QRP Quarterly

Journal of the QRP Amateur Radio Club, International

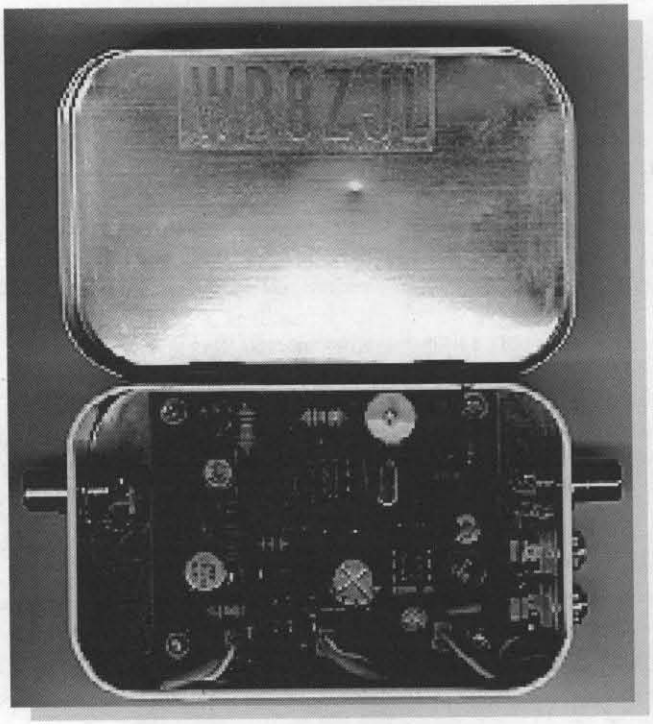
October 1996 Volume XXXIV Number 4

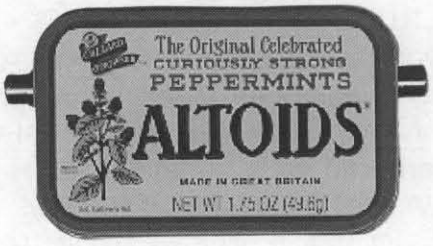
WINNER
Cover Contest
October 1996

Here is the 40-9er built by **Paul Valko WB8ZJL**

What? You haven't built a 40-9er yet?

Send in your picture for the Cover Contest.
They can be photographs or electronic files like this months winner. Use .tif or .bmp format. Contact the editor for the ftp site.





The only "mod" is a single toroid to stop self oscillation in the output. My first QSO was a station in Boston, (I live 30M N. of Detroit). I have also worked KS and PA with it

I ONLY use a 9v battery and get about 200mw output to a full wave dipole at 40ft. It has all the quircks of a typical 49er, i.e. BC interference, 100hz TX offset, and no sidetone! QSOs made this way are the most challenging and rewarding of my entire QRP career. I almost hate to give away my secrets, but those cute wire harnesses are simply salvaged from scrap VCR innerds. I had the battery mounted internally but made a cosmetic decision that doing an internal battery was not quite as "elegant."

I get snide remarks about my choice of RCA phono jacks as the DC and RF inputs, but did so as my way of honoring old Ten Tec and Heathkit equipment.

Paul Valko, WB8ZJL

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.

NOTES FROM THE PRESIDENT

BUCK SWITZER, N8CQA

I am hearing some very disturbing reports from several sources regarding WRC-99 and the Morse Code requirement which is currently required internationally for HF operation. It appears that, among others, the ARRL is strongly in favor of removing the Morse Code requirements from the ITU regulations. There are many fingers being pointed, but the bottom line rumor is that the manufacturers and large publishing outfits want to open their markets to larger numbers and feel the CW requirement is impeding their growth (those of us who buy $100.00 kits instead of $2,400.00 transceivers are part of the problem). I'm sure we are a long ways from hearing the last on this issue and it's ramifications for our hobby and our QRP niche.

The ARRL has printed a survey in the 09/96 QST which contains questions regarding CW/SSB usage and other questions which to my way of thinking are intended to slant the respondent towards a no-code response. I would strongly recommend that you complete this survey and return it to the ARRL. My survey will be strongly in favor of retaining the CW requirements, you of course may respond as you see fit, but please respond. Also of interest is the Editorial in the 09/96 CQ magazine which speaks of CW in the past tense. Be aware that the ARRL BoD adopted a resolution supporting proficiency in Morse code at it's 01/93 Annual Meeting.

It has been my impression over the years that QRP operators tended to be primarily CW op's, that is certainly the case for myself. While we have never taken a survey regarding CW/SSB operation (that I'm aware of) most of the members I talk with at swaps, etc, are dyed in the wool CW buffs. I personally am very much against removal of the CW (5wpm) requirement and intend to aggressively fight for it's retention. I will suggest to the Board of Director's that a survey of the members be taken regarding this issue so that we can speak for the membership of QRP-ARCI with the assurance that we really do represent the majority of members and represent their true feelings on this issue.

There are a number of organizations amassing support for the retention of the CW requirement among them are FISTS and apparently QCWA, I will try to keep you informed on this matter. Please be aware that the above statements are my own and do not represent QRP-ARCI's position on the matter.

On a sadder note, **Dick Pascoe, G0BPS** has resigned as our DX agent for renewals and/or memberships, apperantly as a negative reaction to our recent dues and advertising rates increase. Dick has done a fine job for over 6 years and I am truly sorry to lose his services to the Club. While I can't resolve our disagreement on prices, I can offer my own and the Club's **thanks for a job well done**. I personally, have heard no reactions regarding the dues increase. I did feel that those increases were necessary for the continuing healthy survival of QRP-ARCI and that the BoD and Officers would have been remiss in their duties had they not taken such actions. We are still pursuing the issue of DX mailings and if a cheaper solution can be found, we may yet be able to reduce the current DX dues, it is not necessarily a closed issue. The BoD can make changes as they see fit.

I hope to hear and work many of you in the upcoming contests/sprints. Have to get my HF wire back up and con **AC8W** into climbing the tower again. Hope all of you have a great Fall and Holiday season. **72/73 Buck N8CQA**

TIME TO CHECK THE ADDRESS LABELS

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

REMEMBER: THERE IS NO OTHER WARNING

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How Much does it Cost?

$1.64 printing/assembly for each copy of the Quarterly.

U.S.
+ 1.02 postage = 2.66/issue = 71% of $15.00 dues.

N.A
+ 2.16 postage = 3.80/issue = 84% of $18.00 dues.

DX
+ 3.84 postage + 0.10 envelope = 89% of $25.00 dues.

The bill from the printer for the July, 1996 issue was $3,338 for 2,040 copies.

I just received notice from **Dick McIntyre, K4BNI,** that **C-W Crystals**, of Marshfield, MO, is no longer in business. This was a business completely run by **Bob Woods, W0LSP** and his lovely wife, **Ruth**, for 55 years. They did all the work, from making the crystals through doing all the paperwork.

Let me quote the first sentence from **Bob's** notice; "Production at **C-W Crystals** has ended with the sudden death of my wife **Ruth**, a vital part of the **C-W Crystal** team of **Bob** and **Ruth**".

May our thoughts and prayers be with Bob.

NOTES FROM THE VEEP

Mike Czuhajewski, WB8MCQ

QRP HALL OF FAME FOR 1997

This is the call for nominations for the QRP Hall of Fame for 1997. If you feel someone has had a significant impact on the QRP community through outstanding accomplishments (technical, operating, organizational, etc.), here's your chance to nominate them for this honor. The ground rules are the same as last year: You have until the end of January to get your write-ups to me, via mail or e-mail. I'll send them on to the voters, we'll have a few weeks of discussion on them, do the voting and announce the inductees (if any) at some QRP function at Dayton.

The Board of Directors, which does the voting, agreed at Dayton this year to expand the voting body by adding the President and Vice President. Another change--current QRP Hall of Fame members will be offered the opportunity to vote if they desire.

Nominating letters will be accepted from QRP ARCI members only, although current Hall of Famers can also nominate worthy individuals. Some people reading this may be non-members; if so, there's plenty of time to join up so you'll be eligible if you want to make 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 worth of the honor. Don't count on all 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.

The July issue announced the 1996 inductees and gave brief biographies. Those will give you an idea of what we're looking for in a nominating letter. And be sure to include your QRP ARCI member number so we can verify that you are eligible to submit it. Send all nominating letters to me; my addresses can be found at the top of the Idea Exchange column and elsewhere in this issue. All inputs will be acknowledged. If you don't hear back from me within a week or two, please assume that I never received it and let me know. I'd hate to see someone lose out on the chance to be in the QRP HoF because a letter got lost The following hams, listed alphabetically, are already in the:

QRP Hall of Fame

Brice Anderson W9PNE
George Burt GM3OXX
Tom Davis K8IF
Doug DeMaw W1FB
Rev. George Dobbs G3RJV
Wes Hayward W7ZOI
Roy Lewallen W7EL
Rick Littlefield K1BQT
Randy Rand AA2U
C. F. Rockey W9SCH
Adrian Weiss W0RSP

Remember, if there is someone you feel is deserving of being in the QRP HoF, you have until the end of January to submit a nominating letter to **WA8MCQ**. --qrp--

FROM THE EDITOR

Monte "Ron" Stark, KU7Y

The days are still hot but the nights are getting cool. Here at work we are ready to put the cloud seeding generators back into the field. Winter is on it's way. Soon all the signs will be right for that antenna work. I have the place selected for the second tower. Now all I need is the hole! One element of the two element phased array for 30m is up and I have already made a qso with that most famous of all 30m operators and the man behind the idea of the **TMPS**, **Chuck Adams, K5FO**. His little pistol wasn't too loud here and it took a couple of nights to do it, but we did get it done.

WIMU96, held in Park City, Utah this year, was great. **Duane Anderson, KJ7HO**, and his wonderful wife, **DeAnna, KC7ISG**, put togeather a fine package. **Carol McWherter, KC7LLW**, had the fun of getting all the fourms orgnized! And I am sure that there are many others that I am missing. But a big **Thanks** to all!

Duane and **DeAnna** met me at the airport in Salt Lake City on Friday afternoon and drove me to Park City. Then, after the event was over on Sunday, they drove me back to the Airport! This was the first time we had met and it was fun. They are both very nice people. Thanks!

The QRP fourm was filled with 50 people! We know it was 50 because **Bob Follett, WA7FCU**, counted them! Bob lives in Park City and was a big help to us all.

I had it easy. Both **Bob Cutter, KI0G** and **Larry East, W1HUE** did all the work for me, both at the QRP fourm and at the booth. **Bob Follett, WA7FCU**, also spent a good deal of time at the **QRP ARCI** booth. At the QRP fourm, **Bob** and **Larry** got to show off all the great looking rigs they had brought and told all about them and QRP in general. **Bob Follett** also had some good looking equipment there. These three are a prolific group of builders. And their "toys" not only look good but they also work!

The drawings at the QRP fourm were won by the following people:
Oak Hills Explorer II 40m won by **Andy Flores, AA7AA**
QRP-ARCI Membership won by **Scott Anderson, KC7JXF**
NorCal Membership won by **Bob Ludtke, K9MWM**
MI QRP Club Membership won by **Craig Homer, KJ7YF**
QRP Operation Companion, won by **Carolyn Harmon N7SMX**

When the people scheduled to present the **DX fourm** had to drop out, I agreed to do it. I was still trying to think of things to do when **Wayne Mills, N7NG**, (also **P40V**), came by Friday night. With very little begging and crying he said he would help!

At the DX fourm Saturday morning, there was **Wayne** talking to **Walt Stinson, W0CP**, the **ARRL Vice Dir for the Rocky Mt Div** and another "big" DXer. He also agreed to help. Then along came **Steve Mendelsohn, WA2DHF**, the **ARRL First VP**! Another "Sure, I'll help"! These three did a great job. First they found out what the people were there to learn. This was mostly a group of "new commers" to DXing. All three did a fine job of giving information that was of help to all! No talking over anyones head. They answered many questions and we could have gone on for hours. This was one of the most informative DX fourms I have ever seen. Thanks to you all! Again, others made my job easy! The prize for the drawing at the DX fourm was a **MFJ World Clock**, won by our own **Larry East, W1HUE**!

Keep the letters, ideas and cover contest pictures comming. Oh, and don't forget to get on the air and have fun!

Ron, KU7Y

Incoming Mail

Compiled by Larry East, W1HUE

Dear Ron,

As you stated in your July '96 QRP Quarterly response to W9NJQ, "No one publication will ever be all things to all people." My wish is for more technical coverage whereas Jim and those he apparently has contacted want less technical coverage. Reviewing the July Quarterly, I think Jim got his wish because the majority of the coverage was non-technical (although there might be some difference of opinion on how to categorize some articles). I guess my suggestion is to maintain a 50/50 balance and then all of us will be satisfied some of the time.

I think you and all of your associates and contributors do a magnificent job. It's a happy day when I find the Quarterly in my mailbox.

Dick McIntyre, K4BNI/QRP

Dear OM "Ron" Stark, KU7Y,

I was interested in the letter from James Griffin, W9NJP in the July 1996 QRP Quarterly. A few years ago I had to give up working on my old tube rigs. I got an old Ten-Tec DELTA 580 and have become an "appliance" operator.

I joined QRP ARCI in February of 1963, number 567, under the old rules, and have stayed with the organization except for a few years when I stopped getting mailings and could not find the address of the organization. Although I am not "gung-ho" for the present QRO operating, or for contesting, I do put in some time in QRP contests and in the Illinois QSO Party, usually running 4 Watts, as Brown County is hard to get.

I skip most of the technical articles in the Quarterly. I always read such things as "QRP Really!" by Bruce Muscolino.

73 & 72, Ken

Rev. Kenneth A. Anderson, W9CUN
302 Camden Road
Mt. Sterling, IL 62353

Thank you Dick and Ken for your input. A good, even balance is the goal, but like Dick pointed out, how one classifies an article or column can change that balance. And we are driven by what is sent to us for publication. We never have enough! With enough, I could pick and choose, count this article and that article to hit just the balance I wanted. The reality is that we print most of what we get. Very little gets left over for the next issue. Feel free to write an article for submission. Our editors will help you do a good job. Above all, keep reading the Quarterly and letting us know how we are doing! Please send your comments and suggestions to me or any of the editors. Postal and e-mail addresses are listed on the rear cover. -- de Ron, KU7Y

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

Two Good Antenna Books -- A Short Review

G. Danny Gingell, K3TKS 3052 Fairland Rd. Silver Springs, MD 21144

The W6SAI HF Antenna Handbook, by William I. Orr, WA6SAI Published by CQ Communications, Inc. ISBN 0-943016-15-0 $19.95

What, you don't have the book yet? Well, run right out and buy a copy! You won't be disappointed. The only real improvement that comes to mind would be to offer it in a spiral binder like the NA5N QRP Handbook. This book is not for those of you who want deep technical analysis of every antenna type. It is for those of us who want a handy book to help point the way to building a wide variety practical antennas.

I am very pleased that I bought the book. I tend to buy just about every book that comes out on building antennas, out of habit. This one is going to become a classic. The "Solid State Design" of Antenna books. Not just another antenna book to put on the shelf, but one that you will use every time you think of trying another wire antenna.

Oh Yes, I bought another Antenna book that is worth mentioning with equal praise. It is the book Practical Wire Antennas by John D. Heys, G3BDQ. It is an RSGB Publication (Red Cover) and $14.00 at Maryland Radio Center in Laurel, MD (my local "candy store"). It has a wealth of information that is not readily available any other place. Among the special items of interest that I found while browsing through this book was the "W3EDP" antenna which Bob White, WO3B, and The Maryland Milliwatt Team used inside of our hotel room at Dayton with his 40-9er kit. The antenna consists of 85 feet of wire (strung around the ceilings of our two room suite) and a 17 foot counterpoise (strung around the floor). This simple antenna and an ATU and you are in business. We made our first across the room contact with the 40-9er and a QRP-Plus. The official QRP ARCI Monitoring Station at the Day's Inn heard us and called for a second contact. Isn't QRP great?

One of the other interesting items in the book is the "Dual Coax Feeders" for use with a loop antenna. This is a pair of 50 or 75 Ohm coax cables with shields joined and used like shielded ladder line. This will allow you to have a low loss path to the antenna with buried coax part of the way.

There you have it, not one but two great antenna books for your library.

TWO KEYERS, TWO REVIEWS, TWO BOBS

By Bob Follett WA7FCU and Bob Gobrick VO1DRB/WA6ERB

Bob's think so much alike - especially two QRP Bobs. **Bob Follett, WA7FCU** and **Bob Gobrick, VO1DRB/WA6ERB** both went to the Dayton Hamvention to attend the **"Four Days in May" QRP ARCI** Extravaganza and what did they both come home with but the exact same two purchases - the brand new **Embedded Research "Atomic Keyer" AK-1 memory keyer** and the brand new **R.A. Kent Engineering "Touch Keyer"**.

Both units were kits and now the rub - both **Bobs** didn't build them exactly alike. After consultation over the internet QRP-L list both **Bob's** decided to build the kits and share notes as they each came up with their own unique enclosure designs. The goal was for a light weight and portable key/keyer combination for use in the ever-so-popular "To the Field" QRP weekend operating events by the New England and Northern California QRP Clubs and the recently augmented "Spartan Sprints" by the new Adventure Radio Society.

Atomic Keyer AK-1

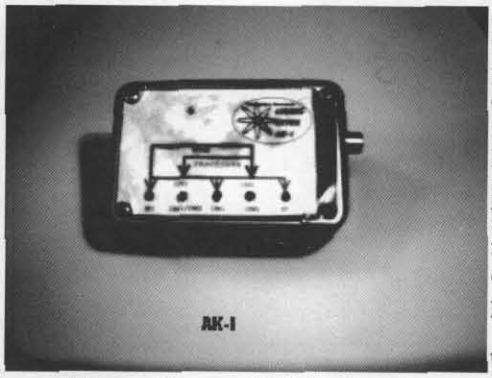
The Embedded Research's Atomic Keyer AK-1 is a brand new memory keyer that was the creative work of **Brad Mitchell, WB8YGG** and **Gary Diana, N2JGU**. The AK-1 is an extremely lightweight (ten parts total) memory keyer than can be run off of two small AAA batteries. All commands are done with five printed circuit board mounted mini-pushbuttons and your iambic key of choice. To save weight, the Embedded guys devised a clever way to change sending speed using one pushbutton and your key.

The "atomic" heart of the AK-1 is a custom programmed Microchip (c) PIC micro-controller. That chip, along with a battery, five pushbuttons, a tiny piezo speaker and some creative programming gets you a mode "B" iambic keyer with one "static" and two "dynamic" (user configurable) message memories. Power consumption is about 300 microamps at idle - so no pressing need for an on-off switch.

The kit comes without an enclosure but **Brad** and **Gary** give a number of mounting options for internal rig mounting or a stand-alone unit. **Both Bobs** opted for an external enclosure after seeing the AK-1 installed in an Altoid's candy tin at the 1996 FDIM - the unit can be made "small".

Atomic Keyer-1 Enclosure:

The Bobs ran out of Altoid tins so they elected to go for a more "stout" enclosure design using a 3 1/4" X 2 1/8" X 1 1/8" molded enclosure from Radio Shack (RS 270-230). Other parts needed were the battery holder for two AAA batteries, one phono jack or a miniature phone jack for the keyer output and one miniature stereo phone jack for the iambic key input. The only problem is the AK-1 printed circuit board is just a wee bit bigger than the RS enclosure. So out came the files to "shrink" the pc board width below 2" and cut out notches at two corners of the pc board to clear the enclosure internal posts. Voila - the board will now fit. For safety sake a couple of wire jumpers were added to connect all perimeter ground pc lands that were filed pretty thin. For those worrying about lack of shielding and potential feedback, **WA7FCU** tested the keyer with a TS-850 at 100 watts, and found



no problems with a coaxial-fed antenna.

The next challenge was mounting the AK-1 printed circuit board with it's pc board mounted pushbuttons and piezo speaker to the top aluminum cover of the enclosure. A mounting template which came with the unit was helpful in drilling the exact hole locations for this close fit. Since the top plate of the RS enclosure is fairly thin it was possible to sandwich the printed circuit board snug up against the top cover using spacers. By soldering the pushbuttons high off the board there is just enough height for the push buttons to protrude through the holes in the cover. It was close and a thicker cover would have precluded mounting the unit this way. After all was nicely fitted, a pre-printed label was glued on to the cover. This label is quite helpful since it tells you all the combinations of push-buttons for programming the "atomic" brain.

One neat little package. This along with the tiny and light Whiterook Products MK-44 keyer makes for a key/keyer combination for the back-country. The AK-1 is $29.95 (US) + $3.95 shipping from Embedded Research, Box 92492, Rochester, NY 14692.

Kent Touch Keyer

The Kent Touch Keyer is actually an iambic key and a mode "B" electronic keyer combined on one printed circuit board. The "paddles" are "capacitance" touch paddles so there are no moving parts - a very attractive feature for field use. Touch paddles have a history of not being reliable. Many years ago Heathkit had a keyer that used metal touch paddles that were susceptible to how moist (or dry) your fingers were to operate effectively. Ramsey approached the problem a little differently by making the paddles out of two parallel serpentine traces to allow for more "contact" area. This became a problem if the paddle traces became dirty or wet. One of the best designs for a touch paddle came from an article in the May 1991 73 ham magazine called "The Copperhead Keyer Paddle". The "Copperhead" was unique in that the palm of your hand rested on a piece of copper clad PC board while your paddle fingers touched similar copper clad paddles. A nice design but the paddle was too big for "field" use. In any event, capacitance paddles are a good alternative to vertical keyers such as "Mouse keyers" or the Kitano key. The amount of re-learning is much less with this keyer, and it works as well, or better than a Whiterook paddle. Those who remove their finger and thumb between elements on their desktop keyer will have no problems.

The Kent paddle uses two metal clad pc boards as the paddle surfaces. The "return" path for the keying circuit is the "capacitance" coupling your body has with the keying circuit ground. This appears to work OK when you run the key off of an external power supply. When the unit is packaged for battery operation the key became erratic unless you physically provided a good ground return to the chassis of the key. After discussing the problem with Kent they did provide a different set of resistors that allowed the keying circuit front end to be a little more sensitive. But that still did not totally solve the problem. That was the first challenge in making this key "field ready".

The second challenge was the keyer circuit itself. Similar to the Embedded Research "Atomic Keyer", the Kent circuit uses a Microchip (c) PIC micro-controller. This is a more basic PIC and does not have the message memory storage capabilities of the AK-1. It also draws a lot more current (2-5 ma idle and 2-20 ma depending on audio sidetone use) which would not be a problem for a shack operation but becomes a challenge for the field. It should be stated up front that the Kent keyer was not intended for low power field use thus the changes and comments that follow "stretch" the design basis.

