QRP Quarterly

$4.95

Journal of the QRP Amateur Radio Club, International

July 1999 Volume XXXVII Number 3

This issue's cover photo contest winner is Ed Loranger, WE6W. Everything you see here fit on his bike. See his story inside for more details.

The QRP ARCI is a non-profit organization dedicated to increasing world-wide enjoyment of QRP operation and experimentation, and to the formation and promotion of local and regional QRP Clubs throughout the world.

http://www.qrparci.org

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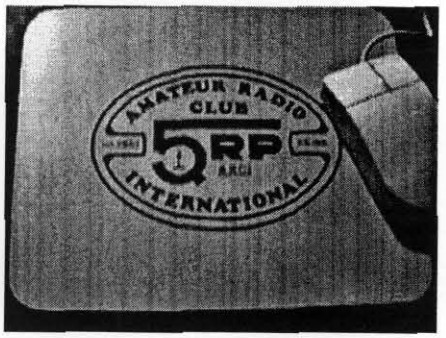

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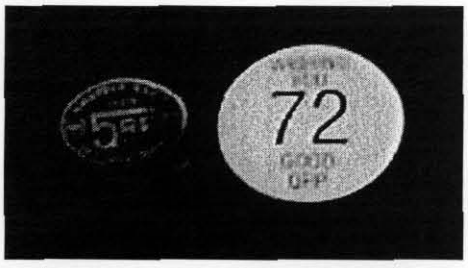

These attractive blue and brass (on left) and white (on right) metal pins have a tie-tac pin and clasp on the back to allow attaching to hats, badges, clothing and equipment. The White 72 pins say "WISHING YOU 72 GOOD QRP"

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From the Editor

Monte "Ron" Stark, KU7Y

Here I am, back wearing the editors hat again. First I would like to say 72/73 to Bob Gobrick, N0EB (VO1DRB & UN7/N0EB). Bob was a good friend and I will miss him.

And once again I am looking for someone to take over as the managing editor. George Heron, N2APB did a super job but conditions at his end changed and he was forced to step down. A new job along with a long distance move didn't leave enough time left over and I can understand that.

The position requires that you are able to spell better than I can and that your English skills are better than mine. You must also be connected to the Internet and be able to handle file transfers via FTP and attachments. Some files are BIG and if your system doesn't like you playing with big files you will have a problem before you get very far along the road! You must also be able to scan photos, drawings and text. Converting from many different file formats is also necessary. If you feel that you have the skills and want to put in lots of long hours, let me know!

You have already noticed that this issue is much smaller than the last few. There are several reasons for that with one of the main ones being that we can not afford to continue doing 80 to 100 pages at our current dues level. And I took over a bit late in the cycle and had nothing ready! My number one goal this issue is to get it out on time.

The printer is doing the layout this issue and I hope to stay on long enough to get this system working. This should reduce the number of hours needed to do each issue and make it easier to keep good editors!

I liked George's idea of having a guest editorial and am trying that this time. I saw this idea first on the Internet QRP mail list and asked Laura if she would do it for the Quarterly. She says yes and I'm sure you will enjoy reading what she has to say.

Guest Editorial

The Technological Society

Laura Halliday VA3LDH

We live in a technological society. Our society has access to technology of unprecedented sophistication, price and performance. Communications technology, in particular, is everywhere. Ham radio, the hobby of communications technology and electronics, should be an easy sell in such a society, right?

Wrong.

While there is enormous use of and interest in technology, it is strictly on a consumer level. People buy and use black boxes. How they work is not interesting. People take functions for granted and do not investigate further. Simply communicating is not interesting. If you want to talk to another continent, use a phone. If you want to send a message, use the Internet.

I see this in ham radio too. Many hams buy a radio, plug it in and use it. How it works is not of interest; all that matters is that it does work, and that they can talk to people with it. Yes, I know, people bristle at the suggestion of ham radio being a non-technical hobby of personal communication, but that's what it looks like these days. Techie hams are a minority. Perhaps they've always been a minority. I'm too new at this to know.

Something has changed since the Golden Age, and I think I know what it is. Ham radio isn't democratic anymore. At one time (pick your Golden Age, all I know is that they stopped happening about the time I was born) it was possible for any ham to design equipment of respectable performance. You didn't need much more than Ohm's Law and some formulas relating to LC resonance and Q to build radios. And they worked.

Now?

The learning curves are steeper. The technologies of today require significant formal background: I didn't encounter Fourier Series in any serious way until my 3rd year of university. Deriving useful relationships from them and using them to process signals came later. Not every ham has such a background. Not every ham wants it. Not every ham has the aptitude for it. We all have different aptitudes and interests: this doesn't make us better or worse. Just different.

Could this be why so many hams are not only indifferent to new technology, but even actively hostile to it?

Techie ham radio survives today in specialty areas, like QRP. This is A Good Thing, but I'd like to see more. I'd particularly like to see some new technology. While we must be realistic about this-custom ASIC design is not something one can do in one's shack-there are many other technologies that should be much better known. Instead of being fringe elements, they should be mainstream ham radio in the 1990s, and beyond. A couple of examples:

Digital signal processing for applications other than audio filters. Even a mediocre sound card can record all there is to record in a communications grade audio signal. A modern personal computer has processing power that rivals dedicated DSP chips. Use it. If you don't like using your PC for this, or need more power, DSP chip evaluation boards are a steal. They are intended to convince engineers that their makers' products can be useful in the devices the engineers are designing. They also make excellent self-contained DSP cores for anybody who wishes to play with them. A seriously powerful processor, with hardware support for common DSP operations like convolution sums, bit reversal and circular buffers. Memory, 16 bit 48 kilohertz sampling stereo audio input and output, support chips and software, ready to go. One manufacturer's kit is less than $US100.00 (Analog Devices ADSP-2181 EZ-Kit Lite). Why doesn't everybody have one? PSK31 is an excellent step in the right direction, but I'm hard to please. I want more.

Programmable logic. Professional designs never use discrete logic circuits, unless somebody goofed. Instead, they use programmable logic devices all the way from the small PALs and GALs up to the mighty FPGAs and CPLDs. Hiding behind the acronyms are chips full of logic elements that you can wire up in any way you wish. Describe your logic circuit on a computer, synthesize it into gates, burn an FPGA. It works, but it can be expensive to get started. If anybody can come up with a cheap hobbyist package-say, VHDL synthesis for 5000 gates-they might make a bundle. Does it already exist? I'd like to know myself.

So here's the challenge for ham radio in the new millennium: let's show the world that technology can be used and understood on something other than a black box level. Let's grow our own, distinctive technology. Let's grow some new hams, and maybe even some new engineers along the way.

Laura Halliday VA3LDH "Que les nuages soient notre pied
Grid: FN03gs a terre..." - Hospital/Shafte

About the Cover

Ed Loranger, WE6W

I started riding my 10 speed bicycle as my sole means of transportation in January, 1997 — 3 months before returning to ham radio after a 8 year hiatus. This time however, I'd be using small QRP radios and equipment and it wasn't long before I was dreaming of traveling to my radio sites by human power.

Today, I've got an efficient setup that packs in just a few minutes and fits nicely on the bike rack — ready for another exciting journey. What is truly amazing is just how complete this package is. I have a comfortable chair, a table, telescoping antenna with base support, A 1/2 wave dipole, 2 gel cells, tools, headphones, radio, antenna tuner, and SWR/PWR meter. I also have two log books, vibroplex bug, and my lunch on board!

When I look back at the days we took the car to the park, along with that big car battery, I just laugh. I even borrowed a ladder once to get my antenna up. Now I insist I bring my own table and chair. The inverted vee antenna requires no trees as the 20 foot extendable, Black Widow fishing pole supports it well. No longer do I look for an unused park bench for my operations — I can set up anywhere.

My first attempts at bicycle portable were hilarious. First I tried to stuff everything into an expandable briefcase. Just too tight. I ended up balancing the briefcase and a soft overnight bag on the bike rack. The load shifted badly and I nearly wrecked the bike.

Nevertheless, my early park adventures were fun. I operated between two trees while sitting on a cold rock with my gear on the lawn. The antenna was only 3 feet off the ground but I worked the WSN-40 QRP net with ease. I was officially hooked. Never again would I require the man-made comforts the park offered.

I also got serious. I located a travel box for my equipment. The box even had a separate battery compartment in the bottom — room for a 15 AH or so gel cell. With the lengthy web strap on the box I easily lashed it to the bike rack. Also, the box serves as my operating table and antenna stand. The timely arrival of the Black Widow pole and purchase of my 'Comfort Quad' folding chair completed the portable station.

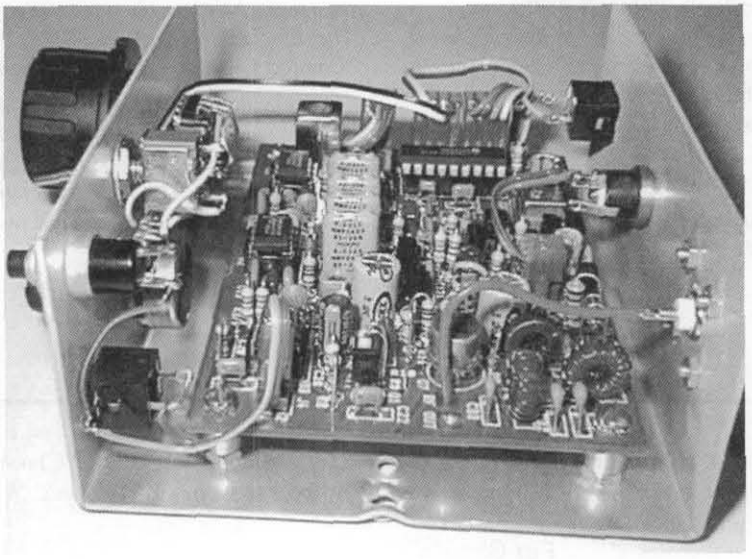
With all the transportation details nailed, I am free to focus on enjoying the bike ride and my radio operation. One of my favorite operating sites is Roberts Lake. It is right next to the golf course in Rohnert Park, California. The view is tremendous and my Saturday morning trek to the lake is a great start to a getaway weekend.

Small Wonder Labs DSW-40 Transceiver Kit

Chuck Adams, K5FO *email: adams@ticnet.com*

Being a fan of all the Dave Benson, NN1G, rigs and not having built one in some time, I was excited to hear the announcement of the soon to be available DSW-40. So it is with a great deal of pleasure that I write a review on one of the first ones to get built from a group of beta versions sent out by Dave.

Some background information for those new to what goes on in the engineering world. The development of any new piece of equipment requires a great deal of time, energy, money, and effort on the part of the designer and company in order to insure that the final product works and can be built by many hams worldwide. Variations in parts tolerances, etc. can make for some serious headaches for a company if care is not taken up front to insure stability and reproducibility in results for a large number of builders. So there is the alpha-version which the designer builds/prototypes/etc. The alpha is the prototype that usually isn't seen outside the walls of the lab and off the workbench. Then there comes the beta-version where a few chosen individuals get an early version of the parts and boards and instructions and do a detailed report back to the owner on suggestions/problems/comments that hopefully add value to the equipment and end up in the final version or go to make the final version better. Beta builders get to find the typos and suggest some wording changes in the manual that might make it clearer for the new builders. You old timers don't read manuals anyway...



This review is written from the building of a beta-version. There may be some changes that Dave comes along with from what is described here, but only minor changes probably as I find the rig worked just fine and is on the desk in use as this is being written. In fact, I just finished a QSO with K5ZTY in Houston with the rig running at 1W and using a long wire on 40 meters.

First of all, let me list the appropriate information from Dave and Small Wonder Labs (http://smallwonderlabs.com).

Rig: DSW-40

Bands: 40 and 20 meters with others to follow.

Mfgr: Small Wonder Labs, 80 E. Robbins Ave., Newington, CT. 06111. Email: dave@smallwonderlabs.com.

URL: http://smallwonderlabs.com/

Avail.: At Dayton Hamvention and thereafter.

Price: About $90 for the board and board parts. Optional case to be priced by Dayton and shown at Dayton.

Size: Board is about 7.0cm x 11.0cm which is the same size as the SW-40+ board.

Output: 2.5W nominal at 13.8V.

Supply Voltage: 8-15V.

Current: About 32mA on receive.

Sidetone: 800Hz, fixed.

SFDR: >60dB over specified frequency.

TTDR/MDS: Equal to SW+.

Filter: ~500Hz for any band.

All of this information was found on Dave's web page.

I won't bore you with all the gory details of building it. It went together in about six hours for me, but don't hold me or anyone else to that timeline. Take your time and do it right. I'd say allow yourself about eight hours or so for the board. If you did the Elmer101 project and have built the SW-40+ or other similar single band rigs you can build this one. In fact, it is much simpler than comparable kits as I will explain.

The SMT parts for the DDS are already mounted and checked out by Dave. This is a neat start, as even with my expertise and supply of building equipment I know that I don't have a soldering iron in the house to do the DDS chip (AD9835). This is the Direct Digital Synthesizer chip and has very close lead spacing. You do get to do two SMT inductors but these are done first and are not difficult. Just be careful and follow the instructions.

The layout is very similar to the SW-40+ and you'll recognize the similarity to it from comparison of both schematics if you have them.

There is a PIC processor (PIC16C622 from Microchip) that does the control of the DDS and is the keyer, freq-mite and RIT all in one small package.

I got the package from Dave in the afternoon but delayed until 9PM to start as I know how I am when I get started on these things. Sure enough, at 3AM I have the board completely done. I find a gel-cell, the ear-buds, and a wire clip-lead to hook up the antenna and then I power it up. No noise so I check and by clipping the antenna to the first point past the coupling cap from the PA filter I can hear noise. Tuning around I hear an EA8, DL7, G4, and a KH6 on 40 meters. OK, receiver is working but only for DX... I know I have a problem so it's off to bed.

Next morning I get back to the rig and do a signal trace with the VE3DNL marker generator. Sure enough, it looks like a short in the filter section. Turning the board over and looking carefully, I find a connection between one of the filter caps and ground. As it turns out the board manufacturer did this. Email to Dave confirms this as the board layout figures show no such land, so good thing manufacturers have a few boards made to find these kinds of errors; in this case it was not Dave's fault. Exacto knife fixes the problem in short order. OK, peak the transformer on the front end and the receiver is completely tuned.

Setup the paddle and check the transmitter and it is working. Only 0.9W out. I get the voltmeter out and the gel-cell is at 11.08V. Why is it that I always do this? But hey, it's working so keep on going. No chirp or any other problems and the voltage is within Dave's specs. I then make the only other adjustment you have to make and that is to set the receiver offset to match the transmitter frequency and I'm all done. It's just too simple.

Then I take the rest of the day to take a TENTEC TP-17 case, prime it with gray paint, and drill the holes for everything. The final product can be seen in the accompanying photo.

So, it now sits on the operating desk and on the first night I worked TX, AZ, and FL. The FL station being Mac, KF4KSM/QRP. All three Qs in response to my CQs. A couple of days later I got a response from Bill, K5ZTY, in Houston to another CQ on 7.040MHz with no QRM/SSB/... a miracle unto itself.

So what we have here is a complete rig in a small package requiring only an antenna, battery, and paddle externally and you are up and running. Neato.

In summary, here are some notes from K5FO:

- Tuning range: The entire 40 meter band — 7.000MHz to 7.3000MHz. Note that this takes a significant number of turns of the dial.
- Constant output the entire range with just a minor degradation into the Novice band — like 0.90 at 7.120MHz vs. 0.95W or so at 7.040MHz; this is probably due to ripples in the Chebyshev low-pass filter.
- On power-up the rigs comes up at 7.040MHz on the nose. I suggested that Dave add a feature to come up in the Novice band if the RIT switch is on at power up.
- Keying speed: 5 to 50wpm and it comes up at 15wpm.
- Frequency is announced by pushing the tuning knob in for an instant. The thing that I love is that if you are using the keyer at 40wpm then the frequency is announced at 40wpm. No waiting on slow speeds here.
- RIT is unlimited! You can tune to the frequency you want to transmit on then tune the receiver to the DX station and that station can be 50KHz away. You really wouldn't go that far but you get the point.
- Front panel layout that I used was TUNE, GAIN, RIT, Keyer Button, and PHONES.
- Rear panel layout: PADDLES, POWER, and ANT. That's it.
- Initial stepping is at 200Hz with the tuning dial using an encoder. By pushing knob in and holding it a second or two you can get the finer 50Hz steps. I was asked how I like this and I like it fine. Now if you want to move a long distance from 7.040MHz then you have some dial twisting to do, but it is fine as most of us won't move that far anyway.
- 6KHz per dial revolution at 200Hz step size. Hint: put the knob that you are using, the usual Mouser in my case, with any dot in the vertical (12 o'clock) position when you power up the rig. This will be 7.040MHz. If you make three revolutions going up, then you'll be at 7.058MHz; the FISTS calling frequency. Neato. I did find that if I spin the dial rapidly then you can cause the processor to miss some increments, but this is to be expected so don't tune too rapidly.
- Filter is about 500Hz and you can miss a signal by tuning too rapidly. I've seen this before in the Uniden 2510 on 10 meters. I suspect that all digital rigs do this.
- Keyer controls are speed, reverse to change dit/dah paddles to opposite paddles, tune and straight key. The thing that I like that Dave did here is that when you push the keyer button it starts cycling through the options and you don't have to sit and hold the button down to get to the next option. When the one you want to change comes up you hit one of the paddles to stop and do whatever it is you want.
- Equipment needed for alignment: None. You use your ears for peaking the front-end. The receiver is plenty sensitive.
- There may be enough power to drive a small speaker but it is spec'd only for earphones and there is plenty of drive.
- Some noise in the audio but this gets masked by atmospheric noise when the rig is connected to an antenna and the gain increased.
- Only four toroids to wind and they don't have that many turns.
- Only two tuning adjustments.
- No test equipment needed if you don't run into problems.
- Excellent receiver and I can't hear any digital generated noises that I recognize.

When guys and girls start getting this rig, I expect to start seeing a lot of posts on QRP-L about how neat it is. As noted earlier, $90 for the board and parts and I don't know what the entire rig with case and case mounted connectors, knobs, etc. is going to be. Dave will determine that later.

This is an excellent rig and one that I will enjoy for some time to come. One of the things that people have to get used to with this rig is that it uses a lot of software developed by Dave and that won't be available at any price. So unless someone spends a lot of time and energy, you won't be seeing this rig done HB style as in previous cases with other rigs that don't use micros.

My sincere thanks to Dave for letting me be in on the first group to build and test this little rig. I have already placed an order for the 30M version.

Members' News

Richard Fisher, KI6SN
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Riverside, CA 92506
email: KI6SN@aol.com

QRP AND `THE BIG MO'

Now, wasn't that fun? Field Day, I mean. If you weren't able to participate last month, that's too bad. Maybe next year.

For those who made it onto the airwaves, here's hoping the experience was enough to satisfy your good-time minimum requirement for another year.

Richard Fisher

One of the best things coming out of a QRP Field Day is what some athletes call "the Big Mo" — momentum.

Hopefully you've been rejuvenated on a number of fronts:

• Reminded of the pure joys of getting on the air and being amazed by what a tiny amount of power can do.

• Basked in the glow of the camaraderie that undoubtedlywells whenever QRPers come together in a common cause.

• Appreciated and marveled at what gear others have built, or the skills they exhibit as they take to the airwaves.

Field Day is, indeed, a good moment to benchmark our QRP experience; to come away with even more enthusiasm than before; filled with great ideas, expectations and goals.

Now's the time to hitch your wagon to "the Big Mo" and use it to enhance your QRP life beyond Field Day. And it's not too early to start planning for Field Day '00.

Is this a great niche in amateur radio, or what?

— R.E.F.

ONE QRPER'S RUN TO THE BORDER

Cam Hartford, N6GA, of Claremont, CA, reports that his QRP to the Field day "turned into a major honey-do-fest, so I couldn't get to my friendly local Taco Bell until after 2100 UTC.

"After ordering a coffee and taking the obligatory pictures, I settled in. This is a real gourmet's treat of a neighborhood, by the way. Within a block is a KFC, a Pizza Hut, a Sizzler and a Burger King. Thesmells were enough to drive a person wild. "At least the Taco Bell parking lot was to the east of the building, so the building wasn't blocking my signal from traveling that direction. My guess is that the drive-through menu/place your order/talk to the Chihuahua sign was properly positioned to act as a reflector for my roof mounted 20-meter Hamstick.

"Unfortunately, nobody who came to schmooze with the order girl ever bothered to kill their motor, and the resulting ignition noise was at times deafening . . . If I had known I would have brought my Sierra with Buzz-Not.

"Gear consisted of a shiny new NC20 and a 20-meter Hamstick mag-mounted on the roof of the family grocery getter. I got in about 1 1/2 hours, did 18 QSOs and 12 SPCs. Sometimes QRP is absolutely astonishing. My apologies to those I couldn't hear - a mobile whip isn't the most efficient of antennas, and S-9 ignition buzz is tough to overcome.

"It was a fun and educational event. Would I do it again? Probably not, but if we had the option of doing it at an In-n-Out Burger, I'd be there in an instant!"

A WET AND WILD QRPTTF FOR W0CQC

Ron Zoerb, KI0II, writes from Littleton, CO that "a cold, wet and windy day led to major disappointment (in April s QRP to the Field contest) in being able to keep any decent antennas up and working for more than a few minutes before they became a tangled heap of wire and supports on the ground.

"There is a good reason why a fence post is usually the tallest structure found in this area.

"After several attempts at using a real antenna, the Hustler and mag mount became the best idea of the day.

"The last 25 miles over muddy and slick gravel/dirt roads was another unexpected obstacle delaying the arrival at the proper spot by considerable time.

"The first contact was W5ON at AR/MO/TN, the second was KK6MC at the Four Corners, the third was VE7SL, so 3 contacts resulting in 8 SPC and 5 bonus DX points, boy this is easy. NOT!

"Both 10 and 15 meters provided 0 contacts through out the day, and I really needed those multipliers. My signal was being heard on 20 meters by stations I had a real struggle in pulling out, often losing the signal entirely.

"Forty meters was the opposite. I was hearing stations (N0EA and AB5UA for example) calling CQ and not hearing my answer. That was the pattern for the day, with 15 to 20 minute periods of tuning the band and hearing no signals at all or calling CQ with no answers, then signals would start to appear in the noise and build to a decent level before the pattern repeating.

"Having used the call KI0II for some time, it was difficult getting used to W0CQC and I must apologize to one station in particular . . . who asked for a repeat of my call and I quickly sent KI0II then realized my mistake. So I went for a 30-minute walk in the rain and wind, came back very refreshed and ready for more QRPTTF. So (I give) the W0CQC call back, a bit bruised and tattered, but intact.

"The jerky, beans and Almond Joys held out and the chicken fried steak in Longmont, CO on the way home topped off another learning experience with Amateur Radio/QRP to the Field.

"Some of my notes:

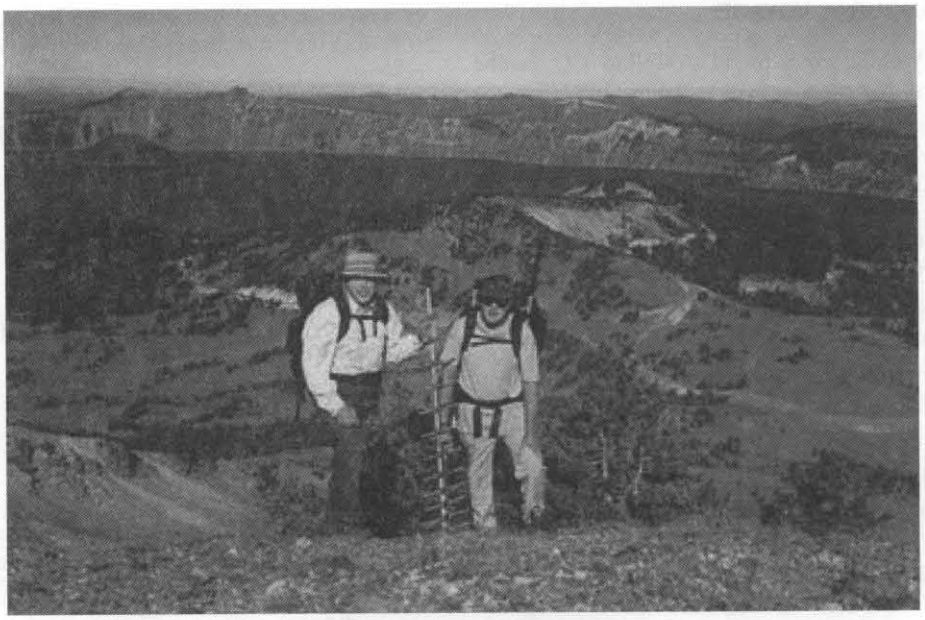
"I had 86 contacts resulting in 98 QSOs at 5 points each = 490 plus 15 as DX bonus = 505 QSO points. (Thanks to VE7SL, VE7CQK and VE3FAO); 34 multipliers this year compared to 40 last year, - 41 of 98 QSOs were from CA (21), TX (11) and MI (9).

"There was 1 contact with 4 SPC (KK6MC), 2 with 3 SPC (W5ON and N0UR) and 5 with 2 SPC (K4AGT, KI0AF, KI0G, NY9A and W1FMR), so that's 8 border stations of 86, less than 10 percent.

"I spent 6 hours operating time resulting in 206,000 points compared to 201,600 last year.

"NEXT YEAR: Better antenna(s) that work in those conditions; make contacts on more bands (multipliers) and work more border operators.

"Thanks to those in the log and to those who tried!"



QRPING IN THE ROCKIES

Jess Gypin, AE0CW, writes recently from Lafayette, CO, that he had "just gotten back from the weekend in the mountains near Rocky Mountain National Park. Had some very interesting QSOs that I thought you all might like to hear about.

"The contacts were not plentiful, but enough to keep the interest up! "I have used an 80 meter twinlead fed dipole, the SLV fishing pole vertical, and other antennas over the years. "This year I went for simple. Took a 90-foot roll of 18 gauge stranded wire and hung the end of it in a pine tree at about 45 feet. Then just hooked the other end to the tuner. Then hooked a counterpoise to the tuner ground of about 20 feet. "It tuned up on 40 meters, 30 meters and 20 meters without too much fuss.

"My first QSO of note was on 20 meters at about 4:45 p.m. MST. It was WQ4RP/NA 67. I did not even know that they were going. They called me after I had CQ'd for about 10 minutes near 14060. Deep QSB, but we got it done. "I guess the end fed wire was working!

"Next QSO was at about 0645 p.m. MST with KG4ADU — Chuck in Atlanta. Nice chat!

Then I heard WB6ZFG calling CQ/QRP at 7014. It's not that usual to hear that type of call that low in the 40 meter band. I called him and it turns out that he was skiing in Tioga Wash, CA and in a cabin.

"He was using an MFJ rig and a folded dipole that was hung on the skis on the snow only up about 5 feet. Nice signal and contact, though. "I thought it was a hoot that he was portable as was I and had a nice chat!

"The last contact for the trip was a really nice one. I heard 3D2QB calling CQ on 30 meters the next morning. He only got one stateside person calling him and then he signed.

"I sent my call 2 or 3 times and /QRP and was about to give up when I hear `AE0CW/QRP 449 BK.' I was thrilled.

"I sent back `559 559 TU for FB QRP contact. Running 3 watts to end fed wire, BK.'

"He finished with `Great QRP signal here, keep up the good work, like to work QRP stations. 73 de 3D2QB.' What a hoot.

"That was a new one for me on 30 meters, marginal antenna, on vacation and first DX with the new call. "It was a good time. Nice antenna trees, lots of falling snow, elk and peace and quiet. How can it get better?"

MENTORING FUTURE QRPERS, AND THE NC20

Ralph Irons, N7RI, writes from Charlotte, NC that "the much anticipated Priority Mail package arrived (carrying the NorCal NC20 transceiver kit), and I whisked it off to school the next day to show the PCB to a colleague who is designing a board for a robotics project.

Here's his reaction: `Wow!' "As we drooled over the kit before the start of class, we were joined by Reed, a junior with a novice license (that vanishing species!) who has been racking up the states, and ratcheting up his code speed, on 40 meters.

"His eyes lit up like a Christmas tree when he saw the NC20 kit. "Between classes, Reed and I examined the manual, and talked construction.

"His short-course in robotics has given him some experience building circuits in stages and testing them. His plan at present is to build the power supply, the audio amplifier and pre-amplifier stages.

"Once these stages are functioning, he'll decide whether he wants to tackle the rest of the project. We inventoried the kit together, to get acquainted with the all of the component types. All the capacitors, resistors and semiconductors are now labeled and attached with nursing tape to sheets of white copier paper.

"Reed melts solder on Monday (unless he has too much Latin homework!) He knows that once his General ticket is in his hand, so is 20 meters!

"I'll get my SWL 40+ back once Reed earns the right to operate the NC20. When he heads off to college, it'll return to the shack.

"Like many of us did, Reed will go off to college and completely forget about ham radio, maybe until his 30s. Then watch out! The seed of a QRP CW operator has been planted.

"These inexpensive single-band rigs give us lots of opportunities to share our hobby with others. It doesn't get any better than that!"

QRP MOBILE: AN INAUGURAL VOYAGE

Jerry McCollum, W0MC, writes from Fort Collins, CO, that he thought he'd relay his "first-ever experience of operating QRP HF on the road.

"I'm out in Hillsboro, OR on business for a couple of days. I had just gotten there. For the first time ever, I brought some HF gear with me (NorCal 40A, tuner, power supply, wire dipole, etc. — thought about taking my freshly built NC20, but then realized the band would be shot by the time I got around to doing anything in the evening).

"Well, I strung my dipole across my second floor room (it's a 3 floor building), got everything hooked up and powered up the NC40A.

"Forty meters was awful, I presume because of my lousy antenna (only the driven leg was loosely strung across the room, the shield was curled up in a corner).

"I tuned around a bit and heard K1AO calling CQ coming in fairly strong. I thought, `What the heck, I ll give it a go.' I replied and right away he came back! I got a 519! (My lowest signal report ever.)

"Ron, K1AO, is located in Kentucky. It didn't last long, but we got a real QSO.

"Amazing what cruddy conditions, a lousy antenna, and 2 watts out of a superb rig can do!"

DROPPING IN ON THE NORCAL BUNCH

Joe Everhart, N2CX, writes from Brooklawn, NJ that "every once in a while we east coasters have to check out what that NORCAL gang is up to. The best way to do so is to drop in unannounced!

"Of course we DO have a spy in their midst in the person of James, KA5DVS, but a personal visit from `the old country' helps to keep them on their toes too.

