QRP Quarterly

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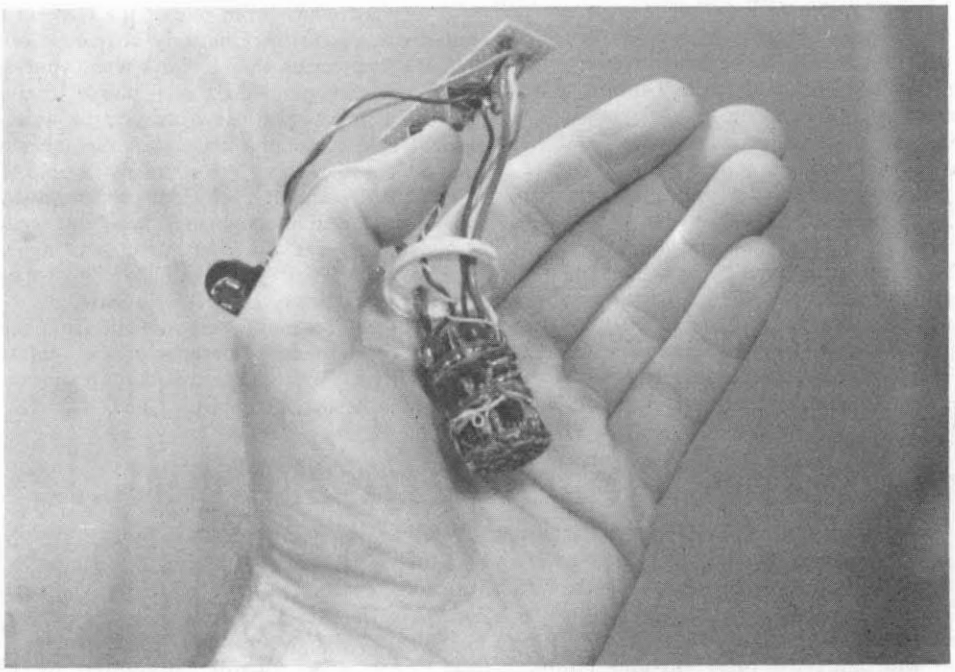

The invasion of the tiny rigs continues! Turn to pages 7-9 for the latest little handful.

Contest Results:

1989 Holiday Spirits
Homebrew Sprint
1990 Winter Fireside Sprint

An ARRL proposal threatens the QRP operating frequency on 40 meters. See page 4 and read the president's message on page 2 to learn more.

EDITOR'S WORD

by Charles F. Wooten Jr., KD4XX

Hi gang, first off I would like to offer an apology for the lateness of the January issue (which turned out to be a February issue). It seems like everything that could go wrong with getting that issue out, did go wrong. And it all started with me, so I'll take the blame for most of the problems, and say that I still learning, and if you will bear with me, I'll try to do better...

Dayton Hamvention! Are you going? It's the place where you will find everything you can dream of in ham gear and the like. I've been there the last three years. Although I will not be making the trip this year, for those who do for the first time, be prepared. Make a list of the things you will be looking for to buy. Why, you may ask, do I give this suggestion? I've found that if you don't make a list, and try to go from memory, as soon as you get inside Hara Arena, and out in the flea market, your mind goes into shock! This is not like your local hamfest. Just about everything, and I mean everything that was made for amateur radio will be there some place, so be forewarned.

Another word of advice, when you find something you are looking for in the flea market, that item you've been looking for forever, you need to decide now if you really want it. Because if you walk away thinking you will come back for it later. You're going to have two problems. First problem: will it be there when you come back, with so many hams there (last year over 25,000 hams), it may not last long. And the second problem, will you be able to find your way back there! The flea market took me almost two days just to walk through it once, and that's at a good pace. So keep that in mind.

One last word on buying something at the Dayton flea market, as the old saying goes, "let the buyer beware". This being a flea market with people from across the country offering items for sell, you have to look out for the ones who are selling stuff that looks good, but turns out to be junk, trash and just plain garbage! Now I'm not saying that this will happen at every table. I have found most of the sellers are very honest, but what I'm saying is, just be careful when you buy in the flea market...

Fred Bonavita, W5QJM, is still waiting to hear from you about suggestions for QRP operating frequencies on 18 and 24 MHz. Send your recommendations to him at his new address as soon as possible.

I just got a note from one of the QRPers asking me if I wanted articles for the Quarterly on computer disk only. If I left the impression that I didn't want your articles if they weren't on a computer disk, then please forgive me. If it's a good article, you can use a crayon to write it. The only reason I said something about sending me stuff on a computer disk is that there are so many people nowadays who have an IBM computer, why not use it! But I will be glad to have your articles no matter how you write them. Also, for those who are thinking about writing something for The Quarterly, I will have available a Writer's Guide soon. I hope to have it ready by the next issue.

That's all for now gang, and again, if you have any ideas, suggestions,or comments please feel free to let me know. This is your magazine, and it'sup to all of us to make it the best that we can.....Chaz, KD4XX

From the President's Desk....

Paula Franke, WB9TBU

As we head into a new decade, the QRP ARCI is gearing up to make its presence know to the general amateur community. We are starting off with several key changes in the organization's leadership.

First, I'd like to welcome past president Jim Fitton, W1FMR, back to the board of directors. Jim has been the driving force behind making the QRP gathering at Dayton what it is today and I'm happy he is filling the balance of my term on the board. I also welcome our newest directors to the board: former QRP ARCI president Les Shattuck, WN2V, and Lou Berry, KF7TQ. New officers officers are vice-president Buck Switzer, N8CQA; secretary Luke Dodds, W5HKA; membership chairman Mike Kilgore, KG5F; and editors of The Quarterly, Chaz Wooten, KD4XX and Gary Devon, KI6DQ.

There are several issues the board is considering at press time:

Quarterly Mailing

Publicity chairman Joe Sullivan, WA1WLU, reports getting many complaints from our overseas members regarding lost issues and issues delivered in torn condition. Joe suggests first class mailing for overseas.

The board has discussed the possibility of first class mailing stateside and it was determined that the cost was prohibitive. Director Doug Stivison, NR1A, has taken on this project to explore the feasibility of second class mailing.

Dayton Hamvention

Here are the forum line-ups: Saturday, 28 April, 1530-1700, Room 4 Moderator: Paula Franke WB9TBU; "QRP—Build It!" presented by Rev. George Dobbs, G3RJV, and Ian Keyser, G3ROO; and "Practical Power Today" presented by Michael Bryce, WB8VGE

Sunday, 29 April, 0930-1100, Room Moderator: Jim Fitton W1FMR; "Milliwatt DXing" presented by Randy Rand AA2U; "Building From Kits" presented by Dick Pascoe GØBPS, Kanga Kits; and "Michigan QRP Club: Activities, Contests & Awards" presented by Lowell Corbin KD8FR, President MQRP

Buck Switzer is again in charge of our booth at Hara Arena. It is booth #243 and is located this year in the new addition at the arena. The hotel is once again at Country Suites Inn. Call Myron Koyle N8DHT at 216-477-5717 for rooms.

European CW Association

A few months ago, the Board of Directors voted to support the European CW Association. That organization was responsible for changing the proposed AMTOR calling frequency away from the QRP calling frequencies in Europe (a problem that is facing us now in the North America).

A volunteer is needed to act as liaison to the EUCW. The EUCW is anxious to establish regular contact with QRP ARCI. Anyone interested in this position should contact me as soon as possible.

Threat to 40 meter CW

A letter from Tom Verachtert, WD9IWP to the ARRL appears on page 4. Tom addresses a concern for the ARRL's support of allocating narrow frequency segments for automatic HF operation of RTTY and data transmissions. The proposal for 40 meters is to allocate 7.035-7.045 MHz—sounds familiar to QRPers, right?

The board of directors has approved a resolution objecting to any effort to earmark 7040 kHz or any other tra-

continued on page 15

The QRP ARCI is a non-profit organization dedicated to increasing world-wide enjoyment of QRP operation and experimentation. QRP, as defined by the club, is 5 watts output CW and 10 watts output PEP.

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League Threatens 40 Meter QRP Frequency

Editor's Note: Following is a letter to officials at ARRL from Tom Verachtert, WD9IWP, which should be of interest to all QRPers. The QRP ARCI Board of Directors is keeping watch on developments in this situation and will take appropriate action as necessary to protect 7040 kHz from being engulfed by RTTY and/or packet radio.

Meanwhile, all club members are urged to write the ARRL and protest the proposal to make the 7035-7045 kHz segment of 40 meter, a band segment for anything but CW transmissions. If necessary, the club will take the fight to the FCC. This proposal struck me as being the first step by the ARRL in trying to get U.S. Hams "Voice" privileges below 7.100 MHz.

Tom is to be congratulated and thanked for spotting this threat to a long-standing, traditional QRP frequency that is recognized and utilized worldwide and for alerting the membership to the problem.

ARRL Headquarters
225 Main StreetNewington, CT 06111
Attention: Mr. David Sumner, K1ZZ, Secretary
Mr. Chris Imlay, N3AKD, Counsel
Subject:
Packet Radio and RTTY in the 40 meter CW band

Dear Sirs:

I am writing as a concerned amateur radio CW operator, more specifically as a QRP CW operator, in regards to the February 1990 QST Articles "It Seems to Us..." Automatic Control, p. 9, and "Happenings", ARRL FILES PROPOSAL FOR AUTOMATIC HF OPERATION OF RTTY AND DATA TRANSMISSIONS, p. 54.

As a CW operator, I strongly object to the proposed allocation of this automatic, robotic, and what is sure to be high powered, uncontrolled digital communication to a 40 meter band segment that is widely accepted as a 40 meter QRP CW operating frequency and the daily meeting place for hundreds of QRP and other CW operators. I do not doubt the efficacy of digital communications for automatic operation of amateur message networks. I will accept your statement that the data exists to prove the utility of these technologies.

I have no objection to the frequencies suggested for any of the other HF bands. But why must the 40 meter CW band be sacrificed? The 40 meter CW band is currently divided into 25 kHz for the US Extra Class Licensees (49.883 as of October 1989), richly deserved, and, effectively, 25 kHz for Advanced and General Class Licensees (218.522). (Between 7.050 and 7.080 MHz is nothing but foreign SSB and BCI, and between 7.080 and 7.100 MHz is RTTY. Foreign phone operation is encroaching ever lower, as you suggest, frequently as low as 7.040 MHz by my own observation.

Your proposal would now crunch the 40 meter CW operations, not only QRP but also CW net operation, for 218.522 amateurs into a total of 15 kHz, 7.025 to 7.035 and 7.045 to 7.050 MHz. I think this is ill conceived and does not serve the interest of the majority of amateurs using these already crowded frequencies.

During the high portion of a Solar Cycle, those of us limited to evening time operation by our day time employment are able to move up to the 30 and 20 meter bands. But during the low portion of a solar cycle, everyone is now crammed into an already tight allocation on 40 meters, and into what would be and intolerable allocation if your proposal is adopted by the FCC. Since if is never justified, in my opinion, to criticize a proposed action without offering an alternative or string counter argument, here are my preferred alternatives:

1. My first preference is to allocate the new robotic operation to 7.080 to 7.100 MHz for manned RTTY operation. Since the digital operation you are trying to allocate is quite similar, the preferred location for this new robotic operation is in this portion of the band, either the whole 20 kHz of a subsection of it. This part of the band is already occupied by kW RTTY stations which are better equipped to cope with nearby QRM. The international community is already faced with the presence of RTTY type signals in this band segment and is well aware of the USA band plan. By allocating the new operation here, they will not have to cope with an entirely new spate of powerful RTTY interference in the band at 7.035 to 7.045 MHz which would most likely result in pushing foreign SSB QRM further down the band.

2. Much to my personal distaste because it means the loss of current CW spectrum, but an alternate plan that is fairer to a greater population of US amateurs and should be, for the reasons cited on the articles, less offensive to foreign countries, is to allocate the 10 kHz for high powered robotic RTTY and data transmissions to 7.020 to 7.030 MHz. This forces the Extra Class operators to give up 5 kHz and the Advanced plus General operators to give up 5 kHz, rather than take it all away from one group.

These are my views on the ARRL petition for rulemaking to the FCC. I do not agree that your "careful review" was careful enough. Further, in the past, the ARRL has sought member guidance in decisions such as this. Why wasn't a survey of members conducted? How many high-powered robotic stations being considered? How many nets would be forced to relocate? CW operation is not dead, as some of the amateur publications would seem to be trying to promote of late. I will be watching this action very carefully and will be asking other CW and QRP operators to make their own comments on the ARRL proposed action.

Very truly yours,
T. A. Verachtert, WD9IWP
105 Mockingbird Lane
Wheeling, IL 60090

Super RIT for the HW-8

Rulon VanDyke, KA7BCD
788 E. 1600
S. Orem, Utah 84058

A number of years ago I added Receiver Incremental Tuning (RIT) to my Heathkit HW-8 under the direction of a magazine article.

Having a minimal understanding of direct conversion receivers, I operated my HW-8 for several years without any transmitter offset. I thought the RIT modification I installed worked just like the RIT controls on superhet rigs. That is, the operator normally uses the RIT control only when he needs to track the transmitting station. Little did I know I always needed the RIT to provide a transmit offset. After learning about direct conversion receivers, transmitter offset, and proper tuning procedures,I improved my RIT circuit so it provided an offset when set to zero position.

My super RIT goes one step beyond ordinary RIT controls, as it allows sideband switching without retuning. This greatly reduces QRM in direct conversion receivers as an interfering signal may not be present in the opposite sideband. This modification requires a frequency counter to accurately adjust all the offset frequencies.

Understanding the HW-8's original offset circuitry helps one comprehend the Super RIT design. Originally the transmit offset is produced when D11 is forwarded biased via R36, adding C55 to the oscillator circuit (see Figure 1).