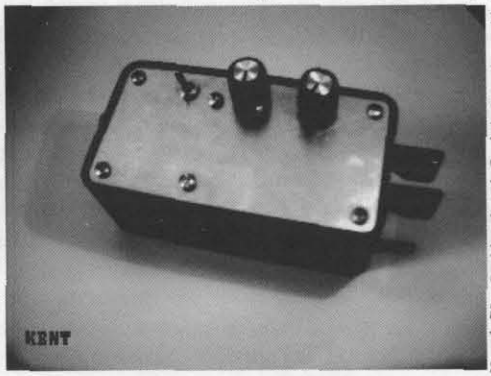
Before the unit can be mounted in a suitable enclosure (none is available from Kent) some work needs to be done to trim power consumption. The first candidate for change was the removal of the big 5 volt regulator (unit was intended for 9- 12V

operation) and the addition of a battery holder for three AA batteries. The regulator IC has to be removed anyway since there is no easy way to mount the PC board with the regulator chip in place. The unit also uses a reed relay which makes for good positive switching but the relay does draw power. A FET switch or a 2N3904 would probably be a better low power solution. **Robert Kent** did say that they prefer the reed relay since it eliminates interface problems with older rigs. The reed relay remained for the "field" version. The second change was the addition of an on/off switch. Finally to increase the sensitivity of the paddle for more positive touch, resistors R4 and R5 where changed to 750K ohms. This was at the recommendation of **Colin Kent** (the "electronic" son of **Robert Kent**). This did help out but there is still a need to have close contact with the "ground" of the keying circuit. These new resistors can be obtained from **Kent** in the UK or US office. **WA7FCU**, living in a very dry climate, is using 1M ohms with reliable keying without a return ground. One could use a pair of mini-adjustable pots for variable conditions - i.e., the 'cool' ragchew or 'sweaty' contest'.

Kent Touch Key Enclosure:

Now the unit is ready for mounting. **Kent's** instructions make no recommendations for mounting their key/keyer board. The way the PC board is laid out and with the components sizes selected, finding a tidy enclosure was a challenge. Since the touch paddles are attached to the printed circuit board the key challenge (pun) was to incorporate them into the enclosure design. A 4" X 2 1/8" X 1 5/8" molded enclosure was chosen from **Radio Shack** (RS 270-231). It turns out that this enclosure is ideal for mounting the "field" version of this key.

Once the 5 volt regulator is removed it



now becomes possible to "sandwich" the pc board with it's top mounted components up on to the enclosure's aluminum cover. By notching out two corners of the pc board and adding a few appropriately sized standoffs a tight fit can be made with the cover. The speed and audio volume control, along with the added on/off switch, protrude through the enclosure cover. One end of the enclosure has a phono jack for the keyer output and a miniature phone jack for an external speaker (internal speaker may be added later). It's the other end of the enclosure that makes this project zing. Two slits are made with a hacksaw into the plastic enclosure for the keyer paddles to protrude through the enclosure. What you end up with is a completely enclosed keyer except for the two touch paddles protruding out. Goal achieved - a tidy "field ready" keyer/key.

The "field ready" version of this Kent Touch Keyer is really quite nice. Self-contained in a small enclosure is a complete key and keyer. And with no moving parts it does make for a sturdy package that can get bounced around in a backpack. Because of the sensitivity of the keying circuit operation may require two hands - one to key with and the other to make contact with the enclosure for the ground return. Or, again, adjustable 1M pots would remove this problem. There has been suggestions to attach one of those static discharge wristbands that they use in the semiconductor industry but that will be left for the purists. The Kent Touch Keyer is $36 (US) plus $6 shipping from R. A. Kent (Engineers), P.O. Box 0809, Mount Ida, AR. 71957-0809 USA.

So what's next? Well let's see who can develop a low power, small size version of combined touch key AND memory keyer.

Stay tuned!

The Bobs are ready for more projects.

MILLIWATTING: 10db BELOW QRP

Bob White, WO3B

JPS NIR-12 Audio Spectrum Display

Last quarter I wrote about the capabilities of the **JPS NIR-12 DSP** unit. I also mentioned that JPS was in the process of developing special software which when used in conjunction with a 386 or higher PC and their own NIR-12 DSP box, provides the user with a means of video display of a receivers audio output. This past week I have had the pleasure of trying out an advance copy of that software. I quickly became dependent on the visual display when tuning in a CW signal. One look at the display, which shows an audio range of from 0 to 4 kHz, and I knew whether or not I was right on frequency with the station I was listening to. It was a simple matter of making sure that signal of interest was peaking on the audio display at the same frequency as my CW offset, (in my case 700 Hz). No more guess work here folks.

I mentioned that the display goes from 0 to 4 kHz, but what you will see on the display is dependent on the IF and AF filter settings on your receiver. I found that I needed the NIR-12 to be set with a bandwidth as least as wide as the bandwidth of the audio input to it in order to see all the audio. It seems that the advanced version I was using only showed a representation of the audio output of the NIR-12 after filtering. When I asked fellow QRPer and milliwatter **Doug Hall, KF4KL** of JPS if it would be possible to see both the input signal and output signal of the NIR-12, he stated that it already was being coded for the final release. It is nice to watch the filtering action take place, but it is also nice to be able to see the signals which you have filtered out. Bottom line is that the new version will display the entire audio spectrum presented to it no matter what the settings are on the NIR-12. The final version will also provide some representation of where the bandwith filters are set.

It is my feeling that JPS has come a long way with the NIR-12 towards making the use of DSP as simple as possible for the operator. I mean the last thing you want to have to do while chasing a weak signal is twiddle more knobs with the crap shoot of either improving reception or losing the signal all together. With the addition of their soon to be released video display, you will have no extra knobs, but you will be adding a pair of eyes to your ears when trying to peak up the desired signal.

Use of the video display package with the NIR-12 requires purchasing the Software Developers kit for the NIR-12 which sells for about $35 dollars and provides the necessary RS-232 port to hook up your computer. Purchasing the Software Developers kit also provides you with everything you need to download updated firmware for the NIR-12 as it becomes available from JPS.

As a bonus for the multimode operators, the audio spectrum display makes tuning in RTTY signals a snap!

Milliwatting for Field Day

Zack Lau KH6CP reported 4 FD QSO's on 5760 MHZ while using only 155 uw. **Zack** was using a homebrew hybrid ring mixer and bandpass filter, IC-202 IF radio, and a 17 dBi horn. **Zack** worked **WB1FKF** both SSB and CW (36 miles or 232,258 miles per watt) and **W1BIM** both SSB and CW (17 miles or 109,677 miles per watt). Zack said that he also made some "QRO" contacts at 560mW. Zack is one serious milliwatter. Anyone interested in competing at the <1 milliwatt level during FD should send **Zack** E-mail at zlau@arrl.org.

AZ Canvas Slappers FD report by Mike Pulley WB4ZKA.

Typical Arizona Field Day. 110 degrees Fahrenheit in the Phoenix Valley of the Sun, but downright chilly in the mountains near Flagstaff. Three guesses where we spent FD 1996... and the first two don't count!

Rocky Evans (KG7VG) and **Larry Gass (KG7WS)** joined my family for a casual, low key FD effort. This year, a first for us all, we participated at 0.95 watt QRPp levels. Let me explain what "casual" means to us.

First, "casual" means "leisurely". **Rocky** and my family cashed in a vacation day Friday and drove three rambling hours to our site in the Pine Grove Campground, a public campground near Flagstaff. Pine Grove sprawls among the tall Ponderosa pines at about 6800 feet MSL. The drastic contrast of terrain and temperature within only a few hours' drive of the Phoenix desert shocks most newcomers to AZ. That high, we were in the land of lowing cattle, bugling elk, skittish deer, racing-striped skunks, bristly porcupines, Vulcan-eared squirrels (bold little beggars, those), and fluorescent hummingbirds.

"Casual" also means "good food". My wife **Debbie (WB4UTS)** coordinated pot luck meals all weekend. Everyone contributed a little and enjoyed a lot. **Rocky** brought plate-sized, patty-like cookies dusted with cinnamon that tasted great but resembled something you wouldn't consider putting in your mouth. 'Nuff said.

"Casual" is the opposite of "grueling 24 hour" events. We don't relish the idea of pushing ourselves around the clock in a serious, exhausting effort. Preferring, instead, to compete with ourselves annually, we agreed on an 8 hour operating limit, a consistent measuring cup we can try to fill from year to year. There is a time for radio, a time for kibitzing, a time for walking in the woods, and a time for sleep. No need to face Monday morning in desperate need of a restful weekend. The QRP sprint format has spoiled us.

We launched our antenna -- a Carolina Windom dipole -- Friday afternoon with my trusty wrist rocket and fishing reel. The Ponderosa pines offer excellent sky hooks for antennas. After supper Friday, we fired up the radios for final checkout and worked the **Zuni Loop** guys on 40m doing the same thing. Saturday morning, **Rocky** tried out the **WR9R** computer logging software, but decided to drop it. Laptop LCD displays don't contrast well in direct sunlight. Maybe next year. Paper and pencil "natural power" logging is probably more in the spirit of things anyway. Around midmorning, **Rocky** dropped out of commission with a stomach ailment. It took him most of the weekend to feel back up to snuff again.

Larry Gass arrived with his oldest daughter shortly after the FD starting gun sounded. **Debbie** gathered up his daughter with ours and headed into town for the "Hunchback of Notre Dame" movie. Oh yeah, "casual" also means no boredom forced on anyone regardless of age.

Larry and I alternated operating the station through the day. **Rocky** worked some 10m SSB from his mobile station using his own call sign. With FD chumming the waters, there was plenty good RF fishing for anyone who cast a hook. The **WB4ZKA** station used an **NE-40/40** (great little rig, that!) for 40m and an **MFJ-9020** for 20m CW. An **MFJ-971** tuner, **Palomar** memory keyer and gel cell battery rounded out the station. Both rigs were turned down to 0.95 watts.

I learned that an antenna tuner can be misadjusted to absorb nearly all of the transmitted RF while displaying an excellent SWR. At first, I didn't believe the languid field strength meter (FSM), and spent a couple hours making zero contacts. "Hmm," I thought, "this QRPp peanut whistle contesting is harder than I thought!" When I touched up the tuner controls and watched the FSM jump back to life, stations noticed me again. The only difference between an antenna tuner and a dummy load is the loose nut behind the controls.

Visitors trickled through our campsite all day. Maybe the antenna

stretching over the road and the CW beeps attracted the attention. Whenever someone dropped by, we usually stopped operating and chatted, explaining the FD emergency communication exercise, the CW station, and **Rocky's** SSB operation next door. (Did I mention we like "casual" radio events?)

One father and his 14 year old, technically inquisitive, son stayed for a couple hours. After a while, I recruited them to help with the CW dupe sheet. Both lit up excitedly every time we bagged another contact. I made certain they had a phone number back home for license class follow up. Our 8 hour timer expired about dark and we packed our gear away just in time for stories and jokes around the supper table.

Some things never change from year to year. **W6TRW** dominated our receivers all day. Tired CW ops often morphed their club callsigns with their own. We laughed aloud when one op responded to a "CQFD" with his garbled call sign and the other station replied by imitating his call... blurbs, bleeps, bloopers, and all! They eventually got it right. Propagation to the Pacific Northwest -- normally strong and steady -- was nearly nonexistent this year. We never determined whether it was an ionospheric headwind or antenna deafness in that direction. Did anyone else in the Southwest have trouble hearing our northern brethren?

We entered as 1B-Battery QRPp with two operators -- **WB4ZKA** and **KG7WS.** 40m 18 QSOs 20m 60 QSOs
78 QSOs x CW QRP = 780 points. Bonus points: 400 (W1AW bulletin, public site, visitor's booth, 100% emergency power) **Total score: 1180**

We worked 17 states and 2 provinces. California dominated our log pages like with a roller brush, but we did reach out and touch such exotic places as MD, TN, AL, NNJ, NH, and NC. About 15 QSOs qualified for 1000 mile/watt. Not bad for a casual radio weekend! We can hardly wait for the NE QRP Afield in Autumn!

Milliwatting Mobile - A sure cure for Milliwatting Fever

At the end of my talk at FDIM I mentioned that a sure cure for the Milliwatting Fever, (that fever which keeps one turning the RF gain down or the attenuators up), was to Milliwatting Mobile (this was also confirmed by QRPing Dr. Z from the north). If anything will get you to increase your output power, Milliwatting Mobile will! Case in point one **KF2PH Nick Franco** from Long Island. **Nick** almost had me believing that I was wrong about the cure. I mean the last time I worked him I was in Maryland running 400mw with a 571 foot loop up at 55 feet. He was running 800mw mobile on Long Island with a ham stick! The next day I get an E-mail from **Nick** where he tells me of the other two guys he worked on the way home from work. **VC2AWR** and **DL8MX**, both of them also while at 800mw. I guess ole **Nick** just had a very bad case of Milliwatting Fever, but it finally broke. Word has it that Nick built an amplifier for his mobile SW-30. He is now running mobile at 2-5 watts! He must be going after mobile DXCC or something. Way to go **Nick**!

TMPS

At mid August **Chuck, K5FO** and I were again neck and neck at 33 states worked. We both have RI but neither of us have DE (hint, hint). The only other report I have received on milliwatting TMPS is from **Kent Torell AB7OA** who is running just under 1 watt with a **SW-30**, a ground mounted vertical with 4 radials (a 20 foot pipe mounted against the house). Kent has picked up both AK and HI. The HI contact was two-way QRP. Kents totals for TMPS as of mid August are Qs=16 States=11 Confirmed=1 DX=1.

Well that is about all for this Quarter. Please send reports of your milliwatting activities to me by either snail mail or E-mail. The next time you are cruising down the Internet stop by my homepage and check out the latest TMPS or FOX Hunt reports.

HTTP://WWW.GEOCITIES.COM/SiliconValley/5582

--QRPp--

QRP CLUBHOUSE

Bob Gobrick, VO1DRB / WA6ERB

Welcome to the second installation of QRP Clubhouse Column - a column dedicated to the support and growth of regional QRP Clubs. Thanks to all who sent me mail in support of this column. There are great ideas springing forth from regional QRP clubs and it will be my goal to disseminate this information so that all clubs can partake in the excitement. So drop me a line on any items that you would like covered in this - your QRP CLUBHOUSE column.

New England QRP Club "72" Newsletter "Scoops" a New Technical Project

This issue of the QRP Quarterly has a feature technical article **"The QRP RX-Plus"** authored by **Steve Weber KD1JV**. This wonderful article was a "scoop" picked up by **Dennis Marandos, K1LGQ**, editor of the New England QRP Club newsletter "72" and with their kind permission it is being republished here. There is some really great technical talent out there in QRP land and it's regional QRP club newsletters like "72" that assure the QRP community of a continuing showcase of this talent. Newsletters like "72" have moved me to write a little piece later in this column about "How to Enrich Your Life Through QRP (writing that is..)".

The June 1996 issue of "72" also covers a **K1LGQ** "picture laced" article on assembling the new **NE QRP Club Kit #3 - The Twenty-30 PVC Mast kit**. Yes a "Ready-for-QRP-Afield" 20 foot PVC mast kit for $30 (or less). This kit, dreamed up by New Jersey QRP Club member **Joe Everhart, N2CX**, was highlighted in the July 1996 QRP Clubhouse column and since then a follow-up article has appeared in the June issue of the **Northern California QRP Club** newsletter "QRPp". My kit was received a month ago and you just can not believe the work that went into the 20 page illustrated manual - this kit (and some luck) will easily win you first place in the upcoming September 21, 1996 New England QRP Afield contest.

Other great articles by **Bill Studley, AA1OC** on "Soldering Tips", a quick preview of the new Embedded Research "Atomic Keyer AK-1", a couple of **Joe Everhart N2CX** editorials, and some nice articles by a transplanted Louisianan **Joel Denison WA5CVM** on QRP life in Maine close-out another great issue of "72". For NE QRP Club membership info drop a note to **William McNally - AE1D, 7 Blueberry Rd, Windham, NH 03087 or email Bill Studley - at AA1OC@concentric.net**.

QRP and the Internet

Many of you may be aware of the **QRP-L** list on the internet - a gathering of QRPers that exchange upwards of 75 messages a day. The internet has certainly added a new dimension to QRP ham radio activities. Contrary to what you may think the **QRP-L** probably encourages, rather than discourages QRP on-the-air activity. Whether it be setting up 40 meter Fox Hunt Schedules (1996-1997 hunt season starts this autumn), the newly established TMPS (Thirty Meter Propagation Study) hosted by **QRP-L** listmeister **Chuck Adams, K5FO**, or up-to-date QRP club contest announcements the Internet has provided us a means of keeping up-to-date on QRP activities.

Having said all that, **Fred Bonavita, W5QJM,** a regular QRP book reviewer for the Michigan QRP Club newsletter "The Five-Watter" dropped me a nice note asking that a mailing address be included for the

regional QRP clubs covered in this column. As **Fred** rightly points out there are still many QRPers who do not have an email account (yet). This address information will be listed and if a club has any changes please drop a note to the QRP CLUBHOUSE for posting. But times are-a-changing...

First Electronic Regional QRP Newsletter

The **North West QRP Club** was one of the first "new wave" regional QRP Clubs. They were formed in 1992, the same year we saw the advent of the New England QRP Club and shortly there after the Northern California QRP Club. It was a banner year for new regional QRP clubs and newsletters.

Four glorious years of unprecedented QRP growth has occurred partly because of clubs like the **NW QRP Club**. Fours years have also brought higher postal costs (the NW QRP Club had to raise their dues for the first time from $10 to $12 a year), less time by volunteers to "paste" together the bimonthly copies of "The NWQ Newsletter" and finally the onslaught of the internet yanking people away from ham radio and QRP. But wait - the guys and gals from the Northwest (influenced by their neighbors in Redmond, Washington?) are trying something new and novel - paid subscriptions to the "electronic version" of the printed "The NWQ Newsletter". Now you have a choice - $12 for the "surface mail" edition or $3 (new membership or $2 for renewed membership) for the electronic edition.

So how does it "look". Well the first electronic edition was the August 1996 issue. It is emailed to your address the same day it is "printed" and there is NO waiting for second class bulk mail delivery. This first edition had no graphics, photos or cartoons like the "printed" edition but that should come with time. It's still not known if the "electronic members" will read the newsletter off their screen or make a print-out to be carried around like the "printed" version.

So what's new - "virtual reality" **President and Publisher** of the **NW QRP Club, Bill Todd, N7MFB** introduces the new electronic edition and shares his membership mail with you. Following that are articles by **Paul Harden, NA5N** on stripping old CB rigs for "good" QRP parts, a number of QRP DX news items by **Ward Silver, N0AX**, Tips on Kit Building by **Marshall Emm, AA0XI**, a novel PVC passive portable CW filter by **Stan, KG7ME** and finally on the last "page" an advertisement for a **Dave Ingram, K4TWJ** book complete with free 4th Class Shipping for NW QRP Club members. Wow. Membership info: **The NW QRP Club, PO Box 354, Bay Center, WA 98527 or email: n7mfb@juno.com.**

Arizona ScQRPions Have a QRP Sting

Highlighted in this issue will be a few of the newer regional QRP clubs springing up around the country. About a year ago, **Dave Little, AF5U,** mustered a group of "QRP believers" at a local Phoenix diner and laid out a strategic plan to win some of the summer QRP field events -ARRL QRP Field Day, New England QRP Afield, and the NorCal QRP to the Field. Arizona QRPers contend with a number of unique operating conditions - 100 degree F temperatures, snakes, scorpions and even some awful stuff like wind. 20 members sprung into action and the "ScQRPions" were formed.

What's planned - around Christmas time 1996 their first QRP community kit offering will be unveiled. This could be a new keyer that plays morse musical tunes to charm those rattlers - we'll just have to wait and see. **Scheduled for February 1997 will be the first annual ScQRPion sponsored FYBO QRP Afield Contest (FYBO - Freeze Your Buns Off)**. It seems that the New England QRP gang was bragging that only the hearty were qualified to operate QRP Afield in the winter. With temperatures dipping into the 70's and the soda pop warming in the cooler, this will be one great event for the ScQRPions and cooler heads from other regional QRP clubs. These guys and gals really know how to have fun. Membership info: First Saturday of every month 10:30 AM Luby's cafeteria next to HRO or email: **Joe Gervais KC7NEW vole@primenet.com**

QRP Society of Central Pennsylvania

The QRP gang from the Keystone state have organized a "Ben Franklin" form of club - everyone is welcome to join in on the fun. **Publicity Officer, Cameron Bailey, KT3A** states: the Club Motto is "I hear and I forget, I see and I remember, I do and I understand." This sound like words out of Poor Richard's Almanac. The Club serves it's members by 1. Learning and Sharing Sessions, 2. The bimonthly QRP Gazette newsletter, 3. Portable Operations and 4. Friendship with fellow local QRPers. Some past club projects were a SWR bridge and a gell cell charger. In a future column we'll try to get some feedback from the Liberty gang on organizing a QRP club project. For membership info: **QRP Society of Central Pennsylvania, c/o Cameron Bailey, PO Box 173, Mount Wolf, PA 17347-0173. email: KT3A@aol.com**

NorCal Still Hitting Gold

When you hit the "Mother Lode" there is just no stopping. The June 1996 issue of the Northern California QRP Club Newsletter **"QRPp"** devoted over 20 pages of mods to the now famous, **Wayne Burdick, N6KR** designed, **NorCal 40-9er** transceiver kit. At 84 pages this was the biggest QRPp issue ever, and a very special issue recognizing 3 years of phenomenal growth, 1700 members in all States, most Canadian Provinces and 60 countries.

