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QRP Quarterly

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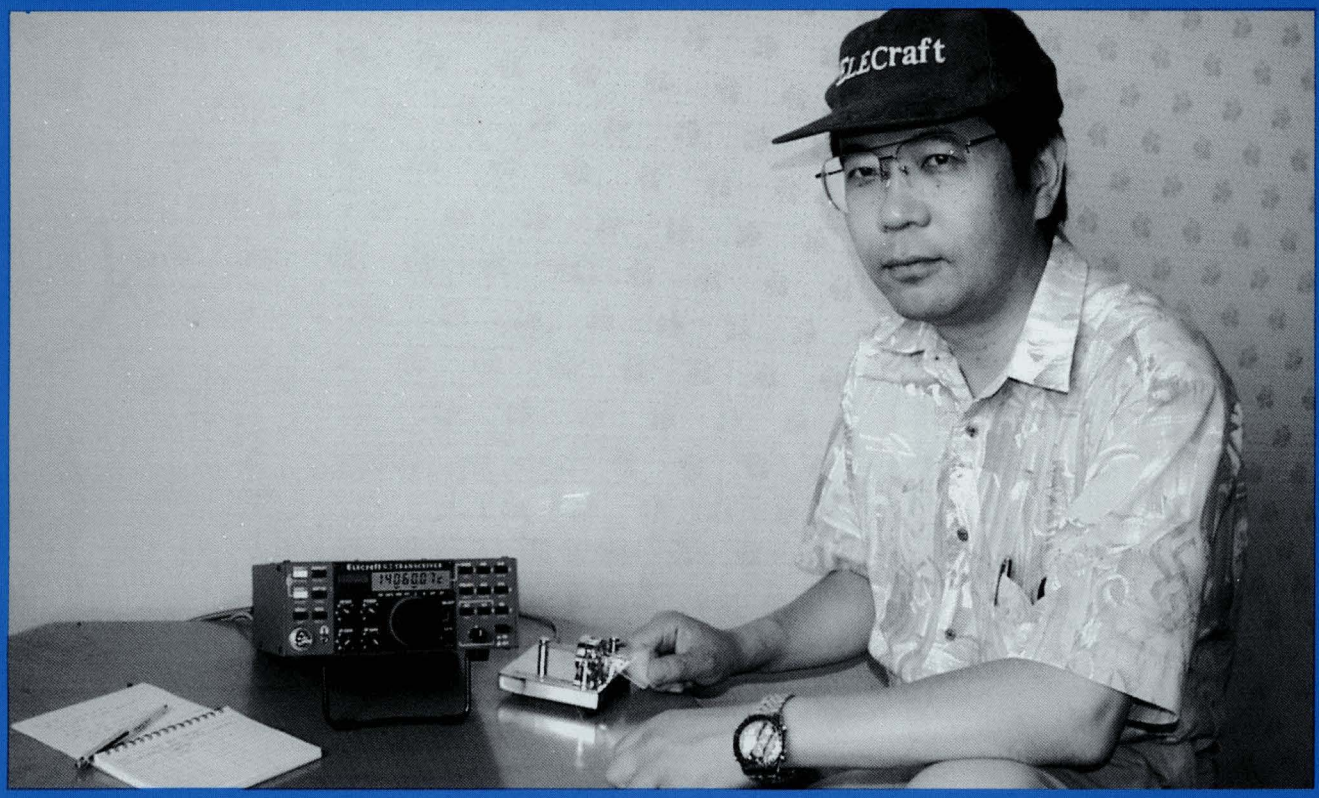

The cover photo winner this month is Shigehiro Kinoshita, JA8CCL. He sent this photo of him using the new K2 rig while at the Tsukuba-san Mountain Hotel. This was the base for the QRP mountain topping expedition. Shige is an avid builder and has built an SST, NorCal40 and a Sierra. Thanks for the photo Shige and I hope you work WAS with you soon to be K2!

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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Bob White, WO3B is still getting setteled down in his new QTH. He will be back with his Milliwatting column as soon as he can.

We all lost a dear friend when Roy Gregson, W6EMT passed away last week. Our prayers are with his family.

NOTES FROM THE PRESIDENT

Mike Czuhajewski, WA8MCQ

NEW E-MAIL ADDRESS

Please note that my e-mail has changed. My old abs.net account will be closed by the time this appears in print. My new address is wa8mcq@erols.com.

GQRP OBITUARY—NICK CARTER, G2NJ

Rev. George Dobbs, founder and guiding light of the GQRP Club, announced the death of a prominent GQRPer this summer:

"We regret to announce the death of Nick Carter, G2NJ, on June 4th. Nick was GQRP Club Member Number 2 and was a founding member of the club. Nick was a former sports journalist and an avid CW operator on 80 meters. In many ways Nick was instrumental in the formation of the club. It was after several 80m QRP CW skeds with Nick that I decided to write to the Short Wave Magazine asking for like minded people to drop me a line about the possible formation of a QRP group. Naturally Nick was one of the first 30 or so people who made up the club. When we added membership numbers, as the club grew, because of his early involvement and motivation Nick became number 2.

"His call will live on in the club through the "G2NJ Trophy," an award he presented to the club many years ago [in fact our first award]. This is offered each year to the person we believe to have made the best overall contribution to the club or to QRP operation during the previous year."

ROY GREGSON PASSING--W6EMT SK

On 21 August, Preston Douglas, WJ2V, posted this to QRP-L, the Internet QRP forum:

"I have the sad duty to report that our friend Roy Gregson died early today. He had been ill with cancer for some years and had a recent relapse. Roy was the owner/proprietor of Emtech, manufacturer of the NWxx series of transceivers, Ladder Grabber dipole centers, and a popular antenna tuner kit. His daughter advises that the children will see to it that all existing orders will be filled. The children will also advise about future sales of these products.

"Roy was a friend of mine who I never met in person. We met on the phone when I built my first NW80/20; his generosity, interest and enthusiasm were what made him such an easy guy to become friends with. We spoke and e-mailed frequently, and he had hoped to one day come to Dayton for the Hamvention. I wish he had made it. Many of us have expressed similar feelings, I know."

There were several other comments on QRP-L about his passing, and all spoke very highly of him. It's quite obvious that he was greatly respected and liked, and many will mourn his passing.

NORCAL 20 SOLD OUT IN 18 DAYS!

In the last issue we carried the announcement by Doug Hendricks, KI6DS, for the latest NorCal kit, the NorCal 20. I hope that everyone who really wanted one didn't hesitate or procrastinate, since they were all spoken for quickly. They said they would not accept orders until the first of August, and they were gone within 18 days after the gate opened, according to Jim Cates, WA6GER.

Unlike some of their previous kits, this one has a limited run. They planned on doing 500 of them--with another 500 to be donated to hams in third world countries, with distribution being handled by the GQRP Club and G3RJV--and there would be no more after that. (At the time of writing, I haven't heard of any plans for someone to produce the rig commercially, although it should be a good seller. The design was done by Dave Fifield, AD6AY, and it sounds like a real winner.)

NEW EDITOR FOR THE QRP QUARTERLY

George Heron, N2APB is one of the guiding lights of the New Jersey QRP club, and has also helped with the FDIM QRP symposium at Dayton. Now he has another job--editor of the QRP Quarterly. Outgoing editor KU7Y, Monte Stark, has made a number of improvements in the QRP Quarterly since he took over with the July 1995 issue. With 14 issues under his belt (including this one) he feels it's time to move on, leaving it bigger and better than ever. We really appreciate all the work he's done over the years, and I especially appreciate him letting me be chronically late with my column most of that time. I actually got it to him BEFORE his deadline--once!

ELMER 100 SERIES IN FALL 1998 QRPP

Those of you who frequent QRP-L, the Internet QRP forum started in 1993 by Chuck Adams, K5FO, are well aware of the months long Elmer 100 project being honcho'ed by Mike Maiorana, KU4QO (ex KF4TRD). The "Elmer Project" was started to provide a group learning experience, helping those in need to better understand how a common QRP transceiver works, the idea being to build a standard kit as a group, while the Elmer volunteers provide technical advice and circuit analysis during each section. They chose an updated version of the SW-40 from Small Wonder Labs. As people built their kits they would post their questions to QRP-L and someone would reply publicly, helping everyone understand how it works.

When the project started there was a lot of talk about putting the lessons, rig instructions, circuit theory, modifications, etc into a booklet. Since that would be an extensive undertaking if done as a project in its own right, Doug Hendricks, KI6DS decided to devote the entire autumn issue of QRPp to the project. It will have the lessons and assembly instructions, as well as the detailed circuit analysis and descriptions offered by many on QRP-L. It was said that Doug expected to have around 80 pages for this issue. It should make an excellent tutorial and be quite interesting. Those of you who are already QRPp subscribers have an excellent issue to look forward to. But don't worry if you're not; Paul Harden, NA5N indicated that they will be printing up 500 extra copies, and will be made available for purchase sometime next year.

If you subscribe now you can still get the Winter issue, which should also be a good one. That will be primarily dedicated to the winning entry in the NorCal 2N2222 building contest at Dayton this year. The rig was designed by Jim Kortge, K8IQY and is quite impressive. There will be detailed, step by step construction details, along with lots of pictures.

If interested in subscribing to QRPp, the rate for US/Canadian subscribers is $15 per year, $20 for others (air mail), US funds only. They request that checks, money order, etc be made out to Jim Cates, not to NorCal. Send to Jim Cates, WA6GER, 3241 Eastwood Road, Sacramento, CA 95821. (Sorry, like the QRP ARCI, they will not accept subscriptions for periods greater than 2 years.)

HAMFEST SUPPORT

This hasn't been too well publicized lately, but we still do it. If anyone is interested in setting up a QRP booth at a hamfest or convention, we can provide you with one of the QRP ARCI banners as well as some back issues to sell, and possibly even a few goodies from the QRP ARCI Candy Store, like hats, pins, mouse pads, cups, etc. We'll pay for the booth if it's set up primarily as a QRP booth, and will also reimburse for return postage of the banner.

QRP HALL OF FAME TIME AGAIN

The annual call for nominations appears elsewhere in this issue. If you'd like to put someone's name in the ring for possible induction into the QRP Hall of Fame, check it out, write it up and get it to me (US mail or e-mail) by the end of January.

NEW ANNUAL QRP RECOGNITION PROGRAM

Also appearing elsewhere in this issue is information on our new Quality Recognition Program (QRP for short, of course!). This is something to supplement the QRP Hall of Fame, to honor those who have made outstanding contributions to QRP within the previous year or so. We've needed an "attaboy" program for some time, and this is it. If you know of someone who has done something good for QRP recently, let us know and submit a nomination for them. Unlike the QRP Hall of Fame, this is an award which can be given to an individual repeatedly if the contributions warrant it.

This program has not really been publicized much yet, although we have issued several awards already. (They were supposed to have been given at the QRP banquet at Dayton, but several things had to be dropped due to the length of the program.) The article elsewhere in this issue gives details.

—qrp—

NOTES FROM THE VEEP

James Stafford, W4QO

Well, it's time for the fall contest season to begin and I hope to see all of you in some of the big ones like SS and CQWW as well as the little ones like the QRP ARCI Fall QSO Party, October 17-18 - although we hope it isn't so little this year! As I write this, I am just returning from the Huntsville, AL Hamfest where Randy Moore, KS4L, hosted a darn nice QRP forum. There were 3 hour-long speakers and I think the average attendance was about 25 at each one. I really like the Huntsville Hamfest which I've heard is billed as the seventh largest hamfest in America. It certainly seemed to have something for everyone again this year.

At the QRP forums, L. B. Cebik, W4RNL, did his usual great job of explaining how to get the most from your antennas, no matter how meager. I also enjoyed talking about "birds" with he and his XYL Jean over a hot dog at lunch. Seems their interests and the Stafford's run somewhat parallel, although Jean and LB are way beyond Marilyn and me in the bird assistance field. It was still fun exchanging hummingbird stories.

Back to the forums. Mike Maiorana, KU4QO - The Internet and the "Collective Elmer" - was a very popular forum talking all about his experiences with the Internet 101 project. This is getting me to the point of this note - Mike has been a ham for only one year and it is especially gratifying to see new (and sometimes young) hams participating in QRP construction and operation. In the room for Mike's forum and one that I presented (courtesy of George Heron, N2APB who put together an excellent QRP tutorial on PowerPoint) was young ham Brian Mileshosky, N5ZGT. Brian is from New Mexico and made the trip to Huntsville. Seems he is quite a QRP enthusiast and has been helping promo QRP at some of the hamfests in NM. He also happens to have won a Young Ham of the Year award recently, so he is quite an active young man.

OK Jim, what's the point? I have, for the past ten years, been promoting ham radio among the young folks in North Georgia with something called the RadioActive Schools program. We go out to area schools and do programs showing off technology as much as ham radio, but always tying it back in to the hobby and how much fun it is. Here is my question - with the new QRP ARCI fiscal year just beginning, what new areas should the club branch into? We hear that all members want is the QQ - on time and fat - and that defines their interest in QRP ARCI. I think there is more that can and should be done. Perhaps enticing youth through some kind of support - a book on ham radio construction, a kit of some sort, or just promo materials that can be handed out to young people as we go about our lives. I'm not sure what it is, but if you have ideas, let me know at my email address on the back cover. We heard at FDIM at Dayton, that there seemed to be a younger ham crowd at the seminar than is found in a cross section of amateurs. So we seem to be attracting younger hams, now let's just get it in high gear and get even more of them involved. QRP is the route to go in my humble but accurate opinion!

Or if you want to see some other areas emphasized (a youth program is just one idea), please let me or the other officers know. I firmly believe that QRP and all its associated activities is just about as close to fundamental ham radio as you can get. Now let's figure out how to get the word to everyone, not just fellow hams. That's my comment; now let's hear yours.

From the Membership Chairperson

Dave Johnson, WA4NID

Please, EVERYONE understand these 4 points.

1. The QRP ARCI provides a wonderful publication, great programs, and is run by volunteers. Because we operate with somewhat limited resources, we ask that you please take the responsibility to renew your subscriptions on time. We usually show the last scheduled issue to be received under your subscription, in the form of a date, on your mailing label. Please renew, or provide any changes of address, before or by this date to assure uninterrupted delivery. (I must receive all data by the first of the MONTH PRIOR TO AN ISSUE MONTH to assure updating the mailing labels for that issue.)

We lose money when we send individual issues, so please understand when we ask you to purchase back issues for any you missed due to lapse in subscription. We need to be fiscally responsible because we want our club to continue, so do not be offended when I am strict about observing the deadlines. Just be happy that we do offer a supply of back issues, and improve your record keeping if necessary. I do not have time to send out routine renewal reminders to all members individually, or to inform members that their renewals have been received, and this would be a financial burden to the club as well. So let's all support our club by keeping our own subscriptions current.

2. Another way you can support the club is to follow these rules for filling out the forms for new memberships or renewals: PLEASE INDICATE CLEARLY if the application is for NEW MEMBERSHIP OR RENEWAL, write legibly or type, and provide your QRP ARCI Membership Number if you have one.

3. This last point applies to all correspondence directed to ANY of the officers, committee chairpeople, or staff of the club. When writing by postal mail, or by email, or whatever method, PLEASE ALWAYS SUPPLY COMPLETE INFORMATION so that your request can be handled directly, and send the correspondence to the proper person. This is just common sense and courtesy, but many times members fail to provide necessary information, or send to a person who does not handle that type of request, and this requires much back-and-forth effort from one officer to the other. OK I know it may be difficult to direct a request to the correct person, as we have so many chiefs! But please try! THIS IS AN IMPORTANT EXAMPLE: If you are making a request for a missing issue of the QRP Quarterly, check with ME as I handle the records regarding subscriptions and if warranted, I will arrange for our Super Back Issues Guy (K3TKS) to send you one. Do not just send Danny a note without any information other than your callsign, saying you missed an issue! When you correspond, send your full address so that we can check the records and verify we have it correct. That may prevent us having to send yet another message asking you to verify something. And use your QRP ARCI number to make it easier for me to look you up in the database.

4. The volunteers who serve as officers are trying to make the club successful at serving the needs of members, and the only way we can hope to be effective is for YOU to share your ideas, praise, gripes, and inspiration with us. We are available and want to hear from you! Let's work together to make QRP ARCI even better.

A couple of unnumbered extras. As always, I solicit materials for the QRP ARCI Web Site: member news, information on upcoming contests, or anything else you think may be of interest to members. I need your input! Hey you can visit the QRP ARCI Toy Store via a link from the home page, at www.qrparci.org

Have Fun With QRP., Dave WA4NID
QRP ARCI Membership Chair, and Web Site Manager

TIME TO CHECK THE ADDRESS LABEL

Please remember to check the address label to see if you need to renew your membership in the QRP ARCI.

DON'T MISS A SINGLE ISSUE OF THE QUARTERLY

APPLICATIONS MUST BE RECEIVED BY THE MEMBERSHIP CHAIRPERSON AT LEAST 30 DAYS PRIOR TO THE COVER DATE TO RECEIVE THAT ISSUE!

Don't wait for us to send you a reminder, we just might not!

FROM THE EDITOR

Monte "Ron" Stark, KU7Y

Wow, time for another Quarterly already. The weather here is still hot, near 100F again today. I am having a hard time trying to figure out what to say this time. This is my last issue as the your editor. I started doing this job with the July 1995 issue. This makes just over 3 years, during which time I have met many, many wonderful people. I wish there was some way to thank each and every one of you.

Before introducing our new editor, I want to thank the whole crew for all their hard work these past 3 years. These are the people that have made the Quarterly what it is today. I really can't imagine having a better crew to work with.

I would also like to thank our President, Mike Czuhajewski, WA8MCQ for his support over the years and to the BoD for not tying my hands and letting me come close to running wild!

Our new incoming editor is George Heron, N2APB. George has written many fine articles and he is responsible for the great job on the FDIM proceedings. I hope you will all send him a note welcoming him to the team and that you will give him your support. And from me to George, Thank You. Now I can start getting caught up with the projects around the place!

I have moved the shack into it's own room in the garage, complete with hot and cold running water, bathroom, kitchen sink, stove, refrigerator, reloading bench, fly tying bench and even cable TV!

There will soon be two computers hooked up in a network for 2 radio contesting. Still to be done is the ditch for the feedlines and control cables, fences around the tower and guy wires, fixing and mounting the 3 element 20m yagi at the 60' mark on the tower. Then comes the phasing box, automatic antenna switching and etc. You can see why I need some extra time! Don't forget, I have to defend my honor this upcoming SS contest. There is a fellow in TX that would love for me to have to buy his dinner!

Then there is the ARRL and the FCC. Seems these two are having a race to see which one can get rid of all the details that stand in the way of anyone wanting to become a ham. Soon they will be ready to just charge a fee and pass out the license!

Why would they want to do this? Seems simple to me. The FCC doesn't have the people or money to watch after something that doesn't bring in any money, like amateur radio. Better for them to just sell the licenses and be done with it. If you noticed in their proposal, nothing was said about hams being any kind of "experienced pool" of operators to call upon in case of emergency. They have classified it just about the same as CB. Nothing more than play time radio with no real purpose.

The ARRL on the other hand just might have a different reason. The more people that come into the hobby, the more members the ARRL should be able to get. This equates to an almost guaranteed growth for them. I hate to think this but their actions over the years seem to support it. After all, if the shoe fits, you have to wear it!

What should we be doing? Why, I thought you'd never ask! As one of the people to enter the hobby during the early days of the dumbing down of ham radio, I have watched this whole pattern unfold. What we should be doing is having one entry level license that is very restricted. Fixed time for it to be good. Good for 2 or 3 years. Maybe even renewable once. But not a lifetime deal! Only allowed on 1 GHz and up for voice and a couple of novice type CW learning bands on HF. CW at 5 wpm should be part of this license.

All CW tests should be solid copy for 1 minute out of 5. Either copy it or study some more. No more guessing! There should also be a sending test required. Your fist should have to be good enough for a computer to decode what you are sending. Again, 1 minute out of 5. Your choice of key or keyer as long as it's not a keyboard.

Starting with the general class license there should be circuits that need to be drawn! The general class should be the highest class license someone could start with. Each move up would require some "time in grade". Maybe 1 year as a general before becoming an advanced class. 2 years as an advanced before becoming an extra class.

Radical you say? Could never be? Well, that's about what there was before the ARRL started taking it all apart. And there was nothing wrong with it. Anyone who wanted a license got one. Sure, you had to work for it and I realize that today that's not how things go. But just because the popular idea is for free access without work, that doesn't make it right and that doesn't make it good for the hobby.

We must accept one little truth. Ham radio is NOT for everyone! No matter how much we love it, there will always be just a small amount of the population that want's to play with radios! Or with computers hooked up to radios! Starting in the 50's the new novice license was going to bring in all the kids that "just could not learn the code" and make real whiz-bangs out of them. I'm still looking for them!

I would love to see the QRP ARCI take a firm stand and join with FISTS, SOWP and who ever else is fighting this trend. Someone has got to lead the charge back to normalcy. It's all about lowering the standards to the lowest common denominator and that's wrong.

Notice that in step one of the ARRL "plan" there is no more incentive for the extra class license. Next it will be eliminated because it serves no propose. Just like the novice license. SSB sub bands are increased into CW bands. Soon CW will be having to operate in with the SSB signals. This is very similar to what happened to AM years ago. And there is nothing wrong with AM!

No, these proposals are not about saving amateur radio, they are about the beginning of the end for amateur radio as we know it.

I don't blame anyone for entering the hobby through whatever door was open at the time they got there. I did the same thing with the novice license. But my point is that I would have become a ham with or without the novice license and so would most others!

QRPers are a wonderful group of hams. Most are willing to work to better their understanding of electronics and operating. If you don't think so, look at things like the Fox hunts and the Elmer 101.

The secret to building up amateur radio is to go out and recruit good people that have an interest in the hobby. Then HELP them! Most of us can give some war stories about our first visit to a club and how we were made to feel all alone. Don't just go do a show and tell someplace. Follow up and HELP those who show some interest.

No group is any better than the dedication of the people that are in it. Remember that as you contemplate lowering the requirements. Think about why the FCC no longer sees us as a useful pool of anything! To me, that's insulting. That used to be our strong suite and helped save us from loosing our bands to the "big boys". Now it seems there is no real reason for the FCC to care if we are here or not!

It's sad times we live in in many ways. Compromise, compromise and more compromise. Always trying to make the lazy feel better about being lazy. While you are thinking, think about this: All compromise is always in a negative direction! Those who wanted a 25 wpm code test compromised with those who wanted only a 13 wpm test and came up with 20 wpm. Now it's being compromised down to 13 wpm. I don't know of any example of compromise EVER going in the positive direction!

Thank you for reading my last editorial. You are all free from my ranting at last! Lets be sure to continue to fight for QRP in spite of everything else that is going on around us.

de Ron, KU7Y

Announcing the QRP-ARCI Quality Recognition Program

Steven Pituch, W2MY
2020 South Dairy Ashford
Houston, TX 77077

The purpose of this new program is to recognize hams for their contributions to QRP by way of a special award. This award is meant to complement the QRP-ARCI Hall of Fame award. Whereas the H.O.F. award recognizes lifetime achievements, this new award is meant to recognize the shorter term achievements that help the QRP movement. By way of this award, QRP-ARCI hopes to encourage others to experience the joys of QRP operation, and to make their own contributions to QRP.

Any Ham may nominate any other Ham for this award. Neither must be a QRPer. Sometimes a non-QRPer makes such a great contribution to Amateur Radio that it significantly helps QRP. The QRP-ARCI Board of Directors votes on each nomination.

The nominating sponsor decides what the award category should be. This is because the number of ways one can help the QRP movement is limitless, and the sponsor knows best how the award category should be described. It is very important that the sponsor supplies a detailed description of the nominee's qualifications. It is this description that is used to formulate the custom testimonial at the bottom of the certificate. Because of the unique information shown on each certificate, every certificate is individually made, and is very special.

The announcement about this award, and the first set of recipients of this award were going to be announced at Dayton, but there just was not enough time, so we are doing it now. It is my privilege to announce the first eight recipients of the QRP-ARCI Quality Recognition Program (or Q. R. P. for short):

The following form may be used to nominate someone for this award. There is also a copy of this form at the QRP-ARCI web site. Please send the nomination to me at spituch@fwc.com, or the following address.

Quality Recognition Program Nomination Form

Sponsor's Information
Name:_____ Call:_____
Street1: _____
Street2: _____
City: _____ State: __ ZIP:_____
Country:_____
E-mail address: _____

Nominee's Information
Name:_____ Call:_____
Sex: M / F
Street1: _____
Street2: _____
City: _____ State: __ ZIP:_____
Country:_____
E-mail address: _____

Award Category:_____

(Since contributions differ, you are best qualified to describe the nominee's contribution in a short concise phrase. If the nominee is approved, this information will be used by the chairperson to help create a category/title for the actual award certificate, so this information is important.)

Summary of Nominee's Qualifications for this Award
(Please be complete in your description. If you don't supply sufficient information, the nominee may not be approved. Take as much space as necessary. Don't assume that the B.o.D. knows anything about the nominee. Include as many pages as necessary.)

It is my privilege to announce the first eight recipients of the QRP-ARCI Quality Recognition Program.

Award #	Recipient	Nominated by	Category
1	Andy Becker, W0NVM	NF0R	Outstanding Club President
2	Keith Arns, KC0PP	NF0R	Outstanding Newsletter Editor
3	George Murphy, VE3ERP	W0RSP	Outstanding Amateur Radio Software Package
4	Maguel Montilla, EA3EGV	GM6JAG	Establishment of the EA-QRP Club
5	Maguel Molina, EA3FHC	GM6JAG	Establishment of the EA-QRP Club
6	Vicenc Llario, EA3ADV	GM6JAG	Establishment of the EA-QRP Club
7	Jerry Parker, WA6OWR	G4WIF	Outstanding QRP Web Site
8	Wayne Burdick, N6KR	WA8RXI	Outstanding Technical Article

Still QRP Really!

QRP WISDOM FROM UNCLE BRUCE

Bruce Muscolino, W6TOY
P.O. Box 9333,
Silver Spring, MD 20916-9333
w6toy@erols.com

Mea Culpa

In last quarter's column I said the CB Slider part of the Back to the Future project was appearing elsewhere in that issue; clearly it didn't! The route the material took from me was to Doug Hendricks for QRPp, first, and then from Doug to Ron Stark for the QRP Quarterly. Because of my health problems and some lost emails my input to Doug was late and he wasn't able to get them ready for QRPp or sent to Ron. Doug Hendricks apologized that the CB Slider will not appear in the Fall issue of QRPp. That entire issue is devoted to coverage of the Elmer 101 project recently run on the QRP L:ist. However, the CB SLider does appear in this issue of QRP Quarterly.

Gimmie Some of That Olde Tyme Knowledge

Recently the QRP List ran a project that involved a large number of subscribers who built a NN1G transceiver with help from a number of "elmers" on the list. The radio was built a stage at a time and the theory of each stage was discussed simultaneously. It is a testimonial to Dave Benson's design work and Mike Maiorana's editorial work that almost everyone who started this project finished up with a working radio! And a darned nice little rig it is, an improved SW40 now called the SW40+.

But the project illustrated the wide difference in understanding of the theory behind your radios within the group. I watched a number discussions, and participated in a few, with students who were confused by the theory because it came at too high a level. Whenever a group undertakes a project like this the lesson material must be set at some level that is likely too high for some and too low for others.

I think everyone needs to learn a methodology for answering their own questions or, at least, learning to ask those questions in a way that will get the necessary answer. I'd like to present an approach -- get a copy of the Radio Amateur's Handbook -- either buy it or take it out on loan from your local library and study the chapters on basic circuits (chapters 4, 5, and 6 in my 1995 edition). Study the basic material on passive circuit elements: resistance, capacitance, and inductance. I'm not ignoring the active components, but they are really easier to understand than the passive ones and a sound knowledge of the passive ones will let you do most of the circuit analysis necessary to understand your rigs.

Then study the material on AC and DC circuits, paying attention to series and parallel combinations of resistance, capacitance, inductance, reactance and impedance. Finally study the material on resonance and resonant circuits. With this material under your belt you are ready to begin analyzing circuits; no, not designing them, but at least understanding how circuits work.

You're probably wondering how to apply this material. A second book every QRPer should own is Paul Harden's Book "The Electronic Data Book for Homebrewers and QRPers". The first four sections of this book are devoted to an analysis of several small QRP rigs. Paul does a very good job of taking the rigs apart and telling the reader what does what. Recommended reading.

If I can add anything to his excellent work it is to always try to break any circuit you're trying to understand down to its basic functional elements. Usually, you can look upon the components on either side of an active device, or between two active devices as units. For example, the components between the antenna and the input of the first mixer (maybe a NE602) in a receiver form a matching network and a filter. Looking carefully at the circuit arrangement you can identify these elements and analyze them independently

Computer Aided Design and Analysis

You can help yourself quite a bit if you invest in one of the circuit analysis programs being offered these days. I started with a free downloaded copy of Micro-Cap V and recently graduated to the ARRLs Amateur Radio Designer software. These products are SPICE based circuit analysis programs. Micro-Cap V lets you enter your circuit either as a list of SPICE statements or as a schematic diagram. You can print out the schematics, the list of SPICE statements, and the results. With Amateur Radio Designer you enter your circuit as a list of SPICE statements. Again, the listing and the results can be printed. Both packages will show you the performance of your circuits in graphical or tabular format.

Micro-Cap V is available from Spectrum-Soft (<www.spectrum-soft.com>). The demo version is free. It is limited to 50 components in any one design but I seriously doubt that'll be a limit for you in the beginning.

Amateur Radio Designer costs about $150.00 and is available from the ARRL (<www.arrl.org>) and various other sources. I bought my copy from Bill Kelsey at Kanga, USA. There is no limit (that I've found) to the size of your SPICE Model.

Since these two packages do the same thing and one is free, you might ask why buy the ARRL's package. Fair question. The quality of your results using either of these packages is dependent on the quality of the circuit element models they provide. The ARRL package seems to better model circuit elements than the demo version of Micro-Cap V. Also, Amateur Radio Designer comes with both hard copy and CD based documentation and a number of example circuits that are immediately of use to radio amateurs. To get the full version of Micro-Cap V is an expensive proposition.

Another package that has come to my attention lately is Electronic Workbench as well. It is produced by Interactive Image Technologies in Toronto, Ontario, Canada. A demo is available from their web site (<www.interactiv.com>) or they will send t to you on a CD-ROM. I ordered the CD-ROM today and I'll let you know more about it next time.

Some information sources

OK, you worked XYZ4AB and you want to know how to send him a QSL. Here are several Callbook resources available on the world wide web. Please remember that most sites are specific to a particular country or set of countries.

Two sites I use all the time are the University of Arkansas at Little Rock (UALR) Amateur Radio Club and QRZ.COM. They cover only the United States. The UALR site is updated daily via the FCC and is probably a good place to look for your upgrades. In most cases the addresses I list will take you directly to the callbook server. Most sites have a lot more to offer, so look around while you're there.

http://www.ualr.edu/~hamradio/callsign.html

http://www.qrz.com/directory.cgi

Another site that carries the US and some foreign countries is Buckmaster's On-line Data.

http://www.buck.cgi-bin/do_hamcall

QSL managers and routing information can be found at:

http://www.systemtechnik.tu-ilmenau.de/ham/qsldb_gate.html

Russia and the former Soviet Union countries information can be had from: http:/www.octavia.com/callbk.htm

And finally, Grid Square Maps in bit map format that can be downloaded and printed or viewed are available from:

http://VHFGroupers.greeceny.com/page10.html

Until next time

I will finally be having my right hip replaced on August 21st. Wish me luck and I'll see you all next time.

QRP CLUBHOUSE

Bob Gobrick, N0EB, (VO1DRB & UN7/N0EB)

Welcome to the **QRP Clubhouse**. What's the secret password? Why "QRP" of course! Breaking Clubhouse News - The word is on the street! Fall 1998 kicks off what may be one of the most exciting periods for QRP operators. This is the year when we should see the start of an upswing in DX contacts as solar conditions improve the propagation of QRP signals. As recently reported by **Arnie Coro, CO2KK**, on his Radio Havana Cuba's DXers Unlimited program, QRPers should experience some fantastic band conditions on 20 meters and above. Look especially to the 17, 15, 12 and 10 meter CW bands for some super DX contacts. These bands offer the QRPer many benefits since a low power signal at these frequencies has a better chance of making that DX contact when the propagation is right. Antennas for these bands are also a lot smaller than what one needs for the 80, 40 and 30 meter bands. I have many fond memories, from the last solar cycle, of working exotic DX with a 15 foot half wave 10 meter dipole strung across my apartment balcony. 20 meters will also be hopping, but it will be a crowded band with many QRO DXers taking to the airways. So get ready for some real QRP fun starting this fall.

The Fall kick-off will also be an exciting time for QRP Clubs. There are so many QRP topics to be talked about and so many educational programs to be held dealing with the upcoming solar cycle. Presently, there are only a few North American QRP transceiver kits available for the bands of 17 meters and above. The only mono-bander kits available are from **Small Wonder Labs** with their Green Mountain series of CW rigs. There are a number of multi-bander kits presently available that reach up into these higher frequencies such as the **Oak Hills Research** OHR-500, **Wilderness Radio** Sierra, **Elecraft** K2 and the **S&S** M1. Opportunities abound for QRP Club designers to develop some nice portable rigs for these hot DX bands. Antennas for the QRPer using these DX bands would make for some interesting club talks. Since the size of antennas become smaller and more manageable as we go higher in frequency we should start exploring some simple gain antennas for these bands such as wire yagis. A good wire antenna reference is **William Orr's** book on "Simple Low Cost Wire Antennas". Propagation and understanding operating techniques on these bands would make for some interesting talks. And finally there could be some wonderful tutorials about QRP DXing techniques. A good reference for this talk is the book "Complete DXer" by **W9KNI**.

So now is the time to start setting up some autumn and winter educational programs for the QRP Club meetings. I'm sure when the QRP DX bug bites there will be a clamoring for more information about how to join in on the fun. Please drop me an email if your Club is planning some talks on QRP DXing. It would be nice to share that information with the other clubs.

The QRP Clubhouse news will be brief this month as many recover from their "QRP To-the-Field" activities and the many great QRP forums that took place this summer at hamfests across the country.

CQC Goes Iambic

The July issue of the **Colorado QRP Club** "The Low Down" highlights an article by the new CQC President **Marshall Emm N1FN** titled "Adjusting Bencher-style Paddles". Marshall takes the reader through a detailed adjustment procedure for the very popular Bencher paddle. This is wonderful reading and more importantly it may give us all an incentive to finally adjust are paddles for best performance. I hope Marshall continues this series with future articles on adjusting other paddles like the magnetically tensioned ones, etc. The July issue also highlights installment #11 of **L.B. Cebik W4RNL** Antennas from the Ground Up series of articles. This issue covers a 135' Off-Center-Fed Multi-band Dipole Data Compendium. **Phil Krichbaum N0KE** in his QRP DX News column reminisces about a "hot" 2 element wire beam for twenty meters that he installed in his attic. With the antenna (attic) aimed at Europe he made many enjoyable DX contacts. Nice to hear as our DX bands heat up.

Also reported on the QRP-L was a new program by the CQC called "This Old Dipole" Basically the club conducted an antenna workshop at Marshall's QTH. The main event was to replace an old 40 meter coax fed dipole with a new one fed with 300 ohm ladder line. To this columnist it sounded like a good way to get some free labor but actually it is a neat way to learn about installing antennas from some of the club elmers. Great idea gang! If you are interested in joining the Colorado QRP Club, or as **Rich High W0HEP** states "a regional club with national and international membership" drop Rich an email at W0HEP@aol.com or write CQC, PO Box 371883, Denver, CO 80237-1883.

CQrp Reviews

Steve Bornstein K8IDN seems to always have a new review for each monthly issue of the CQrp Club newsletter of the **Columbus (Ohio) QRP Club**. The August 1998 issue was no exception. This time Steve tackles one of the premier QRP kits in Europe - namely the **Hands Electronics** GQ-40. I've heard a lot of good things about this rig and Steve's review let's you know that this is one "class" design. Designed for the harsh European 40 meter broadcast band environment, the single conversion rig has a bullet-proof front end with a high end mixer and a six pole crystal IF filter. Power output can be adjusted up to 7 watts so it just "cruises" at qrp power. **Bill Kelsey N8ET** (a CQrp member) of **Kanga US** will be carrying the GQ-40 and GQ-20 for North American sales. For more information on joining the **Columbus QRP Club** drop Steve Bornstein K8IDN an email at Saborns@aol.com or write him at 475 East North Broadway, Columbus, OH 43214.

Lo-Key - Chock full of QRP Goodies

The June 1998 issue of the Australian "**CW Operator's QRP Club**" **Lo-Key** newsletter arrived at the **QRP Clubhouse** mailbox just chock full of QRP circuits. **Fred Bonavita W5QJM** leads off with an article on using the famous American Wall Warts as qrp power supplies. As a follow-up **Bill Currie, VK3AWC** follows with an Australian version (230 Volts 50 Hz) on Plug Packs qrp power supplies. **Phil Anderson VK2GPT** presents a circuit for a Simple Direct Voltage Calibrator for use with test equipment around the shack. The "centerfold" article is one by **Bill VK3AWC** and **Harold VK3AFQ** on a neat Tunable Low Pass Audio Filter using two National Semiconductor MF4-50 chips. This issue finishes up with an article by **Walter Dufrain AG5P** on the St. Louis Loop (SLL). For information on the CW Operator's QRP Club drop **Kevin Zietz VK5AKZ** (treasurer & Secretary) an email at kevin.zietz@adelaide.on.net or 41 Tobuck Ave, St. Marys, SA 5042, Australia.

