QRP Quarterly

Journal of the QRP Amateur Radio Club, International

October 1997 Volume XXXV Number 4

Photo by Michael Johnson

Paul Taylor, WB2GIN, is the winner of this quarters cover photo contest. How many rigs have been built into an Altoids box? This one is a Pixie II and the 9v battery is included inside. Power output is 100mw. The RX runs off the xtal and is hooked up to the 386 chip. "A real pain in the Altoids on receive" says Paul!

You too can win a one year membership or renewal to the QRP ARCI.
Just send your entry photo for the cover picture contest to the editor at the address on the back cover.

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.

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IN THIS EDITION OF THE IDEA EXCHANGE:

The article on page 31 of the July, 1997 issue, "The EveryReady, A 9 Volt Direct Conversion Tranceiver" by Jeff Anderson, WA6AHL, was a reprint that first appeared in NorCal's magazine, **QRPp, Sept, 1996.** We apologize for any inconvenience this oversight might have caused.

NOTES FROM THE PRESIDENT

Mike Czuhajewski, WA8MCQ

NEW MEMBERSHIP CHAIRMAN

Mike Bryce, WB8VGE, has resigned as the membership chairman, a job he had held since July 1994. I really appreciate all the hard work he's done over the years in that position, which is probably one of the most important functions in the club--the Keeper of the List. Without it, the printer doesn't get a mailing list and you don't get your copy of the **QRP Quarterly**. Sometimes it seemed like the USPS was doing its best to undermine his efforts, but he kept everything straight on his end. Mike also earlier resigned his position as Publicity Chairman. Turning these jobs over to others should add about 20 hours of free time to each week for him! Don't worry about him deserting QRP, though--he'll still be writing his QRP column in 73 Amateur Radio Today, which he has been doing for over ten years now.

When Mike resigned this job, **Bruce Muscolino, W6TOY**, had this to say on QRP-L--"As the inheritor of half of Mike's old responsibilities, Publicity Person [which he had since July 1990], let me say I find it amazing that Mike was able to keep up that job and the Membership job at the same time and for so long. Mike, when I asked for the Publicity job I had no idea of what I was getting into. My hat is off to you! I truly believe the club lost a valuable resource when you resigned. I do understand the reasons. The very best to you and your family. Please stay in touch with us all and let us hear your call on the air once in a while!"

Mike used to keep in constant touch with me via e-mail on the many problems involved in running the mailing list. Let's just say it was interesting. The new Keeper of the List will find out soon enough! When I ran into Mike at Dayton I was surprised to see that his hair hadn't been pulled out yet. (Mike and I do have one disagreement. I told him that Membership Chairman was the most thankless job in the club, and he said it was only #2. And on the top of his list of most thankless jobs? President!)

When Mike notified us of his resignation, those of us in the Inner Circle hashed things over for a while and came up with the following arrangement. **Dave Johnson, WA4NID**, will be the new membership chairman and the keeper of the membership data base. Since there is a very good chance that he will be moving within the next year, **Ken Evans, W4DU, our Secretary/Treasurer**, has agreed to have all mail sent to him. In that way we won't have to worry about yet another address change in less than a year, and avoid additional confusion and turmoil.

Ken will handle all the checks (which should be made out to QRP ARCI), and forward the information to Dave. This has the added benefit of speeding up deposit of the money into the treasury. Splitting up the job reduces the amount of work for any one individual and helps avoid an early burnout, but there are also potential problems with having two people involved. Everyone involved realizes that and is willing to give it a try.

Here's how to do it: Send your applications and renewals to Ken Evans, W4DU, the Taker of the Money. If you have any questions about your subscription, expiration date, complaints about missing issues, etc., direct those to Dave Johnson, WA4NID, the Keeper of the List.

Dave has been putting in a huge amount of time, transferring the existing data base over from the Macintosh system that Mike used and onto an MS-DOS system, getting used to the new database software, etc. Please bear with him as it may take a little while to get all the kinks worked out.

TECHNICAL EDITOR RESIGNS, TWO REPLACE HIM

Our technical editor, **Ray Anderson, WB6TPU**, has submitted his resignation due to personal reasons. Not surprisingly, ever increasing demands on his time in all areas of his life figured strongly into the decision; that's a very common reason. KU7Y authorized me to find a replacement for him, since I had recruited the last two. This time we came up with two strong candidates for the position, and we ended up "hiring" both of them as a team, which is a first for the QRP Quarterly as far as I know. Both will be introduced elsewhere, but I must say I'm quite impressed with their technical qualifications and look forward to good things from them. And I'd like to thank Ray for all the work he's done in the position. Having held it myself for three issues a few years ago, I know how much work it can be!

SLIGHT DELAY IN BOARD ELECTIONS

I blew this one a bit; in the last issue, I announced that Board of Director elections would be held, asked for interested people (including incumbents wanting to serve again) to send in their self- nominations to W4DU, and that we'd print them along with a ballot in this issue. What I failed to consider were deadlines. Specifically, with the deadline to KU7Y for the October issue being 16 August and the July issue probably not being received by everyone until mid July, people would only have a few weeks to mull over running for the BoD and get their letters in. Worse, I did not give a deadline for sending them! We could easily end up with a situation in which someone wanted to run but sent in their name after the deadline for the October issue (a date they wouldn't know about), and thus wouldn't get on the ballot through no fault of their own.

The Board has agreed to let the elections slip a bit. There will be no change in the date that the new terms start--it remains at the first of April. Those whose terms are ending are **Cam Bailey, KT3A; Hank Kohl, K8DD; and Bob Gobrick, N0EB**. (Some of us also know him as "Bobgob", for obvious reasons. I started calling him that last year, the name seems to have caught on, and he hasn't complained yet!)

We'll even extend things slightly; we'll give you until the end of October to have your names placed on the ballot. If interested in running, send a one or two paragraph "campaign statement" to the Secretary/Treasurer, W4DU, by USPS or e-mail. And don't forget, you must get an acknowledgment back from him. If he did not acknowledge receipt of your name, you must assume that he never got it, and send it again.

73 TO 72

Those of you on QRP-L and those who are members of the New England QRP Club have already heard the bad news--their excellent newsletter, 72, will no longer be published. I know I'll miss it; I've enjoyed it considerably in the several years it was printed. The club itself will continue to exist as a local group. Bobgob will probably have more to say on it in his QRP Clubhouse column.

MEMBERSHIP CERTIFICATES NOW FREE

For most of recorded history, the **QRP ARCI** has had two rates--subscription renewals were one price but the initial application was always $2 higher. This was to cover the costs associated with producing the membership certificates. Recently we dropped the application down to the same price as the renewals, and made the certificates optional; people could request one for an additional $2 if they wanted one. There has now been yet another change; we will absorb the expense of the certificates (printing, envelopes, postage) as a "cost of doing business" and send free membership certificates to new applicants. The initial application (which includes a one year subscription to the QRP Quarterly) and annual renewal will all be the same price, and you will not need to request a membership certificate or pay extra for it. One will be sent automatically. --qrp--

FROM THE EDITOR

Monte "Ron" Stark, KU7Y

Wow, another quarter has passed by. It was just turning to Spring the last time I wrote anything. But now the mornings are down in the low 40's F and that can mean only one thing. Not much good antenna weather left!

It's **Labor Day** weekend as I write this. The boats are making noise on the lake for what will be the last time for many of them. Time to make sure all the insulation is in place and all the other little pre winter chores done.

The most important thing here on the homestead this year has been trying to get the towers up and topped with antennas. I am very happy to report to you that the **85 foot of Rohn 25G** is in place and the **Force12 C4SXL/H** is looking down over the whole valley! (I know, last issue it was 70 foot but I had the extra section and 70 foot just didn't seem very high!). It was just 2 weeks ago that the boom truck came and lifted the antenna into place. What a nice way to handle antennas!

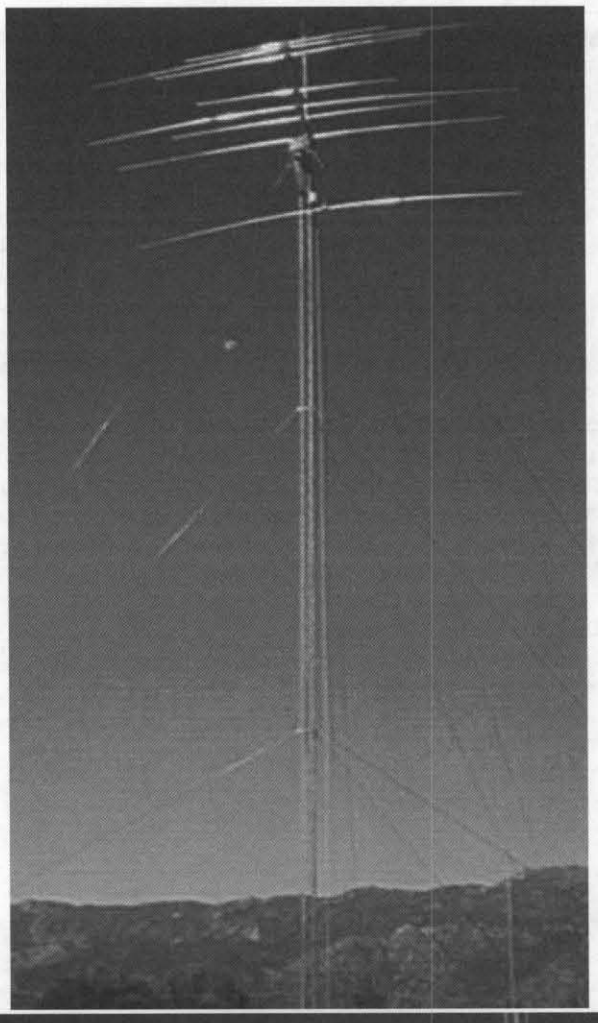
I still have about 75 feet of ditch to dig to bury all the cables and have yet to make the feed through panel for the wall, but I do have the rotor control sitting on a lawn chair outside and can turn the yagi when I need to!

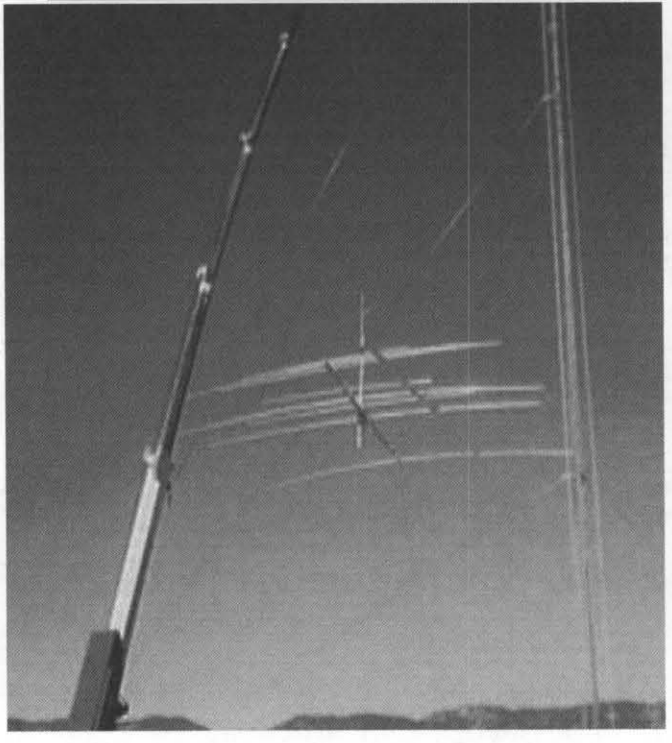
The shack is the next project. It will move into a small apartment built into the garage. Then I will be able to make lots of noise and mess without much flack!

I am including some pictures just to let you all see what I am talking about. I know some of you would like me to not waste the space with such pictures, but hey, I'm excited!! Just like a kid in a candy store.

I have been thinking about the minimalist approach to QRP and have come up with another idea. Many say that QRP means not using big antennas up high, that QRP is really meant to be done with the least of everything including antennas and rigs.

But some (lots?) of those folks have been at the other end of the scale at one time or another. Big antennas, tall towers, amps and etc. So they can say "Been there, Done that". Me? I have never had a tower higher than 40 foot before. And I've been licensed since 1953! And if you have ever worked hard and dreamed of having something like a tower with a nice yagi on it and been able to make that dream come true, you know how nice it feels! I never paid over $25 for a used yagi in the past! This time I bought a new one and yes, it did cost a bit more than $25!





I have recovered from Dayton I think. Now it won't be long and I'll be in Concord, CA at the Pacificon97 convention. **Doug Hendricks, KI6DS**, will once again have a super QRP show lined up. **Paul Harden, NA5N**, is going to try to book a flight into Reno and visit a bit before we head over there. One evening **Chuck Adams, K5FO** and I will put on a little show and tell about basic cw and contest operating. Nothing real fancy but aimed at the newer folks that would like to give it a try but don't know where to start.

There have been more changes in the help department. **Mike Brice, WB8VGE**, has resigned as the Membership Chairperson. I would like to thank Mike for the many years of hard work he has done for the club and to wish him well in the future. I don't think there is any way to describe just how much work there is in doing that job. **Dave Johnson, WA4NID**, has stepped up to the plate and is finding out just how much work it really is! Thanks Dave.

Please be sure to read the inside back cover to see where to send your membership application forms now.

Ray Anderson, WB6TPU, our Technical Editor, has also stepped down. I would also like to thank Ray for all of his hard work. He is being replaced with a team of two people, **Bill Carver, W7AAZ** and **Chris Trask, N7ZWY**. Look elsewhere for their introductions, which I made them write themselves!

One last thing. I have not finished either the kit I won as the second place Fox, (**Oak Hills Research QRP SPRINT II** for 80M) or the or that great prize I won at the **FDIM** dinner at Dayton, (**S&S Engineering FC-II Frequency Counter**). I did get a nice soldering station that will do the **SMT** parts with ease. I promise that both will be done in time to let you know how they work in the next issue! I hope to see you all on the air.

de Ron, KU7Y

OUR NEW TECHNICAL EDITORS

Bill Carver, W7AAZ and Chris Trask, N7ZYW

Bill Carver, W7AAZ

I was first licensed as **KN6OLG** in 1958. I started on 40 CW and operated 80 autostart RTTY for many, many years. I've done 30m CW and Clover, 20m RTTY, CW and SSB, but 40 CW is still my favorite and currently my ONLY band/mode. I love keyboards but I'm still mike shy.

Hamming focused my interest on electrical engineering and I stumbled to a **BSEE** degree then **MSEE** in 1970. I started working at a government research facility then moved into design engineering and engineering management at **Dunegan/Endevco** and **Scantron**.

Five years ago I moved to Idaho to teach math and engineering at the **College of Southern Idaho** before retiring to live by my wits.

I have build several NE602 receivers, **Rick Campbells "R1" and "R2"**, DDS before there were DDS chips, and dance back and forth between enjoying RF and software design. The biggest project currently is an **all-mode, all-band synthesized transceiver**. See **May 1996 QST** for a look at part of this rig. This long-term project is augmented with breadboarding a smaller CW-FSK transceiver that uses a converted **Collins PTO** for frequency control, a 10 Hz resolution digital dial, homebrew xtal filters for selectivity and a much less expensive implementation of variable-hang AGC. That's evolving on my workbench and runs 24 hours a day.

If anyone comes tripping through **Idaho** they are welcome to stop in and listen, just make sure I'm not off skiing!

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Chris Trask, N7ZWY

I got my license back in 1972 (**WA3TYJ**) while attending undergraduate school at the **Pennsylvania State University (BSEE 1973)**, out of a general interest in amateur radio, but specifically a desire to fly R/C sailplanes without having to "share" the 11 meter band. I also had an intense interest in SWLing, so was already on my way to being an incurable receiver and antenna designer.

Graduation in 1973 saw a tour of **Viet Nam** era duty with **USAF**, **flying C-130's** almost everywhere (that's what they do best) until returning to graduate school, again at **Penn State (MSEE 1979)**, during which I did the theoretical design and modeling of the vertical beam log-periodic antenna at the **Arecibo Observatory's Ionospheric Modification Facility.**

Moving out to **Arizona** after graduation, I have been involved in the design of **space, military, medical, and commercial RF, microwave, and linear analogue** circuitry for 18 years, **designing low-noise microwave oscillators, satellite receivers, satellite data modems, synthesizers, switching power supplies, every sort of filter imaginable (passive, distributed, and active), and everything in between.**

I returned to being active in amateur radio 6 years ago (**N7ZWY**), and along with my **consulting RF/Microwave** design business, I'm busy designing circuitry for both amateur and SWL activities, including high-dynamic range **receivers, active antennas, and Class-F amplifiers**. Being semi-retired helps.

Along with the responsibilities of being a **technical editor for QRP Quarterly**, I'm looking forward to the future opportunities of being an active contributing member of the amateur radio homebrewing community.

Back Issues of QRP Quarterly Available

George "Danny" Gingell, K3TKS, is now handling sales of back issues of the QRP Quarterly for the club. He currently has copies of all issues back to January 1995 and a few assorted 1993 and 1994 issues. Back issues are $3.00 each plus shipping. Four issues can be shipped Priority Mail in the US for $3.00. Please contact Danny before ordering to make sure he has the issues that you need. He can be reached as follows:

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

email: K3TKS@abs.net

Incoming Mail

Compiled by Monte "Ron" Stark, KU7Y

Hi Bruce:

I received the Technical Papers for the FDIM 1997 today, 5 Jul.97. As in last year's compendium, the quality is excellent. You care very much about the things you do and it is reflected in the excellent quality of the technical papers, packaging (heavy brown paper wrapping and bubble wrap) and Priority Mail sent on 1 Jul. 97. Now to read every word in it. Thank you very much. Sincerely, Earl S. Mead, K6ESM

Hi Earl. The crew did a great job with the FDIM. I am still trying to absorb all the information in package! ed.

Hi Ron

My name is Bud McClure (K5IUO) and Club member # 5434. Been a member since the early 80"s and have enjoyed the Club, the activities and certainly the Quarterly. I have often read letters from members that I didn't agree with but never replied because I do believe everyone has a right to their own opinion and nothing would ever be resolved because we each would stick with our own opinion. But your response to "Rock" is a master piece. I do believe that even he would have to respect your reply. I have never read anything that said it all like your letter. It is a good thing we don't all have the same interest.We would all be on CW on 7.040 at 0200Z. It would be crowded. I got off the QRP-L because they were all screaming about the unfairness of the cheaters for DXCC and QRO. I used to have a linear but once I found the excitement of running QRP and yes sometimes a big 100 watts I sold it. I think certificates are nice goals and one should be proud when they earn them. I at one time really questioned if the station I was talking to on CW was really running 5 watts. Couldn't be and still be 569. Then I did it myself and I then believed. I still have friends (QRO with 120 ft. towers) that don't believe. But if I never send in for a certificate, the one person that must be satisfied is me and that's the difference. I know I worked two Russian stations back to back on 20 meters running one watt. One of the QSLs from Russia mentioned my one watt and the other didn't. Yes I could have been running 1KW or 100 watts and couldn't prove it. But the one that really knows it was one watt and really got excited was me. I have that excitement in my mind and no certificate would ever duplicate that. Besides some would think I cheated to get the certificate. No need to cheat myself because when it gets to that point I'll hang it up. Hi Hi. Anyway Ron, I enjoy your column each month and please keep up the fine work. 72/73 Bud McClure K5IUO

Hi Bud, Thank you very much for such a nice letter. And I agree that it is a good thing that we don't all like the exact same thing. Like you said, 7040 would sure get crowded! But just to show that we don't all think alike, please read the following letter. ed.

Dear Ron,

Your response to Rock's Letter to the Editor in the July 97 issue of the Quarterly seemed very unfair to me. First, you obviously wrote a column to which Rock was responding. He has a right to send in his OPINION. Why must you respond in such great length? If you have the last word on everything, it indicates that you think YOU are kingpin of QRP. That is one problem I have had with the QRP ARCI, and that is why I am leaving the fold. Letters to the Editor are supposed to be the opinions of the members. Let them have them, whether we think they are right or wrong. Who knows, maybe they are right, and maybe they are trying to tell you and the officers of the QRP ARCI something. QRPers are supposed to have good ears. Is that the case with the QRP ARCI? Best of luck. - Jim, W9NJP, St. Charles, IL

Hi Jim. You make some good points. I would like to see you reconsider leaving the fold. Thank you for your support of QRP over the years and for taking the time to write and let me know how you feel. ed.

Hi Ron

Better late than never - got my QRP Quarterly today after a mix-up in my membership. I would be happy to see reprints from other qrp journals. I receive QRP Quarterly and SPRAT but would very much like to see technical stuff from other sources. One possibility could be giving the reference if they are available on the net. That would not take up much space. 73 Goran Hosinsky ea8yu

Hi Goran. Glad the mix-up in your membership has been fixed! Now all I need to do is find you on the air! Tomorrow is the BUBBA contest and maybe I'll get lucky! ed.

Hi Ron,

I'm looking forward to receiving my copy of the next issue. You do a great job with the newsletter. I'll be taking some pictures of the rigs I sent back to Dayton and will send you some. If you can use them in electronic format, I can send them as jpg files. Darrel, WD6BOR

Hi Darrel, Thanks for the kind words. Love to get pictures. Sending pictures as .jpg files with e-mail is fine with me. Saves time and postage also. ed.

Unless specifically requested that it not be published, any letter, note, etc. received via any means, by the editors and or staff of the QRP Quarterly, that is of general interest to our readers will be published when space is available. We reserve the right to edit all published correspondence as we find necessary. Opinions expressed are those of the authors' and do not necessarily reflect those of The Quarterly editors or the ARCI Board of Directors.

QRP Really!

QRP WISDOM FROM UNCLE BRUCE

Bruce Muscolino, W6TOY
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This time we're going to look at a few of my favorite QRP myths, and one very important topic. Pardon me if you've read some of these thoughts before. I think they are important enough to bear repeating, and I may well do it again.

Is QRP a religion?

What, you say! QRP a religion? How ridiculous! Of course you're right. QRP is just one small splinter group of a much larger hobby. But, I ask you... "Do you religiously adhere to the 5 watt principle of QRP?" "Do you chastise your fellow QRPer when he even suggests there may be life above 5 watts? Hmmmm?

Yeah verily my friends, a terrible guilt is being loosed upon the world of QRP. There are those among us who would publicly scourge you for even considering the 5 watt doctrine. I read the QRP List almost every day. I often see questions about whether it is all right to run 10 watts, or 20 watts, or, gasp, even 50 watts. I see the answers -- NO! If you run more than 5 watts you aren't QRP. OK, so what are you? Chopped Liver?

Silly, isn't it? Friends, we are a group of communicators. Sometimes we can work people we want to, or need to, running 5 watts or less. Sometimes we need more power! If you need more power to make a contact, then I say you're not much of a communicator if you stick to 5 watts. Communicating with oneself is just another type of self abuse, and we all know where that leads. If you're happy sitting there in your cave not talking to others, good on you. Myself, I'll come out of the cave with my bull horn if I need to!

Can I make contacts with 5 watts?

Oh no, not that one again. Yep, stay with me, I'll keep it short and sweet. I recently had the pleasure of helping one of us (**NF3I**) tell a local radio club about QRP. **Scott** did an excellent job of telling the assembled members what QRP is and how it's done. Several others of us came along to give **Scott** some moral support and show off some of our radios. One of the most popular questions was "Can you really make contacts with 5 watts?"

That got me thinking about what I've been preaching to all of you all this time -- I can work anything I can hear. Of course, those of you who have read my column faithfully know I have strayed off the 5 watt path more than once in my young life. And, if you read the first few paragraphs of this column you know I advocate straying off that path when necessary.

But, in fact, I attribute much of my success at 5 watts and less to two things: first, I do have a lot of CW operating experience, and second, I really never doubt they'll hear me and come back. Think about that -- experience aside, do you believe the contacts you make are a matter of luck? Or do you treat your QRP operating sessions as just another quasi-mode of ham radio? If you think your QRP QSOs are the result of good luck, you're WRONG.

Think about your life before QRP -- did every one come back to your 100 watt wonder? I doubt it. Do yourself a favor, starting with you're next QRP QSO, treat it as just another QSO. See if it doesn't make a difference in your success rate.

Is it hard to work DX?

NO. Does this deserve more explanation, again? OK, you twisted my arm.

Working DX is like squirrel hunting, or fishing, if you don't care for squirrel. Hunter's don't look for squirrels at the lake, and fisherman don't often find fish sitting on tree limbs. Seems pretty obvious, doesn't it? Also, on the opening day of hunting season, or fishing season, when lots of other hunters and fishermen are around, there's lots of competition for game. Again, obvious, isn't it?

OK, what does all this mean in terms of ham radio? Simply enough, don't look for DX stations on 80 meters in the middle of the day. And there will be a lot of competition for DX during contests. So, how is one to work DX?

I'm fond of the "being there" principle. True story; hams living in foreign countries aren't much different than you or me. Having been there, and done that, I can confirm this fact without fear of contradiction. They all have jobs and they all have other activities competing for their time at the radio. But, most important, they all want to work DX, just like you and me.

So, keeping the time difference in mind, look for them when they are most likely to be on the air and on the bands that are most likely to reward both of you. Bands? Yeah, 20 and 30 are better than 40, and all of them are better than 80. Does this mean DX won't be found there? No, I work a lot of 80 and 40 meter DX, but remember, I don't think it's special. I expect to work them.

Contests. Without singing my older songs about the good of contesting, contests are an excellent place to work DX. However, they are a lot like opening day in the woods. There are lots of DX stations around and there are lots of pile-ups too. How can your 5 watt peanut whistle get through those kilowatts? It can't. You've got to count on the **K5FO** factor here -- during contests you have the best stations and the best operators on the air at the same time.

Listen to the pile up. Listen to the DX station, he's the one you want to work. What's he doing? Is he coming back to the guy in the middle every time, or is he moving up and down the pile? If he's moving, do what he does -- if he's sitting on the same frequency move on, come back later when he's not so busy. Remember, unless you're trying to set some kind of big time contest score, you don't need to work everyone. Go find someone who's not so busy and work him. Make the both of you happier.

Ask not what your club can do for you. Ask what you can do for your club.

If you read the back page of QRP Quarterly you'll notice I've taken on the job of Publicity Manager for the club. I had one or two free minutes each week and felt I had to fill them! Anyway, one of my goals as Publicity Manager is to expand the presence of the QRP ARCI within the ham radio community. One of the best ways to do this is to actually have a presence where hams are. Remember the squirrels in the lake?

There must be a hamfest somewhere in this country every Saturday or Sunday during the year. I'd be willing to bet that one of you attends darn near every one of them. Why not get a table and spread the word about QRP?

A table, you say? But, I'll have to be there all day. I won't be able to wander around and look for goodies. Who'll pay for it?.

OK, lets take them one at a time, but first some conditions. I'm going to limit this offer to major hamfests for starters. At least an ARRL Divisional hamfest or a major regional one, like Pacificon, or Hamcomm. Dayton we'll cover ourselves.

Now, about a table. Back here in swamp country, where the temperature is exceeded only by the humidity, I have a hamfest rule. I get an inside table -- it always keeps the sun off my head, and often the place is air-conditioned!

Being there all day. That's one of the reasons you have friends. Share the duties so neither of you have to be there all day if you don't

want to. Also, most hamfest crowds start to thin out after a couple of hours, so leaving early is not a sin.

The bargains. When was the last time you saw a really good bargain at a hamfest more than a couple of hours after it opened? Right, they're gone early. Guess what, dealers and table holders get in early, before the thundering herd. Set up and go spend that allowance before anyone else can get to it!

Who will pay for it? Given that you are attending a major hamfest as described above, the club will pay for your table if you'll do one or two small things for us! You'll need to show our flag. We have banners -- they're at various places around the country, and we'll loan one to you for an event. We'll even pay the shipping. You'll have to hand out club literature and tell others what fun QRP is and why. We have brochures and we have publicity materials, and we'll send you a small supply. You could even sell back issues of this magazine -- we have them too. I'd really like it if you would show off some of your handiwork by displaying a rig or two. But, I'd also prefer you don't make the table look like a junk sale as well. Now, to get reimbursed for your expenses take a picture of yourself and the table, and send it to me along with a receipt for the table. I'll turn it over to "Him who pays the bills" and you'll get a check, and the undying gratitude of your fellow members! By the way, I'll use my influence with the editor to get your pictures run in QRP Quarterly!