All that can be done is to just touch upon the many articles that **Editor Doug Hendricks, KI6DS** and Chief crystal grinder **Jim Cates, WA6GER** worked diligently on to get into print. 40-9er mods, Epiphyte 2 QRP SSB mods, a **Derry Spittle, VE7QK** Simple Digital Frequency Display, Sierra multiband cw rig mods, a "revisited" Tuna-Tin 2 article, The Recipe VFO by **John Koenig, NB7W**, **Joe Everhart, N2CX** - PVC Mast guru, **L.B. Cebik, W4RNL** on what else - antennas - 50 ohm dipoles, St. Louis Tuner kit mods by **Bob Follett, WA7FCU** and a new keyer design that will just blow your socks off - the Atomic Keyer AK-1 by **Brad Mitchell, WB8YGG** and **Gary Diana, N2JGU**. There has never been such a great collection of articles and authors and there may never be again since **Doug** has probably "exhausted" every last article written about QRP - we'll just have to wait and see what the next issue of QRPp brings - hi. Membership info: **Jim Cates, 3241 Eastwood Rd, Sacramento, CA 95821 email: wager@juno.com**

Summer Beach Reading at the Michigan QRP Club

The June 96 issue of the Michigan QRP Club newsletter "The Five Watter" covers a review of a new book by **C.F. Rocky, W9SCH** on "Regenerative Receivers". As fitting of a dignitary like **Rocky** the review was by our beloved QRP ARCI President **Buck Switzer, N8CQA** (when does the QRP CLUBHOUSE editor get a raise Buck?). Also one of our best technical critics, **Fred Bonavita, W5QJM** tackles the ARRL published book titled "Vertical Antenna Classics". Fred helps the reader "re-define" the word Classic. Other articles, like a "Simple Flexible Tuner for QRP" by **Craig LaBarge, WB3GCK** (a QRPer known to have worked the world on his rain gutter) and "How to Test an Antenna: Thoughts Thereon" by **Rock, W9SCH** round out this issue. Membership info: **Michigan QRP Club, 654 Georgia, Marysville, MI 48040 email: Lowell Cordin - KD8FR@aol.com**

Other QRP Clubhouse News:

The latest news from the Colorado QRP Club and the Northern Georgia QRP Club was not able to reach the QRP CLUBHOUSE by deadline so updates will appear next issue. "Links" are also being established with additional regional QRP clubs so stay tuned.

QRP NEWSLETTER ARTICLES Uncle Elmer Wants You!

Next to the membership, one of the most important assets of any QRP club is its' newsletter. The QRP newsletter and the QRP newsletter editor provide an invaluable service by keeping members informed of club activities, providing inspiration to new members to partake in club technical projects or operating events and finally providing a home for shared technical or operating articles.

Every member of a regional QRP club should strive to write at least one article for the club newsletter. What better way to share an experience and for others to learn about a new QRP operating technique. Writing an article for a newsletter is easy - just jot down your thoughts and ask your QRP newsletter editor to give you a helping hand. And here's a little secret - all QRP editors are "Elmers".

One of the greatest fears a writer has is that his material may not be accepted. And for a non-technical person, the fear of not reporting accurately on a technical aspect of your hobby might be daunting. Well, have no fear, your QRP editor is near. They want to see your article published so others in the club can partake in your enjoyment. There are even some QRP newsletter editors, like **Dennis, K1LGQ** of the New England QRP Club, who are English teachers in another life - what better help can you get?

So why write an article? The first thing that comes to mind is that others may want to know about your experience. You become an "Elmer" by sharing that new modification to your QRP rig. Or reporting to others on a new QRP toy that you just purchased. Or reporting on that weekend camping event and what it takes to operate QRP from "The Field". There is an endless list of topics that folks want to hear about. Someone just needs to write it down and get it published. Second, writing for a QRP newsletter will enhance your career and family life. Whoa - what's this - writing will benefit me personally? Yep. No matter what work related activity you're involved with, practicing effective communications is beneficial. No one is born with writing skills - it takes studying and lots of practice. So why not "practice" writing for your QRP newsletter. It's a "safe" environment and certainly not job or family threatening. And as mentioned there are those great QRP newsletter editors there to help you.

So get out that electronic pencil and paper, jot down an outline of your topic, develop a beginning, a middle and an ending for your article and finally run the spell checker. Then sit on the article for a day or two and write it over again. Have a fellow QRPer "proof" your article if you like. And finally work with your newsletter editor to "polish" it for the final copy. We are waiting to see your name in print.

Well that's a wrap for this issue. I welcome your club postings. Drop me a letter or email and I'll see you next issue. **73/72 Bob VO1DRB/WA6ERB - "QRP CLUBHOUSE" - What's the secret password? - "QRP".**

QRP Software Review - "QRP Companion"

Review by Bob Gobrick VO1DRB/WA6ERB

The last time we saw software dedicated to QRP was a few years ago when **Bruce Milne, WB2QAP** introduced a program called "Logger". Logger was a dedicated logging program specially configured for the many QRP ARCI and regional QRP club contests and is the program used by many top QRP contesters.

Bruce has done it again with the new release of the "**QRP Companion**". In a major undertaking, **Bruce** programmed a Windows shell interface for "Logger" and has added new and exciting suite applications. Upon startup, up pops a QRP transceiver with The QRP Amateur Radio Club International logo in the "dial" area and a slew of "virtual" pushbuttons and controls that activate different software modules. In addition to Logger you have, at the touch of your keyboard, a QRP Contest calendar, QRP Rig reviews with pictures, QRP Club information, a list of QRP Nets, QRP Periodicals, QRP Kits/Vendors and personnel QRP Award tracking for DXCC, WAS, WAC, QNI-25, QRP-25, and 1000 mile/Watt. This is truly a QRP Companion. **And once again the program is being offered as freeware** - a great contribution by our QRP Pal - **Bruce, WB2QAP**. At it's debut over 100 copies were handed out as special registration gifts to the 1996 "Four Days in May (c)" QRP Symposium attendees.

"QRP Companion" is like "QRP Internet in a Box". This needs some explanation. **Bruce** credits the building of the software modules to many in the QRP-L internet community. The rig reviews and pictures came from the great work of **Steve Hideg's - N8HSC** QRP-L homepage, and QRPers **K2LGJ, WA2IPZ** and **WB2QAP**. The other databases came from the QRP-L public domain - **K3TKS** with vendor info, **W4RNL** with the periodicals module and **DL8MFQ/AA8CP** with the club module. A real community effort and when you view the program it's like being connected to the Internet.

Not only is "QRP Companion" a personal tool but it's also an excellent piece of software for regional QRP clubs to hand out at hamventions and club meetings as well as a welcome gift to a new QRP member. As freeware, **Bruce** asks that the software not be sold, but a reasonable cost can be recovered by a club for disk reproduction and labeling. Setting up a portable computer and a running copy of the **"QRP Companion"** would be a great advertising aid for a QRP club hamfest booth (you may even attract those young computer geniuses).

You need a PC computer that runs Microsoft Windows, VGA, and 4 megabytes of memory. The program has been run on a 386 and 486DX25 laptop with a VGA monochrome screen. It's slow and you may have to play with the virtual memory swapfile size to accommodate the extensive graphics but it is workable. On a more robust computer the program hums right along, even with the audio morse code sign-on and "72" sign-off.

The Logger module is run in DOS so it's possible to use the "QRP Companion" shell to launch this application or you can boot right from DOS (the way many use Logger). The QRP Contest and dupe checking program is now available for QRP ARCI, Northwest QRP, and Michigan QRP contests. A user configurable Logger module is available for other events. **Bruce** may be add more contest sipport in future editions.

The program works well but there are couple of hints that **Bruce** covers in his opening page "Info" pushbutton. To turn the database pages you need to become familiar with the menu bar commands. Once you get past that you have a wealth of knowledge at your fingertips. There are also a few little quirks that **Bruce** may change in the future. When a "push-button or control" is "clicked" the Windows "egg timer" does not appear. So there are times when you're waiting for a module to come up but have no indication of the command having been executed. This is brought to your attention because one of the conditions of the freeware agreement is that we are asked to drop **Bruce** a note on any hints, fixes, features that you would like to see. Bruce would very much like to keep this program current.

The software can be downloaded from the **New Jersey QRP Club Internet Homepage at http://www.ges.com/~marmor/** or if you send **Bruce** a pre-formatted 1.4 Mb disk with no label he will send you back the latest version with his fancy Lotus AmiPro custom label. By the way, for club use, Bruce will also "freeware" the label but you will need Lotus AmiPro to print it. Bruce's Summer address is **Bruce Milne, 2350 Clark Rd, Penn Yan, NY 14527 and winter it is 3701 Baynard Dr, Punta Gorda, FL 33950.**

Enjoy your new QRP Companion. 73/72 Bob VO1DRB/WA6ERB

QRP WISDOM FROM UNCLE BRUCE

QRP, Really!

Bruce Muscolino, W6TOY
P.O. Box 9333,
Silver Springs, MD 20916
w6tjoy@qrols.com

Hello again! Well summer's almost gone and I hoping for a mild winter. I hope your summer was as good as mine. The "stealth" antenna will soon be no more... your faithful scribe has bought a house (remember the tale of the minnow and the whale?). Since I've spent most of my free time on the deal I don't have too much this time (HEY, knock off the cheers!). I'd like to talk to you a bit about two of my favorite subjects -- Four Days in May and antennas.

Four Days in May (FDIM)

It seems like it was only a few weeks ago I was telling you about how much fun we had doing FDIM 1996. We're doing it again -- there will be a FDIM 1997 -- same time, same station. This year we had about 105 of the faithful in a room for 90 listening to an array of speakers who kept them awake and interested. We hope to have twice that number in 1997. The Day's Inn has a large room -- the room where we held the banquet this year -- we want to fill that for FDIM 1997. If we do it right, by 1998 the ARCI will be able to buy its own hotel!

If you were there last year you know what a deal it was and a bit about what to expect next year. I want you to do two things for me -- tell all your friends and get at least one of them to come along next year. Then I want you to sit down and think up a paper to write and give for your fellow QRPers. If you weren't there last year, find someone who was and let them talk you into being there! You can write a paper too!

Papers -- last year I had to beat the bushes to fill my author slots. I had 7 or 8 from the first, but the last 4 were like pulling teeth. I really don't want to go through that again this year -- everyone of you has a story in you. It could be something technical or something like a camping trip where you took your favorite rig along. I want each of you to write either an outline or a short summary of your idea and get it to me before Thanksgiving. You can do it. Same rules as last year apply -- no product reviews and no blatantly commercial papers. A revised version of the "Call for Papers" appears at the end of this column.

Antennas

I've seen a lot of questions lately about indoor antennas versus outdoor antennas and how to make a dipole from hamsticks(TM). I've had some experience with both and I'm gonna share it whether you want it or not! **Indoor antennas** -- Between 1976 and 1983 I used indoor antennas with reasonable success several times. I used both end fed wires and a helically wound dipole at both QRO and QRP power levels.

The first indoor antenna I used was here in Maryland. I came home for Christmas one year and brought along my beloved TS520. I swear I was only going to listen, but I heard so many stations I couldn't resist trying. I had a little homebrew L-network tuner I'd built and I connected that to about 25 feet of wire I laid out on the floor of my room. I think I made about 10 or 12 QSOs on 80 and 40 meter CW running about 100 watts output. The QSOs were with stations between 300 and 1000 miles away. To say the least I was impressed!

The next indoor antenna you can read about in your 1996 FDIM proceedings. It was a helically wound dipole originally built for 40 but used with great success on 15. It hung in front of the living room window in my California apartment. Again, using the TS520 I worked 25 or 30 states and a few countries. I also used this antenna for a few weeks with an Argonaut 509 and had lots of fun on 15 meters.

In 1978 I moved to Holland and became PA3AIC. The first antenna I put up was 30 feet of wire running up the stairwell in my house (Dutch houses are tall). I made two QSOs with this antenna, an English station and a Swedish station. The next morning I replaced it with a ground mounted vertical.

Later in my Dutch experience (one of the high points of my life, I might say) I built a 20 meter helically wound dipole using a CB whip as part of each element. Again, you can read about this in your FDIM 1996 proceedings. I used this antenna with an ARRL WARC transmitter running 5 watts output to work all continents on 20 meters in a two week period. The antenna was hanging in my attic.

Indoor antennas can work. They do work. There are tricks to making them work well. At FDIM 96 **Walt Thomas, WA4KAC,** presented a paper on an attic mounted loop he built and uses regularly. I gave a paper on helically wound antennas, some of which I presented above. What made these antennas work? In Walt's case, he spent quite a lot of time refining the antenna to maximize its performance. In my case, what I didn't get from power I got from the high sunspot levels!

Are indoor antennas for you? Hard to say. If you're willing to fuss with the antenna and maybe solve the TVI problems you may encounter from their increased chance of coupling to the power lines in your building, they may just be a solution to HF operation. However, I would first exhaust every possible alternative to an outdoor antenna first.

At the top of this column I said the "stealth" antenna is no more. The "stealth" antenna was my ultimate solution to the HF operation problem. I've been living with my mother in a condominium. We're on the third of four floors. There is a very friendly tree about 35 feet away from my bedroom window. One afternoon about 18 years ago I asked the tree how it felt about holding up one end of a piece of wire for me. It agreed, and since then I've used a slingshot to launch a piece of #26 magnet wire into that tree when I wanted to get on the HF bands. For 15 of those years that translated into a couple of times each year, when I came home on vacation. Three years ago, when I moved back here, that became a semi-permanent deal. I can say, no matter how well my indoor antennas worked, the short wire between my rig and the tree worked hundreds of times better.

If you're new to ham radio and new to QRP, you should remember that QRP is a corner of the hobby where operator skill and experience pay off in a big way. Humans tend to believe that smaller things are easier to use. Back in 1963, when I got into sports car racing I chose an Austin Healey Sprite over a Corvette. The Sprite was small and not very powerful, and I thought it would be an ideal car for a beginner. While that was partly true, the Corvette would have been a better choice because it would have required less talent on my part. The same applies to QRP versus QRO. QRO operation can gloss over mistakes a beginner might make. It requires less skill. Please don't construe that to mean I'm saying give up QRP. Far from it.

Just remember that whatever rig you use and whatever antenna you use, QRP contacts are always a little harder to come by. If you find yourself getting frustrated with the lack of contacts, intermix a little QRO with your QRP and work on your technique!

Hamstick antennas

Lots of you, it seems, are interested in using hamsticks(TM) to make portable dipoles. You aren't too sure how, though, it seems, so I'm gonna unconfuse you. A hamstick (TM) is a helically wound antenna intended for use as a vertical in mobile applications. Hamsticks are only one brand of helically wound mobile antennas --

they will all work as well in dipole applications. The question is, how do you connect them together in the center without buying two cars and crashing the together!

There are a number of ways that will work. To begin with, the hamstick(TM) people manufacture a dipole mount for their antennas -- I paid about $20.00 for mine 5 or 6 years ago. It's a piece of aluminum strap, about 1/8th inch thick and about one inch wide with a "U-bolt" at one end and a couple of 3/8-24 fittings at the other. Since one side of the dipole is at ground, one of the fittings is nothing more that a 3/8-24 bolt. The other is what is called a "single hole mount" in CB circles. It insulates the 3/8-24 bolt from the aluminum. A SO-239 coax connector wired to the hardware completes the unit. Difficult to build? No. However, I can almost guarantee it's cheaper to buy that from hamstick(TM) than buy the bits and pieces and build it.

If you're into building go to Radio Shack and buy one of their small plastic project boxes. Drill holes for 3/8-24 bolts on long the sides, a coax connector in one of the short sides, and a small eye-bolt in the other short side to hang it from a tree. Go to your favorite Home Depot and buy two 3/4 inch long 3/8-24 bolts, two nuts, and a couple of lock washers. Also but two large "ring" terminals (solder lugs" to us, that have a 3/8 inch hole in them to connect up everything. Then put it all together. If you aren't sure how to do this, send me a self-addressed, stamped envelope and I'll send you a sketch.

Once you have the center mount, just screw in two hamsticks (for the same band) and tune it up using a grid dipper. When you've got it resonant where you want it, mark the element ends with some tape and get on the air.

Do these antennas work? Yes, and darned well. Two of our QRP vendors routinely use them to demonstrate their rigs at hamfests -- S&S Engineering and MXM Industries.

FDIM 1997 Call for Papers

August 30, 1996

Papers are sought on the following topics:

Antennas -- Papers describing practical, working antennas. Antenna designs suitable for camping, or backpacking, or hidden antennas suitable for use from apartments and condominiums would be of special interest..

Equipment Construction -- QRPers are avid builders. New designs, or good sound analyses of existing designs are on interest. Papers covering "constructing, and troubleshooting finished projects" are also of interest. But, product reviews will not be accepted. If you use a specific rig as an example, stick to how and why you chose it, and how you solved the problems you had putting it together and getting it running.

Operating Activities -- Papers describing operation away from the home QTH, whether it was a camping trip, a DXpedition, or just an afternoon at the local park are welcome. Papers that describe special QRP operating techniques you've developed that have helped you win awards, or contests, or just make more QRP QSOs are welcome. Papers on the history of QRP operating, and QRP operation during sunspot cycle highs and lows would also be interesting, as would papers on QRP operation at VHF or UHF, or using satellites.

A new topic area for 1997 is using older equipment. Gear from the 50's and 60's like the "sandwich box transmitters" and the "one tube wonders", or converting and using military surplus gear would be of interest.

Manufacturers may submit papers. However they may not include blatant advertising. You can talk about design techniques and performance characteristics of various circuits as compared to others, and you may use your designs as examples. But I won't let you say "my superwhizbang 5 is better than all the rest of the rigs".

All accepted papers will be reprinted and distributed to the conference attendees. The bound proceedings volume will be offered for sale to others after the conference is over.

Send me a summary or an outline of your proposed paper by November 15th, 1996. The summary should not be much longer that one double-spaced typewritten page. I'd prefer to receive the summaries by US Mail so I don't lose them in my lousy electronic filing system. All papers will be reviewed by an acceptance comittee. I'll let you know before February 1, 1997 if your paper was selected.

Plan for a 20 to 25 minute talk followed by a 5 to 10 minute question and answer session. I understand that some topics will be longer and generate more questions.

Please send summaries to:
Bruce Muscolino -- W6TOY/3
PO Box 9333
Silver Spring, MD 20916-9333
--
Bruce -- W6TOY/3
QRP, Really! (c)

Members' News

Richard Fisher, KI6SN
1940 Wetherly St.
Riverside, CA 92506
(e-mail: KI6SN@aol.com)

QRP contest season's looming

October has traditionally been a great month for QRPers. The bands are starting to quiet down, with summer's QRN diminishing day-by-day. Propagation is picking up, and QRP's big contest of the year is just around the corner: the QRP ARCI Fall QSO Party.

KI6SN
. . .Richard Fisher

There are other exclusively-QRP events that bring low power enthusiasts out of the woodwork, but none rival the popularity of the fall classic Oct. 19-20 this year.

For new contesters — and old, alike — it's a great weekend to renew old friendships, make new ones, test QRP gear and antennas, and to hone operating skills in a very exciting and challenging event.

If you've never worked the Fall QSO Party, it's high time you joined the fun. **Cam Hartford, N6GA,** QRP ARCI's contest manager, provides details on the rules, exchange and scoring in his popular "Contests" column in QRP Quarterly. His great work in overseeing the club's contest program has made QRP ARCI contesting more popular than ever. Cam's also made it easier than ever to submit your score — with a variety of avenues open for sending your contest log.

So be sure to keep Oct. 19-20 open on your activities calendar, and we'll be looking for you on the bands.

— R. E. F.

QRP, down on the farm

Bob Hartley, K2QJ, writes that he "just just returned from Norway near Farsund after a two and a half week vacation on the family farm.

"I operated as LA/K2QJ (QRP of course) with the Heathkit HW-9, homebrew SWR bridge, W3TS tuner, and 40 meter centerfed Zepp and 300 ohm twin lead feeder.

"Had to put the Zepp over the top of the house as there were no tall trees nearby. Worked about 18 countries with about 2 hours operation per day.

"Could not hear many US stations and did not work any US or Canadian stations. 40 meters is the best band I found with 20 meters a close second. Thirty meters was a disappointment with a lot of commercial digital stations.

"We used the Quick Launch system from Antennas West and it worked well. I know I was no rare DX to work but I enjoyed it all the same with lots of good QSOs from other QRPers as well as the QRO group. The power is of course 220VAC 50 Hz and I used a Radio Shack 50 Watt converter (transformer type) that worked well.

"My built-in keyer changed speeds on occasion but I got pretty good at changing pace after a while.

"A 33-foot radial wire was the only RF ground I used so maybe that was the problem; RFI to the keyer."

AA6UL / QRP: Ralph Irons, veteran QRPer, operates his homebrew 40-meter SSB rig while on the road in Southern California. He's one of a growing legion of QRPers building phone gear.

A QRP-update from Pennsylvania

John Shannon, K3WWP, sends e-mail from Kittaning, Pa., that "overall, conditions continue to be horrible here. I can't even come close to the totals this year that I had last year in contests. Just about every one I enter, I wind up with a lower score than last year. (Well, the Wisconsin QSO party was an exception. More later.)

"Incidentally, speaking about contests, I urge everyone who submits a score to a contest to urge the contest organizer to have a QRP division if they don't. At least urge them to have bonus points for QRP operation. And if those two things fail, at least ask the organizer to list your call as '/QRP' so that others will know that our achievements are done with QRP.

"For example, I just received the results from the Wisconsin QSO party, and my request to list my call as K3WWP/QRP was honored, and it makes me feel good to see my score up there among the top with the /QRP at the end of my call. Let's brag about our QRP accomplishments and let the high power boys know we also have fun and can do well in contests. In that Wisconsin party, I note that among those who entered CW only, I had the second highest score in the country among 17 stations that had only CW QSO's.

"Overall I was 12th in the country, and 11 of those 12 had SSB QSOs to help them along.

"I had an interesting experience a few weeks ago on 30 meters. I was just calling a normal CQ (of course with no / QRP at the end since I don't believe in that), and got an answer from VK6HQ in Perth. (Just received his QSL card, so it was legitimate. HI) I think that it must have been a long path QSO from looking at the sunrise/sunset lines, etc. That means around 13,000-14,000 miles with 5 watts and a random wire antenna. Not bad! He copied me well also, and copied that I was running QRP, etc.

"As I write this, the late spring/summer sporadic E skip season has started, and I have been having fun on 17 through 10 meters. I picked up about a half dozen new band states to move closer to my goal of 9 band WAS. I need 93 more band states now, mostly on 12 meters where I only have 9 states worked.

"Incidentally, how about our CW members getting on the

higher bands when E skip shows up? Often times, 10 meters is full of SSB stuff, but no one at all on CW. It's a lot of fun making those E skip contacts, and quite easy with QRP. Make it a habit to check the lower TV channels for distant station interference. If you see any, head for 10 meters, cause it will probably be open. Another good check point is around 27 MHz. If you hear a lot of non local stations there, again head for 10. It will be open. You may not hear anyone, especially on CW, but conditions are there to make contacts. Try calling CQ. I usually call CQ (3x2) 5 times, then if I don't get any answer, I tune the whole 28000-28300 range looking for other CQs. If none are found, I repeat the CQ/search pattern. Another tip for those who are new to 10 meters is to check the beacon segment from roughly 28200-28300. If the beacons are being heard, again conditions are there to make contacts. Plus by IDing the beacons, you know where the band is open to. I should have sent this earlier, because the prime sporadic E skip season will be over by the time this is in print, but according to the VHF boys, there was some E skip every month for the past year and a half or so now. So keep checking, and give me a call if you hear me.