"I was fortunate enough to be able to schedule a business trip around the time of the March NORCAL meeting so I reluctantly (yeah, sure!) traded a NORCAL meeting for the previously scheduled NEQRP inspection tour.

"To begin the day, a trip to the Livermore swapfest was in order. This flea market was several notches above the usual small club events back east.

"Lots of ham gear in addition to all of the usual old computer goodies and junk from the basement. Want a Mac `Classic' for $50? They got 'em there.

"How about PCMCIA Ethernet and 33.6 modem cards for $10 each? "The buy of the day was a bag of about 100 4.03 MHz ceramic resonators for $2.50. Great in place of the clock crystal for PICs.

"The most fun at the swapmeet was when I ran into James. I spotted him looking over some bargains and walked up to greet him with a 'Hi, James.' He turned with that deer-in-the-headlights look and stammered 'Joe, what, errr, what are YOU doing here? Weren't you just at the NJQRP meeting?'

"Surprisingly, not one soul noticed the Zombie badge I wore, or maybe they are so used to them that it evokes no comment these days.

"After loading up on more stuff to carry home in the suitcase it was time to head for the California Burger.

"Now only one of the gang, Mike Gipe, K1MG, was taken into confidence so that yours truly could get good directions. His was superb except for that LAST turn.

"California Burger was on the left, not the right. Got to keep your eyes on these guys! But, being from Jersey, I'm used to having to work with inaccurate directions — you know the kind that end with 'you can't miss it!'

"It was obvious that this was the place - several cars parked right in front had ham tags and prominent HF antennas!

"Ah, QRP Nirvana! The gang was starting to arrive at 10 o'clock and the father of the NC20, Dave Fifield, AD6A, was holding court, showing off his personal NC20 in the Doug Hauff, KE6RIE, anodized (red!) case and his newly created NC40.

"He says the NC40 receiver is too good! It is so sensitive and crunchproof that it hears stations that a QRP transmitter can never hope to work!

"Folks brought lots of stuff for show and tell, from a bunch of homebrew rigs to Bob (ole Kenwood) N6WG's Fox-chaser drinking glass resonant speaker to, of course, a new K2 that its owner just HAD to show off!

"The surprise appearance was repeated when Doug Hendricks showed up and James dragged me over to him saying `Look who showed up, Doug.'

"Non-plussed as ever, Doug merely replied 'Well, you finally made it to our meeting!'

"NJQRP had a minor show and tell offering in the form of a prototype FB40A and a proto FB40B. The `A' is the one with the decapitated oscillator pulled down 500 Hz from nominal. Lots of folks pawed the rigs and all wanted to know when the companion receiver would be available.

"The biggest hit of the NJQRP stuff was a clever end-fed wire antenna that Tony, W2GUM, had devised and given me. It consists of a homemade reel complete with hand-crank and a `heaving line' spool that both fit in an Altoids tin.

"It was extensively photographed by Jerry Parker, WA6OWR and the photos definitely will show up on the NORCAL web page. I was coerced into promising to write up the details to share with the QRP community.

"There were too many other folks there to mention, so I won't because I'd forget to mention someone's name.

"One parting shot . . . I knew I was in California when I looked at the menu board. In addition to the usual burgers, cheeseburger and bacon cheeseburger they also feature not only buffalo burgers, but ostrich burgers as well!

"I've got to get back to Jersey to recover from all this . . ."

ALL HB QRP, ALL THE TIME

Steve Gallchutt, N0TU, of Monument, CO, writes that he "took the leap! And it feels great!

"My bench is clear of all QRO gear, manufactured rigs and anything that would distract my attention from operating and building QRP rigs!

"I've found for myself that this activity is the essence of ham radio and helps keep the magic of HR alive for me.

"The first QSO that follows the turn on stage is most special. Besides, I know the guy who made my radio. I'm him.

"My good old friends . . . my Drake B line has found a new home and my Argosy is also soon on its way to a fellow ham. My little Sierra sits all alone . . . but is now king of the radio shelf.

"I thought I would really miss the Argosy in the mobile, but I'm

having a blast with my SST/20 jammed between the seats pounding out QSOs to and fro to work everyday.

"It's amazing what 1.5-2 watts can do even from a mobile. It's a funny feeling to think that after 40 years of this nonsense I would have accumulated more stuff: Like a room full of sophisticated hi-tech rigs with mega buck antennas ready for instant world wide QSOs.

"But instead, my quest is to recapture and sustain that essence of ham radio. And for me it's my Sierra and my little portable monobanders! But the Sierra is really my Walden pound.

"It's my bay window to that magic world of RF and propagation and many new kindred spirits. At least for the time being — that is until my simple world gets cluttered up again with possibly a new K2.

"WHAT? Is this a journey or destination or is the destination only a reflection of where we ve been or where we think we should be going?

"Seems like I've been here before. Now . . . where did my XYL hide that NC20 kit?

"Forget fixing the lawnmower. I need a QRP kit fix. NOW!"

TWO WHEELIN' QRP

Ed Loranger, WE6W, of Santa Rosa, CA, writes that he d like to relay a recent weekend operating adventure.

"Walter, AG5P, graciously sent me a Black Widow pole for my antenna use. Thanks Walter! What a guy. And Chris, N3XRV, sent me a BB3 base tuning unit. Both of these are going to really help my stealth operations here at the mobile home.

"I also wanted to field test my `Quad Chair' and check into the WSN-40 Net (every Saturday, 9 a.m. Pacific time, 7040 KHz). So I packed up the OHR-100, tuner, wattmeter, wire, twine, Vibroplex bug, dipole antenna, screwdriver, headphones, and two 2.1 AH gel cells with cables etc.

"Everything fit into a plastic box with velcro lid enclosure. I strapped the box with quad chair on top, and all was stable on the back of my rack on the 10-speed bicycle.

"Except for forgetting my jacket, all was perfect. It was 7:45 a.m. and 3 miles to the park.

"Upon arrival I set up next to the lake in Rohnert Park.

"Roberts Lake is a little duck pond by U.S. 101. The pond is part of the Mountain Shadows North golf course. Very pretty.

"I wedged the feedpoint of the dipole between the wood slats in the park table and tied the ends of the dipole 6 feet up in the neighboring trees.

"With all connected I was hearing good signals and nabbed a 30 minute ragchew.

"But an icy breeze whipped in and I was shaking with cold, leaving me wishing I had grabbed my jacket and cap. So I unfurled the full 15 feet of headphone wire and sat in my quad chair in the sun, listening to the net during call-up and comments.

"Then it was my turn and I shared the beautiful view and station setup. All signals were fine, except everyone experienced QSB.

"I packed up and rode off.

"A quick lunch and now it was time to act on that black widow pole. I decided that anchoring it to the travel box would be ideal, since I use the box for my station table when away from picnic tables. So I found that the web strap on the box could easily wrap around the pole and box, then anchored under the Velcro lid for a rigid antenna base.

"Then I grabbed two 50-foot rolls of wire that Jim Skalski traded me and I made a 66-foot doublet antenna, then used the rest of the wire as window line, using duct tape strips, 3/8 inch fat, as the insulating spacer about every 6-inches. It was fun.

"Oh, storing wire antennas is important for quick setup so I grabbed a 5x4x1 inch box with lid and slid a curtain hook under the lip of the box. The center antenna point clips under the hook and each leg of the dipole is wound to the right and left side respectively.

"The feedline wraps last and is hooked in at the end. Very clean. I did add 10 feet of twine and a plastic coathanger insulator to the dipole ends.

"With all my gear in the box, my Quad Chair, and Black Widow pole I decided to time myself going from fully packed to on-the-air in 15 minutes of slow-and -easy setting up, as if out in the cold weather.

"Pretty cool setup, antenna strapped to box, rigs/bug on the top of the box, and me sitting in my comfortable Quad Chair.

"It is important to have the first section of the pole locked in place before strapping the pole to the box. Otherwise you can't get the first section out.

"I had a great time working portable and with the Black Widow fishing pole (Commonly used for SLVs), I expect my park trips are really going to be extra fun."

LESSONS LEARNED: QRP CONTESTING AND THE CLUB STATION

Bill Kelsey, N8ET, writes from Findlay, OH, that prior to the QRP ARCI Spring QSO Party he told himself that he was "going to take some time off and get on the Spring QSO Party for a reasonable effort.

"A few days before the test I was starting to waver when N4BP posted a note to QRP-L asking if anyone needed another Team Member for the test.

"The night before the test I sent Bob a note saying - if you found a team and they need another guy - let me know, I ll get on.

"He sent me a note back saying no one had contacted him, so we would do it on our own - if the contest manager would accept an e-mail application at that late date.

"The new manager wrote back saying 'have at it, so we were hooked.

"I operate from a local club station where I have put in MANY hours of tower and antenna work. At 11:30 the day of the test (3.5 hours after the start) I rolled up to the club and went to work. First I had to load the latest copy of TR which is the contest software I use to log.

"That went fairly well, and then things went down hill from there.

"A quick review of the manual and the help screens and I remembered enough of TR to get going.

"I fired up the Club's TR-7 and found it had gone `Real QRP' zero watts out. I spent some time checking all the settings and connections (club stations have a way of becoming `mis-adjusted') and finally decided it was dead.

"I hopped into the car, went home, and picked up my TR-7. I did not bring the power supply - after all - what ever goes wrong with 30 amp supplies in QRP tests?

"Arriving back at the club I fired up the PC only to see a `hard drive failure' message on the screen. Some time was spent being sure it really was a hard drive failure — it apparently was! So - I installed the newer PC the club had put together last year and loaded TR again.

"The PC is now running, so I fire up my TR-7 and find it also has no output! I recall the Drake power supply has separate leads for the low

current and high current +12V to the transceiver, so I scoot off home to pick up my power supply. Arriving back at the club, I find the PC still works (first thing that has gone right in a couple hours!), plug in my PS and find I STILL have no output. I KNOW there can't be that many failed pieces of equipment in front of me, so I start pulling things apart.

"The first thing I do is to disconnect the remote VFO and try again.

"AND FINALLY I HAVE RF TO THE ANTENNA! Someone had left the SPOT button pushed in! I then recall that when the remote VFO is in the SPOT mode - TX is disabled on the TR-7 - even though the remote VFO is OFF.

"I'll never forget that again.

"Anyway, it is now 2 o'clock, so off we go. I put in a couple of so-so hours in the afternoon on 20 and 15 with one QSO on 10 when HP1AC agreed to QSY there, and head home for dinner and to be sure the family has not forgotten me.

"That evening I return and make some QSOs on 40. It was getting pretty noisy. I went to 80, and could hear some signals in the QRN, and even worked one or two. I called CQ once and could tell there were many stations calling, but with the noise it was impossible to copy even one of them. The antenna on 80 is up 90 feet or so, and gets out fairly well. About 11 I finally gave up and decided to get some sleep and hit it in the morning.

"As I got in the car I looked west, and the entire western horizon was lit up with lightning!

"There were some clouds that never seemed to get dark. Cloud to ground, cloud to cloud - it was all there. It was one of the best electrical storm shows I have ever seen - and definitely the worst I have ever heard!

"There was always a bolt visible somewhere on the horizon. I got back on the next day for a few normal hours in the morning, a couple in the afternoon, and finished up the last two hours of the test. The last two had the most activity and I had two hours of over 30 QSOs per hour then - and I even made some QSOs on 80!

"My final claimed score was 206 QSOs, 874 points, SPCs 79, power multiplier of 7 (5 W) for a total score of 507,794 in about 11 hours of operating.

"Twenty was the big band (77 QSOs, 27 SPCs) with 40 very close behind.

"My next QRP test will be with some new kits I have in the works - I will not waste 3 hours again because someone pushed in a button I didn't see."

LET THE QRP PARTY BEGIN

Jim Hale, KJ5TF, writes from Kingston, AR, that "the turnout was great for the QRP ARCI QSO party.

"My recently destroyed and repaired 10/15 meter quad beam at 70 was sitting cockeyed up there. The driven element spreaders had buggered up the holes in the boom.

"It leaned at a funny angle to the reflector, but SWR was fine!

"Not fully trusting it I setup my Black Widow vertical in the yard outside my shack window. Only two radials and tuned for 15 meters.

"Saturday morning I started out with 20 meters and worked West Virginia with 50mW, and North Dakota with 90mW.

"The 20 meter antenna is a half square 20 feet off the ground. "Next I went to the 15 meter ground mounted vertical. There was HP1AC and I worked Cam with 45mW.

"On to Connecticut and Florida — both with 45mW.

"This was going so well I lowered the power to 25mW and worked Colorado and New Mexico on 20 meters.

"Coming up next and slightly with 35mW for Oregon back on 15 meters.

"Sunday again starting with 20 meters and 55mW I worked North Carolina, Pennsylvania, Colorado, and Virginia.

"Back on 15 meters I heard the Bahamas but he never copied me with the Black Widow. So I gave the crooked quad a try and with 200mW I made the QSO.

"Hummm, 200mW is a lot of power!

"Feeling like I had just spent too much power, I lowered the power to 11mW and worked Maryland on the 15 meter crooked quad.

"Then 10 meters at 8mW I bagged two Oregon stations, and a VE7 in British Columbia as well.

"Back to 15 meters and 11mW again, I worked the same VE7, plus North Carolina.

"Feeling really lucky I lowered the power to 2mW and worked New Mexico and New Hampshire.

"I ended up Sunday afternoon early, but bagged California and Nevada with 9mW, Pennsylvania with 18mW.

"This was pretty good for my mW WAS effort. My standings now are 37 states, and total power used 1.173 watts.

"I added a few new states, and lowered the power on several states I had already worked with higher power.

"To make all this even MORE FUN, I worked a lot of stations with the AR QRP club callsign, NQ5RP.

"There was no multi for club stations, but it was just good fun. It was a great party QRP ARCI! Now I ve gained confidence with my ground mounted Black Widow fishing pole vertical, and ready for (the next contest)."

Keeping in QRP contact

Part of the fun and fascination of QRP comes in hearing of the experiences, challenges and success of others. And tell your story is part of the natural process.

Why not drop a card, letter, photograph of e-mail to Members' News? Sending off a few lines takes only a few minutes. Putting it in the mail of on the wire is painless, and the camaraderie it invokes in the QRP community is a substantial payback.

Here are the only mailing addresses you'll need:

Richard Fisher, KI6SN
1940 Wetherly Way
Riverside, CA 92506

(E-mail: KI6SN@aol.com)

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Another Portable Vertical Antenna

(Keep Your Fishing Pole for Fishing!)

John Cumming VE3JC *email: ve3jc@rac.ca*

I really didn't need a portable vertical antenna when this project began. My "backpacker special" fan dipole and various other wire antennas did quite well in my "to the field" exploits. But as with a lot of other projects, an unexpected flea market purchase got my imagination going. In this case, the purchase was a set of odd-looking three-foot long rods of various thicknesses. The six rods were threaded at the ends, with a color-coded knurled section above the threads, obviously designed to permit quick assembly. Through the chipped black paint, it appeared that these rods were made of copper, although they were surprisingly light.

A "what-the-heck-are-these-things" posting to QRP-L provided me with a lot of history on my newest purchase. I was informed that these were intended for use as a mobile whip on various military vehicles, and were designed such that a broken or bent section could be quickly replaced. I also learned that they can be purchased through Fair Radio Sales {Footnote}, and possibly through military surplus dealers. Fair's Catalog describes them as follows:

> "3-foot mast sections, WW-2 and Korean War Vintage: painted copper-coated steel. Sequentially screw into the other. 3/16-in. diameter. MS-49 top section the smallest. Self-supports to 15 ft. MS-49-50-51-52-53, used $3 ea., MS-54 $6 ea." [Fair Radio Sales, Catalog WS-98-1, p. 11.]

So what to do with my 18 foot quick-disassembly whip? My first thought was to build a simple base insulator, and to use it as a "to-the-field" vertical with lightweight guy system and roll-up radials. However, I didn't want to stop at 18 feet. And of course, I was going to need something to carry the antenna sections in (ABS pipe with an end cap quickly came to mind). The system I'm going to describe is the result of a few hours of doodling and head scratching, and several trips to the plumbing section of my local Home Depot.

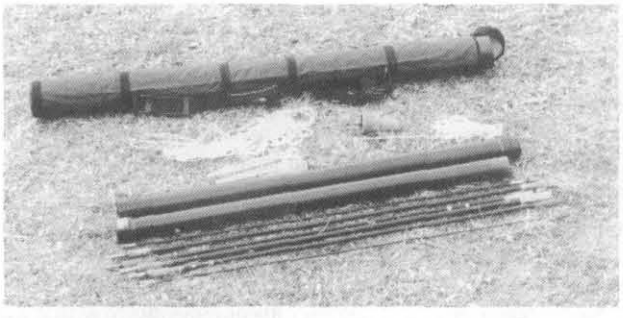


Figure 1. A complete 24 foot portable vertical antenna system

By experimentation I found that the six antenna rods fit snugly inside a 1 1/2" ABS pipe, which of course easily fits inside a 2" ABS pipe, so my first purchase was a three-foot section of each diameter. My design challenge was then to mount the bottom mast section on the ABS pipe, extended to give a total height of twenty-four feet. Quick disassembly and a maximum "collapsed" length of about four feet were essential objectives.

I received many strange looks from the plumbing sales staff, as I tried every combination of ABS, PVC, and copper plumbing coupler I could find. My final design for the ABS sections is as follows: A 1.5-in. end cap, permanently cemented to one end of the smaller diameter ABS, serves as the antenna base. A 2 in. X 1.5 in. coupler is permanently cemented to one end of the 2 in. ABS, and permits this section to rest on the open end of the bottom section. At the other end of the larger ABS, a 2 in. threaded coupling is cemented. Note that, when disassembled, the larger ABS section can be flipped around to telescope over the smaller pipe holding the six whip sections. On the 2 in. ABS assembly, binding posts are mounted at each end by drilling small holes through the cemented side of each coupling (that is, close enough to each end to permit inside access for mounting the binding post without interfering with the function of the couplers)

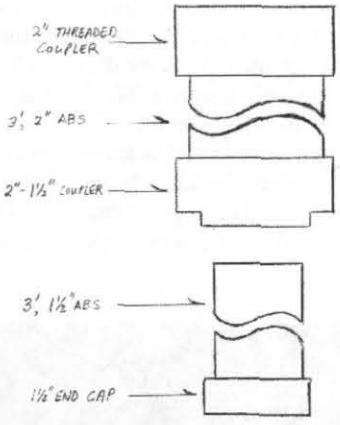


Figure 2. ABS Base sections

Now, how are we to get the bottom (MS-54) metal mast section to mount at the inside-thread coupler end of the large ABS pipe? If I had a 2-in. diameter aluminum rod and a fully equipped shop, I would machine a very nice connector for this purpose. Having neither, I ended up building the contraption shown in Figure 3.

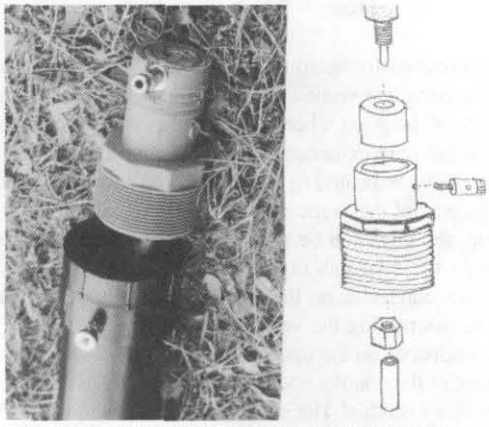


Figure 3. Detail of the mast to ABS connector

A 0.5 in. diameter hole is drilled in the center of a pipe cap for 0.75" copper pipe. I was lucky to find a 0.5 in NC13 nut (same thread as the base of the MS-54 mast section) and a small length of 3/8 in. ID steel tube (the same diameter as the tip of the MS-54). After threading the rod through the copper cap into the nut and the tube, I filled the copper cap with epoxy putty. A single thickness of electrical tape was used to "cap" the open end of the small tube and to prevent the putty from sneaking in between the tube and the nut. To assure proper alignment, the putty was

allowed to harden completely before the antenna rod was removed. Next, the copper cap assembly was epoxied inside a 2 in. X 1.5 in. threaded ABS to PVC coupler, and liquid epoxy was used to fill the coupler assembly. One final step is required in constructing the whip-to-ABS connector — a means must be provided for continuity between the whip and the "base" radiating conductor (which we'll talk about shortly). Going back to the junk box, I found a nice combination banana jack/binding post. After removing a section of the PVC at the top of the connector, a hole was drilled and tapped through the side of the copper cap into the nut. When installing the binding post, be careful not to overtighten, since this could affect the alignment of the nut and pipe, preventing easy insertion of the MS-54 antenna section.

Now we haven't even discussed what kind of an antenna we're going to use our vertical radiator for: Single or multi-band, vertical or inverted-L, resonant or random, base or center loaded? Before looking at a few alternatives, let's talk about how we're going to get the thing standing up! My objective was to have a simple guyed system, capable of being assembled by one person whose strength had been sapped in a long day of paddling and portages. This is achieved quite nicely by the system shown in Fig. 4. Three small holes are drilled in a beveled washer having a 7/16 inch center hole diameter. This washer fits between the MS-51 and MS-52 sections (that is, at the 15 ft level of the assembled vertical. Nylon cord guys (each 24 feet in length) are tied to "guy ring" washer, and each guy is looped through a brightly colored bead, 15 feet out from the washer. In addition to providing some visibility for the guys, the beads will be used to conveniently spot the proper location for tent peg guy stakes.

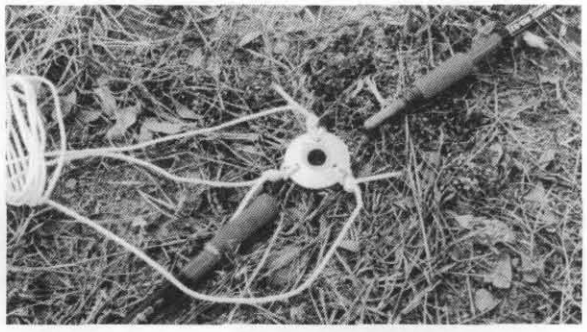


Figure 4. The main guy ring

The process for getting our vertical upright is as follows: Assemble the complete vertical on the ground, and position it such that the guy ring is at the point where we want the base of the antenna to end up. The three guys are extended out on the ground, and a tent peg is driven in at the points indicated by the beads. The ends of the guys are then tied to the pegs, and the vertical is "walked up" into position. Once the vertical is up, the guys can be readjusted, and a second set of guys can be tied on for additional stability. These second guys are looped over the MS-54-to-ABS connector on the ground before the whip is threaded in place. Before assembling the vertical for the first time, it is a good idea to use fine sandpaper on the open end of the small ABS. Because of the tight tolerance of the coupler and the lower pipe, disassembly will be difficult if you don't do this! The erected antenna is shown in Figure 5.

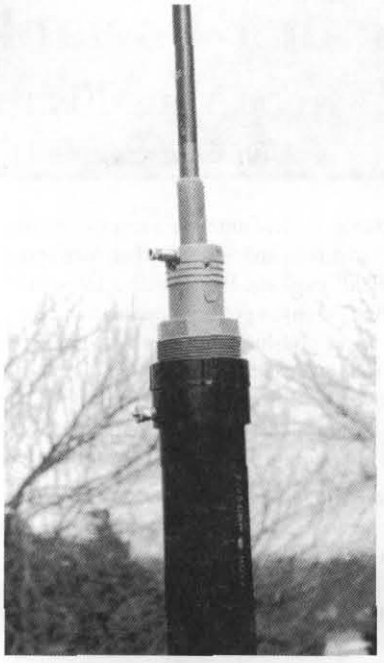


Figure 5. Close up of assembled antenna

In its simplest configuration, a wire is connected directly from the rig (or tuner) to the binding post on the mast-to-ABS connector. Alternatively, a coil can be wound on the ABS (terminating at a binding post on the ABS), and a short jumper is used between the two binding posts shown

We now have a twenty-four foot structure pointing to the sky. So how are we going to make it radiate? As I said before, there are a number of alternatives, and I'd like your imagination to run wild with this part of the project. I first used this "vertical" in a totally random configuration during the 1998 "Flight of the Bumblebees", simply by hooking a hunk of wire between my MFJ 971 tuner and the binding post at the bottom of the "whip", and throwing out a couple of radials. I have also planned to use it as an inverted L on 40 and 80 meters, by clipping on small-gauge Teflon wire as a horizontal radiator from the tip of the whip to a conveniently located tree. If desired, the "far end" of the horizontal section could be dropped down to permit connection of a wire extension, to provide band-switching capability. I have soldered a terminal connector to the top rod for easy connection of the horizontal leg.

Of course, a loading coil could be constructed on the 2 in. ABS. This works out well, since the larger diameter ABS is up higher, permitting improved loading efficiency. Also, a coil wound on the exterior of the large pipe will still permit the ABS sections to telescope for storage. To wind a coil on the ABS, one end of the coil conductor is anchored in the ABS, and a lawn-trimmer nylon string (equivalent in diameter to the conductor) is used as a spacer as the coil is wound. Multiple nylon strings can be used if greater coil spacing is desired. Because I already have a banana jack at the whip base, I have toyed with the idea of soldered and epoxied banana jacks at appropriate points on a loading coil. Jumpers with banana plugs would then permit selection of the appropriate band — Outbacker Perth, eat your heart out!

Unlike the St. Louis Vertical and other recent variations, this portable vertical antenna does not use a fishing pole. However, I did not keep completely away from the tackle shop; a four-foot fishing rod carrying case (shown in Fig. 1) is perfect for transporting this system. The collapsed antenna, guys, and tent pegs fit conveniently. Note that you can also wind any radials you are using on the outside of the larger ABS pipe before putting the antenna in the fishing rod carrying case. With a total packed weight of approximately ten pounds, you would not want to carry this over your shoulder on a 10-day hike. But for a short "to the field" trek from the car into the bush, or on a weekend canoe trip, it is quite transportable.

I hope this article has presented a few ideas that you can apply to your own portable antenna projects. I'll be listening for you in the next great "to the field" contest!

{Footnote} Fair Radio Sales, P.O. Box 1105, Lima, OH 45802. Phone: 419-227-6573. Email: fairadio@wcoil.com

Temperature Stabilization for the W1HUE QRP-PLUS Final Amplifier Mod

Larry East, W1HUE

Beginning with the January 1997 issue of the QRP Quarterly, I published a series of three articles describing modifications to the Index Labs. QRP-PLUS Transceiver. (See note at the end of the article.) In the second article of the series, which appeared in the April 1997 QRP Quarterly, I described how to replace the IRF510 MOSFET used in the final amplifier with an MTP3055E MOSFET for improved SSB linearity and output power.

Unfortunately, my original circuit did not include any temperature compensation for the DC operating point of the MTP3055E, which exhibits an upward drift in its drain current under key-down conditions. With the zero output power drain idle current initially set at 200 mA, it will typically increase an additional 80 to 100mA over a 30-second period and then (more-or-less) stabilize. I did not consider the drift to be cause for concern at the time, but several folks who have performed the mod have expressed concern. In any event, the idle current is difficult to set when it's drifting all over the place!

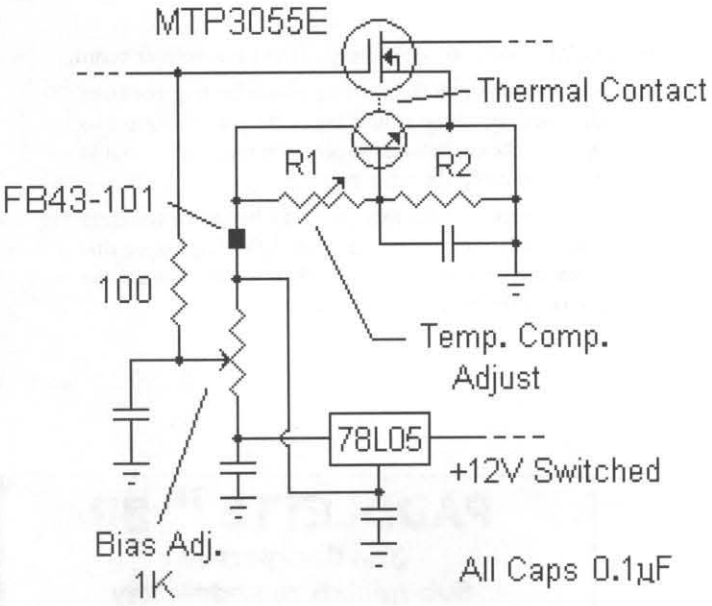
The idle drain current of the original IRF510 also drifted upward, but not as much as the MTP3055. This is because the '510 is a much lower current device than the '3055, and the idle drain current is closer to its "zero temperature coefficient" drain current versus gate voltage point. This point occurs at a drain current of about 2A in the IRF510 and at about 7A in the MTP3055. Below this point, the drain current will have a positive temperature coefficient, and a negative coefficient above (that's why "thermal run-away" is less of a problem with MOSFETs than with bipolar transistors).

I decided to see what could be done to reduce the drain current temperature drift. One possibility is to replace the MTP3055E with the newer MTP3055V; according to its data sheet, the "V" version has a lower temperature coefficient at drain currents below 1A. I have been told by others that the "V" works just fine in my modified amplifier circuit, but I have not tried one myself so I have no data on its drain current point drift. For temperature compensating an MTP3055E, the relatively simple circuit shown in Figure 1 provides excellent results.

In this circuit, compensation is provided by an NPN transistor in thermal contact with the MTP3055E (how that is accomplished is described later). R1 is adjusted so that the change in the transistor's collector voltage with temperature reduces the MOSFETs gate bias to exactly cancel its drain current positive temperature coefficient. The voltage drop across the transistor is a multiple (determined by 1 + R1/R2) of its base-emitter voltage, V{subscript on}BE{subscript off}, which has a negative temperature coefficient. The change in the MOSFETs bias with temperature is therefore given by:

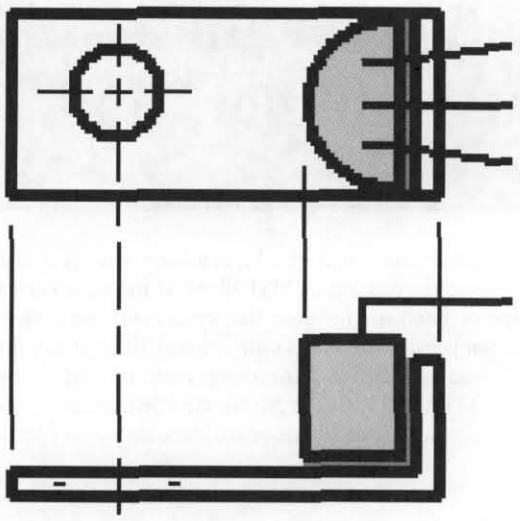
$$\frac{\Delta V}{\Delta T} = \left(1 + \frac{R_1}{R_2}\right) \times \frac{\Delta V_{BE}}{\Delta T}$$

Note that this scheme only works if the magnitude of the MOSFETs drain current temperature coefficient is greater (and opposite to) than the base-emitter voltage temperature coefficient of a bipolar transistor. This happens to be the case for an MTP3055E in the drain current range of interest. However, this circuit will very likely overcompensate the drift in the original IRF510 amplifier. It will probably also overcompensate the drift in the newer MTP3055V. (If the drift in the idle current in your rig is less than about 30 mA or so, I wouldn't worry about it.)



