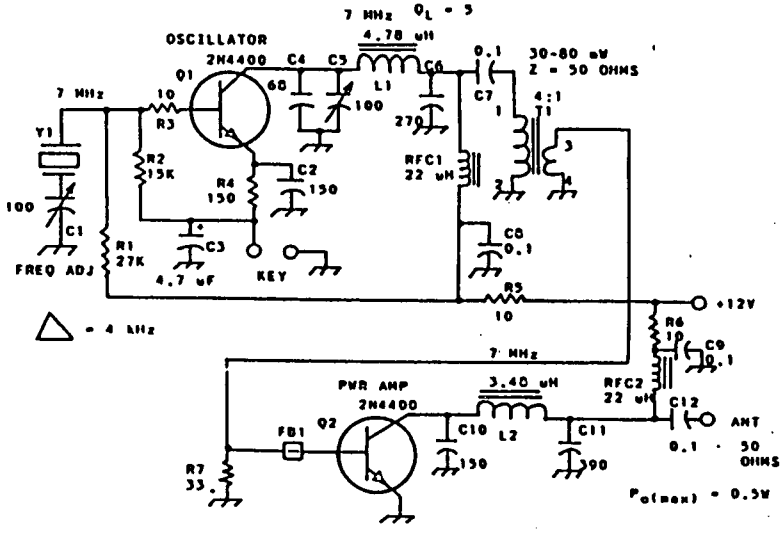


Figure 1 - Circuit for the 40 meter, 0.5-W QRP transmitter. Decimal value capacitors are in uF. Others are in pF. C1 is a 100-pF air variable. C5 is a 100-fF compression trimmer. L1 has 34 turns on no. 28 enamel wire on an Amidon T50-6 toroid core. L2 has 29 turns of no. 28 enamel wire on a T50-6 toroid. FB1 is an 850 ou mini ferrite bead. RFC1 and RFC 2 are miniature ferrite core RF chokes (Mouser Electronics). Resistors are 1/4-W carbon film or carbon composition. T1 is a 4:1 impedance ratio broadband transformer with 12 primary turns of no. 26 enamel wire on an Amidon FT-37-43 ferrite toroid (850 ou). The secondary contains 6 turns of no. 26 wire.

THE RSGB HF CONVENTION 1991

The Convention is at the Penguin Hotel, Daventry, on September 29th. This is an event that we have had difficulty in staffing in the past. Any member who intends to be there and would like to help with a club stand, please write to G3RJV.

BRIAN CASTLE G4DYF 065

We regret to announce the death of Brian on Boxing Day, following a cycle accident on Christmas Eve. Brian was a keen club member and a very active local radio amateur. He will be missed by his many amateur radio friends in Kent and beyond.

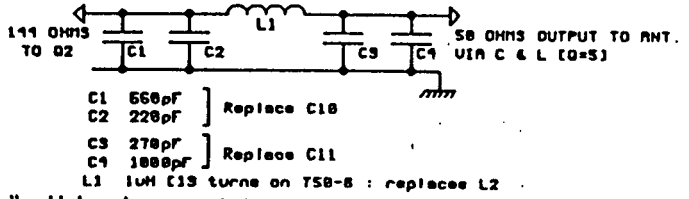
'PEBBLE CRUSHER' MODIFICATIONS

UPDATES TO THE PEBBLE CRUSHER TRANSMITTER BY W1FB IN SPRAT 66

TONY LYMER GM0DHD
16 Gerson Park, Greendykes Road, Broxburn, West Lothian, EH52 6PL

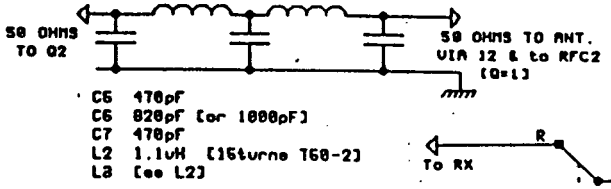
I was attracted to the Pebble Crusher transmitter by Doug DeMaw's comments about signal quality, and chirp etc., but when I completed it, I found that I could only get about 200mW output. I traced the problem to the output matching circuit and analysed the circuit given. Unfortunately, the component values did not agree with the transformation from 144 ohms to 50 ohms with a loaded Q of 5. The recalculated values are shown in Fig.1. to the nearest prefered values. L1 was wound with 15 turns on a Micrometers T50-6 core. I found that the inductance range can vary by a factor of 2:1 between closewound turns and turns widely spaced on the core. The latter gives the correct impedance, according to the manufacturer's data. The 144 ohm, Q=5 network gave 0.74 watts output with 14MHz at -30dB, and 21MHz at -44 dB. I had a little trouble adjusting the network, as the correct loading does not occur at the point of maximum output when adjusting the coil. I set it up using a network analyzer.

FIG.1. NEW OUTPUT NETWORK FOR PEBBLE CRUSHER



I eventually added another output device in parallel with Q2, and used two cascaded 'half-wave' networks with a lower Q of 1 [Fig.2.]. This gave an increase in the output power to 1.35W., using 2N2219A devices, with small clip-on heatsinks and a 12V power supply. The extra sections of this filter are necessary as the lower Q factor decreases the attenuation of the transmitter harmonics. The harmonic levels I measured were : 14MHz, -49 dB, and 21MHz, -64 dB. relative to the carrier level. No other outputs were less than 70dB down.

FIG 2. OUTPUT NETWORK FOR INCREASED OUTPUT AND BETTER HARMONIC SUPPRESSION



Finally I added a change-over relay to the output and had only one remaining problem: how to net on another transmission without radiating significant power. This was solved by using the remaining relay contact to connect a 50 resistive load to the transmitter when switched to receive. This reduces the frequency excursion that occurs due to the change in load on the oscillator, when the output stage loading changes. This is shown in Fig.3.

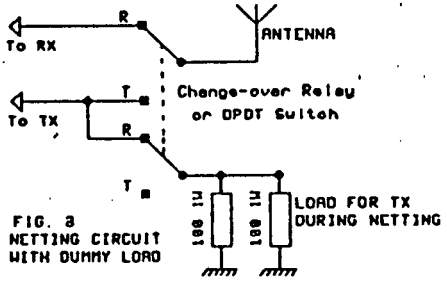


FIG. 3
NETTING CIRCUIT
WITH DUMMY LOAD

THE SUPER TEE ANTENNA TUNER

D.A. (Miko) Michael W3TS
POB 593 - Church Lane, Halifax, PA 17032-0593, U.S.A.

I have been trying antenna tuners for most of my ham career and now finally settled down to this one circuit. It is based on a tuner by DJ2LR that was written up in QST December 1974 page 48 and ELECTRONIC DESIGN 19 September 13, 1975 page 96.

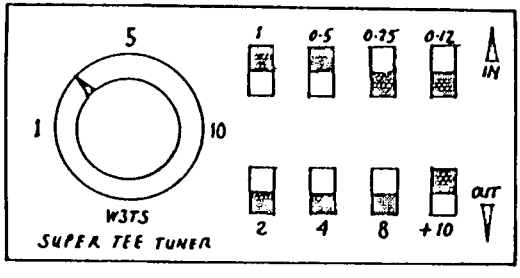
I made a few changes to improve it for low power use. I use 7 slide switches (I think toggle switches would work just as good at QRP) and 7 separate inductors to get a large range of inductance while keeping a high Q. By using separate inductors that are shorted out when not needed you do not get the "shorted turn" effect that lowers the Q. This then keeps the tuner losses very low, which is important when you are using only a few milliwatts. It also is much easier to reset the tuner under contest operating conditions, (I used a roller inductor on a prototype, but it takes a long time to crank from low inductance to a high inductance.) I may build another using relays and diode programming from push button band switches for contest use.

Another modification that I made was to float the low side of the circuit above ground. This way you can tune balanced lines with it. I have checked this for balance with a simple feed line current sampler using two ferrite cores and the tuner does not appear to cause any imbalance. When you want to tune coax or random wire antennas, all you have to do is jumper the low side to ground.

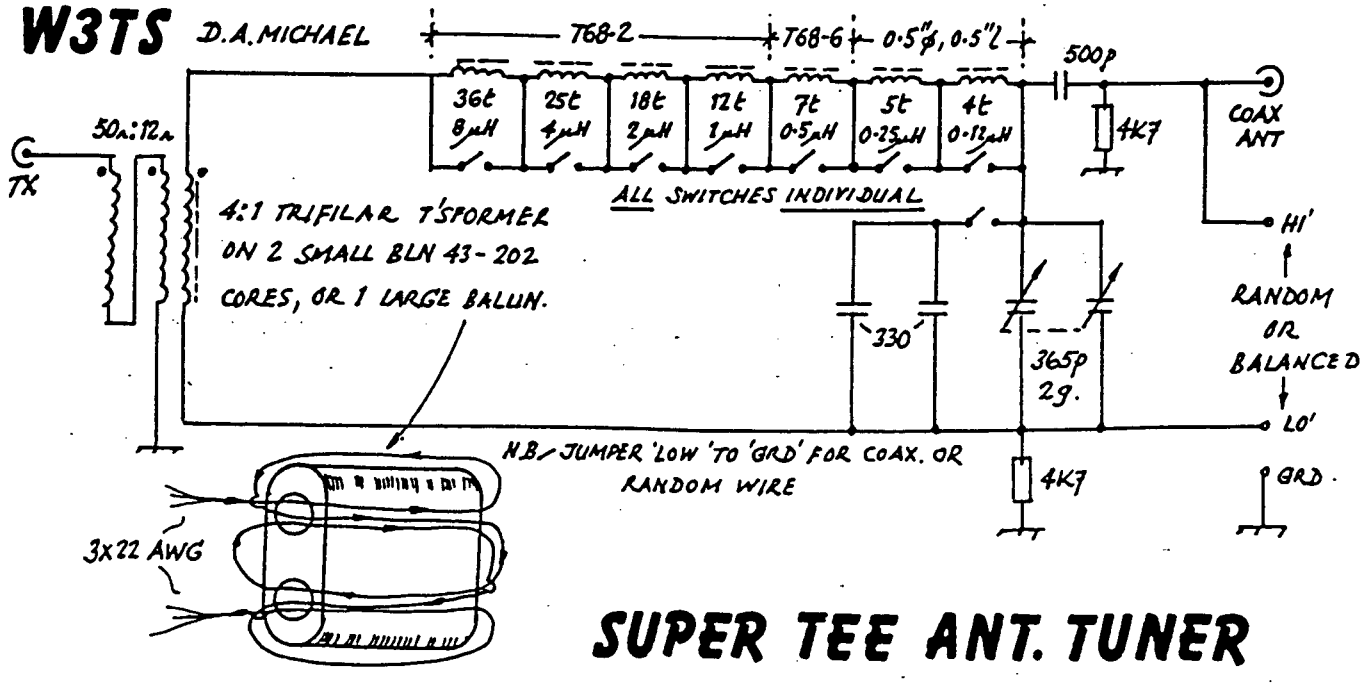
Because the low side of the tuner is floating above ground you must insulate the dual 365 pF tuning capacitor from the chassis. I have used two methods to do this. One way is to use double sided "picture Mounting" foam tape. At QRP power levels up to 50 Watts this works fine. The other way is to mount the capacitor to a piece of plastic and then mount the plastic to the chassis. Be sure to use a large plastic tuning knob with a deeply set screw so you don't get an RF burn when tuning balanced lines with the low side of the tuner floating. Of course a flexible insulated shaft coupler could be used.

This tuner always operates as a low pass circuit and does not have any false match modes that present high circulating current. To adjust the tuner, I set the dual 365 capacitor fully meshed but don't switch in the extra 660 pF of capacitance. Then I start with the lowest inductance and work up till I hear a noise peak in RX. Then I supply TX power and adjust L and C for the best match. Some times the best match is had when all the L is switched out.

For Field Day the last few years two of these tuners have been used to match all types of antennas. So far, nothing has been found that cannot be matched. Of course the longer and higher your antenna the better it will work, but if you only have a low short wire this tuner should get the most power into it.



FRONT VIEW OF TUNER
COIL SET FOR 1.5uH : CAP SET FOR 14 [Log Scale Ref. Only]
' +10 ' is extra 660pF Capacitor Switch


W3TS
D.A.MICHAEL
T68-2
T68-6
0·5"ø, 0·5"l
36t 8μH
25t 4μH
18t 2μH
12t 1μH
7t 0·5μH
5t 0·25μH
4t 0·12μH
500p
4K7
COAX ANT
50Ω:12Ω
TX
ALL SWITCHES INDIVIDUAL
4:1 TRIFILAR T'STORMER ON 2 SMALL BLN 43-202 CORES, OR 1 LARGE BALUN.
330
365p 2g.
HI'
RANDOM OR BALANCED
LO'
N.B. JUMPER 'LOW' TO 'GRD' FOR COAX. OR RANDOM WIRE
4K7
GRD
3x22 AWG
SUPER TEE ANT. TUNER

21

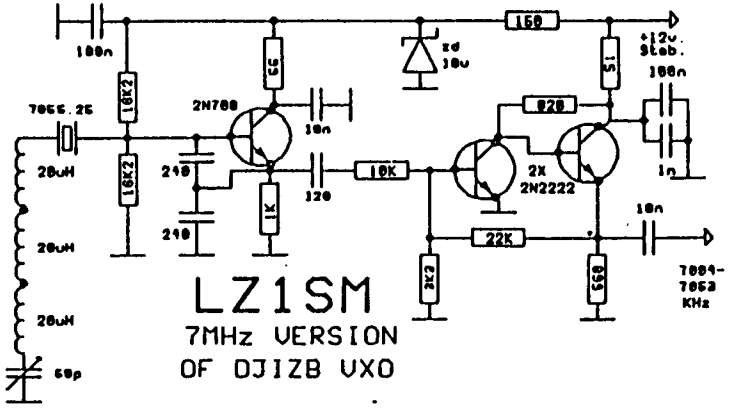
WIDE RANGE VXOs FOR 80, 40, 20 and 10 METRES

Angel Gerasimov LZ1SM
BL.234 WH.2, Mladost - 2, 1799 SOFIA, Bulgaria

Using the ideas suggested by Ha-Jo Brandt, DJ1ZB, (Ref 1), I built and tested discreet element VXOs using crystals on 3543 KHz, 7055, KHz, and 9390 KHz. The most important thing that I achieved was a wide frequency swing combined with good frequency stability. I used a modified Clapp oscillator at a frequency lower than the crystal frequency. On 3543 and 7055 I used commercially made rf chokes. On 9390 KHz I used a home made 3 section choke wound on a ferrite rod with an inductance of 8.2 micro-Henries. It was made in 3 parts, as the Q must be low, with no pronounced resonance (we think Angel means 3, scramble-wound sections Ed).

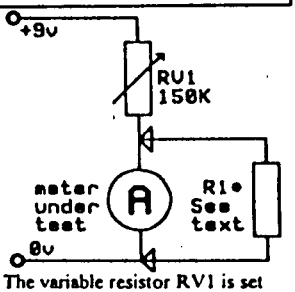
During my experiments I found that the correlation between the capacitor and the inductor was very important. The capacitor needs to be about 50 t0 60 pF. A variable capacitor of good mechanical construction was used. The required inductance depends upon the frequency (see later).
Ha-Jo used a capacitor of 250p and achieved a frequency swing of 11 KHz on 3597 KHz. I used a capacitor of 60p, and achieved a frequency swing of 30Khz on 3543Khz.
Without compromising frequency stability (the maximum drift of the third harmonic was less than 100 Hz per hour) I achieved the following frequency swings:-
3534 KHz, 3514 - 3544kHz. (L=324 uH, made from 250 + 30 + 30 + 15)
7055 KHz. 7007 - 7050 KHz. (L=60 uH, made from 20 + 20 + 20)
9390 KHz 9320 - 9390 KHz. (L=8.2 + 8. 2 + 8. 2 uH)
It is possible to obtain larger swings, but this degrades stability. There is also some change in stability with frequency. It is best at the high end of the frequency swing. After a 5 minute warm up period typical drift is 5 - 10 Hz per 10 minutes, measured on a laboratory type frequency counter. I recommend this VXO to anyone requiring a wide frequency swing with good stability.

Refs; H. Brandt. "A wide Range 80 Metre VXO". SPRAT No 70. Pages 16 - 17
Editorial note. Different crystals, even of the same type, often exhibit differing frequency swings when used in VXO circuits, so the above results may not be reproduced when other crystals are used.



FINDING THE INTERNAL RESISTANCE OF UNMARKED METERS

Dave Acrill G0DJA 104 Durkar Lane, Criggleston, Wakefield, WF4 3HY



Cheap meters are available from most Rally Flea markets and salvaged from old equipment. However, many of these meters do not have the value of the internal resistance of the meter marked on them. This makes calculating the necessary series or shunt resistors needed to use the meter in a new circuit.
It is not a good idea to try and measure the internal resistance using an Ohm meter connected across the meter terminals as this will just bounce the needle of the meter against the end stop and possibly damage it or burn out the meter coil.

The internal meter resistance can be found using the circuit in figure 1. The variable resistor RV1 is set to its maximum value and the meter to be tested inserted into the circuit. RV1 is then reduced until the reading on the meter it at half scale. Next various resistors between about 1k ohm and 100 ohms are inserted across the meter terminals. The reading on the meter will probably move. If the reading increases then the shunt resistor is a higher value then the internal resistance of the meter, a reduction in reading means that the shunt resistor is lower than the internal resistance. No movement means that the shunt resistor is the same value as the meter internal resistance.

As an alternative, use a variable resistor instead of swapping resistors for R1. Then remove the variable from the circuit and measure its resistance using an ohm meter.

This system is not absolutely precise as the shunt resistor alters the voltage developed across the meter terminals and this will slightly reduce the meter reading. However, most meters only develop some 300 mV across their terminals at full scale and since the supply voltage is 9v the effect of adding the shunt resister R1 is small.

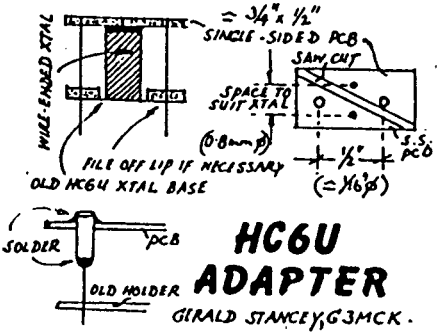
HC6U ADAPTER

Gerald Stancey G3MCK 14 Cherry Orchard, Stalnes, TW18 2DF

I made this adapter to allow me to use wire ended xtals in HC6/U sockets. The sketch is self explanatory but the following notes may help.

1. Remove the screening can, by unsoldering the base seal, from a useless HC6/U Xtal. Then remove the Xtal.
2. Cut and drill the PCB as shown.
3. Solder in the wire ended Xtal.
4. If necessary file away the lip of the HC6/U to ensure that the legs protrude through the PCB
5. Solder the PCB to the legs of the old HC6/U. If the legs of the old HC6/U are too short I suggest you lengthen them using brass tube from a model shop.

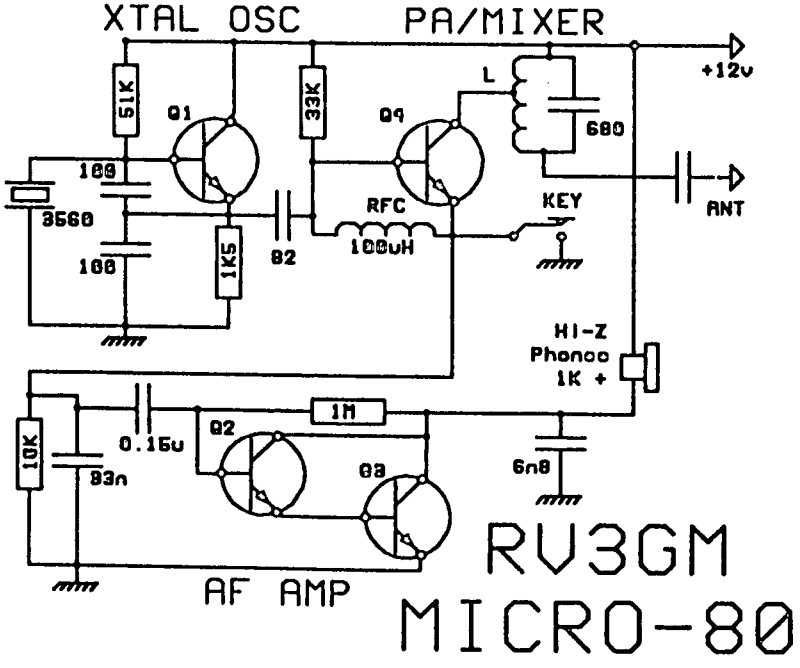
In which case it is probably better not to file away the lip from the base.



THE MICRO-80 MINI-TRANSCEIVER

Oleg Borodin RV3GM P.O. Box 229, Lipetsk 43, U.S.S.R.

Oleg offers members the circuit of his miniature MICRO-80 Transceiver which is produced in kit form by his small company Radio-S. The circuit is a simple QSK transceiver for 80 metres which could be adapted for other bands by changing crystals and L and C in Q4. The devices quoted are Russian types but any generic transistors should perform in the circuit. Q1-3 would probably work with BC108 and perhaps a 2N3866 for Q4. The rf choke is around 100uH and could be home-wound with 180 turns of 0.1mm wire on a ¼ watt resistor of high value : say over 400K. L is wound with 18 turns [5+13] of 0.33mm wire on an 8mm former with ferrite core. Oleg's suggested layout is used on a PCB 50 x 35mm. He says, 'Is this the world's smallest transceiver ?'



THE HB9ADQ MUTLIBAND DELTA LOOP : A Plea from W5QJM.

Main Reference. Simple Low Cost Wire Antennas. Orr. 1990 edn. p.60

Several variations of this antenna [all claiming to original] have appeared in abbreviated form in US magazines, none has been complete. In fact the more articles that have run, the less and less is said about the antenna and how it works! No one has cited the source of this design or otherwise offered an explanation of more than is seen in the Orr ref. While there is general agreement about the dimensions of the loop proper, there are variations in feeder length and methods of feeding. It occurs to me this would be a good design for QRPers with limited space. I would like to try it too, but have neither the inclination to re-invent the wheel by duplicating HB9ADQ's work to arrive at the same point as he did. CAN ANYONE HELP?

Fred Bonavita, W5QJM, Box 2764, San Antonio, Texas 78299-2764, USA

MEMBER PROFILE:
Doug Hendricks, KI6DS

I am 45 years old and work as a biology teacher and girl's basketball coach at Dos Palos High School. My wife and I have 2 daughters, the oldest attends Merced Junior College and the youngest will be a Senior in high school next year. I was born and raised in Kansas, moving to California in 1985. I have 2 college degrees, one in Physical Education and one in Physical Science with a major emphasis in Physics and Chemistry. I have worked in broadcasting, having been the General Manager of a 1000 watt AM station for 5 years in Kansas. No other member of my family is a ham nor have they ever expressed a desire to be one. They don't know the fun that they are missing.

I have been a ham since 1976, when I was WB0YVK and lived in the great wasteland of electronics, Kansas. Things were a lot different there than they are here in California. First of all, the ham population density is not very high. When I was licensed, I lived in a town of 7,000 people, and I was the fifth person in town to get a ham ticket. Electronic parts were none existant, other than at a Radio Shack, and you never ever saw components at a swap meet. In fact, a big swap meet was 10 tables with 4 or 5 rigs total for sale at the swap. When I moved to California in 1985, I thought that I had died and went to ham heaven. I could not believe the repeaters, the Foothill flea market blew me away, and radio clubs with over a hundred members?

I have always been interested in QRP, my first building project was a 15 meter transmitter, crystal controlled. I made 1 contact with someone in Massachusetts, and never used it again. But it worked. The problem that I had in Kansas was that no one offered me any encouragement with QRP. Everyone said it was a waste of time, no one will ever hear your signals, ad nauseum. Then I met Jim, WA6GER, of Sacremento through a packet want requesting copies of the QRP columns in CQ and 73. Jim answered and sent me tons of material, including several back issues of the QRP Quarterly. Reading the QRP Quarterly got me started in QRP. Now, I even supply the back issues of the Quarterly for the new members who are interested in obtaining them.

My interests in QRP are building gear, although I am not very good at it. You should see the projects that I have started and not finished, finished and they did not work. Never throw those away, because they are a great source for parts. Haw Haw! I have built the W7EL rig from Oak Hills Research. It is now called the Sprite. It is my all time favorite rig. Much superior to a HW-8 on 40 meters, plus, I built it. Other projects include the "Ugly Transceiver" from QST, NN1G 20 meter transceiver, LCK Transceiver from Sprat, Simple Frequency Counter from 93 ARRL Handbook (I use for a frequency display on DC receivers), QRP mod to turn output down to 0 - 5 watts on the Icom 735, homebrew paddle, homebrew Stockton Wattmeter, and a W3TS antenna tuner.

I love to build, and every time that I do, I learn. My problem is that I don't know very much. Many of you reading this understand transmitters and receivers frontwards and backwards. I am trying to learn, but it is a slow process. Hopefully, I will meet more

technically oriented people in the club who can help me. Another thing that I like to do is collect information on QRP. I have copies of every issue of Sprat from issue #48 to #73 (present) except #51, and I have copies of every issue of QRP Quarterly from 1983 except January 88, of which I have a copy but not the actual issue. If anyone has copies of #51 Sprat or January 88 QRP Quarterly to sell, I would be very
interested in purchasing them.

One more thing that I like to do is meet and talk QRP with other QRPers. I will go almost anywhere to do that. Witness the fact that my good friend WA6GER and I even went to Dayton this year. We are going to go back next year, it was so much fun. I work mostly CW on the bands, but once in a while will work SSB, but still QRP. The only time that I have had my rig on 100 watts since the 1st of the year was to prove that I was operating 20 milliwatts to a guy. I turned it up to 5 watts and then to 100 so he could hear and see the difference on his meter. Then he believed me. I enjoy ham radio, but I love QRP.

If you have any questions that you think that I might be able to help you with, please feel free to contact me. My packet address is KI6DS @ K6RAU.#NOCAL.CA.USA.NA, my internet address is dh@deneb.csustan.edu, and my US Postal Service address is 862 Frank Ave., Dos Palos, CA. 93620. My phone number is 209-392-3522. 72, Doug

DAYTON 93

By Doug Hendricks, KI6DS
862 Frank Ave.
Dos Palos, CA 93620

Have you ever read one of those magazine articles about someone with a list of exciting adventures that they want to accomplish in their lifetime? I have, and I also have a list of "goals" that I want to reach. This year, I was able to achieve one that I have had ever since I first became a ham in 1976. I went to DAYTON. Dayton is the site of the largest hamfest in the United States, and the second largest in the world. You just cannot imagine what it is like to attend. There have been very few experiences that have lived up to my expectations, but Dayton was one. I think that every ham should attend, and especially every QRPer. The following article will tell you how easy it is to do.

I was sitting in my radio shack one dreary wintry day in December, thinking of what I would rather be doing. While browsing through an old ham magazine, I saw an ad for the Dayton Hamvention. I have always wanted to go, but just couldn't swing it. Teachers have a hard time getting off in April, which is when the hamvention is. Then I thought, why not? I had never taken any personal leave days in all my years of teaching, this was the perfect use for them. Next, I thought about the logistics, and my wife and family came to mind. None of them are hams, in fact, they refer to me as "geek of the week" when they want to give me a hard time. So, I contacted Jim, WA6GER, my good friend in Sacramento. Jim is retired and pretty free to go if he has all of his yard work caught up (that is a private joke). When I contacted Jim, I suggested that we go to Dayton and stay with the QRP gang from ARCI at their headquarter's hotel. Jim was game,

he said that he would take care of the plane tickets if I would arrange for the hotel. We agreed on the arrangement and I got to work.

I looked through my back issues of QRP Quarterly, and found out that Myron Koyle was in charge of arrangements for reservations. I sent a check for $75 to reserve a room, and would pay the balance upon arrival. We had reservations at the Dayton South Day's Inn. The Dayton South part would be interesting on our arrival at the Dayton Airport.

We arranged to fly out of Sacramento on Thursday and return on Monday. Next year we will leave on Thursday again, but will return on Sunday. We flew to Chicago and caught a smaller plane for the last leg of the trip to Dayton. Guess what? The plane was full of hams all going to Dayton. We arrived at the Dayton Airport, and as Jim went to look for our luggage, I called the Day's Inn Dayton South to arrange for the shuttle to come pick us up. Surprises were in store for me. First of all, the Day's Inn does not have a shuttle service and second, it is 25 miles south of the Dayton Airport. Great, now what do we do. Luckily there is a shuttle service at the airport, but it costs. I asked the guy what it would cost for 2 of us to go to the Day's Inn Dayton South, and he told me $44.00. I told him that was too much and could he give us a deal. He immediately drop the price to $26. Let that be a lesson to you when you go to Dayton, prices are negotiable!

We arrived at the hotel, checked in and went to our rooms. You have to understand that the only QRPers that we knew at the hotel were each other. But, the QRP ARCI was hosting a hospitality room and Jim and I decided to go check it out. We met the greatest group of people that night. There were about twenty to twenty five people milling about looking at several rigs that were on display. Dick from Oak Hills Research was there with his product line. Karl from RadioKit was there with 2 of the neatest little tranceiver kits you have ever seen. Chris Hethorn, who used to run the Small Parts Place was there. He was selling excess parts as he has gone out of business. What a deal he had. MC1496's 2 for a dollar, SPDT Toggle switches @ 4 for a dollar. And several other bags of parts. Someone had a station set up over in the corner. John Collins, KN1H, Jim Fitton, W1FMR, Jack Frake, NG1G, and Randy Rand, AA2U, were all there. Dick Pascoe, who runs Kanga Kits in England had a display. All of this qrp gear in one room. And, all of these people who have written articles in QRP Quarterly were here. They all made us feel very welcome, and they were eager to answer our questions and to give us tips on what to look for and see at the hamvention.

They told us that the next morning there would be a shuttle service starting at 7:00AM that would pick us up in front of the motel and take us to the hamvention. It was free and one of the services of the hamvention. If you go, I strongly suggest that you take advantage of the shuttle buses and do not try to drive your car to the Hara Arena, as there is just not any parking available there. You will have to park at least a half mile away, and the shuttle buses will deliver you to the front gate.

The first day at Dayton the commercial booths do not open until noon, so you want to visit the flea market. There are over 3000 flea

market spaces, and they have every thing imaginable for sale as far as ham gear goes. I like to go to flea markets with Jim, because he has either owned or operated almost all ham rigs. Very rarely am I able to question him about a radio that he doesn't mention that he owned one of those once. One word of caution. Jim and I found that the gear at Dayton is priced very dearly. In fact, if you are looking for a bargain, stick with Livermore and Foothill. The prices are negotiable though, and if you must have that special rig and find it, you will have to decide whether or not it is worth it to pay the prices.

If you are looking for components, there are some fantastic bargains available. I found capacitors, diodes, led's all at ridiculously low prices. Jim and I worked our way through the flea market and I purchased a gel cell for $1. Which did not turn out to be a bargain at all considering I had to lug it around all day and when I got it back to California, discovered it would not take a charge. As Jim says, "Caveat Emptor".

Noon finally came and we struggled to get inside the Hara Arena for the commercial exhibits. I was dumbfounded when I walked in. It was wall to wall people, and it was like a living QST magazine. I think that every advertiser that has appeared in a ham magazine for the past 3 years was there. There are over 700 commercial booths inside, and they are all there ready to sell you gear. We saw TenTec, (with the new Scout on display), Yaesu, Kenwood, Azden, Alinco, Standard, all the biggies were there. The program gives you a map, and believe me, you need it to find your way around. Of course, Jim did not use his, as he followed me everywhere and let me figure out where we wanted to go.

Friday night the hospitality room at the QRP Hotel was really hopping. The highlight for me was when Roy Lewellen, W7EL and Wes Hayward, W7ZOI showed up. I have read articles by both of these men, and they are world famous in QRP circles. Roy brought the original W7EL with him and I was fortunate to operate it. Hopefully Jim got a picture of that, but I am not sure. Jim went to bed about 10, but I stayed until they shut the room down at 1:30 AM. It was a short night, and when Jim rousted me out of bed at 8:00 the next morning, it was raining.

One piece of gear that you most definitely want to take with you to Dayton is a raincoat. It has rained on Dayton during the hamfest for the past 8 years in a row. The locals say that it is rare to go more than 3 days without rain in April. I believe them. When it rains at Dayton, it rains. That puts a serious damper on the flea market and everyone goes inside to the commercial booths. Jim and I attended the QRP Forum Saturday, and it was standing room only. The forum was interesting, as John Welch who developed the Techno Whizzy that was in December 73 was there. Bill Hickox moderated and talk about kits and homebrewing. Bill runs Tejas Radio, and sells a great line of kits. He is really a nice guy and very knowledgeable about QRP. Fred Reimers, from FAR circuits was the third member of the panel. He answered questions about homebrewing. If you need a circuit board for a project that has appeared in a ham magazine, contact FAR circuits, as they probably have the board.

Saturday night is the big night for the QRP ARCI group. They

have a business meeting for all the members, which usually lasts about 30 minutes. This year, the president, Paula Franke, gave a summary of the year's activity for the club, and discussed other minor details about next years hamvention. Then the fun begins. Several pizzas are ordered, every chips in $5 or so, and there is a huge pizza party with beer and sodas. I would say the crowd on Saturday night approached 200 people with several coming and going. The thing that impressed Jim and I was how friendly everyone was. They are all open to questions, and they all want to show the latest project that they are working on. Again, Jim went to bed around 10, I stayed until 1:30, when the last group broke up and went to bed.

Sunday is the last day of the hamvention, and it starts to shut down around 2 PM. This is the day that I spent running around, trying to remember all of the things that I wanted to buy. One piece of advice that I have is to shop around on Friday, but buy on Saturday. Several things that I was interested in purchasing were sold out on Sunday. That is disappointing. Oh, it rained buckets on Sunday. All of the flea market booths gave up and shut down. But there was plenty to see inside, and besides, we wanted to attend the QRP forum Sunday morning. Randy Rand, AA2U, who is one of the top contest operators in the World, gave a very interesting presentation. Randy has over 300 countries confirmed, all on QRP! Jim Fitton, W1FMR gave a short presentation with some excellent advice on how to start a local QRP club. He was one of the inspirations that pushed Jim and I over the edge to start the NorCal QRP Club. Then Petr Doudera, OK1CZ gave a really neat slide presentation showing shacks in Eastern Europe. Most of the stations are either homebrew, or they are using WW2 surplus gear. Really! In fact, most stations are probably tube, as transistors and IC's are very hard to get. The amazing thing to me was how poised and polished Petr was presenting a program in English. I was thinking how difficult it would be for me to go to the Czech Republic and do the same thing in their language. Petr is the force behind the OK QRP club, and is quite famous in his own right. He received QRP DXCC trophy #10 from Ade Weiss, and has DXCC QRP on three bands.

Jim and I left the hamvention around 2, and we were faced with the dilemma of how to get back to the airport. Our problem was solved when we met yet another nice QRPer. Jim Johns, KA0IQT, was staying the night also. I think that the three of us were all that remained of the QRP group. He had a rental car and very graciously offered us a ride to the airport Monday morning. We went to dinner, and then spent the rest of the evening visiting with Jim. He works for Mitre, and is one of those people who have the ability to explain complicated things simply, so that even I can understand it. Monday morning, Jim, Jim and I checked out of the hotel and drove to the airport. We said our goodbyes, as Jim was flying to Boston, and Jim and I were going home to California via O'Hare Airport in Chicago.

We left Dayton at 11:30 AM and we landed in Sacramento at 3:00. (We gained 3 hours flying west.) I said goodbye to Jim and drove home to Dos Palos, arriving in time to teach my 7 PM night class. I was tired but happy. The trip was one that I will treasure all of my life. Jim, WA6GER is the perfect traveling companion. He is gracious, friendly, and a great conversationalist. We had fun, and learned a lot about ham radio. The QRP ARCI group is without a doubt the friendliest bunch that I have ever met. They made us feel welcome and like we had known them for years.

How much did all of this cost? The airplane ticket was $268, the hotel was $75 per night, and I spent about $90 on food and that darn airport shuttle. Jim and I split the cost of the room, so the trip cost me about $500. That does not count the money that I spent on buying kits and ham gear. Next year, will be a little cheaper as we will come back on Sunday instead of Monday, saving the cost of 1 night's motel and a day's food on the road. I plan on saving the money starting now, as Dayton gets in your blood, and I want to return. The reason that I want to go back is not just to attend the hamvention. If that was all that there was, I would not be going back. The reason that I am going is to have the eyeball qso's with all of the friends that I made at the QRP ARCI hotel headquarters.

One final note. I suggest that unless your wife is a ham, leave her at home. You will want to see as much as possible, and there is nothing for your wife to see if she is not in to ham radio. She will be bored, and will want to drag you away to do something else. Take her to the mountains, promise her a weekend at the coast, but don't take her to Dayton. Dayton is for 110% immersion into ham radio. Take my advice and take the trip.

MEMBER PROFILE: Jim Cates, WA6GER

Hi! I'm Jim, WA6GER, a QRP'ER and hamswap addict. I have been licensed since 1959, and have a General class ticket. I operate CW, RTTY, and packet. Almost entirely QRP.

In the mid 1960's, booted off the low end of 20 CW, via incentive licensing, I phased out from DX'ing, and went to VHF-UHF. With a lot of technical help, home brewed and converted surplus, finally getting A,B,C,D,and E on during one of the ARRL VHF contests. That translates to 6,2,220,432, and 1296. I had seven antennas twirling up on the roof, and a spider web of TV mast guy wire. Sure was glad I did not live next door to me.

Later, I bought one of those four channel, two watt World Radio Labs two meter FM transceivers; but as my hearing and consequent interest in operating phone declined, I got involved in 40 meter CW, QRP style. I built a crystal controlled 6AQ5 transmitter, and a one tube converter for a BC-453, and had a lot of fine QSO's during the late evenings. Later, I went solid state with a GE-20/2N3866 rig on 40, and worked about every state west of the Mississippi.

Currently, I am running one watt CW on 40, with an SP-1 Spider, from an article in the Jan. issue of 73. I operate in the mornings, and generally rouse someone for a ragchew. I also operate QRP RTTY, but need five watts to keep my sked to Idaho Falls. However, on 20, 5 watts is approaching overkill.

I finally got around to joining the national QRP club (ARCI), having become ashamed from bumming issues of the Quarterly. I recommend all QRP'ERS become members; the Quarterly itself is well worth the modest dues, and supporting anything QRP is, ipso-facto, a good thing.

I hope that as a new QRP club, we can promote fellowship among ourselves, help each other, learn more, and enjoy more, this interesting, and to me, fascinating, challenging facet of ham radio. 72 and thank you. Jim, WA6GER

Product Review: Lectrokit SP1 Spider

Jim Cates, WA6GER
3241 Eastwood Road
Sacramento, CA 95821

The January '93 issue of 73 has a cover-feature construction article by Mike Agsten, WA8TXT. It is a QRP transceiver, crystal control on "BOTH" transmit and receive. It is called the "Spider", and can be set up for 80, 40, or 30 meters.

I read the article, mainly because I read everything related to QRP. But my interest was not aroused, remembering all the frustration of my crystal-controlled novice days.

Here the matter remained, until Forest, N6ZBZ put one of these Spiders on 40, and asked me to listen for him, portable in Phoenix. He was Q5 copy, even though his antenna was a dipole only ten feet off the ground. Good, solid, QSO.

This grabbed my attention like a..... well, spider bite. Monkey see; monkey do. So naturally I had to have one. On 40, of course, my favorite band. I dug out the issue of 73; checked the old junk box; got out some catalogs to price a couple of needed parts. Gazooks! These minimum order restrictions! Forget it! And I'm not one for kits; too many irritating experiences.

