40TH ANNIVERSARY ISSUE

QRP Quarterly

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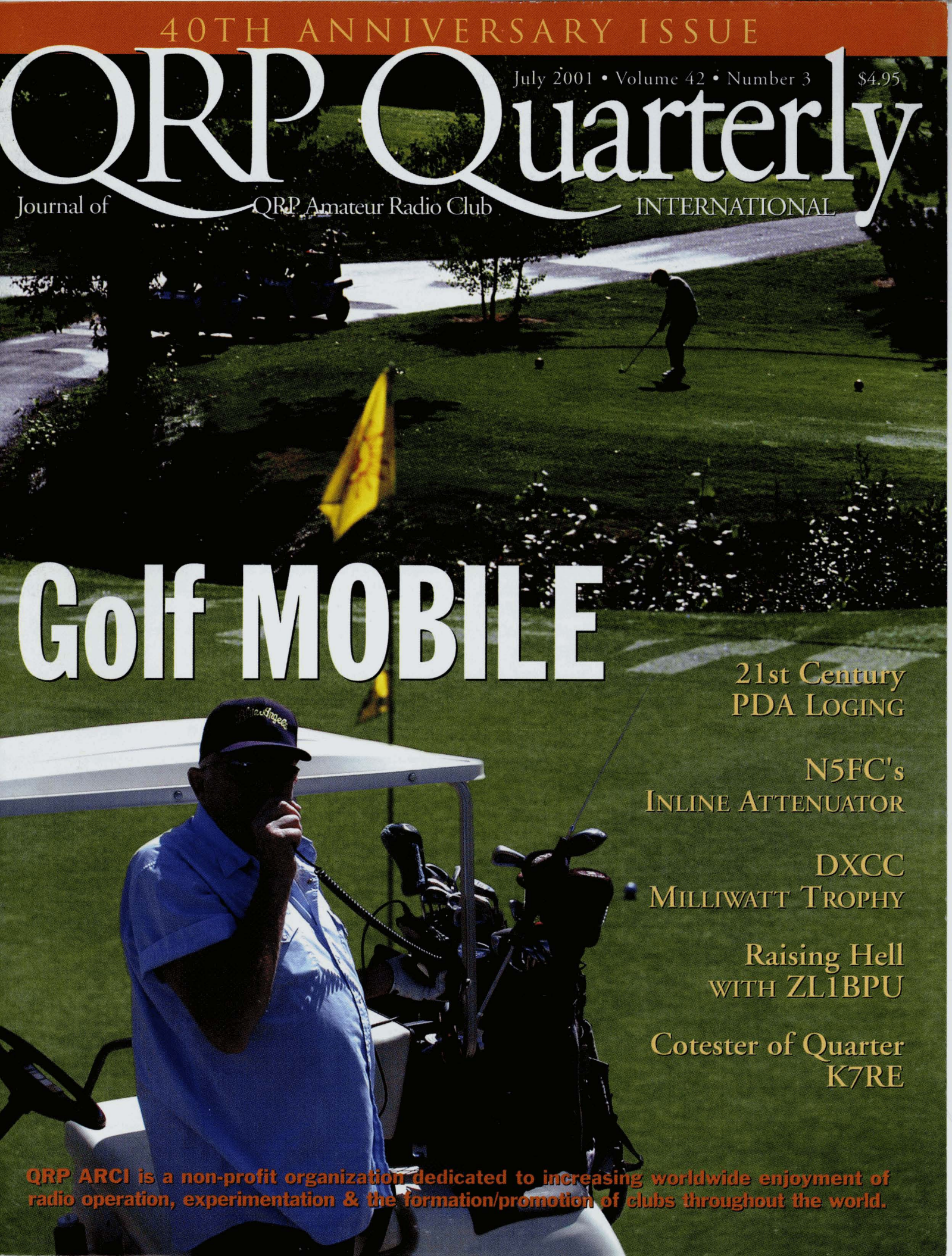
Journal of QRP Amateur Radio Club INTERNATIONAL



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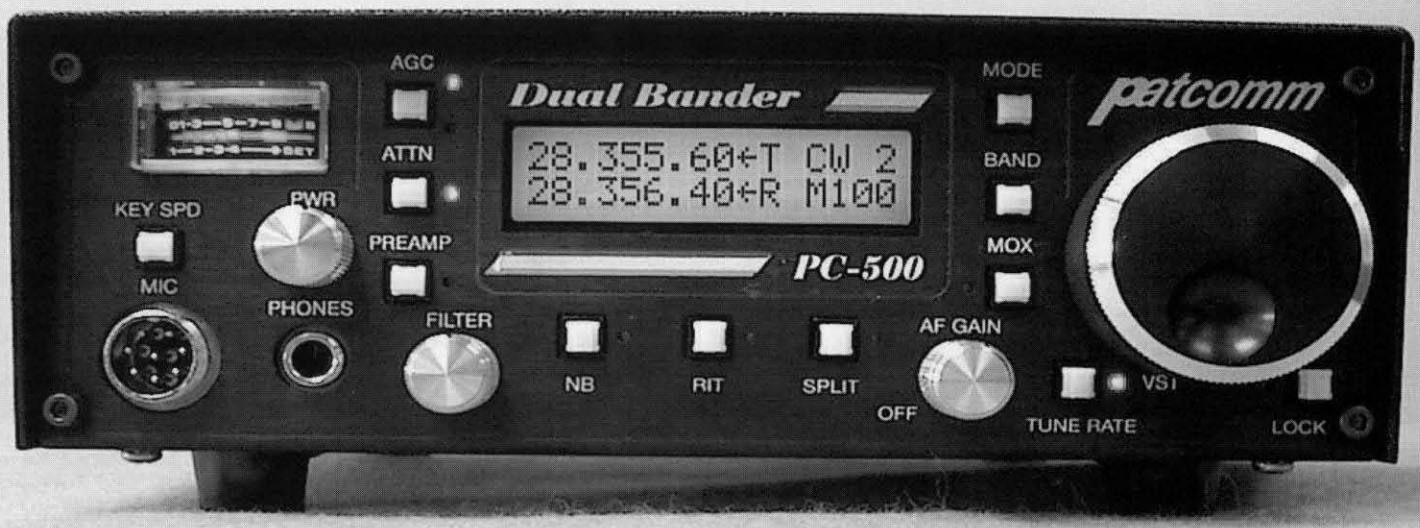

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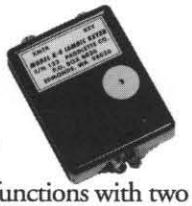

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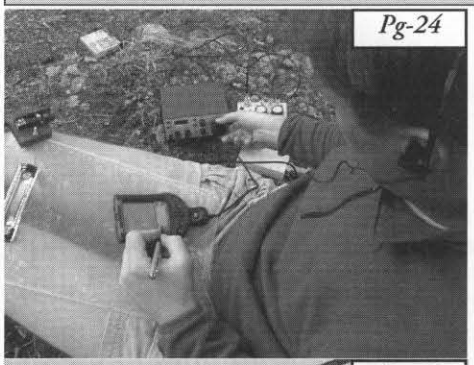
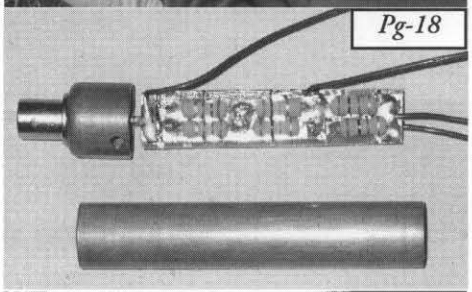
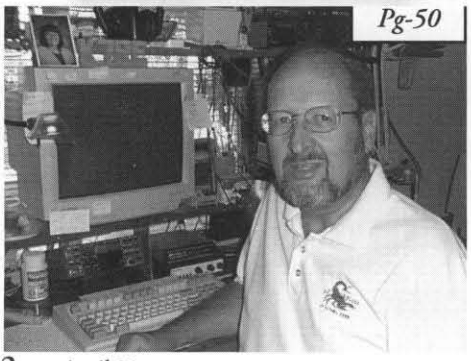
Table of Contents







Technical

Operating

Reviews & Product Announcements

Columns and Departments

Miscellaneous

From the Editor's Desk

Craig W. Behrens--NM4T craigwb@hiwaay.net

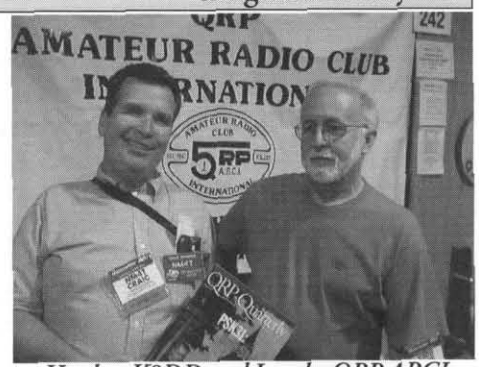
Let me start with an apology for not getting the QQ in the mail earlier. It seems that everyone on the extended QQ team has been busier than usual. Some of the delays were attributed to our efforts to include lots of Dayton/FDIM highlights in this issue to for those unable to attend...and to provide a fun flashback for those who did.

My first Dayton/FDIM was everything I expected and more. One high point was working the Flying Pigs who were using Doug DeMaw's Original Tuna Tin at the hotel. This was a 2AM kinda thing. My roomie, Traci Underwood—KU4FL, completed the antenna circuit on the FT-817 by holding on to the tip of the collapsible whip antenna while I transmitted. (Since this was QRP, his eyes only partially illuminated on transmit.)

Thanks again to all the people that made Four Days in May 2001 a success. A few examples are the New Jersey QRP Club gave all FDIM attendees a free copy of their superb ***QRP Homebrewer*** magazine; the Cheeseheads provided special refreshments; there was strong vendor support with demonstrations; superb forum presentations; the homebrew contests were fantastic; animated conversations were taking place everywhere you looked; and how about the almost 100 door prizes. (see page 47)

Like us, Ed Hare—W1RFI, ARRL Staffer, was totally involved with the shenanigans of the notorious Flying Pigs QRP Club gang. (This was wild, and crazy, and not always a pretty sight.) QRPers from dozens of clubs took over the Ramada hotel where we were constantly surrounded with great people and fun times. (praying in picture below.)

The induction of Peter Zenker and George Heron into the QRP Hall of Fame was a rewarding experience. The contributions these gentlemen (I'm using the term loosely, "Bad Boy" Peter) have made to amateurs around the world are amazing. It's no wonder that the QRP spirit excites and serves the world of Amateur Radio so well.



Hank—K8DD and I at the QRP ARCI Booth. (Hank is the debonaire lookin' guy on the right) Pic. by Alan Kaul—W6RCL

Since our last issue, we have had Bull Dog IambicKey and Farr Circuits who have advertised with us over the years rejoin us. GigaParts, W4RT Electronics, Traffie Technology, maker of the famous HexBeam have ads in this issue--Vibroplex, GAP Antennas and a coupe other fine companies will join our QQ advertising support team in the October issue. (Our ad space is "prime real estate" since we will severely limit the amount of ad space to the minimum required to keep our subscription rate at $15 per year.)

This issue has a ***QRP Everywhere theme.*** (Done Golf Cart QRP yet?) While we recognize that it's our traditional technical core that makes the QQ so great, we try to capture examples of QRPers enjoying the fruits of their labors--gaining copious amounts of pleasure from their efforts.

QRPer innovation and our ability to have so much fun with this hobby is such an incredible thing! Here I am, still high on the Dayton/FDIM experience and already looking forward to a mini version of this at the Huntsville, Alabama Ham Fest 8/18-19/01. (FDIM South?)

We hope this little magazine complements your QRP experience, and that you enjoy all we squeezed in between the covers of this 3rd of four special QRP ARCI 40th Anniversary Issues. ●●

QQ Correspondence

Congratulations to QRP ARCI for another fine and enjoyable round of events at Dayton this year. I was impressed and amazed, as I am every year, by the ingenious and original entries in the rig building contest. But this year I was particularly encouraged by one very noticeable change from previous years by the number of rigs built using "ugly" construction, mainly from the "Flying Pigs" group. Please let me explain why I think this is an important event.

For a long time, a large number of builders have been under the impression that a rig or other piece of gear has to be built on a printed circuit board in order to function well, or at all. This philosophy has been strengthened by the ready availability of circuit boards for most projects, and reinforced by such things as QST's policy (for a time, at least) to not accept project articles unless a circuit board was made available. The fact is that this impression is entirely false and, I believe, a major stumbling block for may would-be homebrewers. The fact is that a newly designed rig can be built a lot more quickly using "ugly" construction, and in many cases is much more likely to work well the first time, than when built on a circuit board. I'll amplify on this in a moment, but first let me tell a story.

Years ago, I ran across Don Greer, A35DE, on the air. He was working as an electronics technician on Tonga, in the South Pacific, and had started a club to get up interest in amateur radio among the residents. It turned out that he was from Oregon, and returned here for a visit not long after we had met on the air. One of his frustrations was the inability to get people on the air. He had assumed, like many others, that a circuit board was required, and didn't have the materials to make them. At one point, he tried etching some boards with dilute battery acid, without much success. When he came for a visit, he saw and used the "Optimized" rig I had designed and built, along with several others. We went to the home of Wes Hayward, W7ZOI, who showed him several of the rigs and test equipment Wes had designed and built. All my rigs and Wes' used "ugly" construction, with nary a printed circuit board among them. He was amazed. It had never occurred to him that rigs built like this could possibly work, let alone work as well as or better than any he'd ever used. A very short time after returning to Tonga, he had several rigs on the air. They all looked terrible, he said, but worked terrifically.

Briefly, "Ugly" construction is done by soldering parts directly to or above a solid copper surface, usually un-etched circuit board material. High value resistors can be used for standoffs. Integrated circuits are generally mounted "dead bug" style with the leads up, and three-dimensional topology can be used. The term was coined by Roger (KA7EXM) and Wes (W7ZOI) Hayward in their classic article "The Ugly Weekender", which was published in QST in August 1981. In their article, they review the advantages of "ugly" construction. I highly recommend that anyone interested in homebrewing read this article. Briefly, the advantages of "ugly" construction over circuit board construction are:

1. For a single unit, it's much faster, since no layout, etching, or drilling needs to be done. You can try out a half dozen ideas or build a handful of rigs in the time it takes to lay out, etch, and drill a board.
2. The only parts necessary are a piece of un-etched board and the components themselves.
3. Modifications, particularly extensive ones, are more easily done.
4. Because of the solid ground plane and direct wiring, crosstalk and feedback problems are often much less than on a circuit board.

I'd like to add that ruggedness isn't a sacrifice, either. I've taken many "ugly" rigs into the wilderness and banged them about severely without a single problem. And Wes, W7ZOI, has doubtlessly done so at least an order of magnitude more than I have.

In the years since Rog and Wes' article appeared, I've sensed a steady return to the myth that circuit boards are necessary. Their article eloquently countered that misinformation, but with time it's returned. So I'm very glad to see increasing public exposure of the "ugly" construction method.

Of course, circuit boards are indispensable when multiple copies of a circuit are to be made. And I appreciate as much as anyone the works of craftsmanship and beauty some people justifiably take pride in creating. But if your goal is to get a rig on the air or other equipment into use, to learn about electronics and homebrewing, or just to try out your ideas, go "ugly". Keep 'em coming, Pigs!

Roy Lewallen—W7EL, w7el@eznec.com

Hi, Craig,

We, Jerry N9AW and myself appreciate the hospitality and thanks shown to us at the QRP-ARCI FDIM in Dayton. We had a blast and I think the participants did too.

So what did we go through...10 feet of salami, 3' 8" of crackers and 15 plus pounds of that "Ohhh-so-GOOD" WISCONSIN CHEESE.

Thank's Again!

Rick—NK9G and **Jerry—N9AW**
QRP Cheeseheads A.R.C.

Jim,

Just got back in the UK and would like to ask you to pass on our thanks to all of the QRP-ARCI team that made FDIM so enjoyable for myself and XYL Liz (M0ACL).

Having met many folks over the Internet, I had some expectations of how just fun 4 days in Dayton Ramada might be, but even these expectations were greatly exceeded. For Liz, however, this was her first encounter with the QRP fraternity and, boy, was she impressed. Her description of the trip to our daughter yesterday—"Dayton was great, the QRP folks in particular were fantastic." On the way back she even asked me "I can turn the power down on the TS850 can't I?"

We've both been involved in organizing enough events to appreciate the amount of sheer hard work needed to make FDIM such a great success.

So "THANKS!" to all of the team.

Brian—G0UKB and **Li—M0ACL**
Date: Sat, 7 Apr 2001 09:10:45 +0000

(The following was captured from QRP-L)
Yoldashlar,

I just plucked the April QQ out of the mailperson's grip, tore open the envelope (after noting that I need to renew my sub) & was once again flabbergasted by the marvelous job!

If you ain't gettin' a QQ, you're in need of help. Seriously.

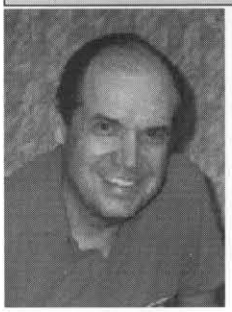
A couple weeks ago I responded to a post about the major mags pickin' up on QRP, saying something like how I'd stick the the club magazines mainly 'cause they're dedicated focus on QRP & lack of fickle, money-driven editorial policies were more important than the glossy adverts & occasional reviews of toys interesting to the QRP lunihood. And this issue of QQ proves it!

Very quality cover, in color, clear photos inside with legible graphics, & an easy to read type face in a reasonable size (I ain't about to

—Continued on bottom of page 5—

Base Current

Jim Stafford—QRP ARCI President w4qo@arrl.net



The thrill is back!

The thing that seems to always amaze me about the QRP community and the club specifically is the willingness of volunteers to step forward when a job needs to be done. Sure, we sometimes search for a few while to fill a position but in general we find someone to step in whenever the opportunity presents itself. Take for example, when Chuck Adams, K7QO, one of our directors (who himself was filling in for someone who resigned a couple years ago) felt the need to resign. Bill Harding, K4AHK, was more than willing to step in. I've had a few exchanges of email with Bill over the past year or so, but really got to know him this year at Dayton. Bill was real active in the club during the early to mid-80s and as retirement is approaching for him, wanted to get back into some serious involvement. He brings a wealth of knowledge and history with him. Welcome Bill and good luck to Chuck in all his QRP activities!

Do you, uh, homebrew? (apologies to Yahoo)

A theme that I was speaking about at Dayton this year was how the club (and QRP in general) is heavily oriented toward homebrewing, kit building, and construction. Yet many hams out there seem to know us as "those low power folks". Sure, we are typically use low power but the "loyalty" clause was abandoned a couple decades back. I suspect that quite a large percentage of us own amps although we may use them a whole lot less as we understand "QRP Power". We need to be sure we are letting every ham out there know that we devote a large percentage of our efforts to building, gadgetizing, tweaking up, etc. I think a lot of the hams are missing us because they don't really understand this. Let's get the word out at every opportunity.

QRPy

The second area I hit hard at Dayton is one of my original "hot spots" - youth in amateur radio. I've mentioned this often but we need to revisit the issue and the contest proposed by Wayne Burdick for FDIM this year - to come up with ideas that would find favor among our younger citizens. This didn't even have to be a radio! The idea was to use our collective brain power and creativity to come up with these ideas. The entries were quite few in number but the one that did stand out was from Gary O'Neil, N3GO, of Raleigh, NC. He submitted his project—the Potato Regen. He has used this in working with a group of young people in his area. It can run off a "potato" battery or anything that can generate a mil or so of current (sometimes less). Thanks Gary for entering this interesting project. Watch these pages for more details in the future on the Potato Regen.

VHF-QRP

The third area I'd like to see us emphasize more is VHF. What with all the Tech licensees out there, do they know about QRP or QRP ARCI? Not many do. Again, do they know QRPers like to build their circuits and get great satisfaction from this? Just this weekend, AE4GX (right here in our local club) caught an opening with his Georgia Sierra (see January 2000 QQ-pg. 29) which the boys have now put on six with a plug in for that band. He was running a half watt with a 3 element beam and worked into the Northeast from Atlanta! How can we get out message out to some 300k Tech license holders? Try holding a net on your local repeater especially announcing your local club's QRP meeting. You might be surprised who shows up.

FDIM 2001

Well, we've just come back from Dayton and again, a very successful (if we can go by the comments received) event it was. Thanks to Ken Evans, W4DU, for heading up a great team of workers again. With about the same number as last year at the seminar, we can safely say that at least as many attended all events this year, if not more. I'd put the number at 400 (again) and folks seemed to really like the seminars and the food this time along with the outstanding book (thanks, AD4S) of Proceedings (see the Toy Store web site page for how to order yours). I should announce here that a new "head man" will be handling the duties next year - **Tom Dooley, K4TJD**. He played a big role in this year's and we have already met to discuss 2002. Stay tuned. What Tom has in mind along with what the Flying Pigs Club have planned for the Club/Vendor night alone should make you set your plans for Dayton next year!

The Thrill is Back! ●●

—Continued from page 4—

ask for everything in 12 point Linotype Ionic just yet.) The articles are timely, helpful and well organized. And there's even a sneak picture of Elecraft Wayne runnin' a K3 on the last page.

You can't beat that! Unless you also sub to QRPp (another kick-butt QRP magazine that you should had otter sub to if you don't already). Or you sub to the DL-QRP-AG quarterly QRP-Report, another slick cover, welll written & printed magazine.

Of course, all this costs money, money which you might figure was better spent on solder, parts, kits, boards, antennas & antenna hardware, family counseling, attorneys, neighborhood committee bribes, PACs &c. But let me tell you: Once you pull one of these magazines out of the mailer, you'll be happy you did spend the jing.

And people think we're just a fringe group!

73, **Nils R. Bull Young—W8IJN**

75 degrees, sunny and breezy here in central Indiana. All the windows are open and I heard the mail man pull up. He was kind enough to leave me the latest (April 2001) QRP Quarterly. Once again a spectacular looking edition—nice job folks at ARCI!

So now I'm off to the hammock with a cold Pepsi in one hand and the QQ in the other. It's like winning the lottery only without the hassle of all that money! :-)

72, **Jeff Davis—N9AVG**

Today was neat because I had to go into work later. I found both QRP Quarterly and SPRAT in my mailbox and actually and a couple of hours to sit a read them before heading into the salt mines.

QRP Quarterly has become the most professional club magazine on the planet. SPRAT, while smaller, remains very tenacious. Both exemplify what QRPers can do to advance the hobby.

T.J. "SKIP" AREY—N2EI

Hats off to everyone who had a hand in the April QQ, turning it from a good idea to a tangible object in my mailbox. Another excellent issue.

John Harper—AE5X ●●

Idea Exchange

Technical Tidbits for the QRPer

Mike Czuhajewski—WA8MCQ wa8mcq@erols.com

IN THIS EDITION OF THE IDEA EXCHANGE:
Enclosure for the Microvolt Signal Source, Joe Everhart, N2CX
RX Blocking and IMD Dynamic Range, Michael Tracy, KC1SX
Scrap Tribander Becomes A Vertical, Bob Patten, N4BP
Umbrella in Table Replaced by Antenna Mast, Dan Presley, N7CQR
Mixing Wire Colors in Portable Antennas, John Harper, AE5X
Finishing Aluminum... The Easy Way, Denny Baker, W9OCP
Solder Wick Holder Becomes Solder Holder, Al Bates, W1XH
A Personal Relationship with the DK9SQ Mast, Dave Heintzleman, K8BBM,
A Fishing Pole Vertical, Doc Lindsey, K0EVZ
FT-243 Crystal Holder as Twin Lead Connector, Frank Brumbaugh, W4LJD
Comparison of Autek and MFJ Antenna Analyzers, Stuart Rohre, K5KVH
Old Telephones Provide Antenna Wire, David Bixler, W0CH
Fiberglass Mast is Passive Antenna Erection Tool, Brian Jones, G0UKB
The Complete HW-8 Output Coil Set, Mike Czuhajewski, WA8MCQ
QRP Online

Enclosure for the Microvolt Signal Source

QRP Hall of Fame member and New Jersey QRP Club guiding light ***Joe Everhart, N2CX,*** *has been describing a weak-signal source in his QRP Quarterly column, as well as sharing some of the construction details with the Idea Exchange. In this issue he talks some more about it in his column, and shares construction details of the enclosure with us in the Idea Exchange. For those keeping count, this is #38 in Joe's unending series of Technical Quickies.*

As detailed in earlier Quickies and recent Test Topics And More (TTAM) columns the Microvolt Signal source is constructed in a well-shielded case made from copper clad pc board stock. This Quickie will provide some details on how the case was constructed. Figures of the box and its components will be presented but space does not permit them to be printed in a fully usable fashion. Those with Internet access can find sketches in PowerPoint format on the NJQRP web page www.njqrp.org. Others can receive copies of these sketches by sending a business-size SASE to the author.

Figure 1 shows the basic physical layout of the Microvolt Signal Source in which each functional block occupies its own shielded compartment as described in earlier installments. It is repeated from Quickie 36 for reference. Electrical details are provided in the TTAM pieces, and some mechanical details of overall box construction and signal and power feedthroughs were described in Quickie 36.

The nitty-gritty mechanical layout details and overall dimensions are shown in Figures 2 and 3. **Figure 2** is a top view of the entire signal source with all covers removed. It shows the oscillator board installed in its compartment to the left and BNC connectors in each compartment. Also shown are all nuts needed to attach the various compartment covers as well as the top cover.

Unfortunately, showing all the nuts in one view makes it hard to distinguish compartment covers from those used for the top "lid." However the convention was used that where confusion exists, compartment cover nuts are located in corners while top cover nuts are not. Alas, placing them all in corners leads to problems getting to internal hardware!

Figure 3 is a front view with each compartment shown dotted. Compartment dimensions are not shown, except for the oscillator "box" at the left. However the attenuator sections were standardized at exactly 1-1/2 x 1-1/2 x 1-1/2 inches. Doing so meant that the three interior walls and all four attenuator section covers could be exactly 1-1/2 inch square. Note that each compartment cover as well as the top cover is recessed so that they fit flush with the enclosure walls. This makes installing the nuts a tad "interesting" – more about this later.

Dimensions for all the required PC board pieces can be obtained from the sources described in the first paragraph. Absolute precision in cutting the pieces is not required. Several prototypes of the enclosure were cut using no more than a good pair of thin snips and a handy flat file. Honestly, several prototypes were built in order to determine exactly what dimensions were needed. The biggest source of error was not taking the thickness of the PC board material (1/16") into account!

Then, too, the final design has its shortcomings. The enclosure height is excessive. There is about 1-1/2 inches of "dead air" above the attenuator section compartments. Actually only ¾ inch or so is necessary – but 1-1/2 inches looked so good on the computer!

I suggest that you make all of the case parts and ensure that they will fit together before you start assembly. The voice of experience says that it if you try to do it piecemeal the wrong-sized pieces will not be evident until your construction is well under way. Remember I mentioned building several prototypes?

Assembly has to be done in stages so that you can access everything as you go along. The very first thing to build is the crystal oscillator. Its board size has to be small enough to fit in its compartment with some "slop." The compartment measures 2-3/8 x 2-15/16 inches so a good size would probably be about 2 x 2-1/2 inches. Be sure that it is working properly and its output is calibrated before final mounting in the enclosure. The calibration procedure was

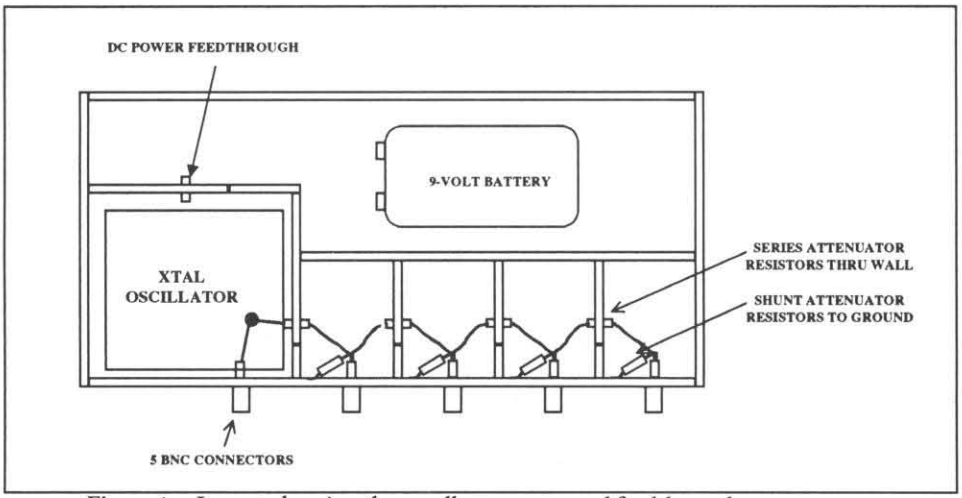


Figure 1—Layout showing thru-wall attenuator and feedthrough components.

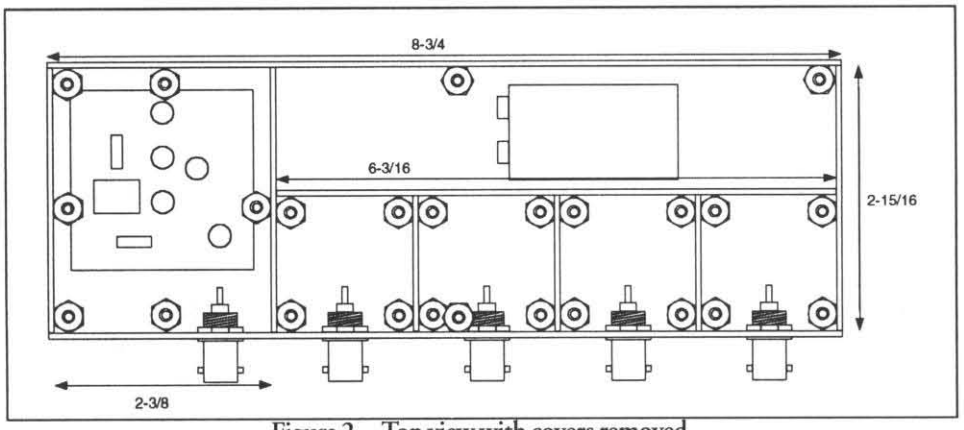


Figure 2—Top view with covers removed.

described in TTAM No. 6. Mounting it in the compartment could be done using nuts and bolts but I found it easiest to simply use some double-sided adhesive foam tape underneath. Radio shack sells this as #64-2343 or you can find an equivalent at most hardware stores. But don't mount the oscillator until you have built the enclosure!

And before you build the box it's important to do the necessary machining. First mark the BNC connector locations. To make those holes follow the hints in Quickie No. 36. BNC chassis-mount receptacles have a nasty habit of eventually working loose and rotating unless you use D-shaped mounting holes. A little file work makes this easy. Begin with a 1/4 inch round hole then file the D-hole flat side with a small flat file and enlarge the round side with a rat-tail file. Use one of the connectors as a guide while you file and you can easily make holes that look like **Figure 4** in Quickie No. 36.

The oscillator and attenuator compartment walls also need holes as shown in Quickie No. 36. As with the BNC connector holes, this machining must be done prior to assembly of the enclosure. These holes are not dimensioned since their size is determined by the components used. The resistors passed through the holes should have their bodies protected from abrasion with heat-shrink tubing or electrical tape. The exact locations can by "eyeballed" in the approximate center of the compartment wall.

Clearance holes should be large enough to pass the components without more than 1/32 or so extra air gap. Too large a hole can result in unwanted end-to-end capacitive coupling across the component body. The slots for the ground straps can simply be cut about ¼ inch deep with a hacksaw. Copper strap or thin copper braid is then soldered on each side of the slot to provide a defined path for ground currents.

Once you have all the pieces cut to shape and have done the requisite machining, you can begin assembly. The very first thing to assemble is the outer enclosure proper, which are the four sides and the bottom. I know, easier said than done! Just take your time and tack the five pieces together at several places along each seam. Don't solder in a continuous bead until you have installed the internal compartment walls.

Next install the four attenuator compartment walls starting from the right hand side as viewed in **Figure 2 and 3**. Since these four compartments all have identical 1-1/2 inch square dimensions, you can use one of the top covers as a guide to accurate location of each wall as you proceed. When these are all in place, install the oscillator compartment **side** piece and finally the common rear wall for the attenuator sections. At this point you can run the continuous solder beads around each seam.

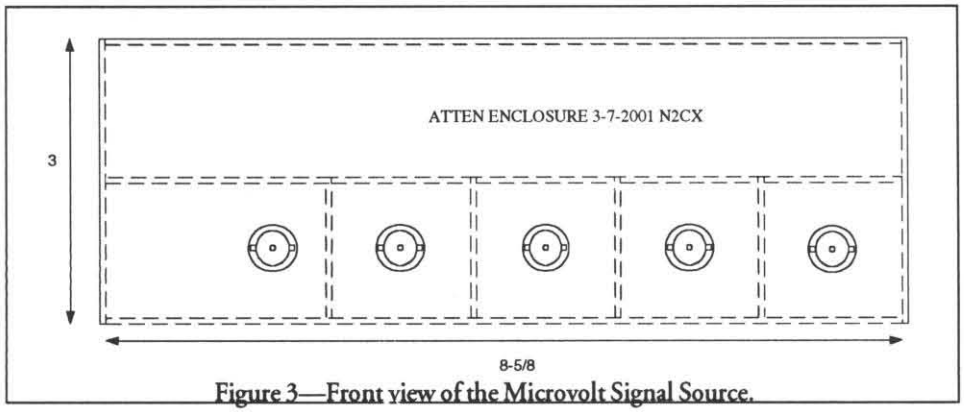


Figure 3—Front view of the Microvolt Signal Source.

I suggest now that you mount the oscillator board followed by the BNC connectors. Then proceed with the attenuator resistors starting from the oscillator and moving to the right from there.

Now it's time for the compartment cover nuts. This step takes a tad of skill and practice. Brass nuts are a must since they can be easily soldered. The ones in the attenuator compartments are easiest since they nestle in the box corners as shown in **Figure 4**. I tried any number of methods of holding these nuts in place before figuring out how to do it. The problems are that they are relatively small, they have to be held still until the solder solidifies, they need to be carefully aligned, and they get darned hot in soldering.

Actually the embarrassingly simple method is shown in **Figure 5**. You simply thread them onto a stainless steel screw that is long enough to give you a good handle. The screw rests on the compartment bottom and you can easily hold the nut in place. A stainless steel screw is important so you don't end up soldering it to the nut! A screw like this even allows you to accurately set the nut at the correct depth to allow the cover to be flush with the compartment walls when installed.

Finally solder in the top cover nuts. They must be "spotted" inside the enclosure at various locations that allow unobstructed access to

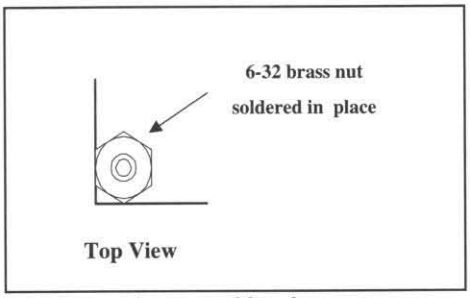


Figure 4—Nut soldered into corner.

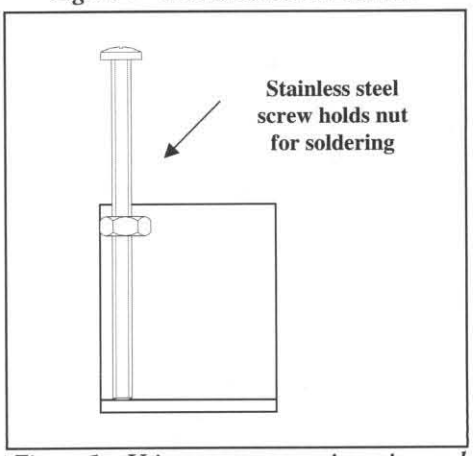


Figure 5—Using a screw as an insertion tool for the nuts. Be sure to use a stainless steel screw so it doesn't get soldered to the nut.

the compartment covers.

When the mechanical construction is finished, you can do the final wiring per TTAM No. 8 in this issue of the QRP Quarterly and you are done! I apologize for the breathless run-through in this column. If NJQRP decides to offer the Microvolt Signal Source as a club kit you will have the benefit of yet another of their excellent detailed instruction manuals.

REF:

1. Joe's Quickie No. 36, Idea Exchange column, QRP Quarterly Jan 2001.
2. TTAM No. 5, Oct 2001, QRP Quarterly
3. TTAM No. 6, Jan 2001, QRP Quarterly

—DE N2CX

RX Blocking and IMD Dynamic Range

Here's an advanced receiver topic of interest to many. Michael Tracy, KC1SX (mtracy@arrl.org) posted this information on the 160 meter mail reflector (topband@contesting.com), and Eric Swartz, WA6HHQ reposted it to the QRP reflector, QRP-L. (Michael is a member of the ARRL staff.

Dynamic range in general is the difference between the weakest signal that can be perceived and the strongest signal that can be present without adversely affecting the weakest signal.

In the case of ham rigs, the weakest signal is generally considered to be one that is equal in power to the receiver's internal noise, although most folks can pick out weaker signals using the "filter" between their ears.

BDR stands for Blocking Dynamic Range and it refers to a condition where the weak signal is "blocked" or suppressed. In layman's terms, you'll often hear this described as "desense" because it reduces the effective sensitivity of the receiver.

BDR as a lab measurement normally refers to the point where the weak (presumed desired) signal is reduced by one dB by the presence of a strong (presumed undesired) nearby signal. The frequency difference between the two is the "spacing". The blocking dynamic range is a measure of the difference between the receiver's noise floor and the level of the signal that caused the blocking condition.

A "noise-limited" measurement means that the undesired "blocking" signal caused an increase in receiver noise output before the "desense" effect was observed. Usually this is caused by interaction of the signal with the phase noise of the internal oscillators (phase noise being energy that every oscillator has close to its desired output frequency) - that's why rigs with a high transmit composite noise (most of which is phase noise usually) often also have noise-limited dynamic range measurements. Some folks consider this to mean that a "real" BDR measurement can not be made for that rig, but in the ARRL Lab we believe that the effective blocking dynamic range on a noise-limited measurement is where the noise increases by1 dB, which is the same change in the signal to noise ratio that you get when the signal decreases by 1 dB.

So if you see a rig where the sensitivity (aka MDS) is -140 dBm (which is dB relative to a mW, in case anyone didn't know) and it has a 20-kHz spacing blocking dynamic range of 125 dB, that tells you the level of signal that caused blocking 20-kHz away was -15 dBm. Now, all S-meters are different, but it is convenient to use the Collins standard for discussion purposes. In that standard, S9 = -73 dBm (or 50 microvolts, assuming a 50-ohm system). Therefore, -15 dBm would be about S9+60. Quite a strong signal, but certainly not unheard of and many rigs don't have a BDR that high.

Intermodulation is when two or more signals mix, creating false signals that aren't really there. These false signals are referred to as intermodulation distortion (IMD). For lab testing purposes, it is most convenient to use only two signals (requires the fewest expensive generators) for this test.

IMD dynamic range is the difference between the receiver's noise floor and the level of two nearby signals that caused a false signal to appear right where we are trying to listen. The process of mixing makes the highest such false signals appear at a frequency spacing equal to the difference of the two signals. If you are listening on 1820 kHz and you have strong signals at 1840 and 1860 kHz, you will hear a false signal, since the two are spaced 20 kHz apart and you are 20 kHz below the "lower" one. Someone listening on 1880 will also hear the same false signals.

As with BDR, IMD DR can also be noise-limited. In this case, the effect on the frequency you are trying to listen to is being created entirely by the interaction of the nearest strong signal and the receiver's phase noise and oscillators. Sometimes the result is just an increase in noise and sometimes it can be a signal. However, in both cases, the more "distant" generator is turned off when the IMD is observed and you would find the IMD is still there. In the case of non-noise limited measurements, if you remove either signal, the IMD goes away.

Now, the important thing to note is that these lab measurements don't exactly duplicate real-world conditions because only unmodulated carriers are used and you usually find more than two signals near the one you are trying to listen to. However, they are a good yardstick for comparing real-world performance of different radios.

Michael later posted this update to the QRP mail reflector—

One of the fellows on the 160M reflector suggested that close-in dynamic range was perhaps more important than the ARRL lab "standard" spacing of 20-kHz (personally, I think you need to look at as much as possible to get the most accurate "big picture").

In response to this fellow's post, I did some research on dynamic range at 5 kHz spacing for various radios that we have tested for this (only the ones we have expanded reports on). Here is a copy of my findings (in alphabetical order):

Rig	BDR	IMD	DR
Elecraft K2	126	8	8
IC-706 MkII G	86	7	4
IC-756	98	6	7
IC-756 Pro	104	8	0
IC-775DSP	104	7	7
TS-570D	87	7	2
Omni 6+	119	8	6
FT-1000MP	111	8	3
" Mark V	106	78	

—DE KC1SX

Scrap Tri-bander Becomes A Vertical

What do you do with a scrapped multi-band beam? You can toss it in the trash or reincarnate it in a different form. Here's what Bob Patten, N4BP did with one—

About thirty years ago I was given an old Hy-Gain tri-bander as a bonus when I bought a used amplifier from a friend. The antenna was too beat up to reassemble as a beam, so the traps and aluminum were salvaged instead. One half of the driven element was used to construct a portable four-band vertical. The fourth band was achieved by topping it off with a 40M Hustler "super resonator". (**See Fig. 6.**)

The base is a mobile ball mount, which was in turn mounted onto a piece of aluminum, channeled to raise the ball mount off the ground. Sections of telescoping aluminum are held in place with stainless steel hose clamps and markings were made on the sections with a file to quickly find the proper lengths at which to set them. Original settings to achieve resonance on each band were found by trial and error.

Attaching the tubing to the Hustler resonator and ball mount is accomplished with a handful of common items from a hardware store as shown in **Figure 7**. Each end of the tubing

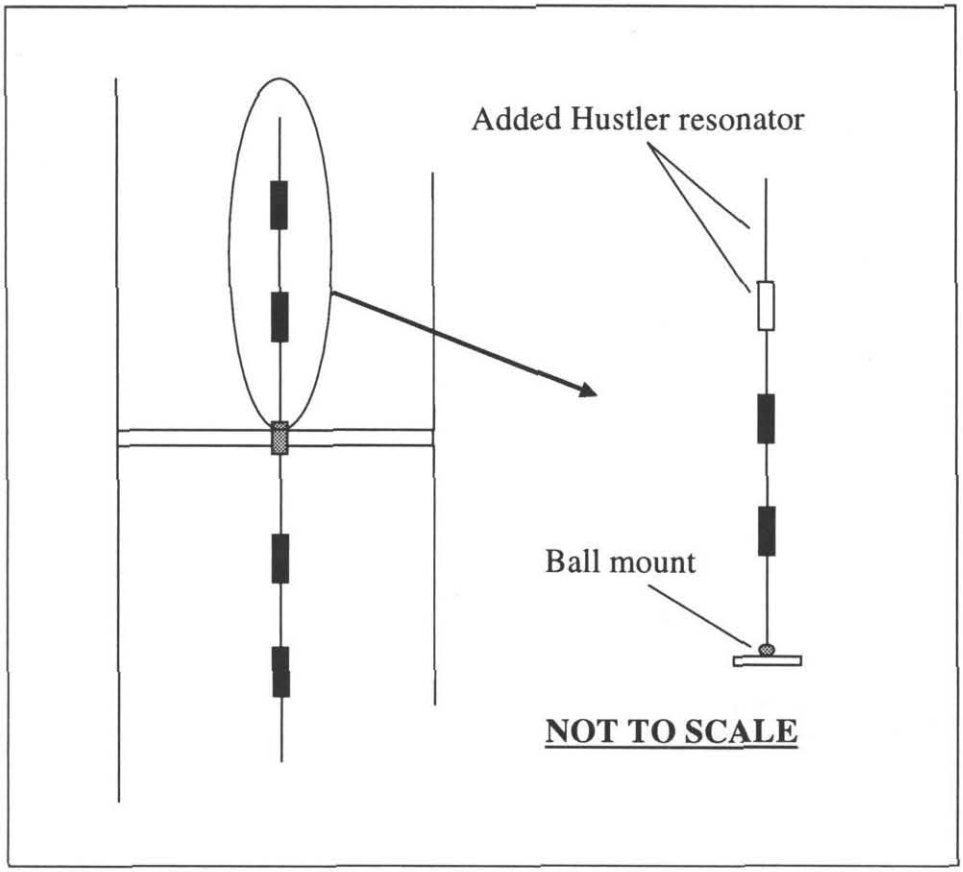


Figure 6—If one of the driven elements of a scrap beam can be salvaged (or if one good one can be made from parts of both), it can be turned into a portable verti-cal antenna easily. Adding a Hustler resonator to the top gives an added band.

has a stack of washers held together with a 3/8"-24 bolt and nut. The size of the washers is chosen to just fit into each end of the mast. The mast ends are slotted and a hose clamp tightens them down on the cylinder of washers. Enough bolt thread is left sticking out each end to mate with the ball mount and 40M resonator.