Oh, did I mention that tables usually come with free parking close to the door and free admission tickets? Interested? Drop me a note, or an email.

--UNCLE BRUCE

QRP CLUBHOUSE

Bob Gobrick, N0EB, (ex VO1DRB, VE2DRB, WA6ERB)

Welcome to the QRP Clubhouse. I hope everyone has had an enjoyable summer. Our esteemed editor Ron Stark, KU7Y, has been busy as a beaver working all summer to get his 85 foot tower and new Force 12 QRP yagi up in the air. Look out for a top notch Nevada QRP contest station this fall and watch out Colorado QRP Club. For others, summer may have meant moving your QRP Clubhouse activities out of doors. QRP operating events like the ARRL Field Day and the Adventure Radio Society's "Flight of the Bumblebees" can really add zing to those hot dog and watermelon summer picnics. Outdoor QRP operating events are great ways to get regional QRP club members together for some good old "eyeball QSO" bonding. It's not to late to join in the fun - why not plan a club outing this autumn in time for the QRP ARCI Fall QSO Party on October 18 or the many State QSO parties where you are bound to win the QRP operating class. Or, for a nice one day outdoor event, try one of the monthly Adventure Radio Society Spartan Sprints.

New England QRP Club "72" Newsletter Presses Cease

In the July 1997 QRP Clubhouse column I talked about alternative ways to get information out to your regional QRP club members. Traditionally, clubs would publish a newsletter to keep members informed. Recently though, with the rising cost of postage, limited available free personal time and the Internet, a number of alternative ways to communicate have surfaced. The QRP leader in this area has been the NorthWest QRP Club under the tutelage of Bill Todd, N7MFB. Bill has been publishing an electronic version of "The NWQ Newsletter" to supplement club's snail mail edition. The NorthWest QRP Club decided to take this approach in order to get the news to it's members in a more efficient way and second, to save printing and postal costs associated with a surface mail newsletter. Just for reference, the NWQ Club has a subscription fee of $12 a year for it's printed newsletter and $3 for the email subscription version. I have to admit, at first I was not a fan of these new "zines" - I wanted a transportable newsletter for my favorite "reading room". But now that I've become accustomed to it arriving lickity-split on my computer I just print out the sections that I want to carry with me. It's a whole new age of information retrieval.

Many regional QRP clubs are also coming up with alternative approaches to the published newsletters. The New Jersey and North Georgia QRP Clubs, have moved their "town crier" on to an Internet Web site. This still requires some "publishing", but it facilitates getting information out to members in an efficient manner. Of course, this is only good for the members that are on the Internet. We should also not forget the fine service provided by the QRP-L email list. The QRP-L email list has the largest readership in the QRP community, not because it's free (we are amateur radio hams aren't we) but because it is the best place to pick up timely QRP information. If you are not a member of a regional QRP club then by all means register with this email list. For further information drop an email to Chuck Adams, K5FO (adams@sgi.com) the QRP-L Webmeister.

But what if your members are not capable of accessing the Internet? Well, it's back to the printed media. The printed QRP newsletter is still a viable option for many small regional QRP clubs. The newsletters may differ in size and content from the "big" newsletters, like the QRP Quarterly, the NorCal "QRPp" or the G-QRP "Sprat", but they do a wonderful job of communicating member QRP news needed to keep the club active. This past month, I received two delightful QRP newsletters -- the QRP Society of Central Pennsylvania "QRP Gazette" and the Columbus (Ohio) QRP Club "CQrp Club" . Both of these publications are two to four pages in size and were published using inexpensive desktop publishing software. What's "works" for these publications is that they are easy to design and layout and inexpensive to mail out as compared to the bigger publications. The theme in both of these publications was getting information to the membership about club operating events, meetings, outings, etc. Also the editors of these regional QRP newsletter are willing to help members develop writing skills in publishing QRP equipment reviews and technical articles that may not be available otherwise. If you would like to get some information about how to put together a nice small newsletter for your regional QRP club then contact editor Bob Wicks, W3HAH of the QRP Society of Central Pennsylvania, 20 Brenely Lane, Mount Holly Springs, PA 17065 or editor Steve Bornstein, K8IDN of the CQrp Club, 475 East North Broadway, Columbus, Oh 43214.

My reason for suggesting publishing options for regional QRP Clubs leads me the title of this section. Ernie Gregoire, AA1IK sadly announced on the QRP-L that the New England QRP Club will cease publishing it's excellent quarterly QRP newsletter the "72". It was a tough decision by the NEQRP gang since editor Dennis Marandos, K1LGQ has been putting out a first class publication for a good number of years. But the challenge that an editor faces each issue in begging for member's articles and news has taken it's toll on the NEQRP Club. I feel that it may be a sign of the times, but it is getting difficult to motivate people to freely write and publish material considering their busy lifestyles. And then to have to do support a fairly sizable publication means that further burden is placed on the editor to seek more and more material. Let's face it - putting together a big newsletter is a tough job - I'm sure QRP editors like Doug Hendricks, KI6DS of the NorCal QRPp and Rich High W0HEP of the CQC "The Low Down" will reaffirm that statement. Maybe clubs need to re-evaluate how their regional QRP newsletter can serve their membership best. I am happy to report that the NEQRP Club will still be active in hosting the famous QRP Afield operating event that takes place on September 20. Get on the air and cheer the NEQRP gang on.

I also want to make a plug for our QRP Quarterly editor Ron Stark, KU7Y and the happy-go-lucky Quarterly staff. If a regional QRP club needs help with their newsletter feel free to drop any of us a line. As Ron can attest, we are a very verbose group and are more then willing to offer "free" advice whether it's unsolicited or not - hi. OK, so what's been going on with some of the many regional QRP clubs this past summer? Here's the news:

Colorado QRP Club Western BBQ

As reported in the 40 page July 1997 issue of the CQC "The Low Down" a festive QRP Family Picnic was held on July 12. This, along with the numerous summer hamfests, has kept the Colorado gang pretty busy. This issue of The Low Down, like every past issue was filled with some great articles. Leading off the issue is that famous Area 51 QRP space cadet Paul Harden, NA5N with a great tutorial on Diodes, Diodes, Diodes. Also we find installment number 5 of "Antennas From the Ground Up" by L. B. Cebik, W4RNL where L. B. talks about the 135' Center-Fed Multi-Band Dipole; and the last in a series of tutorials "Soldering - A Primer - Part 3" by Jack Horregan, AB0DB. This is all good stuff and a credit to Rich High, W0HEP in recruiting this talent. But it doesn't stop there. Nemo Ormsby, KG0TH has a nice review on that old favorite the Small Wonder Labs SW-40 QRP transceiver, Jim Pope, KG0PP has part two of his review of the new Ten Tec model 1330 QRP transceiver, and finally a good splattering of operating events by Dick Schneider, AB0CD and Jim, KG0PP. For more information on subscribing to this great newsletter contact Rich High W0HEP, 740 Galena St., Aurora, CO 80010-3922 or CQCLOWDOWN@aol.com

QRP Society of Central Pennsylvania Hosts QRP Seminar.

A wonderful service that a regional club can perform is to host a local hamfest QRP Seminar. That is exactly what the gang from the QRP Society of Central Pennsylvania did. Cameron Bailey, KT3A, QRP seminar chairperson reports that a two hour talk was given at the York Hamfest (PA) with a catered QRP luncheon to follow. Along with all the festivities the members brought in their prize toys for a QRP show-and-tell. Also reported in the 4 page QRP Gazette was a Gell Cell Performance Summary by John Jaminet, W3HMS, some mini reviews of the Columbus QRP Club MRX-40 receiver kit and the matching Dave Ingram, K4TWJ designed Micronaut QRP Transmitter and lots of QRP news items from around Pennsylvania. By the way John, W3HMS listed the Society budget for the 6 month period as $186 income and $178 expenses. Just goes to show how folks who have been raised in Ben Franklin country can manage their Club budget. For more information on the QRP Society of Central Pennsylvania contact Bob Wicks W3HAH, 20 Brenely Lane, Mount Holly Springs, PA 17065.

Michigan QRP 'The Five-Watter" Has a New Editor.

The latest issue of the Michigan QRP Club "The Five-Watter" reports that editor Bruce Pea, N9WKE had to resign his post for personal and work related reasons. The new editor of one of the longest running QRP newsletters will be Tom Arvo, WA8DXD. Many of you may know Tom from the great work that he did with the Digital Journal and a number of other ham related publications. Much of the coverage this issue was devoted to the many operating functions that the Michigan QRP Club has scheduled for 1997 and 1998. Buck Switzer, N8CQA, the past president of the QRP ARCI and Hank Kohl, K8DD, a present Director of the QRP ARCI are big QRP contesters so keep and ear out for the new vanity Michigan QRP Club call - WQ8RP in the upcoming autumn QRP contests. For more information on the Michigan QRP Club contact President Tim Pepper, K8NWD at 654 Georgia, Marysville, MI 48040.

NorCal QRPp - Premier QRP Technical Journal

The Summer 1997 issue of the Northern California QRP Club "QRPp" newsletter has to be a candidate for the best technical QRP newsletter of the year. Editor Doug Hendricks, KI6DS, a recent QRP ARCI Hall Of Fame inductee has once again outdone himself by gathering some of the best QRP technical articles around. I'm just going to list the titles and authors from this issue. This alone will peak your interest: The MRX-40 Mini Receiver by Steve Bornstein, K8IDN - CQrp Club; The PVC Gusher II by Joe Everhart, N2CX - NJ QRP Club; Rainbow Tuner Application Notes, again by Joe Everhart, N2CX; Thump Thoughts (NC 38S) by Dan Winkler, N7IVR; The "Bumblebee" Backpacking Station by Bill Jones, KD7S; Oscilloscopes (Part 1) - A SUPER TUTORIAL (my words) by Paul Harden, NA5N; QRP Plug Paddles by Steve Wroblewski, N6MSQ; The DB 80, an 80 Meter SSB/CW QRP Transceiver by Dr. T. C. Choy, VK3CCA; TiCK-Talk: A Review of the TiCK-2 Keyer Chip by Bill Jones, KD7S and finally numerous mods and QRP Hints and Kinks by Dave Meacham, W6EMD and Paul Harden, NA5N. Say no more - just contact Doug Hendricks KI6DS at 862 Frank Ave, Dos Palos, CA 93620 for NorCal membership.

CQrp Club is Growing

Arriving in my mail was the July and August 1997 MONTHLY issues of the Columbus (Ohio) QRP Club "CQrp Club" newsletter. President Steve Bornstein, K8IDN really has this club on fire. The club kit - the MRX-40 Mini Receiver is selling very well and I'm sure Steve has more kit ideas for the club up his sleeve. This current issues serve the purpose of spreading news to the members. Steve also has some nice reviews on the Gap Titan Vertical Antenna, and some first impressions of the Wilderness Radio SST QRP transceiver designed by Wayne Burdick, N6KR. For more information on the CQrp Club and the MRX-40 club kit write Steve Bornstein, K8IDN at 475 East North Broadway, Columbus, OH 43214.

North West QRP Club Electronic NWQ Newsletter

Right on Time. There's no waiting around for the mail service to deliver your NorthWest QRP newsletter - just log on to your computer Internet server and your email newsletter is waiting there for you. After running the file through my printer I ended up with nine jam packed pages of great QRP information. Bill Todd, N7MFB, NW QRP editor starts off with a good splattering of mail from the members and then a listing of the QRP clubs participating in the ARRL Field Day Event. Then the articles start: "Who Wants to Learn CW" by Roger Hightower, N7KT; the third installment of the QRP novel "Jeremy Finished His Radio" by Bud Larson, W7LNG and a product review of the Paddlelette CW Paddle by Lynn Burlingame, N7CFO. Finally Stan Yarema, KV9X the NWQRP contest editor has an up-to-date listing of upcoming QRP operating events. Lot's of good QRP news. For more information contact Bill Todd N7MFB, NorthWest QRP Club, PO Box 354, Bay Center, WA 98527.

Arkansas QRP Club Growing

I received my first copy of the Arkansas QRP Club Update newsletter from Bob N9ZZ and it was impressive. The AR QRP Club has a goal of 100 members by the end of 1997. Let me tell you - they are on the way with this active group of QRPers. In the "Builders Corner Review" Bob Seymour, W0LK tackles the TiCK-1 Keyer; Bob, AC5AM devotes three pages in his "Antenna News" to the Delta Loop with some good information on building this hot antenna.; in the "Operating Corner" Frank, N5SAN writes about "lessons learned" on Portable Operation and to round off the issue a Member Profile of Ken Graham, K5ID is showcased. For more information please email Jim Hale KJ5TF at kj5tf@mctc.com I do not have a mailing address for the club.

MFJ 90's Newsletter

Although not a regional QRP as such, I'd like to make a plug for a great little newsletter devoted to the MFJ QRP rigs. It is the MFJ 90's Newsletter by David Luscombe, W5RIF and it is the publication that was mentioned by Martin Jue, K5FLU at this year's QRP ARCI Dayton Banquet. This newsletter is a "passion of love" for David and all he asks is that members send in their reviews, articles, mods etc. on the MFJ 90XX rigs so that it can get published. I've picked up some neat little tid-bits on these rigs from past newsletters and the newsletter is invaluable if you have MFJ QRP gear in your shack. As an example, the July 1997 issue had a review of the MFJ 1788 Super Hi-Q Loop by Dave, W5RIF. If you are interested in receiving the MFJ 90's Newsletter drop David Luscombe a line at 13506 Clareton Lane, Cypress, TX 77429. I should mention that newsletter renewals are only $2 a year and that is for a nice desktop published newsletter with photos - a bargain. But there is a catch - Dave only publishes when he gets enough material to make an issue.

QRP Newsletter Exchange Program

Mike Czuhajewski, WA8MCQ - QRP ARCI President has graciously offered to establish a QRP newsletter exchange program for any QRP club that is interested. The QRP ARCI will offer a complimentary subscription to the QRP Quarterly in exchange for your QRP club newsletter forwarded to the QRP Clubhouse. The purpose of the exchange is for the QRP ARCI to help advertise your regional QRP club and in turn we ask that the regional QRP club share the QRP Quarterly with it's membership. So far we have established an exchange with the NorthWest QRP Club and the Australia QRP Club. We would like to hear from you all. If you are interested please have your editor drop a note to me, Bob Gobrick N0EB, PO Box 249, Lake Elmo, MN 55042 or email to rgobrick@worldnet.att.net AND rgob@tengizchevroil.com

Well that's it for this issue. For our next issue please send me your QRP club news with some Jpeg photos if you like. Have a wonderful autumn and make it a point to haul your QRP gear outdoors and make a few Q's with mother nature at your doorstep. Move your QRP Clubhouse outdoors and remember not to forget the secret password for all QRP Clubhouse meetings - Why "QRP" of course. Cheers 73/72 Bob Gobrick, N0EB - QRP Clubhouse.

To Trap or Not to Trap

L. B. Cebik, W4RNL QRPARCI #2572, 1434 High Mesa Drive
Knoxville, TN 37938-4443 e-mail: cebik@utk.edu

The trap antenna, whether a doublet or a one-sided vertical, was invented mostly to permit the operator to use coaxial cable as a feedline. It was not invented for maximum efficiency. As with all antennas, trap antenna adherents claim they get good results--and indeed they do. Whether they get better results than they would with other types of antennas of comparable size is a question few are positioned to answer. The answer would require that the trap antenna and the alternative be placed in nearly the same position at the same height, and few of us can afford the space, time, or money for such side-by-side comparisons.

There are two types of trap antennas, with examples illustrated in Figure 1. The most common are those with traps, or parallel tuned circuits, that are resonant at or just below the edge of the higher frequency band to be covered, with extensions to make up the length of the lower band. These antennas will be shorter than a full-size dipole at the lower frequency, since the trap acts like an inductor at the lower frequency, much like a mid-element loading coil. However, the inductive reactance is not a product of the coil alone, but of the tuned circuit making up the trap.

The second type of trap antenna is one with a parallel tuned circuit with the components and position selected to permit the antenna to show a low SWR on several of the ham bands. W8NX, who has done a great deal of work on these types of antennas, published an 80/40/17/10 meter antenna with only one trap each side of center, and it was tuned to 5.16 MHz (QST, July, 1996).

Let's look at the more conventional trap antenna first and simplify it to just 2 bands, like 80/40 or 20/10. A full size #14 copper wire resonant dipole will have a gain of about 2.1 dBi in free space, but it has this gain only in one ham band. We may use the gain figure as a standard against which to measure trap antennas for two bands. The first thing we note is that performance of a two band trap antenna of conventional design is dependent very heavily on the Q of the trap. There are many trap designs, but here is a table of one pretty good design with coils of various Qs. The gain is for free space. Comparisons between dipoles and doublets at the same height above real ground will show the same differentials.

Q	High-Band Gain (dBi)	Low-Band Gain (dBi)
50	0.7	1.7
100	1.4	1.8
200	1.8	1.9
400	2.1	2.0
800	2.2	2.0

Avoid low-Q trap coil designs. It is fairly easy to homebrew airwound coils with a Q of 200, and common coil stock usually meets this figure. Even the best series-wound coaxial trap coils will not have Qs higher than about 400, and most coils with Qs claimed to be higher than 400 will not retain that Q under the influence of the our chemistry-lab atmosphere. Nonetheless, a dipole with a gain of 1.8 or so will not yield results noticeably worse than a full size dipole, since a half dB of lost gain translates into less than a tenth of an S-unit. (Where these small losses mount up is in multiband beams with traps in every element, since the losses of each trap tend to be cumulative. They also add up in antennas with many traps for many bands.)

The sample conventional 80/40-meter trap dipole in Figure 1 uses traps tuned to 6.75 MHz. With a Q of 200, the traps equalize performance on the two bands at just above 1.85 dBi in free space. This is only about 0.35 dB down from a full size dipole for each band.

Well, that's not too bad. What about the other type of antenna, like the W8NX improved trap antenna? Since the trap is not resonant at any ham band, the antenna is functional over its entire length at all advertised frequencies. On the three upper bands, the trap mostly adjusts the reactance that appears at the feedpoint so that coax can handle the feed task. On 80 meters, as Al Buxton notes, the trap does exhibit significant losses--about 0.6 dB relative to the gain of the wire of the same length (83.6') without the trap. (The 80 meter performance is down by a bit over 1 dB from a full-size dipole for 80 meters.) Since most of the impedances are close to 100 ohms, replacing the

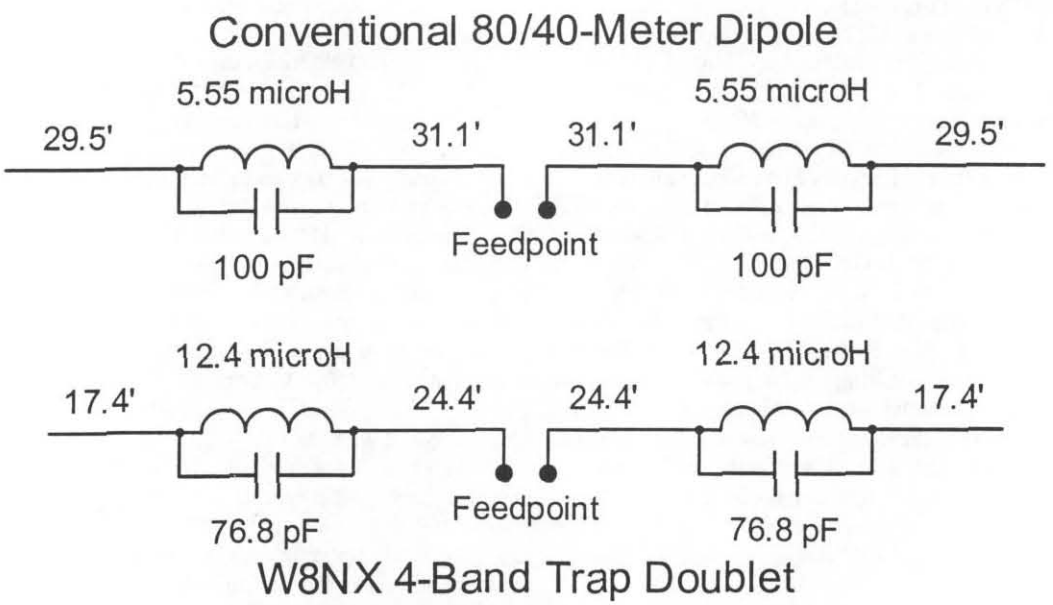

Figure 1

recommended 1:1 balun with a 4:1 balun will likely create no problems.

Since the W8NX antenna is operative along its entire length, its patterns are not true dipole patterns on all but 80 and 40. On the upper bands, they are multi-lobe patterns typical of a wire of the same length fed with a parallel transmission line and an antenna tuner--and at the same lobe strengths. So unlike the conventional trap antenna, the special trap design acts like a simple doublet.

Now we have an additional selection criterion for our decision-making machine. If we just have to have coax, then a trap design is desirable, especially if we do not have space for a yard full of standard dipoles. If we have to have standard dipole figure-8 or (at low heights) oval patterns, then the conventional trap design is indicated. If we have to have the coax, but are willing to accept patterns that are a function of the antenna length, then the special trap design may be useful.

But--what if we do not really have to have coax. What if we could use parallel feedline and an antenna tuner. And--what if the dipole pattern were not too important to us. Should we still opt for a trap antenna? Probably not.

First, traps are always a maintenance problem. More than their losses, their inability to withstand weather without periodical disassembly and cleaning is a disadvantage to most users. Open traps are an invitation to big bug nests and closed traps invite little insects that get into weep holes and eventually clog them.

Second, a doublet with an ATU allows one to put a signal on all the ham bands. The W8NX antenna, without the traps, is about the right length for an EDZ on 20 meters, but the high reactance requires parallel feedline to avoid losses. With the traps and a coaxial feedline, the band is not accessible without significant power losses in the line.

Third, in the short run, a trap antenna may be cheaper than an ATU, but since ATUs are not out in the weather, they tend to last a lifetime. Hence, you can prorate their costs over many years more than a trap antenna.

So if you need the exact things a trap antenna offers, then opt for either the conventional or the special design types. On the other hand, if you prefer general operating on all bands, then simply put up a doublet and feed it with parallel feedline and an ATU. The 121' of the conventional trap antenna would translate into a good doublet at 80 meters and up. Even the 83' length of the W8NX antenna--which is short by G5RV standards--when used as a doublet without traps, will still give performance every bit as good as any trap antenna and on more bands. The length of a doublet is not critical, but a. try to make it at least close to 3/8 wavelengths long on the lowest frequency needed and b. be ready to change parallel feedline lengths in case you run into the occasional impedance condition your tuner cannot handle well.

Remember that there is no magic to any kind of trap or doublet antenna. For the band in use, the elevation angle of maximum radiation will be the same as a dipole at the same height above ground. Therefore, more height is always a key to improved performance of any trap or doublet antenna.

My object is not to downgrade traps: use them where your system's specifications demand them. But do not neglect the multiband doublet, which can be just as good and occasionally better for many installations. Hopefully, setting the two side-by-side here will let you make a more reasoned decision for your installation.

For further information on trap antennas and other antenna topics, you are invited to check out the W4RNL web site at:

http://funnelweb.utcc.edu/~cebik/radio.html

Members' News

Richard Fisher, KI6SN
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QRP contesting we will go

The seasonal change from summer to fall has always been a welcomed one for QRPers who like to operate on the lower bands. The QRN seems to diminish along with hot weather's thunderstorms. It's no accident that many of the hottest contests — those sponsored by QRP organizations, and those mainstream contests with QRP categories — start popping up on the ol' contest calendar as the weather cools.

KI6SN
Richard Fisher

QRP Amateur Radio Club International's granddaddy competition — the Fall QSO Party — comes this month. It's a great time to meet old friends, make new ones and to give the QRP gear that you've been building or storing over the summer a good test.

Many regional QRP clubs offer competitions this fall and winter. The ARRL's November Sweepstakes is also a good contest for QRP operation. Scan last year's SS results and you'll see lots of familiar QRP callsigns listed.

Cam Hartford, N6GA, QRP ARCI's contest manager, has an excellent roundup of contest results and the club's contest calendar in each edition of "QRP Quarterly." If a photocopy of his upcoming listing of competition isn't hanging on your shack wall, well, it should be.

Contest participation is a great way to support QRP ARCI, and to hone your QRP operating skills.

— R. E. F.

A pinnacle of QRP success

Bill Jones, KD7S, writes from Sanger, CA, that he had a great time in late July during the Adventure Radio Society-sponsored four-hour sprint called "The Flight of the Bumblebees."

"The object was to hike, bike or boat to some remote location and make as many contacts as possible. Bonus points were added for QSOs with any of a 50 specially designated 'Bumblebee' stations.

"As Bumblebee No. 4, I chose to climb a rock pinnacle just outside a campground in Kings Canyon National Park in the central California Sierra mountains. I shot a line into a couple tall pine trees and erected a 40 meter dipole fed with 50 feet of 300 ohm twinlead.

"Although the antenna was only 50 feet high at the center, the terrain dropped quickly to the west, north and east. Within one wavelength of the antenna the wire was well over 200 feet above the ground and about 100 feet above ground to the south.

"Besides my faithful Heathkit HW-8, I also used a tiny 40 meter transceiver specifically built for backpacking and portable work. The HW-8 was pressed into service for 20 meter contacts. The MFJ-948 tuner took care of matching the antenna to the transceivers.

"Next time, however, I am going to use my MFJ QRP transmatch and make more room in my backpack for a second bottle of water. A box of Cheezits for lunch calls for more than one pint of water.

"Despite the ideal location, conditions were not all that good for me, especially on 20 meters. I managed 15 contacts on 40 meters but only 14 contacts on 20 meters. No signals were heard on 15 meters.

"If you would like to join The Adventure Radio Society, point your web browser to *http://www.natworld.com/ars/* The name describes the group perfectly."

Three QRP bees for the road

Eric McFadden, WD8RIF, writes from Athens, Ohio, that he and two members of the Southeast Ohio Radio Adventure Team, Mike Hansgen, AA8EB, Tom Witherspoon, KC8GLI, participated in the Adventure Radio Society "Flight of the Bumblebees" from North Bend State Park in West Virginia.

"This was the first time the SEO RATs left Ohio for a radio event. North Bend State Park is about a two-hour drive from Athens, Ohio. While Mike had been to the park sometime in the past, he wasn't sure how well it would work for radio, thus making the journey a true adventure.

"Fortunately, the park worked very well for radio, with plenty of well-spaced trees with their lower branches up fairly high. The chosen location provided a concrete picnic table, and was shaded through most of the operating time.

"The weather was hot — about 90 degrees — and humid — about 95 percent relative humidity. The three RATs, plus Tom's girlfriend, Heather, parked at one picnic area of the state park, and walked a twisty and hilly trail to another picnic/playground area. Once on site, we quickly erected a 20-meter dipole and I started working 20 meters while Tom and Mike erected the 40-meter delta loop.

"The station consisted of WD8RIF's QRP Station in a Bag, an Index Labs QRP Plus, antenna tuner/SWR bridge, antennas, gel cell, solar panel, Whiterook paddle, and sundries in a computer carrying case. This station worked well, but was too heavy for the walk! In addition, we took a 20-meter delta loop, 40-meter delta loop, CMOS Super Keyer II, and a 10Ah gel cell.

"A total of 37 QSOs were made on both bands. I made 16 QSOs. Mike made 15 QSOs. Tom is a recently licensed ham, and made six QSOs with a straight key. Stations were worked in New York, Vermont, Arizona, South Carolina, Virginia, New Jersey, Pennsylvania, North Carolina, Tennessee, Alabama, Ohio, Indiana, Maryland, Ontario, Texas, Massachusetts, Michigan, and maritime mobile in the Gulf of Mexico.