But hark! A footnote, Lectrokit has the board and all surface mounted parts for ... for only twenty nine dollars? Hey, for twenty nine bucks, I'm starting to like kits.

This one arrived quickly, like return mail? So, let's snip open this padded envelope and find out what is inside.

To begin with, the instructions are so complete as to make assembly 99% foolproof. Definitely a beginner's project. (Blushingly I confess I am the reason why the kit is not 100% foolproof.I managed to install Q6 upside down on the board; not easy with the overlay - clearly marked - right in front of me.)

The instructions and the parts are in separate plastic envelopes. And when I say instructions, I mean with CAPITAL LETTERS. Like sixteen pages; everything from how to read resistor and capacitor values to a drilling template. Pictorial diagrams, schematic; it's all there. Simply too much to permit a detailed description; so, let the table of contents suggest the extent:

1. Fundamentals of component installation
2. PC Board Assembly
3. Band Selection
4. Top panel assembly and wiring
5. Tune-up and operation
6. In case of difficulty
7. Schematic diagram
8. Mechanical drawings
9. Pictorial wiring diagram
10. PC parts overlay

In addition to all the above, step by step, check-off assembly instructions, making this the most failure-proof kit since Heath.

Is the kit complete? Bet your sweet patootie it is. How about solder included, and even an abrasive pad to scour the circuit board to remove the fingerprints you put on it while turning and eyeballing. All parts are there. None of this typical product review stuff, "I phoned XYZ company and they sent the missing parts....etc." This kit is complete; I mean no missing parts. and, they are supplied in bags, permitting bitesized assembly chunks, letting you follow a logical-sequence assembly.

Ok, so now it is all assembled. How easy is it to tune up? Apple pie. Peak one transformer for RF out, one for maximum received signal strength (loudness). That's it. Period.

How well does this rig work? Is it practical? Yes, oh yes, yes, yes. In a month of casual operating, around 0800-0900 Pacific time, on my two crystal frequencies, 7120 & 7125, I have worked and confirmed seven states, and snag a qso almost every day.

At night there are the usual foreign broadcast problems, same as you hear from your megabuck rig. But I've worked east to the Great Lakes, on an average night.

Is one watt enough? Believe me, 559 to 599 reports are common. Do you need a cw filter? After all, the receiver bandpass is admittedly a tad broad. Hey, this is a simple rig. Naw, the best filter is the one between your ears. Learn to use it!

I now have three Lectrokit Spiders. And they have put fun back into hamming. I love the challenge, one watt, crystal control, forty meter QRM and QRN. But honestly, it isn't that big a deal; no fish in a barrel, but entirely practical. And, if 40 isn't your cup of tea, put yours on 80 or 30. You'll love it, and that's a promise.

*Lectrokit, 401 W. Bogard Rd., Sandusky, OH 44870

SP1-BBM: Bare PC board with manual .....$12 postpaid
SP1-PC: PC board, manual, all PC board parts....$29
SP1-Kit: Complete kit, including case.....$39
SP1-AT: Assembled Spider, 80, 40, or 30.....$59
AF-1: Audio bandpass filter kit.....$6
Shipping (Except SP1-BBM).....$4
Ohio residents add 6% tax

WANT ADS WANT ADS WANT ADS WANT ADS WANT ADS

For Sale: "Ugly Tranceiver Kits" All parts needed to construct the transceiver featured in the 93 handbook designed by Wes and Roger Hayward. $45, postage paid. Does not include PC board, available from Far Circuits. Only 5 available. Doug Hendricks, KI6DS, 862 Frank Ave., Dos Palos, CA 93620.

For Sale: QRP Quarterly Reprints. I have all of the large format issues of the QRP Quarterly available as reprints. They are bound in 1 year editions, (4 issues per year), with a heavy cardstock cover. Special Price: $73 postage paid in US, $100 foreign, for complete 8 volume set 1985 - 1992. Individual years are $10 per year plus $3 postage. Doug Hendricks, KI6DS, 862 Frank Ave., Dos Palos, CA 93620

WANTED: Small Format Issues of QRP Quarterly prior to 1985. I am trying to collect a complete set and would like to either purchase or borrow to make copies. I will pay shipping both ways and promise to guard them with my life if you let me borrow to make copies. Doug Hendricks, KI6DS, 862 Frank Ave., Dos Palos, CA. 93620. 209-392-3522.

WANTED: Hams who are interested in QRP. Meet us monthly at the Livermore Swap Meet. Booth will be located by the Concession Stand. No Business Meeting, No Dues, Just QRP Show and Tell. Come and share with others who are interested in QRP. Bring your projects and your questions. All are welcome. Booth opens at 9:00 AM.

QRPp

Journal of the Northern California QRP Club
Volume I, Number 2, September 1993

From the Editor
by Doug Hendricks, KI6DS
862 Frank Ave.
Dos Palos, CA 93620
209-392-3522 KI6DS @ K6RAU.#CENCA.CA.USA.NA dh@csustan.edu

Here is the second issue of QRPp and things are really starting to happen. In this issue you will find that over 75% of the material has never been published before. That is exciting to me and hopefully to you. Since the last issue, Wayne Burdick, N6KR, has designed a 40 meter transceiver for the first club project, see his announcement on page 6 for further details. Jim Cates, WA6GER, has secured a meeting place that is superior to standing out in the weather at the Livermore Swap, see page 4. Field Day has come and gone, there are several interesting accounts in this issue. More QRP kits are coming on the market, Chuck Adams, K5FO, has a neat review of the MXM, Jeff Gold, AC4HF, has a couple of reviews of OHR kits, Kevin Purcell, N7WIM, contributed a nice writeup of the new TenTec Scout, and one of the reprinted articles, "The NN1G 20 Meter Superhet Transceiver" is actually an update.

Speaking of the NN1G article, I have some exciting news for you who have been bugging me about the NorCal Project. Danny Stovig, who runs Dan's Small Parts, 1935 S. 3rd W. #1, Missoula, MT 59801, is selling a kit of parts for the NN1G rig. It includes the pc boards, all pcboard parts, and the variable capacitor for $49.95 plus $3.75 shipping. Folks, that is a deal!

The NorCal Project is coming along nicely. As I write this in late July, Wayne has the rig designed, a bread boarded version working (he worked Argentina on 40 meters!!!) and the board layout off to Far Circuits who is doing the prototype boards. When Wayne gets the boards back, he will build one in a case to check it out. If all goes well we will then order parts kits and make them available to the members. Letters will be mailed to all members announcing the availability and ordering instructions.

And that brings us to another subject. We need a distinctive logo for the NorCal QRP Club. So, we will have a logo contest. The logo will be used for the newsletter, and also be placed on club projects, patches, whatever. The design will become the property of the club with the designer receiving the fame and notoriety of being the designer, but no money, as this is a volunteer club. Send your logo designs to me at the address above. I will bring them to the next club meeting and we will pick a logo as a group. Let's make the deadline for entries Sept. 30.

This next item is painful but necessary. Starting with

the next issue, Jim and I will not be able to continue providing free copies of the QRPp Journal. When I started this publication, I thought that I would be printing maybe 20 copies at most. That is when I made the offer of free publication, because I thought it would be easy to do a journal and print 20 copies. What a surprise I had. The word has gotten out, there are at the present time over 62 members of the NorCal QRP Club, and the press run for this issue is 100 copies. So, there will not be any dues for the Northern California QRP Club. You can be a member for no charge. But, if you want to get the journal, it will cost you $5 per year. How did I get $5 per year? Well, it costs about $1 per issue to print and mail, and any excess will be turned over to the club. I will give an exact accouting yearly of the printing and mailing costs. I am doing my part as a volunteer without pay, but I am going to have to be reimbursed for copying and postage. Hopefully you will understand my dilemma.

So, how do you subscribe? Send me your Name, Call, Mailing Address, and $5 and that is all there is to it. If you send checks, please make them out to Doug Hendricks. The bank will not cash a check made out to NorCal QRP Club, unless we have a Federal I.D. number. So, make it out to me. I will be accountable for the money.

The articles in this issue were gathered mostly by my efforts. I used material from Internet quite extensively, and I do appreciate the permission that was granted so that I could use the material. What I am trying to do is stimulate you so that you will submit material. It doesn't have to be lengthy, just submit it and I will edit it if needed. The best way is to send me a disk with the article in ASCII format or WordPerfect format. Or you can send it via packet or internet. If all else fails, scribble it on paper and send via Uncle Sam's snail mail. But contribute. If you have anything at all, send it to me. This is your journal, and you have to start contributing so the rest of us can get to know you. After all, this is a hobby of communicators. Use the articles as inspiration. Read them, enjoy and produce some of your own. If you build a project from one of the articles, write me about it. I and all of the other members want to know about your experiences.

You will also notice that this issue is more "polished" than the first one. I have learned a great deal doing this. Please bear with me as I am new at the job. Also, WordPerfect 6.0 has been a lifesaver and a great help. Until next issue, 72, Doug, KI6DS

Whither Thou Goest NorCal???

by Jim Cates, WA6GER
3241 Eastwood Rd.
Sacramento, CA 95821

Editor Doug (KI6DS) says I am club coordinator. I don't know what that means, and I am too foxy to ask. However, it appears to include a mandate to write an article on the future of the NorCal QRP Club.

It seems to me that there are at least three types of ham clubs. One is the "mail order" type, where your dues get you primarily the club newsletter, though there may be other benefits as well. The second type is the traditional club, with a constitution and by-laws, officers, programs, etc. The third type is informal, no officers, nor dues; just get together and discuss matters of mutual interest, e.g. QRP Plus, "Show and Tell", club projects (home brew construction), etc. Perhaps it should be added: two other kinds, the club that simply never gets off the ground, and the kind that flies along until it augurs in.

I see the NorCal QRP Club as going one of these three ways; hopefully not either of the last two mentioned. Should the club go "mail order", this would involve a commitment to publish the QRPp journal throughout the life of the club. This option is not attractive, unless there are a bevy of volunteers to write, edit, assemble, address, and mail the journal. (Ed's note: That is basically my job now, and so far I am enjoying it immensely.)

A formally organized club has the advantage of structure and continuity. The disadvantage, it seems to me, is that ab initio, it divides the membership. Officers, (the doers), and members, (the doees).

A hands on, show and tell group, talk about QRP seems to me to be the most attractive. No egos need to be stroked; no wounds need to be healed. If interest is keen, the group survives; if not, it dies, as it should.

So, let's find out which it shall be. Beginning in September, the NorCal Club will NOT have a table at the Livermore Swap. Instead, all members and interested parties are asked to attend the meeting Sept. 5th at 11 AM, right after the Livermore Swap. The place is California Burger, Pleasanton. From the swap, take the freeway towards Oakland. Exit at Santa Rita Road. Go in to the shopping center (South of the freeway) on the East side of Santa Rita Rd. The California Burger is in the Southwest corner of the shopping center. Through the door; turn right and you are there.

The July Swap/QRP Club meeting was on the Fourth of July; that took its toll. I see the September one is during the Labor Day weekend. Oh well, sigh....October looks clear. Hi

Hi, 72, Jim

Member Profile: Wayne Burdick N6KR

by Wayne Burdick, N6KR
74 Elm St.
San Carlos, CA 94070

My first encounter with ham radio was at the age of 9, when I discovered my neighbor's father's huge antenna and spacious radio shack. We listened as he worked the world from our San Diego-area community of Fletcher Hills. Soon afterwards I received the first of many Radio Shack Science Fair project kits from my Dad, who thought I'd do well in electronics. I didn't get my first ticket--WN6HQH--until I was in 7th grade.

I received my extra three years later, and by that time had begun to focus on building my own QRP gear. My first serious project was the W7ZOI "Mountaineer," for which I etched my own board. (My first etching tray was an aluminum ice cube tray, which didn't survive the process! Ferric cloride does a number on most metals, I discovered....) After high school, I joined the Coast Guard, graduated first in my E.T. school class, and ended up in Bermuda--the world's best Coast Guard duty station, as far as I was concerned. The longevity rules for two-letter calls changed around then (1977), so I applied for and received my current call, N6KR, and signed /VP9 for a year.

My interest lagged for a few years, but in 1988 I discovered the NE602 and built a little receiver that was nearly identical to the Neophyte. In fact, I was at my local Ham Radio Outlet looking for an address for the ARRL--to send them my receiver article--when I saw the Neophyte on the cover of the Feb. 1988 QST! I was bummed. I called the author and congratulated him for beating me to it. Ever since, I've been optimizing receiver and transmitter circuits that use the '602, trying to eek out the best possible performance from it. In 1990 I published a three-part QEX article on "The Safari-4," a 4-band CW rig with everything built in, for backpacking. More recently, I built a smaller version of that rig that uses plug-in transverters, and have just completed the NorCal 40, a single-band rig that I hope will get some more folks interested in homebrew.

I have been in the bay area for only 7 months, but I'm sure my fiancee, Lillian, and I will be here for the long haul. And, by the way, if Jim and Doug hadn't started NorCal, I would have!

Arriving Soon: The NorCal Club Project

by Wayne Burdick, N6KR
74 Elm St.
San Carlos, CA 94070

As some of you may know, NorCal has its first club project in the works: a 40-meter QRP (of course) CW transceiver. The rig, which will soon be available as a kit for $75, has been dubbed the "NorCal 40." The NorCal 40 has a number of interesting features, dreamed up by NorCal members at a McDonald's somewhere west of Livermore. These features include:

- small size (just over 1.5 x 4 x 4 inches) with custom case
- all parts--including controls and connectors--on one board
- VFO coverage of any 40 KHz CW segment of 40 meters
- superhet receiver with 500Hz crystal filter and simple AGC
- variable-output TX (up to 2W) with QSK
- low receive-mode current drain of about 14mA
- single-conversion RX/TX with 2.0MHz VFO for stability

The kit will include a detailed manual, and will be easy to build, having fewer parts and simpler alignment than nearly all other transceiver kits. In fact, a major goal of producing the kit is to appeal to first-time or dormant homebrewers. NorCal members, including the rig's designer (Wayne Burdick, N6KR) will assist in getting the rigs up and running if needed. A full description of the rig (and ordering instructions) will be mailed to all NorCal members as soon as the kit is available.

QRP FOREVER AND EVER AND EVERMORE

by Jim Cates, WA6GER
3241 Eastwood Rd.
Sacramento, CA 95821

At the July Livermore swap, I picked up a super-mint Argonaut 509, a QRP 80-10, CW-SSB, 2 watt rig from the mid seventies. A classic! (No, you didn't miss spotting it; it was a prearranged deal.)

Reading through the manual, operating hints include:

1) Select the highest frequency that is completely open. Hmmmn... if you read my Spider review in the last NorCal Quarterly, you know I am running one watt on 40, crystal control on both transmit and receive. So, easy to pick the highest frequency band that is "completely" (?) open. Now, let's see, I think I'll pick.....forty meters. Easy, huh?

2) Call loud stations. Now that is advice with which one hardly could argue. But, how about, not so loud stations? Sotto voce? Q5-S2? Hey, that guy (gal - oops; not politically correct) person - hamperson, i.e., might be a fellow - rats - strike that also - too gender specific - another QRP person. Ignore another brother/sister QRP'er? Never! Hey, when you are rock bound, call everything, anything you hear. With only RIT tuning ability, the playing field isn't all that wide; albeit the Spider does have barn door ears, (sob, but not transmit).

3) Choose a part of the spectrum that is not heavily populated. Good advice. You smart VFO knob twisters. But with two crystals, 7120 and 7125, what you hear is what you get!

4) Don't call CQ except during favorable band conditions. Mama mia! With the Spider, operating in the mornings (yes, I am retired, thank you), how else ya gonna scare all the SWL's outta the woodwork? Those frequencies are mostly a vast expanse of earphone hiss. In fact, I've set up a Grandmaster keyer as a CQ beacon; either someone can send "L-I-D", or my call. Heh heh.

At night, it is a different ball game. I like to tailend, even though I can't find zero beat with the Spider, I call anything I can hear that I think....maybe, just maybe....etc.

5) Call and sign a little longer than when running high power. Nawh! Never! Shows lack of faith in QRP! So, I work it the same as though I were running a kilowatt. Self confidence to the point of arrogance? Well not really; we are self confident, albeit modest. But look, working QRP is no different than any other way of operating. Either you make a contact, or you don't. So what? How many years did you live before you became a ham and never had a contact? Life went on, didn't it?

Remember, when you are QRP, you are in one of the few remaining frontiers of ham radio. You are not part of the herd; you march to a different drummer. You are the last of the Home Brewers; you rise to the challenge of low power. You are King of the Hambands. You are --- QRP!!!

You've come a long way, Baby! Er-ahh, that is, ham-persons.
72, Jim

P.S. And I don't call CQ de WA6GER/QRP, either. I have my pride you know.

Making Simple Paddles

by Fred Cady, KE7X
2211 Arrowleaf Hills Dr.
Bozeman, MT 59715

I made a simple paddle that worked great when my General class built keyer kits. I'll try to describe it.

Use a wood base, 2 right angle brackets (about 1"x1") from the hardware store and two pieces of single sided pc board material about 1" by 6". The angle brackets attach one end of the pc board "paddles" to the wood base about 1" apart. Attach the dit and dah wires here. At the other end of the "paddles", in the middle, put a brass screw with the ground wire. You can adjust how far apart the paddles are for the amount of tension. Worked pretty good (not a bencher!) but its hard to beat the price.

Let me know if any of you try this. Was thinking about sending it to QST or 73.
73 Fred, KE7X

Field Day

by Jim Fitton, W1FMR
P.O. Box 2226
Salem, N.H. 03079

Boy am I tired.... But QRP FD was worth it. On 20m, I worked W3TS, N4BP, and heard N6GA, NO1E.

After FD, I called CQ QRPI from 1800 - 1805 but NIL. On 20m, The Argo 509 worked flawlessly with the 7 AH gell cell holding up through the entire weekend. The corner fed Delta loop on 20m did well again.

KZ1L, with a tiny Mizhou 17 meter hand held SSB transciever used an outbacker mobile antenna and made a number of SSB contacts. At sunset, he could work everything he heard. I was impressed.

Dave, NN1G brought his 40m version of the 20m rig that appeared in QQ, and it works as good as the original 20m rig. I was impressed.

We had 9 camping out, and 2 visitors and ran 3A from WMA.

72, Jim - W1FMR

Field Day

by Bruce Walker, WT1M
667 Belknap Rd.
Framingham, MA 01701

I regret not joining QRP-NE for FD. I was on the air

very little working 1E from home, but I wasn't feeling that well, and quite honestly, I was bored doing it alone from home. Saturday evening, I went over to the W1FY group for a while, which was set up about 1/2 mile from my house.

From home, I heard W1FMR at least once, calling someone just before I did. I wanted to jump in and try to work him, but that would have been impolite. I had a really wild wormhole into ORG section on 15m Sat afternoon, working about 6 straight, hearing none of the other CA sections during that period.

CASTLE ARC'S FIELD DAY (OR, MURPHY IS ALIVE AND WELL IN MERCED COUNTY)

by Mike Siegel, KI6PR
1145 Julie Drive
Merced, CA 95348

For Field Day 1993, I spent the weekend with the Castle Amateur Radio Club, in Merced. While operating QRO, it was an interesting and educational weeekend for everyone involved, and well worth noting. Not only did we introduced a whole new group of hams to the fascinating world of HF, but we met Murphy himself, and gave him a good fight!

The Castle ARC is a new club, with a membership of only 30 hams; our members range from old pros like Fred, K6RAU, all the way to Kera, KD6TAZ. A little more than half our members are no-code Techs, but all are very active and motivated hams. This made things very easy for us "old timers", as we never lacked for help in putting things together.

We gathered early Saturday morning, at the empty lot behind the church where the club meets. The first order of business was to string up a tarp for shade; it was only 8:30, but the temperature was already in the high 80's (as it turned out, temperatures reached over 110 during the weekend!). The tarp was strung between two trees, and anchored at the bumpers of three vehicles, whose owners were anchored firmly to the FD site for the weekend.

The crew started erecting a 40' crankup tower; the tower was to hold a TH6-DXX tribander, a Skelton Cone wire antenna, and a 4-element VHF quad. When we unpacked the TH6, we discovered that there were parts missing - enough parts that we wouldn't be able to use the beam. So we decided that the Skelton Cone would have to suffice; it is, after all, an 80-10 meter antenna in it's own right. The VHF beam, however, wasn't quite so easy to live with. The original plan was to mount the quad on the TH6, tie a rope to the end of the tribander, and pull the rope to change beam headings. Without the tribander,

we had to come up with another means of mounting the quad. One of the guys had a length of PVC pipe in his truck, so we mounted the quad on the PVC, and tied a rope to the end of the quad's boom.

While we were working on the tower, several of the neighbors came by to visit with us. The first came by to tell us that he was leaving for the weekend (I wonder why?), but would leave his LARGE dog in the back yard. "If the dog gets loose, don't worry - he's really friendly!". Yeah, right - did anybody bring a gun to deal with Cujo? The other neighbor just dropped by to warn us about the neighborhood kids that like to ride at breakneck speeds through the empty lot - they usually don't look too far ahead to see what's there, and their normal flight path would take them right through our campsite. Gee, did anyone bring any flags to tie to the guy lines? I sure hope the kids don't come through here at night! This was going to be an interesting weekend!

The club had decided to operate single/multi, allowing the new kids to take turns working to their hearts' content, and us OT's could simply fill in on CW when the "kids" burned out. As the time came for the contest to start, we looked at the non-HFers, and asked them who would start. "Start? Not me - I don't want to be first!". We thought about drawing straws, tossing coins, or just playing "scissors, paper, rock". Our infinite wisdom finally dictated that one of the OT's start things off, just to show the kids how easy it was. So Kent, KK6IU, sat down at the rig, and started tuning the antenna (what's that funny box for anyway?). Kent got all tuned up on 10 meters, and waited for the contest to start. The band was quiet - for a long time. Kent tuned around, and looked at the clock. Ten minutes into the contest, we finally figured out that the band was dead to us. We ultimately discovered that everything above 20 meters, due to our location, propagation, and Murphy, was absolutely dead to us for the whole weekend.

We settled in on 40 meters, for most of the day, and set about hitting that certain rythym of Field Day Saturday. Once things got going, we decided that it was time to look at our logging. I had brought along a 386 laptop, all loaded up with CT - or so I thought. The logging program was nowhere on the hard drive! So I pulled out the CT book, so I could grab the disk, and load it in. The disk was a 5-1/4"! How could I forget these details? Up around the corner, I could hear Murphy, laughing his head off. Fortunately, Fred, K6RAU, lived just across the street from our site; it only took him a minute to copy the disk to a usable format, and we loaded the program into laptop. I had been doing all this by way of instruction, telling other folks what needed to be done at the other table. Once the program was loaded in, I jumped over to the laptop to start the program and get it set up. I studied

the LCD screen, and realized that I couldn't see a thing! The daylight was completely washing out the screen - why hadn't anyone said anything? I could see that if we attempted to use the laptop to log over the weekend, we would all end up blind from eyestrain. Damn that Murphy! We decided the best thing to do was to keep a pencil log, enter it into the computer after the contest was over, and depend on the charity of those with more efficient logging system to inform us of dupes.

Knowing that we would be expected to fill in between the kids by working CW, I had brought along several different keys to accomodate the various tastes of the other OT's. I have a small pile of bugs (I am NOT a collector! I only own ten bugs!); Kent, KK6IU, had specifically requested the Blue Racer - it had the smoothest feel for him. So, I spent some time Friday morning, fine-tuning and tweaking the Racer for the smoothest and quickest feel. I also packed along a Heath memory keyer and the new WBL single-lever paddle, as well as a straight key. The first lull in the action came Saturday afternoon; Kent sat down at the bug to start working. Apparently, Murphy had come along right behind me, to make additional adjustments on the bug - it took us several hours to get the bug back into reasonable working condition again. So, Kent tried the keyer/paddle set; this wasn't the answer, either, since it refused to key the radio consistently. We eventually ended up using an extra keyer/paddle that someone had brought along "just in case".

While we were struggling with the HF station, Rod, KC6ZVE, had decided that 2M SSB was the ticket for him; he parked himself in front of the FT-221, and started calling CQ - with no answer. Still being early in the contest, we didn't give it much thought, and suggested that he give the rope a yank, and spin the quad around towards the Bay Area. So Rod grabbed the rope, and started to walk the antenna around - that is, until he realized that the antenna was not turning! It seems that we had put the quad up on such a long piece of PVC, that every time we tried to turn it, the PVC simply bent over. We ended up with the quad pointing towards L.A. for the whole weekend, and had to settle for only ten QSO's. During a break period Sunday morning, Rod was asking several of us why he was getting such consistently weak signal reports; in the process of discussing the situation with him, we soon discovered that the quad had been mounted VERTICALLY. At that point, we congratulated Rod on being able to operate in the wrong polarity, and still get results! Towards the end of the contest, Rod tuned across one the L.A. stations sending out a CQ on 2M CW. I quickly jumped over to the FT-221 with a straight key in my hand (Rod is a no-code Tech), plugged it in, and was not at all surprised to find that Murphy had been playing with that key as well. It took me five tries, but I

finally managed to get the whole report without broken keying.

The heat was also a problem for us; at 110-plus degrees, most of us went through several gallons of drinking water over the weekend. The tarp we had strung up for shade was a real help. Aside from the trees and car bumpers we had tied off to, we were also using a number of aluminum tent poles. Late Saturday afternoon, the wind came up, and started working on the tarp. The end result was that with the tarp flapping, we bent, spindled, and mutilated some sixty dollars' worth of tent poles.

By the end of Field Day, we had racked up a whopping 504 QSOs, mostly on 40 and 80 meters. We were hot, tired, frustrated, and generally over-fed (N6WTL cooks a mean hamburger, not to mention my own world-famous pancakes!). But all in all, we had a great time. Once I got home and got things unpacked, I checked all the CW gear that had given us such a hard time - at home, it all worked flawlessly! Ah, Murphy, you son of a ....

The club considered the whole thing a grand success: for many of the members, it was their very first Field Day. They got learned a lot from not only our mistakes, but from our successes as well. Many of the club members have become interested in HF since their Field Day exposure, and have started studying the code for their upgrade. And all of them are talking about working multi/multi next time. I can tell that Murphy is going to have to hire extra help for next year....

Great Wire Antenna

by Jeff M. Gold, AC4HF
1751 Dry Creek Rd.
Cookeville, TN 38501

A good while back I pulled some info about the ZS6BKV antenna from somewhere. I built one for Field Day.

This is a 5 band tunerless antenna which was developed using computer modeling. It has a good SWR on 40, 20, 17, 12, and part of 10 meteres. Mine also was resonant at the lower end of 80 and worked fine on 15 meters.

It is 92 feet 2 inches of wire (split in half as a dipole) with 40 ft of 450 ohm ladder-line as a matching section. This is then directly connected to some 50 ohm coax.. I used RG58/U. I then took about 5 extra feet of coax and tightly looped it around the end of the coax section nearest the 259 connector to keep out RF.

The club used a 440 with an autotuner and a bunch of QRP kits I had built. The antenna was up at about 25 feet to start, then I restrung it to about 40 feet.

The 440 easily tuned the antenna on all except 160 meters

(no big surprise here). The antenna worked GREAT. After I restrung it at the 40 foot height.. seemed to be able to work everyone first try with the 100 watts and had real good success with the QRP rigs.

The antenna seemed to outperform the G5RVs that were strung around at the other tents.. and has the advantage of working a number of bands without a tuner.

Field Day

by Randy Rand, AA2U
8 McDermott Pass
Denville, N.J. 07834

The Splitrock ARA Field Day went well. With our 2A setup, running QRP, we worked several hundred contacts. We also had a Novice/Tech station, a packet station and a VHF/UHF station going to keep the younger crowd busy. Radios used were the Argonaut II, a Yaesu FT301S , an IC-730 and various VHF rigs. We had 222MHZ but made no contacts there on FM. Antennas were 2 tribanders, a 10m X beam, 40 and 80m dipoles and 2m + 222mhz ground planes and J-poles. Antenna supports consisted of 20-30 ft pushup masts, aluminum tower sections and military surplus 40 ft antenna masts and a 20 ft crankup. Power was provided by several deep cycle batteries and some really large military batteries. We logged all the HF contacts using CT and 2 Zenith laptops. The rest was handled with paper. I will still be typing in the data tonight. I estimate our 2A-battery score at about 7000 points, but will have an exact number later.

We had a number of thunderstorms on Sat. night and Sun. morning that kept us off the air for a significant period of time. During one of them I watched discharges from the PL-259 connector to ground. The arcs showed up nicely in the dark. I did this from the safety of my van. The ops at the Novice/Tech tent claimed they saw a purple glow coming off their connector. Some sort of corona discharge maybe?

Just finished typing in the last of the logs into the computer last night. We made a total of 792 QSO's with 260 being on SSB or FM and the remainder on CW. Our final score including bonus pts is 7320. This would have placed us 4th in our 2A-battery category in last years FD.

Going through the logs I noticed that our Technicians worked W1FMR on 2m FM. We were running 5w to a 2m groundplane up 40 ft. Wonder what Jim's bunch were running? Our QTH was a superb VHF location, though, being on top of a 900 foot ASL + hill with nothing higher to the east, northeast and south of us.

73,
Randy Rand AA2U
rrand@PICA.ARMY.MIL

Dinosaur Valley DX Society FD

by Chuck Adams, K5FO
830 Waite Dr. Copper Canyon
Lewisville, TX 75067

I worked with group from the above club. My first outing for FD in 8 years. Tried last year, but storm squashed that. We used IC-735 with 5 watts out on 40 and 20 mtrs. 20 meter 5 element trapless beam up 40 ft with rope rotator. 40 meter three element wire beam up 40 ft pointed NE from 50 miles SW of Ft Worth TX. I don't have the total but about 570 contacts or so for the test.

Ops were K5MW (call used), WA5MWD, AA5SL, KD5EZ, WA5ZGC, AA5WH, AA5UA, AA5TZ, and K5FO.

This was the first time for me to use CT on laptop. Works great. Now I have to go and figure out how to do them at home. I've already seen reports of bad conditions, but didn't seem too bad. Didn't try 15 or 10 although I listened on 10 driving to the site. I thought it would be open, but I guess not. Saw some note about possible solar flare. It may have happened.

The one miracle was the weather. Fantastic! No rain, no wind, and temps around 70 at night and 90 during the day (degrees F). Ohhhh. CLASS 1A.

Field Day in Extreme NE Illinois.

by Vicki Welch, WV9K
22 Pine St.
Carpentersville, IL 60110

Well, not being into drinking beer and even less into contesting, (the bane of the amateur radio service) I got involved this year anyway. We had nothing to prove since the entire station here runs off 12V and the computers run off a UPS full time - necessary since we are involved in disaster services anyway - we *are* ready.

What sparked this off was "who *can* I talk to ?". The results were interesting! From 270440Z through 271132Z I managed to work 30 stations. Not impressive I am sure, but interesting and actually fun (NO, I still think there is too much of this as a normal course of events). Almost all of it being on 40 meters, all being "QRP" (formal definition: 5 Watts) and all being done in CW (a mode that I have come to like more over time, especially having the CMOS Super keyer and the Kent key!). Next year I hope to have a keyer with more capacity (could be done if you could get source code for the thing).

The antenna was a dipole cut for 4.5MHz up about 15' or so and bent (to fit, one leg oriented E/W and the other SE/NW. Radio is a Yaesu FT-747GX. No, just because it will do it, I *do not* "turn up the wick", just because I can - a silly thing to do, only for the integrity impaired. All ran off battery power and I even un-programmed the charger not to come on that night. Class 1E IL. (The batteries are charged at night here as the electric rates start to approach rational during that time).

It *was* a zoo. The CW filter in the rig was practically useless and the external audio filter (down to 80 Hz) was not much help either in most cases there were as many as 5 stations (+?) within that passband. Occasionally there were spots that were a bit cleared (only maybe two stations in the passband). If I could have worked everyone I heard, it would have been a MUCH higher number than 30 contacts. Best coverage was to the northeast and southeast with reasonable coverage to the east and south (lots of 1,2,3,4 and a few 5s and 0s, no 6s worked (a few heard) and one difficult 7 and one VE3, one 8 (20 meters) and no 9s worked, (but one heard). DX consisted of 2 Virgin Island stations which were the ONLY stations on the band when I went slumming on 20 meters about 0900Z. With the solar conditions, I wasn't too surprised at the lack of stations on 80 and 160. The times I was operating (local night time) precluded anything much above 40 Meters.

The late start I am sure didn't help either. We had *nasty* weather (so what's new in Illinois?) that kept me on the weather nets until just before I started on 40 Meters (three local tornadoes down ("minor damage") several wall clouds that (thankfully) never formed and several from other areas "down and headed your way". After that "Field Day" was a yawn <grin>. If nothing else the storm lowered the temperature so one could breathe.

The results were interesting. I would have thought that the "best coverage" would have been North/South and NW/SE. It turns out (from this experience anyway) that "best coverage" from this antenna is to the NE/SE, practically nothing N/S. Interesting. Best part was getting some experience in CW operations. My opinion about it being an abomnible mode for communications still stands, but there are ways to improve the throughput (of course a "contest" is about the most limited communications I could imagine "de wv9k 1e il 5nn tu qrz", wow.). I did cheat and use the PK-232 down at the low end of the band where the big boys were zooming along at 35+ WPM (I can't write what I hear fast enough at that speed and haven't done enough of it to really hear words, sigh... More practice and getting more relaxed will probably make it easier. Since I am not a typist (I took engineering drawing in high school rather than typing (I was (am) a real rebel in those days) so

that isn't too helpful, sigh...

I finally decided to go fall over about 0700 local (CDT). Slept until noon while my husband played around on 10M. He had his best luck into 5 land with that! He also fixed an "anniversary dinner" consisting of steak and lobster, fresh corn (one of the few advantages of living here) and other yummie fare. Yes, it was a good field day <grin>.

The local QRP group did not fare quite as well out there in the storm. Lotsa lightning and some bright folks who shut it down and went away until after the airborne fireworks display ended. That much rain has to make for a decent ground. I have no idea at this time what the NEIQS did score wise, but I'll post it when I find out. As for my score, don't know and really don't care.

Next year I hope to have a radio with better filtering and I want to see what I can do with pactor QRP. If the bands are in better shape, I am sure that will help as well.

Earlier in the day, around the start of things, I did look around 6 Meters, 2 Meters and 70 CM (all ssb). Dead as a rock. I did hear ONE station on 2M. Since he was running a very high power station, I didn't talk to him (I do not support pollution and after getting the s-meter needle unwrapped from the upper peg, I shut the rig off. I had *really* hoped that VHF/UHF would have been more active. I didn't even try packet (2M FM) as the cable tv system in this town leaks so badly that the "packet area" is simply unusable (but it saves the money one would spend on cable to watch TV <grin>, if one watched tv...).

All in all an interesting experience. Not much as far as a real emergency test (with a year to plan for it ? - call another one next weekend and see who turns out). Also from looking at the rules (briefly), it looks like a contest with even more involved rules than most of them - I'll leave that to the "blood thirsty" contesters and their lawyers <grin>. The point is that it can still be fun and you can still learn something from it all. I suppose that if you can operate reasonably effectively under that sort of adverse (QRM/QRN) conditions, then we still might be able to do what the war department wants us to accomplish.

I hope that everyone else participating had as much fun with it as we did.

Take care es 72, Vikki.

Battery FD

by Jim Fitton, W1FMR
P.O. Box 2226
Salem, N.H. 03079

Low Battery Voltage? Radio Shack sells an analog 15 volt

DC panel meter. It consists of a sensitive meter with a series resistor. Leave it connected to the FD battery terminals using a couple of RS clip leads. I used it to monitor gell cell voltage for the Argo 509.

Also, QST had a neat little expanded scale voltmeter project, perfect for monitoring 12 v. batteries a couple of issues ago. Maybe under Tech Correspondence.

The Argo 509 voltage dropped from 13.8 to 13.4 v over the entire period. We used the speaker, which draws more current, er.... uses more power than phones do.

NOTE!!! Be sure to put an in-line fuse inside your HW-8 or HW-9, between the on-off switch and the power connector. And tape spare fuses inside the cover. A friend learned the hard way that when the battery gets accidently reversed, all expensive, and hard to get devices sizzle and smoke. On the positive side though, they only smoke for a instant.

Zuni Looper Field Day

by Doug Hendricks, KI6DS
862 Frank Ave.
Dos Palos, CA 93620

Gang, Here is the report from the Zuni Loopers. There were 18 hams there at various times, with most of them staying the full time. KI6SN, Richard Fisher; N6GA, Cam Hartford; W6SIY, Keith Clark; AA6UL, Ralph Irons; WF6D, Bill Young; KD6WKJ, Kim ????; KD6JFG, Marion McGee; WA3JPG, Clark Savag Turner; KC6TKO, Belinda Morrill; W6JHQ, Tom Brown; N7FEG, Rob Roberts; N6KR, Wayne Burdick; WA6GER, Jim Cates; N7PPF, Jim Smith; WA6ARA, Mike Herr; KD6NCW Mike Hanisee, K6MDJ, Fred Turpin, and KI6DS, Doug Hendricks.

Antenna's used were:

80 meters - 8JK Phased 2 element array up 80 ft.
40 meters - 4 Element Parasitic Delta Beam up 70 feet, all elements spaced 16 ft.
20 meters - 6 Shooter (6 phased half waves fed between elements) up 80 ft.
17 Meters - Lazy H up 60 ft.
15 Meters - G5RV at 70 ft.
10 Meters - Upper & outer at 50 feet.
2 meters - 4 element quad
440 - 8 element quad

1099 contacts were made. The 40 meter beam working great after midnite into the 4's & 5's. 20 meters was decent, with 15, 17 & 10 only fair. I had the greatest time of my life at a field day, will report our score when I get it from Cam. We operated 6A battery. Beautiful site, great weather, and I just hope the pictures that I took turn out ok. Fred, Cam, Bill, and the rest of the original group did an outstanding

job of preparing. Everything was perfect. These guys really know how to do field day.

Rigs used were: Kenwood 660, Icom 735, Argo 509, 515, Wayne Burdick's Sierra 4 (hb 4band transceiver), Spider, HW-9 & Kenwood vhf and uhf rigs. We used N6GA's call in place of W6SKQ.

The group was saddened by the sudden passing of Bob Spidell, W6SKQ, who was one of the original driving forces behind the Zuni Looper group. Bob died 10 days before Field Day and was and will be missed by all who knew him. I never got to meet Bob Spidell in person, although I worked him on the air and talked with him on the phone. He was a neat person to know.

Field Day

by Kevin Purcell, N7WIM
318 10th Ave. E. C7
Seattle, WA 98102

I operated with N7TNI and new tech as co-ops from Fort Flagler State Park, WA (on the Olympic Penisula -- the top left corner of the map for the non-WA amongst you!) as the novice station, N7WIM on the site of K7LED, the Mike and Key club of Seattle.

As usual 10m varied from weak signal locals to sounding like 20m. For us the band was open at the start (11am to 1pm local), then it reopened on Sat night (8pm to 11pm local), then the next morning (9am to 11am local). Fooled a few people in CO with an S9 signal, and one operator in NH was suprised to hear us (I was suprised to hear them!).

We ran a 3 element 10m monobander at 30 feet (I got volunteered to climb the tower -- a first for me) fed by a IC-725 running 100W. The station was located on a bluff about 100 feet above the beach. This gives a 180 degree view (N to S) across seawater. Gives good low angle radiation :-).