I used a 2N3904 for the compensating transistor, but just about any small NPN transistor will work (Do not use a Darlington type, however). R2 should be in the range 1K to 10K, and the maximum resistance of R1 should be 20 to 30% larger than R2. For example, if you use a 5K pot for R1, then 3.9K would be an appropriate choice for R2. The ferrite bead is probably an overkill, but I wanted to make sure that no RF reached the 78L05. The transistor is epoxied to a 0.25-in. wide, 0.064-in. thick piece of brass (obtainable from most hobby shops) fabricated as shown in Figure 2 (copper or aluminum will also work - maybe even better than brass).

The transistor should be in "intimate contact" with the metal; don't depend on epoxy for good heat transfer! The metal strip holding the transistor is mounted over the MTP3055E mounting flange; use heat sink compound between the two to ensure good heat transfer. R1, R2 and the 0.1 uF bypass cap can be mounted on a small piece of perf-board suspended above the transistor by its leads; a little epoxy can be used to hold it in place. Make sure that R1 can be accessed for adjustment, and that none of the components touch the cabinet or the PC board above the RF amplifier board.



This mod requires some minor surgery to the RF amplifier board:

1. You must remove the existing bias adjusting pot from the board. Bend the ground leg of the pot 90-degrees so that it sticks out behind the pot, then remount the pot to the board using the other two legs.
2. Remove the 78L05 regulator and bend the common lead (that's the one in the center) 90-degrees so that when the 78L05 is remounted, it points toward the center of the board.
3. Drill a small hole through the board so that the 0.1 uF bypass cap shown in Figure 1 between the common lead of the 78L05 and ground can be mounted on the top of the board and soldered (through the hole) to the ground plane under the board.

The 0.1 uF cap that bypasses the output of the 78L05 (not part of the original circuit) can be mounted under the board.

After installation, set R1 to its minimum resistance and the bias pot set at its full clockwise position. Slowly adjust the bias pot for an idle current of about 200 mA (that's in addition to the 400 to 450 mA the rig draws in transmit with the MOSFET biased completely off). Remember that the RF drive must be reduced to minimum when making this adjustment. You should note an upward drift in the idle current. Unkey the rig and increase the resistance of R1 slightly (about 1/8 turn).

Wait a minute or so for the MOSFET to cool, then key the rig and readjust the idle current using the bias control. The drift should now be less, maybe even downward. Continue this process until the idle current remains steady. If you "overshoot" and need to reduce the resistance of R1, reduce the bias slightly (rotate the bias pot clockwise) before re-keying the rig to prevent excessive MOSFET drain current. When R1 is properly adjusted, the idle current should stabilize within a few seconds and then remain constant within a few mA for as long as the rig is keyed.

Note: You can obtain copies of my QRP-PLUS modification articles by sending me a "business size" SASE with two units of postage. If you are overseas, just send me an IRC. If you are fluent in German, you might be interested in reading the translations of my articles that appeared in the 1998 issues of "QRP Report" published by the German QRP Society.

Still QRP Really!

QRP WISDOM FROM UNCLE BRUCE

Bruce Muscolino W6TOY/3
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Silver Spring, MD 20916
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I lost a friend two weeks ago, and QRP lost one of its staunchest supporters, when Bob Gobrick, N0EB, left us for better horizons. You all know Bob from his columns *"QRP Clubhouse"*, where he tried to bring us all together in support of a bigger and better QRP community.

I knew Bob a little better than most. Bob and I started FDIM, back in 1995. We sat down together and agreed that one of the things the QRP community needed badly was some technical and operating smarts. There were a lot of newcomers being attracted to QRP who didn't know their transmitter from their receiver. We agreed that a Technical Conference of the type commonly used in the engineering business would help.

We both thought it was a success when the first one was attended by over 100 people! We honestly expected maybe 25 or 30 folks. It was a new experience, hams coming from all over, to Dayton, one day early, to sit and listen to our patchwork of authors talk about what they did and didn't do with QRP. I salute you Bob, without your energy and dedication we couldn't have done it, and QRP would be a much more barren place with out it.

One or two other things and then...

Have you ever noticed how the price of entry keeps going up? Once upon a time it was enough to have a subscription to the daily paper. Then a radio, and a TV, and now a computer and a VCR! How many news programs have you heard say "for more details log onto our website at www.getmorenews.com"? How many offers of good stuff are accompanied by a "video tape" for further instruction?

Well, it's come to QRP and I'm not sure I like it. I'll grant you that technology has its place, and maybe ham radio is one of them, but are we raising the price of entry too high by our dogged determination to use more? Every QRP operating event I see is accompanied by questions about "how do I make my computer (home, station, or pocket)", do logs for this event? As if everyone is going to make 2000 QSOs!

Get serious. Why clutter up your operating position with another interference causing box just to log 30 QSOs? Well, you say, it's easier than doing all that duping by hand. Really, a standard ARRL log book does 25 or so QSOs per page. Are you telling me you can't read your own writing for ONE page?

And then there is the "push a button" and get your entry printed out argument. Tell me, how much longer does it take to put 30 QSOs into your computer after the fact and print out a report? You should have been around in the 80's, when it was common to a 400 or more QSO contest entry by HAND!

Lets get back to operating. Leave the super-teckkie stuff until you can do at least 60 QSOs in a two day weekend!

DX, and high-speed CW

Operating, ah, isn't that the whole purpose behind this exercise? To get on the air and work other stations? I saw a posting recently about working DX that I had to comment on. In a way the writer was saying, what's wrong with me? I'm a ham but I can't copy 25 wpm, why don't they slow down for me.

Well, the truth is they really do slow down. You have just got to look for them where they will. For example, during a contest you would think they would want to work you, and really, they do. Why then don't they hear you? A couple of reasons come to mind. First, during contests the QRM level is much higher than at other times. A low power signal, especially if you have very few contesting skills, can easily be overlooked. Especially at slower speeds.

Contesters these days seem to think there is some relationship between their CW speed and their score. Maybe there is, but it will take a few years for it to shake out and until then don't count on them slowing down much in the early parts of a contest. After that, well, either speeds will come back to 20 - 25 wpm or we'd better all learn faster code!

You can get around this by looking for contest stations late in the contest period, when thing are slow for them too. They have more patience then, maybe because they're tired, and are willing to put up with slow speeds and repeats.

But there is another way to work DX that has worked for me for the last 30 years! Listen around for the DX stations. Find out where they hang out. One reason I got an Extra Class license years ago was I realized the DX guys hung out low in the band to get away from those boring Americans! With an Extra I can get them where they live!

Another thing to do is to take into account the time difference between them and us. Look for them after their work period, which most likely will not be your after work period! Look for them between 14.030 and 14.050 on Saturday afternoons. Hardly a Saturday goes by that there aren't dozens of DX stations on in that time period. And work the smaller European, and other DX contests. CQWW and ARRL DX are fun contests if you have some experience, but I guarantee you will work more Dutch stations, and at speeds you can deal with, during PACC! This also applies to the REF contest and the UK contests!

I hope to be more mobile as the summer comes on and maybe see some of you at hamfests. I will be back at Dayton next year, even though it will not feel the same without Bob.

Software Reviews . . .

by Bruce Muscolino, W6TOY/3

Circuit Maker

Here's the real cause of my column not being here last time! Circuit Maker PRO is a circuit simulator, published by "MicroCode, 927 West Center Street, Orem, Utah 84057-5203". It is a fine product, and I'll let you in on a little secret. I spent almost two months trying to come up with a set of circuits that would exercise some of the features of Circuit Maker.

I spent a lot of time looking through the circuits that are bundled with Circuit Maker PRO to find ones which are most applicable to ham radio. I finally settled on the bandpass filter. Here is one circuit which we are familiar with in one form or another. It is commonly used as an audio filter in simple receivers. The MicroCode example, shown in Figure 1, is a single stage filter that you can use as is (with frequency adjustment) or play with to optimize bandwidth to suit your design. And, you can actually build it using a single 741 Op Amp! Let's look at it.

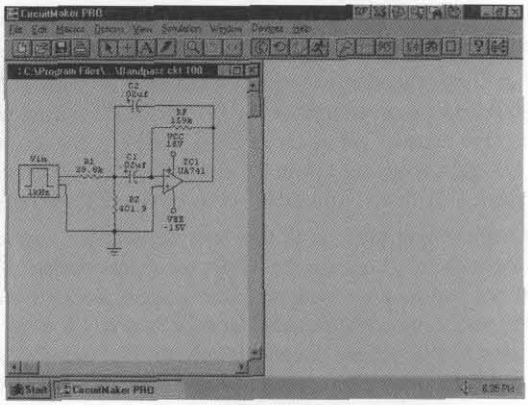


Figure 1

Start with C1 and C2. They are shown as 0.02 uF capacitors. The center frequency, with all the rest of the components staying the same is about 991 Hz, and the voltage gain is 1.840. If you simply shift them in value to about 0.022 uF you come down to a center frequency closer to 900 Hz. Actually about 0.025 uF should be perfect, though you'd have to make it up from smaller capacitors. The capacitors must be fairly well matched to give the best performance.

How well matched? Using the component change panel shown in Figure 2, I tried varying them individually from 0.02 uF to 0.027 uF. If C2 is set to 0.027 uF and C1 is left at 0.02 uF the center frequency drops to 848 Hz but the gain also drops to 1.62. Reversing the capacitors, that is making C1 0.027 and C2 0.02 uF leaves the center frequency the same but raises the voltage gain to 2.120! Hmmm, interesting?

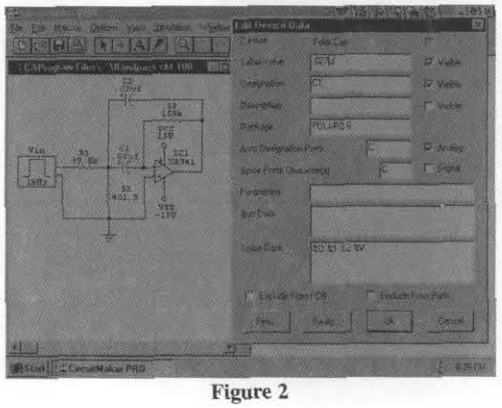


Figure 2

Next I left the capacitors alone and varied the resistors. Precision values are easier to get using resistors, either by buying them or by just matching with an ohmmeter. Changing the input resistor from 40.9K to 56K gave a voltage gain of 1.32 and a center frequency of 895 Hz. Then raising R2 to 560 ohms from 400 ohms left the voltage gain the same but reduced the frequency to 760.5 Hz. The final adjustment was to the feedback resistor, raising it from 159K to 170k. This lowered the center frequency to 737 Hz and raised the voltage gain to 1.410. My final filter uses a 56K input resistor, a 560 ohm resistor to ground and a 170K feedback resistor along with 0.022 uF capacitors. Its center frequency is 743.5 Hz and its voltage gain is 1.44. Clearly an example of what you can do with CircuitMaker PRO without ever heating up the soldering iron! A very instructive example. You can see the circuit analysis in Figure 3.

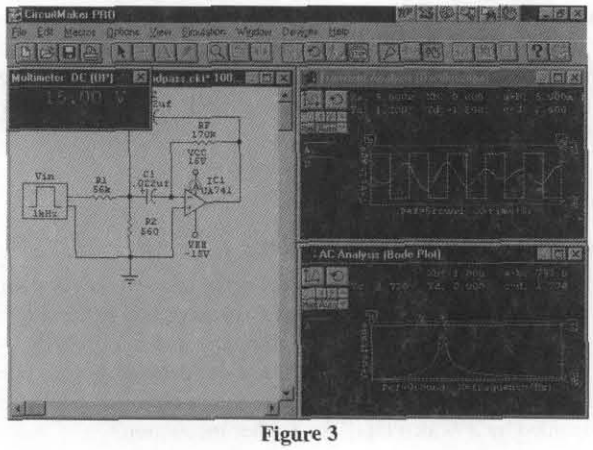


Figure 3

By the way, I got out my copy of Solid State Design for the Radio Amateur and did a few of calculations for these circuits. The original circuit, starting from the components shown on the screen turns out to be a 1.0 kHz bandpass amplifier with a Q of 10. The modified circuits have Q's of 8.5 and 8.4, and center frequencies of 745 and 791 kHz respectively. Pretty interesting stuff, right?

The toolbox of circuit elements is the most comprehensive of any I've yet reviewed. All of he QRPer's stable of common "cockroaches" are there, the 2N2222A, the 2N3904, and the uA741 among them. A very extensive sample components is presented with the opportunity to change values to make custom circuits as well. A quick look at the component panel shows the range of values that can be changed for any component. This is illustrated in Figure 4.

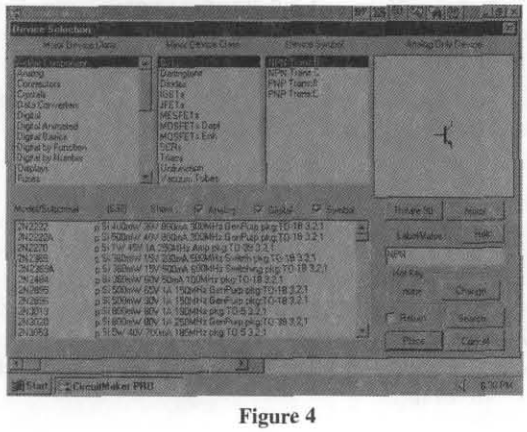


Figure 4

CircuitMaker PRO can be used for circuit layout and also for drawing schematics. It is easy to use and produces very good output. Perhaps next time we'll look at the layout features.

The Parts Gallery and Analogue Electronics

These are two learning programs that teach the basics of analog electronics and parts. They are both written by Mike Dooley and published by Matrix MultiMedia Limited of Bradford, England. They are marketed here in the USA by Claggk Inc., the publishers of "Electronics Now" and "Popular Electronics". Even though it has changed hands and directions, "Popular Electronics" remains high on my list of teaching aids because it did most of the basic work for me way back when it first started publication! Oh, if you're curious, the unique spelling in the titles is because they're British, don't 'cha know!

The introduction section of each CD provides a lot of information on use it to best advantage, whether in a classroom or for individual study. Hints are also given about how to best organize your studies, whether you want to study only one part or all of them.

The Parts Gallery

If you're of a mind, pick up your Mouser catalog and look at the section devoted to analog parts, resistors and capacitors. The current catalog devotes 35 pages to the topic of Resistors and Potentiometers. Included are 3 pages of varistors and thermistors, 5 pages of fixed resistors, 2 pages of resistor networks, 6 pages of power resistors, 7 pages of panel mount potentiometers, 8 pages of trimmer resistors and 2 pages of precision potentiometers.

The current catalog also contains 30 more pages devoted to capacitors. These pages break down as follows: 10 pages of electrolytics, 4 pages of tantalum capacitors, 2 pages of chip capacitors, 4 pages of ceramic caps, one page of variable capacitors, including ceramic trimmers and polyfilm variables and the rest devoted to monolithic, polyesters, polystyrenes, and micas.

Never thought of the tremendous array of resistors and capacitors available. Each type of capacitor and resistor is accompanied by a brief specifications panes which describes its performance over temperature and one or two other important variables. How is the beginner to weed his way through this wide assortment of parts to buy what he needs for his project? I now have an understanding of why kits are so popular!

Parts are the basic glue of which our radios are built. Specifying the wrong part can lead to poor operation or even no operation at all. Resistors and capacitors have the same values available in multiple types — are they all the same or are they different? Knowing how to select parts is part and parcel of successful equipment design. The Parts Gallery CD can help a beginner and even an Old F@@t. For the beginner it provides an unequaled overview of they different parts types and what they are used for. For us older folks, it provides a review of these parts and what they do. It is a useful CD to study.

Figure 5 shows the menu for this program. As an introduction to the wide variety of electronics components available today this CD succeeds. Each part type is shown in photographs and described in writing. There are two sections, which cover the same material from different directions. The first is a photogallery rendition of the various components and the second is a series of schematic representations of these components. Figure 6 shows some of the photographic renditions.

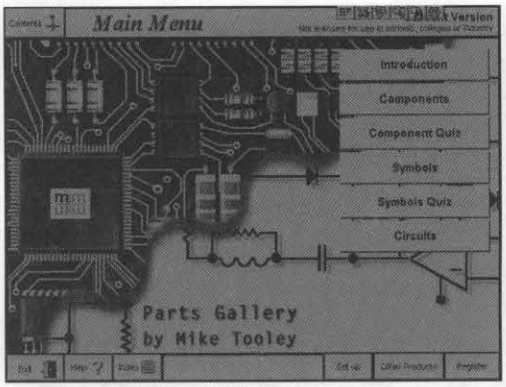


Figure 5

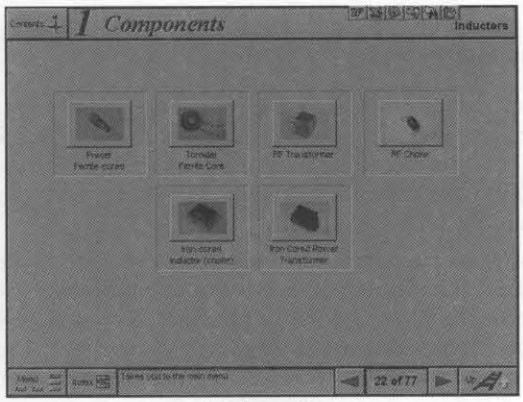


Figure 6

The majority of these components will be familiar to anyone who has a basic understanding of electronics. However, there are two things that should be kept in mind — the first is the continental method used in naming and displaying circuit symbols and parts, and the second is that some of the components are uniquely European! Figure 7 shows some examples of "continental" circuit symbols.

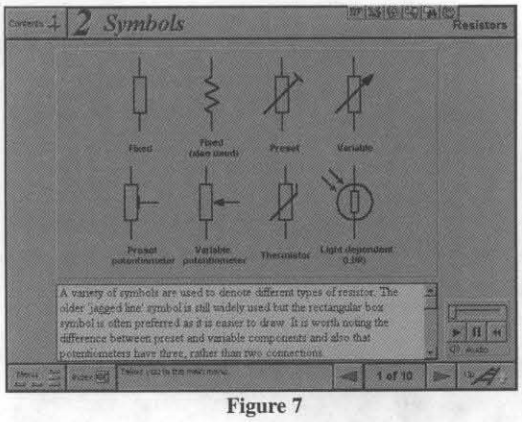


Figure 7

I took both tests given with the software. I scored 10 out of 10 in the parts identification from photographs but only 8 out of 10 in the identification from schematic symbols. Figure 8 shows one example of the test. My errors were in the representation of parts that differ between continental and US standards. Also the continental system uses the word "preset" for small veritable resistors and capacitors that are adjusted and left unchanged. In the US we do not differentiate between variable resistors by using the term presets. We are more likely to represent them the same way on the schematic and call them "trimpots". The same theory applies to trimmer capacitors!

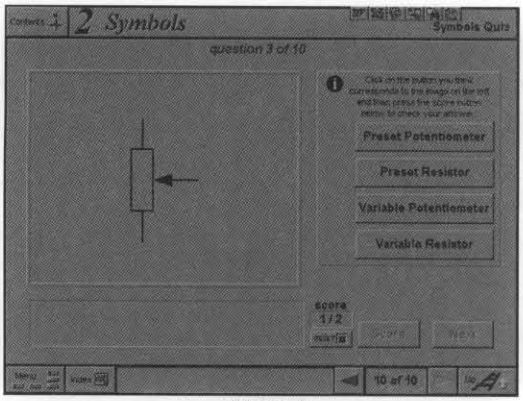


Figure 8

Analogue Electronics

As radio amateurs we all have a need to understand the operation of analog circuits. For the most part, analog electronics is the foundation on which our radios are built. We really don't need to understand them well enough to design them but we should know how they work and what they are made from.

Some of us are fortunate. A job or an education in electronics provides the. But what of the newcomer to our hobby? I can well remember the trauma involved in trying to understand the operations of a simple crystal oscillator so I could pass my Novice test! The general exam involved DRAWING circuit diagrams for transmitters and receivers! Egad, how did I ever pass them.

Of course testing has changed these days so that detailed knowledge is not required. A systems level knowledge of the circuits works well. But the question remains, where to get this knowledge. In the "old days" there was really only one way, READ and STUDY everything you could get your hands on about the circuits involved. I actually used my ARRL Handbook as a reference for some studies in college! These days you still have to read and study the material, but advances in teaching methods have made it much easier. The Analogue Circuits CD-ROM is one way to make it simpler. Figure 9 shows the menu for this program.

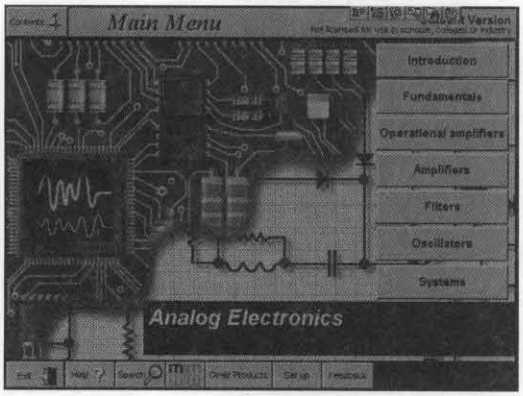


Figure 9

In a series of programs, Mike Dooley takes you be the hand and leads you through the concepts and circuits you must learn as a basis for further study. Each program includes an Introduction, followed by lessons on the high points of the topic. These are not cursory lessons, some of them are up to 50 or more pages long, involving a lot of reading. They should probably be accompanied by some studious note taking for review purposes. If fact I would buy a bound notebook and go through the course lesson by lesson, taking notes as I went. It would make for a very good background in analog electronics. Figures 10, and 11 show the detail of a couple of the lessons.

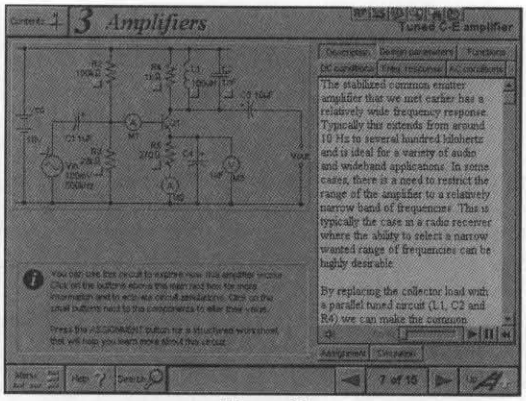


Figure 10

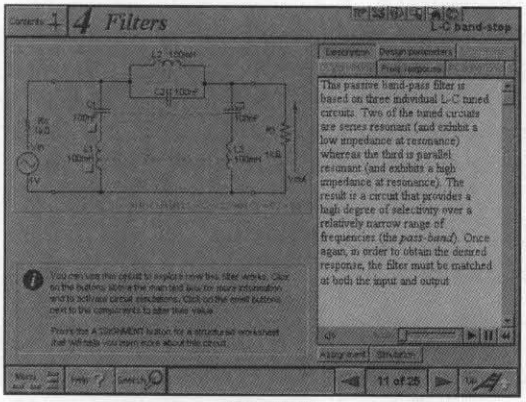


Figure 11

An added feature, if you have Electronics Workbench is that the assignments can be done there. This is a valuable feature because it allows you to experiment with part values to gain a better understanding of how and what actually works. I was not able to get the links between Analogue Electronics and Electronic Workbench working in time for the publication date, but the it was easily tested by simply copying one of the files into EWB and opening it. Figure 12 shows an EWB analysis of an Analogue Electronics circuit, a TwinTee oscillator. A very instructive feature for this teaching CD! This feature I would like to see expanded to include other circuit simulators (hint, hint, CircuitMaker PRO) and other electronics teaching CD's as well!

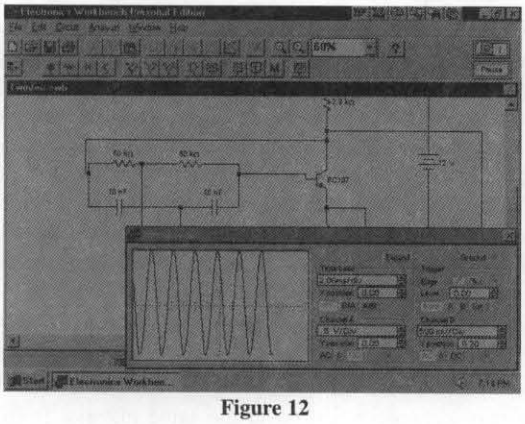


Figure 12

And in conclusion...

Thought you'd never hear those words this time. Well, I was a bit would up, and had to make up for the missing column from last time. I hope you enjoyed the material. I hope to be more mobile as the summer comes on and maybe see some of you at hamfests. I will be back at Dayton next year, even though it will not feel the same without Bob.

Introduction

In the part 1 of this article I described how to build a temperature controlled test chamber using a thermoelectric module (TEM) for the heat pump. Part 2 describes a controller that will maintain the chamber at a user selected temperature. Basically, the controller measures the chamber temperature, compares that with a set point input from the user, then adjusts the current to the TEM to make the chamber temperature equal to the set point. At the heart of the controller circuit is the popular 16F84 microcontroller. User input is via a low cost mechanical rotary encoder. Temperature measurement is handled by an LM75 digital temperature sensor chip. Both the set point and measured temperature are displayed on a liquid crystal display, LCD. The power control output is a pulse width modulated signal that controls the average current through the TEM. A second output controls a relay that selects heating or cooling mode by setting the direction current flows through the TEM. The relay and TEM power circuits are described in part 1 of this article.

Controller Hardware

The LM75 is a digital temperature sensor chip made by National Semiconductor. Data sheets are available at http://www.national.com/pf/LM/LM75.html. Digi-Key stocks these parts. The LM75 chip provides 9 bits of data via a 2 wire serial interface. The 9 bit number represents measured temperature with a resolution of 0.5 degrees Celsius. The 16F84 is programmed to read the temperature data using a protocol called an "I2C" serial interface. On the schematic in Figure 1, the LM75 pins 1, SDA and 2, SCL are the connections for this interface.

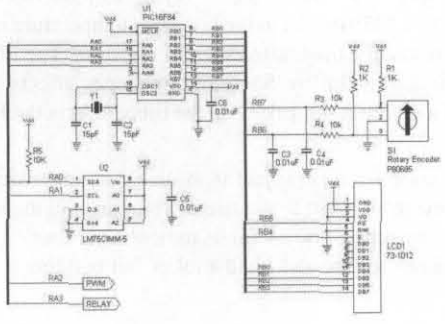


Figure 1

The LM75 is a flea sized chip with pins on 25 mil centers, but it turned out relatively easy to mount. I hand made a little PC board using a sharp knife to cut pads on a piece of copper clad board. The chip has 8 pins but only four separate pads are required. Figure 2 is a photo of my homemade temperature probe.

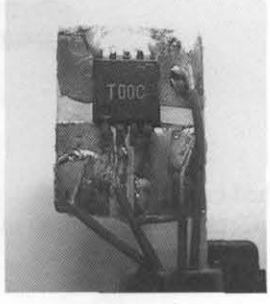


Figure 2

Placing the LM75 inside the chamber deserves a few words. I used a miniature fan inside the chamber to circulate air over the TEM cold plate and past the LM75. Wires connecting the LM75 to the rest of the controller outside the chamber conduct some heat, which can result in a measurement error. I reduced this effect by leaving a loop of wire inside the chamber so that the end of the wires connected to the LM75 are heated or cooled to the chamber temperature. Figure 3 illustrates how I placed the LM75 in the chamber.

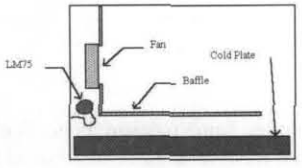


Figure 3

A mechanical rotary encoder is the means for user input. The encoder provides two signals which cycle through a 00, 01, 11, 10 sequence as the encoder shaft rotates clockwise. Turning the shaft the *counter clockwise reverses the sequence. The PIC program decodes the* encoder signals to determine which way the shaft turned. The set point temperature increments or decrements based on the encoder direction. Mechanical encoders cost much less than optically coupled encoders but are more prone to contact bounce. Low pass filters clean up the encoder outputs.

Both the set point and actual chamber temperature are displayed on an 16x1 character LCD. The PIC program uses the LCD in "four bit" mode. Only 4 data bits are needed from the PIC. The LCD's Read/Write pin is tied low so when the *PIC writes to LCD the* "busy" signal is not checked. Instead a delay built into the program gives the LCD time to process writes from the PIC.

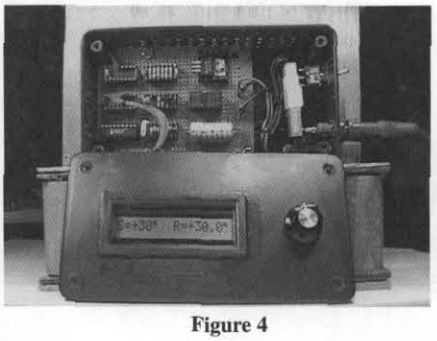


Figure 4

Figure 4 is a photo of the completed controller board. Wire wrap construction was used for the most part. Larger wire was used for the high current connections to the TEM. One thing I'd change next time is to use a relay with a higher current rating and larger heat sink on the power FET. The units I used were from my junk box and were adequate but they do get a bit warm.

Controller Program

The basis of the controller program is an algorithm that textbooks on control theory call "Proportional and Integral Control", PI for short. Textbooks call the user input the "set point". The difference between the set point and the actual temperature is called the "tracking error". The idea is to calculate a response, (in this case more or less power to the TEM), based on the tracking error. For a PI controller the response is the sum of a proportional term, (Kp times the tracking error) and an integral term, *(Ki times the integral of the tracking error). The trick is to pick the* proper values the controller constants, Kp and Ki. In theory one can calculate the correct values for Kp and Ki but the math is not trivial. For this project I found good values relatively quickly with a little experimentation.

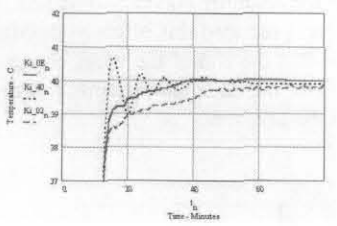


Figure 5

In Figure 5, I've plotted some measurements that show the effect the controller constants can have. The plots show what happened when the chamber was stable at 10 degrees. Then the set point was changed in one step to 40 degrees. The plot data was obtained by recording the output voltage of resistor/thermistor voltage divider inside the chamber. A voltmeter with an RS-232 interface was used to measure and save the data to a computer file.