I use two radials for each of the four bands, made up of #14 insulated wire. The radials are permanently attached to the base and coiled up when not in use. To simplify assembly in the field, I etched numbers into the ends of each section of tubing and the trap assembly. The entire antenna can be erected in about fifteen minutes. The overall height is about eighteen feet and does require nylon guys to hold it up. Recently I found that two guys hold it up nicely if it is leaned slightly away from the pair. (A third may be required if winds are expected.)

This antenna has been used in almost every Field Day for the past thirty years, several times to take first place in the single-transmitter category (QRP battery). To steal a word from Elecraft, it had "Mojo" long before the K2 or K1 were even dreamed of. It has also been used in several events besides FD and has done duty in MA, CA, GA, Ontario, C6A, ZF2, and VP9. When I took it to Bermuda three years ago, I cut it up into three foot pieces to fit into a suitcase. The sections and trap assemblies are now numbered from 1 - 9.

—DE N4BP

Umbrella in Table Replaced by Antenna Mast From Dan Presley, N7CQR of Portland, OR—

In true 'lazy' QRP fashion I'm always looking for an easy way to simplify my portable operations by carrying less, or at least making something do double duty. I use a DK9SQ collapsible fiberglass mast for a support for an inverted Vee (usually a 'gusher' from the New Jersey QRP guys), and one of the problems is to locate a simple mounting system for the mast. In addition, it's often a challenge to find a spot to put the rig(s) and to sit comfortably while operating. I'm sure you've tried to juggle a radio, battery, key and log while trying to sit on a less-than comfortable rock!

A while back my son and I were attending a cub scout "camporee", and noticed that one of the parents had brought one of those nifty little collapsible picnic tables. These are nice as they fold right up into a small carrying size with a built-in handle. It's not really very big, but certainly better than a wobbly camp stool or a rock. Since it was a sunny day, he proceeded to put up his sun umbrella, and pop it right down the middle of this table, where there was a ready-made hole for the umbrella shaft. Bingo! Why couldn't I drop my mast in that hole, and use the table for all of my gear?

Upon returning to civilization, I purchased an inexpensive version of the aluminum and plastic folding table and started to modify it as needed. Mine cost about $25, and is a 'camp green' color. The only thing I had to do was to enlarge the center hole to accommodate the mast, which had a larger diameter than the umbrella shaft. I used a jigsaw with a plastic-cutting blade to enlarge the hole (after measuring of course), and then used about four applications of 'Tool Dip' (a liquid plastic that is used for dipping tool handles for insulation and comfort) to smooth out the rough edges of the cut. I didn't make the hole as big as the bottom of the mast, preferring to get it as close

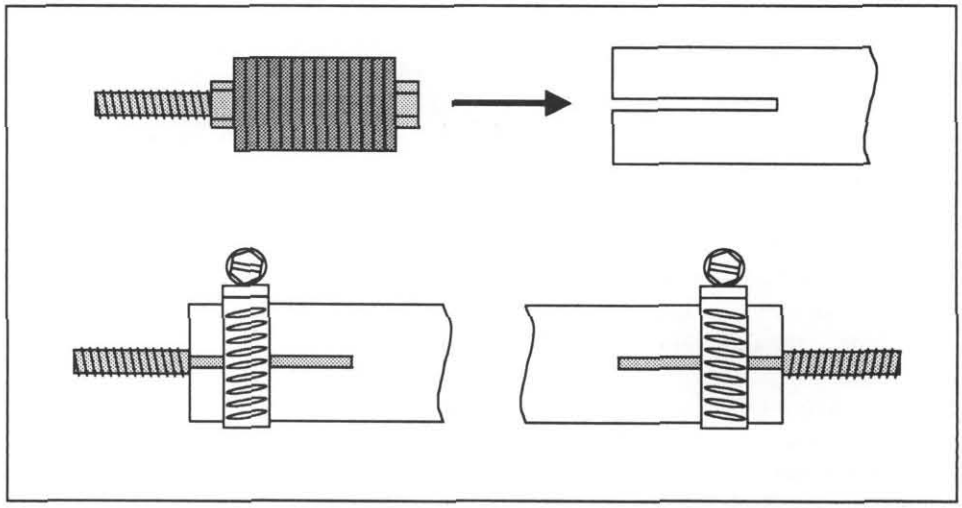


Figure 7—Bolts with stacks of washers are inserted into slotted ends of tubing (top) and clamped down with radiator hose clamps (bottom). Tubing can now be screwed into a mobile ball mount, and a Hustler resonator screwed onto the end.

to the size of the mast where it meets the table.

Now all that remains is to stabilize the bottom of the mast, which I've done by looping two bungee cords around the bottom of the mast and anchoring them to the folding legs of the table. In some conditions you may wish to guy the mast, but so far I haven't needed to—the inverted Vee 'legs' take care of this, and my weight on the table seems to do the job just fine.

You have to assemble the table 'around' the mast as the hole hits the mast a few feet up from the bottom, but this isn't hard. Another benefit is that I don't need as much feed line as it drops right down on the table from full extension (approx 30 feet). Less feed line (in my case RG-174) means less losses—save those QRP watts! It's not really effective for a long backpack trip, but for other casual operations this works fine and may save you a trip to your chiropractor!

Comments, improvements and suggestions are welcomed; email me at:

n7cqr@arrl.net.

—DE N7CQR

Mixing Wire Colors in Portable Antennas

Here's a simple but brilliant, "why didn't I think of that?" idea from John Harper, AE5X (ae5x@qsl.net)—

I've found that using different colored wires for various antenna elements helps to untangle them, if necessary. After being in a pack all day, wires tend to become one with each other - the ground radials tangle with the radiating wire, the two dipole ends get tangled together, etc. Having different colored insulation on them really eases what could be (and has been!) a tedious chore.

—DE AE5X

Finishing Aluminum... The Easy Way

This tip comes from Denny Baker, W9OCP—

A lot of us use aluminum for our chassis and panels when we build electronic projects because it's available and easy to work into the desired shape. While working on the soft metal, it is very difficult to not make unwanted scratches and surface abrasions. If you like your projects to look nice, something frequently needs to be done to the aluminum to improve the final finish.

A recent question on the QRP list, QRP-L, prompted some suggestions about anodizing and applying conversion coatings but these can be very messy, difficult to achieve, and require extensive metal finishing skills and equipment. There is an alternate way to make aluminum projects look nice and is fairly easy do.

The finishing should be done after all other operations have been completed to prevent more scratches. Everything previously attached to the aluminum piece must be removed before beginning the finishing operation. The first step is to remove surface scratches and abrasions by sanding the surface with sandpaper, by hand. Because the aluminum is frequently not perfectly flat, do not use a sanding block.

Use a grit rough enough to remove the scratches, but if some remain the final result does a good job of hiding them. Usually, 150 or 180 grit is rough enough to remove all but the very deepest scratches but, if the finish is not badly scratched, 220 grit paper may be a good choice. Depending on scratches and the finish desired, the 220 grit may leave the surface smooth enough to go to final finishing. If not, using even finer papers may yield the desired results. Again, the surface does not have to be perfect to look good when finished.

The next step is accomplished by scrubbing the aluminum piece, while wet, using Comet cleanser and 3M Green Scotchbrite, available at supermarket cleaning displays or at hardware stores. Rub the piece to be finished in one direction, not circular motions or first one way, and then another. Use plenty of cleanser and rub the surface to achieve a uniform look. The aluminum should be wet all the time it is being scrubbed so doing the operation in a sink makes good sense.

When the aluminum has a uniform satin look, wipe the surface with a wet paper towel, while under running warm water, to remove any remaining cleanser grit. Next, wipe the aluminum piece with clean dry paper towel-ing to remove the water and allow it to dry.

The final step is to apply a coating of wax to the aluminum to achieve a uniform light gray color. The new "waxes" seem to just leave an oily film and do not even list wax on the label. A can of Johnson's paste wax that has been around the house "forever" is normally used on my projects, but other suitable waxes are still available at hardware stores or your local Home Depot. In a pinch, automobile wax, like Turtle Wax can be used but, again, it should list some type of actual "wax" on the label.

Apply a fairly thick coat of the wax and, using a clean paper towel, wipe the excess from the surface. Try to achieve a uniform surface look when the waxing operation is completed. Set the piece aside and allow the wax to dry completely.

The result should be a very attractive light gray satin finish that doesn't look like paint or the original aluminum. The gray seems to be a result of using the Comet cleanser but other brands were not tried because we always seem to have "The Green Comet" around the house.

Some of the aluminum pieces that were finished this way have been in use for over 10 years and the appearance has not changed. The process seems to be very long lasting and even resistant to scratching. The finish is not as tough or "pretty" as anodizing and dyeing or painting but it is easy for the builder to do at home with commonly available materials.

If the surfaces become scratched or abraded again because of rough handling, the process can be repeated.

Before beginning this finishing operation on a completed project, try it on a scrap of material because varying techniques will produce slightly different results.

—DE W9OCP

<dlbaker@pressenter.com>

Solder Wick Holder Becomes Solder Holder

I got small packet in the mail from Al Bates, W1XH, and Figure 8 shows what was inside. Many of you will recognize it as one of those holders that de-soldering braid (solder wick) comes in. That's braided copper wire, similar to the shield braid on coaxial cable except that it's bare, not tinned. It also has a bit of flux on it, to help it soak up hot solder during use. But this one was stuffed with solder instead.

Al said that he saw a lot of the empty holders being tossed in the trash at work since they used them quite a bit, and he hated to see them go to waste. One day inspiration struck and he realized that they would make perfect portable solder holders, as shown here.

If you have a toolbox that you carry around often, you save a lot of weight by just carrying a little solder instead of an entire roll. But if you pull a few feet of solder off the roll and toss it in the toolbox it becomes a tangled mess after a while. You could buy one of those small plastic

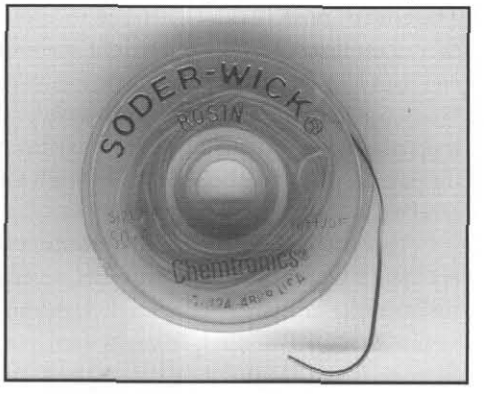


Figure 8—When a roll of solder wick (desoldering braid) is used up, don't toss the holder; fill it with solder for portable & field use.

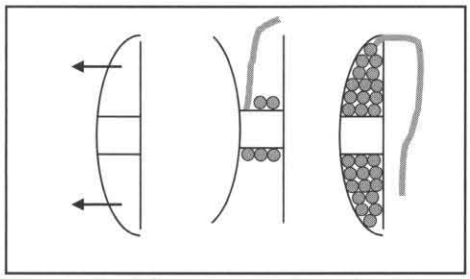


Figure 9—The easy way to put solder into the holder. Flip the cover out, wind solder& flip the cover back into place.

tubes of solder; it keeps it neat but that's an expensive way to do it. Since many homebrewers use solder wick on the little plastic reels already, just convert them into solder holders when the wick is gone.

There are two ways to wind the solder onto the reel. One is to laboriously stuff it into the circular gap between the cover and the disk. The easy way, shown in Figure 9, is to just flip the cover out, wind on the solder, and flip the cover back into place.

A Personal Relationship with the DK9SQ Mast

Dave Heintzleman, K8BBM, passes along these comments. For the uninitiated, this is a collapsible mast, 10 meters long, made from triple reinforced fiberglass, and is of interest for portable operation. (They are sold in this country by Bill Kelsey, N8ET of Kanga US. You can find some info on his web page; the URL is: ***http://www.bright.net/~kanga/kanga/***

At my last QTH I had zero trees on a city lot with a split-level home. Remembering some positive experience with a HYGAIN 40-10 meter trap vertical mounted on the roof, I ordered a DK9SQ mast from Walter Kern of Cincinnati. A 3 foot tripod from Radio Shack was mounted along the peak of the roof and a left over 8 ft piece of RS TV antenna mast (1 1/4" OD) was put in place. I cut #14 insulated wire for a 40M ground plane vertical and taped the driven element to the mast with electrical tape.

I clamped the fiberglass mast to the RS mast with two U bolts about four feet apart. I made no allowance for the shape factor of the mast, so my "vertical" was not quite vertical. Feeding the antenna with 450-ohm commercial ladder line, the radials were tied off at 90-degree angles in the yard. The antenna gave very good performance, the base being about 30 feet above ground and above nearby power lines. I had a couple of incidents where the mast "twist & lock" clamps vibrated loose in the winds, so I extended the mast and used small hose clamps to keep it extended. Everything was fine until a windstorm! The mast splintered above the top clamp and laid over.

Impressed with the mast, I ordered a second one as I moved to a new QTH. Up went a new tripod on the roof and the same piece of TV mast. I taped 4 wires, # 16 insulated, cut for end fed half wave verticals for 20/12M, using ladder line and the same clamping. I was quite pleased with the antenna setup but missed the 40/30M bands. I tried to hang an inverted Vee for 40 meters using the #16 wire and my old standby, commercial 450-ohm ladder line. I felt that the antenna would guy the mast.

I remounted the mast and had a beautiful curve about 20 feet up that pointed horizontally. No amount of working with the dipole legs could make up for the flexing of the mast. Boy, did the flexing scare me! But it never broke. So back up went the 40 meter ground plane vertical. Tornado season brought wind and the second mast broke, splintering just like the first one.

After some hacksaw surgery to the splintered end, up went a vertical ground plane for 30/10M, using L. B. Cebik's (W4RNL) idea "Suppose I Could Have Only One Wire Antenna." I took # 14 insulated wire, cut five pieces 22 feet long and set up the ground plane with four radials and my ubiquitous ladder line. This time, I took masking tape to wrap around the RS TV mast so the mast would slip over the metal and have a fairly tight fit. Thanks to Alan, KB7MBI for the tip.

The left over piece from the first antenna work was slipped over another piece of TV mast and has a 2M wire J-pole and a 6-meter J-pole taped to it. So far wind survival has been great and the performance on 20/10M has been great! My tuner is awfully touchy for 30M, but the signal gets out fine. The tuner can't handle the antenna for 40 meters.

Overall I am impressed with the mast for its strength, portability and usefulness. The only problem has been "operator error" in the clamping to the mast. I plan on purchasing another for trips when I set up a portable station and will either run an end fed half wave vertical for higher bands or a 40 meter ground mount vertical with lightweight radials. Maybe I'll consider a very lightweight dipole. The DK9SQ mast, in my opinion, is well worth the money.

—DE K8BBM

A Fishing Pole Vertical

Wilford "Doc" Lindsey, K0EVZ (70511.3041@compuserve.com), passed along this tip for a simple portable antenna—

I use an inverted Y with an SD-20 "mast" [see note 1 at end] when operating portable. It is so simple, yet apparently many guys don't know how to go at it. I buy a chassis-mount SO-239 connector at Radio Shack. I solder the vertical 1/4 wave element to the center conductor and two counterpoise wires through two of the four available holes. Then I extend the mast (using the longer one for 40 meters), tape the vertical element to it using electrical tape, stand the mast upright, extend the two counterpoise wires, connect a bit of coax to the rig and/or tuner—and go to it. I can be on the air in less than 5 minutes, even in a blizzard when I was hunting the FOX. [Note 2]

And this simple lash-up can be amazingly effective. Two years ago I got 238 QSOs in QRPTTF in about 3 hours, including some DX, from an open field in South Dakota. This past FOX season I got 17 pelts using it. One evening I did not use the mast, but got a bag of clothesline at the hardware, tied one end to the vertical element of the inverted Y and the other end to a heavy adjustable wrench—and heaved the wrench over a 25' high tree limb in a hotel parking lot. Worked like a charm, and I got the FOX within 5 minutes—even though both counterpoise wires were actually stuck into handy snow banks.

Maybe all this is old information, but it seems like every time we come up to a QRP field event—QRPTTF and Bumble Bees [note 3], to name only two—that guys ask what kind of antenna they can use that's easy to put up, highly portable, efficient, etc. To me this simple lash-up takes care of a lot of issues. BTW, I also rigged up a 2x10 and a pipe flange, which allows me to park on one end and stand the mast up over the other end on a parking lot.

—DE K0EVZ

WA8MCQ notes:

1. The SD-20 Black Widow is a collapsible fiberglass fishing pole that has received a lot of talk on the QRP-L mail reflector in recent years. I've never seen one myself, but I'm told they make excellent supports for temporary antennas—end of a long wire, center of a dipole or inverted V, etc. George Heron, N2APB, did indicate that there is a slight restriction, that it should only be used with small wire since the end of the pole is rather flexible. According to the descriptions, it collapses down to just a few feet long. To use, pull out the telescoping sections and tighten the twist-locks. One source of the pole was given in a QRP-L post— National Sports Supply, P.O. Box 14, Random Lake, WI 53075, 920-994-9218.

At the time, in early 2000, the price was about $20 plus shipping.

2. "The fox" refers to the HF fox hunt, an operating activity that was started on QRP-L several years ago and remains very popular. Unlike VHF fox hunts, this one is on HF and the station that is the fox operates around a certain frequency at a certain time. Unlike VHF hunts, there is no hiding and the idea is to contact as many of the foxes as possible over the months-long period. Making things a bit more interesting, the volunteer foxes are scattered all over the country. Getting a "pelt", of course, refers to a successful contact with the current fox.

This one was started in 1994 by Chuck Adams, K7QO, father of QRP-L, in an effort to get some mid-week activity on the QRP frequencies. And it most certainly does that. Bob Tellefsen, N6WG, recently made this comment about it—" It also makes a fantastic training ground for would-be DX hunters. A pileup of QRP stations is just as impressive as a QRO pileup, and can be just as tough to crack."

The fox hunt runs from roughly mid October to early March, with two sessions per week of 2 hours each. It has always been held on 40M, although last year as an experiment they did a summer hunt on 20M, which was well received.

3. QRPTTF and the Bumblebees are other operating events that are often discussed on QRP-L. The former is QRP To The Field, sponsored by NorCal and started around 1995. The idea is similar to Field Day—take QRP to the field, but earlier in the year. Flight of the Bumblebees is another popular operating event, this one sponsored by the Adventure Radio Society and started in 1997. The ARS is a wonderful group dedicated to portable QRP operation. The Bumblebees are those who take flight, operating portable QRP for the event, but the twist here is that they have to get to their operating location by human power—hiking, rock climbing, etc.

And while we're at it, here's another popular, long running QRP operating event coordinated on QRP-L: FYBO (Freeze Your B____ Off) Winter QRP Field Day, sponsored by the Arizona ScQRPions, started around 1996. (I don't think anyone ever defined what the "B" word is, but you can probably think of a few that will fit!) To make things interesting, this one even has a multiplier based on the temperature at the operating position (a lower temp gives a better score).

FT-243 Crystal Holder as Twin Lead Connector

A former "Frequent Idea Exchange Contributor" surfaces again! Frank Brumbaugh, W4LJD of Bradenton, FL passes this along—

Joe Everhart's idea for twin lead connectors in the April issue reminded me of the good old days when FT-243 crystals and sockets sold for pennies. I used to take the crystals apart, discard the innards, insert the twin lead and solder it to the pins, and put the holder back together. I used the sockets for the female connector.

WA8MCQ note—Old FT-243 crystals for "useless" frequencies still show up a lot at ham fests. Being for non-ham frequencies should give you leverage to bargain the price down a bit. Finding the sockets to go with them will probably be more difficult, but old-timers will recall that an octal tube socket will accept two of them. (If you can get a really old commercial mobile FM radio for next to nothing to strip for parts, such as a Motorola or GE, some of those contain a dual FT-243 socket.)

Comparison of Autek and MFJ Antenna Analyzers

Stuart Rohre, K5KVH posted this comparison of the Autek and MFJ analyzers to QRP-L—

I have an Autek HF analyzer, and have tried it side by side with the 259 and 259B from MFJ. Both are fine units. One of my clubs has had both MFJ models, replacing the 259 when the B model came out. They are our loaner test equipment. The accuracy in the optimum ranges seems well within 5 per cent for both, plenty good for amateur band use.

The Autek is smaller, and uses one battery, 9v. The MFJ is larger, heavier, and is being replaced by the 269 model. It requires several flashlight cells. It would be awkward to carry up a tower to check a beam. However there is a case with strap available.

Besides the digital display, the MFJ also has analog meters for SWR and total impedance. The analog meter is easier to see an SWR dip on, while tuning across a band.

The MFJ has a band switch, while the Autek has a band control pushbutton. The Autek can alternate its display between 2 functions like frequency and SWR, while the MFJ does one function at a time. The Autek has pushbuttons for each mode, L, C, SWR, etc.

The Autek goes above 10m, but not to 6m, while the MFJ goes to VHF high band above 2m. Autek does sell another small model, in the same small case size, that does not only 35 MHz and up for 6 and 2m, but also goes to 440 MHz.

If you are a tower climber you need both Auteks for HF and to do VHF to UHF. If you are a ground antenna tester and do not go above 2m, the MFJ does the job nicely. However, there is a UHF model MFJ to augment the 259 series.

With 1% precision components, I did simple L and C evaluations of both, and they measured the same values for my parts. I also have used both on HF antennas and gotten the same answer from both. Thus, if you are skilled at using a digital display to see a minimum number, the Autek will work just fine, on a cheaper battery, and in a smaller case than the MFJ.

If you do everything by looking for an SWR minimum, then the analog display of the MFJ will be the more comfortable to you. There are neat advanced features like figuring L and C that you can do with only one button push each on Autek, but take more control juggling on MFJ. Both will do things like find the velocity factor of a line, with a little math.

Both can be turned into grid dip meters by fabricating a couple of coils from the MFJ web site. However, since the coils act across a 50-ohm bridge, you do not get sharp and distinct dips as with a true GDO. Everything you did short of dipping an LC tank by induction you can do by direct connection of either analyzer. The main benefit of both is accurate frequency measurement. The Autek tunes a little faster than most would like, but includes a fine-tuning control for the exact touch. With practice, I can do all my Autek tuning with the main fast knob, and that has been a time saver. Just takes a delicate rotation, and it will be almost as close as doing both knobs. Close enough for most antenna work. Where you are in the segment of the band you wanted is good enough. You can always set both units to a frequency exactly, and trim the antenna to resonance, if you know it is long to start with.

Bottom line, as of several years, I can see no clear advantage if you do antennas all the way from 160 to 10m only. If you do a lot of VHF-UHF antennas, you may not want to have to have two boxes from Autek. The VHF one is pricier than the HF one. It is too bad they did not have the same coverage, but Autek crammed a lot into a shirt pocket size plastic box. The MFJ is a metal box, with not very thick material. I have seen some bent. Neither comes with schematic; there is a lot of proprietary tweaking in each of them. I have worked and fixed a connector problem on my Autek, but I am used to miniature circuits commercially. It was a board-to-board plug problem, not lining up right. A pin was actually too long. The MFJ is pretty busy inside, and likely you would not be able to fix much there.

Be sure to try out the units if you can before you decide which to buy. I think the controls use is very subjective, and neither is totally user friendly in my book—and my book is big on user friendliness. But I don't like the modern 2-meter HTs where 3 buttons do all the programming, either. I like intuitive front panels!

Some additional comments Stuart passed on later—One other thing to add to the comparisons: The new MFJ 269 antenna analyzer gives HF, 2M and 440 MHz operations in one package. Although it takes two Autek packages to provide the same coverage, the Autek retains the winning small volume/ideal size for use on a tower, even if you had to carry both.

On the other hand, there are pouches for the MFJ models that allow them to strap onto the user who climbs a tower. However, it would be harder to view the display with a strapped on instrument, in my opinion. Again, the deciding factor may be the fact that MFJ provides a quick view analog meter as well as digital display. Autek has all digital display. The Autek can alternate between two functions at the same time by simultaneously selecting two buttons, which could be handy up a tower, with limited hands available. As in many basic ham instruments it may come down to one's preference for analog or digital displays.

The comments should also apply to the Vectronics analyzer, available through Radio Shack, which is apparently the same circuit as the original MFJ 259.

—DE K5KVH
(rohre@arlut.utexas.edu)

Old Telephones Provide Antenna Wire

Here's a tip on inexpensive wire for portable antennas from David Bixler, W0CH of Seneca, MO—

I would like to suggest a source of "invisible wire" to be used for covert antennas in hotel operating or for antenna restricted homes.

Years ago when I was in college, I wanted to set up my ham station at my boarding house. The antenna had to very discretely installed to be invisible to the landlord. I discovered that the coils of mechanical telephone ringers were wound with literally hundreds of feet of very thin gauge enamel coated wire. I'm not sure of the wire gauge, but this stuff is so thin that it's very difficult to see indoors and outside it's invisible.

These ringers can be found and removed from old rotary dial phones easily. The phones can be found at garage sales and often can be purchased for a dollar or less. The last one I bought cost 25 cents and I have used the wire for several vacation hotel operations and still have hundreds of feet left on the coil. Examine the base of the phone for the mechanical ringer "loudness" control or tap the phone and listen for a "ding" sound to identify one with the mechanical ringer.

The college antenna was run from the rooming house through a couple of bushes and then to one of the top branches of an evergreen tree. It was end-fed with the pi-network of a home brew transmitter and worked like a champ. I even worked W1AW on 80 CW one time with it (from Indiana) and the landlord never discovered the antenna.

—DE W0CH

Fiberglass Mast is Passive Antenna Erection Tool

Our editor, NM4T, alerted me to this one, saying "I like this because there are a lot of places where using a slingshot or bow, etc, is really frowned on. (For example, RV parks and government managed sites.) This is something non-threatening for non-amateurs to watch." This item comes from GQRP-L, the mail reflector of the GQRP club, from Brian Jones, G0UKB—

I'd been thinking about the DK9SQ collapsible fiberglass mast for ages and the recent discussion thread on GQRP-L helped the decision, so I bought one.

I haven't used it as a mast yet but it's great for erecting antennas. A retiree close to me lost his dipole in a storm a while back. He had a wonderful oak tree with a branch at about 30' and a V at nearly 40' as ideal antenna supports but being in the middle of conurbation the usual catapult technique would be dangerous. [Loose WA8MCQ translation: be very, very careful about using a slingshot when there are houses and people in every direction!]

I taped a loop to the end of the DK9SQ mast, and passed a fishing line with a small weight through it. I extended the mast directly under the tree, though the branches and managed to just drop the weight over the 40' high V. Net result, antenna up at approximately 40' in record time.

—DE G0UKB

The Complete HW-8 Output Coil Set

From me, WA8MCQ—It's been almost nine years since my first article on the HW-8 output network cores; it appeared in the October 1992 issue of the QRP Quarterly. I had discovered that the ferrite cores used in the transmitter output networks on 80 and 40 meters could go bad, resulting in significantly reduced output power. (The other two bands, 20 and 15M, use powdered irons and do not suffer from this problem.) The solution is to replace the cores with new ones; Amidon carries a material, which is suitable.

After I discovered this I thought that it was a fluke and would be a rare problem. But by the time the article appeared in the QRP Quarterly, over two years after I replaced my first set of cores, I had 7 confirmed cases of low power being cured by new cores. I quit counting when I hit ten cases many years ago, and I still run across one occasionally.

Last year, Andy, GM0NWI, announced on QRP-L that he was attempting to resurrect and rebuild an old HW-8 that was in very bad shape. He wanted all sorts of things like switches, pots, the PCB (!), etc. I supplied him with a complete set of the output coils, wound from scratch on fresh cores and tested on my Boonton 260A Q meter.

The manual for the HW-8 gives the inductance for all 8 coils, but no further details. Having a recipe to make replacements instead of having to do all the experimentation and development would be very handy; there will always be HW-8s that have low power on 80/40 caused by bad cores, or coils for any band that are damaged or missing. Thanks to Andy asking for the complete set of coils, I now have a recipe to share.

Figure 10 shows the output section of the HW-8. Instead of a switchable set of low pass filters that we'd see in more modern designs, they use matching networks, which give some degree of adjustment. A front panel "loading" capacitor is tuned for maximum output when on the air. There is also a trimmer cap on the PCB for each band. On 80 and 40M only, an additional input capacitor is added.

Big volts in the little green box

As I noted in my original article, this is NOT a low impedance circuit. There are some surprisingly high voltages present within the network, which can be seen with an oscilloscope or neon bulb. For example, with a good HW-8 running well over 1.5 watts output to a dummy load I checked the voltages at various points, using a Tektronix 465B scope and X10 probe and saw the peak-to-peak voltages shown in Figure 11. (It was necessary to retune for maximum output every time the probe was moved, due to its small but finite capacitance affecting the network.) These are similar to those seen in other HW-8s on these bands.

Yes, that really IS four hundred and ten volts peak to peak on 80 meters, or 205 volts peak and 145 volts RMS. Nonbelievers are

invited to verify this for themselves with a high impedance probe (although you will probably have to retune for maximum output due to the probe capacitance; don't forget to retune it again when the probe is removed). Lacking that, you can touch one lead of a neon bulb to the circuit board and watch it light up. (Simply holding the glass bulb in your hand may provide sufficient current path to ground for it to light, or you may have to hold the other lead with your hand.) The other voltages may not be enough to fire a neon, depending on the particular bulb used.

Another test to demonstrate the high impedance—a 22K resistor placed from Point D to ground reduced the voltage at the antenna connector from 28 volts P-P to 22 volts. That's a reduction from 1.96 watts to 1.21, a drop of 38%.

Voltages were lower on the other bands and not as impressive, but still rather high. Note that the highest voltage is at Point D, which is the rotor of the loading capacitor. If you take its knob off, you'll see that the last half-inch of the shaft is plastic, not metal. Be careful where you put your fingers while transmitting with the covers off. You may not get fried at this power level, and you might not even feel it since the added resistance to ground could well be enough to cause the power to drop dramatically. However, I wasn't about to try THAT experiment!

Recipe for the new coils

80M: Coil A—L26, 15.5 uH; 28 turns #28 on FT37-67 core. This wire size barely fits, and #26 is too large to wind without overlapping turns. Coil B—L27, 27.5 uH; 35 turns #26 on FT50A-67. (This is taller than an FT50-67; this is roughly the same size as the original core.) #28 wire also fits, but gives somewhat lower Q, while #24 is too large to fit without overlapping.

40M: L28 and L29, both 7 uH; 19 turns #26 on FT37-67. #28 OK but lower Q, while #24 is too large. To get this inductance on my cores I had to spread the turns out to cover the entire core.

20M: L31 and L32, both 2.5 uH; 21 turns #24 on T50-2. On my cores I had to squeeze the windings to leave a gap of about 90 degrees to get the proper inductance.

15M: L33 and L34, both 1.3 uH; 16 turns #26 on T37-2, squeezed to leave a gap of about 100 degrees.

On the powdered irons I had to squeeze the windings a bit to hit the inductance on the head but that's being a perfectionist. Since two variable capacitors are involved on each band, one on the board and one on the front panel, there should be no problem if the inductances are off somewhat.

Watch out for L27

At one time my standard advice to everyone with low power on 80M caused by bad cores was to buy these cores and wind the same number of turns as the original coil. However, I have seen that backfire twice over the years. In the case of L27, wound on a fresh FT50A-67 with the same number of turns as the original L27, in one instance I got somewhat more power but it was still low. I had to remove several turns to bring it up to snuff (over 2 watts on 80M).

Interestingly, I saw this happen again a couple of years ago. Rich Arland, K7SZ, sent me an HW-8 that he was fixing for someone and gave up in desperation. He had replaced the cores as I instructed and wound the original number of turns and still had low power. When I got it, I pulled several turns off L27 and the power came right up. The same thing might happen to someone else; don't be afraid to trim things a bit if you don't get the expected results. (Unfortunately I didn't bother to check L27 either time with the Q meter, either before or after pulling turns. But presumably the permeability was somewhat off the nominal value.)

Use the right cores

You may make one substitute for the type 67 material (which has a permeability of 40)—although type 63 is no longer readily available, you might be able to find some. It's an older material which is essentially the same as 67, although the latter is a somewhat improved mix. I used 63 when it was still sold. Otherwise, do not make substitutes.

Since I was too lazy at first to order the type 63/67 cores, I tried an FT37-61 since I had some on hand. It has higher permeability (125), and I calculated that only 11 turns were needed to give the necessary 7 microhenries for L29 (40 meters). For L28, I used the good coil from my own HW-8. Although it had the proper inductance, the -61 core only gave about a quarter watt output, and after 10 seconds it was almost too hot to touch! Obviously it was not the proper mix for this application. Avoid the temptation to use what's already on hand, and take the trouble to get the right cores.

Additional info on the Internet:

In addition to my original article I had some follow-up info in the Idea Exchange on the issue of bad cores, along with some experiments I did to make perfectly good cores go bad. If anyone would like to read those, they can be found in the file archives area of the QRP-L host. They can be downloaded by HTML or FTP. Go to

ftp://qrp.lehigh.edu/pub/listserv/qrp-l/

and if you're doing it by normal FTP go next to "articles" and look for these files: badhw8cores.mcq and zapcores.mcq. The files will also have another extension of .Z, which means they are stored in a compressed format. If you download the files with the .Z included you will receive the compressed files and have to uncompress them on your computer with the proper program. (It's a well-known and widely available UNIX routine, I believe. PKUNZIP and WinZip will not decode them.) If you omit the .Z extension when you download the files, they will be decompressed and then sent to you.

You can also get the files using HTML. Go to the QRP-L homepage at

http://qrp.lehigh.edu/lists/qrp-l/

and click on QRP-L File Archive. This transfers you to the same FTP address shown above and you'll see the same folders. If you click on them you'll be able to download them but will not have the option to delete the .Z extension to get the uncompressed files. Instead, click on index.html, which will give you the same index but in HTML. Then click on "articles" and you will be able to view any of the files with your browser. If you wish to save the text, highlight it and copy to the clipboard, then paste into a word processor.

If anyone who does not have access to these online files wants a copy, let me know and I can send you a printout.

—DE WA8MCQ

QRP Online

There's been a huge amount of QRP info flying around the Internet for years, and

it's still there!

QRP-L, which I call the "QRP Daily," is the online QRP discussion forum started in 1993 by QRP Hall of Fame member Chuck Adams, K7QO (K5FO at the time). It continues to run several dozen postings per day on a variety of topics related to QRP.

QRP-F is an alternative QRP forum started by the QRP ARCI in October 1999 to take some of the load off QRP-L. The forum, QRP-F, requires a web browser such as Internet Explorer or Netscape, while QRP-L is a mail reflector and only requires an e-mail account. (If you go to the QRP-L home page, you can check out all the archived messages back to Day One.)

To check out the online QRP world, go to these URLs:

QRP-L: go to http://qrp.lehigh.edu/lists/qrp-l/ and you're at the home page where you can sign up, read the archives, etc.
QRP-F: go to http://www.qrparci.org/ and click to enter the site, then click on QRP-F on the menu at the top.

And while you're on those home pages, don't forget to check out their lists of QRP related links; and at each link that you go to, check *THEIR* lists as well, since not all sites list all others. (Although this is heresy for me to admit this, as a long time QRP ARCI stalwart, my personal favorite is the NorCal site, run by Jerry Parker, WA6OWR, at http://www.fix.net/~jparker/norcal.html.) You'll find quite a wealth of QRP info online. ●●

Ramblings of a Peaux Displaced Cajun Lad in Maine

Joel Denison—KE1LA

hamjoel@juno.com

One day, when I was talking to my friend Alphonse, Alphonse said..."U kneaux, Joel...CW is kinda like a woman..."

"*What you mean Alphonse,*" I asked?

"Well, now think about it, don't it make u smile when you grab that CW key... and don't u take ur time tuning it just right... and don't it sing so pretty when u got it all right...why the only reason u stop is cause u got uself tired out..."

"I think u got sumthin thair Alphonse ...Why when I was a-courting I could make that key sing...always adjusting things...then it quit working for me and I had to got myself a newun..."

"What u trying to tell me Joel," Alphonse asked?

"U kneaux, when things got bad with that other woman I had, I sat her down and asked her what I could do to make her happy. Boy, did I think I done the right thing. She sat up, put her arms round my neck and with a grin from ear to ear she said 'LEAVE!' U kneaux it made me so sad to make her so happy...

Anyhows after that I lost most of my ham stuffs and had to got myself a new key...and this one musta liked my touch cause it worked just fine all the time. I'll tell u man... I used to dream about that key and making it sing around the world...kinda like this new woman I found...

Kinda strange though...I had brought *myself to a monastery in MO. and was looking* to join up with these hooded guys when I met this brazen (female...u kneaux it's best to clarify these days... :-), redhead what made me *a better offer...*

I treat her like I treat my code key ...tenderly caressing and adjusting, man that woman can make me sing...just like my code key...So I guess u be right Alphonse... CW is kinda like a woman and a ham should treat the CW key like such...tenderly....

Now contests, they be kinda like an angry woman—the CW is so fast u gotta guess at what they is sending...and man don't interrupt at the wrong time or say the wrong thing...cause things gonna got worse...

U kneaux Alphonse, I remember dating this one woman what reminded me of a well-tuned bug (code key). The only problem was, she was stuck on the dit side and wouldn't stop till the spring tension gave way...talk ur head off man...

Nuff of this Alphonse, u done got me to tears..."

"Sokay Joel, my man... I hear u ban working some twenty meter SSTV lately..."

"Sure thing Alphonse, I got aholt of this 4 and we done sent maybe 5 pictures each before he say 73...gave me a 595 (R S V) report. U kneaux, I got a new interface for my radios...K2 & QRP+. Now I can switch either one to the computer and run SSTV, RTTY, PSK—sure is sumthin! I went out an bought a radio shack duel heat solder iron...15 & 30 whats...I don't tend to smoke the connectors like I did with the 250 whats Weller gun... U should see that Alphonse...I can flick a switch and use either radio, CW or SSB. Then, iffin I wanna work digital, I can flick another switch and work digital from either radio...First time I put a soldering iron on a *project in a long time...especially* with the right amount of heat...it's fun..."

Alphonse jumped in and continued ..."well u kneaux, Joel, that's the QRP advantage...u can got away with lots of things what would cause permanent smoke damage iffin u tried doing that with 100 whats...kinda like a woman..."

"What u mean kinda like a woman, Alphonse..."

"Well u kneaux u gonna live with her so u don't got one what gonna outweigh u and beat u up when she get tired of u ham stuff..."

"U kneaux that's true Alphonse...An't nuttin ruin ur day like getten throwed across ur ham shack into ur own radios by ur wife...and with QRO equipment, especially of old, that could be real shocking...

I gotta geaux Alphonse...sure been nice chatting and u bring ur lovely cajun belle with u next time and we gonna have a crawfish boil, Ok?" ●●

Joel out fishin; them Antenna Wires...

Test Oscillators

Mike Branca—W3IRZ w3irz@att.net

This article presents four simple test oscillator circuits that show how simple some test equipment can be. Any one of the four could be a fun evening project and each has a useful purpose. Junk box parts and point to point wiring are the rule here so most of the construction time is spent in gathering the parts and enclosure.

The first three are crystal oscillators for radio frequencies—each having a different purpose. **Fig. 1** is the schematic of the first one I built 25 years ago to test my first homebrew frequency counter. This Pierce circuit is very good for sorting out crystals to be used in crystal ladder filters as most crystals will readily oscillate in this circuit. A "test box" containing the oscillator is shown in **Fig. 2.**

The series 50 pF variable capacitor is used to indicate how much the crystal will "rubber" and when set to minimum will give an indication of the crystal activity. If a variable capacitor is not available a fixed 25 to 33 pF capacitor can be substituted. An LED is wired in series with the battery lead as a pilot lamp and will dim slightly when a crystal is plugged in thus acting as a simple crystal tester too.

With a hand full of crystals much receiver alignment can be done with this gadget with the attenuation being controlled by moving it away from the receiver. While some would say that I should use a voltage regulator to keep the output constant, I have not found this to be necessary as the current draw is so low that a battery will last me for years; I often use batteries that no longer function in other circuits. The 78LXX series regulators use more current than this oscillator does. My version includes a couple of built in crystals and a couple of sockets on top. As an Elmer, I send my students home with a hand full of parts so that they too can build one of these useful devices. This circuit works well using the 2N2222, 2N3904 as well as many other NPN transistors.

Fig. 3 illustrates a circuit that will make low frequency (2 MHz and below) crystals and ceramic resonators oscillate. I guess that the 2N2222 has an impedance and gain that is far to low for these crystals so that gives us a chance to play with another interesting circuit – the Darlington transistor pair. This circuit actually multiplies the Beta of the two transistors and has an input impedance in the megohm range. Construction couldn't be simpler with old-fashioned breadboard style on a scrap of wood. One half of a relay socket is used for the crystal socket (although clip leads could have been used) and the other side of the relay socket is used to put a variable capacitor in series with the crystal which has proven especially useful with the ceramic resonators. It ain't pretty but it works great.

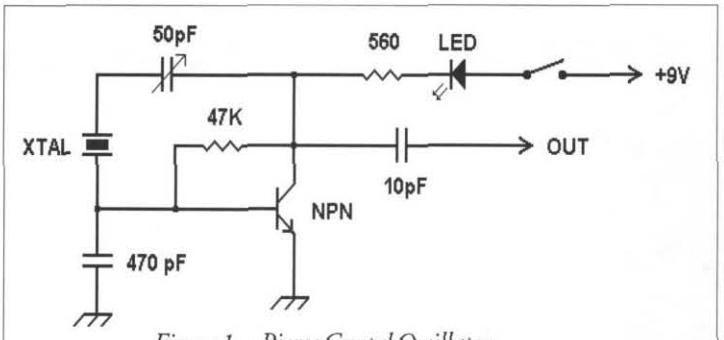


Figure 1—Pierce Crystal Oscillator

Figure 3—Pierce Crystal Test Oscillator

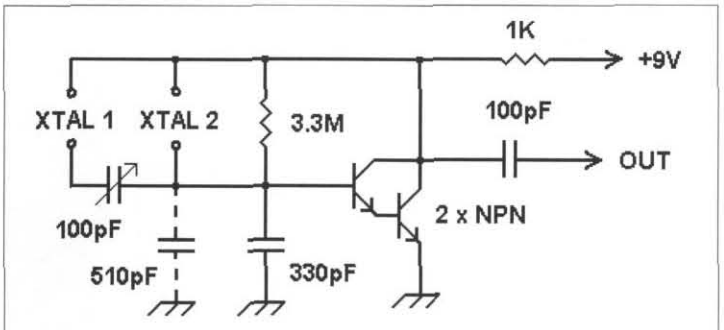


Figure 3—Pierce Crystal Test Oscillator

NOTES:
XTAL 1 socket tests for rubbering and activity.
XTAL 2 socket for general testing.
510pf capacitor required for some WW2 xtals.

Fig. 4 is one that I recently made that operates in the Colpitts type circuit and the 33 pF series capacitor is used to establish a 33 pF parallel load as the 390 pF and 510 pF series combination would seriously load the crystal otherwise. This is also a handy circuit for spotting crystal frequencies in simple receivers and to check for the parallel resonant frequencies of crystals. I am getting much better at this as I no longer use crystal sockets since there are just too many different crystal types and the clips work well on them all. The 1¼ X 2¼ X 3¼ inch plastic project box show in **Fig. 5** is one that Speer ships its bullets in and they sure come in handy for QRP projects

Finally, we come to the audio oscillator shown in **Fig. 6.** This is an interesting circuit called the "Twin Tee" oscillator. Producing a clean sine wave, it makes a good sidetone in rigs that do not come so equipped. It keys well and can make a good code practice oscillator. In this particular application, I needed a tone to test several SSB transmitters under construction on my workbench including the Epiphite 3. An audio tone results in an RF output needed to adjust and tune the amplifier stages and to adjust the antenna tuner. Eventually a copy of this gadget will be included in the transmitter circuit. It can also be used to produce CW from an SSB transmitter or MCW from an AM or FM transmitter. I used a battery clip removed from an old battery as everything gets recycled here.