NorCal QRP Pacificon is Coming

Doug Hendricks KI6DS reports that the **NorCal QRP Club** will be well represented at the **Northern California Pacificon Hamfest** held in Concord. CA on October 16, 17 and 18. The Saturday QRP forum will have a line up of some great speakers. **Bill Jones KD7S** will speak on Building QRP enclosures, **Joe Gervais AB7TT** - having fun with QRP contests in the field, **Paul Harden NA5N** - Solar Predictions, **Dave Littlefield AD6AY** - designing the NorCal 20, **Ade Weiss W0RSP** - Propagation, **George Dobbs G3RJV** - the famous G3RJV Six Pack and **Roy Lewallen W7EL** on using antenna software and QRP Field Day Operating. For information on Pacificon and obtaining a copy of the NorCal QRP Forum Proceedings drop Doug an email at

ki6ds@dpol.k12.ca.us or 862 Frank Ave, Dos Palos, CA 93620.

QRP Society of Central Pennsylvania not so "TACy"

Congratulations to the **QRP Society of Central Pennsylvania** and Contest Chair **Cam Bailey KT3A** on their first annual TAC Contest held on June 6, 1998. This turned out to be a unique and popular QRP contest with folks exchanging their Telephone Area Codes. In the July 1998 issue of the **QRP Gazette Bob Wicks W3HAH** reports that the next club project "build" will be a 20 meter version of the famous Pixie design. The **QRP Clubhouse** will keep you informed on how the Pixie works on 20 meters. For more information on the club contact Bob Wicks W3HAH at bonwicks@aol.com or 20 Brenely Lane, Mount Holly Springs, PA 17065.

Indiana QRP Club off to a Racing Start

Jim Osburn WD9EYB reports that the new **Indiana QRP Club** had it's first gathering at the Indianapolis Hamfest on July 11. What started out as 15 QRPers meeting via email is now an official QRP Club (with Club call **WQ9RP** courtesy of **Bob W9YA**) and over 50 sign-ups at the Hamfest. The QRP table at the hamfest was busy all day with hams gawking at the neat QRP toys on display. **Tom N9DD** and **Jim** manned the table. **Denny N9JXY** displayed his popular lunch bucket rig that appeared on the April 98, QQ cover. **Denny** also had a KnightLite SMiTe built into a Kiwi shoe polish can, a Tuna Tin 2, a Herring Aid 5 and other "tin" radios that drew the crowds. **Rick Weber W9QZ** displayed a KnightLite SMiTe and surface mounted **Embedded Research** Tick keyer combo - that was really small. **Jim WD9EYB** also had a 38 Special mounted in a pencil box. A good QRP show-and-tell and a great start for this new club thanks to the work of **Ted KB9RPD, Rick W9QZ, Wayne AA9SP** and the rest of the gang. Check out the **Indiana QRP Club** website at http://www.accenttech.com/qrp/ For information on joining drop Jim WD9EYB an email at wd9eyb@qrp.com

Mid-America QRP Association invades Mid America Kansas City

Mike Watson W0TMW, Joe Eder KU5M and **Dale Lam WA0NKE** reported over the QRP-L the great showing of the new **Mid-America QRP Association's** booth at the July 11 Kansas City PHD Hamfest. The MAQRP put on a two hour forum at the hamfest with **Ade Weiss W0RSP** as the guest speaker. Additionally a QRP rig show-an-tell was carried out by **Joe KU5M, Roy AA0B** and **Mike W0TMW**. At the MAQRP booth **Jack W0FNQ** installed a St. Louis Vertical and many of the members QRP rigs were set up for display and operating. Other Club attendees were **Doug AA0MS, Jerry W0CLR, George W0AV, Gary K0BC** and **Dan KF0OV**. Mike reports that over 15 new members were signed up at the hamfest. For more information on the MAQRP please contact Mike Watson W0TMW at crucis@sky.net

KnightLite QRP Net Swings into Autumn

Just a quick not from **Randy Hargenrader WJ4P** on the popular **KnightLite QRP** net held every Sunday evening at 21:30 EST on 3.686.4 Mhz (that's exact +/- xtal drift). Net control is **WQ4RP**. And yes, there have been a number of check-ins from folks using the famous KniteLite SMiTe surface mounted rig. For more information check in on Sunday night or drop Randy WJ4P n email at randyh@harksystems.com

Michigan QRP Club 5 Watter

The June 1998 issue of the **Michigan QRP Club** newsletter the **5 Watter** has a dual review on the TenTec 1330 and 1340 transceivers by **Walt Amos K8CV** and **Steve Sorrell W8SFF**. This review supplements nicely the one in the September 1998 **QST**. **Bob Williams W9NIP** reports in his QRP DX column the super achievement by **John NN0F**. Recently John completed his Worked All States (WAS) 2-way QRP contact with **Sam KH6AFS** on 15 meters. This was all done with a 120 foot center fed Zepp antenna at 30 feet high. Congratulation to John for this great QRP achievement.

DL-QRP-AG Visits Dayton

I missed reporting in the last issue of the **QRP Clubhouse** a visit by **Peter Zenker DL2FI** to the 1998 **QRP ARCI Four Days in May Conference** and the **Dayton Hamvention**. Peter was commissioned to attend Dayton by the Chief Editor of **Funkamateur Ham Magazine** (very popular ham magazine in Germany) as the QRP Editor. This was a lucky happening since Peter is also the Chairman of the **DL-QRP-AG QRP Club** in Germany. Although Peter was not able to attend the FDIM QRP Symposium we hope that he is able to arrive a day earlier next year and attend this great event. The **DL-QRP-AG** was founded in May 1997 and has grown to over 700 members in a short period of time once the first issue of the **QRP-Report**, the first German language QRP and Homebrewers newsletter, hit the stands. For more information on **DL-QRP-AG** please send an email to Peter_DL2FI@CSI.com

MFJ 90's Newsletter

Although not a QRP Club as such, I'd like to make a plug here at the **QRP Clubhouse** for the new quarterly **MFJ 90's Newsletter** edited by **Paul Harden NA5N**. This newsletter is dedicated to the MFJ-9000 series of QRP transceivers. In the Summer 98 issue, Paul covers the alignment of the 90xx's transmitter section. This followed the alignment of the receiver section which appeared in the Spring 98 newsletter and was well received by many members who were able to improve their rigs with the simple tune-up. The Summer issue also has a simple mod for adding a FAST or SLOW AGC function to the these great little rigs. Future issues will highlight additional mods for the 90xx cw transceivers, as well as tweaks for the MFJ-971 QRP tuner and MFJ-9020 SSB QRP rig to name just a few items on the agenda. If you are a MFJ 90xx owner, or for that matter an owner of similar **Rick Littlefield K1BQT** designed rigs (Emtech NW series), then drop Paul an email at NA5N@Rt66.com or PO Box 757, Socorro, NM 87801 for subscription information.

NoGaQRP Meeting.

NoGaQRP (North Georgia) group will meet on Nov. 14 at 11 AM at the Tech America store on Buford Hwy, Atlanta, GA. Web site:

www.america.net/~w4qo/nogaqrp.html

Well that is it for this issue of the **QRP Clubhouse**. Please mail your club news and photos (jpeg would be great) to **Bob Gobrick N0EB**, PO Box 249, Lake Elmo, MN 55042 or email me at rgobrick@att.net. Also drop the QRP Clubhouse a note if your QRP Club would like to exchange newsletters with the QRP ARCI. Cheers 73/72 Bob N0EB, QRP Clubhouse. **What's the secret password? - "QRP"**

Everyone is invited to check the QRP ARCI web pages at

http://www.qrparci.org/

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

NOMINATIONS BEING ACCEPTED FOR THE QRP HALL OF FAME FOR 1999

Mike Czuhajewski, WA8MCQ wa8mcq@erols.com

It's that time again--we are now accepting nominations for the 1999 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. In the last 2 years we gave the current QRP HoF members the option of voting if they wished, and several of them accepted. That may be done again this year, although it may be dropped or limited in the future. As the list of HoF members grows, so does the administrative burden of keeping the whole thing going. Sending out the nominations and ballots is not a problem, but having an increasing number of HoF members without e-mail accounts is.

After the deadline for nominations passes, the voting body discusses the nominees collectively via e-mail with a large address line. Collecting all of that discussion, dozens of mails over a couple of weeks, printing and mailing it out to those who cannot participate online, all is an increasingly difficult and time consuming task. Unfortunately it's a necessary one since everyone voting needs to be aware of the comments of the others so they can make informed choices. And it's further complicated by a growing number of HoF members who are located outside the US, with attendant mail delays.

In the past nominations were only accepted from QRP ARCI members since it's a QRP ARCI award. However, starting this year we'll accept nominations from anyone. As always, anyone can be nominated whether a member or not; this is an award to recognize those who have made great contributions to the QRP community, not just to the QRP ARCI.

If submitting a nomination, 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.

Send all nominations to me, WA8MCQ ; my USPS and e-mail addresses can be found elsewhere in this issue. (Please note that I have a new e-mail address, wa8mcq@erols.com.) 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!

Chuck Adams, K5FO
Brice Anderson, W9PNE
Wayne Burdick, N6KR
George Burt, GM3OXX
Jim Cates, WA6GER
Mike Czuhajewski, WA8MCQ ***
Tom Davis, K8IF
Doug DeMaw, W1FB (silent key)
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
Gus Taylor, G8PG
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 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--

Link-Coupled Antenna Tuners
Part 3: The Output Story

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

This is the third installment of a multi-part series on Link-Coupled Antenna Tuners by "LB". The first installment was in the April '98 issue beginning on page 13, and the second installment was in the July '98 issue, page 14.

In the preceding installment, we looked closely at the most common circuit variations on the input side of the inductively coupled ATU. The adjustments available to the coefficient of coupling and the series L-C combination provide limited flexibility. However, in conjunction with some techniques we can apply to the output side of the coupler, they add the refinement needed for very precise tuning that provides a 50-Ohm resistive load for the source and maximum power output to the feedline.

Before we jump into these output-side circuit variations, let's again reset the parameters of our initial ongoing problem that we initiated in Part 1 and continued in Part 2. We wanted a tuner for 7 MHz and chose from a list of recommended values a secondary inductor of 12 µH (with a reactance of 528 Ohms at that frequency) along with a primary inductor of 1.2 µH (53 Ohm reactance). The resonant capacitance was 43 pF. We chose 1500 Ohms (resistive) as our load (R_L). As in the previous installments, we will continue to work with resistive loads and save reactive loads for later.

With the chosen values and an assumed k of 0.6, the mutual reactance was 100 Ohms. The secondary loaded Q was 2.8 or so (which tells us that everything we are doing here is an approximation, since the equations are only accurate for Qs above 10). We obtained about 54 Ohms for R_A, given the resistive load of 1500 Ohms.

Let's take another look at the basic equation that will aid our overall understanding of inductively coupled tuners, expressed both in terms of working Q and in terms of the relationship in the secondary parallel tuned circuit of the load resistance and the reactance of the tank components:

$$R_A = \frac{k^2 X_{LP} R_L}{X_{LS}} = k^2 X_{LP} Q \qquad 1$$

R_A is the primary resistive impedance (coupled back from the secondary), k is the coefficient of coupling, X_{LP} is the reactance of the primary inductor, R_L is the load resistance, X_{LS} is the reactance of the secondary inductor (and of the capacitor at resonance), and Q is the loaded or working Q of the circuit.

The ratio of the load resistance to the reactance of the inductor (or Q) is critical to obtaining a desired value of R_A. If we alter that ratio, then we must alter one of the other components of the equation in order to obtain the same value of input impedance. For a fixed parallel-tuned secondary and a fixed value for the input inductor, if Q increases as the load resistance increases, then the coefficient of coupling must decrease. Under the same circumstances, if the load resistance decreases, thus decreasing Q, we must increase k. However, we are already close to or at a practical limit for the coefficient of coupling for air-wound inductors.

In addition, many of the coupled loads we shall face will be well below 1500 Ohms. The range from 200 to 1000 Ohms is perhaps the most common with parallel feedlines. Clearly, we need some flexibility in the secondary values.

Changing the L-C Ratio

As the load resistance decreases, we can simply decrease the inductor reactance accordingly and preserve the original value of Q. This move would seem to allow us to retain the same input inductor and coefficient of coupling to arrive at the same desired value of R_A. There is a catch in this plan which we shall consider shortly. However, let's begin with the assumption that we can maintain the coefficient of coupling and input inductor value. Then we might imagine a modification to our basic tuner as in Figure 1.

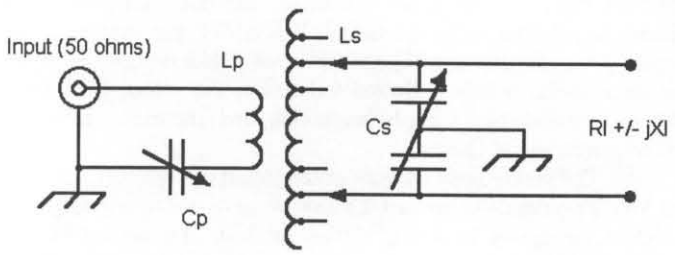

Fig. 1 L-C ratio impedance transformation.

Figure 1 shows a series input capacitor, but for now, let us only use it to cancel the reactance of the input inductor so that the source has a purely resistive load. The secondary shows a set of coil taps to which the capacitor is connected, so that the result is a tuned circuit of differing L-C ratio as one moves from one tap to another. Since each tap represents a different value of inductance, the inductive reactance also changes accordingly. This requires a new value of capacitive reactance for resonance, and hence a new value of capacitance. Since we are lowering the inductance and the inductive reactance of the secondary, new lower values of the load resistance will be needed to re-establish Q at its former value.

For this exercise, Table 1 lists the values we might derive from this situation, using our initial tuner design as a basic starting point.

Table 1. Tuner component values for a constant Q and varying loads.

R_L (Ohms)	$X_{LS} = X_{CS}$	L (µH)	C (pF)
1500	528	12.0	43
1350	475	10.8	48
750	265	6.0	86
300	105	2.4	215

This table presents us with usable values down to at least a 750-Ohm load. Below that point, the required value of capacitance to resonate with the tapped inductor increases to a much more difficult level. If we install a 250 pF capacitor, the rate of change of capacitance grows higher, while if we install only a 100 pF capacitor, the range is insufficient for lower values of R_L. This is a limitation of changing the L-C ratio of the secondary tuned circuit, but it is not the catch mentioned above.

The catch is simply this: in order to reduce the value of the secondary inductor reactance, we have to reduce the inductance of the coil. In practice, simply eliminating some turns in the secondary coil will alter the relationship of the primary to the secondary, changing the mutual inductance and hence the coefficient of coupling. Restoring the coefficient of coupling will therefore require some physical alteration of the coil positions.

The equation below relating k to X_M gives an indication of the required change. If k is to remain constant, then the mutual inductance must decrease as the square root of the decrease in secondary coil inductance and inductive reactance. Restoring or retaining the coefficient of

coupling will therefore require some physical alteration of the coil positions.

$$X_M = k\sqrt{X_{LP} X_{LS}} \qquad 2$$

Although this system of tailoring the inductor reactance to the load resistance for a constant Q is feasible for a single band of operation, it has several drawbacks when applied to link couplers designed to cover several HF bands. First, the number of taps grows well beyond the range of a switching system, and manual tapping becomes necessary. Second, on the higher frequency bands, most of the coil is unused. Since inductors have inter-turn capacity, it is possible for the large unused portion of the coil to be self-resonant at the operating frequency or one of its harmonics.

Load Impedance Transformation

Many of the potential problems associated with changing the L-C ratio of the secondary tuned circuit can be avoided by leaving the L-C ratio constant. To handle load resistances lower than the natural value of R_L which — with the given size of L_P and value of k — transforms to a primary impedance of about 50 Ohms, we first transform the load resistance to the natural value of R_L. In the running example, this value is 1500 Ohms.

Figure 2 shows one way of effecting the transformation. We simply create a second inductively coupled circuit between the original secondary and the load. We may call this new inductor L_L, the load winding. We could even add optional series capacitors, C_L, which would provide us with the ability to resonate L_L at the operating frequency.

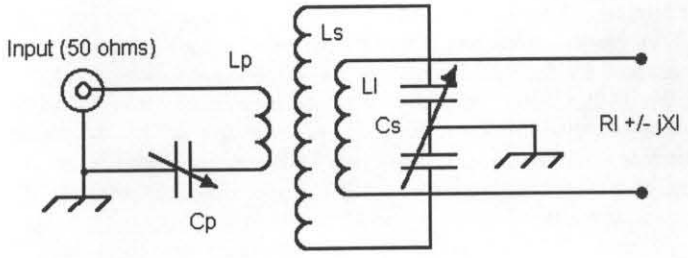

Fig. 2 Coupled-inductance impedance transformation.

The impedance transformation between L_S and L_L operates according to the same equations that govern the relationship between L_S and L_P. Since we are interested here in the ratio of primary to secondary impedance, let's rewrite Equation (1) in general primary-secondary terms:

$$\frac{R_P}{R_S} = k^2 \frac{X_{LP}}{X_{LS}} \qquad 3$$

R_P is the primary resistive impedance, R_S is the secondary resistive impedance, X_{LP} is the primary inductor reactance, X_{LS} is the secondary inductor reactance, and k is the coefficient of coupling. The value of k, of course, indicates the function of X_M, the mutual inductance between the inductors. Unless $k=1$, the ratio of primary to secondary impedance will always be less than the ratio of the inductor reactances. Since the individual inductor reactances are directly proportional to coil size — or, for a given inductor diameter and turns per inch, the number of turns — the ratio of primary to secondary impedance will always be less than the ratio of primary to secondary coil turns.

When the secondary of the coupled load circuit is not resonant, the ratio will vary further due to the presence of a coupled value dependent on X_{LL}, the reactance of the load winding, and an additional reactance will be coupled to the tuned parallel circuit. This reactance is normally compensated for by a revised setting for the variable capacitor.

The circuit of Figure 2 is not often used in amateur work, although it is an efficient way in which to transform lower load resistances to the higher value required by the parallel tuned inductive circuit. The use of a further inductor complicates mechanical arrangements, especially if the arrangements involve switch leads. However, the circuit is applicable to special situations that call for the matching of a single load value with small variations around the target value.

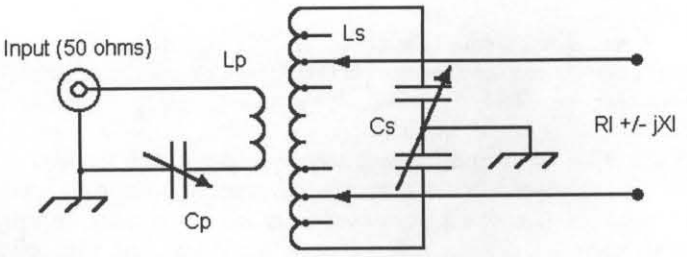

Fig. 3 Tapped-secondary impedance transformation.

Equivalent to the coupled circuit in Figure 2 is the arrangement shown in Figure 3. Instead of a separate winding, we use coil taps on L_S to create an autotransformer. Nothing changes relative to the principles of operation that we have just surveyed, except that we lose control over the value of k. However, normal practice is to tap the inductor L_S every turn or two, depending upon its construction. The result is the ability to handle a wide range of specific values of R_L lower than the value required by the full inductor for a given desired primary impedance.

Although subject to variations by virtue of the value of k (or the mutual inductance) necessary to effect maximum power transfer between windings, the impedance transformation may be crudely estimated by taking the ratio of the squares of the individual inductor values (or the squares of the inductor reactances). In the following example table, I have further simplified the calculation to one comparing numbers of turns, beginning with a coil of 20 turns. Since the coil is tapped inward one turn from each end with each step, the net reduction is two turns per step.

Table 2. Values of R_L vs. approximate turns ratios.

Number Of Turns	Ratio to Full Coil	Ratio Squared	Approx. Ideal R_L
20	1.0	1.00	1500
18	0.9	0.81	1215
16	0.8	0.64	960
14	0.7	0.49	735
12	0.6	0.36	540
10	0.5	0.25	375

The values in Table 2 are not to be construed as accurate for any particular coil; they simply show the trend in values as an inductor is tapped further toward its center. Note that it is possible to obtain a good match with load resistances in the neighborhood of 300 Ohms by this method. Indeed, loads as low as 25 to 50 Ohms may be accommodated by this arrangement, although when loads are less than about 100 Ohms, a series circuit is generally recommended for maximum efficiency and convenience. The use of series secondary circuits will be discussed in a future installment.

The values of R_L, which transform to the higher value, occur in step-fashion. However, the values of R_L between those steps are ordinarily easily accommodated by the variable capacitors in the tuned circuit and in the primary. Therefore, the optional series capacitors in the output circuit, which we noted were optional, are usually not required in order to effect a match.

One operating inconvenience of the tapping arrangement is that the effective Q of the circuit increases as the coil is tapped closer to its center.

The lower the load resistance, the higher the Q. The result throws off the values in Table 2, but this is rarely a problem, given the number of available taps and the variable capacitors in the primary and in the tuned circuit. The inconvenience arises from the sharpness of the resultant tuning. The higher the load resistance and the lower the Q, the more easily a single setting of controls and taps may cover an entire amateur band. With lower load resistances, settings may have to be changed several times to cover the same band. For very low load resistances, a series tuned secondary circuit may provide a lower-Q alternative and more convenient operation.

A second inconvenience associated with the tapped-secondary form of the inductive coupler is the need to change taps. On multi-band tuners, the number of available taps can easily outgrow the ability of good RF-rated switches to handle. Manual tapping with band changes is possible, but it is often inconvenient in high speed operations, such as contests. Therefore, the tapped-secondary type inductive coupler is typically used for casual operation or for single-band units, such as couplers for 160 meters, where a set of taps may suffice for a given antenna, with only capacitor adjustments required as the operator moves across the band.

Capacitor-Divider Impedance Transformers

The inconvenience of tapped secondary inductors can be largely overcome by changing the method of transforming the load resistance to the desired higher value. Instead of changing the impedance by inductive methods, one can use a capacitor divider circuit, as illustrated in Figure 4.

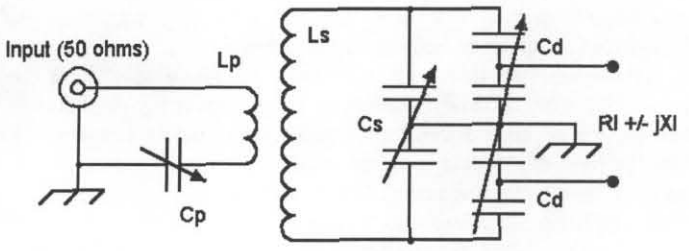

Fig. 4 Capacitor-divider impedance transformation.

Except for the input-side capacitor, the schematic is similar to the Johnson MatchBox design. With the capacitor, it resembles the Annecke link coupler. To see how the capacitor divider system accomplishes the same goal as the tapped inductor, lets break the circuit down into useful chunks. First, we can note that the circuit is balanced around the ground point, so let's work with a single-ended (or unbalanced) circuit. It might make the principles somewhat clearer.

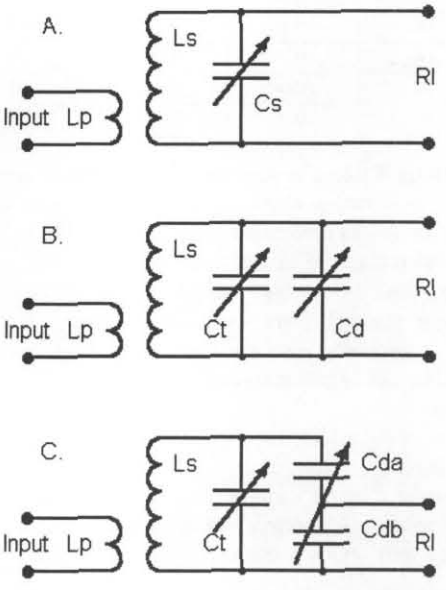

Fig. 5 Evolution of the capacitor-divider impedance transformer.

In Figure 5, we take a single-ended tuned circuit through several stages of development. In 5B, we simply divide the tuning capacitor shown in 5A into two paralleled capacitors: C_T, which will be the main tuning capacitor, and C_D, the "divider" capacitor. Of course, no dividing is yet going on.

In our running example, we needed 43 pF of capacitance. We might have selected a 75 pF capacitor to provide plenty of range on either side of the projected ideal setting. If we divide the capacitor into two sections, we might let C_T be 65 pF and C_D be 12 pF. (We are working here with some convenient hypothetical values that ignore the balanced nature of the full circuit. We will restore that circuit and more nearly correct values at the end of this exercise.)

In Figure 5C, we replace the simple capacitor C_D with a differential capacitor. A differential capacitor is a split stator capacitor with the plates arranged so that as one set meshes, the other set separates. If the plates are cut for straight-line capacitance, the sum of the two capacitances is approximately equal.

However, the two capacitors are arranged in series, so that the net capacitance will range from a very low value (depending on the minimum capacitance of each unit) to a maximum when each unit is meshed 50%. We might select a capacitor with a maximum capacitance per section of 50 pF, which would yield a maximum total capacitance across the unit of 12.5 pF with the plates meshed half way. If the minimum capacitance is 10 pF, then the minimum capacitance for a 10 pF and a 50 pF capacitor in series is a little over 8 pF. A differential capacitor would require very little readjustment of the tuning capacitor, C_T, across the range of our new C_D.

Of greater interest here is the fact that the differential capacitors form a capacitor-divider, with the load resistor connected at the center junction of the divider. Since capacitive reactance is inversely proportional to capacitance, the lower capacitance side of the differential has the greater reactance, and vice versa. The reactances that apply to Figure 5C are X_T (total reactance across the differential), X_U (upper side reactance), and X_L (lower side reactance). Since the reactances are in series, $X_T = X_U + X_L$.

A load of 1500 Ohms (our ideal load resistance that couples back to the primary as just about 50 Ohms) would require that X_U be minimum and X_L be maximum. Since the minimum value of reactance is set by the maximum value of the capacitor section, there may still be some division and the load may appear as a higher value across the tuned circuit than the actual 1500 Ohm value.

For load values less than 1500 Ohms, the differential is set at an intermediate value such that the load appears across the tuned circuit as close to the ideal value as feasible. As a crude approximation that ignores some of the variables involved in the actual circuit, the load resistances to be matched vary as the ratio of the square of the reactance across the load to ground to the square of the total reactance across the capacitor divider. The values in Table 3 illustrate the trend.

Table 3. Values of RL vs. approximate capacitor reactance ratios.

C_U	X_{CU}	C_L	X_{CL}	X_T	X_{CL}/X_T	R_L
10	2273	50	455	2728	0.17	43
25	909	25	909	1818	0.50	375
40	455	10	2273	2728	0.83	1041

Once more, the values in the table are not meant to be accurate, but to indicate the trends. Obviously, some circuit adjustments to the secondary L-C ratio would have to be made to handle higher loads, since a load of a little over a thousand Ohms appears as 1500 Ohms across the tuned circuit. However, it is evident that the capacitor-divider system is capable of handling a very wide range of load resistances with components of limited range.

There is no reason why the sections of the differential capacitor must have the same maximum capacitance. The capacitance per section can be tailored for a desired range of X_{CL} to X_T. However, in multi-band tuners, expected perhaps to cover 80 through 10 meters, the component selection will be a compromise. Hence, the range of load resistances that the tuner can accommodate may differ from one part of the spectrum to another.

In order to restore our circuit to a fully balanced version, as shown in Figure 4, we need to use a split stator tuning capacitor. Since the total capacitance across the series connected capacitor sections is to be about 75 ohms, we need to choose a 150-150 pF unit (although a 100-100 pF unit will provide the basic 43 pF required by the running example). Likewise, for a 12.5 pF total series capacitance maximum for the dual differential unit (when it is set for 50% mesh of both differential units), we need a maximum capacitance of about 100 pF per section at full mesh.

One final advantage attaches to the dual differential capacitance divider: tuning is continuous, with none of the stepping required by the tapped inductor. Thus, a precise setting is possible for any load resistance within the divider range. In principle, this ability within the secondary does away with the need for a series variable capacitor in the primary circuit, and the Johnson MatchBox indeed omitted this component. However, Annecke has restored it in order to provide the operator with an added measure of flexibility. The flexibility does mean that more than one set of control positions will provide a 1:1 SWR for the input. The best set of control positions is the one providing maximum output to the line, which requires a measurement not usually provided in an ATU.

A Final Note on Approximations

It is necessary to add to the running warnings a final warning that all of the tables shown in this episode are based on approximations that presumed that certain other variables remained constant. In practice, these other variables will change, thus giving figures different from those in the tables. Thus, the tables show trends in values, but not actual values.

Although it is possible for any particular case to calculate quite accurate values, doing so requires the specification of all applicable variables. When those variables can be fully specified, one might adapt the full algebraic procedures detailed in an old Rider publication called ***Impedance Matching***, a small volume in the "Electronic Technology Series" from the late 1950s (edited by Alexander Schure). The relevant section is called "Transformer as Impedance Matching Device."

For the purposes of this brief tutorial, not only would the full specifications obscure the general principles being presented, they would also be of limited, if any, use in designing a working link-coupled ATU. Because real ATUs operate over a wide range of load resistances and Qs, their actual design is largely a combination of approximation and experimental experience. Later, I will present some tables of recommended values based on experience, and hopefully, these principles will be evident in their selection.

At the same time, a good link-coupled ATU must also provide maximum flexibility to achieve a good match and maximum output together. So far, the circuit in Figure 4 comes closest to that ideal.

Edited by W1HUE

DAYTON QRP BANQUET PRIZES

by

Scott Rosenfield, NF3I

The fourth annual QRP ARCI Dayton QRP Banquet, as you well know, is history. The bills are being paid, the last of the door prizes are (finally) being mailed out, and I'm wondering how I'll possibly put together a banquet for next year that can top the one we had this past May.

You probably already know that door prizes helped to make the banquet successful, but I want to thank all prize donors for being so generous and playing a part in that success.

We had over 200 attendees this year, making it the largest ever, and as predicted, we (myself included) ate a LOT of food. The door prizes made for an impressive display, covering roughly 12 lineal feet of table, and the attendees were eager to win/play with/assemble their prizes!

Unfortunately, the keynote speech went a little long this year, and combined with "Vendor night" having been scheduled to be immediately after the banquet, time did not permit us to draw for prizes "live" as we'd hoped to do. Still, attendees did get to see the prizes displayed on the prize table, and each dinner table was adorned with two placards thanking all prize donors for their support, and listing them by name. We were able to draw for the prizes immediately after the banquet ended, and roughly 80% were picked up in person within an hour's time.

A complete list of all prize winners can be found at http://w3eax.umd.edu/~ham/banquet.html.

So, for next year: slightly better time management, more attendees, and hopefully as many (or more) door prizes! Again, I thank you for your generous donation, and hope that you have found it to be a worthwhile venture. I also hope that it can be repeated when I again (slightly annoyingly but necessarily) come knocking in late 1998/early 1999. I also hope to be able to greet each and every one of you in person at next year's event. If you have any questions, comments, or would just like to chat, I can be reached at 301-549-1022 (h), 301-982-1015 (w), or via e-mail at ham@w3eax.umd.edu.

See you on the bands, in Dayton in 1999 and beyond, es TU agn. 72, 73, Scott Rosenfeld, NF3I

Dayton 1999

It's coming sooner than you think! HOTEL ROOMS - QRP ARCI is managing a block of rooms during the Dayton Hamvention at the Days Inn South for 1999. If you had a room in 1998, you are probably on the list for ONE room for 1999, but you must let Hank Kohl, K8DD, know that you will need it. If you would like to inquire about getting one of these rooms or to confirm that you'll need yours in 1999, send email to k8dd@contesting.com or U.S. Mail to QRP-ARCI Rooms, 1640 Henry, Port Huron, MI 48060-2523

The reason for the "you are probably on the list" is because there are two who had rooms last year that have been removed from the list. Mr. Terres and Mr. Thomas, due to the scene they made at the front desk. Most likely I won't hear from them, but they will be ignored.

73 Hank K8DD

Members' News

Richard Fisher, nu6SN
1940 Wetherly Way
Riverside, CA 92506
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Gettin' ready for Pacificon

No question that in the larger picture, Dayton is king of the hamventions. The success of Four Days in May and the QRP ARCI banquet are testimony that low power enthusiasts value it as an annual focal point.

nu6SN
Richard Fisher

Emerging as a formidable partner, however, is the West Coast QRP Symposium, held this month for the third year in a row at Pacificon in Concord, CA.

Orchestrated by NorCal QRP Club's **Doug Hendricks, KI6DS,** the event is bringing some of the top speakers in QRP today to the Sheraton Hotel Oct. 17.

Consider this line-up.

Bill Jones, KD7S: *"How to Build Cheap and Easy Cases for Your QRP Equipment."*

Joe Gervais, AB7TT: *"Operating QRP Contests from the Field and Maximizing Fun!"*

Paul Harden, NA5N: *"Solar Phenomena and How to Interpret Solar Reports."*

David Fifield, AD6AY: *"The NorCal 20 — How It Was Designed and Why."*

Adrian Weiss, W0SRP: *"Propagation Predictions, and How to Interpret Them."*

The Rev. George Dobbs, G3RJV: *"The G3RJV Six Pack."*

Roy Lewallen, W7EL: *"Field Day Operating," and "Antennas for Field Day."*

As always, NorCal is also sponsoring a hospitality room on Saturday night, and other activities such as the Unlimited Building Contest, The 2N2222 Building Contest, and the NorCal K8FF Paddle building contest.

In addition, **Chuck Adams, K5FO,** will conduct a CW copying contest.

All of the activities are free with the admission price for Pacificon — a tremendous gift to the QRP community from NorCal, and the tireless effort of Mr. Henricks.

Hope to see you there.

— R.E.F

A little QRP magic on 6-meters

Mike Herr, WA6ARA, sends e-mail from Ridgecrest, CA that he took part in June's ARRL VHF contest and had a great time.

"I got the (newly built) Ten Tec 6-meter transverter up and running. However, the battery I was planning on using died. Two cells went down and there were no replacements to be had.

"So (XYL) Paula, **N6VGW,** and I went hiking anyway. When we got home, I built a 6 meter dipole, and stuck it up into the air. Boy, oh boy, is 6 meters weird! And am I having fun.

"So far I've worked into Montana and North Dakota with 7 watts and a dipole at 10 feet.

"It's very weird listening to the band move in and out.

"All this comes to is this: 6 meters is ripe for us QRPers. A $99 transverter and that trusty 20 meter rig and you're on the air.

"So far I haven't heard any CW on the band, other than beacons. Maybe we need to make a 'CW statement' "

He and Paula also worked 6-meter sideband and CW during the ARRL's annual Field Day with the Zuni Loop Mountain Expeditionary Force north of Los Angeles.

A QRP weekend to remember

Larry Cahoon, WD3P, writes from Maryland that the Easter weekend found him "with the family on a short 3-day vacation at the Peaks of Otter in Bedford County, VA on the Blue Ridge Parkway. Along came the Sierra, the ZM-2 and some homebrew antennas.

"Operating time was limited but it sure was fun to carry the little rig along. The antennas went into the fanny pack, and the coat pockets, the rig, key, and ear buds went along in a calculator case. Eight AA renewable batteries were used for power. The basic strategy was to take a couple of hikes each day and operate for at most an hour at a time.

"I moved the power up from the normal 0.5 Watts used at home, to — as I was to find out later — was a great 0.7 watts.

"It was done quickly as I went out the door without measurement. I was aiming for 1-watt. I used the homebrew vertical for most of the contacts. It did not work real well from the mountain top, but did a great job from the lake shore at the foot of the mountains.

"It might have been terrain or the fact that both mountain top operations were at about 1 p.m. local time and many were not on the bands yet. I did take two radials from the vertical and turn them into an inverted V at one point while on the top of Sharp Top Mountain.

"It had to be run through the ZM-2 as the radials are a bit short for a real dipole. The signals were better with that arrangement.

"I stayed with 20 meters only. I had the 40 meter module along and a long wire for the band but never found the time to put it up. I probably should have taken the 15 meter module along.

"In all it was a fun trip and well worth the effort. **N4BP** got the honor of the first QSO from the top of Sharp Top Mountain — at about 3,900 feet elevation.

"**K0NI** was the last QSO from Harkening Hill at about 3,600 feet. The distance records went to **NQ7X** in Arizona and **VE6XT** in the Canadian province of Alberta. Those were both from the shore of Abbot Lake at an elevation of about 2,400 feet with Short Top to the Southwest, Flat Top (4,000 feet) to the Northeast and Harkening Hill to the Northwest.

"Net result was 13 QSOs — 1 dupe — 10 states and Canada."