In the Super RIT circuit, a varactor diode replaces D11 and C55 is increased to provide sufficient oscillator swing for lower and upper sideband operation. Different voltages are placed on D11 depending on which sideband is used, the position of the RIT control, and whether or not the HW-8 is in transmit.

Furthermore, R36 is increased to provide more isolation between the RIT circuit and the VFO.

During transmit, Q1 saturates, thus impressing emitter voltage on D11 via R36. R3 and VR2 form a simple voltage divider for this voltage. During receive the voltage on D11 obtains from another voltage divider (R2, R4//VR1, and the R5+VR3/VR4 network). This voltage depends on the RIT control (VR1) and the sideband switch. The sideband switch selects a different voltage leg in the divider (R5 and VR3,or VR4). R4 limits the voltage across the VR1, determining the RIT frequency range. R7 provides isolation between the RIT and transmit voltages. R1 and D1 regulate supply voltage to 9.1V, improving oscillator stability.

Replace D11, C55, and R36 with the values given in the parts list. Locate the wire connected to R36, labelled point "B" on the HW-8 circuit board and schematic. Remove the end of the wire connected to point "K" on the same circuit board. Solder a .01 mF capacitor from point "B" to ground on the underside of the main circuit board. The RIT control can be mounted in place of the selectivity switch on the front panel. The sideband switch may also be located on the front panel; I placed mine to the upper right of the loading control.

Place the remaining parts on a small circuit board. Note that the three trimmer potentiometers (VR2, VR3, and VR4) should be at least 10 turn potentiometers to minimize resistance changes, and for better calibration. Mount the RIT circuit board close to the RIT control and VFO circuitry. Connect 12 volts, ground, RIT control, sideband switch, and the wires from "K" and "W" (CW key, grounded on key down) on the main circuit board to their proper places on the RIT circuit board. The Super RIT is now completed!

For linear operation, Super RIT must operate in the linear region of the graph (Figure 2), between +3 to +5

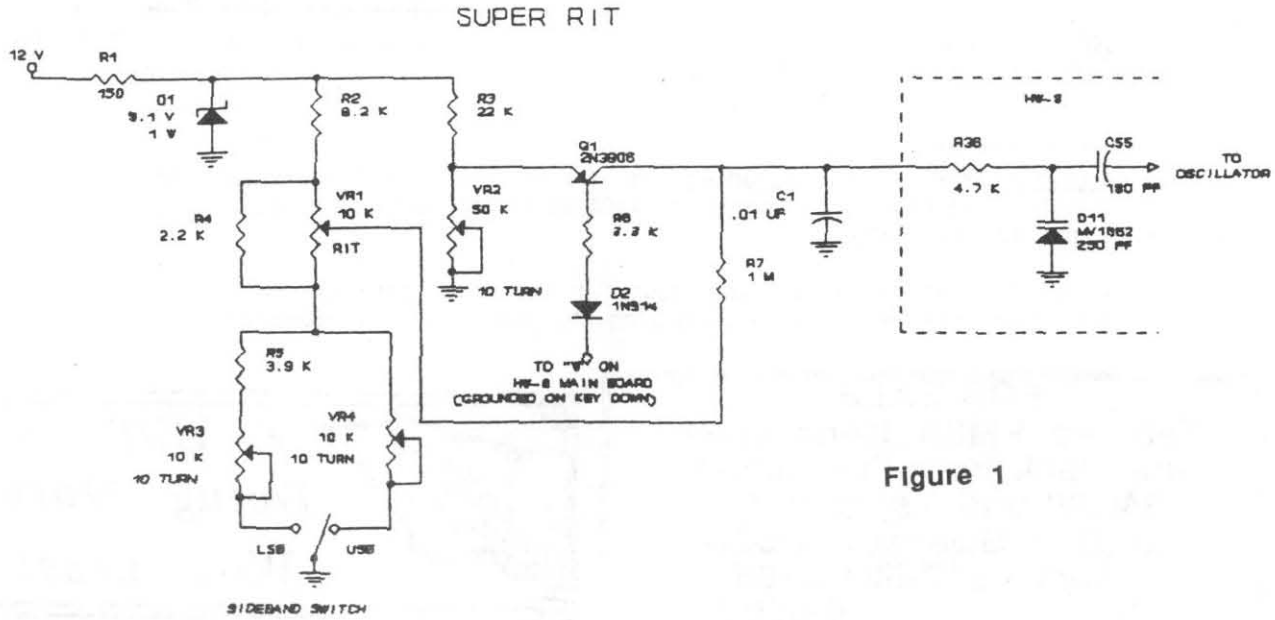


Figure 1

volts. While transmitting, adjust VR2 for 4 volts on the collector of Q1. Measure the local oscillator output by attaching a high impedance frequency counter to TP-2 (Q5 emitter) on the main circuit board. Adjust the VFO while transmitting to 7.040000 MHz. on the counter. Set the sideband switch to USB and the RIT to the center, or zero position. Adjust VR4 for a reading of 7.040800 MHz. Key the transmitter, and verify that the counter reads 7.040000 MHz.Set the sideband switch to the LSB. Adjust VR3 for a reading of 7.039200 MHz. Key the transmitter again and verify a reading of 7.040000 MHz. Repeat these adjustments until all three readings have been verified. Now the RIT control should be rotated to its stops in both directions to verify that a linear variation of the RIT control causes a linear change in oscillator frequency.

Adjust the RIT control to the zero position. Zero beat the transmitting station by tuning the VFO until an 800 Hz tone is heard. Tune to the sideband at which the sideband switch is set, or proper zero beat will not occur. If increasing the VFO frequency increases the pitch, the operator is tuned to USB. If decreasing the VFO frequency increases the pitch, the operator is on LSB. Once "netted" or zero beat with the transmitting station, the operator can instantly copy the other sideband with a flip of the sideband switch to avoid QRM. The RIT control can be adjusted to track the transmitting station.

The R2 and R4 voltage divider sets the range of the RIT control; with the specified value of R4, the RIT range is +/- 800 Hz. This range can be increased by raising the resistance of R4. R2 should be decreased by the same amount that R4 in increased in order to maintain the 10 Kilohms total resistance of the string.

PARTS LIST[1]

REFERENCE NO.	TYPE	DESCRIPTION
	CAPACITORS	
C1	0.01 µF 50V	Disc
C55	180 pF 50V	Silver Mica
	DIODES	
D1	1N914	Diode
D2	9.1 V 1 Watt	Zener
D11	MV1662 250pF[2]	Varactor
	TRANSISTORS	
Q1	2N3906	Small Signal PNP
	RESISTORS	
R1	150 Ω ¼W 10%	Metal Film
R2	8.2 kΩ ¼W 10%	Metal Film
R3	22 kΩ ¼W 10%	Metal Film
R4	2.2 kΩ ¼W 10%	Metal Film
R5	3.9 kΩ ¼W 10%	Metal Film
R6	3.3 kΩ ¼W 10%	Metal Film
R7	1 MΩ ¼W 10%	Metal Film
R36	4.7 kΩ ¼W 10%	Metal Film
	SWITCHES	
S1	SPDT	Toggle
	VARIABLE RESISTORS	
VR1	10 kΩ	Potentiometer
VR2	50 kΩ 10-Turn	Trimmer
VR3	10 kΩ 10-Turn	Trimmer
VR4	10 kΩ 10-Turn	Trimmer
	CIRCUIT BOARD	
276-150 Radio Shack		Experimenter's IC Perfboard

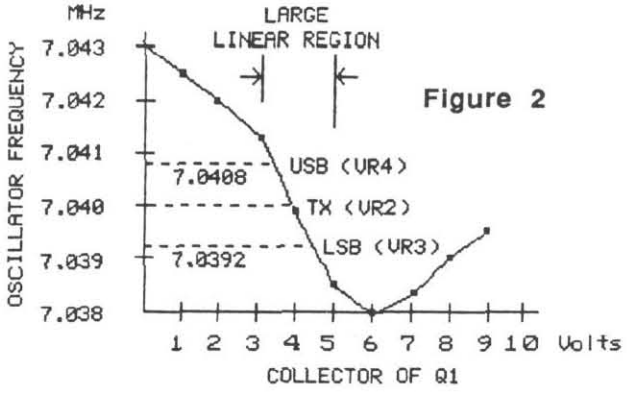


Figure 2

[1] A complete kit of parts including the circuit board can be purchased for $9.50 plus $2 shipping from, Antennas West, 1500 North 150 West Box 50062, Provo, Utah 84605, tel 801-373-8425.

[2] This varactor diode can be purchased for around $1 plus shipping, from Small Parts Center, 6818 Meese Drive, Lansing, MI 48911 tel 517-882-6447.

The DB25 QRP Challenge

Michael A. Czuhajewski, WA8MCQ
P.O. Box 232
Jessup, MD. 20794-0232

After reading an article in CQ about the practice in the 1920's of building crystal sets in thimbles, Robbie, WB3EVS, became intrigued with tiny QRP. He reasoned that modern technology allowed for building sophisticated yet tiny equipment, and thus was born the DB25 QRP Challenge.

One day WB3EVS showed me a small plastic bottle, which had previously contained DB25 connectors pins (for RS232 computer use). A common bottle size is 3 1/2 drams, with an inner diameter of 0.8 inches, and length of 1.4 inches (0.70 cubic inches), which is about 40% of the volume of a 35 mm film canister, the size basis for the DB25 Challenge. Anything which would fit inside was defined as a DB25 rig, whether a receiver or transmitter.

Initially I was confident of my goal to place a transmitter inside the container, but doubted that my partner could fit an entire transceiver inside. As things turned out, both our goals were achievable.

A loose set of specifications were followed. First, no surface mount devices were allowed. Also, components and techniques had to be commonly available. No one-transistor transmitters or crystal set receivers were allowed. Transmitters were required to have at least an oscillator and amplifier, along with harmonic suppression on the output. Crystal control, if used, could be external, but any VFO had to be inside the bottle. The rig must be capable of making actual contacts on the air. The output power was not specified, but we aimed for at least 1/4 of a watt.

All external connections were made with wires coming out of the bottle. It was suggested that at least one connector be included on the bottle, if possible. A lot of things were not spelled out, to allow room for experimentation and innovation. We accepted this project as a challenge, rather than as a competition.

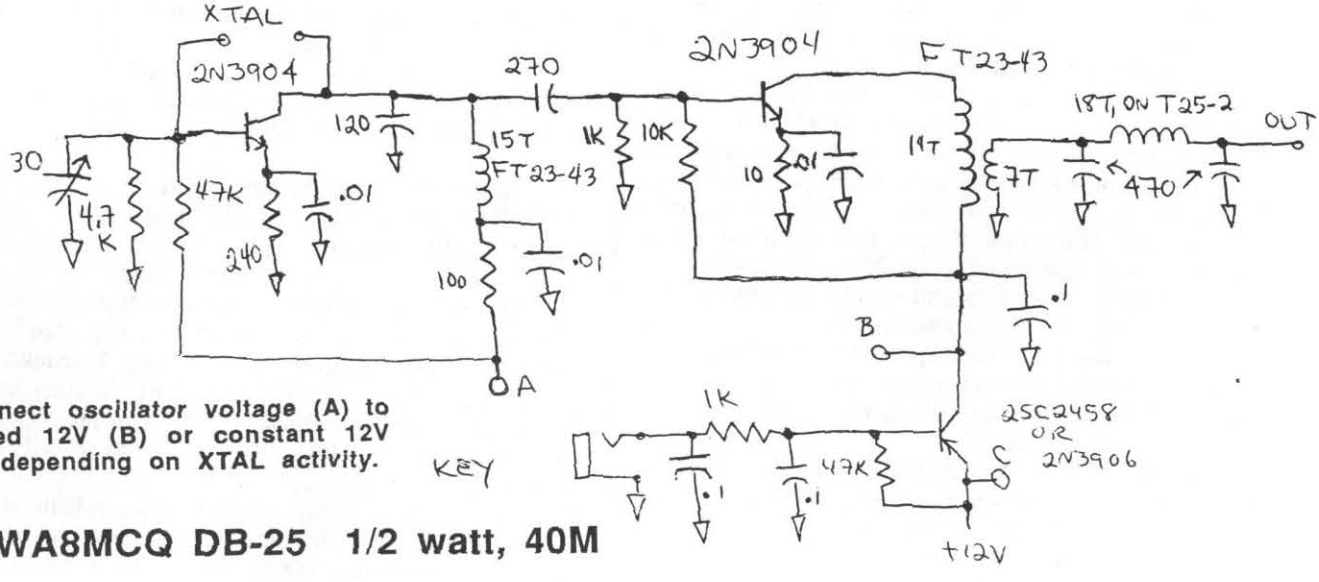
As of this writing, Robbie's project is still in the works, due to business commitments. N2GAR and I built 40 meter crystal controlled transmitters in our bottles, and Hal, WA5JAY, built a complete 40 meter VFO CW transceiver, tuned with a jewelers screwdriver. That rig, built by an inactive QRO ham, is the current star, and he fully describes it in a separate article (see DB-25 Project in this issue).

I have been on both ends of QSO's with his transceiver. It really does work, and it fits in the palm of your hand. It has some shortcomings, due to the limited time available for design and construction, not due to the small size.

I claim the distinction of completing the first rig, and completing the first contact with one. My rig is based on the W1FB Tuna-Tin 2 from May 1976 QST, and puts out 1/2 watt on 40 meters. I used a piece of 0.8 x 1.4 inch perf board with 0.1" hole spacing.