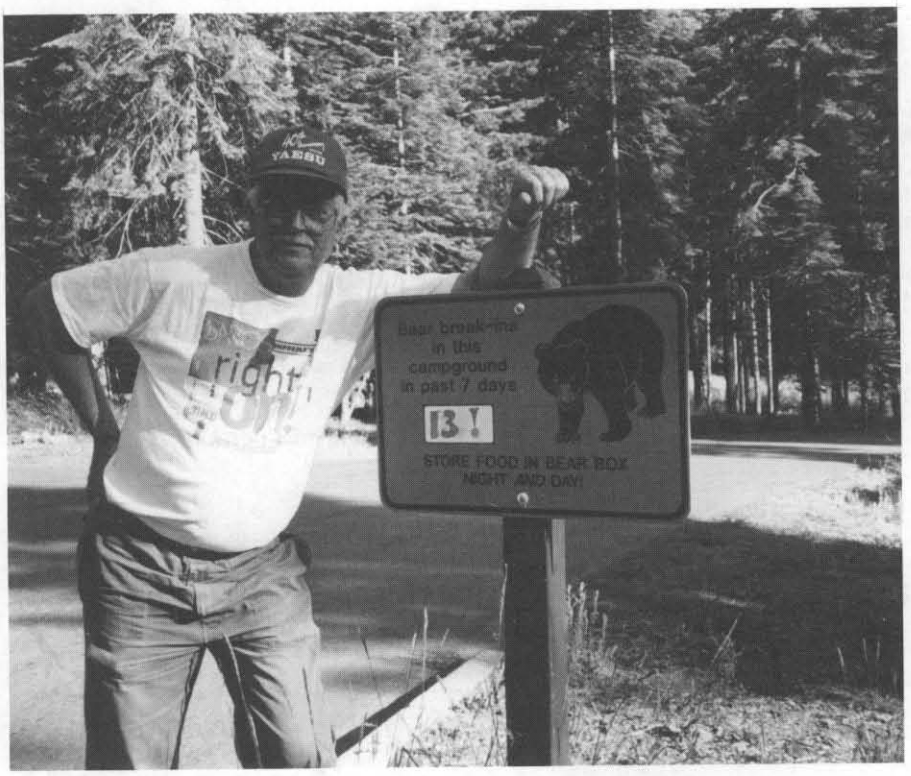
"A family reunion arrived after we'd started operating. Strangely, these people showed very little interest in our activities, although Mike and Tom's efforts to get the 40-meter delta loop erected did produce some stares. Our thanks go to all the station who worked us, and to all the other Bumblebees who hit the trail."

QRP: What's up at Pacificon

Doug Hendricks, KI6DS, says that "NorCal QRP Club is pleased to again sponsor the QRP Forums at Pacificon which is located in Concord, CA and is held at the Concord Hilton Hotel on Oct. 17, 18, and 19.

"NorCal now is able to get some of the foremost authorities on QRP to attend and speak at the forums. This year is no exception as we have an outstanding lineup for

Members' News Gallery



A KD7S 'bee'

"When operating from the field, most QRPers only have to worry about QRM, dead batteries or a few mosquitoes," writes Bill Jones, KD7S, adding, however, that he had "an additional problem when camping in the central California Sierra mountains. He's leaning on a sign that warns: "BEAR BREAK-INS IN THIS CAMPGROUND IN THE PAST 7 DAYS: 13! STORE FOOD IN BEAR BOX NIGHT AND DAY." Below is part of Jones' "Flight of the Bumblebees" station set-up used in the Adventure Radio Society's summer contest. "The HW-8 was used for 15- and 20-meter contacts. A tiny 'Bumblebee Special' transceiver was used for 40 meters," he writes. "The antenna was a 70-foot dipole fed with 50 feet of 300-ohm television twinlead."

the Saturday presentations, and all of the speakers will be attending the QRP Show and Tell to be held at 7 p.m. Saturday in the DeForest Room. This year, as an added attraction to the Show and Tell, we will have two demonstrations. **Mike Gipe, K1MG,** will demonstrate surface mount construction techniques and **Chuck Adams, K5FO,** and **Monte Stark, KU7Y,** will do a QRP CW contest operating demonstation.

Forum speakers Saturday, Oct. 18, include:

"Gary Diana, N2JGU, and **Brad Mitchell, WB8YYG,** *(9 a.m.)* are the designers and inventors of the Atomic Keyer and the TiCK series of keyers. Embedded Research is the company that they formed to supply PIC based products to the amateur market. They shocked the QRP world with their introduction of the TiCK keyer chip. It is a PIC based chip that is an Iambic keyer chip with either mode A or B available. The shocking thing was the price: $5! They will be speaking on the development of the TiCK keyer and also the history of the iambic keyer chip.

"Dave Benson, NN1G, *(10 a.m.)* owner and founder of Small Wonder Labs and one of the very top QRP designers in the world. His products have included the NN1G Transceiver, the Small Wonders Labs 30 & 40 CW transceiver, the Green Mountain series of CW transceivers, and the White Mountain series of SSB transceivers. Dave will speak on QRP rig design.

"Paul Harden, NA5N, *(11 a.m.)* a technician for the National Radio Astronomy Observatory, is the author of the "Data Book QRPers" which is a must have book for every QRP builder. He has written many articles for the QRP press and is a valued contributor to QRP-L. Paul is being brought back by popular request after his outstanding presentation last year. His topic this year is 'Aligning and Tweaking Your QRP Rig'

"Wayne Burdick, N6KR, *(1 p.m.)* is known as the father of the NorCal 40, Sierra, KC-1, KC-2, the NorCal 49er and the SST Transceiver. All of these designs have been built by hundreds of QRPers and are still be being sold today by Wilderness Radio, a very successful QRP company that sells his designs commercially. Most of his designs are first tested as NorCal club projects and then have been refined and improved as commercial products. Wayne specializes in minimalism, and is known for the simplicity of his designs that work as well or better than more complex designs. Wayne was the first to design an audio based frequency counter/keyer, the KC-1 and also designed the only 9 band cw transceiver available in kit form. Wayne will speak on 'Optimizing QRP Rig Design.'

"Dave Gauding, NF0R, *(2 p.m.)* is one of the founders of the St. Louis QRP Club. He is well known in QRP circles for his work on the St. Louis Tuner, the St. Louis Audio Filter, and the St. Louis Vertical. Dave works as a consultant and loves to experiment with portable and stealth antennas. His talk will focus on portable and stealth antenna operating from an apartment dweller's point of view.

"Roy Lewallen, W7EL, *(3 p.m.)* was among the first to be inducted into the QRP Hall of Fame along with George Dobbs, G3RJV, Randy Rand, AA2U, and Doug Demaw, W1FB. He was among the first to design modern QRP rigs, and his W7EL Transceiver is considered to be the design that started the modern QRP revolution. Roy has authored many articles for the QRP press, including several for the ARRL that have appeared in QST, the Handbook, and several ARRL QRP publications. He is also one of the world's best antenna software programmers, and his ELNEC and EZNEC software is the standard for antenna modeling. His presentation will be 'Operating QRP from the Field'.

"The best part about the Pacificon QRP Forums is that there is *no* additional charge to attend. The admission to Pacificon is $3 for advance tickets and $5 at the door. The Concord Hilton is also offering a Pacificon special price (no it is not like Dayton, they really do give you a discount). Call 1-800-826-2644 and ask for the Pacificon rate. The rate this year is $80 per night.

"Last year's event was standing room only for every session, and we expect the same this year. Plus, NorCal will have the introduction of our next kit, and kits will be available at the conference. Hope to see you there."

Keeping in QRP contact

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

Why not drop a card, letter, photograph or e-mail to Members' News? Sending off a few lines takes only a few minutes. Putting it in the mail or 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 need:

Richard Fisher, KI6SN
Quarterly Members' News
1940 Wetherly Way
Riverside, CA 92506

(e-mail: KI6SN@aol.com)

Goodie Giveaway

Last January's "Goodie Giveaway" featured a copy of **K3CHP's DX QSL Guide,** contributed by the author and QRP ARCI member **Joe Mikuckis, K3CHP,** of Riverdale, MD. We're going to repeat the honor this quarter with another copy to our winner: **Eric McFadden, WD8RIF,** of Athens, Ohio.

The 100+ page booklet gives the QSLing QRPer "a set of standard sentences, written in various languages, to be selected and copied in QSL-related correspondence, and thereby produce an impressive QSL return." Twelve standard sentences are offered in a lots of languages ranging from Afrikaans to Zulu.

Sincere thanks to Joe for his contribution. Three copies have been provided, so they'll appear also in Giveaways to come.

To be in the running for next quarter's Giveaway, simply drop a card, letter, photograph or e-mail to the address at the head of this column. Your name and call go into a hat for the random drawing. The hat is emptied each quarter, so your chances for success are pretty darned good.

Items for the Members' News column should be sent to Richard Fisher, KI6SN, 1940 Wetherly Way, Riverside, CA 92506. Photographs — either black and white or color — are welcomed. Please include a self addressed, stamped envelope if you would like pictures returned. Submissions by e-mail (KI6SN@aol.com) are welcomed. To clarify intent, please state that your e-mail text "is offered for publication in QRP Quarterly."

Freidericshafen 1997

Dick Pascoe, G0BPS

Freidericshafen *is a large town situated on the shores of* **Lake Constance** in the south of **Germany** in the corner of the country bounded by **Switzerland** and **Austria**.

Better known in the early years of this century for the huge balloons that were tested over the waters of what the Germans call **Bodensee**. The huge zeppelin factory is still there and can be seen as you drive through the town. The large museum is also well worth a visit I am told. Perhaps I will find time to see next year.

Many readers will be aware that I usually travel abroad with **George Dobbs G3RJV** and did so again this year. Travelling with his wife Joanne we crossed the channel to **France** from my home near the ferry port of **Dover**. We met up with some friends from **Texas, Glen W5HGB** and his family. We stopped off at a small village near **Ludwigshafen** the home of the Germany rep of the **G-QRP club Rudy DK4UH** for a couple of days to see the sights.

Our arrival at **Freidericshafen** meant that we had a lot of work to do, getting our booth set up ready for the show over the weekend.

The hamfest here starts at 1200 on the Friday and runs through until 1600 on the Sunday opening at 0900 and closing at 1800 each day. There are five halls with a **total area of about 25% of that at Dayton**. The first hall is where all the national societies and clubs gather and yes the **ARRL** were there collecting QSL cards. We prefer not to be in this hall as many punters tend to miss it.

The second hall is where the large companies are found such as **Icom, Alinco, Yaesu** etc. with several other traders too. The third hall, where we are based houses several computer retailers and the world *famous* ***'Conrad'*** *store. It is set up inside with a passage the guides* customers through to the tills and open air. As the show opens each day there is a rush to get to this store. Often there is a queue of 25-30 yards waiting to get in. Once inside it is a fight to get round. This store is *much like* **Tandy** *in the* **UK** *or* **Radio Shack** *in the* **US** *and use this show* to clear the shelves of end of range stuff etc.

The passage over the road is used as another hall with several traders selling things, like the famous **SHURE** Morse keys and again more computer stuff and used test equipment.

The final hall is the Mecca of the bargain hunter, the flea market, but here it is all inside. About 200 stands, with goodies from all over Europe. Fancy decorated smoothing irons, brass pestle & mortars, old radios. Strange Morse keys and many, many old valves and valve equipment.

I found that prices were increasing year by year and that things that cost just $10 a couple of years ago were now on sale for $20 or more.

This is truly an international hamfest with visitors from all over Europe, you will hear, ... **English, German, French, Dutch, Flemish, Italian, Spanish, Albanian, Czech, Russian (plus the other ex USSR languages), Greek, Turkish** and many more (**even Yank**). Great fun for the linguist.

Germany is not a cheap place to visit. Good quality food is easy to find but expensive by US standards. Hotels are also expensive at about $50 per person but you do get a continental breakfast included. (Bread, cheese, meat coffee etc.)

Cheap 'Bed & Breakfast' places do exist, ours cost under $20 per person per night and no I won't tell you where it is!

Many visitors fly into **Munich** or **Zurich**, both are within easy driving distance or even train / ferry.

Any Radio Ham who is in Europe during the last weekend in June should insist on putting a visit to **Freidericshafen** on their list of priorities. It is a must.

If you require any more information not covered by this then email me at **Dick@kanga.demon.co.uk**.

HAARP [1] — A Center For Ionospheric Exploration

William E. Gordon Rice University, Houston, TX bgordon@spacsun.rice.edu

[Bill Gordon has spent his professional career on radio communications, forward scatter systems, and remote sensing of the earth's atmosphere by radar. His current interest is in the use of powerful radars in the polar region to detect and track major disturbances in the upper atmosphere produced by space weather. He earned a Ph.D. at Cornell University after serving in the Air Force during W.W.II. During the first half of his engineering career (1948-66) at Cornell he conceived, supervised the design and construction, and directed the early operation of the Arecibo Observatory with its 300 meter spherical antenna (featured in the films "Contact" and "Goldeneye"). At Rice University (1966-86) he served as a Professor of Space Science and Electrical Engineering, as Dean of Sciences and Engineering, as Provost and Vice President, and is currently Distinguished Professor Emeritus. He is a member of the National Academy of Engineering, a Fellow of the IEEE and has received many prestigious awards for his work. We are most fortunate that Bill agreed to write this article for us describing some of the research goals of HAARP. —W1HUE]

A powerful HF transmitter to experimentally explore the ionosphere on the edge of the auroral region is being built with the strong support of the engineering community. The community includes many radio amateurs and venturesome experimenters – radio engineers and scientists – whose goal is to improve communications in a geographical region with serious problems. These problems include HF radio blackouts, GPS navigation upsets, data errors in satellite transmissions, and others induced by space weather and its impact on the Arctic upper atmosphere. This upper atmosphere is the link between disturbances that originate on the sun, propagate as waves and particles through the sun-earth space, and enter the atmosphere in the auroral regions. These disturbances can induce large currents in electric power distribution lines resulting in breakdowns and power blackouts in the area served by the grid.

The powerful HF transmitter, a component of HAARP [1] under construction near Gakona, Alaska, will have when completed 360 10 kW transmitters feeding an array of crossed dipoles over a ground plane, pointed at the zenith and scanable to 30 degrees from the zenith in any azimuth. It will have a nominal effective radiated power (ERP) of 86 to 96 dBw over the frequency range 2.8-10 MHz. The current HAARP Developmental Prototype (DP) antenna array, consisting of 18 active elements (see photo on the next page), was built primarily for evaluation and validation of the engineering design for a much larger array consisting of 180 elements arranged as a rectangular planar array of 12 rows by 15 columns.

The DP array has been used for limited experimental research during 1996 and 1997 but many areas of ionospheric research require more power than the DP can produce. During 1997 and part of 1998, the DP array will be upgraded to a 48 element system, the Filled DP array, which will be capable of addressing nearly a complete set of scientific and applications research areas. The increase in power performance will be accompanied by improvements in the site's diagnostic instruments and operational facilities. The technical details of the HAARP are given in the September, 1996 issue of **QST** in an article by Edward J. Kennedy, K3NS, and John Heckscher. A box on page 35 of that issue contains the note "How HAARP Might Benefit Amateur Radio" by Eric Nashlund, NL7ZW.

While the ERP is large, the effect on the ionosphere is quite modest; the incident power density will be 0.1 mW/cm^2 at 300 km height for the completed HAARP. RF absorbed in the ionosphere changes its temperature slightly and, hence, the resistance of the partially ionized medium allowing the experimenters to modulate the currents normally flowing in the ionosphere. Given the proper diagnostics, the investigators can plan and conduct experiments in the ionosphere, whereas usually they are limited to observing the changes produced naturally. The DP array and transmitter have demonstrated that the system works and a detectable but very modest ELF (extremely low frequency) modulation has been produced.

The HAARP facility with its broad spectrum of diagnostic instruments is intended to become a world-class center for exploration of the upper atmosphere at a site that was once considered for an over-the-horizon radar.

As radio amateurs know better than most people, HF blackouts in the polar regions can be intense. The frequency of occurrence maximizes with the peak of the sunspot activity in an eleven year cycle. The next peak should occur in 2000-2001 AD.

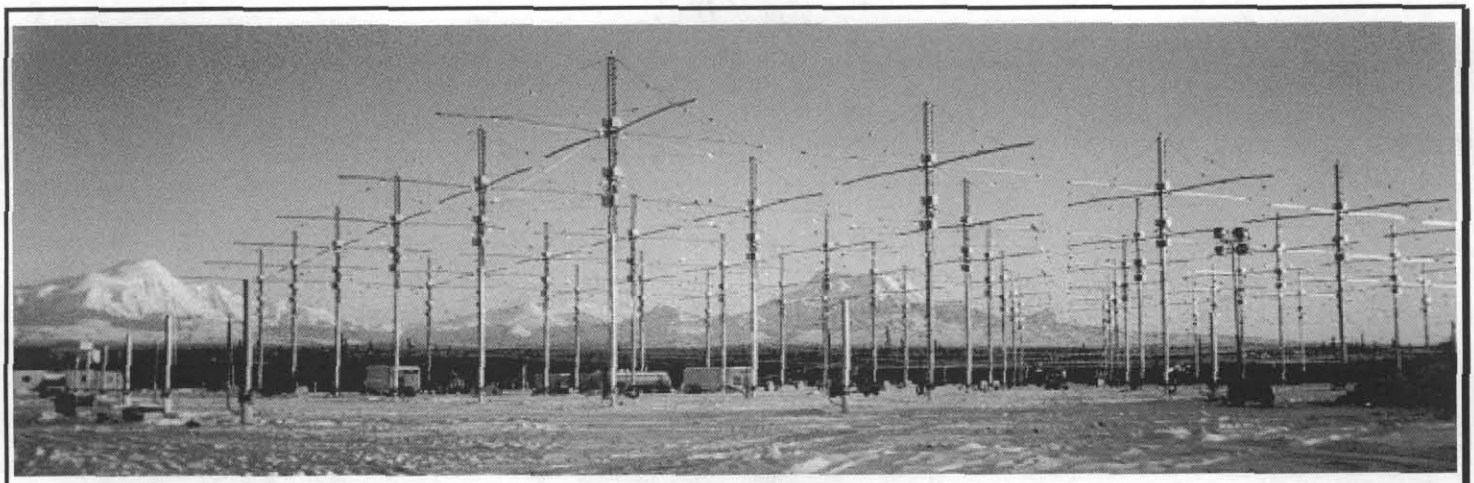
Communication experiments at the HAARP facility now use the partially completed HF array pictured in the figure with the snow-peaked Wrangell Mountains in the background. The ELF produced in the ionosphere over HAARP is detectable on the ground at test sites in Alaska. Since ELF propagates well in the cavity between the earth and the ionosphere it has the capability of long distance communication, although at very limited information rates. The experiments involve the location of the natural currents in the ionosphere, the factors that influence the efficiency of the modulation, and the detection of the ELF on the ground. Since ELF penetrates into the ground, one study considers the measurements of ELF reflected back to the ground surface from structures in the ground that might be of interest to geologists and geophysicists.

The experiments at HAARP have two purposes: 1) to learn more about the upper atmosphere, primarily the ionosphere, and 2) to seek remedies for communications, navigation and other problems related to the ionosphere. The two experimental types often overlap and the applications usually have both civilian and military aspects.

The structure of the ionosphere is examined now by: 1) measuring the scintillation of signals that propagate through the ionosphere, where the signals may have originated on the Earth's surface, in a satellite or naturally in the sky, i.e., noise from radio sources outside the Earth; 2) measuring the components of the earth's magnetic field, and 3) optical observations. In some experiments rocket-borne transmitters and chemicals are used to probe the upper atmosphere and interact with the medium. The HF waves from HAARP interact with the ionosphere to produce irregularities that become scatters for radio waves. The scatters may be elongated along the magnetic field-lines of the Earth, may be horizontally stratified, or may be solitons, rather large irregularities often with fine structure on their surfaces (like a balloon with a rough surface).

The generation of ELF waves in the ionosphere by modulating the HAARP transmissions in different ways provides a clue to the efficiency of the process. The propagation of ELF waves generated over Gakona to receivers on the ground provides information on the efficiency of the generator and the ELF propagation medium. ELF

[1] "HAARP" is an acronym for *HF Active Auroral Program*. The program will be operated by the US Air Force and Navy in conjunction with experimenters from several laboratories and universities, both public and private.



*This photograph shows part of the antenna array with the Wrangell Mountains in the background. Each tower carries a pair of crossed-dipoles for the low band and a separate pair for the high band. Each dipole is a series of wires formed into triangles to "fatten" the dipole and increase its bandwidth, so that the two sets cover the band from 2.8 to 10.0 MHz. The upper end of the dipole is supported by a tube that contains RF switches, and inductors and capacitors to control the VSWR over the band. The lower boxes are baluns to convert from coax to balanced line. Support strands of wire and/or Kevlar are visible in the figure. Further details are available in the **QST** reference cited in the text.*

waves from overhead at Gakona will penetrate into the ground and be reflected by structures in the ground to provide geophysical information about the upper layers of the Earth. Long distance ELF tests to submerged submariners are likely to be successful, although ground-based ELF antennas are already providing this service.

Diagnostic instruments at or near the HAARP site observe the natural properties of the ionosphere and the changes induced during the experiments. The significant addition of incoherent scatter radars (ISR's) as diagnostics at HAARP and separately at Resolute Bay in Canada, will enable engineers to study the "weather" in the upper atmosphere as the Earth's receptor of space weather. The upper atmosphere's weather includes temperatures, densities, winds and composition – all contained in the spectrum of the ISR's echoes and available at ionospheric heights. The fluctuations of the weather produce upsets in satellite communications and GPS navigation systems.

It has become clear that the sky coverage of the ISR at the Gakona site will be far superior to what is currently available and that when the two observatories are built, virtually 100% of the Earth's north polar region would be accessible during simultaneous operations by an Arctic chain of radars. The existing ISR radars are at Millstone Hill, Massachusetts; Sondre Stromfjord, Greenland, EISCAT[2] in Scandinavia; and the new EISCAT Svalbard Radar on Spitzbergen. The Arctic chain will consist of the existing ISR's plus the proposed sites at Gakona, Alaska and Resolute Bay, Canada. The chain will provide polar cap coverage that is virtually complete.

The radars at Gakona and Resolute Bay, individually and networked with the existing radars, will have the capabilities of contributing to understanding the mechanisms, background, and interconnections of the particles, waves, and fields that originate in space, on the sun, and in the lower atmosphere and mix in the polar cap region producing, among other effects, the beautiful and brilliant aurora.

Such radar coverage of the polar cap is unprecedented and should lead to much improvement in our ability to observe and track disturbances in the polar region and to understand and predict disruptions of the high latitude electric-power distribution systems which is one of the goals of the Space Weather Program. The convection pattern in the polar region should be determined very well. The patterns would be related to conditions in the solar wind. The solar wind conditions could be derived from existing satellites in the Sun-Earth space.

Another goal of the Space Weather Program is the prediction of severe disruptions of satellite communications in the polar region. These disruptions have been correlated with the breakup of solar produced plasma on the day-side of the Earth. The breakup results in thousand-kilometer patches which are dragged across the polar cap by the solar wind induced electric field. The patches become unstable, and the small scale structures that result produce scintillation of radio signals used for communication and navigation. As the military and civilian populations become ever more dependent on transionospheric signals, such disruptions will become more serious.

The diagnostic radars, the ISR's, will investigate the physical processes responsible for the weather in the upper atmosphere and develop methodologies for the tracking of geomagnetic storms in a way that is analogous to the network of modern weather radars observing and mapping the disturbances in the lower atmosphere, i.e., hurricanes, thunderstorms, tornadoes, snow, sleet, and the calm clear weather that surrounds them. In both the upper and lower atmosphere the coverage areas of adjacent radars overlap giving two views of the same disturbance that add to the detail available. Tracking the storms in the lower atmosphere leads to forecasting their movement and serving the public and the weather-dependent industries in important ways, often mitigating damages that result from severe weather. The presently operating incoherent scatter radars observe a portion of the upper-atmosphere in the Arctic region and hence a useful but limited map of the storms that occur there. With the addition of the Gakona, Alaska and Resolute Bay, Canada ISR's, almost complete coverage of the Arctic region will be achieved. As a result, a comprehensive view of storm dynamics will become available, allowing a more detailed picture of space weather to emerge.

Observations from the network of ISR's in the Arctic will provide practical benefits to society regarding communications, navigation, and electric-power grid blackouts.

[2] European Incoherent SCATter — a consortium of scientific establishments in England, France, Germany, Finland, Norway, Sweden, and Japan

A Sierra Goes Traveling

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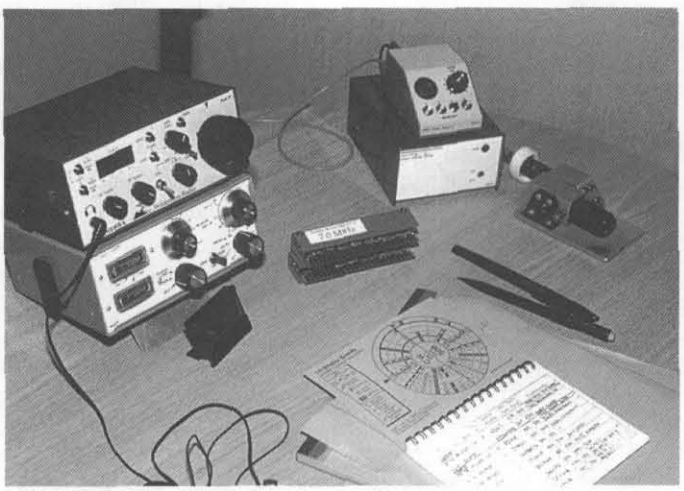
In this escapade, a Wilderness Sierra gets taken for a ride and gets some pretty rough handling, but comes through with flying colors. Read on!

In late December, 1996, I knew that in April of 1997 I was going to be making my biannual trip to the Pacific area as a volunteer liaison member of the American Red Cross's Regional Management Committee. This was not to be a vacation (far from it!), but some ham radio could (and would) be squeezed in. The trip would require audit visits to the Chapters in Hawaii (KH6), Guam (KH2), Saipan (KH0) and American Samoa (KH8). At least there would be no need for reciprocal licenses – W6ZH/KHx would do! In all the trip would take three weeks; I would leave on April 2 and return on April 23. Before it was all over I would take eight different flights lasting 36 hours in the air and would cover a bit over 18,000 flight miles. And luggage would be self-limited to one suitcase and one briefcase.

On one previous Pacific trip I had taken my QRP-20 (see the November 1991 issue of **CQ** magazine). This is a strictly 20 meter QRP CW rig. On another trip, I used an Index Labs. QRP Plus along with an RTTY interface and a laptop computer and made multimode QSO's on 40, 30 and 20 – but this required a second heavy suitcase for radio equipment alone. This time, keeping in mind the luggage restrictions, I wanted a rig and accessories that were light, compact and multiband so I could work 30 and 40 meters in addition to the anticipated work-horse, 20 meters.

The obvious candidate was my newly completed Wilderness Sierra, complete with KC-2 digital display and "Buzz-Not" noise blanker. What is a Sierra? It's a **N6KR**-designed kit-based QRP CW transceiver that uses plug-in band modules to cover the HF ham bands from 160 to 10 meters, including the WARC group. Power output is around three Watts. Originally a kit from NorCal (Northern California QRP Club), in its present iteration the kit and accessories are available from Wilderness Radio (see end of article for address). As a carry-over from my NorCal Sierra, I had all the plug in-modules for 160 through 10 meters, so I could select what I wanted, and was ready to go.



W6ZH/KH2 up and running. Pictured from upper left to right: Sierra (top), St. Louis Tuner (bottom), LCD clock (front) two Sierra band modules, power supply (minus switch), CMOS Super Keyer II (top) and Galbraith key paddle with remote keyer memory buttons.

The antenna would once again be a 12 foot, center loaded whip that collapses to an 18 in. bundle, plus a "fastening" system that would allow it to be used almost anywhere (for example, see **QST**, March 1992). From over eight year's experience with this antenna I knew it would work acceptably well on 20 meters without an antenna tuning unit (ATU), but I also knew that one would be needed to make the antenna work on any other band. A recently finished St. Louis Tuner (a.k.a. SLT, a kit from NorCal) complete with an SWR bridge was the choice. A suitable A/C power supply was at hand – a compact home-brew regulated 13.8 Volt DC supply (PSU) that was in daily use with the Sierra. Also to be included was a super-small version of the CMOS Super Keyer II, along with a Galbraith key paddle. The photo above shows the assembled station. Not shown are such things as 15 feet of RG-8X, AC extension cord, various connecting cables, fuses, logs, tools, pencils, etc., – all the other things that go to make up a station and are so easy to forget.

Previous experience showed that hand-carrying the transceiver would be wise, but everything else could be packed in the hard-cover suitcase. When completely packed, this piece of luggage weighed a bit over 60 pounds and would carry a "HEAVY" airline tag throughout its journey. Yes, I did manage to include enough clothing so that my sponsors and hosts would not be embarrassed by my appearance. The Sierra went in my briefcase, along with about 25 pounds of Red Cross paperwork!