There you have it – four

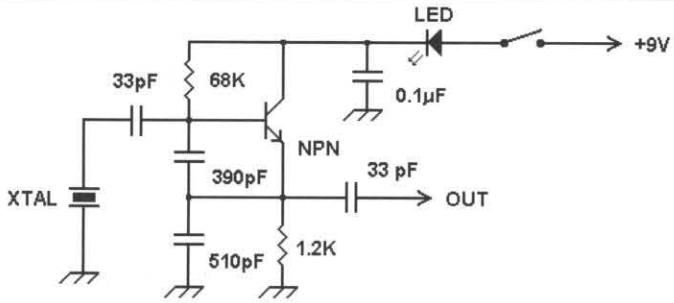


Figure 4—Colpitts Crystal Oscillator

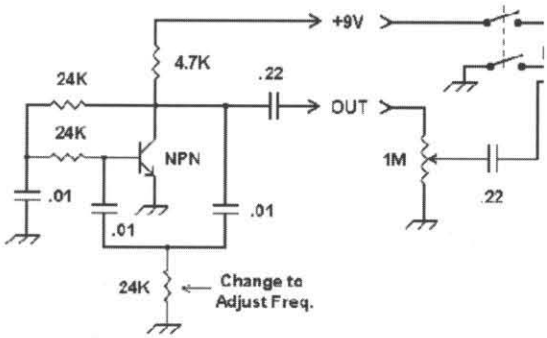


Figure 6. 1000 Hz "Twin Tee" Oscillator for SSB Transmitter Testing.

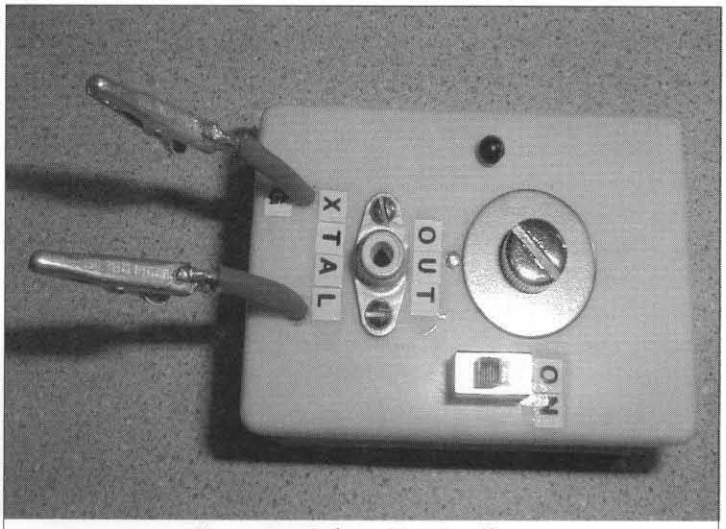


Figure 5—Colpitts Test Oscillator

projects to play with. Please try them with various values of components with the power on just to see the effects. The worst that can happen is that you will blow a transistor but so what. They cost but pennies but the knowledge gained is worth much more than that.

Personally, I feel that if you don't occasionally pop a part then you are not learning. For example, I still have the two CK722 transistors that I purchased in 1955 and they are still in perfect condition because the magazine writers of the day scared me so badly about how fragile transistors were that I was too timid to experiment with them! It was not until several years later when I had a cigar box full of WECO 29A transistors (their version of the 2N2222) and started popping them that I really learned how to use transistors. I am still learning and still popping parts occasionally. ●●

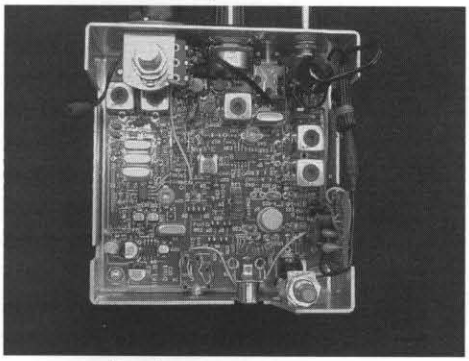
Super Cub with Ladybug Paddle

Larry Woodworth—W0HXS larryw0hxs@yahoo.com

Spending a couple winter months in South Florida, as a snowbird from Kansas, has made me more productive. Before getting hooked on QRP, I used to covertly struggle for weeks trying to get an RF signal out of our ground floor apartment. Each new antenna type became another mere Dummy Load.

After a few years of imitating an underground agent, I've re-discovered "roll-your-own" radio construction. In the 50s, we built one and two tube novice rigs that got us on the air and enjoyed that creative feeling. Now, it's even more fun and there are many good QRP kits to choose from. So instead of all that effort to operate a low profile station, I enjoy kit building in a converted apartment closet.

The Miami Tropical Ham fest last February gave me a chance to select a new QRP kit. This time, I was drawn to the MFJ CUB 9320 kit. It has a small circuit board packed with factory installed surface mount components. This makes assembly of additional components that can be seen by the naked eye go very fast. This was not my goal, but it allowed me ample time to consider additional mods to build into the 3½ x3¾x1¾ case. Thanks to the technical efforts of guys like **Larry East—W1HUE**, and **Rick Littlefield—K1BQT**, the needed/useful mods are already tested and ready for a builder to use by following their well written and diagrammed instructions.



I like to get involved planning design mods and make the finishing touches in my Kansas home workshop where I keep more tools, parts and machine ability than will fit in a closet. More construction details on my CUB include the TICK memory keyer, by EMBEDDED RESEARCH, a simple clear plastic tuning scale marked on the panel side, and a 2 inch speaker sharing cabinet top with the RIT control of Larry East's design. The TICK function code sounder and mode switch peek from holes at left front and rear. While the MFJ manual suggests springing the lower half of the cabinet slightly to allow the board to have fit clearance, my rear panel is sectioned with the top part fixed to the cabinet top. With this and 1/8 inch of the key jack removed, the board gently goes into position. As for the key jack, I don't use it much. For some time I've been using a front panel mounted "LADYBUG" paddle, as I call my design. It totals 1-inch in length, only 5/8 inch of which is out front of the face panel and equals usual knob size. It delights those who have tried it.

The "LADYBUG" paddle adds QRP unity to my CUB. Applying only power and antenna to a QRP rig makes one think setting up is too easy, or, "what did I forget?"

I have enjoyed the Cub project. My additions make operating it a blast. Questions or comments welcomed. ●●

N5FC's QRP Transmitting Inline Attenuator

Monty Northrup—N5FC n5fc@io.com

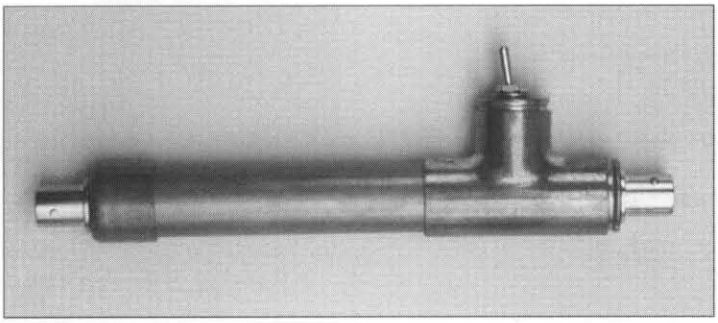
Any QRPer knows how much fun operating with low power can be. A decrease of power from 50 Watts to 5 Watts is -10 dB, or about 2 S-units. The increase in fun is also about an order of magnitude. Usually, decreasing power to a tenth of normal power can be effected simply by turning the transmitter's drive control down, if you have a commercial rig. But there's a point of diminishing returns, and it's frequently impossible to lower the power much less than a few Watts, and even harder to know what that level is. With simple QRP rigs, the drive is often fixed, and the power thereby set to 2-5 Watts. Wouldn't it be great to have the means to readily and easily decrease that QRP power by a factor of ten, thus making QRP even more fun? And for about 5 or 6 dollars?

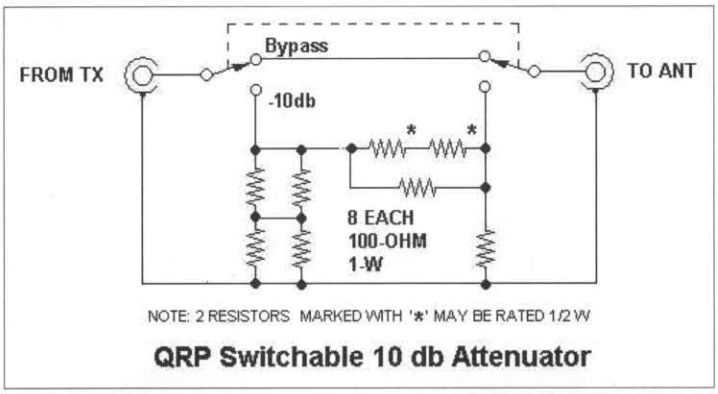
Well, that's the basis for this project, a switchable 10 dB transmitting inline attenuator. Simply place this device inline between your transmitter and antenna tuner (or other 50-Ohm load). With the switch in the "Bypass" position, full power goes to your antenna normally. A flip of the mini-toggle switch to "-10 dB", and your output goes to one-tenth of its original power. In either position (assuming your antenna tuner is properly adjusted with high-power applied), your transmitter sees 50-Ohms.

The attenuator schematic is shown above. I used eight 100-Ohm 1-Watt 5% metal-oxide resistors, available from Radio Shack for a mere 25-cents each (RS 271-152). The DPDT micro-toggle switch (RS 275-626, $3) was selected for it's small form factor and it's excellent ratings. Two UG-1094 BNC jacks provide my favorite means of connecting RF.

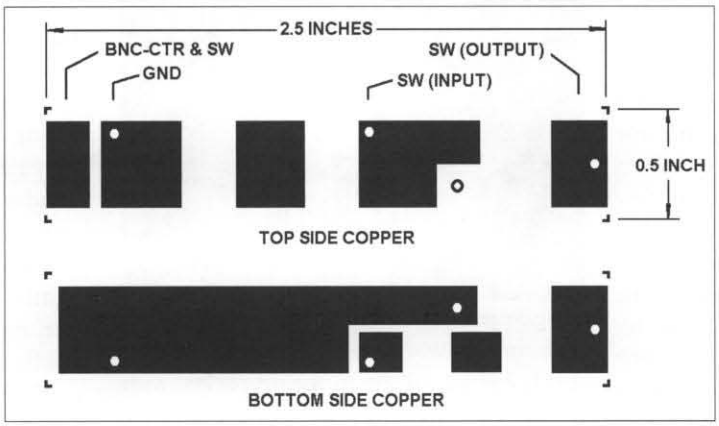
If you do the math, you'll discover that the attenuator isn't really 10 dB (it's 9.6). This means that for 5 Watts input, you'll get about 550 mW out (rather than 500 mW). The compromise is miniscule, and allows the use of equal value, off-the-shelf resistors. The input/output impedance is still within 5% of 50-Ohms, so it should provide low SWR operation throughout the HF range.

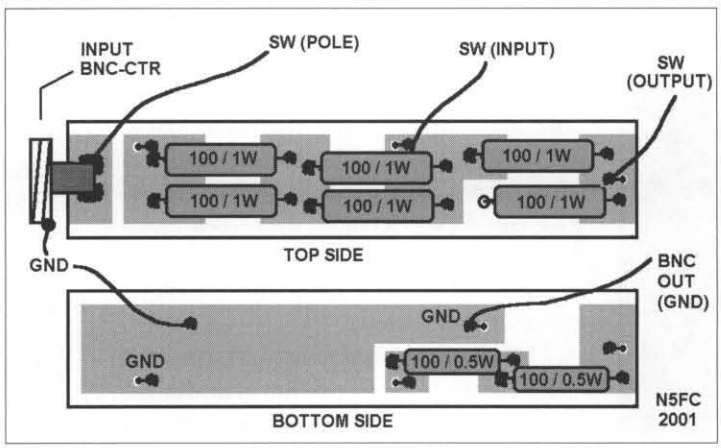
I mounted the resistors on a piece of scrap double-sided printed-circuit board, about 2.5 x 0.5 inches. Using a hobby knife (and safety glasses!), I formed pads on both the top and bottom of the PC board. All resistors and wires were then tack-soldered to the PC board. You should use Teflon-coated wire for the wiring, because the resistors can get very hot in this application. The drawings at left show the PC board copper pads and component layout.





QRP Switchable 10 db Attenuator





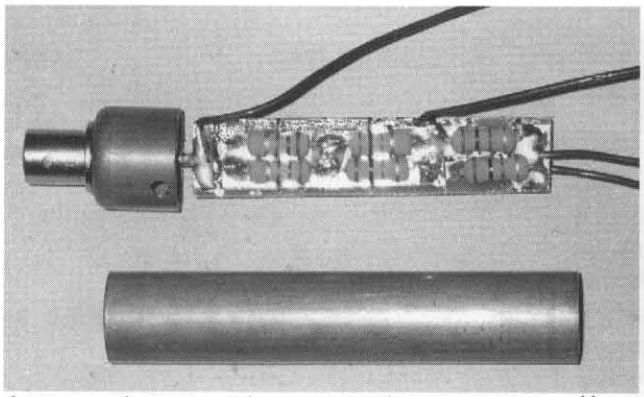
Note that where holes are drilled through the board, a wire provides continuity from top to bottom (solder on both sides). Otherwise, everything is soldered "surface-mount" style, with a big blob of solder holding the components in place (don't get carried away). The center pin of the input BNC connector gets soldered directly to the foil where shown.

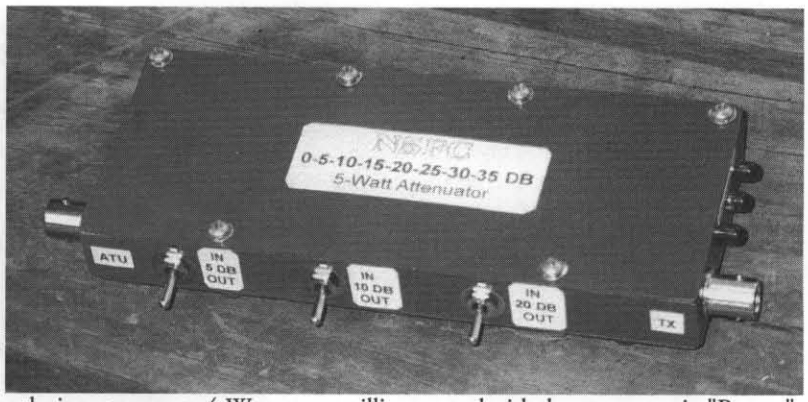
As you can see, I was on a copper-pipe-kick when I built this attenuator. You may, of course, elect for some other packaging, though at 5-1/2 in. long, this unit is very compact and portable. The 1/2 in. copper pipe provides a convenient, compact form factor, is an excellent shield, and helps to dissipate heat to the outside world. Copper end-caps, available at most hardware or plumbing supply stores, provide a means of mounting the two UG-1094 BNC jacks and toggle switch, and closing the unit.

The photo above shows the front of the board assembly just prior to putting it inside the copper tube.

Wrap the entire PC board assembly in plumber's Teflon tape before installing it in the copper pipe, to prevent shorts. Don't be tempted to use any other kind of tape because of the high temperatures involved.

Check you wiring before applying power to this attenuator. Check that the "Bypass" position shows 0-Ohms continuity from input center-pin to output center-pin, and no continuity from center-pin to ground. Then, with the switch in the "-10 dB" position, verify 60-65 Ohms at the input (center-pin-to-shell) and





the same at the output. Then, measure from input-center-pin to output-center-pin and verify 50 Ohms (approximate).

— Warning —

This device dissipates energy by generating heat. Heat generated in a small space translates to temperature rise, and temperatures can be hot enough (under the right circumstances) to burn people and ignite adjacent materials. Because of the thermal mass of the attenuator and its enclosure, that heat can stay around for a long time. Always locate your attenuator in a safe place, where there is no chance that it will burn people or catch something on fire.

How does it work?

I checked the input SWR in both the "Bypass" and "-10 dB" switch positions. At 30 MHz and below, SWR was 1.1:1 or less. At 146 MHz, it was 1.3:1 in "Bypass", and 1.6:1 at "-10 dB". Attenuation on all HF bands was measured at 9.6 to 9.65 dB. (Attenuation on 2 meters was not measured.)

I keyed-down at 5-Watts input for 60 seconds. The unit barely got warm. Still, I recommend keeping the input power to 4-Watts or less for continuous periods of 30-seconds or more, and not more than 8-Watts at 50% duty-cycle (like with CW)

The fun really starts when you put this thing on the air. As soon as I got it buttoned up, I started cruising 40 meters around the QRP calling frequency for a CQ. I didn't have to wait long before I heard Lionel, K6CEQ, and gave him a call with the attenuator "IN", i.e., 1/2-Watt output. He came back to me with his QRP 5-Watts and a 559 report. We made a couple of solid exchanges at that power level, at which point I switched to "Bypass", gained a couple of S-units, and finished out our ragchew. Austin, TX to San Diego, about 1155 miles, and about 2300 miles-per-Watt. Not Bad!

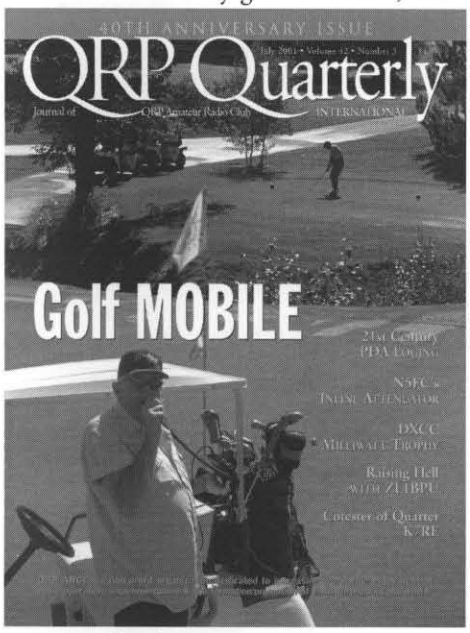
When the band is really hot, and I'm using the TenTec Century 21 (which allows you to adjust the drive level), I adjust it for 5 Watts out with the attenuator bypassed. Then, I switch in the 10 dB attenuator, and note the exact position of the forward power needle on my SWR Meter. Next, with the attenuator bypassed, I readjust the drive level to match that mark (i.e., 0.5 Watts instead of 5 Watts). Now, with the attenuator "IN", I'm transmitting 50 milliwatts, and with the attenuator in "Bypass", 500 mW. Using this technique, I was able to call and exchange info with Jim, AL7FS, in Anchorage, Alaska, using only 50 mW of power, a path of 3144 miles for 62,880 miles-per-Watt!

For those worried about the attenuator being inline during receive, I have not found this to be a problem, as my TenTec Scout has plenty of reserve gain for the bands I work. On the DX bands, you may elect to switch to bypass during receive cycles.

Encouraged by my on-the-air results with the 10 dB attenuator, I decided to expand my flexibility with an attenuator switchable in 5 dB steps from 0 through 35 dB. The attenuator that I came up with is shown in the photo below. It is usable throughout the HF range (and maybe into VHF) and allows one to reduce a 5-Watt output by about 1/3 with each 5dB step, until its divided it by 3000 -that's roughly 1.6 milliwatts! Think you can't have some fun with that? You bet you can! Here's the clincher: the cost is less than $25, and a couple of long evenings of your time.

For complete construction details on this attenuator and other QRP related projects, visit my web site:

http://www.io.com/~n5fc/ ●●



About the July QQ Front Cover...

What do a couple of QRPers do when playing behind a slow foursome? Why, they work the world!

Ron Stark—KU7Y and Dave Yarnes—W7AQK worked the SSB WPX on 10-meters while a game of golf at the Shadow Mountain Golf Course in Pierce, Arizona.

How well did this work out, you say? Well, it worked great for them! Ron broke 100 for the first time and Dave had 3 birdies. And...their first QSO was an HB4 in Switzerland. They simply grabbed the mic whenever they had the urge and worked a bunch of SSB contest DX. Later on, they worked some more DX with CW.

If you look at the cover shot closely, you'll see the FT-817 mic in Ron's hand and Vern Wright's MP-1 antenna sloping off the back of the golf cart. Although this versatile little antenna did a great job, Ron says it stinks when trying to use it as a driver. (Ron never did get the VSWR right on his clubs.)

They dragged the antenna radials behind the cart. Worked like a champ until they backed up. Dave said "no biggie" since he has extra radials stashed away.

Power was provided by a Sears power pack. Vern says he does wonder though if Yaesu has a noise filter that is better tuned to golf carts—"Gads those things generate (noise)!"

See more pictures at:
www.desertviewrealty.com/
desertviewrealty/shadmtn.html ●●

SMK-1 and 49er 20-Meter Modifications

Brian Wingert—N7RVD brianw@synrad.com

20 meters has always been my favorite QRP band. It affords good DX and small, portable antennas. AD6A Dave Fifield's SMK-1, and N6KR Wayne Burdick's 49er, are fun rigs that are simple to modify for 20 meters. Dave and Wayne's circuits are very forgiving. Both the SMK-1 and the 49er are direct conversion transceivers based on NE602 mixer/oscillators. 20 meter mods consist of changing the LC resonate input to the NE602, changing the oscillators frequency, and replacing the output low pass filter.

The SMK-1 uses surface mount components and a second transmitter oscillator. The component values I used for the SMK-1 are as follows:

NE602 input:
L1 - 4.7uh, C2 - 68pf, L2 - 1.8uh, None of the values are especially critical. The variable caps TC1 and TC2 have a lot of room for adjustment.

NE602 Oscillator:
C4 - 33pf, C5 - 15pf, L3 - 4.7uh, X1 - 14.060mhz The components are NOT critical. I strongly suggest changing only L3 and X1, using a 14.063-065 crystal (perhaps, even a 14.070 crystal), and then testing the radio by monitoring the frequency with a digital display receiver. My 14.060 crystal was pulled down to the low 50's by the original circuit components. I had to swap out capacitors to raise the oscillator
frequency back to 14.060. Starting with a higher frequency crystal, the oscillator may work in the proper frequency range without capacitor substitutions.

2222 Oscillator:
C16 - 150pf, C18 - 27pf, X2 - 14.061mhz Ditto above. With a 14.063-065 crystal, the C16 and C18 may be OK as is. Change cap values are needed to adjust freq range.

PA Output:
L5 - .47uh, C24 - 220pf, C25 - 220pf

The finished SMK-1 transmits from 14.059 to 14.060 and receives from 14.057 to 14.062. Before starting SMK-1 mod, I ordered a small assortment of surface mount capacitors and inductors from Mouser electronics. The large 1206 size capacitors were no longer available. So, I bought the 0805 size caps which worked OK. By laying the capacitors on the board at a slight angle, there was just enough overlap to flow solder from the parts to the pads. There is no reason one couldn't use regular leaded parts. In some cases, when I didn't have the correct surface mount part, I bent the leads of a regular ceramic cap and soldered them to the board with no problem.

The easiest method I found for removing surface mount parts was to use two soldering irons to heat both sides at the same time. To salvage the parts, without overheating, I flipped the parts off the board as soon as they came loose. There was a tendency for the unsoldered parts to stick to one of the soldering irons, in which case, I quickly wiped the sticky part/iron on a moist soldering sponge.

49er modifications are very similar to the SMK-1, and a bit simpler, since the 49er uses standard parts and a single oscillator. The component values for the 49er are as follows:

NE602 input:
RFC1 - 1.1uh (16t on a T30-2 core), C1 - 18pf, C7 - 18pf, C20 - 82pf, C2 - 5-70pf variable capacitor. As long as C2, C20 and RFC1 are resonate around 14.060, a lot of other combinations are possible. I selected parts that happened to be on hand. I changed C1 and C7 from 22pf to 18pf although the original 22pf may work just fine.

NE602 Oscillator:
C4 - 15pf, C5 - 2-7pf variable, RFC8 - 11uh (14t on a FT37-61), X1 - 14.060mhz. Same as SMK-1 - My use of a 14.060 crystal necessitated reducing the capacitor values. I used a variable capacitor at C5 to adjust the tuning range.

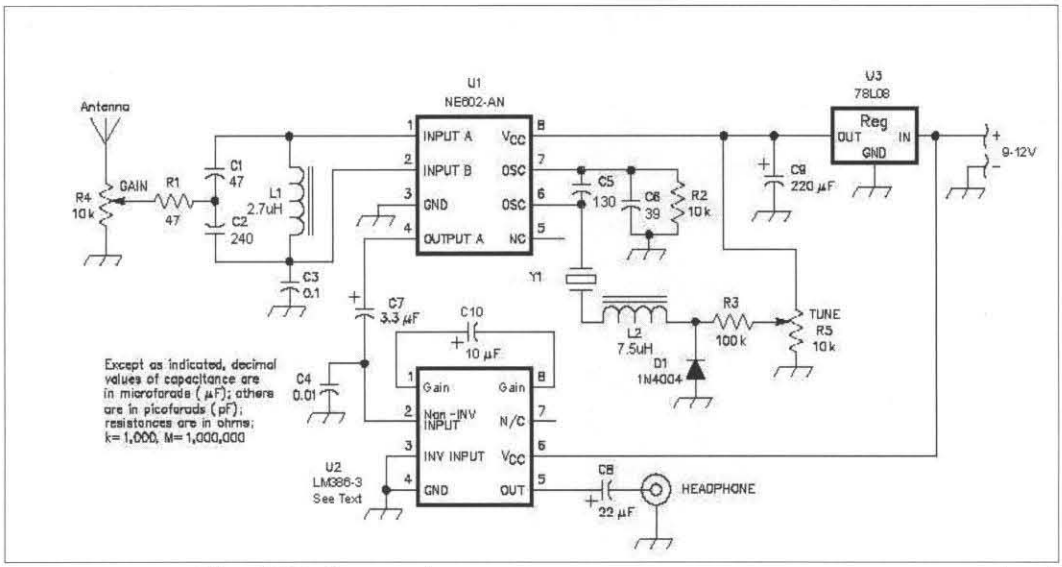
PA Output:
RFC6 - .47uh (11t on a T30-2 core), C24 - 220pf, C25 - 220pf

Misc parts:
C14 - 10-45pf variable capacitor, RFC3 - 15uh (9t on a FT23-43)

49er transmit offset is set by C14. Since none of my junk box parts produced a 600-700hz offset, I installed the variable cap which allows offset adjustment from 0-1800hz. 1mh for RFC3 seemed like a lot of inductance to me. Instead, I used the same 15uh inductance as RFC4. It works FB.

On my forty niner, I replaced the VXO variable capacitor with a voltage tuned 1N4005 diode arrangement identical to the SMK-1. My 49er has a 5 Khz range centered around the 20 meter qrp frequency. The original LC VXO circuit should produce similar results. I mounted my 49er in an Altoids tin with all the connectors on the short ends of the tin. The 49er, with an earphone, 9v/2 AA battery pack, and microswitch key weighs only 6 ounces and easily slips into a shirt pocket for QSO's on the go! I've made numerous contacts running 1 to 2 watts QRP portable, including New Zealand from a campsite using a 1/4 wave vertical. Best DX with the SMK-1 so far is Seattle to Florida, 1000+ miles per watt.

Have fun! ●●



One-Half Wavelength Inverted-L Multi-Band Antenna

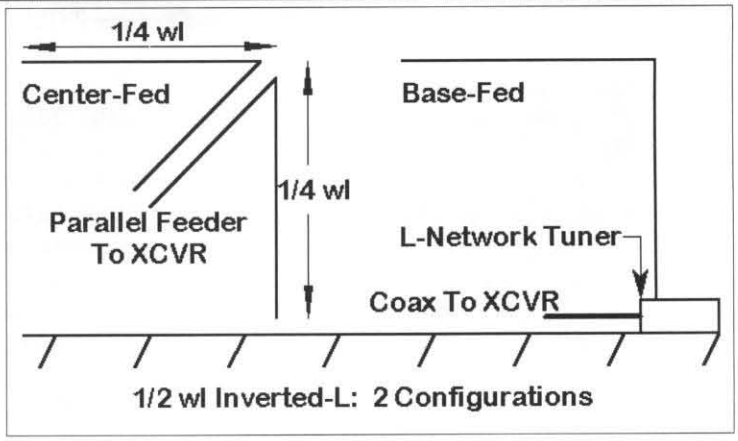
A Data Compendium

L.B. Cebick—W4RNL e-mail: cebil@cebik.com URL: www.cebik.com

An 80-meter 1/2l inverted-L requires about 65.5-ft. horizontally and the same amount of vertical space. For a full size antenna, the height needs to be slightly more to ensure that the bottom of the vertical arm—a high-voltage point—is out of reach from anyone. If the fundamental frequency is on 40 meters, the antenna will be half the size.

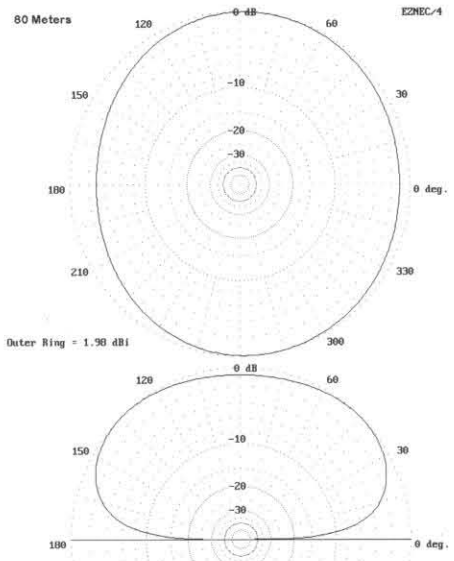
For odd installation situations, the antenna can be distorted in either the vertical or horizontal dimension. Adding more horizontal and less vertical length tends to make the horizontal arm more dominant, with a reduction in lower-frequency, lower-angle radiation. Lengthening the vertical arm and shortening the horizontal arm does the opposite, with slight reductions in gain on the upper HF bands.

Top-corner feed usually requires parallel transmission line to a wide-range balanced antenna tuner. Often, however, hams feed the antenna through an L-network placed



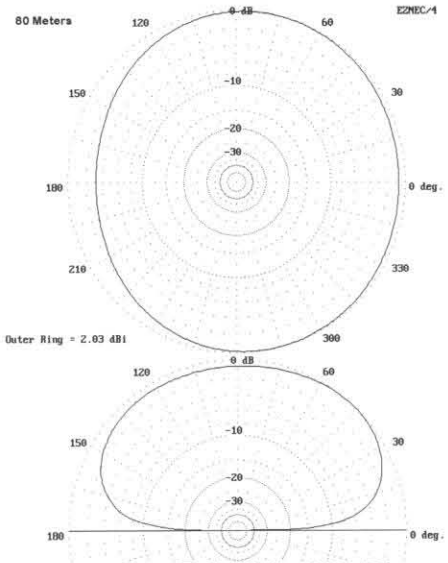
1/2 wl Inverted-L: 2 Configurations

—Continued on page 37—



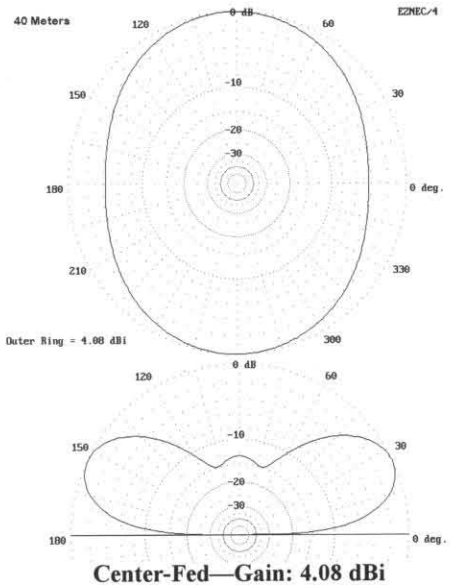
Center-Fed—Gain: 1.98 dBi

T-O Angle: 44 ° *Feed Z: 65 + j4 Ω*



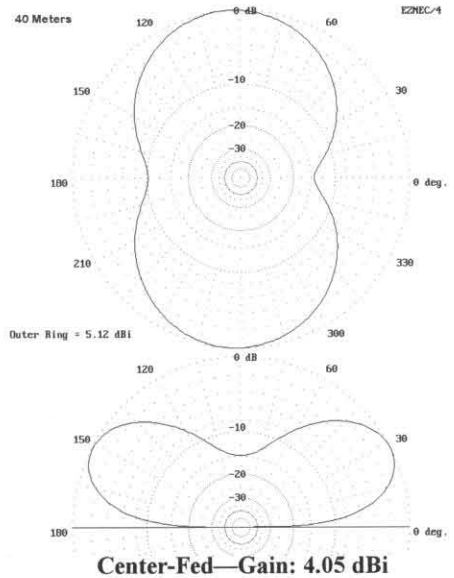
Base-Fed—Gain: 2.03 dBi

T-O Angle: 46 ° *Feed Z: 4800 - 1060 Ω*



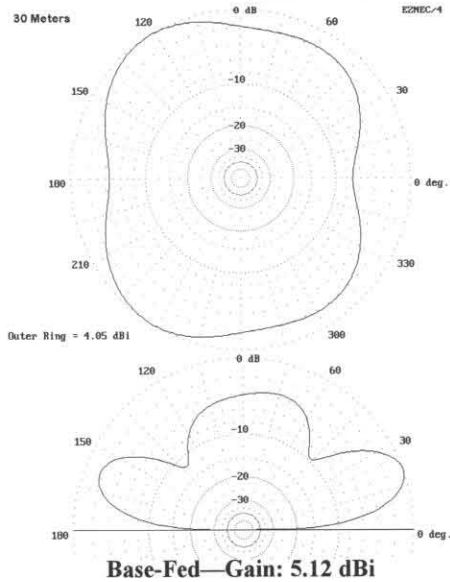
Center-Fed—Gain: 4.08 dBi

T-O Angle: 26 ° *Feed Z: 6500 + j710 Ω*



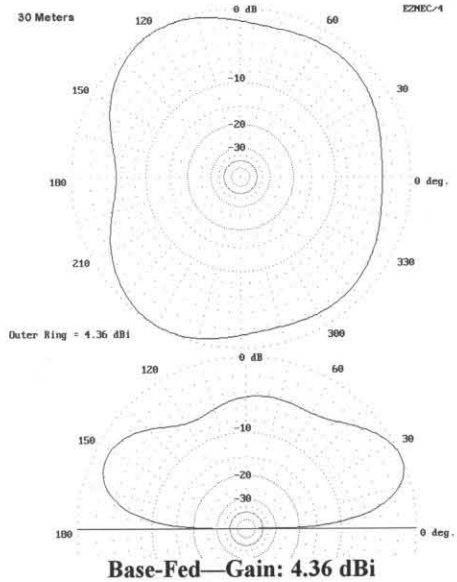
Center-Fed—Gain: 4.05 dBi

T-O Angle: 20 ° *Feed Z: 150 - j495 Ω*



Base-Fed—Gain: 5.12 dBi

T-O Angle: 28 ° *Feed Z: 920 + 825 Ω*

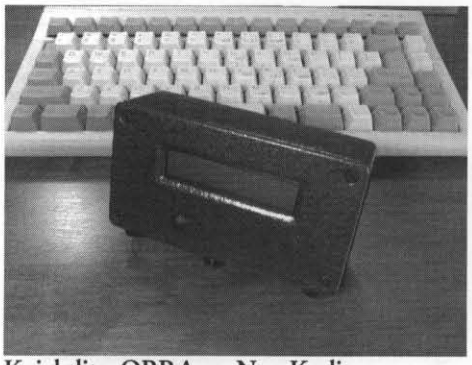


Base-Fed—Gain: 4.36 dBi

T-O Angle: 24 ° *Feed Z: 190 + j280 Ω*

Seen at Dayton—Product Announcements

Craig W. Behrens—NM4T craigwb@hiwaay.net



Knightlites QRP Assn. New Keylite

The Keylite is a memory keyer, it is a beacon keyer, and it will operate with an IBM PS/2 keyboard or with Paddles. It sends special characters with a single keystroke. Its internal speaker allows code practice or listening to memories without transmitting. The memories can be chained together or used independently. The Keylite makes it easy for any ham to send perfect code, slow or fast.

The kit is easy to assemble and fun to use. An LCD gives the user a clear view of what has been typed, and the buffer allows time to make keyboard corrections before the message is completed. The Beacon Mode and many other features make the Keylite a flexible tool. Its small size allows it to go anywhere. The current draw is minimal, controlled mostly by the keyboard used.

Specifications:

- Power Requirements: 9V-14V
- Maximum current draw: Less than 20ma plus Keyboard.
- Keyboard input: Standard IBM PS/2 jack.
- LCD: 2 lines, 16 4mm Characters each line, backlit display.
- Buffer: 32 Characters.
- Code Speed: 1-99 Words per minute, standard or Farnsworth.
- Memories: Four 64-character memories. May be chained.
- Beacon mode: Keyboard entry disables beacon.
- Paddles: Iambic B paddle input.
- Case Size: 4-3/4" X 2-1/2" X 1-1/2"

John, WB4OFT, Randy, WJ4P, Gary, N3GO and Bob,AE4IC, assisted the Knightlites development team, Steve, AE4YQ, and Todd, AG4AY, in putting the package together.

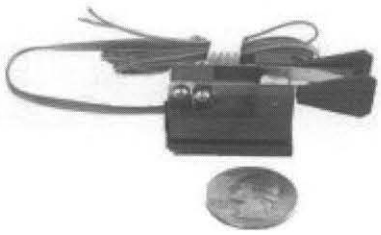
Price for the Kit: $55, which includes all parts and the case. Add $3.50 for U.S. Priority shipping, $5.50 DX. Make checks out to Bob Kellogg and include a return address label with your check. Mail to: Bob Kellogg, AE4IC, 4708 Charlottesville Rd. Greensboro, NC 27410-3622

2 New Paddlette Products for K1

Two new Paddlette Company products were seen at the Elecraft booth at Dayton for use with the very popular Elecraft Model K1 transceiver. The first was a customized Model BP sub-miniature paddle, the BP-K1. It mounts directly to the K1 tilt stand. The second was an adapter plate which permits mounting either of Paddlette's standard paddle keys (Models BK-1 and BP) on the K1 tilt stand by merely engaging the magnetic bottom of the key with a mating magnet bonded to the adapter plate. This adapter is simply called the "K1 adapter plate". A brief description of each,

with prices, follows:

Model BP-K1: The Model BP-K1 is a sub-miniature backpacker paddle key with a sturdy, powder coated, .60" thick aluminum bottom measuring ¾" x 2 ¼", in place of the 1" x 1/4" magnetic bottom used on the standard backpacker key. A .196" diameter hole 3/8" in from the free end is provided for the #10-32 thumbscrew furnished by Elecraft used to attach the BP-K1 directly to the K1 tilt stand. The key may be swiveled to the right or left to accommodate right or left handed operators. The BP-K1 is furnished with neither knee mount or carrying case; hence the price of only $45.50 instead of $54.80 for the standard Model BP. Ad $3.00 for shipping and handling.



Model K1 adapter plate: For hams who already have a PK-1 or BP, or plan to buy one for general use as well as for use with the Elecraft K1, Paddlette also offers a sturdy, powder coated, .060" thick aluminum plate measuring 1" x 2 ¾". It too has a .196" diameter hole 3/8" in from the free end for attaching to the tilt stand. A 1" x 1 ¾" magnetic plate is bonded to the opposite end on the plate. This mates with the magnetic bottom of either key, holding it firmly in place for keying. To remove the key, merely lift it off the magnet. The plate may be swiveled right or left for right or left handed operators. Price for the adapter is $3.00 plus $1.00 shipping and handling. If ordered with either key, however, the shipping charge is waived.

(See pae-1 ad for contact information)

Elecraft K2 Rev. 2 Firmware Adds Many New Features

Elecraft's popular K2 SSB/CW transceiver is now shipping with firmware revision 2, which provides a host of new features and improvements. K2 owners who have older firmware can upgrade to the new revision for $39. It is also supplied free of charge with the purchase of the KIO2 Aux. I/O option ($89), which includes an RS-232 interface for computer control of the transceiver.

In addition to full support for the RS-232 interface module, the new K2 firmware includes:

- Programmable bands for use with external transverters, including direct display up to 999 MHz, fixed or variable output power level, and +/- 9.99 kHz oscillator/multiplier chain error compensation—all on a per-band basis
- User-selectable Data/RTTY mode with four independent crystal filter settings
- One-button CW message play mode
- Larger CW message buffers (9 buffers of up to 250 bytes each)
- Four RIT/XIT offset ranges
- Independent or per-band split/RIT/XIT configuration
- Adjustable squelch

(See back cover for contact information)

Elecraft K2 Transceiver RS-232 Interface

The **KIO2 option** allows the K2 SSB/CW HF transceiver to be remote-controlled by any computer with a serial port. Most PC-based logging, contesting, and DXing software can be used. The transceiver can even be controlled over an Internet connection. With the KIO2 option, internal bat-

tery, and a small laptop computer, the K2 becomes a highly integrated field contesting or DXpedition station.

Many transceivers with serial interfaces provide only logic-level (TTL) signals, so that connection to a computer requires an external RS-232 converter. In contrast, the KIO2 provides true RS-232 signal levels. It also adds very little to the K2's receive-mode current drain, and its low-noise design ensures no effect on receiver performance. The small module mounts in the top cover of the K2 along with the internal battery (KBT2) and automatic antenna tuner (KAT2).

In addition to the serial interface, the KIO2 offers a number of useful signals for interfacing the K2 to other equipment. These include an AuxBus output, +12 V to power small external accessories, and signals for use with an external power amplifier. All signals are RF filtered. Shielded cable and all connectors needed for connection to the computer are provided in the kit.

The KIO2 is available now @ $89.

(See back cover for contact information)

Elecraft K1 Internal Battery Adapter

The KBT1 internal battery option provides the convenience of an internal 8-AA cell battery for the K1, Elecraft's compact, two-band QRP CW transceiver. With the KBT1, KAT1 internal autotuner, and KTS1 wide-range tilt stand, the K1 is a high-performance, all-in-one-box portable station—requiring only a length of antenna wire and a keyer paddle to get on the air.

You can use virtually any type of AA cell with the KBT1, disposable or rechargeable (e.g. alkaline, NiCd, or NiMH). The replacement top cover provides quick access to the batteries, so it's easy to recharge them using any charger of your choice.

The KBT1 kit includes:

- A recessed on/off slide switch to disable battery for transport
- Rugged, low-drop battery-protection diode (0.2V typ. @ 500 mA)
- Lightweight custom battery/speaker bracket
- Industry-standard 8-AA cell holder
- Speaker
- Easy-access replacement top cover (uses two thumb screws)

To maximize operating time, Elecraft recommends setting power output to 2-4 watts when using the internal battery. 1600-mAhr NiMH cells may provide longer life than alkaline because of their relatively flat discharge curve. You can operate down to a battery voltage low as 8.2 V with virtually no instability, thanks to the K1's double-regulated VFO.

(See back cover for contact information)

Hands Electronic RTX-109 All Band SSB/CW Transceiver Kit

The **RTX-109** is an amateur band SSB/CW transceiver with a direct digital synthesis VFO (with display) to 1 Hz resolution. The VFO uses the AD9850 DDS clocked at 100 Mhz with phase locked narrow band voltage controlled oscillators covering the 1.8 to 28 Mhz amateur band allocations.

The RTX-109 is available as a QRP (up to 6W out - $538)) or medium power (up to 20W out - $598)) version. Construction is in a modular form, allowing the builder on a budget to start with a basic receiver and build up to the full transceiver.

A high level (17dbm) DBM in the front end insures the RTX-109 is capable of dealing with high signal levels - even 40 meters at night in Europe! The IF module includes a crystal filter, passive audio filtering on receive, and SSM2166 speech processor on transmit.

Spare band positions and TTL drivers are built in to the control MPU to allow configuration for Transverter driving. The master VFO display can be offset up to 4.5 Ghz to give the actual frequency display of the final frequency rather than the Drive IF frequency.

Full information is available from Kanga US and on the Kanga US web site.

(See Kanga Ad on page-1.)

KK7B R2Pro Receiver Module Kit

The **KK7B R2** receiver circuit was originally published in 1992. Advances in components and techniques, and improved understanding of the underlying principles now permit a few improvements to be made. The R2pro remains true to the philosophy of the original R2—a basic, all-analog, high-dynamic range, very low audio distortion receiver module using commonly available components. A conservative approach to circuit modifications preserves the performance and character of the original R2 receiver. The changes are as follows:

1. The receiver is separated onto smaller circuit boards which improves RF and audio isolation, allows optimum grounding for both RF & audio circuitry, and provides flexibility.
2. The gain distribution includes an RF LNA, lowering basic system noise figure to 10 dB while preserving dynamic range.
3. Mixers have been changed to the TUF-1 series. Improved mixer specs and LNA reverse isolation reduce the LO level at the antenna connector to typically less than –90 dBm.
4. The diplexer network pair has been redesigned for better amplitude and phase match, and lower group delay.
5. Reduced interaction between mixer IF port impedances and diplexer networks allows the R2pro to provide more than 50 dB opposite sideband suppression, when built with carefully matched components.
6. In-band audio harmonic distortion in the original R2 was approximately 60 dB down. R2pro harmonic distortion products are below the receiver noise floor, more than 80 dB below either of the two tones in multitone in-band distortion tests.