Figure 5 shows how the choice of K's can result in a too slow, too fast, or optimum response. A complication occurs due to the TEM. A TEM is a better heater than a cooler. Figure 6 shows an overlay of two step responses, one from 10 to 40 and one from 40 to 10 degrees. Because the response of the TEM is greater for heating than cooling, different values are used for Ki and Kp when the chamber is being heated versus being cooled.

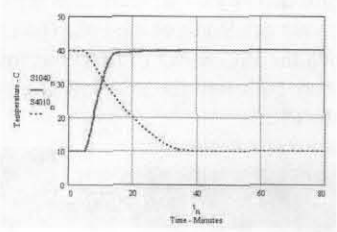


Figure 6

The PIC is programmed to switch between heating or cooling, (via the RELAY output), when the magnitude of the tracking error is greater than 1.5 degrees. Some hysteresis around the relay switch point is required for the PI algorithm to work properly. Hysteresis allows the integral term to sum positive and negative tracking errors. Figure 7 shows the step response going from 5 to 10 degrees. At 5 degrees the chamber is in cooling mode, at the set point step it switches to heating mode. Since the chamber could not be stable at 10 degrees when heating, (the room temperature was at 20 degrees) the chamber temperature overshoots. When the overshoot is larger than the hysteresis value the chamber goes back to cooling mode and stabilizes at 10 degrees.

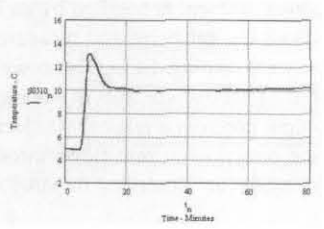


Figure 7

The program calculates a 16 bit number, "pi_sum" which represents the PI response. A PWM routine uses this number by switching the TEM on, then counting from pi_sum to zero, switching the TEM off and then counting from pi_sum to FFFFh. The PWM routine is an infinite loop. The rest of the program routines are called in response to interrupts. A change on the rotary encoder inputs triggers an interrupt which calls the routines to update the set point. Temperature reads and the PI calculations are triggered by interrupts from a timer built into the PIC.

The rate at which the timer triggers the PI calculations is important for a couple of reasons. One is that the LM75 requires 100 ms to complete a temperature measurement. Trying to read more often will keep resetting the LM75 output to the last valid temperature reading. The second reason is that the timer affects the PI response. The PI calculation is in some sense a digital filter. Sampling frequency affects the frequency response of a digital filter. Likewise the timer affects the PI controller response.

Source code for this project is available at some web site to be named later. I made an effort to put useful comments in the source code. Hopefully this project will be useful to someone out there. I was a great learning experience for me and I had a lot of fun building it.

Notes from the President

Mike Czuhajewski, WA8MCQ

BOB GOBRICK, SILENT KEY

We were saddened to learn of the death of Bob Gobrick, NOEB, from cancer shortly before Dayton. He has been active in QRP for several years and his enthusiasm was well known. He was one of the two co-founders of the FDIM QRP conference concept, and also wrote the QRP Clubhouse column for the QRP Quarterly, as well as serving on the Board of Directors. He will be sorely missed by all.

The family has requested that they not be inundated with a huge quantity of mail, although they indicated that a small number of notes would not be a problem.

K5FO APPOINTED TO BOARD OF DIRECTORS

With a position vacated by the death of Bob Gobrick, we had to find a replacement to fill the remainder of the term. Several possible candidates were contacted. The remaining Board members voted on them and Chuck Adams, K5FO, has bee appointed to the position.

KU7Y IS BACK AS TEMPORARY EDITOR

George Heron, N2APB, resigned as managing editor after his second issue due to taking a job in another state and other demands on his time. We all appreciate the tremendous job he did on his two issues, which takes a huge amount of time.

Monte Stark, KU7Y, has agreed to take the position back on a temporary basis. To greatly reduce the workload on the managing editor, he worked out a deal with the printer for them to do all of the layout and formatting, instead of us doing it in-house with desktop publishing. Although this will cost us a few hundred dollars per issue it is well worth it, and will go a long way to making life simple for the managing editor and all contributing editors.

Instead of spending huge amounts of our limited free time laying out the Quarterly at home, all of us will just send ASCII text files and graphics files to the managing editor, and let the printer staff worry about the rest. There may be some glitches as we work things out and this is the first issue to be done this way, but we'll get the details ironed out in time.

By the way, this is the same way the QRP Quarterly was done in the past until Paula Franke, WB9TBU, took over as editor about ten years ago. She decided that we could do the layout work ourselves and save a lot of money. Of course, back then the Quarterly was a great deal smaller and it could be more easily produced by volunteer workers. At the current size, the Quarterly takes a huge amount of time by a large number of people. The new way will cost us some money, but will help insure a quality magazine for a long time and avoid a lot of burnout.

SMITE RUN IS OVER

Bob Kellog, AE4IC, announced that the Knightlites QRP Association kit, the KnightSMiTe, has come to an end. He said, "It was a little transceiver kit using Surface Mount technology. Our plan was to acquaint hams with SM through an inexpensive, fun kit that really worked." Based on the simple Pixie design, they wondered whether they should do 100 or 150 kits. They kept the price low and were worried about losing money on the project. Happily, they later got a generous donation of a large number of parts, which really helped. Bob says that they ended up shipping over 700 kits.

OHR SOLD

Dick Witzke, KE8KL, recently sold Oak Hills Research. It was picked up by Marshall Emm, N1FN, of Milestone Technologies in Colorado, and he is continuing OHR as a separate product line. You can check the web page at www.ohr.com, or write to 2460 S. Moline Way, Aurora, CO 80014. Phone: (303) 752-3382.

NORCAL 20 IS NOW A RED HOT RADIO

The NorCal 20 transceiver from Doug Hendricks and helpers was a huge success, selling out 500 units in a little over two weeks last summer. After some delays the units were finally shipped and many are on the air, but don't feel too bad if you missed out. Dave Fifield, AD6A (formerly AD6AY), the designer of the unit, has formed a small company called Red Hot Radio and is keeping it alive as a commercial product. He'll also produce a 40M version, called the Red Hot 40. For more info, check their web page at www.redhotradio.com.

CHECK YOUR EXPIRATION DATE

Don't forget to check the expiration date on the envelope and see if this is your last issue of the QRP Quarterly. If it is, please renew promptly.

--qrp--

VERTICALS WITHOUT VERTIGO - Part 1

Ten Questions You Always Wanted to Pose to Your Vertical, But Were Afraid to Ask

L.B. Cebik, W4RNL 1434 High Mesa Dr., Knoxville, TN 37938 email: cebik@utk.edu

This three-part series on vertical antennas is based on a talk given by L. B. Cebik, W4RNL, at the "Four Days In May" symposium held in conjunction with the 1999 Dayton Hamvention. Shortly after "LB" presented his talk, it was announced that he had been inducted into the QRP Hall of Fame."LB" just passed the 45 year mark on his ham license and was recently inducted into the QRP Hall of Fame. He has taught, lectured, and written on various aspects of radio and electronics, although in recent years he is perhaps best known for his work on antenna modeling, antennas, and antenna tuners. He writes regularly for the ***QRP Quarterly,*** *maintains an antenna column in the* ***Low Down*** *(Colorado QRP Club newsletter) called "Antennas from the Ground Up," does a monthly antenna modeling column for* ***AntenneX,*** *and has written "An-Ten-Ten-nas" for nearly six years. He has written articles for all of the US Ham Magazines, including QST, QEX, NCJ, CQ, and Communications Quarterly. "LB" has also written a book on antenna modeling, published by Nittany-Scientific. His web site (http://web.utk.edul~cebik/radio.html) recorded its 50,000th visitor in January, 1999, less than a year and a half after the counter was added. Since ham radio does not pay the bills, "LB" fills his spare time as professor of Philosophy at the University of Tennessee, Knoxville.*

- W1HUE

Part 1: Questions 1 Through 4 Answered

Horizontal antennas are simple. Verticals, on the other hand, are complex, mysterious beasts around which we have spun horror stories, myths, and gobs of misinformation. We live in terror of the dreaded ground plane, not knowing if we need one or, if we do, what will work and what will not. We fear to load them, for we know not where to place a coil or how to hang a hat.

Verticals look innocent enough. Like a skeleton with one bone, they sit erectly, so prim and properly military in their posture and bearing. But at night, when the wind howls, we have nightmares in which the vertical writhes and bends into pretzel shapes, choking the communications life out of our precious RF.

Books abound on the vertical antenna.1 However, most appear to be exercises in black magic. Often it seems less that the author has mastered the vertical antenna than that the vertical has mastered the author. Have you ever noticed the reverence with which aficionados of verticals approach their subject? The mystique of verticals is enough to make anyone dizzy.

I wish I were overstating the case, but-alas-I am not. Among all antennas, verticals evoke the largest number of disputes and the most desperate question of all: how do they work?

Quite frankly, I cannot answer that one question-just because it includes everything there is to know about verticals. However, we can explore a number of smaller questions-ten in all-that might give us a hand-hold on vertical antennas. Once we have looked at these ten questions, I hope the myths and misinformation about verticals will dissipate like a rain cloud and let us progress on our own toward filling in the gaps I leave behind. For my goal is to bring verticals down to earth-and at the same time, to bring them up from the murky depths. My aim is to make the vertical antenna as ordinary as the horizontal.

As with any mystery, we clear it up by asking the right questions. The ones I shall pose are not the only ones we might ask-and the approach is not the only one we might take. However, the following questions are good ones and just might lead us to a little more clarity than before.

1. **What makes an antenna a vertical antenna?**
2. **Why do we even bother using verticals?**
3. **Why are verticals so much harder to understand than horizontal antennas?**
4. **Why is "counterpoise" such a dirty word?**
5. **What makes a vertical either a monopole or a dipole?**
6. **What is a ground plane?**
7. **How can we make a short vertical work well?**
8. **How can we make verticals directional?**
9. **How can we make verticals out of wires that are mostly horizontal?**
10. **Just how "good" is a vertical?**

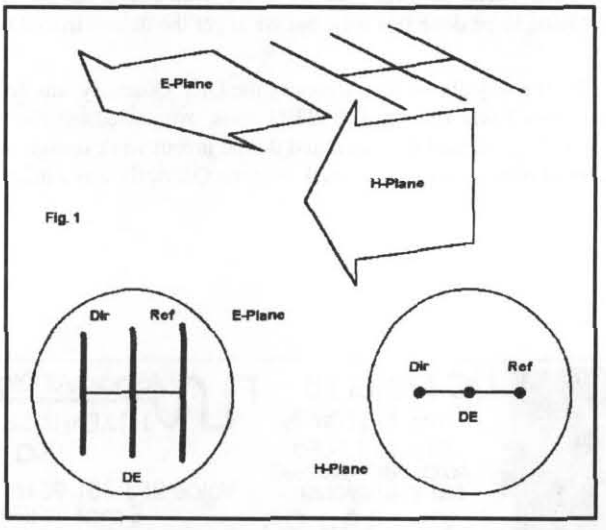
If that is not enough work for one foray into vertical antennas, then I have lost the meaning of the word "work."

1. What makes an antenna a vertical antenna?

Antennas are inherently and by themselves neither vertical nor horizontal. The technique of studying a antenna by itself is to place is in free space, with no other object in its field in any direction whatsoever.

Unless an antenna is a dot or a sphere, the antenna will have identifiable planes of radiation. The traditional names for these planes are the E-plane (associated with the antenna's electrical field) and the H-plane (associated with the antenna's magnetic field). Consider **Fig. 1** at the top of the next page. For the Yagi antenna-a very planar antenna-the E-plane is in line with the elements. The H-plane is at right angles to the elements. The fields can use arrowheads to indicate direction a. because the antenna is very directional and b. because the elements define a major plane.

Except for element and object coupling, the magnetic field is far less important to antenna performance at a distance than the electrical field.



Although we shall return to the magnetic antenna field or H-plane before we are done, let's focus on the E-plane or the electrical field of the antenna. This is the field primarily responsible for long distance communications (although one field could not exist without the presence of the other at the antenna).

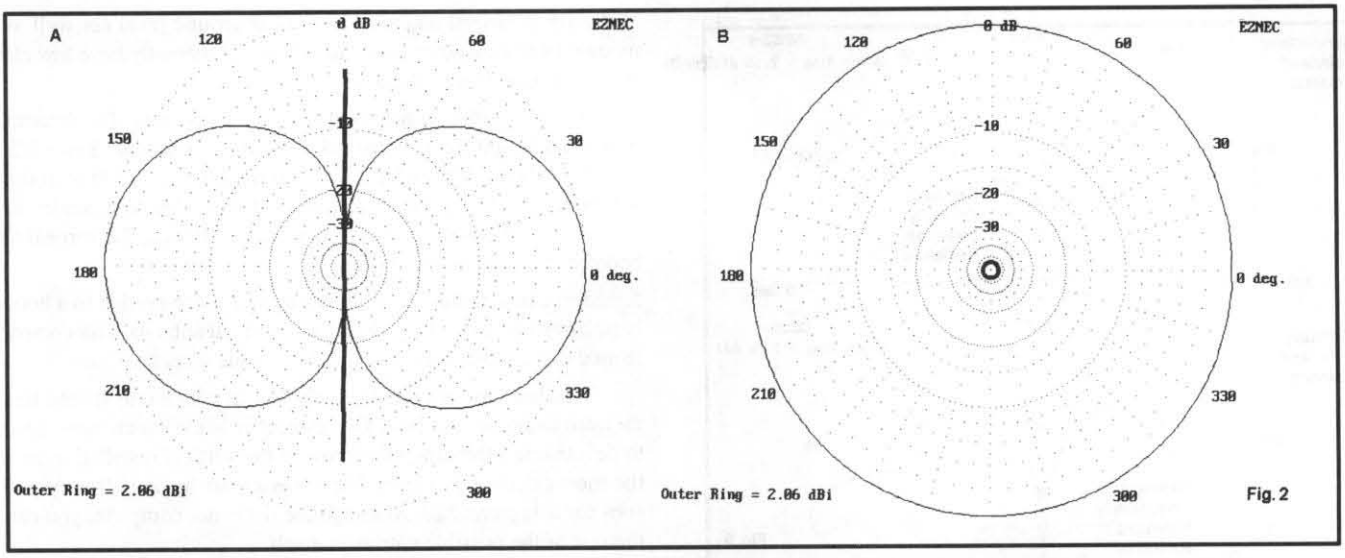


Fig. 2

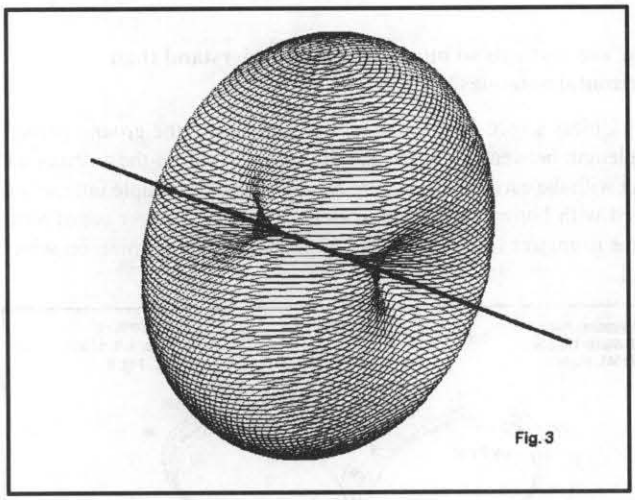


Fig. 3

A simple antenna, like a dipole, has many possible E-planes. In **Fig. 2** below, the left figure shows the shape of any one of them, since it cuts a cross section in a plane with the element. The right figure looks at the element from the end and sees an indefinitely large number of cross-sections or E-plane figures we might make-all just alike. So if we tilt the left figure progressively upward, it will turn into the right figure-and vice versa.

To see the transition, look at **Fig. 3,** a 3-D representation of the same patterns. The antenna is exaggerated immensely to shows its orientation relative to the field pattern. However, these fields are represented at arbitrarily huge distances from the antenna, so that if I drew the antenna to scale, it would be invisibly small.

The familiar donut shape pattern can only materialize in free space. If we place any objects of significant size anywhere in the field, some radiation will reflect from them or refract around them, distorting the pattern and at least taking a bite from the donut. With all antennas we use-except in outer space, perhaps-we live with reflections and refractions and distorted patterns. In fact, we have learned to make use of the distortions to make our antennas to a better job of placing radiation fields where we need them.

Until further notice, we shall concern ourselves only with the E-plane fields of antennas. If we think E-plane only, then we can understand why we call antennas vertically and horizontally polarized-or vertical and horizontal for short. All we have to do is to bring them down to earth, as we do in **Fig. 4.** Now we have a reference plane, namely the surface of the earth, against which to compare the E-plane fields of an antenna. If those fields are parallel to the earth's surface, the antenna is horizontally polarized. If the fields are at right angles to the earth's plane, then they are vertically polarized.

The scheme is so simple that you would think that no one could confuse it. However, antennas themselves give us good reason to get confused sometimes. In the real world, hardly any antennas are purely vertical or purely horizontal. Instead, even antennas that we think of a purely one or the other have some remnant (E-plane) radiation of the opposite polarity. **Fig. 5** provides a couple of samples.

The top antenna is a horizontal dipole. As purely horizontal as we like to think of the dipole, it retains a tiny vertically polarized component, mostly caused by ground reflections which interact with the element. The amount is insignificant in terms of having any affect on the overall antenna pattern. The horizontally polarized field is not distinguishable from the total antenna field.

The bottom antenna happens to be a half-square, which has a larger horizontally polarized radiation component to go with the predominantly vertically polarized radiation. The remnant does have a small but determinant affect on the overall antenna pattern, as evidenced by the slight smudge in the larger pattern outline: the total field and the vertically polarized field are not absolutely coincident.

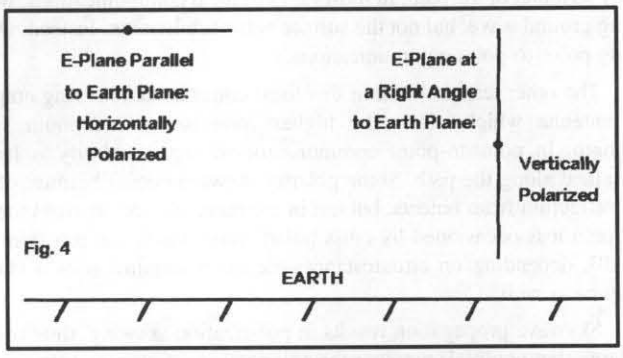
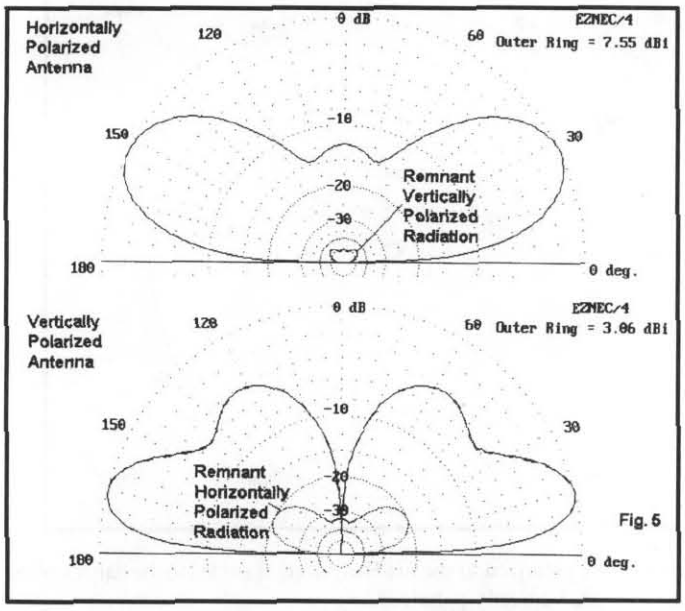


Fig. 4

So when we call an antenna a vertical, what are we saying? We are simply noting that the dominant orientation of the electrical fields from the antenna are at right angles to the earth's surface. Nothing more, nothing less.

2. Why do we even bother using verticals?

There is a myth that says, inherently, verticals are inferior to horizontals. Consequently, they are always the last option, perhaps when you are faced with using a vertical or not using any antenna at all. Although there is a way in which we can give this claim some truth, in fact it is not event a half truth-more like about an 8th truth at best.



Verticals have their best use when we define some total communications picture. Then their use makes eminent sense. So let's construct some communications scenarios.

1. From lower HF down through VLF, the surface wave component of an antenna's radiation is important. From lower HF on up, the surface wave is too weak and dissipates too soon for more than community communications. In the AM broadcast band, a surface wave can cover a radius of 50 miles with modest power (relative to broadcast powers). At VLF, with enough power, a surface wave will go around the world.

Surface waves are most efficient when vertically polarized. Hence, AM broadcast antennas are vertical to enhance their surface wave propagation.

2. Mobile antennas from HF through UHF are vertical for two major reasons. First, moving objects, like cars and boats, do not have much surface area to support horizontal antennas. (The 6- and 2-meter halos are exceptions.) Second, vertical antennas tend to be omni directional. For local communications, where a vehicle may undergo many changes of orientation, the vertical means a more even signal strength relative to the other terminal of the path. In most cases of local communications, we are using ground wave, but not the surface wave subdivision. Instead, we are using point-to-point communications.

The other terminal within this local communications ring employs an antenna which offers the highest promise of maximum signal strength. In point-to-point communications, signal polarity is largely sustained along the path. Some polarity skewing occurs because of signal refraction from objects, but not in the main. Hence, to avoid the signal path loss occasioned by cross polarization-which can run from 3 to 20 dB, depending on circumstances-the other terminal uses a vertical antenna as well.

3. Skywave propagation results in polarization skewing, thus voiding in large (but not total) measure the polarization differences between vertical and horizontal antennas. However, some operations dictate that they be able to receive from and transmit to all directions equally well and simultaneously. Since vertical antennas (but not necessarily vertical arrays) are omnidirectional, they are often the only antennas suited to the communications need.

4. In the war between vertical and horizontal antennas, most horizontally polarized antennas do not have an elevation angle of maximum radiation that is low enough to match long distance propagation angles until those antennas are at least 1/2(up-or higher. Above that height, going horizontal is seldom a bad choice, but below that height, long-distance communications may suffer with a horizontally polarized antenna. Vertically polarized antennas at or near ground level (as well as those mounted some distance above the ground) inherently have low elevation angles of maximum radiation.

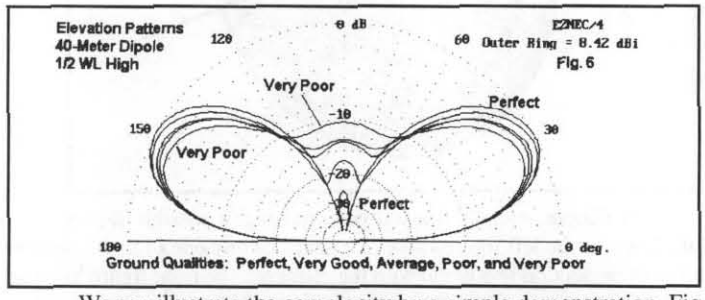
Every installation has its own special concerns that determine the maximum height (and horizontal spread) for antennas. Since 1/2(at 40 meters is about 70 ft and 135 ft at 80 meters and 275 ft at 160 meters, achievement of significant radiation at low elevation angles is often impossible for feasible horizontal antennas. Hence, the vertical antenna becomes the antenna of choice.

5. Some installations lack the horizontal space needed to a horizontally polarized antenna. In such cases, a vertical antenna with compact horizontal dimensions may be the only feasible antenna.

This last case may be the only one in which one should think that they are using second best. However, it is likely much more productive to devote one's thinking to improving the vertical installation to make it the most effective possible. The items in our list are all very good reasons for using verticals. Although the list is not complete, you can fill in the rest of the possible entries yourself.

3. Why are verticals so much harder to understand than horizontal antennas?

Unless a vertical antenna is very high above the ground-perhaps a wavelength between the earth and the antenna bottom-the antenna will interact with the earth in ways more complex than the simple interactions involved with horizontal antennas. Hence, there is a larger set of terms we have to master in order to fully appreciate what is going on with a vertical.



We can illustrate the complexity by a simple demonstration. Fig. 6 shows a series of elevation patterns along the main axis of radiation from a horizontal dipole placed 1/2(above ground. The horizontal antenna is concerned with ground quality mostly at a distance from the antenna-the region sometimes called the Fresnel region at several wavelengths distance from the antenna. Here, the ground quality has an affect on the reflection of radiation to combine with the direct radiation to form the main elevated beam. Note that from perfect to very poor ground, the increments of signal strength change are quite small and very regular. They progress downward from perfect to very poor in neat steps.

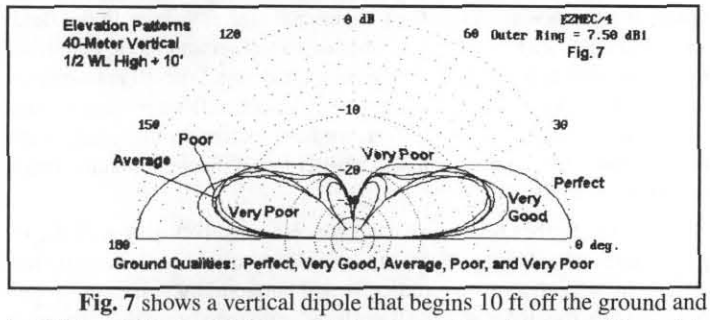
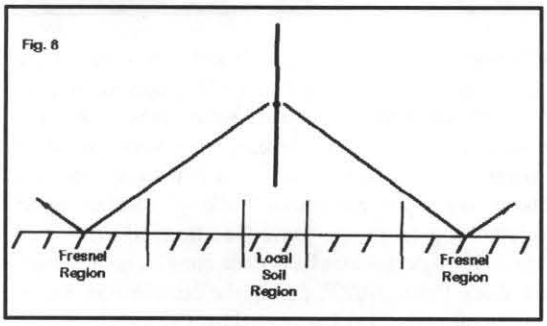


Fig. 7 shows a vertical dipole that begins 10 ft off the ground and is 1/2(long. If we could have perfect ground, the antenna would provide very significant gain. Salt water (not illustrated here because it would bring tears to the eyes of most land-locked vertical users) approximates the perfect pattern quite closely. However, over typical soils, the skywave signal strength is reduced considerably from its ideal. Notice also that

the changes are not as regular as with the horizontal antenna. Poor soil produces a slightly stronger skywave signal than does the supposedly better average soil.2 This phenomenon does not occur at every height at which we might mount the vertical.



Because verticals-whether or not they are self-contained or use ground planes-are so interactive with soils, we must acquaint ourselves with soil behavior and peculiarities. For example, at lower HF, RF penetrates the soil much deeper than at upper HF. Since soils are very often layered, with each layer having difference conductivity properties, we may not be able to predict or to model with precision the performance of a vertical antenna at 80 meters, although the same antenna at 20 meters might be very predictable. Likewise, some soils-such as those in desert areas with sandy salts-may change with the weather-becoming more conductive for a while after a ran storm-the performance of a vertical may change from day to day.3

Even though some vertical designs-those we shall eventually classify as self-contained-are dependent for the most part only on soils in the Fresnel region, vertical monopoles that use ground planes are also dependent upon soils immediately beneath the antenna.4 Hence, we must not only concern ourselves with general soil properties, but as well, we must be able to distinguish between local and distant soils, as sketch roughly in **Fig. 8.**

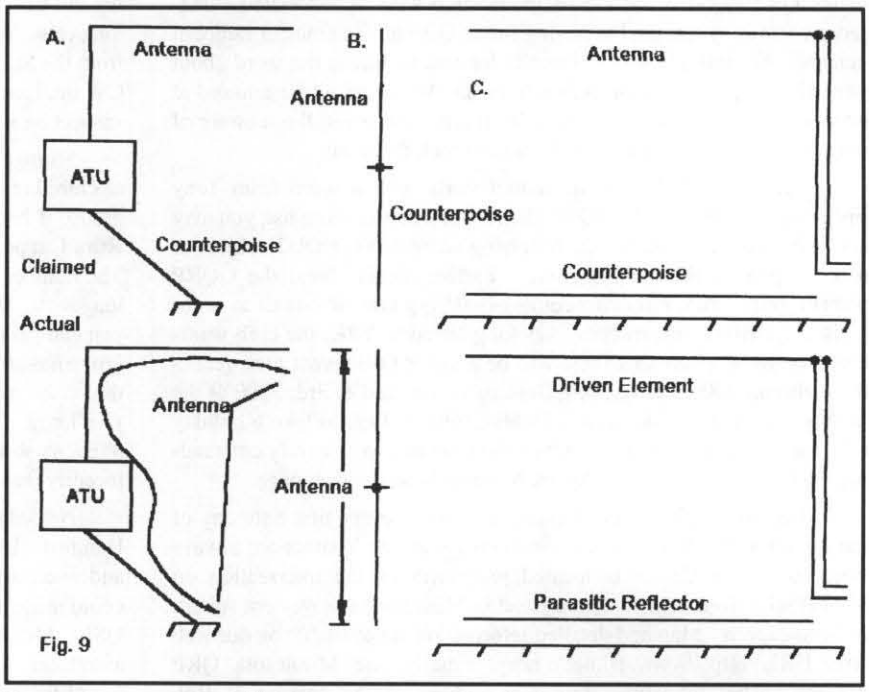
As complex a subject as soil is when juxtaposed with antennas, the major hindrance to the understanding of vertical antenna behavior are the partial truths that parade as universal generalizations. Here are a few, given without much comment:

1. Verticals always need a ground plane. Wrong.
2. Verticals are omnidirectional. Not all are.
3. Verticals are always weaker than horizontals. Not always, and it depends at which elevation angles you look. Besides, the stronger reception might be mostly noise.
4. A short vertical is next to useless. Very wrong.
5. If you cannot put down a large ground plane, you had better add lots of copper sulfate to your yard soil. Only if you are seeking to kill the grass.
6. Verticals are dangerous to other people in the area. Actually, this can be true, if one installs the antenna carelessly, without due attention to safety. We could spend an entire hour on the subject of differentiating RF exposure (usually not a problem, especially at QRP levels) from RF contact (and the inevitable RF burn). It is the latter that forms the chief danger to folks in the area, but preventing contact is a simple matter to fix by any of a dozen different techniques, ranging from fencing beyond touching range to elevating the antenna out of reach.
7. Every vertical needs a counterpoise. A what?? Let's spend a few moments on this term.