From looking at the log sheets we got about 260 QSOs (we didn't dupe check as we went along, but our memories caught a few!). All SSB, no CW. I expect we beat last years total of 230 Qs. With a little more effort (and perhaps some more ops) we could have hit 300 Qs.

I don't have logs with me (chairman has them) but I can remember working the following states:

ID, CA, AZ, NM, TX, OK, KS, MI, MS, NH, MA, NJ, NY, FL, GA, TN, KY, OH, NE, ND, SD, MT, WY, UT, WI, HI, LA, AR, PA, MD, WV, WA, NC, SC, IN, IL, CO

Where were Delaware and Nevada? All ten call districts,

VE2, VE3, VE7, best DX (only DX!) was FG5.

I enjoyed it (even though I was laid low with a bad headache for Sat afternoon). Q R Zed November Seven Whiskey India Mike.....

Field Day

by Gary Diana, N2JGU
65 Pacer Drive
Henrietta, NY 14467

Since the reports are coming in about field day exploits, thought I'd share our experiences with the group.

Brad (WB8YGG/2) and I (N2JGU) ran a field day operation as N2JGU from about 9am til 3pm on Sunday only. Equipment was as follows:

(1) - Cubic Incher on 80m, to be exact 3.718 MHz (homebrew by WB8YGG; built on pc prototyping board).
(2) - Sudden receiver on 80m (also homebrew by WB8YGG, utilizing homebrew pc boards!)
(3) - Professional Weekender xcvr on 40m (actually called the Ugly Weekender, but Brad complained that the final product looked too commercial to be called "ugly") homebrew by N2JGU
(4) - wire dipole antenna, cut for 80m and fed with 300 ohm twinlead. With the aid of an antenna tuner, it tuned 80m and 40m quite nicely.

We ended up with 17 contacts in all. PA, NY, OH, VA, MI, NH, CT, MD, IN, VE2, and VE3. We operated with a 10AH battery, which easily lasted the entire 6 hours. This was our first attempt at Field Day with QRP equipment, so we were happy with the results, given the last minute arrangements to even get out and operate. We'll be there next year, hopefully sporting a couple more bands!

A Superhet Transceiver for 20 Meters

by Dave Benson, NN1G
80 East Robbins Ave.
Newington, CT 06111

Just for the record, I didn't rush home and slap this project together over a spare lunch hour - I had to finish it up the next day. Seriously, this project evolved out of an interest in seeing how compact a superhet transceiver could be. While I don't claim that this rig is the ultimate in compactness, it combines small size with performance the experts proclaim "pretty good".

The transceiver is built into a TenTec TP-20 enclosure. Peeking under the hood, all circuitry is laid out on a pair of 1.8" x 3.8" PC boards, corresponding to the receiver and transmitter sections. This is not a beginner's project. PC Boards are available as is a parts kit which includes pcboards, but no case[1]. There's still some grunt work involved in chasing down parts and selecting crystals for the receiver filter. All components are available through mail order suppliers, though there are no "Bulgarian People's Republic" parts needed here.

The design is based on Rick Littlefield, K1BQT's past work with a few modifications. I wasn't happy with the original design's AF muting characteristics, so I grafted in the W7EL popularized series FET audio switch to yield "seamless" QSK operation. In all fairness, the problem wasn't with the electrical design itself but with the dense layout. The IF amplifier stage (U2) amplifies and outputs a fair amount of BFO energy, which the product detector (U3) receives as a DC component. The resulting "thump" when the IF amp is muted is tough to overcome, hence the need for the extra circuitry. In a well isolated layout the MC1350 AGC input pin may be used very successfully to provide smooth muting.

I also added a stand-alone local oscillator at the receiver front end. While it's possible to use the NE602's built in oscillator transistor for the LO, the QSK configuration subjects the NE602 to a large input signal on transmit. The NE602's internal coupling will tend to "pull" the oscillator transistor, resulting in chirp on key-down.

The crystal filter is the heart of any superhet receiver, and building your own is surprisingly easy. I'd recommend getting 8-10 crystals (they're cheap) and building a "what-have-you" test oscillator. The four most closely grouped of the lot as monitored on a receiver or frequency counter are the ones which go into the filter. By the way, you're not restricted to a 10.0 MHz IF - if you're able to find other frequencies, by all means use them. I've seen a number of crystals offered at swapfests in the 10.1-10.3 MHz range. These were intended for CB synthesizers and are actually a better choice for IF use due to reduced spur susceptibility and freedom from WWV feedthrough. By my casual reckoning, the passband is about 800 Hz wide and only the strongest stations are audible on the other side of zero-beat. While the filter won't compete with the one in your big rig, it's more than adequate for most operating needs.

The receiver AF section is tailored to restrict the audio bandwidth to minimize hiss. The bypass cap on the output of U3 and the network between pins 1 and 5 of U4 noticeably reduce the high frequency noise (thanks to Wayne, N6KR, for the tip). The LM386 has another 20 dB of gain in reserve but

it wasn't needed for this design. Sidetone is provided by letting a portion of the received signal through to the AF amp during transmit. (The beauty of using separate oscillators for the transmit mixer and BFO stages is that sidetone takes care of itself). A 1M resistor was added across the series FET mute switch to ensure sufficient sidetone level during key-down.

The design uses 10.7 MHz IF transformers throughout, with the 7mm size saving precious board real estate. Each of the transformers is modified by snipping off the primary tap lead and one of the case leads as shown in Figure 1. Since most of the transformers will be used above their design frequency, the built in capacitors are removed from the base (an ExActo knife is the implement of choice.) The capacitor in T4 is the exception and is left intact.

The transmit mixer was taken from my recent VFO article (July 1992 QRP Quarterly). The final amplifier uses a bit of DC biasing on its base to make it easier to drive. Any of a number of transistors should work well in this application, including the 2N3553 or the 2N4407. The transmitter puts out about 1.5 watts. Due to the compact layout, a 0.5 inch diameter "hat" style heat sink is used on the PA, and the heat sink is just warm after extended transmissions.

How does this little rig work? Althought I'm not a 20M aficionado, I've had good luck ragchewing with stateside and European stations with the occasional DX QSO thrown in. Signal reports range from 589s to "QRZ?", depending on band conditions. The results have been encouraging enough to tempt me to put up a real antenna for 20M (meaning one whose pattern and gain are a matter of forethought! (Who knows? Maybe DXCC is finally possible -- I'd counted on reaching it in the year 2163 at my present rate!

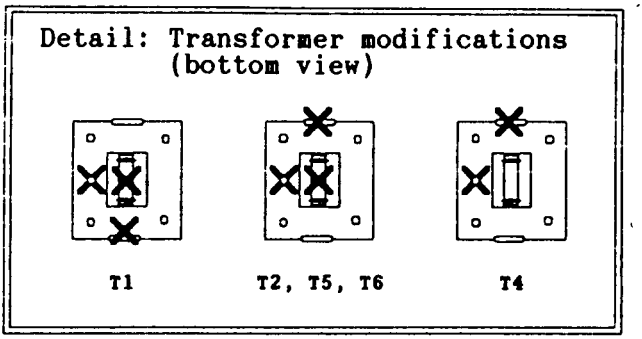


Fig. 1

PARTS LIST

C1	560 pf 110V Silver Mica
C2-4	5-35 pf Murata 6mm trim cap
L1	2.70 uH. 30 turns #30 on T-37-6 tapped at 4T
L2-4	6.7 uH. 11 turns #26 on FT37-61
L5-6	0.67 uH. 11 turns #26 on T37-2
L7	4.1 uH. 32 turns #30 on T37-2
Q1-2	MPF102 JFET
Q3	2N3906 PNP
Q4-6	2N2222 NPN Metal
Q7	2SC799
T1-2	10.7 MHz IF Xfmr, 7mm
T4-6	See Text and Figure 1
T3	9T:3T on FT37-43
T7	7T:3T on FT37-43
U1,3,7	NE602A Mixer/Osc. IC
U2	MC1350P IF Amp
U4	LM386 AF Amp
U5,6	78L08 3 terminal regulator
Y1-6	10.000 MHz HC-18/U Xtal (see text)

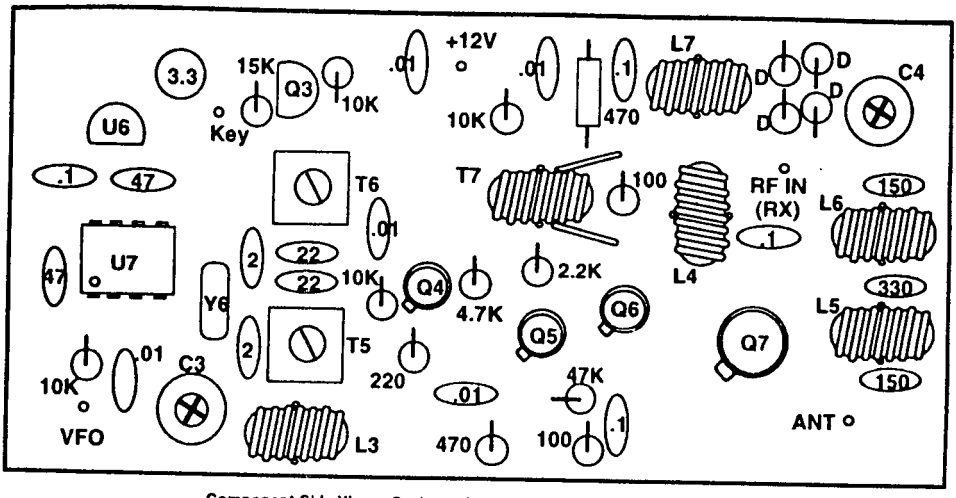
Note: 1) 0.1 uF caps are ceramic disk, Digikey P4164
2) All diodes are 1N4148 or equivalent
3) Xmitter low-pass filter caps are 10% disk

Editor's Note: This is the end of the original article as it appeared in the January issue of QRP Quarterly. I contacted Dave, who kindly provide the alignment instructions, parts overlays and pcboard layouts. Due to reduction necessary to fit our format, the pcboard layout is not to scale. By the way, Dave is member #62 of the NorCal QRP Club.

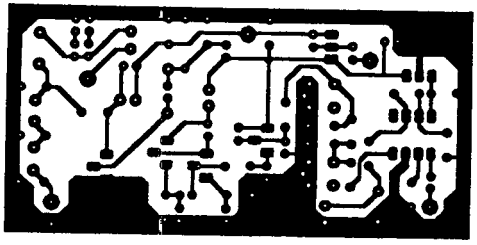
BUILDING AND ALIGNING THE NN1G 20 METER TRANSCEIVER
FROM JAN. 93 QRP QUARTERLY
By Dave Benson, NN1G

Building Tips:
1. Use sockets for the IC's. The added lead length isn't too critical at these frequencies, and troubleshooting / replacing these devices becomes much easier.
2. Check the 10.7 MHz transformers for winding continuity with an ohm meter before you solder them in. An open winding isn't that easy to track down (especially without test gear). You'd be surprised how often the parts are defective, even when new! By the way, it doesn't take much DC current to burn the windings out, so try to avoid inadvertant shorts to

The "72" Transceiver
-Transmitter Board Pictorial-



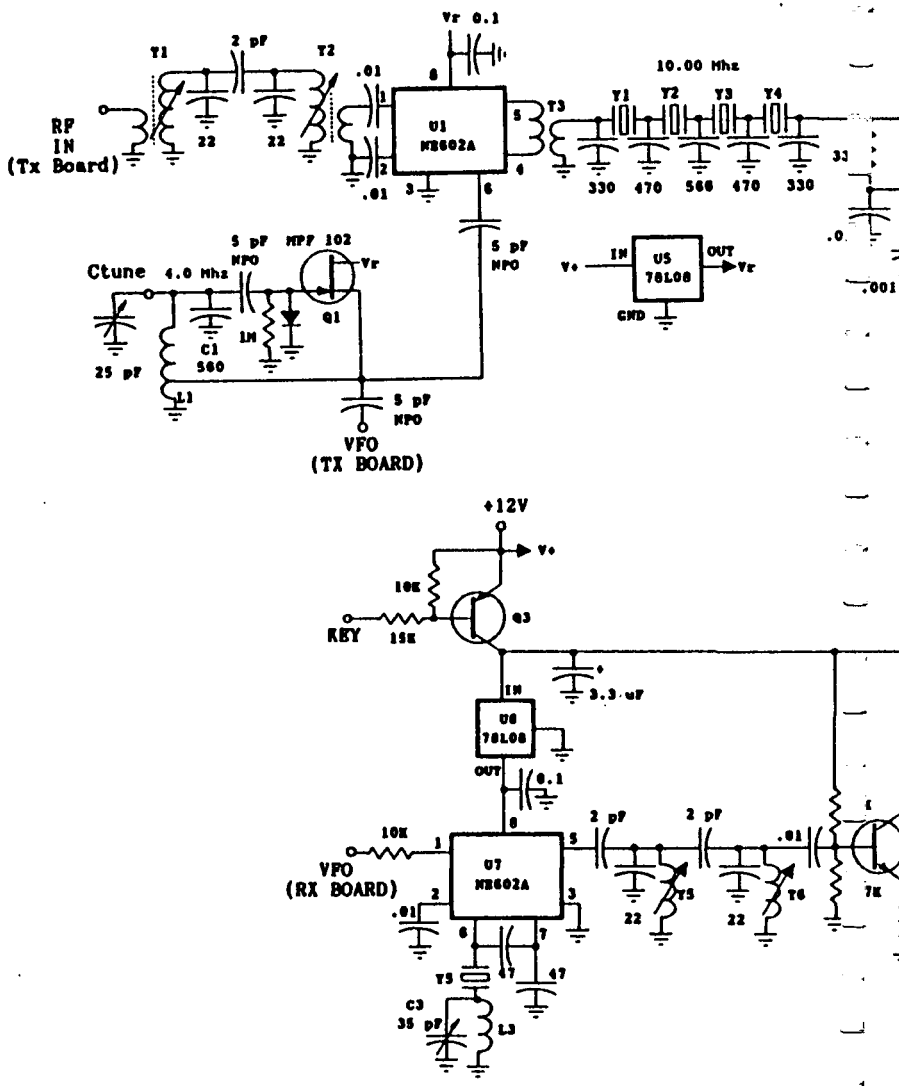
Component Side View Scale: 2 inches = 1 in. approx.



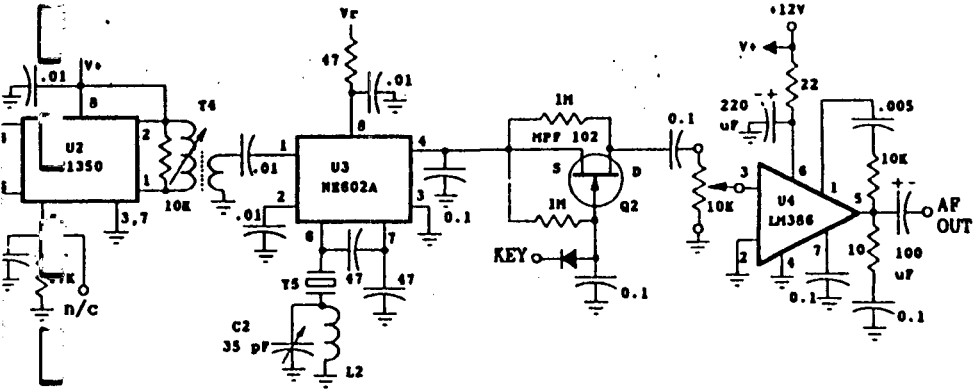
(Foil side View scale: 1:1)

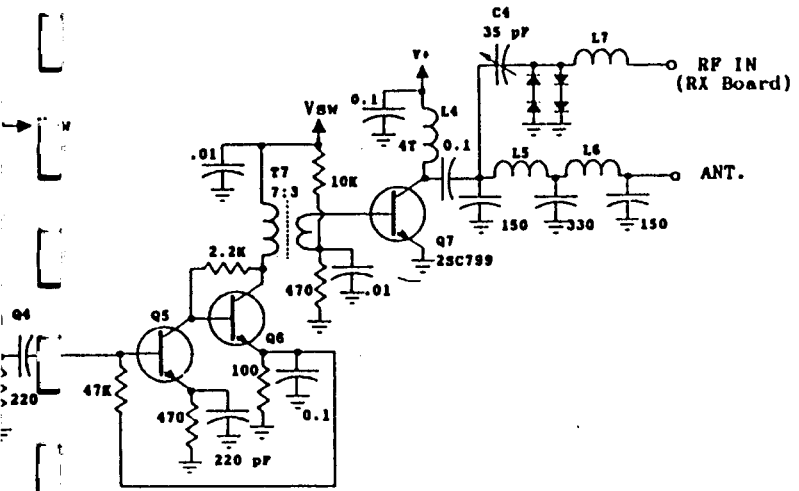
1/6/93 NN1G

A 20-meter Sup e



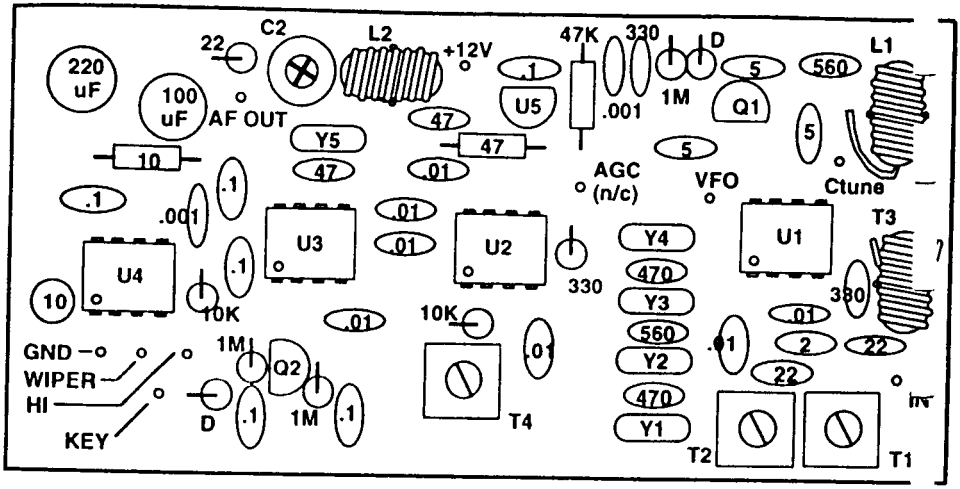
rLet transceiver





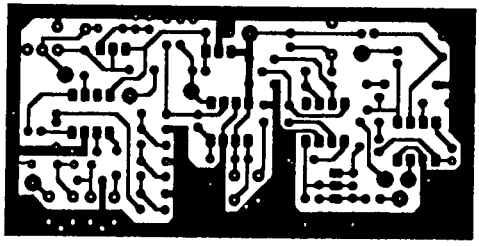
NN1G 12/14/92

The "72" Transceiver
-Receiver Board Pictorial-



notes: 1) The "RF-cold" end of L2 is actually connected to +12V to conserve layout space.
2) The 10 uF capacitor to the left of U4 is optional and may be added to boost AF gain by 20 dB.

3) Scale: 2in. = 1 in. approx, not to be used for dimensioning.



(Foil side view)

Rev. A Changes:

8/27/92- Add IF Amp (output) transformer
8/27/92- Additional ground plane area at input filter (T1,T2)
9/01/92- Add AF series switch components

Rev. B Changes.

1/05/93- Input network per schematic
1/05/93- Add tuning cap post
1/05/93- Add elec bypass cap- AF final
1/05/93- Lengthen R(agc) pad spacing

NN1G
1/6/93

power/gnd if you need to troubleshoot.
3. Transformer winding polarities are non-critical.
4. The LO inductor L1 is tricky. It installs in the receiver board as follows: With the board component side up, the coil goes in the upper right hand corner. Take the wound toroid with the tap towards U1 and the ground end on your right and the hot end on the left. Looking straight down, the ground end of the coil is on the right, the hot end on the left and the tap on the side towards U1.

Suggested Alignment Procedure:

Starting with the Receiver Board
1. Connect headphones to the RX audio output and apply 12-14 VDC power. Some background noise should be heard in the headphones.
2. Peak IF output transformer (T4) for maximum audio output.
3. Use a signal from a main station transmitter to find the receiver's operating frequency. This will be a function of the HFO frequency, which will nominally be about 4 MHz. Due to individual component variations each oscillator will be different and will need tweaking. Fine adjustments may be made by squeezing or stretching the turns of the LO's L1. If this doesn't add or subtract sufficient inductance to get the LO to the desired frequency, it's necessary to adjust the component values to bring it in. To RAISE the receiver frequency: Subtract a turn at a time from L1 and retest and tweak after each turn. To LOWER the receiver frequency: Add a small fixed capacitor in parallel with C1, the LO's main capacitor. Small ceramic disks will be OK, although the NPO variety (the kind marked with a black tip) will ensure the best frequency stability. (It's possible to add turns to L1 to accomplish the same effect, but that is a pain in the neck!) It should also be possible to add a small trimmer cap on the backside of the board (again in parallel with C1) if you want an easy variable adjustment. I haven't tried this though.
4. Open the connection between the Transmitter antenna pickoff circuit and the Receiver's RF Input (labeled "RF IN" on the schematic). Connect an antenna to the Receiver "RF IN" Point.
5. Peak T1 and T2 for maximum received signal strength. You should now be hearing 20M signals if the band is open.
6. As you tune through CW signals, the peak audio response will probably be wrong. Adjust BFO capacitor C2 until peak audio response occurs at normal CW listening frequency (about 800 Hz.). If the BFO is capable of tuning either the upper and lower, pick the one which gives better rejection of other-sideband signals. (These simple filters aren't

symmetrical with respect to their skirt selectivity.) It's possible to add or subtract turns to the BFO tuning coil L2 juciciously to change the BFO range.
7. Ground the Receiver "KEY" input to check that feature. (The transmitter Key input should be disconnected for this step.) The audio should mute smoothly and return rapidly after the connection is opened. This completes the receiver board alignment.

Transmitter Alignment:
8. Restore the "RF IN" connection between the RX and TX boards and install a dummy load on the transceiver antenna connection.
9. Ground the transceiver "key" input with a string of dots from your keyer. A sidetone should be heard in the Receiver headphones. This corresponds to a sample of your own transmitted output. Adjust the TX Mixer frequency by tuning capacitor C3 until the sidetone matches the receiver's peak audio response frequency. You should be able to tune the sidetone through zero beat. Make sure that you select the louder of the two signals to peak on. (If there isn't sufficient tuning range, see step 6 above and try the other sideband.)
10. Find the transmitted signal on a main station receiver and tune transformers T5 and T6 for peak signal (you may need to add a clip lead to Q6's collector (case) to get sufficient signal level in the early stages of this tuneup. These two adjustments are somewhat interactive so alternate between the two several times for best results.
11. Final peaking of T5 and T6 should be done with an SWR meter in the "forward" position, or with an RF probe to maximize output power.
12. Let the key up, remove the dummy load, and reconnect an antenna. Peak the receiver response by tuning the TX board C4 for maximum signal. Be sure to use an insulated tuning tool. (This is a high-Q network and body capacitance will spoil the adjustment.)
13. We're almost done! Tune in a 20M signal on both this transceiver and your main station rig (separate antennas) until both audios are at the same pitch. Key the transceiver. If it's not at the same pitch in the main station rig, adjust TX mixer C3 trimmer cap until they match. This last step ensures that the transmitted signal is exactly zero beat with other stations. (This also verifies that you didn't accidentally select the wrong sideband in step 9.
Other niceties:
14. If the sidetone volume isn't to your liking, feel free to change with the existing 1M resistance value across Q2's drain/source.

15. If transmitted power output is low, try increasing the value of capacitance at Q5's emitter cautiously. (Increase it only enough to get the rated 1.5 watts output.)

73 and QRP DX! - NN1G, Dave Benson

MXM Transceiver

by Chuck Adams, K5FO
830 Waite Dr. Copper Canyon
Lewisville, TX 75067
(downloaded from Internet)

Jeff Gold(AC4HF), famous QST author and member of this group, periodically pings me about the new MXM simple transceiver. I've gotten mine in a case and going finally. Too many trips and not enough room for equipment on the road to finish sooner. Missed qso with the famous Jim Kearman. One of these days.

The receiver section is the SuperRX plus an addition IF stage in the front end with Cohn crystal filter for 10 Mhz IF followed by 455 Khz IF, thus a dual conversion receiver. Bandwidth is about 500 cycles with the filter.

I was on 40 meters early yesterday morning. I heard VE3s until about 10 am CDT. The band was very long and signals pretty strong for this time of year. Lots of W1s and W2s on.

I had MXM rcvr and Icom 725, Yaesu FT-707, and OHR Spirit rcvrs on 40 meters. The MXM was the most sensitive. It heard signals the others did not. QRN was present as tropical depression was to the East of Texas yesterday morning and some rain showers in northern part of state. The MXM receiver has more noise than the OHR Spirit and about the same as the Icom 725, which I consider a noisy receiver with respect to background noise levels. The Yaesu FT-707 is quieter but lacks some in sensitivity relative to the MXM. The Yaesu FT-707 is a much better receiver than the Icom 725.

Pluses for MXM rcvr -

- Good sensitivity
- Good stability
- Cheap
- Good selectivity

Minuses -

- More difficult to align for the general builder, but not impossible. It just requires a little more time and effort on the part of the builder. I used the scope, frequency counter, and great care to align. But I do this with everything anyway.
- A little more background noise internally.
- No RIT, but not a severe handicap to me.

The transmitter is vfo controlled with osc for receiver and another mixer (NE602 mixer). I've got mine tuned to 500mW out into dummy load. With 2SC799 final PA, should be able to get 3 or more watts out. It has qsk without relay. A real plus to me.

Parts complement:

6 ICs - 4 NE602s, MC3340, and LM380
6 Transistors - 4 2N2222s, 2N3906, and 2SC799.
7 IF transformers

The rig has been on solid for days running off a 7AH/12V cell. Voltage dropped 0.85V total after five days. Not bad.

The receiver is quietor than I previously mentioned, probably because last Sunday I had it on the 80 mtr long wire when there was a lot of qrn in the neighborhood due to thunderboomers. At night I can hear Europe when the other receivers do not. Probably couldn't work 'em now, but should work like magic next fall and winter. I think that Bruce Williams, WA6IVC, will probably start taking orders and stuff in 30 days or so. It will be a single bander for around $100 to $110, I guess. Doesn't include case, but the board is 4.25" wide x 3.25" deep. Not too crowded, with 7 of the small IF cans, 5 crystals, 5 8-pin ICs, couple of transistors and final PA, and a couple of voltage regulators. I'd guess about 65 resistors and maybe 40 or so bypass caps. Couple of toroids for the output lowpass filter to be wound, but no problem.

I was able to put the board, variable cap, variable resistor for gain control, PL-259, power, key (RCA plug) and phone jack into one of my cases very nicely. I'll let you know how it receives on 40 meters at night during the test this weekend. That should be a true test of front end for any receiver. The case is 6.5"w x 5.5"d x 2.5"h. Plenty of room to work. I like some open spaces and elbow room.

72, Chuck Adams, K5FO - CW spoken here....70+ wpm

[Editors Note: Chuck sells the cases for $9 each, postage paid. I ordered 6 and am very satisfied. They are made out of 2 U-shaped pieces of aluminum, .050 thick. KI6DS]

Hotel Antennas

by Jim Fitton, W1FMR
P.O. Box 2226
Salem, NH 03079

Randy, AA2U had a nice hotel antenna at Dayton. We worked stations in the Pacific on it. Ask him for

details....He is on internet.

Also we used to hang a 40m delta loop from the 11 floor balcony at Dayton.... We also found a way to get up on the roof and secretely put antennas there. The delta loop coul be deployed in under an hour with 4 people working on it.

A lot of hotels have sealed rooms and no balconies. I thought of bringing a small drill and making a tiny hole to push a wire out through, under the window.

In Dublin IR, I found a way to get up on the roof of a hotel, put up a dipole (I was unsophisticated in those days but thought I was going to be shot when the militia came running through the hotel.

I recommend a Super Tee Tuner and 2 lengths of wire. 1 for the antenna and 1 for a counterpoise. You may be able to match the antenna by tuning for maximum receiver noise, and have it work well. The tuner is hi-Q and very sharp. Experiment.

For versatility, the single endfed wire antenna is probably the most flexible, compact, quickest to erect, antenna for varying and unknown situations, and this tuner, which can be built very tiny has low loss and a high matching capability. The age old caveats still apply however, The higher, in the clear, the better. A horizontal wire is better for local, and a vertical wire is better for long distance.

An antenna always works better if:

1. A piece of it comes from a previous antenna.
2. It is erected during a hurricane or snowstorm.
3. An old copper toilet tank float is put at the top of the antenna. Otherwise, Good luck.

72, Jim - W1FMR

Kent Keys

by Jeff M. Gold, AC4HF
1751 Dry Creek Rd
Cookeville, TN 38501

I received and built my 2 Kent Key kits. The first one I built was the Twin Paddle Morse Key kit. It has a real heavy steel base. The main parts are machined from brass bar. It has ball race bearing, solid silver contacts and fine pitch screw threads with instrument knurled heads that allow precision and individual adjustement on each of the two contacts and springs.

The kit comes with the main parts assembled. It was fun to put together.. and very easy. I suggest reading each sentence of the instructions a few times before acting on it. The directions are kinda backwards in my opininion..

EXAMPLE: It will tell you to mount a part with a certain size screw..after you have put on the necessary washer and

solder lug..instead of telling you to put on the solder lug, washer and then mounting the part.. no big deal.. still easy to put together.

Really pretty key... the plastic paddles can be mounted either with the pointed parts up or down.. I tried it both ways and mounted them up.. fits the way I send perfectly. The paddles work GREAT.. you can adjust them down to "breath on them" level of sensitivity. I sold my Benchers immediately after using them. They can't fly apart like Benchers.. the arms are solid.

Next I put together the Solid Brass Morse Key kit.. a BIG straight key.. Had fun putting it together. This key is tied with the nicest feeling straight keys I have ever used.. still also like my Merrick solid brass from Canada. The Kent has all brass parts on a nicely finished piece of wood that has weights that go inside it.

The Kent is really nicely weighted...precision adjustable.. haven't had time to try every possible adjustment yet.. but easily got it to the point of loving the feel. It has a big knob with the flat underpiece..I am experimenting with a different approach to sending with it...I think it is like the old telegraph style.

A great key.. only thing I don't like is they should have used a harder wood.. the wood can be indented with any pressure.. not good for really using it environment.

I feel both keys were bargains.. don't remember exactly the prices (sent them in with the order). I think the paddles were around $65 and the straight key around $75 or visa versa.

R. A. Kent Engineers
PO Box 809
Mount Ida, AR 71957-0809

Homebrew PC Boards

by Gary M. Diana, Sr. N2JGU
65 Pacer Dr.
Henrietta, NY 14467

I have purchased pc boards from FAR Circuits, and have been very impressed with their quality and service for the money. After seeing the boards Brad (WB8YGG) had built, I decided to try it myself. So far, I have etched 10 circuit boards from The QRP Notebook and QRP Classics. To do so, I used a flatbed scanner, a Macintosh with adobe photoshop, and a good laser printer. Good boards would have been hard for me to build without the above toys... luckily my place of employment has these things. [Note: you can alternately use a paper copier and overhead material in place of the scanner and

printer.

The process starts with scanning the pc artwork from a paper copy. After scanning, the image must be mirrored (flipped). The image is then printed onto a special paper (made by DynaArt). The toner serves as an etch resist. The paper is cut out to board size, then the image is ironed onto the pc board. The board/paper is then put into a container of water, and after a few minutes, the paper floats away, leaving the toner on the board. The board is now placed into the etching solution for 20-40 minutes. You now have an etched pc board. Just drill the holes and you are ready to populate the board with components.

Since the DynaArt paper is expensive ($3/8.5"x11" sheet), it is desireable to put as many pieces of artwork on the page as will fit, as opposed to just printing one piece of artwork on the entire page of paper. This is where it is handy to have a program like photoshop, which will allow easy manipulation of images. This is the main reason that I ended up making 10 boards, all at one time.

This has been yet another aspect of QRP which has enhanced my enjoyment of the hobby... making my own boards! Will I continue to buy boards from FAR and others? Surely. But I won't hesitate to make my own, either.

Another thing to consider is that FAR doesn't make boards for everyone's projects; consider the KK7B single-signal direct conversion RX-TX projects as an example. The two board set, available from Applied Radio Research, is $30. I ordered them a few months ago and still haven't received them!

72/73 and happy pc board homebrewing.

TEN-TEC SCOUT Model 555

by Kevin Purcell, N7WIM
318 10th Ave. E C7
Seattle, WA 98102

[Editor's note: Kevin submitted the following information which came from an advertising brochure distributed by TenTec. Many of you are curious about the Scout, thanks to Kevin, here is the pertinent information. As of July 18, 1993 none have been shipped that I know of. KI6DS)

Back to Basics - With Real Performance

SIMPLE: SSB or CW, just sit down and operate! Master every feature in a few minutes - no modern rig is as easy to use. Simply plug in the desired band module and work any band 160-10 meters including WARC.

SMALL: At half the size of other "small" transceivers, SCOUT makes mobile and portable operation a cinch. This

travel companion even fits in a briefcase. Try that with other HF rigs!

SELECTIVE: Revolutionary, patented "Jones" filter. A variable bandwith 8 pole crystal filter from 500 Hz to 2.5 KHz. The right filter for every band condition at the turn of a knob. No need to buy expensive accessory filters.

POWERFUL: 50 watts output is enough power to work the world, even for a new ham. And power to spare for the skilled amateur. Runs directly off 12 volts, even the cigarette lighter in your car for easy installation.

SMART: TEN-TEC's exclusive "FLS" frequency lock system keeps VFO virtually drift free regardless of temperature variations. THE "RISC" microprocessor running at 5 MIPS also manages the large digital display and built-in iambic keyer.

LOW PRICE: At $495, its closest competition is nearly twice the price. No other rig offers so much performance at so low a price.

SCOUT is "back to basics" and redefines value for the active amateur yearning for a second rig or the new ham searching for an affordable way to experience the world of HF communications. FACTORY DIRECT $495.00 Additional Band Modules: $25.00 each

SCOUT ACCESSORIES:

Model 801, 160 meter plug-in band module
Model 802, 80 meter plug-in band module
Model 803, 40 meter plug-in band module
Model 804, 30 meter plug-in band module
Model 805, 20 meter plug-in band module
Model 806, 17 meter plug-in band module
Model 807, 15 meter plug-in band module
Model 808, 12 meter plug-in band module
Model 809, 10 meter plug-in band module (28.00-29.0 MHz)
Model 937, Power Supply - Matches SCOUT, 115 VAC, 60 Hz input. 13.8 VDC, 11 amp output @ 50% duty, 7 amp continuous. DC output binding posts, Fold-back current limiting, over voltage protection.
Model 297, Noise Blanker, effective on ignition and some impulse type line noise, field installable.
Model 296, Mobile bracket mounts on top or bottom of transceiver in 4 positions.
Model 607, Weighted key paddle, single paddle style with adjustable spacing.
Model 700C, Handheld mike, electret with coiled cord and 4 pin connector.
Model 291, 200 watt antenna tuner, "T" match circuit matches variety of unbalanced antenna systems.

GENERAL SPECIFICATIONS:

MODES: CW, LSB, USB (Normal sideband for the band in use)
FREQUENCY RANGE: All ham bands 160 through 10 meters available through plug in modules. Overshoot at upper and lower edges.
DISPLAY: 4 digit to 100 hz resolution, .56" LED
FREQUENCY CONTROL: Permeability tuned oscillator (PTO) mixed with a crystal oscillator for each band.
OFFSET TUNING: +/- 1 KHz nominal - receive
FREQUENCY ACCURACY: +/- 100 HZ @ 25 deg. C
ANTENNA: 50 ohms unbalanced. POWER REQUIRED: @12-14 VDC; 600 mA receive, 10 A transmit @ 50 watts out, 4.5 A @ 5 wats out.
CONSTRUCTION: G10 epoxy glass boards, most field replaceable. Molded plastic front panel, aluminum chasis, steel top and bottom.
DIMENSIONS: HWD 2.5" x 7.25" x 9.75" - 6.4 x 18.4 x 24.8 cm
WEIGHT: 5 lbs, 3 oz - 2.4 kg

RF OUTPUT: 50 watts, ALC controlled internal adjustment to reduce power.
DC INPUT: 125 watts maximum
SELECTIVITY: "Jones" 8 pole crystal filter front panel adjustable 500 Hz to 2.4 KHZ
DYNAMIC RANGE: 85 dB @ 2.4 KHz bandwidth at 20 KHz spacing.
THIRD ORDER INTERCEPT: +1 dBm
NOISE FLOOR: -126 dBm typical
S-METER: Calibrated for 50 uV at S9
I-F FREQUENCY: 6.144 MHz
NOISE BLANKER: Optional plug-in board
AUDIO: 1 watt @ 8 ohms with less than 2% distortion
SPEAKER: 3 inch

Made in USA...America's Best! TEN-TEC 1185 Dolly Parton Parkway, Sevierville, TN 37862, U.S.A. Orders: 800-833-7373 Office: (615) 453-7172 Fax: (615) 428-4483 Repair Dept.: (615) 428-0364

Kevin Purcell N7WIM / G8UDP

Fun with Spider

Clark Savage Turner, WA3JPG
1514 Verano Pl
Irvine, CA 92715

On a lark, I ordered the little Spider (from Jan 73) and got it in less than a week. Pretty good compared to Campbell, who is making a lot of us wait for our R2 T2 boards.

Anyway, I had a spare hour around my research time so I wound the toroids and stuck the iron on....put it together in

no time. Contrary to my other experiences, all the parts were there and the radio worked fine first try.

My wife laughed at it, all alligator clipped to my antenna and key (and crystal clipped on, too), and asked if it would really work. I heard some guy signing off from a QSO, so....I called him. He came back with 579 report and we went on for about an hour at midnight on 7038. Put a little thrill back into my life, there. Simple and fun. Anyway, I have one problem that someone may understand. I bought the 10K audio taper pot for the RIT and it just isn't right. When I put my hands on the RIT wires I get just the right amount of resistance to move a Khz or so, so it seems that the circuit wants to see about 200K to 500K ohms or something, NOT 10K (it just goes off frequency and stays there). I suspect I can get a 100K audio taper pot and put a 100K resistor in line and fiddle with that, but, anyone with a Spider see this happen? I have checked the parts carefully and didn't mix up any resistors, although some of the transistors are substitutes (but used per the manual.) No big deal, though. Just wondering.

So, I heartily recommend the little thing for anyone wanting to spend $30 or so on a single board transceiver for a little fun. Now I plan to put it into a little box with battery pack and antenna tuner built in. My wife promises to get her General in the next two months - and I will try to keep in touch with her via CW when I go on my long camping expedition in the Rockies. Simple, silly....but big thrill to me still. This radio stuff is just magic.

I put my Spider on 40 (for now, easy to change) and I have xtals for 7040 (reads out at 7038) and 7110. The Smart Tone works just fine...if the xtal is pulled or the antenna gets loose (or goes haywire) the tone changes a lot. I suspect it will take some getting used to, and that I may be able to diagnose other things with it as time goes on.

I have been on the air with it 4 times now, my best DX is MI last night with 579. QSO for about an hour with W9IS - who went to High School with Herb Johnson (of Atlas Radio) so we discussed Herb's new Atlas 310 and what a funny guy he is. I also know him personally, so it was real fun. Also met N6KR, Wayne, who is sometimes here on the Internet with us, there around 7038. Was a real pleasure to meet up with him. Altogether, I haven't had this much fun since my WN3JPG Novice days. I suspect it is that more skill goes back into the operation, since the radio is so basic and simple. The only modern day piece I use right now is the Autek QF-1A on the output. I used it a couple of times to narrow the bandpass, and it is a real help, though it is no problem to copy without the filter - but the concentration (exhaustion) factor goes up a lot.