The original R2 set the standard for low distortion audio in receivers. The R2pro offers advanced experimenters even lower distortion, lower noise figure, improved opposite sideband suppression, & more flexibility.

Pricing is being determined as this announcement is being written. (Kits were available at the Dayton Hamvention.) Other Modules designed by KK7B are available from Kanga US including the R1, T2, LM2, and miniR2.

(See Kanga Ad on page-1.)

DK9SQ All Band Folded Vertical

The new antenna covers all bands 80 - 10 meters including the WARC bands. The 60' long vertical is mounted on the 33' DK9SQ mast (available separately). Jumpers are installed at 33', 41', and 50'. The collapsible DK9SQ mast makes it easy to set the appropriate jumper for the band of interest. Only one coil (not a trap) is used to resonate the antenna on 80 meters. A length adjustment is provided at the feed point for fine adjustment of the resonant frequency of the antenna.

No antenna tuner is needed for any of the bands. A good ground or radials are necessary for proper operation. The antenna can be used on all bands without setting the jumpers by opening the 50' jumper and using a tuner. Then the feed point will be low impedance for all bands except 24 Mhz and can be easily matched with a tuner.

As with all the DK9SQ products, the new vertical antenna can be easily and quickly erected by one person.

The antenna will be available at the DK9SQ booth (# 9 - shared with DARC) at the Dayton Hamvention (May 18-20) and will be available from Kanga US after the Hamvention. Tentative pricing is $59.

All other DK9SQ products are available from Kanga US including the 33' collapsible mast, 80/40 dipole, 10-40m loop, and dual band 2m/440 beam.

(See Kanga Ad on page-1.) ●●

QRP Field Contest Logging in the 21st Century

David Ek—AB0GO
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For some reason, many QRP'ers love to get out of their shacks and operate from the field. I'm one of them. Go figure. I especially like to work QRP contests from the great outdoors. Over the past few years I've worked three Field Day events and an FYBO contest from fairly remote locations in Pike National Forest. I suppose I enjoy this so much because I can combine two activities I enjoy immensely: ham radio and backpacking. The challenges of being on the air for an extended period of time in a remote location are especially stimulating, and I'm always looking for cool things to try on the next ham radio excursion.

One thing I really have missed when working Field Day from the middle of nowhere is the convenience of computer logging and sending, which I find to be indispensable when working contests from home. But even a notebook computer represents too much cargo to bring along for field contests. So when I'm in the field I've been doing logging, dupe checking (ugh!), and sending by hand. It gets pretty messy by the end of Field Day, even with my relatively feeble score. This year I decided to see if I could do better.

I decided I'd try to marry a Palm handheld computer to my QRP rig so that I could use it both to keep my log and to send my exchanges. Since the Palm only has a serial port for interfacing, it was obvious that I'd need to use that serial port to control my rig. TR, CT, and a bunch of other contest loggers can do the same thing, but they all do it by manipulating one of the serial port data lines directly rather than actually sending serial data over the port. This low-level hardware control is the reason why all these loggers are DOS-based and run very poorly (if at all) from Windows-based machines. I decided that what I needed between the Palm and the rig was a serial device capable of communicating with the Palm and keying the rig. The Palm would send the text to be keyed to the device and forget about it, and the device would worry about converting the text to dits and dahs and keying the rig without the Palm's help.

Dave—AB0GO at the controls of his computer contesting station during QRPTTF at the top of Mount Herman.

Caveats

First things first: this article represents a project that is a work in progress. I've designed and built the serial CW sending device, and that circuit is described below. However, there is no software available either commercially or from me (as of this writing) that is useful for contest logging and can communicate with the device, either for the Palm or for the PC. However, I have written a prototype software program for the Palm that was exclusively for logging QRPTTF. In fact, I field-tested it this year during QRPTTF and found it to be usable but not great. It is also not readily adapted to other contests. Just for fun, I'll show you a bit of it below.

By Field Day, I hope to have a more general-purpose contest logger written for the Palm and ready for field testing. Since you'll be reading this after Field Day, I'll provide a follow up with the latest information in the next issue. Ultimately, the Palm software will be available to everyone on the web.

Know, too, that the circuit I describe was designed mainly for contest CW sending. In particular, the firmware is aimed at that purpose rather than more general "CW keyboard" use. Although the hardware could easily be adapted for such a purpose, the firmware might need rewriting to be more interactive. On the flip side, any commercial PC logging software could easily be modified to use this hardware for contest sending. In fact, because it frees the PC from having to worry about CW timing and such, it could be especially useful to Windows logging programs where it is very difficult to handle precise CW timing on the PC.

The Palm Software

A screen shot of the logging page of the Palm software I wrote for QRPTTF is shown in **Figure 1**. Because I wanted to minimize the number of actions needed to make a log entry, the screen ended up quite busy. The buttons labeled "Next" and "Back" at the top were used to move through the entries in the log, and only one entry was visible at any time. Any time either of these buttons was pressed, the current log entry was saved (the exception was when the current log entry was the newest one and was empty—empty entries were never saved). The number of the QSO was shown at

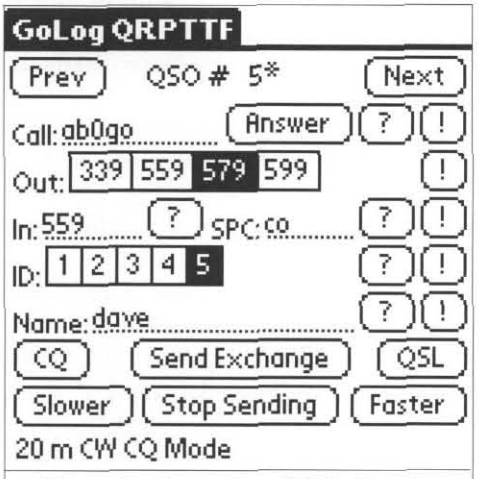


Figure 1—Screenshot of Palm Logging display for QRPTTF.

the top in the center (the asterisk denotes a log entry that has not yet been saved). The Call field was for recording the call sign of the station I worked, and the "Answer" button next to it was for responding to his call. I wrote the software so that at any time I was either in CQ mode or search & pounce mode (just like other logging packages), and you set the mode using a pull-down menu (not visible in the screen shot). If I was in CQ mode, then when a station answered my CQ I would enter their call in the Call field, choose the RST I wanted to send him from the buttons below the Call field, and then hit the "Answer" button. That would cause the Palm to answer the station and send my exchange. When the station responded with his exchange, I would enter them in the remaining fields on the form. If I needed a fill, I'd click the "?" button next to the field for which the fill was needed, and the Palm would ask for a repeat. If the other station asked for a fill, I'd click the "!" button next to the requested field to repeat it. Finally, when the contact was complete, I'd click the "QSL" button to send "TU 73 dit dit".

Search & pounce mode worked much the same way, except that clicking the "Answer" button only sent my call sign as an answer to the other station's CQ. When it came time to send my exchange, I clicked the "Send Exchange" button. In search & pounce mode the "QSL" button simply sent "dit dit."

At any time, if I needed to interrupt the Palm's sending, I clicked the "Stop Sending" button. If CW was in the process of being sent when I clicked a button, which would normally cause other CW to be sent, the Palm warned me that the sending device was busy and disregarded the request. Finally, I used the "Faster" and "Slower" buttons to change the speed of the CW being sent (although I had to wait until between messages to do so). The "CQ" button called CQ for me, and if I clicked it while in search & pounce mode it changed me to CQ mode.

The bottom line of the display reminded me what band and mode I was working (which I had to remember to set using pull-down menus whenever I changed) and whether I was in CQ mode or search & pounce mode. The date and time of each QSO were recorded using the Palm's built-in clock but were not displayed.

One other feature of the software was that it checked for duplicate entries. Each time I entered a call into the Call field and clicked the "Answer" button, saved log entries would be checked to see if I had already worked that station on the same band and mode. If so, a message would pop up telling me so. If I were in CQ mode, it would then answer the station with a "QSO B4" message.

I used this software and the CW sending device in the field during QRPTTF, and despite the horrid band conditions I discovered three things about my system. First, I'd spent too much time working on this thing and not enough time on the air, and my CW was pretty rusty. Second, it didn't work very well to have to switch from one field to the next when recording a received exchange. It would have been better to record the entire exchange in a single field and avoid the extra motions necessary for switching fields. Third, the device I built for sending CW was leaking digital noise into my radio, creating a lot of noise. After using it for several QSOs I shut off the device and reverted to manual sending for the rest of the event. I believe that the current design of the device has largely fixed this problem.

My main concern going into QRPTTF was whether the Palm's Grafitti data entry interface would allow me to record data fast enough and with few mistakes. Again, one of the biggest problems was switching fields from one part of the exchange to the next. The next version of the Palm software will record the entire exchange in a single field. This will also make it workable to pop up the virtual keyboard (a keyboard displayed on the screen, where you tap the letters to "type" them) for recording the exchange, too, if desired. It will also make it easier for me to generalize the software for use with any contest.

One thing you're not likely to see in the next version of this software is much in the way of data validation (beyond dupe checking), score tallying, and lists of SPC's worked, or other features provided by PC loggers. While nice to have, they take up extra memory and take time to execute. Palm's philosophy is that Palm software should be fast and lean, and I think this is a good approach for field logging software, too. Stay tuned for further developments.

The Serial CW Sending Circuit

As I stated before, I wanted to design a device for handling the CW keying which would do all the work associated with converting text to CW and taking care of timing of dits and dahs. It needed to accept some text from the Palm and then perform its duties without further intervention, freeing the Palm for its own work. A PIC microcontroller is ideally suited for such an application. I used the PIC16F84 since I had already written some code for it to perform serial communication as part of another project (although some PIC chips have built-in serial capability, the PIC16F84 does not, so I emulated it in software). The only other major component required in the circuit was a MAX232 chip for converting TTL levels to RS-232 and vice versa. The rest of the circuit consists of voltage regulation, the crystal for clocking the PIC chip, and a 2N2222 transistor for keying the rig. I powered my prototype with a 9V transistor battery and found that battery life was at least several hours. Figure 2 shows the schematic diagram of the device. **Table 1** gives the parts list.

Table 1: Parts List for CW Sending Device

Part	Description
C1	10 uF 35V electolytic capacitor
C2, C9, C10	0.1uF monolithic or ceramic disc
C3, C4	22 pF monolithic or ceramic disc cap.
C5, C6, C7, C8	1 uF 35V electrolytic capacitor
J1	female DB9 connector
Q1	2N2222 transistor
R1	10K ¼ watt resistor
R2	1K ¼ watt resistor
U1	78L05 voltage regulator
U2	Microchip PIC16F84-04/P microcontroller
U3	Maxim MAX232CPE level converter
X1	4 MHz crystal

In the circuit, U1, C1, and C2 make up a regulated +5V supply for the rest of the circuit, and any voltage greater than about 8V may be supplied as input to the regulator. U2, the microcontroller chip, is clocked by crystal X1 and requires C3 and C4 to be present (the values of C3 and C4 need not be exactly 22 pF—any value around 30pF or so should work). The pins labeled RESET can be shorted temporarily to provide a soft reset for the microcontroller chip. If desired, you can connect a normally open, momentary SPST switch here to serve as a reset button.

Pins 6 and 18 of U2 serve as serial output and input, respectively. They are connected to U3, which converts the TTL voltage levels to the RS-232 levels (-12V and +12V) expected by the attached computer. C5 through C8 are used by U3 to create the necessary RS-232 voltages given the +5V supply. J1 is a standard female DB9 connector and can plug directly into the serial port of a PC.

Pin 1 of U2 keys the CW on the attached transceiver. Q1 is used to close the circuit on the key line just like would be done with a straight key. R1 limits the current flowing through the base of Q1. C9 and C10 help to filter out any RF generated by U2's 1 MHz internal clock (I added these after experiencing a lot of noise during my field test, as I mentioned previously).

The circuit as shown is wired as data com-

munications equipment (DCE) such that it can be plugged directly into a PC or other computer with an RS-232 port (referred to as data terminal equipment, or DTE). DCE is designed to plug directly into DTE. Other examples of DCE are computer mice and external modems. Generally, DCE has a female DB9 connector, and DTE has a male DB9 connector. In addition, DCE sends data on DB9 pin 2 and receives data on DB9 pin 3, while for DTE pin 2 receives and pin 3 sends. Of course, this makes sense, since you want DCE to receive whatever DTE sends, and vice versa. The upshot of this is that if you build the device according to the schematic, it'll plug right into your PC and you can use a terminal program like Hyperterminal for testing it.

However, the Palm computer is also a DCE device rather than DTE, meaning that if you build the device according to the schematic, it won't plug directly into a Palm. You have two choices. Either you can use a null modem cable (where pin 2 of one end is connected to pin 3 of the other end) between the Palm and the device, or you can wire your device to be DTE by swapping the connections to pins 2 and 3 in the schematic. In either case you'll also need to change the gender of the DB9 connector on the device to male in order for it to plug into the Palm's serial cable (commonly called the HotSync cable).

Also, note that pins 1, 4, and 6 in the device's DB9 connector are tied together, as are pins 7 and 8. This is to fool your computer into thinking that it's getting handshaking signals (xon/xoff, etc.) from your device if it requires them. In reality, it simply routes the signals sent by the computer right back to the computer.

In my case, I wired the device as shown and built a combination null modem/gender changer to use to connect my device to my Palm computer. Only pins 2, 3, and 5 are connected between the two DB9 male connectors (with pins 2 and 3 swapped but pin 5 wired straight through), while pins 1, 4, and 6 are tied together in each connector, as are pins 7 and 8. Table 2 shows how to wire this adapter.

Table 2: Null Modem Adapter Wiring

Left Side Pin(s)	Right Side Pin(s)
1 and 6	4
2	3
3	2
4	1 and 6
5	5
7	8
8	7
9 not connected	9 not connected

Firmware

Of course, when discussing PIC-based circuits, much of the discussion concerns the firmware written for the PIC chip. I won't bore you with the details here, except to describe the commands that the device accepts and the responses it provides. Although I designed it to work with my Palm computer, I did all the testing of the device by connecting it to the serial port on my PC. It expects 9600 baud with 8 bits, 1 stop bit, no parity, and no flow control. Table 3 describes the commands that may be sent to the device by a computer.

Note that the device does not echo commands or data back to the computer. If you're using a terminal program such as Hyperterminal to test the device, you won't see the commands as you type them unless you turn on the "local echo" feature.

Construction and Testing

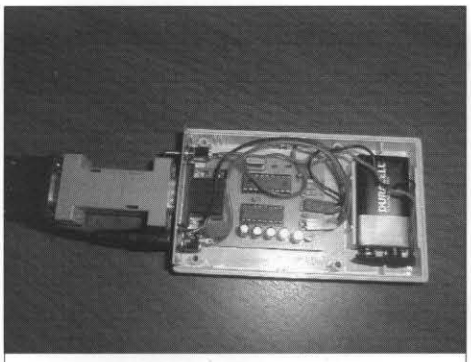
Don't forget to program the PIC microcontroller before you install it in the circuit! You can download the hex code for programming from the ARCI web site (INSERT URL HERE). I learned everything I needed to start programming PICs from the QST article[1] by John Hansen W2FS. That article also describes a simple programmer you can build, and tells about PC software to drive the programmer. There is also a lot of information on the web on how to program the PIC16F84.

Wiring the circuit shouldn't be too hard. I built the prototype on a solderless breadboard, and whenever I use a solderless breadboard I like to build the permanent version on the Radio Shack generic PC board that matches the layout of a solderless breadboard. Component placement is not critical. I recommend using 0.1" header pins and connectors for making connections to the board—wires soldered directly to the board tend to break off easily.

The easiest way to test the circuit is to hook

Table 3: Serial CW Device Command Description

Command Character sent to the device	Data sent to the device after the command	Reply from the device	Description
< (ASCII 60)	up to 54 characters, followed by a carriage return (ASCII 13)	r (ASCII 114), after sending is complete	causes the device to key the characters as CW on the attached transceiver. The following characters are supported: A through Z (upper or lower case) 0 through 9 period (.) comma (,) slash (/) BT prosign (=) AR prosign (+) question mark (?) SK prosign (*) KN prosign (:) AS prosign (-) Other characters will be ignored. Characters beyond the 54 currently supported will be ignored until the terminating carriage return is received.
> (ASCII 62)	two characters	r (ASCII 114), immediately after receiving the two characters	sets the inter-dot and inter-character spacing. To get the appropriate values, divide 1300 by the desired words per minute. The characters sent are those whose ASCII values yield the desired speeds. For example, "A" has an ASCII value of 65 and will give a speed of approximately 20 wpm (1300/65). The first character sets the speed at which the dits and dahs are sent for a single CW character. The second character sets the spacing between CW characters (like in Farnsworth spacing). Note that speeds are approximate and not precise.
^ (ASCII 94)	none	a string of characters terminated by a carriage return (ASCII 13)	returns a string describing the firmware version.
Any character	none	r (ASCII 114), after sending of the current CW character is complete	interrupts CW keying. The CW character currently being sent is finished, and the remaining characters are forgotten. If no sending is in progress, this command is ignored.



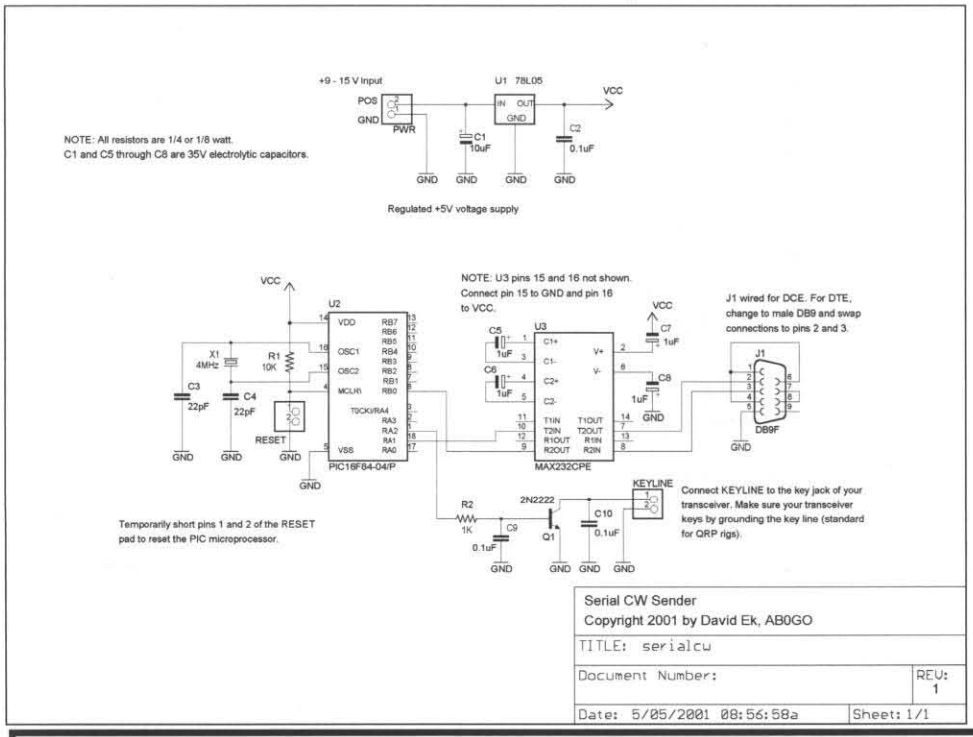
A close-up of my CW sender device.

Prototype CW sender device with Palm m100 running prototype logging software.

CW sender device, Palm computer, and Wilderness Sierra field contesting station.

it up to a PC and attempt to communicate with it using Hyperterminal or another terminal program. Set up the terminal program to communicate directly through the serial port to which you've connected the circuit (rather than through a modem), and set the communications parameters to 9600 baud, 8 bits, 1 stop bit, no parity, and no flow control. Make sure the circuit is powered up, and then type "^" (shift-6, or ASCII 94) in the terminal program. If everything is working correctly, you should see something like "Version 1.00 by AB0GO" appear in the terminal window. If not, double-check your circuit construction, power connections, serial port connection, and terminal program settings.

If everything works so far, connect the key line from the circuit to a transceiver's straight key jack, and connect the transceiver output to a dummy load. Power up the rig, and then type "<ok" in the terminal program followed by the Enter key. You should hear "ok" sent in CW on the rig. If so, everything works correctly. If not, go back and double-check your connection between the circuit and the rig, and try again.



Missing Features

One feature that the serial CW sending circuit doesn't sport is a built-in keyer so you can plug a paddle in for those times when you need to send something other than a canned exchange. In my case, my rig has separate jacks for a paddle and straight key, so the interface simply plugs into the straight key jack and I plug a paddle into the other jack. But it would be good to add a simple keyer to the PIC's program. There is plenty of memory left in the PIC for such a program, and there are many free I/O lines that could be used for the paddle input. Until this gets added, users will probably want to set up a paddle and keyer in parallel with the device.

Another feature that might be nice would be a CW keyboard capability. As programmed, the interface expects to receive a string of characters before it sends anything. Giving it a more interactive buffer, where it sent characters as they were entered into the buffer, would be useful for non-contest CW keying. This would more likely find a use in the shack than the field.

Contact me if you're a PIC hacker and would like to tackle either of these enhancements, or perhaps one I haven't thought of yet. In the mean time, I'll be working madly on getting my next version of the Palm software ready for use. Look for updates in upcoming issues.

Footnote 1—Hansen, John A., "Using PIC Microcontrollers in Amateur Radio Projects," QST, October 1998, pp. 34-40. ●●

DX Master Idea: **Re-wire your head-phones so that signal to right earpiece is out of phase with left earpiece. That way the CW flows back and forth through ears and brain. Otherwise, with normal head-phone wiring the CW hits both ears and brain in phase and you lose the back and forth flow of sound. It makes copying high speed and low signal strength CW much easier. I tried it and WOW what a difference. Got it from Bob Locher's book "The Complete DXer".**

Larry Duncan—K4WLS, K4WLS@carolina.rr.com

Decibels Count More in QRP

Warren U. Amfahr—W0WL 1563 Curry Blvd., Fairbank, IA 50629

This note originally appeared in the Summer 2000 issue of the Iowa QRP Club newsletter and is reprinted here by permission of the author. Warren offers good advise—especially regarding antennas!

Some publications say that the least detectable audible difference is 3 dB. This may be true for 1000 cycles at five dB above the hearing threshold, but it is not true for weak RF. signals near the noise level. A 1 dB difference near the threshold of signal to noise is detectable by ear. Since 1 dB can make a difference, it is as essential for a QRP operator to understand decibels as it is for a carpenter to understand inches.

In the fall of 1939, I was 14 years old, in the 9th grade, and had just received my class B amateur license, W9WLR. I asked the East Waterloo, Iowa high school physics teacher if he could explain decibels for me. He said that he could not until after I had taken algebra II and logarithms. When I told my homeroom teacher that I needed another semester of algebra for logarithms, he agreed. Then he told me to come to his manual training shop after school and that within two or three 20-minute sessions, I would understand how to use decibels.

The first afternoon he explained how power ratios for heat, light, sound, and RF were equal. He used light bulbs rated at 10 watts, 25 watts, 50 watts, and 100 watts for his demonstration and he asked me to memorize the following power ratios:

A. 2 times the power equals 3 dB. (50 W to 100 W = 3 dB)

B. 4 times the power equals 6 dB. (25 W to 100 W = 6 dB)

C. 10 times the power equals 10 dB. (10 W to 100 W = 10 dB)

Example: How many decibels between 10 W and 2000 W?

Answer: 10 W to 100 W = 10 dB, 100 W to 1000 W = 10 dB, and 1000 W to 2000 W = 3 dB; Add 10 + 10 + 3 = 23 dB.

For the next few days, I was questioned on the power ratios and the decibels and when I had them perfect, I was invited back to learn about voltage (or current) ratios. I was asked to memorize the following ratios:

A. 2 times the voltage = 6 dB.

B. 3 times the voltage equals 10 dB. (Precisely 3.162)

C. 10 times the voltage equals 20 dB.

Question: How many decibels between 7.07 volts and 70.7 volts?

Answer: 20 dB. A value of 7.07 volts was chosen because that is the voltage across a 50-ohm antenna load of a 1-watt transmitter. Watt power = E x E divided by 50 ohms.

The 20 dB increase from 7.07 to 70.7 volts would increase the one watt to 100 watts. As a double check, let us look at 1 watt increased to 10 watts for 10 dB and then add another 10 dB for an increase from 10 watts to 100 watts. These two 10 dB steps add to 20 dB and 1 watt to 100 watts equals 20 dB. In each case, starting at one watt or an equivalent of 7.07 volts, a 20 dB increase results in an equal amount of 100 watts and 70.7 volts. A 20 dB increase in our voltage ratio or a 20 dB increase in our power ratio is equal. A 'times 10 in voltage' and a 'times 10 in power' are not equal. The ratios of voltage and the ratios of power are different but the dB's are unchanged. 'Voltage decibels' and 'power decibels' are misstatements. Such shoptalk can be misleading.

After one 20-minute lesson on power ratios and two lessons on voltage ratios, I applied decibels to every ratio that came to mind. I even used my bicycle speedometer for ratios of speed and of distance. Most of my ratios were dysfunctional applications, but the practice was beneficial and I learned to think and speak in decibels like a carpenter would converse using inches, feet, and yards.

A year later I took algebra II and learned logarithms. Decibels made logarithms meaningful for me. From logs, I coined my own 'one dB rule' which would fill in the steps between the 3, 6, and 10 dB power ratios. Roughly, 1 dB is 80% of any power (79.37% actual). Eighty percent of 100 watts equals 80 watts. Again, 80% of 80 watts equals 64 watts. Once more 80% of 64 watts is close to 50 watts. In other words, we have three 1 dB steps from 50 to 100 watts. And we have 1 dB steps to go between the 3 dB, 6 dB, and 10 dB power ratios.

Likewise, a 20% reduction in power equals 1 dB. One dB down from one kilowatt is 800 watts. One dB down from 10 watts is 8 watts. One dB down from 1 watt is 800 milliwatts, and you can certainly hear the difference when you are receiving a signal close to the noise level.

Zero dB can be any starting reference. Bell Labs uses a range of 0 to 120 dB. Bell's zero equals a mosquito buzzing at six feet and 120 dB is the threshold of human ear pain. A change of 1 dB in the mid-range of this 0 to 120 dB scale can be defined as the amount a small child will turn down the volume when asked to do so. (This is my reference.) A critical 1 dB would be when the child looks you straight in the eye and turns the volume down. In most occasions, 1 dB will be the least detectable difference. If you want a 3 dB reduction, you must ask three times. This measurement might also apply for teenagers. For QRP, every dB is important. A kilowatt signal may be 40 dB above the noise level, while the QRP signal may have only a dB or two of existence.

My friend and author of **Reflections**, Walt Maxwell, W2DU, jokes about some antennas by saying, 'Almost any wire will radiate to some extent.' He also says in a different way, 'It is difficult to prevent a wire from radiating even when you do not want it to radiate.'

With QRP, the antenna must perform to the maximum extent. With QRP, 'sloppy slopers', 'inverted top hats', and other antennas with funny or fancy names will show their true merit. Basic antennas with vertical radiation (not polarization) angles matched to the natural sky wave angle will prevail. But with high power, antenna performance becomes unknown and lost in the excessive decibels. The problem is QRP becomes greater when there is no comprehension of decibels.

Today we have easy access to calculators and we can punch in 10 times the log of the power ratio or 20 times the log of the voltage or current ratio for the decibels. After months of continuous calculations, one would probably gain some comprehension of decibels; however, memorization of a few basic power ratios and voltage ratios for decibels is immediately meaningful. ●●

Test Topics and More...#8

Joe Everhart—N2CX n2cx@voicenet.com

This installment of TTAM will unveil the overall schematic for what has been described in earlier columns as the Weak Signal Source. And the project has a new, more descriptive name – the Microvolt Signal Source. The MSS is currently in the final stages of mechanical refinement and testing a comprehensive description of its performance is not yet ready. However the Designed For Test Section will have a detailed circuit description and some suggestions for refinement.

Coming To Terms - Abstraction

Electronics and ham radio, being nerdy by nature require numerous abstractions to understand just what's going on. For example when we describe what bands we work on, we are really talking about the wavelength of the signals we are transmitting and receiving. Though we are comfortable in thinking in those terms, the idea of wavelength is foreign to the non-technical layman. Even use of familiar (to us) communication modes is abstract. We are quite comfortable communicating by voice when really what we are doing is sending audio into a transceiver that converts it into a modulated radio frequency carrier that my be Amplitude Modulated, Frequency Modulated or Single Sideband Suppressed Carrier Amplitude Modulated. Any via the magic or radio communication we send these signals out into space to bounce off the ionosphere to talk to someone in another city county state, or even country. And we don't even think about what's going on. I think whimsically of dealing comfortably with these abstractions as "the value of ignorance."

And when we get inside our electronic equipment we have even more levels of abstraction that allow us to be intentionally ignorant (when it suits our purposes) about what's really going on. Now you can get really complex by thinking of electronics in terms of electrons, "holes" quantum levels and electron tunneling, but let's not go that deep – it makes my head hurt!

What I'm thinking of is more familiar. Here are some examples.

First off, we need a source of power to operate our electronic equipment. This is usually either AC or alternating current (AC) when we connect to the commercial power grid (which really is yet another abstraction) or direct current (DC), when we use battery power. When we use this power we really don't think too much about its characteristics such as voltage, power or frequency unless we have a problem – usually it's just power. Except when we have to measure it or connect to a new source it's something we can take for granted.

Even inside a circuit we are measuring, the AC input or output from a transformer is just that, an AC voltage. We *know* that since we got it from the power grid we don't have to worry its details such as frequency or waveshape, only its voltage. We can ignore the other details. Generally any measurements we make can be done with a simple AC voltmeter or Digital Multimeter (DMM.)

Our DC battery source is the same way. We know what DC is so all we have to concern ourselves with is – how much voltage is present or how much current are we drawing. Generally DC is DC. It is constant and doesn't have the frequency or waveshape that AC does. As with AC we use DC voltmeters or ammeters or a DMM on its DC ranges.

When we get deep into a circuit we use other abstractions. For example in audio circuits we again deal with AC, but in a different way. We often do have to think about the frequency or the waveshape of audio signals. Also of import are operating impedance levels and a measure of degradation of waveshape called distortion. The types of instruments we use for audio are also different. To measure voltage we often use an audio voltmeter, its frequency is checked with a frequency counter and with an oscilloscope we can see amplitude, frequency and waveshape to gauge distortion. DC characteristics can usually be completely ignored.

At yet higher frequencies things are different yet. We still deal with amplitude, frequency and distortion at RF or radio frequencies, but other considerations like modulation, impedance and Standing Wave Ratio (SWR) are considered. A whole new variety of test equipment is needed to measure these characteristics.

The previous abstractions all deal with the familiar analog world where values are continuously variable and take any value. Modern electronics also deals with the digital world where yet another level of thinking tells us that absolute voltage values are not important, but we can think of signals in binary terms. That is a low value corresponding to a binary 0 or a high value or binary 1. In digital electronics the world can be digitized or converted (at its lowest level) into a series of YES/No decisions. A voltage (or other value) above a given threshold is a logical 1 and below it's considered a 0.

This really sounds simplistic, doesn't it? In truth, though many things in the world can, indeed be represented this way, given enough of the binary values. They can be call binary digits or "bits" and are usually dealt with in groups called words which contain a predetermined number of bits. They can by nybbles (four bits), bytes (8 bits) or even larger words.

There is an exploding number of examples of digital products in our daily experience. In the ham shack a simple example is the frequency counter, but our watches, digital computers, common appliances and even our radios either use digital circuitry or are entirely digital.

Strictly digital electronic measurements are made with frequency counters and oscilloscopes but frequently these days use other specialized instruments such as logic analyzers to observe the myriad of digital logic signals and convert them info a form that mere humans can comprehend.

And Going even further these digital circuits form the basis for the digital computer. These omnipresent appliances are a higher level abstraction of digital circuits to and form an entirely different type of device. Within them are integrated circuits hundred of thousands or even millions of digital logic elements called gates that are arranged in particular ways that let computers make zillions of logical decisions based on input data, store them internally and display them either visually on a monitor, a loudspeaker or other I/O (input/output) device.

What makes computers vastly more valuable than merely complex assemblages of logic decision elements is their ability to store and execute programs. In the simplest terms, programs are groups of instructions that tell a computer to accept data, perform mathematical or decision type operations on this data, and store the data for future use or to display it for human use. These programs are yet a higher abstract entity called software, which controls the operation of the physical computer, embodied in digital circuitry called hardware.

As you can imagine there is an entirely different set of test "stuff" required to test computers. The hardware aspects can be dealt with by logic analyzers and oscilloscopes. Dealing with software however, necessitates use of other

tools, called "emulators" and "debuggers" which may be entirely software based, or part hardware and part software.

Would you believe that this is only scratching the surface? That's part of the message. We poor mortals can only handle just so much in our brains at one time. Abstraction is a way of simplifying the way we think about something so that we can ignore most of the details. By using selective ignorance we can concentrate on what's important and not sweat the small stuff. Of course the trick is knowing what to ignore – but that's another story...

Designed For Test

The MSS schematic has been presented in a rather piecemeal fashion in earlier columns. We can now see the whole picture, so to speak. Figure 1 is the overall wiring diagram. It shows a detail not mentioned earlier – for example, the battery connection to the oscillator through a power switch. I took it for granted but several folks have asked if the switch was needed since it was not mentioned.

Note that the battery and switch are in the outer section of the overall enclosure. They hopefully do not carry any RF signal, which should be attenuated by the crystal oscillator compartment feedthrough filter. The switch is a small toggle switch-mounted on the front panel of the compartment to the left of the 100 mV BNC. I expect negligible leakage to occur through his hole.

Figure 1 also shows an alternative scheme for switching MSS power. If a common power switch is used, the signal will be a continuous carrier. As pointed out in TTAM No. 1 a weak steady carrier may be difficult to hear in your receiver. The solution presented there was a simple 555-timer pulser called the Calfinder that could be used to key the weak signal source (in that case the VE3DNL calibrator) on and off with a distinct cadence. The same idea is usable with the MSS. For now the block diagram shows simply that the Calfinder can be used. An upcoming Joe's Quickie will show just how.

The remainder of the block diagram is almost trivially simple. The oscillator output is fed through its shielded compartment wall to a succession of attenuators, each in their own compartment. The oscillator schematic is reproduced from TTAM No. 5 in Figure 2.

Figure 3 is the "meat" of the MSS: the attenuator chain. It consists of a series of resistive voltage dividers, each individually compartmented and fed to the next one down the chain. To minimize construction complexity and to maximize reproducibility, there is no switching. Note that each output has a 50 ohm (well, actually 49.9 ohm) termination. To use a particular output, you simply remove the termination from that connector and connect a cable from that port to the circuit under test. All other terminations must stay connected to ensure calibration and shielding.

Note that the resistors are all 1-% values. This tolerance is critical to maintaining calibration without the need for any "tweaking." They are inexpensive from Digikey. I used the ¼ W Yageo or Panasonic types which cost only $.54 cents for 5. You have to buy them in groups of 5 per value but they are still a bargain.

The same type of precision resistors is used for the "50-ohm" terminations. Figure 4 shows a sketch of how the terminations are made. A common BNC male plug has a resistor soldered to its center pin at one end and a small circle of scrap PC board material on the other. The copper clad PC scrap is sized to just fit inside the open end of the BNC plug (I used my Harbor Freight round hole punch) and has a small hole to pass the resistor lead. To assemble, the pin and resistor slip into the connector and the lead passes through the end piece. The end piece is soldered to the BNC body and to the resistor lead. The result is a well-shielded precision 50-ohm termination. You **could** use common Ethernet terminations but these should be checked with a DMM and only those between 49 and 51 ohms should be used so that the attenuator accuracy is not degraded.

The next TTAM will show completed pictures of this project and some actual measured values. Meanwhile check the NJQRP web site www.njqrp.org for interim info. Lest you wonder ... yes, NJQRP will likely offer a kit of parts for the MSS. If that comes to pass it will likely not be before the fall of 2001 – our kitters need the summer off!

Stimulus and Response - Debugging the Warbler

A recurring theme in the letters and questions I get from readers of this column, is "How do I troubleshoot XXX." I've tried to give some real life examples in earlier TTAM installments and will continue to do so.

Often it boils down to some sort of abstraction – that is, a "trick" that lets you examine one aspect of a misbehaving circuit to the exclusion of others. This is often referred to as a binary decision process, or simplifying a problem by cutting it in half. You separate out what **is** working from what isn't. Then you can **ignore** what is ok and concentrate on what isn't.

Since most of what I have been doing these days involves PSK31, I'll use yet another situation involving the NJQRP Warbler to illustrate. When folks build this kit, they plug it in and want to check it out immediately — but it ain't like the Hollowscratcher they grew up with or even the Yeacomwood they have on the operating bench. There's no dial on it, no microphone or key to make it transmit and no loudspeaker to listen to. A computer running a program such as Digipan takes care of all these "human-machine interface" functions.

Now come a succession of binary operations.

First, you have to load the software on the your computer and learn some simple aspects of how to run and use it. Then you hook it up to your Warbler.

The best thing to check first is – does it receive any signals? Assuming you know how to interpret the display, you will look for the characteristic "railroad track" signals on the computer display. If you do, you can align the Warbler frequencies according to the manual instructions. If not, you have to find out where the problem is.

The first question is – do you have it connected properly? Then you have to decide if the receive portion is working. You can connect your antenna to your usual ham receiver and listen to tell whether or not there are signals present where the Warbler is tuned. By tuning the receiver to the center of the desired part of the band and setting its selectivity to 1-2 kHz you will simulate what the Warbler will hear. Then if you reconnect the antenna to the Warbler and feed its output to an audio amplifier and speaker you can determine whether the Warbler hears what the station receiver did. If not, concentrate on the Warbler.

If you do hear the same thing, the problem is likely in the area of setting the sound card input levels on your computer.

In a similar manner for the transmit side, you should first verify that the computer outputs audio on transmit **and** it toggles the appropriate keying lead on the RS232 line to the Warbler. If not, the computer settings need to be corrected. If you **do** have the correct computer outputs, an RF wattmeter on the Warbler output should show a transmitted signal when your software is keyed to transmit. If there is no RF out, the difficulty is more than likely something in the Warbler transmit chain.

This is a classical troubleshooting proc-

—Continued on page 31—

QRP Is a Very Relative Thing!

Lynn Lamb—W4NL Maryville, TN w4nl-ka4s@chartertn.net

One hundred watts is many DXer's definition for QRP. For some it's 5 watts or less, and yet to many others it's somewhere in between.

Many who read DX Magazine have worked tons of DX, Zones, IOTA, CW, SSB, RTTY, etc. and wonder which challenge is best for them. There are many challenges for those who have imagination and seek a continuing sense of accomplishment. For those who may have experienced a loss of interest or feel there's nothing left to do since they've worked them all, QRP DX may be the spark that could rekindle the joy of ham radio. Then again, maybe not but please read on!

Most of us started with modest power, didn't we? Remember the 807 or the 6L6, 5763, and the high power 813s? Remember the sense of accomplishment when we were deep into the headphones, J-38 in hand (still have mine), the snow perhaps coming down, and we were on the edge trying to work the KP4? Looking back on those times, I've never enjoyed ham radio more. The Windoms, long wires, NC-57s, BC-455s, S-38s, SX-whatever...oh there was the HQ-129 and the SX-28. Get the drift?

At many ham fests I see hams, with just a slight tinge of gray, looking at some of these prizes with a glint in their eyes, recalling how it used to be. We say to ourselves "Ah... those *won't fit in anymore*", *so we walk away.* Grown men don't cry, but believe me, I've come close. What's wrong with reflections and memories of just plain good times? Nothing.

I place today's QRP into a box somewhat akin to the low power days of yesteryear...and some can still build 'em too. They WILL fit, and they WILL work in our shacks. They won't bring back all the good times of staying up all night to work a W6 or W7 from the east, but the entire effort of QRP just may touch a cord of going back in time. It may remind you of trying to impress someone that you had a "radio station" or you could talk across Sharps Ridge to another friend who likewise was playing the low power and the Zip cord for "coax" because there was no other way.

We all have our stories and memories. I'm just trying to create some interest of going back in time and doing it with first class rigs, better antennas and all of our experience. Shucks, "DX IS" and it IS with good ops who know how to work DX...especially QRP!

If you are still with me you know, as DXers, that most of any successful station is outside. QRP recognizes this better than you might ever believe. So QRP may make us take a better look at our coax, antennas, switches...in other words, all those things we have been covering up with POWER. This is a complete other story, of course, but the point is that QRP will, to be successful, create an *interest in making your station better. Maybe* you are already there—only you can say. But...QRP will prove it, QRO may not.

We can all agree being a good operator is important to DX. We hear of some bad ops...another relative term. What I'm talking about here is listening, timing, position, knowing when to forget it, knowing props, gray line, who's where and when, talking more to your buddies as to all the possibilities. The list goes on. Like the attention to your antennas...QRP may just bring out the best of your operating skills. I can honestly say you WILL become a better operator if you involve yourself in QRP.

Don't ever let anyone tell you life is too short for QRP. I'll admit life may be short, but a sense of accomplishment and reflecting on good times you've had with your RADIO STATION is really nice. A challenge of course, but it was a challenge back then too, wasn't it?

CW, SSB or the digital modes. CW is easier by far, and PSK-31 is a natural. SSB is considerably more frustrating, but it does work. The rigs on the market now are great, along with the books, magazines, web pages, clubs and a cult or two. There's lots of interest and good company in the hinterland these days for QRP.

I'm sure most of us don't concern ourselves with TVI, BCI, telephone problems, but just in case it does in some weak fleeting moment—it's seldom a factor with QRP. I even read that some folks hike and backpack with QRP rigs and batteries. I know one fellow who takes his to the beach with a mobile whip and works dx...would you believe that?

I've been asked to tell my QRP story to make the point. Please, just glance over the numbers and know it can be done...done with a reasonable antenna system and a will to be a little bit better operator. This from an old timer who can very well remember the way it was...small, warm house, no place to go and no money to get there, Moms good cooking, my radio station...a 6L6 and BC-455, trying to work the world on a Windom just off the ground. I knew it could be done—not many others did, but I did.

I love DX, any kind of DX. I love CW but do work SSB and the digital modes. The numbers on QRO are appropriate for the years of someone who loves ham radio and DXing.

Give QRP a try for me. First, I too thought life was too short for QRP. One could most surely do better with the black box wick *turned up. True, but to know it worked well* QRO became like fishing in a stocked pond. This is not 100% true but enough to look for something else to augment QRO.

QRP started seriously (for me) on April 8, 2000 after my friend Taylor, N4TD, finished building my Elecraft K2, because my eyes weren't good enough anymore. He is good, with a track record of better than average in about anything he does, including building. My first QSO was Doyle, N4VV, my boyhood friend (then KN4BEO) who had a similar upbringing.

It hasn't been a year yet, and here are the numbers...remember, *glance over quickly*!! 262 Mix DXCC, 137 SSB, 224 CW, 6 BDXCC with 81 and 25 on 30 and 80 respectively, WAZ and all 53 WRTC stations.

By most definitions, my QRP isn't QRP since I use 10 watts. Sure, I turn on the QRO when I need a new band country over all and in some contests, but knowing that is possible, my K2 gives this little boy at heart a travel back in time and a sense of accomplishment that's not there most of the time with QRO.

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NEAT STUFF: See URL: www.g3vgr.co.uk/ldgbalun.htm For Z11 mod schematic and picture. Seems like a nice approach, yielding a 1:1 and a 4:1 internal balun, that can be switched out for normal operation.

—Continued from page 30—

dure. You divide the problem into the part that works and the part that doesn't at each step of the way. You then have only to worry about half the world at a time!

If you have any troubleshooting tips or "tricks" that you think are particularly clever or useful and want to share them, please drop a note to me by either snail mail or e-mail and I will incorporate the best ideas in a future column. I can't promise that all of them received will be published but the clever ideas that do make it to print will bring you some small degree of notoriety.

Joe Everhart, N2CX n2cx@voicenet.com

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Extreme QRP

MilliWatt Award

Margaret Williams—KI4W

ki4w@infi.net

The fourth winner of the coveted DXCC Milliwatt Trophy, Margaret H. Williams, KI4W, is a quite diversified and accomplished person as well as a top-flight QRP operator. It is difficult to know where to begin in describing her! Her current profession is teaching at Northside Jr. High School in Norfolk, VA. where she conducts classes in Electricity / Electronics and the Earth Sciences, and depending on curriculum needs, and for extra-curricular contributions, she heads a student electronics club, as well as a Lapidary club and Photography club (She is a retired Professional photographer too).