Of life's yin, yang, and QRP

Scott Rosenfeld, NF3I, writes from Burtonsville, MD, that "this report is subtitled, 'How to remain active yet en-

Mike Herr, WA6ARA, and XYL **Paula Herr, N6VGW,** *operate 6-meter sideband QRP during '98 Field Day with the Zuni Loop Mountain Expeditionary Force in the San Gabriel Mountains north of Los Angeles.*

joy ham radio immensely.' "

After scoring 121,730 points over about 9 hours in QRP ARCI's Spring QSO Party, Scott leaned back and pondered what he'd done — life's big picture.

Using a Wilderness Sierra / TH6DXX beam at 100' "briefly, for 5 QSOs," and an IC-706 with a Screwdriver antenna for 81 QSOs, including 40/80m, Scott said in hindsight that he "didn't even plan on *doing* the contest. I figured I'd hand out a few Qs to people, that's all, as I had a zillion things to do over the contest weekend.

"As such, my logging at the start was quite poor, which probably cost me a few points in the final analysis. Much of the time, I was actually (mobile) in motion, which gave my tape recorder a good workout and was an extra, added challenge.

"Saturday morning, I went to someone's house north of Baltimore (40 miles north) and bought a pair of used Rollerblades and some other stuff. One exciting thing was finishing a QSO with **K4MX,** trying to get that NUMBER/POWER through the QSB/QRM/QRN, just seconds before I dove underground and into the tunnel under Baltimore harbor. The guy I got the rollerblades from thought what I was doing was pretty cool . . . 'you don't actually know Morse code, do you? Wow, that's cool!'

"Saturday afternoon the weather was great and I walked about 5 miles and did some rollerblading. Saturday night, I'd been invited to **Ben Schultz', KE3OM,** family's Passover Seder, which knocked out that evening.

"Sunday morning I figured I'd go down to the University of Maryland with Maggie to do some early morning squirrel hunting (we never catch any, nor would she know what to do if she ever caught one). This would tire her out, thus giving me the chance to sit in the club station and fire up the Sierra.

"But after 45 minutes of exhausting sprinting all over campus, I was tired and she wouldn't sit still. I got in about 30 minutes of operating from there, and headed home.

"The weather, again, was great, and I looked at my backyard at a winter of neglect. I proceeded to spend the next three hours doing yard work, digging up dandelions and grasses growing between bricks, as well as a few weeds that were about three feet tall.

"Then I did a little more rollerblading and listened to the ballgame.

"So where's the contesting here? *In between* events, driving from place to place. *That's* why I have a mobile station — I *never* stop moving, but when I'm in the car, I can do it *guiltlessly!*

"*Finally,* later Sunday afternoon, I settled down and concentrated on the contest. How enamored am I with my mobile setup? To give you an idea, I've got a Paragon and a Corsair II that run out to a G5RV in the woods behind the house, and I *still* feel that my mobile setup outperforms them. It was 65 degrees and sunny. I hopped in the car, opened the window, put my feet up, reclined a bit, and worked virtually everyone I could hear. Wow, this was a *blast* — like, almost as much fun as Sweepstakes or Field Day (at least the operating portion of it).

"It amazed me how loud the guys from Arizona were on Saturday afternoon. I expected to work a bunch Sunday afternoon, but the opening just wasn't there as it had been the day before. The west coast was solid, as was the Mississippi River zone, but little in between (except for Colorado).

"I am still in amazement over how loud N4BP is during every contest, at any power level, and at the number of people who answered my CQs when I was using nothing more than my mobile-mounted Screwdriver antenna.

"What was reinforced?

"Don't be afraid to use your filter/ear combination! It's amazing how much stuff lives underneath and between the big signals.

"A 10-foot coaxial run to a well-matched antenna has

very low loss!"

QRP fun to the field

Dan Wolfe, N4ROA, writes from Gate City, VA that QRP to the Field was a great time: "Wow! What a blast. I will have to say that this QRPTTF was the best one yet. I even had some company other than cows, squirrels, and all the other critters you usually meet up with on excursions like this.

"I picked up my friend **(Dennis Brickey, N4DD)** for the event at 7:45 a.m., and we were off. Hit the four lane wide open and immediately started telling 'war stories.' We cruised along enjoying the trip so much that we were 20 miles past our intended exit before we knew it. Oh well, that's the way it goes when you are having fun.

"We managed to back-track and arrived at our destination on White Top mountain with an hour left to get everything set up. Our operating site was right on the junction marker for Virginia, Tennessee, and North Carolina. Picked out some trees for our antennas and went to work. Why is it you always have to wade through briar patches and thorn bushes for best antenna orientation?

"OK, the dipoles are up and I start organizing our station while Dennis works on putting up a 500-foot loop antenna to test. It will be interesting to see how it works. As the afternoon progressed, it proved to be the antenna of choice and we used it the last 5 hours of the event.

"Zero hour and Dennis is still at work on the loop. Looks like it is up to me to start things off. Think I will try 20 meters first: There is **KQ0IK** in Iowa for the first contact. Here we go: **W0RSP, N6WG, N0UR, NQ7X, AB5UA.** Man! It don't get any better than this. Fun, fun, fun.

"Dennis finally has the loop up and since this is his first trip afield for him, he will get to do most of the operating. It seems like he is really enjoying this and he keeps saying: 'I like your QRP+ a lot.' I better keep an eye on him. He is getting that glazed, glassy-eyed look. You know what that means, fellow QRP'ers. He is hooked. Keeps murmurring 'this is fun, I'll never forget this trip.'

"We only operated on 40- and 20-meters, but we did check other bands frequently. No activity was heard on 15- or 10-meters. It sure was nice to hear so many familiar calls and, yes, Dennis *did* let me operate a bit.

". . . We operated with 21 and possibly 22 border stations. We had **KS4V** down for Kentucky only. We may have missed some of the exchange.

"Here is a list of border stations we contacted: **W0QF, N0UR, K7NX, W0YSE, N0TU, KI0II, N7CEE, WA7LNW, N7KT, WAQVM, AB7TK, KB2VTN, N3AO, W5GIX, K4JSI, KA1AXY, AA5YX, N9ZXL, WQ3RP, KN1H, and W4ED.**"

QRPpp DX on 15 meters

John Reynolds, G3PTO, of Bristol, England writes that recently he had "one of those QSOs which gives one a tremendous amount of satisfaction.

"I called 'CQ QRP' on 21.060 Mhz at around 1430 UTC and was answered by **EA1CHC,** Javier in Oviedo (Northern Spain). He was a 5 5/6 9 signal and gave me a 579.

"His power output was 500 mW and I was using 4 watts. My antenna is a 67-foot doublet fed with open wire feeders and he was using a ground plane.

"So far, nothing unusual as this is a normal exchange on 2 X QRP.

"On Javier's suggestion, we both reduced power in stages. Both using 100 mW 549/549 was exchanged.

"I then reduced power to 15 milliwatts and was surprised that I then received a 3/5 3/9 and Javier had reduced to 50 milliwatts and was a 439 with me.

"The distance between Bristol and Oviedo is about 650 miles.

"You may wonder why I am sending this information. The reason being is to encourage those who are interested in QRP but as yet are not fully convinced that it is possible to have contacts over reasonable distances in only average HF band conditions.

"I would also like to mention that this sort of contact will be easy when the 28 Mhz is at its peak.

"So, you don't need high power or big beams, just a little bit of luck and a reasonably clear frequency.

"Check out 21.060 and 28.060 Mhz. There is life there. Weak . . . but it's there."

John adds that readers might be interested in his web page for QRP homebrewers:

http://www.qsl.net/g3pto/

"It is devoted entirely to homebuilt equipment, mainly circuits and Hints/Tips etc.," John writes. "I am trying to make it a one stop site which will contain most of the ideas and designs that QRPer's need to get on the air."

QRP DX: Never, never give up

Neil Klagge, W0YSE, writes from Layton, UT that he has "read about it but finally experienced it on 40 meters (on a recent Sunday morning) with a new antenna — an R7000 vertical at 25 feet — and a QRP Explorer II transceiver.

"From about 5:45 thru 6:45 a.m.the following (DX) was worked during the CQ WW WPX contest: **TI1C** (Costa Rica), **ZM1A** (New Zealand); **WL7E** (Alaska), **KH7R** (Honolulu County, HI), **VK5GN** (Australia), and five stations in **Japan** — and all at a power of about 2 watts!

"This is better than fly fishing.

"Never, never, never give up!"

Where QRP was hot on Field Day

Steve Modena, AB4EL, writes from Raleigh, NC that each year he does his "little Field Day thing.

"The last couple I've parked in the yard next to the duplex under the lovely tall pines running off my collection of gel-cells: 1B.

"I take down all of my antennas and put up a fresh collection for the affair.

"This year I almost thought to move inside the house because the prediction was for 100 degrees and 100 percent humidity.

"I took off Thursday and Friday for slow paced gathering the junk together and tailoring the new antennas. So on Saturday I knew where everything was and actually got on the air on time (unusual for me).

"The heat was just bearable. I guessed correctly that there would not be much to chase after on 80 meters.

"I worked my TS-430 at five watts CW (only) on 40, 20 and 15 for about 240 QSOs with big breaks for sleep. I note working very few 'B' stations: worked more 'C' than 'B'!

"I also noted an increase in multi-transmitter 'D' and 'E' stations (must have been some of the more sane individuals who *did* move inside).

"Band noise was OK! Operator courtesy and competence was noticeably better this year. Hurray to the gents on the bands!

"Night time temperatures moderated and by daylight things were definitely 10 degrees lower that the day before — thank goodness!

"On 20 and 40 most of my contacts were confined mainly to certain parts of east-of-the-Mississippi USA. I think I could do one of those maps the E-SKIP boys on VHF love to publish in QST. I don't think it was my antenna orientation since my 20 and 40 antennas were at right angles and the coverage patterns similar.

"I love Field Day: each one is distinct. And this year I felt that doing it QRP was easier that it has been at low power in recent years."

Having a field day on Field Day

Bob Tellefsen, N6WG, of Newark, CA, writes that "this was one of the best Field Days ever for the Alameda County (CA) Radio Club.

"Conditions were good, and there were lots of stations on. We were in Class 8A, battery powered. We will be looking forward to see the QST results, as we worked far more 8A stations this year than ever before.

"My team was the 40 meter CW tent, so at this point that's all I can report on. Later, when our statistician has boiled the numbers down, I can tell you how we did overall.

"Our 40 meter CW effort netted 235 QSOs, about 17 percent increase over our previous best. Rig was Ol' Kenwood (my TS-180S of Fox Hunting fame) at 5 watts, with a 40 meter dipole and a half square, both at 40 ft and at right angles to each other.

"The batteries were heavy, so first line on my notes for next year is *'Park the car closer to the operating tent!'*

"I remember a few of the calls we worked **K6ZNI** (The Zuni Loop Mountain Expeditionary Force) breaking in their new call; **WQ6RP,** (Southern California QRP Society) and the **N7F** special events call.

"Also got one PAC section station, but don't remember the call at the moment.

"One high point was working **Wayne Burdick, N6KR,** with his K2 prototype from their FD site. The rig sounded great, and Wayne reported he was very pleased with it.

"Our Novice tent was kicking and hauling on 10 meter SSB. A really excited bunch. I heard someone say they had about 107 Qs.

"We did have one curious thing going on. We were on one ridge, facing another across a valley. There are some commercial radio sites on that ridge, and we were getting some terrible intermod in bursts on 40 meters.

"You could hear voice intermingled in the QRM, but couldn't read it. We suspect someone had an equipment failure on some site, contributing the intermod.

"During the late night hours it was pretty much gone, suggesting it was commercial radio. Sunday morning it came back a little bit, but nothing like Saturday. I wonder if any other FD sites around San Francisco Bay experienced this? We don't think it was generated on site, as we have been doing this for 14 years with the same gear without a problem. We tried turning off one station at a time to see if it had any effect. Nothing changed, so we think we were clean within the site.

"I experimented with a new antenna mast. Three sections of Radio Shack TV mast (30 feet), then another 12 feet of overlapping green plastic garden poles from our local hardware store.

"These green poles are light, stiff and tough. Next year I'll try three for about 18 feet on top of the 30 feet. I'm preparing for the inevitable. My favorite tree, a huge eucalyptus, has died and is supposed to be cut down this year. I'll have to find some new way to hang wire now.

"For hot weather, which we didn't really have, we had a swamp cooler for the tent. A little platform with a 12-volt muffin fan on it, surrounded by wet burlap. It was designed by **Bob Buckley, W6HOR.**

"It worked very well, as long as we remembered to wet the burlap periodically. We hung it just outside the tent window on a bamboo pole tripod."

Doing his bit for QRP

Jim Anderson, VE6JWA, writes from Canada that "The Northern Alberta Radio Club semi-annual Hamfest was held over the May 24 weekend at the Edmonton Inn. I was asked to do a bit on QRP.

"So **Al Williams, VE6AXW, Al Kostyk, VE6MAN,** and myself got together and put on a one hour show and tell of QRP equipment.

"We had two HW9s, a 38-Special converted to 40 meters with a 5 watt linear, a California Board 75 meter SSB, a White Mountain 20-meter SSB transceiver and a much modified W7EL transceiver on 40 meters.

"In addition we had a homebrew QRP watt meter, a couple of TiCK keyers, a Rainbow tuner kit and a Gipe frequency counter/clock connected to the California Board and the "S40."

"It was a good crowd with lots of interest in QRP and building. There were lots of questions.

"In addition, **Dr. Rick Zabrodski, VE6GK,** was the keynote speaker at the
Saturday night banquet. He is an avid QRPer as well as a medical doctor and aviator."

Items for the Members' News column should be sent to Richard Fisher, nu6SN, 1940 Wetherly Way, Riverside, CA 92506.

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, nu6SN
Quarterly Members' News
1940 Wetherly Way
Riverside, CA 92506

(e-mail: nu6SN@aol.com)

TIME for QRPers or What is UTC?

Chuck Adams, K5FO

There seems to be almost daily confusion on QRP-L whereby some individual misses the point of the use of UTC or GMT for keeping records in the logbook. Hopefully this small article will clarify some points and make it clear to those whose have been confused.

First let's start with just what is going on the world as we know it by considering some elementary Astronomy. The earth is in an orbit about the closest star that we know and we call the sun. The orbit is slightly elliptical by only two per cent and thus we are slightly closer to the sun in January and furtherest from the sun in early July. And we make one orbit in about 365 days and we call that a year.

The earth rotates about its polar axis and revolves around the sun in an orbit. The rotation is from west to east. If you stop just a moment and think about this, it seems logical. Imagine that you are outside just at sunrise. The sun first appears during the day (cloudless, of course) in the eastern sky and appears to move in a westerly direction. But we all know that the sun doesn't move that fast and that we are stationary on a rotating sphere that must be rotating in a direction towards the east. Things are interesting in that the polar axis is tilted by 23.5 degrees from the orbital plane in which the earth moves about the sun.

If we used a watch to time the sunrise, we'd probably be suprised to find that it comes up about 4 minutes earlier each day. The reason for this is the movement of the earth along its orbit, since the earth is moving also in the direction of rotation thus shortening the time interval. If we were to watch the rise time of a fixed star we'd see that the time interval is a constant between successive 24 hour intervals. But when this occurred relative the day and night times would vary over the period of a year. So, what are we to do? Well we can define several terms that relate to just how we are measuring time.

Apparent Solar Time is true sun time as governed by the movement of the real sun across the sky and this would be the time you would measure on a sundial.

Mean Solar Time is the uniform solar time when all of the time in a year is divided into 365 days of equal length. The difference between this time and the apparent solar time may vary from zero to almost 17 minutes over the year, with both positive and negative values.

Standard Time came about in 1884 when an international standard was adopted and would you believe that this was brought on by the desire of the railroads to be able to publish a time table that everyone would comprehend and use? The world was divided up, starting at Greenwich, England, into 24 equal zones corresponding to a time interval of one hour. The zones to the west are plus 1 to 12 and the zones to the east are minus 1 to 12. These zones are located every 15 degrees of Longitude, with +4 at 60 degrees, +5 at 75 degress, etc. What this means is that the time at the zero meridian thus the time in Greenwich, England, then their time is +4 hours ahead of your time if you are at 60 degrees west. This of course neglects all the problems we have with daylight savings time changes. Now boundaries for these standard time zones tend to follow geographic and political boundaries.

Local mean time is the application of solar time to your own location. Local mean time is useful in astronomy work.

Greenwich Mean Time is the mean solar time at Greenwich, England, located on the 0 meridian. Universal Time is exactly the same time as GMT and may be abbreviated UTC from the French phrase for universal coordinated time. It is this time that all radio amateurs should use to record QSO times, etc. Thus it avoids any confusion between when a QSO occurred between different parts of the world.

Sidereal Time is based on the rotation of the earth one time in relation to any star other than the sun. This is a constant and not affected by the revolution of the earth around the sun.

So with all these ways to measure time and with variation in particular with using the sun as a reference point the world has used other physical means to get a reference point for measuring time. Physicists have been able to measure frequency with a very high degree of precision and accuracy and have built time standards using atomic oscillators as frequency standards. The National Institute of Standards and Technology in the United States has such a standard in Colorado which it uses as a time standard. This time standard is made available to the rest of the world through several means either via shortwave broadcasting, via a telephone call to area code 303 and phone number 499-7111 in Boulder CO, or through the Internet via a web page.

There are other nations that also keep time standards and broadcast them on VLF or SW frequencies. In fact there are a number of commercial clocks available that use these radio transmissions to accurately regulate a clock and display the time within a few milliseconds of the time standard with variations only due to propagation delays between the receiver and the source. These clocks are getting relatively cheap and readily available at the time this article is being written. Within a few years it is possible that all electronic devices that have a clock could use the single IC chip that does this and we would never have to reset a clock ever again after a power outage.

dit dit de K5FO

IDEA EXCHANGE

Technical tidbits for the QRPer

Mike Czuhajewski WA8MCQ 7945 Citadel Drive, Severn, MD 21144 wa8mcq@erols.com [new!]

IN THIS EDITION OF THE IDEA EXCHANGE:

NEW E-MAIL FOR WA8MCQ

My e-mail address has changed. I am closing out the old account of wa8mcq@abs.net, and by the time this appears in print it will probably have been shut down.

My new address is **wa8mcq@erols.com.**

RESISTIVE SWR BRIDGE APPLICATIONS (JOE'S QUICKIE #27)

Here's the latest Technical Quickie from one of the guiding lights of the New Jersey QRP group, ***Joe Everhart****, N2CX of Brooklawn, NJ (n2cx@voicenet.com)*

In ham circles the resistive SWR bridge is kind of a Rodney Dangerfield circuit 'cause it "don't get no respect!" It has been discussed in the ARRL Handbook and Antenna Books since the use of coax cable became popular and Doug DeMaw made frequent mention of it in his QRP books and articles. Lately it has also been applied in the Autek and MFJ Antenna/SWR analyzers as well as the Rainbow Antenna Analyzer presented at FDIM '98. (See the NJQRP web page at **http://www.njqrp.org** for more info on the latter.) And the same basic circuit has appeared lately in the N2CX Rainbow Bridge/Tuner and the Dan Tayloe (N7VE) SWR bridge as used in the popular Emtech ZM-2 Z-match.

But beyond these uses, it is viewed by many QRP'ers and homebrewers as a poor choice for SWR measurements. This is not at all true! This humble circuit has lots of utility for the QRP'er. It has the exemplary qualities of ease of construction, lack of critical adjustments and very broadband performance.

Perhaps a future Joe's Quickie will discuss the circuit in more detail, but for now let's focus on a couple of unique benefits in connection with antenna "tuners." (More precisely they are antenna couplers, but I'll use the popular term "tuner".)

Figure 1 shows the guts of the resistive bridge. For more detail on its operation refer to the ARRL publications or the NJQRP page listed above. For purposes of this discussion it's enough to know that it looks like a 6 dB resistive attenuator pad that goes between your rig and the antenna or tuner. What this means is that the SWR reflected back to the rig NEVER goes above 2:1 no matter what the load SWR is!

The first benefit of this is protection of the rig's final. Simple QRP rigs such as the Pixie (and its derivatives) and the NorCal 40-9er among others provide no protection for the power amplifier in the face of high-SWR loads. The net effect is that the output transistor can be damaged by an off-tune antenna or even a good antenna tuner while it is being adjusted. By limiting the SWR to 2:1 during tuneup, damage can be avoided.

The second benefit is that adjustment of an antenna tuner is often easier when a resistive bridge is used. In rigs including the ones already mentioned, the RF power amplifier can break into off-frequency oscillation when it sees a high load SWR. This off-frequency signal naturally causes reflected power that forces a high SWR reading as long as it is present. And it may be present

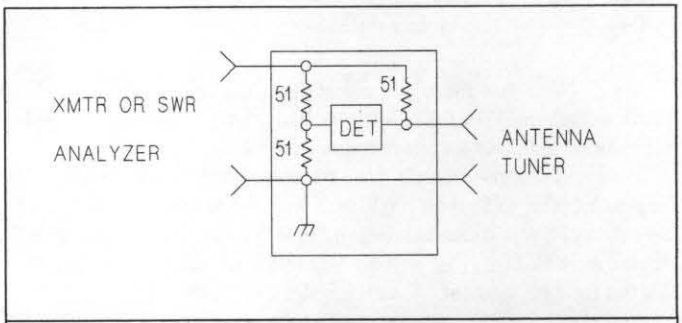


Figure 1—Resistive SWR bridge (simplified). Block marked DET is reverse power detector. (N2CX drawing)

(and vary in frequency, too!) until the tuner is adjusted very close to perfect, causing tuner adjustment to be very critical. When a resistive bridge is used, the SWR seen by the final amp may

never get high enough to cause spurious oscillation, making tuneup much less critical.

The final benefit is one I ran across at Field Day while dealing with an antenna that required very critical tuning. I was trying to tune an end-fed half-wave wire with my ZM-2 tuner. Now keep in mind that this antenna is high-Q *and* the ZM-2 tunes quite sharply. The combination proved difficult to adjust for best match. I kept tuning past the optimum SWR setting. So I connected an Autek RF-1 Antenna Analyst in place of the transmitter.

The measured SWR didn't rise above 2:1! And the tuner settings were much broader. Then the light over my head came on. I had forgotten to switch out the internal SWR bridge in the ZM-2. Aha! I found that with the internal bridge in-line, the tuner settings were significantly less sharp to get to an indicated 1:1 SWR. Then with the bridge switched out, the SWR reading rose due to decreased attenuation, but I could easily set the tuning for less than 1.5:1 SWR.

This is the same phenomenon that makes a VHF antenna seem to have low reflected power when lossy coax feedline is used. The antenna SWR is still high, but the feeder attenuation makes the reading at the rig end much lower.

Fiddling around with the internal bridge switched in and out gave the following RF-1 readings:

Bridge In-Line	Bridge Switched Out
13:1	1.7:1
8:1	1.6:1
5:1	1.5:1
4:1	1.4:1
2.5:1	1.3:1
2:1	1.2:1
1.8:1	1.1:1
1.4:1	1.0:1

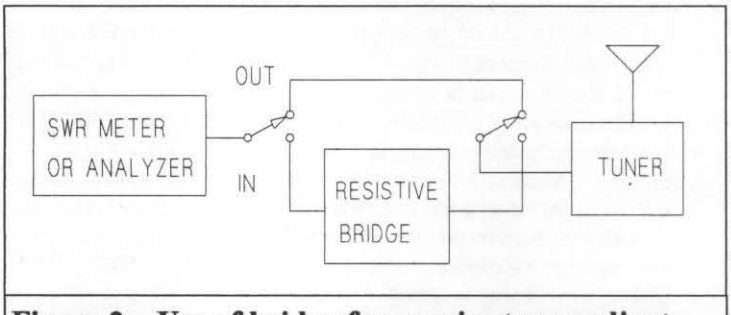


Figure 2—Use of bridge for vernier tuner adjustment (N2CX drawing)

Note that these are actual measurements. Theoretical calculated values may or may not give the same numbers. The bridge attenuation acts like a vernier tuning control for the tuner!

The same benefit will be noted with other tuners. It will be much easier to find an SWR null with a resistive bridge in line with an external SWR indicator. Simply tune for the lowest reading with the bridge switched in. This will get you in the ballpark. Then switch it out for the final adjustment. A simplified set up is shown in Figure 2.

—DE N2CX

REFURBISHING OLD KNOBS

***Denny Payton, N9JXY** (dpayton@fwi.com) posted this information to QRP-L a while back*—I frequently pick up pieces of equipment at hamfests that I take home and disassemble. Then I keep the few parts I want for my stock and pitch the rest. Often the equipment has some neat knobs but they're old looking and oxidized. Although I've had fair success refurbishing them, I wonder if anyone has a better method.

What I do is first clean them thoroughly with a mild detergent using a soft toothbrush. After rinsing and drying, I put them in a zip-lock bag and soak them good with a protectorant like Armor-all. Then I give each one a thorough brushing using the protectorant, remove as much air from the bag as possible and seal it, and let it sit overnight. The next day I take them out and buff them. If I'm not satisfied, I put them back in the bag to soak some more, except for a much shorter time. I discovered the set screws can begin rusting if left in the protectorant too long. I may have them in and out of the bag five or ten times before I'm satisfied. There's not really any strong reasoning behind this procedure except that it seems to work so if you know of a better way, I'd sure appreciate hearing about it.

—DE N9JXY

SAMLEX PSA-305 POWER SUPPLY FIX

Our Features Editor, ***Larry East, W1HUE*** *(w1hue@amsat.org) has a cure for a minor problem in a Tech America power supply*—How many of you couldn't resist buying one of the SAMLEX 0-30V bench supplies recently on sale for half-price ($99.97) by Tech America? Well, I couldn't resist the temptation either and ordered one. I'm reasonably happy with it in spite of two minor flaws: Temperature sensitivity of the output voltage and no bleeder across the filter caps (but I'm glad I didn't pay fill price for it).

The temperature sensitivity is pretty minor and not a big deal. However, the lack of a filter bleeder results in the output voltage "over shooting" the setpoint when the supply is under light load (less than about 50 mA) and the AC power is switched off. That could potentially result in damage to devices under test – like low current drain QRP rigs. However, there is an obvious fix – just install a bleeder resistor.

I found that a 100 Ohm 10W resistor across the output cured the problem (for all output voltages above about 4V, at least). The not-so-obvious part is where to put the resistor so that it does not affect the reading of the current meter since no schematic (or even a manual!) is supplied with the unit. I managed to talk Samlex America's tech support out of a schematic (for future reference, their phone number is 1-800-561-5885) so I can tell you where to put the resistor.

First, you will need a 100 Ohm 10W power resistor (you can get a package of two from Radio Shack for about a buck, part number 271-135). After you have found an appropriate resistor, remove the top cover of the power supply and look at the circuit board standing vertically in the left rear corner. Find the two wires (probably red) just above the two power resistors that connect to the emitters of the 2N3055 pass transistors (these are mounted on the rear panel heatsink). One end of the bleeder resistor connects to this point. Now look at the back of the board and find the large solder pad to which the bottom leads of the filter capacitors (one on each side of the board) are soldered. This is the other point of connection. To make sure you have the correct points, check the voltage between them with the supply turned on--it will be the same as the output voltage if you have the correct points.

I mounted the 100 Ohm resistor on the rear panel heatsink using a homemade bracket and ran flexible wires from it to the circuit board. I suggest that you also mount the resistor on the heatsink so that it won't heat the circuit board. (The heat generated is only about 1.5W at 12V but increases as the square of the output voltage, reaching 9W at 30V.) One important note: The power supply output is floating (the negative side is NOT connected to case ground), so DO NOT just connect the load resistor from the 2N3055 emitters to the case! That's it; problem solved.

—DE W1HUE

SODA BOTTLES GIVE PORTABLE ANTENNA INSULATORS

In the August 1998 issue of the Peanut Whistle, from the St. Louis QRP Society, ***Walter Dufrain, AG5P*** *presents a simple insulator for portable antennas. (SLQS was founded as a local QRP and home-*

brew group in 1987. They feel now, as then, that the QRP world is well-served by QRP-ARCI, NorCal, Michigan QRP etc. and choose not to compete. They do not accept members from outside their area or accept outside subscribers to the Peanut Whistle. But have no fear, I'll be sharing some of their technical goodies on a regular basis.)

These little sealing lock rings on soda and juice bottles are just the item for building small and light weight wire antennas for the portable antenna farm. (See Figure 3.) Use wires sizes 24, 20 or 18 for the antenna and either a 300 ohm twin lead or RG-58/RG-59. For light weight, the 300 ohm twin lead is hard to beat and remember to put several twists in the feedline so the wind doesn't push it around as easily. The feedline can be either soldered onto the antenna element or simply solder some clip leads (alligator clips) to the end.

When finished building the antenna of your choice, usually the famous Altoids box will be plenty of room for the antenna and 300 ohm feedline, which is a quarter wavelength at the operating frequency. Put a label on the Altoids box so you can tell at a moments glance which antenna you're taking to the field. Also, a 20 pound monofilament fishing line should be al you need to put the antenna in the air.

—DE AG5P

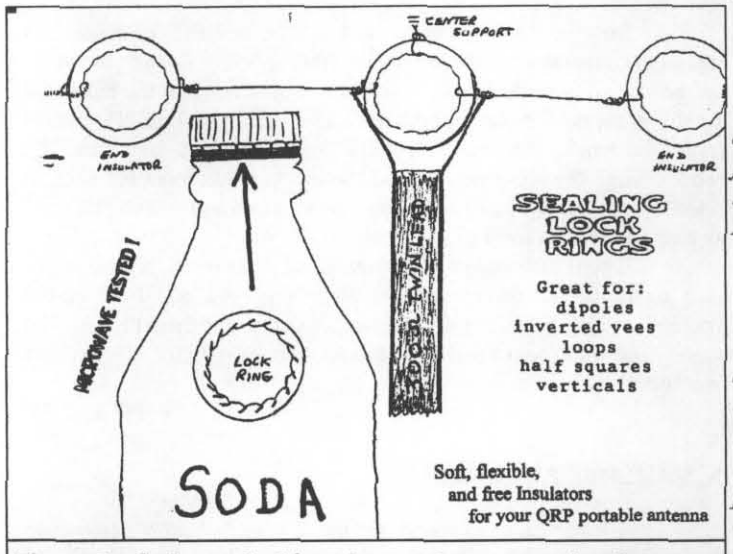


Figure 3—Soda cap locking rings make antenna insulators.

USING SOLDER-IN FEED-THROUGH CAPACITORS WITH CAST ALUMINUM BOXES

*From **Wes Hayward, W7ZOI** of Beaverton, OR*—Some of the modules in our spectrum analyzer (co-authored by K7TAU, QST, Aug/Sept, 1998) are built in the popular aluminum boxes from Hammond. Although made in Canada, these boxes are readily available from US sources including DigiKey and Mouser. The cast aluminum is easily drilled with very clean holes. We use feed-through capacitors to get DC and low frequency signals in and out of these enclosures.

The threaded versions of these capacitors, although effective, can be rather expensive. A solution is to bolt a strip of brass to the aluminum box that will hold the solder-in connectors. This is shown in photo 1.

The brass strip in this example was tinned, but hobby store brass strips should do the job. Be sure to use several bolts to maintain tight shielding. This strip was drilled first with holes spaced every 0.3 inch that then served as a template for drilling the box. The extra holes in the box (see photo) won't compromise the shielding. The pictured box is for a receiver experiment and was not used in the analyzer.

Excellent feed-through capacitors are available from Down East Microwave. I've found some good feed-through buys at Dan's Small Parts, and have added them to my junk box, but have yet to try any of them. See **http://www.downeastmicrowave.com/Catalog.htm** and **http://www.fix.net/dans.html/**

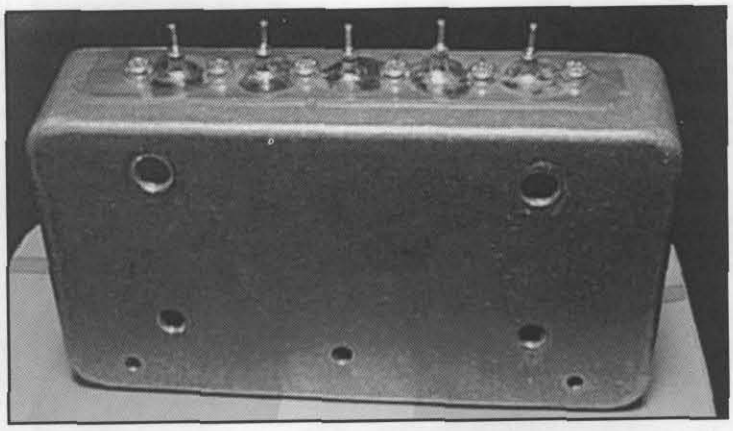


Photo 1—Brass strip bolted onto aluminum box to allow use of solder-in feedthroughs

*If you want to look at Wes' home page, go to **www.teleport.com/~w7zoi/***

and take a look around. He includes an area for "technical tidbits" from which this came, as well as a section containing updates on the spectrum analyzer article by him and Terry White, K7TAU, in the August and September 1998 issues of QST. —WA8MCQ]

—DE W7ZOI

TEST JIG FOR AADE L/C METER

***Chuck Adams, K5FO** posted this test adapter info to QRP-L a while back, and put a picture of it on his web page— **http://reality.sgi.com/employees/adams_dallas/** —although you'll have to dig through a lot of other good info to find it. (This item also appeared in the summer 1998 issue of QRPp, journal of the NorCal QRP Club published by Doug Hendricks, KI6DS, in the QRP Hints & Kinks column written and illustrated by Paul Harden. While the QRP Quarterly is more of a "full service" QRP journal, QRPp leans mostly to the homebrewing side, and I recommend it highly.)*

A basic "problem" with a lot of test meters is that they have binding posts for connections, and that's not always the most convenient or fastest way to test things. Chuck's adapter uses two pieces of PCB material which fit under the binding posts, and provide two small terminals to plug your component leads into.

The Almost All Digital Electronics L/C Meter IIB is one of the most useful tools around for the QRPer who likes to experiment. If you want to make some serious measurements, then this is one you gotta have IMHO (In My Humble Opinion). I don't get finders fees and I paid retail just like the rest.

OK, now for a mod. It's not an internal mod and not really a mod to the instrument itself.

Take some scrap PC board material. I used single sided. Cut two pieces about 2.25 cm x 1.60 cm or so. Take a nibbler and make a notch about 1.5 cm long and centered and parallel to the long side. This makes a U-shaped piece. My nibbler is about 0.5 cm wide.

I also used a WISS straight metal cutter that was discussed ages ago on QRP-L for cutting the PC board pieces. The WISS cutters are available from HomeDepot and part number is M-300 and you'll know the cutter by the orange handles. The right curve and left curve

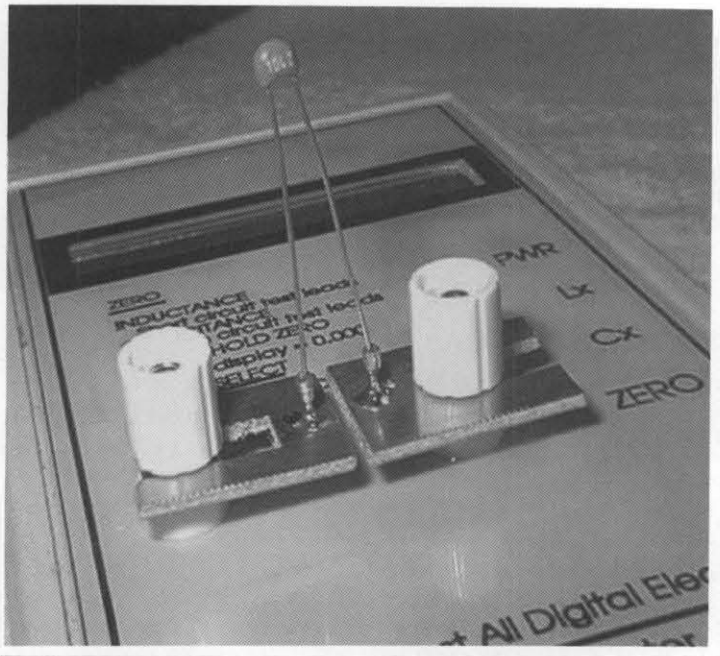


Photo 2—K5FO test adapter for AADE L/C meter

cutters have something like green or blue handles. Don't get them unless you want to cut curved pieces. :-)

Now solder an Augat machined socket pin or equivalent to the center part of the U of each piece. Make the pin perpendicular to the board. *[That's something you can salvage out of an old IC socket. —MCQ]*

Now you have two pieces that you can clamp to the terminals on the AADE Meter and can adjust pin spacing to match component spacing without having to bend leads etc. I can quickly grab several components from the parts bag and measure them and pick the one that I want, etc. without having to bend leads and make funny noises trying to get the leads clamped down.

Neato? I thought so. From the picture (Photo 2) it should be obvious what I'm doing. The L/CM IIB calibrates itself for the additional real-estate (added capacitance, etc).

[Note—Chuck's old e-mail address at sgi.com is probably closed by the time you read this, and his new one should be adams@ticnet.com At the time of writing I don't know if his web page will be allowed to remain at sgi.com or not. —WA8MCQ]

—DE K5FO

"HARD AS NAILS" AS Q-DOPE SUBSTITUTE

***Frank Brumbaugh, W4LJD** of Salinas, PR, dropped this note*—"Hard As Nails," a clear liquid plastic intended as an overcoat for colored nail polish can replace Q-dope and is much harder than Q-dope or clear nail polish. Keep these materials in the refrigerator along with the XYL's nail polish to extend useful life and prevent thickening.