There are two ways to fly to American Samoa: find some way to fly to Western Samoa and then take an inter-island flight to American Samoa, or fly directly from Honolulu. And if that wasn't restrictive enough, there are only two flights a week from Honolulu to American Samoa – Friday and Monday. The plane leaves Honolulu at 5:30 PM and arrives at the Tafuna Airport in American Samoa about 9:30 PM. The same plane turns right around and returns to Honolulu the same night leaving at 11:30 (or so). It arrives in Honolulu at 5:45 AM (yawn) the next morning.

The timing and routing of the entire trip were dictated by this Honolulu-Tafuna flight schedule. We (my fellow team members and I) had an appointment with American Samoan government officials on Monday morning, April 14, which meant we had to fly in on Friday, April 11. My chores would not be finished until Saturday, April 19, which meant the earliest flight out that I could catch would be on Monday, April 21. With these dates decided the remainder of the trip could be set up. It would go like this: Los Angeles-Honolulu-Guam-Saipan-Guam-Honolulu-American Samoa-Honolulu-Los Angeles. This is the explanation for what seems like a lot of needless chasing back and forth across the Pacific Ocean. Now, back to the Sierra.

On the "first" arrival in Honolulu, I set up the Sierra in my fifth floor hotel room. Although there was not much time available, I wanted to make sure that everything functioned, since I knew that there was at least one ham radio emporium in Honolulu in case I needed something. (Lesson #1: Make a trial run before you get out into the "beyond"!). I connected everything up (and was grateful I had brought along 12 ft. A/C extension cord), plugged in the 20 meter module and everything worked! Power out according to the SLT was three Watts. The antenna was clamped to the room balcony and stuck out horizontally, pointing due West. All this took 12 minutes by the clock! Not much time available, but I did work Lou, **NQ6S** in Groveland and Gary, **K9AW/KH2** in Guam – both with 559 reports. Gary told me that the weather in Guam would be hot, humid with periods of sunshine and rain – nothing new there!

After a day-and-a-half of Chapter business, I took off for Guam for a two-day stay. **W6ZH/KH2** was on the 7th floor this time. Murphy had also arrived! Problem: the A/C power supply had taken a real hit

(yes, in the luggage) and the internal parts of the A/C off-on switch had been pushed through the back of the switch! No switch! I used parts of the now-defunct switch to short the A/C leads together and bound the whole wretched mess together with scotch tape! Yes it worked, but the PSU was now turned on and off by plugging or unplugging it from the wall. (Yes, the Sierra has its own on-off switch.)

Murphy wasn't satisfied with just the PSU. Next, the SLT seemed to be non-responsive. Investigation showed that this might have been the other contestant in the tussle with the PSU! The front panel of the SLT had also taken a blow – right next to the upper meter – fracturing one of the plastic "ears" on the back of the meter. A little cursing and careful poking around got the meter back in place and amazingly, it worked!! Hurrah – now to get on the air.

First **W6ZH/KH2** 20 meter QSO was with Ralph, **BD4DC** in Shanghai (I got a 539) followed by **JF8EV**, but now time to go to work. Some eight hours later, back on 20 for a bevy of JA QSO's – reports ranging from 449 to 599. Then onto 30 meters for a couple of more JA QSO's. Major disappointment: the SLT would not load the antenna system on 40 meters, no matter what I did – and what I did was get myself a nice little RF burn trying to improve matters! Oh well – back onto 20 meters to find that the SP (Poland) CW contest was going on. Worked two SP's – got two 599's (no, I don't believe that either), and gave as good as I got (they were really S-5 or so). But what the hey – a couple of European QSO's from KH2 with three Watts is not to be sneezed at!

While still on Guam I had a QSO with **V73K** in the Marshal Islands and **VK4LX**, Frank, who must have the best ears in Australia! He was 539 to me, and I got a 339 and was grateful. Here is the second lesson of the trip's QRP activity: If the signal is not over S-5, there is very (repeat *very*) little chance of working the station, unless the other operator is a dedicated weak signal person. I'd hoped to find a replacement switch for the PSU in Agana, but there is no Radio Shack on Guam – there's an opportunity for someone! A better fix than scotch tape was needed, so I borrowed a soldering iron and soldered the two A/C leads together in the PSU. At least there would be another unscheduled "power outage" due to slipping scotch tape!

Off to Saipan – KH0-land. I was not going to take any further chances so the SLT rode in the brief-case along with the Sierra, replacing some no-longer needed paper work. I knew in advance that in Saipan there would be no chance to operate from my hotel. It is a really neat place, run by a friend, but I would have no access to the outside. Therefore, when the chance presented itself, I planned to use the Cushcraft R-7 vertical antenna installed at the Saipan Red Cross Chapter House. While the Chapter had a Red-Cross-provided FT-890, it had never been used as anything but a receiver to listen to inter-island search-and-rescue activities. The R-7 had never been used as a transmitting antenna – on any frequency!

The time finally came when I could set things up at the Chapter House and check out the antenna. Using the FT-890 turned down to QRP levels as an RF source, and the SLT for SWR measuring, I found that the R-7 had a very high SWR on 40 but was right on for 30, 20, 17, 15, 12 and 10. I was not in a position to find out what was wrong on 40, but to "check out the rig" I did load the 890 up to its full 100 Watts on 20 SSB and called **V73K**, who gave me a 5/9 and said it sounded great.

Okay, duty done; back to QRP. The Sierra was loaded directly into the R-7 on 20 meters, and who's there but Frank, VK4LX (he camps on 14.023.7 MHz). Once again, he's a 539 and I'm a 339. A JA, a UA0 and another VK4 then it's time to pack up and head back to Guam and on to Honolulu the same night. At least I had gotten three QRP QSO's into the Saipan log.

No time to set up in Honolulu between planes this time, so next stop, American Samoa. I had asked for and got a "fale" (separate cottage-like accommodation) at the venerable (that's the nicest word I can think of) Rainmaker Hotel in Pago Pago. I clamped the antenna to the edge of the thatch-like roof and was ready to tear up 20 meters .... but propagation was against me. There were a lot of signals, but very few that were stronger than S-5, so there were fewer QSO's in the log than might have been expected for the week or so that I was there. I did work a number of JA's and ZL's including being able to keep my weekly schedule with **ZL1BAV**. I worked Lew, **N6VV**, for the only state-side contact, and worked Ian, **T20AA** in Tuvalu, Ron, **3D2RW** on Fiji (awaiting unsuccessfully transportation to Banaba Island), a couple of VK's and an HK6. All QSO's from KH8 were on 20 meters, none on 30 meters.

Even if it doesn't have a big mouth, the Sierra has good ears. As mentioned before, there were few signals above S-5, but there were many at S-4 and lower. As a sample from the KH8 listening post on 20 meters: **ES1WN**, **BV4QA**, **SV2BXJ**, **9A2SY**, **FK8GJ**, **PY7ZZ**, **SM3IRD**, **DJ8SW**, **OH1MGZ**, **TI4CF**, **OZ8RO** and **T97M**. I listened on 30 for a number of hours and turned up **LA9SN**, **S59AA**, **OZ3W**, **VK9NS** and **W8IXP**. The latter station had an outstanding signal, but alas I couldn't get him to listen for a peanut whistle signal.

I arrived home on April 23 and put the Sierra back "on line" at the QRP operating position at the home QTH. The power supply got a new switch and now functions as it should. Lessons learned (besides #1 & #2)? Take delicate things (transceiver and SLT's) in hand luggage and carefully pad other items to prevent en route damage (socks and T-shirts are good for this!). The less-than-optimum 12 foot center-loaded whip is not as good as a dipole, but is much easier and quicker to install, and will allow at least a few QSO's. In case you might wonder, even for a seasoned (many seasons!!) QRP operator, three Watts output can be very frustrating coupled with a marginal antenna and unfavorable propagation no matter how exotic your call might be!

On the good side, the current version of the Sierra is great! Its ABX (variable selectivity) is a real break-through, and the KC-2 digital readout is a real benefit. The CMOS Super Keyer II continues to be my keyer of choice – I have four of them. It's nice to be able to put a long complicated call like W6ZH/KH8/QRP into the memory, and turn up the speed to 25+ WPM and dive into a DX-pileup with just a push of a button! And if a "QRZ QRP?" is the result, push that button again (and again, and again, and ....)

Over a three week period I had used two different bands to have 33 QSO's from four different call areas. I probably spent a total of about 20 hours with the Sierra, listening, working stations and/or calling CQ (last resort). In all, having ham radio along on the trip was a pleasant way to unwind after a day's work, or a neat way to start the day. Besides, it kept me off the street corners and out of the pool halls!

Sure, the frustrations were there but that's really part of the fun. And not having a lot of heavy luggage to schlep around was another benefit of the QRP approach to travel – alas try it, you'll like it. If you want to know more about the antenna system that I have developed, look for an article on this subject in an upcoming issue of the **QRP Quarterly**.

Sierra transceiver kits are available from:

Wilderness Radio
PO Box 734
Los Altos, CA 94023-0734
Telephone: (415) 494-3806

CMOS Super Keyer II (and III) kits are available from:

Idiom Press
PO Box 1025
Geyersville, CA 95441

From the Badger's Nest

Nils R. Bull Young, WB8IJN &c

Avast, me mateys! The ol' sea puke is here to tell ye another tale o' adventure an' darrin' do! Arrrhhh! Hold yer course while I puts away me fightin' otter. Make a hole! Them gums be razor sharp!

One of my favorite fantasies has always been what some call the "spy radio". A little radio in a small space, complete with power supply, antoona tenner &c, ready for t' goin' t' sea. Arrh! (Bet'cha thought that I'd slipped the rhetorical perspective a notch, didn't ye? Arrghh!) Had one once, an olive-drag (or is that olive-drab – times keep a-changin'! Arrrgh!) aluminum box with all the necessary accoutrements for 40M QRP. Even almost worked California on it, back around 1971, standin' watch from me post lookin' out to sea (my third-floor apartment on Jax Beach in Florida, truth be told). I remember giving that radio to a guy whose 2M radio I'd blown up.

Reparations fer me days of piracy under the flag of King Pura Mierda IVXXQ, sovereign of All Bogus and the fleas what stand between. Argghh!

So there I be, without a radio or a cheese otter, hungerin' for a taste of potent rabbit venom, when what should I espy from me perch but a whole collection of tiny radios the likes of which I'd not seen for many a year.

Each of them with special feeetchers what'd make me scurvy mates drool and slobber fer a good keel-haulin'. Cottage industries, they call 'em. Talk about cues and peas. Arrrh! Cue! Arrhh! Peas! It sets me to thinkin' about them old days off the coast of reason, down by Florida!

Or: How do I put a box together that won't weigh more than the stuff that'll go in it, what I can cover with fine cloth imported from Guatemala to make it look the spittin' image of me cabin boy's undergarments? It ain't easy, see? But it's worth a try. Off to the hardware store I go. Back I come with a collection of 3/4 in. pine boards, a chunk of 5/8 in. plywood, nails and spikes and a manual on marlin spike seamanship. Arrhhh! "Measure twice, cuts ye once," says me mate Octavio Winston Cool-head Phillips-Jones, son of that famous scallywag, Buford Cyrus Potato-Head Wilson Young III (no relation). So I measures and me figgers and come up with a plan. But it's only after I make me way aft to change the level of the sea that I realizes that me plan be flawed. Egregiously so, so it be.

The 3/4 in. I can do without, since I be usin' the cloth to keep the box steady, mates. Arrrhh! I conger me badger repellant and considers the course ahead. An' not bein' one to retreat from infamy, me forges on, slashin' through the seas of me own stupidity with galantry and panache. (I gotta use them big words now and then or ye all be thinkin' I be gone soft in the calabash, see?)

Finally I be done with the work an' shows it to me mates. We agree all around that my plan be more crack-brained than Gorgeous Jean McFlea, what brung us all to this here island o' woe and perdition years back. Besides, I can't find a way to pack it out without harmin' me back on the weight of it.

So we keelhaul the badger and send in the Turkish donut police! Arrhhh!

Sabers and daggers! Ali the Cabin Boy's kris! The potent venom of the black mamba! Halogen lights with dimmers! Numbers stations on 10.126! Old Bob Dylan records! What a powerful assault we make, the crew and meself! And when all be said and done, not a single use could we find for the infernal box. So we sticks it outside the fortifications and waits for the answers to come!

Arrrghhh! There goes the antoona, high into the trees! Arrrrh! There be the solar panel, pickin' up the power of the sun over our scurvy heads!

Arrrgh! There be the sparks, tappin' on the key! Arrrh! We be sure as saved now, what with the Cargo Cult around us day and night, wantin' to empty our containers or some such gibberish! Arrrh! Make a hole, mate! We be on our way to, what? Ah! A field day with the scourin' powders and the scrappin' edge!

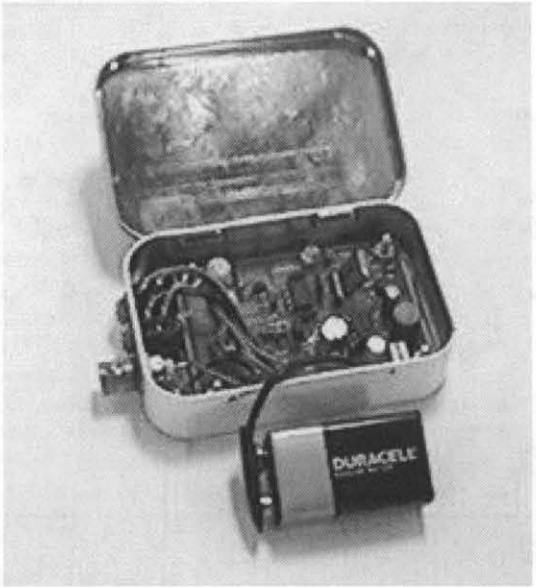
There be no comet now, mates! Arrrh! Shiver me gibbers! It's medication time!

Arrhh!

Mint Tin Projects

Darrel Jones, WD6BOR **358 Patten St.** **Sonoma, CA 95476**

It all started with the 40-9er. That project came along not long after I successfully built one of the first batch of NorCal 40s designed by Wayne, N6KR. Next I built a 40-9er from plans I picked up at a NorCal meeting. Then I kitted up a bunch more of the 40-9ers and distributed them around the Valley of the Moon ARC, our local radio club up here in Sonoma, California. To do that I had to find more Altoids® mint tins. Luck was with me when I spotted them at the local Costco discount store, packaged by the dozen. After the 40-9ers were all gone, I still had a couple of tins left over. What to do with them...?



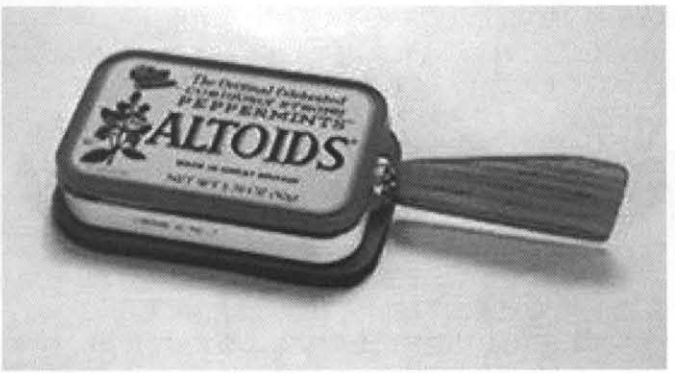
How it all started: A "40-9er" in an Altoids® tin.

Rainbow Tuner built into an Altoids mint tin.

Embedded Research had their Atomic Keyer out and offered at a very reasonable price. When I received the kit I noticed it was just Altoids size, so after soldering it up, into a tin it went. Next came the remarkable Rainbow Tuner with the challenge of fitting it into an Altoids tin. Into another tin it went.

The next time I was shopping I picked up another dozen Altoids tins. At the April NorCal meeting I asked Doug for any suggestions he might have for projects to go into an Altoids tin. He thought a minute and then said that a station clock would be a nice accessory. I just happened to have two clock modules built into remote control microphones meant for CBs that were surplus left over from the big CB boom of the seventies. Perfect. Into two more tins, complete with the nine volt batteries needed to power them. They were good news/bad news items though. They use LED displays so Doug will be able to log his time from the dark of his sleeping bag during the next Zuni Looper Expedition, but that will be about the extent of the clock operation on one nine volt battery. The silly thing draws about 25 milliamps, or just a little more than most QRP rigs on receive. I'm sure Doug will think of some clever solution.

I began digging through the debris on my bench looking for more things to put into Altoids tins. Under a pile of hardware and loose resistors I found an old telephone switch Bruce had given me last year at Foothill where he was busily cleaning out his shack by distributing heavy things to unsuspecting people. After disassembly, modification, a little metal- and woodwork and painting, I had a perfectly usable single lever paddle to use with the Atomic Keyer. I had weighted it down with some lead ingots and casting plaster and then added some "anti-skid" by cutting up a mouse pad and setting the paddles on top. With a polished oak paddle and a little red paint it looked quite nice.



"Altoids" Keyer Paddle.

I was staying up late and abusing my health by this time, but that is the way of all addictions. The next project to go into an Altoids tin was a LM386 audio amplifier out of Paul Harden's, NA5N, Data Book for Homebrewers and QRPers.

Finally I thought that a regulated power supply would help with that pesky problem I have been having with the smoke leaking out of some of my nine volt projects. I dug through the pile again and came up with a bent, spindled and mutilated 7809 that still had some leads left and soldered that together with a few caps and put that into another Altoids tin. I plugged it into my "regulated" Sears CB 12 volt power supply, which actually puts out about 16 to 18 volts, and it checked out just fine.

I put them all into a big black box and took them to the June NorCal meeting hoping to find someone there who could help me end this terrible affliction. I've said some nice things before about the gang at California Burger, but I'm not so sure anymore. Doug, KI6DS, offered some suggestions for more projects that might fit into an Altoids tin and then gave me a beautiful silver Altoids tin from England by way of Dayton. Jerry, WA6OWR, further encouraged me by taking a picture of all the Altoids tins lined up on a table and asking me to write up something for the web page.

Meanwhile, I just returned from Costco where, you guessed it, there were all these by-the-dozen packages of Altoids for sale. My stomach's already shot from all those previous mints.

IDEA EXCHANGE

Technical tidbits for the QRPer

Mike Czuhajewski WA8MCQ 7945 Citadel Drive, Severn, MD 21144 wa8mcq@abs.net

IN THIS EDITION OF THE IDEA EXCHANGE:

IN PRAISE OF KNURLED NUTS

*From **Joe Everhart**, N2CX of Brooklawn, NJ (n2cx@voicenet.com) here's Joes Quickie #23--* It's fun to enjoy simple things in homebrewing, like unique hardware for example. When I first began tinkering with electricity as a wee tyke, it was a real kick to experiment with light bulbs and homemade electromagnets. The power source of choice was a #6 dry cell. Wow, that baby must have had some Ampere-hour capacity! Would you believe I can't find any info on it on the Web?

Anyway, one of the really neat things about that battery (yeah, I know, it's really only a cell) was the means of connection. It had two threaded posts sticking through the top, one plus and the other minus, and screwed onto each was a knurled nut like the one in Figure 1A. To attach a wire, you loosened the nut, wrapped a wire around the post (clockwise, of course) and tightened the nut by hand. No fancy tools or bother. That knurled nut is a masterpiece of convenience. Just try finding a battery with them these days. Yeah, there are some with crummy plastic imitations but they just aren't the same! About the only place you can still find them is on the plunger type firing boxes for blasting.

When I made a simple portable QRP tuner recently, I wanted the simplest possible means of attaching a wire in the field. I searched local hardware stores with no luck. Then at a hamfest, I found a guy with a big box of brass #6 knurled nuts so I bought several dozen. For the antenna tuner or even for battery connections, they are hard to beat.

Another type of "old-time" wire connector that seems to have disappeared is the good old Fahnstock clip. (How do you pronounce that anyway? I say "Fawn-stock" but I've heard other variations.) See Figure 1B for an example. It's another simple means of making a wire connection. They were held onto insulating surfaces (like wooden breadboards) by a screw in the left-hand end. Since they are constructed from springy sheet metal like brass, pressing down on the top surface made room to slip a wire through the small loop protruding up through the hole in the top piece. Then when you released the top, spring action held the wire tightly in place. Actually they were rather elegant and functional. But they seem to have gone the way the of "pushback" wire that was popular for homebrew tube rigs back before the days of sophisticated and quickly obsolete electronics.

One kind of hardware that is still fairly common is the wing

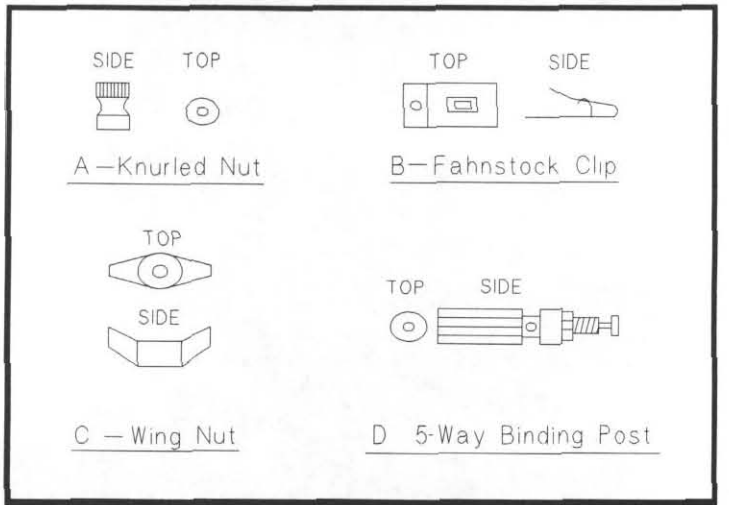


Figure 1—Knurled nuts and other simple wire connectors (N2CX drawing)

nut. This familiar piece is shown in Figure 1C. Like the knurled nut, it threads onto common hardware and is very easy to install and tighten with no more tools than the ones on your hands. They are convenient for electrical connections, of course, but also for mechanical constructions that you may want to assemble and disassemble frequently, like portable antenna masts and beam antennas. No fuss, no muss and no need for that one oddball size socket wrench when you are far from home. Not only that, but they are "the" fastener for a ground lug on the back of a transmitter. Why would anybody use an ordinary hex nut for ground leads on the rear

panel of equipment? Shucks, half the time you can't even SEE back there to hook up the ground wire, let alone try to get a nut driver onto the danged nut!

One simple connector that has survived is the so-called "5-way" binding post shown in Figure 1D. As Andy Rooney might say, "What ARE those five ways, anyway?" I've come up with six candidates:

1. Banana plug in top of post
2. Wire thru hole in side
3. Wire wrapped around (clockwise) and held in place by top screwed down
4. Alligator clip in top of center post
5. Phone "tip" plug thru hole in side
6. Spade lug around post, held by top screwed down.

And there are no doubt more. The 5-way combines the "no-tools" convenience of the knurled nut with a multi-use capability. It also has the advantage of combining insulating mounting hardware in one unified structure.

Next time you build a piece of portable gear, be sure to use some of the "old-time" connection hardware. It's usually much cheaper and convenient to use than some of the newer fancy connectors, it is often more universal and might even be more rugged!

--DE N2CX

NE602 OSCILLATOR SECRETS REVEALED

*My hamfest partner **Walt Thomas, WA4KAC** of Laurel, MD has decided to start numbering his items like N2CX, so here's Walts Home Building Tip #9. References are at the end.*--Last year on QRP-L [1] there were questions and some discussion about the proper signal voltages to be used with the NE602 mixer-oscillator IC, the workhorse of many QRP transceivers. The 200 mV p-p oscillator injection voltage cited on QRP-L comes from the NE602 data sheet [2]. This is 70 mV RMS, which seems a bit low for proper mixer performance. On the other hand, an oscillator voltage too high can cause spurious mixer products. For instance, the original NorCal 40 had some cases where more active crystals created transmit spurs. After changing the C18 and C35 oscillator capacitors on two mixers (both of which are in the C2 position in the generic schematic of Figure 2) from 150 pF to 220 pF, Dave Meacham [3] measured 0.90 to 1.0 V p-p at pin 6 of the U2 and U4 oscillators and transmit spurs were reduced to -50 dBc (dB below the transmitter carrier level). Dave also decreased the coupling capacitor between the VFO and transmit mixer. Reviewing numerous NE602 transceivers showed various capacitances are used at the chips oscillator pins. So just what is needed for optimum mixer performance?

The NE602 data sheet [2] reads: "External L. O. should be *at least* [my emphasis] 200 mV p-p." Signetics' application note on the '602 oscillator [4] states, "If the application calls for a separate local oscillator, it is acceptable to capacitively couple 200 to 300 mV to pin 6." This, however, does not tell if the voltage is peak to peak or RMS. An EDN article [5] states, "If you use an external LO, pin 6 can act as a buffer/driver input. The optimal drive level for this mode is between 200 and 300 mV *RMS."* [Again, my emphasis.] The most definitive explanation is given in another application note [6]: "The oscillator is a single transistor with an internal emitter follower driving the mixer. For best mixer performance, the LO level needs to be approximately 220 mV RMS at the base of the oscillator transistor (pin 6)....The impedance at the LO input (pin 6) is approximately 20K ohms...." More about the oscillator transistor is given at the end of this note: "The oscillator transistor is biased with only 220 uA. In order to assure operation in some configurations, it may be necessary to increase transconductance with an external resistor from the emitter to ground. 10K to 20K ohms are acceptable values. Too small a resistor can upset DC bias...."

Most QRP rigs using the NE602's on-chip oscillator are configured as Colpitts oscillators. The two capacitors at pins 6 and 7 (C1 and C2 in Figure 2) control the oscillators feedback and thus set the RF voltage at the transistors base (pin 6). These capacitors *also affect the frequency* of a crystal controlled oscillator. Earlier '602 based transceivers [7, 8] used equal capacitances. More recent designs [9, 10, 11, 12] have larger emitter-ground capacitances to lower the oscillator base V RMS and reduce mixer spurious products. The NE602

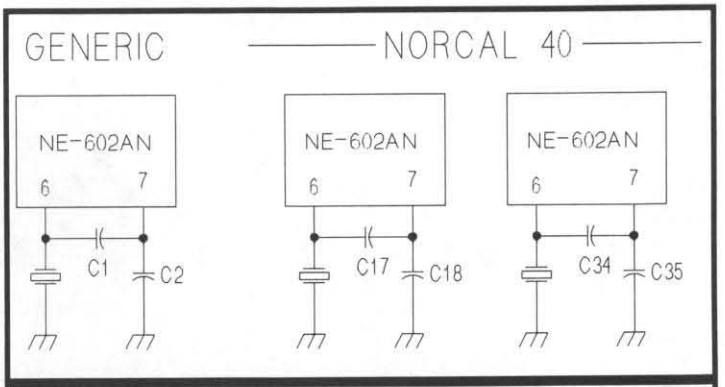


Figure 2—NE602 oscillator capacitors. (NorCal 40 uses two NE-602 cystal oscillators.)

oscillator application note [4] shows reactances of 638 and 162 ohms (5.6 and 22 pF at 45 MHz) for the feedback capacitors. Carr [13] states these capacitors are "semi-critical" and provides two formulae for selecting their values:

$$C1 = 100/\sqrt{F} \qquad C2 = 1000/F$$

where C and F are in pF and MHz respectively

For a homebrew design, I suggest using either the reactance values or Carr's formulae to select the capacitors to get the oscillator running. Then measure the VRMS (or V p-p) at pin 6 and adjust C2 to give 200 to 300 mV RMS (570 to 850 mV p-p). C1 then can be adjusted to give the proper BFO or mixer frequency. (Some radios use a trimmer at C1 to adjust the oscillator frequency.) As an example, my NorCal 40 was built originally using 220 pF at C18 and C35 (again, both are in the C2 position of Figure 2 in their respective circuits), but the U2 pin 6 voltage was 490 V RMS. Changing C18 to 330 pF decreased pin 6 to 210 V *RMS and the receiver was noticeably quieter* (less "white noise"). The added 110 pF shifted the BFO to a lower frequency, so C17 was changed from 47 to 39 pF to reset the BFO to give a peak response at 600 Hz in the receivers passband. Pin 6 voltage measurements can be made using either an oscilloscope, as Meacham did, or an RF voltage probe as I did. Since the oscillator base impedance is 20 K ohms, a high impedance probe is needed.