At last writing, Margaret was dedicating her summer to pursuing another of her avid interests—power boating in her 24' "Winner" cabin cruiser named "Red Ink". With the United States Coast Guard Auxiliary where she instructs Weather, Radio, Patrols, and other essential courses for the Coast Guard as well as the general boating public. She is a certified Coxswain, Pilot, and Instructor in and for the Coast Guard Auxiliary. This, plus her hobby of fishing, provides the perfect place for soaking up the sun on lovely Chesapeake Bay and other local waters. She notes, "I am particularly fond of fresh water fishing, primarily fly fishing for large mouth bass, and have quite a collection of rods and reels (total of 27) to fit any occasion. What a delight to see the ichthylogical Miss America dance on her tail when she hits the bug that has just been cast from my Shakespeare graphite fly rod". She, of course, carefully and gently releases her catches. I don't really know much about the comparison, but it is my impression that a fly rod is a "QRP" fishing rod, isn't it?

Margaret served in the U.S. Air Force from the beginning of the Korean War, was enlisted, promoted to Staff Sgt., selected for the six months Officer Candidate School and retired with the rank of Lt. Colonel. Her interest in radio began in the mid-1930's when a family friend became terminally ill and set up a radio station beside his bed. She notes, "I simply couldn't imagine talking with Florida...golly gosh!!! That was so far away." She began her amateur radio after WW-II with the call of WN4FTJ. She has been quite active since then, and served in an official capacity with the YLRL, as Vice President, as well as ARES, Navy MARS, and is local Emergency Coordinator for the 5 cities of South Tidewater Virginia.

Margaret and JJ at the Hanger Door

One gets the impression that Margaret "Went Air Force" because airplanes were involved, and one of the disappointments was that women were not allowed to be pilots during her entire active duty years. She remarks: "I took my first flying lesson at Ft. Lauderdale Air Field in 1939, but parents found out about it and that ended that for the time being. I am now a commercially licensed pilot, but have grounded myself due to physical problems the medicine for which affects my response time, and creates a slight vertigo, and that just isn't anything a pilot should have. However, my heart is still in the cockpit where I have had some delightful, terrifying, humorous and boring experiences".

The timing of the arrival of the DXCC-Milliwatt Trophy #4 could not have been better planned, Margaret recalls, "The trophy was just wonderful and it brought a great lift to me. A friend picked up my mail while I was hospitalized and brought it to me, and the entire staff who also came to my room admired the trophy. Few, if an of them knew what it represented, but they admired it none the less!" We know what it represents though! At the time her 100th QSL arrived, she had worked 129 countries with under one watt output from the TenTec Triton backed off to that output level. She provides the following information about her achievement.

"I carefully watch the propagation charts and follow WWV reports on conditions so that I won't waste my time on a poor band. When the 8Z4A operation was on a few months ago, I knew there would be no chance for me working him through the pile-ups, so I "smelled around" and found out where and when he would be up on 10 meters, checked the charts to see how good the band would be, and then one morning just at sunrise, I waited. Before long I heard a station tuning up and gave a 'QRZ". I made my call, and sure enough, the reply was, "KI4W, you are 5-9". I had done it! Later the HK0BKX operation was on 40 meters CW, and again it was cat-and-mouse. I heard him several mornings around daylight but had no luck at all getting through the pile-up. So I waited, and then got up early on a day when propagation was supposed to be good toward the south, tuned his frequency, called "QRZ, QRZ, this is KI4W operating on only 850 milliwatts, is anyone hearing me?" and sure enough, he responded immediately and we had a delightful chat about my QRPp operation.

"I think that the keys to QRP operation are: (1) a good clean station; (2) A good antenna system well-grounded and with a low s.w.r.; (3) understanding the capabilities of your transmitter and antennas in relation to band conditions; (4) knowing when and where to look and being prepared for action; and, (5) being patient. I know that on CW a good clean signal and sharp, well-formed letters are a MUST! It doesn't hurt to add "QRP" after your call either. I have really enjoyed QRP operation, and certainly do not intend to stop it after winning DXCC Milliwatt. It is the way to go, and if everyone would cut down on their power, the bands would be a much more pleasant place to operate.

"In closing, I especially want to extend my thanks to those DX stations on the 10 meter DX net who give special calls for QRP stations only. Those considerate DX stations deserve the praise of ever QRP operator throughout the world."

My interest in QRPp started in 1976. By accident, while talking to WB4MXI and complained that I could only get 1 watt out, our conversation was interrupted by ZL2BPB who broke in and said he couldn't believe I had one watt out. He thought my meter was ineffective or totally broken. However we chatted quite a while and both "Brown Paper Bag" and MXI were as stunned as I was. Later I saw an article in the RSGB journal in 1979 about QRPp awards, and was advised to contact QRP milliwatt International for information.

AWARD REQUIREMENTS:

(1) Your initial contact must NOT be QR. (over 1 watt)

(2) At least 2 amateur radio operators must SEE the station operate and must sign a notarized affidavit to that effect.

(3) The methods for measuring output must be verified by an Electronics firm,

(4) A statement from the manufacturer

Margaret at the Office

of the equipment on the ability of that equipment to operate QRPp.

TECHNICAL:

Rigs:

Ten Tec Triton IV modified for low output, CW and SSB Heathkit HW8 CW rig I had built several years earlier

Antennas:

10, 15, 20 meters with Mosley TA-33 Jr. beam 40 & 80 meters on Bazookas I made from the Handbook, in inverted V configuration with and NE/SW orientation. All antennas grounded to the water table at 18 feet depth

Measurements:

(1) Ten Tec ammeter, model 207
(2) Swan wattmeter WM 2000 for PEP
(3) Heathkit SB 610 monitor scope
(4) Field Strength meter (from antenna)
(5) IM-4100 frequency counter

Ammeter:

Triton IV - in line according to factory directions. Ten Tec Triton IV manual, 8 amps = 75 Watts, with output of 34 watts
Therefore, 2.2 amps (0.2 over the quiescent current of 2 amps produces INPUT of 2 watts (0.2 over the quiescent current of 2 amps produces an INPUT of 2 watts, output of 1 watt. Priest Electronics sent engineers to my home, checked accuracy for me and signed documents of verification. These were included in my application for the DXCC Milliwatt award.

HW-8: I modified the rig for no more than 2 watts input at any time on 4 bands. Output was approximately 550 milliwatts CW.

Heathkit SB 610 Monitor Scope:

In line for cross check.
(Calibrated by Priest Electronics to indicate peak output power.)
This unit was of great value for observing the quality of the signal, the peak modulation, and keying of the CW.

TECHNIQUE:

CAREFUL study of:

1. Propagation charts
2. WWV reports
3. Geomagnetic fluctuations
4. DX reports of upcoming activity - where & when
5. Sunspot cycle status
6. Gray line

a. Border sunset / sunrise, N & S
b. D layer disappears on sunset side and not built up on sunrise side.
c. D layer absorbs HF signals usually about 23 degrees because of earth's axis.

Other:

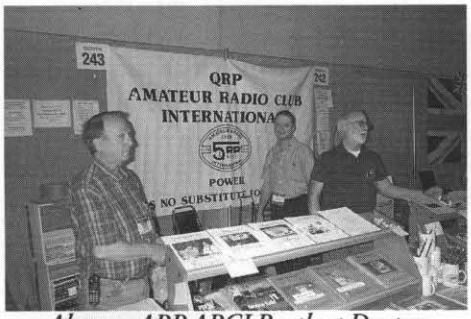
8Z4A **- (Neutral Zone Saudi Arabia/ Iraq) I found where he would be and when he called QUZ I replied, "this is KI4W and I'm operating 850 milliwatts, do you copy?" He responded me immediately, gave me a good report, chatted for a while, and then the "California Kilowatts and international shouting match started...they couldn't hold off any longer, but I got him first!**

HK0BBX **(San Andreas & Providencia) on 40 Meters CW at 0400 local time. Same technique, same results.**

Many DX stations call ME and there is frequently a pile-up. That was really fun! ***HZ1AIB*** **(Saudi Arabia) and I chatted for about 5 minutes or so. His QSL card stated, "never has so little been heard by so many."**

Well, folks. As the Disney pig says...ttttt hhhh aaaa ttttt's all, folks.

●●



Above—ARP ARCI Booth at Dayton

Above—Shady Looking Europeans!

Right—Cal, KF7ET's Shack

Antennas, Transmission Lines, Tuners...

Myths, Mysteries and Qualifiers

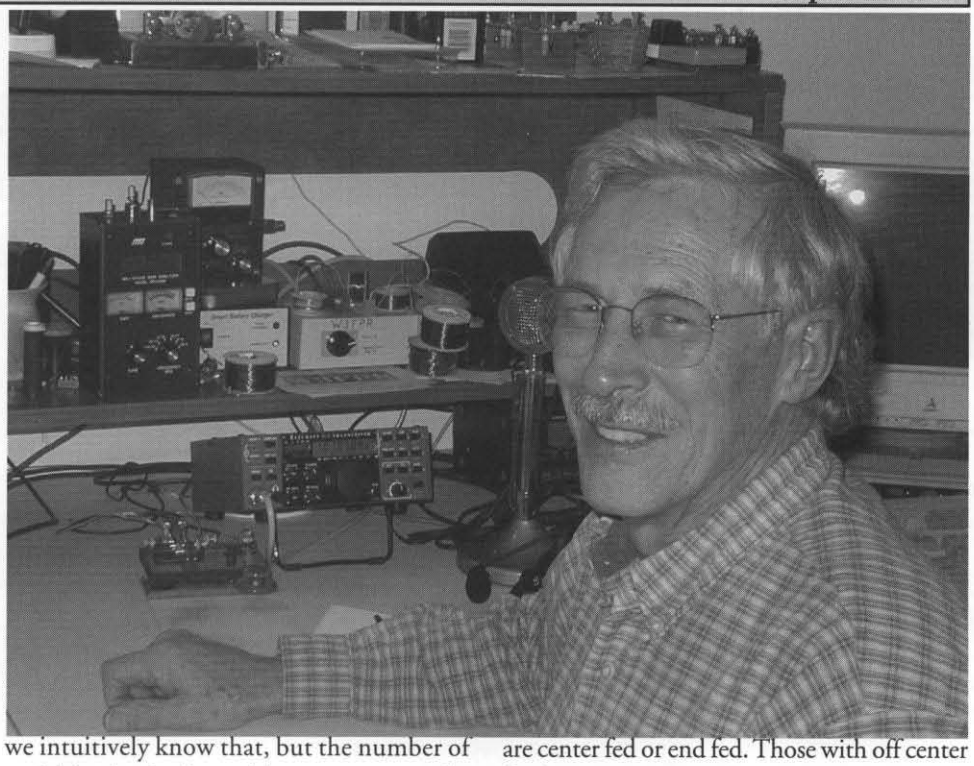
Don Wilhelm—W3FPR w3fpr@arrl.net

When Amateurs get together, there is a lot of talk about antennas and how to get the 'soup' from our transmitters to the antenna. In the process of such talk, a lot of stuff creeps in that I would call myths. It is not that such myths are untrue, but rather some things have potential for being universally accepted when in truth, they apply only to certain specific situations. A few examples:

- Stay away from quarter-wave transmission lines
- Keep the SWR low
- Always use a balun

There is yet another group of statements often made, that are only true in a few situations, and seem to be perpetuated as absolute truths due to mis-information with sometimes a bit of advertising hype thrown in.

- Baluns reduce SWR
- Coax is better than parallel feedline
- SWR will burn up your finals



Here, I will attempt to convey a few concepts and principles to help you better understand what is going on in an antenna system, particularly on the transmission line and through an antenna tuner. I am not going to provide formulas for you to work from; there is plenty of good reference material for that ranging from detailed study materials to practical information presented in literature like the ARRL Handbook and the ARRL Antenna Book. My goal is to help organize a picture in your mind that will assist you in knowing when and where to apply the many tools and formulas that are available dealing with antennas and transmission lines.

A complete and thorough analysis of the full properties of radiated RF energy is quite complex, and I would ask that you keep that in mind when approaching the subject. What we are really dealing with is a four dimensional relationship; not only do we have a directed point in space, but the time position of that point. Since we usually deal in a three-dimensional world, we lack the natural ability to properly visualize all the variables that are present. We can analyze antennas easily by freezing one or two of the dimensions in the problem, but we need to realize that is what we are doing. We cannot apply an answer that was produced by freezing those variables to another situation where they vary - we intuitively know that, but the number of variables in dealing with antennas can be large, and it is easy to lose sight of some. I believe that is why we end up with so many myths when dealing with antenna systems, and my response is "It ain't necessarily so". I encourage always asking; "How is this system or situation different from the last" and also how is it similar.

There are several solid facts though that can be used to advantage. The first is that the current at the end(s) of an antenna is zero and the voltage will be at its highest there. Sort of like in a DC circuit, no current can flow from an open, but unlike a DC circuit, as soon as you move away from the end of the antenna, the current will increase, so don't take my DC comparison too far - it only applies at the antenna ends (an example of use caution when extending an analysis).

The other useful fact is that along an antenna wire, the current will increase (and the voltage will decrease) until you reach a point 1/4 wavelength from the end and decrease again, also the direction of the current will reverse every half wavelength. Look at antenna books and you will see plots of antenna current and the direction vectors.

Everything works out nicely with a center fed antenna that is a half wavelength long, or an odd multiple of that. For simplicity, I'd like to restrict my discussion to antennas that are center fed or end fed. Those with off center feed require more analysis than I will present here. But what if the antenna is non-resonant as in the case of a multi-band antenna? I assure you that the same relationships hold true, and as you follow the antenna in from its endpoint, you encounter a feedline at some point where the current is not necessarily at a maximum. The current must continue and will follow down the feedline until it reaches a point where it is a maximum and the voltage is a minimum. For a center fed dipole, when we do this 'current-wrapping' from each end of the antenna, we will find that the currents on each side of the transmission line are of equal amplitude, and will be have opposing directions. So once we get on the feedline, the condition necessary for a true feedline - equal and opposite currents exist.

That brings us to the real substance of this discussion, which is feedline behavior. If we continue the current and voltage relationship moving from a minimum to a maximum and back to minimum again, we can repeat this current/voltage picture until we reach the transmitter end of the feedline. All along the way, these currents and voltages will be equal and opposite. Fact time - if the voltages and currents on your feedline are not equal and opposite, it is not acting as a feedline alone, it is also behaving as something else - perhaps as an antenna or a resistor. To keep the

feedlines being feedlines we can do our best to run the feedline away from the antenna at a right angle so the feedline is in what I would refer to as the antenna's RF ground plane which has a point in the center of the antenna feed point and extending perpendicular to the antenna in all directions. Put a pencil through a sheet of paper, the pencil is the antenna and the paper is all the points at RF ground potential with respect to that antenna.

Keeping the feedline balanced

Once we have established balance at the antenna end, we need to keep the feedline balanced. If it is parallel feedline, we can observe these rules of thumb; support it away from conducting surfaces by a distance three times the spacing of the feedline. If we have to cross a conductor, run the feedline at right angles to that surface or straight through it, and if we must make turns, keep them gentle, like a radius of 10 times the conductor spacing. Coax is easier because it is shielded, and can be coiled, run next to conductors, laid on the ground and other nice things. We speak of coax as an unbalanced line, and as far as the outside of the coax shield is concerned, it is unbalanced, however inside the coax, the center conductor and the shield will have equal and opposite currents and meet that qualification for a balanced line - so as far as the proper RF is concerned, even coax is balanced. Due to skin effect, the outside of the coax can (and should) carry a ground potential without effecting the balanced condition going on inside the coax.

SWR as a friend

We know that feedlines come in different impedances, and that is the characteristic impedance of the line, and we also know that if we terminate a line with a resistor equal to its characteristic impedance, we end up with a flat line or SWR = 1:1. Under these conditions, the current along the feedline will be equal at all points. That is nice if we can arrange the antenna to provide a resistive feed point equal to the impedance of the line we want to use. Life is not always so easy, and multi-band antennas (except for trap antennas) can provide that condition for only one band at most. SWR will be something other than 1:1 for the usual multi-band antenna.

When we have SWR on the feedline, it means that the voltage and current on the conductors will change as we travel down the line. If we measure the current at all points along the feedline, we can find a point where that current is a minimum (it will not be zero), then an electrical quarter wavelength further down the line it will be at its maximum. We will also find that where the current is maximum, the voltage will be at its minimum, and vice versa. The ratio of the maximum current to the minimum current is the SWR ratio. Also, at all points along the line, the currents in the two conductors will still be equal and opposite, so the line is still balanced. In a real transmission line with SWR, the higher voltages will leak a bit more across the dielectric, and the higher current points will cause more resistive losses. With high quality feedlines, we can minimize these losses, but we can't eliminate them.

We have established that the line has higher voltages and higher currents, so what about the old tales that the reflected power comes back down the line and zaps the transmitter. It doesn't do it that way! What really happens is that the output stage has to deal with the increased voltage and/or increased current. It is usually the voltage that gets to solid state devices, and if high enough, will punch a hole in their substrates and 'let the smoke out'. Most modern output stages are designed to withstand a certain level of additional voltage and a 3:1 SWR can be handled by most of them. Do check your transmitter specs to be sure.

How much power will get to the antenna if a mismatched line is used? All of it, except for the power turned into heat by the line losses. Yes, in any given wave front approaching the antenna, only a portion of that power moves out onto the antenna, and the remaining portion is reflected back into the transmission line, and it travels the 'wrong way'. When it reaches the transmitter, it turns around again, and travels back to the antenna, where a similar percentage is radiated - this same thing happens again and again. Well, sounds like a losing battle here, but no, remember that we only did this for a single wave front, and there is another one coming right behind it on the next RF cycle (not exactly correct, but good enough for understanding), and the sum of all these wave fronts getting transmitted, and partially reflected again and again is equal to the power that the transmitter is generating. Nothing is lost by the reflections per se; any additional loss is the result of the higher voltages and currents that occur.

OK, so we have SWR on our transmission line - how can that help us? It can help us match our antenna impedance to the transmitter's output impedance. The impedance at any point along a mismatched transmission line has a specific voltage and current relationship, and that relationship can be translated into an impedance (Z=V/I). The impedance will be a maximum at those points where the voltage is highest and the current is lowest (these conditions will occur at the same place along the line), and will be a minimum at the point where the voltage is a minimum. By changing the length of the transmission line, we can find a feed point impedance that matches the requirements for our transmitter output. In fact, Cecil Moore, W6RCA has designed a 'No-Tuner' multi-band antenna system that works by switching in additional lengths of feedline to adjust the impedance seen at the transmission line feed point. The statement that "My feedline tunes my antenna" is a true statement - and it is because of SWR that it is possible.

Quarter wavelength stuff

If any length of feedline with SWR can be used as an impedance transformer, then what about all the quarter wave sections that we have heard about? There is no magic in a quarter wave transmission line, but if we are using numbers and formulas, the impedance transformation for a quarter wavelength is a lot easier to calculate than some random length. If we have low impedance at one end, the opposite end will have higher impedance. The transformation formulas are in the reference books, so I'll not repeat them here. I would point out that if the impedance at one end is purely resistive, the impedance at the other end will also be resistive, and a random length section can be resistive at one end and yet have a complex impedance at the other end.

As far as avoiding quarter wave multiples in your feedline length, I am uncertain why this has come to be a guideline. In a real world installation, it may help sometimes if the feedline is located in the field of the antenna rather than at its centerline plane where the feedline picks up radiation from the antenna and acts like a counterpoise with a resulting high voltage at the open end. I know of no other generalized reason to avoid a quarter wave feedline. The origin of this rule of thumb may have been from the times when hams fed antennas from a link on the transmitter output tank or a direct tap, and found that some antennas with quarter wavelength feedlines transformed the feed impedance to a value that was difficult to feed with that output arrangement. So don't be concerned if your feedline is a quarter wave or multiple on some bands as

long as you have the proper tools for dealing with the impedance at the shack end of the feedline like a good antenna tuner, and orient the line for minimum pickup from the antenna.

Balanced or unbalanced and Baluns

I have mentioned that coax feedline may be physically easier to work with than parallel line. You can toss it most anywhere and it will be OK, not so with parallel line which must be properly arranged if it is to work as a feedline rather than an antenna or a resistor. A properly installed balanced feedline can give the advantages of multi-band use and relatively low loss with the variety of SWR that result from a multiband antenna. For single band operation, coax feed is usually the easiest to deal with and I highly recommend it for that application. If operated with SWR less than 3:1, good quality coax has only small loss. Reducing the SWR below 3:1 may not be worth the effort if the payback will be in loss only. Keeping the transmitter happy and providing its full output is another matter - some will provide full output with a 3:1 SWR while others will not.

With coax feed on a dipole, due to the surface effect of RF current, the equal and opposite currents in coax are confined entirely to the inside of the cable, and RF will not flow on the outside - at least not from the source (your transmitter). Now, look at the junction of the antenna wire and the coax shield. When the RF current gets to that point, it has two conductors to look at, 1) the antenna wire, and 2) the outside of the coax shield. The electrons dutifully split here with half of them going out along the antenna wire and the other half traveling along the coax shield. A balun will stop this action, and keep all the RF on the antenna.

If we chose to use a balun, which one? We as QRP folks tend to use small toroid cores for our baluns just because they are small, and "we don't need anything big for QRP". I agree with that based on the capabilities of the balun core itself, but what about the wire? If we use a small core, we also must use small wire to fit all the turns into it. Unless we really need it compact, perhaps we should re-think that one, larger wires have smaller resistance, and therefore smaller resistive losses. Why operate QRP and shoot ourselves in the foot by turning part of our signal into heat?

If the installation of a balun should make your antenna bandwidth better, or make your apparent SWR go down, then you should be looking at another balun - the ones that make the SWR or bandwidth better are doing so because they are turning precious watts into heat, and you can do better than that. A simple resistor across your antenna terminals will increase the apparent bandwidth and lower the SWR too, but it radiates only heat, not RF, and a balun that produces the same effect is just making heat too.

Let's say we fail to install a balun at the feed point, is it important? I tend to agree with the late Doug DeMaw on this one - maybe and maybe not. If we leave the balun out, we will end up with the feedline actually becoming a part of the antenna. It will radiate, and in most installations that radiation will be vertically polarized. What harm is there in that, the RF gets radiated and we can work stations, and sometimes the vertical radiation even helps if propagation conditions and distance work out right. But, when we are trying to create a particular antenna pattern, like for a beam or other directional antenna, this radiation most likely will be in the wrong direction and wrong polarization to aid our desired pattern and the use of a balun to eliminate it is prudent. In this article, I will not attempt to counter those who fear that this extra RF on the coax shield will travel back to the shack and do all kinds of damage.

Antenna Tuners

Antenna tuners come in two major flavors - the kind that act as a transmission line, and the kind that act as a tuned circuit. Let's talk about the ones that act like a transmission line first.

We already discussed how a transmission line itself has the ability to change its input impedance by changing the length. Well, we can electrically represent a transmission line as a collection of inductors and capacitors too. Not only represent it that way, we can build a physically short transmission line with lumped inductors and capacitors. The "L" network tuners, the "T" network tuners, and the "PI" network tuners all fall into this category. They all do the task just fine, and each one has its own limitations. The PI network with a single inductor is also a low pass filter and can be very efficient, but at low output impedance, the output capacitor has to be very large for a match, so it may not be a good choice for the low frequency bands given the choice of available variable capacitors in today's world. The L network can be quite workable over a large range, and can take the form of either a high pass or a low pass design, although some compromises may have to be made due to the size of available components. The T network with a single inductor is the one most commonly used, is a high pass design, and has become the favorite of most manufacturers. It can cover a large range with its three-variable elements. With its wide range we have another problem - an apparent match can be achieved with several combinations and some of them produce high losses. With the T match circuit, use the setting with the greatest capacitance on the output side and the smallest inductor setting that will provide a match.

The Tuners that use a tuned circuit usually look like a parallel tuned LC tank and are tuned to the frequency of operation (any capacitive or inductive reactance at the feedline terminals may also be a part of this tuned circuit), and sometimes will use a tuned series circuit rather than a parallel tank for matching to low impedances. The coupling to the transmitter may be obtained by a tap on the coil, or more commonly by a 'link' which is another coil placed in the magnetic field of the main coil. There may be a capacitor in series with the link to increase the range of the tuner.

These tuned tank circuit tuners provide a bandpass filter characteristic, and a link coupling offers some immunity from static noise especially on the lower frequencies. The side that connects to the antenna feedline can be configured as either a balanced or an unbalanced circuit. In The parallel LC tank configuration, the feedline can be connected to taps on the coil, a very wide range of impedances can be matched with high efficiency - attach the feedline toward the outer ends of the coil for higher impedances, or closer to the center for lower impedances.

Link coupled parallel tank circuit tuners are by far my favorite. Set the output tank tuning somewhere near resonance at the frequency of interest, and start with the taps about mid-way out on the coil, and then fine tune for minimum SWR on the input side. If it does not go down to 1:1 set the taps to the feedline at a different place and try again. Once you have established the proper tap point for any particular band and antenna, tuning to a 1:1 SWR is fast and easy. There are no false tuning points to be troublesome, and the balance for parallel feedlines is excellent if the components are arranged symmetrically. The down side is that they do not lend themselves to easy band switching, especially in the balanced configuration, and with commercial coil stock becoming scarce and/or expensive as well as dual section variable capacitors becoming scarce, these simple but excellent tuners may become a thing of the past.

Losses in antenna tuners and feedlines

As QRP oriented folks, we should be interested in getting as much of our transmitter output as possible radiated into the air as RF energy, and minimize the energy radiated as

heat through our feedlines and antenna tuners. For portable operation, we can find an antenna that can be easily erected in the field, and feed it with a lightweight feedline. We must accept some compromises for the sake of portability and ease of use. Say we chose a center fed dipole and we operate on a single band - we can cut the dipole so its feed point impedance is close to 50 ohms and feed it directly with coax, no tuner required. Similarly with a single band vertical, we can get it tuned to match the feedline at the home location, carry it into the field and set it up with confidence in a short time and spend our time operating instead of tuning antennas. We don't even need to carry an SWR meter along unless we expect something to change. If we anticipate multiband field operation, or will be operating from strange and difficult places like a hotel room, more thought must be placed into the antenna situation, a tuner is a necessity, and we will likely have to face more compromises. In general, use the fattest wire practical in a tuner's inductor as well as the feedline so the resistive losses are smaller, and accept the compromises presented by the choices we are forced to make.

At our permanent operating station, we don't have to make as many compromises (ignoring the limitations created by CC&Rs and other situations requiring 'stealth' operation). I believe we should strive for the least loss consistent with our choices of operating convenience. What does that mean? It means that we use fat wires for our inductors in the tuners, and that may also mean physically larger tuners for lower loss. It is a simple matter of lower resistance that makes a high power rated antenna tuner more efficient even for QRP operation. Those small signals will not get lost in that big box. Alternately, we can build our own antenna tuners using physically large inductors but use variable capacitors having lower voltage ratings for QRP and gain the advantages of the high power tuners without the high cost of high voltage variable capacitors. We can often 'have our cake and eat it too' by just re-thinking things with a small bits of similar information.

I have only hit on a few of the highlights of transmission lines, and have made no attempt to state how well any particular antenna will radiate - I leave that to the antenna experts. I have attempted to give you a slightly different way of thinking about how we move the power from our transmitters to our antennas. If I have encouraged you to get out the books and apply some of the formulas and 'rules of thumb' in a meaningful way, I have achieved my goal. Put up the best antenna that you can muster under the constraints that life and circumstances have handed you and squirt some RF into the air, for that's what this stuff is all about. Then you will have done your best, and perhaps learned something along the way that you can use to do it better the next time.

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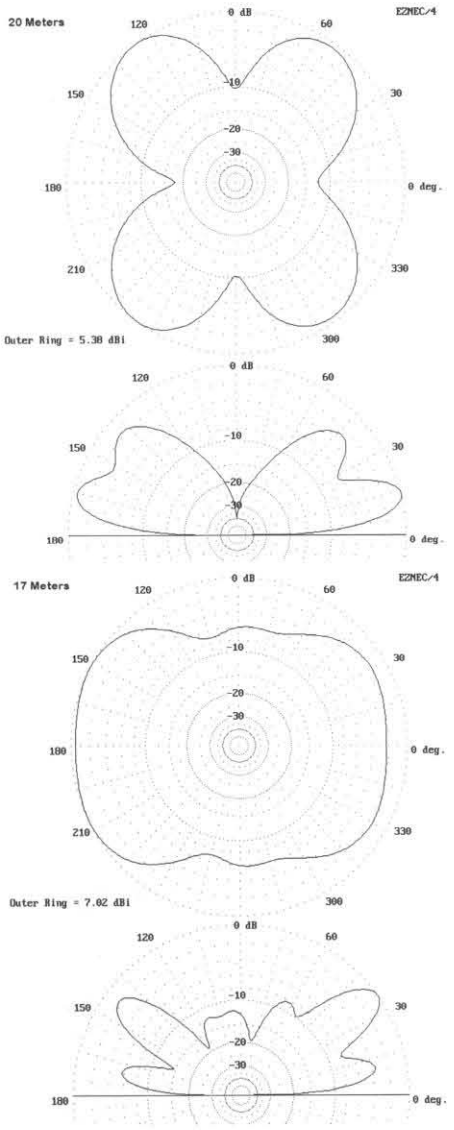
—Continued from page 21—



right at the base of the vertical arm and well-grounded for RF. Although a good RF ground is essential, a ground plane immediately beneath the antenna is unnecessary and in fact does little if any good.

Installation variations, if moderate, also create few problems for operation of the antenna on all bands. The horizontal arm can be modestly sloped downward or bent downward at its outer end. Likewise, a center-fed version of the antenna might have the lowest part of the vertical arm bent to one side to maintain a safe height above peoples' heads.

The following figures give azimuth and elevation plots of a 1/2l inverted-L cut for the middle of 80 meters and used on all the HF bands. The patterns and data are representative and will vary with the specifics of your installation. However, notice the absence of very high-angle radiation on any band. Moreover, even though the gain is almost always less than that of a 135-ft. doublet, the patterns are smoother, with fewer and shallower nulls. That feature alone makes the antenna a good general operating aerial. ●●

Top Left:

Center-Fed—Gain: 5.38 dBi

T-O Angle: 14 ° *Feed Z: 1850 - j2330* Ω

Botom Left:

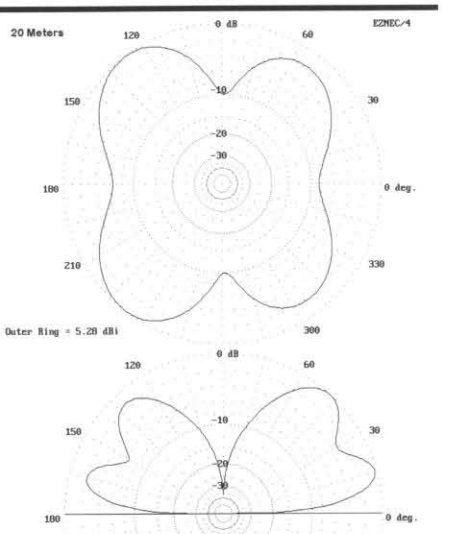
Base-Fed—Gain: 5.28dBi

T-O Angle: 15 ° *Feed Z: 360 + j325* Ω

Bottom Right:

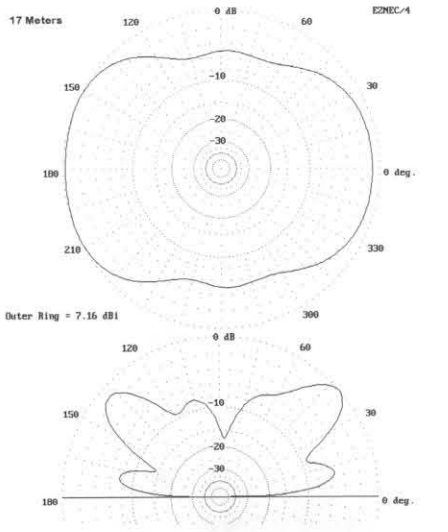
Base-Fed—Gain: 7.16 dBi

T-O Angle: 41 ° *Feed Z: 475 + j440* Ω



Center-Fed—Gain: 7.02 dBi

T-O Angle: 36 ° *Feed Z: 170 - j255* Ω



—Continued on page 39—

QRV—Building Your Cub-40

Mike Boatright—KO4WX ko4wx@mindspring.com

Seems like I always find myself on the way home from some place really cool, right at the publication deadline for the next QQ. Well, Bush House and Germany were really something, as I write this issue's column, I'm on my way home from my first Four Days In May at the Dayton Hamvention. WOW! Ham radio is a great hobby. And I know that I'm not the only one who feels that QRP is a true passion! I'm hooked on FDIM!

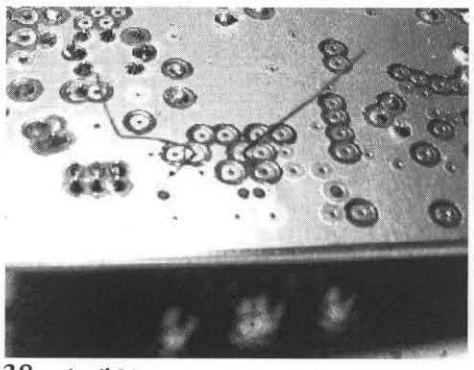
There's just nothing like sitting down and chatting with the guy that dug you out of the mud one night and gave you that 229—the one you happy danced over because you were running a handful of milliwatts in your first Spartan Sprint. And you can't pay enough money for the opportunity to sit down with the developer of your favorite piece of equipment and ask him what was going on in his mind when he came up with his design.

If you haven't been to FDIM, go! Pencil in next year's event on your calendar (May 16-19, 2002), grab a buddy—or a bunch of buddies—and go. I promise you, you won't regret it. Oh, and by the way, even if you're having too much fun at FDIM, don't forget to go to the Hamvention as well—there's nothing like it anywhere!

Assembling Your Cub-40

The MFJ Cub *Construction Manual* is very well written, and the assembly instructions are very straightforward. First you "stuff" (home brewer's term for placing components in their proper positions on the PC board) and solder all of the Cub's generic parts. A number of the parts in the Cub circuit are the same, regardless of band, so you install these first.

The manual gives you a step-by-step guide and a suggested order in which to install the components. Until you have experience building kits, it's probably a good idea to follow this order, and to use a pencil or pen to mark the checkbox provided after installing each component (it's not a bad idea to do this, even if you have a lot of experience with kit building—sometimes you can get into real trouble, especially as projects get more complex and/or more compact).

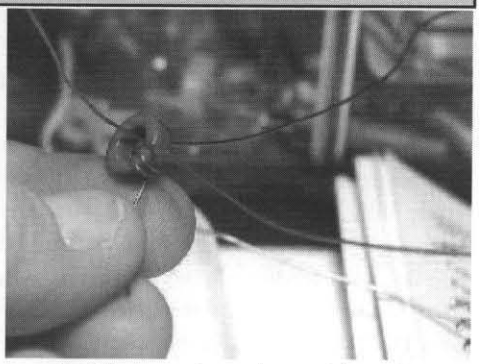


When I install a component, I find that it helps to first place the component leads into the proper holes, then take a finger and hold the component in place while I flip the board over and using my long-nosed pliers, pull the leads snug at a slight angle so that they stay in place while soldering. It is very important, however, to just pull the leads snug. Don't yank them or pull them too hard, as it is easy to damage a component—and that would put a serious dent in your kit building fun. Once you solder the component in place, use diagonal pliers and snip the extra lead (I guess I should suggest here that you wear proper eye protection as you are soldering and snipping the leads). Hold the lead with two fingers you cut it so that the lead won't go flying into your eyes or elsewhere—a stray lead can wreck havoc in your shack (remember they DO conduct electricity and the always seem to land in the worst places like your keyboard or inside a very expensive piece of equipment!).

Remember from the last column that the point behind soldering is to make a good mechanical as well as a good electrical connection. Take care that you do not create any *solder bridges*—too much solder, or touching more than one pad with the iron or the solder while soldering can also cause a solder bridge.

After installing all of the generic Cub components, you install the frequency specific parts onto the PC board. These components are all capacitors, inductors and crystals. Two of the inductors are "toroidal inductors" or "toroids" for short. A toroid is a coil wound on a donut shaped piece of powdered iron or iron ferrite, called the "core". Winding toroids seems to be the single-most scariest aspect of radio construction for most hams—but winding toroids is EASY! And maybe I'm a sicko, but I actually enjoy winding toroids!

Everyone has their own way of winding toroids. Wind enough and you will eventually "find your groove." Here's my technique that seems to work pretty well—I warn you that I'm right handed, so you may have to adapt this technique if you are left handed. The first thing you do is cut a length of enameled wire the proper length for the band you are building your Cub for (12 inches in the Cub-40). At about inch or so from one end, form a small "U" shape by bending the end of the wire back



over itself, approximately as wide as the toroid core is deep.

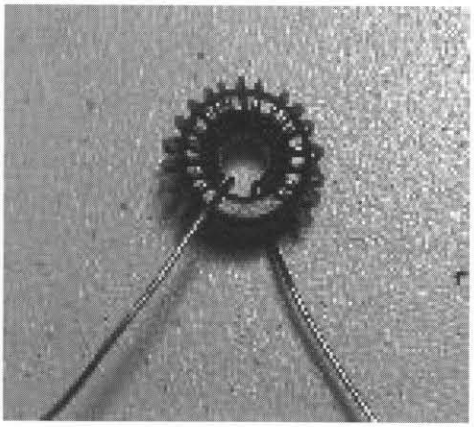
Take the core in your left hand and the wire in your right and pass the short end of the "U" through the hole in the core, *from the top* (that is, the red or yellow side of the core as you look down on it, through the hole), so that the short end of the wire is pointing back at you. What you now have is *1 turn*.

Take the long end of the wire and bend it downward, continuing the loop that you have started from the bottom. Thread the long end of the wire through the hole again, *from the bottom* (that is the dark gray or black side of the core away from you looking down on the core as above). You now have *2 turns*.

There seems to be a lot of confusion about "what is a turn?" It's pretty simple: each time the wire passes through the center of the core, you count one turn). For the Cub-40, thread the wire through the core 18 times (including the first two that you've just completed).

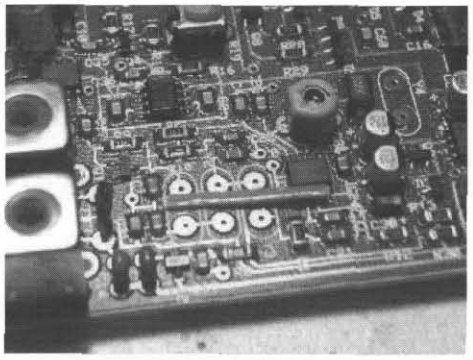
As you make each turn, pull the wire snug and tight, but don't break the wire by pulling it too tightly. When you're done making your 18 turns, smooth out the turns around the core as shown in the manual, to make a nice, neat toroidal inductor. Your finished toroid should look something like this picture.

You have to remove the enamel coating from the two leads before installing onto the PC board. The easiest way is to *carefully* scrape



the enamel off with a hobby knife (Xacto knife). You have to do this VERY carefully, because the slightest knick in the wire could cause it to break at the worst time later on (like when you're the only guy in your club who hasn't worked the fox). An alternative way (and one I've personally been using a lot more lately) is to carefully burn off the enamel using your soldering iron and a blob of solder. It's a little trickier, but results in a much better connection and potentially more stable circuit.

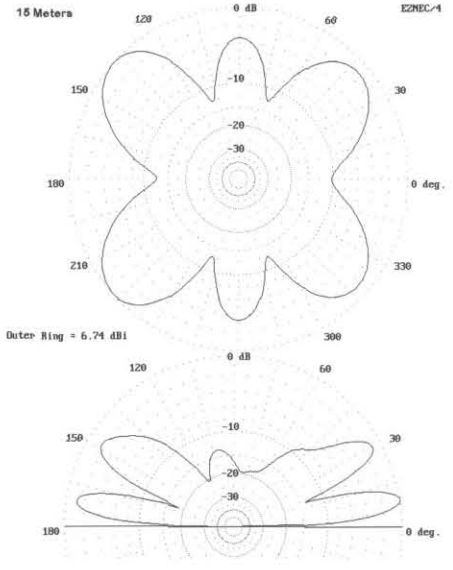
Once you're installed the two toroids, and have soldered them in place, you're ready to install the crystals. The manual cautions to leave an air-gap between the base of the crystal and the PC board. There's an easy way to do this. Cut a small piece of thin cardboard, about one-eighth to one-quarter of an inch wide and about an inch and a half long. Place the cardboard strip between the two holes where the crystal leads go and install the crystal (tugging the leads snug on the other side with your long-nosed pliers). Once you've soldered the crystal in place, you can slip the cardboard out (you may need to tug it a little with your needle-nosed pliers). For the crystals in the crystal filter, Y1, Y2 and Y3, place the cardboard so that it fits in between all three pairs of holes, and install all three crystals before removing the cardboard.



After you've installed all of the crystals, you've completed the basic assembly of your Cub-40 (MFJ-9340).

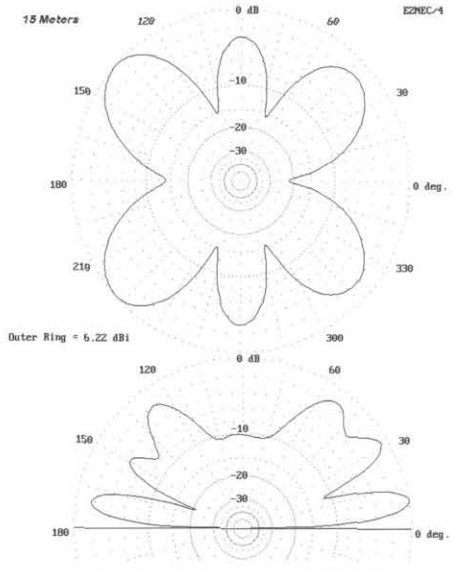
Next time, we'll test out your completed board, align it, and hook it up to an antenna. Then your Cub will be QRV! ●●

—*Continued from page 37*—



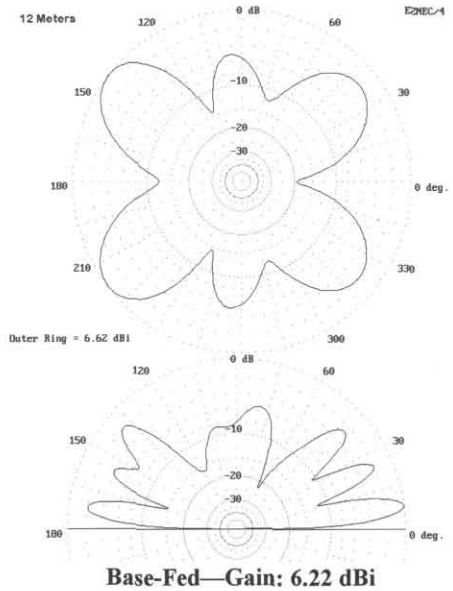
Center-Fed—Gain: 6.74 dBi

T-O Angle: 9 ° *Feed Z: 700 + j1375 Ω*



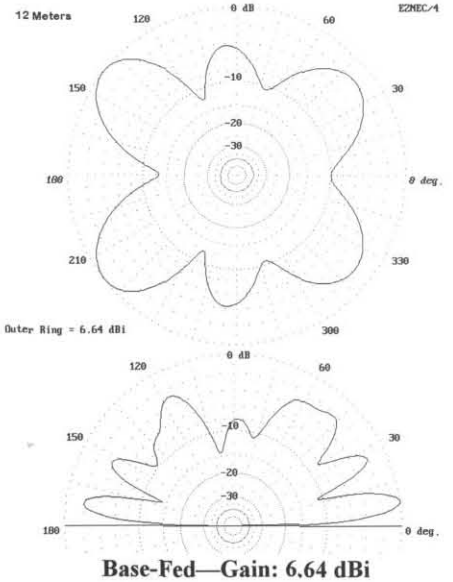
Center-Fed—Gain: 6.62 dBi

T-O Angle: 8 ° *Feed Z: 215 - j525 Ω*



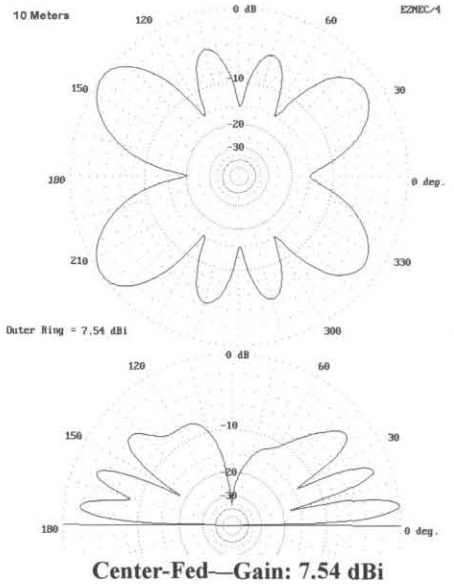
Base-Fed—Gain: 6.22 dBi

T-O Angle: 10 ° *Feed Z: 230 + j165 Ω*



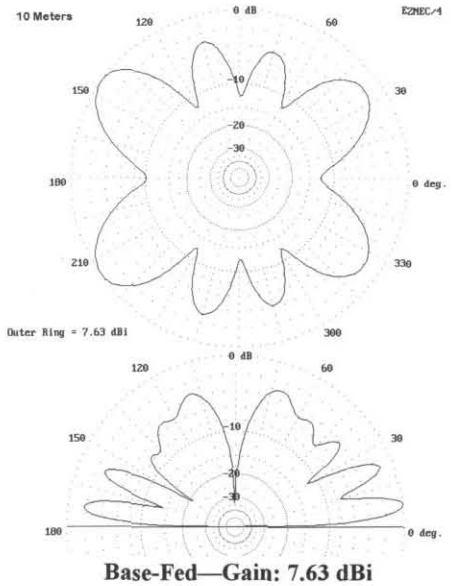
Base-Fed—Gain: 6.64 dBi

T-O Angle: 8 ° *Feed Z: 200 + j175 Ω*



Center-Fed—Gain: 7.54 dBi

T-O Angle: 7 ° *Feed Z: 535 + j1055 Ω*



Base-Fed—Gain: 7.63 dBi

T-O Angle: 7 ° *Feed Z: 195 + j90 Ω*

Thumbnail History of the Vibroplex Semiautomatic Telegraph Key

Paul Bock—K4MSG k4msg@arrl.net

Most hams are familiar with the name Vibroplex because of the company's primary products: semiautomatic keys or "bugs", and electronic keyer paddles. A couple of excellent books have been written on Vibroplex (see bibliography), but for those who haven't read one and are interested in the history behind the original invention - the semiautomatic telegraph key - this article should provide a "quick picture."