By comparison, WA5JAY built his rig on three perf board discs, with the layers stacked on top of each other, a QRP high-rise! His method was much more space-efficient. I abandoned the idea of mounting parts on both sides of the board quickly. As a result, the only parts on the bottom area resistor, a toroid, and a trimmer capacitor. Wiring is all point-to-point, with several wires often sharing one hole. I used a pair of 2N3904's for the crystal oscillator and amplifier, and filed the plastic cases to match head size, an idea from WA3TID. I added another transistor to allow grounding for the key. Here I cheated a bit, and used a 2SC2458 pulled out of a junked TS930S, and it is already match head size without filing. A 2N3906 could also be used.

Miniature parts such as 1/10 watt resistors, monolithic capacitors, T25, and FT23 toroids were used extensively. Both male and female DB25 pins were used as connectors. These were tied onto the board with single strands from stranded wire, then soldered for rigidity. Matching pins are plugged into them for the crystal,



Connect oscillator voltage (A) to keyed 12V (B) or constant 12V (C) depending on XTAL activity.

WA8MCQ DB-25 1/2 watt, 40M

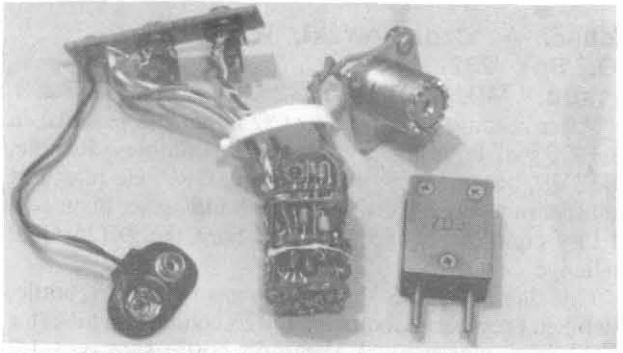
DB-25 Project, H. F. Bower Version

Hal Bower, WA5JAY
c/o Michael A. Czuhajewski
P.O. Box 232
Jessup, Maryland. 20794-0232

The challenge of building a rig in a DB25 connector pin bottle brought back memories from 1962 of that transmitter I built in a machine screw box. And now, I would construct a CW transceiver in that tiny bottle utilizing only a 9 volt battery for power.

The cylindrical shape and size of the 3.5 dram bottle (0.8" diameter and 1.4" long) and the use of commonly available parts ruled out the normal rectangular board configuration. A boardless scheme would have become an impractical "rat's nest". I cut multiple 0.8" circles of "one pad per hole" perf board to fit just within the bottle. This method provides sturdy solder points for components, and a method of soldering bus lines between the wafers. Study showed three wafers would fit, providing enough space for a VFO-based, direct conversion transceiver.

I built the Hartley VFO on the lowest wafer, far from the antenna leads at the bottle's top. A small glass piston trimmer cap of 2-6 pf. combined with a Radio Shack 2N3816 FET and a T-25-2 toroid formed the VFO's heart. Receiver mixer output was taken form the 2N3816 source through a 5 pf capacitor. Transmitter output was buffered by a 2N4393 FET source-follower. The lowest wafer also contained the transmitter driver, another 2N4393 FET.



WA5JAY DB25 40 meter 1/2 watt transceiver (crystal for reference only). This rig has internal VFO!

I built the receiver mixer on the middle wafer. I tested several designs before selecting the 40673 dual gate MOSFET mixer. The mixer proved very sensitive but suffers from AM broadcast detection. An LM386 mounted vertically on the middle wafer performs as the receiver audio channel. The remaining space contains the transmitter tank circuit RF coupling coil (FT23-61 toroid), and most of the 600 Hz transmitter offset circuit.

I built the final amplifier, low pass filter, and receiver protection diodes onto the topmost wafer. I adapted these designs from various published articles. I selected a Radio Shack VN67AF VMOS power FET for the final amplifier. Cutting off the heatsink tab and filing the package reduced the size slightly. Also, the device operates in enhancement mode, which requires no bias components, thus reducing circuit size.

Once all three wafers passed bench testing, they were mounted together. Two supports fashioned from 1/4 watt resistor leads were soldered through aligned holes in the wafers, providing ground busses. A third support provides the 9 volt power bus. Intra-wafer connections are made through available holes or along notches in the wafer edges. Flexible wires run through holes in the bottle cap connect the headphones, key, battery, and antenna to the rig.

The 9 volt lead to the driver and PA is keyed, while the VFO, buffer, and receiver are always on. A small hole near the bottle bottom provides access to the piston trimmer for tuning with a jeweler's screwdriver.

This rig does perform, within limitations imposed by the size constraints. Hand capacitance effects can be minimized by holding the rig while tuning. Unwanted AM detection could be reduced by picking off the receive signal from a tap or low impedance winding, at the expense of sensitivity. This problem also increases in severity as the battery voltage is reduced.

The transmitter chirps slightly on weak batteries. The headphones click loudly on transmit--sorry, no sidetone. The rig covers from 6.988 to 7.108 mHz, as measured on

Challenge...
(continued)

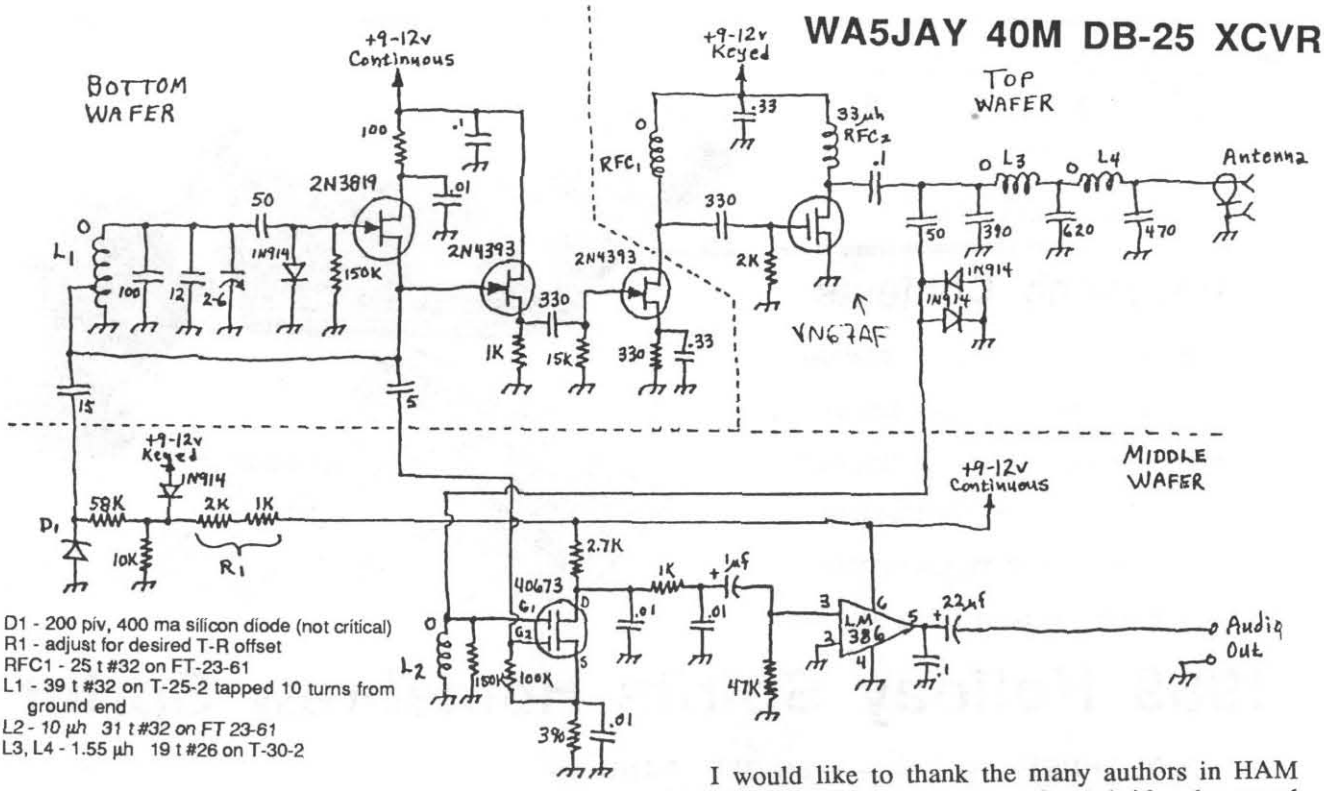
power, and key. The antenna connected via a piece of RG-174 coax terminated in a BNC plug. Two more pins were soldered onto a crystal socket, so it could be plugged onto the bottle.

A jeweler's screwdriver stuck through a hole in the side tunes the trimmer capacitor to pull the crystal frequency about 800 Hz. Power output ranges from 250 to 500 mW, depending on the frequency. The oscillator may be keyed or left on continuously while transmitting, depending upon crystal activity. Jumper the appropriate pins on the board to select either mode. The external T/R switch turns on the 12 volt transmit line.

As any QRPer knows, 1/4 watt is sufficient when coupled with a good antenna, propagation, and operator skill. I put the rig on the air over two weekends, and made ten easy contacts in 7 states on 40 meters.

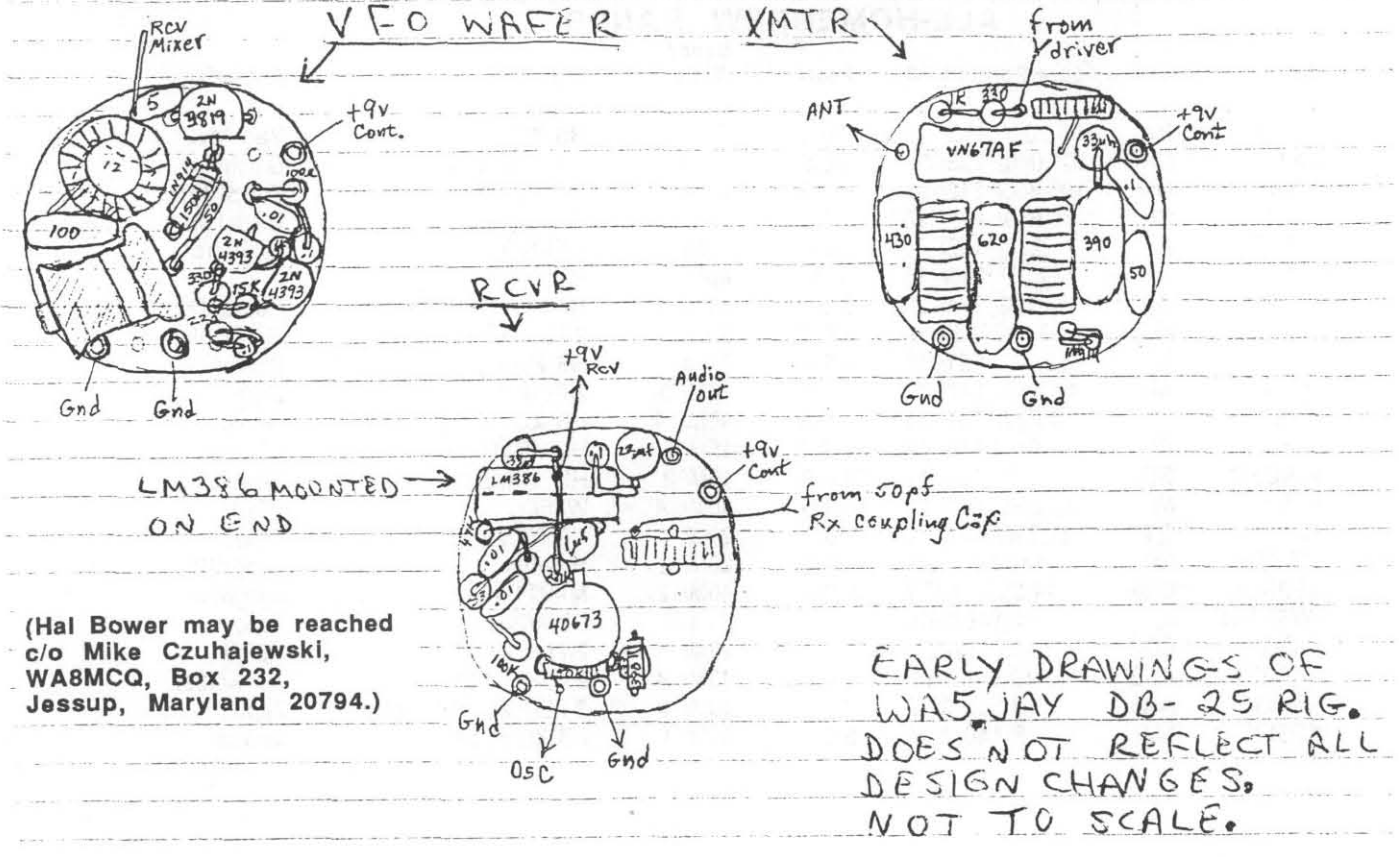
The N2GAR rig is a close copy of the Poor Ham's QRP Rig,Figure 2-5 in Doug DeMaw's QRP Notebook. While he used the same tiny resistors, capacitors, and toroids that I did, Paul also used larger parts, including five dipped silver mica capacitors, 1/4 watt resistors, and a T50-2 toroid. Top mounting and point-to-point wiring were also used. Instead of metal 2N2222As, with cases connected to the collectors and supply voltage, he used plastic 2N3904s for closer spacing. He also eliminated variable capacitor C2 to save space, and selected a larger value for C3 to give good output. Paul's rig emits 1/2 watt on 40 meters. Several QSOs were completed from my station using his rig.

The DB25 challenge was fun, one of the aspects of ham radio about which we mustn't forget! These little rigs encourage homebrewing, too. I'm sure The QRP Quarterly would love to present more articles on DB25's...who will rise to this new challenge?



a TS-430S. VFO drifts about 3 kHz during the first 30 minutes. Power output varies from 120 to 220 mW. into a 55-68 ohm loads, when powered from a 9 volt battery. Not bad for a pill bottle!