So .... my 440S sits unused ... along with my other stuff, while I have a real ball with this little naked board sitting on my table clipped to power and antenna.

OAK HILLS RESEARCH SPIRIT: A Review

By Jeff M. Gold, AC4HF
1751 Dry Creek Rd.
Cookeville, TN 38501

Here is my review (totally non-technical) of the Oak Hills Research Spirit:

Description:

Single Band kit for 80, 40,30,20,or 15
Curtis Chip keyer (8044ABM)
Superhet receiver with diode ring mixer and RF pre-amp
4 pole crystal ladder filter followed by an on board audio filter
Switchable HP AGC circuit with manual gain control
2 watts audio output
VFO with 8:1 vernier drive
Sinewave sidetone oscillator w/frequency and level controls
QSK
5 Watts output
12vDC
4" X 6 1/4" X 6 7/8" weighs 47 oz.
100% complete kit with pre-wound coils
PC boards are quality double-sided and plated through and screened.
==========

OK, that is what it says in the catalog. I opened the box and checked things out. There is a stack of stapled sheets that are the instructions. There are large part overlays, a chart showing you how to read the resistor codes, a detailed and well thought out parts list, and schematics.

This kit isn't the Heath step by step approach. The first page tells you some general things about assembling the kit and soldering and be careful type comments. The first step is to find all the parts and make sure they have been sent to you. Next you find the Receiver board and then it tells you to put in all the resistors followed by the capacitors. The next steps do go through what you need to do. As the process itself would get more unclear the directions get clearer.

After building a number of kits I find I like this approach best. I first check off all the parts and label them on a piece of paper and stick the wires through. This gives me a chance to make sure all the parts have been included,

familiarizes me with the parts and gives me a double check about putting the correct parts in the right holes on the board. I check them once while I am going through the parts check off and then again before I place them on the board. I also find that checking off the parts is my least favorite part, and when I do it this way, when I start to build I don't have to go hunting for parts. Since I have started to use this approach, my projects seem to work correctly the first time (except for putting in an audio chip backwards and smoking it.. well no one is perfect and I was able to get a replacement for $2.00 at Radio Shack). I found the way the parts were listed on the instructions made it very easy to identify them and check them off.

I found almost all steps in the final construction to be very clear and unambiguous. I do a lot of documentation at my job. I find that most instruction sets have places where the author meant one thing and the words indicate something else. The instructions for this kit were very clear.

Now for the kit. I think there were over 170 resistors in this kit. It took me quite some time and energy to sort out the parts. I found ALL the parts to be of top quality. The enclosure is excellent. I didn't see any hint of cutting corners in any piece that was included with the kit.

After building kits from about all kit manufacturers, the quality of the parts in this were the best. I have found that Ramsey uses some quality parts and some real garbage..I think Ramsey's enclosures are real ripoffs.

The board was the single item that impressed me the most. Like it says it is high quality plated through. You heat the joint and the board sucks up the solder. The result is that you will be proud to show either side of this board to anyone.. my wife comments on how her needlework is beautiful on the front side, but she won't show the back to anyone, well many of my projects are like that. With this one, I felt like displaying the board in an art show.. what a proud pop I am. The silk screening on the receiver board was ok, but certainly not great.. I found I put one piece in the wrong place because I couldn't read the part #. Well this really isn't a problem, and it was my fault. There is a clear large part overlay that makes it easy to identify parts placement.

The receiver board is jam packed with parts.. but the back of the board is layed out so that if you use a fine tipped soldering iron you really shouldn't have any problems with solder bridges. The transmitter board was a lot less dense.

The Keyer board isn't plated through and not near in quality to the other 2 boards.. be careful with this one.. I found it not nearly as much fun to solder to as the other boards.

Once I got the parts checked off and labeled, I found it very easy to assemble. The first part of the instructions tell you to put on about 200 parts in a mere 2-3 steps. Then when you put in the rest of the parts the instructions (like assembling the chassis, the final wiring and alignment) are detailed and clear. There are no checks as to whether you have built it right.. like Heath's resistance checks, when you are done, you power up and pray. I would have liked to see some power off tests.

I was real careful with this kit, but got a little too excited at the final assembly and had put one teeny weeny audio chip in backwards.. boy did I feel dumb.. and when I powered up.. the smoke came out.. it failed the smoke test (or is it passed the smoke test, but failed to work). It was very easy to spot the mistake, and since the chip was on a socket, it was a breeze to correct. I checked the resistors and other parts that fed it, and no problem at all.

If you are building the 20 meter version beware of the sections that are on the board for the other bands and not used in the 20 meter version. The directions clearly tell you about it, but I ended up putting some of them on the board anyway. The extra parts were included with the kit and the parts are labeled on the board. Dick said he was not going to include them in future version to avoid this confusion. He also said he would be separating out the parts lists for each of the boards. This will make it easier in the parts checkoff and when building.

The final alignment suggests a frequency counter. I can't ever get the frequency counter in my MFJ antenna analyzer to read such low levels, so I use my 757GX as my alignment tool. You just need to set a coil and a capacitor to set the full 100kc bandwidth for the VFO. I take a piece of copper wire, stick it in the antenna jack of my 757 and hold the loose end over the oscillator circuit. It works just fine. The rest of the alignment had some aspects I have never encountered before. You tune the pitch of your TX out signal and the sidetone pitch (I once again used the 757, put both rigs on dummy load, transmitted and set the Spirit for the same note as the 757. I figured the Yaesu people knew what they were doing and had the proper equipment when they did it). For the TX alignment I used my Oak Hills QRP wattmeter and you simply adjust a variable resistor for power level and then 2 coils for maximum output. I spoke with Dick at Oak Hills who suggest you tune it for the full 5 watts out to get the best quality TX signal. Over the weekend I took the case off a few times and tweaked various things.

A note about the keyer weighting adjustment. I started at the suggested middle position. The keyer was acting really funky... couldn't really set it right. I turned the weighting

adjustment and it is now perfect.. one of the better keyers I have used..guess that is why a lot of people use Curtis chips.

A note of caution, for one of the receiver adjustments that you peak you should be careful that you are on the right sideband. I didn't have much audio level to my speaker, when I went and re-read the instructions, it had cautioned about being on the right sideband and how you could tell if you were. I went back and re-adjusted and everything was fine.

The real question you should be asking is "how did it work." Well let me tell you that the weekend of the CQ WPX CW contest is quite some time to test out a new QRP rig. The rig puts out a full 5 watts (I turned mine back from a little over 6 watts.. may have to have a friend put the oscilloscope on it to check the signal out). The keyer works real smooth.. full break in.. but has a minor little click in it.. don't think the click is going over the air.. I have listened on another receiver. The receiver at first deceived me and I will need to do some more testing. The bands were really crowded at my QTH. The big guns were using big ammo. The rig doesn't have a narrow and wide CW filter switch. This worried me. During contests it is real nice to have a narrow filter available. I tuned around and noticed that when the receiver got a signal, you really only heard that one signal. At first I thought that this was caused by the receiver being too insensitive. After spending the entire weekend of the contest testing the rig out, I found that if I could hear them on the other rig, I could hear them on the Spirit without other station interference. I am not as of yet a person who possesses enough electronics knowledge to go in and analyze the circuit and do comparisons. I can do extensive "real-life" tests.. which from my experience sometimes have more truth than theory.

I worked over 125 stations with my 5 watts and Gap vertical during the contest. I worked two Russian stations, a S50S I think it was, an Italian, a French, Alaska, a bunch of islands, and from the West Coast to the East Coast and some other places in between. After I got the hang of it, I got many returns on my first call.. not bad for 5 watts and a vertical. I used the built in keyer, not my contest keyer and my Bencher paddles.

Other impressions: I would have left out the AGC on and off, the RF control and made the keyer an option. I use a straight key most of the time. The rig is BIG and HEAVY. A little smaller than my HW9, but not much smaller. The chassis is solid... lots of metal. I think Oak Hills can keep the best parts of this kit, get rid of the extras, and maybe add a narrow filter and a S meter. I think they are coming out with something like this in the near future. For a station QRP rig, it would be pretty hard to beat this though.. and for

portable operation it would also be excellent, a little too big for backpacking.

The rig is available from Oak Hills Research, 20879 Madison Street, Big Rapids, MI 49307. The price at the time of writing this review is $199.95.

Oak Hills Sprint:

Jeff M. Gold, AC4HF
1751 Dry Creek Rd.
Cookeville, TN 38501

Oak Hills Research
20879 Madison St.
Big Rapids, MI 49307
1-800-842-3748 (Orders)

Sprint is W7EL Optimized QRP CW Transceiver
Single band for 80,40,30
High performance DC receiver
Diode ring mixer
VFO tuning 8:1 vernier ..covers any 100KHz of band
RIT, center dtent
Peaked audio filter
Sidetone oscillator
Smooth QSK
1.5 watts
all coils prewound
12vdc
100% complete kit
$109.95

OK, that's what the catalogue says.. I am in no way connected with the company, other then sending them a great deal of my pay check.

The boards are plated thru.. the best quality I have soldered.. I am currently building a kit with good boards that aren't plated thru, and boy do I notice the difference. Apply heat and solder and the board sucks up the solder..looks great and makes a real good connection.

The directions aren't step by step. More like check the parts off and put them in. The board is silk screened and there is a very nice large parts overlay, so putting the parts in is a breeze. When you have to do more than just put resistors or capacitors in, the directions become more detailed and are very clear. With some help a beginner should be able to do this fairly easily. I like to put the lowest lying parts in first.. not the resistors and then caps as directions suggest.. this way the IC sockets sit flatter to the board.

The cabinet is very nice and all plugs and jacks are included. The rig is VERY small. It draws very little current. I have been trying to drain a 12v 4ah gel cell before vacation. I leave the receiver on from when I get home till I go to sleep and have done a lot of operating with it.. the battery didn't have a real good charge to start with.. the rig is still taken a licken and it keeps on tickin.

The receiver works nicely. This is my first Direct Conversion Receiver.. quite an experience. I have read all the down sides to them like.. you hear twice as much noise, you must tune to the correct sideband, and it is more likely to get inteference from AM stations.. all this is true. I put the rig on the air last weekend and it took a few minutes to learn how to tune quickly.. the directions clearly tell you the procedure..simply start at the "0" end of the scale and when you get the signal to the "0" side it is the correct side. While tuning around I usually tune past the signal till it is right in the middle of the wave.. the signal disappears.. then make sure by tuning up a little past and then down again to the correct side. It only takes a few seconds and it really seems to be working. I have been getting most people the first shot on about 1 watt. This last week the 30 meter band around here has been real bad. Lots of noise sounding like storms inside the rig. I have still been able to get thru the noiso and make contacts. I have had a problem with signals coming over my QSO in the middle so I couldn't hear the other person.. but they could hear me. They were on a superhet.. and only hearing one side of the wave..

I have enjoyed the rig.. it will make a nice backpacking rig.. can use my small gell cell and going to make a new top piece and radials for my portable PVC vertical for the 30 meter band this weekend and take it with me to a conference.

I have tested it against a couple of Superhets.. I still like a superhet better.. find them easier to operate and easier to carry on a longer QSO without inteference that really isn't even on your freq. This doesn't mean I don't like the Sprint... I was on it this morning and the bands were behaving a little better and I had a real nice and clear QSO with no problem.. always surprised how well the 1 watt is getting out with the way the 30 meter band has been.

Modifications to Improve the 40M QHR W7EL

Ed Pacyna, W1AAZ
72 Pitman Rd
Marblehead, MA 01945

Re: Problems w/ high power swbc stations / am detection

Cure is to put a band pass filter between the QSK circuit and the RF port on the SBL1. See appendix of Solid State

Design for design info. The second thing that will help is to be sure the SBL1 port is terminated wideband at 50 ohms and change the low pass filter between the IF port and AF amp to have an audio frequency cut-off.

Re: Problems w/ QRM

The active filter in this design is a peaked low pass with a Q of 5. It doesn't really have great skirts. I usually change the Q to 1 and than install a 7th order elliptical low pass filter (either switched capacitor or L/C passive) between here and the next AF amp. stage. The cut-off is usually around 800 Hz with a 6:60 dB shape factor of 1.4:1. Works wonders. I've also built a simple bridged twin T notch filter to eliminate the interfering image note from a near by station. However, I have found the RIT to be very useful in this matter. It only tunes one side of zero beat (the side your transmitting on) which is advantageous because if it is the audio image from a nearby station that is causing the QRM, as you adjust the frequency slightly, the image will move away in the opposite direction! With a few modifications, this is a great little rig.

73's
Ed W1AAZ

The UK QRP Scene

by Paul Turvey, G1PJJ
165b Snargate St.
Dover, Kent, United Kingdom
CT17 9BZK
+44 304 214030

The UK QRP organisation is known as the G-QRP Club. Many readers may have seen an article in the QRP-ARCI Quarterly Summer edition that described the G-QRP Club and I make no apologies for doing the same.

The G-QRP Club owes everything to Reverend George Dobbs G3RJV. Without him, the club (and the QRP scene in the UK) would never have got off the ground. The club has an active membership of 4500 and a UK membership in excess of 3500. The quarterly magazine 'Sprat' is received by each member and is very well received, sample copies are available from G3RJV QTHR, membership information in the states is available from Luke Dodds W5HKA.

The Club organizes various nets and contests, but the most pleasant aspects of the UK QRP activities are the social gatherings, a small QRP-convention in the South-West of England at Yeovil, the main convention at George's church-hall in Rochdale and a barbeque hosted by Chris G4BUE on the South

Coast. As befits low-power operators, these events are small, minute by hamfest standards, but by being so intimate they allow you to talk to everyone. The general rule is that 'All egos are to be left at the door!'. Anyone who was at the QRP forum at Dayton this year will have found the same friendly atmosphere. The Rochdale gathering is especially good fun, being the main international QRP gathering of the year on British soil with many ARCI names attending each year, along with amateurs from ten to fifteen other countries. The emphasis is completely on friendship in a QRP enviroment, amateur radio at its best.

The major movement on QRP gear is in the kits market, several companies specialise and these include several names known in the US: Kanga, Lake's, Jandek, Hands. These companies have done very well in recent years owing to the growth in the QRP market where there are so few 'majors'. The number of articles that G3RJV has had published (followed by G0BPS of Kanga) in UK magazines has helped the 'cause' tremendously. I have to declare an interest here; I have worked part-time at Hamfests with Kanga for the last four years and visited Dayton for the first time this year jointly under the G-QRP and Kanga banners.

Those with a good knowledge of UK calls will realise that my license does not permit to me operate under 30MHz. Why should I be interested in QRP? I operate on 2m and 70cm primarily and I do not have access (ie QRK) to QRO linears, my largest linear gives 30Watts. I run no more than 3 watts under most circumstances. I do not run any more power than I need to. I can do that just as effectively on 2m as 80m. Sorry, just a little rant at VHF-ers.
Enjoy QRP, and maybe I'll see you at Rochdale this October, otherwise at Dayton '94.
72, Paul Turvey G1PJJ

[Editors Note: Paul is member #44 of NorCal. We met at Dayton this past year, and he is a very nice young man. I asked him to write an article about the QRP situation in England. This is the result of that request. I am indebted to Paul, and look forward to future updates, perhaps a regular column about our friends in Europe. By the way, I have promised to buy Paul dinner at Dayton next year, so I guess that I will have to go again. One must keep his word.]

TIDBITS

by Mark Cronenwett, KA7ULD
1029 Duncan Ave.
Sunnyvale, CA 94089

This is the first time for this column. Have any ideas that you would like to share with others? Well here is the place to do just that. Send your ideas to me at the address above, by packet at KA7ULD @ N0ARY, or by E-mail to mcronenw@pyramid.com via Internet.

<> SHAFT INSULATORS FOR VARIABLE CAPACITORS

I have had some trouble finding these little insulators, and most often when I did, they were prohibitively expensive. So here is my solution. I use 1/4" i.d. plastic tubing that can be found at most hardware stores. This provides a fairly snug fit over the shaft of the capacitor. I then buy some 1/4" wood dowel to serve as my shaft. You could also use a plastic shaft, usually foun at your hobby and craft store, or locally at Tap Plastics. I then use a little dab of loctite and let dry overnite. Doug, KI6DS, also added that a fiberglass shaft (such as that used for arrows) could also be used instead of the plastic tubing.

<> KEEP YOUR KEY FROM MOVING

Larry Cronenwett, KA7WXN, has a problem of the key base moving around on the table in spite of the base being very heavy. He cut a piece from a rubber mat like used in drawers in the kitchen. I used a piece of rubber that is supposed to be used to open jars that are difficult. Othe possibilities are a piece from an old mouse pad for your computer, or neoprene from an old wetsuit.

<> SIMPLE BATTERY VOLTAGE MONITOR

From Jim, W1FMR on Internet

Low Battery Voltage ?

Radio Shack sells an analog 15 volt DC panel meter. I consists of a sensitive meter with a series resistor. Leave it
connected to the FD battery terminals using a couple of RS clip leads. I used it to monitor gell cell voltage for the Argo 509.

72, Jim - W1FMR mvjf@mvubr.att.com

<> LABELING FRONT PANELS

From: Jim Osburn on Internet

Recently I needed to make some little modules for one of our customers. I needed to label the modules quickly and neatly so I used a sheet of adhesive backed repro film. I designed my label on the computer, then I feed the repro film through the laser printer to print the label. I then cut the label to size, peeled off the sticky back, and stuck it to the module. It looked better than I anticipated. The repro film is translucent so the color of the module comes through. You might want to spray the label with clear acrylic to make it last.

The repro film is made by:

Rayven, Inc.
431 N. Griggs St.
St Paul, MN 55104
(612) 642-1112

I think we got this stuff from the local drafting supply store. I have a hunch a full box would cost an arm and a leg. I just found the stuff listed in a local office supply store catalog. A box of 100 8.5" x 11" sheets is $65.00.

73, Jim, WD9EYB

<> LIGHT BULB CONVERTS POWER SUPPLY INTO A BATTERY CHARGER

Originally appeared in March 1992 issue of QST, page 85, from Michael Covington, N4TMI

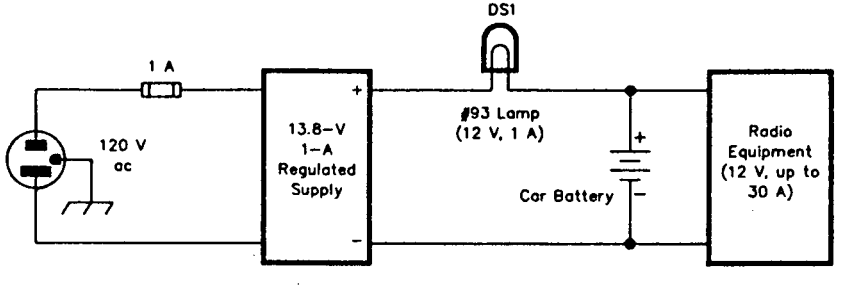
You can safely float-charge a 12-V lead-acid battery indefinitely. This keeps the battery fully charged without overcharging it. Because float-charging doesn't require nearly as much current as a 100-W MF/HF transceiver, you can power such a transceiver from a battery that's float-charged by a supply incapable of running the transceiver on its own. Wanting to avoid having to disconnect my charging supply every time I operated my rig from a battery, I needed a circuit that

would automatically ensure that the battery supplied the additional current demanded by the radio. In other words, needed a current limiter between the power supply and the battery. I spent a couple of evenings trying to design a solid-state current limiter. (The foldback limiting built into 7800-series three-terminal-regulator ICs won't do, because it actually cuts off output current. I needed a circuit capable of limiting current at a safe, constant value greater than zero!) Finally, I realized that a component with this characteristic already exists: an incandescent lamp!

The resistance of a #93 automotive bulb is 0.8 ohms cold, 7 ohms hot. As long as the current flowing through i is small, the lamp's filament exhibits very low resistance. When the current increases, the filament heats, and its increasing resistance limits the current-in m application, where the source is a regulated supply-to about 1 A. The batter recharges when the radio doesn't draw much current.

Fig A shows the simplest possible circuit, and Fig B shows the circuit that I built for the WA4BKF repeater. Tw metal-oxide varistors (MOVs, Z1 and Z2) protect the repeate from lightning-induced surges. A silicon diode (D1) keeps the power supply's bleeder resistors from discharging the battery in the event of a prolonged power outage. To compensate for the diode's 0.6-V drop, I adjust the power supply output to 14.4 V. At this voltage, two #93 bulbs in parallel (DS1 and DS2) limit the maximum current into a dea short to 2.1 A.

In normal use, the lamps do not pass enough current to light up, so they should last practically forever, (When they do light, though, you know they're doing their job!) Rather than use sockets, I soldered them in place to keep system resistance to a minimum.



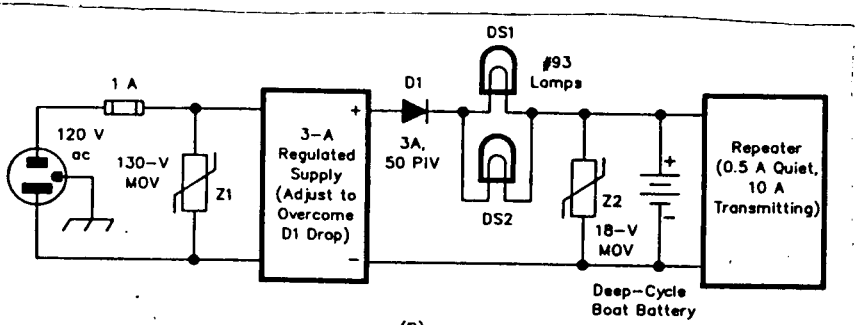
(A)

Want Ad:
QRP Parts and Kits Catalog. Send your name and address to Dan's Small Parts and Kits, 1935 S. 3rd W. #1, Missoula, MT, 59801. Phone 406-543-2872.

Wanted: All kinds of QRP related items. Kits, rigs, books, pins, etc. If it is QRP related, I am interested. Contact Jim Cates, WA6GER, 3241 Edgewood Rd., Sacramento, CA 95821

Wanted: Articles for publication to QRPp. We are interested in your experiences. Write your QRP related article and become a world famous author (at least you will get to England, as we have a couple of members over there!) Send your article to: Doug Hendricks, Editor, QRPp, 862 Frank Ave., Dos Palos, CA 93620

QRPp is published at Dos Palos, California 4 times per year, June, September, December, and March. Subscription fee is $5 per year. To subscribe send your name, call, address and $5 to: Doug Hendricks, KI6DS, 862 Frank Ave., Dos Palos, CA 93620. If you send a check or money order, make it out to Doug Hendricks. It is the policy of this journal to not accept any paid advertising, but individuals may submit want ads which will be published on a space available basis. Companies that wish to place want ads for catalogs or brochures may do so, as long as the product is QRP related. The editor will have the final say as to whether or not the ad is published. The articles in this journal have not been tested nor is there any warranty as to the feasibility of the items described in the articles. You are cautioned to use safe practices if you attempt to build any devices described in this journal.



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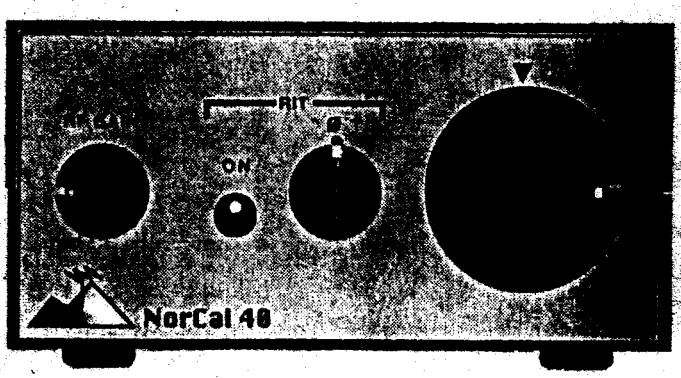
QRPp

Journal of the Northern California QRP Club
Volume I, Number 3, December 1993



The NorCal 40
By Wayne Burdick, N6KR

Table of Contents

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From the Editor's Desk

By Doug Hendricks, KI6DS
862 Frank Ave.
Dos Palos, CA 93620
KI6DS @ K6RAU.#CENCA.CA.USA.NA
dh@csustan.edu

This is issue #3 and I am very happy with the way things are going for the club. The meetings have been very well attended, and they remind me of what happens at Dayton, which was what Jim and I had in mind when the idea of a club came to mind. Our membership has exploded, far beyond our expectations, with 155 members and 125 subscribers as I write this near the first of November. The membership increase can be explained by the huge growth in popularity of QRP, and also by the appearance of the club project, the NorCal 40. Special thanks go to several of the club members who helped with the NorCal 40. First of all, Wayne Burdick, N6KR, who designed the rig by himself in 3 days! Then gave the club the rights to produce 100 kits. Talk about generous, that is above and beyond the call of duty. Jim Cates, WA6GER, did all of the work of stuffing the parts in the kits, addressing all of those packages, and hauling them over to the UPS station for shipping. Steve Cates, KC6TEV, spent several days manning the QRP booth at Livermore and Foothill, helping us sell QRP and the kits. Vic Black, AB6SO, found the "special" screws for the cases and donated them to the club. Bob Warmke, W6CYX, built the first rig from the kits, and helped us with a few bugs. To all of you, a big thank you. My job was to find the parts, and I scrounged to the best of my ability. Hopefully the members will appreciate the fact that the NorCal 40 kit was a great "buy" at $79. We were able to sell it at that price because of all the donated labor, parts scrounging, and seed money provided by Wayne, Jim, and myself. The club did make a small profit, which will be used to help finance further club projects.

This issue has some really exciting and interesting articles. The highlight to me is Wayne Burdick's explanation of the intricacies of the NorCal 40. Other technical articles include Mike Miller's Handbook Transceiver, Jim Pepper's Audio Filter, and Dave Joseph's 80 Meter Transceiver in a Film Can. The operating articles are from the Fall ARCI QSO Party. You will notice that the accounts run the gamut from the old pros to the beginners, to one that wasn't even in the contest. One of the handy things in this issue is the toroid winding chart that is reprinted from QRP Quarterly. Mike Czuhajewski is a prolific writer, and this is the most useful article that he has ever done. If you do any building at all, you will refer to it. When we were figuring out the wire lengths for the NorCal 40, we used Mike's Toroid Winding Chart. The reviews are here, with Chuck Adams, Jeff Gold, Stan Cooper, Jim Cates and Mike Siegel all doing their usual good job. Mike Herr has an excellent article on working satellites with QRP, be sure to read it. If you have any questions, check with Mike, as he is one of the World's leading authorities on working QRP satellites. Mike Furman's article on charging sealed lead acid batteries is timely, and guess what guys, Mike is still a high school junior! Mike is a great example of why our country will be in great shape in the years to come. He is a very talented young man. Don't forget to take a look at Mark Cronenwett's Bits and Pieces column. Lots of good ideas here. Thank you to all of the authors who have contributed their work. You make this all possible.

I did not think that we would be able to get to the point where we were mainly original material for a couple of years. I have this huge library of back issues of QRP magazines and journals that I was going to steal filler material from. So far, it has not been necessary. If you have an idea for an article, please let me know. We want to read about your experiences.

In fact, I would like to have at least 10 articles about the experiences of building and operating the NorCal 40 in the next issue. Write up your experiences and send them to me. The best way is in IBM format, preferably ASCII, but I can take WordPerfect files, Packet messages, Internet messages, typed articles, or even hand written ones. Send them in. I would also like to announce that Steve Cates, KC6TEV, has agreed to be the awards chairman for the club. See the announcement of the new club awards in this issues. Thank you Steve for coming on board.

What does the future hold for NorCal? That is a good question. Wayne, Jim, and I have been discussing the next club project. If you would like some input, contact Wayne Burdick, N6KR, with your ideas. We have been very successful with the first one, and it is always easier to do something the second time around, as you have the opportunity to learn from your mistakes. It looks to me like the club will probably do one major club project per year, as we do have to attend to our regular jobs and make a living so that we can afford to "play with our toys".

The monthly meetings are fast becoming one of the highlights of the month for me. I really enjoy meeting with all of the members and making new friends. If you would like to join us for a monthly meeting, NorCal QRP Club meets the first Sunday of the month at the "Califronia Burger Restaurant" located off the Santa Rita exit of I580 West of Livermore. It is located in the shopping center just South of McDonalds. The meetings usually begin at 11:00 AM and breakup about 1:30. They are very informal, with absolutely no business meeting, no formal program, just a bunch of QRPers who get together and show and tell about QRP. Join us.

One of the things that many members have asked me about is the cost of QRPp. Most of the questions are to the effect of, "How come you only charge $5?". Here is the explanation. When Jim and I first had the idea of starting NorCal on the plane ride, one of the things that we both agreed on was that we wanted to keep it simple, that we did not want any business meetings, and that we did not want any dues. QRPp was started as a free publication, which Jim and I were going to donate to the club. We did not realize at the time how popular NorCal was going to be. So, when it became obvious that we would have over 100 members, we decided to charge a subscription fee. But, we again agreed, the subscription was not to make money, just pay the costs of publication and mailing. It costs about 50 cents to print each issue, and it costs 75 cents to mail, so we decided that $5 should just about break even for 4 issues per year. One of the things that puzzles Jim and I is the amount that some of the other QRP clubs are charging for their publications. Most are $10 per year or more, and none are the size of QRPp. Wonder what they do with all of their money? We don't have that problem, and as long as we can break even, QRPp will cost the same.

Lastly, I want to say thank you to all of the members who came to Pacificon and supported me as I was the QRP Forum speaker. The convention was held in Concord at the Hilton, and I heard that attendance was over 3000 people. There were over 250 in the QRP Forum, and it was standing room only. Interest in QRP is high, and so is the interest in homebrewing. If you missed Pacificon, put it on your list for things that you must do next year. These guys have the right idea. They only charge $3 for advance tickets, and they drew a huge crowd. Great place to meet all your friends and have a good time. If there is enough interest, we may have a NorCal QRP table next year. I set up the NorCal 40 on the antennas provided for the Special Event station and boy did we draw a crowd. We could have sold 25 or 30 more kits easily, but we only had 9 left and they sold out in 10 minutes. I had a great time and want to especially thank Jeff Jones, AB6MB, for the invitation to be the guest speaker at the QRP Forum. That is about it for this time. Enjoy the issue and keep those articles coming in. 72, Doug, KI6DS

CW Trivia

By Chuck Adams, K5FO
830 Waite Drive, Copper Canyon
Lewisville, TX 75067

1. In the mid to late '50s, some CW operators got tired of sending things like
CQ CQ CQ DE KN5FJZ KN5FJZ KN5FJZ K

During that era, the phrase 'shave and a haircut - two bits' was very popular and used to end some songs. So someone came up with an idea. Instead of sending CQ... you could get on the air and just send (emulating the shave and a haircut)

dit di-di-dah-dit (not EF, but the rhythm for "shave and a haircut") then the operator would wait for

dit dit dit di-di-dah-dit

from another station, then the original operator would send

dit dit DE KN5FJZ TNX OM FER THE CALL. UR RST 589 IN WINK TX ..... and the qso would proceed. At the end of the qso,one of the stations would send, after everything is done,

dit di-di-dah-dit

the other station would end it all with a

dit dit

But, sometimes someone would want to get the last dit in and send "dit dit". This would irritate the other individual and they'd send "dit dit". I heard this go on on 40 meters for about 10 minutes, with the time between the "two bits" (maybe we should call that "two dits") getting longer and longer. At the time the FCC regulations did not allow one to initiate a QSO in this manner and started issuing citations for same.

To this date, some of us still terminate a qso with the "dit dit" as an acknowledgement that we did stay around and copied all the 'final' tranmission. A lot of people do this and may not know of the history of it all.

2. <BK> and break-in operation.

Almost everyone knows about the Q-signal QSK, when used as a question (QSK?) means "can you hear between your signal?". To me this means CW without relays. The first rig that I operated without a relay on CW was a combination of a Heath Apache and a National NC-300 receiver. I put two 1N34 diodes back-to-back across the receiver terminal and a 5W 115V bulb in series to the coax line to the antenna and the transmitter. This was in a small case to prevent TVI, since the two diodes would generate a lot of harmonic radiation when the transmitter was on. I loved it when Heathkit came out with the HW-16 xcvr with solid-state switching. You could hear signals between the dits at 40WPM.

Now days we have many QRP rigs and TenTec has some solid state rigs that do this without relays. I personally refuse to operate any CW rig with a relay in it. It just drives me crazy to hear the clatter of same.

Stations using QSK, especially traffic handlers, love it because if the other stations wants to interrupt, they can. This to ask for repeats for missed text, etc. Also a transmitting station can pause if QRM comes on frequency or you hear the other station tell someone the frequency is busy, QRL.

With BK (the break sign), you can send something and then when you want the other station to answer send <BK> and wait. This emulates voice communication in that you don't have to send call signs on both ends of the QSO. Other stations can break-in to join in the QSO also.

Thou Shall Not Covet

By Jim Cates, WA6GER
3241 Eastwood Rd.
Sacramento, CA 95821

ACT I

Thou shall not covet what? for crying out loud! Well in this case it is the OHR forty meter rig. ("OHR" is alphabetsoupese for Oak Hills Research, and, they make a dandy line of QRP kits and accessories. Oh how I wanted one of those OHR Forties. But, —— a problem. the rig covers only 7000 to 7100 KHz.

OHR, your attention please. I R a general; can't use those lower 25 KHz's. Can't very well use the upper 25 KHz's either, those hertzes being full of RTTY, AMTOR, Packet, PACTOR, Clover, and God only knows what else. And not to mention that the daytime action is between 7100 and 7150. all of which is good reason not to buy. and, if I were a tech or novice, not only would I not buy; I would resent the snub. The very idea! Omitting 7100 to 7150. Incredible!

My oh my. OHR sure has dropped the ball (kilohertz, actually) on this one; fallen out of the market tree. But, not to worry. Ol' Jim will shine the light; show the way.

So being of goodwill, I write OHR...How much I admire their product line, etc. But, please don't slam the door in the faces of techs and novices. Make that forty meter rig tune all the cw segment, from 7000 to 7150. Please, Pretty Please! Oh, thank you kind sir.

Alas, forgotten and forelorn, Jim waits, and waits and still waits for an answer from OHR. So full of goodwill, he just knew OHR would appreciate his keen market analysis, the eleteism and snub implied in those absent kilohertzes must be rectified.

ACT II - Dayton Hamfest (with editor Doug, KI6DS, 1993)

Well folks, here we are at the QRP-ARCI hospitality room, over there is Oak Hill's table, their product line on display. And someone appears to be tending it. Could it be Mr. OHR himself? Shall I go over and politely inquire as to why no reply to my letter? Or, shall I punish Mr. OHR, by ignoring him... ha ha ha, I love a secret.

Being shy and retiring (not like editor Doug), Jim took the middle course; neither approach nor snub. Ooh and Aah, but remain anonymous. Low profile, that's Jim.

ACT III - Back Home

Oh happy day! Friend sells me his OHR 40. Yum yum. Delicious. Euphoria... Warm up the counter, dust off the diddle sticks. Oh, wunnerful, wunnerful (closet Lawrence Welk fan). This old boy is gonna band spread this little jewel... 7025 to 7150. Everybody welcome here!

What's this? Gazooks and zounds! Curses! My predecessor done embedded L1 in ..... concrete? Epoxy? Whatever! Lordy, Lord' these turns ain't never gonna again. this mother's gonna stay at 7000, forever.

Oh, the agony of defeat. Shoulda swallowed me pride and ordered a kit from OHR. Could have set L1 anywhere, like 7025, spread the band up to 7150. Ok, so dial would be off, wouldn't need it anyway.

Well, what the heck, may as well diddle C2, the upper end setter upper (please forgive the esoteric terminology, but us low techs love to sling around these technical terms). Diddle diddle ..... ooh la la, counter is reading 7145. Lovely, lovely, wonder what's down at the other end? 7020? Hoo-boy! Just enough for general operating.

Ok guys, so this isn't much of a mod. I'm the mother of it, father unknown, and even

I admit this baby ain't no MC squared. In fact, I don't even remember why I started writing this. Some deep, deep moral message, I suspect. Something about goodwill being a two way street. Too bad I forgot the message, whatever it was.

Anyway, now that I have a Jim-Dandy (ha ha ha) OHR 40, I can devote full time to coveting that magnificent QRP Watt meter that OHR has on the market. Swallow your pride Jim, go ahead order one. (That was Mr. Goodwill speaking to me, my conscience). Ok, ok Mr. Goodwill, I hear you. Yes, yes, alright, but please, please can't I wait just a while, to see if a used one comes along?

Oak Hills Research 20 Meter QRP CW Transceiver Kit

By Stan Cooper, K4DRD
1390 Market St. # 2024
San Francisco, CA

Although I've enjoyed working QRP for the past twenty years using a Ten-Tec Argonaut model 505, there are occasions - vacations and business trips - when I want to take along a small HF rig, but the Argonaut is just too big and takes up too much luggage space. Early last year, with a ten day Hawaiian vacation coming up, a small ad in QST for the Oak Hills Research QRP transceiver caught my eye. The ad offered a 7.5" x 6.25" x 2.5" CW transceiver kit in either 40 Meter or 20 Meter versions for $149.95. Published specifications for the rigs are pretty impressive:

SPECIFICATIONS:

General:	
Frequency Range:	14,000 to 14,100 kHz (20 Meter Version)
	7,000 to 7,100 kHz (40 Meter Version)
Transmit Offset:	700 Hz Mode:
CW Power Requirement:	13.6 VDC (Negative Ground)
Power Consumption:	700 ma at 2.5 Watts Transmit
	60 ma Receive (no signal)
Antenna Impedance:	50 ohms
T/R Switching:	Semi-Break in
Sidetone Frequency:	700 Hz
Active Components:	7 ICs, 14 Transistors, 13 Diodes
Transmitter:	
Final Power Output:	2 - 3 Watts
Final Output Stage:	2SC1909 or 2SC2092
Receiver: Circuitry:	Single Conversion Superheterodyne,
IF:	9 MHz
Sensitivity:	.25 V
Selectivity:	+ 1 kHz @ (-6 dB)
	4 Pole Crystal Ladder IF Filter
Integral, Switchable Active Audio Filter: 1 kHz With 700 Hz Center Frequency	
RIT:	+/- 1.5 kHz
Audio Output:	500 Mw

I chose to order the twenty meter version, partly because of the DX potential on twenty and partly because of antenna restrictions. Also, my recollection of QRM from high powered broadcast transmitters on forty meters when I was a novice is still vivid in my memory.

ASSEMBLY

The kit arrived several days after I'd placed my order. After inventorying all of the parts, I began assembly. The kit is built around a single printed circuit board, and all coils are prewound. Although the instructions are not detailed "step-by-step" procedures with profuse illustrations like the old Heathkit manuals, they are adequate, and I managed to get all of the parts properly mounted and soldered to the PC board.

One complaint I have is the number of jumpers on the PC board. There are twenty six jumpers, and they are not clearly shown on the parts overlay illustration; the two ends of each jumper are labeled, but one must locate the label for one end, then look at a very "busy" drawing for the label identifying the other end. Finding the locations of each of the jumpers was very time consuming, and this task could have been made much easier had the jumpers themselves been drawn on the parts overlay illustration. By contrast, the NorCal 40 QRP transceiver has only four or five jumpers - a sure sign that Wayne Burdick, N6KR, put a lot of thought into the board layout.