—DE W4LJD

RECYCLING USED CHASSIS WITH DISHWASHER PANELS

*When I talked to **Bill Stietenroth, K5ZTY** (k5zty@juno.com) at Dayton I mentioned that I hadn't heard from him for a while with something for the Idea Exchange, so he sent this along--* Here is an idea that I have used many times to recycle an old chassis box. I even look for old boxes at flea markets to use in this way.

Ten Tec type boxes are expensive in my opinion, but they look good, so I like to use them. When I find one that has been used for some other project and has holes in the front and back, I can usually buy it for a buck or two or talk the seller into throwing it in with something else I am buying. Covering up the holes and making the box useable again costs practically nothing and most hams have the stuff to do it right at home. All it takes is a can of hobby craft spray contact cement, a piece of duct tape or masking tape and the spare color panel from your dishwasher.

Most built-in home dishwashers have changeable front color panels. Usually there are two panels, one behind the other in the frame of the door. A black panel with white on the back and an almond panel with gold on the back, or some similar combination. Most people never change the color once it is installed and that fine piece of thin aluminum with the glossy paint job on two sides goes to its grave unused. It's a real shame with all the uses it can be put to.

Remove the screws holding the chrome side trim on the door and slide the panels out. Put the one that your wife wants back and the other one is good for many front and rear chassis box repairs. Take the two halves of the chassis box apart and lay the "holey" front down on the aluminum panel and trace around it with a scratch awl and cut it out with a pair of tin snips. The stuff cuts very easily. Take care not to slide the painted panel around on a rough surface and scratch it up. Work from the side that you will glue to the chassis.

Now put masking tape or duct tape on the inside of the chassis behind the holes to keep the spray glue from spraying through the holes and getting all over the inside. Follow the instructions on the label, but usually you spray the glue on both surfaces and let it set until it is almost dry to the touch, then very carefully align the edges and press the two together. It sticks instantly and there's not much room for doing it twice. Now take a fine file and smooth the edges and you have a good looking chassis box for next to nothing.

If your dishwasher doesn't have the extra panel, a local appliance repairman or dealer will probably give you one from an old machine, or look for an old dishwasher set out for the trash pickup. The almond and white colors make good looking fronts with the black covers over them.

—DE K5ZTY

A "QRO" QRP AMPLIFIER

*A while back, someone on QRP-L asked about a power amp that could run somewhat more than the standard QRP "legal limit" of 5 watts and someone made reference to an interesting web page which has one, called Harry's Homebrew Homepage. It's operated by **Harry Lythall, SM0VPO / G4VVJ**, a Brit who works for Ericsson Radio in Stockholm. The URL is:*

http://user.tninet.se/~acz732k/index.htm

It is quite easy to get a watt or more with very simple equipment, but to get more than 5 watts becomes a little more difficult. This article describes a 10 watt linear amplifier that is capable of delivering over 15 watts into 50 ohms and uses cheap plastic transistors that are used in CB equipment. If you have difficulty in finding 2SC2078 then lift the lid of your CB set to find a suitable alternative.

The amplifier has a wide bandwidth, from 1.8 MHz through to over 30 MHz. The drive level required is only about 2 - 5 mW under 14 MHz, rising to 10 mW at 30 MHz. You can therefore make a good QRP CW rig with nothing more than this PA and a simple crystal oscillator. I can achieve 12 watts out of mine using a 10-turn loop around my Grid Dip Oscillator!!

The circuit was originally designed to accompany my phasing-type SSB exciter.

To align, set the 1K0 potentiometer to minimum resistance, apply power to the 'PA-12v' and 'DV-12v' terminals whilst monitoring

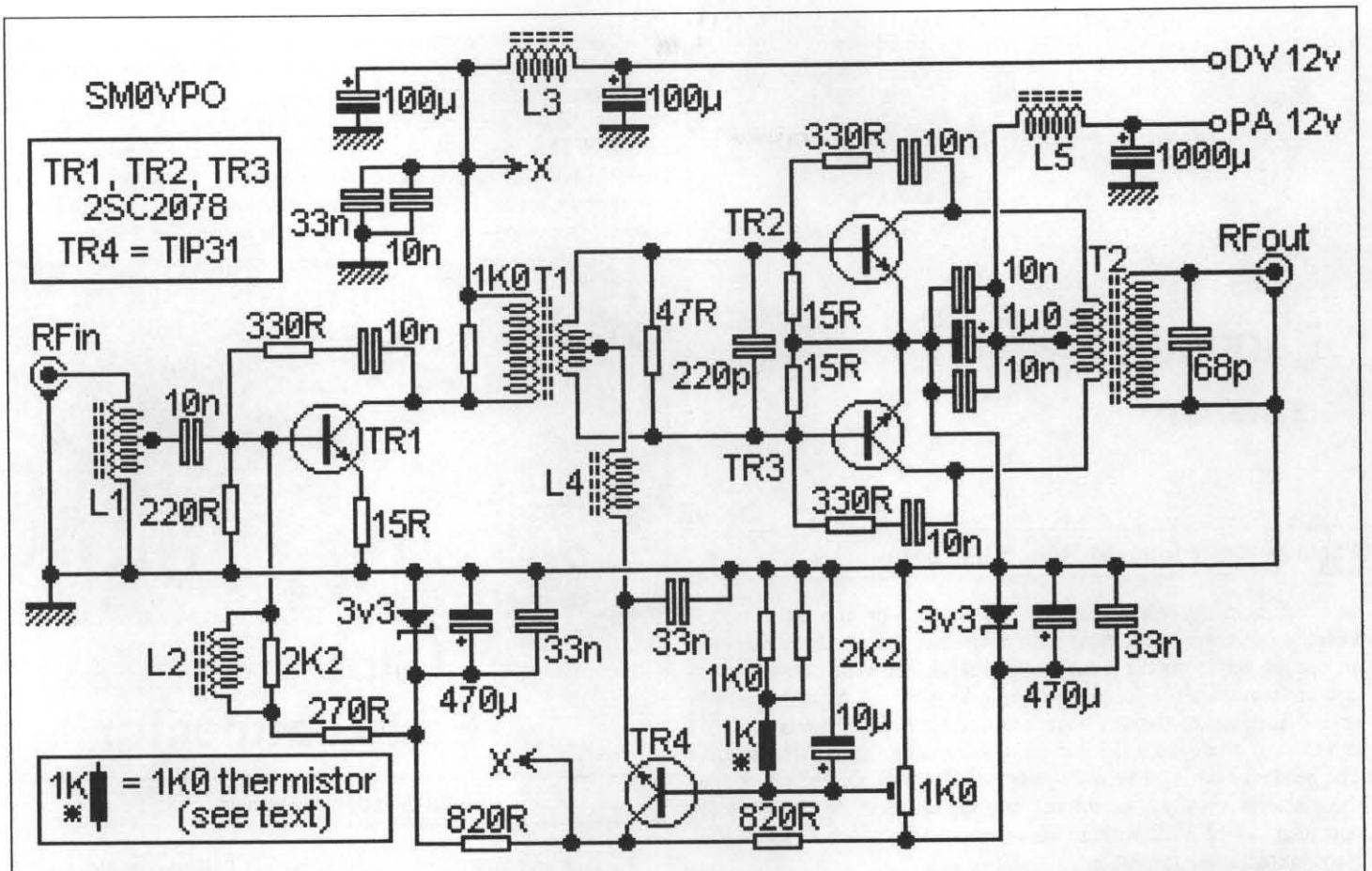


Figure 4—"QRO" QRP amplifier from SM0VPO/G4VVJ. Note that this does not contain any provisions for harmonic suppression, which must be supplied by external low pass filters. (Although the note says to consult the text about the 1K thermistor, the text on the web page did not mention it. Based on my experience on a number of commercial rigs, it should be mounted on the heatsink of TR2 and TR3. Put a small blob of heatsink compound on the heatsink somewhere, then bend the leads of the thermistor so it's immersed in the compound. —WA8MCQ)

the current drawn by the 'PA-12v' connection. The current should be next to nothing. Increase the potentiometer until it draws about 50 - 100 mA. That's it!!

COILS

L1 - 6 + 6 turns 28 - 36 SWG wire on two ferrite beads superglued together - side - by side.

L2, L3, L4 - 10 turns 28 - 36 SWG wire on ferrite bead.

L5 - 4 turns 18 SWG on large ferrite bead.

T1 - 6 turns 24 SWG wire on two large ferrite beads superglued together - side - by side. Secondary = 1 + 1 turn.

T2 - 3 + 3 turns 18 SWG wire on twin-hole ferrite slab. Secondary - 16 turns 22 SWG.

[Those who are regular readers of SPRAT from the GQRP Club will have no problem with the European schematic conventions. For those not familiar, it's easy enough to pick up on. For instance, the letters R and K are used in resistor values to indicate the decimal point. Thus 2K2 would indicate 2.2K or 2200 ohms, and 4R7 is 4.7 ohms. (M is also used for megohms.) This has an advantage over our system in that a faint or missing dot cannot cause confusion. If you see 2 7K, is that 27K (27000) or is it actually 2.7K (2700) with a missing dot? No problem with 2K7! The same applies to zener voltages (although this is the first time I've noted this one used), where 3V3 indicates 3.3 volts.

Capacitors are indicated in pF (p) and nF (n), the latter being nanofarads. One nF equals 1000 pF, so 10n is 10,000 pF or 0.01 uF. and 33N is 33,000 pF or 0.033 uF. —WA8MCQ]

SALVAGING STEPPER MOTORS FROM FLOPPY DRIVES

***Jon Iza, EA2SN** (ea2sn@jet.es) had a posting on QRP-L about using these things. I asked him to write up an expanded article on it and he even included pictures.*

Old 360 KB (5 1/4") floppy drives are a wonderful source of parts. Usually people scrounge for the magnetic head preamplifier, an NE592, which can be used as a video amplifier and some other power transistors and chokes. But, almost untouched, drives are far more interesting than parts alone. One may find: a 300 rpm servo-controlled motor, a hefty stepper motor, several LED and phototransistors, switches AND the circuitry to run all together!

The DC motor usually runs off 12 V, and has a TTL-logic gate to switch on and off. As a pancake motor, torque is not outstanding, but you may find some interesting uses for it on your shack. It splits off quite easily from the drive frame (see Photo 3).

The index detector, and sometimes the Write-Protect detector, are just LED and phototransistor pairs, which can be scrounged for the junk box.

The most interesting part of the drive is the stepper motor, for its capability to move back and forward on precise steps. The task of such motors was to displace the head setup along a narrow slit on the floppy disk cover to read different tracks. At first, drives used to "exercise" the head by moving it along the full slit until Track 00 was

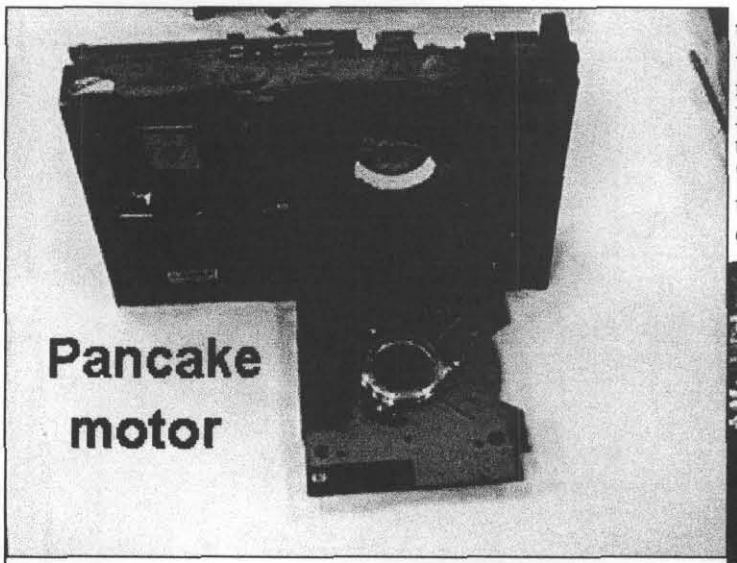


Photo 3—motor from old 360K, 5 1/4" floppy drive

detected, normally when the head was parked on the outer track. Detection was carried out using a slit optosensor fixed to the frame, and an opaque finger on the head mechanism. In order to transform the circular movement of the motor into a longitudinal head movement several mechanical fixtures were used: gears–more common on 3.5" drives–or a drum and a flexible band, such as the one on the picture. The head was confined between rails (see Photo 4). On the old drives the motor is usually a permanent magnet, unipolar, four-phase unit operating at +12 VDC with an advance of 3.6° per step. It takes 100 steps to complete a revolution.

So, what can you do with it? There are two uses which are easy to implement: the linear displacement, although short, may be of interest for a Permeability Tuned Oscillator (PTO). Major drawback is that tuning is stepped, and not continuous. The other use is to scrap the head mechanism together with rails and other mechanical parts and leave the axle of the motor free to move any circular motion need you may have; i.e. pot movement to set remotely the squelch of a FM receiver, variable capacitor movement, for a remote tuner, etcetera.

And now, how to do it? Easy. No one has to dig out the information about the stepper; you don't need it! And no one has to buy

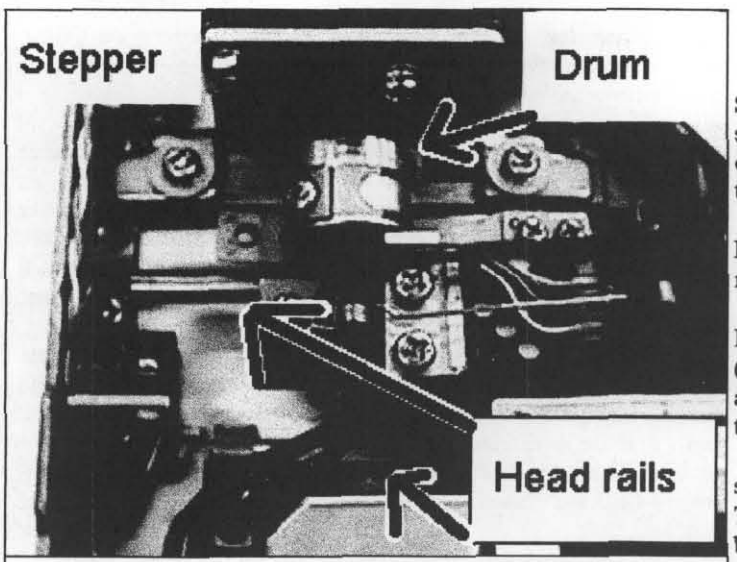


Photo 4

the usually weird, and expensive integrated circuit required for that; you already have it! Where? On the nice printed circuit board you still have screwed to the drive frame. On the edge of the circuit board you will see two connectors: a "computer supply" connector, with the typical +5/0/0/+12 scheme while seen the connector from outside with both round corners up (check also the silkscreen) and an edge connector (see Photo 5). All odd-numbered "fingers" on one side of the PCB are tied together to form a ground return (numbers 1-33). The even-numbered "fingers" (2-34) are usually silk screened on the PCB, but you may find there is a slot on the PCB which served as a key to avoid plugging the connector the wrong side. The slot is between fingers 4 and 6.

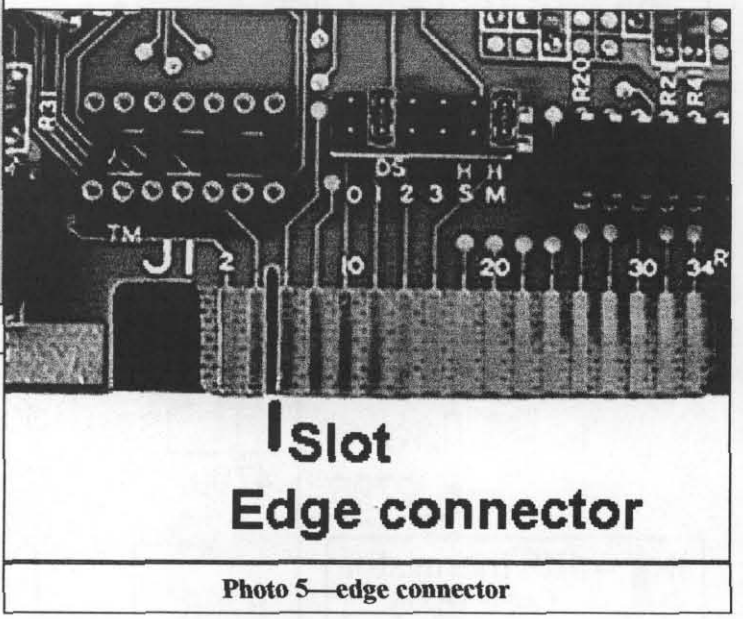


Photo 5—edge connector

The signals on this connector are all TTL compatible. Logic TRUE is low, with typical values +0.4v (low maximum) and +2.4v (high minimum). It is not recommended to run long wires so you may use optocouplers if you want to use it remotely.

The key fingers are:

6	Select 3
10	Select 0
12	Select 1
14	Select 2
16	Drive Motor Enable
18	Direction
20	Step
26	Track 00

Select lines. Drives were thought of as to use up to 4 drives at once sequentially, therefore it was needed to select the right one for each operation. As we are only using one, there is no need to worry about those.

Drive Motor Enable is only used if you want to control the pancake dc motor with a TTL signal. It's TRUE (motor on) when low.

Direction and **Step** are the most important fingers. A Direction low (TRUE) means the motor will turn clockwise every time a pulse will arrive at the Step line. If Direction is kept at high (FALSE), it will be then anti-clockwise. Rotation starts at the trailing edge of the Step pulse.

From the drive board we may get several signals, but after scrapping most of the extra components from the frame, we still may use **Track 00**. When the finger at the head mechanism intercepts the light beam at the slit optocoupler, the **Track 00** signal goes low (TRUE). In Photo 6 you may see the head mechanism almost fully open and the rails and the drum mechanism. In Photo 7 the head has been moved towards Track 00 and the finger is close to the optocoupler (edges have been enhanced). This may be used as an indication of beginning of tuning, or tuning limit.

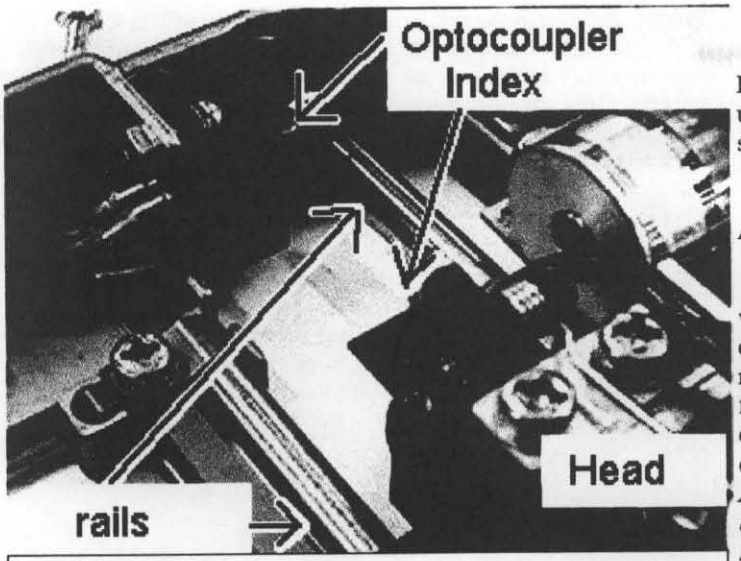


Photo 6

It is just that easy! You hook up the power supply, a switch for the Direction finger and a pushbutton for the Step finger and you are in business! You may also use any TTL oscillator (drawing the power from the drive itself) or an ubiquitous NE-555. For those of you who are more interested there are plenty of places on the Internet to look for more information. A good place to start is Ian Harries place:

http://www.doc.ic.ac.uk/~ih/doc/stepper/

and also Tomi Engdahl's—

http://www.hut.fi/~then/circuits/diskstepper.html.

For those of you who want to connect the motor to the PC, a very simple setup is to use the Parallel Port (Printer port), with simple BASIC commands such as OUT 888,xx for the typical LPT1 port at 0x378 in hexadecimal (decimal 888). More information is on Towanda L. Malone's page,

http://jewel.morgan.edu/~tmalone/dskdrv/dskdrv.html

or on

www.boondog.com/tutorials/parallel/paralell.html

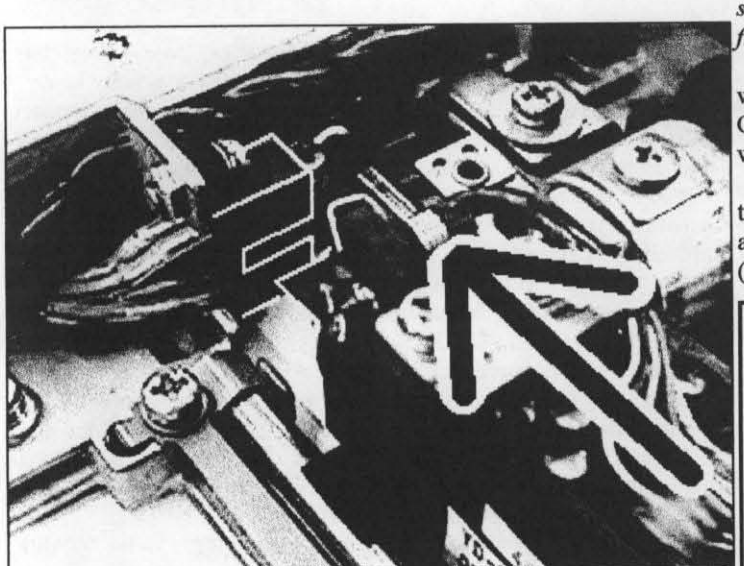


Photo 7—finger getting close to the optocoupler in top left, which has been outlined

There are people driving this idea to the extreme: Luberth Dijkman, a Dutch has built a computer operated Hobby plotter/engraver using this kind of motor. Full description and details, together with software can be found at

http://www.wxs.nl/~luberth/plotter/plotter.htm.

Another circular motion device

Remote-controlled hi-fi amplifiers have a motorized master volume control. It usually has a dual, log scale potentiometers mechanically coupled to a small DC motor. If variable capacitors are oiled to reduce friction, the small motor is able not only to displace the pot fingers but also the variable capacitor connected outside. It is quite common to find 1/4" shafts on those motorized pots, so hanging the cap only requires a small coupler. *[Note—this only applies to older units. As technology marched on, newer commercial electronics started using electronically controlled attenuators, or variable gain amplifiers instead of motor-driven pots. —WA8MCQ]*

—DE EA2SN

HF 4 WATT QRP LINEAR AMPLIFIER

Here's another item from the web page of ***Harry Lythall, SM0VPO / G4VVJ****, a simpler amplifier for the 4 watt level. As with his higher power design, it contains no provisions for harmonic suppression, something that must be supplied externally by way of a low pass filter designed for the band in use.*

This is a rather unusual QRP power amplifier design, with a wide frequency response; within three dB's from 300 kHz to 30 MHz. Overall gain is in the region of 16 dB and the final output power may be well over four watts.See Figure 5.

The wide bandwidth is a result of the construction of the RF transformers, T1 and T2. These are wound on 2-hole ferrite balun cores as commonly found in the old fashioned valve [vacuum tube] TV sets (e.g. Phillips 4322-020-31520). Twist 2 lengths of 22 SWG enameled wire together and wind as shown. Connect the end of the "A" winding to the start of the "B" winding. Use this junction as the center-tap of the transformer.

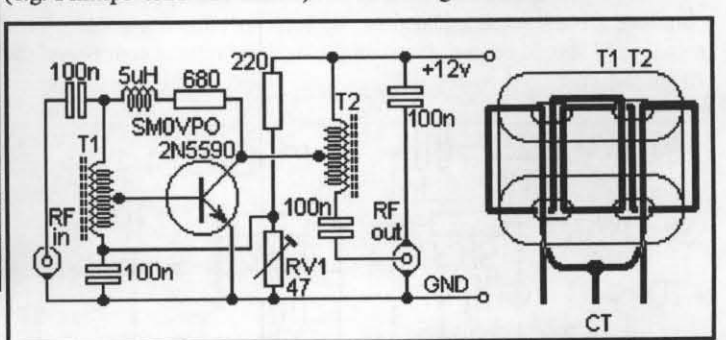


Figure 5—4 watt linear amplifier. (Requires low pass filter at output.)

This PA will deliver 4 watts continuously (with a suitable heatsink), and may be loaded into a short-circuit or open circuit without causing damage. This makes it almost the ideal PA for outdoor/field use. Figure XX is the full circuit diagram of the RFPA and the coil winding pattern. This PA may be used for for SSB, as well as CW.

Set RV1 to MINIMUM resistance and apply 12 volt power with NO DRIVE. Adjust RV1 for about 250 mA DC total supply current. This may be be reduced to a much smaller current if lower output powers (reduced drive) is used.

—DE SM0VPO

CW AND NOTCH FILTERS by SM0VPO

More from the SM0VPO web page—Two projects are described here, both of which may be used to enhance simple receivers. These two circuits may be built on the same circuit board and the OP-AMP IC, LM324, has sufficient sections to accommodate both circuits.

NOTCH FILTER

This circuit may be used to eliminate an unwanted carrier when trying to copy weak stations. Direct Conversion receivers in particular will benefit from this addition as these receivers have quite a wide bandwidth and receive both sidebands. A carrier present in the unwanted sideband can render the wanted signal inaudible, especially if the wanted station is quite weak.

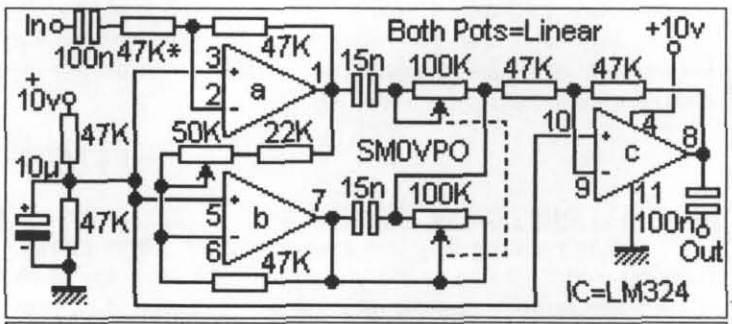


Figure 6—notch filter. (This uses three of the 4 sections in the LM-324 chip.)

The circuit of Figure 6 is very simple and is based upon a Wein-Bridge network. The Op-Amp provides anti-phase outputs to the two filter elements, and also buffers the filter output from the load. The 100K ganged Potentiometer controls the notch frequency and has a range from about 75 Hz to 15 kHz or so. The 50K pot compensates for any imbalance of level at the filter output.

By adjusting the 2 pots in turn, it should be possible to totally eliminate an unwanted signal from the receiver output. The circuit has no gain and should be used between the receiver volume control and the AF amplifier.

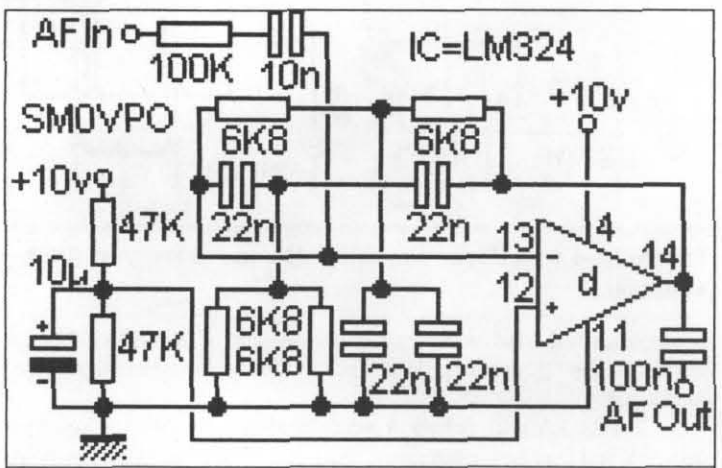


Figure 7—the CW filter (using the 4th section of the LM-324 from the notch filter).

CW-FILTER

Direct Conversion and other simple receiver have quite a wide bandwidth which can make life a little difficult when copying weak CW stations, especially if the band is a little crowded. This circuit uses a single Op-Amp together with a Twin-T filter to provide a very narrow AF filter. Before anyone jumps in to tell me the Twin-T is a NOTCH filter - yes, but it is used here in a feedback loop which shunts the high 100K input impedance, until the input frequency is at the Twin-T notch frequency. This circuit is centered around 900 Hz and is fixed at this frequency by the filter. The circuit has no gain and should be used between the receiver volume control and the AF amplifier.

NOTES

The output level of both these circuits may be altered, by changing the value of the 47K feedback resistor from the output of the (last) Op-Amp, to its -VE input. The unused Op-Amp in the NOTCH FILTER may be used for the CW-FILTER circuit. If you do then you can also delete the two 47 K resistors and 10 uF capacitor supply splitter [on the left side of Figure 7]. This circuit already exists in the Notch Filter and may be used to bias the + input of the Op-Amp in the CW-Filter.

—DE SM0VPO

K6BSU VOICE MEMORY KEYER UPDATE

The July 1998 column contained a reprint from QRPp describing a different approach to CW memory keyers. Instead of digitally reproducing a short message with dull, robotic precision and perfection, this one uses a voice recorder module to record audio from a speaker as you send a short CW message with your straight key, bug, etc, with a sidetone or code oscillator. The recorded CW message, with your own unique "fist," is then played back, triggering a one shot and keying your CW rig. This neat idea came from NorCal's Floyd Carter, K6BSU.

John Kirk, VE6XT *(jakirk@calcna.ab.ca) sends along this update*—Just a tagalong note to K6BSU's great tip for a memory keyer: Quite a few of the "liquidator" type retailers are dumping a product called the "Memo Mate" personal electronic voicepad for as little as $2 each. Essentially, this consist of the circuit Floyd describes, minus the 4538 one shot and transistors, but plus a mike, speaker and 5 watch batteries. An incredible value, even if you just keep the batteries and throw the rest away.

Add a 555 timer to Floyd's circuit, and you have an inexpensive beacon identifier, a feature not lost on me, as I build 6 metre beacons for a number of high-arctic sites. Many "foxhunt" type identifiers exist, and all work well, but have a major flaw for the digitally illiterate: they all require additional hardware (and sometimes software) to program. Most are made by small "basement entrepreneurs" who may or may not be around when you need a new chip programmed. Nothing more complicated than the keyer you probably already use is necessary to reprogram the "CW Message Recorder-Keyer."

—DE VE6XT

DRAINING ANTENNA STATIC CHARGES

In response to someone's antenna question on QRP-L, ***Kevin Muenzler WB5RUE*** *(wb5rue@stic.net) had this to say—*

You need the following to get good performance from a vertical.

1 - an excellent ground
2 - an excellent radial system.

It is more important to have a good radial system. But having a good ground is pretty important too. If you have a tall vertical like 40 or 80 meters it is extremely important that you have good lightning protection. Drive two or three 8-foot ground rods in the ground right next to the base mount on the ground. Connect these to the mast (however short it is) with good mechanical connections. DON'T SOLDER THEM. If you must, you may braise them. Lightning will blow the solder connections and leave you with an open circuit. *[Heavy current flow can cause the solder to melt and run off. —WA8MCQ]*

Connect a large value resistor (33K or so) between the vertical radiator and ground. This will bleed static from the antenna as it builds up. You can also use an RF choke in place of the resistor. Be sure it is of sufficient value as to be an "open circuit" to the RF. Not only will they bleed static but they will help reduce the noise caused by the static buildup. These measures WILL NOT guarantee that your antenna will be immune from lightning but will help some by taking static from the air and sending it to ground.

For more on lightning safety you can visit the ARRL web site at **http://www.arrl.org/tis/info/lightnin.html** or visit the Polyphaser web site at **http://www.polyphaser.com/**

—DE WB5RUE

RECEIVER NOISE FLOORS AND AUDIO VOLTMETERS

First, a little background since this involves a post to QRP-L back in June 1998 by **Chuck Adams, K5FO**. This appeared on 14 June 1998 (ref QRP-L Daily Digest #1122, message 13121).

Chuck said--

"In the June 1996 issue of QEX, the ARRL's Experimenter's Exchange newsletter, there is an excellent article by Ed Hare, ex-KA1CV now W1RFI. The title of the article is "Swept Receiver Dynamic Range Testing in the ARRL Laboratory". The section on Noise-Floor Test Conditions was of interest to me. *[Test setup is shown in Figure 8. —WA8MCQ]*

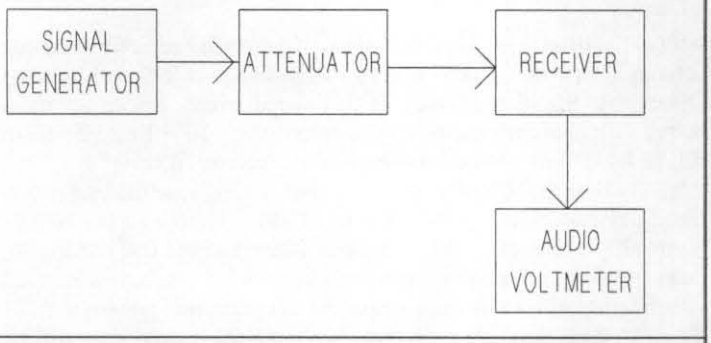


Figure 8—Setup for measuring receiver noise floor

"1. Set receiver bandwidth to 500 Hz, if possible or as close as you can get.

"2. Set volume to comfortable listening level.

"3. Measure output level of noise using audio meter.

"4. Use a signal generator and tune for maximum output.

"5. Then crank in attenuation (or change the level of the signal generator) until you get a level 3 dB greater than in step 3.

"Then from the attenuator and signal generator output level you can calculate the level of the signal (in dBm) and this is the receiver's noise-floor sensitivity.

"Ed and the ARRL lab group use a National Instruments AT-2150A 16-bit digital acquisition card. I'm told if you have to ask the price you can't afford it, so I won't.

"So the question here is: Is there another way to do this using a sound card that already exists? A lot of people may have already seen an alternative solution. My thinking here is that with systems with 200 MHz and faster processors the FFT [Fast Fourier Transforms] and spectral analysis is much easier to do now than back in the 4 MHz days.

"A diode detector would most likely not give the accurate results desired for this experiment. So many questions and so little time....."

(end of K5FO post)

WA8MCQ comments:

I've already done receiver noise floor tests just like this myself at home many times, and I did it without a computer with a data acquisition card, using an old HP analog audio voltmeter instead. (And I also did it with ancient signal generators with vacuum tubes!) There is no reason why this has to be done with a computer and expensive plug-in cards unless one needs extreme precision or is doing a computer automated test run. Just because this is the digital age and the computer age does NOT mean that analog is dead!

I receive a large number of trade journals at work (somewhere around 76, in a variety of fields), for which I often receive snide remarks from the people who handle the mail. One thought that I've seen pop up repeatedly over the years in several of the electronics journals, on the editorial pages, is that for home use--or even for nondemanding use at work--there is absolutely nothing wrong with older test equipment that does not have all the bells and whistles, and may even be <GASP!> analog! There's still a lot of good, older test equipment out there at good prices at hamfests, and it's still quite usable. It may not be fresh out of the calibration lab and may be a bit dirty and beat up, but at least it still works well. (Or we hope it does, and that the seller isn't fibbing!)

But don't bother looking in any of those catalogs from places like Tucker, Test Equity (formerly RAG), Test Equipment Connection, etc, that sell reconditioned equipment unless you want some severe sticker shock. They totally refurbish things and make them like new, including fresh calibration, and that costs a lot. For our purposes we can be satisfied with things that we buy at hamfests, from individuals or the small test equipment dealers who hit hamfests. As always, caveat emptor, no matter who you deal with. And don't forget there are different types of dealers. Some just pick things up for pennies on the pound, sell them cheap, and have no idea what they do. (And occasionally they'll admit that, which is refreshing.) Others may well test them out at least minimally to make sure some of the main functions work, and others do thorough checks and give good warranties.

THE HP 403B AUDIO VOLTMETER

What I use for these receiver noise floor measurements is an old HP model 403B "transistorized AC voltmeter." (See Figure 9.) It's a relatively high impedance (2 megohm) meter with response to 2 MHz, with 12 ranges going from a full scale reading of 0.001 volts RMS to 300 volts RMS. (The scales are also calibrated in decibels, which is quite handy.) Most of you have probably seen these at hamfests without realizing what they are. They seem to be relatively cheap of late, and I've seen them as low as $25 several times this year, a good bargain if in reasonably good shape. They are good meters for measuring AC voltages such as audio. (I'd be VERY careful about using one to measure the AC power line, though.) They come in handy when building audio amplifiers, filters, etc and testing receiver sensitivity.

The size is 5 1/8" wide, 6 3/32" high and 8" deep. They have internal rechargeable batteries, which in most cases will probably be in poor shape due to the age. They also operate from the AC line, selectable between 115 and 230 VAC. If you buy one, check the AC connector on the rear and be sure you have something that matches it; buy one at the hamfest before you go home if you have to. They have two different styles of AC connectors, depending on the age of the unit (see Figure 9, left side). The newer ones use the 3-prong rectangular connector that is now used universally on computers, and everyone probably has a dozen around the house. But the older ones use an oblong power connector with 3 round pins. You can still find that style of power cord at hamfests if you look around, and you can also find them in places like the Newark catalog.