4. Why is "counterpoise" such a dirty word?

The term "counterpoise" comes from mechanical systems contexts. It means a counter-balancing force, ordinarily a weight on the other side of a fulcrum. It wormed its way into antenna work as a term that covered up ignorance under impressive sounds. If some hank of wire seemed necessary to make an antenna work, but it had no name officially condoned as the name of an antenna part, it was dubbed a counterpoise. This name was reserved mostly, but not always, for antenna parts that did not seem to contribute to radiation.

There is nothing in the world of antennas that corresponds to the dead weight facet of the concept of a counterpoise. Every part of an antenna contributes to the antenna far field pattern (except those parts that we specifically design to have self-canceling radiation). Hence, there is no such thing as a mere counterpoise. We should do our best to expunge the term from the language of antennas.



illustrates three recent applications of the term in ham literature. Case A involves a wire running for some specified number of feet from the ground terminal of an antenna tuner to ground. However, The entire length of wire from ground to the far elevated end is the antenna, with the feedpoint at the ATU simply off center.

Case B. treats the lower wire from a 1/4(vertical as a counterpoise, even though-in its vertical position-it constitutes the other half of a common vertical dipole.

The third case (C) is a modern adaptation of a very old scheme of running a second wire at or near the ground under a horizontal wire, ostensibly to improve some mysterious relationship between the upper wire and the earth. Actually, the horizontal antenna performance remains unchanged, and the wire becomes a trip for anyone careless enough to walk through it. At best, it serves as a parasitic reflector, possibly converting a general-purpose antenna into an NVIS (Near Vertical Incidence Skywave) special.

In every case, the so-called counterpoise can be analyzed (and modeled) as a part of the antenna. Hence, let us simply set the term aside as one we no longer need and replace it with specific terms that correctly identify the parts of antennas.

Stay tuned for more...

QRP CLUBHOUSE

Jim Stafford, W4QO Email: w4qo@amsat.org.

Welcome to the **QRP Clubhouse.** What's the secret password? Why, "**QRP**", of course. That is how **Bob Gobrick**, N0EB, always started this column and like you, I (and the entire QRP world) am saddened greatly by BobGob's passing. Bob was such an ardent proponent of QRP and felt strongly that the mission of QRP ARCI should include the formation and promotion of local and regional QRP clubs. In fact, he was so committed to this premise that he edited this column for the past several issues of the QQ magazine. In a word, Bob was passionate about QRP and local clubs. I have volunteered to step in and try in some small way to continue this tradition. I also feel strongly that the greatest asset of the QRP world is the local/regional club with its associated camaraderie that is so essential to having fun in QRP and in amateur radio, in general. Accordingly, this column is for you to spread the word about your club, especially your club activities. We would all be amazed at how many QRPers there are in our local areas that are still not aware of our local clubs. This column is for you to seek them out.

GQRP CLUB-News this month starts with a word from Tony Fishpool, G4WIF, that the GQRP CLUB has a new mailing list, you may subscribe with an e-mail to the following address WITHOUT subject or text: gqrp-subscribe@onelist.com. Further, details from the GQRP website http://www.btinternet.com/~g4wif/gqrp.htm or e-mail to webmeister **g4wif@btintern.com.** Looking ahead to Y2K, the club wants everyone to be aware that there will be a major QRP event next year - the **Celticon 2000 Convention,** September 1st, 2nd & 3rd, 2000 at the Marino Institute of Education - Dublin, Ireland. Plan to take a holiday (Ed: vacation) and combine it with what promises to be a truly outstanding QRP hamfest next year. Again, full details on the web page.

Minnesota QRP Society meets at 1:30pm every first Saturday of the month at the Minnetonka Community Center. Visitors are always welcome. The Center is located just north of the intersection on Minnetonka Blvd. and Williston Road in Minnetonka, a western suburb of Minneapolis. Map and detailed information are available on our web site, URL http://www.qsl.net/mnqrp. Finally, the Minnesota QRP Society wishes to express our deep sadness at the passing of Bob Gobrick, N0EB the former author of this column. We were very proud to have been Bob's "local club". Bob was involved from the inception of the MNQRP and provided much input and support. He was also a delight to have at the meetings and will be missed him greatly.

KnightLites (North Carolina) have been meeting steadily for many months at the Two Guys Pizza restaurant on Hillsborough St in Raleigh, NC, at 7:00 pm. This is just across the street from the North Carolina State University Campus. The first KnightLites kit project, the **KnightSMiTe,** a surface-mount CW transceiver, was a big success, with almost 400 shipped, but now all are SOLD OUT and there are no plans for a second run. Instead, there are multiple other projects in the works. A group operated for the second time from Core Banks, on the North Carolina Outer Banks, from March 25-29, 1999. Again, kite-supported beacons were run, even one on 160 meters! A great achievement during this event was a QRP to QRP contact with a group in Germany, with both sides using the KnightSMiTe at about a **quarter** watt on 80 meters! For this contact, the stations on both sides were operating from the field.

IAQRP Club (Iowa) reports that their club newsletter is available online. This editor can report that it certainly is and if you want a real treat go to their website at the URL listed and read the story on **K0YL**-http://zeus.ia.net/~spinner/W0FMS/IowaQRP. You will enjoy this article which will bring back memories!

St. Louis QRP Society is truly a local club and as has been pointed out several times is for QRPers who live in the St. Louis metro area. Your editor is privy to their fine newsletter and I would suggest that they could raise some serious money just by binding up a year's worth of them and selling them (much as NorCal does). It is loaded with great QRP info. All this to say if you are within "striking" distance of St. Louis, you should join this great group. **Dave Gauding, NF0R,** of vertical fame could provide you details at: nf0r@slacc.com. A related item-I ran across young **Zack Pyles, N0ZP,** during the last Spartan Sprint. Actually, he was not in the sprint, but I answered his CQ and upon finding out that I was QRP, he dropped his power to 5w and we had a nice long chat. We ended up meeting briefly at Dayton. Zack is 14 years old from the St. Louis area and has been a ham for less than a year. A great CW op, I suspect that he will soon show up on the QRP freqs and I also suspect he will find the SLQS group very soon.

Strangely, the next club I want to mention is not a local or a regional club, but the **Adventure Radio Society (ARS)**, certainly a spirited group. I had the pleasure of having lunch with one of its sparkplugs - **Russ Carpenter, AA7QU**, at Dayton where he was a speaker at FDIM. The number of activities that the ARS sponsors is huge for its size and longevity. Their annual **Bumblebee Sprint is July 25th** this year and if you can get on and make a few contacts, you will begin to see why this group has attracted some much support in the past 3 years. Russ tells me that those who hike to remote sites have the most fun in ham radio and you know I am beginning to believe him. The ARS website is at: http://www.natworld.com/ars and has all the BB Sprint details. ARS recently passed the 500 level in membership. Congrats!

NoGaQRP Club held their last meeting on June 5&6 at the Atlanta Hamfest. Two stations were in operation - one inside the main building and one outside in the horse pavilion. Operators visiting the exhibits could make a contact between the two stations and get a commemorative QSL. Members gave demonstrations of "lemon" powered rigs and an assortment of new and old QRP rigs were in abundance. The next meeting of the club will be Saturday, August 7 at TechAmerica in Atlanta at 11 AM. Member summer field activities will be reviewed. Web site: http://www.qsl.net/nogaqrp - a new web address for NoGa.

The **German QRP Club DL-QRP-AG** has its 2nd birthday this year and already has more than 1200 members.. The 8th issue of their journal QRP Report will be out by the end of June containing another couple of home brewing projects. In May we started delivery of 4 actual club project kits. At the Ham Radio in Friedrichshafen (June 24-26, like Dayton, 35000 in attendance) a DL-QRP-AG team will give a big QRP presentation in the hall of Radio clubs. DL-QRP-AG chairman DL2FI has been invited by the German Amateur Radio Club DARC to hold a lecture about QRP, development and possibilities in the official DARC Program. In autumn, we will start the Elmer 101 project, the well known QRP-L group building project. We will use a complete translation of the **NorCal Elmer 101** QRPp and the standard SW 40+ Kit from **Small Wonder Labs** to build the project. In September we plan a big QRP weekend in southeast Germany. This will be a big Party plus a lot of group seminars. Good luck, **Peter DL2FI** et al!

FINAL REQUEST - I especially want to encourage you to submit items that are related to activities **coming up in the future.** Be sure to remember that we need information for the quarter following the issue date of the magazine. My deadline is about 6 weeks ahead of the issue date and will be **August 15** for the **October issue.** Let's make this a fitting tribute to N0EB by providing a steady stream of club news!

An All-Band CW/SSB QRP Transceiver Update

Frank Nance, W6MN

I'm excited: Here's the latest "wrinkle": In going over the VFO control circuits, I realized that with the K1MG LCD readout, I can and have made and tested this rig and I have incorporated these three features which I believe are unique:

(1) Tx and Rx signal paths are identical in terms of mixing products, insuring QNZ,

(2) A Vackar VFO with varactor tuning and dual temp-comp feedback circuits which use two rear panel pots to set frequency drift to zero,

(3) The flexibility of tuning in terms of how much of the tuning dial is used to cover a selected bandwidth of coverage, where coverage is easy to set by the inclusion of the K1MG LCD readiout, and bandspread is adjustable over a range of about 50 KHz to about 2.2 MHz.

First, before going over the selections available to an operator, note that I have now extended VFO coverage so that the entire 10 meter band is covered. (At this time, I am not going to include an FM mode.).

Here are four things to consider: (all using the two VFO lower and upper limit-setting, front panel pots.)

1. An op might decide to set the lower and upper limits for VFO coverage to 0.0 and 1 MHz., requiring that the op remember which ham band has been selected and stay within the allotted lower and upper limits, or,
2. he/she might select a given band, set the low limit to the bottom of that band and the highlimit to the upper end, giving 10 turns of VFO pot to precisely cover the selected band. This choice would require that the lower and upper limits be reset with each band change, or,
3. he/she might like to take advantage of a very flexible, analog tuning of the VFO. This last feature is available because,
   a) considering just the lower limit setting of the VFO, this low limit can be set ANYWHERE from about -.85MHz from any ham band selection,(allowing the dial to be set to the bottom of the 24.89MHz band, to over 2MHz (a range which exceeds any ham band needs, but which might accommodate MARS operation and will allow selection of any small segment of the 10 meterband all the way through 29.7MHz.),
   b) then, for the upper limit, the bandspread range is from about 50KHz min. to 2 MHz max., over the setting of the lower limit, or,
4. the op might choose how much of the ten turn tuning pot to use. The ophas the choice of picking two tuning-pot dial positions and setting the lower and upper limits to correspond with these positions. The reason why this might be desirable is to allow for a continuously variable tuning ratio of VFO change vs dial change within the range of the 10 turn pot, i.e.variable dialing speed from a very gradual coverage to the max coverage of the full ten turns.)

You can see why I'm excited. The bread board works great and I'm about 97% finished with the first of two PC boards to be used in the production model.

I've also come up with a front and rear panel layout, hole diameters and the like, so that I can go ahead on both cabinet manufacturing and screening of the two panels. The manual to go with the kit will be on a par with the best of the ole Heathkit manuals in terms of making assy, setup and operating instructions as easy as possible to follow. (lots of dwgs, etc.)

My delivery goal of 1 July1999 of the first 25 kits looks like a realistic one. Am quickly setting in place ways to speed up kit assy in case the sale of this rig takes off.

Also, am looking into sound ways to extend myself such that, ifsales do take off, I am prepared for tech backup to kit builders who might run into trouble with such things as solder bridges and the like.

One last note, and I think that I already mentioned this point: I have eliminated the SMT parts and am completely redoing the production PCs with wider pads and conductor trails. I have also made the PCs larger than originally planned. In doing this, I have now arrived at cabinet dimensions of 3.5" hi x 9.5" wide x 7.5" deep.

A local, quality cabinet mfgr & screening company is standing by for me to go ahead with cabinet mfgring. Their lead time is quite short too. At this time, the rig will have a 250 uA meter with multi functions including S Mtr, TX Pwr, SWR readout and all of the voltage readouts needed to make internal, initial adjustments. I currently have 1000 of these meters on hand. If sales go beyond 1000, I will include a DVM in a later version.

73 de Frank, W6MN

CONTESTS

Joe Gervais, AB7TT Email: vole@primenet.com

Contents:

-- Hey, you're not Cam! --

Howdy folks! You may have noticed it. Something odd. A slight disturbance in the Force. The alien callsign in the tagline of this column. Or to put it frankly, a profound lack of veteran ARCI Contest Critter Cam (N6GA).

In case you missed Cam's sign-off announcement in the last issue of the Quarterly, after five years of dedicated service and laborious grunt work greasing the wheels of QRP contesting, Cam retired as the QRP ARCI Contest Critter. Since hanging up his spurs, scouts have reported that he's already managed to build a kit or two, started ragchewing on the air again, and generally having a darn good time. Well deserved! Well timed too, what with the sunspots coming to life again. I'll bet someone's going to be working QRP DXCC in his (newly-discovered) spare time!

Cam has been helping me a lot with the transition, and we've been busily swapping email and boxes of logs on a regular basis as he brings me up to speed. Poor Cam will likely be shipping logs to me many months after his retirement, but he knew the job was dangerous when he took it. ;-) I'd really like to thank Cam, not only for his work over the years for QRP contesting, but for giving me a model to follow as I dove into managing contests a few years ago. It's always easier when you can follow the example of someone who's "been there, done that, still doin' it right". Pizza's on me at Pacificon, Cam!

So here I am, the New Guy. What can you expect? Not many big changes, at least in the near future. Cam and I have talked about ways to drum up more support for some of the contests, the QRP SSB events in particular. We'll see what we can do. I firmly believe that any QRP mode is a good mode, and the more QRP activity we can drum up the better, whether CW, SSB, RTTY, etc. Contests are a great way to generate activity and show new folks that QRP really does work!

Something I'm trying to quickly nail down is a new date for the ARCI Fall QSO Party. It turns out that the NorCal QRP Club's Pacificon QRP-Fest (tied to the ARRL's Pacific Division Convention) falls on the same weekend as the Fall Party, and since hordes of QRPers attend Pacificon, it really puts a dent in the number of QRPers who can get on the air. Fewer QRPers means less activity for everyone, so I feel we'd all benefit greatly by avoiding the schedule conflict. The Fall Party will stay in October, I just need to find a relatively free weekend for it. Keep an eye on the Oct. issues of the Quarterly and QST, as well as QRP-L and the QRP ARCI website http://www.qrparci.org for more info.

Speaking of the ARCI website, it's going to take some time, but eventually the rules for every ARCI contest will be posted there year-round, as well as Summary Sheets specifically tailored for each contest. Using the tailored Summary Sheets will hopefully reduce the odds of me messing up your results, so we'll all benefit!

That's all the general comments I've got for this issue. Results of the Spring QSO Party follow, as well as ARCI contest announcements and a general QRP contest round-up for the next several months. We greatly appreciate your patience during the transition period. Look forward to hearing you all on the air in the contests ahead!

Cheers de AB7TT,

- Joe, QRP ARCI Contest Critter

Upcoming QRP Contests

QRP ARCI Summer Homebrew Sprint	July 11
ARS "Flight of the Bumblebees"	July 25
QRP ARCI Summer Daze SSB Sprint	Aug. 1
CQC Summer QSO Party	Aug.
BUBBA QRP Sprint	Aug. 29
MI QRP Labor Day Sprint	Sept.
QRP Afield	Sept. - TBD
QRP ARCI Fall OSO Party	Oct. TBD

New "QRP Grand Slam" Competition

Do you like QRP contesting? Diving headfirst into the adrenaline of a crowded band with your QRP signal? Sharpening your skills/knowledge to keep your rate up? Trying to keep ahead of your QRP friends to win that pizza you wagered? Well here's something for ya!

The ARCI "Grand Slam" (QRP Contest Master - CW) Competition is in the works. What is it? An annual award given to the dedicated QRP contester who manages to outpace the rest of the QRP Pack that year, competing in several major contests. (A QRP SSB award hasn't been ruled out for later inclusion, but won't be part of this first season.)

Here's how it works. QRPers will compete as normal in the chosen contests. When the results for each 'test are printed, QRPers will be ranked against each other and assigned points accordingly. At the end of the season, the QRPer who has the highest point total wins a VERY spiffy award - a plaque so nice your spouse will even encourage you to hang it in the entryway.

Here's the "Grand Slam" Contest Series List:

- ARCI Spring QSO Party
- WPX
- CW Sweepstakes
- NA Sprint
- ARCI Fall QSO Party

What do "you" have to do? Operate to the best of your abilities in each of these contests (CW QRP category, of course), and submit your log as usual. That's it! A running update of "Grand Slam" standings will be released after each set of results becomes available.

Once the full details are worked out, everything will be revealed (exact scoring details, etc). Just remember to operate QRP in the above tests and do as well as you can.

1999 Spring Party Results

Here are the results of the 1999 QRP ARCI Spring QSO Party. Great turnout for this one! Bands were mixed for many of us, and as usual QRPers managed to not only work through it but pulled out some whopping scores too! 109 logs poured in from as far away as Japan, Costa Rica, and Germany. Once the sunspots really start kicking in, we're going to be having some serious fun with our friends across the globe!

Please note that I've always like all the extra data that Cam put into the results spreadsheet. I plan to do the same, but we've been busy as it is trying to be sure logs don't get lost between our QTH's! As soon as things settle down, more info will appear, trust me. If it helps, I did manage to add a "Favorite Ice Cream" field in the Summary Sheet, and included the results below.

Soapbox comments will be posted on the QRP ARCI website http://www.qrparci.org timed to coincide with the release of this issue. That way I can get every single comment out there, instead of picking a small percentage of the lucky few. Thanks again for your patience during this transition, and hope to work you in the contests!

Top Scores, Survey Results

Multiband

1)	N4BP	2,037,760
2)	N0UR	1,325,436
3)	N7OU	1,271,600

High Bands:

1)	AE0Q	1,145,221
2)	VE7SL	566,979
3)	W6BAB	262,416

Low Bands:

No Entries

Single Band:

10M:	WX7R	27,104
15M:	DL8TWA	8,715
		(Op K3TW)
20M:	W5VBO	277,676
40M:	K9PX	203,000
80M:	WA3SRE	15,730
160M:	KD1P	735

DX Results:

1)	HP1AC	775,208
2)	VE7SL	566,979
3)	VE6AAN	27,440

Summary Sheet QRPer Survey: Favorite Ice Cream

NO5W	807 Float
AB7TT	Ben & Jerry's Cherry Garcia
N6GA	Ben & Jerry's Chunky Monkey
K1QM	Ben & Jerry's
KE2KW	Breyers Vanilla
N0SS	Burgundy Cherry
AC4HF	Chocolate
KF4KSM	Chocolate
W0UFO	Chocolate Peppermint
W1VT	Coconut
WA8GHZ	D.Q. Vanilla
W5VBO	Double Vanilla (fat-free)
G3XJS	Free
JR0BAQ	Haagen datz
KA1DDB	Heavenly Hash
N2CX	Mint Chocolate Chip
AB0GO	Neopolitan
KR2Q	None - Lactose Intolerant
WN6HYX	Orange Sherbet
KA8NRC	Peach
N7RI	Phish Food
WA9PWP	Rocky Road
W3BBO	Vanilla
WB3GCK	Vanilla
N0RC	Vanilla
NA3V	Vanilla Walnut
N7CQR	Zombi

Team Results:

1)	Team ET/BP	2,545,554 pts.	(N8ET, N4BP)
2)	NJ QRPeanuts	415,002 pts.	(N2TO, N2ABP, KB2JE, N2CX, WK8G)
3)	QRP SWATeam	297,738 pts.	(K8UCL, K3WWP)

Overall Results

Callsign	Score	QSO	Pts	SPCs	Power Category
N4BP	2,037,760	1,592	128	950mW	Multiband
N0UR	1,325,436	1,527	124	5W	Multiband
N7OU	1,271,600	1,156	110	900mW	Multiband
AE0Q	1,145,221	1,529	107	5W	High bands
K5LG	1,144,962	1,398	117	5W	Multiband
KU7Y	1,116,720	792	94	240MW	Multiband
K0FRP	876,736	1,215	103	5W	Multiband
HP1AC	775,208	1,016	109	5W	Multiband
W1VT	742,882	1,129	94	4.2W	Multiband
NY4N	680,960	1,024	95	5W	Multiband
K4AT	658,560	2,240	42	4.5W	Multiband
WB3AAL	628,800	524	120	900mW	Multiband
KR2Q	612,864	912	96	4W	Multiband
WZ2T	575,148	1,002	82	5W	Multiband
VE7SL	566,979	931	87	4.8W	High bands
K5AM	545,412	906	86	5W	Multiband
K5HQV	538,790	895	86	5W	Multiband
N8ET	507,794	874	79	5W	Multiband
WA8GHZ	489,216	768	91	5W	Multiband
W3TS	399,285	467	57	250mW	Multiband
KB2JE	388,598	677	82	5W	Multiband
NA3V	379,694	733	74	5W	Multiband
K3CHP	372,169	673	79	5W	Multiband
W4ED	316,932	588	77	5W	Multiband
N0SS	286,902	621	66	5W	Multiband
K2JT	282,268	593	68	5W	Multiband
W5VBO	277,676	844	47	5W	20M
W6BAB	262,416	568	66	5W	High bands
K1QM	239,330	526	65	4W	High bands
W2JEK	228,032	509	64	5W	Multiband
AB5UA	226,422	599	54	4.5W	High bands
K3WWP	225,995	587	55	5W	Multiband
N0IBT	209,300	460	65	5W	Multiband
K5AAR	208,236	444	67	5W	Multiband
K9PX	203,000	725	40	5W	40M
N0KE	171,430	395	62	5W	Multiband
NO5W	165,816	423	56	4W	High Bands
N0RC	155,820	318	49	950mW	Multiband
N3AO	155,036	452	49	5W	Multiband
NK9G	151,956	402	54	5W	Multiband
K4GEL	142,646	443	46	5W	Multiband
K3SS	137,088	384	51	5W	Multiband
W4DU	136,416	406	48	4W	Multiband
W)UFO	134,652	458	42	5W	Multiband
N6GA	131,019	367	51	5W	Multiband
WA7LNW	121,520	434	40	4W	20M
KA1DDB	117,992	344	49	2.2W	Multiband
AF5Z	111,860	340	47	5W	Multiband
KN1H	103,600	259	40	750mW	Multiband
K3NVI	97,965	311	45	5W	Multiband
W5WO	97,660	257	38	800mW	Multiband
WB0IQK	84,588	318	38	5W	Multiband
KA1TQM	83,776	272	44	4W	Multiband
W3BBO	78,337	361	31	5W	Multiband
K8UCL	71,743	277	37	2W	Multiband
AC7A	70,560	252	40	5W	Multiband
W3YK	56,644	238	34	5W	Multiband
AC4HF	52,577	259	29	4W	20M
W4NTI	50,820	220	33	5W	Multiband
W0PFR	50,589	219	33	2W	Multiband
KI0G	49,693	229	31	2W	20M
W9KV	47,586	206	33	5W	Multiband
K2UD	44,835	305	21	5W	40M
N5SAN	40,635	215	27	5W	20M
N9MDK	40,404	222	26	3W	20M
KE4LIA	36,288	216	24	2.5W	40M
W3DP	33,740	241	20	5W	40M
KB0JUL	33,516	171	28	5W	Multiband

Callsign	Score	QSO	Pts	SPCs	Power Category
W3MWY	31,878	207	22	3W	Multiband
WA20CG/7	31,563	167	27	5W	High bands
KE2KW	29,575	169	25	5W	Multiband
KF4KSM	28,525	163	25	5W	40M
N0WM	28,525	163	25	5W	Multiband
WA3WSJ	28,462	214	19	2W	20M
VE6AAN	27,440	140	28	1.5W	High bands
W9OVZ	27,216	162	24	5W	20M
WX7R	27,104	176	7	5W	10M
N2CX	26,404	164	23	3W	Multiband
W1HE	24,640	160	22	3.5W	Multiband
AA8SN	23,023	143	23	5W	Multiband
K4KJP	21,784	113	17	5W	Multiband
WA3GYW	21,476	118	26	2W	Multiband
N7CQR	19,488	116	24	5W	Multiband
K5EYE	18,998	118	23	2W	Multiband
N7RI	18,928	169	16	1.5W	40M
WD0K	16,660	140	17	5W	Multiband
WA3SRE	15,730	121	13	990mW	80M
N7OG	14,900	298	50	70W	Multiband
N8CQA	14,280	102	14	950mW	40M
WN6HYX	14,112	112	18	5W	High bands
KB6FPW	12,635	95	19	4W	Multiband
AB)GO	12,369	93	19	5W	High bands
WA2IPZ	10,290	98	15	5W	20M
WB3GCK	8,820	126	7	950mW	40M
VA3JEG	8,722	89	14	5W	20M
DL8TWA/K3TW	8,715	83	15	5W	15M
WC4CW	7,371	81	13	4W	20M
AF9J	4,770	53	9	700mW	Multiband
N3CZB	4,130	59	7	5W	High bands
AD6GI	3,402	54	9	4.6W	Multiband
WA9PWP	3,276	52	9	5W	20M
W3CB	2,520	45	8	5W	High bands
N2ZHF	2,401	49	7	2W	40M
KM3D	2,156	44	7	2.5W	40M
KA8NRC	2,100	30	10	3W	Multiband
NO1E	2,058	42	7	2W	40M
G3XJS	1,715	35	7	3W	Multiband
KD1P	735	21	5	5W	160M(!)
AB7TT	588	14	6	5W	Multiband
JR0BAQ	35	5	1	5W	15M

Summer Daze SSB Sprint '99

Sponsored by QRP ARCI

Date:

August 1, 2000-2400Z, SSB HF only.
Work stations once per band. Operate all 4 hours.

Categories:

- All-band, Single band, High bands, Low bands, Multi-Op, DX.

Exchange:

RST, SPC and ARCI number (non-members send power).

Suggested Freqs (KHz):

1830, 3865, 7285, 14285, 21385, 28385

CSO Points:

- Member = 5 pts.
- Non-member different continent = 4 pts.
- Non-member same continent = 2 pts.

Multipliers:

- SPC total for all bands. SPC's count once per band.
- Power: >5W = X1, 1-5W = X7, 250mW-1W = X10, <250mW = X15

Final Score:

- QSO points X total SPCs X Power Multi.

Entries must include copy of log and summary sheet, callsign(s) of op(s), QTH, power out, and station description.

Send entries within 30 days of contest date to Joe Gervais AB7TT (ATTN: SSB Sprint), PO Box 322, Peoria, AZ 85380-0322, or email ASCII-text entries to <vole@primenet.com>.

All decisions of the Contest Critter are final Unless you have pizza to offer, in which case I'm always listening;-)

FDIM/Dayton 1999 Report

Jim Stafford, W4QO *Email: w4qo@amsat.org.*

Dateline Dayton OH (Thursday, May 13-8AM) - The 4th Annual Four Days In May (FDIM) QRP conference was held the day before the Dayton Hamvention at the Days Inn Dayton South. Following a welcoming by VP Jim Stafford, W4QO, Director Preston Douglas, WJ2V, started the morning with a report and tribute on Bob Gobrick, N0EB, who had recently become a silent key. Bob was a QRP ARCI board member and, along with W6TOY, was an original innovator of the first three conferences. The news came as a shock to all the FDIM attendees and he will be sorely missed in QRP and amateur ranks.

FDIM - Seven technical presentations were scheduled for the day with speakers venturing from the west and east coasts of America and three from across the pond, Great Britain. QRP ARCI Sec. Treas, Ken Evans, W4DU, this year's chairman, kicked off the festivities with traditional opening speaker, L.B. Cebik, W4RNL, of Knoxville, TN (http://www.cebik.com). His topic this year was entitled - "Verticals without Vertigo." L.B. was his usual (or unusual) self as he kept the crowd solidly interested in what many would think is the VW of amateur antennas. Among other key aspects of the vertical covered, LB suggested we all consider elevating the radials to about 10 feet above ground. At his height, he indicates that four radials are about as effective as many more.

Our next speaker was Joe Everhart, N2CX. Joe spoke on a PIC-Based SWR/Bridge:PICSWR. Joe has made good progress toward getting this project implemented using a PIC chip. Rev. George Dobbs, G3RJV, spoke on several interesting simple circuits for QRP operation with his talk aptly entitled "Weekend Projects for QRPers" (http://www.btinternet.com/~g4wif/gqrp.htm). To top it off, he had a small kit of parts available at Vendor Night to implement the circuits he had presented.

By lunchtime the attendance had surpassed last year's total participation level of 150. The afternoon session was lead off with Steven Farthing, G0XAR, Jan Verduyn, G0BBL, and Alan Rowe, G7PUB. Describing the implementation of QRP2000, a multiband Direct Conversion transceiver. Prior KK7B based designs (R2) phased DC receivers were limited to single band coverage; however, implementing many control capabilities using a micro processor has now permitted the step up to multi-band functionality. Dave Benson, NN1G, next spoke on "Distortion Demystified." Everyone appreciates Dave's clear explanatory style and the subject was certainly less mysterious for all in attendance. Chuck Fishman, WA2UNN, on "Mixer Madness" led us through another search for a better mixer. His results enlightening and helpful for those seeking the next generation of mixers.

Russ Carpenter, AA7QU

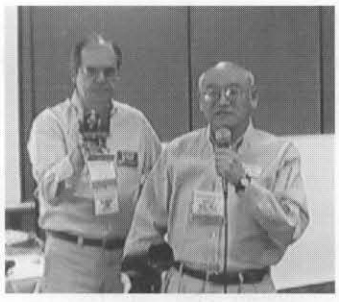
Capping off the day, Russ Carpenter, AA7QU, founder of the Adventure Radio Society (www.natworld.com/ars) spoke on his experiences in a talk entitled "QRP Contesting in the Wilderness". Russ told us how to enjoy amateur radio to the fullest by hiking to high mountain areas and operating contests from those beautiful vistas. In his quest, Russ has merged data from propagation programs and various other databases to show the areas of best communication. Several models of mountain slopes were studied. Russ brought a unique perspective and encouraged us all to try something different to enjoy the hobby even more.

Prizes were drawn throughout the day but the grand prize, which was donated by QRP ARCI and Elecraft (http://www.elecraft.com/), was the new K2 transceiver. It was won by non-other than L.B. Cebik, W4RNL. The crowd was overwhelmingly excited for LB who will now have to divert his attention from antennas for a while to build the rig. Asked about this, LB indicated that he had decided to retire this summer from the University of Tenn and become a full time amateur! Congrats, LB. Copies of the Proceedings were provided to each attendee, but additional copies are available from the QRP-ARCI Toy store - see elsewhere in this issue or www.qrparci.org.