I would like to thank the many authors in HAM RADIO, QST and CQ magazines for their ideas borrowed for this project. I would also thank Mike, WA8MCQ, who talked me into this and provided assistance with parts procurement and information, as well as the 1989 Gaithersburg, Maryland hamfest where many small parts were obtained.



(Hal Bower may be reached c/o Mike Czuhajewski, WA8MCQ, Box 232, Jessup, Maryland 20794.)

Contests

Red Reynolds, K5VOL
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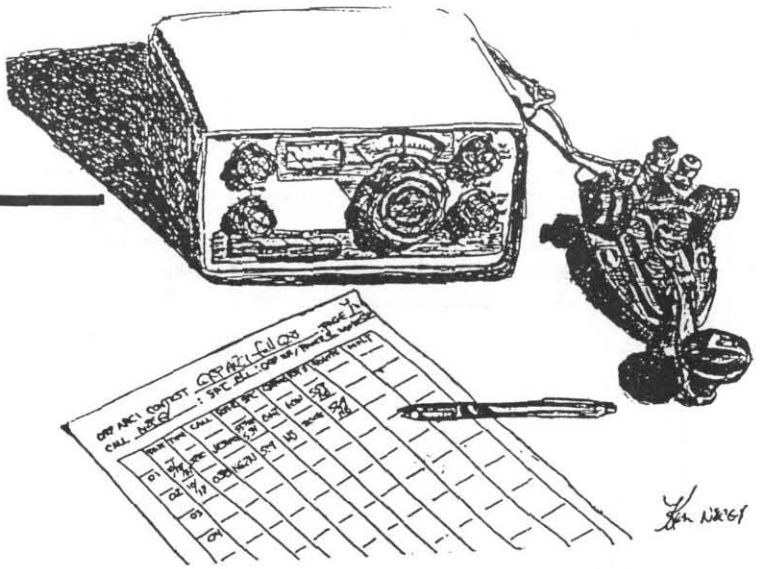

Upcoming Contests

Spring QSO Party: April 14 (1200Z)-15 (2400Z)

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Hootowl Sprint: May 27 (2000-2400 local time)

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Summer Homebrew Sprint: July 15 (2000-2400Z)

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Summer Daze Sprint: Aug. 12 (2000-2400Z)

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Fall QSO Party: Oct. 20 (1200Z)-21 (2400Z)

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Holiday Spirits Homebrew Sprint: Dec. 2 (2000-2400Z)

1989 Holiday Spirits Homebrew Sprint

-------TOP THREE------			-------SINGLE BAND-------		
1	W3TS	395,200	80 M	WD8DWM	6,770
2	KN1H	201,040	40 M	W8MVN	80,880
3	NF5Y	170,240	20 M	VE50T	62,740
			15 M	KF7MD	39,514

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ALL-HOMEBREW BANDS

Call	SPC	Score/Points/SPC	Power	Bands /Time	Rig	Antenna
W3TS	PA	395,200/ 415/ 44	.90 S	6 / 4	HB XCVR ~S)	Yagi/InvV
KN1H	NH	201,040/ 292/ 31	.70 S	4 / 4	HB RX(s)/TX	Dipole/Lw
WI5W	OK	105,860/ 212/ 27	.90 B	4 / 4	HB RX/TX	Zepp/Vert
W8MVN	OH	80,880/ 271/ 20	2.0 S	40M/ 3	HB XCVR	Delta Lop
*K5VOL	IL	76,200/ 166/ 20	.08 S	20M/ 3	2-FER XCVR	Longwire
WD2H	NY	73,800/ 246/ 15	.9 S	40M/ 4	HB XCVR	---
K9AY	CO	58,116/ 271/ 28	5.0	20M/ 4	HB XCVR (S)	Rotate Dp
W2JEK	NJ	54,820/ 51/ 9	4.0 B	5 / 3	2-FER XCVR	Gp/Dipole
KB1MJ	MA	52,128/ 221/ 16	5.0 B	3 / 4	HB RX/TX (S)	Dipoles
N5KIG	AR	43,796/ 142/ 17	2.0 S	20M/ 3	2-FER XCVR	Zepp
KH6CP/I	CT	41,740/ 167/ 11	.44 S	40M/ 4	HB XCVR (S)	Dipole
KF7MD	WA	39,514/ 173/ 19	2.0 B	15M/ 3	HB XCVR (S)	LP/Loop
WAØZPT	SD	33,560/ 160/ 17	3.0 B	15M/ 3	HB RX(S)/TX	VersaLoop
KM8X	MI	30,200/ 140/ 12	.90 B	40M/ 4	W7EL	G5RV
NN1G	CT	21,760/ 140/ 12	1.5 B	2 / 2	HB XCVR/RX/TX	Windom
W5TTE	NM	14,360/ 52/9	.90 S	20M/ 3	HW-8/m	Loop/BB
VE2BLX	QUE	14,335/ 127/7	5.0 B	40M/ 2	MAVT1-40	Longwire
WA9QMO	IL	14,140/69/6	.80	2 / 1	HB XCVR	Zepp
KIØG	CO	10,630/20/3	1.5 B	20M/ 1	2-FER XCVR	G5RV
VE6BLY	ALB	10,599/19/3	2.5 B	40M/ 4	2-FER-2 XCVR	A3 w/40el
N5KIG	AR	10,560/20/2	2.0 S	40M/ 1	2-FER XCVR/Neophyte	Zepp
KD5LX	NM	5,140/20/1	5.0	40M/ 1	HB XCVR (S)	Inv Vee

MIXED BANDS

Call	SPC	Score/Points/SPC	Power	Bands /Time	Rig	Antenna
KVØK	CO	159,980/ 298/ 34	1.0 B	4 / 3	HB TX/R4C	Yagi/G5RV
NC8X	OH	107,004/ 234/ 29	5.0 S	3 / 4	2-FER TX/HW-9	Longwire
WB7SNH	WA	85,800/ 190/ 28	1.0 B	3 / 4	2-FER/HW-8	Yagi/Slop
VE50T	SK	62,740/ 178/ 22	.90 B	20M/ 4	2-FER TX/FT-IOIB	Quad
K3TKS	MD	49,000/ 150/ 11	.90 S	40M/ 3	2-FER TX/Argo 509	Loop/Dp
N1GJR	NH	37,658/ 283/ 18	4.5	40M/ 3	HB TX/R4C	Inv Vee
KD8FR	MI	9,850/65/9	1.0	2 / 1	6AQ5 TX/Tempo-1	Loop
WD8DWM	MI	6,770/53/9	.90	80M/ 4	Hall VFO/m//RS DX-440	End-fed
WD5GLO	OK	4,695/55/7	3.0	2 / 1	HB TX/HW-9	Yagi/Vee

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COMMERCIAL

Call	SPC	Score/Points/SPC	Power	Bands /Time	Rig	Antenna
NF5Y	MS	170,240/ 266/ 32	.90 S	4 / 4	HW-9	Yagi/Loop
WB3AAL	PA	125,280/ 261/ 32	1.0 B	4 / 4	Argo 515	Vertical
N4OHB	AL	94,276/ 364/ 37	5.0	3 / 3	IC-735	Quad/Dp
VE3KQN	ONT	92,340/ 228/ 27	1.0 B	3 / 4	HW-8	Inv Vee
K2QJ	NJ	85,470/ 370/ 33	5.0	3 / 4	HW-9/TS-930	---
N3FYW	PA	74,704/ 232/ 23	4.0 S	4 / 4	HW-9	Inv Vee
WB2QAP	NY	65,205/ 189/ 23	.90 B	2 / 3	Argo 509	Inv Vee/V
WA3SRE	PA	41,958/ 222/ 27	4.0	4 / 4	Argo 515	Vertical
AA5HN	TX	39,816/ 158/ 18	5.0 S	20M/ 4	Argosy-1	Vertical
W2PFS	NY	30,800/ 176/ 25	5.0	3 / 3	TS-130V	Loop
KK4HF	AL	30,345/ 170/ 17	3.0 B	20M/ 3	HW-9	Longwire
AJ6T	CA	24,206/ 182/ 19	5.0	15M/ 4	FT-726R	Delta Lop
WØNGB	MN	22,950/ 102/ 15	.80 B	3 / 2	TS-440S	Yagi/Vert
AL7FS	AK	18,560/ 116/ 16	.90	15M/ 2	Century-22	Yagi
W2FB	NY	18,375/ 125/ 14	4.0 B	3 / 1	HW-9	Yagi/Zepp
W6YVK	OR	16,170/ 110/ 14	3.0 B	3 / 1	TS-440/AT	Vertical
N8LA	MI	12,285/ 117/ 15	4.0	2 / 2	Argo 515	Inv Vee
K16DQ	CA	12,208/ 109/ 16	5.0	2 / 4	HW-101	Gnd Plane
WN2Q	NY	9,310/ 95/ 14	4.0	2 / 3	HW-9	Loop
WD9IWP	IL	5,544/ 44/ 9	5.0 S	15M/ 1	IC-735/m	Inv Vee
PY7FNE	BRAZIL	2,688/ 48/ 8	4.0	2 / 1	HW-9	Yagi
K4FS/MM	CA	2,520/ 45/ 8	4.5	2 / 1	Argosy	Vertical

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CHECK LOGS: N9GPF

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Time of operation rounded to nearest hour
* = Contest manager - not eligible
B = Battery power
S = Solar / natural
/m = Modified

HB = Homebrew
(S) = Superhet
LP = Log Periodic
BB = Button Beam

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The Holiday Spirits sprint finished out 1989 with a record of 54 entries to lead all sprints. It seems a few QRP'ers are able to negotiate a four-hour sprint easier than a 24-hour QSO party. * The most popular rig ? - the 2-FER !!

Four new All-time single band records:

WD8DWM set a new single-band record for sprints on 80M (.9 W)
W8MVN set a new single-band record for sprints on 40M (2 W)
K5VOL set a new single-band record for sprints on 20M (80 MW)
KF7MD set a new single-band record for sprints on 15M (2 W)

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1990 WINTER FIRESIDE SPRINT

-------TOP THREE -------

1	N7NKG	214,402
2	VE5ZX	120,960
3	KIPVT	74,316

-------SINGLE BAND-------

80 M	---	00,000
40 M	---	00,000
20 M	WB5KYK	50,127
15 M	VE7EQA	4,774
10 M	N7NKG	214,402

------HIGH/LOW BAND------

HI-BAND	W5TTE	31,960
LO-BAND	---	00,000

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Call	SPC	Score/PTS/SPC	Power	Bands/ Hours	Rig	Antenna
N7NKG	WA	214,402/ 407/ 49	10. B	IOM/ 4	HB DSB	Yagi
VE5ZX	SK	120,960/ 540/ 32	10.	IOM/ 4	TS-930S	Yagi
K1PVT	CT	74,316/ 209/ 34	9.0 B	5 / 4	FT-757GX	Yagi/Dp
KCØPP	MO	67,200/ 140/ 24	1.8 S	4 / 4	FT-757GX	Yagi/Cone
W3TS	PA	50,880/ 106/ 24	1.0 S	6 / 4	HB XCVR (S)	Yagi/Vee
WB5KYK	MS	50,127/ 217/ 33	10.	20M/ 3	TS-440S	Yagi
AJ6T	CA	44,226/ 156/ 27	10. B	IOM/ 4	FT-726R	Yagi
W2PFS	NY	38,752/ 173/ 32	5.0 S	4 / 4	TS-130V	Loop
WAØVBW	IA	35,532/ 188/ 27	3.0	4 / 2	Argo 509	Yagi/Vee
W5TTE	NM	31,960/ 94/ 17	2.0 S	H-3/ 3	Argo 505	Loop/BB
KAØVSL	IA	30,912/ 96/ 23	5.0 S	4 / 2	Argosy	G5RV/Loop
KF7ET	ID	24,024/ 143/ 24	5.0	H-2/ 4	Argosy 525	Yagi
WX7R	OR	21,280/ 80/ 19	4.0 S	H-2/ 3	IC-735	Yagi/Vee
W6SIY	CA	19,642/ 122/ 23	4.0	4 / 4	TT Delta	Quad/Dp
KA5PVB	TX	18,600/ 93/ 20	1.9	H-2/ 4	TS-520	Vertical
N5JWL	TX	13,680/ 76/ 12	1.5 B	IOM/ 2	Argo 505	Yagi
WD8DWM	MI	12,644/ 78/ 14	7.0	IOM/ 4	Cobra/m	Gnd Plane
KD8JN	OH	10,605/ 101/ 27	2.0	IOM/ 4	Argo 515	Yagi/Slop
KFØFS	MO	9,600/80/ 12	1.8	H-3/ 3	IC-735	Yagi
WD9IWP	IL	7,700/55/ 10	10. S	4 / 2	IC-735	Inv Vee
WD2H	NY	7,290/54/ 9	.90 B	H-2/ 1	Argo 515	Yagi
WD7I	AZ	5,292/42/ 9	10. S	20M/ 3	IC-725	V. Dipole
VE7EQA	BC	4,774/62/ 11	10.	15M/ 1	TS-530S	G5RV
*K5VOL	IL	3,770/49/ 11	2.0	4 / 3	Argo 509	Longwire
VE6GK	ALB	3,640/52/ 10	10.	H-2/ 1	---	Vertical
WA4NID	FL	3,497/37/ 9	10. B	H-2/ 2	---	---
WA3YYC	PA	2,457/26/ 9	10. B	IOM/ 2	IC-735	Yagi
WØNGB	MN	1,313/25/ 5	10. B	H-2/ 1	TS-440S	Yagi
JA8RJE	JAPAN	315/15/ 3	10.	15M/ 1	TS-180V	Yagi

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S = Solar / natural
/m = Modified
HB = Homebrew
(S) = Superhet
BB = Button Beam

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COMMENTS:
N7NKG set a new record on 10 meters.
WB5KYK set a new record on 20 meters.
W5TTE set the record on the new catagory of HI-BAND.