"Had an interesting experience (recently). Worked my friend W4HG on 10 meters, and asked him to QSY to 12 since I needed North Carolina on that band. We made it there, and got to talking about how many bands we had worked each other over the years. We never worked on 15, so I suggested we try it for fun. It worked, and things kind of progressed from there. We wound up with a QSO on 8 of the 9 HF bands (all but 160 which we didn't try because the QRN was unbearable on 80, and we just barely made it on 80).

"That was the first time I have ever done a band excursion with a station, and it was a lot of fun. Now I hope to make it for the full 9 bands with someone sometime. It was interesting to see just how uniform our signals were on all the bands, between S5 and S8 all the way except for a 349 report he gave me on 80.

"Here's something else for you to try during these sunspot doldrums. When sporadic E is in, and the distance is right, try for a QSO with someone on all bands in a single evening. There are all kind of things to try on ham radio while we are waiting for the spots to return and liven things up again.

"Just received an interesting e-mail from a fellow QRPer, and he made an interesting statement. He said there are too many 40 meter-only QRP rigs out there. Harsh, maybe, but true. Let's spread our QRP activities to all 9 HF bands (and the VHF bands as well). I have yet to get on VHF, but I do regularly operate all 9 HF bands with my little homebrew QRP rig."

A QRPer's BC151 re-revisited

Bob Seymour, W0LK, writes via e-mail that he was "happy to see the BC151 described by Richard Smith, N7CTJ, in the July issue of the Quarterly. Now I know what we were playing with in my picture in the January issue!

"I sure couldn't remember any of the details until I saw his write-up. But when we got more modern equipment, the details of that unit were easily forgotten!

"We had begun to get the newer gear before WWII started so didn't really have much experience with the unit shown. I am glad someone is keeping the old gear so other people will know how radio equipment has changed over the years."

3-land QRP

Members of the Maryland Milliwatters recently set up a QRP table during a swapfest in Odenton, Md. Some of the operators attending included, from left, Kevin Bell, KE4TOY; Bob White, WO3B, Scott Rosenfeld, NF3I, Craig Sterling, AA3MD; Bruce Muscolino, W6TOY, and Kathy Szakonyi, N3SAD. Seated is Dick Szakonyi, KA3ZOW.

Attending a "Triple Treat of QRP," sponsored recently by the Maryland Milliwatt Club, were, from left, Dick Szakonyi, KA3ZOW; Mike Czuhajewski, WA8MCQ; Gil Kost, W3MKE; and Craig Sterling, AA3MD. The event was a combined QRP show and tell, mini-fest tailgate, and Maryland Radio Center closeout / moving sale.

The QRP Companion

Bruce Milne, WB2QAP, sends e-mail that "my program, 'The QRP Companion,' a FREEWARE QRP software program, is available for downloading from the NJ QRP Club and NW QRP Club homepages.

Addresses are:

NJ QRP Club — *http://www.ges.com/~marmor/data/software.html*

NW QRP Club — http://www.scn.org/IP/nwqrp/nwqjun05.html

QRPer's 'dream' come true: The HT-750

Russ Sutton, W3MY, writes from Holland, Pa.:

"After 32 years of searching, experimenting, building and buying I've finally found the 'dream' QRP rig for which I've been looking.

"It's a hand-held CW and SSB radio for 6, 15 and 40 meters made by Tokyo Hy-Power of Japan called the HT-750. I first learned about it in Oct. 1994 'QST.'

"The article's sidebar information explains how the author discovered the rig and purchased it directly from Japan . . . which is the *only* source.

"I followed his lead and bought an HT-750 with a 6-meter whip, leather case and speaker mike for just under $700 in January.

"This price included the shipping via Express Mail, international duties and the equipment.

"Of course, the specific cost depends upon the existing dollar / yen exchange rate at the time of purhase.

"I've used the HT-750 with a homebrew 40-meter bazooka dipole and a homebrew three-element 6-meter beam and had lots of fun.

"However, during '96 Field Day operation from my back yard, the 40 ad 15 meter RF output dropped well below the rated amounts to real QRPp levels. I didn't attempt trying to investigate the problem. Instead I faxed Japan and they asked me to ship the rig back for inspection. I am currently waiting for a response to their review of the radio. By the way, they are extremely courteous.

"I am curious to learn if any QRP ARCI members are familiar with the HT-750. If so, I would like to correspond and exchange notes — or meet on the air for a QSO. I've already contacted the author of the 'QST' article and he has given me insightful comments on operating the rig."

A special QRP guest

Danny Gingell, K3TKS, writes from Silver Spring, Md., that the Maryland Milliwatt Club held a Special Guest Mini Show and Tell in Calverton in July.

Niel Skousen, WA7SSA, visiting the area from Idaho Falls, was the special guest. Maryland Milliwatter **Mike Czuhajewski, WA8MCQ,** also attended.

"Niel brought a NC-40 and a nifty little Sony Pocket Receiver," Gingell writes, ". . . it is a general coverage receiver that goes up to 30 Mhz. It does CW, SSB and AM . . . It would be great to take backpacking.

"After dinner, we retired to the parking lot to view the K3TKS key collection, listen to the Sony receiver and my NC40-A. I even fired up the Wilderness Radio Sierra for the first time (amazing, no smoke)."

San Diego QRPers unite

Ace Collins, K6VV, in an e-mail dispatch from San Diego, CA, writes that "although we are not an organized club, (a group of local QRPers) get together three times a week and yack about QRP activities.

"The most active are: **Bob Crawford, WO6I; John Roessler, KB6WB; Dave Osborne, WB6LNL,**" and Collins himself.

"Three of the four are builders and each has several transceivers or transmitter/receivers around the shack. This OM uses a TS-530S with the power cranked down below four watts.

"My first rig was a pair of 45's in a tuned plate/tuned grid oscillator and a regenerative receiver. The rig probably put out less than two or three watts. That was 1938.

"I have always been a QRP buff and a CW operator and still am."

Keeping in QRP contact

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

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

Here are the only mailing addresses you need:

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

(e-mail: KI6SN@aol.com)

The Goodie Giveaway

Everyone submitting either a card, letter, e-mail or photograph for use in Members' News is automatically eligible for a "goodie" given away each quarter. It's one way of saying thanks for members' contributions and ongoing support of MN. Without them we wouldn't exist.

This quarter's prize is a novelty item donated by **J. Frank Brumbaugh, KB4ZGC,** of Salinas, Puerto Rico: a large microammeter manufactured by the Trio Corp., originally reading .3-0-.3 volts. Frank has measured the instrument to accurately read 100-0-100 microamps — an excellent scale for many QRP applications.

This quarter's winner is a frequent contributor to MN and has generously donated goodies for the giveaway in the past: **Mike Czuhajewski, WA8MCQ,** of Severn, Md.

A sincere "72" to all who contributed, and here's an open invitation to all members to drop a line to MN for next quarter's giveaway.

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

QRP RX - Plus by Steven Weber, KD1JV

Reprinted from the New England QRP Club Newsletter, "72", Dennis Marandos, K1LGQ, Editor

Editor Ron Stark, KU7Y** and technical editor **Ray Anderson, WB6TPU**, are always on the lookout for candidates of the "Technical Article of the Year" award. One candidate, **Steve Weber, KD1JV**, has been located and is presented in this issue, as a courtesy extended by **The New England QRP Club "72" newsletter editor Dennis Marandos, K1LGQ.

*What caught our eyes were some of the innovations that **Steve** has put forth with this **QRP Receiver-Plus** project. The receiver **front end is RF amplified** with a **static ring mixer** and is all ready for the new direct digital frequency synthesizers that are starting to appear from S&S Engineering and others. Other **KD1JV** receiver designs include an **RF derived AGC** using a **single FM IF strip chip**; a **one chip switched capacitor low-pass filter**; and **separate detectors for CW and AM**. These are but a few of the exciting design ideas showcased by this QRP receiver. Printed circuit boards (4" X 5") should be available by the time this article hits the newsstands.*

Enjoy. Bob Gobrick VO1DRB/WA6ERB - QRP CLUBHOUSE.

The problem with most QRP home-brew receiver designs is they tend to be overly simplistic. Sure they kind of work, but you would not replace your station receiver with one. A quick glance at the schematic will show you this is not the case with this design. This is a full fleaged *super-het*, with a level of performance as good as that found in medium priced commercial radios. The receiver has built in QSK diode switching, RF derived AGC, crystal filter, an audio switched capacitor low-pass filter and detects both **CW and AM**. It has good sensitivity at about 0.5 µv and is low noise.

The receiver has built in QSK diode switching, RF derived AGC, crystal filter, an audio switched capacitor low-pass filter and detects both CW and AM.

The receiver has built in QSK diode switching, RF derived AGC, crystal filter, an audio switched capacitor low-pass filter and detects both CW and AM.

Despite the apparent complexity of this receiver, it is made up of simple, classic circuits. You may have already noted that I do not show any input filters or VFO. This is because the receiver has a useful range of 1 MHz to 30 MHz or more. What you use for input filters or a VFO will depend on your specific requirements. The input of the receiver can be directly connected to the driven side of the low-pass filter in your QRP transmitter, up to ten watts of output power. I use a DDS VFO at my station, and it covers up to the 15 meter band. You can add any other type of VFO that meets your needs.

How it works

The receiver is connected to the driven side of your transmitters' low-pass filter. A diode QSK switch isolates the receiver's input amplifier from the transmitter. During receive, D3 and D4 are biased ON. Any signal applied to the junction of D3, makes R2 appear at the junction of D4 and R3. When the transmitter is keyed, the RF signal is rectified and voltage is doubled by D1 and D2. With bias D3 and D4 OFF, little or no signal finds its way to the D4, R3 junction.

A high input impedance amplifier is necessary to get the best low level signal transfer through the QSK switch. Q1, a MPF102 JFET does the job. Q2, 2N5088, is a low noise, small signal transistor, and it buffers the output of the JFET. This configuration has a small amount of gain. The AGC action for the receiver is achieved by varying the source voltage of the JFET via Q6.

A SBL-1 double balanced diode mixer is used to convert the input signal to the IF frequency. The LO input signal is buffered by Q3 and must be at least 1 volt p-p. A tuned circuit between the output of the mixer and the first IF amp keeps unwanted mixer products out of the first IF amp section. The IF is amplified by a low noise common base amplifier (Q4) and then buffered by Q5. AGC is also applied to the base of Q4.

Selectivity is achieved using a three crystal ladder filter and narrow and wide selectivity is achieved by using diode switching on the loading caps. In the CW position, the diodes are biased ON, effectively shorting the caps to ground. In the AM position, the diodes are turned OFF, making the filter much wider. It is much easier to make a good CW filter than it is to make a good SSB filter. This is the main reason this receiver does not do SSB. Signal losses in the filter are made up by a negative feedback amp, Q6, which then drives the final two IF amps. The major IF gain block is a MC1350 IC. This amp is operated at a fixed gain set by P1.

A Pair of NE602 mixer ICs are used to do the final conversion from the IF to audio. The input and output of these chips are effectively connected in parallel. Power is switched between the two, enabling either AM or CW operation. The CW detector uses the built in crystal oscillator for the BFO. Pseudo-synchronous AM detection is achieved by using an AM limited carrier, injected into the oscillator input of the NE602. A Crystal and capacitive divider cleans up the carrier signal from the 3089 and reduces the level to that required by the NE602. The detected audio drives a differential input op amp with a gain of 1.

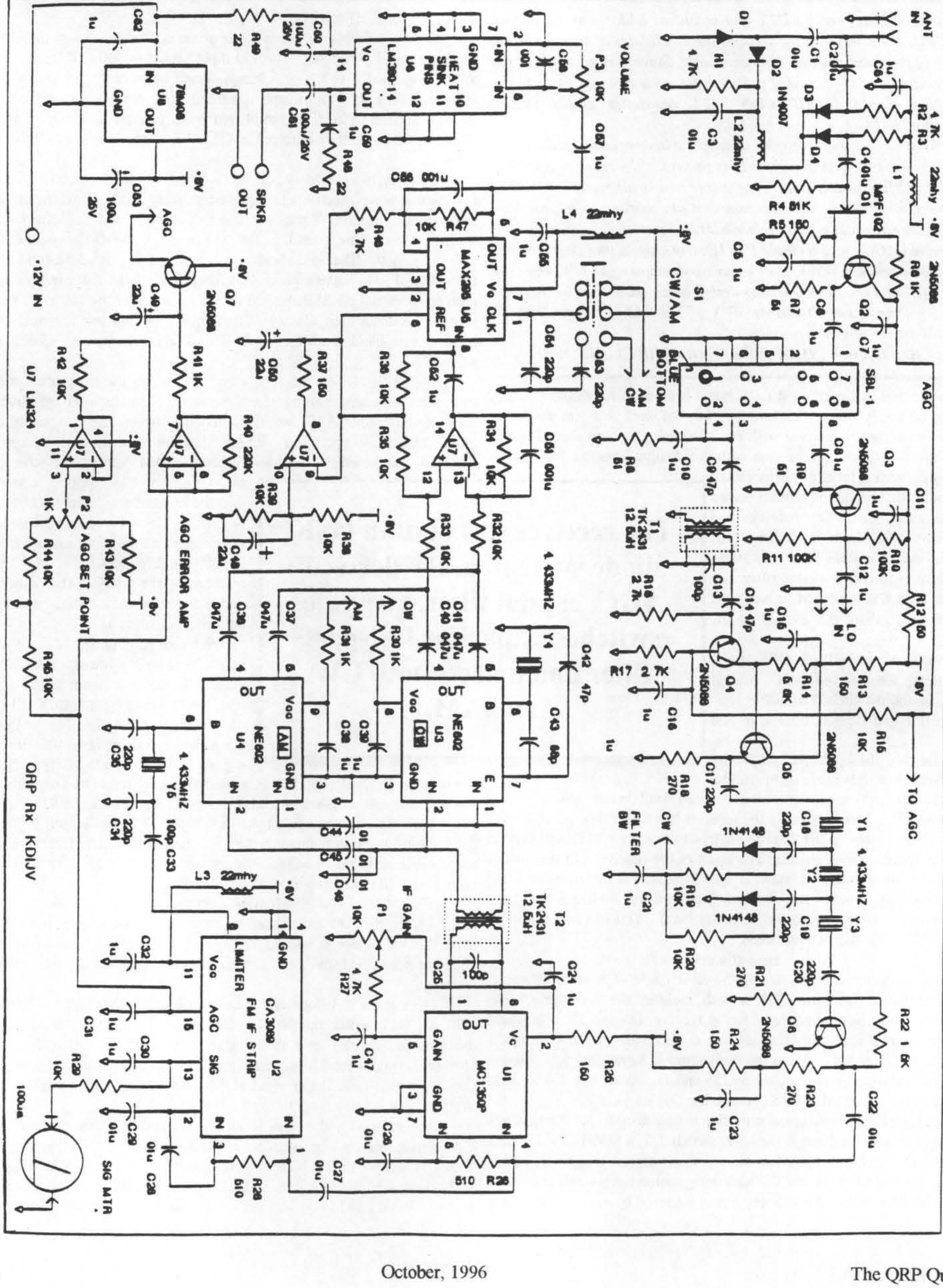
High frequency filtering of the audio is achieved with a Maxum, MAX295 switched capacitor filter chip. This chip is a low-pass filter, with a roll-off of 45 db per octave. The roll-off frequency is controlled by a timing capacitor which sets the frequency of the internal clock. A push button switch is used to select two capacitors. For CW, the roll off is set to 1 KHz. For AM, the roll off is 3 KHz.

The audio is amplified by a LM380-14, a 2 watt amplifier chip. This amplifier exhibits much better fidelity and less distortion than the more commonly used LM386. Unless heat sink fins are added to the chip, it should not be run at very loud levels.

The CA3089 FM IF sub-system provides three functions. First, as noted above, the AM limited carrier output from the IF amp is used to drive the AM detector. Second, its signal level output is used to drive a signal meter. Third, the AGC output is used to control the gain of the receiver.

During the development of this receiver, I discovered a serious problem with using the NE602 mixers. They have a very limited dynamic range. The data sheets give them a 45 db dynamic range. However, this is for FM signals. For liner amplitude conversion, the range is much less. If the input signal is too weak, the audio sounds muffled. If it is too strong, the audio is distorted.

To get good audio with weak signals and yet prevent distortion with strong ones, a very aggressive AGC system had to be developed. The AGC output of the 3089 was designed for the FM broadcast band, and is very abrupt. Once it kicks in, the "knee" is sharp and the "slope" is steep. What I had to do was use a set point servo control circuit. This


QRP Rx KD1JV

allows the input amplifier to run at full gain with weak signals. When a signal reaches the set point, (just below the AGC 'knee'), the gain of the input and first IF amplifiers are adjusted so that the signal level, at the input to the 3089, does not exceed the set point. What you will see on the signal meter is that once the set point is reached, the signal meter will stay at the same reading, no matter how strong the signal becomes.

This is done by placing an error amplifier between the AGC output of the 3089, and the RF, IF amplifier (controlled by Q6). For stability, the DC gain of the amplifier is higher than needed to close the loop, but low enough to prevent wild output swings in the OP AMP. In this case, a gain of 22 is enough. Since the AGC output from the 3089 is negative going for strong signals, a non-inverting amplifier is used. P2 adjusts the AGC set (operating) point. A 22 µf cap on the base of Q6, provides the basic AGC loop stability and AGC speed. Power to the circuits is supplied via a 78M08 three terminal regulator

Construction

Building this receiver on a PCB is a must. The board is 4"x5". Any other method is bound to prove time consuming. The board layout and parts list are not published here to conserve valuable page space. The actual construction is straight forward. Simply insert the parts in the proper places and solder. The layout is a bit tight in places. If you stuff the parts in the order of their physical height, there should be no problem. The completed board will fit into one of several project boxes from Radio Shack. If you would like a circuit board for this project, drop me a line. If there is enough interest, say 10 or more, we'll have **Fred** at **FAR Circuits** make up a batch.

Alignment

If you have tuning equipment, an RF signal generator with variable output level and a 'scope will help in the adjusting and possible trouble shooting of the receiver. First, apply power, turn up the volume and place receiver in the CW mode. Adjust P1 to just below the point of maximum hiss. Adjust P2 until the output voltage on pin 7 of U7 goes to maximum. Connect an antenna or signal generator to thye antenna input. Tune around until you hear at least a hint of a signal. Tune T2 and then T1 for maximum signal. The tuning of T2 is sharp and that of T1 is very wide. Tune for a real strong signal. Adjust P2 so that the audio is not distorted. When it becomes muffled, you have gone to far. You will indubitably have to play around with the setting of P2 until you find the point of best AGC action. It will be easiest to set the AGC control if you can tune in SW broadcast stations. Those stations on the 49 and 40 meter band prove to be a good test here in the Northeast.

Additional Information

For $2.00, I will send you an information kit that will include the complete parts list with vender part numbers and phone numbers, full size schematic, X2 PCB parts placement and PCB artwork.

Steven Weber, KD1JV
Box 140
Gorham, NH 03581

The R2 Single Sideband Direct Conversion Receiver, Revisited: The R2a

Glenn Leinweber VE3DNL

[In this article Glenn presents some significant improvements to the audio channel in Rick Campbell's R2 receiver. Here is a chance to spend some time at the workbench and to squeeze even higher performance out of an already fine receiver. -WB6TPU]

Rick Campbell's R2 receiver prompted the question, "Can it be prodded to perform even better?". A good deal of simulation, and breadboarding showed a few minor flaws, some of which Rick has already corrected. My main interest is in improving the audio chain. The goal was to achieve an overall noise figure 10dB or under. A new method of tuning the audio phase shifter is introduced that allows sideband suppression of 50 dB. A lower noise audio preamp, a sharp, tunable audio filter, and a more powerful no-adjustment audio driver are included as well.

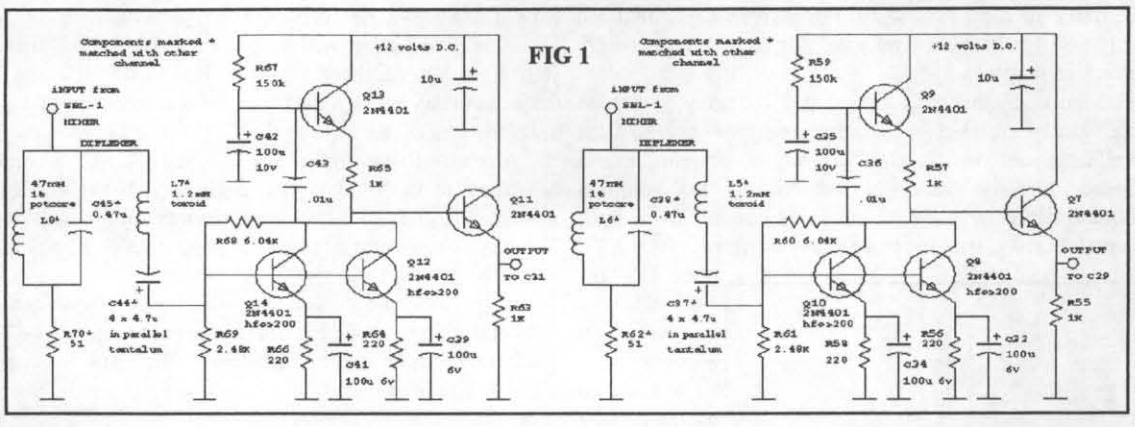


FIG 1

Low-level Audio Preamp

The old common-base audio preamp, having a noise figure of 5dB is an obvious target to improve the noise figure. A common-emitter configuration, with shunt feedback gives 50 ohms input resistance (preferred by the mixer) and a 2dB noise figure. Two paralleled 2N4401 transistors results in better noise performance at such a low input impedance. A gain of 60 masks most of the noise in the op-amp phase shifter that follows. Common collector ouput stages provide a low output impedance needed to drive the audio phase shifter.

A simpler diplexer between mixer and preamp shaves a little off the noise figure too. See the schematic in figure 1. Rick's R2 diplexer has steeper stopband slope, but about 2dB loss. The TOKO 10RB inductors simply have too much series resistance: I wound my own on small potcores, 14x8 mm. The potcore bobbins are very easy to wind, but its tricky to get the inductance exact - too much pressure from a mounting screw can change inductance dramatically. Potcore mounting hardware from the manufacturer is recommended. The 1.2mH inductor should have low internal capacitance - 35 turns #32 wire in a single layer on a FT37-77 ferrite toroid.