Around 1900, a telegrapher and inventor from New York named Horace G. Martin set out to develop a key that would prevent the onset of the dreaded "telegrapher's paralysis" caused by prolonged, rapid up-and-down motion of a straight key. Martin's first attempt, patented in 1902, featured a side-to-side lever and would send dots automatically by means of an electromagnet as long as the lever was held in one direction, and send dashes manually when the lever was repeatedly pressed the other way. Martin named his invention the "Autoplex," and although it worked well enough it never sold well because the price was reportedly around $20.00 (a princely sum in the days when a good telegrapher might earn $8-$12 a week), it required costly extra batteries in the telegraph office to power it, and it was tricky to adjust.

By 1904 Martin had patented a simpler device that also operated side-to-side but formed repeating dots by means of a weighted vibrating arm mounted on a thin leaf spring. Martin named this new instrument the "Vibroplex", and it met with immediate success. First sold in 1905 for a price of $12.00, the relatively uncomplicated, purely mechanical Vibroplex was not difficult to adjust or to learn to use. Somewhere along the line the Vibroplex picked up the nickname of "bug", a moniker that is still used today.

Although Horace Martin met with success in selling his instruments he was never much for actively marketing them, so in 1911 he teamed with entrepreneur J.E. Albright, who had been selling typewriters since 1890. In 1915 Martin & Albright officially formed The Vibroplex Company, Inc. Martin sold his interest in the company in 1920 and it remained in Albright hands until 1965 when it was sold to John La Hiff, a long-time employee who designed the "assembled frame" instruments (see below). La Hiff's sons sold the company to Peter Garsoe in 1979 and it was moved to Portland, ME. Garsoe, in turn, sold the company to S. Felton "Mitch" Mitchell, W4OA, in 1994 and it was moved to Mobile, Alabama, where it is currently located.

Below is an overview of Vibroplex "bugs" that is accurate up to the late 1990s.

One-piece frame

(An instrument with a cast frame to hold the lever arm pinion and adjusting screws)

"Original": First known simply as a "Vibroplex", Martin's original design was later referred to in ads as "The Original Single-Lever Vibroplex" to distinguish it from other models developed by the company. Sometime in the 1920s it became known as just the "Original", and it is still offered today. Base size is 6-3/8" x 3-1/2".

"Double-Lever": This instrument used separate levers for dots & dashes rather than the two-piece hinged lever of the Original. It appeared in 1907 and disappeared in 1926.

"Model X": This model had an intriguing lever-arm mechanism that allowed dots and dashes to be formed by the same set of contacts. First sold in 1911 with a square shaft & weight, by 1919 it had a round shaft & weight. It was discontinued in 1923.

No. 4 or "Blue Racer": First appearing in 1914 as the No. 4, the name was changed to "Blue Racer" when it was offered with a cobalt-blue enamel base. The blue paint was later dropped but the name stuck. The only Vibroplex built on a 2.5"-wide base, its parts were approximately two-thirds the size of "Original" parts. It was discontinued in 1966.

"Junior": The "Junior" was a set of "Original" parts mounted on a slightly smaller (6" x 3") base. It first appeared in the early 1920s and was discontinued by 1939, and was the only Vibroplex bug that had the nameplate facing to the right instead of left or rearward.

Assembled-frame

(Consists of two triangular plates and two vertical posts bolted together to create a support for the lever-arm pinion and adjusting screws.)

No. 6 or "Lightning Bug": First appeared in 1927 as the No. 6. The name was changed to "Lightning Bug" sometime in the 1930s. Same base size as an "Original" but with a flat lever-arm shaft and square speed weight. Discontinued in 1979.

"Zephyr": First appeared in 1939. Consisted of "Lightning Bug" parts mounted on a "Junior"-size base (6" x 3") but with a simplified damper design. Discontinued in 1958.

"Champion": This "low-end" Vibroplex featured a set of "Lightning Bug" parts on a standard-sized base, but with the simplified damper of the "Zephyr" and the circuit-closing switch omitted. Introduced in 1939 and discontinued in 1979.

Special Models

"Upright": Also called the "Wire chief's Key", this model combined a horizontal knob & thumb piece with a right-angle mechanism so that the lever arm and contacts were vertical, giving the instrument a small "footprint" on a desk. Built 1917-1919 only.

"Midget": The rarest Vibroplex— only a half-dozen or so are known to exist. This tiny, nickel-plated instrument was truly "pocket-sized" and featured a small, articulated rear leg that could be swung out for stability. Built 1918-1920.

The thin-base or "Norcross" bugs: During 1907 and 1908 Horace Martin moved from New York to Norcross, GA. There he built some "Original" and "Double Lever" instruments using a 3/16" thick base rather than the standard ½" thick. Because of the light weight these instruments had an articulated leg for stability.

Base paints & plating

From 1905 until 1938 or 1939 all Vibroplex bugs were offered with a standard black "japanned" base with gold pinstripe decoration and nickel-plated top parts. An optional nickel-plated base was also available on most models. Vibroplex advertised red, blue and green enameled bases on special order in the 1920s and 1930s but only a handful still exist. In the late 1930s Vibroplex began using black wrinkle paint instead of japanning, and in 1940 the company switched from nickel to chrome plating for the top parts, black wrinkle bases for "Standard" models, and chrome bases for the newly-introduced "Deluxe" models. (NOTE: From 1943-1946, "Deluxe" instruments used a "battleship gray" wrinkle base paint to conserve chromium for the war effort.)

In 1958 the "Standard" base paint was changed from black wrinkle to gray wrinkle (lighter than the "battleship gray" of the WWII deluxes). Some "Champions" and "Lightning Bugs" were offered with beige wrinkle base paint in the 1960s and 1970s. Post-1979 Vibroplexes have used a variety of paints including textured gray, Sienna brown,

powdered black, etc.

Deluxe Models and the "Presentation"

In 1940 Vibroplex introduced "Deluxe" versions of the Original, Lightning Bug, and Blue Racer. These bugs featured chrome-plated bases, jeweled trunion bearings, and red plastic knobs & thumbpieces. In 1948 the company went one step further with the introduction of the "Super Deluxe", later renamed "Presentation," which was an Original Deluxe with a gold plate mounted on top of the base. Later Presentations had an adjustable mainspring, although this feature was ultimately dropped. The Original Deluxe and Presentation are still in production.

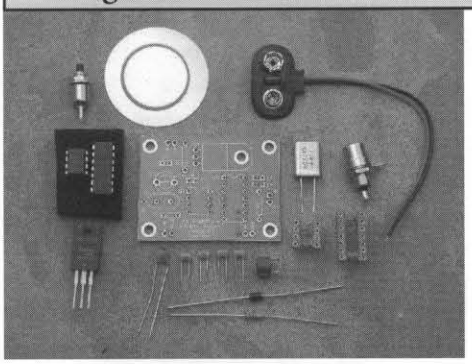
Bibliography

The Vibroplex Co., Inc., 1890-1990, William R. Holly, K1BH, 1990.

Vibroplex Collector's Guide, Tom French, W1IMQ, 2nd edition, 1996. ●●

New Frequency Announcer Kit by Dan Tayloe—N7VE

Bob Hightower—NK7M nk7m@extremezone.com



This little kit was designed by Dan Tayloe, N7VE, and is intended to provide an inexpensive, but accurate, tool for the homebrewer, tinkerer or just about anyone else who deals with amateur radio.

The 'heart' of the kit is the 12C508A pic processor programmed by Dan to read the input frequency and provide the output to the piezo buzzer.

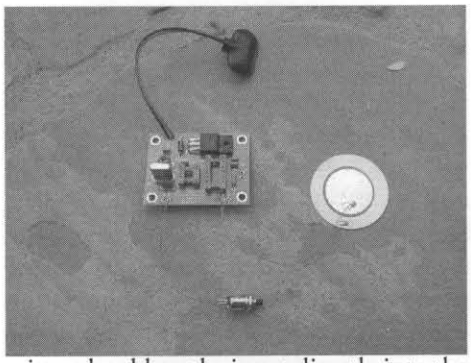
The kit is composed of a quality printed circuit board, silk screened and solder masked, and all components needed to complete the construction, less the enclosure...you can enjoy the mints, then install the board. Both chips are socketed, which permits replacement of the 12C508A if for some reason it should become damaged, and to allow upgrade of the 74HC00 chip (covers up to 75-100 MHz or more) to the 74AC00 chip (covers up to 150-180 MHz) for a wider frequency range

Programmed to announce the input frequency in morse code, the frequency counter can be used in alignment of rigs, crystal matching and in any application where the output of a circuit, in terms of frequency, is required.

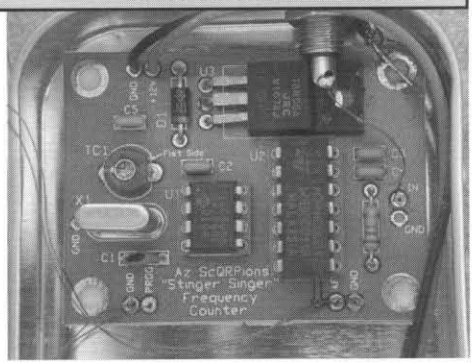
The counter provides 'readings' at two speeds, slow speed of 18 wpm, and fast at 27 wpm, selectable by holding the 'program' button down until you hear the speed you want. Each speed setting has four modes, either giving the complete frequency down to 1 Hz, or a shortened version with the MHz omitted. It also has a filter mode for measuring crystals.

Designed to fit into an Altoids (or similar) tin, the audio is output to a piezo buzzer, which uses the lid of the tin as a resonator, providing more than adequate volume. If desired, the output may be fed to an audio amplifier for even more volume.

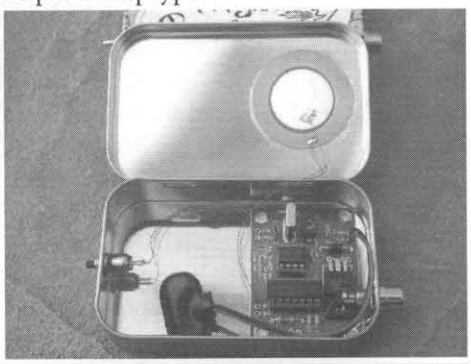
One caution is that the output of the transmitter should not be input directly into the counter, but should be padded first. Complete specifications and operation instructions are included in the kit.

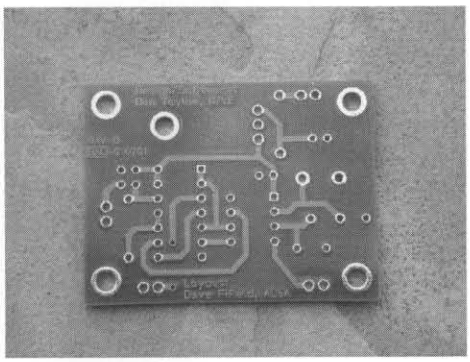


Pictures of the kit components, and various stages of construction, are shown at http://www.extremezone.com/~nk7m/cwafc.htm



The kit is priced ate $20.00, and may be ordered by sending a check made out to Bob Hightower at 1905 N. Pennington Drive, Chandler, AZ 85224-2632. If you are signed up for PayPal, you may also order the kit through http://www.paypal.com. ●●





—QRP Marine Mobile—

QRP operation is a life choice I think, so I apply the choice to my other hobbies also . . like boating http://home.hiwaay.net/~prm/MARINEMOBILE.jpg. Next weekend I plan to rig my QRP sailboat (minus the polytarp sail and boom) with a 10 meter dipole and my FT-817 and do some marine mobile work from the placid waters of Guntersville Lake. I might even run the WA4NWW PSK 31 milliwatt beacon from the mini-yacht.

The QRP boat is a Phil Bolger designed "Nymph" that I built about a year ago. It is 8 feet long and of plywood/epoxy construction. The mast is 14 feet, so with a small sternsprit extension, it is just right for hanging a 10 meter 1/2 wave dipole sloper.

Yep, I'm having too much fun.

73, Richard Mathews—WA4NWW/MM

Raising Hell with QRP

Murray Greenman—ZL1BPU as149@detroit.freenet.org

We are pleased to include this first of a 4-part article series about how Murray and others are Raising Hell with QRP. Ofcourse, here we are talking about the Hellschreiber communitations mode, a simple HF mode with charm and performance ...and a long QRP history.

Summary of Series

1. What Hell is, and the early history. "Fuzzy" modes.
2. Feld-Hell, QRP, Amateur development, available software
3. Modern developments suitable for QRP (PSK-Hell, SLOWFELD)
4. Advanced ideas (EME, MS, LF), MT-Hell, beacons

Part 1—What is Hell?

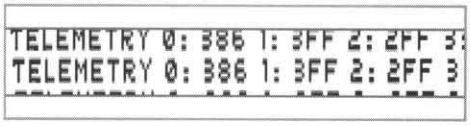
So you've never heard of Hellschreiber? That's not surprising! Until a year or two ago, virtually nobody in the Amateur world knew much about it, but "Hell", as it is popularly known, is now more popular now than ever before. You may have heard the prrt prrt sounds and not known what they were.

Hellschreiber is a very old digital radio mode (only Morse is older), and is one of the most effective QRP modes around. The name means "clear writing" or "Hell's writing", and it can be transmitted using a conventional CW transmitter, and received with the simplest CW receiver, it isn't fussy about tuning, does not suffer from distortion problems, does not use much bandwidth, and has a certain simple charm (like Morse) that soon appeals to those who try it.

Hell text is transmitted in a manner similar to the dots on a dot matrix printer. It sends the dots up each column from bottom to top, then up the next column and the next. When a black dot is to be sent, the transmitter carrier (or audio tone) is keyed on, and when there's a white space, the transmitter carrier is off, exactly in the manner of a Morse transmission, but rather faster. Each dot is about 4 ms long (equivalent to 80 WPM Morse), and each character consists of 7 columns containing 14 dots, so there are exactly 2.5 characters per second. Since 2.5 x 14 x 7 = 245, that's what you'd expect the baud rate to be - but no! Rudolf Hell was very cunning, and designed the Hell font so that single dots are never transmitted on their own. The resolution remains at 14 dots per column, but the signal bandwidth is reduced and transmission rate is only 122.5 baud.

History

Invented by Rudolf Hell in 1927 (hence the name), Hellschreiber was first developed to send press text via telephone lines. The receiver printed on ticker tape. It was adapted for radio by 1937, when the German Kondor Legion used it successfully during the Spanish Civil War. The portable unit was DC operated and used with the standard CW field radio of the time.



There is no synchronism used in Hell. The transmitter and receiver simply run at about the same speed. This is important, because with no synchronism, there is no sync to lose if the noise level is high. If the speed is off, the text climbs up the paper, or slides down the paper, and yet the text can still be read easily. You can see this in the above picture, text sent recently between two machines dating from WWII. The print is a little wobbly because the machines are 60 years old and rather worn. Hell developed a very simple solution to the problem of text becoming unreadable as it disappeared off the edge of the tape due to speed errors - he simply arranged the receiver to print the text twice, once above the other!

The war-time receiver contained a small worm gear which rotated above the paper strip once per column. The worm was inked by a rotating felt wheel above it. The worm had two turns, so printed twice. Under the paper was a solenoid operated print hammer, which pressed the paper up onto the worm, leaving marks on the paper, two at a time.

Considering the antiquity of this simple mode, the performance and some special features of the mode were ahead of their time. Bear in mind that Hellschreiber was developed at a time when tubes were expensive and unreliable, RTTY was unsatisfactory because FSK had not been invented, and teleprinters were complicated and expensive. The small and inexpensive Hell receivers with only a few moving parts were used all over the world for press traffic (Reuters and Tass were using Hell by radio as late as the 1970s, and the North Koreans used it well into the 1990s).

The definitive machine was the Siemens A2, of which probably about 18,000 to 20,000 units were made between 1941 and 1944. This machine, pictured below, was very simple, highly reliable, and used the standard Hell format we still use today. A few are now owned by hams and some are still in use.

The 1944 Siemens A2 Feldfernschreiber

At the bottom left of the picture you can clearly see the paper tape and the ink wheel above it, and below the paper the solenoid which drives the hammer. The keyboard was difficult to use because it had a strange interlocking system, and operated a drum containing many rows of contacts, one per character. The name of this machine - "field teleprinter" gives us the name of the format we still use today - Feld-Hell - on/off keyed at 122.5 baud. The only difference is that today we use computers to generate the signal and much more advanced radios and reception techniques.

Hell machines were made by several German companies, and also in Japan, and were even made by the British Post Office. A very similar machine, the RC-58, was manufactured for the US Army. The RC-58 had one unique feature - instead of sending by keyboard, it could optically read words written on paper tape. Commercial use of Hellschreiber died out as the Telex network took over in the 1960s, the main reasons being the limited ability to save and retransmit messages and a lack of page printing capability. There was a minor revival of Hell by European amateurs during the 1970s, as surplus machines surfaced, but a shortage of equipment limited the activity. It was not until the advent of home computers that Hell was set to return to stardom. The first Hell

software was written by Klaas PA0KLS for the Apple II in 1980. In 1982 Jan PA0SSB bounced the first Hell signals off the moon, and the first PC software was written by Sigfus LA0BX in about 1995. The software used today is modern Windows software by Nino IZ8BLY, uses very sophisticated digital signal processing, and is very easy to use. The LA0BX software is still used for transmission by those with CW-only QRP rigs.

In the next part of this series, you'll learn how simple it is to get on the air with a modern Hell station.

***Above**-Reception from a 1944 Hellschreiber*

References:
"Hellschreiber, What it is and how it works" *Radio Communication* April 1981, Stan Cook G5XB
"Hellschreiber - a rediscovery" *Ham Radio* December 1979, Hans Evers PA0CX
"The Fuzzy Modes Web Site" http://www.qsl.net/zl1bpu ●●

Bicycle Mobile

Dick Arnold—K8RJA **k8rja@arrl.net**

Years ago while traveling in my motorhome, I enjoyed operating mobile CW. At that time it was kind of a novelty to work a mobile CW station. Not so today; with the availability of the small HF rigs on the market, it's not unusual at all to hear a number of stations signing /M. After the sale of my motorhome, my small car didn't have room for a cell phone let alone an HF radio, so my mobile operation ceased.

My ex-aerobic instructor XYL insists that I exercise, which started me riding a bicycle rather than working out in our basement gym. After being knocked down twice while riding on the highways, my biking was reduced to cruising the subdivision. Then came the bike path, miles of safe thoroughfare stretching from Freedom Hill to Metropolitan Beach. With renewed interest in biking, I bought a 21-speed mountain bike. Twenty-one speeds? I thought I would never have a need for that many gears, but when the wind comes up you would be surprised how many gears are useful. Well after a few trips to the beach, I noticed the many natural antenna supports available and started taking my QRP rig and some wire antennas along. I have had many pleasurable hours operating K8RJA/8 from either the beach or other local parks.

One day while surfing the Internet I ran across VE3JC's web page where he displayed his HF mobile bike setup. This started me thinking about operating while biking, but put it on the back burner because of the antenna problems. A couple of warm days last week encouraged me to begin my spring rides. I

hopped on the bike and pedaled to Metro, but on the return trip it was against the wind, so geared down, traveling 4 MPH, I had lots of time to think and started planning an HF installation on my bike. By the time I arrived back at my QTH, I had it all worked out in my head.

The first thing I did was to bolt an antenna mirror-mount bracket to the frame. After trying every conceivable location, I settled on the main tube supporting the seat post. This put the Hustler mast at about a 45-degree angle, which will serve to keep the antenna clear of strikes from low branches. Then I had to find a place to mount the mini paddle where I could reach it without taking my hand off of the handlebar grip. I ty-rapped the paddle under the grip where I could reach it while still being able to steer, shift gears and use the brakes. Then I stuffed the 20-meter MFJ Cub and the battery into the handlebar bag, donned the headphones and went for a test ride. After a couple of T-E-S-T transmissions I tuned around and heard an N5 station calling CQ. This would be the proof of the pudding, as they say. I answered with my call and was rewarded with a 559 signal report from Texas. This, from 1 watt output to a mobile antenna mounted on a bicycle! I was pumped as I returned home with plans to make the radio installation more secure and in a better position for tuning, and I also needed to find a more comfortable position for the paddle.

Isn't it amazing how finding something new in radio can fill you with enthusiasm? I'm looking forward to some long rides this summer while talking to the world from my bike/mobile. In looking for ideas for this project, I was surprised to learn that there are hundreds of hams operating while biking. True a large number of them are operating 2 meters which doesn't present all the problems of an HF setup, still they are having a good time and hamming it up; many of them belong to a club dedicated to this activity. The Bicycle Mobile Hams of America (BMHA) is a special Amateur Radio club for those that enjoy communicating over the airwaves as they ride to work or travel with fellow enthusiasts in their free time. BMHA members also play an important public service role by providing communications support, and emergency assistance if needed, during big bike races and tours. The Bicycle Mobile Hams of America boasts more than 450 members in 43 states, and six countries.

A word of caution: Whenever operating a radio, whether riding a bike or driving a vehicle, mobile operation can be hazardous to your health if you don't pay attention to what's going on around you. Pilots call it SA or situation awareness. Don't get so distracted by the radio that you lose your SA.

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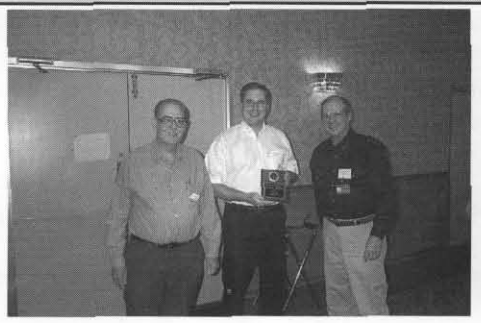
QRP Hall of Fame 2001 Inductees

Mike Czuhajewski—WA8MCQ wa8mcq@erols.com

The QRP ARCI is pleased to announce the 2001 inductees into the QRP Hall of Fame:

George Heron—N2APB
Peter Zenker—DL2FI

Out of 20 nominations received this year, these two received at least the minimum 2/3 majority of FOR votes to be inducted. The QRP Hall of Fame is not competitive, and has no quotas or minimums. Nominees are judged on their own merits, and in the case of this year's inductees they are considerable. Both are richly deserving of the honor.



George Heron, N2APB

George has been very visible in the QRP community for several years, and is one of the guiding lights of the very active New Jersey QRP Club. Condensed from his nomination letter, QRP Hall of Fame member Joe Everhart, N2CX, has this to say:

George is a unique individual who has become a driving force in QRPdom and made a number of outstanding contributions to the QRP community and ham radio in general. Membership in the HOF is a fitting recognition of his high power accomplishments in furtherance of QRP operating, homebrewing, written publications, symposium presentations and leadership.

George has acted for the last several years as the first among equals in the NJQRP club. With his guidance and tireless efforts the club has encouraged and aided a strong homebrewing focus with a series of club kits sold at bargain prices. Several were either designed by George or he had a strong influence on their design. All were wildly successful in generating club revenue and getting large numbers of QRPers and other radio amateurs interested and active in homebrewing.

George has been quite active in publishing and presenting QRP topics to the community, and is an excellent and well-received speaker on a number of topics. He has made presentations at FDIM several times, as well as Pacificon, Atlanticon and Arkiecon. Additionally he prepared a dynamic computer based slide show entitled "What is QRP" which he has presented to QRP and "traditional" ham clubs. He has made the slides available so that others could spread the word at their own local ham clubs.

He has also played a prominent role in QRP publishing. George served as editor for the QRP Quarterly for several issues, and editor/publisher of the FDIM Proceedings for 1998 and 1999. He also conceived and undertook publishing of a journal for the NJQRP Club entitled the QRP Homebrewer. In existence for over a year, it has furthered the cause of homebrewing with material that otherwise would not be available to the public.

George has written a number of articles for QRP journals including the QRP Quarterly, NorCal's QRPp and QRP Homebrewer. Most recently he co-authored an article with NN1G on the PSK-80 Warbler in QST which garnered the Best Article award for March 2001.

Another idea that has borne fruit under George's tutelage is a major yearly QRP symposium entitled Atlanticon, sponsored by NJ QRP. It is the east coast counterpart to the west coast's Pacificon with similar goals.

Finally, George has made a valuable contribution to amateur radio and QRP'ing via the NJQRP web page. He is the web master for that page which presents a wide variety of material. In addition to NJQRP club news, announcements, projects and happenings, it serves as a focus for other amateur radio activities including a ham-PIC list archive, has strong links to PSK-31 activity and provides a wide-ranging reference source for all things QRP. George somehow finds time to be the sole keeper of the web site in addition to his many other activities.

[WA8MCQ comment—calling the QRP Homebrewer a journal for the NJ QRP Club is a bit misleading and doesn't do it justice. When it was announced on the QRP-L mail reflector it was an overnight hit and success, and in a very short time it had over a thousand subscribers throughout the country.]

Peter Zenker, DL2FI

Every now and then someone observes that the QRP Hall of Fame seems to be concerned only with the English speaking QRP world, and that's probably unavoidable. While we all know a great deal about what goes on here due to all our QRP journals and on-line QRP forums, detailed news of other QRP communities usually appears only in their domestic QRP presses, in their own languages, and is invisible to us. That makes it very difficult to tell who their movers and shakers are, and learn about their accomplishments. Typically, very little of it trickles out into our arena.

This year we are fortunate to have someone from the German QRP group nominated and inducted into the QRP Hall of Fame. We don't know as much about him as we do of those in our own QRP community, but he has been at Dayton for several years and the feedback I get from all who have talked with him is that he is richly deserving of the honor. He happened to be a speaker at FDIM this year, and I've heard nothing but excellent feedback from his talk. Here's some info on him, culled from several sources such as his bio in the FDIM proceedings and QRP-L postings.

Peter is hardly a newcomer to QRP. He joined the G-QRP club long ago and holds member number 1053. I can't tell you how far back that was, but this will give you some idea: I joined circa 1987 and my GQRP number is 4792. In addition to building his own equipment, his special interests are ham education and publishing (not only ham radio technical info but also ham philosophy). He is QRP editor for two big ham radio magazines and also publisher of the QRP-Report, journal of the German QRP Club, DL-QRP-AG.

Peter helped start the club in 1997 and due to his hard work it has grown to over 2000 members. He has no official position within it, because it has none, but according to the FDIM proceedings for 2001 some call Peter the Ayatollah of the DL-QRP-AG. He also re-

cently started his own business, QRP Projects, which markets a number of QRP items.

QRP Hall of Fame member **Dick Pascoe, G0BPS**, had this to say about Peter in his nomination letter:

"Peter has been a stalwart of the QRP fraternity in his home country of Germany. He has worked tirelessly for the past 10 years to my knowledge to expand the knowledge of QRP in Germany. He has become to the Germans what **Rev. George Dobbs G3RJV** became to the English.

"With help from friends, Peter started the DL-QRP club in 1997. Before that most of those interested in our hobby were members of the G-QRP club (German section).

"Through his work in QRP Peter has, again with help, made sure that a truly excellent QRP journal has been published in his own language enabling non-English speakers to enjoy the hobby more.

"As the editor of this journal Peter has visited the giant hamfest at Freiderichafen many times [the European equivalent of Dayton], promoting QRP to all interested visitors and enabling a small gathering of QRPers at a local hostelry each year. His visits to Dayton and FDIM brought him to the attention of many US members.

"Through this work promoting QRP he has become, to the Germans, Mr. QRP/DL."

The few words presented here do not really do justice to Peter or give a true picture of his impact on QRP in his own country. About the best I can do is repeat Dick's comment about him, since it pretty well says it all and is high praise indeed: "He has become to the Germans what Rev. George Dobbs, G3RJV, became to the English."

Administrative Details

The QRP Hall of Fame is an honor bestowed by the QRP ARCI on people who have made outstanding and long running contributions to the QRP community. The composition of the voting body was changed slightly from previous years, when all Hall of Fame members were offered the option of participating. Due to the ever increasing size of the HoF, the Board of Directors voted to limit the offer to the prior two groups of inductees. It was also decided to add the secretary/treasurer to the basic voting body which consists of the Board, president and vice president. Although an honor bestowed by the QRP ARCI, membership is not required to be nominated or inducted, or to submit nominations. The call for nominations goes out in the fall of each year, and inductees are announced at FDIM.

Hall of Fame Members

The following people, in alphabetical order, have been inducted into the QRP Hof:

Chuck Adams, K7QO (ex K5FO)
Brice Anderson, W9PNE
Dave Benson, NN1G
Michael Bryce, WB8VGE
Wayne Burdick, N6KR
George Burt, GM3OXX
Jim Cates, WA6GER
L. B. Cebik, W4RNL
Mike Czuhajewski, WA8MCQ ***
Tom Davis, K8IF
Doug DeMaw, W1FB (silent key)
Joe Everhart, N2CX
Rev. George Dobbs, G3RJV
Paul Harden, NA5N
Wes Hayward, W7ZOI
Doug Hendricks, KI6DS
George Heron, N2APB
Roy Lewallen, W7EL
Rick Littlefield, K1BQT
Dick Pascoe, G0BPS
Randy Rand, AA2U
C. F. Rockey, W9SCH
Gus Taylor, G8PG
Adrian Weiss, W0RSP
Peter Zenker, DL2FI

****Done behind my back by the Board of Directors without my involvement, as reported in the July 1997 issue. A few people had sent me nominations of myself and I told them that I was not accepting them due to the obvious conflict of interest, being the administrator of the program, and to submit them directly to the Board if they wanted them to be considered.*

above, Bill Harding—K4AHK & Ade Weiss—W0RSP holding milliwatt DXCC trophy. Houston, 1983. below, 2001 FDIM Banquet. Well...we all know who these guys are!

Adventures in Milliwatting—QRPTTF

from an Arkansas Island

Jim Hale—kJ5TF

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Saturday the 28th of April 2001 was one of the 1st nice weekends of the new year. I would have no problem landing on the inhabited island on Beaver Lake near Rogers, Arkansas. Water temps were still too cool to wade to shore from the boat, but my inflatable kayak got all my gear and me to the beach from where I had anchored.

I started with the collapsible 20ft Black Widow pole, and found that the big end of the 2nd section from the top was cracked in 2 places. It would not hold in place. The pole needs to go to the full 20ft or I wouldn't be able to operate on 20m! I had some rubber bands, but needed some twigs to use as shims with the rubber bands, before it would hold. After raising the pole, with stinger wire attached, I placed it over a piece of rebar I had driven into the sand and it was up. I had delt the cracked pole, but knew I wasn't going to be touching that antenna, or attempting to set it for 15M band. That was a small disappointment.

Parallel to the shoreline, I laid out my 2 raised radials and stretched them out to reach a 2ft long fiberglass tent pole section I had sticking in the sand. Next I attached my RG58, and moved over to my operating position in the shade on a small rise 30ft from the water. I had a small cooler, with cool drinks on ice, and that made a nice table for my QRP+, C cell nicad battery pack, and SWR/PWR meter. A folding chair, next to that cooler, and I had it made in the shade!

As soon as I had my headset on and turned on my QRP+, I tuned up and down and heard contest signals from 14.057 to 14.063mHz! Excellent! Right on 14.060 was Doc K0EVZ in North Dakota, and with my rig set for 2w I got him on my 1st call. Doc was one of the special bonus stations, so I started off with a bang! I worked everyone I could hear calling CQ, and then went looking for a place to call CQ.

In spite of others reports of poor band conditions, I found that I needed to look hard to find a place to call CQ. I went up to 14.063 and as soon as I called CQ I was set upon by a beehive of stations calling me at once. Wow, a pile up! I've heard them, but never been on this end of one. I called a couple letters from the loudest one, and worked him, and the next and the next until I got them all in the log. The rest of my day wasn't to be like that, but still callers were plentiful.

As I logged station after station, my family would appear now and then and wave. They were paddling the kayak around and around the island, beach combing, wading in the shallow waters, climbing rocks, and watching the Canadian Geese who are nesting on the island.

What a wonderful Saturday it was, and I'm glad I brought my family along for the day. It meant that I would limit myself to only 3 hours on the air, but it was for the best.

My 1st radio expedition to Slate Gap Island was in spring of 1999. I was only able to get there with radio equipment 4 or 5 times that year, and never able to operate for long. But I returned several more times in 2000, and operated with my QRP+, and this same antenna setup. In 1999 I made over 20 QSO's on Slate Gap Island, and every one below 1 watt. My best band has been 20M, using the 20ft pole. But I've also worked 30, 40, and even 80M on the islands, or from the boat. On all bands below 20M, all I do for radials is connect a wire to the antenna mount, and throw the other end into the water. Instant flat SWR's!

It would be great if I lived on Hawaii, a Pacific island, or on the coast where I could take

part in the great IOTA island operations, and contests. But I live in the middle of the heartland of the USA, nowhere near any saltwater. However there is another group of amateur radio operators that encourage operation on fresh water islands. I'm sure every one of the 50 Canadian and US states has a river, or lake with some islands in them. The US Islands group has certified Slate Gap island now as AR-007L.

This is the 3rd island I've "activated" now under the US Islands Awards program. All are on Beaver lake, and there are still others on this lake, and I'll get to them all sooner or later. ●●

FDIM-2001 Grand Prize Winners

FDIM Donors, Prizes and Winners

Scott Rosenfeld—N7JI ham@W3EAX.umd.edu

PRE-BANQUET

#	Donor	Description	Winner
1	ARRL	Hints & Kinks	N0BN
2	ARRL	RF Design Book	N8MX
3	ARRL	ARRL Antenna Book	N5HF
4	Kairos Research	FT-817 Quick Reference	N8VAR
5	Radio Amateur Callbook	Callbook CD	G0UKB
6	Kairos Research	FT-817 Quick Reference	N0BN
7	Coilcraft	Designer's Kit	W7EL
8	N7GSU QSLs	Custom Designed QSLs	K4QQK
9	ARRL	Yagi Antenna Book	WB8GXB
10	ARRL	Ant. Imped. Matching Book	KM3V

BANQUET

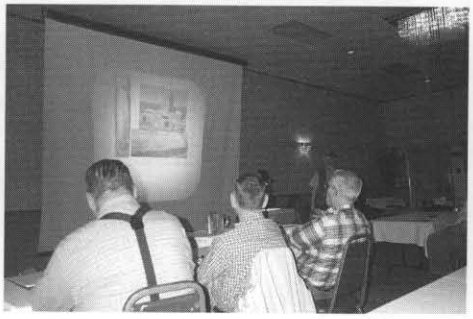
#	Donor	Description	Winner
1	Morse Express	Junker DBGM Telegraph Key	KO4WX
2	Llaves Telegraficas	Millennium Key	JA8CCL
3	Llaves Telegraficas	GMP Key	N5TW
4	Embedded Research	Tick + enclosure	AD4J
5	ARRL	QRP Project Book	WB8ICM
6	ARRL	QRP Project Book	KB8WEV
7	ARRL	Low Band Dxing	N8IE
8	ARRL	Antenna Compendium	N8ET Guest
9	QRP ARCI	MFJ 17m Cub	KB8KOQ
10	MFJ Enterprises	30m Cub	KC4MHM
11	ARRL	Antennas & Feedlines	K4AHK
12	K3CHP	DX QSL Guide	G3RJV
13	K3CHP	DX QSL Guide	W0HX
14	K3CHP	DX QSL Guide	DL8OBD
15	K3CHP	DX QSL Guide	K5HQV
16	Universal Radio	SW Receivers Past & Present	W4DU
17	ARRL	Transmitter Hunting	KB8RRG
18	Coilcraft	Designer's Kit M102	K8KLP
19	G3TUX	CW Operator T-shirt	W9YA
20	G3TUX	I Love CW T-shirt	N2CX
21	Technisoft QSLs	500 QSLs	KC5GWA
22	Solder-It	Screwgrab	N8WE
23	K9LU	Bulldog Paddle	KF4OTG
24	Knightlites QRP Club	Keylite	N8ET
25	No. GA QRP Club	NoGAWatt	WD8JLI
26	Eastern PA QSL Club	QRP Contest Calendar	W0JMP
27	Eastern PA QSL Club	QRP Contest Calendar	KB8YHN
28	Eastern PA QSL Club	QRP Contest Calendar	K8SGL
29	Eastern PA QSL Club	QRP Contest Calendar	W2APF
30	Eastern PA QSL Club	QRP Contest Calendar	AE4NY
31	Eastern PA QSL Club	QRP Contest Calendar	W4ADE
32	Palm Radio	Mini Paddle	WB6JBM
33	Kairos Research	FT-817 Quick Reference	KF4OTG
34	Kairos Research	FT-817 Quick Reference	K5DW
35	Kairos Research	FT-817 Quick Reference	N2APB
36	Kairos Research	FT-817 Quick Reference	W6IU
37	Kairos Research	FT-817 Quick Reference	NM4T
38	Kairos Research	FT-817 Quick Reference	N8ET
39	Kairos Research	FT-817 Quick Reference	Ellen Kellogg
40	Kairos Research	FT-817 Quick Reference	K2UD
41	Kairos Research	FT-817 Quick Reference	K8NI
42	MFJ QRP Club	Coffee Mug	NM4T
43	no prize	N/A	N/A
44	No. GA QRP Club	NoGAPig	N1SG
45	No. GA QRP Club	NoGAPig	W5TWR
46	N3JL	QSL Design Software	G0UKB
47	Far Circuits	$15 Gift Certificate	N9YAI
48	Far Circuits	$15 Gift Certificate	W8RIK
49	The Wireman	$25 Gift Certificate	AB7MY
50	RSGB	Low Power Scrapbook	WK8S
51	N7GSU QSLs	Custom Designed QSLs	W0JOE
52	N7GSU QSLs	Custom Designed QSLs	K0PC
53	N7GSU QSLs	Custom Designed QSLs	N7JI
54	N7GSU QSLs	Custom Designed QSLs	N2WW
55	NJ QRP Club	Warbler	WE5O
56	NJ QRP Club & N2CX	Gusher 20	WA6HHQ
57	Almost All Dig. Elect.	Digital Freq. Display	DL2FI
58	W4MPY	500 QSLs	K8IQY
59	W4MPY	250 Eyeball QSL cards	KD6ZJH
60	Buckmaster	Hamcall CD	WA2RZJ
61	Buckmaster	Hamcall CD	K8CZ
62	Buckmaster	Hamcall CD	KG8IH
63	Buckmaster	Hamcall CD	WA2ECP
64	Radio Am. Callbook	Callbook CD	KC9LC
65	Oak Hills Research	WM-2	W4QO
66	Byers Chassis Kits	Project box	K0QD
67	ARRL	Wall Map	KI8JQ
68	ARRL	Wall Map	AD6JV
69	ARRL	Wall Map	OK1KT
70	ARRL	Wall Map	DL9SCO
71	ARRL	Wall Map	N5EM
72	ARRL	Wall Map	N3FZX
73	ARRL	Wall Map	WD1V
74	ARRL	Wall Map	WB0JMG
75	ARRL	Wall Map	W6MMA
76	QRP ARCI	MFJ 30m Cub	N0BN
77	QCWA	1 yr. Membership	W0UFO
78	Kanga US	Micro Mountaineer	WN3DVG
79	Kanga UK	FOXX-3 20m xcvr	W8VK

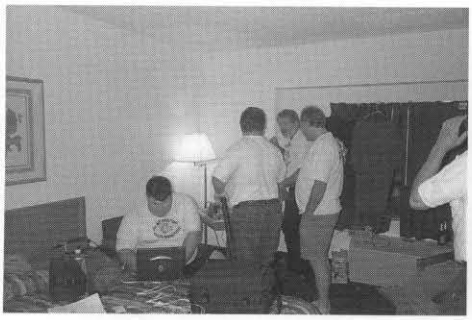
GRAND PRIZES

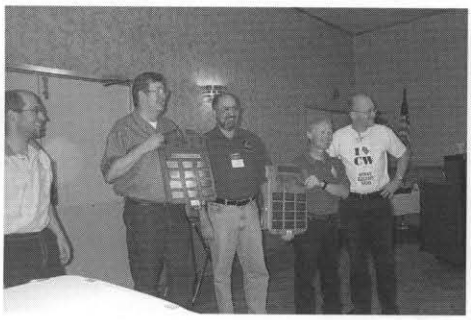
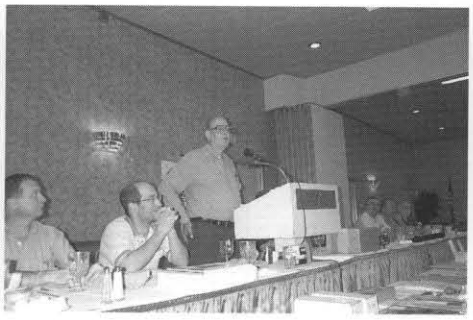
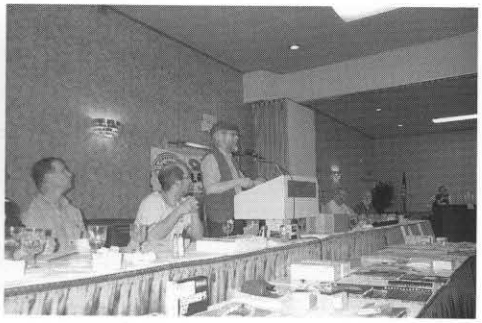
#	Donor	Description	Winner
1	Small Wonder Labs	Kit of winner's choice	W9YA
2	Bird Electronics	Model 43 wattmeter w/slug	KB8USZ
3	QRP ARCI	K1 xcvr kit	W0UFO
4	Patcomm	PC-500 dual band xcvr	KB8USZ
5	Ten-Tec	QRP xcvr kit	
6	Kanga US	Portable fiberglass antenna	
7	Vern Wright	MP-1 Portable Antenna	