I have measured pin 6 voltages between 40 and 800 mV RMS on seven different '602 based rigs (including a Wilderness Radio Sierra, NorCal 40, three NorCal 40A's, an OHR Explorer II and an NE3040.) Such variances are caused by component tolerances. Passive components can be bought (at a reasonable cost) down to five percent tolerances, but no tolerances are specified for either the NE602's oscillator transconductance or for the "activity" of the inexpensive microprocessor crystals used in these radios. Thus it's up to us

homebuilders to tweak our rigs if we want to get that last ounce of performance.

References:

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3. D. Meacham. "NE602 Spurs in the NorCal 40," NorCal *QRPp*, December 1994, p. 55
4. "AeN1982: Applying the Oscillator of the NE602 in Low-Power Mixer Applications," Signetics Application Note, February 1987, 3 pp
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7. W. Burdick, "The Safari 4: A High-Integration 4-Band QRP Transceiver--Part 1 of 3," ARRL *QEX*, October 1990, pp 10-16
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11. D. Witzke, *Explorer II Construction Manual*, Oak Hills Research, 1995
12. D. Benson, "NN1G MkII all better now!", QRP-L@lehigh.edu, Fri, 11 April 1997 06:49:15 -0400
13. J. Carr, "Carr's Corner, Using the NE602 in Ham Circuits", *73 Amateur Radio Today*, February 1993, pp. 46, 48

—DE WA4KAC

HF2V VERTICAL ON 30 METERS

*From **Joe Mikuckis, K3CHP** of Riverdale, MD*--Here is a simple way to make the Butternut HF2V 40- and 80-meter vertical antenna operational on 30 meters. Simply short the upper coil with a short clip lead, then short the lower 12 turns of the bottom coil. I measured a VSWR of 2.3 across the 30 meter band. (My antenna has no radials, is mounted 2 feet above ground, and is 2 1/2 feet from a brick wall.

--DE K3CHP

IMPROVED AUDIO OUTPUT FOR THE MFJ 9420

*From "The QRPer Formerly Known as KB4ZGC", **Frank Brumbaugh, W4LJD** of Salinas, PR. Two years ago Frank sent me a series of letters about his then-new rig, detailing his search for a cure for some audio shortcomings. The first one he encountered was the lack of an audio output jack, which he fixed by adding a jack and a pair of back to back audio transformers (Idea Exchange for April, 1995). He had to do that since the audio output IC, a TDA7052AN, had two output pins going to the speaker and both were floating above ground. The back to back transformers provided DC isolation and allowed one side of the speaker jack to be grounded.*

But he reported other problems as well, including motorboating of the audio sometimes, as well as excessive current draw in receive and background noises—both white and popcorn—which he attributed to the existing audio amp. He also reported that the 100 uF power supply decoupling capacitor (C49) on pin 1 of the old audio amp was probably a bit small for adequate decoupling, and also located a bit farther away from pin 1 than it should be, saying that it should have been snuggled up as close as possible to the pin. He suggested that a 470 uF cap with short leads connected directly from pin 1 to ground might have improved the original amp somewhat.

After some interim work involving an external LM-380 amplifier circuit tacked onto the output of the existing amp, he eventually replaced the output chip with the LM-380 amplifier circuit shown in Figure 3. He powered it directly from the 13.8 VDC input line, rather than the 10 volt line like the original amp. The following is pieced together from his letters on the subject.

Pin 1 was clipped from the old amp, U5, to remove power from it, killing the noisy thing. Pin 2 is clipped from the chip—audio from the wiper of R42, Volume. A short length of RG-174 coaxial cable has the center conductor soldered to the remains of pin 2 extending through the PC board. A Ty-rap [tm] cable tie secures the RG-174 to the gray plastic cable nearby to eliminate any strain on the solder-tacked connection to the board. The shield is not grounded at this end. The other end of the coax is routed to the input of the LM-380 amplifier, built on a small added board inside the rig, and the shield is grounded at this end.

The brown and white output wires from U5 are clipped and removed, as well as the back to back transformers I previously installed. The output of the LM-380 goes directly to the added jack through a 470 uF blocking capacitor. Keep the 470 uF supply decoupling capacitor physically close to pin 14. Note that several pins must be grounded, as listed on the schematic.

If one is certain he will never want noisy old U5 back in the circuit it could have all its legs clipped off and be removed entirely.

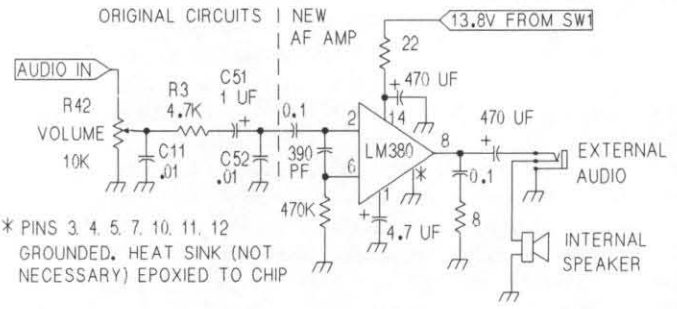


Figure 3—Improved audio amplifier for the MFJ 9420

This would make soldering the input coax to the LM-380 a lot easier than if U5 is left on the board with only pins 1 and 2 clipped. The chip is partly beneath the optional CW adapter board so the audio mod should be done before installing the adapter.

The results are quite satisfactory. With no signal input and full AF gain, the output is almost totally silent; you can put your ear to the speaker and detect just a very low level hiss. Receiver current drain has been reduced to between 50 and 100 mA, a reduction of at least 50 mA from the original circuit (with no signal input). U5, the TDA7052AN, was current greedy as well as noisy. There is no motorboating on signal peaks, a problem that the old amp had. The LM-380 is not a particularly high gain chip but is extremely quiet and stable in this circuit. It contributes to the lower receiver current drain but still has the backbone to blast the speaker cone on a powerful signal.

—DE W4LJD

FIXING HW-8 VFO CAPACITOR PLATES

A problem with the HW-8 VFO tuning capacitor is that the rotor plates will sometimes fall off the shaft. They are press-fit onto it and can eventually work loose if the knob is run up against the end stops too many times. I've seen this a few times myself on different units I've worked on. Sometimes I've been able to simply jam them back onto the shaft, but that doesn't always work. This topic arose on QRP-L, and Steve Galchutt, N0TU, passed along this response from ***Bill Stietenroth, K5ZTY*** *(k5zty@juno.com).*

J. B. WELD is a two part epoxy that has metal in it. I have repaired the cylinder wall of an outboard motor with the stuff and it lasted for years. It is found in most good hardware stores and auto parts supply stores. It takes about 8 hours to set up but when it does, it holds.

There are several HW-8 tuning caps around here that are repaired with it. Use it sparingly. Clean the plates and the shaft with lacquer thinner, acetone or other solvent. Mix a small amount and apply it to the very tips of the plates and to the grooves in the shaft. I use a toothpick to apply it. Take your time, be neat, and make sure that everything is lined up right; it doesn't set up fast, but when it does, it would be very hard to undo. *[WA8MCQ note—don't forget that the spacing between the plates is probably no longer exactly what it was before they fell off the shaft, and may not be uniform throughout the entire rotation. Alignment of the VFO may be necessary, and the dial may no longer track properly across the entire range, but at least the radio is working again!]*

--DE K5ZTY

PREVENTING DEFORMATION OF CHEAP SO-239'S

From ***Frank Brumbaugh, W4LJD*** *of Salinas, PR*--Many SO-239 UHF sockets available today (unless one pays a higher price for Amphenol or equivalent) have a plastic insulation that likes to deform when soldering to the center pin, making attaching a PL-259 UHF plug difficult to impossible. A simple preventive measure is to plug a PL-259 into the SO-239 before soldering. This works better than anything else to keep the center conductor centered in the cheap plastic, and is free!

--DE W4LJD

INEXPENSIVE FRONT PANEL COVERUP

From ***Frank Hulbert, N5SAN*** *of Parks, AR*--"POSTED--NO TRESPASSING" After having modified your front panel too many times, visit your hardware or farm store. You can get a great, thin piece of aluminum that can be cut with a pair of scissors. Look for the "POSTED", "FOR SALE" etc signs. Here in Arkansas they cost 97 cents plus tax. Use the back side of the sign; and it takes rub-on decals and letters quite well.

--DE N5SAN

CHANGING ATTENUATOR IMPEDANCES

From me, **WA8MCQ**--I always see attenuators for sale at hamfests, sometimes at very good prices, but there's a little "gotcha" that'll bite you if you're not careful--they may not be for fifty ohms. Before buying one, look carefully at it. It could be 75, 93, 125, 170 or 600; I've seen all of those and there may be more lurking out there. Assuming you're working only with 50 ohms, does that mean you can't use them at all? Not necessarily.

A couple years ago W6TOY bought a really nice Kay Electric step attenuator and discovered too late that it was for 75 ohms--probably why the price was so good. I told him I could sell it and get his money back and I did. A quick ad on QRP-L produced a buyer. I could have sold it as-is and someone would probably have had a use for a 75 ohm device, but I tossed in a free bonus from my junk box: a pair of "minimum loss pads" to convert it to 50 ohms. They had male and female BNC connectors on the ends, so they plugged right onto the attenuator.

A minimum loss pad is a simple resistive device consisting of a couple of resistors, used to convert between two different impedances. Connect it to anything, then plug your cable into it and instead of 75 ohms you'll see 50 (or 75 instead of 170, etc, depending on the value of the pad). It does have a drawback--being a resistive device, it introduces additional loss. But that's not a problem if whatever you're using can tolerate that, and the loss is a known value--just add that to the attenuation of the attenuator itself. The loss of a 50/75 ohm pad is 5.7 dB, and a pair of them on both sides of a 75 ohm attenuator adds 11.4 dB to the loss. That turns a 0-80 dB 75 ohm attenuator into an 11.4-91.4 dB 50 ohm unit. You still have the full range available; you've just shifted it a bit and converted it to the impedance you need. While you do lose a bit of flexibility on the low end--you're stuck with a minimum of 11.4 dB in this case--that's not always a problem since you won't always need those lower values of attenuation. And to use the unit, simple read off the attenuation from the switches or dials and add the 11.4.

I occasionally see these devices at hamfests, usually for 50/75 ohms. They usually look like attenuators, small cylindrical devices

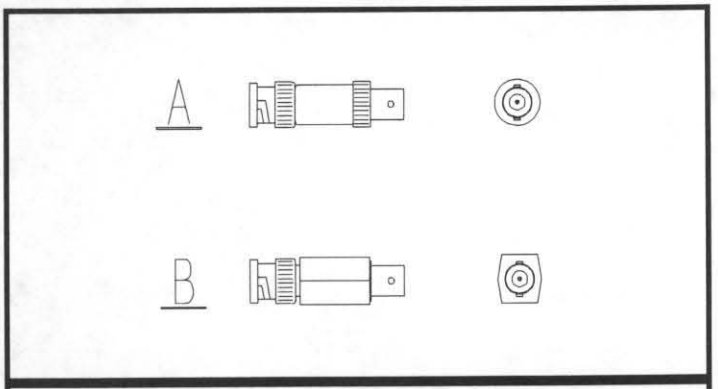


Figure 4—A, most fixed attenuators and minimum loss pads. B, Tektronix attenuators (be careful of the markings which can be misinterpreted)

with connectors on each end, although some are in little rectangular metal boxes. Figure 4A shows a typical BNC fixed attenuator; many of the pads look the same. How do you tell them apart? If it's an attenuator, there will be an attenuation value on it, such as 3 dB or 10 dB. If a minimum loss pad, each end will be marked with a different impedance, such as 50 and 75 (in addition to a dB value, which will be an oddball number like 5.7).

I made a point of singling out the Tektronix attenuators in Figure 4B for a good reason; if you don't pay close attention to their markings you could be misled about their values. They have a six sided shape, and the bodies are red, green and brown. They are plainly labeled as "Tektronix" and "attenuators", power rating of 2 watts and 50 ohms, but they are marked as 2X, 5X and 10X. They are labeled as voltage range multipliers, not in dB. Here are the decibel values, which are NOT marked anywhere on them:

Color	Part #	Marking	Attenuation in dB
Red	011-0069-02	2X	6 dB
Green	011-0060-02	5X	14 dB
Brown	011-0059-01	10X	20 dB

Back to the minimum loss pads, the sex of the connectors is critical. An example: If you have a 75 ohm attenuator with female connectors on both ends (the most common by far), you'll need pads which have males on the 75 ohm side and females on the 50 ohm side; otherwise you'll have to add a pair of adapters. Unfortunately, the freebies I included with the W6TOY attenuator were backward to begin with--the female was on the 75 ohm side, male on the 50 ohm side, which would have required a pair of BNC male to male adapters to plug them onto the attenuator. But modification was easy enough. It wasn't too hard to unscrew the pads--although not shown in figure 4A, there are several flats on the units to grip with wrenches. (It is necessary to remove the label before unscrewing.) After it was open, I flipped the innards 180 degrees to get the proper orientation. The soldering work was easy enough, and working under a 7X stereo microscope--while not truly necessary--made it more enjoyable.

You can sometimes find these things at hamfests; bargains exist, but they are often several dollars. Be sure that they are for the pair of impedances you need, and it's best if the sexes are properly oriented (see above; modification may be possible, and mentioning that they are unsuitable in their current configuration may help your bargaining position). Most that I've seen are 50/75 ohms, but I've also seen 50/600 pads (which introduce a little over 16 dB loss each). If you

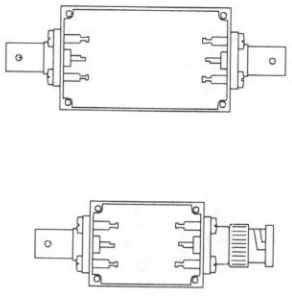


Figure 5—Two different Pomona diecast aluminum boxes with connectors (sexes and types of connectors vary, and many box sizes are available); boxes also come with cover and 4 screws, not shown here. Although some are unpainted, most have a distinctive light blue color. Long connector mounting screws provide convenient ground studs.

can't buy what you need, you can also make your own. One way is to buy some cheap coaxial attenuators, maybe something of an oddball impedance that no one wants, and open them up, rip out the innards and replace with your own resistors. You could also get some small Pomona die cast aluminum boxes with connectors on the ends (preferably male and female; see Figure 5) and build into that. You can often find these boxes at hamfests at good prices, either unused or with something already built into them. I don't like to pay more than a buck or two, though $3 is still a good price. They come in several sizes, and the best one for this application is about an inch and a half long.

The table shows the resistor values and the losses that these add and Figure 6 is the schematic. Don't forget that the loss given is for one pad; if you use two of them, on both ends of an attenuator, you'll get twice as much additional loss (such as 11.4 dB for the 75/50 ohm conversion). Resistor values are given for both 1% and 5% parts. These were calculated using a freeware program from Teledyne Microelectronics called RF Toolbox. It's been around for quite a few years now and is fairly simple and limited but does have some useful

Input/output impedances; resistor tolerances	Nom. loss (dB)	R1 ohms	R2 ohms
50/75 1%	5.71	86.6	43.2
50/75 5%		91	43
50/93 1%	7.21	73.2	63.4
50/93 5%		75	62
50/125 1%	8.96	64.9	97.6
50/125 5%		62	100
50/170 1%	10.61	59.0	143.0
50/170 5%		62	150
50/600 1%	16.62	52.3	576.0
50/600 5%		51	560

Component values for minimum loss pads to convert 50 ohms into various other impedances.

features. It runs under MS-DOS and can be found at ftp.lehigh.edu, under pub/listserv/qrp-l/tools, filename rftools.zip. (I uploaded it a few years ago.) It doesn't calculate min-loss pads per se, but you can design a PI or tee attenuator with different impedances on each end, which is the same thing. Although it shows a PI configuration with a third

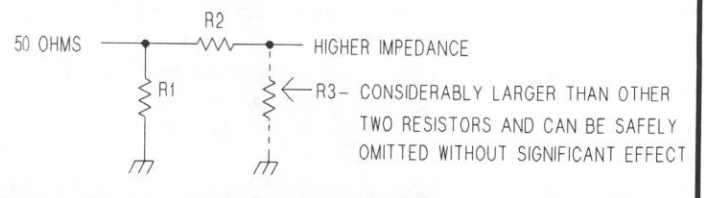


Figure 6—Minimum loss pad. R3 (which is not included in the table) is quite large and can be safely omitted.

resistor of 90K or more, in the real world you could probably eliminate it with no significant effects. The pads that I modified did not have that resistor.

Figures 7 and 8 show two different attenuators with and without pads. These are two commonly seen types. Rotary units are more convenient since you turn the knob to whatever value you want and you read it directly, rather than adding up the numbers on the switches that are flipped up on the other type--a possible source of error. But the drawback is that rotary attenuators come in steps of 1 or 10 dB, and sometimes 0.1 as well. To get a range of, say, 0 to 70 dB in 1 dB steps

you'd have to have two rotary attenuators in series, with steps of one and ten dB each. (Some contain two attenuators in one housing, with concentric knobs; they are longer and more expensive than their single counterparts but more convenient.) One of my Kay Electric units

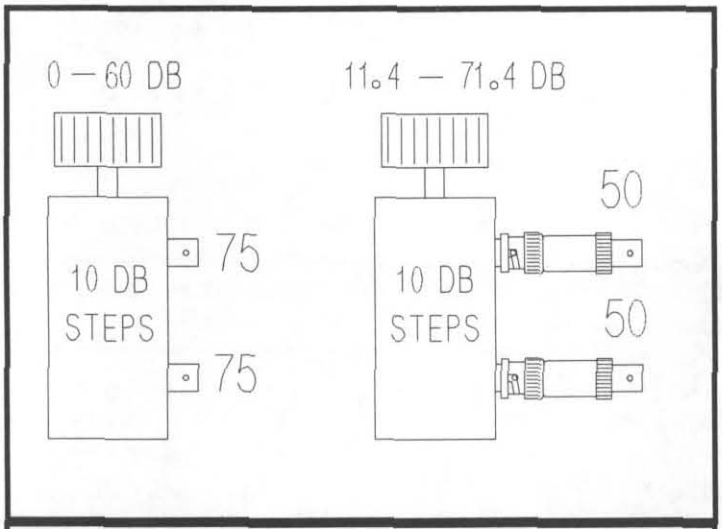


Figure 7—75 ohm rotary attenuator converted to 50 ohms with minimum loss pads (note increased attenuation)

(similar to figure 8) has switches for 20, 20, 20, 20, 10, 5, 3, 2 and 1 dB, allowing selection of any value from 0 to 101 dB in 1 dB steps (but be sure to add all the numbers correctly!).

Note that the resulting attenuator and pad combo is starting to get a bit large and clunky. There's not much you can do in the case of

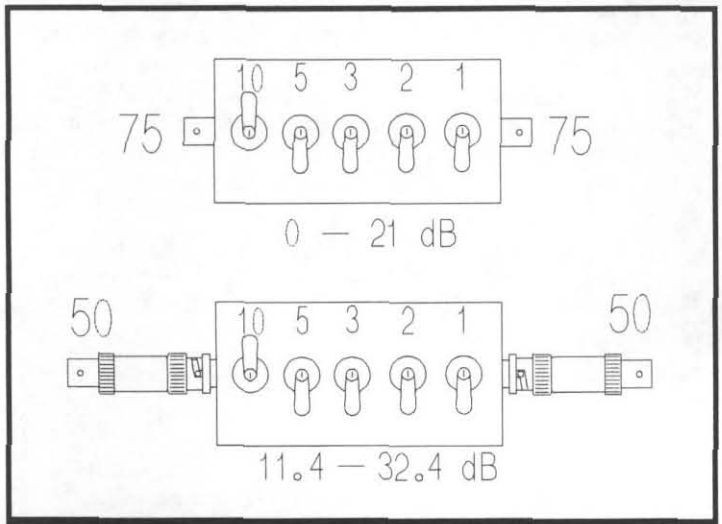


Figure 8—Another 75 ohm attenuator converted to 50

the rotary attenuator, but if you have one with individual switches you have the option of putting the pads inside the case and eliminating the add-on units. You could open the unit and wire in the resistors between the connectors and the original wiring. Be sure to put a label on the outside indicating the new impedance and the new minimum insertion loss of 11.4 dB (or appropriate value if the impedance transformation is something other than 75 down to 50 ohms).

—DE WA8MCQ

FIXING QRP-PLUS "CHIRP"

From our Features Editor, Larry East, W1HUE--

My dull little brain has finally figured out that there are (at least) two sources of "chirp" in the QRP-PLUS: 1) The PLL settling time when RIT/SPLIT offsets greater than a few kHz are used, and 2) the rise-time of the BFO offset switching signal. (The 650-700 Hz shift in CW transmit/receive frequencies takes place in the BFO, NOT the VFO/PLL circuit). Keying chirp due to both causes are more likely to show up after installing the "Rev 4C" EPROM, resulting from the faster QSK (especially when using an external keyer) provided by the firmware in this EPROM. For some reason (which my dull little brain hasn't figured out yet), the chirp caused by the BFO frequency switching is more noticeable above 30M (20M and higher). There may be a third source of chirp; one QRP++ owner reported that my cure for the BFO chirp described below did not cure the problem in his rig. Stay tuned for further developments.

I understand that there is now a "Rev 4D" EPROM available from Index, even though they have stopped producing the rig. I have been told that this EPROM provides a longer switching delay between receive and transmit, thus reducing (but not entirely eliminating) the likelihood of the two sources of chip described above.

You can check for chirp by listening to the keyed output of your QRP+ (run it into a dummy load!) on another receiver, or by on-the-air tests with a local ham. It is most instructive if you can actually listen to your signal -- either in a local receiver or over the phone from another ham.

The good news is that both chirps can be easily cured; at least on the two rigs that I have experimented with. The bad news is that you have to remove the top three board from the rig to do it. Both fixes are accomplished by replacing some caps on the LO board (the third one down in the stack). The chirp fixes described below apply to BOTH the QRP+ (original version) and QRP++ ("new improved" or "updated" version).

Fixing Chirp due to BFO Switching

Change C3 on the LO board from 1.0uF to 0.1uF. Look for a green trimmer cap (shown as C56 in the schematic) near the front right corner of the LO board. C3 will be just slightly to the rear of the trimmer and very close to the right edge of the board; it's a small dipped tantalum, probably orange or yellow in color. Replace C3 with a small 0.1uF mono cap rated at 25V (or higher).

Fixing RIT/SPLIT Chirp

This mod was described in the April 1997 QRP Quarterly along with several other transmitter related mods. (See the January and July 1997 issues for more QRP+ mods.) However, to save you from looking it up, I'll repeat the information here. Change C43 and C44 on the LO board from 4.7uF to 2.2uF. These caps are in the PLL low pass filter and are located near the right rear edge of the board. The original caps are dipped tantalum; replace them with 2.2uF dipped tantalum caps, rated at 16V or greater. After this change, there should be no detectable chirp for RIT/OFFSET splits below 20kHz (or more).

Fixing "Soft Keying" in the QRP+

This does not apply to the QRP++!

Just in case you haven't seen this before... (it was in the April 1997 QRP Quarterly).

After installing the Rev 4C EPROM in my QRP+, I noticed that the keying was very "soft" unless RIT was used. I discovered that the problem was due to a long time constant in the +12V decoupling to the first driver stage resulting in about a 10ms rise in the keyed waveform (one would like no more than about 5ms). I fixed the problem by changing C54 on the RF board (the top board) from 4.7uF to 0.47uF.

C54 is located in the rear left-hand quadrant of the board. The original C54 is a dipped tantalum, and I used the same type (but a factor of 10 smaller in value) for replacement. The voltage rating of the replacement cap should be at least 16V (preferably 25V to 35V).

--DE W1HUE

SUBSTITUTE FOR TEN TURN POTS IN VOLTAGE TUNED RIGS

In a posting on QRP-L, **Dan Winkler, N7IVR** (dwink@juno.com) had this suggestion to improve the tuning rate of the NorCal 38 Special, but it's also applicable to any rig that uses voltage tuning for a VFO or VXO. While some folks use ten turn potentiometers to slow down the tuning, they can be expensive or hard to find. His suggestion is a second pot used as a bandspread control in addition to the main tuning pot (coarse tuning). He says, " Radio Shack sells a 100k dual audio taper pot (about $2). If you connect one side of the dual pot (pot A) to +8 volts and the other side of the other half (pot B) to ground, and then connect a smaller (5K) pot between the wipers of these two 100k pots as shown in Figure 9, you will effectively be able to "move" the 5k pot up and down the 8v tuning range. The 5k pot will have about 0.4 volts across it, which should really spread out those signals." He later said privately, "Mouser sells a full size (24 mm = 1 inch) dual pot for $2.35 (313-2420-100K). They also have them in 50k, audio taper, of course. I'm getting a 50k for my 38S "

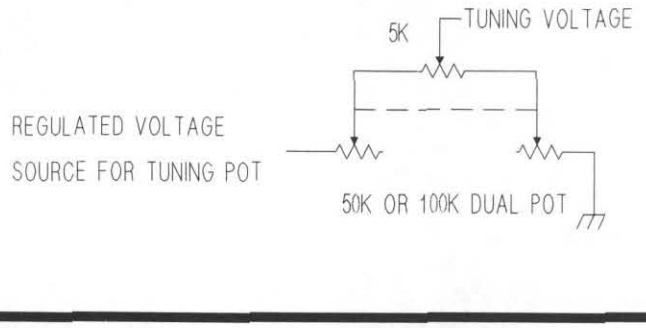


Figure 9—Bandspread control for voltage tuned rigs

ONE JACK FOR PHONE AND KEY

Or to use the title that he gave it, "Panel Space Saving Idea". This tip from ***Doug Moore, KC5ZF*** *of Oklahoma City, OK has been in print before, but it's one of those that deserves to be repeated every now and then.*

As miniaturization continues to be a trend among QRPers, panel space becomes as valuable as real estate on Waikiki Beach! One way to free up some is to use a stereo headphone jack for dual purposes, ie, simultaneous key and headphone connections as shown in Figure 10. You may also use this modification to free up a front panel jack hole on a commercial rig for the addition of that extra modification control that you haven't been willing to drill a hole for. Just replace the separate key and headphone jacks and their corresponding plugs with a single stereo jack and plug, and you're in business. At resale time,

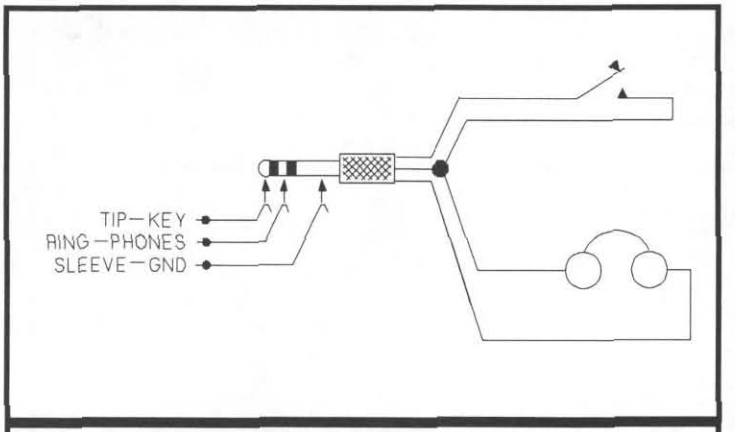


Figure 10—One jack to make 2 connections saves panel space or frees up an existing hole for other use.

simply put everything back where it was. (Note--use the tip for the key line, not for the phones, or the transmitter will momentarily key up through the low DC resistance of the phones as the plug is inserted and the tip passes over the ring contact on its way in.)

--DE KC5ZF

TWO "DIALS" FOR VOLTAGE TUNED RIGS:

SIMPLE, G3XXQ
FANCY, KD7S

There are many different QRP rigs in use that are tuned with a tuning diode of some sort, driven by a potentiometer. How do you tell what the frequency is? If it's a single turn pot it's easy to make a scale on the front panel, but with a multi-turn pot it's a bit more complicated. You could use a turns counting dial, which looks good but can be expensive and you need to keep a chart of frequency vs. dial count. Here are two alternative tuning indicators which give an indication of frequency by monitoring the tuning voltage. One is simple and requires no current to speak of. The other is literally a bit flashier, definitely more complicated and draws a certain amount of current since it has ICs and LED's, but is a nifty idea and more visually impressive.