The diplexer's low-pass frequency at 6700 Hz., and high-pass frequency at 170 Hz are outside the audio passband (350 - 3500 Hz.). This means that unwanted phase shifts from mismatched diplexer parts are less troublesome, relaxing the need for extremely accurate component values. With the tuning method described below, some of the bad effects of mismatched components can be tuned out. Nevertheless, diplexer components were matched with the aid of a

commercial Maxwell impedance bridge.

Quadrature Phase Shifter

The phasing R's and C's were all scaled so that resistor values were much smaller. Otherwise, the Johnson noise from those warm, large value resistors adds so much noise that preamp gain would have to be much higher to achieve the same noise figure. A return to a low-noise bipolar op-amp (LM837) gives lower noise than the FET-input TL074 with these lower resistor values. The Motorola MC33079P should work equally well. The circuit is show in figure 2.

Most low-noise op-amps have extended frequency response as a side-effect. My circuit layout was slightly unstable, oscillating at 3 Mhz. Running at low power supply voltage doesn't help, but oscillations are most likely caused by too much stray capacitance between the inputs and ground. A 10pF feedback capacitor is usually enough to correct the problem, and doesn't add noticeable phase error. A simpler USB/LSB sideband switching arrangement means a few less op-amps.

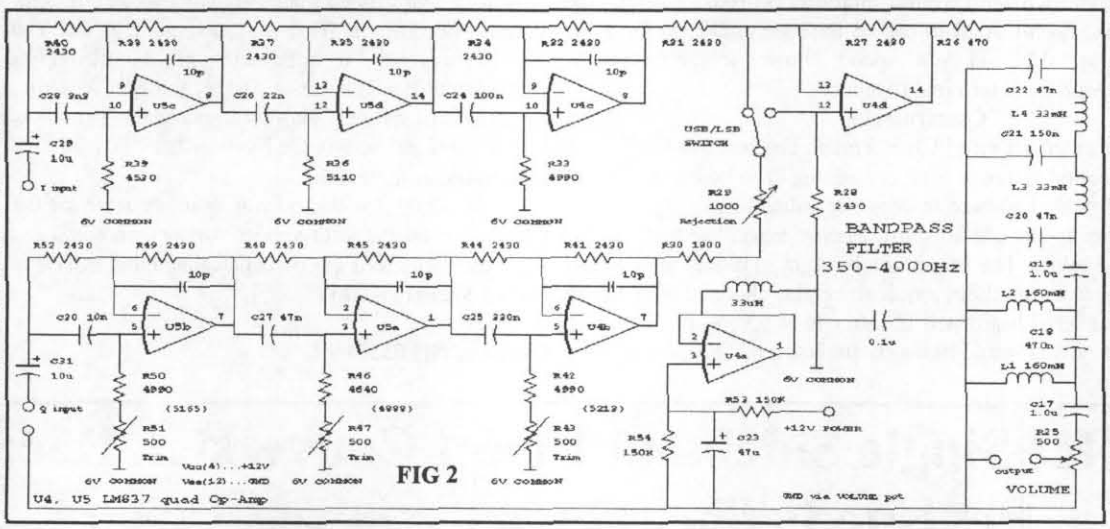


FIG 2

This phasing circuit is capable of high sideband suppression; a minimum of 58 dB (figure 3). As Rick has mentioned, actually doing this well is very very difficult, mostly because of component tolerances. Capacitors C24, C25, C26, C27, C28, C30 should all be of the same type. The Panasonic P-Series (polypropylene) capacitors have tight tolerance, and good temperature stability. Philips 460 series are even better, but unavailable in the larger sizes. Polystyrene capacitors are good too, but only small values are available. Almost all the resistors should be 1% precision resistors.

Trimming these components is considered by many to be too difficult, partly because of the need for a quadrature signal generator. I'm a believer in building your own test equipment; a very simple and accurate quadrature generator was developed that uses two common CMOS chips. Figure 4 illustrates the circuit. This circuit can be built temporarily on a protoboard to trim the three phasing trimpots R43, R47, and R51 for best alternate sideband suppression.

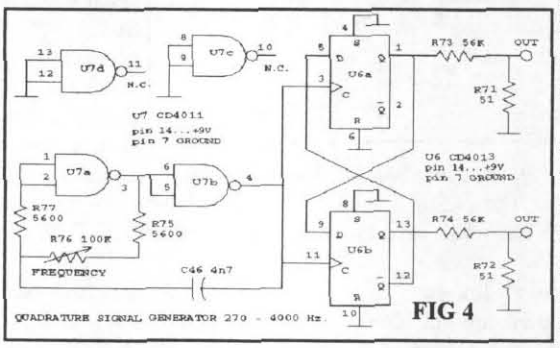


FIG 4

The signal generator must supply two signals of the same frequency, same amplitude, but with exactly a 90 degree phase relationship. Since each of the three trimpots to be tuned affects some audio frequencies more than others, these two signals must be frequency agile: 300 - 4000 Hz. Two square waves in quadrature are easily generated with a logic shift register. However, the harmonics of those square waves make it very difficult to determine the null point for the fundamental frequency of interest. Sharp low-pass filtering in the following audio stages can eliminate those harmonics. Simply listen for minimum signal of the resulting sine wave.

U7 is a simple square-wave oscillator whose frequency can be adjusted with R76. It oscillates at four times the output frequency. The dual flip-flop U6 is connected as a two-bit shift register. Outputs at pin 1 and 13 are at the same frequency, but shifted 90 degrees in phase. R72 - R74 divide the output voltage down to a small value (with a 50 ohm output impedance) that the preamps can handle. Since there is so much gain in the R2's audio chain, the possibility of ground loops can adversely affect trimming adjustments. Power the signal generator from a separate power supply, perhaps a 9v battery. It draws less than a few milliamps.

You might wish to set the three trimpots with an accurate ohmmeter first. Theoretical values of resistances from the non-inverting inputs of op-amp U5b, U5a, U4b to 6V COMMON are listed on the schematic diagram in curly braces.

Apply the two outputs of the quadrature generator to the two diplexer inputs. Now adjust the SCAF frequency (R15) to pass only the fundamental frequency, and eliminate all the harmonics. You can do this by ear, or look at the voltage at C5 with an oscilloscope. You should be able to adjust R15 to hear (or see) a sine wave. Flip the USB/LSB switch to the side giving the lowest amplitude. Adjust R29 for minimum signal. Now you can go to the three 500 ohm phasing trimpots.

Iterative tuning will be required, since each trimpot affects the setting of its neighbor a little. R51 will trim the highest audio frequencies: try nulling for best sideband rejection at 3 KHz. R47 trims mid-frequencies: try for a null at 700 Hz. R43 trims the lower end: 320 Hz. At each of these frequencies, adjust the SCAF cutoff frequency to pass most of the fundamental frequency, but reject harmonics of the square wave. Rock R29 back and forth as well to help find the best null. The signal generator provides a large enough signal that a deep null should be achievable.

Figure 3 shows that this quadrature circuit can give excellent sideband suppression. However, mismatching in the local oscillator quadrature hybrid, and an unbalanced R.F. splitter can easily degrade sideband rejection.

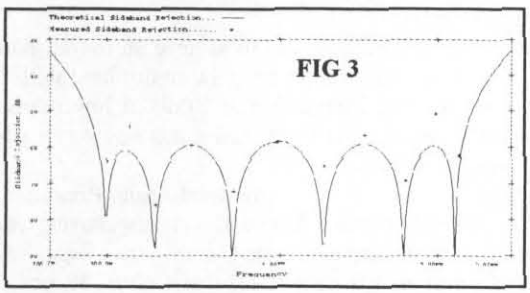


FIG 3

The Butterworth band-pass filter following the audio phasing combiner U4d passes audio from 350 Hz to 3500 Hz. Again, the TOKO 120 mH pre-wound coils have been replaced with hand-wound potcores. The 120

mH 10RB TOKO coils have a Q of three at low audio frequencies...a little too low to be useful. However the R10B type 33mH coils have acceptable Q for the low-pass part of this filter. Bandpass filter components need not have high accuracy.

Audio Amplifier

From the volume control, Q6 amplifies the audio signal by about 100. Good noise performance is needed here, especially at low volume. The 2N4403 PNP transistor gives a noise figure of about 1dB, with a 500 ohm source resistance, and biassed at about 1ma. Only exotic, expensive low-noise op-amps can give better performance than this $0.16 transistor. However, the integrated circuit amplifiers are often better at rejecting noise and hum present on the power supply.Q5 is added to isolate Q6 from power supply hum, noise and feedback. A non-critical op-amp follows (U1a) with a gain of 16, and provides nearly rail-to-rail output voltage swing. Figure 5 shows the audio amplifier, SCAF and the power output stage.

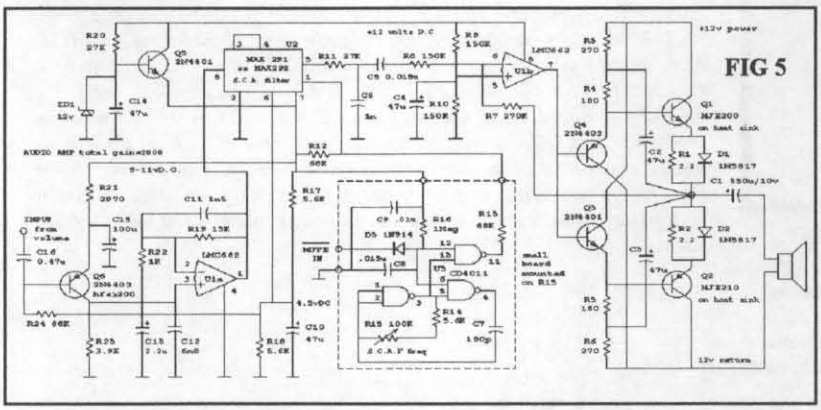
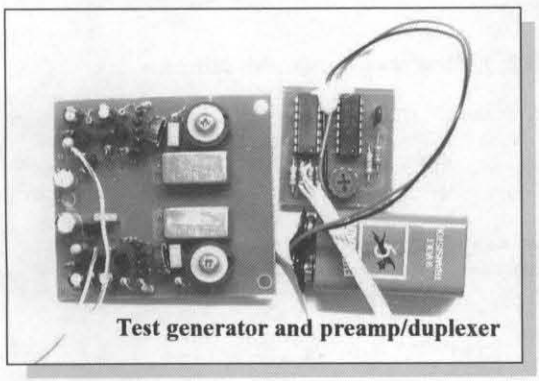


FIG 5

Switched Capacitor Audio Filter (SCAF) U2

These devices are so easy to apply - they're impossible to pass up. And the variable lowpass tuning that they make possible is a great bonus. Unfortunately, these devices are relatively noisy, necessitating their use at high amplitudes. You have a choice of pin compatible filters to plug in here:



Test generator and preamp/duplexer

MAX292 - Bessel filter for best rise & fall shape with no ringing whatsoever. (not recommended)

MAX291 - Butterworth filter for flat frequency response and a little ringing. (recommended)

MAX293 - Elliptic filter for steep stopband slope but more ringing. (recommended)

MAX294 - Elliptic filter giving even steeper slope

All are available from Digi-Key for about $6.

Instead of using the built-in oscillator, the SCAF filter chip is driven from an external variable-frequency oscillator (R15, a front-panel variable resistor sets the frequency). U3 oscillates at exactly 100 times the cutoff frequency, providing a continuously variable filter from 350 Hz to 4000 Hz. This oscillator can be gated on and off with one of the CMOS logic inputs. With no clock, the SCAF filter stops in its tracks, holding its output voltage constant. This makes an extremely clean mute. R16, C8 and D3 have a fast attack, and slow decay (about 10msec) appropriate for break-in keying. The R16-C8 time constant can be easily changed if you need a mute with a longer tail.

Power Amplifier

Because the SCAF filter works best with high-level signals, the power amplifier needs little voltage gain, but lots of current gain. All the common integrated circuit power amps have too much voltage gain to be useful here. Q3, Q4, Q1, Q2 have a composite voltage gain of one.This circuit self-biases to a quiescent current (class AB) of about 16 ma.

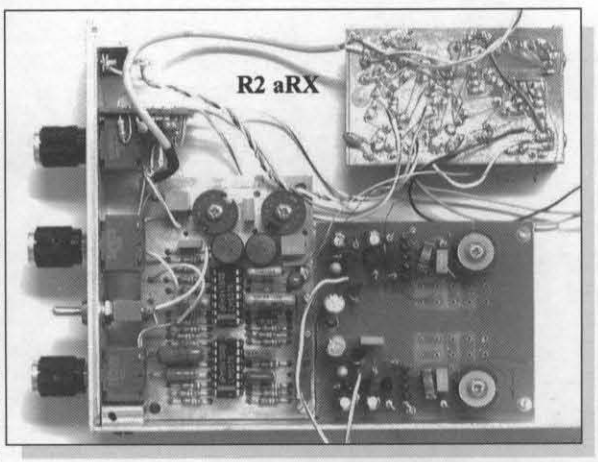
Since the SCAF filter must run from a lower supply voltage, a tiny bit of gain is needed. Op-amp U1b supplies this gain, and reduces distortion to a very low level. The combination of a rail-to-rail op-amp with the bootstrapped output stage (C2, C3) result in an output swing nearly equal to the supply voltage. Be warned: with no AGC this amplifier will make you jump when an unexpected QRO signal arrives in the passband.

The high currents drawn by the amplifier must be routed carefully to avoid howling oscillations. Ground loops are difficult to avoid when dealing with such high overall audio gains. The collectors of Q1, Q2, Q3, Q4 and resistors R3, R6 should be connected to the supply voltage separately from the rest of the receiver. The "ground" lead of the speaker should be connected to exactly the same point as the collector of Q2 and Q4. A grounded phono plug connection to the speaker is asking for trouble, if the chassis is attached to any other part of the receiver. Fortunately, the SBL-1 mixer ground-isolates the local oscillator and radio-frequency input stages, so you shouldn't have to worry about ground-isolating these inputs. A headphone jack, if used, should be ground-isolated too.

The LMC662 CMOS op-amp sets an upper power supply limit of 16v. High performance eclipsed low-power operation as a design goal - 100mA total current is drawn from the supply - more at high audio levels.

Conclusions

High-gain audio amplification needed by direct conversion receivers will always be difficult to deal with. Microphonics in the low-level preamp are a problem. Hum pickup by the diplexer's magnetic components and ground loops are problems too: a ferrite-free diplexer is a tempting future project. While the square-wave quadrature generator allows optimum trimpot tuning, the procedure is still not for the faint-of-heart: it should be attempted by experienced homebrewers.



R2 aRX

Excellent sideband suppression of 50 dB has been achieved with a little extra tuning. The resulting receiver has contest-quality characteristics, with good dynamic range and few spurious responses. The sharp cutoff audio filter can be set very wide (when listening after a CQ) or narrow, for QRM elimination. A bandpass response would be better, but would require another front panel control to set the centre frequency. Break-in muting is excellent, when the time-constant is matched with the transmitter.

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IDEA EXCHANGE

Technical tidbits for the QRPer

Mike Czuhajewski WA8MCQ 7945 Citadel Drive, Severn, MD 21144 wa8mcq@abs.net WA8MCQ@KA3RFE.MD

IN THIS EDITION OF THE IDEA EXCHANGE:

POWER ATTENUATOR QUICKIE

From Joe Everhart, N2CX of Brooklawn, NJ, Joes Quickie #19-- Here's something I whomped up when I volunteered to hold a QRP kit repair clinic at a recent NJ-QRP meeting. I wanted a gadget that would allow me to monitor the output of a QRP transmitter without frying the monitoring equipment while giving the transmitter a load that it liked. With QRP, the solution is very simple - a power attenuator.

I knew that 30 dB of attenuation is a practical number. Much more than that and the output level can be tough to measure and shielding becomes a severe problem. Much less than 30 dB and you have to worry about zapping your test equipment.

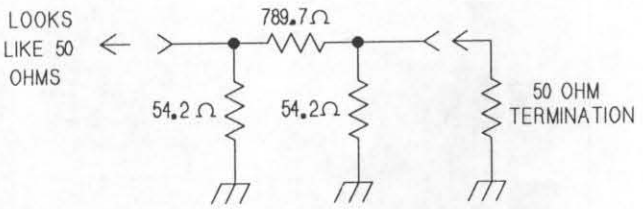

Figure 1: Basic 30 dB attenuator

A simple pi attenuator is shown in Figure 1. [Joe provided his own drawings, done on KeyCAD.] Running through some numbers, I came up with 54.2 ohms for the end resistors and 789.7 ohms for the middle one. To get the a usable dissipation value for the attenuator with commonly available resistors, you need to parallel several of them. It just so happens that if you parallel five 270 ohm resistors, you get 54 ohms - not bad. Not only that, but I had a bunch of 270 ohm 2 watt resistors on hand! And two series-connected 390 ohm resistors gives you 780 ohms which is very close to ideal. The final schematic, which includes an RF detector, is shown in Figure 2.

Construction is not very critical for HF applications. I used a die cast Bud box that measured about 4.75 X 3.75 X 2.25, but a mini-box would do just as well. Figure 3 shows a sample layout.

Resistors R1 through R5 are laid out next to each other on a piece of perforated board and their leads daisy-chained and soldered together. The hot lead of the end one goes to the center pin of a BNC connector on the end wall of the box. The ground ends are connected similarly and go to a ground lug on the BNC connector.

At the other end of the board, resistors R8 through R12 are connected to another BNC connector. Two 390 ohm resistors, R6 and R7 are series connected to the hot ends of each power resistor group.

For extra monitoring (and because there were already a couple of banana jacks on the box), a simple diode detector was added on one end of the attenuator. With the values shown, it reads pretty close to RMS voltage using the DC voltage scale on a DVM with 10 megohm input impedance. *[The 4.7 megohm resistor forms a voltage divider in conjunction with the 10M of the voltmeter. The 4.7M is a holdover from the old days when vacuum tube voltmeters had an input impedance of 11 megohms. A divider of 4.7 and 11 megs gives a net output of 0.7006%, while the exact division required to give the RMS equivalent is 0.707, a reasonable degree of accuracy. Using 4.7 and 10 megs gives a net output of 0.68%, which is within 4% of 0.707. A more precise value for use with 10 megohm input meters would be 4.14 megohms, which could be made from placing two or three carefully selected resistors in series. --WA8MCQ]* Accuracy will suffer with power levels below 100 mW due to diode nonlinearity at lower voltage levels.

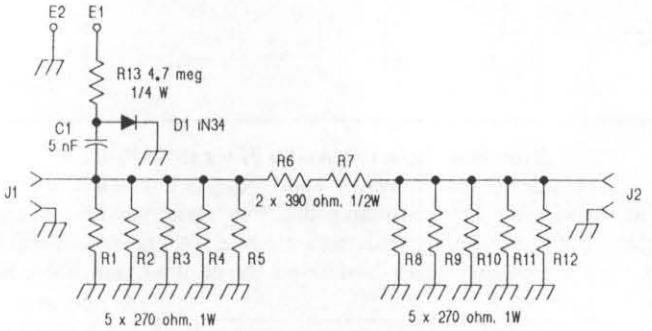

Figure 2: 30 dB attenuator with diode detector

Measurements across the HF region with my Autek RF-1 show that the load is pretty good. Table I shows readings of both SWR and impedance on some HF ham bands. WA8MCQ described a simple method of evaluating attenuators using nothing more than a DC power supply and DVM in the October 1994 Quarterly. This method gives an attenuation of 29.8 dB. Attenuation was not measured at RF (which can change depending on construction methods), but is probably within a dB or so of the DC value up to 30 MHz.

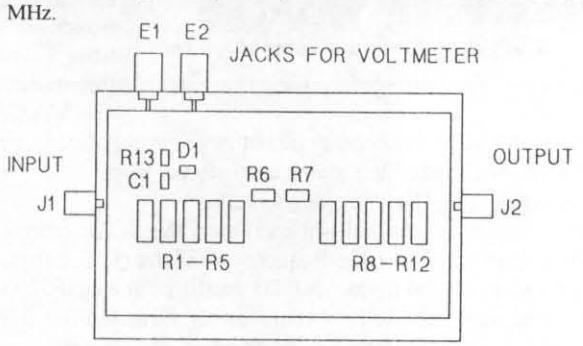

Figure 3: Sample layout for attenuator in box

Two more notes: First, power resistors aren't needed at both ends. Because of the attenuation, only milliwatts are present at the end opposite the transmitter. If you wanted to, you could use 1/8 watt resistors with no

problems. However if you do, be very careful not to smoke them by hooking the transmitter to the low power end!

Secondly, the attenuator makes a good dummy load even without the far end terminated. Because of the attenuation even an open or short reflects very little power back. My Autek RF-1 Antenna Analyzer gave the readings shown in Table I across the HF range. Note that the RF-1 reads 1.0:1 for any SWR below 1.2:1 because it cannot accurately read SWR's that low (nor can most bridges used by amateurs). The measured impedance changes are probably more a matter of (in-spec) RF-1 inaccuracy than variation in actual impedance. Also, because of the attenuation, the impedance and SWR readings were unchanged with the "other" end of the attenuator shorted, open-circuited or terminated with 50 ohms.

Table I - Power Attenuator SWR and Impedance

Freq. (MHz)	SWR	Z (ohms)
1.2	1.0:1	50
1.8	1.0:1	50
3.7	1.0:1	51
7.2	1.0:1	51
14.2	1.0:1	52
21.2	1.0:1	51
29	1.0:1	51
37.	1.0:1	48

--DE N2CX

GLUING TOROIDS ON CIRCUIT BOARDS

Via e-mail from ***Steve Pituch, N2MNN*** *(n2mnn@openix.com)*--There was a thread on QRP-L about securing toroids on the Sierra band modules to the PCBs so they would not wiggle. I finally found an adhesive that worked. I use a bow and arrow to get my wire antennas up. When I first started with a bow and arrow, I was not that good and damaged several arrows. The fletching (plastic fake feathers at the end of the arrow) needed to be replaced. At the local sports store I found replacement fletching, and a wonderful adhesive called Fletch-tite, made by Bohning Co. Ltd., Lake City, MI. It says "for fletching wood, glass [presumably fiberglass], and aluminum". The fletchings are vinyl-like and the label says "vinyl lacquer". It sticks vinyl nicely to metal. It is clear and very thin.

I tried it on a couple of the toroids and it worked great. I put a dab on the end of the toroid and use a plastic clothesline pin (clip) to keep the toroid against the circuit board for about 20 minutes (this is not a contact cement). I can use 5 pins to secure all the toroids at one time on one module. Those with a secondary winding usually don't need this treatment because the 4 wires keep the toroid close to the board.

Wayne Burdick (N6KR) said that gluing the toroids down wasn't necessary, but it was beginning to look so bad that I decided to do them anyway. Once the glue dries it is invisible, so others will wonder how your toroids always seem to behave and stay flat. My only concern is the glue melting the enamel off the wires. However, the toroids tune the same so it seems to have worked for me.