Assembly took place non-stop over a Saturday afternoon and evening, and I decided to wait until Sunday morning to apply power. The checkout and alignment instructions call for the use of a voltmeter, frequency counter and an oscilloscope, so if these aren't part of your tool box, you should probably arrange to borrow them from a neighbor before attempting alignment. The VFO coil, L1, is the only coil not "doped" from the factory, and the reason for this is that the winding of L1 is compressed or expanded on the toroid core to obtain the proper VFO frequency before doping by the builder. I spent about an hour tweaking the L1 winding trying to "bring in" the VFO frequency to the required 5 MHz with the tuning capacitor plates fully meshed. I finally gave up, wrote a brief note to the folks at Oak Hills Research explaining my predicament, and shipped the unit back to the factory for check out and alignment.

The OHR people called me to let me know that after they had adjusted L1 (admittedly a tricky procedure), the rest of the alignment was uneventful. They even complimented me on my work (nice soldering, no wiring errors, etc.). The cost for their efforts was a very reasonable $28.00, including return shipping charges.

OPERATING

The rig arrived by UPS several days later, and I fired it up minutes after opening the box. I live in a twentieth story apartment, so my antenna options are pretty limited. I'm currently using a pair of "Hustler" mobile whips with 20 meter resonators, configured as a dipole. Using this antenna, I worked several states in the first few hours on the air with the OHR rig. It was (and still is) a real thrill to use this tiny rig, powered by a twelve volt gell cell, to work DX as far away as Latvia. I've found the rig very easy to use, and on-the-air reports of the signal quality have been gratifying. I'm consistently told that the signal is steady as a rock, without any sign of chirp, and - when powered with an AC supply - hum free. QSK characteristics are excellent.

Receiver audio is adequate when used with a quality eight ohm impedance headset, but I bought a Radio Shack eight ohm speaker with a 12 VDC powered eight watt internal amplifier (part number 21-541) for use with the rig, and have come to prefer the speaker.

Oak Hills Research also offers a keyer kit which may be built into the transceiver. I opted to build the keyer into a separate minibox since I wanted to use it with the Argonaut as well as the OHR rig. The keyer is built around the Curtis 8044ABM keyer chip and costs $29.95.

CONTROL LAYOUT

The OHR QRP rig controls are nicely laid out, with the vernier VFO frequency dial located in the center of the front panel. The audio volume control with On/Off switch is in the lower left corner of the front panel, and the headphone jack is mounted directly above

it in the upper left corner. The receiver incremental tuning (RIT) knob is in the lower right corner, and the audio filter "narrow/wide" switch is located in the upper right corner. The antenna connector, an SO-239 type, is located on the rear apron along with the key jack and 12 VDC power jack.

SUMMARY

The OHR QRP rig is well designed and a real ball to operate! In spite of my complaints, I believe anyone could assemble the kit and get it on the air. Although I haven't tested the unit's specifications, I have no reason to believe the manufacturer's published specifications aren't accurate. The receiver is hotter than a pistol, and the transmitted signal gets glowing reports.

My Account of the ARCI Fall QSO Party

By Mark Cronenwett, KA7ULD
1029 Duncan Ave.
Sunnyvale, CA 94089

Well let me say that this was my first contest ever. I sure didn't know what I had been missing :)) Everybody must be nuts to do this all the time :))

I woke up at 4:30 am to make LOTS of coffee. Started right on time at 0000 utc. Then it happened, from out of nowhere, someone came and took my code COPYING ability!!! WHAT HAPPENED!! All of a sudden it was all Greek. I decided ok, I will just slow down, then I can copy it. But NO, that didn't help either. After an hour of trying to make a SINGLE contact, I decide I needed more sleep.

Back on at about 0400 utc on 20 meters. Ah, now I can copy, at 3 WPM!! Managed to make a couple of contacts, then I moved up to 15 meters to do some up there. Got a few more, then everything went bezerk..... I couldn't seem to hear anybody....I then realized that my wife was yelling in my ear about some trivial matter that mortals worry about. Something about food and the fact that it was raining hard outside.

Back on the air later in the afternoon provide more insight. In an answer to one of my CQ's, I get a nice strong answer. I figure it is someone close, possibly a fellow NorCal club member. HAH!! it is a guy wanting a QSO that is in Milpitas....I live in Sunnyvale....say about 10 miles. I was nice and chatted with him for about a half hour about the contest and other stuff. I found out he was running 100 W for our nice little chat. At least I could COPY code well enough :))

All in all, I had a real fun and funny time. I made 9 contacts for about 5 hours of operating. Considering my difficulties (water in my coax perhaps :)) I had a great time. I must have changed my Super Keyer settings 5 times at least. I NEEDED that keyer. I couldn't SEND EITHER!!!!!! :))

My First CW Contest

By Warren E. Lewis, KD4YRN

Hummm...where do I start :-) Well, I was really excited about participating in my first CW contest. The night before I got the Kenwood TS-820S(More on the boat-anchor side of things

than a QRP rig :-)), MFJ TNC Keyer all set up with my exchange and CQ QRP call all ready, and my shack all organized for the Fall ARCI QSO party. I was so excited I could barely sleep. I figured this contest would be a great way for me to get my feet wet and to hopefully help improve my slow 5-7 wpm code speed. I also hoped that I could meet a few qrp mail-list regulars that may stray into the novice sub-bands during the contest. :-) The next morning, I got everything turned on and tuned up for 40 meters. Okay, now wait till 1200Z...time couldn't have moved any slower!! Ding Ding Ding the race is on!! I figure I would listen around for someone else first and give them a call. Nothing...Nada...Not a peep!! So I tune down to around 7040 to make sure I had got the starting time correct. Sure enough people where down there, calling and answering to CQ QRP TEST. Okay, I go back up to around 7110 and still nothing. So I say what the heck, why not give a few calls and see if anyone answers me. Hit the keys to make the TNC send the CQ QRP call I programmed in the night before. Well, I sent a few CQs and then I heard a weak signal coming back to me, an N2 call (Do not have log here at work and I don't remember the exact call). I then sent my information and received his after a couple of repeats, due to the weak signal and my slow code speed. Yeah!! First contest contact!! Okay QRZ QRP TEST DE KD4YRN K , wow somebody else is coming back to me, a KC4 call. Now is when the QSO party turned for the worse for me!! :-(As I was sending my information to the KC4 call I noticed all of the sudden my plate current meter stopped moving and the power meter on the SWR meter was showing ZERO on key downs!! Oh no what is wrong!!

I did everything that I know of to get the rig up and running again. I went so far as replacing all the tubes, but the electrons just were not on my side!! I was disappointed at first, but, I soon let the elation of having made my first CW contest contact cover up the disappointment. After failing to get the radio to transmit again, I decided just to listen for awhile and see if I heard any of the folks from the mailing list during the contest. I didn't hear any familiar callsigns, but I was surprised at how many folks were on 40M.

I was also glad to see that there was a good bit of contest activity in the Novice sub-bands for all us Novice and Tech+ ops. Even though my radio died and I could not transmit I learned a good deal about proper contest technique and etiquette during the QSO party. So all was not lost!! :-)

P.S. Anybody know of a good Kenwood repair shop/person? :-) :-(

Fall ARCI QSO Party

By Marty Squicciarini, NR3Z

As Chuck says, inquiring minds want to know, so here is my story about the QRP Fall contest. I had a great time. I would like to thank everyone I worked and apologize to everyone I did not hear. I'll start modifing my Argosy as soon as I build a workbench (but that's another stroy).

This was my first contest using a logging program (N6TR's) and it was great!! I finished the interface box on Thursday. The box keyed the rig and also allowed my paddles to be connected. This was a big plus.

There were several big signals out there. Looking over my log they were K8NQC, N4LH and N9ND to name a few.

I worked about 6 hours around a hectic schedule including an overnight visit by my parents, my son's soccer game, a party at friends and the Giants football game. There were several times I would go down to the radio and make a few contacts before anyone missed me.

Now for the summary.

Rig: Ten Tec Argosy
Ant: 3 elem Yagi up 35 ft / ground mounted vertical
Pwr: 1 - 5 Watts
81 Q's for 330 pts
36 SPC
Total (I think) 83,160

I've been away from QRP for awhile and it was nice to get back. As soon as the workbench is completed I'll even start to build things.

ARCI Fall QSO Party

By Peter Hardie, VE5VA

Well I don't have any war stories from the contest. Things went smoothly. Well not quite. Did anybody notice all the PACTOR etc. all over the place? Then there was the pileup on 14.062 for ST2/G4OJW. However, my scoring program (which I wrote for my Amiga) ran without a hitch, although I did have the printer backup output running just in case. I have chronic fatigue syndrome so I can't do the early mornings which loses me lots of contacts on 40 and 80, but I did squeeze a few contacts out on both bands before I went to bed at about 0400Z. Contacted some familiar calls, including Roger W5LXS and Chuck K5FO, and lots of others that ought to be familiar but my memory fails me. I need to add another feature to my program so that it remembers everybody's name for me.

Too bad ten meters didn't open up more than it did - 2 QSOs. And it would have been nice to work some EU but couldn't hear any from here.

Summary: 0.9W out to a 2-el Gem Quad at 40 feet

Band	QSO Points	SPC
80	12	3
40	78	11
20	406	35
15	385	29
10	7	2

Total 888 * 80 * 10 = 710400

I was particularly happy with the QSOs on 80 as they are my first QRP QSOs on that band. I also was really pleased to work HP1AC and PY7FNE, both 2-way QRP. Too bad the battery multiplier isn't in the rules any more. I liked it when it was a 50% bonus and wasn't too bad when it was 25% more points.

ARCI Fall Contest

By Randy Rand, AA2U
8 McDermott Pass
Denville, NJ 07834

I was pretty busy this weekend working on preparations for my upcoming QRP operation from Aruba. However, I did make a few short appearances in the contest. Saturday night I worked a long string of stations on 40m. I got most of the callers but there were a few in there

that couldn't quite make it over top of the SSB and digital mode QRM we have back here. I was really quite suprised at the level of activity. The responses to my CQ's were frequent and sometimes a small pile was generated.

On Sunday afternoon I worked a bunch of stations on 20m and a few on 15m. Notable DX contacts were HP1AC, HC1CK and ON5UP. It was nice to see some activity from the overseas QRPers. The QSO rate on 20m was pretty high for a while. It was alot of fun logging so many stations so quickly. I never did hear or work Chuck though. Did manage to work Peter, VE5VA.

I used my Argonaut II for a rig and a KT34XA on the higher bands and a 2 element 40m yagi on 40m. Pulled out a few really weak signals that wouldn't have been copiable without the gain antennas. All in all, the contest was alot of fun and I would have much rather spend Sunday morning working it than replacing crankup tower cables(Not an enjoyable exercise).

ARCI Fall QSO Party

By Chuck Adams, K5FO
830 Waite Dr.
Copper Canyon
Lewisville, TX 75067

I started at 1320Z on Saturday morning, worked two stations, then quit for about 30 minutes to fix WWV bleedthrough on NN1G/K5FO xcvr on 20 meters. The 10MHz IF is going to go within the week. :-)

I worked total of 6 hours for the weekend. Saturday afternoon saw the storms start to roll in again and we had some beauties Saturday and Sunday night, with baseball sized hail and tornado alerts. It's late in the season for violent storms, but hey, we have all this room to have these things.

Because of the storms lasting most of the nite, I missed 40 meters, my favorite band, completely. So, I wound up single band QRPp with 0.95W.

Like most of you on 20M and the other bands too, I fought two problems. The CHN (county hunters net) at 14.056 seemed to be the lower limit and 14.062 and above was all digital. Like Peter, we had all kinds of interference from them. I still have nightmares where I'm in the middle of copying a real real weak CW signal and a strong KW digital critter starts chirping right on top. :-) I tried to hold them above 14.062, but at 0.95W, I didn't have a chance. Twice the digital garbage came down to 14.055!!! Just isn't fair. Just isn't fair. Looks like I have gotta get a TNC and start taking names and publishing them in the QQ. :-) Let's see them try to get any awards. :-) :-) Joking guys, joking.....

Big names in the contest I worked: W5TTE (Ed, NM), N8CQA, N6GA (Cam, contest manager), and the previous winner in Canada VE5VA (Peter). That makes VE5VA, Peter, and I with two 2-way QRPp QSOs, one on 40 and one on 20 meters. His 0.9 and my 0.95. Both 559, but a better 559 on 20 meters.

Did anyone notice that when the band was up and down how some of the same '5W' signals were the only ones left? :-) :-)

I found that I worked CA, GA, IN, NM, WI, SD, and OH most populated QRPers. The SD stations were the strongest, guess because of the Long Wire pointed north.
The summary:

QSOs = 55

BAND	POINTS	SPC
20	244	27

Total 244 * 27 * 10 = 131,760 points OK I guess for 0.95W on single band for 6 hours.
Rig: NN1G/K5FO xcvr 20M 0.95W out to 80 meter long wire up 10 meters.

Rig: NN1G/K5FO xcvr 20M 0.95W out to 80 meter long wire up 10 meters.
Kent paddle with CMOS II keyer.
Rig battery powered on 7AH Gel Cell.

I got stopped three times for qsos by people who didn't know about the test, but were QRP. It pays to advertise. This ate up about 35 minutes of the total time, but no problem. Speaking of which, if you are going to QSL everybody and you want to include a handout on QRP awards and ARCI in an envelope, send me email and I'll send you some copies. I pay for these, not the club or anyone else. This is a freebie. I usually send out my cards in an envelope (have you seen what the USPS does to QSL cards?) and it costs no more to include two pages, printed both sides. One has award summary and QRP ARCI application. The other a schematic of the rig and parts list. If I can get in another page, and I have to weigh this, I'll throw in WAS list.

I listened for everyone, but didn't hear you through the QRM QRN and WWV. I agree, seemed to be a good turnout. I spent most of the last hour or so looking for multipliers. You keep hearing the same stations sitting on the same frequency the whole weekend. Recognized the shape of their keying after listening to them twice. :-)

We're still having rain and thunderstorms here for a few more days. Hope to catch each of you on 40Meters this winter. Good luck to Randy on his DXpedition and contest. Some people have all the fun. :-) I know the group is cheering for you all the way.

Contest Score - Zero....

By Bill Kelsey, N8ET
3521 Spring Lake Dr.
Findlay, OH 45840

I was not on the test at all this past weekend, but did listen for a few minutes - and my impression was that the activity level was high. Instead of operating I made a trip north and picked up a 51' crank-up tower, so I should be ready for the next one. The base was ordered Monday, and with any luck I'll have it up before the snow gets too deep here in Ohio. Also have the hole dug for the foundation for my 18HT vertical which should go up this weekend if Hygain gets the base for that here as promised!

So - I was not in this one - but look out for the next one!

Charging Sealed Lead Acid Type Batteries

By Mike Furman,KD6OCS
1449 Yukon Dr.
Sunnyvale, CA 94087

[Editors Note:Someone asked on internet if it was safe to use a regular car battery charger to recharge lead acid sealed batteries. This was the reply posted by Mike Furman. By the way, Mike is 17 years old, and is in high school. He is member #138.]

These are some general guidelines for charging any sealed lead acid type batteries: The usual method for charging these batteries is constant voltage with a current limit. The maximum current that the battery should ever be able to draw is C/4 (C is the capacity of the battery in amp hours). Cheap surplus 12 volt power supplies can be modified for constant voltage/current limit. Most of the time they are set up for foldback. This may work, but not as well. The battery determines its own current levels as it charges (don't let it exceed C/4 or it will vent hydrogen gas as the electrolyte boils away inside) When a battery is charged the current will be very low (C/100 or C/1000 depending on the charging rate).

For this type of charging you need to have a well regulated power supply. There are 2 charging rates: cyclic and float. A typical cyclic charging voltage is in the neighborhood of

about 2.45 volts per cell (7.35 volts for a 6 volt battery and 14.7 volts for a 12 volt). When the battery is charged the current will drop to C/100. At this charging rate, you should not leave the battery unattended. When the current gets to the lowest level, you need to remove it from the charger otherwise you may cook out the battery! After a cyclic charge you can then put the battery on a float charge for a few days to top the charge off.

Float charging: Batteries can stay on a float or standby charging rate for years without loss of capacity. The current limits are the same, but the voltage level is lower, 2.25-2.30 volts per cell. I use 13.65 V float level for all my 12V SLA batteries. The batteries can be left on the charger at this rate indefinately! If you want an emergency battery supply use this rate. When the battery is fully charged, the current will be C/1000. Some notes on shelf life and sulfation... if you charge your battery and then take it off the charger and set it on the shelf, you need to make sure to charge it again about every month on float for a few days. If you let it sit and sit forever, it may become sulfated and won't accept a charge.

Another note, if you use the battery for some time, you need to be sure not to overly discharge it. These batteries are not like NiCd batteries where you use them till they stop. Don't go lower than 12V or even 11V unless you need to! If you want to charge it, you do not need to (and should not!) fully discharge the battery.

I hope this is enough information to answer the question about using a car battery charger for charging sealed lead acid/gell cell batteries.. it depends on the capacity of the battery and the current limit of the charger. For small batteries it may be better to use a small powersupply! This information is from personal experience and also from the informational pamphlet put out by PowerSonic.

One last note about SLA batteries... the C/4 charging rate is the ABSOLUTE MAXIMUM CURRENT FOR CHARGING THE BATTERIES!!! You should probably use a C/5 level or something like that just to be safe!

Don't you hate it when you forget something important!

—Mike

QRP and the Space Age

By Mike Herr, WA6ARA
613 Rebel Road
Ridgecrest, CA 93555

I just finished a QSO with N9DD. He was runing QRP, one watt out of a HW -7 while I was runing about 3 watts from a HW-9. Indiana to California, not too bad, but then nothing to write home about, except, this QSO was thru an Amateur Radio Satellite!. Yep, that's right, an amateur radio satellite, using a HW-7. The satellite in question is RS-12. This satellite or "bird", is very unique. It appears to have been built specifically for the QRPer!, it operates in the HF portion of the spectrum, specifically it receives on 15 meters and retransmits on 10 meters, and it is very sensitive. Forget about all the tracking antenna, high gain preamps and mega-watt linear amplifiers.

The satellite that is of interest to QRP operators is RS-12. RS-12/13 was launched by the then Soviet Union as a pair of parasite satellites attached to a navigational satellite, deriving it's power and stability from the host. On board the satellite are two separate sets of linear transponders, each set of transponders has various modes of operation. Mode A takes a portion of the 2 meter band, amplifies and heterodynes it down to the 10 meter band, Mode K takes a portion of the 15 meter band and converts it to the 10 meter band. Mode T takes a portion of the 15 meter band and translates it to the 2 meter band. On RS-12/13, one set of transponders is known as RS-12, the other is RS-13. RS-13 is a backup to RS-12 and thus is silent until needed. As RS-12, mode K is the present active transponder, I'll be

refering to it for the remaining of the article. See figure 1 for actual frequency assignment of the satellite. Note that you will need at least an Advance license for the bottom frequencies and an Extra for the entire bandpass. Now there's a good reason for upgrading!

Two design features make the RS-12 bird attractive to QRP operation. First, this bird is very, very sensitive, making low power operation a snap. I typically use 2 to 5 watts on 15 meters into a dipole. When the bird is empty, I've cranked it down to 1 watt or less and still have an S 5 signal. Because of this sensitivity, omni directional antennas are used, eliminating the need for tracking. The second great feature is that the transponder's 40 KHz pass bands are split up into 10, 4 KHz wide subpass bands, each with their own AGC. Earlier satellites had a single AGC for the entire transponder band. With a single transponder AGC an inconsiderate QRO operator (boo, hiss) at one end of the pass band would cause all the signals to drop in strength as the AGC would clamp down. Some of the earlier RS series satellites would shut down all together! With the smaller subpass bands the same effect occurs, but only in a small, 4 Hz wide region. Thus the considerate QRP operator is not penalized. Here the true aspect of QRP rules: use only as much power as is necessary for communication — excessive use of power ruins it for all.

Equipment to operate on RS-12 is simple. All that is needed is a 10 meter receiver, a 15 meter transmitter (5 watts CW or 15 watts SSB) and dipole antennas. It is necessary to use two separate antennas and rigs, one receive and one transmit as this is full duplex. I use my HW-9 barefoot to a dipole for up link on 15 meters and a Argonaut 509 with a zepp for receive. The receive or downlink signal is very strong. Just about any receiver will work, for example KI6SN has used an old HRO 50 and 30 meter dipole. First, you have to know when to look for the "bird". While it is orbiting once every 120 minutes, it is in a polar orbit, passing more or less directly over the north and south poles. As the earth rotates under it, the typically mid latitude operator gets about 4 to 6 "windows" a day of use, each one about 12 to 15 minutes long. The best way to track a satellite is with a computer program. AMSAT maintains a software exchange of the various programs for just about every computer built. Any satellite nut would be more than willing to run off a month's worth of predictions for your location so you can get your feet wet. Another way is the graphical method using a polar map and tracking line. The OSCALATOR by the ARRL is excellent and works well. If you need a start, I'll be glad to run off pass information for you. Just send me your location in longitude and latitude and a SASE (with two stamps) and I'll send you a month's worth of pass information. Whether or not you can talk to a particular region or station depends upon your mutual windows. If your window and the other station window overlap during a pass, then communication is possible. This can be used to the operator's advantage. If communication is desirable to the east coast, then the west coast operator looks for moderate elevation easterly passes. Likewise, if communication is desired with Alaska, the times and passes favoring that area are concentrated on.

Once a suitable pass is identified, set your station up. Turn the rigs on about 5 minutes prior to the pass. This ensures everything is up and running because once the pass starts you are going to be busy. At the start of the expected pass, start looking for the beacon, usually the beacon at the bottom end of the pass band is easier to find. You guys with super digital displays will find that the beacon will not be exactly at the assign frequency, due to the doppler shift (more about that later). The beacon transmits telemetry information in CW, at about 20 wpm, as a series of letters and numbers. Once the beacon is found, start moving up frequency. If it's a weekend and a decent hour, you should start to hear a few signals, CW signals near the bottom while SSB toward the top. There may be a few SSB signals on that don't seem to be working the bird. They're stateside and DX operators working regular HF. They're on the bird and don't even know it! On weekdays you may be all alone. This is a good time to practice and get your feet wet. Using the frequency chart to estimate the

approximate transmit or up link frequency for a clear receive or down link frequency. Transmit a series of dits while tuning the receiver across the frequency. At this point you should hear your signal. I turn off my transmitter sidetone and use the receive signal as the sidetone. As you transmit you will notice a slight drift in frequency. No, this isn't vfo drift, it's doppler shift. Because the satellite is moving fast with respect to you, the frequency slightly changes, like a horn on a passing train changes pitch. The higher the frequency used and the higher the relative velocity, the greater the frequency change. On Mode K the doppler shift is quite low and can just about be ignored. To compensate for doppler adjust the transmit frequency only. If everyone does this, the tendency to walk across the band is reduced. If you're calling CQ, call "CQ RS". Keep the call short, about 3 times and then your call. If someone is going to answer you will hear them come to your frequency with a series of dits. If your answering a call, tune the receiver to the calling station, estimate the transmit frequency, then send a series of dits while tuning the transmit frequency until you hear it. The exchange is short and to the point, more like a contest, i.e. RST, state or city, and name. The other station will do the same. Longer QSOs are possible but usually take place over several orbits. Typical RST are 559, 569, 449. A 599 report is actually a bad report, as it is saying the station is using too much power, so give honest reports. During high solar activity, there will be considerable QSB as the signals on 15 and 10 meters is alternately pass through and bounce off the ionosphere. Usually one to three QSOs can be had during a pass, if the operator is fast and there are stations avaiable.

Another fun thing to try on RS-12 is to listen about an hour before a daylight pass. Sometimes the satellite magically appears for a brief time. The bird is actually on the other side, the signal is getting down and bouncing around until it gets to you. No telling what you will hear. Europeans have been heard on the down link working the US. This is on a combination of satellite and ionosphere propagation. Or, on a slow night try copying the beacons. The RS-12 telemetery code is a group of three letters followed by a 2 digit number. This will tell you about the health and welfare of the bird. Information on decoding the telemetry is available from AMSAT and has be printed in several Ham publications. Satelite operation is simple and fun. Worked all states is possible and challanging. So far I have 44 states confirmed. Multipule "net" type operation is fun. Once, W6SKQ, N6GA and I met on the bird and had a brief three way QSO. In fact, if there is interest, it would be fun to hold a quick QRP roundtable on the bird, say Thursday night UTC passes. RS-12 is way under populated, partialy because the typical satellite folks are moving to high frequency, longer duration birds and the misbelief of others that satellite operation is expensive and difficult. It is amazing to me that here is a super simple satellite to use and is almost always empty! A busy night is one where I work two stations! This also opens up all sorts of portable, field day, and demonstration possibilities. A simple direct conversion receiver using a VXO could be used as a 10 meter receiver with a 1 to 5 watt vxo 15 meter transmitter. The antennas would be small and simple, perfect for backpacking. Working an amateur radio satellite while treking thru the high Sierra's would be a blast! Give satellites a try, you might just get hooked, like me! I hope all you QRPers will give the bird a try.

RS 12

MODE K UP		DOWN
21.210	=	29.410
21.220	=	29.420
21.230	=	29.430
21.240	=	29.440
21.250	=	29.450

BEACONS RS 12 29.408, 29.454
NOTE - ALL FREQUENCIES IN MHz

FIGURE 1

More on the MXM Transceiver

By Chuck Adams, K5FO
830 Waite Drive
Copper Canyon
Lewisville, TX 75067

I was at the Belton Swap Meet in Belton TX on Saturday, Oct 9. Saw a PM-2 complete in box for $80 and several HW-8s, all clean. Sorry, I didn't buy any, since the last thing I need is a new rig. :-)

I do personally want to thank you guys up in the north for the cool weather. Finally the heat wave has broken. High temp today was 75 and the low forcast for tonight is in the lower 40s.

Belton is a two hour drive from Denton county. I took the NN1G 40 meter rig with me and ran it off the 7AH 12V Gel Cell. Just listened as I was rushed to get out the door early and didn't have a setup for a keyer and I did want to concentrate on the driving. The receiver worked great and enjoyed listening to many QSOs going down. Band was not doing all that well in the afternoon, with the solar flare (corona hole?) and all. Used the WD4BUM 'ham stick' for an antenna.

Here is the latest ad that came out today from MXM Industries, Rt. 1 Box 156C, Smithville, TX 78957 (512) 237-3906 and I quote from the flyer that I picked from Bruce Williams, WA6IVC, owner and designer. I am not paid by or financially connected to MXM Industries, just a satisfied customer.

Hi-Performance CW Transceiver Kit Available on Your Choice of 80-40-30-20 Meters
SIMPLE TRANSCEIVER

Double Conversion	Excellent Dynamic Range
Super-Het Receiver	Speaker Volume Audio
Dual IF Filters	True RF Monitoring
Pass Band Tuning	3-4 Watts Power Output
Double Balanced Mixers	QSK Full Break-In

The SIMPLE TRANSCEIVER is not a re-hash of an old design. It is new, inovative and outstanding. The receiver performance is the best of any kit we have tested. It rivals the sensitivity and selectivity of many of the expensive commercial transceivers. The QSK is smooth and you monitor your transmitted signal not some silly side tone. The pass band tuning feature will allow you to vary the effective filter width and the pitch of the received signal.

The transmitter features a solid 3 to 4 watts output power with no chirps or clicks. It is also SWR protected just like the big radios.

Your kit will include: PRINTED CIRCUIT BOARD, ALL BOARD MOUNTED COMPONENTS, 7:1 VERNIER DRIVE TUNING CAP, ALUMINUM CABINET. You will need to pick up a few minor parts, such as connectors of your choice, from your local supplier or Radio Shack. $129.95 and $5 S&H Limited Time Only

A 40M Transceiver from Handbook Circuits

By Mike Miller, WB6TMH @ KJ6FY.#NOCAL.CA.USA.NA
12350 Maple Glen Rd.
Glen Ellen, CA 95442
(707) 996-4157

I thought the club might like to hear the story of my first complete homebrew rig built from handbook circuits. I had always wanted to build a DC transceiver ever since my friend Ed, WA6ODR, built one from the handbook in the '70s. I started reading every article, handbook project, and the QRP Notebook.

I sent for the KK7B R2 and T2 boards and lots of parts. But the months wore on and the boards didn't come. Work was slow. I'd been promising my kids a backpacking trip before summer ended (both have their techs, Chris, KD6WUC, 9, and Laurelee, KD6WIV, 11). I needed something small but capable. I know double-balanced mixers are best, but I wanted to try the NE602. I started by making the receiver from the KH6CP rig in QST, Oct. 1989, except for 40 meters. The circuit takes advantage of the differential outputs of the NE602, and has and active low-pass audio filter, FET mute, and "plenty of headphone drive". The headphone drive was dismal. I use lightweight 'Walkman' phones. With both 32 ohm elements parallel, that's 16 ohms. So in went the LM386 for a few db of power gain.

I was amazed how well it worked, until I realized I was hearing SSB in the novice band! Even though I had a pretty clean VFO, I was hearing twenty meters! Later, at night, I heard broadcast signals rectifying in the detector. I identified them from the 39 meter band. I took out the input toroid and tried a few other coils, settling for a tiny ferrite IF can which was probably a 10.7 Mhz interstage transformer. I cut out the internal cap and added the input link. This shaped it up somewhat, and with the addition of the final low-pass and coupling networks, overloading and harmonics are no longer a problem. Even at night with the SW broadcasts in band, the receiver performs well.

When the transmitter was added, I had terrible clicks in the sidetone. These were traced to the NE602 overdriving the op-amp into saturation. This was cured by adding the diodes in the feedback of the first stage. The Hartley VFO is a variant of those published by W1FB, W7EL, KK7B, and others. I started with a fixed cap across the tank, and the tuning cap in series with a small value cap to reduce its value to a small fraction of the fixed cap for the proper tuning range. This resulted in very non-linear tuning. The circuit shown results in an almost linear dial, but accommodates my oversize tuning cap (it has a nice built in vernier). It would be very nearly linear if the series cap, and the combination of the tuning and padding caps were about equal, avoiding most of the non-linearity of the series capacitor formula. Also, I found a toroid inconvenient, so I changed to a slug tuned form for the VFO tank.

The RIT/CW offset works well. The control moves the receiver from 0 to 1300 Hz. The offset is removed for transmit. The VFO buffer amp works, but is power hungry. I'd like to try an FET or MMIC here.

I had quite a time compensating drift out of the VFO. Early versions were pretty stable without compensation, but I think the oriental NPO caps I got later weren't too good.

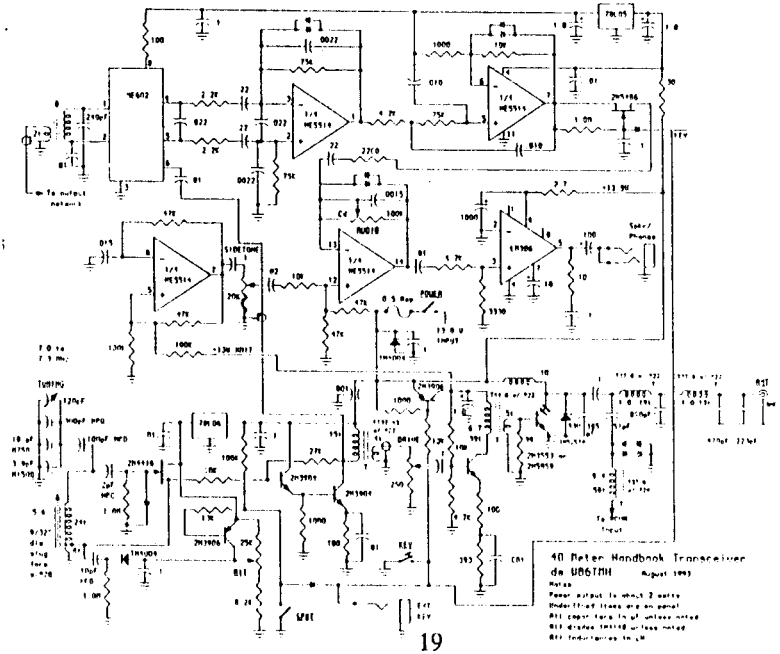
The transmitter is lifted from the W7EL 40 meter transceiver in the '92 handbook. The drive pot stays at 100%, but could be useful for QRPp work. I used a miniature choke for the final power feed, which works fine now that I made sure to keep a 0.5 Amp fuse in the line! Accidental shorts of the large 'hat' heatsink on the TO-5 cooked a choke, which later allowed the final to oscillate, popping the tranny! The 33 volt over-voltage zener gets a workout when the load disappears. I moved to a 500 mW size with good results after losing a smaller one, but it can still pop after a long 'key-down'. The final seems to readily accept other TO-5 RF transistors. The two watt output looks good on a spectrum analyzer, thanks to the output low pass filter. The additional 220 pF at the output was needed to get a good match to 50 ohms. This rig is all 'ugly' constructed on 2 un-etched PC boards and spacers, one of which also serves as the panel. Only the ICs and final transistor got sockets, mounted in holes drilled through the inside board. It all gets stuffed inside a meter box 3.75" X 6.25" X 2", requiring only headphones, antenna, and power.

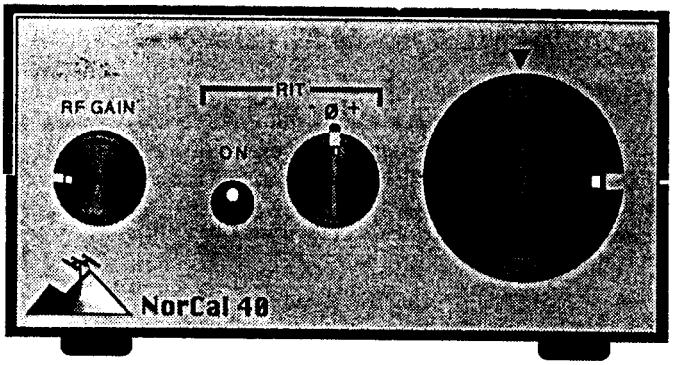
The rig has a built in key, made from PC strips. A lot of work was needed to keep the key from vibrating the VFO on the same PC. Only a minimum of shielding was practical due to lack of space and planning. PC strips and solder served as both stiffening and shielding. Tin foil was used on part of the bakelite case to eliminate hand capacitance effects on the VFO while using the built-in key. It sounds much better on an external key. I probably won't try a built-in key again with a mechanical VFO.

Many hours of work later, and with a few QSOs made from home, I made an inverted vee out of #28 wire and RG-174, packed up the packs, and we hit the trail. We set up the vee in a clearing in the bottom of a canyon, and worked skeds home, a couple of hundred miles away, with no problem.

This isn't intended as a reproducible project, but as an example of the process of building a transceiver from 'scratch'. If you are new to construction and electronics, try to closely follow one published plan using identical parts, or just stick to kits. But if you enjoy a challenge ....

Now wouldn't it be nice to set up a PLL and 68HC11 uP for a VFO and frequency display for use with the R2 and T2 that finally came. Then, that NN1G rig looks neat and easy too. And howabout the NorCal club rig? Long live home-brewing!





NorCal 40, A Club Project

By Wayne Burdick, N6KR
74 Elm St.
San Carlos, CA

Now that our first NorCal club project is just about wrapped up, it's time to pause and look back on what the heck happened. In this article, I'll try to explain that, and will provide some technical details about the NorCal 40 for those who didn't build one of the kits.

A Bit of History

On June 6, 1993, a few die-hard QRPers braved the food at a McDonald's in Pleasanton. Cold drinks in hand, they toasted the creation of the NorCal QRP Club, and then slammed their cups together in solidarity, spilling coke all over . . . Well, ok—I made that part up. But seriously, a club was born that day, the result of much effort by Doug Hendricks and Jim Cates. QRP must have been in the air that summer. A month earlier, I had begun thinking about forming such a club myself, being a veteran of the successful QRP Club of New England. I had just arrived from Massachusetts and was looking for another gang of home-brew nuts to hang out with.

So anyway, here we were at this McDonald's in Pleasanton, and inevitably the question "How about a club project?" came up. The NorCal 40 transceiver emerged from the ensuing discussion.

I had built a couple of similar rigs before, but the idea of putting it all together as an easy-to-reproduce kit was appealing to all of us. The end result is a small, 40-meter CW rig that puts out 2 watts. It has a superhet receiver with RIT, a simple AGC circuit, and a 400-Hz-wide crystal filter. The VFO operates at around 2.0 MHz, and the drift is very low. (There are many subtle differences between the NorCal 40 and other NE602-based designs; see "Unique Circuit Features.") Receive-mode current drain is extremely low at 15mA.

The physical layout of the rig is optimized for ease of assembly. All components, including the controls, connectors, and the case parts themselves are mounted on a single printed circuit board, so there is virtually no chassis wiring. The top and bottom covers come off easily, allowing the builder to work on the PC board without disconnecting any wires or removing any knobs or other hardware.

A Bit of Theory

The NorCal 40's receiver is a single-conversion superhet. U1 (see schematic, sheet 1) mixes incoming RF at 7.000MHz with a nominal 2.085MHz VFO signal to produce an I.F. (intermediate frequency) of 4.915MHz. This I.F. frequency is constant; i.e., for an RF signal of 7.100MHz, the VFO is set to 2.185MHz, and the difference frequency is still 4.915MHz. Note that the internal oscillator of U1 is not used as the VFO, because large signals at the input might pull such a VFO's operating frequency.

The 4.915MHz I.F. frequency was chosen for a couple of reasons. First, inexpensive crystals are available at this frequency. Second, it is a low enough frequency that a narrow crystal filter (X1-X4) can be constructed without special test equipment.

After passing through the crystal filter, the 4.915MHz signal is fed to the product detector, U2. The on-chip oscillator of U2 forms the BFO, using a crystal frequency about 700Hz higher than the center frequency of the crystal filter. The resulting output of U2 is a signal in the audio range. This type of receiver provides "single-signal" reception, in that a signal will only be heard on one side of a station's zero-beat (0 audio frequency). This means half as much QRM compared to a direct-conversion receiver.

The output of the product detector is kept relatively constant by Q2 and Q3, the AGC/mute transistors. Q2 and Q3 are JFETs, and their resistance increases as their gate voltages go more negative. D3 and D4 rectify the output of the audio amplifier, U3, to provide a voltage that is about 0.5 volts with no received signal, but goes as low as -3 volts when a loud signal is present.

When the transmitter is keyed, Q4 (see sheet 2 of the schematic) conducts, providing +8V from the voltage regulator, U5, to the transmit circuits. Transmit mixer U4 mixes the VFO signal with the signal from its on-chip oscillator to provide an output at the operating frequency.

Note that crystal X6 (transmit mixer) is the same type as X5 (product detector), but operates at a lower frequency due to L5. Ideally, you want X6 to operate at the center frequency of the receiver's crystal filter, so that when you transmit, your signal will be very close to that of the station you're listening to. X5 operates higher than this to provide an offset and hence an AF note of 700Hz that you can hear when transmitting.

Q5, Q6, and Q7 amplify the transmitted signal to about 0.5 to 2 watts, depending on the setting of R13. C45-C47 and L7-8 form a 5-element low-pass filter that clean up Q7's class-C output wave form. The output from Q7 is a solid 2 watts, but you can get 3.5 watts with this circuit if you substitute an MRF237. (Don't try this at home, but Bob Warmke has tweaked the circuit so much that it now puts out 5 watts.)

The receiver's RF input is obtained at the pickoff point between C44 and the lowpass filter. This signal is routed to U1 via C1 and L1 (sheet 1), which form a low-loss series-resonant circuit. When transmitting, Q1 is saturated, shunting nearly all of the transmitted signal to ground before it gets to U1, and effectively making C1 a small part of the lowpass filter.