Diary of a Contester

by Dave Muller, KK2E
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East Moriches, New York 11940

Ever since the completion of my solar panel last fall, I have been thinking about trying solar power QRP contesting. My previous QRP operating had been limited to some sporadic operation using a couple of one watt transceivers I had built. It was fun, but the QRP "hook" had still not been set. The solar panel seemed to be just the impetus I needed.

I decided to try QRP in the ARRL DX CW contest this year. I set a goal for myself of 200 QSO's. It seemed to be a realistic goal, based on past experience running 100 watts, although it was a bit hard to judge since for several years I have used a linear amplifier in every contest I have entered.

As the contest approached I busied myself with various preparations. A temporary two element delta loop antenna for 40 meters was installed on a 56 foot telescoping mast, a Heathkit HW-9 was built and modified and the operating position was rearranged to accommodate the HW-9. However, Murphy intervened before my preparations were complete. Due to business and family obligations some of the HW-9 work had to be left to the last minute, when a problem with the crystal filters was discovered. At 1 p.m. Friday, six hours before the contest, the decision is made to abandon the HW-9 and use my trusty TS-830S with reduced drive. So much for solar powered contesting! Also on Friday I noticed that my delta loop had lost its reflector, and I spent much of the morning before the contest repairing it.

2350Z Friday: Minutes before the contest I have the rig warmed up and the decision is made to start out on 15 meters. My wattmeter is a fairly precise instrument, having a 20 watt scale, but not trusting its accuracy I decide to set the output to four watts to make sure I don't exceed the QRP limit. I'm expecting most stations to have a great deal of difficulty copying me, and I spend the last few minutes debating how long I think it will take to make the first contact. I settle on about 10 minutes.

0000Z Saturday: Hey! The first minute's not over yet, and I already have I4IND in the log! This will be a piece of cake!

0015Z: I now have three contacts in the log and the fourth continues to elude me. Maybe this won't be so easy after all. I elect to move down to 20 meters.

0100Z: I'm rolling right along now on 20 meters. I expect the QSO rate to drop soon once I work most of the "big guns".

0245Z: I decide to switch to 40 meters. My competitive strategy is that most QRP'ers will concentrate on 20 through 10 meters. I hope to gain an advantage by getting more 40 meter multipliers than most. I cross my fingers as I give it a try.

0400Z: Hey, this antenna really works! I have about 20 QSO's on 40 meters so far, I figure that if 40 meters works, why not try 80 meters a little later?

0435Z: 80 meters turns out to be a rude awakening. No one hears me except WF8C/VP9 in Bermuda. I decide to spend the remainder of the evening alternating between 40 and 20 meters.

0645Z (1:45 AM): For the past hour I have been rationalizing how a few hours sleep will improve my performance the next day. I'm not sure if I believe it, but I do believe that I'm not 21 any more. I decide to take a nap.

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ALL TIME CONTEST LEADERS (YEAR END 1989)

--- CW --- (QSO PARTIES)

BAND	CALL	SCORE	
ALL	N4BP	3,587,220	Fall 88
160	N8CGY	1,260	Fall 87
80	WK8G	136,800	Fall 88
40	W8MVN	284,720	Fall 89
20	WD71	343,200	Fall 89
15	W6SGJ	103,572	Spring 89
10	WB2CZB	26,100	Fall 88
6	---	---	---
HI	---	---	---
LO	---	---	---

--- CW --- (SPRINTS)

BAND	CALL	SCORE	
ALL	W3TS	452,380	Holiday Spirits 88
160	---	---	
80	WD8DWM	6,770	Holiday Spirits 89
40	W8MVN	80,880	Holiday Spirits 89
20	K5VOL	76,200	Holiday Spirits 89
15	KF7MD	39,514	Holiday Spirits 89
10	T12QRP	7,600	Holiday Spirits 88
6	–	---	
HI	---	---	
LO	---	---	

-- SSB ---

BAND	CALL	SCORE	
ALL	W8WVR	179,580	Summer Daze 88
160	---	---	
80	---	---	
40	---	---	
20	WB5KYK	32,039	Winter Fireside 89
15	KA6HGT	58,500	Summer Daze 89
10	WA61ET	107,184	Winter Fireside 89
6	---	---	
HI	---	---	
LO	---	---	

--- TEAM ---

Colorado QRP Team:
(KRØU, KIØG, WØKEA, WIXE, W8QZA)
3,825,663 Fall 1989

0920Z (4:20 AM): Back on the air, I decide to continue to concentrate on 40 and 20 meters until daybreak. I'm still working about 15 stations on hour which is far better than I ever expected. Even though I still expect the rate to drop soon, I raise my goal to 300 QSO's.

1700Z: I now have 250 QSO's in the log and there's no let up in sight. I realize that I'm not just working the guys with big towers and Yagis, I seem to be able to work just about everyone I hear! This is incredible. I double check my output power, it's still four watts. A little arithmetic tells me that theoretically, I should get over 500 QSO's at this rate, but I'm still not prepared to set my goal that high.

2300Z Saturday: The contest is not even half over and I have logged 350 stations! I am almost convinced I really will reach 500 QSO's. To put this in perspective, the most I have ever worked in the past was 589 QSO's, and that was running 700 watts output.

0100Z Sunday: CN8FC is calling CQ on 20 meters. As I swing the beam over to Africa, I realize that the pileup is substantial and the chances for a QRP station are slim. After a few minutes of fruitless calling, I move on.

0250Z: Tonight's rationalizations are even harder to resist than those of last night. Fatigue wins, and I decide to give myself a break and get five hours sleep.

0950Z: I've been back on for an hour on 40 and 20 meters, and it's almost time to go back to 10 and 15 meters. Before I do, I decide to give 80 meters another try. To my surprise, I work four more stations, all new multipliers.

1500Z: There's TA2BK on 10 meters with a considerable pileup. After the CN8 experience, I almost pass it up, but while I'm here, why not throw in my call a couple of times? He returns with KK2?, and my heart is in my throat. As I complete the contact and log it, I wonder of I'm starting to hallucinate. The rate is still about 13 an hour, less than half the rate this time on Saturday, but predictably I'm having trouble finding stations I haven't already worked. Also, propagation doesn't appear to be as good and quite a few stations just don't seem to hear me.

2030Z: I have over 490 QSO's, but the rate is getting VERY slow. Still, 500 QSO's now seem inevitable, and for the first time in the contest I finally start to relax.

2126Z: OH6AP on 20 meters is QSO 500; now I can really coast. I decide to quit at 2300Z and have dinner.

2200Z: There's a weak station calling CQ with a strange callsign. I struggle to copy it while I swing the beam around, and discover that it peaks with the beam on Africa. It's 5H1HK, Zanzibar, with no one answering him. One quick call and he's in the log, and nobody else seems to have noticed him.

2250Z: Just before breaking for dinner I snag several new multipliers, including TA2BK on 20 meters.

345Z: With 515 entries in the log, I still can't resist trying to find a few last multipliers in the waning moments of the contest. I find several new ones on 20 meters, but time runs out while I'm calling GW3NYY, who would have been yet another multiplier.

Now that the contest is over, I can sit back, savor it, and draw some conclusions. One is obvious, I went into this contest with some serious misconceptions about what can and cannot be done with five watts of output. Conversely, I may have been overestimating the value of high power to a contester, or maybe I just haven't learned how to use the power to my best advantage. The final results are 518 QSO's, 159 multipliers for 247,000 points, and one very happy contester. It's worth noting that this is 21,000 points above last year's winning score, although everyone's scores are likely to improve this year due to better propagation. While I will still operate high power in some contests, you can bet I'll be on QRP again soon.

QRP VHF Contesting in the Field

by Peter E. Beedlow, NN9K
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Let me start out by stating that I am not a VHF QRP contester, I'm strictly QRO all the way. However, all of the concerns that I face in the field are very similar for the QRP VHF contester.

Let's start out with the first consideration for any contester, where am I going to contest from? That's easy, the nearest mountain top! Oops that's a bit difficult for some of us but we still have choices. For city folks there may be access to roofs or penthouses of tall buildings, but remember, don't forget to check for RF that may cause desense or other problems. For the folks in the flat lands there are still high places that can be found, Interstate overpasses for example, are usually higher than the average terrain, although the highway noise factor may by a bigger problem than a site with a lower elevation. If you can't find a location that is elevated above average terrain try to pick a site that is at least clear of nearby tall trees and obstructions.

Some other site considerations: ambient electrical noise that may be present and cause problems, sanitary facility availability, general public access (you may be spending more time as a amateur radio public relations person than as a contester), your access and egress. The last item could be very important during inclement weather conditions, you could get in and not be able to get out!

Equipment choice is probably the most straight forward and easiest of all the considerations. Rig choice will be dictated by the band or bands to be operated and what equipment is on hand or can be borrowed.

A good preamp is a must. I'm partial to in-line preamps because they can be turned off when not required, such as during sporadic E openings on six meters when everyone is 20 over S9 anyway. Memory keyers and the newer digital voice keyers are a plus and go a long way towards preventing operator fatigue. Stacked antennas are definitely an asset and a good way to add 2.8 db to your ERP as well as your received signal.

Stacked antennas however makes supporting structure choices a little more tricky. My personal choice is lightweight tower such as Rohn 20 or even 25 especially on six meters, or on two meters with some of the longer, higher gain antennas. For example my six meter multi-op portable antenna system consists of two, five element beams with 16 foot booms. Support is 30 feet of Rohn 25 with a tilt-over base, good quality rope guys and four foot screw anchors. The antennas are stacked eleven feet apart using 1" and 3/4" mast. Feedline is a easy choice, hardline for all bands. If that's not an option, then cable TV hardline or Belden 9913 variety of coax should be used.

Don't forget about items such as an operating table, seating and lighting. These easily overlooked or forgotten items go a long way in making any contest an enjoyable event rather than a chore for the operators involved. Log sheets, dupe sheets, grid square maps, pencils/erasers, scratch paper, compass (do you know where north is?), schedule sheets, 24 hour clock, alarm clock (great to wake you up for that 5 a.m. schedule), and all the other necessities needed to keep track of all of the contacts and multipliers that you are going to make. You can add or delete from this list as your personal operating habits dictate.

Power requirements, if not prescribed by the contest rules for the category you're are going to operate, then it's probably whatever is available. Pre-test everything before you take it to the field! Know what the fuel consumption for portable generators is from experience, not word of mouth, and plan accordingly. If you are going to use or modify commercial power that's available, be extremely careful! Know what you are doing and don't take any chances however slight the risk might seem.

I have been contesting away from my fixed station location for a number of years and if I have learned one thing, it is to "plan for the worst!" It's going to rain and storm when mother nature wants it to, no matter what the soothsayers have said. Or there will be four hours of aurora, and you didn't even pack a straight key. I'd much rather take too much and not have to use it, than suffer for taking too little. Granted, there are varying degrees of too much or too little, that's something you will have to determine, guided by your habits and your chosen contest location.

One item that should be included no matter where you go or how you get there, and that's a good first aid kit. Remember, SAFETY FIRST!

Maybe it's because I'm getting older, but I have found that I spend a lot more time than I used to planning for operator comfort. I try to make my single operator "off times" as hassle free as possible. Menus for example are planned in as dictated by band conditions. Sleeping conditions are made as comfortable as possible so I can hopefully make a little sleep go a long way.

Operating away from home can add an exciting dimension to QRP contesting. Adding that element of total self-sufficiency to the challenge of QRP operation makes for excitement as well as satisfaction. I hope that you will give VHF QRP contesting a try. Just remember that although the goal is to work a lot of stations and grid squares so as to do well in the contest, do it safely and have fun.

President...

(continued from page 2)

ditional and internationally recognized QRP frequency for RTTY and data transmission frequencies. It also urges the ARRL to modify its proposal to the FCC and seek frequencies elsewhere in the 40 meter band.

I urge the QRP ARCI members to make their concerns known as Tom Verachtert has already done.

Resolution

WHEREAS low-power (QRP) Amateur Radio operators have a long, honorable and well-deserved history of experimentation and development that have enhanced the growth and pleasures of our hobby, and

WHEREAS QRP operators are one of the fastest growing segments of our hobby, and

WHEREAS the international QRP community for more tan a decade has recognized and used 7040 kHz as its calling and listening frequency in the 40-meter Amateur band and has made it a cornerstone of the numerous QRP nets, contests and operating periods throughout the year, and

WHEREAS the American Radio Relay League has proposed that the Federal Communications Commission set aside certain frequencies in the various high-frequency Amateur bands for automatic operation of RTTY and data transmissions, including the 7035 to 7045 kHz portion of 40 meters, which would engulf the traditional QRP frequency on that popular and already-crowded band, and

WHEREAS other portions of the 40-meter band, notably the 7080 to 7100 kHz region, already are a known and used area for RTTY transmissions, most of which are at power output levels hundreds and sometimes thousands of times more than QRPers run, and

WHEREAS the League has taken this action without consulting this or nay other group whose members have a well-known history of use of frequencies which would be adversely affected by the proposal now before the FCC.

NOW THERFORE BE IT RESOLVED that the Board of Directors, QRP Amateur Radio Club International, objects to and opposes any effort by the League or any other group to persuade the FCC to earmark 7040 kHz or any other traditional and internationally recognized QRP frequency for RTTY and/or data transmissions or to have 7040 kHz used for other than CW transmissions, and

BE IT FURTHER RESOLVED that the Board urges the League to modify its proposal to the FCC and seek RTTY and data transmission frequencies elsewhere in the 40-meter band, and

BE IT FURTHER RESOLVED that the Board, through the officers of the Club, will make its feelings known to the FCC, including filing testimony opposing the League's proposal in its present state.