--DE N2MNN

QRP ANTI-THEFT ALARM

Here's a simple anti-theft circuit from "The QRPer Formerly Known as KB4ZGC", **Frank Brumbaugh** of Salinas, PR, once again signing **W4LJD** ("Last Judgement Day") thanks to the FCC vanity call program. Shown in Figure 4, it uses a mercury switch as a motion sensor. He touts it as a bicycle theft alarm (a number of hams operate QRP from bicycles, and there's even an Internet mailing list for their discussions), but it could also be useful at Field Day or other locations where equipment might be tempted to "walk off". If the unit is upset while the switch is in the ARM position, the blob of mercury in the switch shorts its contacts, activating the piezo beeper, and applying power to the relay to latch it on. Opening the SAFE/ARM switch resets the unit.

He recommends a $1 relay from All Electronics, part number RSD-6V. It has a 220 ohm coil and operates over a range of 4.3 to 14 volts DC. Says Frank, "The coil is polarized--apply positive to pin 3 or it won't switch. It's SPDT and quite tiny, with 1 amp contacts. I've noticed that several surplus DIP and other small relays now have polarized coils. You might want to warn your readers to pay attention when using these relays." You are hereby warned: if you build any circuit with a small encapsulated relay and it won't switch, try reversing the coil connections before you throw it away.

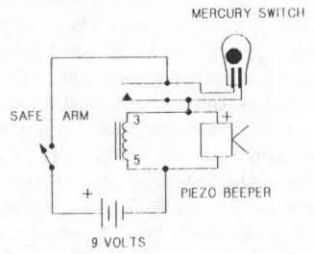

Figure 4: Anti-theft circuit

GROUND ROD DISCUSSION FROM QRP-L

Here's a recent thread (used with permission) from QRP-L, the Internet QRP forum. (If interested in subscribing to what I call the "QRP Daily", which can run from 40 to 80 messages a day, send e-mail to wa8mcq@abs.net and I'll tell you how to get on the mail reflector.) These were taken from "daily digests" 387, 388 and 389, message numbers 9678, 9684, 9706, 9715, 9740, 9747, 9819 and 9842. If interested in viewing the original, unedited postings you can download the daily digest files via ftp from lehigh.edu (send me e-mail if you want details of that).

From Bob, KI5EZ, rhilto@acxiom.com--I went looking for ground rods; they offered 8 foot solid copper for what I thought was a high price. To my surprise, they also offered 8 foot "solid something" galvanized ground rods for about half the price. Are they as good as the copper rods? This set me to thinking of ways to save $$ (hey--I'm a ham, and I have to uphold the finest tightwad traditions)--could I use EMT (electrical metallic tubing)? What about copper tubing? Is this a case of saving a few $$ and endangering my whole house?

From Kevin Muenzler, wb5rue@amsat.org--It is very doubtful that it was solid copper. It was most likely copper plated steel. Get that one if you can afford it. The galvanized one is OK but if you have a very acid soil the zinc "plating" will quickly corrode away and then the steel shaft will rust. You can braze to the copper plated one. What I did was dig up a small section of my yard, about 5 X 5 feet square. (I had to promise my wife that I would completely restore the area.) I constructed a small grid using 1/4 inch copper tubing used for water pipe. The total length was around 50 feet so I have a large surface area. I buried it about one foot below the surface. This makes a great ground and it will last a very long time.

From Larry East, W1HUE--There is an old trick for "driving" copper pipe into soil which has been mentioned before but is worth repeating. I have used 10 foot lengths of 1/2 inch copper plumbing pipe for ground rods many times. "How do you drive the stuff into the ground without smashing the ends and bending the pipe" you ask? Simple: connect it to a water hose and let water passing thru the pipe "drive" it into the ground!

I have a hose fitting soldered to a short length of copper pipe and I use a piece of rubber auto heater hose and hose clamps to attach the fitting to the pipe I am going to "drive" into the ground. Turn on the water, point the pipe at the ground and gently push -- it will go right in! Works in even hard packed clay soils, but does not work too well in coarse sand or gravel without a lot of extra up-and-down motion applied to the pipe (but works quite well in fine sand). After the pipe is in the ground -- you may have to cut it off if you hit rock -- disconnect the hose fitting and solder on a copper end cap. Works great, and 10 foot lengths of copper plumbing pipe are cheaper than 8 foot ground rods!

The "water drill" is a really no-sweat method and I have probably put at least a dozen 10 foot hunks of copper pipe into the ground over the years using it. By the way, I believe I first saw the method mentioned in Hints and Kinks in QST.

More from Kevin Muenzler, at a different account, muenzlerk@uthscsa.edu: Re the pipe and hose: great Idea! I live in sand and my son took the garden hose, with high pressure nozzle at the end. He drove the hose itself about 20 feet into the ground and couldn't get it back out; I guess the nozzle got hung on a tree root. I can vouch for the water-hose method!

From Darrel, WD6BOR@aol.com: No, don't use EMT or thinwall copper

pipe. The standard 1/2" x 8' ground rod should be copper clad steel. They should run about $8 to 12 at your local home improvement center. Solid copper ground rods are not commonly used because of the added expense. The copper clad steel rod is necessary to insure adequate mechanical strength as well as corrosion protection. Galvanized 3/4" steel pipe can be substituted but the cost difference is not worth the shorter service life or higher ground resistance it offers. For the time and effort you will invest installing the rod, it doesn't make sense to try saving a couple of dollars on the materials cost.

I also strongly recommend that you use cast brass or bronze ground clamps and make sure the connection is left exposed for future inspection. Don't think of driving the rod in half its length and cutting it off, either. You'll see more than a 70% increase in ground resistance doing that. If you are over a layer of hardpan or rock, you can either drive the rod in at a 45 degree angle or bury it horizontally in a 2 1/2' deep trench. One trick that sometimes works well depending on soil condition is to put a garden hose over the rod and "hydraulically" drive it using running water to displace the soil. A warning note; the hose may not want to come out after doing this.

Your ground is an important safety feature of your station. Don't skimp. (I'm an electrician, if you couldn't tell.)

From Hank Kohl, k8dd@tir.com--EMT, no; I'd say copper tubing is better; buy 8' of copper pipe. If you can't drive it in the ground (I have lots of clay and it's hard to even drive a copper rod!) hit up the road construction sites and look around for an 8' piece of re-rod (reinforcing rod) that they put in the roads to keep the concrete together. Get one that's about 1/2" or 3/4" or what ever your copper pipe is. Stick it down in the copper pipe and drive it in the ground--it's cheaper than a "real" copper ground rod.

Also, you might want to get out the torch and solder some #12 copper wire to the top of the copper pipe before you pound it in the ground. Along with soldering it, put some kind of a clamp on it for a solid mechanical/electrical connection. EMT and galvanized stuff will work, but you might want to change or replace it every couple of years. I used 1/4 mile of electric fence wire for radials about 9 years ago. Lots of 66' radials, but they are mostly all rusted off where they come up out of the ground to the ground stake. They worked really great when they were new, but after about 3 years they started to deteriorate, so they are being replaced with bare copper, stapled into the grass.

From: Peter Simpson, KA1AXY (Peter_Simpson@3mail.3Com.COM: They're putting a second cellular system on the tower down the street from me and this past weekend the "grounding team" started work. I was watching one of the guys put in an 8 foot ground rod. He didn't drive it vertically (which I think was just because it was easier to put it in at an angle...he didn't need to stand on a ladder), but he was using a power hammer drill to push it in. He had some kind of driver tip on the power tool, and the short, rapid, repetitive impacts seemed to drive the rod in pretty quickly. Your mileage may vary.

Another from Darrel, WD6BOR@aol.com: Driving the ground rods at an angle and with a tool is definitely the easy way to install them. It may be worth the cost to rent an electric demolition hammer and drive them directly with that. The hammers will usually drive a 1/2 or 5/8" rod directly with the bit socket (without a special attachment). Ask around. A fellow ham might also be a building contractor and have a hammer that you could borrow for an hour. Actual installation of the ground rod will normally be less than five minutes using this method.

And a final comment from WD6BOR: For multiple ground rods to be effective they need to be spaced at least six feet apart and no less than the length of the ground rod (8' rods = 8' apart). The ground rod depth has much more effect than the rod diameter or even number of rods due to the fact that each rod conducts through the ground resistance of the soil around the rod. The soil resistance density is much higher in the smaller volume directly around the rod so placing multiple rods close together has the effect of combining the soil ground resistance instead of providing effective parallel current paths.

The effectiveness increases with depth more than with rod diameter. Soil chemical composition has a lot to do with the ground system efficiency. Non-conductive soil types can be improved by chemically treating the soil around the rod. The most common treatment is to dig a 12 inch deep trench in an 18 inch diameter circle around the rod, then fill with 8 inches of rock salt and cover with 4 inches of soil. It's important to remember that you will also be sterilizing the soil so that nothing will grow around the rod. Remember the Romans plowing their enemies' fields with salt to starve them.

Ground resistance can also be measured with a "megger" type resistance tester. Ground resistance for electrical safety can be no more than 25 ohms according to the National Electrical Code. Remember again that ground rods are for electrical safety and RF grounds need to be established with radials or some other ground plane type system.

The best way to drive ground rods is still to find someone else to do it. Offer them a beer!

WAX AIDS IN MOUNTING WASHERS

*From QRP-L, a handy hardware tip from **Bob Kellog, ae4ic@nr.infi.net**:* When installing components it is sometimes necessary to align holes, washers and screws in hard to reach places, such as the underside of variable capacitors. This is easily done with the aid of beeswax. Use your soldering iron to melt a very small amount around (not in) each screw hole on the capacitor. While the wax is still warm, align and stick the washer in place. Attaching the capacitor is then no harder than if the washers didn't exist or were permanently attached.

No beeswax? Try earwax, but don't use a soldering iron with it. (Hey, it's a joke, but it might work!) The coils in old AM broadcast band receivers were dipped in a sticky wax that works the same way. Also, dentists use a soft sticky wax that will work. I keep a little plastic cup in my shop with a 50/50 mixture of beeswax and lard. It is excellent for lubricating wood screws. It can be used as above, to temporarily stick a washer in place, or to hold a screw on the tip of your screwdriver while you thread it into a hard to reach place. This mixture has the consistency of stiff earwax, so it doesn't need to be melted with the iron.

--DE AE4IC

AN UNUSUAL VERTICAL ANTENNA

*Adapted from a posting on QRP-L, this comes from **Jay Coote, WB6AAM**, JCoote@aol.com:* Here's an unusual vertical antenna which I believe had a little gain on the higher HF bands, some low-angle performance and wide band coverage of 3-30 MHz. I designed my antenna for 5/8 wavelengths on the highest band I would be using, which was 10 meters. Antenna height was approximately 20 feet. If the mast is taller than 5/8 wave on the highest band you will use, the antenna will lose it's low-angle performance and gain since the lobes from a longer-than-5/8 wave antenna will be at high angles.

If you wanted, you could make the element 5/8 wave long at a lower frequency. Example: if 14 MHz were the highest frequency you would use with this vertical, then you would make it 5/8 wave long (about 40 or 41 feet) on 14 MHz. This antenna is most effective on bands where the length is between 1/8 to 5/8 wave. Below 1/4 or 1/8, efficiency falls off; above 5/8 the lobes are all over the place. My 20 foot antenna was most effective from 11 to 29 MHz, but still worked very nicely on 4, 7 and 10 MHz. Similarly, a 41 foot version would work best from 5.7 to 14 Mhz, but would go lower in frequency with good results.

My 20 foot antenna was roof mounted over a counterpoise of ten radials laying on the roof and radiating from the mast like the spokes in a wheel. Quantity of radials is more important than old hat about using two resonant radials per band. My drawing, Figure 5, shows details.

The antenna was made from non-seamed telescoping aluminum tubing and hose clamps with a thick rectangular block of plastic at the base as insulator and mount. U-bolts and hardware allowed mounting of the insulator to a pipe on the roof, or to the top of a TV mast.

I used an Icom AH-2 automatic antenna tuner right at the base of the antenna. Other military, marine or aviation type automatic antenna couplers will work, but they must be right at the base of the antenna--no coax or feedlines between the antenna and tuner, just a very short lead! "Coax only" tuners may not work, even when connected right to the base of this antenna; these often don't have enough L/C in them to match even a dummy load.

I tried a field version of this antenna as well. I put my 20 foot antenna on top of a 20 foot TV push-up mast. I bolted the tuner to the top of the mast, just under the base insulator for the antenna, with a short lead from the tuner to the antenna. I limited the amount of radials to four and incorporated them into the guying of the TV mast. They were isolated from the mast with insulators, but connected to the counterpoise terminal of the automatic tuner. The coax and tuner control cables were taped to the mast. The 20 foot mast may not have been necessary in the field but does elevate the feed point while drooping the radials for a lower angle. The added height would be a great help for VHF-like local contacts on 10, 12 or 15 meters.

The antenna was as good as any trapped vertical and had wider coverage of HF. There was no problem with 50 or 100 Khz band widths, therefore no need to "force feed" a long coax run with a tuner in the shack and have that loss/radiation/SWR problem; the tuner was at the base of the antenna.

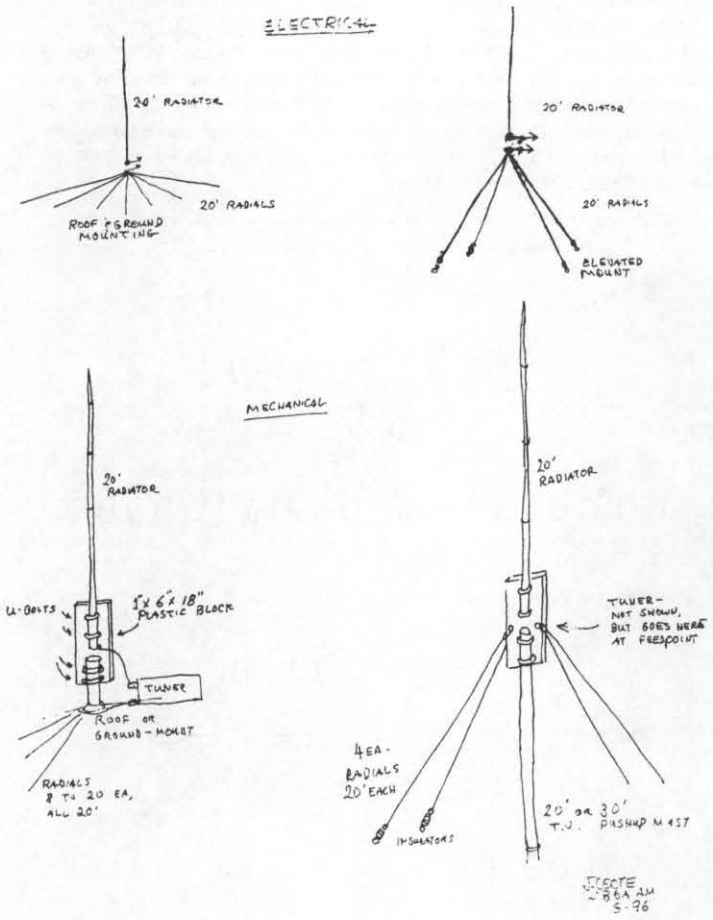

Figure 5: WB6AAM Vertical antenna

A home-made manual or remote tuner could also be used at the base of this antenna if it is a ground-mounted version, or a few feet above ground. The homemade design could be simplified by bandswitching to presets if full 3-30 MHz coverage is not needed.

--DE WB6AAM

FANCY PANELS FOR HOMEBREW RIGS

Another interesting thread from QRP-L was on making great looking front panels for your homebrew rigs. Here are some of the comments--

From ***Jerry Flanders, W4UKU*** *flanders@GroupZ.net* -- Those of us that homebrew usually aren't able to get a really professional looking front panel appearance. On your next project, try this: Use overhead transparency material in your laser printer or copier to make a full-sized panel overlay with all the lettering properly placed. Cut out holes and trim appropriately. Place the transparency over your equipment front panel, which should be painted with a light color.

Place a pre-cut, pre-drilled, one-sixteenth inch thick, flat acrylic cover over the transparency and fasten all together with decorative-head screws. Lastly, send me a picture of it.

Don't forget to design and include your own fancy logo on the overlay; maybe scan in the family crest? This method is going to look best with a "hooded" type cabinet - where the top and sides extend a bit beyond the plane of the front panel.

Incidentally, while you have your transparency material in the copier/printer, also make and cut out a neat overlay for your computer or CW keyboard, identifying all those special macros.

From ***AC6KW, Jeff Grudin*** *(grudin@pacific.vdbs.com)* -- I've done a similar process that has worked real well for me. I laser print or even color ink jet onto a nice gray card stock (or any color you like). Cover that with laminating plastic from the stationary store. Coat the back of the card stock and the front of the panel with spray adhesive (again from the stationary store). When it is tacky apply them together, then use an Xacto (tm) knife to trim out the holes. It makes a pretty good looking panel, and covers the scratches I usually end up with on the front panel after drilling and punching all the holes.

Jim Nestor, WK8G/2 (jim.nestor@ey.com) sends this-- I use a slightly different approach for panels. Lay it out actual size on the computer using your favorite drawing package. Print on plain paper first & double-check for fit by laying it on the bare panel. (Don't skip this step.) Next, print on adhesive-backed label paper (the stuff I use is from Avery and is 8-1/2 x 11 as a single sheet, not divided into smaller labels).

Carefully position, peel & stick it to the pre-drilled panel. To protect the lettering, I apply a piece of peel & stick clear plastic, which is the same stuff you can use to laminate your ham license. Use a sharp hobby knife to remove the material from the panel holes.

If you can't find the peel & stick paper, you could use regular paper and attach it to the panel with rubber cement. That might even be easier since you can slide it around a bit until it's properly positioned and insure perfect placement.

Until now I've been stuck with white panels and black labels. With my new color printer, I'll try something fancier. Maybe I can mimic the Wilderness Radio blue panels with my own logo.

Finally, Features Editor ***Larry East, W1HUE,*** *supplies some info on one type of clear plastic film --* "Repro Film" is manufactured by Rayven, Inc. and is available by the box (100 sheets for around $40) in most large stationary stores. It is also sold by the sheet at some copy centers. It comes in matte, clear and white and various versions for copiers, laser printers and offset printing. The type numbers:

Matte ----- 300 -- For most copiers. 310 -- For most copiers including color copiers. 320 -- For laser printers and high temp copiers. 330 -- For offset printing. 360 -- For most copiers; 1/2 mil thicker than Type 300

Clear ----- 400 -- For most copiers. 410 -- For most copiers including color copiers. 420 -- For laser printers and high temp copiers. 430 -- For offset printing.

White ----- 500 -- For most copiers. 520 -- For laser printers, color copiers and high temp copiers.

I have used Type 320 with a LaserJet III printer and various copiers with good results. The stuff has a paper backing which peals off after copying or printing, exposing the adhesive side of the film. Once in place it can be removed, but it appears that the bond gets stronger the longer it remains in place. I usually cover it with a coat of clear lacquer (Krylon or similar) after putting it on a panel.

NARROW/WIDE FILTER FOR NN1G RIG

Narrow crystal filters are nice, but sometimes you want to hear surrounding signals as well. ***Bill Latta, N4LH*** *of Louisville, KY passes on this mod--*My NN1G one-board 40M transceiver is a great little performer but I wanted a wide/narrow switch to bypass the crystal filter for general listening. As shown in figure 6, I shunted a 0.1 uF disc ceramic and toggle switch across the filter. This was easy to do by connecting to the top leads of RFC1 and the 470 ohm resistor near U3; there's no need to disturb the board. ***[The capacitor is required to provide DC isolation between the NE-602s at the ends of the filter. --WA8MCQ]***

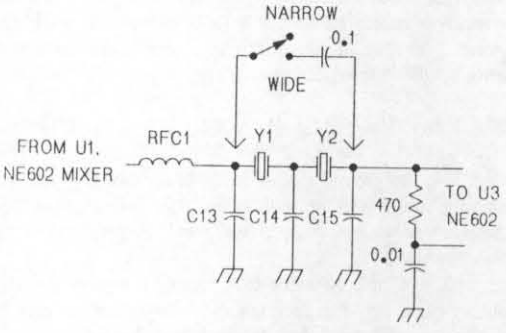

Figure 6: Narrow/wide filter mod for NN1G rig

I find the receiver easier to tune in "wide" and I don't miss those signals that I used to lose due to sharp tuning. Now I can copy SSB, RTTY, packet, AM and especially those exotic, raw or chirpy DX signals that I love! PS--You aren't kidding about the weakness of that multistrand "antenna wire you can tie in knots" (Idea Exchange, April 1996); mine has broken three times!

--DE N4LH

RF SAMPLER

From **Bill Stietenroth, K5ZTY** via QRP-L (k5zty@hamgate2.w5-f6cnb.ampr.org) comes this in-line RF sampler which can be used to tap off a signal from your transmitter to a frequency counter or other monitoring device. He says he used it as high as 440 MHz once, though I wouldn't recommend it for much over HF (30 MHz) since the reactance of the capacitor decreases with frequency, allowing a larger portion of the signal to flow through the tap. Use your favorite type of RF connectors--UHF, BNC, etc. Figure 7 is my KeyCAD version of his ASCII drawing. (The diodes protect the counter by limiting the voltage at the connector.)

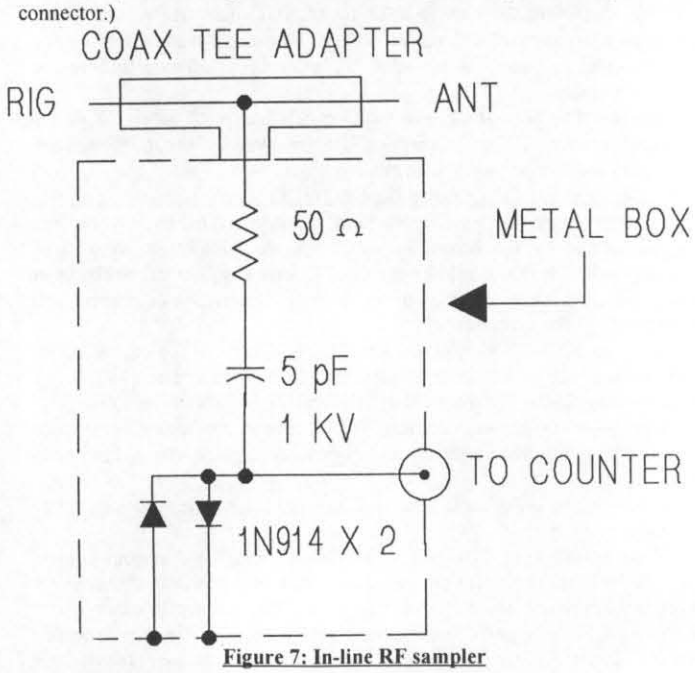

Figure 7: In-line RF sampler

OHR 400 FILTER BANDWIDTH MOD

*From **Marshall Emm, AA0XI/VK5FN** via QRP-L (75230.1405@CompuServe.COM)*-- The IF filter bandwidth on the 400 is very narrow, and I was finding it awkward to work with-- often I'd miss a signal because I tuned across it between words.