The VFO is a fairly standard Colpitts type. D8 is a hyper-abrupt junction varactor diode, which just means that it has a wide capacitance range. R17 controls the voltage applied to D8 and hence the VFO frequency. U6 switches in RIT control R16 during receive if the RIT switch is on.

Unique Circuit Features

Receive Mixer: The usual input transformer with a 2-turn primary has been eliminated in favor of capacitive coupling (C2/C3). This allows the use of a cheap inductor (L2). Note that the rig has been optimized for fewest unique components; an example of this is that L1 and L2 have the same value. Light coupling to U1 provides good isolation from the input tank, minimum input signal into the NE602, and adequate signal strength on 40 meters.

I.F..: In case you hadn't noticed, there is no I.F. amp. It really isn't needed since the '602 has plenty of gain at 7 MHz, and because gain control has been moved to the AF channel (see below). As anyone who has used an MC1350 I.F. amp with NE602s can attest, that's more gain than you really need for a 40-meter receiver, and it adds about 15mA of current drain, not to mention 10 or so components.

Crystal Filter: The coupling to the input and output of the crystal filter is simple and effective: L-networks provide a small amount of selectivity while transforming the high impedance of the '602s down to around 400 ohms. This matching technique provides as flat a pass band as transformer coupling does, but without toroids or I.F. cans (note, again, those cheap 15uH inductors). The small loss in using the '602s single-ended isn't missed much at this I.F. frequency.

AGC/Mute: Q2 and Q3 form a balanced version of the usual AF-thump mute circuit, and double as moderate-range AGC elements. The balanced configuration is used to take advantage of the balanced input to the LM386. The gate bias network (R5/R6/D3/D4) sets the gate voltage such that, with no signal, the FETs are at about their minimum Rds of around 150 ohms. As the AF level increases, C29 acquires a negative DC voltage, pulling the gates lower and increasing Rds up to 1M ohms or more. Only a few microamps of current are required for this circuit.

You still have the usual thumps associated with AF-derived AGC; however, since the detector is working into such a high impedance, C29 can remain fairly small, and the response time is better than many such circuits. Also, there is a limit to the size of signals that Q2 and Q3 can pass without distortion—hence the RF gain control. D1 was added to keep the AGC time constant from affecting the mute time constant, and vice-versa. C29 is non polarized because the DC voltage at that point can be positive or negative. That same capacitor is then used elsewhere in the rig where a small-value electrolytic is called for—even though a polarized electrolytic would work—again in the name of minimizing unique components.

AF Amp: This LM386 circuit is similar to others, except for the arrangement of R8 and C26. Usually, you use a 20 ohm resistor and .05uF cap to ground from pin 5 to kill any high-frequency instability. There is also often a need to remove both internal LM386 noise and input noise using low-pass filter components. Here, we kill two birds with one stone by arranging R8 and C26 as a low-pass filter. C27 is quite a bit larger than C26, so not much is lost at the headphones. R8 sets both the volume level and the frequency response in this configuration, which works pretty well. For example, high-quality headphones typically have both good efficiency and good high-frequency response, so R8 will be set for around 50 ohms, which lowers the gain and removes a good deal of hiss.

TX Mixer: This is a conventional circuit, except for C32, which has the effect of reducing the harmonic content from U4 and reducing the VFO shift induced by U4 when it turns on. By the way, did you notice yet another 15uH inductor (L5)? There's also one more that we'll let you find, for a total of six!

TX Buffer/Driver: Q5's gate circuit saves one component by providing DC bias through L6 and R10 rather than using capacitive coupling and a separate 100K resistor. The value of R10 is a compromise, chosen to look like a small coupling cap at AC, and yet still isolate the gate from L6 to improve DC bias stability. Q5 and Q6 form a minimum-component source-follower/driver, and the usual emitter-bypass cap isn't needed because Q6 has plenty of gain at 7MHz.

RIT and VFO: D8 is a very high-capacitance device (50 to 150 pF). That, combined with the nonlinear resistance/rotation curve of R17/R20, and the relatively small value of C49, results in a fairly linear frequency tuning range. R16 is 10% of the size of R17, so if the VFO range is 40 kHz, the RIT range is about +/- 2 kHz. Comparator U6 drops in a fixed resistor,

R15, during transmit or when S2 is in the "OFF" position. The RIT range increases as you turn the VFO knob CCW with this arrangement. That has the beneficial effect of giving you over +/- 2.5 kHz near the bottom end of the band, useful when you want to call DX stations up or down.

Construction

This isn't really a construction article—more of a technical discussion. But if you didn't get one of the NorCal kits and would like to build one anyway, please write to Doug Hendricks for a manual reprint. The manual has a full parts list, detail drawings, and alignment instructions. (As many of you know, we sold out on the run of 100 NorCal kits in only two months. This was a surprise, since we had originally been unsure about making even 50 of them. We made a sincere effort to offer the kits to NorCal members first, so I hope everyone who was interested was able to get one. As of this writing, I am talking to some kit vendors and to the ARRL about a possible QST article, so the NorCal 40 may in fact get a new life.)

You could do your own PC board or even use "ugly" construction (let me know how it works!), but you might want to wait and see if the PC board is going to be offered by FAR circuits. I have about 6 spare boards that were trimmed incorrectly but will still work just fine—write to me if you think you might want one of these.

Performance

The NorCal 40's best characteristic is that it is quite stable: the VFO doesn't budge, and the driver and power amplifier don't oscillate, at least in my experience. Spurious output from the transmitter is -40dB or so below the fundamental. The keying is very clean, although it is a bit fast—about 1 ms rise and fall time. Some QRP theorists think this "hard" keying is an asset for a low-power signal. You can add an 0.27uF capacitor from the junction of D5 and R9 to ground to shape the keying wave form a bit.

As for the receiver, it is quite sensitive and has adequate headphone drive. The crystal filter works well, as does the RIT. The most interesting feature of the receiver is the AGC, which works fine for moderately-loud signals. It does get swamped by REALLY loud signals, but hey—that's why there's an RF gain control. The NE602 front end has all of the usual problems associated with that device, but the simplicity, low current drain, and low drive requirements make it a good tradeoff in a rig like this.

I have heard the phrase "fun to operate" or thereabouts from a number of people. To me, that's the best indication of the rig's performance!

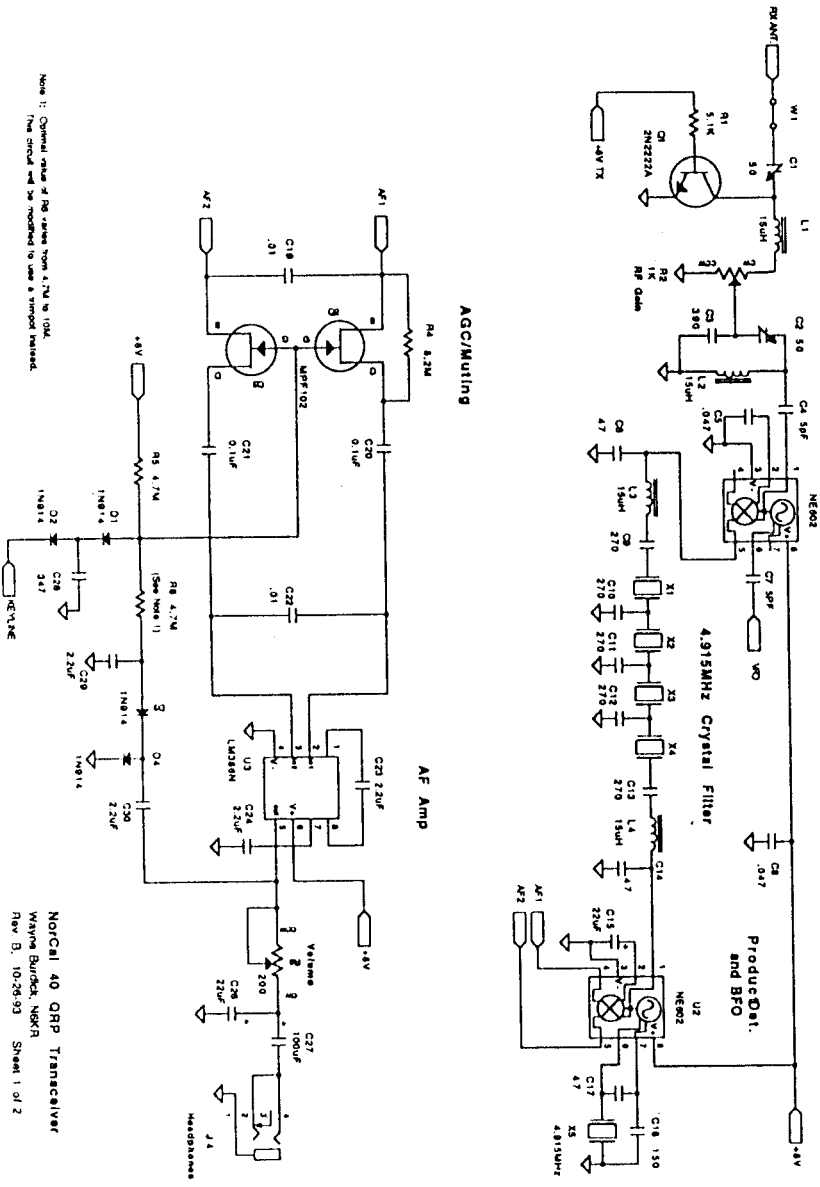
Conclusions

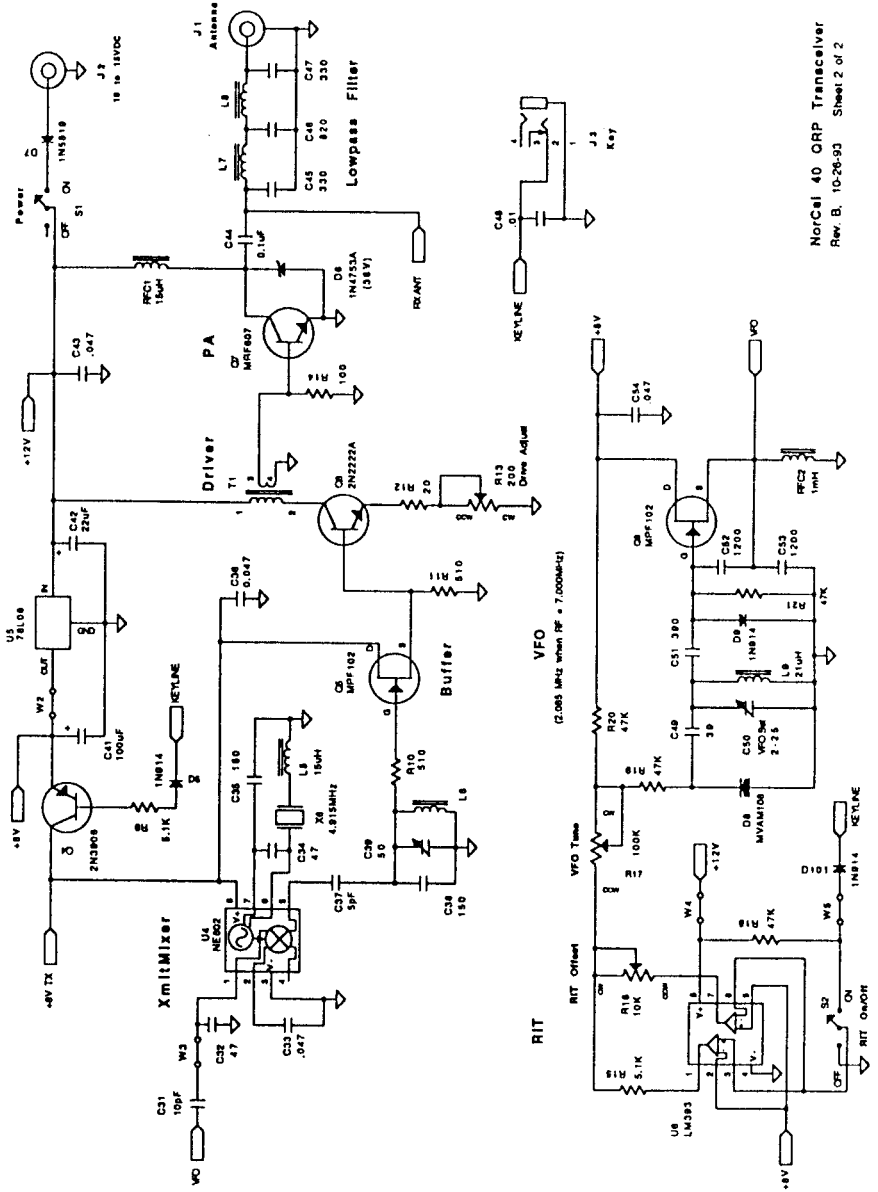
I think it is safe to say that the NorCal 40 has aided the rapid growth of NorCal, bringing people and ideas together in the process. For that reason alone I would say the project is a success. As it turns out, the project has also been successful as a kit, with most builders able to get their rigs working right out of the box. We had a couple of close calls (notably, an AGC problem due to a batch of MPF102's with unexpected cut-off parameters), but overall, the little critter does its job.

This was a big project for a small club, and would have been impossible without some extraordinary individual effort. I would especially like to thank:

- Doug Hendricks, for his never-ending pursuit of cheap parts; for reviewing and printing the manual; for a zillion trips between Dos Palos, San Carlos, and Sacramento; and for general moral support;
- Jim Cates (thank God he's retired!), for organizing a full production line and delivering all 100 kits, and (I predict) deftly handling requests for information and spare parts;
- Bob Warmke, for indispensable feedback on the first production unit, not to mention his tireless investigation of performance-enhancing modifications.

This was and continues to be a club project. On to the next challenge!


Rcv Bandpass Filter
Rcv Mixer
4.915MHz Crystal Filter
Product Det. and BFO
AGC/Muting
AF Amp
NorCal 40 QRP Transceiver
Wayne Burdick, N6KR
Rev B, 10-26-93
Sheet 1 of 2


NorCal 40 QRP Transceiver
Rev. B. 10-26-93 Sheet 2 of 2
Lowpass Filter
PA
Driver
Buffer
XmitMixer
VFO
RIT
Power
Key
Antenna
Draw Adjust
VFO Tune
RIT Offset
RIT On/Off
KEYLINE
+8V
+12V
+8V TX
VFO
RFOUT

Putting The NN1G on 40 Meters

By Chuck Adams, K5FO
830 Waite Dr., Copper Canyon
Lewisville, TX 75067

I bought two kits from Dan's Small Parts and Kits, 1935 S. 3rd W. #1, Missoula, MT 59801 phone/fax 1-406-543-2872. I do not own or am in any way associated with Danny Stevig's company. Just another satisfied customer. The kit sells for $49.95 and $3.75 for S&H. It includes all you need for the two boards and an air variable. It does not have the case, connectors, but it does have the variable resistor. So, you'll need to find connectors for ant, key, power, and phones. Also you'll need some kind of dial indicator. I want to thank Ed (W1AAZ) for his very nice idea yesterday using the fender washer, whatever that is. :-) I know physically what it is, but I assume from the name that it is used as a backing support for thin walled metal sheets for holding and supporting items attached with nut and bolts. (The idea is to take a fender washer with a 3/8" hole and put a grommet in it. Paint the fender washer, put a line on it, and slip it over the shaft.)

The second NN1G kit took me longer, not to build, but a wait for a FT-37-61 toroid that is needed for the 40 meter mod. I got the toroid yesterday in the mail (the USPS is really slow sometimes) and installed it last night after working on another NN1G kit that someone else built. Got it going first (sacrifice) then worked on mine. Installed the toroid after putting on 13T. The rig worked the first time. In fact, I started the IF transformers at the same places I had the 20 meter version. The transmitter was exactly right. The receiver required only minor tweeking.

To build the NN1G for 40 meters you need to make the following changes.

1. Leave the internal capacitors on T1 and T2 intact. Do Not take them out!
2. Replace the 2 pF capacitor between T1 & T2 with a 5 pF.
3. Replace the 22 pF capacitors between T1 & T2 with 47 pF capacitors.
4. Change the windings of L1 to 36 turns of #30 on a T37-2 toroid tapped 4 turns from the ground end. It will have an inductance of 5.1 uH and the vfo will tune nominally at 2.96 MHz.
5. Leave the internal capacitors intact on T5 & T6.
6. Change the 2 pF capacitors in series with T5 & T6 to 5pF.
7. Change the 22 pF capacitors in parallel with T5 & T6 to 47 pF.
8. Change T7 to 10T:4T of #26.
9. Change L4 to 6T #26.
10. Change L5 & L6 to 18T #26.
11. Change the 150 pF capacitors in the filter near L5 & L6 to 330 pF.
12. Change the 330 pF capacitor in the filer near L5 & L6 to 680 pF.
13. Change C4 to a 70 pF trimmer.
14. L7 is changed to 13 T #30 on FT37-61

It works great! Was listening to Europe, F5IN was very strong for about an hour around 0500Z to 0600Z. I couldn't work him, since I had not aligned the transmitter offset to the receiver at the time. Now I have everything aligned, I will start exercising the rig on the air. I was checking the receiver out anyway at the time.

Here is what I did to check out the receiver. I put a PL-259 "T" on the back of the Yaesu FT-707 transceiver (do not try this at home boys and girls unless you are fully awake - as

you will have two transmitters wired to the antenna and to each other!!). Don't worry, I unplugged the CK-2 keyer from the rigs just in case. :-) I have had the Yaesu 707 for many years. I consider it to have one of the better receivers around. The QST review article has a noise floor figure of -126dBm.

So now I have two receivers on the same antenna on the same band at the same time. Starting at 7.000MHz and going to 7.075MHz (oh, forgot - I replaced the air cap with one I got from OHR, since the one provided with the NN1G kit only covers 40KHz or so on 40M), I slowly tuned each receiver to each signal heard. I could hear the same signals on both receivers and the NN1G receiver is slightly weaker, but not enough to worry about, since with only 1W out I doubt that every weak signal could near me anyway. I'm doing an article on The Principal of Reciprocity and what it means to hams.

The NN1G receiver is noisier and I think a low pass audio filter would help a great deal. I'll try to breadboard one up this weekend and see if it helps significantly. It seems to have plenty of power in the LM386 to drive the earphones (Yaesu FT-77) louder than I want into my ears.

In summary, for $49.95, a good kit and I think you should have a little experience before doing this kit. There are no detailed instructions and there are some tricks that will help you a lot if you know ahead of time about construction. I may buy one more for 30M. :-) It's not that I don't have any rigs, it is my relief from stress. At least that is what I tell my wife. :-)

By the way, the OHR cap is another $9 plus shipping. But if you don't mind the narrower band tuning with the original, there is nothing wrong with it.

Ok, hopefully I am through with major construction projects for a few months and now plan to exercise 40M like crazy during the winter months. Starting Oct 1, I will schedule anyone that wants a schedule to try out 40M. Mondays nites will have to be late (after 10PM Texas time), but other nights should be OK. Weekends are dependent upon the scheduling of my social committee. :-)

73 es enjoy your rig and hopefully I'll hear you on the air
de k5fo/qrp dit dit

Wrinkle Paint Finish

By Chuck Adams, K5FO
830 Waite Dr.
Copper Canyon
Lewisville, TX 75067

Got a call from Doug Hendricks last nite. He was bragging about how the paint job on a new rig turned out. Since I taught him how to do it, I will share with you. Here is the technique for a fine looking black wrinkle finish.

1. Start with a clean surface. For aluminum I use Cameo Aluminum and Steel Cleaning compound that is like Comet, except that it is white instead of green. I use a plastic flat pad to rub it lightly over the entire surface while wet. Rinse with water and then dry with paper towel. After this, try not to touch the surface, as finger prints, body oils, etc. don't mix with paint.
2. Go to your favorite autosupply store and ask for AVT Blank Wrinkle Spray Paint. Follow the instructions on the can and you'll have a very nice wrinkle finish. It takes three light coats spaced at 5 minutes or so. Take all the usual precautions for fumes, overspray (don't spray in an enclosed area containing anything that you don't want paint on) :-), You don't have to bake, which is something that my wife appreciates and everyone else in your household will appreciate it too.

I stumbled onto this paint by accident, when my favorite electronic stores didn't carry wrinkle paint. Seems like a lost art going away at a rapid rate. This during the refurb of a Brown Bros. Paddle. It now looks brand new and like it came off the assembly line yesterday, but Brown Bros. folded up some time ago.

Something that I haven't tried, but I guess you could prime over this paint and then use your favorite color on top. For the other parts of the case, I use Krylon Primer and Krylon Semi-Gloss White. I bought the photocopy material to make front panels, but like so many projects, that one is on hold for another week or so (let's see now, 8 weeks and counting — —).

From the flood plains of Texas..... dit dit

p.s. For five nites in a row I've had electrical storms and I'm tired of it. Getting stuff built and paperwork caught up, but no operating.

Making Homebrew PC Boards

By Mont Pierce, KM6WT
32412 Lake Ree St.
Fremont, CA 94555

I did a little expermenting of my own a couple of weeks ago. I previously bought some of the special paper to photocopy onto and then transfer the print to a pcb board. Then later I heard someone say that they've done it with plain copier paper. They said they used plain copy paper, an iron to transfer the print, and water to desolve and separate the paper from the pcb. Here's my results with plain paper.

I took three photocopies of a template and placed them side by side on a pcb. Then I place another sheet of paper on top of this and I heated it for a couple of minutes with an iron (wife's old one). Next I remove the iron and the second sheet of paper and accidentally caught the edge of one of the templates. The print on the pcb looked pretty good so I just continued removing the one template. I soaked the board to try to remove the paper from the other templates. It wasn't too easy and I still had some fuzz that I couldn't seem to get off. Also, in some places the print stuck more to the paper then the pcb, I had to patch them up with a resist pen.

Next I etched the board. The template that I peeled off while the black print was still hot turned out great. The others didn't work to good. The fuzz left behind from the paper interfered with the flow of etching and left copper between some of the traces.

I next took a copy of the Spider-1 template and ironed it onto a pcb, and peeled it off while the print was hot. Same thing, the print came out really nice and the board etched really well. There's only one problem with these boards, they are all backwards. I knew this when I started, I just figured on soldering all the parts to the surface, that way I don't have to drill any holes...

To do this right I need to add another step to the process. Somehow I need to get a mirrored copy of the template so that when it is ironed on it will be correct on the pcb.

Okay, so here is the final proceedure that I came up with to make pcbs from plain paper:

1. Make a transparency film copy (used for overhead projectors) of template using either the "Plain paper copier Transparency film" or the machine that uses heat to transfer a photocopy print onto a transparency film.
2. Turn the tranparency upside down in the copier and make a photocopy of this image. Now the print is reversed on the paper.
3. Place one or more template copies on the pcb where you want the images to be transfered.
4. Place a second piece of paper over the templates. This helps hold them in place while

you iron them.
5. Take a hot iron and place it on top of the second piece of paper. Apply medium pressure and move the iron around the paper is circular patterns to insure that the pcb and templates are evenly heated. Do this for about 2-3 minutes.
6. Remove the iron and immediately but gently pull the templates off the pcb board. You should now have a nice mirrored print on the pcb of the template.
7. Let the pcb cool undisturbed.
You must use a Lazer type photocopier. The lazer photocopying process uses a toner that is bonded (melted) onto the paper. It's sort of like a plastic and not like ink that soaks into the paper.
I turned the iron on to it's highest setting and heated the paper until the second sheet starts to turn brown (light brown!). You want the toner to be sort of liquidy so that when you peel off the template there is no resistance. If it starts to cool then it may cling to the paper more then the PCB.
If it doesn't come out perfectly you can even take another copy and iron it on right on top of the first one. Just make sure you line it up exactly the same as the first one.
If you are in a hurry, just take it to the sink and run cold water on it for 30 seconds or so. Water will not disturb the toner.
Another thing I forgot to mention, but probably it's obvious: After etching the board you can use steel wool under running water to remove the toner from the copper.

I've been buying double sided scraped pieces at an electronics surplus supply store for 1 cent per square inch. They have ends 3 feet long by 4 or 5 inches, and lots of smaller stuff too. A 24" x 6" piece would cost $1.44. Before using with the iron-on process I use comet cleanser to cleanup the board.

The Magical Audio Filter

By Jim Pepper, W6QIF
44 El Camino Moraga
Orinda, CA 94563

[This article was originally printed in 73 magazine, November 1983 issue. Permission to reprint the original part of the artical was granted by 73. KI6DS, Editor.]

Audio filtering is a well known process for improving receiver selectivity and many articles have been written on the subject. Because I have been in the process of building a direct conversion receiver, I have been most interested in the subject. However, in order to further improve the receiver, I wanted more than the usual passband type of filter. Since one of the receiver modes is CW, I wanted a notch filter with a variable frequency and a variable frequency peaking circuit. The notch filter could also be used on SSB reception to reject heterodynes from AM stations. Some of the requirements that I wanted for the notch filter were:

1. A high Q (so the bandwidth at the 3-dB point of the notch frequency was approximately 200 Hz with a rejection of greater than 20 dB).
2. The capability of shifting the notch frequency from 500 to 3 KHz.
3. A minimum number of parts.

The Frequency Notching Circuit Most articles I'd seen on this subject showed at least three or four operational amplifiers plus a multitude of resistors and capacitors and therefore did not satisfy my third requirement. One day, I accidentally ran across a number of circuits in a National Semiconductor Linear Applications Manual.1 The circuit that interested me the most was the one providing variable frequency notching using a variable capacitor. This circuit was constructed on a proto board and performed quite well, but the frequency range was limited by the capacitor. The basic circuit is shown in Fig. 1. The major drawback of this circuit was

the large physical size of the capacitor as compared with the rest of the circuit. Looking at the formula for the notch frequency (Fig. 1), one can see that the frequency is a function of R4, C1, and C2. The frequency varies directly as R4 and by the square root of C1 and C2. Thus, if the resistor is doubled in value, the frequency doubles. Doubling the capacitors only gives 1.4 times the change. I decided to build the circuit with R4 variable and again results were very good. The frequency range requirements were met and the rejection was greater than 20 dB. It did have one problem that was also experienced with the variable capacitor circuit. In order to achieve maxiumum rejection at the high end vs. the low end, R3 had to be varied. Experimenting further, I found that if R5 were varied and R3 and R4 were properly chose, only one control was necessary. Almost equal rejection could then be achieved across the whole range. A typical response is shown in Fig. 2.

The Peaking Circuit Since the above circuit was rather novel (there is no signal inversion from input to output at theoff null point), I started to look at voltages at various points with an oscilloscope. To my amazement, I found that when the output was going to null on IC1, the output was peaking on IC2. Eureka! Here was the second circuit I was looking for. To accomplish peaking only IC2 was needed. This circuit was constructed and the results are shown in Fig. 3. Rin is necessary to prevent saturation of the amplifier. The gain of this stage is about 10, therefore the input must be less than 0.5 volts. The power supply used was plus and minus 8 volts to be equivalent to the supply to be used in the final construction.

Since the original article appeared in 1983, the circuit has been modified and now is shown in figure 4. An LM386 was substituted for the LM380 which was prone to self oscillate. A few component values were also changed to improve its operation such as changing the null pot to an audio taper from a linear taper to give a more linear position for nulling. If wired as shown, the pot should be left in the full clock position unless needed. It is very sharp and requires some learning to properly adjust for a null. With the peaking circuit in (SW1 open), the audio should increase quite noticeably as you pass through the 800 cycle point. To adjust the peaking frequency, set the peaking pot to about midscale. Tune across a CW or AM station with BFO on and note the frequency of the maximum signal. If you don't like this frequency, raising the pot resistance will lower the frequency. Closing SW1 bypasses the peaking circuit but the null circuit is still in operation. This circuit is used in the QRP rig to be published tentatively this fall in the November issue of Commication Quarterly entitled "A Deluxe QRP Station". It consists of a Direct Conversion receiver and a 4 watt transmitter with VFO control of the receiver and transmitter. It also includes a digital display frequency counter as an option.

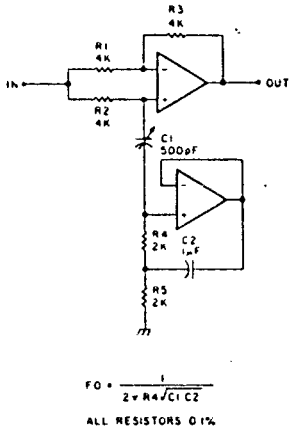


Fig. 1. Original circuit.

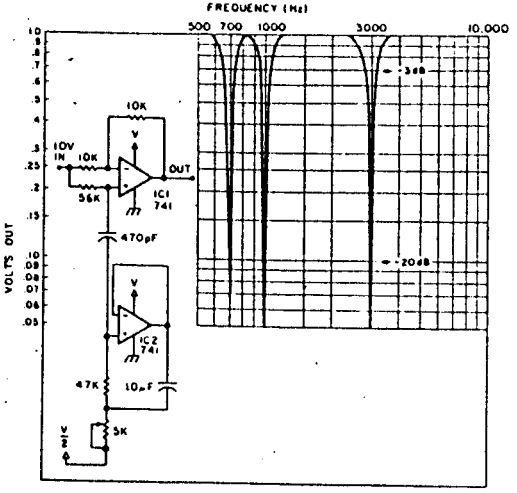


Fig. 2. Notch circuit.

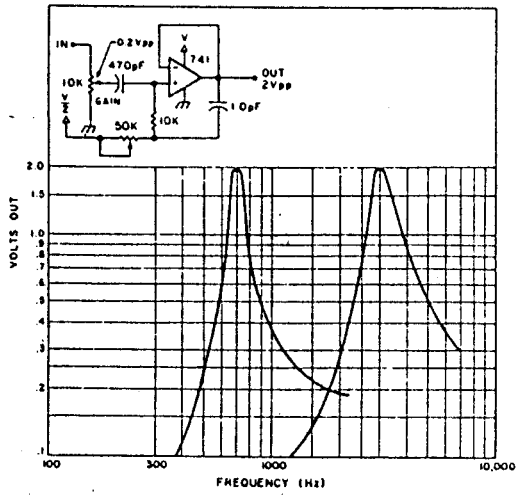


Fig. 3. Peaking circuit.

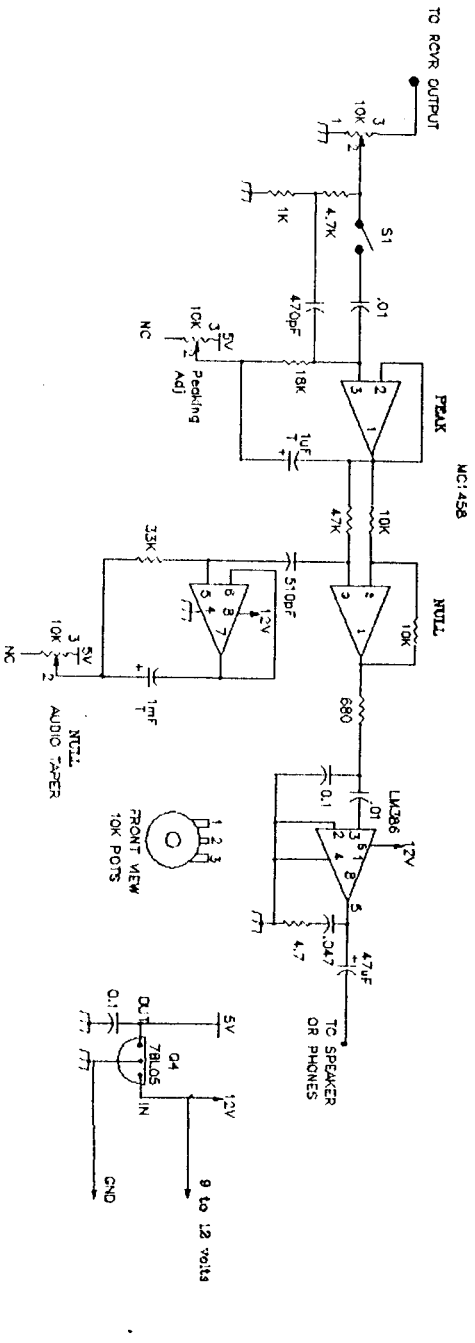

TO RCVR OUTPUT
10K
1K
4.7K
S1
.01
470pF
10K
NC
5V
Peaking Adj
18K
1uF
PEAK
MC1458
NULL
4.7K
10K
33K
510pF
12V
10K
NC
5V
1mF
NULL
AUDIO TAPER
680
0.1
.01
LM386
12V
FRONT VIEW
10K POTS
4.7
.047
47uF
TO SPEAKER OR PHONES
0.1
OUT
5V
Q4
78L05
IN
12V
GND
9 to 12 volts

Fig.4

How to Increase Your QSO Rate

By Chuck Adams, K5FO
830 Waite Dr.
Copper Canyon
Lewisville, TX 75067

QUESTION: What do I do to up my qso rate, either QRP or QRO power levels?

ANSWER(s):

1. Check your transmitter for clean signal. If possible, transmit into dummy load and listen on nearby receiver. Is signal something you would listen to during a QSO? No chirp, no key clicks, and no AC components are desired.

2. Try listening to the band first. Are signals good and at all levels? If all the signals are weak and at about the same level, then band is probably not in good shape for QRP. You're hearing all the 100W stations just above the noise level. If you hear really loud signals as well as weak signals, then QRP levels will work. Another good indicator of the condition that the band is in is to listen to WWV. Listen to 10 MHz. for example if you want to operate on the 40 Meter band. If the signal is lousy, go read a book, build something, or watch TV, but the band probably won't be in good shape.

3. Try to call a station that is sending CQ and is pretty loud, 579-599.

a. If this station is sending a long CQ (see following part 4), I'd hesitate to go after the guy/girl, because they may have attracted a crowd and you'll be fighting some stronger stations.

b. If they are sending a short CQ, you have a good chance. No crowd is likely.

4. If you must call CQ, then do the following:

a. Find what you think is a clear frequency.

b. Send one time at 20 wpm 'QRL?'. Nothing else. Wait and listen.

i) If you hear a dit dit, R, or C, then a QSO is in progress. Move on. DON'T send anything else. I've heard guys send SRI, OK, and other stuff. It's busy, leave it alone. You did your part.

ii) If no reply, then do it again. QRL? and wait. I do this three times in a 10 to 15 second period. I'm in no hurry. No use trying to start a QSO where a net or other QSO is in progress. It will not win you any friends to try otherwise.

c. OK, we have determined that we have a clear frequency. Time to go out in the woods and scare up the bears.

do it: CQ CQ CQ DE K5FO K5FO K5FO K

This is known as a 3x3 call. Nothing more and nothing less will do. I guarantee you don't need more. If you do longer CQs,.you will either draw a crowd or you will tick everybody off and they will move to another frequency. I have listened to someone call CQ for about 20 seconds and still be going when I tune away. How long are they going to send?

Now the hard part. LISTEN. Do you have a receiver and it IS the most important part

of the ham station. Without it, you're not going to have much fun. Listen for the weak signals. It's me!!

OK, no answer do it again. Keep trying this about every 15 seconds or so. If you have RIT, tune to either side. I've found that sometimes I have someone calling me as much as 2KHz off where I'm usually listening. They may have been working DX split and forgot about the offset. The worst case I've had, and this happened in the last six months, was 10KHz!! I worked the guy split. Kinda fun playing DX.

Another thing that I love and it bugs people. In the middle of.sending a CQ, if you have QSK (you can hear between the dits), you hear someone tuneup on freq, stop. Send "?" and see what happens. .:-)

d. If after about a minute or so, you still don't have an answer, move around. You may be on top of QSO that you don't hear but everybody else does and moves on.

e. I start out at a good speed for me, about 35 to 40wpm. If the answering station can go faster then we'll crank it up. If the answering station is having trouble, then I'll slow it down. If I don't get an anwer the first couple of times, then down 5wpm to the next level. I'm sure someone listening to me to do this is smiling or laughing. But it works and I don't care. :-)

Remember I'm racking up QSOs. The only exception is on 40 meters during the day. If I'm in a crazy guy kinda mood, I'll start at 40wpm and go up in increments of 5wpm until 75wpm.

f. I never call CQ DX. It's just a thing with me. I'd be interested in what the DX group on this mailing service think about other stations calling CQ DX. Do you answer them? Is it easier for a DX station (and we are all DX to someone) to answer a CQ or sit on freq and call CQ? Inquiring minds want to know.

Product Review:
Ten-Tec Model 555 Scout HF Transceiver

By Mike Siegel, KI6PR
1145 Julie Dr.
Merced, CA 95348

In the Amateur Radio sales market, there has been an increasing trend towards more features in basic rigs. These additional "whips and bells" have also brought much higher prices for most manufacturers' bottom-of-the-line "basic" radios. As we have all discovered in the QRP game, "more ain't better". Ten-Tec proves this with the introduction of their Model 555, which they have named the Scout.

The night before Dayton was to open, I had a telephone conversation with a ham about aspects of mobile operation; this ham reported rumors about a new mobile rig from Ten-Tec, that was to be unveiled the next day at Dayton. I was so fascinated by the reports and rumors, that the very next morning, I called Ten-Tec to place my order. The rig arrived July 28, packed in the usual generic boxes that Ten-Tec uses for shipping - no resale value on THEIR cardboard!

The Scout is a very unique rig, not only in it's simplicity, but in the design itself, and even moreso, in the way it targets it's sales market. The simplicity of design sticks to Ten-Tec's "less is more" approach to keeping controls and features simple, but effective. No fancy bells and whistles here — just some basic controls that do exactly what they're labelled for.

The design itself is unique, as well. Rather than cluttering up the front panel with band switches, or crowding the interior with other boards, the Scout uses interchangeable plug-in modules, one for each band, 160 though 10 meters (the lower half of 10, 28.0-29.0 MHz). More on this later.

Even the market that Ten-Tec is targetting is unique. The rig offers features and specifications that appeal to the experienced mobile operator, such as large-digit display and built-in keyer. But it also offers something for the Novice operator on a budget as well - a low entry-level price. For $495, the Scout comes with one band module (your choice of band), and allows for the addition of other bands at $25 each, as the operator can afford to add them. This rig even allows for those of us that only operate on one or two bands, in that you only purchase the bands you're interested in. To top it off, the Scout is actually SMALLER than Kenwood's TS-50 (see specifications below). Quite a unique package, in all.

FRONT PANEL CONTROLS

The front panel of the Scout is simple in layout: two concentric knob controls, three miniature bat switches, and a large vfo knob. The digits are a HUGE .56" tall, and accurate to 100 Hz; the MHz digit is actually painted on the front of the band module, and at first glance, appears to be integral to the rig. The bat switches are multi-function. The first switch is simply for power on/off. The second switch activates the RIT, or sets the speed of the built-in keyer. The third switch either activates the optional noise blanker, or activates the TUNE mode.

The concentric knobs offer precise controls for volume, mic gain, RIT, and filter bandwidth. A word about the filter: Ten-Tec has included in the Scout their patented Jones filter, a variable-bandwidth 9-pole crystal filter that offers filtering from 2.5 to 0.5 kHz. More on these functions later. The Scout also sports a small meter, indicating signal strength, relative power output, and an SWR function (controlled from the rear panel).

REAR PANEL

The rear panel offers just as simple a layout: aside from the expected ground lug and SO-239 connectors, there are connectors for DC input, an auxillary 13.8V DC output, TWO 1/8" key plugs — one for a straight key, one for a set of iambic paddles, and a mini-bat switch for calibrating the SWR function on the front-panel meter. More than half of the rear panel is made up of heat sink, with the remaining connectors and controls all located towards one end of the rear panel.