A nice thing about this meter is that the scale is calibrated in decibels in addition to volts. The dB scale goes from -12 to +2 on the standard model, and from -15 to +2 if the unit has Option 01. The option simply places the dB scale on the top of the meter instead of the voltage scale; the top scale covers the longest arc and thus has the best

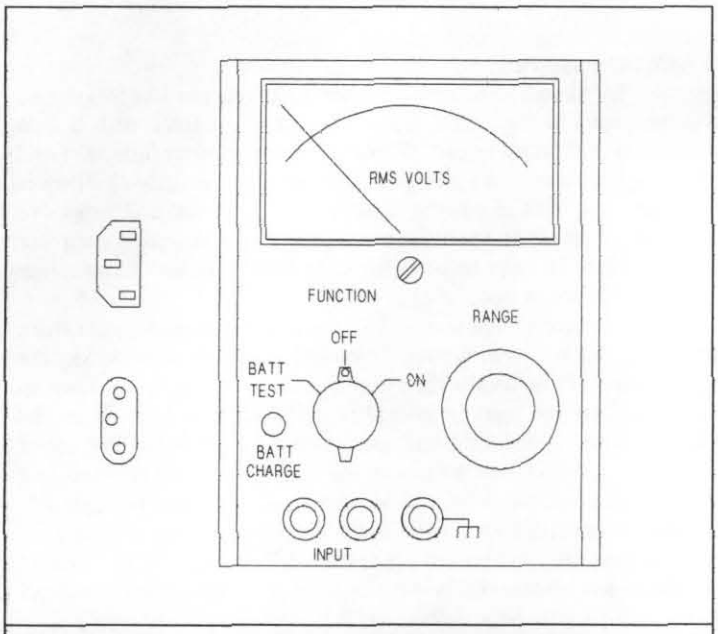


Figure 9—Hewlett Packard model 403B AC voltmeter and two different styles of AC connectors it may have. (Drawing not to scale.)

resolution. (Both types have the dB scale.)

When measuring receiver noise floors, you measure the noise output on the audio line with no signal, pump in a signal until the output increases by 3 dB, and calculate the sensitivity. Using a meter like this which has a dB scale makes it quite easy; set the audio output so the meter reads at some convenient point on the dB scale with no RF signal input, then crank up the signal generator until it reads 3 dB higher.

Remember that the dB is a relative measurement, not an absolute. On the other hand, dBm IS an absolute, indicating decibels relative to a reference point of one milliwatt. Zero dBm is one milliwatt, +10 dBm is 10 mw, -10 dBm is 0.1 mw or 100 microwatts, etc. The HP 403B can be used to measure dBm, absolute power level, by reading directly off the meter in conjunction with the range scale, but this is only accurate if working in a 600 ohm system, which is what the scales are calibrated for. If operated at any other impedance you can no longer measure absolute power levels directly from the scale, although you can convert the readings to get it. But you can still read relative power directly in decibels right off the meter.

PEGS ITS OWN NEEDLE

One word of caution about the 403B--sometimes it loves to peg the meter when switching ranges, even though the signal is well below the maximum permitted by those ranges. When I was in the Air Force and pegging meters was severely frowned on as potentially damaging, it took a while getting used to the 403B doing it sometimes on its own. It was especially fun when going through maintenance evaluations with inspectors looking over your shoulder and having to explain to them that when the meter pegged it was a quirk of the meter circuitry and not your fault! I handled a lot of these meters during my USAF career, and now that I'm retired from that and in my second career, I have two of my own; believe me, they all do it. In fact, they even do it sometimes with no signal connected to the input. The meter will peg briefly, for perhaps a second or two, and then come back down. Sometimes it will even do it twice!

One little tip to keep in mind when using any analog meter with a range switch is to set it to the highest range before connecting test leads, hook them up, and then reduce the range until you get a usable reading. If you have it set to a lower range when connecting the signal, you might damage it with an overload. This used to be a well known practice, but now that we've had autoranging digital multimeters for years, which let us connect leads without doing anything more than setting a switch to AC VOLTS or DC VOLTS, we get spoiled and might forget this if we use an older, analog meter. (It's also important to observe test lead polarity with an analog meter if measuring DC, another thing that modern meters do for us automatically.)

Glen Leinweber, VE3DNL, indicated that there are some potential inaccuracies, although small, due to the different waveforms of noise vs. sine waves, different types of AC meters measuring RMS in different ways, etc. That will be presented in the January issue.

—DE WA8MCQ

MORE ON NOISE FLOORS

Paul Harden, NA5N (pharden@aoc.nrao.edu) replied with this post on QRP-L. Mike's description of performing your own noise figure tests is accurate and fun to do. He brings up a very good point that you don't need current day, expensive test equipment to make these measurements. As we build our rigs or assemble a kit, it is VERY worthwhile to make some measurements with the test equipment you may have. We are generally not interested in super accurate measurements, but a fairly "close" idea of what sensitivity (MDS) and selectivity (filtering bandwidth) we have. Do these things with the equipment you have, then you have a benchmark to evaluate mods or perform diagnostics when the rig gets anemic on you.

There is an equation that represents all of this:

-174 dBm = MDS - NF - 10 log (BWn)

where -174 dBm is the ideal sensitivity of the perfect receiver operating at room temperature with a 1 Hz bandwidth; MDS = Minimum Discernable Signal (measured as that signal which causes an audio output 3 dB above the noise as Mike described); NF = Noise Figure in dB; 10 log (BWn) = noise bandwidth of the receiver filtering.

Note that Chuck's post mentioned setting your filtering to 500 Hz if possible. 10 log(500 Hz) is 27 dB. However, the NOISE bandwidth is generally 1.2 to 1.5 times wider than the CW bandwidth; many people use 1.4 as an approximation. So if you have measured your filtering with a CW carrier to be 500 Hz at the half-power points (3 dB down from the highest power), then the NOISE bandwidth will be about 500 x 1.4 = 700 Hz. 10 log (700 Hz) = 28.5 dB. Measuring the MDS at 500 Hz is an attempt to standardize measurements. Note that when you see MDS measurements for commercial rigs, such as in QST, it is generally based on 2.7-3.0 kHz bandwidth for SSB, for which 10 log (3000 Hz) = 35 dB.

WHAT'S THE POINT OF THIS? Your minimum discernable signal (MDS) or sensitivity of your radio will be a direct function of how much prefiltering is performed before the mixer. This has been a discussion on QRP-L this past week. This is why QRP rigs often outperform the big boys, because our prefiltering is very tight, only a few tens of kHz to cover our range of interest. Commercial rigs must pass the entire ham band, wider filtering, and thus to get the same MDS, they have to do some real engineering.

By rearranging the above equation to figure out the noise figure, you get

NF(dB) = -174 dBm + MDS + 10 log (BWn)

Measure the MDS, know what your filtering bandwidth is, subtract from -174 dBm, and the remaining is the receiver noise level. With a DVM/VOM, even an old one like Mike was using, and an old signal generator with questionable output attenuation accuracy, you should be able to calculate your MDS, filter bandwidth, and hence noise floor to within 10 dB. And that is actually pretty good.

Mike made a very good point—don't let all the dazzle, bells

and whistles of modern test equipment convince you the older stuff doesn't do the job. You can do some good engineering and measurements with what you have; just learn how to use it.

—DE NA5N

DIFFERENT TYPES OF SPECTRAL PURITY MEASUREMENTS SHOWN IN QST

A little while before noise floors were being discussed on QRP-L, the September QST arrived with a review of the new TenTec QRP rig. Someone commented that the spectrum analyzer sweep was incredibly clean and showed almost no spurs except a little noise at around 140 dB below the carrier. That sounded too good to be true, so I looked at the review and noted instantly that it was a composite noise test, not the normal "full spectrum" sweep that we think about when we talk about spectral purity. (The former is something their reviews usually include on all rigs.) It just showed the noise within a few kHz of the signal, not a sweep to several times the transmit frequency showing the strength of the harmonics. What may have helped confuse some people was that the same issue also contained the second part of a two part article on a homebrew spectrum analyzer by W7ZOI and K7TAU, and it showed the outputs of 2 QRP rigs that did show the wider sweep we're used to seeing, and they had lots of spurs.

In private mail, ***Paul Harden, NA5N*** *commented that showing the output spectrum but only looking at, say, 100 kHz around the carrier just indicates the amount of oscillator phase noise and does not include any harmonic content generated by the output stage or any spurs that may result from the frequency generation process (undesired mixer products, etc), and those are the things that we're normally more concerned with. He also pointed out the everyone is used to seeing output spectrum displays showing the first few harmonics and that makes this a bit confusing.*

A later posting by ***Mike Tracy, KC1SX*** *(the ARRL's current test engineer) pointed out that this radio is the first one of its type for which they published a transmit composite noise plot like this, although they routinely publish them on "big rigs." He also indicated that other single band QRP CW rigs could well be similar to the 1340 in their composite noise performance.*

Here's the comment from ***Wes Hayward, W7ZOI****, posted to QRP-L, titled "Apples and Oranges--September QST"—*

The September QST is just out with some spectral displays published. In one case, the paper by K7TAU and me contains the spectral output of a QRP kit popular a few years ago. (Fig. 14, p 39, Sept 98 QST) The photo shows a sweep that spans from about 100 kHz up to about 16 MHz. The proliferation of spurious responses is evident. These spur frequencies are the direct result of the mixing and frequency scheme used in the transceiver. The magnitude of many of the spurs is the result of inadequate filtering within the transceiver and, probably, ground loops on the circuit board. While there are many spurs, they are within current FCC specification limits. A spur measurement is also shown for a simple VFO/doubler/amplifier type transmitter.

The same QST issue presents a review of a kit from Ten-Tec. The review was largely devoted to the kit process, with little information presented about the end product. This is probably fitting for the market. The review included a spectral output. Someone noted in an August 20 QRP-L posting that the Ten-Tec spectral output was outstanding. But it is not. The output presented in Fig. 7 of the review is a different measurement. That data presents a phase noise evaluation, the spectral density of phase noise normalized to a 1 Hz bandwidth close to the carrier. This "composite noise test" only shows outputs very close to the carrier. The review also did the measurement we did [with a wide frequency span] to examine transmitter spectral purity [but did not show a picture of it], with a result of 47 dB. This is within FCC specifications at this time and is similar to the result we presented for the kit we measured.

The phase noise performance presented in Fig. 7 of the review (page 76, August 98 QST) is outstanding. This is clear when the data is compared with similar data presented a few pages earlier for a high-end MF/HF/VHF transceiver. The performance difference has nothing to do with the Ten-Tec 1340 being a QRP rig. Rather, it is the result of NOT using a synthesizer in the 1340.

While the local oscillator (LO) purity is stellar, it's hard to see how Ten-Tec only managed a 75 dB two-tone dynamic range in the 1340 receiver with a published 1 kHz bandwidth and JFET mixer front-end. That performance is probably compatible with the low kit price.

It was confusing to have the LO composite noise plot presented in the review when the greater interest is in overall transmitter spectral purity. I suspect the ARRL lab staff merely performed a standard test for transceivers. Perhaps it's time to encourage real reviews of QRP rigs within the various QRP club journals, allowing us to see how the boxes really perform. Ultimately, the kit prices would probably increase a bit, but the performance increase could be greater. What do we want?

—DE W7ZOI

QRP-L, THE "QRP DAILY"

Although the Fox Hunt on-the-air activity coordinated via QRP-L was over for the season and people got outdoors a lot more during the summer, the traffic load still held up pretty well, with several dozens of posts per day—no shortage of QRP activity here.

To subscribe to the free Internet QRP forum, started up in 1993 by 1998 QRP Hall of Fame inductee **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.

You'll get an automated reply saying that someone tried signing up with your address. It instructs you to return a "conf-cookie" code, which it supplies, to verify that the request really did come from you and that you do want to subscribe. Send that code back in e-mail, and after it gets that verification from you it adds you to the list

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. (To reduce online connection time, download the digests and read them offline later with a word processing program.)

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.)

THE FINE PRINT

As always, if you see an error somewhere in the Idea Exchange, let me know and I'll correct it in a later edition. (Sorry, minor typos don't count!) I never get any mail about errors or incorrect information; either I and the authors are doing really good jobs, or perhaps the problems are there sometimes but no one bothers to mention it. If I present some incorrect info in one of my dissertations, I'd love to have someone correct the error and even expound on the subject and expand our knowledge of the subect. My addresses are at the top of the column—use them!

—qrp—

Reader Survey Report

by

Ron Stark, KU7Y

I would like to thank everyone who took the time to take part in the reader survey. I received a total of 92 responses, 44 via e-mail and 48 via USPS.

Q1. The question of putting the Quarterly into a protective package had 51 Yes answers and 41 No answers. You will all be happy to see that starting with this issue the Quarterly will be arriving in it's own envelope. Only time will tell if this cuts down on the damage. We all have our fingers crossed!

Q2. This question wasn't very clear. There were a few who said that they would pay extra for first class postage but that they would rather have any extra money go toward making the magazine even bigger and better. What we were really asking was how many really think we need to use first class mail, even if it was to cost more.

There were 24 Yes answers and 68 No answers. Most of the Yes answers were via e-mail. I thought this was interesting. It looks like those of us who use e-mail don't have as much patience as those who relay on the USPS! My advice to the BoD is to stay with bulk mail but look into the possibility of going to 2nd class mail.

Q3. Lots of different suggestions were received. Those that came via e-mail mentioned things like digital modes and more computer related articles while those from the USPS asked for less digital and computer articles!

The most popular request was for more articles about operations. When you go to the field, write it up! People want to hear about it, what you did, how you did it, what you used and etc.

Q4. What kind of articles do you wan to see less of? Nothing came to the top here. Most people seem to feel that we have a good balance already. The majority just said something about not having less of anything! (Thanks, that makes us all feel good!)

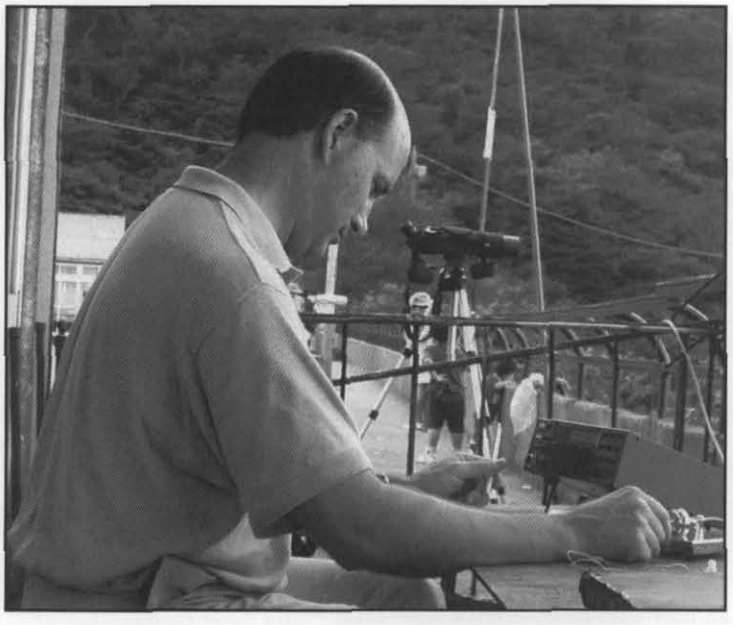
Q5. What is the QRP ARCI doing right? The magazine got the most mentions. Contests was a close second. Overall support for QRP was also mentioned a few times.

Q6. What is the QRP ARCI doing wrong? Not much really! A couple of people felt we were excluding microwave operations. (If someone will write it, we will publish it!) Some think we should stop contesting! But most said that we are doing a good job.

Q7. What could the club do to be a better club? The most common response here was to keep the magazine growing, both in size and in content. Some mentioned that we need to support the regional clubs more by helping them with booths at ham fests and etc. But most said just keep on keeping on!

Q8. The general comments/feedback brought many, many very nice comments. All of us take a great deal of pride in the work we do for the club and for the Quarterly. When so many of you say so many nice things it makes it all worth while!

We will continue to listen to you any time you have anything to say. Your opinions are always welcome. Drop a line to anyone on the back cover any time you like. de Ron, KU7Y



Here is Eric Swartz WA6HHQ, shown here on top of Tsukuba-san mountain at 2700 ft. This is about 3 hours north of Tokyo. Then there was a tram ride up the mountain and a one KM hike to get to this observation platform. Note the SLV in the background. When this picture was taken, Eric was in QSO with your editor Ron, KU7Y. Eric had a ball working many of his friends back here using the new K2 rig with it's internal battery supply. Look for the early review of this rig elsewhere in this issue.

Sneak Preview: EleCraft K2 Multiband Transceiver

Conrad Weiss, NN6CW **440 Walnut St., San Carlos, CA 94070** **email: radman@best.com**

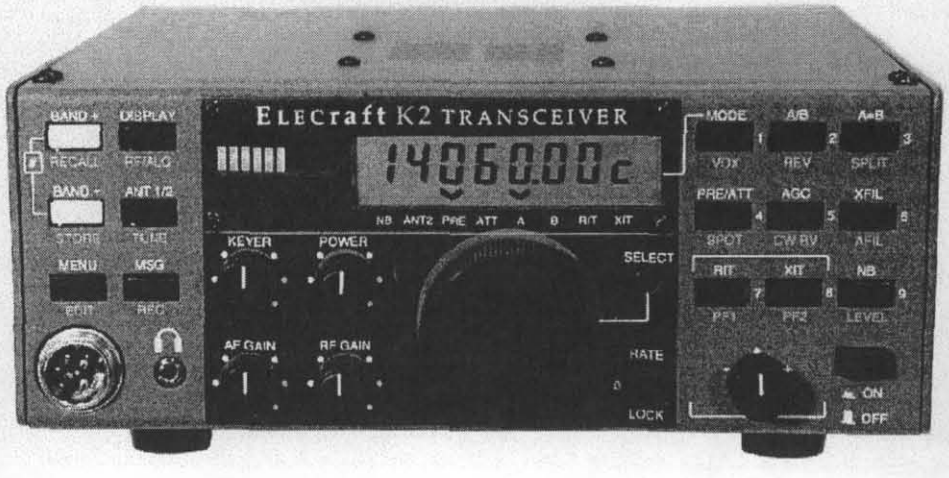
Some Background

Wayne Burdick, N6KR, and Eric Swartz, WA6HHQ, have joined forces to form a new company, "EleCraft", located in Aptos, CA to produce state-of-the-art kits for radio amateurs. (You may recognize Wayne as the designer of kits sold by Wilderness Radio; Wayne's association with Wilderness will continue.) The first kit to be offered by EleCraft will be a compact, microprocessor-based, all-band, CW/SSB HF transceiver called the "K2". This kit is intended for intermediate to advanced builders. A completely assembled version of the K2 will *not* be available (at least not in the near future), but a "partial assembly option" will be available for those who don't feel up to assembling the full-blown kit. To facilitate testing during (and after) construction, the K2 will contain a digital frequency counter, voltmeter and ammeter.

The basic kit will be a full-featured CW transceiver covering 80 through 10 meters. Standard features of the K2 will include:

- Output power adjustable 0-10W PEP via front panel control
- PLL synthesized for low noise
- *Microprocessor controlled*
- Two VFOs with split operation
- RIT and XIT
- Built-in speaker
- Build-in keyer with six programmable memories
- Full break-in, high speed CW
- Variable bandwidth IF filter
- Ten memories store Mode, VFO A/B, Split, RX filter, etc.
- Simple menu system for advanced settings
- RX pre-amp and attenuator
- RF gain control
- Fast attack IF-derived AGC

The K2's options will include: 160M band module (which will allow a separate receive antenna to be used on *any* band), an internal gel cell, noise blanker, custom IF filters, a SSB package (including speech compression and a dedicated SSB IF filter) and choice of either an internal automatic antenna tuner or internal power amplifier (50W or possibly 100W, as yet to be determined). All option modules either plug into the main board or attach inside the top cover and are interfaced via EleCraft's AuxBus, a low-noise, single-wire serial control network that allows for incremental system expansion. The K2 is scheduled for shipment in the fall of 1998 at an introductory base price of about $550 (US).



Prototype K2 Transceiver. *The front panel buttons are multifunction; a short "tap" will activate the function indicated by the label above a button, press and hold will activate the function indicated by the label below a button.* *(Photo courtesy EleCraft)*

Prototypes of the K2 are currently (summer '98) undergoing field testing by "real users". Wayne and Eric asked for field test volunteers and pulled names out of the hat from those who volunteered. They recently pulled my name as one of the lucky testers! The unit that I would test was a Revision XA, Serial No. 0001 – Wayne's personal K2. Other field testers, unknown to me, will take turns running the rig through various torture tests. All of the field test comments will be tallied and any deficiencies in the rig should be corrected prior to Revision XB – the first 50 to 100 kits to be released at the end of summer, 1998. EleCraft's field test strategy will hopefully lead them to a near-perfect K2 product launch.

The K2 I received included everything a production unit will have except the 10 and 12 meter band components – no time to install them for my field test. The internal ATU and Noise Blanker option boards were still at prototype level, and the SSB option board was being tweaked, so I didn't get to test those options. However, the 160 Meter option was installed, as well as the internal 2.9Ah gel cell. I was asked to evaluate it as a fully functional 160-15 meter CW transceiver, testing all of the normal "core functions" of the rig. The rig was fully assembled, so obviously I can't comment on the difficulty of building the kit or the completeness of the assembly instructions. However, EleCraft claims that the rig will be "easily assembled by intermediate builders" – but don't expect it to be a single weekend job since there will be approximately 200 parts to assemble!

I met Wayne at his lab, reviewed a 25-page preliminary operating manual, received a 30-minute crash-course in test driving the K2 and then I was on my own. Wayne was flying out of town and Eric would serve as my safety net should I get in over my head or hit something really serious – like smoke! I packed the K2 in my padded shoulder bag, Wayne wished me 'good luck' and I took off to start field testing. Due to time constraints, a full lab test simply wasn't possible. I made the decision to operate the K2 at an output level of 5W for the bulk of my testing. However, I ran the RF power up to 15W on several QSOs during testing. The K2 functioned well at both power levels.[1]

First Impressions

From the moment I pushed the K2's power button and "Elecraft" appeared on the LCD as the rig's microprocessor ran its self-diagnostic, I was impressed that the K2 *is not your average* HF ham transceiver. It doesn't have to be connected to an external power supply or battery! (Provided that its *internal gel cell is in* place and charged.) I connected a short piece of wire to the antenna jack and carried the rig around my house listening to WWV on 10 MHz. Next I disconnected the gel cell and powered the K2 with

[1] The final amplifier of the K2 is conservatively rated at 10W and prototype units have been run as high as 20W. However, production units may be limited to 10W PEP maximum power according to Wayne.

a 9V battery while listening to WWV. I heard that Wayne performed this demo during Field Day '98 and I had to try it; it really works!

Then it was time to get down to serious business. I plugged my headphones into the front panel jack, plugged my paddles into the rear panel jack and decided to go with my 40 meter Vee through my LDG QRP ATU with a Diamond SWR/Power meter. Later I would switch to my Mosley TA-33jr and do some work on 15 and 20 meters. I pushed the K2's TUNE button and within a second the LDG had the K2 matched at 1.1:1 SWR. The K2/LDG combination worked so well that they stayed together for all of my testing on both antennas and all bands.

I listened around 7.040 MHz and found numerous CW stations to test the K2's RX filters. Wayne had preset the crystal filter band-widths at roughly 400Hz, 800Hz and 1500Hz. The sensitivity of the K2 receiver and its low noise floor makes it fun to go after the "weak ones." The K2 is PLL synthesized – no DDS spurs to get in the way of things – and I soon found myself going after the weakest of the weak stations. It's a very quiet receiver and well suited for QRP work. There were times when I missed my Pass-Band Tuning or IF shift that I enjoy on my bigger rigs. After I had dialed in the 400 Hz RX filter I sometimes found myself carefully working the RIT to bring the signal up a bit. My first impressions of the K2's receive section were extremely positive; it's lively, sensitive and fun to drive! Excellent main tuning feel, selectable tuning steps (10Hz, 100Hz or 1kHz per step) and RIT combine with the nicest AGC circuitry I've ever used. I would rate the receive section among the best I've ever used even without Pass-Band Tuning or IF shift.

Designed by CW ops For CW ops

EleCraft says, in their preliminary manual, that the K2 was designed by a couple of serious CW operators for CW operation. Right they are! The K2 offers a CW reverse mode which when combined with the three RX filter settings yield six CW filter presets. I used XFIL and CW RV extensively in my listening tests. Tuning the agile little K2 around the 20 and 40 meter bands reminded me of driving a sports car around a twisting mountain road – it's agile and very playful! The K2 tempts you to dig a little deeper for that weak signal and amazingly it usually pops out of the noise with the 400 Hz filter setting – ready for a QSO! I became so mesmerized with the K2 receiver the first night of testing, that I found myself just tuning around the bands, playing with the filters and copying CW in my head. I woke up at 3:00AM with my little Kenwood headphones still on... I'd fallen asleep listening to a long QSO!

The next morning I drilled into the K2's Menu Mode. The menu is used for settings that are not changed very often. You can set CW sidetone level, pitch, QSK delay, CW input selection (paddle/reverse/hand-key), iambic mode (A or B), CW speed range (Low: 9-25 WPM or Hi: 10-40 WPM), backlight (On/Off), S-Meter (dot or bar graph), AGC decay (fast or slow), Hi Intercept Point (On/Off), Receive Ant (On/Off for each band), ATU (On/Off), PA (power amp On/Off), Calibrate Menu and PF1/PF2 – the programmable function keys.

The PF1/PF2 keys allow you to "short-cut" the K2 menu and assign two "personal" functions of your choice to these keys, e.g.: PF1 = AGC (On/Off) and PF2 = CW speed (Hi/Low).

In addition, CW 'spot' and "autotracking transmit offset" are standard issue.

Battery Management in the K2

It's not surprising a transceiver that Wayne Burdick has co-designed would be easy on the gel cell. What's interesting is how many ways the K2 can be configured to conserve battery and maximize performance. In the menu mode, the user can toggle On/Off: backlight, AGC, HiIP, and S-Meter (bar/dot). The result is systematic reductions in standby receive current from a maximum of 250mA, in my test K2, to a minimum of 150mA. However, the news gets better! In the "XB" build, EleCraft will abandon the non-latching relays (for band switching, etc.) in favor of latching relays. This will eliminate the holding current for the relays – up to 100mA depending on the number of relays energized – and further decreases standby receive current to around 100mA. EleCraft is evaluating a feature that would allow the user to switch between "performance" mode and "battery save" mode without going through the K2 menu; that would be a nice touch! That would allow the operator who wants to grab the K2 from the home QTH and head for the field a simple key combination to decrease receiver current drain.

Size and Weight

How much does it weigh? My test K2, with internal battery, tipped the scales at 5.66 pounds. With the internal ATU, NB board, optional filters and SSB option the K2 should still be around six pounds. The size is 2.9 in. × 7.8 in. × 8.2 in., making it comparable with the smaller imports. The big difference is that it's fully self-contained with its own battery, ATU and multi-message keyer. EleCraft is even considering a stylish field bag as an option to allow easy "grab-and-go" operation for fast set-up time in the field. I carried it around in a lightweight computer bag – even took it to a NorCal meeting to "loan" it back to Eric Swartz for a demonstration – it's very portable and easy on the shoulder. It's very similar to carrying a notebook computer.

QSOs, QSOs, and more QSOs

I decided I would dedicate my first QSO to the Novices and Tech Pluses. The 40 meter sub-band offers such miserable band conditions it demands the best of any receiver. The K2 performed extremely well amidst the usual cacophony of foreign broadcast and punishing QSB. I answered the weakest CQ I could hear and got him the first time. I went on to work a couple dozen Ns and Ts from all over the US. I called a few CQs and generally got someone on the first or second call. Down the band at 7.040 MHz, I found higher speed ops – tightly packed – and good test conditions for the adjacent signal work. The K2 front-end does a great job; it's very tough. I never was buried or found myself in a QSO that I couldn't manage with the filters at hand. More QSOs on 80, 40 and 20 meters at higher speeds inspired my confidence that the K2 is very capable of running with the bigger dogs. QSK operation and the internal keyer were superb. Not once did I reach for my CMOS-3; I used the K2's internal keyer (in iambic B mode, equivalent to Super CMOS-3) through the entire field test – very nice. This really is a great CW rig!

The Bottom Line

I thrashed the K2 through a lot of real world QRP operation for a couple of days. I never encountered any anomaly in normal operation; no troubles or smoke to report. The rig was so intuitive I never had to call Eric for technical support! All of this points to a K2 design that's very mature. It was very solid when Wayne gave it to me and it was very solid when I handed it off to the next field tester.

About a year ago at Pacificon '97, Wayne and Eric promised us the K2, and the time has now come. Soon they should be ready to ship K2-XB. They've worked unimaginable hours to bring this rig to market. Is it the rig for me? Yes, it is! There is nothing quite like the K2. Once you've driven a K2 for a few days, it's pretty hard to go back to a QRP mono-bander or even the old HW-9. While the K2's receiver won't quite out-perform my pricey Icom-765, it outmaneuvers everything else in my shack – and, it's certainly more versatile as a QRP rig than my Kenwood TS-50. Is it worth the money? Yes, I believe it is, simply because it has no direct competitors in the $600 class. It's a big check to write, but if you like QRP, you'll love K2!

The K2 kit should now be in production. Contact EleCraft for final specifications, pricing and delivery information:

EleCraft, PO Box 69
Aptos, CA 95001-0069
Phone: (831) 662-8345
Email: radios@elecraft.com
URL: http://www.elecraft.com

Edited by W1HUE

Portable QRP Antenna Notes

Joe Everhart, N2CX **214 N. J. Road, Brooklawn, NJ** **email: n2cx@voicenet.com**

Often the difference between a beginner and an expert at some task is simply that the expert has already done it at least once! I've recently run into this phenomenon in helping some new hams make up some simple dipole antennas. Although well versed in theory, they were lacking in hands-on experience. Here are a few things I taught to help them along the way.

The dipole antenna is an old standby. It is relatively cheap and simple and gives good single-band performance without any extra tuners, counterpoises or grounds. It consists of a half wavelength of conductor fed in the center as shown in Figure 1. The theoretical center impedance of a dipole in free space is about 72 ohms. In practice, it varies depending on its height above earth and proximity to wires, towers, houses, foliage, etc. It usually is a good match to 50-Ohm coax. Yes, I know, it's a balanced antenna and coax is unbalanced, so a balun is often used in the center. I agree with that for VHF antennas and for dipoles used in directive arrays, but usually a balun adds little but some weight at the center of the antenna. Particularly for portable QRP dipoles, a balun isn't really necessary.

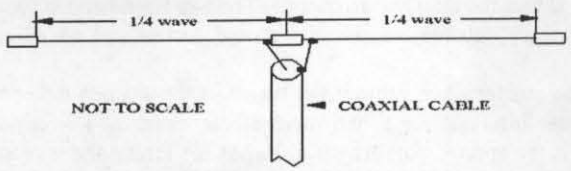


Figure 1. Conceptual Half-Wave Dipole.

Portable antennas are often easiest to erect as inverted vees (see Figure 2). This requires only a single high attachment point. I recommend that the center be at least 20 feet above ground. The ends should be as high as possible, but I often put them up only seven feet or so. Don't make the angle between the two halves less than 90 degrees or you will lose signal due to cancellation. 120 degrees or more is best. As with most antennas, higher is better and much higher is much better, but you will make many contacts even with low skywires. Another advantage of the inverted vee configuration is that you don't need large, heavy insulators or special antenna wire. The weight of the antenna is all supported at the center, so lightweight materials are fine.

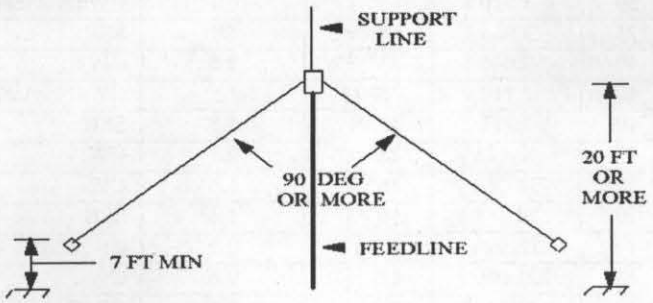


Figure 2. Inverted Vee Dipole Antenna.

Insulators can be almost anything non-conductive. Folks have used scraps of plastic, large buttons, pieces of unclad printed circuit board, cigarette lighter bodies or even done away with them completely, relying on the insulating properties of the support lines. I've been using PVC pipe parts lately, but that's a personal preference. An article in the winter 1997/8 newsletter of the G-QRP Club, ***SPRAT*** described my first PVC dipole, the "PVC Gusher." The October 1996 issue of *72* newsletter from the NorthEast QRP Club described a later configuration, the "PVC Gusher-II."

Freed from strength considerations, the wire elements can be very modest. Electrically, even small gauge magnet wire is acceptable. However, it is rather flimsy and may prove a hazard to birds since they can't see it. A good compromise between minimum weight and strength is 20 or 22 gauge insulated hookup wire. (For a permanent installation, I've been using 14 gauge stranded wire for the last several years.) The insulation is handy because it gives some physical protection to the dipole elements. Also, stranded wire is more flexible and less likely to kink and break than solid.

One thing antenna books give little guidance about is the effect of insulation on the length of the antenna. Theoretically a half wavelength is about 496/F(MHz) so a dipole would be half that or 248/F(MHz) either side of center. However "end effect" caused by adding insulators and feedlines reduces this to the common rule-of-thumb formula for the wire length each side of center:

$$L(ft) = 234 / F(MHz).$$

Plastic insulation on the hookup wire makes it look electrically even longer so the physical length may be decreased even more. The "fudge factor" varies depending on insulation type and thickness. Of course the antenna is also affected by its surroundings, so it is best to start long and trim it to your desired operating frequency. It is important to make the two halves of the antenna equal lengths or the SWR will never be quite right. Nobody ever tells you what is close enough, so I try to get them equal to within one inch!

Here's an over-the-shoulder look at the process of tuning a dipole to length with measurements taken on a 30 meter inverted vee dipole I recently put up. This is the "sanitized" version of the effort; things in the real world never seem to go quite so smoothly! See "What *Really* Happened" below.

The formula above gave a starting length of 23.11 feet but I inadvertently used 22ft. 11in. lengths. The first step was to erect it temporarily on a PVC pipe mast about 20 feet high and tie off the ends to a fence so they were about eight feet above the ground. Using a handy-dandy Autek RF-1 RF Analyst, SWR measurements were made as shown in Table 1. The resonant frequency was at 10.26 MHz where the SWR was 1.5:1 and the 2:1 bandwidth points were 10.10 MHz and 10.38 MHz. A length adjustment was called for since the antenna was resonant so far from the middle of the 30-meter band. If the resonant frequency had been close and the SWR less than 1.5:1 where I wanted to operate, I wouldn't have bothered to change it.

What *Really* Happened!

Try as I might, I could not get the SWR below 1.9:1! Finally, I realized the problem: In my laziness to find convenient tie points, I had ignored the fact that the last couple of feet of one antenna leg ran over a short section of two foot high fencing around a flower bed. That put it only five feet above the fence. I suppose that the fence must have some resonance near 30 meters and this caused the high SWR. The moral of the story? Don't ignore anything! When things don't work out as expected you have probably made some dumb mistake. Don't look for obscure problems – check for something very simple. And don't forget what you found out the next time you put up an antenna.

Since, to a first approximation, the antenna's resonant frequency is a linear function of its length (sorry my engineering side couldn't resist), a simple formula can help adjust it right-on:

$$L(new) = L(old) \times F(meas) / F(desired).$$

L(new) is the new adjusted length, L(old) is the current length, F(meas) is the measured minimum SWR frequency, and F(desired) is the desired resonant frequency. (If formulas and calculations make you break out into a cold sweat remembering Mr. Gorecki from high school algebra, see the Appendix "I DON'T NEED NO STINKIN' MATH!" at the end of this article.)

Using the formula, I obtained a new length of 23ft. 3in. After adjusting to this length, the antenna was re-erected and another SWR run made. Referring to Table 2, you can see that the antenna is now centered close enough to where it should be.

Table 1. Before Adjustment

Frequency	SWR
10.10	2.0:1
10.26	1.5:1
10.38	2.0:1

Table 2. After Adjustment

Frequency	SWR
9.96	2.0:1
10.10	1.6:1
10.13	1.5:1
10.15	1.6:1
10.26	2.0:1

My antenna should have been initially made long so that it could have been put on frequency by shortening. If you somehow have made your antenna too short (as I did), all is not lost. You can solder "tails" of wire to the ends to lengthen the dipole, allowing them to droop down from the insulators.

It is easiest to use a device like the Autek RF-1, one of the MFJ SWR meters, an AEA HF-121 (if money is no object) or a noise bridge to measure the SWR curves. They cause minimum QRM to other users and allow you to go outside your legal operating bands or band segments. If you must use a transmitter and SWR bridge, try not to interfere with QSOs and don't transmit where it is illegal. If the resonance appears to be outside your legal region, make length adjustments a few inches at a time until you are within the band, then use the above formula for final tweaking.