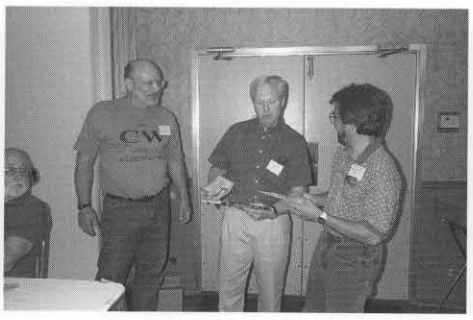
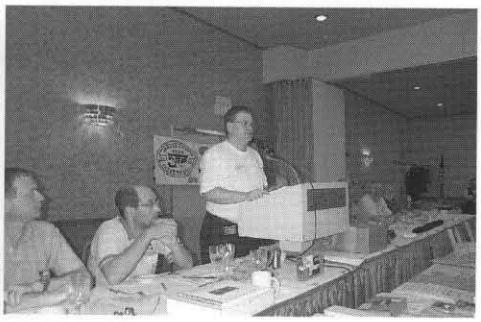
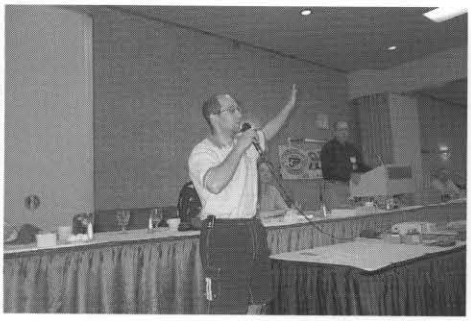
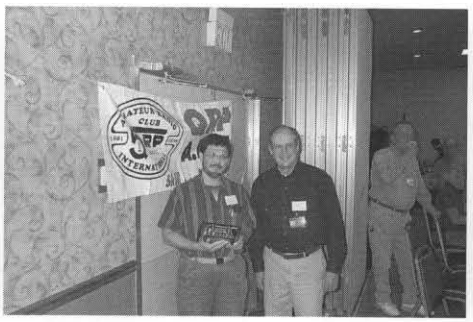
FDIM 2001, A Photo Essay

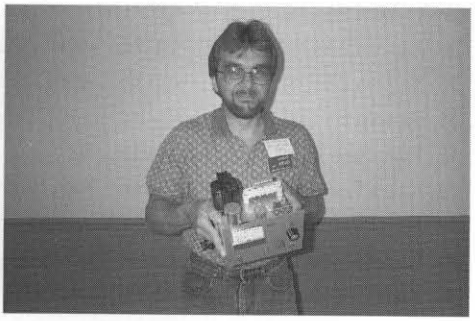
(Get with friends who attended and Enter Your Own Captions)

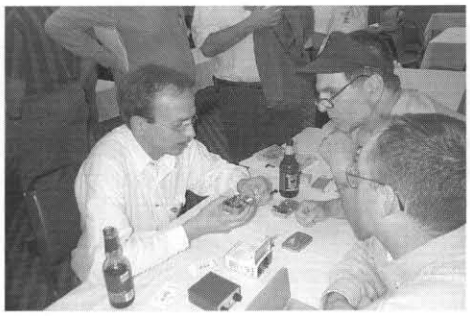
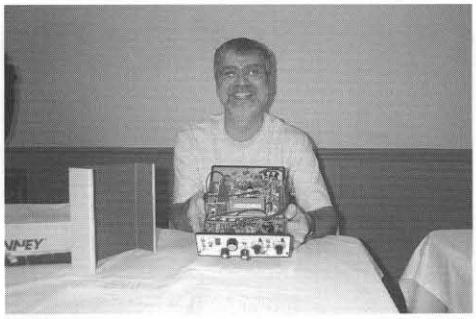
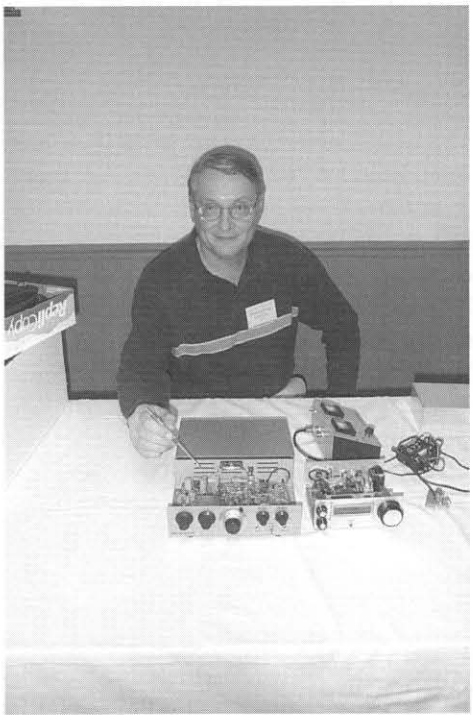
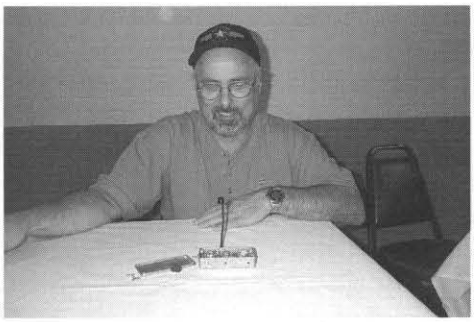
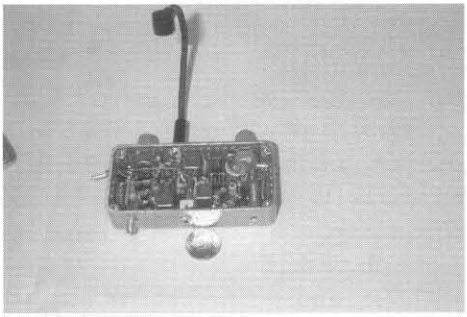
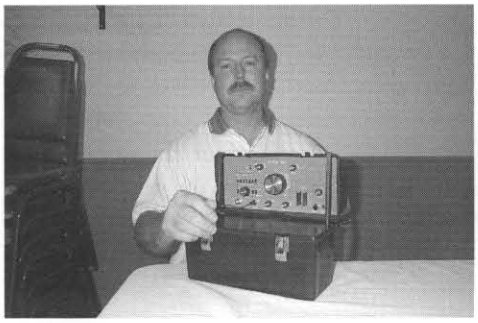



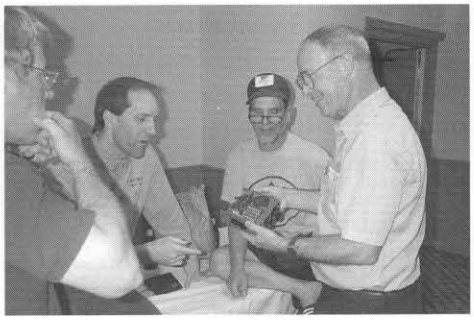


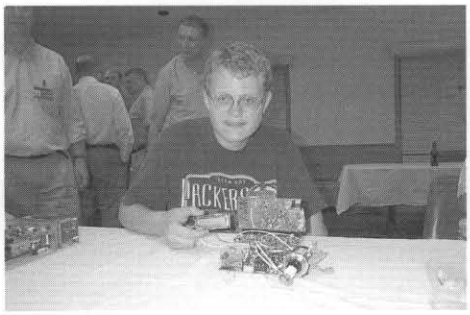
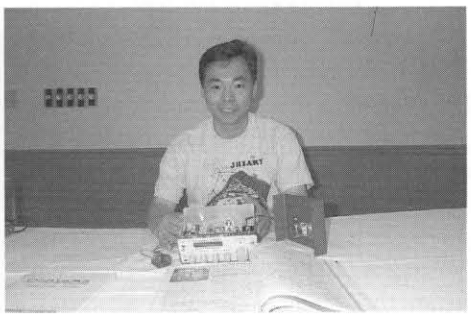
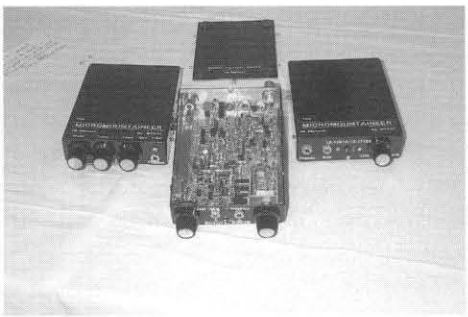
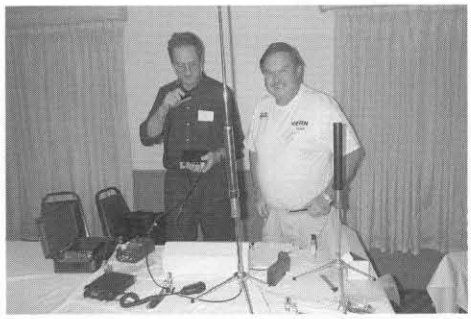









July Contester of the Quarter

Randy Foltz—K7TQ rfoltz@turbonet.com

This issue's Contest Operator of the Quarter is **Brian Kassel, K7RE**, from Peoria, AZ. Brian is an Extra Class and has been licensed as K3LSB and W5VBO. Some of his recent accomplishments are 1) 1st Place in Summer Homebrew Sprint 2000 with over twice as many points as second place, 2) 3rd Place in Spring QSO Party 2000 with over 1.2 million points, and 3) 2nd Place in AZ in Fall QSO Party 1999 as W5VBO.

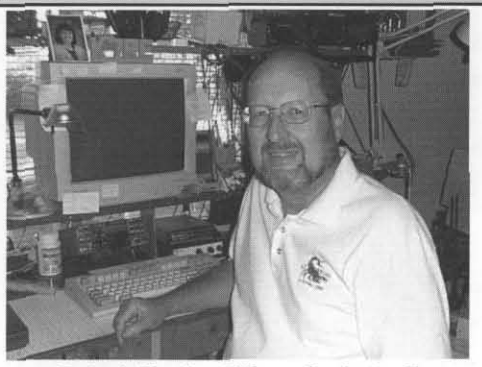
K7TQ: Brian, I just finished operating the New Jersey Spring Homebrew QSO Party. We worked each other twice, once on 15 and again on 20 m. I noticed that you were sending CQs a bit slower than some other top finishing operators.

K7RE: I have to respectfully disagree with folks who hang out at 25-30 WPM in a QRP event. Many prospective operators just can't copy that fast, and are embarrassed to stop by and try a QSO. I want to work as many as possible; one mustn't forget the prime directive "Work 'em all!" I DO run 30+ wpm at the bottom of the band during a major non-QRP event though. If I don't, I get run over!

K7TQ: That's a nice touch to give prospective operators a chance to experience the fun of QRP contests. You've also got a logging program good for both beginners and experienced operators alike.

K7RE: I wrote QRPDUPE as a beginner's contest logging and duping program. It will eventually support every QRP contest of which I am aware, as well as most major ones. The program also allows the user to use nice large fonts, for all of us aging, but still high spirited contest operators. It is in no way in competition with the bigger, well known programs like CT, NA and TR. It is continually evolving as folks use it and make suggestions on how they would like to see it operate. It is a Windows program, and sends CW through the

Brian's Home Antenna Farm



Brian's Shack—Where the Action Is

serial port using the standard simple interface that other logging programs use. The download includes complete directions on how to use the program, build the CW interface, etc. It is totally free, and is available at http://www.dancris.com/~bkassel/index.htm#top. Any input on bugs and how to improve the software is always appreciated.

K7TQ: You must really enjoy contesting to go to all that effort. How did you begin?

K7RE: After 40 years in the hobby, I began looking for new challenges. I happened upon the ScQRPion group at a local hamfest 5 years ago, and met Floyd, NQ7X who was not only a QRP'er, but an avid DX'er as well, with over 300 countries to his credit after more than 60 years in the hobby. We both decided to try QRP contesting, not expecting any really outstanding results. We both were amazed with our results from QRP contesting when we first actually tried it! We both began with QRP only events, and worked our way up to the big international contests, entering in the QRP class.

K7TQ: Tell us about your favorite QRP contest, Brian.

K7RE: That's a really tough question to answer. I enjoy any contest that involves operating from some portable QTH. The ARCI QSO parties are my favorites as far as QRP only type events. Knowing that each and every QSO is QRP-QRP is still quite a thrill for me.

K7TQ: How about non-QRP contests? Do you go out and brave the QRO crowd?

K7RE: I operate every major contest, and all QRP-only contests. The only contest in which I operate above the QRP level is the ARRL International CW in February from C6A (Bahamas) with Bob Patten, N4BP. I ran 100 watts this year as an 80M single band entry.

K7TQ: Tell us about contesting from a DX country.

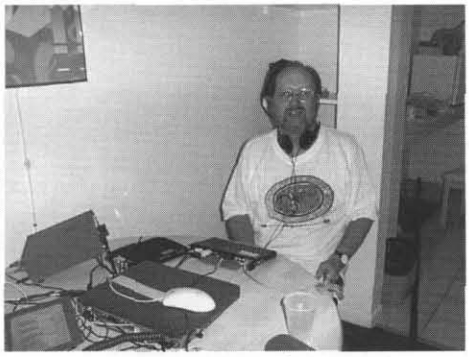
K7RE: This is the second year that Bob and I have done this, and each year is quite a bit different from the previous. To do this successfully, planning is everything. This year I missed the 80 m single band plaque by just a few QSO's and multipliers. Losing to ON4UN though, who was running a kW and literally wrote the book on low band DX'ing did not shame me too much. Conditions this year were the best in many years to Europe, who we are in direct competition with in this contest. We always work 80 or 40, in the single band category, as we are off the coast of the mainland by only 100 miles. We may try 160 next year, too. We stay at a hotel that allows us to put up our 33 foot DK9SQ masts and dipoles on the roof of the 3 story building. The maintenance man even helps! We bring our own freeze dried food with a back pack stove. We have a blast working the WARC bands before and after the contest, too. Bob has written up the details of our adventure and will be publishing them in his column, Contesting for Fun, in the May/June issue of the National Contest Journal.

K7TQ: Sounds like quite an adventure. You mentioned planning. What are some things you think about before a contest?

K7RE: I think about what advantages I can use or create for myself. I determine what bands and at what times would be best to achieve the best possible set of operating possibilities. I try to think about when best to use the gray line effect, when to look for those rare multipliers etc. For example, one big mistake I see over and over is for operators not to try 10 and 15 meters at least once an hour during daylight hours. In contests where states/provinces/countries (SPC) count as multipliers on each different band, a great many more multipliers can be worked, really jacking up one's score.

K7TQ: I've noticed that you often enter the High Band (20, 15, and 10 m) category

Brian's Shop



Brian in C6A DXpedition Mode

in ARCI QRP contests. How does this fit into your "advantages"?

K7RE: *I'm not very good after* 10-12 hours of straight contest operating. I like to operate on the higher bands too, if that is an entry option. Those bands close at night, and so do I!

K7TQ: Continuing with the advantages theme, share with us your mix of Search and Pounce (S&P) versus calling CQ.

K7RE: Well, Bob Patten calls me the S&P King you know. The mix varies a lot with conditions and the type of contest. In the ARRL DX, I was semi-rare DX, so 98% of my time was spent calling CQ. In the major non-QRP events, I rarely call CQ, as the average op won't work a weak station, unless it is a needed multiplier, which he doesn't know unless he read the previous QSO, or actually works me. If I were in NE or WY for the ARRL SS, I probably would be at least 50% CQ though, as those rare sections add 20 dB of imaginary gain to one's QRP signal! In summary, I can safely say that I use S&P more than most stations, especially in the big, non-QRP events.

K7TQ: S&P King, please tell us more so we can attempt to emulate you.

K7RE: It can best be summed up by what I call the "Shark" technique. Keep the dial moving. I start at the top of the band and work down, with the filter set fairly wide. When I hear a CQ, or a QRZ, I quickly tune to the station and check if he is a dupe. If not, I work him and then begin tuning down again. I always tune in the same direction so as not to repeat or to miss a station calling CQ. If I encounter a blank spot, and it's time to CQ, I just set up shop there AFTER calling "QRL?", of course. The trick is to keep moving in a smooth manner, and don't get distracted.

K7TQ: You say " if it's time to CQ", do you have a rule-of-thumb for switching between CQ and S&P?

K7RE: In a QRP contest, where the rates are somewhat lower than the major contests, I usually switch to S&P after 5-8 or so unanswered CQ's. In the major events, that number would be quite a bit less, unless it is near the end of the event, and the last S&P attempt was pretty unfruitful. I use a faster speed at the bottom of the band than at the top. Traditionally the less experienced operators like to hang high in the band.

K7TQ: Some great suggestions! Let's discuss for a minute your station.

K7RE: I currently use an Elecraft K-2 at 5W, with an ancient HyGain TH-3 trapped triband beam up at about 33 feet. On 40 and 80 I use a Butternut HF-2 vertical, ground mounted with 64 radials of various lengths. I also use a vertical delta loop, and low dipole for 40 m.

K7TQ: Well, a TH-3 at 33 feet isn't exactly a killer antenna. Give us some more pointers on how you score so many points from such a modest antenna system.

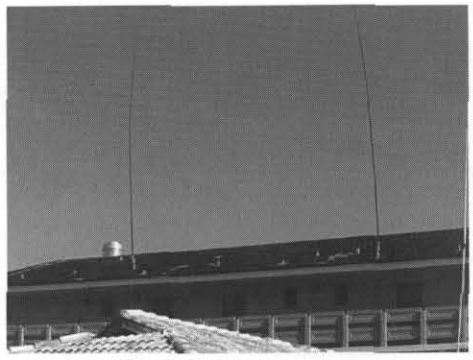
K7RE: I try to remember to use the right antenna for the right path. For stateside QSO's I use the low dipole or delta loop; for DX on 40 I use the vertical. It's imperative to maintain the antennas properly. Keep moisture out of the feedline. Most hams don't realize that a typical PL-259 connector is NOT moisture proof, for example. Use some type of sealant on those types of connections. Make sure that all aluminum to aluminum contacts are low loss. Use Scotch brite pads and anti-oxide grease on all aluminum connections.

K7TQ: In the 1999 Fall QSO Party you finished 2nd *in AZ. After that you've finished in the top 10 in the country. Was there something that you changed to improve your score?*

K7RE: Well, the single biggest reason was contesting with Bob Patten from C6A. There is nothing like watching a true master do his craft. I call Bob my contest ELMER. He has always made time to point me in the right direction--I am truly thankful for his efforts.

K7TQ: Brian, you finish regularly in the top 10. In keeping with the Elmer tradition, is there any other advice you would like to pass on to aspiring contest operators?

The C6A Operator's Position



The C6A Antenna Farm

K7RE: Practice, practice, practice. Don't get discouraged by your slower code speed. Remember that other guy WANTS to put you in his log. Make sure that you are comfortable. Get a good set of COMFORTABLE headphones. Make sure that you know how to operate your radio. Set some attainable goals. For example, in the ARRL SS, you can get a pin from the ARRL for making 100 QSO's. At 5 Watts and a low dipole, this is EASILY attainable. Floyd, NQ7X has been collecting these pins for years. He pins them all onto his white western hat, and wears it to hamfests and meetings. Move higher in the band for the major contests to be able to work the lower speed folks. I used a dictation type mini-cassette recorder to allow me to copy the really fast stations. It had the capability of playing back at half speed. I would just record his exchange to an other station, play it back and enter the data. I was able to pick up a lot of multipliers that way when my CW speed was lower. Never feel intimidated. Don't get all caught up in the fight. If someone takes your frequency, just get another one. Let the other guy's ego work against him. Always be courteous. Call a DX station once or twice, even it seems hopeless. Amazing how many times he has better ears that one thinks he has. Don't waste time though, if it turns out to be REALLY hopeless. Don't be afraid to ask questions from other operators that you know, or to use tools like the QRP-L list to gain knowledge. During the contest, and immediately after, make notes on the things that you did well, and the things that you did NOT do well. Think of ways to combat your faults. If I had to sum it all up in one word I would say that word is "Consistency".

Thanks, Brian. A lot of good things to think about. ●●

HINT: Bruce—N7CEE uses 80 feet of wire with a 33 foot counter poise, the K1, KAT1, and 40/20 and 30/15 filter boards. It tunes to a SWR of 1.2 on 40 meters, and 1.0 on the other three bands.

Dayton 2001 Wrap-Up:

One-Touch Tune Review and Other New Products Observed

Greg Buchwald—K9QI k9qi@arrl.net

The annual pilgrimage to Dayton, 2001 is now history. Despite the weather on Friday, our group from the Motorola Amateur Radio Club (MARC) had the usual good time. I also was able to take a new ham, Roy – KB9ZPN, along with us for his first Dayton experience. I can take partial credit for pushing him towards his amateur radio ticket. Roy enjoys building crystal radio sets and receivers of 1 and 2-tube regenerative design, including some beautiful replicas of radios that would fool the experts. In addition, he grew interested in tuned oscillator and crystal controlled 1 and 2 tube transmitters; all low power stuff, of course. I suggested that he go after his license so that he could actually try the rigs out on the air. On the day we left for Dayton, I checked the FCC database and found that his license had actually issued – he had studied for a few months and then took a one day class at the local community college a week or so earlier. I fixed him up with a 70 cm handheld and he was "one of the boys" while at the fest – **Figure 1**.

Fig. 1—KB9ZPN, K9QI, N9EAO, and WB8HMD with the Dayton-mobile.

I had a personal first at Dayton as well: I finally made it to some of the FDIM activities. I had been urged to do so a few years back by Bob Dyer – KD6VIO, but always seemed to have a full schedule, and never made it. This year, at the urging of Craig Behrens – NM4T, I finally made it to the Ramada for the Thursday night FDIM activities. I am glad that I did. While there, I saw some products that really caught my eye. The first of these was the small, ice cube-sized add-on One-Touch Tune for the FT-817, manufactured by W4RT Electronics. Also quite interesting were the replacement battery pack / cover plate for the FT-817 which allows smart charging of NiMH batteries without removing them from the radio, a neat little paddle that slides into itself for protection during transport, and several QRP portable antennas.

Sometimes It's Clear, and Then There is Dayton...

This year's trip didn't start off too well: We drove from Chicago to Ft. Wayne in heavy fog Wednesday night, getting to our room about 1:30AM. We continued Thursday morning to Lima, OH where we stopped and visited Fair Radio Sales...and the rains started. Continuing on to Dayton, we dropped our small trailer at our flea market spot and grabbed chow before retiring. Thursday morning started early – 5AM wake-up call and off to the fest to set up. It was foggy, but it wasn't raining...yet. At 10AM, we had light rain. Then it cleared, but that didn't last - just a sucker hole in the sky. By noon, the heavens opened up. NOAA weather broadcasts indicated a severe thunderstorm warning with heavy rain in Butler County – only a mile or so from us. Sure enough, the downpour started. Signage from flea market vendors washed past us in the river of water that was once the flea market area. I think we had an inch of rain in 20 minutes. **Figure 2** is a photo of Roy and me keeping (mostly) dry and having a great time despite the weather. Friday was an outdoor washout, but we still had the Ramada FDIM exhibits to look forward to later that night. Saturday proved to be entirely different. No rain, and sunshine peaking through by 11AM. When the clocked ticked past noon, the skies were clear and a great ham fest was underway – indoors and out.

W4RT Electronics' One-Touch Tune

Now that I have owned the FT-817 for about 8 months, dragged it around the world, and still thoroughly enjoy the rig, I am on the lookout for accessories and add-ons that make the rig even more functional. One item that I saw at FDIM and at the Dayton Ham fest was the One-Touch Tune module from W4RT Electronics. It was at FDIM that I met Barry Johnson – W4WB, who was showing the product in his exhibit space. I use my –817 with a LDG Z-11 tuner with great results. The one hitch to using the system is the need to key the radio, and, at the same time, reach over and hit the "tune" button on the Z-11. I prefer to use the semi-automatic (initiate tube command via front panel pushbutton on the Z-11) mode vs. the automatic tuning mode. When operating SSB, the job is even more difficult as you must change modes to AM, FM, packet, or CW before keying the radio, and then change the mode back to SSB before beginning the call or QSO. The One-Touch Tune device makes the job much easier.

Fig 2—Yes, it was pouring rain, but Dayton was STILL Fun!

The unit is about the size of a small ice cube. It is attached to the back of the –817 with two mating Velcro strips. A small cable with a male DIN termination is plugged into the radio "ACC" port, and a second cable with a female DIN connector is provided to act as a new "ACC" port for connection to a computer for CAT commands or any other purpose. A third cable is terminated with a 1/8-inch female stereo phone plug. Provided with the module is a 1 foot long cable with an 1/8-inch male stereo phone plug on one end and a small pushbutton switch on the other end. When the pushbutton is depressed, the module sends a CAT command to switch the radio to the "packet" mode, on the frequency that you have tuned and at the power level you have selected. Further, a PTT command is generated as long as you hold the pushbutton in the depressed position. The result is the generation of an un-modulated carrier at the power level and carrier frequency you have selected. **Figure 3** shows the unit attached to the back side of the –817.

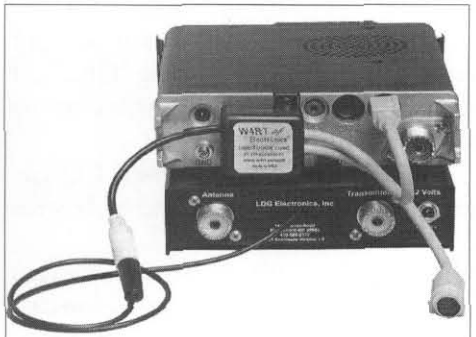


Fig. 3—One-Touch Tune module attached to

Internally, the module has a small microprocessor, which generates the proper CAT commands. These commands enable the radio operation as listed above. A PTT command is also issued. Furthermore, the microprocessor and a series of logical gates buffer the new "ACC" port. When the module is activated, by depressing the pushbutton, the replacement "ACC" port floats and becomes inactive as far as the radio is concerned. The board construction is quite good – a high quality glass epoxy board material is used and surface mount construction is utilized. **Figures 4 and 5** show the parts placement on the top and bottom of the board, respectively, and the high quality of construction.

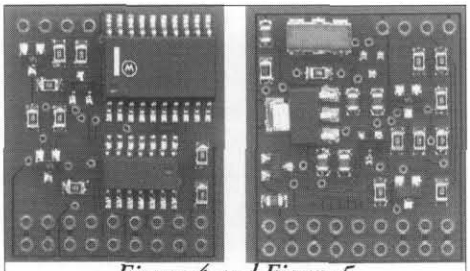


Figure 4 and Figure 5
Front and back sides of the One-Touch Tune PC boards.

When the One-Touch Tune module is connected the –817, no internal modifications are required of the radio. The only connection to the –817 is via the "ACC" port. To establish proper communications with the –817, you must set the CAT data rate (Menu 14 on the –817) to 9600 BPS. When the module is active (which is only when the pushbutton is activated), the current consumption is about 20 mA. As soon as the pushbutton is released, the current drops to less than 25 mA. In the standby / idle mode, the module generates no spurious radiation. I carefully checked to be certain that no spurs could be detected and none were in fact found.

The One-Touch Unit makes tuning and spotting an easy task, but the really cool advantages are not witnessed until the –817, with the One-Touch module, are mated to a LDG Z-11 tuner. With the addition of a single cable to the Z-11 tuner, the pushbutton cable assembly is replaced by a control signal from the tuner itself. When this modification is made to the Z-11, a simple push of the "Tune" button will cause the radio to key, the Z-11 to find the proper match, and the radio to de-key, leaving the radio ready for use. The entire process generally takes about 1 – 2 seconds. This feature is really great, especially when using a random wire antenna and operating in SSB or the DIGLSB or DIGUSB (example: PSK-31) modes. There is no fumbling with the radio to generate a carrier, and re-tuning on QSY is a breeze. Even in the CW mode, the advantages of a single tune control are easily recognized, especially during band changes.

The interface to the Z-11 is easy, as is making longer pushbutton control cables. I mentioned earlier that the input to the One-Touch Unit is made via a 1/8-inch stereo phone jack. The sleeve of the connector is ground, while the tip is active low. Therefore, if a longer control cable is desired, the connections to the switch should be made between tip and sleeve and the ring should be left unconnected. I, in fact, did make a longer cable by using RG 188A 0.100-inch diameter Teflon coax and a sub-miniature pushbutton switch from Radio Shack. Of course, you can use the more common RG174 thin coax as well. I would recommend using coax for the control signal cable, as the inputs seem to be high impedance; they might be susceptible to RF if non-shielded cable were utilized. The cables supplied with the One-Touch Tune module are also shielded, coaxial type assemblies.

In addition to the installation of the control cable to the tuner, most Z-11's in use today will require replacement of the microprocessor. The new micro and cable are sold as an accessory by W4RT and are priced very reasonably; the cost of the chip basically covers the cable cost and the shipping of the chip to your address. You simply install the new chip and return the old chip to W4RT. Barry then recycles the chips through LDG where they are reprogrammed for the latest revision of code, including the modifications for the One-Touch Tune mode. Essentially, the only code change is to allow a 60 ms wait period while the CAT commands are issued and received by the -817. The Z-11, in its original state, is about 10 ms too fast for the CAT buss, and you needn't worry, you won't notice the additional delay. New factory Z-11 kits and assembled units that contain the compatibility software for One-Touch Tune will available from LDG Electronics in the near future. W4RT Electronics sells Z-11 units that are fully modified for use with the One-Touch Tune. The collaboration between W4RT Electronics and LDG Electronics resulted in their units working together flawlessly.

The cable is also easy to install. If you look at the back of a Z-11 tuner, you will see a small hole about the center of the unit. The supplied cable is inserted through this hole and routed to the front of the unit. The center conductor is connected to the top of the "Tune" LED, which goes to 5 volts when the tuning circuit is activated and ground during standby mode. The ground / shield can be connected to any convenient point; I found an easy place to be the main PC board near the screw that mounts the board to the cabinet. I simply scraped the solder mask from the board and soldered the ground / braid to the board at that point.

After testing the unit, I decided that I wanted to clean the installation up a bit. I went to Radio Shack and picked up a 2-pack (1 required) of three conductor, 1/8-inch phone jacks (RS part number 274-249) as well as a 2-pack of 1/8-inch, three conductor phone plugs (RS part number 274-284C). The hole in the back of the Z-11 is enlarged slightly to accept the phone jack. A short piece of 0.100-inch coax, RG-174 or, in my case, RG188A, cable is connected to the LED and ground as indicated above. The other end is connected to the phone jack. This is where the stereo phone plug and jack become important. The tip of the phone jack is active "low", but the ring of the phone jack is active "high". Therefore, the phone jack must be connected to make contact with the ground to the sleeve and the center conductor, from the top lead of the "Tune" LED, to the ring (not tip) connection. Even more interesting was the fact that the Radio Shack jack labels the ground pin (the one closest to the front of the connector) as Pin 1, the ring as Pin 2, and the tip as Pin 3. Pin 3 is in-line with the ground pin, Pin 1, while Pin 2 is on the opposite side. When I wired it in that fashion, I found that the unit did not work. After checking the jack, I found that the instructions were, in fact, incorrect, and that Pin 2 and 3 were reversed. The ring connection was actually the pin directly in line with the ground pin on the jack. Once that was sorted out, a jumper cable was made with the two 3-conductor phone plugs. Once again, the ring of one plug is connected to the ring of the other plug using the center conductor of the thin coax and the shield of the coax is connected to the sleeve of each plug. The tip connection of each plug is left unused. Just for grins, I made two such cables and secured the second one inside the Z-11 box. That way, if I forget to bring it, a spare is close at hand! The finished interface is real clean, and the package is fully connectorized, eliminating the fear of ripping the cord off through some sort of mishap. Once the cables were tested and known good, I filled them with a small amount of RTV / silicone before securing the screw-on end caps. The silicone rubber acts as a strain relief for the cable.

After using the One-Touch Tune inter-

face with my Z-11 tuner, I must wax ecstatic about it. I'm not quite sure how I survived without it! The modification is simple to make, and the module is easy to attach to the –817. In fact, the only thing you can screw up is to forget to change the data rate for the CAT link in the –817 menu (don't ask!). I was very impressed with the fast response I received from Barry – I bought the unit at FDIM right there on the floor and the new Z-11 chip arrived a few days later. The modification was easy to make to the Z-11, and the operation of the Z-11 appears completely unchanged. Furthermore, since Barry had not yet typed an instruction sheet for the chip replacement / Z-11 modifications, he was very helpful, both by email on over the telephone. The instruction sheets have now been completed and are very straightforward and easy to understand. About the only suggestion that I had for Barry, was that he might consider moving the control cable entry point on the module from the upper left side to the lower left side so that would be displaced a bit more from the power connector on the radio. But that would only be icing on the cake as far as I am concerned.

Barry is working on a second product which should be shipping by the time you are reading this – a replacement battery pack for the –817 that includes the cover panel for the radio. It includes a power connector that can be used to charge the batteries internal to the radio without using the "dumb" charger that is built into the radio. It is also much easier to change batteries. I was able to see the unit at Dayton, and observe it in operation, but shipping is planned for early June – too late to try it and review it here. If it is anything like the One-Touch Tune module, I don't mind waiting for a quality product!

For more information on the W4RT products, you can check out their web site www.w4rt.com or contact Barry at w4rt@oetc.com.

Dinner and a RIGblaster...

After a very successful Dayton trip, a few of the guys from the Motorola Amateur Radio Club and I decided to grab a last dinner for the road trip over at a local establishment. While there, the party seated at the table next to us happened to be the sales and engineering team from West Mountain Radio – makers of the RIGblaster audio card interface products. Since both groups finished eating about the same time, they asked if we had seen their latest product. Now, having "Dinner and a RIGblaster" might not be quite up to speed with having 'Dinner and a Movie' (the Friday night movie program on TBS) with Annabelle Gurwitch (sorry, guys), but the RIGblaster team was really great. Ned from West Mountain Radio offered to go out to his vehicle and bring in some samples of their products for us to have a look at. After two long days on the show floor in the Hara Arena, I was somewhat surprised by the offer, but had to take him up on it. I had used the standard interface unit before, but this would be my first look at the NOMIC interface. I have used my –817 for PSK-31; the–817 is a perfect radio for that mode. Five watts is more than ample to communicate worldwide – especially now that we are at the peak of cycle 23.

I was pleased to see the size of the NOMIC unit. At 1.5x2.25x3.25 inches and weighing 4 oz., it is a good mate to the –817 as well as other QRP radios such as the K2. A pre-made cable is also available for most radios making it truly plug and play. A 9-pin RS-232 serial connector is provided for interface to the computer along with audio input and output. It should be noted that, while other RIGblaster products are relay isolated (which allows their use with most all types of radios) and are powered from a "wall wart" supply, the NOMIC model was optimized for very little power consumption, small size, and use with solid state rigs: It utilizes an opto-isolator for PTT functions and requires no external supply. Although it does not provide mike switching, the plus side is that the unit draws what little power it requires from the serial port of the computer, basically to operate the opto-isolator. The audio levels are fully adjustable, and the unit is small enough and quite lightweight; it makes an ideal companion for travel. **Figure 6** is a photo of our after dinner tutorial on the line of RIGblaster products. The insert in the lower left is a photo of the NOMIC unit from the West Mountain Radio website. The fine folks at West Mountain Radio can be contacted via their website: www.westmountainradio.com or at 203-853-8080. Provided with all RIGBlaster products is a CD-R of software which supports the use of many of the popular operating modes. The PACK-IT reference guide from VE3AYR, seen in the photo, is also a must have for the –817, and is available from W4RT Electronics.

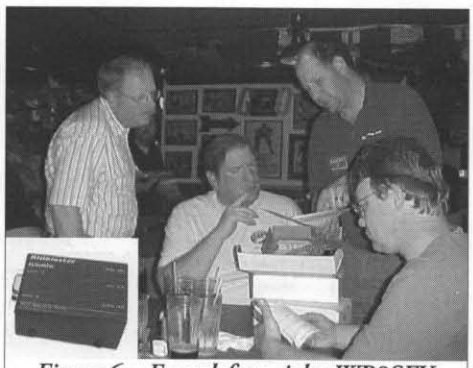


Figure 6—From left to right: WB8SFY, K9QI, Ned (from RIGblaster) – KA1CVV, and KB9ZPN

A Few Other Cool Products As Well

Craig was mesmerized by Walter Spieth—DK9SQ's demonstrations of how his amazing Fiberglass Telescopic Tower can be used. A simple vertical antenna can be erected in 1 or 2 minutes by twisting the mast as you raise each section. The Super Quick 8-Band (Folded) Vertical covers 80m—10m. The Vertical—Loop Antenna covers 40m—10m. Horizontal support elements are included in the carrying bag when you buy these along with the Fiberglass Telescopic Tower. Additional components are shipped in small bags. These are great systems for portable operation that can easily be set-up by a single person. Craig has already packed them into his RV for field use. (See our Kanga ad to order/get info or Kanga@bright.net). I have to add that I, too, was impressed at the masts for their portability, size, and weight and had to purchase 2 masts for use with dipoles while traveling. Sure beats trying to take the 32-foot military masts we at MARC use for field day!

This being Craig—NM4T's first Dayton experience, I asked him what his goals were. His response, probably not unlike other ham fests he attended over the years was: "The first day there, I bought what I planned to buy—several little bags of anti-corrosive antenna grease. The second day there I succumbed to temptation and bought some neat QRP goodies. These included 2 DK9SQ masts with antennas, the "Introduction to Surface Mount Construction" kit from George Dobbs—G3RJV, and a "Mini-Paddle" by Hannes Hiller—DL9SCO. " In later telephone conversations with Craig, it was obvious that he had a really great time and looks forward to coming back again. He was especially impressed with the overflow crowd for the QRPARCI banquet.

Speaking of that little CW paddle, Craig had this to report: Hannes Hiller—DL9SCO's new Mini Paddle is a CW operator's delight. The paddle slides into the little housing so that it can simply be carried in your pocket. Or, the key can snap in and out of the Quick Mount foot that is included. This could be attached to your favorite rig or 2 small magnets can be snapped into the Quick Mount to provide a magnetic mounting capability. (You

will probably want to buy a couple extra Quick Mounts for use with other rigs.) A small keyer cable and anti-skid rubber surfaces on the bottom of the key are also included. Hannes has gained notoriety for his attention to detail and the elegance of his products. (See product announcement in the April 2001 QQ or try http//www.ulmnetz.de/HANNES/Keyer.html for more info.)

Craig also commented on his attendance to the session on chip component construction techniques by George Dobbs—G3RJV. George presented an "Introduction to Surface Mount Construction" at the FDIM Proceedings. George shared with us that, traditionally, electronic construction projects have looked like works of art—Now...they look like robot vomit! None-the-less, he challenged us to keep up with evolving technology. To help us out, he created an ideal 4-kit packet so "SMD Newbies" can gain construction experience on while building useful QRP builder items. His packet includes kits for a Peak-Reading Diode Probe (2 versions), an Audio Amplifier (LM386), a Direct Conversion Receiver Mainframe, and an SMD ONER transmitter. George facilitates construction by including a special velum page in the accompanying booklet with the component overlay drawings. Needless to say, this is a first class way to give SMD construction a try. (See our Kanga ad to order/get info or Kanga@bright.net).

Another product that I had seen for the first time while touring the exhibits at the Ramada, but that is probably known by most QRPers, is the PW-1 portable antenna from Vern Wright—W6MMA. Crafted with meticulous precision, the antenna, with ground plane packs into a very small case for transport. The adjustable coil – reminiscent of a mobile screwdriver antenna – is usable from 80 M on up with the addition of one extra coil and from 40M with the adjustable element. Although the assembled length of the driven element is just about 7 feet, thus making it a bit inefficient on the lower bands, it also includes a counterpoise which stabilizes the antenna feed-point impedance and as well as improves it radiation efficiency to some extent. Finally, brackets are available for purchase that allows the antenna to be attached to a railing or balcony for use in an apartment, condo, or hotel setting. The antenna construction is so impressive looking that I would be tempted just to set it up on my desk to initiate comments from others! Besides, look at all the antennas that are used for mobile applications on 80, 75, and 40M—many of them aren't much longer in terms of percentage of wavelength – they work, don't they? I think that item will be on my wish list for future purchase!

For more information about the antenna and ordering the unit and accessories, visit the Super Antennas by W6MMA website at: **www.superantennas.com**

One more interesting product was observed in the flea market area. As I look through my junk pile at home, I find that I have a number of old CRT's that are just laying around looking for use. Everything from one-inch diameter 1CP1's and 1EP1's, 2-inch varieties such as the 902, 2AP1, and nice 3 inch tubes with oddball phosphors such as 3JP12, 3FP7, 3WP2, as well as the common 3BP1. I have always found CRT's interesting. I have built modulation monitors, small oscilloscopes, and even magnetic fields demonstration devices (yes, electrons really can be deflected with a magnet) from some of these tubes. But I had not seen anything quite a interesting and as much of a conversation piece as the CRT-based Clock Kit from David Forbes at Cathode Corner in Tucson, AZ. David has developed a CRT-based clock that uses old, surplus CRTs to display the time. But the display is not digital: He creates the numbers by generating a series of arcs, lines and circles. A PIC microprocessor keeps track of the time and feeds a D/A of sorts, which then uses a sine and cosine generator to generate the display – no raster scanning in this unit! Think of it as a rectangular to polar conversion computer. The power supply is a small switcher and uses a voltage multiplier configuration to generate up to 1500V to run the CRT. The clock, in the custom case that he can provide at additional cost, is shown in **Figure 7**. The insert shows the time as it is displayed.

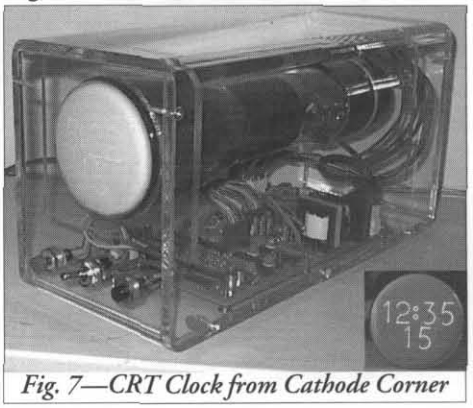


Fig. 7—CRT Clock from Cathode Corner

In addition to the standard 12-hour version, a 24 hours version is said to also be available making this an ideal UTC clock for the shack. Since the seconds display is sometimes desirable, but other times distracting, it can be turned on and off as desired. Furthermore, since the CRT might become burned by constant bombardment of the screen by electrons, the display is slowly moved – dithered – around the face by a small amount by a random number generator over the course of time. You will not notice it when the clock is running, but as you set the time, you will see the display move a fair amount! Kits are available for the clocks in various forms including just the boards and parts without CRT or socket (so you can use your own tube) right up through a complete kit with a spectacular clear case. Total power consumption for the clock is about 10 watts.

Personally, I think the best tube to use is a 3FP7, which uses a cascaded phosphor. These are old radar tubes, which, when excited by the focused electron beam display the numbers in a bright blue color or very short persistence. When excitation is removed, a yellow image is retained for several seconds. You can literally watch time melt away! (Many hams may remember this phosphor as the one used in very early B/W SSTV displays in the 1970's.) If a classic CRT display is more to your liking, simply use a 3BP1 with medium persistence green phosphor. If you build the kit, but make your own case, nearly any 2 – 5 inch CRT can be driven provided it is of the electrostatic variety and uses a 6.3-volt filament. Information about this product, as well as contact information for David, can be found: www.cathodecorner.com

Odds and Ends

Finally, we always see products that just don't quite fit the ham fest atmosphere. This year I saw people selling air conditioners, beanie babies, and other things that, shall we say, don't require a ham ticket to operate. Most are pretty benign, but one item that was pretty disgusting was a certain BBQ pork sandwich, **Figure 8** that was for sale in the flea market area – marked down in price to boot! It was there all day, and didn't seem to

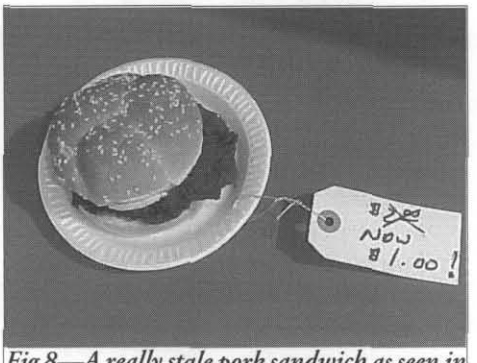


Fig 8—A really stale pork sandwich as seen in the flea market area.

Fig. 9—From left to right, K9QI, WB8HMD, Lindsey Lou the waitress, KB9ZPN, and, mostly hidden, N9EAO, all in appropriate Waffle House garb.

get any takers. Good thing!

Nearing completion on another great Dayton road trip, we still had to make our annual stop at the Waffle House Restaurant for a great breakfast and Tee shirts (un-official ham fest clothing) for next year. A small group of our MARC party stopped there Sunday morning and had a great breakfast. Our bubbly and attentive waitress Lindsey Lou made sure that we were well fed and fixed us up with the shirts (Figure 9). Waffle House breakfasts and Dayton just go hand in hand!

Well, Dayton 2001 is now history, but despite the rain, it was a great time. The only thing left to do is start planning for next year! In addition to getting together with fellow hams, seeing all the product offerings new and old, and spending more time at FDIM, I also look forward to the goat (of goat-cam fame—Figure 10) and his buddies 'Fleabite'

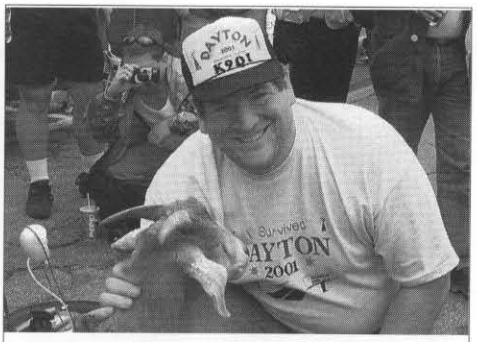


Fig. 10-The goat and I in the flea market.

the Welsh Corgi, and the three ferrets in the flea market again! Most of all, I look forward to all the fest has to offer.