OPERATION

For as simple a rig as the Scout appears, it also operates the same way — simple. The band modules slide in smoothly, yet have a snug fit. To remove a band module, each module has a small lever on the front to "pop" it loose from it's socket. Each module covers a 500-kHz segment, plus 50 kHz overshoot at each end of the band. To cover the entire 1-MHz portion of 10 meters, the 10-meter module has a small sliding switch that toggles between the 28.0-28.5 and the 28.5-29.0 segments.

Once powered up, the rig demonstrates some audio hiss; in certain other rigs, I have associated this hiss with excessive RF gain. In this case, however, the hiss is audible only when the Jones filter is wide open. The audio that one hears is definitely affected by the Jones filter - when the filter is wide open, one tends to hear more highs in the audio, and as the filter is tightened, the audio becomes a very pleasant, mellow, almost broadcast-quality. In the CW mode, the filter can be cranked all the way down to 500 Hz, with no detectable ringing or attenuation of target signals. Needless to say, I am VERY impressed

with this new filtering system.

The mic gain is still something of a minor mystery to me; I can't seem to deliberately overdrive the audio. Like most other Ten-Tecs, the Scout uses an LED indicator for proper ALC adjustment - the LED lights up on audio peaks. I deliberately adjusted the mic gain so that the LED was constantly lit, and was told by other stations that the audio was not at all objectionable. With the mic gain properly adjusted, however, and using the optional 700C hand mic, I received glowing reports of truly high-fidelity audio; one station even remarked that the audio reminded him of the best audio from the days of AM! The 700C hand mic, by the way, while appearing clunky and cheap, is actually very light and solid, and demonstrates no pop or creak in the audio.

Rather than a conventional VFO, the Scout uses a PTO (permeable-tuned-oscillator), using a large variable inductor. While I would not call the tuning knob stiff, it does require a small effort to turn it. I would consider this something of an advantage to a mobile rig, since it forces you to make deliberate tuning adjustments. The tuning is relatively slow and positive, both also mobile advantages. The knob turns smoothly, with no discernable backlash.

The RIT gives a solid 3-kHz spread, 1.5 kHz on either side of the VFO frequency, and the variances are reflected in the large LED display. The display is also used to indicate the iambic keyer speed, when the mini-bat switch is activated. The keyer operates from 5-50 wpm, but will automatically default to 25 wpm, each time the rig is turned on. Keyer speed is actually controlled from the iambic paddles; while in the speed-display mode, if the dit paddle is struck, the speed increases, and in turn, decreases each time the dah paddle is hit.

The optional noise blanker is of a standard type, focused primarily on ignition and pulse-type noise. Unlike many other factory noise blankers, however, the Scout's NB does not appear to be prone to incurring buckshotting of received signals, as is common in some other rigs.

On the air, there is no mode-switching; simply hit the paddles if you want CW, or key the mic if you want SSB. The sideband selection is also automatic, dependant on the band you're operating; unfortunately, this does not allow for running the opposite sideband, but one can't have everything.

In the CW mode, Ten-Tec's famous full (REAL) QSK is flawless and fast. No chirps or other anomolies can be heard while operating (sorry, I only took it to 42 wpm), and the keying and shaping are quite comparable to the Omni-V - smooth on both make and break, and steady in between.

All in all, the rig has received nothing but compliments on the air, even though I went out of my way to deliberately elicit any negative comments from my transmitted signals. The most interesting part is that nobody even realized that I was running only 50 watts! As the rig comes out of the box, it is factory pre-set at 50 watts, but is externally accessble for adjustment down to the 5-watt area. There is a trick to this, however; when Ten-Tec was field-testing the Scout, they found that the tune mode could cause fuses to blow. So before shipping, they re-configured the rig so that the output in the tune mode was limited. In making this change, however, they restricted the amount of adjustment possible for operating power output. Ten-Tec has promised to put out a mods sheet for moving a jumper to defeat this restriction.

MISCELLANEOUS COMMENTS

The fit and finish of the rig is on a par with virtually all the other manufacturers, providing clean lines and a tight fit. Ten-Tec is still using the heavy glass-epoxy boards in their construction; most of the rig is built on a single, large board, with several smaller sub-assemblies (NB, etc.) mounted in areas set aside especially for such mounting. The interior

of the rig still has lots of room in it, presumably to allow for owner servicing or modification, both of which Ten-Tec still highly encourages.

The manual is very complete, including operating instructions, service instructions, and even schematic diagrams of the plug-in band modules. There is even a list of connectors, giving the Radio Shack stock numbers! Ten-Tec has always had an outstanding reputation for customer service and support, and this is also borne out by inclusion of fax and modem phone numbers in the owners' manual.

Ten-Tec also offers a line of optional accessories, including a mobile mounting bracket, a 200-watt antenna tuner, and a weighted iambic paddle.

SUMMARY

While this report is somewhat UN-technical, I personally don't feel that bench tests mean a whole lot. I prefer instead to see just what the rig does and sounds like on the air. And quite frankly I'm impressed with the Scout. I expected a bare-bones rig, and instead, got a radio that I'm going to have a lot of fun with for a long, long time.

Would I change anything on this rig? Maybe. I think I would actually prefer a separate RF gain control, independant of the other controls and functions; I find this feature useful in even the most sophisticated radios. And I would prefer to see the Scout use 1/4" CW jacks, just to facilitate some standardization and swapping around of keys and paddles. But for the price, I can't honestly think of another single thing I would change.

While this review has been centered solely on the 50-watt version of the Scout, Ten-Tec says that they will be producing QRP version, rated from 5 watts down. I look forward to hearing this rig on the air. I really think Ten-Tec is going to get a LOT of attention in the next year. And for all the right reasons.

GENERAL SPECIFICATIONS

MODEL: 555 ScoutPRICE: $495, plus shipping
FREQUENCY RANGE: All ham bands, 160-10 (28.0-29.0) meters
DISPLAY: 4-digit, 100 Hz resolution, .56" LED
FREQUENCY CONTROL: Permaeability-Tuned-Oscillator (PTO), mixed with a crystal oscillator for each band.
POWER REQUIRED: 12-14 VDC,600 mA receive, 10 A transmit @ 50 watts out; 4.5 A @ 5 watts out
DIMENSTIONS: HWD: 2.5" x 7.25" x 9.75"
WEIGHT: 5 lbs., 3 oz.
RF OUTPUT: 50 watts, factory set, ALC controlled; 15 watts nominal in Tune position
T/R SWITCHING: PTT on SSB; QSK on CW
IAMBIC KEYER: 1-50 wpm; Curtis type B, 15% fixed weighting
CARRIER SUPPRESION: -45 dB typical
UNWANTED SIDEBAND: -45 dB typical @ 1.5 kHz tone
THIRD ORDER INTERMOD: 30 dB below two tone @ 50 watts PEP
SENSITIVITY: .35 uV typical for 10 dB @ 2.5 kHz bandwidth
SELECTIVITY: "Jones" 9-pole xtal filter, front panel adjustable, 500 Hz to 2.5 kHz
DYBNAMIC RANGE: 85 dB @ 2.5 kHz bandwidth, at 20-kHz spacing
THIRD-ORDER INTERCEPT: +1 dbm
NOISE FLOOR: -126 dbm typical
I-F FREQUENCY: 6.144 MHz
AUDIO: 1 watt @ 4 ohms with less than 2% distortion

The Livermore Swap Meet Special

By Terry Young, KC6SOC
3383 Belgrove Ct.
San Jose, CA 95148

I have always been a builder of sorts, so when I saw the little table top antenna project in my September issue of 73, I decided to put one of the antennas together for myself. i had already decided to go into QRP for ease of operation and portability, so the small antenna project looked like a natural, and if it actually worked, all the better.

My version of the antenna is a little different from the magazine article as I had decided to go for as much portability as I could get by making the 30" diameter support structure fold in half, and make the base and support dowel a press fit for easy take down. I built my antenna with the idea to make it tune on 40M, and keep the possibility of other band operation open by providing a small enclosure for the separate tuner that would allow for band switching.

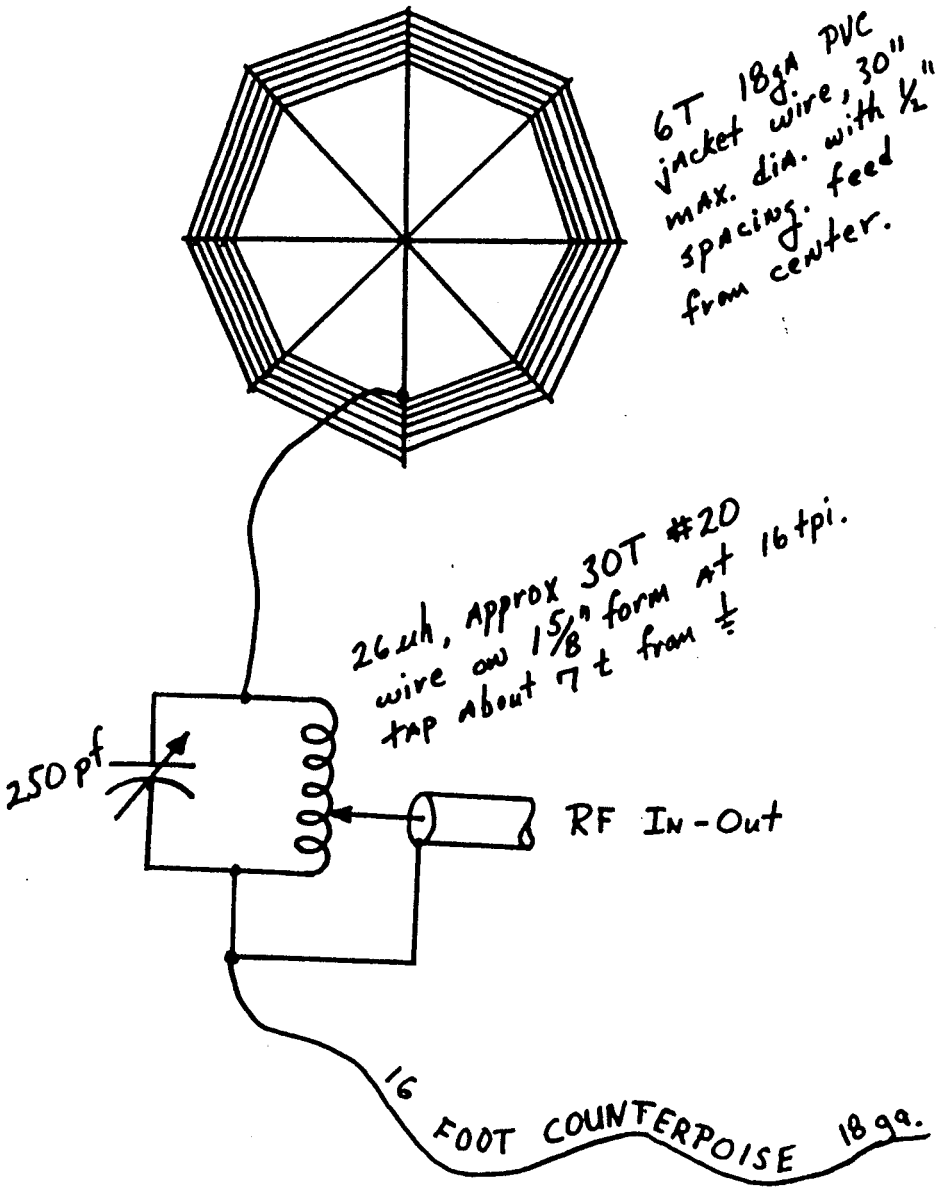
The antenna support is built from 1/2 inch maple dowel stock available at the hardware store, and some maple strip stock cut from a 3/4 inch board. The base was a scrap piece of maple, approximately 3/4 x 7 x 9 inches, that was in my shop. The antenna was built as the article described, except I didn't use the terminal strips for the wire separators on the spokes, (I drilled), and I did split the center spoke into two pieces to allow a set of hinges to be fitted that allow the 30 inch diameter disc to fold in half.

The tuner was constructed using, what else?, surplus parts from the Livermore swap meet. A 250 pF variable cap, some 20 gauge bare copper wire, and a few assorted connectors. in the finest tradition of a cheap ham, I bought no new parts for this project. All parts were Surplus or Homebrew only.

The whole antenna system is a spiral wound end fed wire antenna with 1/2 inch spacing between the wire as it is reduced from the maximum diameter of 30 inches towards the center. The tuner was found to function well on 40 Meters using six full turns of wire in from the outside, and an inductance of 26 uH. The cap was set to minimum, a few pF, for best SWR, and the tap was set at 7 turns up from the ground end. A 16 foot counter poise, made from standard 18 gauge hook up wire was also used.

On completion, the antenna was tested from inside my wood frame house in one of the rooms. I fed 5 watts from my FT 890 into it, and my first call was answered by a station in West L.A. I got a report of 549 from West L.A. on my first contact. In the next few days I was able to work WA, OR, TX, NM, AZ, and CO, all with 2 to 5 watts from inside my house. This antenna is not the biggest or the best, but it works, and that is all that I care about. See you on 40!

KC6SOC Livermore Swap Special



T. Young 100393
KC6SOC

NorCal QRP Club Awards Program

By Doug Hendricks, KI6DS
862 Frank Ave.
Dos Palos, CA 93620

Most Radio Clubs have awards programs which recognize and encourage operation. The NorCal QRP Club would like to encourage QRP operation, and especially homebrew QRP operation. Therefore the club would like to announce the following Awards Programs.

NORCAL HOMEBREW QRP WORKED All STATES AWARD

This is to be awarded to individuals who work all states with homebrew QRP equipment. To qualify, you must have qsl's in your possession that confirm the contact, and you must have used homebrewed QRP equipment at QRP levels. QRP levels are determined to be less than 5 Watts of Power. What is homebrew? If you built it, it qualifies. Heathkits, Ugly construction, OHR kits, projects from magazine articles, original ideas, etc. all qualify. Modified commercial gear does not. To apply for the award, send a list of all of your contacts arranged alphabetically by state, giving the call of the station worked, qth, date, time, frequency, your rst, his rst, and the rig used for the contact. The list should be sent to:

Steve Cates, KC6TEV
NorCal Awards Manager
7320 Farm Dale Way
Sacramento, CA 95831

Enclose a business sized S.A.S.E. with 1 unit of first class postage. Foreign stations enclose 1 IRC. Each recipitant will receive an 8.5 x 11 inch certificate suitable for framing. There is no charge for this award. The awards will be sequentially numbered, and only contacts made after 00:00 UTC January 1, 1994 count. Endorsements may be made for different modes, and bands. Application must be signed by 2 other amateurs attesting that they have seen the QSL's for the contacts on the log. DO NOT SEND QSL's!!!

NORCAL 40 WAS CONTEST

To encourage use of the NorCal 40 club project rig, Chuck Adams, K5FO, is sponsoring a contest for NorCal 40 owners. Between 00:00 Jan. 1 1994 and March 31, 1994, NorCal 40 owners will attempt to work as many States as possible in the United States. QSL's must be in hand to count, but are not required to be sent in. The first person to work all 50 states; or the person working the most states, will receive the K5FO trophy, to be presented at the Dayton Hamfest if the winner is present, or at some other suitable occasion if not present. For QSO's to count, they must be made with a NorCal 40, and a QSL must be in hand by March 31, 1994. Entries will be mailed to Steve Cates, KC6TEV, NorCal Awards Manager, Sacramento, CA. His decision asto the winner is final. Entries must be received by April 10, 1994. To enter, send a list of contacts, arranged alphabetically by state, with the following information included: Call, QTH, Date, Time, Frequency, his RST, and your RST. The application must be signed by 2 other amateurs attesting to the fact that they have seen the QSL's representing the claimed contacts. DO NOT SEND QSL's!!! In case of a tie, earliest qso time of the last contact will be the tiebreaker. [K5FO is eligible for the award.]

Member Profile: Steve Cates, KC6TEV

By Steve Cates, KC6TEV
7320 Farm Dale Way
Sacramento, CA 95831

Decades of resistance fell in 1991 when I received call KC6TEV. I'm still not sure if this was a result of moral weakness on my part or the overwhelming pressures of family and work. I've reflected deeply on this. I believe it all started during the late 1950's when WA6GER, my dad, gave me a one tube shortwave receiver kit to build. i built it and it worked! South America on ten feet of #18 AWG! No, maybe it started earlier. I dimly recall a cat's whisker receiver. Late at night, like some sorcerer searching for the philosopher's stone, he would show me how to tune in border radio stations while whispering strange incantations and arcane formula from amateur radio. But I was strong and did not succumb to these enchantments. Yes, I was a recaccitrant acolyte, a failure as a bfirst born son. i saw my resistance as moral righteousness.

Time and temptation worked against me. he was patient, but never failed to regale me with tales of milliwatt DX. Then in late 1990 it started again. he would interrupt conversations in the most unlikely places to mutter another one of his incantations. "No Code". This went on for months until my resolution collapsed. The runes were tossed and I became KC6TEV during Spring, 1991.

I thought it would stop and I could return to some sort of normalcy. But he sent his associates after me in a most unlikely place... work; The California State Department of Transportation. here they had formed a secret society called the Caltran's Auxiliary Radio System. Under the guise of public service emergency communications, they gave me a packet station to keep in contact with Distrckt Offices during emergencies. In truth, I found it was a way for them to send arcane symbols to each other. Thoroughly weakened, they made me Treasurer of the Sacramento Amateur Radio Club: SARC as they called it. It was my duty, they said, since the club sponsors the W6AK repeater on top of Caltran's headquarters. The enticement increased. Soon I was checking in on 40 meter SSB nets for the Office of Emergency Services and participating in simulated emergency tests for countless public agencies.

I was like a junkie on a two week run. I had lost all ability to reason for myself when he started up again with another incantation. "Only five words per minute -- only five words per minute -- only five words per minute." During the summer they gave me a certificate that said I was proficient at 5 wpm Morse code.

Surely they would stop the pressure. But no, he and his cohort, KI6DS, were incessant. "QRP...QRP...QRP...QRP." By now I was thoroughly under their spell. QRP it was. I even liked it. No, I craved it and withouth thought agreed to be the awards chairman for the NorCal QRP Club!

And now, through the QRN, their latest cipher of seduction is.... di di dah, di da da dit, da da dit, di da dit, di dah, da di dit, dit!

[Editors note: Steve has agreed to become the Awards Chairman for the NorCal QRP Club. All applications for club award will go to him at the address above. He has worked very hard for the club with little recognition for his endeavors. Steve was at all of the Livermore Swap meets and was the one who came up with the idea to have a table at the Foothill Swap in September, where we found many new members of NorCal. He was scheduled to take his exam for his General Ticket in mid November. I will let you know how he did next issue. My personal thanks to Steve for all of his help in the past, and my appreciation for his volunteering to be the Club Awards Manager. Also, best of luck as he goes for the General. Doug, KI6DS]

Toroid Inductance Charts

By Michael A. Czuhajewski, WA8MCQ
7945 Citadel Drive
Severn, MD 21144

This article is a "golden oldie", of sorts. I wrote the first version in 1988 and have been trying halfheartedly since then to get it into the QRP Quarterly. It's not that it's a bad article, just that there were some substantial logistical problems in getting it from my computer to the publishers typesetting computer, since I didn't own an IBM compatible until 1991. Things started looking up when I got volcano'ed out of the Philippines, had to abandon my TRS-80 computer and buy a new one, this time an IBM compatible. Now I could send an ASCII disk. And then Maryland Radio Center, the ham store where I work, eventually upgraded to a '386 computer with laser printer, and now I can submit camera ready copy to the editor, totally eliminating all middle-men. (My deepest thanks to MRC owner Jerry Johnson, WA3WZF, for use of his computer.)

Now for the 397th rewrite of the text... Getting back into ham radio in 1986 after an absence of over 15 years, I began poring over the tremendous number of home brew articles that I missed in the interim. In comparing design features of various projects using toroids, I often had to convert winding data to inductance or vice versa. At other times, I found myself building something and didn't have the exact size of core called for.

I got tired of hauling out the Amidon charts every time, hunting up the formula and A1 value, digging out the calculator and doing the calculations. That seemed like a lot of unnecessary work, reinventing the wheel each time (how often did I calculate the inductance for 15 turns on a T50-2 core?), along with the ever present possibility of making mistakes when applying the formulas. It would be much quicker and simpler to refer to a chart and instantly see that X turns on core Y gives Z microhenries, and how many turns on another core would give approximately the same. The obvious answer, then, was to write a BASIC program to compute and print out, once and for all, the inductance per turn for a variety of the most commonly used toroids. Amidon provides similar charts, but only in multiples of ten turns. Mine are tailored to the coils and cores most often used by QRPers.

USING THE CHARTS

Inductance for a given number of turns can be read directly from the charts. When looking for the number of turns required to obtain a specific inductance, simply choose the nearest inductance value from the chart under the core(s) of interest and read across. (It is assumed that you already know which core material is suitable for the application at hand, having considered operating frequency, Q, etc.) While I could have run off a second set of charts indexed by inductance rather than turns,m it would have been much larger and would have given results in fractions of turns, which are not practical to implement on toroids. If a slightly different value of inductance is required than that shown on the chart, the winding can be compressed or expanded slightly.

I originally made charts for every core size within these four materials, which are the most commonly used types. It ran to 11 pages, but I quickly realized that only a small number of sizes were used most of the time. (Do you remember the last time YOU used a T157-2 core?) Also, most coils use a relatively small number of turns, hence the cut off at 35. In those relatively rare cases where some other size or material is used, or more turns, you can consult the published information, such as an Amidon flyer, and apply their formulas.

I moved the output of the BASIC program over to the word processor and dressed it up, including rounding off the values. There wasn't much point in showing additional decimal places; it implied a degree of precision that is unattainable in practice, as well as cluttering

up the charts. (If you put 21 turns on an FT50-43 core, can you REALLY expect to get precisely 230.643 microhenries?) Anyone who has ever used a toroid knows how variable the inductance is for a given number of turns, depending on spacing of the turns as well as variations in permeability between nominally identical cores. In one of their catalogs, Micrometals (who makes the powdered iron cores sold by Amidon) indicates that inductance tolerance, due to core to core permeability variations, is plus or minus 5%.

By the way, when you get down to very low inductances you'll probably see more than the Al factor would lead you to believe. Distributed capacitance in a coil makes the "apparent inductance" larger than the "true inductance", and lead lengths are another contributing factor. Even a piece of straight wire has finite inductance, and several tens of nanohenries can have a noticeable impact.

HOW MUCH WIRE TO USE?

Next, a different chart of great usefulness—how to figure out how much wire you need to wind those coils. I originally had this published in the October 1988 issue of the QRP Quarterly, and it's time to resurrect it again. You have three choices when winding a toroid: 1) cut off a random piece of wire which looks like it's long enough and hope for the best; you'll end up wasting wire or saying bad things when you run out of wire 5 turns before the end; 2) wind a single turn with a piece of thread, measure it and multiply by the number of turns you want; 3) look up the single turn length from the chart below.

Since I didn't have all core sizes on hand to do the single turn trick, I used the published dimensions from the Amidon flyer to figure out the circumferences. I wound some sample coils, and things didn't always work out right; the figures were the sum of dimensions, but, real wire has finite thickness, and I needed more. After observing how much more wire was needed, from 7 to 13%, I settled on a fudge factor of 15%, which should cover just about every case, and that is built into the charts. On top of that, you also have to provide extra wire for leads; if you do not allow for lead length, you'll end up with a coil that just fits on the core but no wire left over to connect to your circuit. After theoriginal publication, K3TKS pointed out to me that these values are only good for single layer coils. They don't apply if you do multiple layers (which we don't normally do in QRP building) or if you wind bifilar, trifilar, etc: in those cases you're on your won, but the chart gives a good starting point.

I hope these charts make life simpler for some of you homebrewers out there; it certainly helps speed things up for me, and makes comparing circuits and building much more enjoyable.

WIRE LENGTH CHART FOR TOROIDS

Size	Inch/T	Size	Inch/T	Size	Inch/T
FT23	.26	FT37	.50	FT50	.68
FT50A	.79	FT50B	1.37	FT82	.93
FT87A	1.53	FT114	1.13	FT114A	1.7
FT140	1.73	FT150	1.44	FT150A	2.01
FT193	2.22	FT193A	2,51	FT240	2.3
T12	.19	T16	.23	T20	.29
T25	.37	T30	.47	T37	.49
T44	.61	T50	.67	T68	.80
T80	.92	T94	1.16	T106	1.57
T130	1.60	T157	2.02	T184	2.66
T200	2.13	T200A	3.16	T225	2.24

TOROID INDUCTANCE CHART

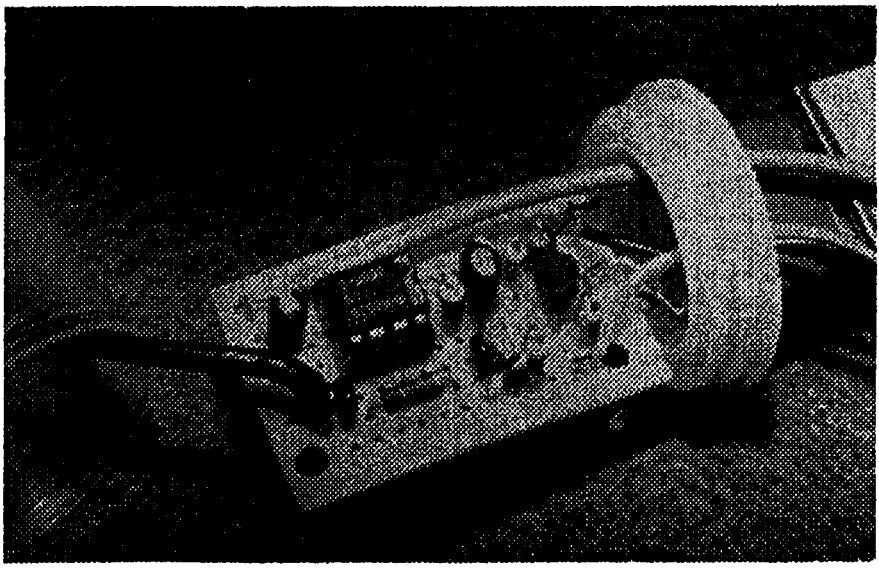
Types	FT23-43	FT37-43	FT50-43	FT23-61	FT37-61	FT50-61
A1 Values	188	420	523	24.8	55.3	68
# of turns	Inductance in microhenries					
1	.188	.420	.523	.025	.055	.068
2	.752	1.68	2.09	.099	.221	.272
3	1.69	3.78	4.71	.223	.498	.612
4	3.01	6.72	8.37	.397	.885	1.09
5	4.70	10.5	13.1	.620	1.38	1.70
6	6.77	15.1	18.8	.893	1.99	2.45
7	9.21	20.6	25.6	1.22	2.71	3.33
8	12.0	26.9	33.5	1.59	3.54	4.35
9	15.2	34.0	42.4	2.01	4.48	5.51
10	18.8	42.0	52.3	2.48	5.53	6.80
11	22.7	50.8	63.3	3.00	6.69	8.23
12	27.1	60.5	75.3	3.57	7.96	9.79
13	31.8	71.0	88.4	4.19	9.35	11.5
14	36.8	82.3	103	4.86	10.8	13.3
15	42.3	94.5	118	5.58	12.4	15.3
16	48.1	108	134	6.35	14.2	17.4
17	54.3	121	151	7.17	16.0	19.7
18	60.9	136	169	8.04	17.9	22.0
19	67.9	152	189	8.95	20.0	24.5
20	75.2	168	209	9.92	22.1	27.2
21	82.9	185	231	10.9	24.4	30.0
22	91.0	203	253	12.0	26.8	32.9
23	99.5	222	277	13.1	29.3	36.0
24	108	242	301	14.3	31.9	39.2
25	118	263	327	15.5	34.6	42.5
26	127	284	354	16.8	37.4	46.0
27	137	306	381	18.1	40.3	49.6
28	147	329	410	19.4	43.4	53.3
29	158	353	440	20.9	46.5	57.2
30	169	378	471	22.3	49.8	61.2
31	181	404	503	23.8	53.1	65.3
32	193	430	536	25.4	56.6	69.6
33	205	457	570	27.0	60.2	74.1
34	217	486	605	28.7	63.9	78.6
35	230	515	641	30.4	67.7	83.3

TOROID INDUCTANCE CHART

Types	T25-6	T30-6	T37-6	T44-6	T50-6	T68-6
A1 Values	27	36	30	42	40	47
# of turns		Inductance in microhenries				
1	.003	.004	.003	.004	.004	.005
2	.011	.014	.012	.017	.016	.019
3	.024	.032	.027	.038	.036	.042
4	.043	.058	.048	.067	.064	.075
5	.068	.090	.075	.105	.100	.118
6	.097	.130	.108	.151	.144	.169
7	.132	.176	.147	.206	.196	.230
8	.173	.230	.192	.269	.256	.301
9	.219	.292	.243	.340	.324	.381
10	.270	.360	.300	.420	.400	.470
11	.327	.436	.363	.508	.484	.569
12	.389	.518	.432	.605	.576	.677
13	.456	.608	.507	.710	.676	.794
14	.529	.706	.588	.823	.784	.921
15	.608	.810	.675	.945	.900	1.06
16	.691	.922	.768	1.08	1.02	1.20
17	.780	1.04	.867	1.21	1.16	1.36
18	.875	1.17	.972	1.36	1.30	1.52
19	.975	1.30	1.08	1.52	1.44	1.70
20	1.08	1.44	1.20	1.68	1.60	1.88
21	1.19	1.59	1.32	1.85	1.76	2.07
22	1.31	1.74	1.45	2.03	1.94	2.28
23	1.43	1.90	1.59	2.22	2.12	2.49
24	1.56	2.07	1.73	2.42	2.30	2.71
25	1.69	2.25	1.88	2.63	2.50	2.94
26	1.83	2.43	2.03	2.84	2.70	3.18
27	1.97	2.62	2.19	3.06	2.92	3.43
28	2.12	2.82	2.35	3.29	3.14	3.69
29	2.27	3.03	2.52	3.53	3.36	3.95
30	2.43	3.24	2.70	3.78	3.60	4.23
31	2.60	3.46	2.88	4.04	3.84	4.52
32	2.77	3.69	3.07	4.30	4.10	4.81
33	2.94	3.92	3.27	4.57	4.36	5.12
34	3.12	4.16	3.47	4.86	4.62	5.43
35	3.31	4.41	3.68	5.15	4.90	5.76

TOROID INDUCTANCE CHART

Types	T25-2	T30-2	T37-2	T44-2	T50-2	T68-2
A1 Values	34	43	40	52	49	57
#of turns		Inductance in microhenries				
1	.003	.004	.004	.005	.005	.006
2	.014	.017	.016	.021	.020	.023
3	.031	.039	.036	.047	.044	.051
4	.054	.069	.064	.083	.078	.091
5	.085	.108	.100	.130	.123	.143
6	.122	.155	.144	.187	.176	.205
7	.167	.211	.196	.255	.240	.279
8	.218	.275	.256	.333	.314	.365
9	.275	.348	.324	.421	.397	.462
10	.340	.430	.400	.520	.490	.570
11	.411	.520	.484	.629	.593	.690
12	.490	.619	.576	.749	.706	.821
13	.575	.727	.676	.879	.828	.963
14	.666	.843	.784	1.02	.960	1.12
15	.765	.968	.900	1.17	1.10	1.28
16	.870	1.10	1.02	1.33	1.25	1.46
17	.983	1.24	1.16	1.50	1.42	1.65
18	1.10	1.39	1.30	1.69	1.59	1.85
19	1.23	1.55	1.44	1.88	1.77	2.06
20	1.36	1.72	1.60	2.08	1.96	2.28
21	1.50	1.90	1.76	2.29	2.16	2.51
22	1.65	2.08	1.94	2.52	2.37	2.76
23	1.80	2.28	2.12	2.75	2.59	3.02
24	1.96	2.48	2.30	3.00	2.82	3.28
25	2.13	2.69	2.50	3.25	3.06	3.56
26	2.30	2.91	2.70	3.52	3.31	3.85
27	2.48	3.14	2.92	3.79	3.57	4.16
28	2.67	3.37	3.14	4.08	3.84	4.47
29	2.86	3.62	3.36	4.37	4.12	4.79
30	3.06	3.87	3.60	4.68	4.41	5.13
31	3.27	4.13	3.84	5.00	4.71	5.48
32	3.48	4.40	4.10	5.33	5.02	5.84
33	3.70	4.68	4.36	5.66	5.34	6.21
34	3.93	4.97	4.62	6.01	5.66	6.59
35	4.17	5.27	4.90	6.37	6.00	6.98



The Pixie 2

By David Joseph, WA6BOY
1873 Harris Ave.
San Jose, CA 95124

Here is a tiny shirt pocket rig you can take with you.. plus extra info on a sidetone circuit and the next best thing to a VFO, the "VFR".

Look at the circuit of this gem in Fig. 1, particularly Q2. No need for a separate mixer circuit, it's happening right there! This novel idea works very well. I first saw this approach in a circuit by RV3GM in a recent issue of "Sprat", published by the G-QRP Club in England, and also republished in Vol. 1, Issue 1 of QRPp. The original circuit's been modified here from a tapped inductor tank output, different audio amplifier plus additional muting. The rig is full QSK too! When the key is depressed, it grounds the input of the audio amp and the cathode of D1, shutting off the 386 chip. The 1K ohm resistor at pin 6 of the amp does two things; reduces the supply voltage for stability, along with the 10uF cap, and is a current limiter when the key is down. Make sure you place the 10uF cap as close as possible to the 386, otherwise you'll get a nasty howl in your headphones when the amplifier breaks into oscillation.

More about Q2. I used a 2N2222, only for compactness, and get about 200 milliwatts output with it. A 2N3053 or 2N3866 will give more power out, if you can work its size onto the limited space. You might want to mount it underneath. On this version, C3, the 82 pF coupling capacitor, along with C8, C10, D1 and L1 are on the solderside. If you put C3 topside, you might have room for a larger Q2 on the bottom.

Q1, a 2N2222, is in a Colpitts oscillator, a good circuit because any type crystal will work, along with another device which turned out to be a wonderful surprise, and let to what I call the "VFR".

"VFR" stands for "Variable Frequency Resonator". You've probably seen these devices. They're ceramic resonators and function just like a crystal. Another article in "Sprat" by GM3RXU showed how hooking a variable capacitor, as shown in Fig. 2, could "pull" the resonator quite a ways, due mainly to its low "Q". In my circuit, a 365 pF broadcast cap and a resonator for 3.58 MHz, gave a frequency range from 3604 all the way down to 3530. That's 74 KHz! For stability, mount the resonator on the board right next to Q1's circuit. Realize that lead length from the cap to the resonator will change the tuningrange somewhat. Just practice good VFO construction techniques.

The sidetone circuit shown in Fig. 3, also came from "Sprat", (this little quarterly's got a lot of great circuits by very talented people!), and was part of a little 40 meter transceiver design by G0RFD. The diode is again used, in this case to turn on the circuit, where D1 in Fig. 1 turns that one off. If you mount the 555 chip directly on a piece of perfboard and use 1/8 watt resistors above and below the board, you should be able to get it into the film cannister. It's not very heavy and #20 or #22 solid wire would hold it away from the main board.

There is plenty of headphone volume, even with the simple circuit on the 386. Weak stations are easily copied and it'll even drive a small speaker. I've got one of these rigs hooked to one and plop a crystal (or tune the VFR) to a QRP frequency and monitor while building or tinkering away on the bench. In a quiet room, I can hear signals from across the other side while I hunt for parts. (Organized???....Haw Haw!)

A simple fixed pi network couples the output to a 50 ohm load. I used a molded inductor on this version (80 meters) and it works just fine. You can also wind a toroid. Try 20 turns for 80 meters or 14 turns for 40, on a T50-2 core with #24 or #26 wire. The network values are for a very low "Q". Other bands, of course, will work, with appropriate inductance values, along with changes in capacitance to maintain a desired "Q".

Bear in mind that this is a bare bones rig. I've not included transmit or receive offset, so, you're receiving on, or very, very close, to the same frequency as transmitting.

Despite this, my first contact was with W6JTT, who was on a mountain top next to the Mexican border. That's about 500 miles from me, not bad, eh! He was a couple of hundred hertz from my crystal frequency so it worked out fine. If you hear a reasonably low tone then, give it a try! I heard NE6S calling CQ one night, the tone sounded about 700 to 800 Hertz, ("cycles" sounds better to me, oh well). I called, and got an answer! Location? Corona, CA, over 400 miles to the south.

A good CW operator, after calling CQ, stays on the transmitting frequency, and tunes near the frequency for calls, either with a separate receiver or using a transceiver's receiver offset control. That's REAL CW operating, and a blessing for rigs like this one!

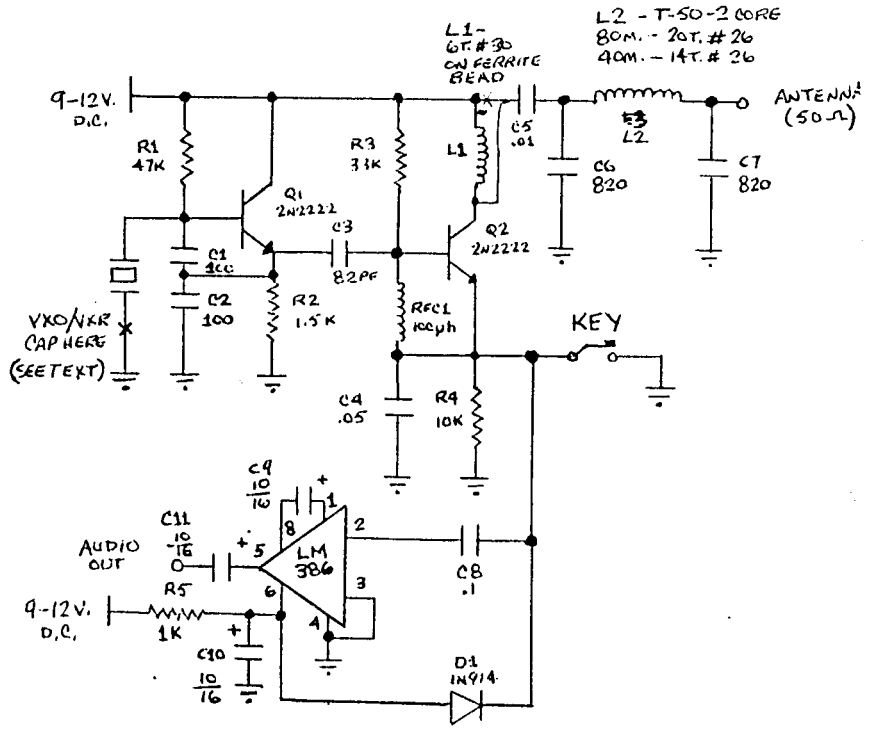
By 'dinking' around with some circuitry, an offset can be rigged on this transceiver. You can sacrifice QSK and/or switch in a swmall variable cap for RIT. There are several ways to approach this and still allow the rig to fit in the film can. A slightly larger enclosure will allow easier and greater flexibility. Use your own ideas on this.

The rig has been fun to get going and a real blast on the air. I'd welcome any ideas from you on this article. But, my hope is that you will build one. There's nothing like having a little critter like this to hook up and enjoy.

NorCal 40 Owners: Send in your experiences, mods, and suggestions for the NorCal 40 rig to me for the next issue. I am planning to make the March issue of QRPp an issue featuring NorCal 40 information. Be a part of history! Send your experiences to Doug Hendricks, KI6DS, 862 Frank Ave., Dos Palos, CA. 93620. Deadline is Feb. 1.