Thursday evening, QRP ARCI hosted the author social in the large meeting rooms down the hall at Days Inn Dayton South, which by the way had been about renovated. Even those in unconverted areas found hot water and generally a comfortable environment this year and the staff was quite attentive in their duties with minor exceptions. For those in the "new" section, life was especially pleasant, with new carpeting, upgraded bathrooms and individual room A/C. As info, club members had this past year made a rather exhaustive search of the Dayton area to find alternatives that would meet our needs for large conference/dining areas in addition to a block of a hundred rooms. None were found at less than a 30% markup in price, so plans are to stay at the DIDS for next year.

At the author social, a large crowd was treated to an evening of solid hospitality and a few people could not resist bringing in some "show and tell" goodies for all to see and experience. N2CX and the NoGa QRP gang erected a DK9SQ telescoping pole (available Kanga US-http://www.bright.net/~kanga/kanga1) and a Gusher antenna (N2CX) for 40 and 20 meters. Elecraft had their K2 fired up on a 20 meter whip attached to the rear of the rig. couple of attempts to contact a 589 Russian from the center of the room were unsuccessful but a relocation to the window and the Gusher snapped S55A (Slovenia) on the first call - 589 both ways! In all, it was a fun, relaxing evening.

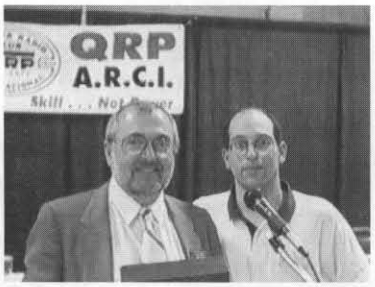
New Product Announced - Friday started early with a forum at the Dayton Hamvention at 8:45 a.m. Jim Stafford, W4QO - QRP ARCI VP leading off in Room 2 with a talk entitled "Why QRP?" This talk drew on material submitted by George Heron, N2APB, who had been on the program to speak but could not attend Dayton this year due to work commitments. The highlight of the talk was the introduction of Mr. MFJ himself, Martin F. Jue, K5FLU, who made the **exclusive announcement** of a yet-to-be released semi-kit for a single band superhet transceiver, covering a choice of 40, 30, or 20 meters. Based on a design from Rich Littlefield, K1BQT, this transceiver is very small and is about 2/3 Surface Mount Technology (SMT). The constructor will find those components already mounted easing the burden for the visually challenged to a great degree! The rig is "trail friendly" in AA7QU language with no protruding connectors. Martin suggested that the rig could be ready for production in 1 or 2 months. He also asked about what accessories might be valuable to QRPers in the same size and format. **QRP ARCI appreciates the opportunity to be a part of this MFJ product announcement.** Stafford finished the talk to over 50 people from various points of the globe with the line "QRP? Why not?" and introduced Rev. Dobbs at 9:30. George was in his usually entertaining form and has a knack for showing QRP to the uninitiated. The ARRL provided the "door prize" for the forum in the form of the new Rich Arland, K7SZ / ARRL book entitled, "Low Power Communication" which was introduced at this hamfest. It was also available at the QRP ARCI booth managed by Hank Kohl, K8DD and Buck Swietzer, N8CQA. The booth alongside the Mich and the G-QRP booth was a hot point of activity all weekend, with hundreds of people renewing or joining as new members. Various club items were available



Martin F. Jue, K5FLU, (right) announcing his new SMT transceiver with W4QO (left)

including the new tee shirts ($10) and the very attractive new club caps ($10). Ordering information is available elsewhere in this issue and on the web site: http://www.qrparci.org

FRIDAY EVENING - Activities on Friday evening began with the now annual QRP banquet. Scott Rosenfeld, N7JI, chaired this event for the second year and the response was strong with 153 attendees. Preston, WJ2V, revisited the Bob Gobrick announcement again and a hearty banquet meal was served. Scott introduced **Ed Haire, W1RFI** of ARRL HQ who was our guest speaker. Ed started out by not using the microphone, but when he couldn't be heard, flipped on the mic and said "so power DOES matter!!" to the amusement of the audience. Ed kept everyone at attention with his coverage of who does what and where at the league headquarters. Of course, it helped that he gave out a very nice prize every 5 minutes or so during his speech.



Ed Haire, W1RFI, with banquet chairman Scott Rosenfeld, N7JI

Scott then introduced Jim Stafford who passed along Czuhajewski, WA8MCQ's apology for not being able to attend the hamvention this year due to work commitments. A number of Quality Recognition Program (QRP) awards were presented including awards to the entire NorCal NC20 design team. Peter Meier, WK8S, and Scott Rosenfeld, N7JI, were recognized for their management of the QRP banquet for the past five years. Club President/Management awards were presented to the following for their contribution to club activities: Chuck Adams, K5FO, Awards Manager, Cam Hartford, N6GA, Contest Manager, Ron Stark, KU7Y, QQ Editing, and Ken Evans, W4DU, Sec/Treas.

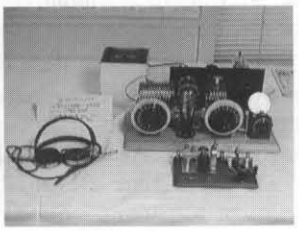
Three people were inducted into the QRP Hall of Fame this year: Dave Benson, NN1G, L.B. Cebik, W4RNL, and Paul Harden, NA5N. Details on these inductees will be found elsewhere in this or a subsequent issue of QQ. More than 90 door prizes were awarded at the banquet including premier prizes: a giant solar panel from Sunlight Energy Systems, an SW40+ (from Small Wonders Lab), a TenTec QRP transceiver, a Shielded Loop Receiver from JADE, the ARRL Radio Designer 1.0, and the Grand Prize - the SGC2020 transceiver (SGC) won by **Joe McKinney, N40VC** of Richmond, TX. The banquet ended at 9:15 p.m. and everyone adjourned to the hospitality rooms for Vendor Night, a mini-hamfest of its own. Some 15 vendors were doing a brisk business and demonstrating their equipment. Small Wonders Laboratories premiered their DSW line of transceivers - a step up from their SW series of transceivers, which includes a microprocessor for frequency readout, keying and other functions.

Joe McKinney, N4OVC, wins banquet grand prize - SGC2020

Saturday provided ample opportunity to take in the hamfest. A bevy of members were seen manning the QRP ARCI booth. But the surprise of the morning occurred when Rod Stafford, **W6ROD, ARRL president** stopped by and enlisted (briefly) to hand out club materials to prospective members and other passersby. Rod was heard to say he hoped that everyone would start using QRP. This excited us all until he added that it would then be easier for him to break through the pileups with his full gallan amp! Oh, well! I think he was kidding? Activity at the booth was steady to heavy all three days as more than 69 members renewed and 42 new members were recruited. In addition to memberships, Hank, K8DD, and Buck, N8CQA, were busy with all the new items. The series of very sharp club caps was a big hit with onlookers. Nearly all of the supply of 72 was sold out.

Saturday evening - Activities resumed at the free hospitality rooms with **the Radio Show and Build-It Contest.** The Radio Show, a new feature this year, encouraged folks to bring out their items for display even if they were not entering the contest. This produced a varied assortment of items from a bicycle mobile SSB setup, to loop antennas, to a very large collection of paddles which someone valued at over $10,000. All of the paddles were hooked up to a working oscillator, such that everyone could try out their hand, picking their favorite. There were two models of paddles valued at over $5000 each based on recent ebay.com sales!

A large number of entries arrived for the **Build-It Contest.** We were pleasantly surprised to have an entry this year in the youth division. Very clever designs abounded in the **Homebrew division** with honorable mention going to: Jim Kortge, K8IQY, won for the second straight year. This was a completely new construction of his 2N2/40 rig that won last year (and which by the way is the subject of the entire issue of the NorCal QRPp December 1998) along with his new 6M transverter. In second place was Rick Weber, W9QZ with a very nice working reproduction of a 1929 rig and other accessories.



W9QZ's 1929 rig

Richard Stamile, KG2ED, placed third for his beautiful key and Steve White, NM8T, received an honorable mention for his keyer.

In the **Kit division,** construction detail and personal touch counted for the most points with the judges: Phil Specht, K4PQC, George Dobbs, G3RJV, and Preston Douglas, WJ2V. Winners in this category included: Greg Tarcza, WA2OOD, who by removing a few of the letters from his call would just be WOOD and that wood be appropriate, woodn't it? His entry was a **wood veneered 38 Special** and was gorgeous. Appearing again but on more steroids (the radio, not Jerry) was Jerry Henshaw, KR5L, now of south Florida with his Sierra/LDG tuner/etc/etc all in a very attractive package. Ron Doyle, N8VAR, brought out his very nice SW30 for third place.

There were many other awards made during the weekend, too numerous to mention (another nice way of saying I can't find all the names!) The activities were officially closed but the last order of business was to remove the Gusher antenna that had been mounted on the carbon fiber telescoping pole. All this was done in the dark with only minor repercussions (Buck!)

Many comments of "best ever" and "why did I miss all those earlier years" were heard during the weekend, giving the organizing committee just enough encouragement to motivate them to begin planning for FDIM2000. Mark your calendar - May 18, 19, 20, and 21 - Four Days In May. See you there!

FDIM SYMPOSIUM - FEEDBACK NEEDED

We've now had four very successful years with the FDIM Symposium at the Dayton Hamvention. The Thursday of Hamvention week, we gather some of the best minds in QRP for an 8-hour symposium on QRP topics. It has been suggested to me that we have two tracks next year. One would be for experienced hams and be technically geared to that level. The second track would be for the novice to amateur radio. There we could focus on some basic issues. These could include but not be limited to: what are the basic items of test equipment needed for the shack & how to use them; construction & soldering techniques; antenna building and launching; operating; the list is open.If we are going to do this, we need to determine the interest level. How many of you would want two different symposiums on that Thursday? Which one would you attend? What topics are of interest to you? Please let me know via e-mail or US mail. As with all other items, the decision of the judges is final. In this case, you are the judges.Ken Evans848 Valbrook Court Lilburn, GA 30047-4280w4du@bellsouth.net

First Major East Coast QRP Gathering Rated "Success"!

George Heron, N2APB

Wow, what a time and what a showing at the Atlanticon 99 QRP Forum, the first ever large QRP gathering on the east coast! Over 125 QRPers gathered in Baltimore, MD on March 26 and 27 to hear presentations from honored and illustrious QRP authorities while also sharing in the camaraderie and fun of mingling with QRP friends across the country.

Another highlight of Atlanticon 99 was the Homebrew Construction Contest held in the hospitality suite on Saturday ... what a fine array of craftsmanship!There was such an excitement, enthusiasm and electricity present during the entire weekend!

The QRP forum itself consisted of a full day of QRP-oriented presentations delivered by some of the top experts and Elmers in the QRP field:* Ho-Ho-HOHPLs: Horizontally Oriented, Horizontally Polarized Loop Antennas, by LB Cebik, W4RNL * Techniques and Topics for 6-meter Design, by Dave Benson, NN1G* Solar and Geomagnetic Storms - Simply Explained, by Paul Harden, NA5N* SPICE and Its Uses for Radio Amateurs, by Chuck Adams, K5FO* PICpm ... a PIC-based QRP Power Meter, by Joe Everhart, N2CX* Troubleshooting 101, by Steve "Melt Solder" Weber, KD1JV* Genesis of a QRP kit (or "Have I lost my mind?!"), by Bob Berlyn, N1PWU.

Prize drawings were made throughout the Atlanticon activities. Registration numbers on the unique and collectors-item Atlanticon badges (designed and contributed by NA5N!) were the way attendees knew they were a winner. Over 86 fabulous prizes were contributed by clubs, vendors and individuals, and included: transceiver kits (NC20, NW80, SW40+, and a 44-Magnum), Ladder Grabbers, QRP Quarterly subscriptions, Fireball 40 kits, DX QSL Guides, ZM-2 ATU, and many more! Winners had to be present to collect their prizes.

Atlanticon followed the model of a growing number of QRP conferences being held around the country: Pacificon, Ft. Tuthill, Hamcom, FDIM, ... great authors & presentations, hospitality suites for QRP mingling, and a building contest to inspire and kindle the homebrewing sprit in all of us.

Atlanticon was sponsored and hosted completely by the New Jersey QRP Club. Active involvement of its membership in the design, kitting and promotion of various QRP projects (most notably the Rainbow Tuner and the Fireball 40 kits), enabled the NJQRP to subsidize the cost of the conference. The club is proud to be able to give back to the worldwide QRP community in a form that is so eagerly sought and enjoyed by all.

Interest in QRP is on the increase wherever one looks these days, evidenced by the many attendees at the Atlanticon QRP Forum and by the increasing number of similar gatherings around the world. The Jersey QRPers are very pleased to be assisting in that growth. The best way to overview the event is to listen to others who were in attendance.

So with a sincere thanks to Atlanticon working staff (N2SMH, N2TNN, N2CQ, and NN1G), let's hear what really happened at Atlanticon 99!

Report from Paul Harden, NA5N:

This was my first trip out to the right coast in years, and so close to Washington DC too. Didn't know what to expect ... I mean what if these guys have two heads? Or maybe one big eyeball smack in the middle of their foreheads? Or worse, maybe they just all look like Sylvester Stallone! Or maybe have names like Bubba, Killer, Scarface or Gambino? Nope ... they are all great guys with the same warm handshakes you get from QRPers everywhere. I doubt more than 2-3 of them have EVER been featured on "America's Most Wanted." Well, maybe 4.

ATLANTICON WAS GREAT ... somewhere between really cool and fantastic. Really keen. Yeah, that's it ... Keen Con.The NJQRP club did an excellent job organizing it.

For a first time event, I thought the attendance was great (more than 125 gungho QRPers) and it seemed to me to go without a hitch. Even had hot running water and towels! In fact, the Holiday Inn was a nice place. I had lost my camera and the staff was great trying to find it (it was found). But more important was the bubbling enthusiasm for QRP by everyone in attendance. I really felt at home.The Proceedings publication of author papers was a great effort too. Finally got a chance to read through it on the plane trip home. Excellent book.

For me ... I truly enjoyed Atlanticon. The talks were great, all the speakers were well prepared, good information ... but mostly, 90% of the QRPers were those I had never met before, just names and calls from QRP-L or working on the air. What a pleasure to finally meet such a huge assembly of QRPers for the first time.

I felt I made lots of a new friends. I don't recall having a free moment the entire weekend, and as a result, you never get the time to sit down and chat with everyone. In fact, I hardly got a chance to talk much to my old buddies that were there, like Dave Benson, Chuck Adams, L.B. Cebik, etc. It was that busy and fun the entire time.

Thankfully, Jan N0QT took over the data & Elmer 101 books and Zombie badges, giving me more time to visit and be one of the building contest judges. I think she got everyone "Zombie-ized."Great job and the highest of kudo's to the NJQRP club for a fantastic event. Thanks much for the invitation — I truly enjoyed it, and considered it an honor to have helped to launch the first Atlanticon.

Several of the NJQRP guys have the energy and drive that reminds me of Doug Hendricks. In short ... watch out! There are going to be some other great things happening from this bunch soon. You've got my support! (PS - Don't miss their webpage with all the neat photos. www.njqrp.org (homepage) and click on Atlanticon 99.)

L.B. Cebik, W4RNL reports on the conference (and in being the lead-off speaker):

Let me note what a privilege it was to kick-off the first Atlanticon QRP conference. Saying "Good Morning" to 125 of the finest hams in the US was a treat, a pleasure, and an experience I shall not forget.

Some high points for all to remember:

1. The other speakers: as fine a group as you can imagine, and I have been writing notes ever since on good ideas, new ideas, and even some funny ideas ever since.

2. The prizes: I do not know what the final count was, but think it was one short of the number of attendees. I know that because my number was never called! But the generosity and support of other folks (ARRL, H&B, EPA Club, QRPARCI, and other groups and individuals) was a marvel to behold.

3. The proceedings: excellently produced, with added materials that should help builders have more success at their craft. The range of topics is reflective of the symposium scope: everything from the sun to propagation to antennas to circuits to troubleshooting to operating.

4. The facilities: although isolated from the Bay, the hotel was first rate, the conference room was spacious

despite our numbers, the hamfest was next door — but no one I saw brought a swimsuit to use the indoor pool. Actually, no time, with activities from Friday evening to Saturday night.

5. The work and dedication of the NJ Club folks: Absolutely tops. Anyone who says that Yankees cannot be gracious and helpful has not met this group of folks. (I am a transplanted CT Yankee myself.) N2APB's endless energy was matched by that of the other members of the club. They made the usual conference snags disappear in seconds—a new record.

6. The MD locals: need a word of thanks to them also for supporting the effort, including Mike C's kind effort to get my YL and me from BWI to the hotel 30 mysteriously routed minutes away.

7. The folks who brought either their QRP products or their homebrew efforts to display: a full room of scrutinizing, questioning, and learning - which is what this group is all about.

8. The attendees: I hope I did not miss anyone who had an extra question or two to pose in the halls during breaks or at the evening social hours. If I missed anyone who had a question related to my talk or other matters, I apologize. I shall miss the opportunity for exchange from which I always learn more than I convey.

In my estimation, Atlanticon will become a standard feature of East Coast QRP activities every year. If you did not go this year, be there next year. They will likely have a full slate of new speakers with new ideas. But if you are asked to make a presentation. by all means accept.

My thanks to George and the NJ gang for inviting me to present. Despite a dental emergency, we still managed to stay happy the entire time.If you missed Atlanticon, make plans to be at FDIM or Pacificon - or one of the other symposia for QRPers. You will leave and drive home with one hand on the wheel and the other holding a portable soldering iron. My thanks to all the folks of and at Atlanticon for a great weekend, and for all your kindnesses to the wake-up alarm on the agenda.

Chuck Adams comments as a speaker, as a judge of the building contest, and as QRPer:

The group was still going strong after 9pm when I arrived at the hospitality suite on Friday. It was a lot of fun to meet the names and calls that you only know from email and postings. "Oh, you don't look like I thought you'd look."....

On Saturday there were about 125 or so for the Forum. This is an outstanding number for a first time QRP event! It was only the hard work and lots of time and energy put into bringing all together by the NJQRP Club that made it all possible. Thanks to N2APB, N2TNN, N2SMH and the whole gang. All of us who attended thank you guys very much. It was an honor to have been a part and to be lucky enough to have been there for the start of something big. Every journey begins with a single step and this looks like a wonderful trip for the QRP world.

I'm sure that you guys had days and times when you wondered if it was worth it and lots of issues to resolve. From someone outside the "inner circle that did the work" it looked polished and well done. We know you did it and we know that it was difficult. Good job. Take a bow and for next year let the QRP community know if you need anything.

After the day of presentations everyone broke up to run for the restaurants then back for the social and building contest. There was a large crowd and the enthusiasm was fantastic. [See Chuck's separate comments below concerning the building contest.]

After the building contest, someone brought some equipment and a 38-special they were having a problem with. You should have been there to see just how many people were gathered around. When I left after looking at the schematics and pointing out what the chip enable line was doing I said "resolder pin 19". About an hour later they came into the central atrium of the hotel where a bunch of us were gathered and sure enough that was a part of the problem, so we all felt good about that.

The point being that at large gatherings a debugging session should be planned for helping out others that have had a problem that seemed impossible to solve. The task of debugging is an educational exercise worth doing. I always tell people that you learn more from something that doesn't work than from something that does work. Steve Weber in his talk gave an excellent overview of the debugging process. I'm sure that you'll see an article appear somewhere from that talk.

So Atlanticon 99 is now a part of the history books. As for me it was another wonderful experience and well worth the time and effort to take it in and be there. I hope that I got to meet everyone as it is important that we all get together and share. Email will never ever replace meetings and gatherings such as these. People are important and without interaction we will not grow as a group or as individuals.

So, George and the gang in the NJQRP Club: Good job and a five star rating from me personally. The enthusiasm and hard work is obvious. It is the sincere hope of the QRP community that you will consider doing it again and don't hesitate to ask for help. I'd guess that next year the number in attendance will hit 200. The hotel was nice and the hot water and A/C worked. The meeting room was nicely done and thanks for the breaks during the day.

So, next year Timonium is on the list of must do meets for a lot of us. Heck, I can spell it now. A million thanks again for a job well done by the Atlanticon team!

Chuck Adams, K5FO next reports on the Building Contest:I have been a judge at a lot of building contests at Dayton, Pacificon, Ft Smith, HamCom....

Let me tell you it is a very difficult job for many reasons. The QRPers are getting better and better every year (not that they have ever been that bad) and the ideas and projects are getting more complex and ingenious. When we decide on a winner or winners there are many projects that don't make #1. That is not a critique of a poor job or of work now well done. I'd give everyone a prize if I could.

Thanks to the group for the prizes and thanks to the entrants for making our job as judges so difficult. Thanks to Paul Harden, NA5N, and Dave Benson, NN1G, as co-judges. We had a tough time on deciding the projects were all good.

Building contests have become so much of a integral part of gatherings and what we call "show and tell". By displaying a project we all learn. "Oh, that's neat." "Can I borrow that?" "How did you do that?" "Can I get a schematic?" All are comments and thoughts that we all have when we see the work(s). After one of these things I'm sure there are a number of people that rush home and try it out or add something to their work. It is a part of Elmering and growing process for the hobby.

Again, thanks to all the builders for participating. There are no losers; we just ran out of prizes.

There were two categories in the building contest. The first being the kit category whereby the entry was a kit that had been built by the entrant with or without mods, etc. The second category was homebrew although we did allow a kit to be entered but additional work was done and only that work judged for the scoring. This would be something like a transceiver or spectrum analyzer kit but the entrant wanted their work and craftsmanship judged on packaging, mods, etc.

In the kit category there were 10 entries including some SW40+s, SSTs, Fireball kits, etc. The winner in this category was Jim Giammanco, N5IB, from Baton Rouge, LA. His kit was brought to Atlanticon by a friend and I'm sorry that I didn't write that info down. Friends are important.

What Jim had done was take a Hearing Aid 5 and put it on 30

meters, but his packaging was great. And a mod that used a magnetic reed switch to enable the additional capacitance into the tuned circuit to allow the receiver to tune in WWV at 10MHz to check time and solar conditions at 20 minutes past the hour.

Also to help check out band conditions 'cuz if you can't hear WWV then you probably won't hear anything but that is not always the case. Been there done that. In the HB category there a dozen entries including a spectrum analyzer, antenna matching systems, 49er, Sierra case that appeared in QQ a couple of issues back, a completely home-brewed Sierra transceiver from the ARRL, and other goodies. There were two winners in the category.

The first winner was Jim Cotton, N8QOH, from Kalamazoo, MI. He had the complete W7ZOI spectrum analyzer with some mods to sweep tracking and some other additions that I didn't make a note of either physically or mentally. When Jim was explaining what he had done he went fast and didn't slow down at all. You gotta talk slow to a Texan..... He obviously had several hundred hours invested and more work lined up from what I saw. Good job Jim.

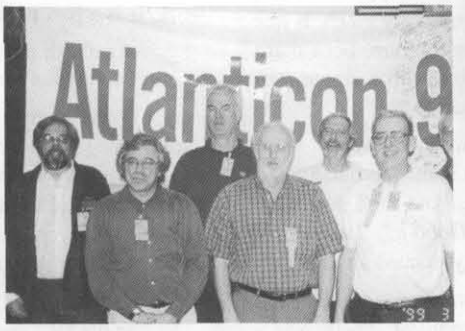
The second winner in the HB contest was Preston Douglas, WJ2V, from Lawrence, NY. Preston is a regular contributor to QRP-L and to the QRP community. It would take hours to list his accomplishments. He built the first Jim Kortge, K8IQY, 2N2222A 40 meter transceivers other than the one(s) that Jim did. For those who may not know or just arrived on the scenes this is the transceiver project that is to be featured in the next issue of QRPp and to become the Elmer300 series project starting in the fall timeframe I believe. Jim K. will be busy this summer with bicycling and most of the group will be doing outdoorsy type of things anyway. This is also the project dubbed the Manhattan Project due to the first view of Jim Kortge's work with the pads and linear layout it looks like a city with buildings aligned along streets. Preston chose to build his along the same lines. Interesting that someone who really works in Manhattan would use this type of construction technique. :-)Preston did his work only from the schematics of the rig and before work done by Paul Harden, NA5N, for the issue of QRPp. Outstanding work Preston and pictures will be on the NJQRP site I'm sure later on when the gang rests up after the weeks without sleep or rest. This project also involved over 100 hours of hard work. It was this work that found problems before they made it into print for the QRPp issue.Congratulations to the winners of the prizes and to the entrants. I can not emphasize enough just how close the scores came out and how the builders are really turning out great work. All the judges were impressed. Again, no words can express the appreciation to the NJQRP Club for an outstanding job well done and to the builders too.

Maryland Milliwatters in attendance

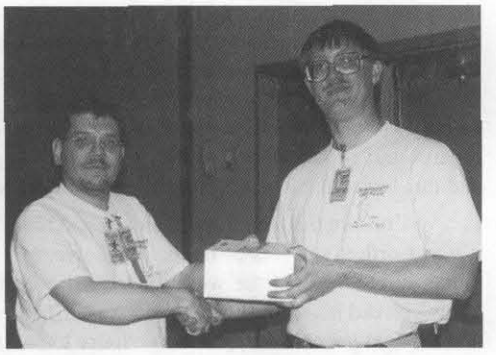
**The Atlanticon Staff ...
these guys made it all happen
(L-R) N2APB, N2TNN, Dean's son Nick,
N2SMH and N2CQ**

**N2SMH presenting to Building Contest
winner Preston Douglas, WJ2V**

**NJQRP members present and helping to run
the show**



**15 - The Speakers (L-R) KD1JV, N1PWU,
K5FO, NN1G, NA5N, N2CX and W4RNL
... thanks for a fabulous QRP Forum!!!!!**



**N2SMH presenting to Building Contest
Winner Jim Cotton, N8QOH**

The Eastern PA QRP Group in attendance

An Rx Noise Bridge - Part 1

Rich Daily, KA80KH PO Box 236, Beverly, NJ 08010 email: ka8okh@som-uky.campuscw.net

NOTE: This article is being reprinted as is from the April 99 QRP Quarterly because of omissions of schematics.

In these days of expensive antenna analyzers, we sometimes forget that the old tool still work, and work very well. The RX noise bridge is one of the most useful instruments that the QRPer/antenna experimenter can have in his arsenal. Unfortunately, it seems that the noise bridge has always been somewhat ignored, or even forgotten by today's amateurs. I've picked up several of these little gems over the years, a couple for as little as $15. One was given to me because the owner had no idea how to use it. I hope that this series will help de-mystify things a little. But look out... if you're not careful, you just might go away with a better understanding of how your feedline and antenna work together to release your signal into the ether.

What can a RX noise bridge tell me?

Probably the most common use of a noise bridge is to trim an antenna to resonance at a particular frequency. By inserting the bridge at the antenna feedpoint (more on this later), an using a tunable detector at the other end, we can adjust our antenna to resonance without the need of a transmitted signal. Likewise, we can place the bridge before out antenna tuner to set the tuner up for a particular frequency, again without transmitting. It's simple, effective, inexpensive, and the tunable detector - the receiver - is sitting right there in your shack.

But wait, there's more! Not only do you get the ability to adjust your antenna and tuner (why do I feel like I'm selling Ginsu knives?), you can also:

- determine the impedance of an antenna
- determine transmission line impedance
- determine the electrical length of a transmission line
- determine the resonant frequency of a series or parallel tuned circuit
- determine the values of unknown capacitors and inductors
- test baluns

No, they do not have fancy LCD readouts. Yes, their use requires a little knowledge of the impedance transforming properties of transmission lines, and some math skills. While not providing lab-quality measurements, they can come quite close. But don't let any of this scare you away from using a noise bridge. We will cover all the bases, and describe how to perform all of the above exercises on a typical antenna system. But first, let's look at how the RX noise bridge came about, and how it works.

A What - stone?

In order to fully understand how the RX noise bridge operates, let's take a look at what the whole thing is based on - the Wheatstone bridge circuit. Referring to Figure 1, the Wheatstone consists of two voltage dividers in parallel. Fixed resistors R1/R2 form one divider, and variable resistor R3 and the unknown resistor RU form the second. Ohm's law tells us that if we have two equal value resistors with a given voltage across them, the voltage across either resistor will be exactly half the supply voltage. Looking at the R1/R2 leg of the bridge, if we use equal values for both resistors, the voltage at point A will be half of the DC supply. By the same token, if we adjust R3 to equal the unknown value at RU, then half of the supply voltage will show up at point B. If we were to put a DC voltmeter across points A and B, we would read zero volts. R3 typically has a calibrated dial, so we can measure the values of resistors by simply plugging them in at RU, then adjusting R3 until our meter reads zero. At that point the bridge is balanced, and we can read the value of R3 off of it's dial, since it is now the same value as RU.

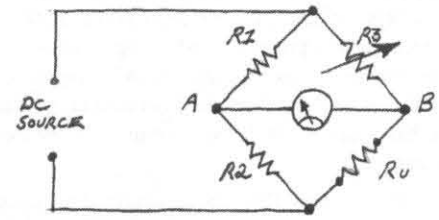


FIGURE 1.

Today we have VOMs to measure resistance, but this was the way it was done way back when. Actually a galvanometer would have been used between points A and B, and R3 would be varied until zero current flowed through the meter.

What's this got to do with my dipole?

Think of your dipole as a series tuned circuit. It contains a resistance, some capacitance, and inductance. At any frequency, there will be some capacitive reactance (Xc), and some inductive reactance (XL). As frequency increases, XL increases and Xc decreases. At some point, both will become equal. This is the antenna's resonant frequency. At that frequency the reactances are equal and opposite in value, thus cancelling each other out, leaving nothing but the resistance.

Now let's use the same Wheatstone bridge, but instead of using a DC supply, let's feed some RF into it. We can use an RF voltmeter to measure between points A and B. Instead of a resistor at RU, let's connect the dipole there. By alternately varying the frequency of the RF going into the bridge, as well as adjusting R3, we'll find a point where we get a deep null reading on the meter. At that point we can read the antenna's resonant frequency from the RF generator. The antenna's radiation resistance is equal to R3.

Now this is all well and good, but in 1967, R.T. Hart, W5QJR (ref 1), cam up with an ingenious idea. Instead of a variable frequency generator and a broadband detector, why not use a broadband generator and a frequency selective detector? The result would be much more economical. A broadband noise generator can be built for next to nothing, and most hams already have a calibrated detector in the shack - the station receiver serves this purpose just fine.