Until next time...

72 de K9QI ●●

FDIM'01 or Bust!

Ken LaRose, VE3ELA John Cumming, VE3JC and Russell Dwarshius KB8U

On the road to FDIM. VE3JC, KB8U, and VE3ELA in Findlay, Ohio

This is a story bout three QRP mobile cyclists (John VE3JC, Russ KB8U, and Ken VE3ELA) who were determined to bike from Ontario to Ohio for FDIM and the Dayton Hamvention.

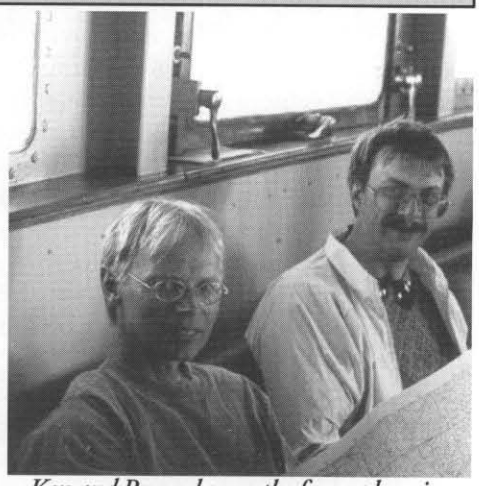
We left from John's QTH in London, Ontario on Saturday May 12. In spite of our months of planning, there were numerous last minute details and it was noon before we were on the road. Loaded down with gear for the next 8 days, the bikes handled quite different than normal! We chose to favor the

"Have I forgotten anything?" Russ checks his DSW-20 and trailer-mounted mobile whip antenna before we set off for Dayton.

paved back roads during our trip, as they were safer, and more scenic. Stopping for supper in the little town of West Lorne, ON was a treat. People along the street were interested in the bikes and radios, where we were from, and headed to. Russ's bike (a recumbent) proved to be a kid magnet. Children everywhere delighted to watch and shout out as we pedaled along. Dogs of every description would charge out to welcome us. There's something about bikes that seems to drive dogs crazy! Finally around 8:30pm we arrived at Rondeau Provincial Park. After setting up the tents, we tried a few CQs on 40m, but had no luck.

John boards the Leamington to Sandusky ferry. We made it to the ferry with fifteen minutes to spare!

Up early Sunday morning, we were on the road by 8:10am. Breakfast stop was in Cedar Springs, ON. It appeared on the map that we would have an easy day's ride to make the 4:00pm ferry across Lake Erie from Leamington, ON to Sandusky, OH. As it turned out, we pedaled our hearts out, and just made the ferry with minutes to spare. It was imperative to keep that schedule, as the ferry did not run again till the next week!



Ken and Russ relax on the ferry, planning our route across Ohio

Completing the 4-hour lake crossing, we continued riding to Traveland Park, just south of Sandusky. Throughout that day on the road, we managed several 2-way QRP contacts from our bikes. We entered the "Leap-Frog mode", each passing our riding partners in turn as they stopped to log their QSO.

Monday morning after breakfast at Micky D's, we hit the road again. It surprised and amazed us that every side road (even one lane wide) was paved! Nice long flat stretches made for easy pedaling. We stopped at Green Springs, OH for an excellent pub lunch. (We came to rely on the recommendation of passing locals for our food stops!) Making good time, we decided to try and reach Findlay, OH. The forecasted rain eventually arrived. Soaked through, we opted to stay at a motel in Findlay for the night.

Tuesday morning, we phoned Bill Kelsey N8ET, who had been expecting us. George Dobbs G3RJV had flown in overnight to visit,

Ken stops to make a note in the log while working W4DU on 15 m with his Sierra and hustler mobile

and Bill fired up the grill to cook us all a wonderful breakfast! Then we had a tour of Bill's comfortable shack and Kanga U.S. Headquarters, located in his beautiful lakefront home. George took some snapshots of us, which were posted on the web at: http://www.bright.net/~kanga/kanga/bike.htm

By 1:00pm we had to get back on the road to make our next campsite. Rain showers continued all day. That afternoon we watched in awe as a major thunderstorm developed, and eventually overtook us. Pelted with hail and wet to the bone, a local resident took pity seeing us huddled under a tree by the roadside, and offered his garage to wait out the worst of the storm. There was unanimous agreement to take another motel and dry out. Located in Lakeview, OH (recommended by our Good Samaritan!) near Indian Lake State Park, the intended campsite.

Unfortunately, the weatherman and the propagation gods did not provide the conditions we were hoping for during our trip. Heavy rains kept our rigs wrapped in plastic for much of the time, and when the skies did clear, the bands were very poor. However, we did manage to make a number of contacts while bicycle mobile. Russell worked 20 meters with his DSW-20, while Ken worked primarily 15 and 10 with the Sierra. John hopped between 30 m and 40m using the K2. The "good ears" award goes to KB8KRD in West Virginia, who worked VE3JC "/VE3" on 30 m Sunday afternoon, and again "/W8" on 40 m Monday afternoon!

Wednesday was our longest day on the bikes. Of course it rained again, but nothing like before. That afternoon we made contact on 2m with Jim Gumbert NC8Y, from Tipp City, OH. He happily cycled out to meet us, and graciously guided us to our final destination (Ramada Inn-QRP Central!). We stopped to gorge ourselves at a great Chinese restaurant, visited a neat cycle shop in Tipp City, and then joined the bike path running along the riverside in Dayton. A few detours were required, as the path was not yet completed. They involved lifting our laden bikes and trailers over highway guardrails and sets of railway tracks, and puffing up steep glacial moraines! Around 10:30pm when we stopped to get drinks at a service station, John discovered his rear tire was flat! Luckily he'd brought along a spare tube, and replaced it. At 11:15pm we rode up jubilant to the front entrance of the Ramada, after 350 miles pedaled in 5 days. We celebrated our success that evening with a bottle of champagne. We were physically exhausted, but charged with excitement, having finally arrived at QRP Mecca, and anticipating the next four days! ●●

Getting Close! The soggy field tells the story of the weather we endured.

—ARRL BOARD MEETS IN CONNECTICUT—

Members of the ARRL Board of Directors have gathered in Rocky Hill, Connecticut, for the Board's July meeting. ARRL President Jim Haynie, W5JBP, will preside at the meeting July 20 and 21.

The Board is expected to hear a Membership Services Committee report that firms up details of the "Logbook of the World" project. The project, described as a secure electronic alternative to traditional QSLing, has been

under development for several months at the Board's request. As conceived, once the Logbook of the World is implemented, ARRL would become the repository of QSO information used to automatically confirm contacts among participants. Confirmation data also could automatically update ARRL awards programs, such as DXCC, and possibly programs sponsored by organizations other than ARRL.

The report of the ad hoc 160-Meter Band Plan Committee will be among the other topics up for discussion at the mid-year session. The Board also will hear an interim report from the Novice Spectrum Study Committee that's been collecting comments from members on possible future refarming of current Novice/Technician Plus HF subbands.

"Having Too Much Fun."

Several NoGaNaughts spirited John, WB8RCR, away from a boring business meeting for a delightful (and different) QRP dinner.

We took John to Fuzzy's Place (Joe Dale) a unique, Atlanta, Cajun place. A couple of hours of QRP talk had John back in his normally good spirits.

John is the author and provider of the "QSLMaker" program that many of us are now using. We really enjoyed our visit.

Left to right in the picture are: **Russ—AE4NY (NoGaWaTT purveyor), Pickett—AD4S (NoGa PiG purveyor), John—WB8RCR (QSLMaker purveyor) and Tom—K4TJD, (tall tale purveyor).**

The picture was taken by Fuzzy himself which...explains why it is fuzzy!

Pickett—AD4S

QRP Contests

Randy Foltz—K7TQ rfoltz@turbonet.com

Greetings fellow contest operators. In this issue you will find the results of the Winter Fireside SSB contest and the Spring QSO Party. The first was a great success with all time high participation. The other was much less stellar. Easter weekend and horrendous propagation on Sunday made for a tough contest. The issue also contains the announcements for the Summer Daze SSB Sprint, the End of Summer PSK-31 Sprint, and the Fall QSO Party. I've moved the date of the Fall QSO Party to avoid a conflict with Pacificon.

One of the goals of last year's Running of the Bulls was to have more Q class stations (QRP) than B class stations (high power). That was achieved by you folks. There were 215 Q stations and 213 B stations. QRP is making an impact.

As a reminder, a contest submission to QRP ARCI consists of a summary sheet and your logs. The High Claimed Scores reporting sheet is a satisfactory substitute for a summary sheet, but you still need to send me a copy of your logs. In the last several contests an increasing number of folks haven't sent their logs. Without them I count you as a check log which means your score doesn't get on the list and you are not eligible for any certificates.

After each contest you can use the High Claimed Scores form at *http://personal.palouse.net/rfoltz/arci/form.htm to send me your contest summary. Watch the scores change nightly at 9 PM Pacific Time for 7 days after the contest. See what others have claimed by looking at http://personal.palouse.net/rfoltz/highclm.htm.*

2001 Winter Fireside SSB Sprint

The 2001 Winter Fireside SSB Sprint was held on February 11 with a solar flux of about 130. There was a very large turnout for an SSB sprint with over 50 stations sending in a

2001 Winter Fireside SSB Sprint

QTH	Call	Score	Pts	SPC	Power	Bands	Time	Rig	Antenna
AZ	NQ7X	138,600	315	44	LT2	20,15,10	2.75	TS850	Triband @ 40'
CA	W6ZH	74,560	233	32	LT2	40,20,15,1	4	K2	KT34XA, 2 el yagi on 40
CO	KI0II	149,142	402	53	LT10	20,15,10	4	TT Omni VI	A99, windom
CT	KC1FB	11,130	106	15	LT10	20,15,10	2	FT7	Butternut butterfly beam
DE	KE3UY	5,040	72	10	LT10	40,20,10	3.5	TS120S, HTX100	Dipole, G5RV
FL	N4BP	215,999	523	59	LT10	20,15,10	2.8	K2	TH7DXX @ 65'
	K4FB	51,744	224	33	LT10	20,15,10	0.9	K2	C3 @ 75'
	KU4OS	51,212	236	31	LT10	20,15,10	4	Argo 509	80 m horiz loop @ 30'
GA	K4BAI	13,720	98	20	LT10	20,15,10	1.5	FT1000MP	TH6DXX
	ND4D	5,040	60	12	LT10	20,15,10	3	FT890	Dipole
	WA4SQM	343	7	7	LT10	20,15,10	1.5	FT817	G5RV
ID	W1HUE	25,200	126	20	LT2	20,15,10	3	K2	GAP Voyager, 450' long wire
	KF7ET	9,800	98	10	LT2	10	2.2	QRP+	2 el beam
IL	N9WW	12,432	111	16	LT10	40,20,15,1	2.25	FT301SD	Multiband dipole @ 35'
	WA9PLT	4,851	63	11	LT10	20,15,10	2.5	Scout	Zepp @ 25'
IN	N9QIL	11,536	103	16	LT10	20,15,10	2	K2	Dipole, vert
	KB9RPX	315	15	3	LT10	10	4	Ranger AR3300	A99 @ 15'
KY	KF4OTG	9,639	81	17	LT10	20,15,10	3	K2	TA33m @ 55'
MD	K3CHP	21,462	146	21	LT10	40,20,15,1	4	IC-956PRO	3 el Yagi, vert
MI	K8DD	2,408	43	8	LT10	20,15,10	0.5	SG2020	AV640
	W8TIM	1,260	30	6	LT10	20	1.5	Cascade	Dipole
MO	WA0NKE	42,630	147	29	LT2	80,40,20,1	4	FT900	G5RV, R7
	N0OXV	12,600	56	15	LT500	20,15,10	4	IC735	Tri-band beam @ 30'
MS	WB5KYK	50,652	268	27	LT10	20	3	TS940S	Inv vee
MT	AC7GM	6,888	82	12	LT10	15		DX77T	G5RV
ND	K9IUA	61,236	243	36	LT10	20,15,10	3	TT Scout & TT Argosy	Hamsticks, Inv vee @ 20'
NJ	W2AGN	6,636	79	12	LT10	20,15,10	1	K2, SG2020, FT817	KT34A
NM	K5OI	35	5	1	LT10	10	0.1	K2	GAP Titan
NY	K2QO	44,940	214	30	LT10	20,15,10	3	TT Omni 6+	3 el HB yagi, vert, 140' loop
	KD1F	35,343	187	27	LT10	20,15,10	2	FT817	TH11
	WB2LOS	15,120	108	20	LT10	20,15,10	3	Argosy	GAP Titan
	WB7OCV	5,775	75	11	LT10	20,15,10	3	SG2020	Hustler 4BTV
OH	K8ZT	64,862	226	41	LT10	20,15,10	3	FT817	Sommer log yagi
	K8SAR	7,448	76	14	LT10	20,15,10	2	Argo II	HQ1 miniquad
	AB8FJ	476	17	4	LT10	15	1	Argo II	Random wire
OR	N7CQR	9,660	92	15	LT10	15,10	1.3	Corsair II	GAP Titan
	KD7CTF	7,007	77	13	LT10	15,10	1	K2	Dipole @ 30'
PA	N3XRV	15,827	119	19	LT10	40,20,15,1	3.5	IC735	Dipole @ 25'
	W3TS	10,920	84	13	LT2	40,20,15,1	1	K2	Inv Vee, C3S
	KB3AAG	4,270	61	10	LT10	20,15,10	3	QRP+	Windom
	WB0IWG	2,254	46	7	LT10	10	4	FT77S	Dipole
SK	VE5QRP	49,200	205	24	LT2	20,15,10	3	TS430S	2 el tribander @ 50'
TX	K5ZTY	210,630	510	59	LT10	20,15,10	4	K2	C4S
	K0RDS	22,610	170	19	LT10	15	1.5	SG2020	Rotatable dipole @ 30 ft
UT	WA7LNW	165,900	395	60	LT10	40,20,15,1	3.5	K2	20 wire loop
VA	K4AHK	3,150	50	9	LT10	20,15,10	1	IC735	Attic dipoles
WA	W7/JR1NK	5,544	66	12	LT10	10	2	TS680V	Delta loop
WI	W9WIS	61,250	250	35	LT10	20,15,10	4	Omni IV	GAP Titan
CHX, KA9TXE, K8PZ, K7LOW, K0WHI									

report. Most folks reported good success on 15 and 10 m and difficult going on 20 m. It is encouraging to see so many folks on SSB. As the number of K2s and 817s increase there should be more activity on the SSB contests. ARCI has two of them; this one in the winter and another six months later summer.

Winter Fireside SSB Sprint Soap Box

K0RDS—Nice to work more members this time. **K0WHI**—This was the first contest I have ever entered and I had lots of fun I meet a lot of nice QRP operators and I am looking forward to the next contest. **K3CHP**—Not a bad turnout. Nothing on 80 meters. **K4AHK**—Only on for 1 hour at the start. Not many signals on 10 m here. Huge sig from K5ZTY in TX on both 10 m and 15 m. **K4FB**—WOW! My first QRP ARCI SSB Sprint. Nice to put a voice with call signs only heard on CW. K5OI—Got tied up in other stuff. Just worked one Q, but it was AL7FS in Alaska! Hope everybody had fun! **K5ZTY**—That was fun. The bands were great and a lot of guys were playing. Lots of member numbers too. What a blast to hear the voices of guys that I have worked on CW for years. **KU4OS**—This was my second contest and first QRP contest. I was surprised there were not more stations on 10m, 20m was clobbered with QRO/M. I like the 2000z-2400z time. **K7LOW**—Nice to hear so much activity! Thanks to all that pulled our QRP from the noise. **K8DD**—Great to hear QRP SSB stations! **K8SAR**—QRM as contest wore on. Glad to pick up Ron on 20 meters. **K8ZT**—New rig worked great. (FT-817). **K9IUA**—For the first hour, I operated stationary mobile while waiting for my wife on an errand. Had a blast (although my feet got cold in the car -- its winter in North Dakota). **KA9TXE**—Lots of fun for the time I spent. I found using the microphone a little uncomfortable as I needed to be writing things down at the same time I had the urge to key the mike. **KC1FB**—Really great conditions and lots of QRPers on SSB today. Wish I could have spent more than two hours. **KE3UY**—1st contest for QRP. This was fun. Look for me on the Spring Sprint at about 8-10 wpm. **KF7ET**—Great fun. First contest in a while. **KG4CHX**—Great Conditions on all bands, lots of QRM on 20. Not much heard for North East. Had a blast. **KI0II**—Was a real treat hear the voices of so many calls worked on CW along with QRO stations stopping by to find out what the "ARCI" contest was about. **N0OXV**—Lots of fun. Everyone I called I got a reply from but my hunt and pounce technique needs to be refined! Looking forward to the next SSB QRPp contest. **N3XRV**—Still like CW better. **N4BP**—Nice to put voices with all the people I've worked many times on CW. Conditions good on 10 m, but no activity. 20 m crowded with KW signals, very tough going with QRP. **N7CQR**—Great to see more activity! **N9QIL**—This was the first time I "ran" stations. One KW station gave me "an honest 59." I was surprised because he was also 59. Even better, he was a real gentleman. **N9WW**—Thanks for running a great sprint. Intensive SSB is a pleasant change, on occasion! Nice to associate voices with calls. **ND4D**—Enjoyed the contest, operators really worked with each other to make a good QSO. Lots of patience and cooperation. **NQ7X**—Lotsa activity on 10 & 15...QRO on 20 made it impossible, only made 1 QSO and that was band hopping with N4BP. Had one good rate hour on 15 with 35 Qs. **VE5QRP**—Thanks for running this Sprint as it becomes more enjoyable every time. It's so nice to match a voice to the call. **W1HUE**—Boy—a lotta work for so few QSOs! Not sure it was worth sticking with less than 2W. **W3TS**—Was away and got home with one hour to operate, so jumped in to boost participation in SSB contests. **W6ZH**—10—great; 15—OK; 20—QRM zoo; 40 & 80—where was everybody? **W8TIM**—Very busy around14.285. Seems QRP SSB is getting more popular. Enjoyed the contest. **W9HL**—Had a great time. Too much QRM on 20 m. Maybe if we spread out a little more. **W9WIS**—My first contest! Had fun. 20 m was tough. Lots of QRO QRM. **WA0NKE**—Very many QRO stations on 20 meters, but lots of us were able to squeeze into some small holes and still operate. I was able to make most of my QSOs on 10, 15, and 20 meters. **WA7LNW**—Operated portable from our New Harmony, UT home building site located just 2 miles west of Zion National Park entrance. Bright blue sunny sky with 4 inches of fresh snow. **WA9PLT**—My first QRP contest and first log ever submitted in any contest in 36 years as a ham. The QRP bug bit me awhile ago. I'm hooked! **WB0IWG**—Great conditions! **WB2LOS**—Good fun for a cold winter day. **WB5KYK**—If anyone listened to this contest, they found QRP SSB is alive and growing! We need more QRP SSB Sprints! **WB7OCV**—Just got my feet wet with this one. Now I know how QRPers sound! **KU4OS**—First QRP contest. I had a great time and look forward to the next one. **KD7CTF**—Met a lot of nice people out there. I like the generally laid-back attitudes. **W2AGN** -SSB always seems slow to me. Not my favorite mode. A lot more stations on than other SSB Sprints, though. **K2QO**—WOW, what great conditions on 10 and 15 m. As more QRPers get K2s and FT817s, interest in SSB will continue to rise. Too bad conditions on 20 and 40 m were so awful. **W7/JR1NKN**—Portable operation at the park as usual. Had a fun.

Mark your Calendars:

Summer Homebrew Sprint
July 15, 2001

Summer Daze SSB Sprint
Aug 15, 2001

End of Summer PSK-31 Sprint
Sep 9, 2001

Fall QSO Party
Sep 29-30, 2001

2001 Spring QSO Party

The 2001 Spring QSO Party was...well what can I say. Maybe I'll just say it was an interesting exercise in high solar activity propagation. The solar flux was about 140 which would have been good, but the problem was that a coronal mass ejection hit on Sunday. This had the impact of nearly shutting down the HF bands. High solar activity increases the solar flux which is good, but it also increases solar flares which can cause disruption as happened in this contest.

The top 10 finishers are shown in the accompanying table. There are a couple of interesting things to note. Four of them used 1 watt or less. Only Floyd, NQ7X, operated for less than 14 hours with the average operating time being 18 hours. Also note that no one used less than 4 bands. If you want to finish with a top score, you've got to be on the air a lot and on all the bands you possibly can. The number 2 fin-

Spring QSO Party TOP TEN

N4BP	*1,324,680*
K7RE	*864,360*
NM5M	*781,942*
K0FRP	*572,010*
KB7WW	*523,341*
N0UR	*453,330*
WJ9B	*401,373*
K4BAI	*373,758*
NQ7X	*340,480*
K3WW	*279,510*

isher is the topic of the Contest Operator of the Quarter.

I'll not expound any more about this one. Let's hope that the Fall QSO Party has better conditions.

BAND WINNERS

40 m	K9PX	213,752
20 m	N7AC	33,418
High-band	K8BBM	23,254

TEAMS

Aluminum Kings—N4BP, N7RE, K0FRP, N0UR, N8ET 3,289,090

Eastern Pennsylvania QRP Club—WB3AAL, N3AO, K3PG, K7SZ 134,070

2001 Spring QSO Party

QTH	Call	Score	Pts	SPC	Power	Bands	Time	Rig	Antenna
AZ	K7RE	864,360	1,029	84	LT1	40,20,15,10	20	K2	3 el tribander, HB yagi, delta loop
	NQ7X	340,480	532	64	LT1	40,20,15,10	9	TS850	Tribander
	AA7EQ	28,392	169	24	LT5	40,20,15	12	K2	GAP Titan
	N7CEE	13,440	48	28	LT1	20,15	13	K2	End fed wire, vert, loop
CA	NK6A	79,499	277	41	LT5	40,20,15,10	5	K2	C4
	KN6YD	13,545	129	15	LT5	20,15		IC706	Hamsticks
CO	K0FRP	572,010	829	69	LT1	40,20,15,10	18	TS850	Mono banders, tri bander
	N0IBT	17,493	119	21	LT5	40,20,15,10	5.5	TS870	Dipoles
CT	W1VT	5,810	83	10	LT5	20	1.5	K2	C3S
FL	N4BP	1,324,680	1,577	120	LT5	160,80,40,20,15,10	23	K2	TH7DXX @ 65'
	K4MF	263,802	571	66	LT5	40,20,15,10	15	IC736	3 el @ 35', dipole
	W4FMS	250,740	147	60	LT5	160,80,40,20,15,10	7	K2	A4S @ 30'
GA	K4BAI	373,758	809	66	LT5	40,20,15,10	14		
	W3IRZ	1,813	37	7	LT5	40,20	3		
ID	K7TQ	82,040	293	40	LT5	40,20,15,10	13	K2	GAP Titan
IL	W9CUN	3,591	57	9	LT5	40	2	TT580	40 m horiz loop @ 8'
IN	K9PX	213,752	694	44	LT5	40	12	K2	80 m loop
MD	W3PO	30,400	152	20	LT1	40,20,15		FT817	Veebeam 205' per leg @ 70'
	W3MWY	23,562	153	22	LT5	40,20,15	6	ARGO 556	23' vertical wire @ 60'
	WA3GYW	2,450	35	10	LT5	80,40,20,15	0.5	HW8	130' longwire @ 20'
MI	K8CV	73,815	285	37	LT5	80,40,20,15		K2	
	AB8DF	52,668	228	33	LT5	80,40,20,15	12	Triton IV	105' dipole @ 40'
MN	N0UR	453,330	657	69	LT1	160,80,40,20,15,10,6	16	FT920	Yagi, wires
	W0UFO	74,214	279	38	LT5	40,20,15,10	7.25	FT840	TA33, 120' zepp
MO	WA0OTV	68	17	4	GT5	15	1	TS530S	Indoor wet noodle
NC	WJ9B	401,373	831	69	LT5	80,40,20,15,10	21	TS950sdx, K2	A3, 2 el 40m, delta loop 80m
NE	K8BBM	23,254	151	22	LT5	20,15	5	Argo 515	GP vertical
NH	KN1H	40,470	142	19	LT250	80,40,20,15	2	Omni	140' dipole
	W1PID	13,104	104	18	LT5	40,20,15	6	FT817	OCF dipole
NJ	N2CQ	73,600	230	32	LT1	40,20,15	6	K1	TA33jr, zepp @ 35'
	W2JEK	20,328	132	22	LT5	80,40,20	3	FT840	Gnd plane, dipole, end fed hertz
NM	K5OI	13,104	104	18	LT5	40,20,15	7	K2	Inv vee
NV	N7AC	33,418	217	22	LT5	20		IC765	182' loop
NY	N1EU	83,160	297	40	LT5	160,40,20,15	2.5	FT1000MP	C3S, G5RV
	W2QYA	2,100	35	6	LT1	40,20,15	1.5	HW8	Inv vee
OH	N8ET	74,710	241	31	LT1	40,20,15			
	AB8FJ	4,690	67	10	LT5	20	5	SW20+	Random wire
ON	VE3NXB	3,136	56	8	LT5	20		FT817	
OR	KB7WW	523,341	923	81	LT5	40,20,15,10	20	TS690	Beam, dipoles
	N7OU	224,896	502	64	LT5	40,20,15,10	5	K2	Wire beams
PA	K3WW	279,510	605	66	LT5	80,40,20,15	21	K2	C3, Skyhawk, 402CD, vert
	WB3AAL	134,070	327	41	LT1	80,40,20,15,10	14	TS50	HF9V
	W3TS	97,515	197	33	LT250	80,40,20,15	3	HB superhet XCVR	Inv Vee, 2 el yagi
	W3DP	29,960	214	20	LT5	40	8	K1	G5RV
	W3ZMN	26,600	152	25	LT5	80,40,20	15	K2	R5, dipole
	NA3V	11,900	100	17	LT5	80,40,20,15	2	IC756PRO	135' doublet @ 65'
	WB3WVC	5,796	69	12	LT5	40,20,15	1		
	N3CZB	1,813	37	7	LT5	20	4	MFJ9020	
Panama	HP1AC	64,904	244	38	LT5	40,20,15,10	5	IC706	TA33jr, long wire
TN	KK4BE	12,705	121	15	LT5	40	6	K1	Dipole
TX	NM5M	781,942	1,106	101	LT5	40,20,15,10	16.25	FT1000MP	Yagis
	W5USJ	149,583	419	51	LT5	40,20,15,10	14.25	FT847	HF9V
	KK5NA	560	20	4	LT5	20			
WA	N7RVD	71,288	268	38	LT5	80,40,15	3.25		
	K7NTW	16,632	132	18	LT5	40,20,15	3	IC745	40 m loop, 2 el quad
WI	K9OSC	13,804	116	17	LT5	40,20	3	K1	Dipoles
WV	K8KFJ	45,570	210	31	LT5	40,20,15	4	IC706MKII	14AVQ
Check log: W3ERU									

Spring QSO Party 2001 Soapbox

W3TS—Did not have much op time due to very nice spring weather. WA0OTV—My new ARCI number arrived in the mail the morning of the contest. What timing you guys have!! I was able to operate my single band before the skip crashed. K8BBM—I am a minister so worked most of the weekend. Propagation rather rough! Lots of fun!! K7NTW—Available time too short and conditions poor here but fun anyway. W5USJ—Good event. Personal best even with family, chores, and Easter events. Lots of familiar calls. W2JEK—Poor conditions. No activity heard on 10 and 15 m. AA7EQ—Quiet bands. Worked everyone I heard. No one on 10 m but I could hear some of the beacons. KK4BE—Had fun. Great group of operators. N8ET—The sun was the most active participant in this one. KN6YD—'Ol Sol threw a monkey wrench into this one. W3DP—The solar storm took its toll. Terrible conditions. Averaged 1 QSO every 10 minutes. Easter weekend a poor choice. Still had fun! W3MWY—Glad to be contesting after illness. K9OSC—Lots of fun despite poor band conditions and Easter weekend commitments. K5OI—Busy with family stuff. Bands were not cooperative. Wish Paul, NA5N, would stop that CME stuff up in Socorro! VE3NXB—First time in QSO Party. Having fun with FT817. W0UFO—Tuff conditions but still fun. K9PX—Nice turn out considering the solar conditions and Easter weekend. NA3V—Didn't have time to really jump into contest this time around. Hope to do better in Hootowl Sprint. K8KFJ—Although I was limited in operating time due to Easter weekend activities, I wasn't about to let the ARCI QSO Party go by without making some Qs (my very first entry). N2CQ—The condx were the worst I recalled ever. Sunday AM had NO signals on 20 or 40 meters. NONE! A few showed up on 15M later. K3WW—revived my old QRP number and enjoyed the event with my new K2. Conditions seemed very difficult. N7CEE—I operated in the field on Saturday, from 7,500 foot Woody Mountain Ridge southwest of Flagstaff, Arizona. On Sunday I operated from home, getting on the air as I could. K7RE—"What does not kill us, can only make us stronger." Man, that WAS painful. ;) C'mon Fall Party ;) NQ7X—Stinko conditions and only 8-9 hrs op time but great masochistic fun. Tnx all you survivors who hung in there to the end. KK5NA—Between Easter festivities and other Sunday/weekend chores, I was only able to work the QSO party sparingly, but I caught a few contacts and still had fun. N4BP—Not the best of conditions. :-) AB8DF—40 was best bet early mornings and 15 seemed to get good late in the contest but I think most packed it in by then. WB3AAL—Had a good time running the contest. Found the Q's were harder to make this year. I guess the X flare we had on Sunday did not help things. Thanks to all for the contacts. AB8FJ--The solar activity sure made for an interesting contest weekend. Decided to go homebrew this time with my SW-20+ keyed by the shack computer running TRLOG. KN1H—I wish ole Sol would pick non-qrp contest weekends on which to have his parties. Bands were spotty at best. N7OU—Conditions were rather poor and noisy here, but it was still fun to work so many familiar calls. W3ZMN—This was a shake down for my K2. It worked very well. With the Easter week end operating time was limited. W3ERU—Poor band condition. QRPDUPE program worked great. W1VT—Surprising conditions--not only did GM3OXX have a good 1 watt signal but I worked GM3SKN and DL3SEU with 1W to a dipole. K0FRP—10m did not open at all. 15m was very sparse. 20m was fair in the afternoons. 40m very noisy and I missed a few calls even with DSP. 80 m nobody home. W4FMS—Struggled with conditions as bands seemed absolutely dead at times. As always, enjoyed the contest. Easter weekend cut into my operating time. WJ9B—There wasn't much activity, and the conditions were poor too! Interestingly, I still had fun! N0UR—Ouch, it was painful. WA3GYW—I did not have a lot of time to operate. KB7WW—Bands stunk. See everyone this fall; the bands have to be better.

2001 Summer Daze SSB Sprint

Date/Time:
August 5, 01; 2000Z to 2400Z SSB HF only

Exchange:
Member - RST, State/Province/Country, ARCI Number
Non-member - RST, State/Province/Country, Power Out

QSO Points:
Member = 5 points
Non-member, Different Continent = 4 points
Non-member, Same Continent = 2 points

Multiplier:
SPC (State/Province/Country) total for all bands. The same station may be worked on more than 1 band for QSO pts & SPC credit.

Power Multiplier (PEP):
0 - 500 mW = X 15
500 mW - 2 W = X 10
2 W - 10 W = X 7
Over 10 W = X 1

Suggested Frequencies:

80 m	3865 kHz
40 m	7285 kHz
20 m	14285 kHz
15 m	21385 kHz

Entry may be All-band, Single-, High-, or Low-Band. Entry includes a copy of logs and summary sheet. Include legible name, call, address, and ARCI number, if any. Entry must be received within 30 days of contest date. Highest power used will determine the power multiplier.

(See the Submission Comments at the end of this column.)

2001 End of Summer PSK-31 Sprint

Date/Time:
September 9, 2001; 2000Z to 2400Z - 20 m band & PSK-31 only

Exchange:
Member - State/Province/Country, Name, ARCI Number
Non-member - State/Province/Country, Name, Power Out

QSO Points:
Member = 5 points
Non-member, Different Continent = 4 points
Non-member, Same Continent = 2 points

Multiplier:
SPC (State/Province/Country) total.

Power Multiplier:
0 - 250 mW = X 15
250 mW - 1 W = X 10
1 W - 5 W = X 7
Over 5 W = X 1

Suggested Frequency:

20 m	14070.15 kHz

Score:
Points X SPCs X Power Multiplier.
Entry includes a copy of logs and summary sheet. Include legible name, call, address, and ARCI number, if any. Entry must be received within 30 days of contest date. Highest power used will determine the power multiplier.

(See the Submission Comments at the end of this column.)

2001 Fall QSO Party

Date/Time:
September 29, 2001; 1200Z through Sept. 30, 2400Z. You may work a maximum of 24 hours of the 36 hour period. CW only.

Exchange:
Member - RST, State/Province/Country, ARCI Number
Non-member - RST, State/Province/Country, Power Out

QSO Points:
Member = 5 points
Non-member, Different Continent = 4 points
Non-member, Same Continent = 2 points

Multiplier:
SPC (State/Province/Country) total for all bands. The same station may be worked on more than one band for QSO points and SPC credit.

Power Multiplier:
0 - 250 mW = X 15
250 mW - 1 W = X 10
1 W - 5 W = X 7
Over 5 W = X 1

Suggested Frequencies:

General	Novice
160 m	1810 kHz
80 m	3560 kHz
3710 kHz	
40 m	7040 kHz
7110 kHz	
20 m	14060 kHz
15 m	21060 kHz
21110 kHz	
10 m	28060 kHz
28110 kHz	

Teams:
You may enter as a team of either 2 to 5 members per team or unlimited number of operators as long as a maximum of 5 transmitters on the air at a time. You compete individually as well as on the team. Teams need not be in the same location. Team captain must send list of members to Contest Manager before contest.

Score:
Points (total for all bands) X SPCs (total for all bands) X Power Multiplier.
Entry may be All-band, Single-, High-, or Low-Band. Entry includes a copy of logs and summary sheet. Include legible name, call, address, and ARCI number, if any. Entry must be received within 30 days of contest date. Highest power used will determine the power multiplier.

(See the following Submission Comments.)

Contest Submission Guidelines
The final decision on all matters concerning the contest rests with the contest manager. Entries are welcome via e-mail to rfoltz@turbonet.com or by mail to

Randy Foltz
809 Leith St.
Moscow, ID 83843

After the contest send your Claimed Score by visiting http://personal.palouse.net/rfoltz/arci/arcisum.htm. You must still submit your logs by either e-mail or regular mail if you use the High Claimed Score form. Check the web page for 7 days after the contest to see what others have said and claimed as their scores.

●●

Our Contest Columnist, **Randy Foltz**, does a phenominal job for us. He manages 10+ contests a year, does the *Contester of the Quarter* features and a whole lot more.

Please join me in recognizing his efforts-it's not often easy being an un-sung hero!

(Your Editor)

Portable Daycare Scheme

Johhny Lightcap—KD4ORO kd4oro@mobis.com

Having two children that are into dance school, athletics, etc.... It takes up a lot of my personal time, which I don't mind, but I have found a way to incorporate some hobby into it for myself.

I drive an Aerostar Van, which allows me to carry some QRP gear along, and it makes a great ground plane for a HF mag-mount antenna. The rig I like to carry along most is a TT 1340 that I built some years back. The antenna I use is a Hustler mobile whip on a standard extension. Of course it's to much antenna to drive around with so I can only put it up once the kids are dropped off at there function and I find a good parking place.

I then assembly my mag-mount and place it on the roof of the van, hook up everything else, take a deep breath, and turn it on. Once everything seems to be working, I can usually get in some QSO's before the kids are through with their activities. Actually it seems like I have only been there for just a little while when it is time to go. That's when I tell the kids that "I don't wonna go home" Hi.

I've made a lot of contacts this way and it's helped to keep my CW practice up too. The kid gets to do what he wants to and so does his children.

73, Johnny—KD4ORO/QRP/M

●●

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The club is now taking membership application and renewals via credit card - online - using the **PayPal** system. In fact, we prefer it. This is true for all applicants- ***worldwide***! Simply go to the club web site, specifically, **http://www.qrparci.org/us2signup.html** and follow the instructions. Be sure to select the appropriate button for the area of the world you reside in (per box below).

PayPal replaces all previous methods of payments for non-US hams except that you may always send your payment directly to **Mark Milburn**, our treasurer; however, funds must be drawn on ***a US bank and be in US dollars***. Make Checks out to: *QRP ARCI*

If mailing your application (if renewing, it helps to send in the mailing label from your QQ), send your application to:

QRP ARCI—Mark Milburn, KQ0I
117 E. Philip St.
Des Moines, IA 50315-4114

Need an *Information Pack*?
Send email to: **k3tks@abs.net**, or...Send an SASE to:

Danny Gingell, K3TKS
3052 Fairland Road
Silver Spring, MD 20904

TIPS:

1. Use the Online Member Lookup feature to keep track of your membership status—check **http://www.qrparci.org/lookup.html**
2. Is your data on file now incorrect? Use online form to send info to our database manager: **http://www.qrparci.org/**

USA—$15 / Canada—$18 USD / Non-US/VE—$20 USD per year

New Member/Renewal Form

CALL _____ QRP ARCI# (or "New" if new member) _____

Full Name _____

Mailing Address _____

City _____ State/Country _____

Post Code (ZIP + 4 for USA) _____

Previous Callsign(s) (if any since you joined the club) _____

(The following is optional and is not released to others)

Email address _____

Comments _____

Become a Famous Author!
Write a Review for the QRP Quarterly

Have you just purchased a new gadget, rig or kit that you would like to tell the QRP world about? Then write a review and send it to the QRP Quarterly! Reviews are handled by our Special Features Editor, **Larry East**—W1HUE (see page one for address). We have no strict guidelines for reviews, but we do ask that you include the manufacturer's basic technical specs and any results of technical tests that you have performed. If you are not sure about some aspects of the device that you are reviewing, don't guess; ask the manufacturer for clarification. (We reserve the right to also contact the manufacturer for additional details or clarification.) Please try to be as objective as possible: tell about the good as well as the bad features. Larry prefers to receive articles in machine-readable form as ASCII text files on PC format floppy disks or as email attachments.

If you want to send word processor files, Larry can handle MS Word 6/95/97, WordPerfect 5/6 and "Rich Text File" (RTF) formats (please don't do any fancy formatting or embed graphics within WP files). Figures (drawings and photographs) can be supplied as "hard copy" (good quality, B&W or color prints for photographs) or as digitized images (GIF, TIFF, JPEG, PhotoCD, PCX or bitmap files). If you want your disks, drawings, etc., returned, please enclose an SASE with sufficient postage.

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IMHO—CW Nit

First I would like to congratulate Craig and the whole crew for what has to be the best ever issue of the Quarterly! And from what I understand, this is just the tip of the iceberg and the subsequent issues will be even better! Now on to a nit that I want to pick.

On page 3 of the January 01 issue, Craig says that the QRP Quarterly "showcases our proud, grass roots Amateur Radio tradition-the pursuit for high standards in technical and OPERATING abilities". Yet in this fine issue I find a cartoon on page 57 which in essence is saying that QRPers don't really want to compete in contests. Then there is the quote on page 62, which is saying that surely there is no need to increase our code speed. With all the opposition to CW the last thing we as a club need to do is legitimize the idea that slow code involves skill!

Let me make one thing very clear. There is only one true measure of CW skill and that is speed consistent with the right degree of accuracy. And I define CW as Morse code with the 3:1 spacing. No Farnsworth or any other "tweaks" to make it "easier". All sending needs to be done with the proper spacing.

Is speed a stand-alone measure? No but it MUST be included in any system used to measure CW skill. There is a club that says, "Accuracy transcends speed". Let's take a closer look at that statement. Accuracy means different things under different conditions. During a normal QSO if you can copy about half of what the other operator is sending you will know what they are saying. You should push yourself by having QSOs at speeds that are faster than you can copy 100 percent.

Lets look at contests. If you are in a major contest like most of the ARRL sponsored events for example, you must copy each and every thing the other operator sends. All the contest logs are put into one computer and all contacts are checked against each other. Miscopy anything in the exchange and you loose the contact! In this case accuracy does indeed transcend speed. On the other hand, if you are in a little event like a Fox Hunt, you don't need to copy anything! All the information is posted on the QRP-L mailing list. If you are the Fox, you need to get close to getting the call sign right but people will correct everything else later. This is a great event for building contest speeds and skills because there really isn't any pressure to get it "just right". Instead you can just concentrate on your operating procedures and QRQ as much as you can possibly stand. Field Day is another "non-contest contest" where you don't need to copy anything because you don't send in a log. But if you do any search and pounce, you need to get the calls right and keep a dupe sheet as a courtesy to others. Calling lots of stations in a contest without knowing if you have worked them before or not is a sure sign of a lid.

Can you get a top score in a contest using a hand key? Not in a major contest you sure cant. First off I don't think there is anyone who can send for 48 hours on a hand key left! In the old days before keyers we used to use bugs and it was a lot of fun trying to read people towards the end of the contests! Back then a hand key stood a chance but not now. There is no one who can send at 30 plus wpm on a hand key hour after hour. If you are talking about a contest that lasts only a few hours, like say 4, and you will be working less than 100 stations then you might be able to be competitive.

I'd be tempted to bet anyone a cup of coffee that if they had a contest grade station, running full power and using a hand key in the ARRL SS, you would not be able to outscore the top QRP stations! That's what I think of hand keys in contests! I sure hope that the cartoon is wrong, that there is no recent change over to hand keys for contesting.

Did will all start out slow? You bet we did! Do we all need to get "fast" (whatever "fast" might mean)? No. I don't care if you are satisfied with 5 wpm or even with not learning the code at all. That's up to you. Just don't try to tell anyone how you have this grand and glorious CW skill down pat if you are still at the 5, 10 or even 15 wpm level! If speed isn't the true measure of CW skill then why are there sending and receiving speed records?

The QRP ARCI should never encourage, legitimize or otherwise indulge those who want to slow everyone down to their level. Instead the club should encourage everyone to push themselves to be the very best they can be and really learn to enjoy CW the way it was meant to be.

There, now I feel better! OK, back in my hole. **Ron Stark—KU7Y** ●●

The Last Word

The QRP Quarterly invites readers to submit original technical and feature articles as a service to fellow QRP enthusiasts. Although The QRP Quarterly cannot pay for submissions accepted for publication, it will acknowledge, with thanks, authorship of all published articles.

Due to space limitations, articles should be concise. Where appropriate, they should be illustrated with publishable photos and/or drawings.

Full articles should go to any of the volunteer editors for review. Information for columns should be sent directly to the column editor. See the ToC for addresses. Submit technical and feature articles with a printed copy and a copy on disk (if possible). ASCII text is preferred. Photos and drawings should be camera-ready or .tiff format. Other formats can be used with prior approval.

Technical and feature articles should be original and not be under consideration by any other publication at the time of submission to the QRP Quarterly or while the QRP Quarterly is reviewing the article. If you contemplate simultaneous submission to another publication, please explain the situation in a cover letter.

Material for possible use in the QRP Quarterly should be sent to only one of the editorial volunteers, not to several at the same time. The QRP Quarterly editors and columnists will transmit the submission to others on the staff if it better fits another category.

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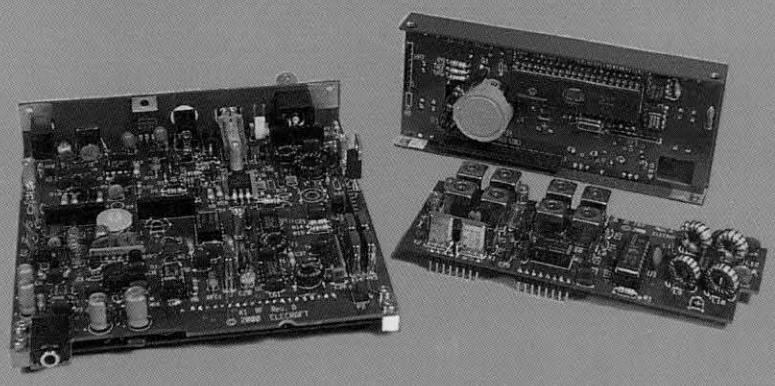

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