Jim Larsen, AL7FS, at the business end of his station in Anchorage, Alaska. Turn the page to read more about his activities in the Members' News column by Fred Bonavita, W5QJM.

Members' News

By Fred Bonavita, W5QJM
P.O. Box 2764
San Antonio, Texas 78299-2764

TWO PLUS AND GOING STRONG! Belated birthday wishes to the St. Louis QRP Society, which turned 2-1/2 last November and boasts some 30 members. With steadily growing membership, a strong homebrewing program and a variety of informative and entertaining speakers at its monthly meetings, there is no wonder club president **Keith Arns, KCØPP,** can boast: "We have really made the ham community notice QRP and its place in operating." Although membership is limited to those in St. Louis and environs, this club has managed to attract some justified attention nationally and can expect to be seen and heard from at the upcoming ARRL National Convention in Kansas City later this year.

FROM SAO PAULO, BRASIL, comes word from **Mauricio Tibirica, PU2NGL,** that he is on the air with a five watt transmitter on 40 meters during the weekends, and is looking for fellow QRPers to work. Mauricio says he spends his available time reading about and studying low power and operating, and he is trying to drum up increased interest in QRP operating in his country.

ED deBUVITZ, W5TTE, logs in from Albuquerque with news that he now has DXCC-QRP behind him and is setting out for a milliwatting version of the same. His five watt total is 162 worked and 135 confirmed.

"Call me crazy, but it really isn't that much different than with five watts," Ed says. "I started in September and now, in mid-December, I have 40 (countries worked) with an output power of 600 and 900 milliwatts. The last CQDX contest netted me seven new ones..." The most exciting contacts so far have been a CT3 and an EA8 on 40 meters and XF4T on 80 meters. I use the Butternut HF6V ground plane for those bands,"Ed advises.

How about some activity on 12 and 17 meters? That's the plea from **David Johnson, WA4NID,** from Gainsville, Fla., who says he finds them "really nice frequencies that we would all benefit from exploring." (His address is Box 389, zip 32602.) David would like to know if any reader has designs for stable VFOs for those bands. He's also in the market for any of the early Ten-Tec modules, especially the TX-1.

While visiting his parents during the year-end holidays, David managed to land HAØIT while running two watts into a dipole in the attic of a single-story house. David isn't the only one interested in hearing more about QRP on 18 and 24MHz (see Members' News, October 1988). We still need some suggested operating frequencies for those bands. Send your recommendations to me at my new address (see above), please, and I'll share them with the rest of the gang. Meanwhile, has anyone bagged a QRP WAS, WAC, DXCC, WAZ on either of those bands?

When last heard from in late 1989, **"Jake" Jacobs, XE2IM/NW6F,** had made it back to his digs at Mulege in Mexico's Southern Baja peninsula. Many hams had the pleasure and privilege of meeting Jake in his visit last summer to the ARRL convention in Dallas and later on his whirlwind tour of other parts of the country on his motorcycle over the rest of the summer and into the fall. He logged a modest 25,000 miles!

"I'm arrived home on a Saturday afternoon and spent a good part of Sunday just trying to get the RadioKit 20 meter rig I got from Rick Littlefield on the air," Jake continued. "I did make the TCN with a very rusty fist and missed words received. **Roger Rose, W5LXS** is a great operator, and my Sundays would not be the same if he were not there." (Amen to that, Jake. -- ed.)

From a little farther north along the Pacific Rim comes word from **Jim Larson, AL7FS,** in Anchorage, Alaska, that he is busy building a Two-fer kit for 20 meters and is shopping around for an active audio filter for the Ten-Tec Argosy. Jim would like one of the factory variety or would welcome hearing from anyone who has homebrewed one. (Address: 3445 Spinnaker Drive, zip 99516.) As can be seen from the photo Jim enclosed, his equipment includes a pair of Century/22's, the analog Argosy and a Kenwood TS-440. What's not visible is a KLM beam at 40 feet. Jim got his feet wet in last fall's CW contest running 900 mw on 15 meters and had a ball.

A picture of Jim appears on page 15.

Another exotic QTH heard from: **Thaire Bryant, WA1MJR,** of North Weymouth, Mass., advises last October's issue of the QRP Quarterly reached him just three days before he shoved off to a vacation in Saint Maarten, where he operated /PJ7. He had just enough time to build the KISS antenna described in the issue.

"The antenna worked perfectly on 10, 12, 15, 17, and 20 (meters). I didn't try it on 30 or 40 meters," Thaire writes. "All CW QSOs were at five watts or less, and all got me at least a 559. Worked GM, G, OH, OZ, DJ, CI, ZW, VE and 1, 2, 3, 4, 5, 6, 7, 8, and 9 call areas in the U.S." Listen for Thaire as FJ5/KA1MJR in May or June. His rig is an IC-730 throttled back to QRP and into the KISS, which he says now is a permanent part of his portable station.

Since we started out on a congratulatory note, let's end on one, too. Hats off to **Chris Page, G4BUE,** a former QRP ARCI BOD member and active QRPer. He has passed his exams and now is a member of the bar in the UK, in addition to his regular duties as a police officer.

Shower down some news items, please, to the new address, and mind the new deadline in the process. Let me hear from you as soon as possible, please.

Idea Exchange

Michael A. Czuhajewski WA8MCQ
P.O. Box 232
Jessup, Maryland 20794-0232

Miniature Dial Drives For Sale

This month we start off with a parts offer for the homebrewer. **Danny Stevig, KA7QJY**, has a number of small Jackson Brothers dial drives for sale at $5 postpaid. Contact Danny at Box 7970, Jackson, Wyoming 83001 or call 307-739-1634 after 6 p.m. Mountain Time.

These are JB's miniature 10:1 drives with flange for mounting a dial or pointer. They are single hole mount, with nut supplied, and accept standard 1/4" shafts on the output end. The input shaft is a bit smaller than 1/4" (Danny says it's about 4 mm), but this shouldn't be too much problem. The output torque is 8 oz. in. Radiokit lists it in their catalog under number 5870/F for $13.70.

QRP BBS?

Not quite, but almost. Maryland Radio Center in Laurel, Maryland has a dial-in computer bulletin board on 301-7258307, 24 hours a day. It accepts 300, 1200 and 2400 baud. After you log in and register, you can type CS from the main menu to get into the Conference System.

One of the individual conferences is QRP, created by **Danny Gingell, K3TKS**; he and I have been active on it for about two years now. He and I seem to be almost the only ones who put anything on it, although a few curious users of the system read it to see what the crazy QRPers are doing. We put a variety of QRP info on there, such as upcoming contests and events, homebrewing notes, sources of parts, operating tips, etc. If you have a computer and modem, you might find it worthwhile to look into—and we'd love to read someone else's material for a change!

Quick & Dirty Crystal Filter Test

Mike Michael, W3TS, sent me a crystal filter for 1.98 MHz and I wanted to check it out but didn't have a signal generator available. I didn't need lab quality measurements at this point, just a rough go/no go indication, so I tried an alternate method with a general coverage receiver and antenna noise bridge.

The latter, which can be found in any recent ARRL Handbook in the test equipment chapter, is really a white noise generator at heart and puts out energy spread across all frequencies simultaneously--sort of like one of my early QRP rigs years ago!

It's actually a bit more complicated than needed for this application, which simply requires a wideband noise source, since it contains an NE555 oscillator to modulate the noise and has a trifilar output transformer for a bridge. All you really need is the zener diode noise source and two transistor amplifier.

Skip ahead to the troubleshooting and repair chapter and you'll find an AF/RF signal injector, which is basically the same circuit with a different oscillator and simplified output. Again, all you need is the zener diode and everything to the right.

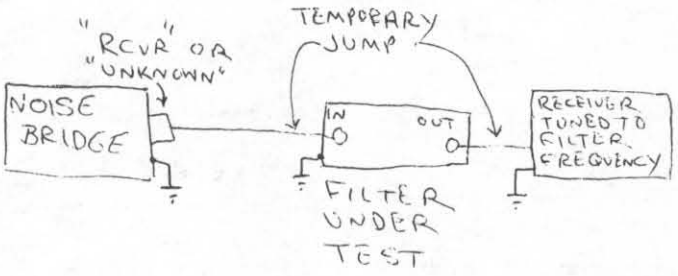


FIGURE 1 (WA8MCQ)

Connect the bridge, filter and receiver as shown. Don't worry about proper terminations, as this is just a quick test. Tune the receiver to the approximate frequency of the filter and momentarily bypass it with a jumper. You'll hear noise everywhere as you tune around, above and below the filter frequency.

Remove the jumper and now only the noise which is within the passband will be heard as you tune. By watching the S meter, you can get a rough idea of the bandwidth and insertion loss. I later tried this with an 8830 kHz filter with equally good results. This method may not be NASA quality, hut it does give a quick good/bad check.

More on HW-9 Drift

From **Charles Cole, K3VFH**, of Williamsport, Penn.:

My HW-9 has always had a major drift problem, but none of the reports of how to correct it sounded very promising until I read the note on HW-9 drift by Larry East in the October 1989 issue of The Quarterly. Following his advice, I used a 33 pf NPO capacitor in place of C184 (which is N750).

However, in my case this overcorrected, changing a large positive VFO drift into an equally large negative drift. I then substituted a 33pf N220, with the following satisfactory results, measured with a Ramsey CT90 counter:

Time	Before	After
1st hour	1299 Hz	550 Hz
2nd hour	334 Hz	45 Hz
3rd hour	289 Hz	1 Hz

Digital Readout for HW-9

Jack Cleary, WN2Q, of Syracuse, New York writes: one of the nicer additions to my 100% QRP station is a Ramsey Electronics model CT-50 frequency counter, used on my HW-9. Connected to test terminal TP-101, direct frequency readout on all bands is possible. Ramsey supplies a receive preload count adaptor kit (RA-1) for use with any receiver provided the IF used has direct

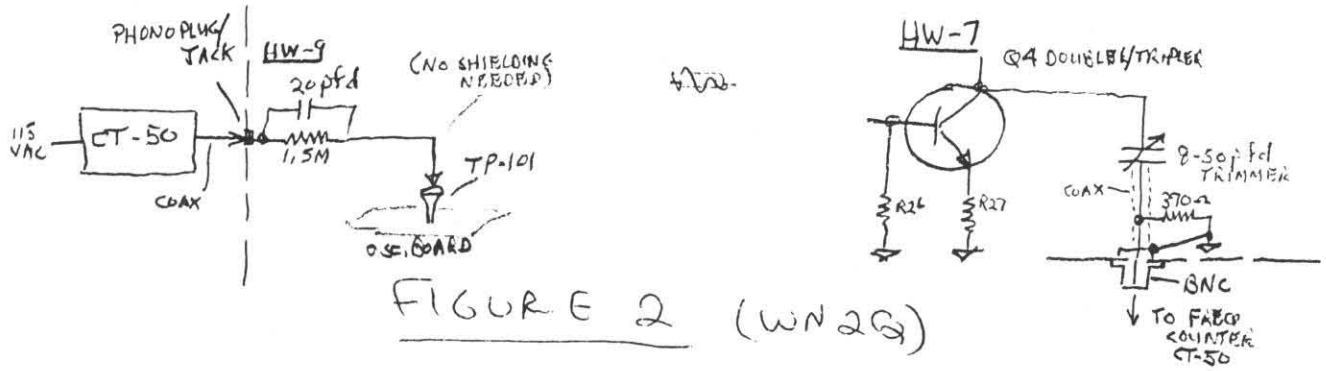


FIGURE 2 (WN2Q)

injection and not reverse. Reverse injection is when the VFO frequency decreases as receive frequency increases.

I connect the counter with a short length of coax to a phono jack mounted on the back of the HW-9 near terminal TP-101. A parallel RC network (1.5 megohm and 20 pf) is soldered to the jack and the other side is inserted into TP-101.

I first used the CT-50 with my HW-7, but common mode hum was so bad I could use the counter only as a spotting readout. I would turn it on, tune, then turn the counter off.

Powering the counter with 12 VDC helped. Hum vanished after modifying the HW-7 and power supply.

The CT-50 was connected to the Q4 collector through an 8-50 pf trimmer and a 39O ohm resistor to ground on the counter side. The trimmer was adjusted for minimum loading on Q4 and oscillator Q2 for stable counter readout. Using this method, direct frequency readout worked good on all bands with the HW-7.

When placing the HW-9 in service, the Ramsey RA-1 preload PC board was modified because of the IF change. Following the instructions supplied with the RA-1 kit made it easy.

This is the only frequency counter I have come across that is supplied as a kit and an accompanying preload kit for use by the homebrew receiver builder.

WA8MCQ comments:

I did some checking on the HW-8 and there's a way to do it there, too. As with the HW-7, it's a direct conversion rig, with the injection right at the signal frequency, so it can be read directly on any counter, both transmit and receive, without presets.

There are places in the HW-9 where the signal frequency is present too, but according to the schematic it appears to be available in the transmit mode only. If you want a receive readout in the HW-9, which is a superhet, you have to settle for counting the injection frequency with presets. As for the HW-8, the signal is available, at all times, at TP2 which is the junction of the Q5 emitter and R49 (270 ohms). R49 is one of the four resistors right behind the VFO coil shield can.

Additional notes from John:

After putting the HW-9 together and getting it on the air, I found all sorts of problems with it. I finally realized that all kits one puts together, especially in the communications field, have to be optimized for performance by the builder. I had low injection voltage, hot finals, parasitics, VFO drift and so on. Little by little I got things working efficiently.