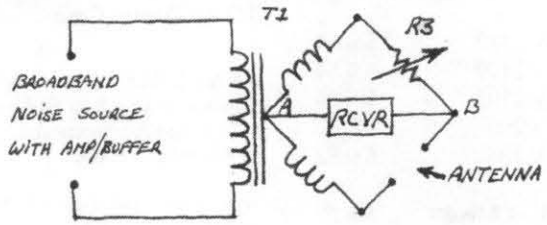


FIGURE 2.

A functional diagram of the resulting Resistance noise bridge is shown in Figure 2. A zener diode makes a great noise source. Following the zener is a couple stages of broadband amplification. From there, the noise is fed through a transformer, then on to the bridge circuit itself. The receiver is connected between points A and B, and the antenna connected in place of the unknown resistance. By varying the receive frequency and adjusting R3, we can watch for the deepest null in the S-meter. At that point we have found the antenna's resonant frequency.

Where does the "X" come in?

What we have described so far is a resistance noise bridge. It can tell us the resonant frequency of our dipole, and the radiation resistance. But if we haven't a clue as to the approximate resonant frequency of the antenna, the process of adjusting the bridge and receiver can be a tedious one at best. The off-frequency reactance of the antenna can be inductive or capacitive. The resistance noise bridge cannot differentiate between the two - it can only show us that some reactance is present by indicating a shallow null on the S-meter. In addition, a narrow coverage receiver, such a typical QRP rig, can only provide a small window to determine if our antenna pruning is resulting in an antenna that is coming closer to resonance, or one that is moving away from our frequency.

In 1973, G. Pappot, YA1GJM (ref 2), modified the resistance noise bridge to enable measurement of reactive properties of the antenna, as well as the resistance. The circuit could then tell us the impedance of our dipole, whether any reactance is capacitive or inductive, and this tells us whether our dipole is too long or too short.

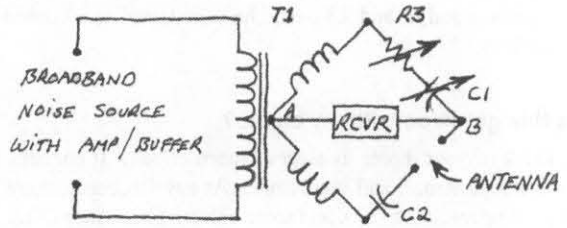


FIGURE 3.

Pappot's circuit is shown in figure 3. Notice the addition of the variable capacitor C1 in the same bridge leg as variable resistor R3. Also note that a fixed capacitor C2 is now included in the unknown, or antenna leg of the bridge. The variable capacitor in this design is 140pf, while the fixed capacitor is half that, or 70pf.

Now back to our dipole. If our antenna is short, is will exhibit capacitive reactance. Conversely, if it's too long, it will have inductive reactance. By alternately adjusting C1 and R3, we will be able to find a deep null without being on the resonant frequency.

With our dipole at resonance, the reactances cancel, and C1 will be set at mid-range, or 70pf, the same value as C2. If the antenna is too long, we will have to compensate for the inductive reactance by increasing the capacitance of C1. Conversely, if the antenna is too short, we must decrease C1 to balance the capacitive reactance in the unknown leg of the bridge. By calibrating C1's dial to read Xl or Xc, we can tell whether the antenna needs trimmed or lengthened. Using a general coverage receiver, we can find the resonant frequency of the dipole by tuning the receiver until we reach a point where our deepest null occurs when C1 is set at mid scale. The receiver will display the resonant frequency, and R3 on the noise bridge shows the antenna's resistance.

* What about setting my tuner?

To align a tuner set the receiver to the frequency of interest, and insert the RX noise bridge between the receiver and the input of the tuner. Set C1 on the bridge to mid-scale, and R3 to 50 ohms. Adjust the tuner until a deep null is found. When the null is found, we have achieved a 50 ohm resistive match for our rig. Just don't forget to remove the noise bridge before you transmit! Even a QRP rig can smoke a perfectly good noise bridge if it's transmitted into.

Next time we'll look at several other ways to use the RX noise bridge, and discuss how to improve the accuracy of our measurements.

References

R.T. Hart, "The Antenna Noise Bridge", QST December 1967.

G. Pappot, "Noise Bridge for Impedance Measurements", Ham Radio January 1973.

IDEA EXCHANGE

Technical tidbits for the QRPer

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In this edition of the Idea Exchange:

MICROWATTING

Wes Hayward, W7ZOI, had a column called Experimenter's Corner in the QRP Quarterly that ran for a year a long time ago. In the last issue we reprinted the one where he discussed a wide range VXO, and he has allowed us to rerun another, from the July 1985 issue. That column spurred me to do some microwatting experiments of my own several years ago. I'll describe that in the future; the title of my article will be "Microwatting (or, Diodes?!? The final here is a foot-long attenuator!)"

Microwatting (or, "The final here is a pair of diodes.")

By Wes Hayward, W7ZOI; QRP Quarterly, July 1985

Many of us have spent the last couple of years bemoaning the lousy band conditions, with frequent reference to the "good ole days." However, realism and a look at the published long-term propagation forecasts tell us that things will not start to get "hot" again until perhaps 1988 or 1989! We could, of course, build finals and join the ranks chasing low-band DX. Alternatively, we can make the best of present conditions, keeping in mind that QRP is relative; the "juicers" are having problems with propagation, too. Perhaps it's time to consider dropping power (!) —at least part of the time.

A virtue of poor propagation conditions is QRM-free bands. This is true even of 20 meter CW, a good band for experimentation with local friends.

One measure we use for QRP success is the "miles per watt" of a contact. The club issues an award for a confirmed contact with a station more than 1000 miles away per watt of output power. Virtually all of us who have participated in QRP operations for any amount of time have realized this goal many times. There are two ways to achieve this milestone: we can go after the long-haul contacts with our normal QRP powers, while fighting poor propagation; alternatively, we can work the local stations, but do so with ridiculously low output power. The second option, which does not depend on spots on the sun, is the game of "microwatting," and is the subject of this issue of the Experimenters corner.

A long time friend and professional colleague, Bob, finally gave in to my prodding and became N7FKI. He's not new to amateur radio, having been an avid listener and serious experimenter for perhaps 25 years. Bob (and his XYL, KA7VAF) has been enjoying the usual thrills of the beginning ham. He has also started to extend his experimental work. Both of us have an interest in the detection of very weak signals. Construction of a special, ultra-QRP transmitter seemed like a good starting point for more exhaustive weak-signal experiments.

The simple transmitter, shown in Figure 1, consists of a crystal oscillator, an emitter follower buffer and a class A feedback output amplifier. A PNP switch is used to key the crystal oscillator. A double pi network filters the output. The buffer was needed to prevent a slight frequency change with changes in output termination.

Figure 1

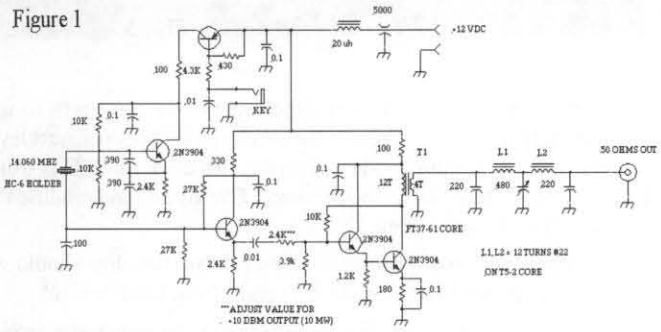


Figure 2

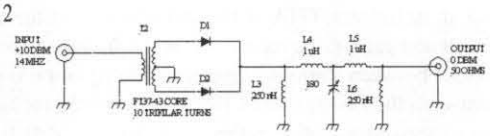


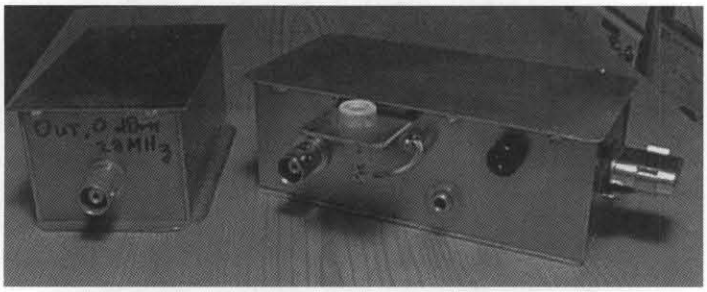
Figure 3 $$P\,(Rx, \text{milliwatts}) = \frac{(570)\,(PT)\,(GTA)\,(GRA)}{(F)^2\,(R)^2}$$

The crystal oscillator output is obtained from a capacitor in series with the crystal. This signal is exceptionally clean, with harmonics that are very much lower than found in other parts of the circuit. Construction is not "standard" form. The rig is built in a box fabricated from double sided circuit board material. The crystal is in a socket that grounds the metal crystal can. Leads into and out of the box are well shielded and bypassed. Virtually the only output is that available from the antenna jack. The resistor marked with asterisks was adjusted for an output of 10 milliwatts with a 12 volt supply. The lid was then soldered to the box.

The circuit goes together easily. It was built late one evening, and a contact was made with Bob the next. The contact format was that described in Chapter 9 of Solid State Design for the Radio Amateur. The contact is started with full output power of 10 mW, then a step attenuator is adjusted for a desired level. A five letter word is sent three times at each power level. Bob had to send the word back to me to confirm true information transfer.

The first contact went fine at powers down to one microwatt output. Bob then encountered some QRM from a weak VK station. Bob's location is 2900 meters from mine (about 1.4 miles), and we were both using 6-band verticals. Mine is roof mounted with a dozen radials. Bob's is on the ground with only a ground rod. (A bright sunny Saturday will alleviate that problem.)

A burst of reasonable 20 meter conditions provided contacts with our big rigs, but added QRM to the microwatting contacts. So the passive frequency doubler of figure 2 was built. Ten milliwatts of 14 MHz drive provides 1 milliwatt of 10 meter energy. Spurious responses are all 45 to 50 dB below the desired output. A shielded box fabricated from circuit board material was used again. The ten meter operation used the same antenna systems described above. The 28 MHz experiments were also successful at outputs down to one microwatt but no further.



Having initiated preliminary experiments, we can begin to ask more meaningful questions. Clearly, the one million miles per watt level is easily attained, assuming modern receivers are used. (N7FKI is using an Icom 751 that's fully loaded with narrow CW filters, and modified to correct several design problems.)

Antenna gain would certainly be useful. But how low should we be able to go in power? How far are Bob and I from basic limits?

One can derive an equation that expresses the power at a receiver as a function of the transmitted power, frequency and antenna gain at both ends of the path. Figure 3 shows the equation. PT is the transmitter output power in milliwatts, GTA is the antenna gain at the transmitter, GRA is the antenna gain at the receiver, F is the frequency in MHz, and R is the distance between stations in meters. The equation is derived for free space between the two antennas. Both gains should include feedline loss and are expressed as ratios rather than decibel (dB) figures. The gains are with respect to an isotropic radiator.

Application of the equation to the conditions of the two contacts mentioned (PT = 0.001 milliwatt, R = 2900 meters, GTA = GRA = 1, or 0 dB, and F = 14 or 28 MHz) shows that the 20 meter signal at Bob's receiver input should be -92.6 dBm, while the response at 28 MHz should be -98.6 dBm. These are both rather large signals, well above one microvolt, and are much stronger than the observed results.

We can estimate the minimum receiver response that we might expect to detect. These estimates are based upon "best possible" (quiet) band conditions, receivers with 100 Hz effective noise bandwidth (provided either by a really narrow receiver or a "good ear"), and a receiver noise figure that's low enough to not be the limitation. The estimates are:

28 MHz	-145 dBm
21 MHz	-144 dBm
14 MHz	-142 dBm
10 MHz	-139 dBm
7 MHz	-136 dBm
3.5 MHz	-131 dBm

These numbers are rather optimistic. Even if we throw in several dB for realism, our experimental results still depart considerably form the fundamental limitations related to free space loss.

Two previous sky wave contacts offer interesting comparisons. One, in 1969, was with WA6YVT on 7 MHz with an output of 2.5 milliwatts. The distance was around 900 miles. The other, in 198, was with JA8AYN with a 28 MHz output here of 4 milliwatts, with a distance calculated as 4441 miles. Both contacts showed about a 25 dB difference between the expected receiver power and the best case listed in the table, suggesting a propagation related loss of around 25 dB for both contacts. In contrast, the close-in contacts with N7FKI represent excess losses closer to 50 dB! The difference is probably a result of our antennas not generating the low angle components needed for effective ground wave communications.

The initial work is hardly profound, with expected results. Additional experiments are suggested, most relating to antennas and locations. Some portable work is suggested. Also, experiments from the shacks of other local hams (with BIG antennas) could be interesting.

Finally, we can make the most of existing antennas, locations, and paths and consider modifications at the receiving end. Bob and I have a number of things in mind in this vein, including application of computer enhanced receivers, auto correlation and the use of a finite impulse response (FIR) active audio filter.

WA8MCQ comment: I asked Wes this year whether the design for the doubler was correct as printed, with L3 and L6 instead of capacitors in those positions. He replied with the information on them, the photo of the two devices, and these additional comments—

These were built when I was on a kick of using the ultraspherical low pass filters. And that's all we have on the 20 meter box. However, the 10 meter output needs a filter that is a DC short at the input, for we need to allow diode current to flow. So, it was converted to a bandpass of sorts. These are very non-critical networks.

L1 and L2 are about 750 nH. Any core available is fine. L3 and L6 are 250 nH; any core or a solenoid will do. Try 6 turns tightly packed #26 or #28 on a T30-6. L4 and L5 are about 1 uH, 16 turns #28 evenly spaced on a T30-6, but about anything handy will do.

The variable capacitors are the mica compression trimmers from the junk box, but something smaller will do just fine.

(WA8MCQ note—The ultraspherical filter he mentions is also known as a peaked low pass filter. The design was described in a very long and comprehensive article in Ham Radio magazine circa 1982. Varying the center capacitor changes the response of the filter; tune for maximum output. In the future column I will describe some experiments I did with one of the designs in the article. Another future column or article will describe my own microwatting experiments in 1991 with a ham about a half mile away, and a 4 milliwatt transmitter based on a computer clock oscillator for 28.322 MHz.)

—DE W7ZOI

THE QUICKIE TONE OSCILLATOR

Number 30 in his unending series of Technical Quickies, this comes from Joe Everhart, N2CX of Brooklawn, NJ, one of the guiding lights of the New Jersey QRP Club—

The subject of this Quickie is one of those circuits that just won't go away! I've built this one up as a code practice oscillator several times over the years and keep coming back to it. This time it was brought to my attention by my friend Tony, WA3CAO. We'll get to just why a little later.

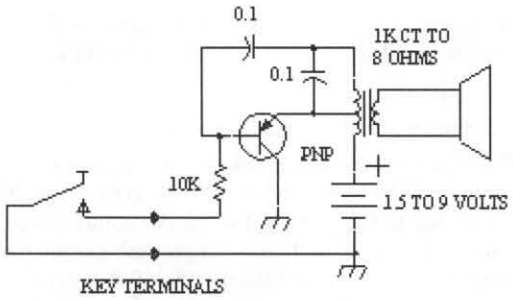


Figure 4 - Quick Tone Oscillator

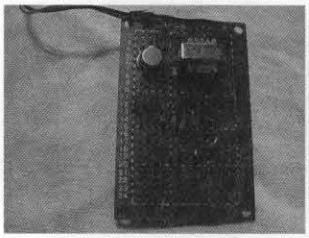
Figure 4 shows the schematic diagram for the Quick Tone, a very basic blocking oscillator. You really can't get much simpler! The transistor gets its bias through its 10K base resistor and feedback from the output transformer through an 0.1 uF capacitor. The transistor emitter goes to the transformer center tap to provide the proper feedback phasing. The 0.1 uF capacitor between the emitter and top end of the transformer were not in my earlier uses. Tony added it to stretch the output pulse width for more volume.

The transistor can be almost any garden-variety PNP type such as a 2N3906 or 2N2907. In fact when I built the first one I used an old germanium 2N404 since silicon transistors were too expensive.

The transformer is the most "exotic" part in the whole thing and the reason I stopped building the oscillator years ago. But when I'd run across a defective transistor radio and an output transformer, I'd keep it for the next time I wanted to build a cheapie oscillator. By the way, if you have an old transistor radio transformer but no idea of its operating impedances here's a trick to get you in the ballpark. They are designed with economy in mind so they don't go overboard on trying to get low loss. They use the minimum material that will do the job including copper wire. As a general rule, the dc resistance is about 10% of the operating impedance. For example, the Radio Shack 273-1380 I just bought has ratings of 1K center-tapped on the primary side and 8 ohms on the secondary. The primary winding total resistance measures 66 ohms and the secondary is 0.6 ohms so it is likely a little better than the "cheapies" liberated from defunct radios.

The capacitors are also non-critical. The values will affect operating frequency so try to stay close to the values shown, but try whatever you might have that's in the ballpark. You can always tweak the tone to a pleasant pitch by picking the right base resistor. Higher capacitance or resistance in the base circuit makes the frequency lower.

In keeping with the non-criticality of the circuit, the operating voltage is your choice as well. Usually anything from 1.5 to 12 volts is OK though you may find volume low at 1.5 volts and very low gain transistors may not be adequate. Current drain is only a couple of milliamperes when keyed and microamps when not. This circuit is an excellent candidate for those carbon zinc batteries that are a bunch for a buck at the local dollar store.



The accompanying photo shows a Quick Tone that my friend Tony built. Ignore, for the moment, the extra resistors. They were added for a use that will be described in a future Quickie, the Tuner Toner. He built the circuit on a Radio Shack project board but almost any scrap of perf board or even ugly style is ok.

As mentioned earlier, the oscillator is great for use as a very cheap code practice oscillator. It can be keyed by shorting the base resistor to ground. It draws only microamps of leakage when the key is open. I have used mine to try to build skill using an iambic keyer and replace the loudspeaker with headphones so I don't drive the family crazy! I have to admit that my iambic skills are not yet good enough for prime time.

Tony uses the oscillator as a piece of general purpose test equipment. First of all the "keying" leads can be used as a continuity tester (Figure 5). The tone is absent when there is no continuity across the leads and is highest in pitch with a short circuit. It can also serve as a water level detector if the leads are placed in an area where you might want to automatically tell when water has reached a certain level in a container or is flooding your basement. When the probes are bridged by water the oscillator turns on.

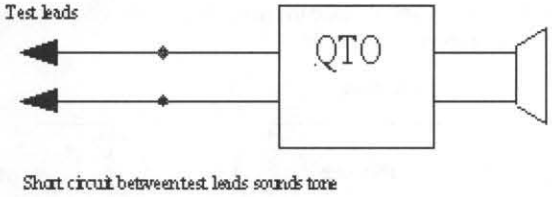


Figure 5 - Continuity tester

It can also be used as a diode or transistor junction tester as in Figure 6. The circuit from the bias resistor to ground is completed when a diodes anode goes to it and its cathode to ground making a tone. If the diode is reversed, the tone stops. And a leaky diode will give a low-pitched tone due to the effective high resistance. A DPDT switch connected as in Figure 7 lets you reverse polarity without swapping the leads around.

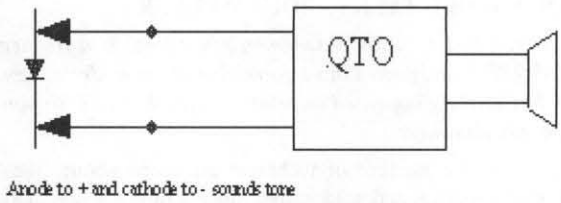


Figure 6 - diode tester

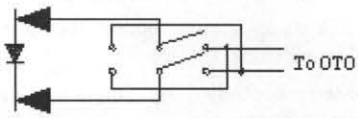


Figure 7 - DPDT switch reverses polarity

The same setup can be used to check electrolytic capacitors. When connected with the "right" polarity the tone starts at a high pitch then decreases as the capacitor charges. With a little practice you can judge the capacitance. A low leakage electrolytic will eventually charge up fully and the tone will disappear. If there is some leakage the oscillator will never stop but level out at a low "growl". If a polarized capacitor is hooked up in the reverse direction, it will appear to charge up very quickly but level out to a fairly high pitch.

Another use is shown in Figure 8. Tony is blind so it is handy for him to be able to detect light electronically. The oscillator does so using a cadmium sulfide photoresistive cell across the input leads. Brighter light decreases the resistance giving a higher pitch.

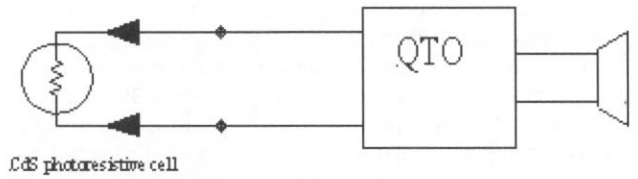


Figure 8 - light detector

One final use of the Quick Tone is as an AC voltage detector. Figure 9 shows a homebrew optoisolator connected to the input leads. Test leads of the isolator are connected to an NE-2 neon bulb through a 220K current limiting resistor. The bulb illuminates when a voltage of 60 VAC or more is applied. A cadmium sulfide photoresistive cell senses the light and keys the oscillator. The lamp and CdS cell should be enclosed in a light-sealed tube (or even black shrink tubing) for best results. Of course you should take the usual precautions necessary when dealing with AC power!

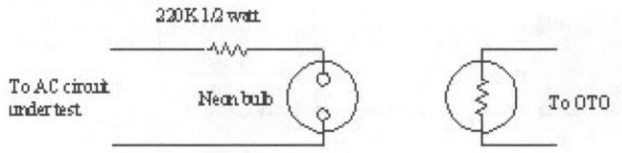


Figure 9 - AC line "sniffer"

Yet another application will be left for the next Quickie. It uses the multiple base resistors shown in the photo to give an audible multi-frequency output from the SWR indicator in the Rainbow Bridge and Tuner.

—DE N2CX

DOCTOR SOLDER TALKS ABOUT WELLER

Conrad Weiss, NN6CW (radman@best.com) is a frequent contributor to QRP-L and posted this information about soldering irons. (He said this has already appeared in print in several places, so you might have seen this elsewhere.)

I received a number of technical questions about the Weller WTCPT solder station and solder tips. Since I'm not a real "Doctor of Solder," I decided to call one on the phone. I had a nice chat with Mr. Larry Smith in Weller's engineering support division, and a thirty-year veteran in the soldering industry. Here we go with, "Ask Dr. Solder."

Q: Why is a solder station "better" than a non-temp controlled (unregulated) soldering iron?

A: A non-temp controlled iron continues to increase in tip temperature the longer it's plugged in — up to 1100 degrees F ! A solder station controls and maintains an exact tip temperature. In the case of 700 degree-F tips, you'll be soldering at a tip temperature of 400 degrees less than a non-temp controlled iron. A lower tip temperature, with good technique, translates to better joints with less chance of damage to sensitive components— IC's, etc. (The 700 degree-F Weller tips will not exceed 710 degrees-F.)

Q: Which tips do I use — 700 or 800 degree-F ?

A: The 700 degree-F tips are typically recommended for single layer and double-sided PC boards — even four-layer PC boards. This includes practically everything in the world of amateur radio kits & homebrew. The most common tip for the WTCPT station is the Weller PTA-7 (1/16" screwdriver tip). You might also want a PTD-7 for much bigger pads/lugs, and a PTJ-7 for longer-reach work or rework. If you want to try surface mount, pick up a PTS-7 for a start. The 800 degree-F tips are recommended for serious multi-layer boards — 4 to 8 layer PC boards — something not typically used for ham radio kits.

Q: Is the tip of a WTCPT really grounded ?

A: YES !!! All Weller solder stations have grounded tips. You can check the integrity of the tip ground as follows: Turn the solder station OFF and let it cool. Pull the plug OUT of the AC mains and using your DMM (ohm meter) check for continuity between the ground plug on the Weller AC plug (you know the one) and the tip of the soldering iron. You should be reading approximately one ohm. If your resistance is considerably higher, you probably need to clean the tip (with 600 emery cloth, etc) and possibly remove the tip and the "barrel" (the hollow part that screws the tip to the iron) and clean the threads with a brass/bronze brush to remove any oxide build-up. Never use a 3-prong to 2-prong "ground cheater plug" — obviously, this defeats tip grounding and ESD-safety.

Q: What is the meaning of "ESD-safe" in soldering stations?

A: "ESD-safety" guarantees that static energy from your body (hands, etc) will be "dumped" to ground via the plastic soldering iron handle or solder station plastic housing. Otherwise, the ESD would transfer to the soldering tip, thus destroying the IC you're soldering. The solder station essentially discharges your body's static charge to ground every time you pick up the soldering iron. (Naturally, you should take additional ESD precautions if you're handling extremely sensitive components — and not rely on the solder station for all ESD-safety in the lab!)

Q: How long should it take to make a "good" solder joint on a common solder pad?

A: Tricky question! The time spent on the pad is called "dwell time." A dwell time of 4 seconds at 700 degrees-F might be considered destructive for some components —however, a dwell time of 2 seconds with an 1100 degree-F unregulated soldering iron can be much more destructive. A 700 degree-F dwell time of 3-4 seconds is not uncommon, to allow for "filling the pocket" — that's the volume of the thru-plated hole, flush to the component side and properly "feathered" evenly to the circumference of the solder pad— on the solder side.

The "pocket" should be filled —but not over-filled — and the solder in the center of the pad should rise evenly to the component lead that will be trimmed. Never have a solder pad with an under-filled "dimple" on the pad. The solder level at the component lead should be higher than the edges of the pad. A soldered pad should never look like a "round BLOB of solder sitting on the pad." Wire soldering is more of an art than a science, and with practice — 1 to 3 second dwell times can be achieved, while safely meeting all of the above criteria.

Q: What about residual flux that's left on the board?

A: Flux removal is an issue that's best answered by the solder and board manufacturer. However, the color of the flux — after soldering a pad — is a good indicator of whether your dwell time is too long. Your residual fluxshould look "honey-colored" rather than "caramel colored." If you're starting to burn the flux, your dwell time is too long, OR your tip temp is too high, OR you need to consider a different tip shape, OR applying heat to the pad/component lead from a different angle. Heat primarily the pad, and catch the lead with the side of the tip —then practice, practice... practice. Have a friend time you and inspect your work if you're serious.

Q: Any closing remarks?

A: Soldering stations allow for greater soldering consistency when compared to non-temp controlled irons. Overall, this translates to

fewer cold joints, fewer heat-damaged components and fewer heat-damaged pads and traces. The quality of your work will be superior, compared to soldering with non-temp controlled irons. Remember to wash your hands after you're finished handling solder. Never smoke cigarettes or eat while soldering. Never allow kids to play with solder. And, practice soldering! It's still an art — not a science!

There you have it! A conversation with "Dr. Solder." Happy soldering.

—DE NN6CW

WA8MCQ comments: A nice thing about a lot of soldering stations is that they use low voltage AC on the cord going to the iron, which is a good safety feature. Also, as far as I know, just about all good quality soldering instruments use a special, heat resistant insulation on the cord going to the iron. If you use a bargain basement soldering iron, you might have 110 VAC on the cord, with insulation that melts easily at soldering temperatures. Make a slip of the tip and it could accidentally touch that cord and melt through it with disastrous results. Having the heat resistant insulation plus low voltage is an excellent safety combination.

Something I've liked to do for years, when working with someone not aware of the heat resistant insulation, is to say, "hey, watch this!" and then coil the cord tightly around the entire length of the hot barrel and tip. It always gets a great reaction! Naturally, the most that ever happens is that it might smoke a bit as contamination on the cord burns off. Warning: before you try this on YOUR friends, be absolutely positive first that you do have heat resistant insulation! And be sure to warn them that not all soldering instruments have it.

—WA8MCQ

BAD SURPLUS LM-301'S

This doesn't count as one of his Quickies, just a note that Joe Everhart, N2CX, posted to QRP-L—

Many of us homebrewers buy parts from surplus suppliers with excellent results. However, every once in a while we get a part that misbehaves inexplicably. At times they end up at the surplus guys because they are not quite up to snuff.

One of my compatriots and I bought a bunch of LM301 op amps recently at bargain prices. But when we tried to use them, we could not get them to bias properly. Every one of them latched with its output high. After lots of head-scratching and digging back thru old literature we found a recommendation that latchup of that device could be prevented by putting a diode across the compensation terminals, anode to pin 1 and cathode to pin 8. Voila—problem solved!

I have used more modern ones (these have early 1980's date codes) without having to resort to the diode so the process must have been improved along the way. I see no reference to the diode in my 1989 National Semiconductor data book. I guess that's why these chips were so cheap! However now we have a heap of good ones to play with.

(WA8MCQ note—As always, it's caveat emptor when buying surplus parts. Things get into surplus channels for a variety of reasons, such as contract terminations, companies going out of business, production overruns, etc. But another reason could be that something is an older, less capable model than newer versions of the same thing, as was the case here. Another reason for being on the surplus market might be due to defects. I once picked up a batch of resistors of a single value which had come through surplus channels of some sort and found that they were hugely out of tolerance. They had been mismarked as a completely different value, off by a factor of several hundred.)

—DE N2CX

PADDLE DUST COVERS

From Joe Mikuckis, K3CHP of Riverdale, MD—

It is nice to be able to keep the dust off the paddles. When I went to Dayton two years ago I was lucky in finding a custom made clear, hard plastic dust cover for my Bencher. Since then I acquired a J. M. March paddle. What to do? One solution is go up to the grocery store and buy a round plastic food container. I found that Rubbermaid number 7, 3 cup size is perfect for the J. M. March. Of course, you have to use it inverted and cut several slots. The same approach may be suitable for the Mercury and/or other round base paddles.

—DE K3CHP

AUDIO GENERATOR

Frank Brumbaugh, W4LJD of Salinas, PR, sends along the audio generator shown in Figure 10. It puts out a sine wave from about 300 to 3000 Hz, with square and triangular waves also available by tapping off at different points.

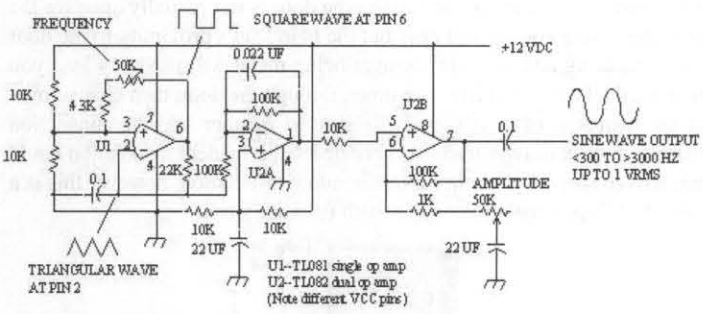


Figure 10 - audio generator from W4LJD

Frank says, "As the resistance of the 50K pot increases, the frequency increases and the amplitude decreases. As the resistance of the amplitude pot decreases, the amplitude of the output sine wave increases. Too much gain will distort the sine wave as it approaches the rails.