THE SIMPLE DIAL FOR VOLTAGE TUNED RIGS

This one comes from SPRAT #75, summer 1993 and is credited to **Len, G3XXQ**. It's nothing more than a simple voltmeter connected to the tuning pot, with a single adjustment to make the high end of the

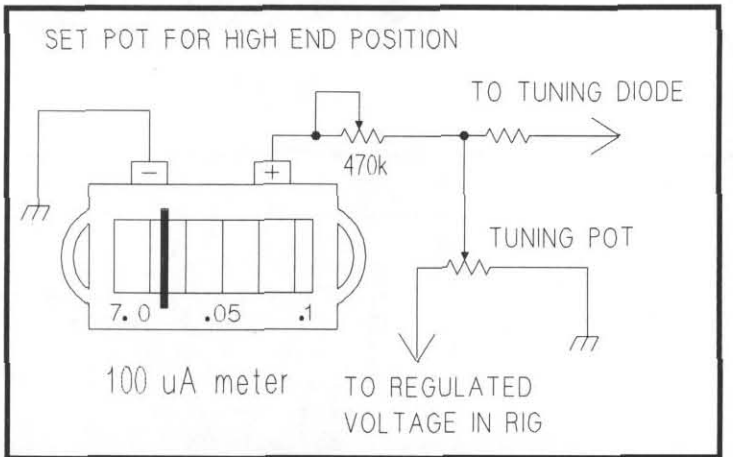


Figure 11—The simplest "dial" for voltage tuned rigs

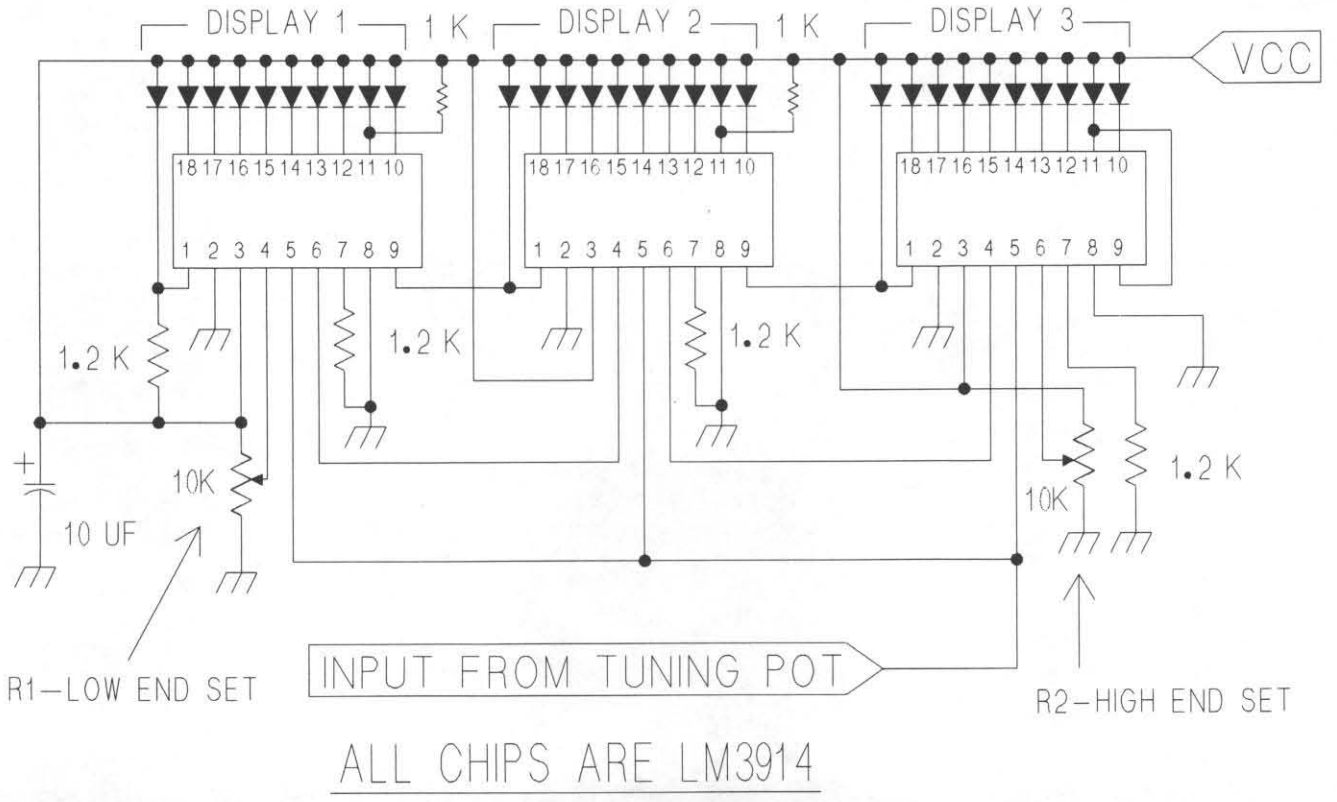


Figure 12—The E-DIAL from KD7S, the fancier "dial" for voltage tuned rigs.

tuning range correspond to the full scale meter position. SPRAT says, "Len uses a surplus ten turn pot and a cheap "tape recorder" meter for this simple varicap tuning drive and "dial" on his 40M LCK. The meter face unclips and is marked in frequency." Although he used a 100 uA edgewise meter, any sensitive meter can be used. Figure 11 shows the details. All that is required is a meter and a pot used as a multiplier resistor--he used 470K but it's not critical. Just tie the combo into the tuning pot in your rig as shown and place your own calibration marks on the face of the meter.

THE FANCY DIAL FOR VOLTAGE TUNED RIGS

The Spring 1997 issue of QRPp from NorCal had an article titled "The E-DIAL: An Electronic Dial for Varactor Tuned QRP Rigs", by ***Bill Jones, KD7S*** *(kd7s@valleynet.com). This nifty "dial" draws more current than the simple voltmeter (which places an extremely light load on the line), but is much more impressive to view! It uses 3 ten segment LED displays, driven by LM3914's, as a bar graph voltmeter to indicate frequency.*

If you want to see a picture of KD7S, look on page 25 of the Summer 1997 QRPp, and page 43 to see his 38 Special with his dial. By the way, it won third place in the 38 Special Division of the 1997 Dayton building contest.

Used with permission, this is a condensed version of Bills article. (The original had some detail on assembly using a printed circuit board. Although no PCB is available that I know of, the QRPp article included a pattern and parts layout. The original schematic was drawn in KeyCAD, which I also use, but the file was not available so I redrew it; I get the blame for any errors that may have crept in.)

QRPp is the journal of the NorCal QRP Club and is published by 1997 QRP Hall of Fame inductee Doug Hendricks, KI6DS. It's stuffed to the gills with technical QRP info. Subscriptions for one year (4 issues) are currently $15 for US and Canada and $20 for DX (air mail), payable in US funds. To subscribe, they request that you make checks or money orders out to Jim Cates, not to NorCal. Send to Jim Cates, WA6GER, 3241 Eastwood Rd., Sacramento, CA 95821.

Many QRP designers have opted to use VVC (voltage variable capacitor) diodes as the main tuning element in their rigs. While this approach circumvents the shortage and high cost of conventional air variable capacitors, it comes with a price. Consider a design with twenty or more kHz of tuning range controlled by a conventional 270 degree potentiometer. Fine tuning can be very difficult to achieve as the tuning rate is much too fast. As a result, many builders have opted to use a 10-turn pot instead. While this certainly slows the tuning rate, it presents another problem. That is, how can you tell what frequency the rig is actually tuned to without a turns counting dial and cross reference chart?

The E-DIAL solves these problems in a very simple and cost effective way. It is the electronic equivalent of a conventional slide rule dial.

The circuit (shown in figure 12) consists of three LM3914 dot/bar graph display driver ICs driving three 10-segment LED bar graph displays stacked end to end. Electronically, the E-DIAL is an adjustable, expanded scale voltmeter using LED's as the display. The voltage to be measured comes from the wiper contact on the main tuning control pot.

CONSTRUCTION:

The E-DIAL circuit can be built on a homebrew PC board or

wired point to point on a piece of perf board. For experimental purposes it could even be built on a prototyping board.

Use three low profile sockets for the LM3914's. Do not use sockets for the 10-segment LED's. Pay very close attention to the polarity of the LED displays. If they are installed backwards, the E-DIAL will not work. You may want to start with a single display first (the one on the left of the schematic). If it lights up when the circuit is finished, you can install the remaining two.

Connect a wire from the point marked VCC to the output of a well regulated power source on the transceivers PCB. The best place to obtain this voltage is from the source that feeds the main tuning potentiometer. It must be at least as high as the highest possible voltage on the main tuning pots wiper contact. Connect a wire from the "INPUT" point to the wiper of the main tuning pot.

INITIAL TESTS:

Do not install the three LM3914 ICs yet. They will be installed only after some initial tests have been performed. Power up the transceiver and measure the voltage at pin 3 of each LM3914 socket. This should be the same as VCC on the E-DIAL circuit board. Check the voltage at pin 5 of each LM3914 socket. The voltage should vary as you rotate the main tuning control pot.

Power down the transceiver and E-DIAL and insert all three LM3914's in their sockets. Pay very close attention to the orientation of these chips to insure you do not plug them in backwards. Restore power to the transceiver and E-DIAL. As you rotate the tuning pot, the LED display should move up and down the scale although it is unlikely that it will move from end to end on the dial since it hasn't been aligned yet.

ALIGNMENT

The following steps will walk you through the alignment of the E-DIAL so the display will correspond with the full tuning range of your transceiver.

Rotate the main tuning control to its lowest frequency setting (generally a counterclockwise rotation of the pot). Adjust R1 so the left-most LED segment just barely lights. Rotate the control to its highest frequency setting (clockwise). Adjust R2 so the right-most LED segment of the third display just lights. *[WA8MCQ note--now it's up to you to put some frequency calibration points on the dial. Don't forget that the full span of your rig is indicated in 30 steps of the display, so each bar is 1/30 of the total span, whatever that may be.]*

This completes the assembly and alignment of the E-DIAL. If you're planning to add the dial to a NorCal 38 Special, a good place to pick off the 8 volt regulated supply voltage is just to the right of VR1. There is a pad on the 38 Special board marked C20. This pad is ground. Directly below this pad is another (immediately to the right of C41) which supplies 8 volts.

--DE KD7S

DUMMY LOAD NOTES

A while back on QRP-L someone asked about the best dummy load to use, which prompted several replies.

Gary Surrency, AB7MY *(gsurrency@juno.com) gave some details about a dummy load once sold in Radio Shack stores and still available by special order*—I found the card that was packaged with my Radio Shack dummy load; here is the info:

VSWR: Less than 1.15 :1 DC-500 MHz
Rated Power:
15W continuous
20w, 5 Min. On, 5 Min. Off
50w, 1 Min. On, 3 Min. Off
100w, 30 sec. On, 3 Min. Off
Surface Temp: 180 deg. F / 80 deg C at Rated Power
(w/o additional cooling)
Temp Characteristics: +/- 0.15 % / deg. C

It's made of a high heat-resistant non-inductive ceramic resistor inserted in the center of a radially finned, ribbed aluminum heatsink about 1 5/16" dia. x 2 3/16" long not including the permanently attached PL-259 that adds another 3/4" to the overall length for a total of nearly 3".

It's almost indestructible when used at the power levels recommended, and available under RSU part number 11269479 for $21.99. I've had this one for a long time, and it was purchased originally under the old Radio Shack part number 21-506 before it became an RSU stock item. The RSU item should be the same. (That's Radio Shack Unlimited, through which you can order items not stocked in the stores. Ask a sales person for details.)

*From **Steve Greene, KA1LM** (sgreene@washsq.com)*—I have an old 50-ohm load I made back when I had a working PM2 (2W out on a good day). I used a single 2W carbon resistor, one end soldered to the center pin of a PL-259 plug, the other end to the center of a thin metal (copper or brass, I think) plate that was in turn soldered to the shell of the PL259. I guess I could have filled it with mineral oil and added heat fins for QRO (5W) use <grin>. I still have it someplace.

Seriously, a home brew dummy load should be fine for HF use. At VHF/UHF, physical layout and components become more critical to ensure that the resistive 50-ohm load is really resistive and 50 ohms at the desired frequency.

*From **WB4EXW, Watson Gabriel** (wgabriel@duke-energy.com)*—I like to take 4 of the 200-ohm resistors, tie one end of each to the center post of an SO-239 connector and fasten the other end of each resistor to the 4 corner mounting holes (with bolts or bolts + solder lugs - whatever is handy). Have done the same with smaller resistors and the BNC panel connector. You can even create mismatches on purpose to check the accuracy of your SWR bridge or to calibrate. At the frequencies and accuracies we are working with, these are close enough for "amateur" work!

Another option I use to make 20-watt loads is to take 19 or 20 1000-ohm, 1-watt resistors and sandwich them between 2 pieces of PCB material. You can then add in a suitable connector to your "design" (all you have to do is drill holes - no etching), preferably in the "center" of the resistor array or solder coax directly to it. On the coax you can flare out the braid for one connection and let the center conductor and dielectric pass on thru a hole to the other piece of PCB where it is soldered. This is easier to draw than explain verbally!

*From **Dale Anderson, KB0VCC** (dalea@artemis.fc.hp.com)*—For my QRPp work, I have a PL-259 connector with two 1/4 watt, 100 Ohm 5% resistors soldered inside. They are connected in parallel with one lead from each resistor to the center pin and the others to the holes in the body; I injected about half a tube of silicone heat transfer grease into the remaining open holes, covering the resistors, then sealed all holes. This load isn't any bigger than the connector itself, and I've fed this 1/2w load with as much as 5 watts (for 20 seconds) with no detectable damage or change in impedance. It still presents a resistive impedance of 50 ohms all the way up to UHF, probably because the resistors are housed within the connector with extremely short leads. It makes for a small, self-contained, lightweight, inexpensive, fits-in-your-pocket load for low power work and can be built in 5 minutes from stuff you probably already have in your shack. (You need tweezers and steady hands to fish the leads into the holes where they belong before soldering. Keep everything as short as possible.)

*From **Arjen Raateland, OH2ZAZ*** —For a dummy load I usually use a PC network (LAN) 50 ohm terminator. At one time we got

a terminator resistor with each new network card. We never needed any of them at work, so they were all over the place. I keep a few at hand and although they're rated at one watt only, I find you can use them at a few watts provided you do it for limited periods of time. It's easy enough to feel if the 'terminator' dummy load is getting too hot. The ones we have came with BNC connectors, which is my preferred style anyway.

Network card packages often include BNC-type T connectors, too. One of those with two BNC terminators plugged onto it should make a fine 25 ohm resistive load for testing an SWR meter scale (2:1). *(Arjen.Raateland@vyh.fi)*

*From me, **WA8MCQ**, adapted from my QRP-L reply*—I tested four of those 50 ohm LAN BNC terminators that K3TKS gave me, of 3 different styles, on an HP 8753C network analyzer. They weren't exceptionally good at 1 GHz, with two giving an SWR of 1.6:1. However, even as high as 450 MHz they were still quite usable; the worst was 1.19 there and the other were 1.09 or lower, and at 30 MHz all were below 1.02.

I don't know what the power rating is on the computer network terminators, but would assume that they consist of a single, low wattage resistor since they are not for high power applications. (If you're manufacturing the things, you'd use the most inexpensive component possible that will give satisfactory performance, and as far as I know LAN terminators don't have to dissipate 2 watts!) You might want to take it easy on one of them unless you positively know the power rating, although OH2ZAZ's experience indicates that you can probably get away with modest overloads for short times.

I also made a load from a 4 hole, chassis mount BNC connector and a pair of those Radio Shack 100 ohm, 1 watt metal oxide resistors. Keeping the wires as short as possible, I soldered one end of both resistors to the center terminal and the other ends to diagonally opposite holes in the base. (See figure 13.) This one looked quite good on the network analyzer as well; at 30 MHz the SWR was under 1.02,

Figure 13—QRP dummy load with a pair of Radio Shack 100 ohm, 1 watt metal oxide resistors

barely over that at 50 MHz, 1.04 at 144 MHz, 1.12 at 450 MHz, and at 1 GHz it was 1.28.

Two of these Radio Shack resistors make a load with a nominal rating of two watts. Make one with a BNC or UHF socket, which you probably have around the house already, and you have a nifty and small QRP dummy load for a half a buck plus tax.

WHY WIREWOUND RESISTORS ARE POOR DUMMY LOADS

*From me, **WA8MCQ**—(I originally posted this item to QRP-L in July.)* Here's another dummy load update. After my earlier posting about using a pair of the Radio Shack 100 ohm metal oxide resistors in parallel--which looked really good on the network analyzer, a fine load--I was asked about their 50 ohm, 10 watt resistor. My reply was that it was probably one of those "sand" wirewound units and that conventional wisdom says that wirewound resistors make poor RF loads. I promised to get some and look at them, and of course it turned out that the conventional wisdom is right--but now I can give some specifics the next time someone asks me.

Radio Shack stock number 271-133 is indeed a ceramic wirewound resistor, 50 ohms, ten watts, 10% tolerance. It's a bit hard to mount one on a BNC socket due to the size--about 1.9" long--so I mounted the BNC on a piece of PCB stock, soldered one end of the resistor to the center terminal and the other end to the copper foil. That way I at least had a large ground plane for the other side, to minimize added inductance.

I examined it with an HP 8753C network analyzer, swept from its lower limit of 0.3 MHz up to 150 MHz. Although the device will go up to 3 GHz I saw little point in going beyond 2 meters; in fact, my gut feeling was that the resistor couldn't possibly be a good load anywhere even approaching the top end of HF (which is 30 MHz). All of the numbers below are rounded for convenience; in the real world there isn't a lot of difference between an SWR of 1.034:1 and 1.03. The frequencies at which I recorded values were at or just above the tops of selected ham bands.

At 300 kHz, it wasn't a bad load; 48.8 ohms in series with 1.2 ohms of inductive reactance (0.645 uH), giving an SWR of 1.03:1. As the frequency went up, the resistive component started dropping but even at 30 MHz it was still 46.65 ohms. On the other hand, the amount of indicated inductance remained relatively constant, from 0.645 uH at 300 kHz to 0.611 uH at 30 MHz. Unfortunately inductive reactance is a direct function of frequency, so as the frequency went up the resistor became progressively more reactive and an increasingly poor load. (Remember, an ideal load is a pure 50 ohm resistance with no reactance.)

Freq MHz	Resistive component ohms	Reactive component ohms	Inductance uH	SWR
0.3	48.8	1.216	0.645	1.03:1
2	48.9	8.1	0.644	1.18
4	49.0	16.3	0.647	1.38
8	48.9	32.2	0.641	1.9
10.2	48.8	40.9	0.638	2.24
14.5	48.4	57.7	0.633	3.05
21.5	47.7	84.4	0.625	4.78
25	47.3	97.5	0.620	5.85
30	46.5	115	0.611	7.6
54	41.4	190	0.560	19.4
100	28.7	265	0.422	51
148	18.5	278	0.299	86

Next, I did the same thing with a pair of RS 271-135 resistors, 100 ohms at 10 watts, the same physical size as the 50 ohm units. The idea was that paralleling them would reduce the net inductance and perhaps help a bit. Of course they turned out to have about twice the inductance of the 50 ohm resistors, so the net inductance with two in parallel was still roughly the same, around 0.5 uH compared to 0.6+ uH, so the net results were equally horrible at RF. These are the SWRs seen for the resulting load:

2 MHz 1.14:1

4	1.3
8	1.65
10.2	1.88
14.5	2.42
21.5	3.5
25	4.2
30	5.3
54	13.1
100	36.4
148	62

Looking at the resistors another way, they are inductors with a fair amount of resistance. How would they look if tested as inductors? Since Q is related to inductive reactance vs. DC resistance, I would expect them to have very low Q. I checked one of the 50 ohm units on my Boonton 260A Q meter, which applies power at a selected frequency to the device under test, resonates it with a calibrated variable capacitor and a meter indicates the voltage rise at resonance. I put it in the Low Q range, which has Q = 50 at the top of the scale, checked it at several frequencies, sweeping the capacitor from end to end at each one. I am not positive, but I think I saw a slight flicker of the Q meter needle a few times, but it may well have been my imagination. Needless to say, as inductors they are extraordinarily poor.

Are these resistors truly useless as RF loads? Not necessarily. You might possibly want to use one as a reactive load to test a tuner at a particular frequency with something other than a perfect 50 ohm resistive load. Also, I have vague memories of an article in some ham magazine quite a few years ago, either QST or 73, in which someone wanted a dirt cheap high power load to test an amplifier, so the author used an iron. As in electric iron that you plug into the wall to take wrinkles out of your clothes! He took an old one, threw away everything but the element--which even comes with a free, steel heat sink!--and used that as his load. It worked quite well, too; the trick is that he put a variable capacitor (with suitably large spacing between the plates to accommodate the power level) in series with the heating element to tune out the inductance. True, it was only good on one frequency or band, but if he wanted to go elsewhere he only had to retune the capacitor.

A final disclaimer to keep me out of trouble with the lawyers--this report on the unsuitability of wirewound resistors for RF loads is not an indictment of Radio Shack power resistors, but simply an unavoidable consequence of the laws of physics. Regardless of who makes a wirewound power resistor, if it is not deliberately designed to be noninductive it WILL be inductive and 2 PI times F times L always applies. (While these resistors are sold by Radio Shack, they are actually made by Dale, a well known and respected name in resistors.)

By the way, while looking for the resistors at Radio Shack, I looked at slide switches first. I saw one item which was plainly marked as being a pair of DPDT slide switches. There were three packs of them; two had a pair of SPST switches, while the third had one SPST and one DPDT! It never hurts to look carefully through the bubble pack before buying! Of course, packaging errors also work FOR you sometimes; I got a good deal on some LM386 audio amps once at Radio Shack. While it was supposed to contain one chip, the pack actually contained two.

QRP-L, THE "QRP DAILY"

To subscribe to the free Internet QRP forum, started up several years ago by **Chuck Adams, K5FO,** send e-mail to **listserv@lehigh.edu** and leave the subject blank unless your system requires something. In the text, put

subscribe QRP-L <your name> <your call>

That's your real name and real call, not your e-mail address—it gets that from the headers. The name and call are for the benefit of people who look at the subscriber list; unlike some mail reflectors, the one at lehigh.edu also gives names (or whatever you type in) in addition to e-mail address—which can be quite cryptic in some cases.

Save the automatic "welcome" message you'll get after your subscription (free) is processed and read it thoroughly. And pay special attention to the part about enabling the Daily Digest function, which will still give you all the traffic but as a single, huge daily e-mail message instead of several dozen individual messages PER DAY cluttering up your mailbox; I couldn't live without it! The digest also includes a handy index at the top so you can decide which postings look interesting and skip the ones on topics you don't care for.

How much traffic was there this summer? As I write this in mid-August, it's down since people are outside more and QRP-L on-the-air activities like the HF fox hunt are inactive until Fall. Even so, for the last couple months the daily digests have been running from 60K to 90K and more.

By the way, those of you using juno.com with its infamous file size limit of about 60K who want to get the daily digest don't need to worry. Just send e-mail to Jim Eshleman, N3VXI who administers QRP-L and he'll fix you up with an alternative that splits the daily digest into two smaller chunks that juno.com can handle. (His address is LUJCE@lehigh.edu.)

A SIMPLE TRANSMIT/RECEIVE SWITCH

Not everyone uses transceivers all the time. Sometimes you might want to use a separate transmitter and receiver, or perhaps use a transmitter while using your transceiver as a receiver. Here's a simple T/R switch built into a 35 mm plastic film can, submitted by **Mike Griggs, N5FOS** of Arlington, TX. Shown in Figure 14, it uses a Radio Shack DPDT switch and three "RCA" phono jacks. (If you prefer, you can of course use different connectors and a different container.)

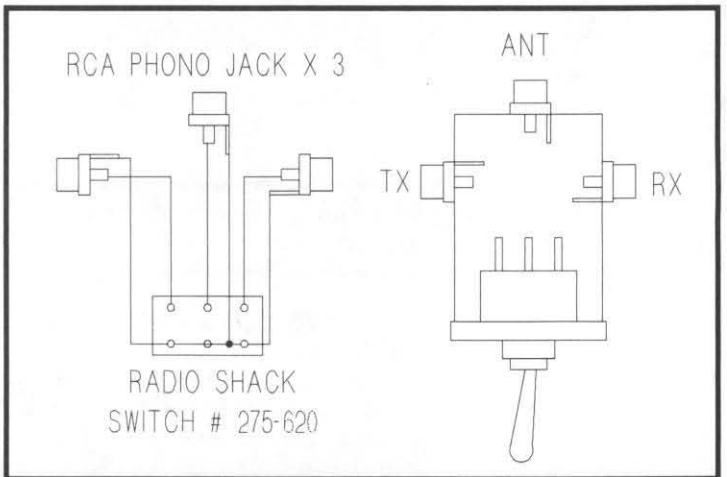


Figure 14—Simple transmit/receive switch built into plastic 35 mm film can.

THE FINE PRINT

Still more experimenting with different techniques of getting KeyCAD drawings onto the printed page, and this time I think I've finally found a good solution, getting good quality without having to rely on a photocopier or scanner. (I abandoned cut-and-paste a good while back.) While N2CX and others send me their own ready to use drawings sometimes, you don't have to do that; just get something semi-legible to me and it will be redrawn for you.

—qrp—

CHECK YOUR LABEL—TIME TO RENEW?

THE AARCmitter-II QRP CW Transmitter and AARConverter Receiving Converter for Top Band

William a. Parmley KR8L 4540 S. Ammon Rd Idaho Falls, ID 83406

In 1988, the Argonne Amateur Radio Club at Argonne National Laboratory developed the AARCmitter (Reference 1), a crystal controlled QRP transmitter for 160 meters. A circuit board, kit of parts, and 1932 kHz crystal were sold to club members, and a club net was started to encourage members to build and use the rig. The club also developed a companion modulator (AM) kit (Reference 2), which many members built and used on the net. A few years later I developed a renewed interest in Top Band, and decided to upgrade my AARCmitter by adding a VFO. The results of my efforts are described in the following article, which was originally printed in "Radioactivities," the AARC newsletter (References 3, 4, and 5).

TRANSMITTER DEVELOPMENT

It was the winter of 1992-93, and I was having fun with my HW-8 on 80 meters. I decided that the time was right to give 160 meters a try, so I dusted off my AARCmitter and put it on the air. I quickly realized, however, that being rockbound on 1932 kHz was not likely to result in many contacts. I considered purchasing a few crystals for the part of the band around 1810 kHz, but dismissed that idea as being too expensive. A review of "Solid State Design for the Radio Amateur," from which the original AARCmitter design was taken (Reference 6), revealed that it should be possible to build a VFO for use with the transmitter (Reference 7). The book also provided several other examples of VFO designs that should be easily adaptable. Thus, I set out to design and build an outboard VFO for the AARCmitter.

Rather than trying to develop a printed circuit board for my VFO, I decided to use "ugly construction." I cut a 2 1/4 inch by 6 1/2 inch piece of single-sided board (recommended by W1FB for VFOs to minimize stray capacitance) and divided it into 3/8 inch squares, leaving a continuous, 3/8 inch wide strip on both of the long (6 1/2 inch) edges for VCC and ground. Using the examples in Solid State Design as a starting point, I began by building and testing an oscillator stage on a breadboard, and then transferred the components directly to the circuit board. I continued this process, adding buffer and driver amplifier stages until I thought I had enough output to drive the AARCmitter's PA stage.

At this point I realized that I was only a few parts away from having a complete CW transmitter. (Note that the AARCmodulator was not incorporated.) I also had a couple of inches of room left on the end of my circuit board, so I decided that it would probably be easier just to duplicate the AARCmitter's PA stage than to modify the original transmitter. This final step met with success. The result was the AARCmitter-II, a complete, VFO- controlled, 1.5 watt CW transmitter for 160 meters.