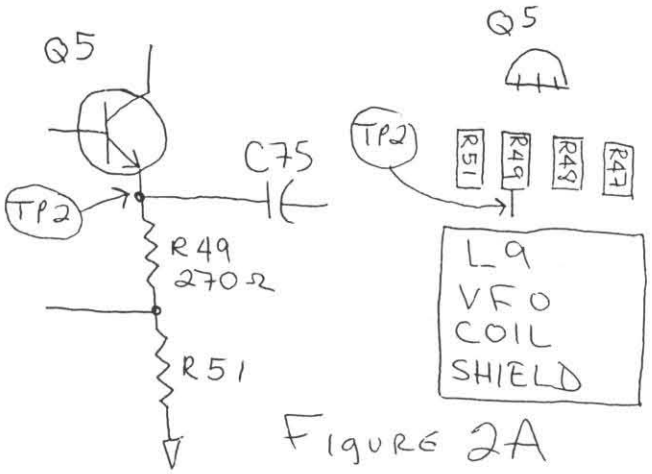
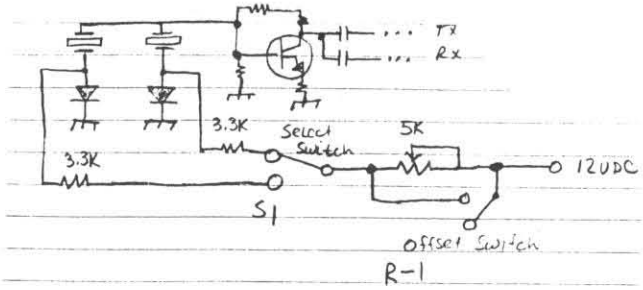


FIGURE 2A

One of the things that perked up the HW-9 was increasing the BFO injection voltage per Herb Ley's, N3CDR, article in the April 1989 Quarterly. I was measuring only about 60 mV and good injection called for 400 mV or more. One of the biggest problems was loss of power output after a few minutes into a QSO. It took me a while to track down the culprit, Q113, which tied in with the low injection voltage. I would key and power would slowly drop from 4 watts down to a half watt. Q113 must have been leaky, but when changed for higher injection voltage, everything snapped into place.

Lil' Sucre Transmitter Note

Don Kelly, KA5UOS, of Edmond, Oklahoma described his Lil' Sucre transmitter in the October 1989 issue of The Quarterly (and matching receiver in April 1989). There is a potentiometer labelled R1 in the schematic, feeding the keyed 12 V to the crystal switch. He didn't mention its function in the article, so I asked him about it and he confirmed my suspicions. His reply—"My first Lil' Sucre was going to be a one or two frequency transceiver. My configuration for the oscillator was going to be as follows:"



"R1 varies the voltage across the diode and shifts it just enough to use for 700 Hz offset. In my transmitter I figured I could use it to VXO the crystal somewhat but after trying it for a while I took it out because it was of pretty limited use. My first idea for the transceiver would have worked fine but I gave up on it because one or two frequencies are pretty limited."

WA8MCQ note:

I haven't experimented with Don's circuit yet, but even if the frequency shift is quite limited, it's still better than being completely rockbound.

TS-830 QRP

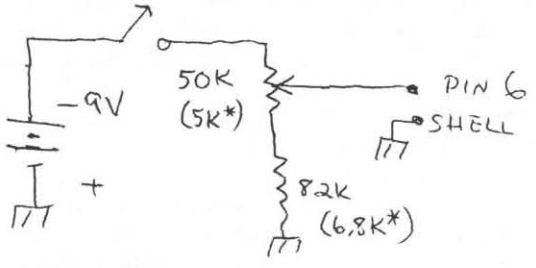
From **March Ressler, K3NCO**, College Park, Maryland—Taking a page from WA8MCQ's article in the July 1989 Idea Exchange about a QRP controller for the TS-4305, I decided to try a similar thing with a TS-830 (vacuum bulb final).

Although you can control CW output by using the front panel carrier control, the useful QRP range is over a small angle and kind of touchy. This rig also uses pin 6 of the 7 pin DIN auxiliary connector on the rear panel for external ALC input. Measuring output power versus ALC input voltage on 15 meters gave the following results when the carrier control was set at maximum (fully clockwise):

ALC Voltage	Power output (watts)
-6.50	100
-6.70	50
-6.95	20
-7.15	10
-7.30	5
-7.60	2

Power output versus voltage varies somewhat across a band and noticeably from band to band; for example, -6.70 V yields 100 watts on 80 meters.

I had a ten turn pot mounted in a wooden signal slope front box with terminal posts that I had picked up at a hamfest years ago. I added a switch, glued a 9 volt alkaline battery inside and ended up with a modified version of Mike's controller as shown below:



* INITIAL VALUE; LATER CHANGED TO PROLONG BATTERY LIFE

This gave me just what I was looking for in smooth control--now I had five turns of a pot to take me from about 10 watts down to 50 milliwatts—and even lower if you turn down the carrier control! But Mike is right, make sure your connections are TIGHT! I sacrificed a lN270 in my QRP wattmeter to the QRO gods when all of a sudden I made 100 watts.

Believe it or not, the switch is actually needed to get reasonable life out of the battery even though the circuit drain is under 1 milliampere. An alkaline 9 volt battery is good for about 550 mAH or three weeks of continuous use at this level. After leaving the switch on overnight two days in a row, I put a dayglo "TURN IT OFF" note on the controller, which worked just fine until I left town for a week with it switched on.

It turns out that alkaline batteries have a reasonably constant drop in voltage versus discharge and that 550 mAH rating is for a battery discharged to 5 volts! This would mean two weeks into the battery lifetime you wouldn't have enough voltage left to run QRP.

Mercury and silver batteries have much flatter curves and would hold on until really dead, but with the alkalines you get a warning as you have to crank in more and more control voltage turn down the wick. P.S.—forget nicads; the typical 9 volt nicad is 7.2 volts and only good for 75 mAH. Measuring the current drain to the ALC pin showed only 3 microamps, so the 5K pot was replaced with a 50K version and the 6.8K resistor replaced with an 82K. Total drain is on the order of 70 microamps. This works just fine and now if I forget to turn the switch off it will only last 11 months

The controller overdrives the ALC line with a fixed voltage. This means there is no feedback loop operation as in the standard ALC system. In fact, if you switch your meter to the ALC position, you'll find the needle smashed hard up against the pin! If you set up your rig by tuning into a dummy load, you will need to monitor your forward power when operating into a non-ideal load or use a transmatch to make the rig see 50 ohms (I do both).

The real problem occurs when running SSB, where the output is not influenced by the carrier control but only by the mike gain. With no feedback loop, it is easy to generate too much output--with the rig set to make 5 watts CW with the carrier control all the way up, you can get 30 watts PEP if you yell in the mike, even with the mike pot only halfway up.

To get around this problem on the TS-830 you need to use the speech compressor—probably not a bad idea when running QRP anyway. You don't need any more than about 10 dB of compression, although more will work. I just don't like the sound of highly compressed speech, let alone transmitting every little noise in your house. The compressor is effectively limiting the amplitude of the incoming audio and your mike gain control now becomes an output level control.

On my rig, setting the control at "8" gets you 5-6 watts PEP and "9" gives you 9-10 watts PEP. Anything higher than "9" takes you out of the defined QRP levels. You should get similar results from other rigs with compressors, like the TS-530, and a well designed outboard audio compressor or limiter should work for rigs not otherwise equipped.

I probably should just pull the 6146's out of the rig and run on the driver tube, but I have this rig around so I can still run 100 watts when needed. This way you don't have to experiment with things like that or change screen and plate voltages. So what's YOUR excuse for not trying your old tube boat anchor on QRP?

The Chicken Bander

by Robert W. Slack, W9DLN
5591 Michigan Road
Plymouth, Indiana 46563

The problem of supporting the ends of a wire antenna has plagued hams from the Marconi era to the present. Many ways of getting the support over a tree limb have been tried, including sling shots, a weight tied to a rope and slung cowboy style, bow and arrows, etc. (Ref. Field Day Antenna Raising, Zuni Loop Style, April 1988 QRP Quarterly).

The most popular seems to be a combination of a bow and special arrows of some kind. A common complaint is that although the arrows go up ok, dragging a monofilament fishing line with them, they have a distressing tendency to remain out of reach in the tree, instead of threading their way down to the ground. After the leaves fall, many a ham has glumly contemplated his support tree festooned with arrows gently swinging in the breeze.

In pondering the problem, the thought came to me, why not use something that would climb the tree for me? Trapping a squirrel at first glance seemed to be a possibility, but trapping proved to be difficult, and squirrels seem to get panicky when turned loose with a line tied to their tails. I then tried the family cat, but he did not want to go to the top, and when he finally did, he refused to come back down. The local fire department had to be called to rescue him. I considered asking them to string up my antenna since they had ladders at hand, but they seemed rather surly for some reason so I did not broach the subject.

I then got a flash of inspiration and began to work with chickens. Leghorns, to be exact. For you city folks, chickens come in brands, like Leghorns, Rhode Island Reds, etc., something similar to automobiles, Buick, Chevy, Plymouth, etc. I chose Leghorns because they are the racehorses of the chicken world, you might say. Compared to other birds chickens are lousy flyers, in fact most of them can't fly at all, but compared to other chickens, Leghorns are the creme de la creme. I have seem Leghorns fly to the top of a 75 foot tree and roost for the night, descending only when they've sighted the feed being put out.

So, in true scientific fashion I set out to train a Leghorn to carry a line up and over a tree, and then come home to papa on the ground. With Pavlov's dog as an example, and using a shotgun lightly loaded with rock salt, I soon had a gun-shy chicken. Chickens are not very smart, stupid as a matter of fact, but it doesn't take much intelligence to associate the sight of the shotgun, plus the loud noise it makes when shot, with a burning sensation in the tail feathers.

Before long, the sight and sound of the shotgun being fired were enough to inspire in him an urgent desire to be elsewhere. With a great deal of squawking and commotion, he took flight. Since I had him with a monofilament fishing line and rod I could more or less steer him in his flight up. He soon learned which way he could go, and I had a trained chicken. He learned so well, as a matter of fact, that I calibrated him according to the height I wanted him to achieve. A ".410 gauge" for instance, is good for a 35 foot tree height. A 20 gauge for 50 feet, 12 gauge for 75 feet, and with a double barrel 12 gauge fired simultaneously you have a broken collar bone and the chicken is out of sight.

If you have aimed the chicken just right, he will fly up and over the limb you've selected. Most chickens are right-footed, so tie the line to his right foot, and taking the wind into account, aim him a little to the left. As he ascends, he will drift to his right, and go over the selected limb. You then put the shotgun away, and uncover a pan of chicken feed. Since chickens have very poor memories, he will forget the shotgun and realize he is hungry. Down he comes and there you are with your line nicely strung where you want it. Be careful that you stay out from under the line of flight. The trauma often causes some internal distress in the chicken, and you will soon be aware that not everything went up with the chicken. Remember, the line of flight is also the line of fire.

A word of caution: if you by come chance get a left footed chicken, he may fly up the wrong side of the limb, twisting the antenna and triggering inverse reactive current. This will adversely affect your unilateral phase detractor, resulting in an exaggerated Lake Erie swing in your CW signal. The only cure is to reverse the wires in your keyer paddle, bug, or straight key, and learn to send with your left hand. For SSB, simply switch to reverse sideband, and turn your headphones around.

This project has possibilities that boggle the mind. I an currently toying with the idea of the use of massive doses of steroids, and teaming up a delta loop, or a lazy H 200 feet up?

Idea Exchange...
(continued)

Homebrewer Part for Sale (WA8MCQ)

For someone interested in homebrewing a SSB rig, or CW rig with relatively wide bandwidth but great skirt response, I have a used 2.7 kHz crystal filter for sale for $20 postpaid and insured. It's a Trio (Kenwood) YK-88s1, part number L71-0222-05, the basic SSB filter in the TS-830S as it comes from the factory. The frequency is 8830 kHz, the standard Kenwood (and HW-9) IF. It's used, but tested good according to the procedures earlier in this column. I can also throw in a couple 8830 kHz crystals free, if you need them for BFO use. (Sorry, they are not available separately.) If interested, write me at my address at the top of the column and include an SASE.

Parting Shots

As always, the Idea Exchange welcomes your technical tidbits. Don't worry if they're a bit long—if necessary, I'll pass them along to the technical editor and they'll be run as a regular article. We're looking for anything to do with QRP and homebrewing—radios, accessories, experiments, etc. Don't pass up your chance for eternal QRP fame and glory!

Omega Tuner

by Alden Gamage, WA9QMO
501 S. Gladstone Ave.
Aurora, Illinois 60506

Here is an antenna tuner that will do an excellent job for the home or portable station. It will match open-wire lines, coaxial cable, and end-fed antennas through a wide range of impedances, covering all bands 80 through 10 meters, including the WARC bands. There are no switches, tapped coils or roller inductors. It is an unorthodox yet simple all-purpose tuner that will delight the antenna experimenter. This tuner will load just about anything that vaguely resembles an antenna and do a fine job.

The inductors can be commercial coil stock or home brewed by winding them on 35 mm film containers, plastic pipe, or toroids.

Winding information is given below for 35 mm plastic film containers. (L1 #1-12T, #3-10T, L2 #2-7T, #4-9T) All windings are 1.25" in diameter, and spaced to 1.25" long. Winding #3 is wound over #1, and winding #4 is wound over #2. Windings #1 and #2 are wound with #18 or heavier enamelled wire. Wrap the first winding with plastic tape, then wind the second.

Mount L1 and L2 at right angles to each other to eliminate unwelcome coupling. A very compact tuner can be put together using toroids. In my compact model I used T-106-2's. #20 enamelled wire was used for windings 1 and 2. Insulated hook-up wire was used for windings 3 and 4. Wind #3 over #1, and #4 over #2. For L1, #1-16T, #3-12T. For L2, #2-9T, #4 11-T. All windings should occupy 80% of the toroids.