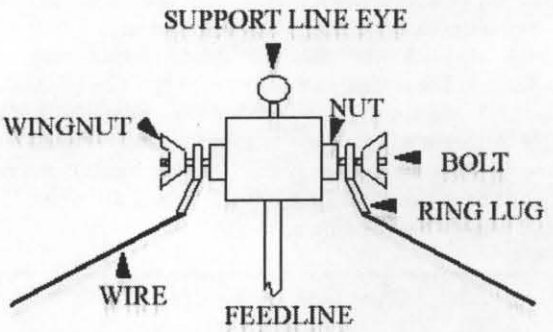


Figure 3. Gusher-II center insulator quick-disconnect.

Portable antennas are usually made to have minimum weight — at least mine are! And to lessen weight as much as possible, I don't use reels or spools for the wire or feedline. I simply coil the antenna up and carry it in a plastic "zipper" bag. This works best if you have wire elements that will disconnect from the center insulator and cable. If left attached, coiling them up is an awkward process and one often ends up with a tangled mess. Figure 3 shows how I handled the problem with my "PVC Gusher II". Bolts attach to the feedline inside the center insulator and the dipole elements have ring lugs on their ends, which are held on the bolts by wing nuts. Disassembly is very quick. Once the wires and center insulator and feedline assemblies are disconnected, they are coiled up individually.

For the coax, first lay it out straight on the ground. Then make a coil of two or three turns, about 8 inches in diameter (larger for coax bigger than RG-58). Secure the coil with a wire tie or removable cable wrap. Now roll the coil in a hand-over-had action pulling the remaining feedline toward you until it is all in the coil. Secure the coil with two wire ties on opposite sides. Both antenna wires can be coiled up in the same way, but make the coils about six inches in diameter.

When you unpack your antenna for use, do so carefully in the reverse fashion. That is, unwind the coiled-up cable and wires individually with a hand-over had motion, laying them out straight on the ground. By doing this, you avoid twists in them that will curl up and invariably tangle.

Good luck with your portable antennas and I'll see you in QRP Afield, QRP To The Field or one of the ARCI Sprints.

Appendix

I DON'T NEED NO STINKIN' MATH!

For those who dislike the tedium of making calculations, here is a table to help you. The first column lists the amateur band while the second shows the US QRP frequency. The two right-hand columns are quarter wave antenna lengths in feet and inches and an adjustment length.

The quarter wave value is the length of the antenna either side of the center insulator for a half-wave dipole antenna. The adjustment length is the approximate length in inches for tuning the antenna to a new frequency. Its units are inches per 100 kHz, centered at the middle of the indicated ham band. The adjustment length value can be used either to cut the antenna to a frequency not shown in the chart or to make adjustments if your lowest SWR reading is not where you want it. To tune to a lower frequency add length and to shorten the antenna for a higher frequency. Add or subtract the indicated amount to both sides of the antenna.

Band	Frequency (MHz)	Element Length (ft in)	Adjustment Length (in/100kHz)	Frequency Use
80	3.560	65' 9"	20	CW
80	3.579	65' 5"	20	CW
80	3.710	63' 1"	20	CW (Novice)
75	3.985	58' 9"	20	SSB
40	7.040	33' 3"	5.5	CW
40	7.110	32' 11"	5.5	CW (Novice)
40	7.285	32' 1"	5.5	SSB
30	10.125	23' 1"	2.7	CW
20	14.060	16' 8"	1.4	CW
20	14.385	16' 3"	1.4	SSB
17	18.096	12' 11"	0.9	CW, SSB
15	21.060	11" 1"	0.6	CW
15	21.110	11" 1"	0.6	CW (Novice)
15	21.385	10' 11"	0.6	SSB
12	24.096	9' 11"	0.5	CW, SSB
10	28.110	8" 4"	0.3	CW
10	28.110	8' 4"	0.3	CW (Novice)
10	28.335	8' 3"	0.3	SSB (Novice)
10	28.885	8' 1"	0.3	SSB

Edited by W1HUE

Review: The RAC "CodeBoy PUP" Keyer Kit

Chuck Carpenter, W5USJ **RR1 Box 36A4, Point, TX 75472-9703** **w5usj@webwide.net**

Having recently built the EMTECH NW20 QRP transceiver kit, I decided it needed a built-in keyer. A message posted on the QRP-L reflector led me to the CodeBoy "PUP" Kit from Radio Adventures Company (RAC). The kit I purchased was the PUP/C1 (model BK-176) which uses the RAC C1S CMOS keyer IC. This version offers very low standby power for battery operation. A lower cost version, the PUP/C2, is available if low standby power consumption is not a consideration.

The kit is packaged in a static-absorbing bag and includes 25 board-mounted components. Also included are the external speed control, the circuit board, and four cables with connectors pre-wired. (You can wire the cables directly to the PC board if you prefer.) The circuit board is silk screened on the component side and solder-masked on the solder side. The solder mask helps keep the solder from bridging across the pads (especially helpful if you're somewhat visually impaired and a little shaky like me). The connectors include color-coded wires about 6 inches long. All parts are good commercial quality providing a well-made assembly for the finished product. Figure 1 shows the components ready for assembly.

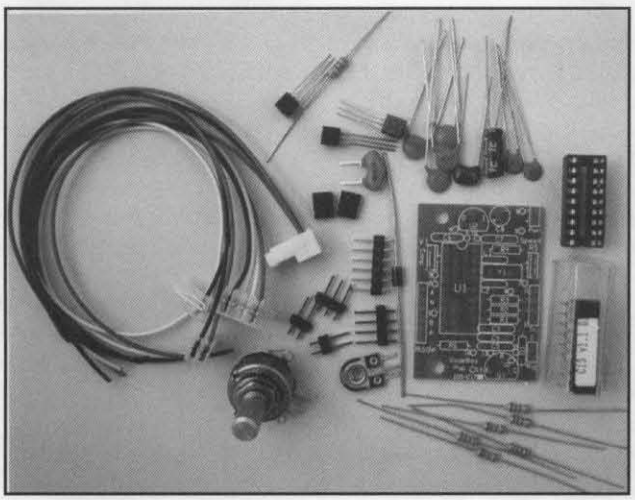


Figure 1. *Components of the kit ready for assembly. The transistor and resistor at the upper center are provided for positive-voltage keying.*

CodeBoy PUP Features

Advertised features of the kit include:

- Speed range from 10 to 40 WPM
- User selectable iambic A or B operation
- Dot and Dash Memory
- Space compensation (PUP/C1 only)
- Paddle or straight key (or bug) input
- Selectable auto-space on straight key input
- De-bouncing of all inputs
- Transistor keying for positive or negative voltage
- Power 7 to 15V DC or 3V battery
- Circuit board size is 1.25 W × 1.75 L × 0.5 H (inches)

Although the kit can be wired directly into your equipment and use 12V DC for power, you can also run the kit from a battery. For battery operation, you can take advantage of the PUP's potential for an idle current drain of 1 μA. The LM78L05 regulator is left out of the assembly for battery operation at 3 to 6V.

Building the Kit

Assembly is accomplished by following the steps in the included instructions. You will be referring to the parts list as you do the steps. You may find it useful to write-in the values for some components ahead of time. The only step I would change is the installation of the jumpers. They are easier to put in place before the board gets crowded. Installing them right after the resistors are installed would be my choice. You will need to make your decision about positive or negative keying and whether you want to use 3-6V battery power (thus eliminating the LM78L05 voltage regulator). Keep in mind the orientation of the diode in the keying circuit too. It goes in one way for positive and the other way for negative keying. The illustrations in the instructions are clear but you must pay attention. Figure 2 shows the completed assembly with cables connected to the headers and jumpers in place for my mode of operation.

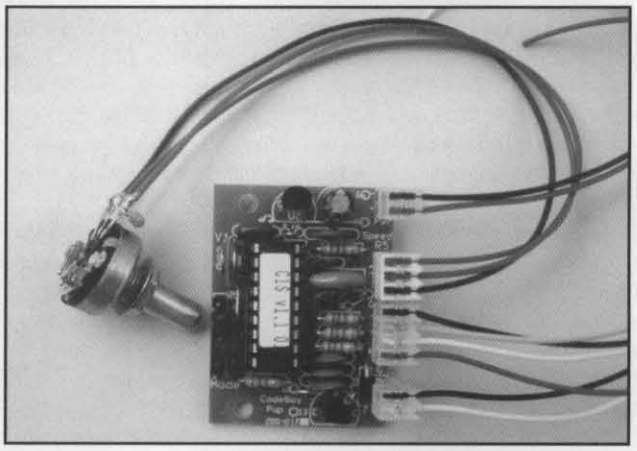


Figure 2. *The completed PUP ready for checkout and installation.*

Checkout

A voltmeter is all the test equipment you need to do the checkout procedure. You may want to refresh your memory about the 18-pin chip numbering. You will be making voltage checks at several pins of the U1 socket. Note that the C1S chip is not installed for the initial tests.

Operation and Installation

After completing the checkout and disconnecting power, U1 is installed and you are ready for operation. Connections were made to my Vibroplex key and to the NW20. Power was again applied to the PUP and the signal from the NW20 was tuned-in on a receiver. I don't have means to look at the character spacing so the space (weight) control was adjusted for a "feels good" sound to the characters. I was impressed by the overall operation of the keyer.

Conclusion

The keyer was easy to build and test. The whole process took me about two hours. The instructions are adequate for an experienced kit builder. For the neophyte builder, the guidance of an Elmer would be a good idea. The kit is full-featured and will meet the requirements of almost anyone needing a basic (non-memory) keyer. With the small size of the completed unit, a compact assembly for portable operation is a practical consideration.

The PUP/C1 kit costs about $25 and the PUP/C2 about $20 plus shipping. These and other keyer kits are available from:

Radio Adventures Company
RR #4 Box 240, Summit Drive, Franklin, PA 16323
Phone: (814) 437-5355 Email: information@radioadv.com

Edited by W1HUE

ANNOUNCING THE QUALITY RECOGNITION PROGRAM (QRP) AWARDS

Mike Czuhajewski WA8MCQ wa8mcq@erols.com

For a while now, we've recognized that we need something to honor people who have done good things for QRP. There's the QRP Hall of Fame, but that's more of a long term award, and those who are on the voting body know all too well that it can be somewhat akin to getting someone approved for a Supreme Court seat! What we really need is an award for short term accomplishments, something that can be awarded for things done within the last year or so, and which can also be awarded repeatedly to an individual when merited.

We kicked the idea around for a while, and this is what we came up with: the Quality Recognition Program, or QRP for short. Steve Pituch has agreed to administer the program. There have already been a few awards given out but they were not well publicized, nor was the program itself. There was some confusion over who would announce it in the QRP Quarterly and when it would be done, and the program and awardees could not be announced at the QRP banquet at Dayton this year due to the length of the program. (And Steve's moving to a new state for a new job didn't help things, either.)

We're now officially announcing the award along with presenting the awards given out already. (In the future we'll try to present them at Dayton.) Steve will be providing further information on the program in the future. But in a nutshell, it's to honor those who have made significant contributions to QRP in the recent past, within a year or so, and the requirements are less stringent than the QRP Hall of Fame. It's more of an "attaboy" than a "canonization."

Those receiving the award will receive a handsome certificate signed by the president and the person running the "QRP" award program. (Note that this is different from our QRP awards program, which is a set of operating achievement awards, and the similarity of names could result in a bit of confusion. We'll have to spell out QRP Recognition Program to be safe.) As for the presidents signature on the certificates, don't count on it becoming a collectors item some day and being worth a lot of money since I sent Steve several signature samples and he made a rubber stamp. (Note that I did not supply him with my bank account number or any blank checks!)

Here are the people who have received awards thus far and the information from the certificates. (Although we have "categories" shown, that doesn't mean that nominations are limited to those categories, nor does it mean that we'll necessarily give any future awards for those categories. We're trying to keep this simple.)

Andy Becker, W0NVM, Outstanding Club President, nominated by NF0R. "This award is presented to Andy for his many years of service to the St. Louis QRP Club. Andy is now serving his 9th consecutive year as president, and during that time has helped to develop a club responsive to the needs of local QRPers, while keeping the administrative activities of the club to a minimum. During his tenure, he has overseen the research, planning and production of many of the QRP kits available from the SLQC, such as the St. Louis tuner and the St. Louis vertical."

Keith Arenas, KC0PP, Outstanding Newsletter Editor, nominated by NF0R, "This award is presented to Keith for his many years of service to the St. Louis QRP Club as editor of its monthly newsletter, the "Peanut Whistle." With the experience that he has gained in publishing over 124 issues of the newsletter, Keith has made it a mature publication offering both original and vintage articles. Keith was a founding father and first president of the SLQC, and realized early on that for a club to grow, it needed a good newsletter. His Peanut Whistle is one of the reasons the SLQC is celebrating its 10th anniversary."

George Murphy, VE3ERP, Outstanding Amateur Radio Software Package, nominated by W0RSP. "George's HAMCALC software consists of many different calculation programs that are of great value to hams and especially homebrewers. He has spent many hours writing these programs which in turn saves QRPers the time it would take for them to do the same. Not only is HAMCALC a valuable resource, but George distributes it as freeware. QRP ARCI presents this award in appreciation of George's unselfish efforts."

Miguel Montilla, EA3EGV, Miguel Molina, EA3FHC and Vicens Llario, EA3ADV, Establishment of the EA-QRP Club, nominated by GM3JAG. All three received separate certificates with identical descriptions of the achievement: "This award is being given jointly to Miguel, EA3EGV, Miguel, EA3FHC and Vicens, EA3ADV, for their outstanding efforts in developing the EA-QRP club, which was once a small postal club, but now has grown to over 400 members, and holds monthly meetings in several areas of Spain. EA3EGV is the President, and also finds time to edit the club magazine, "QU-R-PE". He actively lectures about QRP to other clubs in Spain, and helps to recruit new members. EA3FHC is kept busy as treasurer, but also has time to write articles for the magazine. EA3ADV is club secretary, but also contributes his own articles to the magazine, as well as translating QRP articles from English and German for their magazine. The QRP ARCI thanks these hams for their perseverance in establishing the EA-QRP club."

Jerry Parker, WA6OWR, Outstanding QRP Web Site, nominated by G4WIF. "Jerry has shown consistently high standards in maintaining the NorCal web site. It is always both informative and innovative. The recent screen cam coverage of last year's Pacificon [QRP forum] was superb and allowed everyone visiting the site to almost feel as if they were there. When G4WIF created the GQRP site, it was Jerry's handiwork that showed him how it should be done. The QRP ARCI presents this award to Jerry in appreciation for a job well done."

Wayne Burdick, N6KR, Outstanding Technical Article, nominated by WA8RXI. "Wayne's article, "The SST: A Simple Superhet Transceiver for 40 Through 20 Meters," featured in the Spring 1997 QRPp, was both concise and well rounded. Wayne explained the circuit in layman's terms, and included a new use for an LED and a video amplifier. Wayne is at the forefront of technology, and is always sharing what he learns with the amateur community through well written articles such as this one."

Final comments... Although we have no hard and fast rules for this award yet, they will develop over time. We will try to keep it simple and fluid, though, and make it fairly easy to give to worthy people. Please note that this is NOT a competition and anyone can get an award for any category, and several people can get it in the same one. For instance, Wayne Burdick was honored for "outstanding technical article" but anyone else who writes one can be honored for the same thing, and if we get several worthy people, they'll all get it. That's an award for **AN** outstanding article, not the best article; this way, all worthy authors can be honored instead of just one. And if you want to see someone be honored for something that doesn't fit into one of the categories listed here, write it up and make your own category!

Steve, W2MY, can be contacted at w2my@aol.com or by the postal address which (I hope!) appears on the back page.

—qrp—

Computer Control Korner

by George Heron, N2APB

#2 - A Universal Microcontroller Card for your QRP Projects

We're back again talking about ways we can use small microcontrollers to help us out in connecting to and controlling our QRP rigs and accessories. Feedback from the last issue was pretty good and indicates that many of you are interested in homebrewing hardware and software with chips like the PIC, 8051 and other MCUs for use in the shack.

The Basic Building Block: UMC

This time we introduce a basic building block which will become the springboard for some real interesting projects. The Universal Microcontroller Card, or "UMC" for short, is a small and inexpensive pcb holding a microcontroller and some simple interface circuits for connection to a keypad, to an LCD display, and to a PC via an RS232 serial line. The main intention of the UMC project is to conveniently provide the basic functions needed to interface the user (that's you) and the hardware world (your rig, your PC, your automated test equipment, etc.).

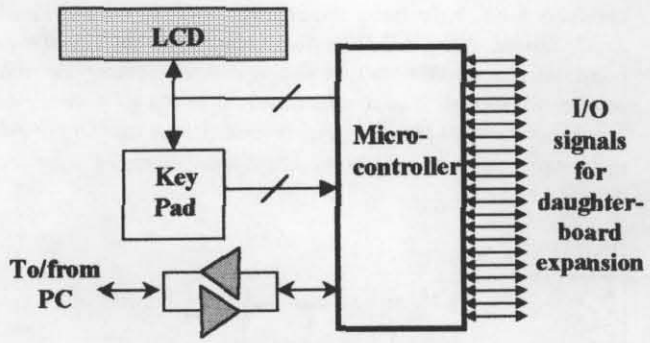


Fig 1: UMC Block Diagram

In the block diagram above you see the single chip microcontroller connected to a 20 character LCD display device, to a keypad for input selection, and to an RS232 serial buffer chip for connection to the PC. All input/output lines are also brought to the edge of the card for connection to the custom circuitry you would build as "daughter cards" providing the personality of your project.

So the beauty of this project is its simplicity. You might think that a printed circuit card might not be even warranted because of this simplicity ... and you'd be right! But since this simple configuration forms the basis of a number of projects planned for my shack in the near future, I thought that a small pcb would accelerate my getting all of them done, allowing me more time to experiment on the various interfaces, control circuits and accessories to which the UMC is ultimately connected.

Yet another aspect of this simplicity-and-flexibility is the optional nature of the various components. I don't intend on including an LCD display and keypad with every project planned for the UMC. An example of such a "bare bones" project would be a DDS VFO controlling my Sierra QRP rig which in turn is controlled by the contest logging program on my PC. Furthermore, leaving off the PC connection and adding a simple potentiometer with several pushbuttons gives you a simple DDS VFO for your rig. Both examples could be contained within very small boxes.

The PCB

Shown below in figure 2 is the layout of the printed circuit board for the UMC. Actual size is about 1" x 2", or small enough to fit into many kinds of enclosures or behind existing front panels.

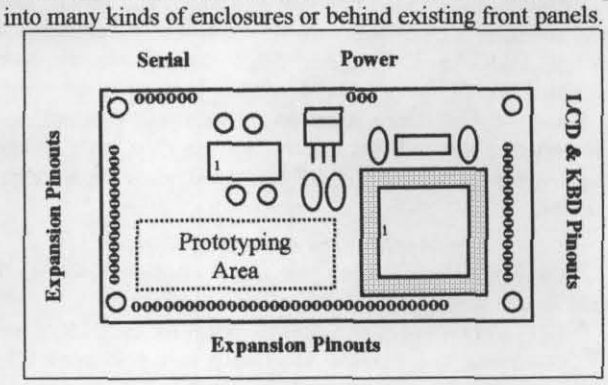


Figure 2: The UMC printed circuit board

The microcontroller is the square component on the right (it's actually a quad flat pack package in a socket); the power and serial components are along the top of the card. You'll notice a small section noted as "prototyping area" which is an array of small plated-through holes made available for the simpler of the custom circuits I may need for a project. By using the onboard prototyping area for these projects (e.g., the MicroBeacon) I wouldn't need to connect in a mating daughterboard. Simplicity again!

Pads are located around the perimeter of the UMC card to interface to the more complex daughterboards on some of my projects (e.g., the DDS VFO). This edge connection scheme offers a number of ways to get signals to/from a daughterboard card: individual wires, pin header/connectors, stacked cards, etc. Flexibility again!

The Beauty is in the Software

Although I've been extolling the virtues of the simple and flexible hardware design, I believe that the real beauty and elegance of this UMC project is in its software. I've provided a generic library in which I supply some simple, configurable and reusable routines to control the various optional peripherals on the UMC. There are software routines to write to the display, read the keyboard, and to talk back and forth with the PC. No matter what application you wish for your UMC project, it's likely that you'll be in need of some of this software to make the project do something useful. And all source code is provided and liberally explained, as I believe in very open systems.

In addition to this software library, I've developed a simple software "engine," or operating system (of sorts), which gives the developer a working framework for building the overall software program around. Whether it's a simple scan and display loop or a tricky timing loop with interrupts coming from your rig or paddles, this software engine will greatly ease your use of the UMC if you're developing your own software.

Programming the UMC

All this talk about doing your own software ... sounds scary, huh? Not at all!

First of all, Motorola provides this real cool "in-circuit simulator" kit called the M68ICS05B. Available for only $99 from

your local Motorola distributor, this kit provides an innovative development interface to your project board for Windows-based editing, assembly, software simulation, programming, and in-circuit simulation. In-circuit simulation allows you to use the actual inputs and outputs of your target during simulation of your code. For lots of details (technical and ordering), see the Motorola website at http://208.10.194.128/ ; select the 68HC705B16 device and look for the link to the ICS tool.

With this wonderful and inexpensive tool, you write your assembly language program in the code development window of your PC, assemble it with the provided assembler, and serially download it to the little 4" x 6" ICS card which in turn is connected to your custom UMC card. You can single step, trace, inspect/change registers, and do many other development-like functions with your ICS and software. Once you're happy with your program, you burn the software into a blank microcontroller chip, plug it into your target system (i.e. your UMC card) and *voila*, your program is running!

Applications & Future Projects

Okay, now here's some of the real interesting directions that are well underway using this UMC project.

1. DDS VFO -- We have a daughterboard for the UMC coming out containing the AD9850 DDS chip and associated filters for connection to and control of your QRP rig.
2. DDS VFO with Contest Logger Interface -- Extra software is provided with the UMC/DDS project to interface the contest logging software (e.g., NA) running on your PC with your QRP rig, thus allowing the logging software to automatically control the rig during contests.
3. NJ-QRP MicroBeacon -- Almost to the availability stage is the keyer and beacon project undertaken by the NJ-QRP club as a group design effort. This project is contained entirely on the UMC!
4. NJ-QRP Rainbow Antenna Analyzer -- Also nearly ready for availability is the Antenna Analyzer introduced at this year's Dayton FDIM QRP Symposium by N2APB/N2CX/WA2UNN. The AntAnal project is constructed with a daughterboard mating to the UMC.
5. Precision Signal Source -- Another UMC project underway provides some additional circuitry to the AntAnal project in order to enhance the stability and accuracy of the output signal.

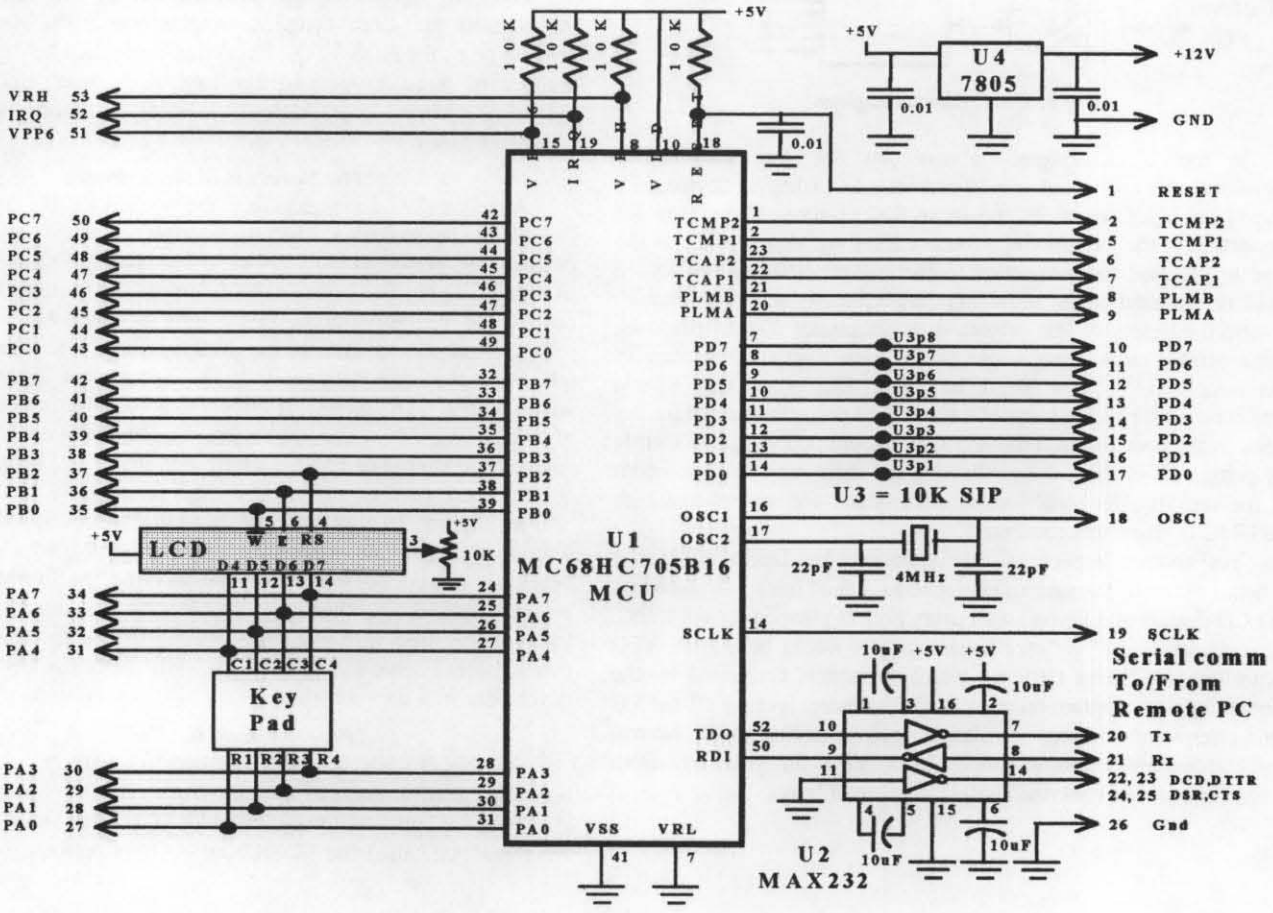
So as you can see, the UMC is indeed able to play a strong role in a multitude of projects in your QRP shack!

It's a Wrap!

I think you'll find the UMC to be a very flexible and simple-but-powerful building block for some of your next projects. Whether you just want to build the board in order to experiment with the software (self-education), or whip up your own project design (e.g., the "W2xxx keyer" or computerized volt/power meter), or even just build up one of the projects I've mentioned being in the pipe, the Universal Microcontroller Card may be just the ticket for you. Let us know what you plan on doing with it!

72,
--George, N2APB g.heron@dialogic.com

NOTE: *The UMC project is being kitted by the NJ-QRP Club and is available for $25 (includes shipping) from G. Heron, 45 Fieldstone Trail, Sparta, NJ 07871. Supplied components include the pcb, a blank microcontroller chip, a floppy disk containing the software sourcecode library, a comprehensive/tutorial-based manual, and all components except the LCD and keypad (which can be provided as extra upon request). Refer to* http://www.njqrp.org *for current details.*



The Back to the Future Project
The CB Slider

by Bruce Muscolino, W6TOY/3 w6toy@erols.com

Some History

The CB Slider was one of several follow-on projects describing accessories for Doug DeMaw's Tuna Tin 2 transmitter; the CB Slider was the VFO. The original article appeared in the March 1977 issue of QST. The authors were Jay Rusgrove, WA1LNQ, QST's Novice Editor, and Stan Brindle, WB5KQJ, a technician in the ARRL Laboratory.

"CB" was a take-off on the Tuna Tin name; the transmitter and its accessories were all built using enclosures made from products found at your local supermarket. The Tuna Tin 2, of course, used a tuna fish can as its chassis, and the CB Slider used a Chopped Beef (Spam) can.

"Slider" was a then popular word used in Citizens Band (CB) slang. A "slider" was a VFO that let you "slide" in between the fixed channels! The combination of CB and Slider was responsible for the author's note that "The boys in Newington have finally flipped!"

Some Circuit Details

The CB Slider is a very straightforward junction field effect transistor (JFET) VFO. Like the rest of the equipment in the series, almost all the parts used were available at Radio Shack. The original slider used a Radio Shack RS 2036 JFET. I think that's a discontinued part these days, so I substituted "everyman's" JFET, the MPF102. Near as I can tell the circuit works just as well.

Two other parts unique to Radio Shack used throughout the series are a 10 uHy RF Choke, part number 273-101, and a 100 uHy RF Choke, part number 273-102. The 100 uHy choke is still available, but the 10 uHy choke is history. I chose to substitute for both of these chokes.

The original CB Slider used link coupled output from the JFET buffer. I changed this to "plain old" capacitor coupling for simplicity and ease of construction. With the original RF Chokes winding a one turn link and keeping track of what wire goes where is pretty easy. Converting that to a toroidal transformer just complicated the job.

The original VFO tank coil was one of the 10 uHy chokes. I substituted a T50-2 toroid wound with about 45 turns of # 30 wire. The winding can be plus or minus one turn without causing problems. The original design did not provide for setting the bottom end of the tuning range except for perhaps spreading the turns on the coil. I added a small trimmer capacitor to accomplish this.

These days, except for the T50-2 toroid, every part in the CB Slider can be bought from Mouser or Digi-Key. You'll have to buy the toroid from Dan's Small Parts or Bytemark. However, In keeping with the spirit of the original series, I'd recommend you buy at least some of the parts from Radio Shack; maybe the MPF102s, the 1N914s, the resistors and the 0.01 uF bypass capacitors (you can use disk ceramics or mylars).

Radio Shack no longer sells the slide type potentiometer used for the "main tuning" control. You can substitute a 10 or 20 K slide type pot from Mouser or just use a common old 10 K rotary type pot for tuning.

Circuit Board Notes

Try as I might I could not get the original circuit board layout to work with my new parts. So, I built a test model on a piece of perf-board (see Figure 1). In the final layout I tried to stay with the spirit of the original by sticking to large squarish pads. A circuit board is available from FAR Circuits, but if you don't want to buy the board, point to point wiring on perf-board works well.

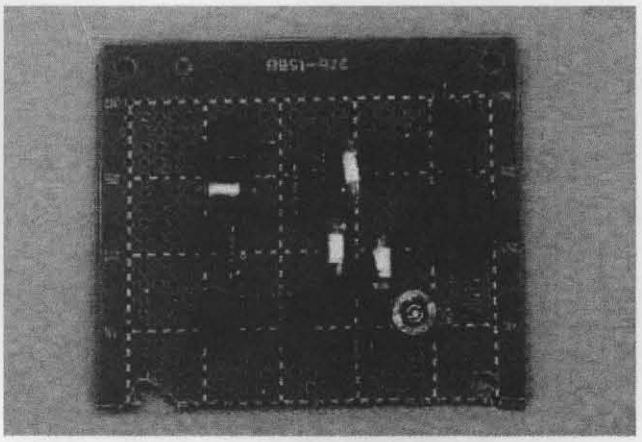


Fig. 1

Spam in the Can!

This project gave me an opportunity to try Spam for the first time in about 15 years; interesting! I did buy the "politically correct" of Spam for this project – Fat Free! One note about the can though; the Spam cans they sold back then had lids that were flat and popped in and out. These days the lids have "pull tabs" and are not flat; the big old "pull tab" is smack dab in the middle! I replaced the lid with a piece of circuit board material (see Figure 2). Figure 3 shows my CB Slider "in the can."

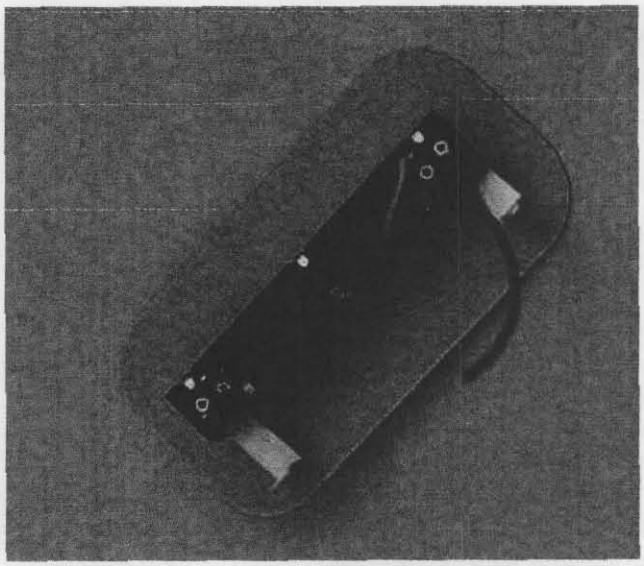


Fig. 2

Construction Notes

I suggest you build the oscillator first and get it running and then add the buffer; that's what I did. You won't have any trouble hearing the oscillator with a general coverage receiver. You can use a frequency counter, but be aware that some counters might load the circuit and give you a false frequency reading. Once you've found the signal, adjust the bottom of the tuning range up or down until it's close to 7 Mhz using the trimmer capacitor.

Then add the tuning circuit to see what the overall tuning range is. You may be able to adjust that somewhat by squeezing or spreading the turns on L1 or by adjusting the voltage divider resistors in the tuning circuit. Mine tunes between 40 KHz and 50 KHz at 7 MHz.

When you're satisfied with the oscillator's performance add the buffer stage and you're ready to have Spam sandwiches for a few days. You'll have to modify the crystal oscillator circuit of the Tuna Tin 2 to work with the CB Slider.

Tuna Tin 2 Mods

In order for the CB Slider to work with the Tuna Tin transmitter, several modifications are required. These changes are shown in Fig. 4. The changes include replacing the 220 ohm emitter resistor with a 68 ohm unit, removal of the 100 pF capacitor from collector to ground and replacing it with a 10 pF unit, and removal of all but 20 turns from L1, and the rewiring of the crystal socket from a base to collector to a base to ground configuration. Also, S1 was changed from a SPDT to a DPDT toggle switch. The new section is used to supply VFO offset voltage during receive. An additional phono connector was mounted on the rear of the Tuna Tin for this purpose. (From QST, pp. 16, Mar. 1977.

Setting the VFO on frequency is a simple task. With operating voltage applied to the VFO, listen at 7.0 MHz on a calibrated receiver. With the slider control arm at the left side position (or fully counter clockwise if you are using a normal pot), spread or compress the turns on L1. Once you hear the signal in the receiver, use trim cap C1A to adjust to zero beat. Check the high end to see how much coverage you have. Don't try for more than 100 kHz or so with this design, as it will be difficult to tune.

L1 in the transmitter should be adjusted for maximum output by spreading or compressing the turns.

Other Stuff

I want to encourage everyone to get in on this exciting bit of history. It'll be a lot of fun when a bunch of us are on the air using these rigs. I also want to thank Doug Hendricks for his work as head honcho on this project. It was a lot of fun and a pleasure to work with you Doug. And finally, I think we all owe Doug DeMaw, Jay Rusgrove, Stan Brindle, and the other designers of these projects a large vote of thanks for doing such

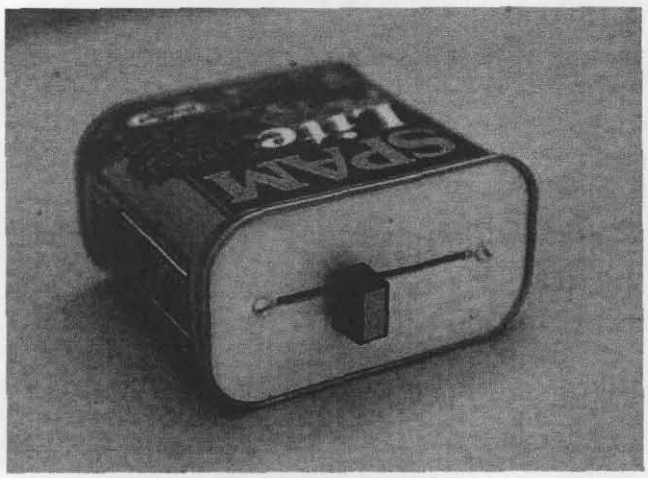
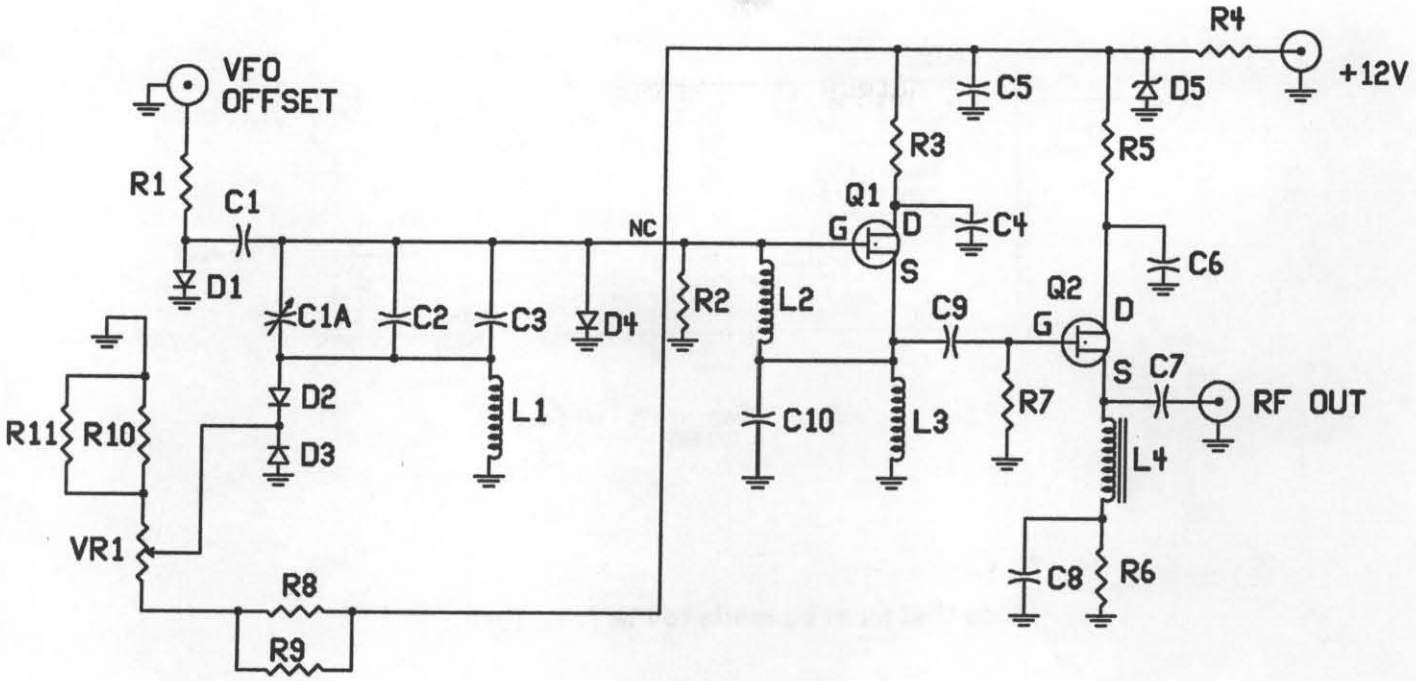


Fig.3

good design work and giving us such fun projects to build. If you have questions, comments, or problems, email, or write, me at the addresses shown at the top of this article.