"Lower frequencies are spread out, and higher frequencies are compressed, as the frequency pot is rotated. A frequency counter at U1, pin 6 allows accurate frequency selection. If desired, square and triangular waves can be taken from U12 pins 6 and 2 respectively."

—DE W4LJD

MOBILE FOAM GOES HOME

In the January Idea Exchange I ran an item from Walt Dufrain, AG5P (walter@inlink.com) from the October 1998 issue of The Peanut Whistle, journal of the St. Louis QRP Society, titled "On the Road with Foam Insulation Tubes." At the end, he promised a second article along the same lines but for home instead of mobile, and here it is, from the November 1998 issue. For those that missed the earlier article, he's talking about "closed cell foam tubes." These are those tubular, hollow core, foam tubes designed for insulating pipes and tubing. They are available at most hardware and lumber stores, and are already slit along the length.

(SLQS was founded as a local QRP and homebrew group in 1987. They feel now, as then, that the QRP world is well-served by QRP-ARCI, NorCal, Michigan QRP, etc, and choose not to compete. They do not accept members from outside their area or accept outside subscribers to the Peanut Whistle. But they do allow me to share some of their technical goodies with the rest of the QRP community.)

Walt says—The "mobile foam" is also useful for quite a few feedline installations around the home or garage.

If you are using a window out of the hamshack, then two easy fixes for the window are shown in Figure 11. [The right side shows a piece of plexiglas cut to fit the opening.] Also, if you have a storm window to contend with, then simply build two of these units and run your coax or twin lead "thru the foam." A hint to getting an airtight seal on your home windows is to use double sided sticky foam tape on the outer edges of the plexiglas, so that you have a picture frame of tape.

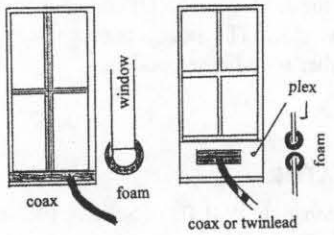


Figure 11

The hardest sealing job is on glass sliding doors, with the aluminum frame (figure 12). This is a large space to get sealed and still keep a measure of weather tightness when the door is left partially open for the feedline. Using coax is still easy but the twin lead's proximity to the door frame molding and the door receiver being metal will probably lead you to use a dual coax feed from the tuner, through the door, then change over to the twin lead of your choice. Be sure to weather seal the connection from dual coax to twin lead. A more or less permanent installation could use a large strip of plexiglas, like a window installation, however this is a large and floppy mess to contend with on a daily basis.

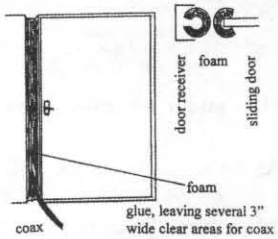


Figure 12

Several hams operate from their garage and put up small portable antennas or run coax to their car mounted HF antenna to get around antenna restrictions and here is an easy fix for the 'ol garage door (figure 13). You may have to manually close the garage door since the automatic door opener sensors are going to be fooled into thinking the door is not closed with the foam holding the door up about 1 1/2 inches from the floor. Again, this is a time to use double coax feed instead of twin lead, at least at the ground level. For this foam sealing job, the 1 inch foam tubes are the most likely to fit on your garage door.

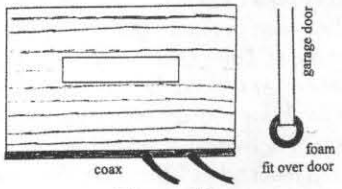


Figure 13

Please remember the "non-security factor" when using the foam. [Doors and windows cannot be locked with it in place.]

—DE AG5P

MORE ON LED NIGHT LIGHTS

The last issue had an item by N2CX on making a portable light from ultrabright LED's for field operations. Frank Brumbaugh, W4LJD, said that a few years ago All Electronics had some ultrabright yellow LED's for sale and bought some. He built two lamps, one about 8 inches high, mounting an unspecified number of LED's in a circle on the end of a plastic 35mm film container, in series with each other and a dropping resistor for 12 volt operation. He built the other in a 35mm can as well, but without a stand, but with a shade cut from a beer can and flared out. He said both make quite a bit of light. He said he earlier published an article in 73 magazine using nine regular yellow LED's, which was OK but not nearly as bright.

Frank said that All Electronics later dropped the ultrabright LED's, but there's another source. I recently received a catalog from Hosfelt Electronics, 2700 Sunset Boulevard, Steubenville, OH 43952-1158. (Their toll free number is 888-264-6464.) They have two pages of ultrabright LED's. Depending on brightness, size, color, etc, some cost two or three dollars each, but many are under a dollar.

INDEPENDENT VOLUME CONTROL FOR SIDETONE

Steven Weber, KD1JV (kd1jv@moose.ncia.net) has been a frequent contributor to the QRP-L mail reflector for a good while now, and has had quite a few excellent technical inputs. Here's one of them, along with my own drawing to illustrate—

I've noticed that in some of the current QRP kits, the sidetone level is NOT independent of the audio gain control. Nothing bugs me more than having my ears blasted by the sidetone when I turn the audio gain way up to hear a weak station and then key the rig! If the rig uses an LM386 or LM380 audio amplifier, there are two inputs to the amplifier. One is usually left open or connected to ground, as shown in Figure 14. To make a volume control independent sidetone, I feed the sidetone signal into the normally unused audio amp input through a small trimmer pot as shown in Figure 15. This completely isolates the sidetone level control from the normal audio gain control. This has always worked well for me.

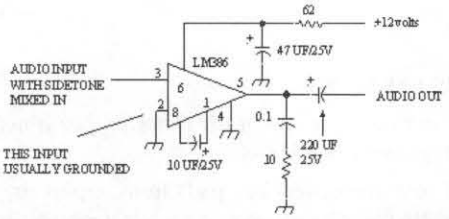


Figure 14 - Typical audio amp with sidetone mixed in

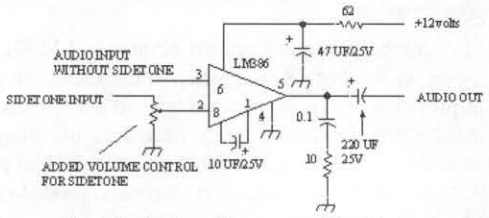


Figure 15 - Typical audio amp with sidetone mixed in

—DE KD1JV

QRP-L, THE "QRP DAILY"

Started by Chuck Adams, K5FO in 1993, the Internet QRP discussion forum (mail reflector) is still going strong, with several dozen QRP postings every day (that is NO exaggeration, as anyone on QRP-L knows!) and over 2500 subscribers. Although it's not a traditional club in the sense of a group of people who meet physically, it has become the largest, most active QRP "club" in the US. If interested in details of subscribing to it (which is free, of course), ask me via e-mail (wa8mcq@erols.com) and I'll tell all, including some alternate ways of reading it that DON'T clutter up your inbox with 50 to 100 additional messages each day. (The Daily Digest is a big help, but the HTML Archives are an absolute lifesaver!) By the way, since it is a mail reflector, you do NOT have to have full blown Internet access; just an e-mail account, such as juno.com, will do.

THE FINE PRINT

Got something you'd like to share with the rest of us? Send it in! Floppy disk, e-mail, handwritten on notebook paper, whatever-just get it to Severn and I'll handle the rest! -qrp-

So You Want to be a Writer

Richard H. Arland, K7SZ

Purpose: To acquaint the new or aspiring writer with the information necessary to become a published author in the radio hobby press.

In the Beginning.....

In order for you to "get published", as we say in the business, you must first come up with an idea for an article or book. I know that sounds pretty profound, but you must start somewhere. There are many ways to organize your thoughts and ideas, and each writer has his or her favorite method. What works for me is a standard outline, starting with the topic at the top of the page and then defining each aspect of the topic as a major heading with subparagraphs used to "flesh out" the manuscript.

Believe me, when it comes time to approach a prospective publisher or editor, they will want to see your organized thoughts on paper BEFORE they ask you to submit the entire manuscript, so why not accomplish this portion of the task at the start.

An outline also serves as a guideline when you start in writing the actual manuscript. It saves you some wasted effort when, as we all do, you start to stray from your appointed topic. It is very easy to start injecting some personal bias, or "editorializing" into an article, which can lead the reader off topic. By adhering to an predetermined outline that covers your topic, you can keep on track and save yourself some wasted effort.

Know Your Topic!

Nothing is worse than reading an article or manuscript by someone who is not familiar with the chosen topic. KNOW YOUR TOPIC! In my particular instance, it would be ludicrous for me to write about building kilowatt amplifiers when my forte is QRP! I know QRP and that is what I write about. Become an expert in your discipline and constantly strive to educate yourself with the latest developments within that discipline. Although ham radio is a hobby, it is also an extremely technical pursuit. Ergo, you must keep abreast of the latest changes in technology and operating procedures if you intend to write about the subject.

Research, Research, Research....

Always remember one thing: when you finally have an article published it will be seen by thousands of like-minded individuals. Should you make a mistake in a formula, reference, schematic, or name....BELIEVE ME, you will hear about it, in spades!

Case in point: In one of Ade Weiss' books on QRP he listed Robert Kruse, Technical Editor of QST, with the callsign: 1XAM. I used this reference in at least two articles that were subsequently published, one of which was in QST. During the development of my new book on QRP for the ARRL, my editor, Larry Wolfgang, WR1B, e-mailed me asking where I came up with that particular callsign for Kruse. I told him that it had come from one of Ade's books (I didn't have access to older back issues of QST to check the source of the article), to which he replied: "We don't show that call assigned to Kruse during the length of time he was associated with the League." As a matter of fact, Larry could find many articles written by a "Kruse", under several different callsigns (all with different first initials or combinations thereof), none of which were close to the "1XAM" call. Not only that, QST seldom printed the callsigns of authors during the early days of publication. Morale of the story: DO YOU OWN RESEARCH! Sure it may take some extra time, but you will know that it is correct and can point the ever present critics to your research in the footnotes.

The Internet is a tremendous research tool. While researching my new QRP book, I spent hours on the Internet verifying information, website URLs (which change faster than most women change shoes!), and a host of other critical details. Get on the web and stay there!

Know What You're Going To Say...

Writing styles differ between writers. Editorial styles differ between editors. What one editor will reject another might well accept for publication. You're in a crap shoot....relax and roll the dice.

My college journalism professor had a very stringent criteria for his students. You wrote it his way or you failed the class. Plain and simple. My high school English composition teacher, on the other hand, told me to "write the way I spoke". Boy, did I have fun in Herb Blissard's Journalism class in college! Hey, I got a "D"....now I am a published author....things work out!

The point I'm trying to make is to write so it flows and for many aspiring authors, that follows the way they speak. One of my all time favorite magazine columnists is Skeeter Skelton, an old Texas lawman, who wrote hundreds of short stories and columns for Shooting Times magazine in the 60s, 70s and 80s. His "down home humor" and southern dialog made his stories come alive and drug the reader right into the middle of the action. Unfortunately, it is difficult to do anything like this with such a boring topic as ham radio, or is it? Bob Locher, W9KNI, authored many absorbing articles on DXing for Ham Radio Magazine and Ham Radio Today using just such a style. His book, The Complete DXer, is an outstanding example of how writing style can transform a drab topic like hunting DX into a readable storyline that captures the reader and holds his/her attention until the end. What's more, Bob's style always kept you wanting more. And, my fiends, that is EXACTLY what you want....you want the readership to want more. If they do, they will let the magazine know, and the editors will be waiting for your next submission.

And Say It!

One sure way to get a rejection from an editor is to have your manuscript bounce back and forth around a topic. This only confuses the reader and gives editors gray hair. Use a logical progression in your writing. Make the manuscript flow from one point to another with out backtracking. This is where the outline is a tremendous help. By compiling your thoughts on a topic prior to sitting down and beating on the keyboard, you can change things and actually get a feel for how well the ideas flow. Remember, you want to capture and hold the reader's interest, not put him to sleep or lead him around the mulberry bush five times!

DIRTFT

Do It Right The First Time (DIRTFT: pronounced "Dirt Foot") and your editor will love you. When you submit a manuscript for publication, be sure it is spell checked and grammatically correct. Spell checkers work fine up to a point. In our technically oriented hobby with all sorts of acronyms and abbreviations, spell checkers can become "confused". So take the time to be sure your spelling is correct.

Grammar checking programs are, in my humble opinion, almost totally worthless. They are time consuming and, if you really don't understand how the English language works, then YOU need some English composition classes at the local community college. Since I abhor grammatical software, I use the "stubby pencil method" of checking my man-

uscripts. I always have my submissions checked by a friend at work who is an English teacher. She graciously gives of her time to insure that I don't look too stupid to my readership. What ever you do, don't let your spousal unit proof read your work. This makes for some really strained relationships.....I speak from personal experience!

Pitching Your Article

There are two methods you can use to submit an article to a prospective publisher. One is to write and request the "Writer's Guide" for the particular publication you want to write for. Follow their instructions for submission of an unsolicited article outline with cover letter to the editor. The other is to contact the publication and find out what they are looking for in the way of articles, request their "Writer's Guide" and plan your article around their needs. Of the two, the second method seems to yield the best results. Unsolicited articles or book proposals can often times sit in the "I'll Get To It Next Century" box on the editor's desk forever.

After you submit your outline with cover letter, follow it up with a phone call in about a week to 10 days. Ask to speak directly to the person to whom you sent your outline. If they are unavailable, leave your phone number and ask that they return your call. If you don't hear from them in a couple of days, try phoning again, preferably at a different time. If they have an e-mail address, start peppering their inbox with short notes wanting to know the status of your proposal. In my experience, without naming any names, there are two really great radio hobby magazines that treat their writers with respect and return calls and e-mail, and the rest of them you have to pester to death in order to solicit a response.

Don't be afraid to keep trying to contact these people....after all it is your article and if they don't want to publish it, maybe someone else does.

The Cover Letter

When you submit your manuscript outline it should be accompanied by a cover letter briefly explaining what the article is about, why you think it is important, and included in the cover letter should be a mini-biography. One word of caution: DON'T EMBELLISH your bio. Be truthful. List your background in the radio hobby, the year you were licensed, class of license, any previous published articles (if this is a different publisher), and any specific expertise you feel is important. In the case of QST, I will absolutely guarantee, these folks will check you out. If you say in your cover letter you have a BSEE you better be able to "walk the walk and talk the talk" 'cuz these guys will spot a "poser" in a heartbeat. Be truthful and this will go a long way in forming a positive relationship with your editor.

Your Proposal is Accepted, Now What?

On that glorious day when you receive notification from the editor that they are going to accept your manuscript your next step is to submit the entire article for consideration. Different publications handle this aspect differently. In the case of QST, your manuscript (all neatly typed, spell checked, and proof read) is handed around to a group of editors and staff members on the QST masthead to read. The staffers actually vote on whether or not to accept it during a staff meeting. CQ I don't believe does this. When CQ published my two part article on basic QRP operation in 1995, I submitted the outline to Alan Dorhoffer at the magazine and, after about 2 months, was told to forward the entire manuscript for publication. To my knowledge, there was no group discussion or "yea or nay" vote taken.

In addition to a hard copy printout of your article, most magazines (and book publishers) want to see the manuscript on diskette. That means computer. If you are not computer literate and can't work a word processing program, you are at a decided disadvantage. In this day of electronic publishing, magazines save time and money by getting the manuscript from the author on diskette, converting it over to MAC format, and use some sophisticated desk top publishing software to turn out the finished product. My favorite word processor program is Word Perfect Ver 5.1 (yeah, I know it's old and slow, but so am I!). Lately I have been using Microsoft Word '97 which I find very easy to use.

This brings me to one very important point: once you submit your article to one publisher, DO NOT try submitting it to another one until you receive a rejection from the first publisher. Should both publishers wish to print your manuscript you will be doing a lot of explaining to editors as to why you didn't tell them you had submitted your manuscript to more than one publisher. Not only is this embarrassing to you, as a writer, it destroys any faith your prospective editor might have in you regarding future submissions.

Pictures

All editors like to see text accompanied by a photo or two, or three. This gives depth to the article, takes up some column inches, and adds interest to the text (a picture is worth a thousand words, you know!).

You don't need a full blown photo studio to do a good job with pictures to accompany your articles. I turn my dining room table into a mini-studio using a 53 inch wide roll of gray or black seamless background paper (attached to a stand), two Smith-Victor "hot lights" (photo floods) balanced for 3400 degrees Kelvin, and a 15 year old Nikon FG, with a 25 year old 43-86 mm/f3.5 zoom lens and an 82B filter (which balances the lighting to the film). The Nikon is mounted on a Slik heavy duty tripod for stability. This is hardly a professional setup.

Ed Hare, W1RFI, who manages the League's lab, and I have discussed gear photography on several occasions, and we both agree that to get the best results, you must "bracket, bracket, bracket". In other words, take several shots of the same piece of gear using various shutter speeds (to keep the depth of field the same for each shot) to give you the best exposure for the article. While a dual light set up is fine for most work, a three or four light set up is better. A "soft box", where light is distributed evenly all over the piece to be photographed, is the ultimate. Even with a two light set up, shadows are manageable, so don't think you can't add photos to your article, just because your name isn't Ansel Adams.

Film selection is a matter of personal choice. I prefer ASA 100 or 200 color print film. Fuji is my favorite due to the color saturation, especially in the greens and reds. For most articles I use an 8 or 12 exposure roll of color print film. These are marketed under various names, but Wal-Mart sells a "Ad-Pack" of short exposure rolls for real estate and police work. These are great since you don't burn off an entire 24 or 36 exposure roll of film for just a couple of shots of a piece of gear.

Finally.....

We have covered the basics of how to go about submitting an article for publication in the radio hobby press. Now for some insight. You are NOT going to become rich writing articles or books for the radio hobby press. Should you be lucky enough to get published in QST, your article will reach a potential audience of 175,000, which is their monthly subscriber base. To contrast this, the first printing of a Tom Clancy novel numbers between 1 and 1.5 MILLION copies! Quite a difference, huh? The point I am trying to make is that the radio hobby press is an extremely narrow market. It is a stepping stone to bigger and better things, however. Once published, you can begin to build a writing career that you can expand into something quite lucrative over the years.

My main goal in sharing this information with you is to bring more potential authors out of the woodwork. If you are involved with something interesting, take the time to jot down notes, make an outline and submit it to a publisher. It's a lot of fun and I can guarantee, your first "by line" that appears in an international ham radio magazine will make you feel very proud.

Review - K2 Logger Program

Charles L. Stackhouse, WA2IPZ Email: cstack@safelink.net

The K2-Logger is recently released logging software for use in the ARCI contests. Bruce Milne WB2QAP has revised his Logger software and made it available for FREE via the Internet. What is new is the graphic interface – a high-resolution picture of the new Elecraft K2 transceiver. The buttons on the K2 image control the software!

I have used Logger a number of times for logging in ARCI contests and it is reliable, easy to learn and easy to use software. To test the K2-Logger, I simulated a contest by entering my log for the 1998 ARCI Spring QSO Party contest (luckily I hadn't done so well and had a pretty small log). I obtained my copy of the K2-Logger software directly from the author as an email attachment.

From Windows 95 (Bruce says it works fine with Windows 98), start the software and a larger than life picture of the K2 transceiver appears in the upper half of the screen. The lower half has the data fields entitled "Add New Records" and "Change/Delete/Review Record." A Windows menu bar is at the top of the screen with commands for "Exit/K2 Specifications/Logger Program/Help." A screen resolution of 800x600 is required.

The Logger Program drop down menu is used to set the time, date, and band, and after the contest, print log sheets and contest summary sheet. Use the tab key or mouse to put the cursor on the correct data field "box" and log the callsign, RST-R, RST-S, SPC (State/Province/Country), ARCI # or power of the worked station. Use the mouse or tab key to "push" the appropriate button on the K2 and the contact is in the log. Date, time, band, points, and multipliers are logged automatically. The software immediately notifies you of duplicate contacts as soon as the callsign is typed in, without the need to hit any key.

Drop down menus are a great help when you have forgotten the abbreviations for the US states or Canadian provinces. There is even a drop down menu for the RST system, in case you give out actual signal reports and not an automatic 599.

When mistakes are made, this software allows easy correction. The log can be scrolled through in either direction and contacts can be searched for by callsign, ARCI #, or SPC. Contacts can be changed or deleted. Upon startup, the software automatically generates 2 files called ARCIFILE.dat and QRPDATA.dat, which are saved automatically to the hard drive. The QRPDATA.dat file is the file that stores the contest data for the program. The ARCIFILE.dat file creates a file of the same information that can be exported to a word processor (and there manipulated, etc.). There is no provision in the program to automatically save these files to a floppy disc, but that would be a good idea. To start a new contest, make sure these 2 files are deleted so you start with a clean log.

This software is written specifically for the ARCI contests (the Michigan QRP club contests use the same format and scoring mechanism) and, unfortunately, cannot be changed for other contest formats After the contest reporting is easy and quick. A log sheet for each band and a final contest summary sheet can be printed. These sheets are well laid out and would earn "style" points if they were available.

Get ready for the next ARCI contest by downloading K2Logger. WB2QAP has produced a very easy to use, graphically pleasing, and highly functional logging program. It is available for downloading FREE from the following sites:

New Jersey QRP Club website

http://www.njqrp.org.k2 logge.html

Bob Patten's (N4BP) website

http://wg104a.wh.uni-stuttgart.de/~n4bp/

The Tuna Tin 2 Lives!

by Bruce Muscolino - W6TOY/3

The Tuna Tin 2, perhaps one of the most famous QRP transmitters ever built, lives again. Last night, actually early this morning, June 4, 1999, a QSO was made between the original Tuna Tin 2, operated by Ed Hare, W1RFI, at ARRL Headquarters, from W1AW, and myself, W6TOY/3, in Silver Spring, Maryland! Ed began the QSO at 0033 UTC, at 549, and wound it up at 0043 UTC at 569. Ed continued to send CQ for another 15 minutes and worked KC1SX just before the bulletins resumed at 0100Z.

The Tuna Tin 2 transmitter, so named because of the Tuna Fish can that formed the chassis, was designed and built by W1FB, Doug DeMaw, in 1976. It was a cover feature artivcle in the May 1976 issue of QST. Many amateurs, your editor and this writer, were prompted to build clones and learn more about QRP.

The original Tuna Tin 2 resided in the ARRL museum for many years. This author remembers marveling at it in 1986 on a visit to League Headquarters.

Unfortunately it disappeared under mysterious circumstances in the early 1990s. Surprisingly, Ed Hare found it years later when he bought it for a dollar from a junk box at a hamfest in Boxboro, MA!. Ed was kind enough to select me to restore it to working condition. It really needed very little work, only some isopropyl alcohol to clean up the circuit board and a new final transistor.

When Ed bought it, he assumed it was a good replica, but after carefully comparing it to the photo in the article — there was no doubt that it was the original unit. We will never know what twist of fate caused it to leave the Lab on its several year adventure and the amazing coincidence that led it to be found by the ARRL Laboratory Supervisor, but the ARRL has satisfied itself that it was the original. The Tuna Tin 2 will be on the air from W1AW, W1RFI and other QRP calls during the coming months, and a possible field excursion to Fort Tuthill is in the works. A gala event to work the original Tuna Tin 2 on 40 meters, and replicas on other bands, from W1AW at League Headquarters is in the planning stages, probably for this October or November, stay tuned! Ed tells us that he intends to restore the Tuna Tin 2 to its rightful place in the ARRL Lab display case as part of the event.

Dayton Banquet Prizes

Scott Rosenfeld, N7JI Email: ham@w3eax.umd.edu

Prize	Description	Donor	Winner
1	Micro M+	Sunlight Energy Systems	KF6PJM
2	World Amateur Radio Directory	QRZ	N8TUT
3	HW-8 Handbook	Sunlight Energy Systems	G0XAR
4	HW-8 Handbook	Sunlight Energy Systems	N4TME
5	HW-8 Handbook	Sunlight Energy Systems	N9YAI
6	PK2 Keyer Kit	Morse Express	KF0OV
7	Inverted Vee Antenna	Maryland Milliwatts	NU3N
8	Experimenter's Kit	Jade Products	N4MPD
9	Metal Enclosure	Jade Products	W4QO
10	Silver Solder Paste	Solder-It	K8AQZ
11	Silver Solder Paste	Solder-It	K3SGL
12	Silver Solder Paste	Solder-It	N3BYY
13	Silver Solder Paste	Solder-It	AA7QU
14	Silver Solder Paste	Solder-It	K8GZ
15	500 QSL Cards	FDS Graphics	NT1R
16	ICK Digital Clock Kit	Blue Sky Engineering	WA5ZJN
17	Antenna Insulator Set	EMTECH	K4JPN
18	Antenna Insulator Set	EMTECH	N8MGU
19	Antenna Insulator Set	EMTECH	W1XE
20	Antenna Insulator Set	EMTECH	W8KC
21	ID Badge	LQV Engraving	N8GKQ
22	Eyeball QSLs	QSLs By W4MPY	G3RJV
23	Tick Keyer Kit	Embedded Research	KS4RN
24	Bulldog Paddle	K9LU	KB8RVS
25	WM-2 QRP Wattmeter	QCWA	WB3BLM
26	MININEC for Windows	EM Scientific	W8LOY
27	1 Yr. Worldradio Subscription	Worldradio Magazine	KC8ASF
28	"Solid State QRP Projects"	MFJ Enterprises	K4YFL
29	"Solid State QRP Projects"	MFJ Enterprises	N9DD
30	"Solid State QRP Projects"	MFJ Enterprises	K4IWL
31	"Solid State QRP Projects"	MFJ Enterprises	KB1DVL
32	MFJ Coffee Mug	MFJ Enterprises	K8NI
33	Ladder Grabber	EMTECH	W8IRQ
34	EZ Torch	RF Connection	N3XRV
35	XT-4 Memory Keyer	Unified Microsystems	Donna Rawson
36	"Receivers Past & Present"	Universal Radio	K0PC
100	Georgia Cracker	North Georgia QRP Club	K4KJP
101	Georgia Cracker	North Georgia QRP Club	K8LHR
102	Antenna Insulator Set	EMTECH	K3NVI
103	Antenna Insulator Set	EMTECH	WA2RZJ
104	Antenna Insulator Set	EMTECH	KI0JP
105	Antenna Insulator Set	EMTECH	WA4KEJ
106	Antenna Insulator Set	EMTECH	W0QIK
107	Paddlette Backpacker	Paddlette	G0BBL
108	PVC Gusher Classic Port. Ant.	Joe Everhart, N2CX	W8RIK
109	TR-Log Software	TR-Log	K8FF
110	KC-1 Keyer/Counter Kit	Wilderness Radio	VE3ELA
111	KC-1 Keyer/Counter Kit	Wilderness Radio	AA6ZM
112	QRP ARCI Coffee Mug	QRP ARCI	K4ZM
113	QRP ARCI Coffee Mug	QRP ARCI	W0UFO
114	QRP ARCI Coffee Mug	QRP ARCI	Marjorie Wohlschlag
115	QRP ARCI Cap	QRP ARCI	WA9FLX
116	Ladder Grabber	EMTECH	K6JS

Prize	Description	Donor	Winner
117	"Solid State QRP Projects"	MFJ Enterprises	W9QZ
118	"Solid State QRP Projects"	MFJ Enterprises	KH6MM
119	"Solid State QRP Projects"	MFJ Enterprises	K8CZ
120	"Solid State QRP Projects"	MFJ Enterprises	W9XH
121	Knightsmite XCVR Kit	Knightlites QRP Club	KG8SM
122	**** MYSTERY PRIZE ****		WS8T
123	SLQS Audio Amplifier Kit	St. Louis QRP Society	WV3J
124	SLQS Audio Amplifier Kit	St. Louis QRP Society	N7JI
125	SLQS Audio Amplifier Kit	St. Louis QRP Society	KD3FG
126	SLQS Audio Amplifier Kit	St. Louis QRP Society	K5HQV
127	SLQS Audio Amplifier Kit	St. Louis QRP Society	K7RXV
128	Coffee Mug	MFJ Enterprises	G0BPS
129	QSL Cards	Marcum's QSLs	AE2T
130	MI QRP Coffee Mug	Michigan QRP Club	Ms. Lifland
131	MI QRP Coffee Mug	Michigan QRP Club	Ellen Kellogg
132	"Worldwide Aeronautical Communication Directory"	Universal Radio	LU3EEC
133	"ARRL Low Power Communication"	Jeff Davis, N9AVG	WB8ZWW
134	"ARRL Low Power Communication"	Jeff Davis, N9AVG	K0BC
135	Screw Grab	Solder-It	WD8QWR
136	Screw Grab	Solder-It	W4RNL
137	Screw Grab	Solder-It	G3TUX
138	Screw Grab	Solder-It	KD4SFW
139	Screw Grab	Solder-It	WK8S
140	Screw Grab	Solder-It	K8IDN
141	Micro M+ Charger	Sunlight Energy Systems	WB9VTY
142	HW-8 Handbook	Sunlight Energy Systems	AA4PB
143	HW-8 Handbook	Sunlight Energy Systems	KB8WEV
144	QST CD-ROM	ARRL	K4TJD
145	QRP Power	ARRL	KB9RBO
146	CQ Magazine Subscription	CQ Communications	AK2A
147	Soldering Kit	Solder-It	N4TZP
148	Micro Jet	Solder-It	N8ET
149	5 Amp Power Supply	Jade Products	K4PQC
150	$50 Gift Certificate	Kanga	K8DD

Winners of ARRL books given out by Ed Hare, W1RFI, during his presentation:

W2RFU KD6VIO KC8BOM W4DU K8IQY JH1FCZ

And now, the **GRAND prizes**...

Ten-Tec model 1330 30m QRP XCVR Kit	Ten-Tec, Inc.	G3RJV
SWL 40+ XCVR Kit	Small Wonder Labs	
SLR Shielded Loop Receiver Kit	Jade Products	
ARRL Radio Designer w/software	ARRL	
50w Solar Module	Sunlight Energy Systems	

And finally, the **GRANDEST** of the **grand prizes**...

SGC 2020 20w SSB/CW XCVR w/general coverage RCVR from SGC, Inc.

A very wide-smilin' **Joe McKinney, N4OVC**

Finally, finally, thanks to Jameco for 50 micro-screwdrivers, prizes for those who didn't otherwise win.

The Last Word

The QRP Quarterly invites readers to submit original technical and feature articles as a service to their fellow 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 back cover 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 .tif 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 they believe it better fits another category.

Accepting advertisements for publication in the Quarterly does not constitute endorsement of either the product or the advertiser.

Material cannot be returned unless accompanied by sufficient postage.

The act of mailing a manuscript constitutes the author's certification of originality of material.

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--The Editor

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