Binding posts from Radio Shack were used to bring windings 3 and 4 out to the back panel of the tuner. A red and black pair was used for each winding. An end-fed antenna may be fed from a red post, and the black post goes to ground. Use a counterpoise instead of an earth ground when operating portable, as a good ground is hard to obtain in many locations. As you will discover, one pair of posts feeds low impedance antennas, while the other pair of posts feeds high impedance antennas.

There is an overlap of impedance matching abilities of this tuner; some lengths will work as well on either pair. There is little to be gained by cutting an end-fed antenna to frequency. Just string up enough wire to reach from a convenient support to the tuner, and let the tuner do its job.

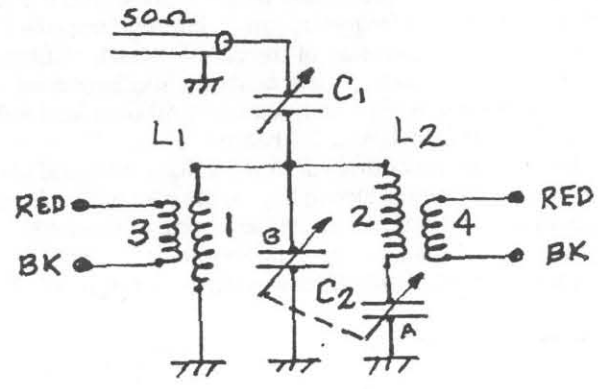
Open-wire line can plug into either winding 3 or 4. The choice depends on the feed line impedance presented to the tuner.

Coax may also be fed to the low impedance winding. Connect the braid to black, and the center connector to red.

Construction method is up to the builder. My portable model fits nicely into a 6" x 6" x 3" H.B. enclosure with enough room for an SWR bridge and 5W full scale power meter.

Polyfilm variables can be substituted for the air variables in the part list. Circuit Specialists have one that is a little low in capacity, two sections 266/2666 pf. It would be easy to switch in 100 pf across each section to bring the capacity up to the needed 365/365 pf. For C1 both sections in parallel would provide more than enough capacitance. These little caps are only about 7/8" square, and can be purchased for about two dollars each. Banana plugs on the antenna, ground wire, counterpoise or open-wire line make the set-up a snap. They can also be color-coded with red and black.

Good luck with building and using this tuner! For me, it is the Omega of tuners, the last tuner I'll ever need.



L_1	L_2
#1 - 3.2uH	#2 - 1.1uH
#3 - 2.1uH	#4 - 1.6uH

C_1 - 2 section variable from an old AC-DC radio. Unequal sections wired in parallel, insulated from ground and panel - about 300 to 400pf.

C_2 - A-B splitstator 365 pf each sec. Loading capacitor from a junked novice rig.

The QRP Candy Store is a clearing house for all member and ARCI sponsored products such as T-shirts, ball caps, hat pins, stickers, stationery and more. Promote QRP in your area! Send your ideas, suggestions and an SASE to Bob Spidell W6SKQ, 45020 N. Camolin Ave., Lancaster, California 93534, for store flyer.

The Balun: Separating Fact From Fiction

Paul R. Schaffenberger, Lt. Col.,
USAF 7J6 CAMPSC 1,
Box 20272
APO San Francisco, California 96230

The balun is a device which can be used efficiently and effectively for QRP work. If you are currently experiencing the negative aspects of feedline radiation (RF in the shack, RFI, or poor antenna performance) you may find the balun helpful.

Baluns perform many functions and come in a variety of designs. Baluns differ in three principal ways: efficiency, bandwidth, and transformation ratio. The autotransformer balun displays unique characteristics that also bear discussion.

Ideally, a balun should improve the electrical balance of an antenna system, help eliminate feedline radiation, and also provide a suitable transformation ratio to make matching more efficient. It is nearly impossible to eliminate all feedline current imbalance and feedline radiation and, as a result, a balun may not always present a simple resistive load to the transmitter. This reflects the imperfect nature of most HF antenna systems, unless of course you transmit from a ten foot square rock in the middle of the ocean!

All baluns cause losses which can be minimized when used properly. Broadband baluns work with fair efficiency over a broad frequency range, but high impedance loads may cause saturation of the core material, resulting in heat and inefficiency. Proper loads are also important in the use of baluns. A 4:1 balun fed into a 50 ohm load will not work as efficiently as a 1:1 balun.

Baluns, like any other RF devices, have a natural resonant frequency range. Depending on the core material, the range varies from a few hundred kilohertz to hundreds of megahertz. Baluns can be very easily tested for their transformation ratio and effective frequency range. With a QRP transmitter, an SWR bridge, and an assortment of carbon resistors, one can build custom baluns which approach 100% efficiency.

The procedure is very simple. Figure 1 shows the testing configuration. Dummy loads can easily be fabricated for QRP levels. For testing 1:1 baluns, a good 50 Ohm dummy load can be built by paralleling two 100 Ohm carbon resistors. For testing 4:1 baluns, a 200 Ohm dummy load can be built by paralleling five 1000 Ohm/1 watt resistors. A 300 Ohm dummy load for testing 6:1 baluns can be fabricated either by paralleling 5 1500 Ohm resistors, or by using 3 100 Ohm resistors in series.

In any case, keep the leads as short as possible. Check the aggregate value with an ohmmeter and, if desired, connect alligator clips to the ends of the dummy load. Keep the power levels low during experimentation, and monitor the resistors for heat. It's easy to "smoke" resistors or permanently change their value.

Using the testing configuration in Figure 1, you can test commercial baluns, or ones that you wind yourself. Figure 2 is a plot of a commercially produced broadband 1:1 balun tested with a 50 Ohm load. The results clearly show a broadbanded response, but not always 1:1. Many broadband ferrite core baluns maintain a nearly flat SWR over a wide frequency range, but none I've tested has been perfectly "flat." In contrast, a trifilar air wound balun designed for 20 M shows a perfect 1:1 SWR on 20M, but the SWR rises rapidly on other frequencies.

Can a balun improve your system balance? A balanced system will show little or no change in SWR when one side is grounded. That is because both sides of the feeder system are equally "above ground" electrically. One technique uses the RF probe, shown in Figure 3. The bulb remains unlit with a properly balanced system. Finally, if you are using insulated balanced feeders such as

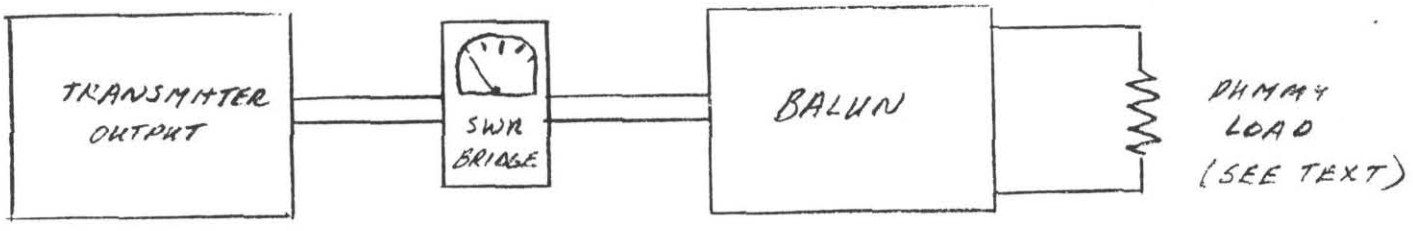


FIGURE 1: TESTING PROCEDURE

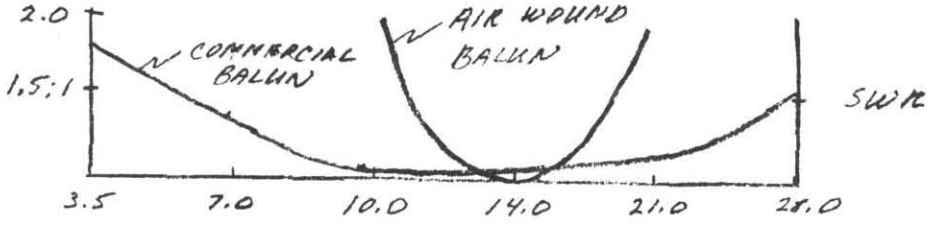


FIGURE 2: FREQUENCY VS. SWR FOR 1:1 BALUN

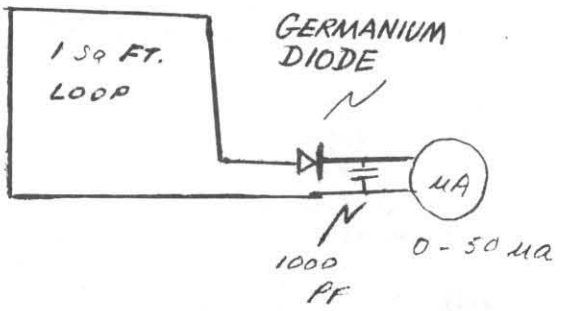


FIGURE 3: RF PROBE

twinlead, you'll notice little change in SWR if you wrap your hand around the feedline, but you'll notice a difference with no balun. Do this last procedure at QRP levels only!

Once you have a balun suitable for use on a particular band, how can you tell if it improves your antenna's performance? Only exhaustive on-the-air use without the balun will reveal improvement, if any. With tuned feeder systems, you may want to use baluns on some bands and not on others, based strictly on antenna performance.

System balance improves dramatically when using a properly designed balun, and feedline radiation decreases dramatically. When using a powdered-iron toroid, check for heating as an indication of lost power. A small change in feedline length can sometimes make a major change in impedance, and solve the problem.

Figure 4 shows some low-to-high impedance matching devices that will do essentially the same job as a balun. However, these devices are larger, less broadbanded, and slightly less efficient than a well-designed balun. If anyone uses one of these successfully, please let me know!

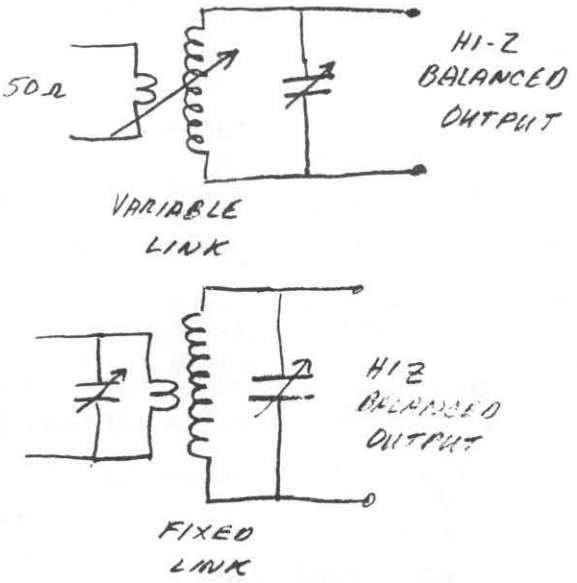


FIGURE 4: ALTERNATIVE MATCHING DEVICES

With the increasing number of sensitive electronic devices in a typical household today, a balun can help eliminate RFI and put your power where it belongs—in the antenna. While far from perfect, they can be a great friend to the QRP operator.

New Member / Renewal Data Sheet

Full Name _____ Call_____ QRP Number_____

Address _____

City _____ State or Country_____Postal Code _____

[ ] New Address?
[ ] New Call?
Amount enclosed $_____
**** Please do not send cash! ****

New Member Applications Only:
License Class_____ Age_____
Year 1st Licensed_____
Other Calls Held_____
Rig_____ Ant_____
Bands Most Used_____
Please circle your chief interests:
Ragchewing, DXing, Contests, Traffic, Awards, Homebrew, VHF/UHF, Packet, CW, SSB, RTTY, ATV, Satellite, Other.

[ ] New Member (U.S. $12.00, DX $14.00)
[ ] Renewal (U.S. $10.00, DX $12.00)
Please make your check or money order payable to: **QRP ARCI.**
Note: Renewals must be received 30 days before publication.

	Yes	No	Maybe
Would you like to be an officer/director of club?	[ ]	[ ]	[ ]
Would you help write for the QRP Quarterly?	[ ]	[ ]	[ ]

What subjects_____
What QRP awards/achievements have you won?_____
_____
Why do you run low power? _____

Mail to: Mike Kilgore, KG5F
2046 Ash Hill Rd.
Carrollton, TX 75007

QRP ARCI
Spring/Summer Net Schedule

Net	QRG	NCS	Day	UTC
TCN*	14060	W5LXS	Sunday	2300
		ANCS-NM7M		
SEB**	7030	K3TKS	+Wednesday	0001
		ANCS-KH6CP/1		
GSN	3560	W5LXS	+Thursday	0100
		ANCS-W5XE		
GLN	3560	K2JT	+Thursday	0100
		ANCS-KH6CP/1		
NEN	7040	WA1JXR	Saturday	1200
		ANCS-W1FMR/K3TKS		
WSN	7040	W6RCP	Saturday	1600
		ANCS-W6JHQ/W6SIY/NJ7M/NM7M		

* On weekends of major contests, TCN will meet one hour later.
** If conditions on 7030kHz are poor, QSY to 3535kHz at 0030Z.
+ Evening of the day before for W/VE

Other QRP Nets

MI-QRP	535	K8JRO	+Wednesday	0100
VE-QRP	14060	VE6BLY	Sunday	1800

Upcoming Contests

April 14 (1200Z)-15 (2400Z)
Spring QSO Party
* * *
May 27 (2000-2400 local time)
Hootowl Sprint
* * *
July 15 (2000-2400Z)
Summer Homebrew Sprint
* * *
Aug. 12 (2000-2400Z)
Summer Daze Sprint
* * *
Oct. 20 (1200Z)-21 (2400Z)
Fall QSO Party
* * *
Dec. 2 (2000-2400Z)
Holiday Spirits Homebrew Sprint

QRP Quarterly
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