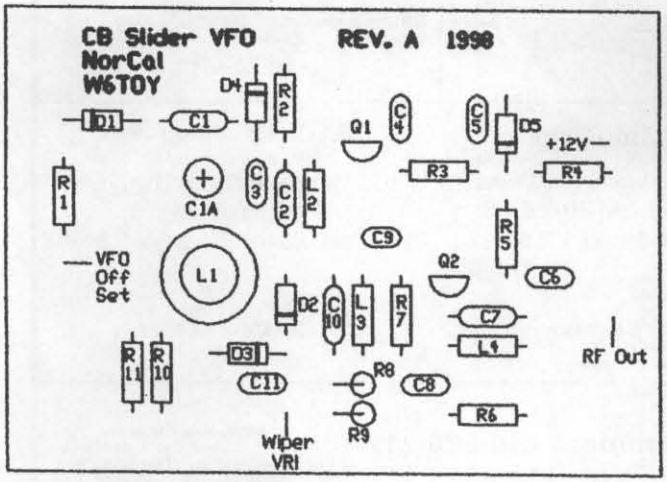
Parts Data:

C1- 5pF Disc
C1A - 5 - 20 pF Trim Cap (Mouser 242-4220)
C2 - 120pF - Polystyrene
C3 - 47pF - NPO
C4 - .01uF - Disc or Mono
C5 - 0.1uF - Disc or Mono
C6 - .01uF - Disc or Mono
C7 - 120pF - Polystyrene
C8 - .01uF - Disc or Mono
C9 - 5pF - NPO
C10 - 120pF - Polystyrene
C11 - .01uF - Disc or Mono
D1 - 1N914

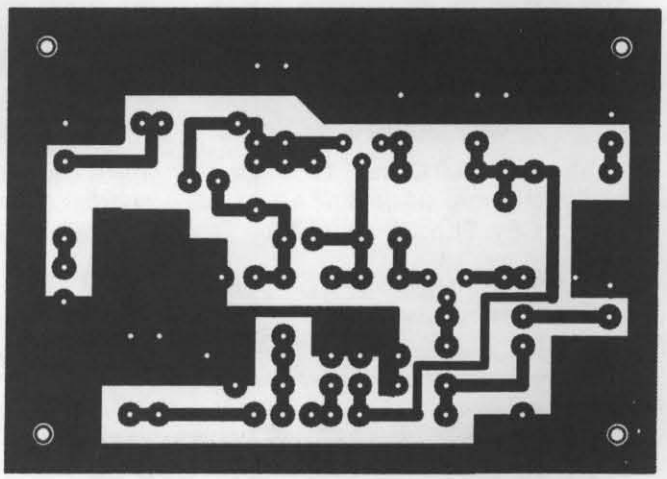


W6TOY's Schematic of the CB Slider VFO

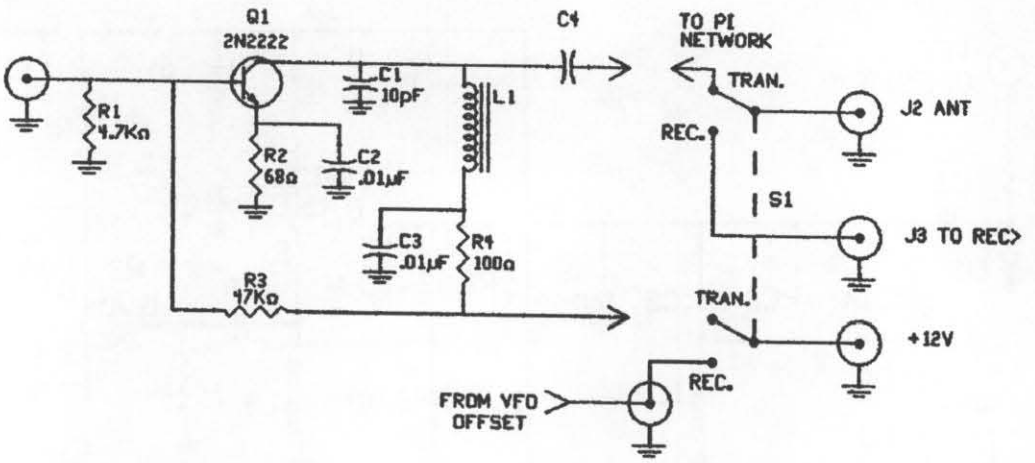
D2 - 1N914
D3 - 1N914
D4 - 1N914
D5 - 1N5239B (9.1V/500mW Zener)
Q1 - MPF102
Q2 - MPF102
R1 - 4.7K
R2 - 100K
R3 - 100 ohm
R4 - 100 ohm
R5 - 100 ohm
R6 - 330 ohm
R7 - 100K
R8 - 390K
R9 - 390K
R10 - 3.9K
R11 - 3.9K
VR1- 20K Linear Pot (Slide or Circular)
L2, L3, L4 - 100uH



CB Slider VFO Part Placement



XRay View from Component Side of PCB Layout



Mods that must be made to the Tuna Tin 2

Circuit Boards for this Project are available from FAR Circuits, 18N640 Field Ct., Dundee, IL 60118. The cost for the CB Slider board is $5 plus $1.50 shipping and handling for 1 - 4 boards. Please specifiy NorCal CB Slider VFO Board when ordering.

Eight Bands on Two Wheels!

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Email: jbcumming@wwdc.com

I enjoy combining QRP with one of my other favorite hobbies—cycling. In the summer of '98, I went to work on optimizing my bicycle mobile set-up. My objective was to achieve all-band QRP capability – both SSB and CW – on the mountain bike, without compromising riding comfort and safety.

The equipment used consists of:

- One very well-used 18-speed bike (a "Canadian Tire" special purchased about 12 years ago for under $200)
- Index Labs QRP-PLUS, original version with no internal mods (I usually run 4-5 Watts on CW, and 2 Watts on SSB which is the most my QRP-PLUS puts out). At some point I will modify the rig for increased SSB, but I'm operating CW 95% of the time, so it's not a high priority.
- Outbacker Perth 75-10 M Antenna
- A flea market special speaker-microphone, and a Mini Paddle made by Gil Kost (American Radio QRP Key Co.)
- A 7 Ah sealed lead acid battery

The transceiver is mounted in a handlebar bag, angled so the front of the rig is visible and controls accessible without having to take my eyes off the road. There is ample room in the handlebar bag for a small logbook, pencil, and microphone.

While some bicycle mobilers use a single earphone (leaving the other ear to listen for road traffic), I haven't been using *any* earphones. Instead, a "deflector" installed on the QRP-PLUS directs audio from the top-mounted speaker to the rider (a la "his masters voice"!). The deflector is made out of one-half of a plastic project box, just slightly bigger than the QRP-PLUS. Most of my riding is on back roads, but I find it surprisingly easy to copy even in the presence of cars and cows! Leaning forward to reduce drag when going down a hill puts my ears very close to the speaker, so even at 50 km/hr copying CW is "a breeze!"

The Outbacker antenna is mounted about one foot behind the back wheel, on a 1-in. diameter aluminum tube extending from the bike frame and rear pannier rack. With the antenna so far back, I can mount and dismount the bike normally without kicking the antenna. Also, the tube extension provides an increased ground plane for the Outbacker (I need all the help I can get in this department, since the bicycle represents a smaller ground plane than the antenna was designed for). With the extension tube well bonded to the rest of the bike frame, the Outbacker's "stinger" must still be extended to almost maximum length in order to achieve resonance on most bands. Although there is some sway in the antenna (the top of the whip bobs back and forth with every stroke) I hardly notice that the extension and antenna are there!

The aluminum tube attaches to the bike frame by sliding into two plastic brackets (50 cents each at a local junk store) originally used for carrying those heavy duty bicycle "U-locks". The tube is then anchored to the rear pannier rack using an "inverted" mobile antenna bracket and a good old Canadian hockey puck for shock absorption. Removal of the whole antenna system from the bike takes only thirty seconds: Undo the butterfly nut on the pannier rack anchor, and slide the pole assembly back. (The U-lock brackets on bike frame remain permanently attached.) The aluminum pole was cut from a folded dipole element of an old commercial antenna. I retained a bend at the end of the pole which permits mounting of a super-bright LED flashing/solid bike light. (This light unclips, and makes a great night light for portable operation from a tent).

The 7 Ah battery (which will easily handle the transceiver's power requirements for a weekend bike trip) rides in one of the rear pannier bags. A quantity of 6-inch "two sided" Velcro straps securely route the power cable and RG-58 coax from the back of the bike to the handlebar bag and permit quick removal of the radio equipment.

Following installation of all the main components, a number of "SWL" rides were necessary to verify the mechanical security of the system. I then moved on to the final goal: CW transmission! I had read that some bicycle-mobile CW ops have employed contact switches in each handlebar extension (dit with left thumb, dah with right thumb), but this did not appeal to me. I wanted to be able to (safely!) send in a "normal" iambic fashion, so the beautiful set of mini-paddles purchased from Gil Kost at FDIM'98 was called into service. The paddles are mounted on a small bracket on the end of the right handlebar extension. My wrist remains on the handlebars as I am transmitting, so steering, shifting and braking are still convenient. It is a bit of a challenge to send good CW while riding on a gravel road, but other operators will be forgiving of the jittery fist when they hear you are bicycle mobile.

I have found the QRP-PLUS to be an excellent bicycle mobile performer. Since my bike has no front shocks, the rig feels every bump! Yet the dial on the QRP-PLUS is surprisingly rock solid; the frequency does not change even with severe bouncing on bad roads. I had previously designed and built a mechanical stop for the dial, but it's not needed. As most readers will know, settings are adjusted on the QRP-PLUS by spinning the main

tuning dial while one or two buttons are pressed. When bicycle mobile, I am able to change most settings "on the fly" using just one hand. For example, keyer speed can be changed with small and middle fingers on the appropriate buttons while the thumb adjusts the main dial. The memory button is especially useful for quickly switching between two favorite frequencies on the band being used. And to change to another band, you need only a 15 second stop to change taps on the Outbacker, and you're back on the road.

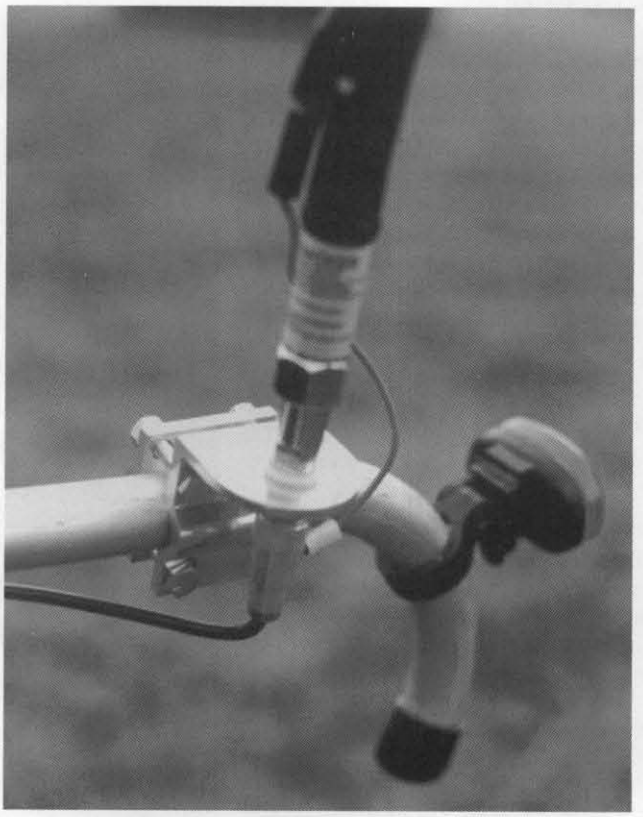
The photos below show some close-up views of various components of my "Bike Mobile".

Bike mobile QRP may not appeal to those who like to keep their rigs in mint condition. Regardless of how much padding you use, bumps and scratches are inevitable. But in my opinion, scratches on field radios show they have character! I always cringe when I see one of those "for sale: trail-friendly radio that has never been outside my environmentally controlled shack" ads. Trail and bike friendly radios want adventure!

I have borrowed many of the above ideas, and a great deal of inspiration, from a number of bicycle-mobile hams. If you hear me on the air "/QRP BM", please give me a call!

Edited by W1HUE

Pannier rack support for the antenna mounting system. Note the hockey puck!



Antenna mount and super-bright LED safety light.

Sending CW – with the operator's hand close to the brakes!

The QRP-PLUS with "Audio Deflector" above it.

The Challenge of QRPp in the Real World

Chuck Adams, K5FO **PO Box 181150, Dallas, TX 75218** **email: adams@sgi.com**

Since the beginning of time mankind has faced and will continue to face many challenges. Some of the most memorable feats and accomplishments have been under the most extreme and challenging circumstances. We all seen many people react to many scenarios in various ways. Some people enjoy challenges and others fall back to a lesser position to weather out the challenge. With this in mind let's discuss the world of the QRPer and in particular the world of the QRPp'er.

As the reader of this piece, I assume that you know the difference between QRO and QRP power levels, the latter being 5W or less. Within the QRP class there is a lower classification of QRPp with power levels less than one Watt. At these levels, sometimes called the milliwatt levels and the individuals who operate at these levels thus being called milliwatters, the difficulty and challenges of low power communications is significantly increased. It is these issues that I want to write about, not as an expert by any means but as one who has spent almost all of the past four years experimenting and operating at these levels.

If you ask any QRPer just how they got started you will get a variety of diverse tales. Some but not all may include:

a. I didn't have any money and I went the least inexpensive way I could.
b. I got tired of squashing the competition with 1KW and expensive antennas.
c. I got bored at higher power levels.
d. I saw John Q. Ham doing it and I thought I'd try it and got hooked.
e. I wanted to build my own equipment and got a kit.

And the list goes on and on.

As for my own experiences of 40 years as a ham, I started QRP with a CE-20A in 1957. For you young pups, this was during the time period when the sunspot count reached the highest recorded level and has yet to be reached again. There were weeks where the count was over 300 and I want to say there was a single day when the count exceeded 370 or more but I have to go back someday and check the recorded data. On 10 meters you could get on with QRP levels and work all the continents and easily get DXCC within a week. During this time period I remember many many days when 10 meters was open 24 hours to all parts of the world. It was exciting. I hope that the upcoming sunspot cycle, which some experts are predicting may exceed those levels, will give a lot of people the experience of a lifetime. But, a lot of people are going to have to be trained to turn down the power levels or there will be a lot of infighting among the radio amateur population. With as many hams as we have now vs. what we had then pandemonium will reign supreme unless we get everyone to try QRP. Time will tell.

Let's say that now you are an avid QRPer, i.e. you operate 100% of all your on the air time at less than 5W. If you do, it is my guess that you have taken the time, energy, and funds to put up an effective and efficient antenna system to relieve the challenge of operating all the time at QRP levels. This is a must if you want to be successful. I believe and a lot of other people will tell you that the antenna system is number one on your list of necessities and must be the best you can get under your own circumstances. So after a few years of doing QRP you may be getting bored or looking for a more challenging area. I had been operating at the 4W level with an 80 meter end-fed long wire and decided to increase the challenge by going to the 2W level. I really didn't see that much of a change in signal reports received or difficulty in making contacts. I was still having a relatively high success ratio on making contacts on 40 meters where at the time I was spending 100 percent of my time.

So here is where you and everyone else gets hooked. You decide to try a power level of less that one Watt, in my case 0.95W. The reason for the number was to get under one Watt and by a margin that would allow a 2% error in measurements (this was pre-OHR WM-1 Wattmeter days) and be under one Watt. Psychologically here is what happened to me and happens to most of the QRPp'ers. You get under one Watt and you make a few contacts, say work five or six states if you are in the USofA. Then you say to yourself, "Hmmm, wonder if I can get 20?", then "Hmmm, that wasn't too bad how about 30?", and before you know it you're hooked and hooked big time. I like to compare this to some hunters that you may have read about or know. They start out hunting whatever with the largest and most expensive guns they can buy. The get some game bagged and then they lighten up the equipment side by going to smaller size ammo and smaller weapons still trying to bag the large game. Then the next thing you know they are using crossbows and then back to the basics with bow and arrow. Honing whatever skills are required in the process. Same with fishermen that start with 30 pound test line and start using lighter line until they are using four pound test line to see just how large a fish they can catch.

And after a period of time of doing QRPp levels people will tell you that you have become mentally unstable. You refuse to adjust the power level above one Watt just because that you might make a contact and ruin your continuous string of QRPp contacts and even work a new state or country that could have added to your needed list for an award or personal goal.

So during the last three or more years as an avid QRPp'er let me tell you what I have learned, discovered, and accomplished (not to brag but to tell you what is possible). In order to do this let me relate equipment and antennas so that you will know what is achievable without a whole lot of expenditure of money. I do have some good news and some bad news. Good news is that you don't need a lot of money. Bad news is that you do need a lot of time and energy and patience. If it were easy everybody would be doing it. Such is the real world.

First of all, let me go band by band for 40 meters, 30 meters, and 20 meters. This information and data are from my own personal experiences. For 40 meters, the least expensive rig that I have is the Dave Benson, NN1G, Small Wonders Lab SWL-40, a.k.a. as the NE-4040. It first came out as a kit from the New England QRP Club as a club kit and project and was priced at $40, thus the name 4040 from 40 meters and 40 bucks. Dave has his own company now and has the SWL-40 and at an excellent price of $55 without the case and off-board components such as pots and connectors. He also has the optional case, knobs, pots, etc. available. Jim Duffey, KK6MC/5, gave a talk at the Ft. Tuthill swapmeet on receiver selectivity and sensitivity and this rig had a very good metric and showed what I had liked about the rig all the time. But I'll let Jim somewhere and sometime put that in print. It was his find and I'm sure he is working on more data and comparisons. At maximum power output with a 12V gel-cell supply the rig puts out about 1.1W or so. It has adjustable output to 0.0W, so with just a slight reduction of the drive with an internal pot, it is an easy fix to get 0.95W or less out. The rig is small and I run all my rigs off of the gel-cell (yet another advantage for doing QRPp levels) with no fear of power going off etc. In fact one time the power in Dallas went off one night due to a

sudden cold front coming into North Texas with very high winds and power lines were downed. I immediately went to the shack and turned on the rig and enjoyed more than two hours on the air with no man-made RFI due to arcing, TV emissions, etc. What a joy! The SWL-40 has great QSK and excellent keying characteristics and the one most important feature and a must for me is no relay(s). Period. I still use the rig during the winter months just to keep it tuned and operational.

But the SWL-40 is not the only excellent rig for 40 meters. There are many more and I have a few. The OHR Explorer series and the new OHR-100a are all good rigs. The one thing that you want is a good receiver. Then comes the antenna. I use an off-center fed (OCF) dipole that is 40 meters in length with the feedpoint 10 meters from one end. I also use 300 ohm window line with an MFJ-941C tuner and an OHR WM-1 Wattmeter for accurate measurement of both forward and reflected power levels to maximize the forward power. It is a relatively inexpensive antenna using solid #14 electrical wire with insulation still in place and at a height of only 5 or so meters. It tunes nicely on 40, 30, 20, and 17 meters. There was no magic formula or time consuming calculations done using W7EL's excellent antenna modeling software. Au contraire, it was the luck of the draw due to placement of the shack, the feedline, and the lot size. Just like everyone else, I just put the thing up and started operation hoping for the best. It worked so well I used the Chuck Adams DFW-rule – don't fool with it. With this setup I was able to get over 40 states with the SWL-40 and the last one I got was AK and had at the time the OHR Explorer II on the desk.

This period of time taught me to be patient, listen and determine the condition of the band to decide whether to attempt contacts or to relax and do some reading or experimenting on the workbench. But don't always trust your instincts here. There were times when I didn't hear signals on the band and would just call CQ and sure enough someone would come back. I guessed that everyone was listening and not a single individual was transmitting. Happens more than we think, I'm sure. The biggest thrill was being up late at 4 A.M. and tuning across the low end of the band and hearing a weak signal (the only one I heard on the band at all) calling CQ. Turned out to be a KH6 and not one to turn down a challenge, I gave him a call and he came back.

Now 30 meters over the past couple of years has become a favorite band of mine. Free from SSB DX signals in this part of the world, with a power limit much less than a KW, and a relatively non-crowded band it is in many respects better than 40 meters. It doesn't typically stay open as long as 40M after sunset, but I have managed many an interesting catch late at night when everyone else seemed to have given up on it. Lots of good DX too and all with good receivers and operators. Whereas I have done 50 states on 40M, I lack only one state to go on 30M and that is a KL7 in AK. I have heard them and gotten a QRZ? when calling them but to this date no luck in working that last state I need.

The antenna on 30M of course will be shorter than that required on 40M, so people with limited amounts of real estate can do a much better job of getting a good antenna to work on this band. I find that early morning and late afternoon and early evening good times for this band.

The last band that I have a lot of experience on is 20M using QRPp levels. This is also a good band if you can find a time when there is not a contest going on during the weekends or can get on during the daylight hours. With the sunspot minimum that we have been enduring the past few years this band closes early after sunset and for most people that work during the week, this presents a problem. Again, the higher in frequency you go the smaller the physical requirements for an antenna system. At 20M and above in frequency you start to be able to get Yagis that won't take up a lot of space and become mechanically manageable. I managed WAS during the ARRL CW SS in 1995, something that I do not recommend for many. It was tough going, but well worth the effort I put forth. But, I must say that the last two CW SS contests I opted for and will opt for a large tower and Force12 beams at 100' and above for an antenna system and 4.5W power levels. I greatly improved my scores and the pain factor. The only time of the year that I currently run over 1W of power.

So from my experiences, I can recommend that after a period of time using QRP only levels and after you get used to the conditions on the bands and what you can and can not do at 1 to 5W levels, then give QRPp levels a try. You learn a lot more about your antenna system, propagation, other operators tolerance for weak signal work, and your own personal endurance level for rejection and missed contacts on the air. But the rewards far outweigh the hardships and failures.

You find yourself among an elite group of individuals with strong goals and know ahead of time that if it was going to be easy everybody would be doing it. So remember them and listen for the weaker signals at all hours of the day and on all bands. We do appreciate the support and every contact that we can get.

Edited by W1HUE

The Story of my Life!

Author unknown

I have a spelling checker -

It came with my PC.
It plane lee marks four my revue
Miss steaks aye can knot sea.
Eye ran this poem threw it,
Your sure reel glad two no.
Its vary polished in it's weigh,
My checker tolled me sew.
A checker is a bless sing,
It freeze yew lodes of thyme.
It helps me right awl stiles two reed,
And aides me when aye rime.
To rite with care is quite a feet
Of witch won should be proud.
And wee mussed dew the best wee can,
Sew flaws are knot aloud.
And now bee cause my spelling
Is checked with such grate flare,
Their are know faults with in my cite,
Of nun eye am a wear.
Each frays come posed up on my screen
Eye trussed to bee a joule
The checker poured o'er every word
To cheque sum spelling rule.
That's why aye brake in two averse
By righting wants too pleas.
Sow now ewe sea why aye dew prays
Such soft wear for pea seas.

de Ron, KU7Y

Ft. Tuthill '98 - QRP Symposium

by

Bob Hightower, KI7MN

The annual Amateur Radio Council of Arizona Convention and Hamfest, held each year at Fort Tuthill (Coconino County Park) near Flagstaff, Arizona, is long looked forward to by Arizona hams, and, now, by QRP enthusiasts throughout the Southwest. This year the hamfest included, for the second year, a QRP Symposium with speakers of reknown from the QRP world, and more than 60 people attended the sessions.

Fort Tuthill was once a National Guard encampment and CCC Camp (about 60 or so years ago), and has since been turned into a county park, complete with race track, horse show arena, campgrounds and facilities ideally suited to events like hamfests. In 1997, Roger Hightower N7KT organized the first QRP Symposium, which was well attended and the decision was made to try to make it annual affair.

The 1998 Hamfest was held on July 24-26, the last full weekend of July, as it is each year. The group campground was once again reserved mainly for QRP'ers, and a slate of speakers was invited to treat us all to some valuable information on Amateur Radio, not just QRP topics. More than 60 QRP'ers registered, and you could see a lot of NorCal Zombie badges being worn around the hamfest area. Paul Harden and his Witchess Sandra provided them, and they were very popular, even with those who knew nothing of the history behind them. Maybe it was the Area 51 pass on the reverse side that did it.

Friday was hamfest day, with no formal QRP activities planned, allowing for travel to the hamfest for those from out of state. The weather was somewhat "iffy" (yup, we got weather up there, too), and sure enough we had a downpour around noon on Friday that drenched everything. Shortly after noon, though, it cleared up and the activities continued.

Saturday was our big day. Doug Hendricks, KI6DS led off with a fine presentation, providing information on the quarterly publication of the Northern California QRP Club, the QRPp, and gave each attendee a complimentary copy. He also filled us all in on the NorCal 20 project that we have been looking forward to.

Doug was followed by Jim Duffey, KK6MC, who presented a lot of great information on antennas, and provided a fact-filled handout for those present. Jim's talks area always well attended and informative, and this one was right on the mark. Without a good antenna, you aren't gonna do much with QRP.

An hour and a half break provided time for lunch and some bargain hunting in the swap area. The vendor area covers more than three football fields, with both tail-gaters and commercial vendors present. Just about anything you could want, let alone need, could be found here. There were some 5000+ hams present, and the trading/bargaining was fast and furious.

Once you have your antlers sorted out, operating techniques become very important, and that's what Gary Hembree N7IR, one of the premier QRP contesters, presented next. Gary runs with a highly tweaked Ten-Tec rig into a very impressive array of aluminum stuck some 85' into the air. Always an entertaining speaker, Gary provided some great insights into how to work those hard ones, and how to break into pile-ups with low power.

Chuck Adams K5FO, the founder of the qrp-l list on the Internet, was next up, and he gave a detailed presentation on SPICE modeling, and antenna modeling using NEC-2. Another well made packet of information was provided to each attendee, complete with more charts than you could imagine. Chuck even explained the tricks behind using long, long wires, which he uses from his home QTH.

Problems with learning Morse Code have kept many hams from progressing as fast as they would like, and, since qrp ops are mostly in cw, Dave Finley N1IRZ presented a solution. Dave has authored a book, "Morse Code: Breaking the Barrier", which is available from MFJ, and he says that you can get from 0 to 13 wpm in 80 hours with with the Koch Method, which he espouses. The talk was very informative, and well received.

The final speaker of the day was Paul Harden NA5N. With the recent changes in the sunspot cycle, Paul spoke to us on Solar Phenomenon and propagation as it relates to that. Once again, a very nice and informative handout was available. Paul is one of those folks who can speak well on just about anything, and can be very entertaining while doing it. And, he knows his subject!

Throughout the hamfest, the Az ScQRPions manned a booth with items from ARCI for sale, some of the LED SWR indicator kits, and various other items of information available. Each registrant for the Symposium was provided a packet of information concerning QRP, and brochures from various equipment vendors. Door prizes were provided by Almost All Digital Electronics (a DFD-3 Digital Display Kit, won by Steve Schroder KI0KY), NorCal (a NorCal 20 kit, also won by Steve Shroder, KI0KY), Morse Express (an Apell Keyer kit, won by Howard Myers W7ILW), Embedded Research (a Tick-2 EMB kit, won by Jim Duffey KK6MC, and an Essential Power Supply kit, won by Galen Kristov KC5TUH), and Small Wonders Labs (an SW40+ kit, won by Gary Surrency AB7MY).

Another highlight of the gathering was the group cook-out on Saturday night. QRP'ers were asked to bring their own meat dish, and the AZ ScQRPions provided the rest; bread, potato salad and Roger's cowboy beans. Not much went on during the meal, as you can well imagine....charcoal broiled meat and all the fixin's will keep conversation down, I guarantee you! Afterwards, there were several groups just visiting, and the infamous strategy session, at which all sorts of schemes/contests/fun times are plotted out. You'll hear more about those, on the list, as the year goes on.

Sunday saw the hamfest/symposium come to an end, and, with the Bumblebee contest that afternoon, many QRP'ers headed out to set up for that. A quick clean-up of the area, and it was over for another year. Next year we're gonna do it again, so set the last full weekend in July aside, make plans to head for Flagstaff and the cool pines and join us for another weekend of QRP fun. We'll have another great slate of speakers, more goodies for you, and a great QRP reunion. Watch the qrp list for announcements, and there will be a web page set up once again. You can see pictures of this year's festivities at http://www.dancris.com/~ki7mn/tut98.htm.

Hope to see you all there for Tuthill '99.

OKLAHOMA CITY 1998 Ham Holiday

by
Dick Stimson, KK5XO Edmond. OK

"If we offer a QRP seminar, they will come." Cliff Sikes; AB5UA was saying to me, and somewhere in the back of my mind I had heard this line before. I reminded Cliff that a QRP seminar has not been presented in OKC for years. "I know," he responded; "but I think its time that we put one on and generate some local interest in QRP."

A month later, Cliff called me to advise that he had contacted ARCI President Mike Czuhajewski; WA8MCQ, who offered to send us an ARCI banner to display on our table. I still had my doubts. Cliff had also contacted the ham fest "powers that be" and was awaiting a response from them.

Four days in May came and went and Jerry Henshaw; KR5L, called to say that he had brought back a box of ARCI magazines etc from Dayton that he had received from Danny Gingell K3TKS. This would give us some ARCI magazines to sell and some membership applications to hand out. I was elected to meet Jerry half way between Oklahoma City and Tulsa to get the goodies.Several e-mails later, Jerry showed up in OKC all on his own and delivered the box of goodies. Thanks Jerry !!!! It was still a couple of months before the "fest", and I still had my doubts.

Before the end of June, Cliff called and advised that he had received the ARCI banner, but had yet to hear from the ham fest officials. As time was getting short, Cliff and I began to outline the presentation. Yada, yada I thought, no one will come to this !!! We billed it as a "QRP Fun Seminar" with an emphasis on "FUN". Between us we had several radios and kits to display along with a multitude of award certificates that Cliff had earned. Key to our attendance planning would be when the officials scheduled our seminar. Early a.m was considered good; late p.m was bad !!

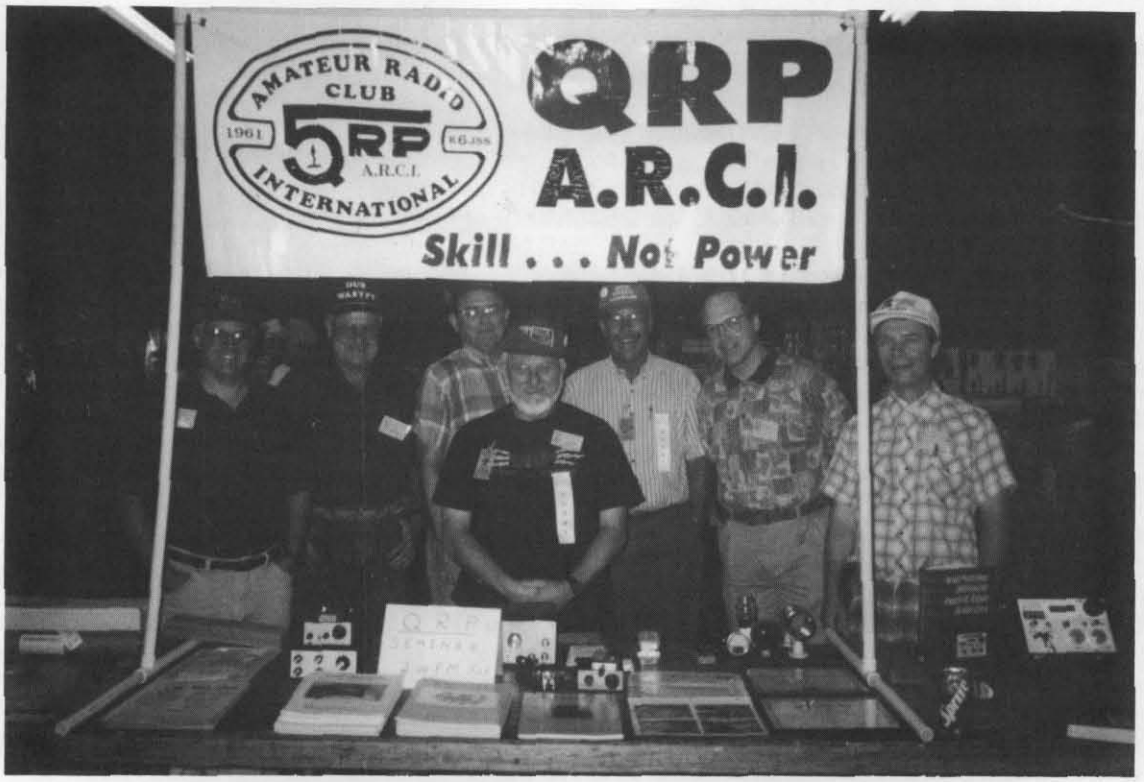
The first of July, Cliff called and advised that we had been scheduled for 2:00 pm Saturday. Our hearts fell because the fest ended at 5:00 pm and from past years experience, there weren"t too many people left by 2:00 pm on Saturday. The OKC Ham Holiday was from Friday 5:00 pm to 9:00pm and Saturday 8:00 am to 5:00 pm; July 24th and 25th. The plan called for the two of us to be present Friday evening and all day Saturday to promote QRP and the ARCI.

Friday the 24th came and I met Cliff at the OKC fairgrounds where the fest was to be. He had the banner up across our table and we displayed our rigs and the ARCI magazines etc. People came by asking questions, looking at the rigs and generally seemed interested in QRP. I wasn"t holding my breath though !!

Saturday we were back at it with the help of Joe Eder, KU5M, who had driven in from Bartlesville, Ok. Thanks Joe !! As the appointed hour drew near Cliff and I noticed that the overall attendance seemed to be dropping. Ten minutes before 2:00 pm we set up our display again in the classroom area and counted two men and one woman present. SURPRISE, SHOCK and DISBELIEF, by 2:00 pm there were over 30 people in attendance; including TWO women !!!

Like the master he is, Cliff covered the FUN aspects of QRP and then opened up the floor for questions. Surprise again, the questions continued for over 30 minutes !!! We answered questions on kits, building, field trips, contests and the joy of QRP as it has effected us. We put it on and Cliff was right; they did come !! Ours was the most attended seminar of the whole fest, thanks to the vision and inspiration of Cliff Sikes. No matter how large or small your local fest might be, consider giving a simple QRP presentation and you'll be surprised too !

Dick Stimson, KK5XO Edmond. OK



L to R. Austin NE5O, Dub WA5YFY, Joe KU5M, Clif AB5UA, Dick KK5XO, Bob N5URL, Randy WI5W

The Murphy Files

Edited by Joe Gervais, AB7TT, vole@primenet.com

Howdy Folks, and welcome to the latest edition of the **The Murphy Files**. Just as we suspected, more than a few of you have had the inevitable "eyeball QSO" with our favorite troublemaker. It'll take time to print all the Murphy Tales, so if you don't see your story show up immediately after your submission, please be patient with us. Otherwise we'd have to print an All-Murphy Special Edition of the Quarterly. Might make good April 1st reading if nothing else!