Dick Witzke, KE8KL of OHR suggested that modification of the IF bandwidth was just a matter of playing around with the shunt caps and suggested a couple of possibilities. I don't have anything to test it with apart from my ear, but the result is that the passband is wide enough now that I can tune the rig much more comfortably, without being "too" wide. And if things get crowded, the switchable audio filter is effective in reducing the audible bandwidth to what it was before.

On the receiver board, locate C204 (560pF). At the back edge of the board (looking from the front of the rig) you'll see an array of four crystals surrounded and separated by five caps:

C202 Y200 C203 Y201 *C204* Y202 C206 Y205 C205

Remove C204; the ground side is in a plated-through hole, so you may need to use your solder wick on both sides of the board. Note that you can unscrew the receiver board and flip it over (carefully) without disturbing any of the connecting wires.

Replace with a 470pF NP0 (or COG) cap of appropriate size. Don't worry about an exact fit-- the intention is to reduce capacitance by "a bit;" any added stray capacitance due to lead length will probably not be noticeable. To widen the bandwidth further, replace C203 and C206 with 330pF NP0s. I didn't do this part, but since Dick suggested it I thought I'd pass it along.

--DE AA0XI

MULTIBAND ANTENNA

John Stribrny, WB9CJB of Palos Park, IL passes on this multiband antenna--I first found this design in the January 1970 issue of Electronics Illustrated, by Jim White, W5LET. I put up one for a few years using 137.2 feet of fence wire and twin lead. It works on 80, 40, 20 and 10 meters very well. The direction of radiation changes from about 90 degrees on 80 to about 30 degrees on 10. It might be possible to work 15M by adding a dipole at the same feed point.

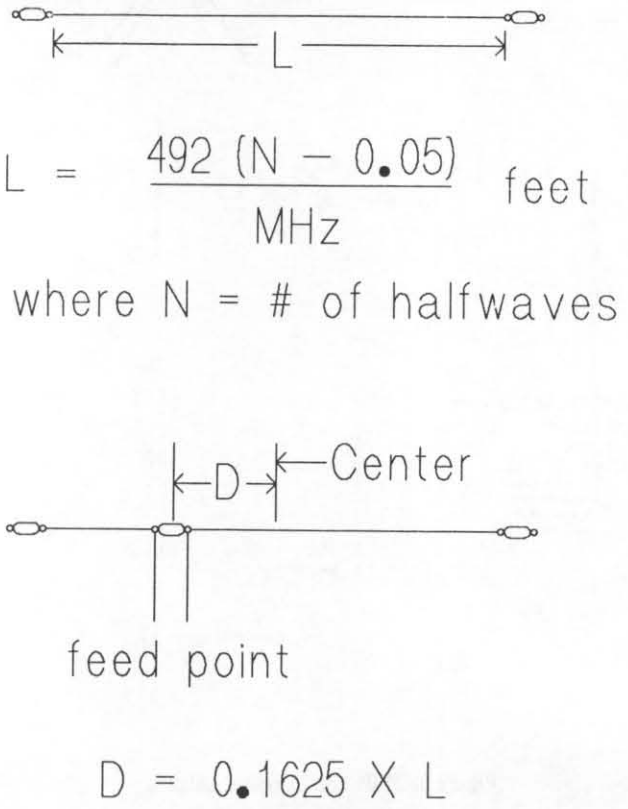

Figure 8: Multi-band antenna

The antenna is fed with 300 ohm twinlead to a tuner. The insulator for the feed point is offset from the center by a distance of 0.1625 times the length. For example, for a length of 137.2 feet, distance D is 22.3 feet. (This overall length was calculated using 8 half waves and 28.5 MHz; if you use 1 half wave and 3.5 MHz, the length and offset will be a bit shorter.)

--DE WB9CJB

THE FINE PRINT: Actually, the entire column is in fine print this time! In the past it used to be done in 10 point, with the "Fine Print" section done in 8 point, but this time it's all 8. Unfortunately I can't yet do 9 point, which is the size the rest of this issue is in (assuming that everyone followed Montes instructions!). We're trying to get things down to that size to cram more material into the same number of pages; I don't have software running yet that will hit that size but hope to in the future. In the meantime, Monte and I agreed that I'd use the smaller type to save space (and as an experiment to see how many people scream when we go this small!).

As usual, lots of good info comes from the "QRP Daily", the QRP-L Internet mail reflector at lehigh.edu. If interested in subscribing, send me an e-mail note and I'll send details on joining and getting a massive, daily dose of raw, unedited QRP. Started a few years ago by Chuck Adams, K5FO, it's grown to over 1200 subscribers, and it isn't unusual to see 50 or more postings a day! Got any good tips? Share them with QRP-L and the Idea Exchange readers! Just be sure to add wa8mcq@abs.net to the CC line so I don't miss it. **--qrp--**

T-Kit 1202 Power/SWR Meter Kit -- A Review

Stuart Rohre, K5KVH Round Rock, TX email: rohre@arlut.utexas.edu

First of all, this kit it is well worth the $49 price! Separate bridges are used for HF and VHF. It can be used from 160M to 6M on one bridge, and the second bridge is intended for use on 2M and will give at least relative indications on higher bands. (The bridge for 2M is the strip-line circuit Monimatch design.)

A heavy steel case is provided; this not only means it is rugged and sturdy, but it is also both electrically and magnetically shielded. There is a U shaped front, bottom and back panel. This sits in a U bottom, and a U shaped top piece goes over the top; four screws, two to a side, complete the enclosure. The result is a recessed front panel, and a very sturdy double case arrangement.

All RF connectors are high quality Amphenol mica-filled UHF female for both the HF and 2M sections. Part of the reason for this is to take advantage of the solder cup on the backside of the UHF chassis connector, which serves to anchor the 2M side to the strip line. On the HF side, it makes a tie point at each connector, for a cap and for the center of the coax piece that forms the primary of the HF RF transformer. The secondary is 10 turns of enameled wire wound on two ferrite cores of differing frequency characteristic, but glued together, to even out the transformer's frequency response. (Neat idea!)

The printed circuit board is silk screened with component designations, but is not solder masked. Room to solder is generally adequate and I used my Ungar temperature controlled solder station with the standard 1/8 inch wide chisel tip. I wished I had chosen a more narrow tip as I got to the final few connections that are made after the board is already soldered in a vertical position to the four type UHF sockets on the back panel. A better iron for this project would be the standard Antex one, or a heavy copper wire could have been added to my tip for the last two connections. There is just not the room that old Heath kit builders are accustomed to!

The components are first class, and no confusion is possible over color codes as long as you have a good strong light to work with. I find that a lighted magnifier helps to clearly see the colors on modern small resistors. (My work lights include a Halogen lamp now, as I find the age of bifocals and half century eyes need a bit of help.) All caps are disk ceramic, and marked in the number and multiplier manner. The back cover of the T-Kit manuals includes helpful component marking schemes, and soldering advice.

The manual is very clear and even included extra explanations as an "errata page" to be added to the manual before construction, just in case the ample illustrations were not enough. The use of color in the illustrations makes these manuals rival or exceed the best of Heath.

There are two boards, a main board that includes the pick up lines, meter amplifier op amps for HF and VHF, and all components except for the push-button switches and calibration trim pots. These mount on another board, which along with a vertical metal shield, cleverly provides a clamping mount for the meter movement on the inside of the front panel. This vertical shield also mounts the toggle switches and the SET pot for the SWR function. The result is a clean front panel layout, and no nuts, screws or fasteners. The unit is better looking than the line drawing in the T-Kit catalog! In fact, one of my few comments is that the T-Kit catalog's line drawing illustrations do not do justice to their sharp looking kits!

The meter amplifiers are powered from either an internal 9 Volt battery, (not supplied), or from a coaxial power jack on the back panel and your station power supply. Turned on, but not measuring RF, the battery drain was 800 microamp. A standard transistor radio battery should last a long time. However, there is no lamp or other indicator to remind you to turn the internal battery off. The power switch is center off, up is the external power and down is the internal battery. This means you have to pay attention, although I guess there is no harm in using the external position as an off state that is harder to bump to 'on' than the center off position. The hole for the coaxial external power jack had to be enlarged slightly to fit the jack supplied. I think that a dull punch had made the hole in my chassis, and then paint running into the side of the hole really made it tight. A set of Radio Shack files was adequate for this task, and it only took a few extra minutes. (Shades of original Radio Shack kits, circa 1964!)

I did completely read the manual first, and I added the errata supplementary comments. I must have been tired, and I did break up the construction because of back problems; but I estimate 7 (leisurely) hours of construction time. Next kit, maybe I will play background music and see if I assemble it quicker, for this kit does not have all that many parts.

One thing that does take a bit of care and time is some connections that are soldered to ground planes on both sides of the main board. Again, a smaller tip would have helped with this. You do end up soldering some of these on top of the silk screening, but the main job of this silk screen is just to help stuff the components, thus it does not really matter. The op amps are soldered to the board, but the option is given of mounting them in sockets, (sockets not included). Both are 8 pin chips, thus soldering them to the board is easy. Another time consuming task is measuring and cutting various pieces of hook up wire, but it is stranded, pre-tinned wire that really has a tight twist and is a pleasure to thread into even the smallest switch lugs. The most difficult measuring and cutting job is the coax, which is the Teflon, 1/8 inch type, for the HF transformer. It has silver plated shield and center conductor, but is difficult to strip. They include enough for you to mess up one transformer primary. With a sharp eXacto blade (and great care), I find I do a better job stripping this type of coax than by using conventional wire strippers.

You need something smaller than the standard alignment tool blade to turn the cross-screws of the tiny trimpots that are provided for calibration. There are four pots, in two groups, for HF and for VHF. One of each group is for the 20 Watt scale, and the other is for the 200 Watt scale. The VHF 20 Watt setting was most critical. A jeweler's screwdriver might be the thing to use for these adjustments.

After some initial confusion due to a dead "new" 9V battery, set-up and calibration was straightforward. It helps to have access to other Wattmeter(s) that can be trusted for either frequency range (HF and VHF) to use for calibration cross-checking. *[You can also measure the RF voltage across a dummy load with a calibrated RF probe or 'scope as a cross-check. --W1HUE]*

Some may ask about the utility of using a power meter for QRP that is rated at 20 Watts full scale on its lowest "factory" setting. The meter is actually very readable at QRP power levels as five Watts is over half scale. But what would it do at QRPp? To answer this, the T-Kit 1202 did its first real testing on the NorCal 40-9er kit running from a 9V battery. Even with the 20 Watt scale, the meter deflected enough to use it as an output indicator at this power level (about 1/4 Watt).

The meter happens to be numbered the same for the 200 Watt 20 Watt scales; you just crank in a factor of ten when you push the QRO button. That lead to the idea of trying to move the calibration of the low power setting to 2 Watts full scale. There was enough range in the calibration pot to do this, and then the NorCal came up to the 2.5 mark corresponding to 250 mW.

If you want to gain more HF sensitivity, a turn more on the pickup transformer core should increase the voltage for even lower QRPp.

There are 10 turns on the "stock" core, and plenty of room to wind more. That would require the least change to the kit. Each pickup unit is followed by a couple of stages of dual op amps, type LM358, thus there is plenty of room for experimentation in various ways to enhance the basic kit.

An attempt to play range calibration games with the VHF pickup section was thwarted by ambiguous readings from the low power range of a 2M HT used as a test source. It did, however, work fine at the 1.5 Watt output level as advertised.

The use of strip line printed circuit on the VHF side means you will have some lower sensitivity that only a change in the strip line pickup dimensions would alter. However, not too many of us need to go below a couple of Watts at VHF.

This kit is certainly a versatile operating aid for all common amateur bands of interest. It easily adapts to QRP, allowing you to have one instrument covering "barefoot QRO" power levels down to home built QRP power levels. If you need a power meter and SWR function that covers both VHF and HF, this kit certainly fills the bill at an attractive price. Its size complements the smaller QRP rigs on the market recently. You can hook RG-8 coax to it and it will not end up on the floor, because it is heavy. Yet it is still small enough to be part of a backpacker's gear.

T-Kit offers a similarly boxed $49 RF counterpoise tuner kit that probably could be turned into a companion QRP rig tuner to accompany this power meter on your travels. Who will be the first to write about a conversion of that one?

T-Kit, A Division of Ten-Tec, Inc.
1185 Dolly Parton Parkway
Sevierville, TN 37862-3710

(615) 453-7172 (Information)
(800) 833-7373 (Orders only)

Round Robin Review '96

Preston Douglas, WJ2V 216 Harborview North Lawrence, NY 11559

Introduction

This is a review and comparison of three single band transceiver kits, the MXM Simple Transceiver, the EMTECH NW8020, and the Oak Hills Research Explorer II. There are several other very good kits out there in the same price class, but I can't afford to buy them all! Notably, the Green Mountain series from Small Wonder Labs and the Wilderness Radio NorCal 40A are not reviewed here despite their popularity; perhaps because they are so much fun, no one wants to lend me one long enough to allow me to evaluate it. I have no financial interest in any of the companies, and, while I am acquainted with all the owners, at least by telephone, I haven't pulled any punches.

Readers may notice that I reviewed earlier versions of the NW and Explorer kits last year. In both cases, the current models are somewhat improved. The MXM kit has been on the market for several years now. All of these kits have superhet receivers, some sort of VBT (variable bandwidth tuning), solid state QSK, four pole IF filters, NE602 mixers, and prices around $100.

MXM Simple Transceiver

The MXM Simple Transceiver is manufactured by MXM Industries (addresses of suppliers are given at the end of this article). The price is $129.00 plus postage. Sales opportunities may bring the price down closer to $100. I did not build the unit reviewed, as it was a loaner, and came to me neatly constructed. The MXM comes with a painted cabinet that measures approx. 5.5in. x 6.5in. x 2in. It is not drilled or labeled. (I repaid the loan of this rig by making a computer generated labeled front panel for it. If you would like to have a copy, send me an SASE and I'll gladly send you a paper printout you can laminate yourself with stationary store laminating sheets.)

The MXM boasts the only double conversion receiver that I know of on the kit market, and it does perform with (subjective) prodigious sensitivity. It will drive a small speaker on strong signals, but it is still primarily an earphone radio. It puts out about 2 Watts of clean audio. The tested unit was on 30M which has not been open most times of the day, but it heard what weak signals there were. With a receiver this sensitive, there is a substantial increase in noise when the antenna is connected. Still, it has a high enough S/N ratio to give it a slight edge in the receiving department over the other radios tested.

This radio comes with a front mounted trimmer cap to vary the BFO in the second mixer (the product detector). The variable BFO allows the pitch/width of a signal to be varied somewhat. It would take me some more practice to get proficient with this control, although I can see it would be somewhat useful as a QRM fighter. It is not particularly user friendly, as it permits the BFO to go all the way over to the wrong side of zero beat, opening the possibility that you can inadvertently be transmitting about 1500 kHz away from an incoming signal. A skilled op should be able to quickly assure it is tuned to the right sideband. A beginner, however, would be confused by the arrangement and would probably be confused by this description!

I would have to say that this kit isn't best for novice builders, primarily because of the lack construction details in the six page manual. The instructions are adequate for those who can read a schematic, but are not suitable for a novice builder. A novice builder would have no idea what to do if it didn't work after it was built. Illustrations are few, and the printing process used doesn't help make them easily understood. Alignment might be a bit difficult because of the number of stages in the receiver. I did not align this radio, but the instructions did not appear to be particularly complicated. A 'scope is not required, although I suspect it would help to have one available. On the other hand, the manual does include a guarantee. You build it and they'll make it work. That is always important to me as a builder, as I am not willing to build a commercial kit without somewhere to send it if it doesn't work. The MXM guarantee is reassuring.

The MXM's PC board is about 3.5in. square, single sided, silk screened, and somewhat densely packed. The transformers are the really tiny transistor radio type, so soldering them will be close work. On the other hand, the cabinet supplied has a lot of room inside for accessories. The MXM has a lot of character for a ham who has some experience and wants something different.

Explorer II

The Oak Hill Research Explorer II is a refined version of the Explorer I, which I reviewed last year. Explorer II kits are available for 20M, 30M and 40M; I have the 40M version. The construction manual is nearly flawless. It is in the tradition of Heath manuals, with clear illustrations, lots of advice about building and soldering, and even pre-wound coils. The coils are wound with different colored wires, so we are talking idiot-proof here. The PC board is double sided, plated through, silk screen and masked. This kit is suitable for a novice builder, even one who is building with the aid of an "Elmer".

I built the Explorer II on a single Saturday, with lots of break time for chauffeuring the kids, etc. Alignment Sunday morning had me on the air with it and it was bug free. Frankly, with the quality of the whole kit, I would have been embarrassed if it hadn't worked off the bat. It did. The parts are complete, without anything missing, and it comes with a nicely punched, painted, and labeled cabinet. Knobs, hardware, and a really neat dial collar for the tuning cap are included. Proper alignment will make the dial markings right on. *[I had to do a fair amount of "tweaking" of VFO capacitor values to make my 30M version "right on"; see page 26 of the April 1996 QRP Quarterly. -- W1HUE]*

The manual specifically says the Explorer II is not intended to drive a loudspeaker. I tried it anyway. It will, on medium to strong signals, drive a speaker. The audio output is improved over last year's model. But it still isn't really loudspeaker audio, nor would I consider cutting into that nice cabinet to make holes for a speaker. This radio also put out about 2 Watts of clean RF, and OHR is deservedly famous for their "silky smooth" solid state QSK. In this case, "silky smooth" is truth in advertising. I find operating the Explorer II is simple and easy. The addition of VBT is welcome here, though the original IF filter (in the Explorer I) was quite adequate for casual operating. As a transceiver package, it works very well. The case is still too big to suit my tastes, but it certainly makes wiring easy. This kit costs about $100. It is a bargain, considering its completeness. If it doesn't work, OHR will fix it, and they also offer an alignment service for a modest bench fee.

I understand that the Explorer II is being phased out in the near future and will be replaced by the OHR-100 series of monoband rigs. If OHR has an Explorer II close out sale, be sure to grab one! I also understand that you will have to wind the toroids yourself for the new line of OHR kits; I guess Dick's XYL finally got tired of winding all those coils!

NW8020

The NW8020 series that I am reviewing here are new to the market in their present form. This series of kits was originally offered by Dan's Small Parts and Kits. When Dan had to temporarily cease business last year, the designer of the NW8020, Roy Gregson, opened his own firm, EMTECH, to sell an updated version of the kits. Kits are available for 80M, 40M, 30M and 20M. I imposed on Roy to send me a beta version to review, which he did. I then thought better of it, and waited to review the released version of the kit when the manual was finalized. My new NW's are on 20M and 80M, and they are very similar in operation. They have parts included for the VBT option, or you may wish to stay with the fixed IF filter, as it is quite adequate as is. I chose to go with the VBT. I found, as with my other rigs using this VBT design, there is considerable signal attenuation if the filter is narrowed too much. EMTECH also sells an optional audio filter that is quite effective. The center frequency of the audio filter and the BFO center must be aligned if the VBT and audio filter are to work in tandem. In practice, this has not been easy to accomplish. It has taken some fiddling to get it right. Still, with either filter alone, the NW receivers are quite good and have more than adequate selectivity. And the good part is that the NW's have audio power to spare. A 5 in. speaker can be driven to painful levels if you turn up the volume. You can operate the NW seriously with the speaker, even on the weak ones.

When I described the loudspeaker audio capabilities of the NW last year, I got a note asking me how the NW can have full audio while some of the other radios do not, although they all use the same complement of active devices. I dunno. Maybe it has to do with the design parameter stuff that I am not equipped to analyze. I do note that the Explorer has AGC which may attenuate the signal somewhat, and the NW's do not have AGC. Then again, the MXM doesn't have AGC and its audio output is low.

The NW instructions are very well done. While the NW is on a single PC board (single sided, masked and silk screened) it is built in sectors, representing modules in the rig. Thus, the VFO, RIT, Audio, and Keying circuits are built and tested individually. Then the receiver IF and BFO are built in a single step. At that point in my construction, I heard signals in this radio, as I expected to, since all the modules were working. That is always a nice sound to hear on a newly built radio, and these radios were only about 2/3 completed at that point! Parts are organized into well-labeled bags, sorted by module (big help) and they are new stock parts. (I didn't see any surplus stuff in any of the radios reviewed.) I was missing one cap in my 80M radio, which I had in stock. EMTECH will fix your non-working radio for a modest bench fee, too. You wind your own coils with this radio, and you have to buy your own cabinet and drill and label it. I did mine in a cabinet donated by Chuck Adams, K5FO, and used Windows Paintbrush to do the front and rear panels. You can do it too with a little investment of time, if you have a computer running MS-Windows® and a decent printer. If you happen to have an "Adams case", want to put an NW into it, and don't have a color printer, send me an SASE for the artwork.

The circuit board is the same size as the previous model's, meaning that it will fit snugly in a Radio Shack P/N 270-253 cabinet. This cabinet is compact, but heavy. Price of this kit is $80 plus postage. Note, though, that the optional audio filter is another $20. You might consider leaving out the VBT and just putting in the conventional audio filter. That combination worked nicely in my NW40 from last year, and it has simplicity to recommend it. I like extra knobs, so I put in everything. In operation, the NW is a full 5 Watt rig, which I find makes a difference in my call-back rate. I do like having the full QRP gallon for daily operation. The 5W drops off at the Novice end of the 80M band if you set up the radio to run the full distance from 3500 to 3725. I tore off three plates from my tuning cap to increase bandspread, sacrificing the novice end. That gave good bandspread over the whole General/Extra CW portion.

Wrap-Up

Which one do I pick? Well, if you factor in cases and hardware, the prices are pretty close. For me, I like the NW8020s because I like the speaker audio and 5W RF output. But for some others, one of the other two may be a better choice. If you are a real beginner, then the Explorer is the hands-down choice. You'll get a working radio that works well when built. And for the experienced ham who is looking for something different and challenging, the MXM is a good choice. Another factor might be current consumption. Without measuring them, the specs show the NW is, not surprisingly, more power hungry than the other two. My experience with all three firms is very positive. They want to make you happy, and they want your rig to work.