TRANSMITTER CONSTRUCTION NOTES

After my circuit board was completed I mounted it on a 1 inch by 6 inch by 9 inch piece of pine board. Two "L" brackets were fashioned from thin sheet metal cut from a cookie sheet and were used to support the air variable capacitor, vernier drive, and transmit/standby switch. A 2 inch by 2 inch piece of double sided circuit board was mounted vertically and soldered in place between the VFO and the buffer stage for RF and thermal isolation, and two phono jacks were mounted through 1/4 inch holes drilled through 1 inch squares of double sided board, which were then soldered in place vertically for the key and antenna connections. Two sheet metal covers were fashioned (again from a cookie sheet), one for the VFO stage, and one to enclose the rest of the transmitter. After final bench checkout and a few on-the-air tests, the circuit board and brackets were removed, the pine board was stained and varnished, and everything was reinstalled.

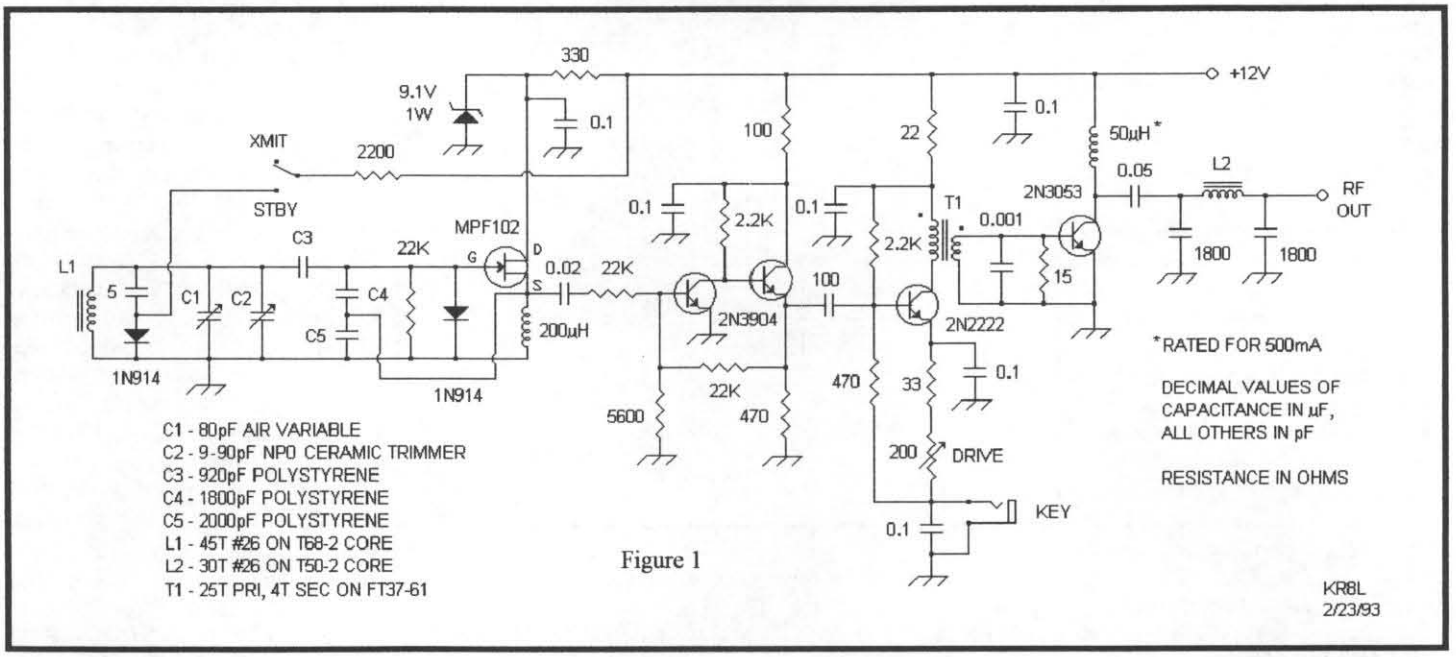


Figure 1

TRANSMITTER CIRCUIT DESCRIPTION

Figure 1 shows the schematic for the AARCmitter-II. L1 was wound on a T-68-2 toroid core and was given three coats of Q dope for mechanical stability. The diode-switched 5 pF capacitor is used to shift the VFO away from the transmit frequency while receiving. A value of 80 pF for C1 gives a tuning range of a little over 100 kHz with the exact portion of the band determined by the adjustment of C2. Polystyrene capacitors were used for the frequency determining portions of the VFO

for stability.

The buffer stage uses shunt feedback for unity gain and is lightly coupled to the class A driver stage. Both of these techniques are used to prevent pulling of the VFO frequency when the transmitter is keyed. The driver amplifier includes a 200 ohm potentiometer to permit varying the output. This was a developmental step, but was left in the finished product to allow for "milliwatting." (I could have replaced the potentiometer with a fixed resistor once the proper value of drive had been set, as discussed below.). T1 is a broadband transformer using an FT-37-61 ferrite core.

As discussed above, the power amplifier stage is essentially identical to the AARCmitter. The Pi network is designed for 50 ohms input and output impedance, and the PA was adjusted for a collector load impedance of 50 ohms. This was accomplished by noting that for a class C amplifier the load resistance, RL, is given by VCC2/2POUT. Thus, for a 50 ohm load, and given my particular value of VCC, the drive was adjusted so that the PA output power, POUT, was equal to VCC2/(2x50). (For example, for a VCC of 13.8 volts the drive would have been adjusted for a final output of (13.8)2/(100), or about 1.9 watts.)

TRANSMITTER FINAL NOTES

The AARCmitter-II was checked out on the bench and on the air with good results. An oscilloscope showed the output to be a pure sine wave with no detectable spurs or harmonics. On the air with a 3/8 wavelength end fed wire tuned with an L-network, the results were very satisfying. The first contact resulted in a 559 report from a station 550 miles away who had a 24 dB signal advantage. Best distance so far has been 1100 miles. After a bit of operating experience, the only improvement found to be necessary was to add a 12 volt DPDT relay and an antenna output jack to simplify T/R switching. The relay is controlled by the transmit/standby switch so that in the "standby" position the VFO is shifted off frequency and the antenna is routed to the receiver. In the "transmit" position the output to the receiver is grounded, which is the only provision made for receiver muting. Signal level at the receiver during transmit is about S9 + 20 dB.

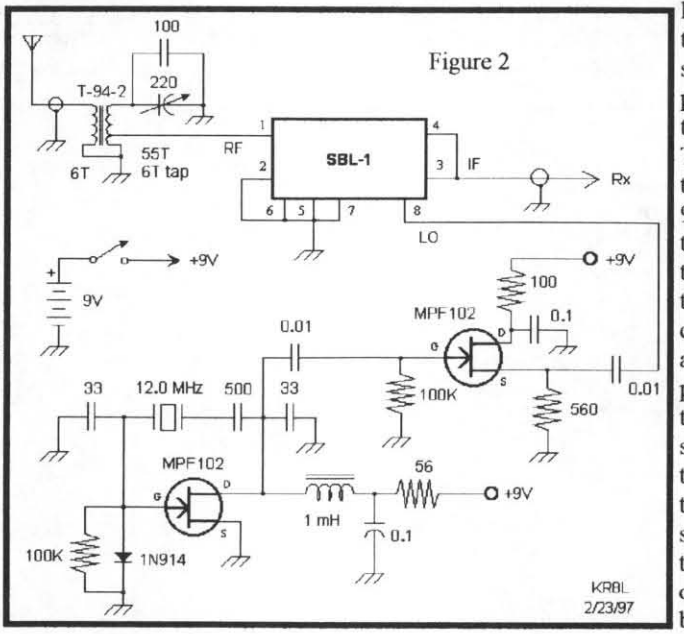


Figure 2

THE RECEIVING CONVERTER

All of my Top Band operation through 1996 made use of my Kenwood R-1000 general coverage receiver. This is a great receiver for general broadcast and utility listening, but is not well suited for dedicated ham use. The filters are too broad, and the 1 MHz to 2 MHz portion of the tuning range suffers badly from spurious responses to medium wave broadcast stations. Finally, I could stand it no longer, and I decided to build a receiving converter that could be used with my Ten-Tec Argosy. In honor of the creators of the original Argonne Amateur Radio Club project for Top Band I decided to name it the AARConverter.

RECEIVING CONVERTER CIRCUIT DESCRIPTION

Figure 2 shows the schematic for the AARConverter. The heart of the converter is the Mini-Circuits SBL-1 diode double balanced mixer, which I purchased from Ocean State Electronics (Reference 8). Although a diode DBM typically exhibits about 6 dB of conversion loss, I avoided the use of any active stages or other non-linear devices ahead of the SBL-1, in order to minimize the chance of interference from strong broadcast band signals. The local oscillator uses an MPF102 FET (Radio Shack no. 276-2062) configured as a Colpitts oscillator, using an inexpensive ($1.25) 12.000 MHz microprocessor crystal, also from Ocean State Electronics. The oscillator is followed by another MPF102 serving as a buffer in a source follower configuration.

The source follower directly feeds the diode DBM and, when operating from a 9 v transistor radio battery, provides close to the +7 dBm of drive specified for the SBL-1. Operating the converter from a 12 v supply increases the drive to considerably above +7 dBm, but I was not able to detect (by ear) any difference in performance at this level. The mixer output goes directly to the output jack, and from there to the receiver. Although this is far from a textbook example of how to properly terminate the mixer, once again I found the performance to be more than adequate as-is, leading me to opt for "simple" rather than "ideal." (For a discussion of the termination requirements for the SBL-1 mixer, see the ARRL Handbook, or KK7B's excellent series of articles on direct conversion receivers. These articles have recently been reprinted in "QRP Power," published by the ARRL, 1996.)

The only resonant circuit in the converter is the tuned transformer ahead of the mixer. I concluded that the 22 MHz image frequency should seldom be open for propagation at the same time that I want to listen to 160 meters, so I assumed that this would provide adequate selectivity. So far, experience has proven me correct (although we are at the bottom of the sunspot cycle!). The secondary of the transformer is 55 turns of #26 enameled wire on a T-94-2 toroid core, tapped six turns from the ground end. The primary is six turns wound over the ground end. For tuning, I found a 220 pF mica compression trimmer in my junk box and paralleled it with a 100 pF polystyrene capacitor. This particular trimmer has a short shaft with a screwdriver slot, so I placed the trimmer on the circuit board so that the shaft could be turned with a screwdriver through an access hole in the cabinet. Although most of my operation is in the low end of the band, I can easily re- peak the tuned circuit if I want to listen at the high end. In practice, retuning is only necessary for an excursion of over 100 kHz, or so.

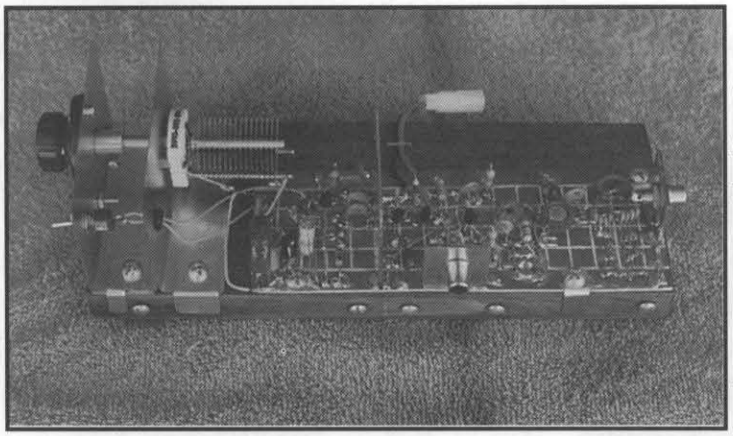
RECEIVING CONVERTER CONSTRUCTION NOTES

I constructed the converter on a small Radio Shack circuit board (no. 276-148), using point-to-point wiring. The oscillator, source follower, and mixer are on one half of the board, and the toroid and trimmer capacitor are on the other half. The board is installed in an LMB mini-box (2" x 3" x 4") with SO-239s for input and output on the back, the switch is on the front, and the access to the trimmer is on the top. I installed a 9 v battery clip and battery inside the box, and added small rubber stick-on feet to the bottom. (As a later update, I added a coaxial jack so that I can provide power from a wall transformer, if desired.)

RECEIVING CONVERTER ADJUSTMENT AND OPERATION

Alignment of the AARConverter was very simple. I tuned my receiver to a frequency between 10.0 MHz and 10.2 MHz and connected the converter. Then I connected an antenna to the converter, and verified that no signals were heard in the receiver. (Any signals would indicate a problem, since the DBM should provide isolation between the antenna and the receiver until the local oscillator signal is present.) I

turned on the switch and peaked the tuned circuit using an available signal at the low end of the 160 meter band. To operate the converter I tune from 10.2 MHz to 10.0 MHz in order to receive 1.8 MHz to 2.0 MHz. The receiver must be set to USB in order to receive LSB signals from 160 meters. Note that the converter is inverting and that the tuning is backwards because the intermediate frequency is between the local oscillator frequency and the input frequency.



FINAL COMMENTS

If you would like to experience the challenge of operating QRP on Top Band, then I encourage you to build the AARCmitter-II and AARConverter. Contrary to what many people think, 160 meters is a great place for QRP. Many times the first response I get from the operator on the other end, once I reveal my power level, is to turn off his amplifier, reduce power to below five watts, and request a signal report! I never hesitate to call CQ -- I don't always get a response, but I get enough to make it worth the effort.

It's funny how first impressions stay with you and influence your opinion of things for a long time. From my earliest days as a ham I had the opinion that it requires some really big equipment to get on Top Band. Big coils, big caps, big tubes, big antennas, big power. Not a place for the average ham. The AARCmitter, AARCmodulator, and AARConverter projects certainly changed my mind on that subject!

I would like to gratefully acknowledge the contribution of KF7M, who assisted with bench checkout of the AARCmitter. Thanks go to N7VVG (SK) for help with the first on-air test transmission. Thanks also to W1HUE for valuable comments on the AARConverter preliminary design, and to KA8TER for advice and encouragement with both projects.

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1. The AARCmitter 160 Meter Transmitter, Argonne Amateur Radio Club, K9CZB and W9GBL, 1988

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3. The AARCmitter-II, A VFO Controlled, 1.5 Watt Transmitter for 160 Meters, Part 1; Radioactivities, Volume XXXIV, Number 7, July 1993; KR8L

4. The AARCmitter-II, A VFO Controlled, 1.5 Watt Transmitter for 160 Meters, Part 2; Radioactivities, Volume XXXIV, Number 8, August 1993; KR8L

5. The AARConverter, A Top Band Receiving Converter for use with the AARCmitter; Radioactivities, Volume XXXVIII, Number 3, March 1997; KR8L

6. "A Universal QRP Transmitter," Solid State Design for the Radio Amateur, p. 26, American Radio Relay League, Inc., W7ZOI and W1FB, 1977

7. "A 1-Watt 160-Meter Transmitter with VFO," Solid State Design for the Radio Amateur, p. 38, American Radio Relay League, Inc., W7ZOI and W1FB, 1977

8. Ocean State Electronics, P. O. Box 1458, Westerly, RI 02891, Information: (401) 596-3080, Orders: (800) 866-6626

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G. Danny Gingell, K3TKS

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June 23, 1996 K3TKS@abs.net

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93-#1 = 00 94-#1 = 00 95-#1 = 00 96-#1 = 030 97-#1 = 017
93-#2 = 46 94-#2 = 00 95-#2 = 07 96-#2 = 032 97-#2 = 008
93-#3 = 00 94-#3 = 12 95-#3 = 43 96-#3 = 030 97-#3 = 000
93-#4 = 00 94-#4 = 00 95-#4 = 24 96-#4 = 030 97-#4 = 000

HANK, K8DD has the following issues:

93-#1 = 00 94-#1 = 00 95-#1 = 000 96-#1 = 184 97-#1 = 160
93-#2 = 10 * 94-#2 = 04 95-#2 = 184 96-#2 = 128 97-#2 = 028
93-#3 = 00 94-#3 = 00 95-#3 = 128 96-#3 = 184 97-#3 = 000
* 93-#4 = 13 94-#4 = 00 95-#4 = 160 96-#4 = 024 97-#4 = 000

The QRP Quarterly Inventory Worksheet/Order Form. Last Updated June 23, 1996

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1989-#3 = __ Copies	1994-#3 = __ Copies	1999-#3 = __ Copies
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QRP Quarterly Journal Back issues are available via USPS at $ 3.00 Each plus shipping. $10.00 per year set, or any four issues plus $ 3.00 Postage via USPS Flat Rate Priority Mail. Please include your mailing address and telephone number in your email message. I will "Reserve" your order and prepare a mailing label, Shipment on receipt of payment.

This work sheet can also be used to inventory your collection and for placing an order for back issues needed.

You may send your orders directly to me, K3TKS@abs.net

Check or Money Order (U.S. Funds) Payable to "George D. Gingell"G. Danny Gingell, K3TKS@abs.net or (301)572-6789.

My address is 3052 Fairland Road, Silver Spring, MD 20904-7117.

I would recommend that you contact me by email to place your order. That way I can confirm availability of your selections.

The Single issue price is $ 3.00, Year sets are $ 10.00. You may also Mix/match four issues for the same $ 10.00 year set price. Shipping is extra on all items. $ 3.00 via USPS Express Mail per 4 issues or less. Please contact me for special arrangements on larger quantities or shipments outside of the U.S.A.

To Join QRP ARCI and receive a one year subscription to the **QRP Quarterly Journal**, Send your Name, Address, Callsign, Telephone Number and email address with your check or Money Order in the Amount of $ 15 for U.S., $ 18 for Canada or $20 for DX (U.S. Funds) Payable to **"QRP-ARCI"**.

Mail your payment and application information to QRP ARCI Membership Chairperson listed on the back cover.

DX Membership contact. (For all non NA members)
Checks for 13.50 UK Pounds ONLY.
We can accept Visa / Mastercard @ 14 UK Pounds.
Dick Pascoe, G0BPS Seaview House, Crete Road East. Folkestone, Kent CT18 7EG UK
Tel/Fax 44 (0)1303 891106 from 0930 to 1900 GMT ONLY
If in doubt, ring Dick, But **ONLY for Membership**

72 ES

Everyone is invited to check the QRP ARCI web pages at

http://rtpnet.org/~qrp

Currently the following things, and more, can be found on the web site: instructions on how to join, schedules of nets and contests, a list of who to contact with input or questions, tables of contents of recent issues of the **QRP Quarterly**, information on the **QRP ARCI** operating awards program, and instructions on how to order back issues of the **QRP Quarterly**. There is a radiolinks page to help you find some other QRP and radio-related web sites. I invite YOUR input, especially with ideas for improvements, additional links, and NEWS that you wish to share with members via the web site. Plans are in place for providing more forms for applications for awards, more info on operating events, and some history of the club. Thanks!

Dave, WA4NID, QRP ARCI Webmeister

IMPORTANT CHANGES OF ADDRESSES FOR SENDING FUNDS AND FOR INQUIRIES ABOUT MEMBERSHIP STATUS

Ken Evans, W4DU, is the **QRP ARCI Treasurer**, and all funds for new memberships and renewals for those in North America should now be sent to him (July 1997 onward). See below for non-North American applicants.

North American applicants please make checks out to **QRP ARCI**, and send to Ken at:

QRP ARCI
848 Valbrook Court
Lilburn, GA 30047 < - - (new zip code for him)

Ken may be reached by email at w4du@bellsouth.net

DX Membership (for all non-North American members): Checks for 13.50 UK pounds ONLY. We can accept Visa / Mastercard at 14 UK pounds. Make checks payable to **"GQRP"** (ONLY), and send to:

Dick Pascoe, G0BPS
Seaview House, Crete Road East
Folkestone. Kent CT18 7EG UK

DX Membership funds can also be paid in US Dollars. Send $20 check or money order to Ken Evans at the above address.

PLEASE NOTE THAT INQUIRIES about membership status, CHANGES OF ADDRESS, or other matters pertaining to membership in QRP ARCI which do NOT involve funds transfers should go to the new **Membership Chair, Dave Johnson, WA4NID**, at the following address:

Dave Johnson
2522 Alpine Rd.
Durham, NC 27707

Dave may be reached by email at WA4NID@amsat.org

QRP ARCI
End of year report - July 1, 1996 thru June 30, 1997
July 2, 1997

Revenue	
4/16 Wire transfer from Myron:	$8660.04
4/25 QQ sales from Cam H.	$ 286.30
5/13 Emtech advertising	$ 80.00
5/19 Check from Myron	$4700.90
5/19 American Key Advertising	$ 80.00
5/19 Checks from M Bryce & Dayton booth	$1954.00
5/27 Check from Hank for Dayton booth	$2054.00
Miscellaneous Membership Renewals	$ 47.00
6/5/97 QQ Sales	$ 20.50
Refund from J Fitton	$ 480.00
6/11 Advertising(Kanga U.S. & Texas RF)	$ 240.00
6/15 Toy Store Sales	$ 20.00
6/30 Miscellaneous Membership	$ 1088.00
Total Revenue:	$19710.74

Expenses	
4/16 Checks:	$ 13.00
4/16Wire transfer fee	$ 12.00
4/25 Dayton booth-Jim Fitton	$ 480.00
4/25 HamCom Booth- T. Drake	$ 100.00
4/27 Certificate Expense-Cam H	$ 199.81
4/29 Banquet Expense-Pete Meier	$ 87.97
5/15 Airplane ticket Dayton-M. Stark	$ 388.21
5/19 Printing/postage-M Bryce	$ 114.52
5/19 Copying- J Stafford	$ 47.23
5/19 Paper tape calculator-K Evans	$ 43.92
5/25 Monthly bank fee	$ 5.00
5/28 Sec of State (Inc. FEE)	$ 10.00
5/30 Returned Check	$ 20.00
6/2 ARRL SS Plaque	$ 50.00
6/22 Les Shattuck (grossly overdue refund)	$ 400.00
6/30 Mike Bryce - Poatage/UPS	$ 298.95
6/30 July QQ - Duncan Press Printing/Mail	$ 2990.00
6/30 Monthly Bank Fee	$ 5.00
Total Expenses:	$ 5265.61
Total Cash on hand:	$14445.13

CONTESTS

Cam Hartford, N6GA

Results: Hootowl Sprint
Results: Milliwatt Field Day
Results: Summer Homebrew Sprint
Announcing: Fall QSO Party
Announcing: Holiday Spirits Homebrew Sprint
Announcing: New Entry Classes! (see rules page)

UPCOMING EVENTS

QRP ARCI Fall QSO Party	Oct 18-19
Holiday Spirits Homebrew Sprint	Dec 7
Winter Fireside SSB Sprint	Jan 11

1997 MILLIWATT FIELD DAY

There was a good turnout for the MW FD event this year. Conditions were quite good, probably due to the ionospheric warming caused by the thousands of FD stations set up around the country. Weather and Murphy conditions were their usual pesky selves, with thunderstorms being mentioned quite often as the primary menace. Congratulations are due to W3TS and NØUR for clinching the gold in their respective classes, and to N4ROA for holding off all the others in his somewhat thin class. First time club entrant N6WG, the Alameda County RC, showed the rest of the clubs how to do it.

Thanks to Chuck Adams, K5FO, for sponsoring some of this year's hardware.

Congratulations to all entrants for making it to the finish line. Wait 'till next year!

Group Name	*Call*	*Score*	*CW Qs*	*Phone Qs*	*Nr. Ops*	*Rig*	*Antennas*
CLUB CLASS							
Alameda County Radio Club	N6WG	11,843	401	777	25	VRS	VRS
Zuni Loop Mtn Expeditionary Force	N6GA	11,640	639	274	11	VRS	VRS
Guano Reef Bashful Perverts	N4BP	10,530	673	58	6	VRS	VRS
Athens County ARA	AA8EB	5,475	336	58	8	VRS	VRS
North Penn ARC	W3BTN	4,283	267	37	6	VRS	VRS
MILLIWATT CLASS	W3TS	6,105	407	0	1	HB TCVR	300' INVERTED LONG WIRE
	N7VE	1,260	84	0	1	3 HB TCVRS	500' HORIZONTAL LOOP
	W4ED	1,118	72	5	1	NN1G, FT-840	TFR 40/20 WIRE VERT
	N4EUK	60	2	4	1	AEA DX HANDY, HW-8	?
5 WATTS - 1 OP	NØUR	8,685	560	38	1	IC-735	G5RV
	W5VBO	3,345	223	0	1	QRP+	YAGI, HORIZONTAL LOOP
	AA7QU	3,045	186	34	1	QRP+	VRS
	W1HUE	2,910	172	44	1	QRP+	TRAP DIPOLE, LONG WIRE
	W2UX	2,715	181	0	1	ARGOSY II	FAN DIPOLE
	K8CV	2,365	235	3	1	SCOUT 555	?
	KO6KA	1,965	127	8	1	ARGO 509	TRAP VERTICAL
	KW3U	1,958	127	7	1	ARGO 505	RANDOM LONG WIRE
	WE6W	825	55	0	1	?	?
	KB9LGJ	280	28	0	1	SST - 20m	DIPOLE @ 25'
	AH7R	45	0	6	1	ARGO 556	180' LONG WIRE
5 WATTS - 2 OPS	N4ROA	3,585	225	28	2	?	?

1997 HOOTOWL SPRINT

QTH	CALL	SCORE	PTS	S/P/Cs	PWR	BANDS	TIME	RIG	ANTENNA
LOW-BAND STATIONS									
NC	AA4XX	32,578	179	26	5	L-2	4	FT-757, SIERRA	80M OCF DIPOLE @ 60'
ALL-BAND STATIONS									
TN	N4DD	111,412	346	46	5	A-2	4	TT OMNI	QUAD, 40M LOG PERIODIC
VA	N4ROA	71,400	255	40	5	A-3	4	OMNI C	2 EL QUAD, 160M INV EL
NJ	N2CQ	65,170	245	38	5	A-3	3.5	TS-850	TRIBANDER, CF ZEPP
CA	W6ZH	42,840	180	34	5	A-6	3	OMNI 6	YAGIS, VERTICAL
CA	N6MM	35,672	182	28	5	A-6	3	OHR 400, TR7	YAGIS, DIPOLE 80, "L" 160M
CA	WO3B	35,625	125	19	0.2	A-3	4	QRP++	YAGI @ 60' DIPOLES
TX	K5ZTY	18,669	127	21	5	A-2	2.5	OHR400	YAGI, G5RV
ID	AB7TK	17,136	144	17	5	A-2	4	TRITON IV	GAP TITAN
MN	N0UR	16,478	107	22	5	A-2	1	IC-735	LOOP/DIPOLE
AZ	WA7LNW	14,280	120	17	5	A-3	3.75	?	?
AZ	W5VBO	10,829	119	13	5	A-3	?	QRP+	YAGI, PHSD VERTS, LOOP
NY	N2VPK	9,856	88	16	4	A-2	2	ARGO 556	40M QUAD LOOP
PA	WB3AAL	8,450	65	13	0.9	A-2	3	ARGO 515	HF6V
MA	WA1QVM	6,048	72	12	4	A-2	2.5	?	DIPOLE HIDDEN BEHIND CONDO
NM	K5OI	4,256	76	8	5	A-3	2	QRP+	GAP TITAN VERT
TX	KC5HLO	3,240	36	9	0.9	A-3	?	MFJ 9040, TR-7	DIPOLE @ 25'
OH	K8UCL	1,911	39	7	2	A-2	3.5	HW-8	ATTIC DIPOLE, WIRE YAGI
MO	K0LWV	1,050	30	5	5	A-2	1	TS-520	80M LOOP @ 13'
NJ	W2JEK	700	25	4	3	A-2	1.5	FT-840	40 DIPOLE, 80 END-FED HERTZ
80 METER STATIONS									
VA	N7RI	1,015	29	5	4	80M	1	CENTENNIAL	DIPOLE @ 40'
40 METER STATIONS									
IN	K9PX	41,391	219	27	5	40M	3.5	TAC-1	80M LOOP, 40M VERTICAL
NY	WZ2T	10,647	117	13	5	40M	2.5	?	?
MI	K8CV	10,185	97	15	2	40M	2	SIERRA	80M DIPOLE
KY	KE4LIA	4,900	70	10	2.5	40M	3	EXPLORER II	40M DIPOLE
MI	K8DD	3,850	50	11	5	40M	0.5	IC-751	DIPOLE, VERTICALS
NJ	N2SMH	2,464	44	8	2	40M	2.5	SIERRA	40M LOOP STAPLED TO ROOF
PA	KT3A	1,890	45	6	5	40M	1.75	IC-726	40M ATTIC LOOP
VA	K3SS	1,134	27	6	2	40M	3	TECHSONIC MILLIWATTER	MINI G5RV @2 30'
OH	KF8EE	1,015	29	5	1.5	40M	1.5	?	?
CA	K6OYY	588	21	4	2	40M	2	NORCAL 40A	VERTICAL
20 METER STATIONS									
MI	XE1/K8ZAA	25,025	143	23	5	20M	4	QRP+	MFJ LOOP
OK	AB5UA	18,000	120	15	0.95	20M	3	OHR400	YAGI @ 50', VERTICAL
SC	K4NK	8,820	84	15	4	20M	3	A&A BREED TX	TRI-BANDER
AR	N5SAN	5,824	64	13	4	20M	1.5	CENTURY 21	130' LOOP @ 60'
TX	KJ5VW	5,733	63	13	5	20M	2.25	NW8020	MINI-DIPOLE
UT	WJ7H	4,200	50	12	5	20M	2	QRP+	TA33JR @ 40'
MI	KG5LO	3,240	36	9	0.9	20M	1.5	NN1G MK III	GND MTD VERTICAL
AL	KE4AGT	1,519	31	7	5	20M	1.25	TS-520S	DIPOLE
WA	WB7OEM	770	22	5	2	20M	2.25	HW-8	3 EL YAGI

The Hootowl seems to be a cyclic event. In 1995 there were 37 entries, last year there were 9, and this year we had 40. It's probably a very sound measure of propagation - if the bands are stinko at 10 PM, the contest gets pitched in favor of TV or sleep! I'm always amazed at the number of people who can still operate a keyer at these late hours, let alone do the logging and duping. Hootowls they are, for sure.