So how does this column work? Simple - it will only exist as long as **YOU** submit your tales of Great QRP Murphy Moments. A few paragraphs, a few pages, whatever you've got, we want to see it! Ideally it'll be something we all can laugh at with you. You don't have to be the world's greatest author - we'll take care of spell checking, formatting, and proofreading. Just send them along to either Ron (KU7Y) or myself (AB7TT) at the addresses on the back of your QRP Quarterly. Email/ASCII text is preferred.

This quarter's Murphy Tale comes all the way from the other side of "the Pond", proving there is more that joins humanity other than taxes and El Niño. Thanks Mike! So without further ado, on to Mike's tale.

Sometimes It Goes Right (or, Is Murphy Losing His Grip?)

submitted by Mike Perry, PA3ASC, Holland, pa3asc@xs4all.nl

"If it can go wrong, it will go wrong." The now infamous law of Edsel Murphy. The reason why all the traffic lights turn to red when you're in a hurry and the cause of other hopeless predicaments can be found on the Internet [Ed's Note: Try a search on www.yahoo.com when Murphy shuts the bands down...]. There are even those who claim that Murphy was really an incurable optimist and things usually turn out much worse than he suggests. However we sincerely believe there is hope amongst all the doom and gloom and recent events in the shack at PA3ASC tend to support this viewpoint.

Practical beginnings

During the final check-out of a regulated 13 V power supply, I had to draw a new scale on the front panel meter so that it read 0-5 A fsd instead of the original 0-1 mA. Construction was otherwise complete. The meter, of uncertain origin and acquired in a junk sale, had already been mounted in the front panel. Accordingly, I pried the cover glass (cover plastic might be a better phrase) gently off the front of the meter and cautiously removed the two tiny self-tapping screws that secured the white scale plate to the meter. Screws of this form and fit are not easily found in Holland at any time, and particularly not on a Sunday morning when all the shops are religiously shut. The screws were thus put in a very safe place. I covered the scale-plate with a sticky label, on which I drew the new scale. The plate could now be restored to its rightful address.

With the scale-plate perched on the meter, I picked up one of the tiny self-tapping screws with spring-loaded tweezers and moved it to the mounting hole into which it needed to be inserted. At this critical point in the operation, there was a sudden loud 'splatttttttt' sound which announced that the screw had spontaneously sprung out of the tweezers and vanished, merrily bouncing off a catalogue of surfaces, like a spare electron on its way to the galaxies.

The irreplaceable screw was gone. The brief monologue which followed will not be reported here. It would probably have been censored by the Editor anyway. [Ed's Note: Don't worry Mike, I'm sure any builder could fill in the blanks with ease!] For the reader who has not seen the layer upon layer of untidy neglect in the shack at PA3ASC, no words can describe how much simpler it would be to look for a needle in a haystack than to find that small screw. I abandoned the quest for the missing screw immediately, and concentrated on getting the remaining screw into its place. The scale now hung precariously onto the meter by one fixing point. With luck, it might hold.

A time of increasing doubt

The maimed meter could now be set up. The box was turned on its side to gain access to the pot which calibrated the reading of output current. With what now appears to have been a cavalier disregard for the events which had just occurred, I used a bare metal screwdriver to make the adjustment, and with deft slight of hand, produced a flash and a bang as the blade of the screwdriver accidentally bridged two tracks on the circuit board. Our supply of expletives having been completely exhausted by the first setback, this event was now accepted with equanimity and in complete silence. Right now I was rapidly beginning to wonder if homebrew was just a long-winded way of producing scrap. [Ed's Note: And of building colorful vocabulary!]

"The output transistor." I thought, "The fastest fuse in the west (of Holland) has gone to Boot Hill." "Keep calm." said a muffled voice inside. "Never say die. Why don't you measure the output voltage?" I did. It was 13.4 volts on-load. So the fold-back short-circuit protection did work after all. I switched the box off.

Then I noticed that the meter needle just hung motionless, jammed at mid-scale, long after the reservoir capacitor should have discharged. Locked solid. Had the full whack of the output current gone through an unprotected 1 mA meter movement? The meter, for which I had no replacement in the junk box. The meter, which now appeared to serve no other purpose than to fill up a gaping hole in the front panel. Had Murphy triumphed after all ?

The come-back

For some not entirely logical reason, just as a drowning man is said to clutch at a straw, I decided to remove the meter from the front panel and see if there was even the faintest chance of a repair. Mounting the meter on the front panel had been easy since it was one of the first assembly operations. Now with the power supply complete, the tiny nuts securing the meter to the front panel were barely accessible. What I needed most was the set of miniature instrument spanners I had resolutely refused to buy at the recent junk sale, on the grounds that the shack was already chock-full of stuff bought with good intentions and never used. The virtue of self-denial turned sour as I picked away at the nuts with a pair of long-nosed pliers. It was slow and tedious but eventually I got the meter out.

Victory at last

I opened up the meter. There were no signs of burning or molten metal. Nor did anything look unduly bent out of shape. But although I could rotate the movement freely along some of its travel, something inside was definitely blocking it. A small, bright object, which clung like a limpet to the magnet. Gently, I eased the object free with a pair of tweezers and lo! The missing screw, the one which held down the other side of the scale had been recovered. Murphy had given up the struggle.

The power supply is doing OK now and drives my two-metre and six-metre rigs. (Ed's Note: I love a story with a happy ending...)

SEEK YOU QRP! de CONTEST de CONTEST

Dave Fischer, NC7W Box 330, Huntsville, UT 84317 email: utahfolk@konnections.com

As an active CW contester for many years, running both QRP and low QRO, I would like to offer some comments and suggestions on QRP contesting. I offer these comments with the thought and hope that what is printed here will make a difference in the next contest. Heeding these suggestions will also reduce the number of times ops are called names in the night!

FIRST: There is one thing that you must remember, for almost all contesters, an accurate signal report is of zero, zip, nil, interest! The only thing a contester wants to hear is "5NN" (not "599"!) where "NN" stands for "No News", "Nothing New", "Nothing! Nothing!", etc. In other words, no signal report intended or given! You then hear folks discussing what use is RST in a contest! There is a *good* reason: Contesters can pick out "5NN" from the din of noise and QRM. It's a flag in the midst of battle and you know it signals that the real exchange info follows. "5NN" is thus extremely useful in noisy or weak signal environments! You can pick out "5NN" much easier than "369", "549C", or whatever. This is a contest, not a scientific study group! An accurate signal report only slows the rate! Those who aren't interested in rate give out 369's etc. and have folks mumble things at them in the night and ignore totally what they may be attempting to send—signal info. The RST system is *not* used in a contest — "5NN" is!

Contesters do not advocate the abolishment of the RST system! In fact, the RST system is an excellent one, if used correctly. I keep a printed card before me with the full RST code on it, for those times I do give accurate signal reports—when I'm *not* in a contest! My point: When contesting, send "5NN" and forget anything else! It even gives the log checkers and you the log maker one less thing to hassle with ... and the big contest programs do not make it easy to handle other RST values! Contesters do give signal reports, in other ways, so listen to them!

Some BIG Things to Remember

QRP does *not* mean send SLOWER, SLOWER, SLOWER!
QRP does *not* mean REPEAT! REPEAT! REPEAT!
5NN means FIVE-NUTTIN'-NUTTIN'!
Give 'um EXACTLY what they ask for!

SECOND: When a station calls "CQ TEST", "CQ QRP", etc. don't answer with the usual format of sending his call then yours. Send your call once (twice only if poor conditions exist). If he hears you, he will send your call in return followed by his report. There is nothing more wasteful in time and space than calling contest CQ's and having someone answer with "your call de his call"; that is *rarely* required in contest work! QRP works! He'll hear you! Get brave and send your call just once! Find out what happens! Egads! You've been heard!

THIRD, and this is very important: One secret to QRP is to know you sound like a KW and act like it! QRP does not mean send slow! Most of the time your signal is good copy and you have no need to send slow or repeat everything three or more times. You learn to judge the condition of the band and frequency and respond accordingly. If you call a station and he returns, listen to what he does. It will indicate what you should do. If he is an alert contest op and repeats several times, that's a sign (the contester's signal report!) that you are weak or conditions are rough, so do the same as he does, repeat if he did, otherwise don't! An accurate signal report will only delay the exchange under such conditions while sending "5NN" here pays off big time. Sending "369" instead will not give either op new information.

FOURTH, and this is *most* important: When an operator asks you to repeat a specific item, such as member number, section, state, name, etc., give 'em what he asks for and *only* what he asks for! There is nothing more frustrating under tough conditions than having the other op turn around and send "your call de his call" and repeat the whole of what he's already sent, what you've already copied, or add such useless strings as "My number is ..." "My state is ... ", etc. *Do not do dat! Never! Ever!* If he asks for your number then concentrate on sending him your number and repeat as you feel necessary; if he needs part of your call, send the *part* not the call! Another thing to realize: Don't change the parameters of his "expectation filter"; don't slow down, don't change frequency, and don't switch to your trusty Erie-swing bug! Go back to him with what he's heard before, that's what he's listening for; don't make him rediscover you doing something else! If a request for a repeat continues, then you can try all the tricks you know and he will do his best to accommodate. But on the first or second try, don't change your format, send what he requests, repeat only if you judge necessary and do *not* send slower! If you change speed at all, increase, don't slow down — unless he says QRS.

FIFTH: A good contest op will do a fair amount of "running" or playing "big gun" as well as "S&P" – "Searching and Pouncing" – as he works the contest. Playing big gun is fun in QRP contests! Everything goes along fine until someone starts calling with "your call de their call" and probably repeats. Or he asks for a repeat and the other op goes off into send-slow-and repeat-often land and takes up time. What one must realize is that the big gun QRP op has staked out a precious piece of real estate (a frequency!) and if you take too long to respond, he is going to dump you! Why me, you ask? Because your diddling will cost him his home on the range! While you diddle, someone who hears you weakly is gonna claim-jump his homestead! "My number is ..." will get you even more names in the night! He knows you're going to send your number since that's what he asked for! So, send your number and *only* your number! Repeat only if you feel it's absolutely necessary. Bottom line: Do not diddle on a Big Gun's turf!

As a short aside, I have always chuckled at the usual thoughtlessness we continue to employ in normal QSOs such as "My name is .... ", "My QTH is ...", UR RST is ... ", "My Rcvr is ... " and on and on. Why do we say these things? Is there a time when the name you give might not be your own? Do you give out someone else's QTH from time to time? Such added "information" is *useless!* "NAME BILL QTH ST LOUIS MO RST 369C RX HQ120 TX 2N2222 ANT DPL" says it all!

And to end, the secret to QRP success was discovered at my QTH about ten years ago when a fella who had accused me of running QRO in the QRP contests (not to me but to others) knocked on my door and invited himself in to see me "in operation" during a contest. He looked at my gear and couldn't find a heavy box, an Alpha or a TL922 hidden anywhere in the shack, then he wanted to know how my antenna got outside. I showed him, and then he "found" it; the coax was clearly visible except for the three feet that went behind my furnace. There it was, he knew, where I hid my 8KW Furnace AMP and it warms my house in the winter and my A/C cools it in the summer! He was right; if your signal is poor, look first at your feedline, then at the outside end, you will find pay-dirt ... but if you want a really big sig, getta 8KW Furnace AMP, whatcha can't see, behind the furnace plenum! Your sigs will warm the ions! The fella never did accuse me of running QRP (which I was) when I won the QRO class a couple of times!

QRP contesting is great fun and more and more contests are being sported at the QRP level. If you have not yet joined the QRP fun, do so next chance; you will find the rates very respectable these days and the ops are getting better and better. Seek You de Contest!

Edited by W1HUE

Financial Report

by

Ken Evans, W4DU

End of year report - July 1, 1997 thru June 30, 1998
AS of: August 10, 1998

Total Cash on hand as of July 1, 1997 = $14445.13

Revenue received

(Numbers in parenthesis are negative - all others are positive)

	Actual	Budgeted	Difference
Membership			
Renewals & new Members	$23897.63	$22500.00	$1397.63
QQ Sales (Back issues)	$1521.20	$ 530.00	$ 991.20
Toy Sore	$ 1717.00	$ 400.00	$ 1317.00
Advertising	$ 100.00	$ 0.00	$ 100.00
Dayton			
Banquet	$4711.00	0	$4711.00
FDIM	$2222.65	0	$2222.65
TOTAL REVENUE	$34169.48	$24170.00	$9999.48
Expenses paid			
Back QQ Sales	$ 310.40	$140.00	($170.40)
Bank Fees	$ 67.00	$ 60.00	($ 7.00)
Membership	$ 596.26	$ 400.00	($ 196.26)
Dues Refunds	$ 102.00	0	($ 102.00)
Treasurer	$ 177.57	$ 100.00	($ 77.57)
QQ Printing & Mailiing	$18305.45	$12200.00	($6105.45)
Toy Store	$ 255.74	$ 400.00	$ 144.26
Attorney Fees	$ 183.24	0	($ 183.24)
Contests (Certificates & Plaques)	$ 299.18	$ 150.00	($ 149.18)
Features Editor	$ 22.39	$ 100.00	$ 77.61
URL Fees	$ 100.00	$ 300.00	$ 200.00
QQEditor Travel	$ 206.19	$ 400.00	$ 193.81
Hamcom Booth	$ 100.00	$ 100.00	0
Dayton			
General	$ 1072.93	$ 600.00	($ 572.93)
Banquet	$ 4536.10	0	($ 4536.10)
FDIM	$ 3674.36	0	($ 3674.36)
President's Discretionary (Officer's Badges)	$ 217.44	$ 600.00	$ 385.56
TOTAL EXPENSES	$30226.25	$ 18282.00	($ 11974.25)

TOTAL CASH ON HAND (8/10/98) = $18388.36

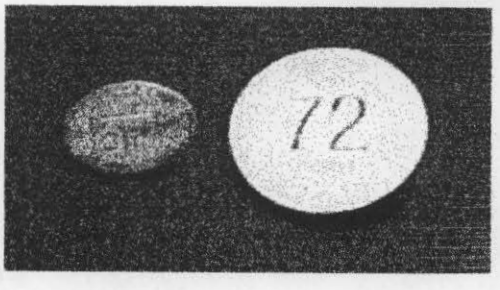
For the year, we gained at total of $3943.23

The QRP-ARCI Toy Store

The **Official** QRP-ARCI Coffee Mug. Used by the top QRP Fox Hunters, contesters and casual operators found near the normal QRP freqs. White on midnight blue, Logo on both sides. Coffee, tea or milk not included.

The QRP-ARCI mouse pad has been tested under rigorous conditions. Excels at high-speed clicking and browsing. Blue logo on champaigne background. Mouse and browsers not included.

The blue and brass metal pins have a tie-tac pin in the back



The white 72 pins say:
WISHING YOU
72
GOOD QRP

Coffee Mugs	$5 + $3 S&H	Blue Pins	$5 + $2 S&H
Mouse Pads	$5 + $2 S&H	"72" Pins	$1 + $1 S&H

No shipping & handeling on pins when ordered with a coffee mug!

Orders to:
QRP-ARCI Toy Store
1640 Henry
Port Huron, MI 48060-2523

What is Your HAMdicap?

Grant Bingeman, KM5KG Dallas, TX email: DrBingo@compuserve.com

This article originally appeared in the June 1998 issue of the on-line publication ***Antennex*** *(see www.antennex.com) and is reprinted here by permission of the author. The opinions expressed are those of the author and do not necessarily reflect those of the QRP ARCI Board of Directors or the QRP Quarterly staff.*

When sailboats compete in a race, the bigger boats are handicapped in order to give the smaller boats a fair chance. The outcome of the race is determined by the corrected times, not the actual times the boats cross the finish line. This helps to create a level playing field. The QRP aficionados like to rate their performance in miles per Watt. That is, their figure of merit is the distance between the transmitter and the receiver divided by the power output of the transmitter. So the QRP player with the highest confirmed miles-per-Watt wins some bragging rights. This rating is also an attempt to even the playing field, or a method to avoid comparing apples to oranges.

However, I think the traditional miles-per-Watt is a bit misleading for what we are trying to quantify. I say this because the electric field intensity of an RF signal is directly proportional to the current in the transmitting antenna, which is proportional to the square root of the power delivered to the radiation resistance of the antenna. The use of miles per Watt is fun and easy, but a yardstick graduated in field intensity makes more sense insofar as it is linearly related to performance and power is not. The square-root relationship is why we use a multiplier of 10 times the log of power ratios and a multiplier of 20 times the log of voltage and current ratios when calculating dB.

A recent CW QSO was made on 40 meters with a path length of 595 miles in which the transmitter output power was stated to be 35 milliwatts. This yields a figure of merit of 17000 miles per Watt, which is pretty impressive. But assume for the moment that our reference power is five-Watts. Relative to five Watts, 35 mW is 143 times smaller (143 times 595 miles = 17000 miles). However, the radiated field from that 35 mW station is only 12 times smaller than from a five-Watt station, all other things being equal (the square-root of 143 is about 12). The value of 12 is a more realistic correction factor than 143, as we shall see in a moment.

Think of this number 12 as the handicap that should be given to the five-Watt station competing with the 35 mW station. The five-Watt station should have a signal 12 times stronger than the 35 mW station, all other things being equal. In other words, the actual path distance of 595 miles times the handicap of 12 should be the corrected distance (7140 miles) given to the 35 mW station. Remember this is relative to five Watts, the de-facto upper limit of QRP CW operation. I believe the linear relationship between current and signal intensity paints a better picture of the degree of communication difficulty than the non-linear relationship between power and signal intensity. The bottom line is that the 35 mW signal is not 143 times weaker than the five Watt station, but only 12 times weaker (22 dB). If we scale our performance with the following correction factor, I believe it makes the game more fair:

$$F = \sqrt{\frac{5}{P}}$$

where P is the transmitter output power in Watts.

But it takes two stations to make a QSO, so we really need to consider both transmitter powers. Thus the overall correction factor in that case would be:

$$F = \frac{5}{\sqrt{P_1 \times P_2}}$$

where P_1 is the output power of transmitter one and P_2 is the output power of transmitter two.

Let's say that the other QRP station was operating with a typical three Watts. Then the overall correction factor in our 35 mW and three Watt QSO becomes 15.4, yielding a corrected path length of 9180 miles. Had the other guy been operating at five Watts, we would be back at the 7140 mile figure. This corrected path length is the score one would record if the QSO were part of a contest.

Now this entire handicapping subject brings up another question – how do we take into account antenna gain? That is, how do we handicap the guy with the steerable log-periodic antenna? First of all, we have to choose a reference antenna. Perhaps a half-wave dipole 20 feet off the ground is a good choice, because it is typical of many QRP amateur installations. Or, to keep things simple, an isotropic radiator would make a good reference. Again, since it takes two to make a QSO, the gain of the transmitting antenna in the direction of the receiving antenna and the gain of the receiving antenna in the direction of the transmitting antenna should both be considered. The gain figure for an antenna should be a simple ratio of its field intensity and the maximum value of the reference dipole's field intensity for a given power input, not expressed logarithmically (i.e., not in dB). The overall gain of the RF circuit or path should be the product of these two ratios.

We can use any of the moment-method antenna analysis programs to determine what the expected field intensity is for a given antenna and frequency at an appropriate elevation angle for sky-wave propagation. I leave this as an exercise for the "race committee" who write the handicap rules. However, we can temporarily assume a five Watt reference antenna maximum field intensity of 13 millivolts per meter at one mile. Note that I have not specified the antenna polarization, as the electric field orientation can be unpredictably skewed during its trip through the "ether." However, some additional points should be awarded if the two antenna polarizations are orthogonal. How much is up to the committee.

Since QRM and QRN are important considerations in any QSO, one should also consider the directionality of the antenna. There is a general formula for this that covers all bearings in three dimensions, not just azimuthal front-to-back and front-to-side ratios. Directionality at both ends of the QSO should also be added to the handicap formula. Do not confuse this term with directivity.

As an example of applying gain correction, say your transmitting antenna puts out a field half as strong as our reference antenna in the direction of the receiving site. And say that the operator at the receiving site has a really good antenna aimed right at you which can produce a field eight times better than our reference radiator. Then the overall RF circuit advantage is one-half times eight, or four. This is what we would use to handicap the distance. So the following overall formula would produce a corrected distance of 1785 miles in this case, that is, 595 miles times 15.4 divided by four. Had both stations been operating at five Watts with half-wave dipoles aligned directly broadside to one another, then the overall path handicap would have been unity.

So now the overall correction factor looks like this:

$$F = \frac{5}{G_T G_R \sqrt{P_1 P_2}}$$

where G_T is the gain of the transmitting antenna and G_R is the gain of the receiving antenna. $G = E/13$, where E is the antenna's five Watt field intensity at one mile in mV/m

There are many other factors which can be cranked into the handicap formula as time goes on and the "race committee" convenes periodically to consider them (frequency, ground conductivity, receiver sensitivity and noise floor, sun-spot number, etc.). Of course, there will

always be those who want to bend the rules, and this is what fuels "race committee" meetings. And human nature being what it is, the official handicap formula will no doubt become very complicated in no time at all. Perhaps it might be easier to assign a handicap based only on the retail value of your equipment in 1998 dollars! Assign a QSO point multiplier based on the ratio of $1000 to the total cost of your equipment. Earlier we spoke of miles per Watt; now we are talking about miles per dollar. It's an interesting comparison, isn't it?

Of course, the overall concept of handicapping amateur radio contests is very dependent on the honesty of its operators. It might evolve that only stations and operators that are inspected by official observers (something like volunteer examiners) during a contest would be allowed into the handicap category. Then maybe those hidden boxes with a pair of 4-400's in each wouldn't get so much illicit use during alleged QRP operation. Some people will do anything to win!

My intent in writing this is simply to propose a more realistic measurement of performance, avoiding comparison of apples to oranges. I realize it adds a certain complexity to the contest process, and maybe even takes a bit of the fun out of it, but let's at least agree that there are some sound principles here worth discussing. I suppose you could think of this article as an attempt to promote a standard HF circuit yardstick for ham radio.

Edited by W1HUE

Back Issues of The QRP Quarterly Available

George "Danny" Gingell, K3TKS, is now handling sales of back issues of the QRP Quarterly for the club. Back issues are $4.00 to $7.00 each (depending on the issue) plus shipping. Four issues can be shipped Priority Mail in the US for $3.00. Reprints of selected Quarterly articles are also available. A limited number of the 1998 FDIM Proceedings are available for $12 postpaid. Please include your call and telephone number in all correspondence. Danny can be contacted as follows:

G. Danny Gingell, K3TKS
3052 Fairland Road
Silver Spring, MD 20904
phone: (301) 572-6789 email: K3TKS@abs.net

CONTESTS

Cam Hartford, N6GA

Results: Hootowl Sprint
Results: Milliwatt Field Day
Results: Summer Homebrew Sprint
Announcing: Fall QSO Party
Announcing: Holiday Spirits Homebrew Sprint

UPCOMING EVENTS

QRP ARCI Fall QSO Party	Oct 17- 18
LI/NJ Doghouse	*Nov 21*
Holiday Spirits Homebrew Sprint	Dec 6
Colorado Snowshoe	*Dec 12*
Michigan QRP Club	*Jan 2-3*
Winter Fireside SSB Sprint	Jan 10

Italicized item dates are tentative at press time. Consult with the sponsoring organization for details.

1998 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.

Congratulations are due to W3TS and N6WG, repeat winners in their respective classes. Congratulations to the newest members of the Winner's Circle, W5VBO and K2SH.

Gentlemen, your hardware will be in the mail soon! And 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 CTY RADIO CLUB	N6WG	12,488	406	853	25		
ZUNI LOOP MTN EXP FORCE	K6ZNI	10,635	513	196	15		
NORTH GEORGIA QRP CLUB	AE4NY	1,665	85	52	4		
HAWAII QRP CLUB	KH6AN	1,155	77	0	17		
MILLIWATT CLASS	W3TS	5,505	367	0	1	HB SUPERHET TCVR	130' DOUBLET @ 50'
5 WATTS - 1 OP	W5VBO	3,780	252	0	1	?	?
	K3SS	2,160	213	6	1	?	?
	K3CHP	1,640	131	66	1		
	N4JS	1,515	100	2	1	OHR 100, QRP+	TX BUGCATCHER, GUSHER
	WE6W	1,170	78	0	1	OHR100, HW-8	HUSTLER VERTICAL
5 WATTS - 2 OPS	K2SH	4,035	266	6	2	ARGOSY, EPIPHYTE	R7, W6MMA SLV, 3 EL 6MTR
	WR4I	3,475	345	5	2	ARGOSY I	CAROLINA WINDOM

1998 HOOTOWL SPRINT

QTH	CALL	SCORE	PTS	S/P/Cs	PWR	BANDS	TIME	RIG	ANTENNA
LOW-BAND STATIONS									
CA	KN6YD	2,205	63	5	5	L-2	2.5	FT-890	INVERTED VEE
ALL-BAND STATIONS									
OH	N8ET	83,440	298	39	5	A-3	3.75	?	?
UT	NC7W	58,072	244	34	4	A-2	2.5	?	?
GA	W4ED	40,362	186	31	5	A-2	3.5	FT-840	80M LOOP, 40M VERT
CA	W6ZH	31,234	194	23	5	A-6	3	OMNI VI	10 - 40 YAGIS, VERT 80 - 160
VA	N4ROA	22,540	140	23	5	A-2	3	OMNI C	2 EL QUAD, INVERTED L 160
MI	K8CV	20,300	145	20	5	A-3	?	?	?
OK	AB5UA	17,080	122	20	4	A-2	2.5	OHR-400	VERT, YAGI @ 50'
CA	WE6W	11,466	117	14	5	A-3	4	VIKING II, TR-3	DIPOLE, VERY SMALL 160M LOOP
CT	N1OCJ	9,506	97	14	5	A-2	2.5	OHR SPIRIT	INVERTED VEE @ 35'
NJ	W2JEK	7,371	81	13	3	A-3	3	FT-840	20M GP, 40M DIPOLE, 80M EF HERTZ
CA	W6SU	5,313	69	11	5	A-6	2	TS-850, ALPHA 87	YES, SORT OF
UT	W0YSE	4,830	69	10	4	A-2	3.5	MFJ-9020, OHR EXPLORER II	R7000 W/BASE @ 24'
MO	N0OCT	4,636	72	9	5	A-2	2	TR7	SLOPING DIPOLE
ID	AB7TK	3,843	61	9	5	A-2	2	TRITON IV	GAP TITAN
NH	KN1H	3,760	47	8	0.9	A-2	1	QRP+	WIRE
AZ	K6QWH	3,094	34	13	5	A-2	2.75	ARGO 509	?
OH	KF8EE	1,344	32	6	5	A-2	1.25	ARGO II	RANDOM WIRE
CA	WA6ARA	1,330	38	5	4	A-2	1	ARGO 509, HW-9	40M ZEPP, 15M DIPOLE
NM	K5OI	1,050	30	5	5	A-2	1	QRP+	ZEPP
40 METER STATIONS									
IN	K9PX	51,156	261	28	5	40M	4	TAC 1	80M LOOP
MO	K0NI	13,720	98	20	5	40M	2.5	?	?
NY	WB2QAP	11,172	133	12	5	40M	1.25	FT-840	80-40 INVERTED VEE
MA	WA1QVM	10,290	105	14	4	40M	3.5	QRP+	G5RV
MD	K3CHP	8,463	93	13	5	40M	3.5	QRP+	VERTICAL
MI	N9DAW/8	4,774	62	11	4	40M	3	MFJ 9040	FOLDED DIPOLE
MI	N8CQA	2,520	42	6	0.9	40M	2	?	?
MS	WB5YIK	2,016	36	8	5	40M	2.5	TS-940S	276' INV VEE
CA	AB6SO	1,820	52	5	1.75	40M	2.5	NORCAL 40	FOLDED DIPOLE
AZ	KK7JU	1,372	49	4	5	40M	2.75	?	G5RV
PA	KT3A	1,050	30	5	4	40M	1	?	?
KY	KB4DJR	833	17	7	4	40M	3	HW-8	1/4 WAVE VERTICAL
AK	AL7FS	756	36	3	4	40M	1	TS-450S	INVERTED VEE @ 38
WI	AF9J	680	17	4	0.8	40M	1	SGC-2020	100' END-FED WIRE
CA	W6SIY	360	12	2	0.25	40M	1	TUNA TIN II, NEOPHYTE	40/20 DIPOLE @ 18'
DE	K3AS	210	15	2	5	40M	0.25	CENTURY 21	WIRE IN ATTIC
20 METER STATIONS									
MAN	VE4AKI	10,710	90	17	2	20M	2.5	SWL GM-20	SLOPING DIPOLE
MO	N5OE	5,796	69	12	2	20M	1.5	SST - 20	V-BEAM @ 30'
MD	KB3WK	5,082	66	11	5	20M	1.75	OHR 100A	YAGI
OR	KI7UN	3,339	53	9	3	20M	1.5	HB TX	80M DBL EXT ZEPP @ 45'

The Hootowls continue to be a persistent and amazing crew. Long after the rest of us have ceased functioning, these guys and girls are still pounding the brass and logging the Qs. Participation in this contest is 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!

Soapbox: Nice to see 20m hold up this late in the evening - **VE4AKI**; The bands could have been in better shape but all in all it was a fun contest - **N5OE**; Another fine hootowl - too bad there was so much QRN on 40m - **WA1QVM**; Had to battle thunderstorms and continuous QRN but it was fun - **K3CHP**; Found myself camping in Michigan during the Hootowl, so I whipped out the MFJ and ran a few Qs - **N9DAW/8**; Big antenna, big QRN! - **WB5KYK**; This is truly Ham Radio at it's best! - **KK7JU**; Lacking in numbers but had great fun telling non-qrp'ers about the sprint and the fun of QRPing - **KB4DJR**; Had fun camping and doing Hootowl in spite of rain - AF9J; It was the ruffest QRP I've sone in a decade, the QRN was continuous - **NC7W**; Outstanding contacts - working old friend W4BW on 40 and WE6W on 160! - **W6ZH**; Now retired, but gonna have to get a job so I will have some time for radio - **N4ROA**; This contest should have everyone on at the same time! - **K8CV**; (Sorry, but every other contest has everyone on at the same time. This one is different, intentionally! - Cam); Thunderstorms in the state, so low bands wall to wall noise. This sprint is always fun, seeing who stays up late - **AB5UA**; These short sprints are nice, a little time, a lot of fun - **N1OCJ**; "The one that got away" - Almost a QSO with CO2KK?QRP but QRM/QRN prevailed - **W2JEK**; Wish I could have spent more time, but not to be - **KN1H**; I haven't worked a QRP contest in a few years and had a ball - **WA6ARA**.

TOP THREE

N8ET	83,440
NC7W	58,072
K9PX	51,156

1998 SUMMER HOMEBREW SPRINT

QTH	CALL	SCORE	PTS	S/P/Cs	PWR	BANDS	TIME	RIG	ANTENNA
LOW-BAND ENTRIES									
PA	NA3V	22,136	153	46	5	L-2	3.5	OHR 400, TS-570	40M DIPOLE
ALL-BAND ENTRIES									
NJ	N2CQ	72,720	280	32	5	A-2	4	NW80/20, OHR 100A	YAGI, CF ZEPP
OK	AB5UA	50,194	198	29	5	A-2	4	OHR 400	YAGI, INV VEE
MN	N0UR	33,175	161	25	5	A-2	3	IC-735, SPIDER	YAGI, DIPOLE
VA	K4GEL	27,080	122	20	5	A-2	3	HB MULTI-BAND TCVR	20M QUAD, 40M 2 EL DELTA LOOP
IL	N9MDK	13,281	91	13	3	A-2	3	TT 1320/1340	R5 VERTICAL, G5RV
OH	WB0IQK	12,800	40	7	0.9	A-2	1.5	SWL GM-20, GM-40	R7000 VERTICAL
MA	WA1QVM	9,240	88	15	4	A-2	1.5	QRP+	G5RV
CA	KN6YD	1,344	32	6	5	A-2	1.75	FT-890	80M INV VEE
20 METER ENTRIES									
TX	K5ZTY	43,934	206	27	5	20M	3	OHR 400	YAGI @ 44'
ID	W7CNL	26,950	154	25	4	20M	3	ARGOSY 2	YAGI @ 45'
ID	AB7TK	24,404	132	21	2	20M	4	SIERRA	TH6DXX @ 90'
AZ	NQ7X	19,112	112	18	5	20M	2	OHR CLASSIC	?
OH	K8UCL	10,005	65	11	2	20M	2.5	HW-8	ATTIC DIPOLE
IL	KB9LCK	8,360	60	8	4	20M	3	SIERRA	VERTICAL
HI	WB6FZH	5,140	10	2	2	20M	1.5	HW-8	VERTICAL ON KANEOHE BAY
TX	WD5ICQ	4,480	64	10	5	20M	4	OMNI C	500' END-FED WIRE @ 50'
FL	K4KJP	2,800	50	8	5	20M	2	OMNI D, SST-20	20M DIPOLE @ 30'
AK	AL7FS	1,666	34	7	5	20M	3	TS450S	YAGI @ 40'
40 METER ENTRIES									
NC	AC4QX	23,746	206	13	5	40M	4	ARK-4	G5RV
MI	WA8RXI	18,440	128	15	1.5	40M	3	SWL SW-40+	DIPOLE
VA	KK4R	13,010	89	9	0.8	40M	1.5	NORCAL 40	DOUBLET
MI	W8TIM	11,840	76	9	0.9	40M	2.5	SWL SW-40	DIPOLE
PA	W3DP	10,530	79	10	5	40M	2.75	OHR-100A	HF6V VERT
MD	K3CHP	10,390	77	10	2	40M	4	SIERRA	VERTICAL
VA	WB4JJJ	9,949	101	7	2.75	40M	3.5	SWL SW-40+	CAROLINA WINDOM @ 55'
MI	N9DAW/8	1,225	35	5	4	40M	1.25	MFJ 9040	FOLDED DIPOLE

The Summer Homebrew Sprint was a contest of contradictions. Guys in the middle of the country couldn't hear the West, and guys in the East couldn't hear the Middle. Must have been one-way propagation. Some folk had a good beginning and lousy end, while for others, the opposite was true. All in good fun. Read on:

Where were all my CA, CO and AZ friends? Really wierd 20m condx. Good first hour, but went downhill from there - **K5ZTY**; Great first hour, not so great last hour - **AB7TK**; Bands were sucko for the first few hours - then things got better - **WA1QVM**; Where were all of the West Coast stations? - **AB5UA**; Where were all call area 9s? Maybe they were all up on 20 meters... - **NA3V**; I tried 40 and 15, never heard a thing. OK, I like 20 - **KB9LCK**; Propagation from HI to Mainland not good during contest window. I onlyheard about 6 QRPers, worked 2 in last 15 minutes - **WB6FZH/KH6**; Band conditions were very tough...it took 6 - 7 minutes to complete a contact with N0OCT. He was willing to keep at it until we hit a peak and I got the info - **AL7FS;** Not much time to operate since we had house guests, but conditions were great and there were plenty of stations to work, so it was great fun - **KK4R;** Good condx, light acivity - **W3DP**; My HW-9 died so pulled out my Spider for 40M - **N0UR;**

TOP THREE

N2CQ	72,720
AB5UA	50,194
K5ZTY	43,934

QRP CONTESTERS INVADE NA SPRINT

Prodded into action by Ron, KU7Y, two teams of fearless QRP ops took the dive into the NA Sprint last February and succeeded in shaking up the normally complacent ranks of KW sprinters.

Well, "shaking up" might be a wee bit of an overstatement, but at least they established a foothold on the Team Scores list. "Les Petits Guerillas" (NC7W, N6GA, KJ3V) and the "QRP Warlords" (KU7Y,W4WS, K1MG,NQ7X) placed 18th and 19th places, respectively, out of 20 competing teams. Speaking personally, I can only say that operating in one of these Sprints is involving oneself in the most concentrated course in operating skill and code speed found in the Ham Radio world. It can also drive a perfectly sane person to the loony bin in short order.

Teams can consist of as many as ten members, so more participants would definitely improve our chances of moving up the ladder of success. If you feel your skills need a quick sharpening, join up next time the call goes out and give it a try.

What a kick!

NEW ENTRY CLASSES

Not exactly new, since I added these classes a year ago, but I am repeating the info in case you missed it first time around.

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've 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

1998 HOLIDAY SPIRITS HOMEBREW SPRINT

Date/Time:
December 6, 1998; 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 17,1998, 1200Z through Ocober 18, 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	50128 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

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.

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(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+4 Code** _____

(Please use your full 9 digit zip code)

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

Packet Radio Address _____ **E-Mail Address** _____

Home Phone Number ( ) _____ **Work Phone Number ( )** _____

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Change of Address, and membership status questions go to:
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Mail completed application to either:

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All applications MUST BE RECEIVED at least 30 days prior to the cover date to receive that issue.

Send to:

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848 Valbrook Court
Lilburn, GA 30047

For a Club Information Pack, write to:
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3052 Fairland Road
Silver Spring, MD 20904
K3TKS@abs.net

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Make checks payable to: "GQRP" (ONLY)

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Folkestone. Kent CT18 7EG UK

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