Wanted: Suggestions and ideas for the next NorCal project. Send to Wayne Burdick, N6KR, 74 Elm St., San Carlos, CA 94070 or via internet: wayne@interval.com

The Pixie 2



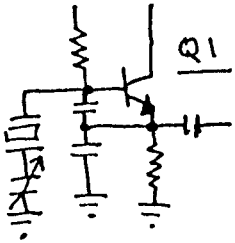


FIG. 2

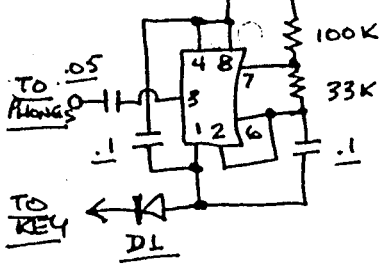


FIG. 3

TIDBITS

By Mark Cronenwett,KA7ULD
1029 Duncan Ave.
Sunnyvale, Ca 94089

Have any ideas that you would like to share with others? Well here is the place to do just that. Send your ideas to me at the address above, by packet at KA7ULD @ N0ARY.#NOCAL.CA.USA.NA, or by E-mail to mcronenw@pyramid.com via the Internet.

<>DIAL FOR NN1G AND OTHER RIGS
From: Doug Hendricks, KI6DS

Ok guys here is a quickie. If you want to make a dial for the tuning capacitor that Danny Stevig puts in his super NN1G kit, here is how to do it. The tuning capacitor is one with a 8 to 1 reduction drive built in to it. There is a sleeve that moves at 1/8 the speed of the knob, so you can't put a pointer on the knob. Dick Witzke at OHR came up with this idea, and Chuck Adams mentioned to me that he had taken one of the clear acrylic dials from an OHR 20 meter kit and put it on his NN1G. The light went on, and here is what I have come up with.

Get some 1/16" thick clear acrylic. Locally we get it from the scrap bin at Tap Plastics for $1 per pound. Use a Black & Decker 2" hole saw in a drill press to cut a hole in the plastic. When you get done, you have a circle that is about 1 7/8" in diameter with a pilot hole in the center of 3/16". Then it is a simple matter to drill out the center hole to match the shaft of the slow turning sleeve on the tuning capacitor. Voila, you have a dial. Some may want to put the frequency marks on the dial itself, a la OHR, or as Chuck says, put 1 line on the dial, and the frequency marks on the front of the cabinet. Whatever works best for you. Not a biggie guys, and most of you probably already thought of it, but in case you haven't.....

72, Doug, KI6DS

Here is another way, from Edward Pacyna, W1AAZ

Your local hardware store sells fender washers. These come with an outside diameter of 1 1/2" to 2" and have a 3/8" diameter center hole. Simply paint the washer, dry transfer an index line or numbers, insert a 3/8" rubber grommet in the center hole and push over the shaft. The grommet center hole will be a comfortable friction fit over a 1/4" shaft.

I perfer this method as I found it difficult to cut a nice smooth, round hole in plastic and it is a lot faster.
73, Ed, W1AAZ

<>POOR PAINTER'S PANEL PANACEA
From: Jim Cates, WA6GER

If you're like me, you want the enclosure for your home brew masterpiece to be the finishing touch, the piece de resistance, the jewel in your QRP crown, right?

Alas, alas! Again, if you are like me, can't paint a barn door without leaving drips, sags, bubbles, runs and/or brush marks. What to do?

Ok. Want to Jazz up that plain aluminum front panel? Or the entire case, box, cabinet, whatever the "case" may be? Ok, Ok, bad pun. Sorry.

Of course you remember the dash on the '36 Cord, don't you? The "machine-turning" or whatever it was called? On the Deusenberg too, if memory serves me.....

Well, I'm not sure if I remember it myself, or if my Daddy told me about it. Anyway, it had a "swirly" finish that caught the light much like a nonchrome version of those stickers, and signs, which change colors when your viewing angle changes.

Ok, let's try this on a scrap of aluminum. Take a pencil, preferably with the eraser unused, and chop it, leaving the eraser and a couple of inches of pencil stub. (Long's Drugs recently had pencils on sale, ten for thirty-nine cents.)

Put the stub in a drill press, and using a slow speed by whatever method available, (variac, trigger on/off), make a couple of revolutions, impressed lightly against the aluminum. Makes a whirl. Now, do the entire surface. Randomly is ok, so is some overlapping. If the eraser wears excessively, grind it flat.

The result is an interesting, attractive finish, and it won't chip or scratch like paint will. And, Decals apply as neatly as on any other surface. My Spider rig is done this way, and never fails to elicit oohs and ahs, and "How did you do it"? Hence this article.

I plan to give my NorCal 40 this snazzy finish. It's chip proof, perfect for a knock about rig. Take it from me, an old roofing and siding salesperson; try it! You'll like it; I guarantee it!

72, Jim WA6GER

<>TAPE THOSE NICADS!!!
MFJ Portable Rechargable Power Pack, Model 4114
From: Jim Cates, WA6GER

Steve, KC6TEV, didn't like the way the nicads fit into the holders. Loose, so, he taped his in; suggested I do the same. I didn't. Why should I? Listen to my own son? It's supposed to be the other way around.....

Later, Hall, N6SYW, and I went on a fishin'/qrpn' trip to Loon Lake, in the high Sierras, taking the MFJ 9040 integrated station. I had everything Murphy could possibly require, except .... a spare fuse!

Click. Dead. Shake, shake, rattle, rattle, rats! Loose nicads. Open case, replace nicads, click, dead! Gads - Blown fuse; no spare. I can tell you, using a clip-lead for a fuse doesn't make for comfort-city.

<>FILTER FOR NN1G RECEIVER NOISE
From: Wayne Burdick, N6KR

A simple solution to the noise problem is to add a single-crystal filter between the MC1350 and the product detector (NE602). I haven't tried this on the NN1G but I have used this method on other homebrew rigs, and it works very well. The reason you need the second filter is that the MC1350 is a VERY noisy part, especially at full gain. The noise is easily removed by a one-pole filter, using the same type crystal as used in the first filter. This mod might be easier than adding a low-pass filter at the audio output, and has the advantage of not adding any active circuitry or increasing the current drain.

You might have to experiment with the terminating caps on either side of the crystal, but 100 pF is a good starting point. The cap on the MC1350 output side is more critical, because it will affect the resonant frequency of the MC1350 output coupling circuit between pins 1 and 8. It's worth noting, as many have before (including Ed, W1AAZ) that you don't always need an I.F. amp in a receiver of this type. For example, the NorCal 40 doesn't use an I.F. amp; I just connected the crystal filter directly to the product detector. This works because the NE602 has over 20 dB gain and a good noise figure at 7MHz. It's just a little less

impressive at 14MHz. With no MC1350, you save 15mA and a whole lot of noise. To make up for the lost gain, you should use differential coupling between the NE602 and the LM386, and use a cap between pins 1 and 8 on the LM386 (about 2.2uF works fine).
Wayne, N6KR

NorCal Membership List

By Doug Hendricks, Ki6DS
862 Frank Ave.
Dos Palos, CA 93620

This membership list is as of Nov. 1, 1993. It is arranged by call sign, NorCal membership number, name, and address. Membership numbers are assigned as applications come in. If you would like to be a NorCal QRP Club member, send your Name, Call, Address, City, State, and Zip to Jim Cates, WA6GER, 3241 Eastwood Rd., Sacramento, CA 95821. If you would like to receive QRPp four times per year, send along $5 for a 1 year subscription. Sorry, but back issues are not available. Members with a number lower than 75 received the first 2 issues. Contact them to see if they will copy the first 2 issues.

	129	Larry Mull, 9904 SW. Siuslaw Ln., Tualatin, OR 97062
AA6DK	85	Stan Cummings, 5201 58th St., Sacramento, CA 95820\
AA6IY	36	Gene Marshall, 4137 Cranford Circle, San Jose, CA 95124
AA6UL	55	Ralph Irons, 6300 Friant Dr., Bakersfield, CA 93309
AA7AR/6	11	Bruce Florip, 441 Greenwood Dr., Santa Clara, CA 95054
AA7U	105	Steve Ratzla, 1885 E. Bayshore Rd. #90, East Palo Alto, CA 94303
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AB6BR	140	Anthony Flusche, 15756 Via Nueva, San Lorenzo, CA 94580
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AC4QO	133	Robert Scott, 13748 Mapledale Ave., Woodbridge, VA 22193
AL7GQ	89	Gene McGahey, PO Box 33910, Northglenn CO 80233
G1PJJ	44	Paul Turvey, 165 b Snargate St., Dover, Kent, U.K. CT17 9BZ
K4DRD	5	Stan Cooper, 1390 Market St. #2024, San Francisco, CA
K5FO	40	Chuck Adams, 830 Waite Dr. Copper Canyon, Lewisville, TX 75067
K6AGN	101	D.J. McDonald, 2119 Danbury Way, Rancho Cordova, CA 95670
K6CQD	156	Mark Hurwitt, 12165 Shady Springs Ct., North Ridge, CA 91326
K6DIW	4	Nicholas Kaps, 378 Sheridan Ct., Manteca, CA 95336
K6EN	33	Charles Ketterman, 4480 Eagle Ridge Rd., Penngrove, CA 94951
K6MA	114	Stan Kuhl, 1149 Heatherstone Way, Sunnyvale CA 94087
K6MDJ	51	Fred Turpin, Box 9145, Cedarpines Park, CA 92322
K6OPG	127	Ken MaHoney, 2036 Revere Ave.,, San Francisco, CA 94124
K6PYP	90	Scott Swanson, 210 Mantua Rd, Pacific Palisades CA 90272
K6ZAN	93	Ralph Butler, 1812 Gunston Way, San Jose, CA 95124
K8BPN	21	Ron Moeller, 35629 Beeching Lane, Fremont, CA 94536
K8VOR	79	Bob Bell, 5305 Paragon St., Rocklin, CA 95677
KA0IQT	145	Jim Johns, 37 Carmichael Way, Groton, MA 01450
KA2UPW	128	Doug Quagliana, 24 Campbell Ave., Edison, NJ 08817

KA6JFF 87	Dale Applegate, 124 Temelec Cir., Sonoma, CA 95476
KA7ULD27	Mark Cronenwett, 1029 Duncan Ave., Sunnyvale, CA
KA9BZM 86	Bill Shortz, 405 Westwood Ln., Rochester, IN 46975
KB6HZM 49	Pat Gormley, 109 Warwick St., Redwood City, CA 94062
KB6LUC94	Tom Server, Jr., PO Box 7234, San Jose, CA 95150
KB6LZW 125	Dennis Murphy, 17740 Freitas Ln., Ft. Bragg, CA 95437
KB6OHO 148	Robert Keller, 1059 Big Oak St., San Jose, CA 95129
KC6AND 13	Randy Shore, 3970 Nordica Ct., San Jose, CA 95124
KC6JEV 58	Larry Earlix, 1198 8th St. #2, Monterey, CA 93940
KC6SEG 32	Mike Collins, Box 99302, Stockton, CA 95209
KC6SOC92	Terry Young, 3383 Belgrove Ct., San Jose, CA 95148
KC6TEV 31	Steve Cates, 7320 Farm Dale Way, Sacramento, CA 95831
KC6UTH144	Jan Barglowski, 329 E. Church Ave., Ridgecrest, CA 93555
KC6ZDG102	Chuck Mahler, 7665 Helmsdale Dr., San Jose, CA 95135
KC6ZTT 113	Rob Ontiverous, 3275 A Rocky Water Ln, San Jose, CA 95148
KC7FG 155	Jim Woods, 1042 Robin Way, Sunnyvale, CA 94087
KD4GLC77	Rusty Smith, 4908 Clovernook Road, Louisville, KY 40207
KD6BWE 123	Matthew Schiller, 4217 N. Woodson, Fresno, CA 93705
KD6CVL80	Stanley Salek, 510 Jibstay Lane, Foster City, CA 94404
KD6ETI 34	Denis Englander, 687 Second Ave., San Francisco, CA 94118
KD6FDW 122	Ron Manabe, 92 Lodato Ave., San Mateo, CA 94403
KD6FJI 12	Lloyd DeVaughns, 216 Whirlaway Dr., San Jose, CA 95111
KD6FVI 25	Bob Smith, 1525 Berkeley Way, Berkeley, CA 94703
KD6GMF 24	William Stanley, 4947 Dowling Ave., Fremont, CA 94536
KD6IPX 139	Bruce Bonbright, 1435 N. Indian Wells St., Ridgecrest, CA 93555
KD6JKQ 22	Mark Eddy, P.O. Box 700351, San Jose, CA 95129
KD6MNP 28	Jeff Furman, 1449 Yukon Dr., Sunnyvale, CA 94087
KD6OCS138	Mike Furman, 1449 Yukon Dr., Sunnyvale, CA 94087
KD6VIO 8	Bob Dyer, 4180 Byron St. Apt. E, Palo Alto, CA 94306
KD6WUC 95	Chris Miller, 12350 Maple Glen Rd., Glen Ellen, CA 95442
KD6ZBQ 67	Hayes Alexander, 2007 Colony St., Apt. A, Mountain View, CA 94043
KE0UQ 57	Roy Crozier, 6225 Sewell, Kansas City, KS 66104
KE4PC 75	Mike Dooley, 202 Lavon Shores Dr., Princeton, TX 75407
KE6HD 68	Mike Jarchow, 310 Houston St., Danville, CA 94526
KF8XC 147	Will Webber, 271 S. River Drive, Gwinn, MI 49841
KH6LE 153	Curt Nakayama, 752 Kaima Place, Hilo, HI 96720
KH6MM 118	Marvin Tanaka, Box 392, Wailuku, HI 96793
KI6DS 2	Doug Hendricks, 862 Frank Ave., Dos Palos, CA 93620
KI6JD 6	James Williams, 1912 McLaughlin Ave., San Jose, CA 95122
KI6PR 29	Mike Siegel, 1145 Julie Dr., Merced, CA 95348
KI6SN 37	Richard Fisher, 1940 Wetherly St., Riverside, CA 92506
KI6UH 30	Gordon Yee, 62 Solano, Brisbane, CA 94005
KJ6GR 136	Bill Shanney, 19313 Tomlee Ave., Torrance, CA 90503
KJ6LL 15	Brian Treusch, 488 44th St., Oakland, CA 94609
KJ6MO 98	Charlie Trentacosti, 1139 Kathy Way, Mountain View, CA 94040
KJ6OG 19	Vern Haik, 2046 Central Ave., Alameda, CA
KK6IU 18	Kent LeBarts, Box 43, Merced, CA
KK6TQ 111	Randy Meltier, 1185 Linda Ave., Ashland, OR 97520
KK6ZC 66	Glenn Menard, 6264 Plymouth Ave., Richmond, CA 94805

KM6EP	121	Dick Kors, 119 A Flynn Ave., Mountain View, CA 94043
KM6FM	35	Mark Helfen, 3160 Melendy Dr., San Carlos, CA
KM6MO	131	James Holt, 11013 Bahia Ct., Bakersfield, CA 93311
KM6QP	96	Bob Lai, 976 Jackson St., San Francisco, CA 94133
KM6QW	154	Richard Howard, 454 Forest Circle, Marina, CA 93933
KM6RI	20	David Varn, 2445 Boxwood Dr., San Jose, CA 95128
KM6WT	135	Mont Pierce, 32412 Lake Ree St., Fremont, CA 94555
KN6HG	110	John Miers, 105 Cayuga Ave., San Francisco CA 94112
KV6I	91	Dan Magro, 2668 Butler Ave, Los Angeles, CA 90064
NF0R	159	Dave Gauding, 830 Coalport Dr., St. Louis, MO 63141
N0VAH	157	James Chandler, III, 6128 Brookside Circle, Rocklin, CA 95677
N1OSA	72	William White, 64 Griggs Rd., Brookline, MA 02146
N2KZZ	103	Paul Beltrani, P.O. Box 1678, Plattsburgh, NY 12901
N3CUD	70	Roberta Perkins, 25 W. Dale Rd., Wilmington, DE 19810
N4HCJ	112	James Kretzschmar, 2618 Valley Oak Way, Fairfield, CA 94533
N5SIV	132	Keith Despain, 413 Pruitt Ave., Los Alamos, NM 87544
N6DOK	117	Lloyd Hartshorn, 5595 Truman Pl., Fremont, CA 94538
N6DZA	10	Gary Steinhour, 875 Hickory Ave., Tracy, CA 95376
N6FZS	106	Mervin Enos, 2325 Stratford Dr., San Jose, CA 95124
N6GA	52	Cam Hartford, 1959 Bridgeport Ave., Claremont, CA 91711
N6GHG	126	Bill Splaine, 1360 Foothill Drive, Healdsburg, CA 95448
N6KR	3	Wayne Burdick, 74 Elm St., San Carlos, CA 94070
N6LQA	107	Wayne Stade, 1031 Wallace Ave, Aptos, CA 95003
N6MVE	82	Michael Wood, 136 Monteverde Dr., Vacaville, CA 95688
N6NQY	116	Frank Nagle, 988 Faris Dr., San Jose, CA 95111
N6PFK	81	Michael Westfield, 1598 Portola Dr., Milpitas, CA 95035
N6PFL	115	Allen George, 3465 Amber Drive, San Jose, CA 95117
N6SYW	83	Hall Baker, 3208 Montclaire St., Sacramento, CA 95821
N6TMR	143	Mike Rench, 642 Berkeley Ct., Merced, CA 95348
N6VT	108	Ralph Conly, 819 Henrietta Ave., Sunnyvale, CA 94086
N6WTL	23	Jim Strang, 3172 Beech Dr., Atwater, CA 95301
N6YBD	14	Gary Narramore, 3866 14th Ave., Oakland, CA 94602
N6YQD	150	Terry Seeno, 2354 Cork Cir, Sacramento, CA 95822
N6ZBZ	124	Forrest Miller, 1355 Oak St., Redlands CA 92373
N7TDK	99	Bill Graves, 16212 N.W. Rock Creek Rd., Portland, OR 97231
N7WIM	63	Kevin Purcell, 318 10th Ave. E. C7, Seattle, WA 98102
N8ET	43	Bill Kelsey, 3521 Spring Lake Dr., Findlay, OH 45840
NK6I	104	Ed Esheim, 17110 Viewcrest Lane, Morgan Hill, CA 95037
NN1G	62	Dave Benson, 80 E. Robbins Ave., Newington, CT 06111
W1FMR	137	Jim Fitton, PO Box 2226, Salem, NH 03079
W1IFL	74	Chandler Eaton, 5128 Swisswood Dr., Raleigh, NC 27613
W4OEL	76	Sheldon Dunham, 2206 Rochdale Court, Mechanicsville, VA 23111
W5QJM	69	Fred Bon2avita, P.O. Box 2764, San Antonio, TX 78299
W6CUB	120	Dave Bradley, Box 2043, Freedom CA 95019
W6CYX	7	Robert Warmke, 12095 Mt. Hamilton Rd., San Jose, CA 95140
W6EBY	78	Jack Shulman, 789 Garland Dr., Palo Alto, CA 94303
W6EQB	119	Paul McKinnie, 696 Saturn Ct., Foster City, CA 94404
W6ISQ	46	John Troster, 82 Belbrook Way, Atherton, CA 94025
W6KGS	109	Loren Moeslchler, 1765 Arroyo Dr., Auburn, CA 95603
W6LNG	60	William Semorile, 42 Morse Ave., Sunnyvale, CA 94086

W6QIF 42	Jim Pepper, 44 El Camino Moraga, Orinda, CA 94563
W6RMY 151	Lars Williamson, 647 Eastwood Way, Mill Valley, CA 94941
W6RVY 149	Ralph Holzknecht, 1425 Gretel Ln., Mountain View, CA 94040
W6SIY 53	Keith Clark, 1609 Ewing Circle, Ridgecrest, CA 93555
W7JDZ 100	J.L. McClurkin, 1111 Cameron Ave., Idaho Falls, ID 83402
WA3JPG 56	Clark Turner, 1514 Verano Pl., Irvine, CA 92715
WA4GIR 73	Joseph White, P.O. Box 13315, Research Triangle Park, NC 27709
WA6ARA 50	Mike Herr, 613 Rebel Rd., Ridgecrest, CA 93555
WA6BOY 26	David Joseph, 195-157 Blossom Hill Rd.., San Jose, CA 95123
WA6ENC 48	Loren Chan, 5719 Makati Cir. Apt. D, San Jose, CA 95123
WA6ERB 88	Robert Gobrick, Box 1591, Champlain, NY 12919
WA6GER 1	Jim Cates, 3241 Eastwood Rd., Sacramento, CA 95821
WA6NCX 45	Rick Ferranti, 254 Florence Ave., Arlington, MA 02174
WA6PWW 97	Kit Blanke, 304 Sylvia Ave., Milpitas, CA 95035
WA7SOU 47	Larry Burkett, 4705 N.E. 114th St., Vancouver, WA 98686
WB2STR 9	Thomas Mukai, 1606 S. 22nd St., Arlington, VA 22202
WB6FZH 71	Greg Greenwood, P.O. Box 1325, Weaverville, CA 96093
WB6QKU 61	Joseph Dabkoski, 41 Sutter St. #1515, San Francisco, CA
WB6SDW 38	Ed Avila, 560 Mill Rd., Auburn, CA 95603
WB6TMH 16	Mike Miller, 12350 Maple Glen Rd., Glen Ellen, CA 95442
WD0CFE 152	Hank Blake, 80 Corte Encanto, Greenbrae, CA 94904
WD6BOR 17	Darrell Jones, 358 Patten St., Sonoma, CA 95476
WD6DCV 84	Frank Zawalick, 8191 Heflin Ct., Sacramento, CA 95828
WD6GYJ 64	Don Wilber, 776 Cambridge Ave., Menlo Park, CA 94025
WF6D 54	Bill Young, 2755 Fowler Lane, Arroyo Grande, CA 93420
WF6U 59	Hollis Button, 1025 W. Parr Ave., Campbell, CA 95008
WO7T 141	Mark Gustoff, 1110 E. Watson Dr., Tempe, AZ 85283
WQ1T 146	Richard Glines, POB 1096, Plaistow, NH 03865

NorCal QRP Club Meeting Notes

By Doug Hendricks, KI6DS
862 Frank Ave.
Dos Palos, CA 93620

The September meeting of the Northern California QRP Club was held at the California Burger Restaurant in Pleasanton. It is located at the Santa Rita exit of 580. 24 members showed up, at least 24 members left, as we had 10 new members sign up. It was a great meeting with lots of QRP info traded back and forth and the members getting to know each other.

Wayne Burdick, N6KR had serial number 1 of the NorCal 40 club project there. It is a 40 meter superhet transceiver that is a thing of beauty and a joy to operate. I know, because I built serial number 2. The NorCal project committe announced that orders would be taken for the kits which will be sold by the club. [Ed. Note: All 100 of the kits were sold in 6 weeks. They are not available from the club.]

Mike Miller, WB6TMH, had a homebrew 40 meter transceiver that he built from various articles in the handbook and QST over the years. It is being written up and will be published in the next issue of QRPp. Mike used ugly construction and is not planning on developing a kit or a pcboard. The article explains his trials and tribulations as he built the rig. We had a qso in the parking lot after the meeting, with Mike using his rig and a "dummy load" for an antenna. I used the NorCal 40 and my hamstick on the pickup. First time that I ever worked anyone using a dummy load for an antenna. Lots of fun. Of course we were only 10 feet apart,

but we still made a contact.

Stan Cooper, K4DRD, brought his Oak Hills research 20 meter rig. He did a really nice job building it, and everyone had to pop the top and check out the insides.

There wasn't a lot of QRP gear at Livermore for sale at the swap. One HW-8, that the guy wanted $125 for. Ouch! It did have one of the old MFJ audio filters in the blue box that I have been looking for with it. Tried to buy it, but the owner said it was "married" to the HW-8. Oh well....The buy of the swap may have been the 3 mint condition leg keys that Bob Smith, Denis Englander, and I bought. We got them for $10 each, and they were new in the package!! Jim Cates, WA6GER, found them for us.

The group decided to keep meeting at the California Burger at 11:00 on the same day as the Livermore Swap. If you are interested in learning more about QRP join us.. Some members are also interested in forming a net. More discussion at the next club meeting.

Membership is approaching 100, as we are in the high 90's, with about 35 opting to subscribe to the QRPp also. Jim, WA6GER, Steve Cates, and I will be at the Los Altos Foothill Swap September 11 soliciting members to join the NorCal QRP club. We will have a QRP display table with various rigs and of course the NorCal 40 will be on display. Stop by and say hello and operate the NorCal 40 if you like. We would love to meet you.

October:

Wow, what a great weekend. This was the Sunday for the monthly meeting of the Northern California QRP Club. We meet on the first Sunday of the month at the California Burger Restaurant located in the the shopping center just off the Santa Rita Road exit on 580 just north of Livermore, from 11 to 1. Today's meeting was attended by about 25 or 30 qrpers, and it was a lot of fun.

Stan Cooper brought his new TenTec Scout for all of us to drool over. I am really impressed with that rig. Everyone checked it out, and it was a hit. Dave, WA6BOY, brought a homebrew rig that he had just built. It is an 80 meter transceiver. No big deal? Well this one was in a 35 mm film canister!! Dave has written an article and it will be published in the next issue of QRPp. You want to look for that one. There was a model of the 40 meter coiled longwire that was in September 73. Terry Young, KC6SOC was the builder. He is writing an article on how he built the antenna, and made it into a knock down unit for storage. That should also be in the December issue of QRPp. Wayne, N6KR had his bread boarded ssb receiver on 20 meters. It sounds great. With a little encouragement, I think Wayne just might go ahead and develop it into a transceiver. I have been urging him in that direction. Anyone else want to build a 20 meter ssb qrp rig? Send Wayne a message at wayne@interval.com if you are interested in such a rig. The rig uses varactor tuning, a ten turn pot, and covers the entire ssb portion of the 20 meter band. Hmn, I sure am interested. And last but not least, we were honored to have the "original" NN1G rig that Dave Benson built. It was featured in the last issue of QRPp and Chuck Adams has been posting several articles on it on the intrnet. Dave did a really neat job of mounting his in a case that is 4" wide x 4" deep x 2" high. How did he do that you ask? He mounted the two boards on edge and back to back. Nifty job with a great looking dial. He made a dial with a piece of plastic cut into a wedge shape. The scale is on white paper that has been laser printed with a half circle, and numbers. It is mounted behind a piece of clear acrylic, 1/16" thick, held on by 4 screws, about 1" x 2".

For those of you who are waiting on the NorCal 40, here is the latest update. There are 27 kits left. We have all of the parts in Jim Cates hands except for the circuit boards. Fred Reimer of Far Circuits has promised delivery within a few days. As soon as Jim gets the boards, he will start mailing out kits. We should hit the Oct. 15th target date. Wayne, N6KR, and I delivered our parts to Jim today. I don't know if you have ever seen the parts for 100 kits, but that is a lot of parts. I saw 310 NE602's in one place today, most that I have ever seen. Anyone know of a cheap source for those? If you do, send me E-mail.

After the meeting, Wayne and I drove over to Sunnyvale and had a great visit with Jim Fitton, W1FMR, who had just flown in from New England. Jim is the coordinator of the New England group, and was a great help in starting the Northern California Club. The NE group has 207 members, while the Northern California Club has 136 members and 104 subscribers to QRPp. We spent the afternoon talking about all sorts of QRP things. Jim and I ran several ideas by each other, and we had a good time. Of course, as soon as we arrived, we had to watch Jim do one of his famous antenna launchings from his hotel window. He put a long wire really high up into the trees right outside his hotel. Jim is a master at hotel operating. He had a neat QRP tuner and SWR meter that he had built. His rigs were, the "original" NN1G, and the "original" NorCal 40, both on loan from Dave Benson and Wayne Burdick.

Member Profile, Clark Turner, WA3JPG

By Clark Turner, WA3JPG
1514 Verano Pl.
Irvine, CA 92715

I began in ham radio at age 14. Well, I began a bit earlier, but was licensed at age 14 (yes, I admit I played around with a CB walki-talkie for almost a year before I got up the nerve to go for the "real thing"). Held the novice license along with the technician license simultaneously (had two different callsigns, WN3JPG and WA3JPG for different frequencies!) for about 6 months. Picked up the General, then when I was about 15, I went for the Advanced license. My beginnings were humble: the National NC-98 receiver and the Knight-Kit T-60 transmitter. The transmitter was capable of about 30+ watts output on most bands. I was crystal controlled. I later got a Heath VF-1 VFO, which was the "cat's meow" as far as I was concerned! My T/R switch was a knife switch with one single lead-in wire from my 130 foot wire - the transmitter on one side and the receiver on the other. No coax, no balanced line, no swr meters, no T/R relay. Just a J-38, the rigs and my knife switch. I was very CW oriented at the outset.

Now, remember that back in the beginning, QRP was considered to be anything under 100 watts INPUT. I was officially QRP at the time. However, I was not yet aware of it or very excited by it. I recall my first low power excitement when I keyed my VFO alone, connected it to my antenna, and while my memory is hazy on it, I believe I held a pretty decent QSO locally. I suspect it put out a fraction of a watt or so, but I will not know until I try it again (I am presently looking for a VF-1 to complete my old station.) I was very impressed by the fact that I could do that with the silly VFO alone.

Next, about 1970 or so I got a Ten Tec PM3A from a friend, and it ran about 5 watts output, 40 and 20 meters. Wow, that was fun! I found out about the QRP ARCI a little later (I was running QRPp at 5 watts by the rules then), and joined, member number 3526. This was a thrill. I worked all states without much problem with a vertical and a dipole from Dallas, Pennsylvania. I was proud to say I operated "QRPp". I found out where Ten Tec was located and got a catalog. I found the Argonaut 505. I had to have it. I was just out of high school at this time (around 1972) and had to save a lot of money (then) for the 505, supply and a few accessories. I discovered their antenna tuner (had never seen such a thing, always tuned my T-60 into whatever I had!), and when I managed to buy the bunch, I had quite a time. Wow, a tuner could make almost any antenna look pretty good to my transmitter (now it was important, because I had transistor finals that expected 50 ohms....my T-60 was able to handle about 10 to 600 ohms without straining.) Even more thrilling, I had convenient full QSK. I say convenient because I had always had QSK with my receiver remaining on while I transmitted, but never had the relay to do it for me. This full QSK stuff was real nice. I liked it. It was then that I discovered my true love: SSB QRP. I got into a lot of QSO's without saying what I was running until asked by the other station. I was often called a liar. Many

didn't believe I put out 5 watts or less. They just wouldn't. I liked that. I used to go out backpacking with my 505 and a lantern battery, carrying a 100 foot wire and tuner. Throw the wire into a tree and have QSO's from the tent. The lantern battery went for a long time. Humble beginnings, but quite a wonderful time.

Now I play around with SSB QRP, have worked a lot of the WAS and DX nets to pickup WAS-QRP SSB 40 meters in about 2 months, and working on WAS-2 way-QRP SSB 40 meters at a slower pace. Have quite a number of DXCC countries confirmed on 40 SSB, too. It is taking me time because I am now busy finishing my Ph.D. here in Computer Science. I usually run Ten Tec equipment, but am starting to build kits, and homebrew just a bit. I have the two boards for the SSB transceiver written up in QST this year. I plan to make this thing up in the coming year. I have the NorCal 40, too. I will surely build that in the coming weeks. My Spider has done a good job for me on 7038 (my crystal). Will do more when I have the chance. The most fun I have all year is with the Zuni Loop Mountain Expeditionary Force on Field Day.

I am a frequent listener on the California 40 meter swap nets, and end up on the 3905 Century Club net and HHH net on 40 meters. I venture down to 7040 on a regular basis, too. Stop in to U.C. Irvine if you are driving by on Route 5 in Southern California!

Ark 40 Review

By Jeff Gold, AC4HF
1751 Dry Creek Rd.
Cookville, TN 38501

If you are looking for something different in a QRP transceiver kit S & S Engineering may have just the kit for you. Their new ARK 40 is a synthesized QRP single band transceiver. It uses a super heterodyne receiver that covers from 7.000 to 7.1999 MHz and the transmitter puts out 5 clean watts. The rig offers full break-in (QSK) keying. What makes this rig different than the other QRP rigs out is that it uses two phase-locked loops to synthesize the frequencies. Tuning is done with thumb wheel push button switches. When you are on a frequency you know exactly what it is. If someone asks you to QSY up 5 you know you will be exactly on that frequency. The rig also comes with RIT, AGC for easier listening, crystal filters and a narrow (200Hz) audio filter. There is plenty of audio to drive the included speaker.

When I first looked at the $269.95 price tag I was a little taken back. The finished transceiver has more features than most (such as the narrow audio filter), but this is the highest priced mono-band QRP transceiver that I am aware of. As I finished building and testing the rig the reasons for the price tag became more apparent. S & S offers a guarantee that the rig will work as advertised or you can send it back and they will fix it. They have a company policy that they will do everything in their power to get the rig fixed and out the door within 24 hours of receiving it. If the problem is found to be caused by a faulty part or fault of the company, it will be fixed for free. If you have put a part in the wrong place or done something wrong they will fix it for under $25.

I have built kits of all levels and all levels of instructions. Some kit suppliers basically give you a bag of parts and a schematic. Heath used to be on the other end of the spectrum and tell you in minute step-by-step detail how to assemble the rig. The S & S instruction manual is a work of art. It was professionally written with excellent quality type, good schematics and excellent photos. The instructions are step-by-step, but not in the Heath approach. One step will say put in all the resistors. There is a master list of parts that has complete descriptions of each part. There is then a separate parts list with two checkoff boxes so that you can use this to build the boards with. The parts list is in the back of the manual. At first I wasn't sure I liked this approach. I went to the step that said to solder the resistors and then went to the

back of the manual to use the parts check off list. While building the boards, I found this worked fine. The parts list has complete descriptions of each part including things like the color code on the resistors. This makes part placement a lot surer. One of the biggest problems builders experience is incorrectly identifying parts and putting them in the wrong place on the board. The assembly instructions for each of the boards is separate and then the final assembly process and alignment are each separate. The manual also has very nice sections explaining the theory of operation of the rig and a trouble shooting section. This was by far the most complete and well done manual I have come across since building my Heath HW9.

The next area I was really impressed by was the kit itself. There are two main printed circuit boards and one small board. There are over 1000 solder connections in all. They clearly state that this is not a beginner's kit. I found that with a little help a beginner should easily be able to build this rig. It is in fact much easier to build than many of the other QRP kits on the market. There are a lot more parts in this kit, but the way the kit is packaged makes it a different type of kit. The two main boards and their corresponding parts are each packaged separately. Within each board packaging parts are packaged separately. If there are a lot of the same resistors or capacitor, they are put in separate packages. If there is any chance of a part being identified incorrectly it is in a separate wrap and clearly labeled. The coils are all pre-wound. In one case there are tiny surface mount capacitors and they give you an extra in case you mess it up. It turned out that this was the only part I had trouble with. I used some surgical forceps that lock and managed to crunch one. It was no problem, I just used a different tool and used the spare capacitor.

My approach to building a kit is to take all the parts out of the box and check them off and separate them. I usually take a big piece of paper for the resistors and capacitors. I label the number of the components (ex: R1, C34), and put the leads through the paper. I find that when I build I am much less likely to make a mistake using this method. I also know ahead of time if I am missing a piece and can call and get one sent before I need it. This is usually my least favorite part of building the kit. I found that the parts were so well prepared with the ARK 40 I built that I didn't need to do this. I took a number of small plastic bins and just dumped each of the pre-prepared packages into each one. There were no missing parts with this kit. With the resistors many had been sorted and I only needed to sort out a small number of them. The same was true for the capacitors. The S & S Engineering approach to preparing their kits made the building process a lot more enjoyable.

When examining the boards I found them to be clearly silk screened and the best quality I have come across. A lot of time went into numbering components so that they are easier to locate on the printed circuit board while building. The boards are double sided and plated through. This makes the soldering a lot easier and solder connections come out better with less chance of cold soldering joints. The down side to this type of board is that if you put a part in the wrong place it is a lot harder to remove it from the board. The parts in the kit were also all top quality. The case is fantastic and should stand up to about any type of use.

This isn't a kit you would want to through together quickly. Building is a type of therapy for me. After a tough day of work I love to come home, lock myself in my ham shack and work on building something. The nature of the kit determines in many cases how much enjoyment I get out of building. I found that due to the careful attention to detail and quality of all components that this was one of the most enjoyable projects I have ever done. I was able to come home and work on the kit for 10 minutes or 2 hours and enjoy every moment of it. I found that the manual was complete enough so that I didn't get frustrated and was written in a way so that it didn't insult my intelligence.

After you complete each board you are given some simple resistance checks to perform with an ohmmeter. You can tune this rig up without any special equipment by using a receiver with a digital readout. If you have use of a frequency counter, it is a lot easier. A scope is

always preferable for tuning up the transmitter, but you can do a good job without one using a power meter capable of reading QRP levels. The alignment procedures are very clear and detailed. They even give you a good plastic alignment tool for the coils. If you run into problems with the alignment, the trouble shooting section should help point you in the right direction to localize the problem. If you need to take advantage of the service, you will find the people at S & S Engineering knowledgeable and helpful.

I still get real nervous when I first power up a rig, especially one that has so many parts in it. The more parts the more likely I have made some dumb mistake. No matter how careful I am, I always seem to put something in the wrong place. I anxiously turn on the power while at the same time looking and smelling for smoke. When I flipped the switch on this rig, the power came on and no smoke billowed out of the rig. Boy was I happy. I feel if I get this far, nothing too bad can be wrong.

I started aligning the transceiver using my digital frequency counter as directed by the instructions. I used a small digital multimeter to check the voltage at one of the ICs. The voltage was a little off. You change the voltage by either spreading or compressing the coil windings of one of the coils. It isn't very hard to do. I would suggest that after the rig is completely operational and checked out you might want to put a little glue on the windings to make sure they stay in place. Most of the alignment procedures are very typical of QRP transceivers. There are two coils and a couple of variable caps to adjust the receiver section and two transformers for the power output of the transmitter. I didn't have a scope at home and used my QRP watt meter to adjust for maximum output. The transmitter was putting out better than 6 watts, so I adjusted it to about 4.5 watts. I went to a hamfest the day after I aligned the rig and came across a good deal on a scope. I went home and checked the wave form of the transmitter out with the scope. I found the wave to be very nicely shaped. I found that when I played with the two transformers and adjusted the power level down that the wave form was still very good. I believe you can easily align the entire rig using another rig that has a digital readout, a voltmeter and a power meter that reads QRP levels.

Building the rig is half the fun. Putting a rig I just have built on the air always is an exciting experience for me. This was no exception. I was impressed with the quality of parts and had a really good time building the kit. I was very anxious to see if the rig performed as good as it looks. I usually find that I like to align a rig, put it on the air and then take it apart and fine tune it. I usually go through this procedure a few times before I am satisfied with the way a rig operates. No matter what the frequency counter and other test instruments tell me, I like to tune a rig till it feels right for the way I operate.

I plugged in the antenna and key and turned on the power. The 40 meter band was not in very good condition. I tuned around a little and heard someone calling CQ. I answered and he came back with a QRZ? This was a good sign as far as I was concerned. I answered back with my call twice and turned it over. Ralph, N3QP in Washington DC, came right back to me. We had a nice forty minute rag chew. The radio received an excellent signal report. The other person was very impressed that my 4.5 watts was getting through all the atmospheric noise. He said my signal had a very nice sound to it. I listened on my Kenwood 850 to the keying and it sure sounds sweet.

At first I had serious reservations about the use of push buttons to tune around the band. I found that after a few minutes I didn't mind this method at all. The rig sounds great, is very sensitive, has great full break-in keying, and is extremely rugged. The size is about right for backpacking or portable operation. I am impressed with this little rig. It is a fun to build and operate rig.