Soapbox: Lots of fun activity has increased, look forward to next one - N4DD; Had to battle qrn and grandson for contacts but enjoyed it - N4ROA; Very surprising that 20M was open after 11 PM - N2CQ; Used TR-log for logging and control of tcvr - keying and freq control - great! - W6ZH; Nice contest,I just wish there were more folks playing those last couple hours - WO3B; Couldn't stand the static crashes here on 40 & 80 so when 20 pooped out, it was over here - K5ZTY; My states ranged from CT to HI. Great fun for a Sunday evening - AB7TK; My goal was 20 Qs and it took an hour to do it - N0UR; Great fun as always! Bands dead after 2 1/2 hours - W5VBO; Today was my birthday, thank you for the contest - K0LWV; Tested out the audio-injection of the centennial - got good reports - N7RI; Nice turnout despite the high QRN levels - K9PX; Lots of activity at start - band died after 1st hour - N2SMH; Lots of QRN and rain here tonight - KT3A; Did much better than I thought - 20M stayed open late - XE1/K8ZAA; This was my first attempt at milliwatt level - it works! - AB5UA; I had fun... got to try out my newly completed NN1G MK III (it took a year, on and off) - KG5LO;

TOP THREE

N4DD	111,412
N4ROA	71,400
N2CQ	65,170

NEW ENTRY CLASSES

Starting with the Fall QSO Party, we will have a couple new entry classes for the ARCI contests.

There have been numerous requests for, and even a few entries into, a Multi-Op class. So I am formalizing this growing class of operation and including it in the rules. If your group wants to operate with more than one op, under a single call, include the details in your entry. Please also let me know if it is a single- or multi-transmitter entry. I'll classify these sepaprately. These will be new reporting classes, and will be in addition to the traditional Club class, which is a compilation of individual scores. The existing rules for the Club class will still apply.

Another area of increased interest is Portable operating. A number of Portable, in-the-Field type contests have appeared in recent years, such as QRP TTF, QRP Afield, FYBO, and activities prompted by the Adventure Radio Society. There has also been a corresponding increase in entries into ARCI contests from contesters who have done it "in the field". Rather than add another Portable contest to the QRP contest calendar, I have chosen to add a Portable class to all of the existing ARCI contests.

If you chose to operate a Sprint or QSO Party from the field, send along the details in your entry so I can include it in a new "Portable" entry class. Please include details of multi-op operation, if applicable.

We'll watch how these classes work out over the next several contests, then fine tune the entry and result reporting details as necessary. As always, suggestions for improvement are always welcome.

72/73, Cam N6GA

1997 HOLIDAY SPIRITS HOMEBREW SPRINT

Date/Time:
December 7, 1997; 2000 - 2400 Z. CW only.
Exchange: Member - RST, State/Province/Country, ARCI Number
Non-Member - RST, State/Province/Country, Power Out
QSO Points: Member = 5 Points; Non-Member, Different Continent = 4 Points; Non-Member, Same Continent = 2 Points
Multiplier: SPC (State/Province/Country) total for all bands.
S/P/Cs may be worked on more than one band for credit.
Bonus Points: Points awarded for using Homebrew equipment,apply for each band on which Homebrew equipment was used: +2,000 HB Transmitter used; +3,000 HB Receiver used; +5,000 HB Transceiver used
Homebrew Definition: If you built it, it is considered Homebrew.
Power Multiplier: (Power Output)
0 - 250 MW = X 15; 250 MW - 1 Watt = X 10;
1 W - 5 W = X 7; Over 5 W = X 1.
Suggested Frequencies:

	GENERAL	NOVICE
160 Meters	1810 KHz	
80 Meters	3560 KHz	3710 KHz
40 Meters	7040 KHz	7110 KHz
20 Meter	14060 KHz	
15 Meters	21060 KHz	21110 KHz
10 Meters	28060 KHz	28110 KHz
6 Meters	50128 KHz	

Score:
Points (total for all bands) X SPCs (total for all bands) X Power Multiplier + Bonus Points.
Multi-Op Class: Submit list of operators and number of transmitters in simultaneous operation.
Portable Operation: Submit information on location of operation, list of operators and number of transmitters in simultaneous operation.

Entry may be an All-Band, Single Band, Hi-Band or Lo-Band. Certificates to the top three scores, to the top score in each Single-band, Lo-band and Hi-band class, and to the top score in each SPC. Entry includes a copy of the logs and a separate summary sheet. Indicate total time-on-the-air, and include a legible name, call, QRP ARCI Number (if any) and address.

All entries must be received within 30 days of the contest date. Late entries will be counted as check logs. Members and non-members indicate their output power for each band. The highest power used will determine the power multiplier. Output power is considered as 1/2 of input power.

Include a description of homebrew equipment, commercial equipment, and antennas used with each entry. Homebrew bonus points may not be claimed if a description is not included with the entry.

Send an SASE for a summary and sample log sheets. Include an SASE with your entry for a copy of the results. Results will be published in the next available issue of the QRP ARCI Quarterly.

The final decision on all matters concerning the contests rests with the contest manager.

Entries are welcome via E-Mail to CamQRP@cyberg8t.com, or by mail to:
Cam Hartford, N6GA
1959 Bridgeport Ave.
Claremont, CA 91711

FALL QSO PARTY

Date/Time:
October 18,1997, 1200Z through Ocober 19, 2400Z. Work a maximum of 24 hours of the 36 hour period. CW only.
Exchange: Member - RST, State/Province/Country, ARCI Number
Non-Member - RST, State/Province/Country, Power Out
QSO Points: Member = 5 Points; Non-Member, Different Continent = 4 Points
Non-Member, Same Continent = 2 Points
Multiplier: SPC (State/Province/Country) total for all bands.
S/P/Cs may be worked on more than one band for credit.
Power Multiplier:
0 - 250 MW = X 15; 250 MW - 1 Watt = X 10
1 W - 5 W = X 7; Over 5 W = X 1.
Suggested Frequencies:

	GENERAL	NOVICE
160 Meters	1810 KHz	
80 Meters	3560 KHz	3710 KHz
40 Meters	7040 KHz	7110 KHz
20 Meter	14060 KHz	
15 Meters	21060 KHz	21110 KHz
10 Meters	28060 KHz	28110 KHz
6 Meters	50060 KHz	

Score:
Points (total for all bands) X SPCs (total for all bands) X Power Multiplier.
Team Competition: Competition between teams consisting of 2 to 5 members will be a separate category apart from individual entries. Team members will be listed as individuals and the team score will be the total of the members' scores. The team captain must send a list of team members to the contest manager postmarked at least one day prior to the QSO Party.
Multi-Op Class: Submit list of operators and number of transmitters in simultaneous operation.
Portable Operation: Submit information on location of operation, list of operators and number of transmitters in simultaneous operation.

Entry may be an All-Band, Single Band, Hi-Band (20M, 15M, 10M and 6M) or Lo-Band (160M, 80M and 40M). Certificates to the top 10 scores, to the top score in each Single-band, Lo-band and Hi-band class, and to the top score in each class in each SPC. The contest manager reserves the right to recognize special significant entries with a certificate award.

Entry includes a copy of the logs and a separate summary sheet. Include duplicate check sheets with entries of 100 QSOs or more. Indicate total time-on-the-air, and include a legible name, call, QRP ARCI Number (if any) and address.

All entries must be received within 30 days of the contest date. Late entries will be counted as check logs. Members and non-members indicate their output power for each band. The highest power used will determine the power multiplier. Output power is considered as 1/2 of input power.

Include a description of homebrew equipment, commercial equipment, and antennas used with each entry. Send an SASE for a summary and sample log sheets. Include an SASE with your entry for a copy of the results. Results will be published in the next available issue of the QRP ARCI Quarterly. The final decision on all maters concerning the contests rests with the contest manager.

Entries are welcome via E-Mail to CamQRP@cyberg8t.com, or by mail to:
Cam Hartford, N6GA
1959 Bridgeport Ave.
Claremont, CA 91711

1997 SUMMER HOMEBREW SPRINT

Sprinters were out in force for this year's Summer Homebrew run, but Sunspots were few and far between. Almost everyone noticed the deep fading that occurred during most of the contest. It was as if the bands kept trying to come to life, but then someone kept pulling the plug.

Here are the Individual Top Three:

	N4ROA	73,080
	AA7QU	68,674
	KP3S	68,210
Multi-Op Leader:	K9HD (K8NQC, N8UOO)	122,856

QTH	CALL	SCORE	PTS	S/P/Cs	PWR	BANDS	TIME	RIG	ANTENNA
LOW-BAND ENTRIES									
NJ	N4JS	33,100	165	20	4	L-2	2.5	OHR 400	40M DIPOLE, 180' ZEPP
VA	K3SS	11,424	102	16	5	L-2	4	FT-757GX	DIPOLE @ 35'
ALL-BAND ENTRIES									
VA	N4ROA	73,080	290	36	5	A-2	4	OMNI C	2 EL QUAD, INV "L"
OR	AA7QU	68,674	254	33	4	A-2	4	SIERRA	YAGIS, 40M BISQUARE
MN	N0UR	53,904	196	32	3	A-2	2.25	HW-9	LOOP, DIPOLE
PA	KM3D	40,110	191	30	5	A-2	4	IC-736	40M LOOP, 20M 4 EL YAGI
NJ	N2MNN	34,000	100	19	0.95	A-3	4	SIERRA	VERT 40M LOOP
CA	N6MM	32,475	157	25	5	A-3	2.5	OHR 400, SIERRA	BEAMS
MD	WD3P	26,380	117	20	2	A-2	2	SIERRA	DIPOLES
MD	K3CHP	24,870	94	15	2	A-3	4	SIERRA	3 EL YAGI, HF2V VERTICAL
AZ	AB7TT	23,209	111	17	2	A-2	4	SIERRA	HB VERT (FOX RAIDER 3000)
ON	VE3JC	21,091	131	23	5	A-3	3	IC-735	YAGI @ 40', DIPOLE @ 20'
MI	K8CV	16,200	100	16	5	A-2	3	OHR 400	DIPOLE, YAGI
CA	N6GA	15,670	54	15	2	A-3	3	SIERRA	YAGI @ 30', DIPOLE
OH	K8UCL	14,158	54	11	2	A-2	4	HW-8	INDOOR 40M DIPOLE & 20M YAGI
CA	WE6W	11,904	34	8	4	A-2	2	OHR-100, HW-8	GND MTD VERTICAL
MO	K0LWV	11,312	101	16	5	A-2	2.5	TS-520	80M LOOP @ 16'
TX	KD5KP	3,920	56	10	5	A-2	1.5	SCOUT 555	40M FULL WAVE LOOP
80 METER SINGLE BAND ENTRIES									
VA	N7RI	6,120	32	5	4	80M	1	CENTENNIAL	DIPOLE @ 50'
40 METER SINGLE BAND ENTRIES									
IN	K9PX	40,875	205	25	5	40M	3.5	TAC 1	80M LOOP
NC	AC4QX	35,646	199	22	5	40M	4	ARK 4	G5RV
OH	N8ET	20,561	117	19	5	40M	4	HANDS GQ-40	DIPOLE, 2 EL YAGI @ 80'
IL	N9MDK	13,281	91	13	3	40M	4	TT T-KIT 1340	G5RV
NY	N2VPK	12,800	78	10	0.9	40M	2.1	SWL-40	DIPOLE @ 50'
NJ	N2YVF	12,252	74	14	4	40M	2	ARK-4	DIPOLE
SC	W2UX	11,622	86	11	5	40M	2.5	OHR 400	G5RV
MD	W3MWY	9,732	99	14	3	40M	4	ARGO 556	INV VEE @ 35'
MA	WA1QVM	9,604	98	14	4	40M	3	QRP+	G5RV IN WOODS BEHIND CONDO
NY	WZ2T	9,347	62	10	1.5	40M	2	SIERRA	80/40 TRAP VEE @ 50'
QC	VE2BLX	8,465	45	11	3	40M	3	HW-7 (MODIFIED)	END-FED LONG WIRE
OH	KF8EE	5,700	25	4	1.5	40M	2.5	SW-40	RANDOM WIRE
FL	AE4MZ	5,399	19	3	1	40M	1.6	SW-40	DIPOLE @ 25'
AZ	W7ILW	5,150	10	1	0.215	40M	1	FORTY NINER	?
OR	WK9C	5,020	2	1	0.79	40M	0.5	HB TCVR	GAP EAGLE VERT
20 METER SINGLE BAND ENTRIES									
PR	KP3S	68,210	258	35	4.5	20M	4	K9AY (A&A) TCVR	YAGI @ 45'
TX	K5ZTY	66,677	267	33	5	20M	4	OHR 400	TA33JR
AZ	W5VBO	47,098	194	31	2.5	20M	4	OHR EXPLORER II	3 EL YAGI, PHASED VERTICALS
AZ	NQ7X	38,425	191	25	5	20M	3.5	OHR 2040	3 EL YAGI @ 40'
SC	K4NK	24,528	146	24	4	20M	3	ARGO 509	TRIBANDER
CO	AE0Q	18,480	120	22	5	20M	2	ARGO 556	?
QC	VE2KN	16,214	89	18	2	20M	3.5	SIERRA	YAGI @ 50'
OK	KJ5MG	14,996	102	14	4	20M	3	HB XCVR	80M DIPOLE
FL	KC4MHM	14,639	81	17	2	20M	3	SST-20	200' DIPOLE
HP	HP1AC	14,560	104	20	5	20M	3	TS-430S	TA 33JR
MT	N7GS	10,187	57	13	2	20M	3.7	NN1G	TA 33
NS	VE1ZAC	9,389	57	11	5	20M	4	?	?
CT	KC1FB	8,510	39	9	0.8	20M	2	SST-20	DELTA LOOP ON DECK
XE	XE1/K8ZAA	6,461	71	13	5	20M	3	QRP+	MFJ LOOP
WA	WB7OEM	6,120	32	5	2	20M	4	HW-8	TA-33JR
NY	WA2BQI	6,067	62	14	4	20M	?	MFJ 9020	DIPOLE @ 30'
AZ	KI7MN	5,805	23	5	3	20M	1.5	OHR CLASSIC	G5RV
CO	KI0G	5,114	17	1	2	20M	0.5	SST-20	YAGI
PA	N3CZB	140	10	2	5	20M	0.5	CENTURY 21	INDOOR LOOP
SM	SM5PHL	35	5	1	3	20M	-	QRP+	SKY LOOP
MULTI-OP STATIONS									
IN	K9HD	122,856	321	48	4	A-3	4	HB 6AQ5/6L6 TX; HW-8	YAGI, HORIZ LOOP, G5RV

Summer Homebrew Sprint Soapbox: Going to have to discontinue contesting, just a QSO now and then (age 89) - N3CZB; (Lou - we'll definitely miss your contacts and entries - Cam); Missed first half hour troubleshooting OHR 400 - N4JS; Thanks for the fun evening - N4ROA; It was a thrill to hear so many HB signals on the air - AA7QU; Ran solar/battery because the power kept going off due to hot weather - N0UR; Working N8ET on 40M 3 hours before sunset was a high point - N6MM;The high point of the test was when N6MM called, 90 minutes before sunset - N8ET; Started off 5000 points in the red. Just finished OHR-100 but did not have it with me - KD5KP; Some call it drift, I call it scan - N7RI; Operating from Lake Gaston on the NC/VA border - AC4QX; 40M was in lousy condx - N9MDK; Worked IARU just 24 hrs before this test, wow, lots of DX. Band was wide open. Spent 25 minutes at start of this test and worked only 1 QSO - N2VPK; QRN was bad and signals were weak - W2UX; Thanks to the other ops for patience in my first contest - AE4MZ; First contest after 49 years of hamming, not too easy with a 49er -W7ILW; With bad conditions it was interesting to hear signal across the big pond, especially the California milliwatts - KP3S; I just wish I knew where to get some sunspots before the next sprint - K5ZTY; Decided to try a hi-band entry hoping that 10 & 15 would be open, but no joy - W5VBO; Operated 1st hour and last hour, sigs really came up at the end - AE0Q; I messed up and sent my G-QRP number! - VE2KN (I accepted the log anyway, Jim, since all else was OK -Cam); This was my first time. Wished I could have worked all I heard, I'd have a million points - KC4MHM; Propagation poor, but did work PR. Once more, worked only half as many as I heard - N7GS; My first contest ever. Duct tape was a key feature - power supply crapped out, had to use batteries - VE1ZAC; A really great time sitting on my deck, battery powered, with the birds around the birdfeeer copying CW - KC1FB; Great contest - lots of fun - bad condx - WA2BQI; Vy pleased with SST, KC1 and BuzzNot - KI0G; K9HD operators- K8NCQ, N8UOO.

QRP HALL OF FAME FOR 1998

It's that time again--we are now accepting nominations for the 1998 inductions into the QRP Hall of Fame. If you feel someone has had a significant impact on the QRP community through outstanding accomplishments (technical, operating, organizational, etc.), it's time to nominate them for this honor. As usual, you have until the end of January to get your write-ups to me, WA8MCQ, via mail or private e- mail. (No nominations will be accepted via public posting to QRP-L.) The nominations will be collected and sent to the voters, we'll have a week or two to discuss them before voting, and the inductees (if any) will be announced at Dayton.

The voting body consists of the Board of Directors, President and Vice President. Last year we experimented with offering current QRP HoF members the option of voting if they wished, and several of them accepted. That may or may not be done this year; there will be some discussion of that and other HoF matters in the coming months.

Nominating letters will only be accepted from QRP ARCI members, although last time we also allowed current Hall of Famers to nominate worthy individuals if they wished. As I said last year, some reading this may not be members but might like to nominate someone. If so, there's plenty of time to join! (This is not intended as a subtle ploy to get new members!)

You must do more than simply toss out a name. We need to have a few paragraphs giving some details of the accomplishments, telling us why the person is worthy of the honor. Don't count on all of the voters knowing everything about your favorite QRP hero; you think they are worthy of the honor and it's your duty to convince us. In the past, it was not unusual to see comments to the effect that since someone didn't bother to write more than a line or two, then the person must not be very worthy of getting the vote.

If you nominate someone, be sure to include your QRP number, so we can verify that you are a member. Send all nominations to me, WA8MCQ ; my USPS and e-mail addresses can be found elsewhere in this issue. Important: all inputs must be acknowledged by me! If you do not hear back from me in a short time, please assume that I never received it, and let me know. I'd hate to see someone lose out on the chance to be inducted because a letter or e-mail never got through.

As always, each nominee is judged on his/her merits; this is not a competition to choose the top two or three or whatever. There are no quotas and no limits. If the voters don't feel any nominees truly deserve the honor this time around, none will be inducted simply for the sake of having someone to announce at Dayton. On the other hand, if there are a dozen nominees and all are judged worthy, all will be inducted. (And we get a quantity discount on the plaques!)

The following, in alphabetical order, are the current QRP Hall of Fame members; do not nominate them!

Brice Anderson, W9PNE
George Burt, GM3OXX
Mike Czuhajewski, WA8MCQ ***
Tom Davis, K8IF
Doug DeMaw, W1FB
Rev. George Dobbs, G3RJV
Wes Hayward, W7ZOI
Doug Hendricks, KI6DS
Roy Lewallen, W7EL
Rick Littlefield, K1BQT
Dick Pascoe, G0BPS
Randy Rand, AA2U
C. F. Rockey, W9SCH
Adrian Weiss, W0RSP

***Done behind my back by the Board of Directors, without my knowledge, as reported in the July 1997 issue. In fact, a few people Ray Anderson <raymond.anderson@eng.sun.com>, had sent me nominations of myself and I told all of them that I was not accepting them due to the obvious conflict of interest.

Remember, if there is someone you feel is deserving of being inducted into the QRP Hall of Fame, you have until the end of January to submit a nominating letter to me, WA8MCQ. --qrp--

NoGaQRP Group

This informal group of QRP enthusiasts in North Georgia meet the 2nd (or middle) Saturday of Feb, May, Aug, and Nov @ Morrison's Restaurant on North Druid Hills, off I-85 in Atlanta. Join us, over lunch, at 11 AM to chat and show off QRP goodies.

Web site: www.america.net/~w4qo/nogaqrp.html
Email to: W4DU@BellSouth.net
or call 404-572-8457 for details.

QRP Net Information

Compiled by George "Danny" Gingell, K3TKS

1997 ARCI QRP Net Schedule

Net	Frequency	NCS (Alt. NCS)	Day	Time [1]
TCN [2]	14060	W5LXS (K2LGJ)	Sunday	2300 UTC
SEN [3]	7030 3535	K3TKS (AA1OC)	Wednesday [4]	0100 UTC 0130 UTC
GSN	3560	N9ZZ	Thursday [4]	0200 UTC
GLN	3560	W1CFI (WA1JXR)	Thursday [4]	0200 UTC
NEN	7040-41	K3TKS (KC1DI)	Saturday	1300 UTC
WSN	7040	W6SIY (several)	Saturday	1700 UTC

Notes:

1. Adjust UTC times to one hour earlier when local time switches to daylight savings time unless otherwise noted.
2. TCN remains at 2300 UTC Sunday the year around except on major contest weekends, then it will meet one hour later.
3. If conditions on 7030 kHz are poor, QSY to 3535 kHz at 0130 UTC (0030 UTC Spring/Summer). Please note that 3535 kHz is the Michigan QRP Club net frequency at 0200 UTC (see " Other QRP Nets " listing).
4. Note that in North America, net meets on the evening of the day before local time.

Other QRP Nets

Net	Frequency	NCS (Alt. NCS)	Day	Time [1]
BC (SSB)	3729	- - -	Daily	0300 UTC
MI-QRP	3535	K8JRO	Wed. [2]	0200 UTC
NE-QRP	3855	WA1JXR	Monday	2100 EST
NEIQS	3560	- - -	Friday [2]	0200 UTC
OK-QRP	7060 (3560)	- - -	Sunday	1330 UTC
NW-QRP	10123	W7DFO (N7MFB)	Tuesday [2]	0200 UTC
NW-QRP	3710	N7MFB	Tuesday [2]	0230 UTC
NW-QRP	7035	N7NFB	Saturday	0730 PST
NC-QRP	3686	KQ4RP (club call)	Sunday	2130 EST
VE-QRP	14060	VE6BLY	Sunday	1800 UTC

Notes:

1. Adjust UTC times to one hour earlier when local time switches to daylight savings time.
2. Note that in North America, net meets on the evening of the day before local time.

Late Breaking News from the President

The Board of Directors just Voted!!

Mike Czuhajewski, WA8MCQ

While this might not affect very many people, I want to announce that the QRP ARCI has added a family membership which will let immediate family members in the same household all be QRP ARCI members without having to pay for multiple copies of the QRP Quarterly. The details all need to be finilized but I didn't want you to have to wait until the Jan 98 issue to hear the good news. Full details will be available on request. **—qrp—**

See Page 46 for examples of some QRP ARCI AWARDS

WAC QRP

Amateur Radio Club International

This Certifies that Bud Turner, QRP Station N3IUT

Has this date of December 12, 19 96 satisfactory evidence showing successful two-way communications with the six continents of the world; while running an output power of 5 watts or less.

Power 5.0 watts Mode CW Band MIX Mc.

Cert. No. 539

Chuck Adams K5FO
QRP ARCI Awards Chairman

5 QRP

AMATEUR RADIO CLUB
INTERNATIONAL INCORPORATED

CERTIFICATE NO. 19

DATE December 31, 1994

OPERATING ACHIEVEMENT

Certificate

Chris Brakhage WB5FKC

Has this date submitted to the QRP ARCI the satisfactory evidence of having conducted two way communication with at least 25 member stations while those stations were using 5 watts or less power output.

Chuck Adams K5FO
AWARDS MANAGER

500 Member Endorsement

5 QRP

Amateur Radio Club International

DXCC-QRP

Francis Kelson HL9BK

Has this date submitted evidence of two-way communications, while running an output power of five watts or less, with amateur radio stations in at least one hundred different countries. This award is presented in recognition of superior QRP operating skill.

102 Countries 5 Watts CW Only

Chuck Adams K5FO
Awards Manager

No. 133

Date December 5, 1996

Award No. 1480

Date February 5, 1995

1000-MILE-PER-WATT

ACHIEVEMENT CERTIFICATE

Be it known that

Paul Stroud AA4XX

Has this date been elected a FULL MEMBER of the 1000-Mile-per-Watt Club.

Election was based on submission of satisfactory proof of a contact between KA3WTF, located at 41.24°N 75.930°W and low-power station AA4XX, located at 35.77°N 78.64°W and running an output of 221 μ watts, which represents successful communication equivalent to 1,909,502 miles per watt of output power.

Endorsements—

7 MHz band #209
CW mode #1141

Chuck Adams K5FO
Awards Manager, QRP ARCI

The Last Word

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

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

Full articles should go to any of the volunteer editors for review. Information for columns should be sent directly to the column editor. See the 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.

Opinions expressed are those of the authors and do not necessarily represent those of the QRP ARCI, it's officers, Board of Directors, Staff or advertisers.

The QRP Quarterly will occasionally consider reprinting articles previously published elsewhere if the information is especially useful to members of QRP ARCI. If your article has been published, include the name of the publication and the issue it appeared in. In all such cases, the QRP Quarterly will obtain permission to reprint from both the author and the original publication and acknowledge the source of the material.

The QRP Quarterly will occasionally print information first appearing on QRP-L after obtaining the permission of the author and ascertaining that the information is not scheduled to appear in another publication.

Copyright of materials published in the QRP Quarterly remains with the author. Although the author retains the right to reuse the material, the QRP Quarterly requests that reprints of the material in other publications acknowledge first publication in the QRP Quarterly.

(With thanks to **L.B. Cebik** for all his help)

de **Ron, KU7Y**

New Member / Renewal Application Form

Full Name:_____ **Call**_____ **QRP ARCI #** _____

Mailing Address _____

City _____ **State / Country** _____ **Zip Code** _____

New Address? **(List ALL old calls)** _____ **New Membership or Renewal?** _____

USA $15	CANADA $18	DX $20

Change of Address, and membership status questions go to:

Mail completed application to either:

Check or Money Order in U.S. Funds

Make checks payable to: "QRP-ARCI"
All applications MUST BE RECEIVED at least 30 days prior to the cover date to receive that issue.

Send to:

QRP ARCI
848 Valbrook Court
Lilburn, GA 30047

For a Club Information Pack, write to:
Bruce Muscolino, W6TOY
P. O. Box 9333
Silver Spring, MD 20916

DX Membership Contact:

(for all non NA members)
Checks for 13.50 UK pounds ONLY.
We can accept Visa / Mastercard @ 14 UK pounds.
Make checks payable to: "GQRP" (ONLY)

Send to:

Dick Pascoe, G0BPS
Seaview House, Crete Road East
Folkestone. Kent CT18 7EG UK

Tel/Fax 44(0)1303 891106 from 0930 to 1900 GMT ONLY
If in doubt, ring Dick, but ONLY for Membership.

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