Suppliers of Kits Reviewed

MXM Industries (Simple Transceiver)
Rt. 1, Box 156C
Smithville, TX 78957
(512) 237-3906

Oak Hills Research (Explorer II)
20879 Madison St.
Big Rapids, MI 49307
(616) 796-0920

EMTECH (NW8020)
3641A Preble St.
Bremerton, WA 98312
(360) 415-0804

MILLIWATT OPERATION OF THE ARGONAUT 515

Brice Anderson, W9PNE

My early milliwatt operation was done entirely with home-built equipment. My best rig was a 6AU6A amplifier. With 100 volts on the plate, the input was 500 mW. With 50 volts on the plate, I could run inputs of 150 mW or less. I made my one-half watt input WAS with this rig 1975.

Later, I got an Argonaut 515, which is ideal for conversion to milliwatt operation. Being a transceiver, the Argonaut is much handier than separate TX/RX units. Open up the Argonaut and disconnect the +12 V lead to the amplifier board, insulating the free end. Connect a flexible insulated lead to the +DC terminal of the amp. board and bring it to the outside. Connect it to a stable DC source that can be adjusted from 1.5 to 5.0 volts.

I built a small voltage regulator unit which is powered from the accessory jack on the back of the Argonaut, and which is adjustable from 1.5 volts on up. I mounted two 3 inch panel meters on the unit to indicate the voltage and current drawn by the amplifier. The current reading is important in maintaining known output when switching between antennas, as explained later.

Before applying DC voltage to the amplifier, I measured the power that leaked through the amplifier stage from the driver. With the drive setting at zero, the output was zero. A drive setting of 8 gave 10 mW output across 51 ohms. A drive setting of 9 gave the maximum of 45 mW. since a drive setting of 8 is higher than normal, I was concerned that the driver or final transistors might be damaged, so I did not operate in this manner.

For accurate power output measurements, I used a Fluke 87 digital VOM with a RF probe, which is capable of measuring power down to microwatts across a 51 ohm resistive load. I compared readings obtained with the Fluke against a wattmeter having good accuracy at one and one-half watt, with a good estimate at one-quarter watt. The Fluke agreed almost exactly with the wattmeter. I am satisfied that the accuracy extends into the low milliwatt regions.

I was concerned about the power output changing when switching between antennas having different impedances. I have a veritable antenna farm here, with most antennas fed by 50 ohm coax. To check this out, I set up resistive loads of 26, 51 and 77 ohms. With the rig adjusted for a given output into 51 ohms, the load was switched to the other two values. There -were- power output differences. I was greatly relieved to find that small adjustments of the drive control to give the same Ic mA reading as the 51 ohm load returned the output exactly to the set value. So, after reading power into a 51 ohm load, I could switch antennas, reset the drive to get the same Ic, and the power output was correct. Of course, Power=E^2/R.

I tried many combinations of voltage and current and drive settings to determine the best combination for specific power output levels. I have listed the best values to use in the tables below.

20 mW Output		50 mW Output		90 mW Output	
1.5 V on final		1.9 V on final		1.9 V on final	
MHz Band	Ic mA	Approx. Drive	Ic mA	Approx. Drive	Ic mA	Approx. Drive
3.5	80	6.0	100	6.0	142	6.1
7	75	5.8	100	5.9	140	6.0
14	85	6.1	105	6.1	155	6.4
21	85	6.2	115	6.25	150	6.5
28	90	6.1	120	6.5	160	6.5

For higher power outputs, I made my tests on 7 MHz. I found variations on the other bands similar to those shown above.

250 mW Output		500 mW Output		1 Watt Output	
2.6 V on final		3.5 V on final		5.0 V on final	
Ic mA	Drive	Ic mA	Drive	Ic mA	Drive
210	6.0	315	6.0	395	6.0

Different Argonauts may require different drive settings and final collector currents. My Argonaut showed highest final efficiency on 7 MHz, where it reached 51% at one watt. Efficiency is less at lower outputs.

Try milliwatt operation. You will find that some stations will never hear you. Many will hear you but say "Sorry OM, too weak to copy". Then there are the real operators, many of them QRPers, who stick with you until they have your call, QTH, name and anything else you tell them.

For me, nothing is more thrilling than having a distant station answer my 20 mW call, and so far, I have contacted 22 states. I have WAS with 50 mW.

Good luck! and I hope I can hear you.

MFJ-90XX Diode/Fuse Protection

Phil Karns, KE3FL

In the shipped version of this radio, the 1-amp diode is on the negative power line going through a 1-amp fuse. The positive power line goes through just the fuse to the positive supply line to the radio. Thus, if polarity is reversed it is applied to the radio and to the diode-fuse combination which blows the fuse (and in most cases the diode as well) thereby protecting the radio by opening up the reversed-polarity positive power line of the radio.

Two problems with the MFJ design is that both the fuse and the diode are rated for 1-amp and the fuse is a thin trace on the PC-board. This causes both items to blow, not just the trace-fuse, and it is very difficult to replace a trace fuse. While the expense of replacing a fuse and diode are not much, it would be easy if only the fuse would blow and if the fuse were a standard easy-to-get, fast-blow type fuse.

I replaced the trace fuse with a mini-glass 1-amp fast blow fuse and I placed a 3-amp diode in parallel with the existing 1-amp diode. Even if the 1-amp diode blows, the 3-amp version will not.

To do the same for your rig, remove the six screws holding the top of the rig on. (Two on the two sides and two on the top nearest the front of the rig.) [To make life easier for me, I included a socket/plug combination on the speaker-wires and on the connection for the antenna wire.]

First, cut the fuse trace on the PC-board. (Or blow it by simply reversing the polarity to the rig. You don't even have to turn it on for the fuse and diode to blow!)

Solder a black wire to the anode side and a red wire to the cathode side. (anode---|>|----cathode - the BARed end of the diode).

Bring these wires to a small PC-board and attach them to at least a 3-amp diode. Connect the red-wire side of the diode to a fuse holder on the small PC-board and connect another red wire from the other end of the fuse holder back to the rig PC-board "PWR" trace.

The rig diode is in the upper left corner of the PC-board just under the antenna connector. The PWR trace is from the cathode side of the fuse going to the right, about half way across the board, and stops just short of the PWR connector (J3). It has a plated connector pad and free hole for your wire.

Don't forget a fuse in your holder- 1-amp MAX! (unless your MFJ says differently) Also, make sure the diode you use is rated at least three times the current rating of the fuse or else it will be damaged as well and need to be replaced at the same time. This means you'll have to carry along diodes as well as fuses and need to have solder and soldering iron and a way to power it, just what we're trying to get away from.

Last, I attached this small board to one of the screw-posts near the back of the radio. These are for the keyer and filter boards, neither of which I have. If you do have these additions, you'll need to figure out another method of securing the small diode/fuse PC-board.

NOTE: If you're not sure of the diode in your junk box, hook it up to a 1-amp fuse and attach power. If the fuse blows and the diode is OK (it might need to cool down a bit first), it should be acceptable for this type of application.

Good-luck, 72 & 73 de **KE3FL/Phil**

*NOTE: All references are with the transceiver facing you, with the top side up unless stated otherwise. (Or unless missed by both the author and editor!) de **Ron KU7Y***

QRP Net Information

Compiled by George "Danny" Gingell, K3TKS

1996 ARCI QRP Net Schedule

Net	Frequency	NCS (Alt. NCS)	Day	Time (1)
TCN (2)	14060	W5LXS (K2LGJ)	Sunday	2300 UTC
SEN (3)	7030 3535	K3TKS (AA1OC)	Wednesday (4)	0100 UTC 0130 UTC
GSN	3560	N9ZZ	Thursday (4)	0200 UTC
GLN	3560	W1CFI (WA1JXR)	Thursday (4)	0200 UTC
NEN	7040-41	K3TKS (KC1DI)	Saturday	1300 UTC
WSN-80	3558	WA6ARA (KI6SN)	Thursday (4)	0300 UTC
WSN-40	7040	W6SIY (several)	Saturday	1700 UTC

Notes:

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

Other QRP Nets

Net	Frequency	NCS (Alt. NCS)	Day	Time (1)
BC (SSB)	3729	- - -	Daily	0300 UTC
MI-QRP	3535	K8JRO	Wed. (2)	0200 UTC
NE-QRP	3855	WA1JXR	Monday	2100 EST
NEIQS	3560	- - -	Friday (2)	0200 UTC
OK-QRP	7060 (3560)	- - -	Sunday	1330 UTC
NW-QRP	10123	N7MFB	Tuesday (2)	0200 UTC
NW-QRP	7035	- - -	Saturday	0730 PST
N.C.QRP	3710	WA4NID (AA4SX)	Sunday	2200 EST
VE-QRP	14060	VE6BLY	Sunday	1800 UTC

Notes:

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

Please tell your friends about the QRP Nets -- they might decide to join after seeing how friendly we can be!

NOTICE: If an NCS does not appear for an ARCI net within ten minutes of scheduled net time, *anyone* can step in and take control. Just remember to send me a net report. No report, no credit!

CONTESTS

Cam Hartford, N6GA

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

I would like to introduce Steve Pituch, N2MNN, to the QRP ARCI contesting community. Steve has generously volunteered to take over production of the Contest Certificates, and to date has done an excellent job. With his help we will soon be current in certificate production. I was having difficulty getting caught up, so Steve's help is certainly timely and necessary. Welcome aboard, Steve, and thanks!

Just one time I would like to get through a Quarterly Contest column without having to publish additions or corrections. Not this edition, however. Your Honorable Editor and I accomplished a dropped pass, electronically speaking, and the result was some contestantants being missed in the results of the Spring QSO Party. I promise to stop throwing knuckle balls, Ron.

In need of recognition are Leonard,VE2BLX, of Quebec, who had 14,161 points. Also missed were Walt, KB2JE, who placed second in New Jersey with 153,867 points, and Ron, AA4S, with 421,596 points from North Carolina. Ron should also be shown on the Top Ten list, as he came in Sixth overall, and it should also be noted his 40 Meter Single Band entry was only a scant 9000 points shy of Ernie, W8MVN, in the 40M class.

Participation continues to be down some from the last few years, with the lousy band conditions seeming to be the main culprit. Note the comments in the Soap Boxes, which seem to be universally obsessed with the crummy state of propagation. Quite a challenging time for QRPers!

72/73, Cam N6GA

UPCOMING EVENTS

Fall QSO Party	October 19-20
Holiday Spirits Homebrew Sprint	December 1

MILLIWATT FIELD DAY

This year we had seventeen entries into the Milliwatt Field Day competition, which was down a little from last year. I know there were more QRP participants out there, but they didn't submit entries. Strange, when you consider that this is the only contest for which we hand out Real Hardware to the winners, not just the usual pieces of paper. The winner of the Club class gets a plaque, and the winners in the One-or-Two Op classes get trophies. So for those who made the effort to submit entries, here are the winners:

One Operator, Less than One Watt	KM3D
Two Operators, Less than One Watt	WB4ZKA
One Operator, Less than Five Watts	W3TS
Two Operators, Less than Five Watts	K3SS
Club Class	N6GA

I decided to split up the traditional ARRL Class B, "One-or-Two Operators" because 2 ops have a decided advantage over one op. With 2 ops, one person can set up antennas, sleep, cook, etc. while the other op is knocking off the Qs. A one-op setup is much more limited. Thanks to Jim, WAØRPI for helping nudge me in this direction.

Please note that, while it is usual for the Contest Manager to disqualify himself for awards because of a possible conflict of interest, I have no qualms about awarding the Club Class Plaque to the Zuni Loop group. It is true that they used my call, and that I was physically present, but my only real contribution was to set up the computer logging programs so that a power failure at 2 AM caused us to lose four hours of 40 Meter CW QSOs.

The fact that K7YHA was in charge of that position at the time may mean nothing, but it is now known that he had a clandestine meeting with the Knightlites on his way west, and that he was given certain "inducements" to help lower the Zuni's score is only a matter of conjecture. Be this as it may, his efforts fell piteously short, as can be seen by the results that follow.

Judging by the comments on the entries and the chatter on the Internet after the event, Field Day was enjoyed again by all participants.

Group Name	Call	Score	CW Qs	Phone Qs	Nr. Ops	Rig	Antennas
CLUB CLASS							
ZUNI LOOP MEF	N6GA	11,700	587	386	18	VRS	VRS
KNIGHTLITES	WJ4P	4,710	262	104	8	VRS	VRS
MILLIWATT CLASS							
	KM3D	300	30	0	1	NN1G	DELTA LOOP
	W9PNE	210	21	0	1	ARGO 515 - 20MW!	YAGI, HALF-SLOPER
AZ CANVAS SLAPPERS	WB4ZKA	1,170	78	0	2	40/40, 9020	WINDOM
5 WATTS - 1 OP							
	W3TS	7,005	461	12	1	ARGOSY	FAN DIPOLE @ 45'
	WAØRPI	6,953	447	33	1	IC-735	G5RV
	W9NJP	3,420	325	34	1	?	?
	KJ5MG	2,460	164	0	1	HB TCVR	DIPOLE
	KO6KA	1,650	110	0	1	?	?
	AE4CA	1,530	102	0	1	QRP+	88 CF ZEPP
	K3CHP	1,480	138	20	1	QRP+	VERT, YAGI @ 30'
	AA5NA	577	0	77	1	?	?
5 WATTS - 2 OPS							
	K3SS	5,385	292	134	2	IC-737	INV VEE, SLOPER
High Knob Hooters	N4ROA	4,433	287	17	2	?	?
	KE3OA	3,908	166	189	2	TS-690	LOOP, 20M FD SPECIAL
	VE3FAO	150	10	0	2	HB TCVR	DIPOLE

1996 Hootowl Sprint

Not many brave souls could stay up long enough to make a dent in the heavy QRN and lousy bands. Last year we had 37 entries, this year a meagre nine showed up. The bottom of the cycle seems to be taking it's toll. Here are the comments: Conditions really stunk on this end - K5ZTY; High bands dead, low bands murdered by QRN - K3CHP; My energy level was low and the noise level was high - AB5OU; Not so many QSOs, but a pleasant late night visit with friends - WB4ZKA.

STATE	*CALL*	*SCORE*	*POINTS*	*SPC*	*POWER*	*BANDS*	*TIME*	*RIG*	*ANTENNA*
AB	VE6GK	11074	113	14	5	A-2	3	IC 751	20M YAGI, INV VEE
TX	K5ZTY	4704	56	12	5	A-2	2.5	TS-830S	YAGI, G5RV
CA	N6WG	3038	62	7	5	40M	4	TS-180	DIAMOND LOOPS
AZ	WB4ZKA	1680	40	6	1.5	40M	2.5	NE 40/40	GROUND MTD VERTICAL
CA	KO6KA	1421	29	7	4	A-2	2	ARGO 509	SLOPING DIPOLES
MD	K3CHP	560	16	5	5	L-2	3	QRP+	HF2V VERT
ID	WB5QMP	350	25	2	2	40M	4	NORCAL 40A	TRAP VERTICAL
NY	N2VPK	294	14	3	4	A-2	1	?	?
NM	AB5OU	280	20	2	5	40M	0.5	QRP+	GAP VERT

1996 Summer Homebrew Sprint

The summer doldrums couldn't have been all that bad, if the turnout for the Summer Homebrew Sprint was any indicator. We had 51 entries this year, quite a few more than in any recent year. And all these in spite of thunderstorms, QRN and the occasional blown-up rig.

In their own words: Surprised at how well the OHR rig worked in a contest situation, proof that simple rigs do not mean inferior performance - KGØPP; Blew up finals in OHR 400, so no HB bonus points - sigh — VO1DRB; Condx poor, QSB bad - VE4AKI; Was rockbound on 14.062 and couldn't get attention of stations on 14.060 - KE4YH; Started on the picnic table, it rained - finished in garage - will be back - W9OVZ; Thunderstorms! - N3CZB; QRN vy heavy, aftermath of Bertha? - AC4QX; 40M very noisy, contested from summer cottage, had fun - VE2ABO; Thunderstorms rolled in, had to take down the vertical - AE4MK; Thunderstorms; AE4JP; Easy to hear weak signals until a VHF contester parked INSIDE my loop and called CQ with 100 watts on 6 meters - AB6SO; Ran portable on my deck... it started to rain - KC1FB; Every time the wind blew the regen would start to whistle and wander off... - WA6ARA; First time operating QRPp level and had alot of fun with it - AA1MR; Conditions poor, really had to dig to get some - KØFRP; Vy QRN, summer storms, took alot of work to make a few MW QSOs - W3TS; I think the IARU guys used up the band, not much left of it Sunday afternoon - K5ZTY; I could hear stations calling me on 40, but QRN just too heavy - WAØRPI; Had to quit early because of lightning - WØLK; So much static, I was numb after 30 minutes - KJ5MG; Impossible QRN from thunderstorms; lucky I made 4 contacts - N2MNN; Severe thunder-lightning-wind storm curtailed ops - N4ROA; 20 not so good, 40 worse - AA7WT; Conditions especially atrocious - all bands practically dead - K3AS; Conditions not great, but had a great time - AB5UA; New DSP filter really helped. This is the kind of contest even a YL can enjoy - N8UOO; Made one Q the first 20 minutes, then nothing for two hours, so went up from 950 MW to 2 watts... - KT3A; My HB transceiver is apart for modification - good timing! - WB6FZH; Heard more than I could work - bad condx on 20 - KG5LO.

From the sound of it, there must have been one very large thunderstorm that rolled all the way across the country, seeking out QRP contesters. But they persevered!

Special mention to Eric, KB3BFQ, who is a neighbor of John, K3WWP. I incorrectly identified Eric as WB3BFQ in the last Quarterly, which was only one of many slights thrown his way by other publications. Missed names, QTHs, and calls seem to have plagued him of late. "I'm starting to feel like Rodney Dangerfield" he said. Our apologies, Eric, and I can attest that there is no conspiracy abroad.

1996 Summer Homebrew Sprint

State	Call	Score	Points	SPCs	Power	Bands	Time	Rig	Antenna
20 Meters									
ID	W7CNL	19,782	157	18	5	20M	4	CENTURY 22	5 EL YAGI
CO	KGØPP	16,865	113	15	3	20M	2	EXPLORER 2	HF6V VERTICAL
NFL	VO1DRB	9,758	82	16	5	20M	4	IC-706	MFJ SUPER HI Q KOOP
MI	KG5LO	8,290	47	7	0.95	20M	3.5	NN1G MK2	VERTICAL
CO	WO0Q	7,576	46	8	5	20M	2.5	K9AY XCVR	INVERTED VEE
MAN	VE4AKI	6,584	58	14	5	20M	2.5	TT 555 SCOUT	SLOPER, DIPOLE, VERTICAL
CA	WA6AYI	6,132	73	12	2	20M	2	MFJ 9020	VERTICAL
FL	KE4YH	2,950	19	5	0.5	20M	2	ONE'ER	VERTICAL
WI	W9OVZ	1,554	37	6	5	20M	4	MFJ 9020	DIPOLE
UT	WØYSE	980	35	4	4	20M	2	MFJ-9020	DIPOLE @ 15', VERTICAL
HI	WB6FZH	294	14	3	4.5	20M	1	TT CENTURY-21	VERTICAL
PA	N3CZB	35	5	1	4	20M	1	MFJ 9020	INDOOR LOOP 36" DIAMETER
40 Meters									
NC	AC4QX	23,921	159	17	5	40M	4	ARK 4	G5RV
PA	KT3A	8,750	51	10	2	40M	4	NORCAL 40	DIPOLE @ 15', HAMSTICK
NJ	N2YVF	8,591	57	9	4	40M	3	ARK-4	DIPOLE
NJ	N2CQ	8,528	56	9	3	40M	2	OHR EXPLORER 2	?
PQ	VE2ABO	8,402	54	9	3	40M	2	HW-9	VERTICAL
ID	WB5QMP	7,898	69	6	2	40M	4	NORCAL 40A	DIPOLE
VA	AE4MK	6,519	31	7	2	40M	2	UGLY WEEKENDER XCVR	VERTICAL, ATTIC DIPOLE
SC	WJ4P	6,260	30	6	4	40M	1	OHR 400	GAP TITAN VERTICAL
CA	AA6IY	6,260	42	3	0.5	40M	2	NORCAL 40A	LONG WIRE
CA	W6SIY	6,230	41	2	0.25	40M	3.5	TUNA TIN 2, NEOPHYTE	40/20 DIPOLE @ 18'
CT	NM1J	5,525	25	3	2.4	40M	0.5	NORCAL 40A	VERTICAL LOOP
CA	AB6SO	5,378	27	2	1.75	40M	1	?	LOOP, APEX 15', CORNERS 4'
CA	WD6FDD	5,280	40	2	4	40M	1	NW 8020	?
CT	KC1FB	5,200	10	2	0.95	40M	2	NE 40-40	DELTA LOOP
OH	WD8KQY	5,200	10	2	0.95	40M	1	NORCAL 40A	?
CA	WA6ARA	5,070	10	1	0.5	40M	1	3A4 TUBE, HEATH GR-81 REGEN	?
CA	KO6KA	5,035	5	1	2	40M	1	HW-8	SLOPING DIPOLE
IN	N9DAN	4,536	72	9	4	40M	2.5	FT 890	R7 VERTICAL
MA	AA1MR	3,800	30	4	0.1	40M	2.5	HB VFO (W1FB DESIGN)	160M ZEPP @ 35'
KS	WBØSMZ	2,616	22	4	4	40M	2.5	HB ROCKBENDER	VERTICAL, DIPOLE
All- Band									
CO	KØFRP	148,512	416	51	5	A-2	4	OHR CLASSIC, TS850	YAGIS @ 70 AND 80 FT
PA	W3TS	75,500	148	25	0.25	A-4	2.5	HB TCVR	INV VEE @ 60',YAGI @ 52'
PA	K7YHA	32,925	75	17	3	A-7	2	SIERRA, TEMPO S-2, IC-24AT	YAGI @ 52', 80 m ZEPP, VRS VHF STUFF
LA	AC5AM	32,560	148	22	0.95	A-2	4	ARGO 515	40M LOOP @ 100', 20M LOOP @ 80'
GA	AE4CA	27,440	109	16	0.95	A-2	4	NN1G 20/40	80M LOOP
TX	K5ZTY	26,214	89	18	5	A-3	3	OHR400, HW-8	YAGI, G5RV
MN	WAØRPI	20,115	85	17	4	A-2	1.5	HW-9	LOOP & DIPOLE
AR	W0LK	17,189	79	13	4	A-2	2	OHR CLASSIC	80M DELTA LOOP
OK	KJ5MG	16,237	81	11	5	A-2	3	HB TCVRS	DIPOLE
NJ	N2MNN	15,800	20	4	0.95	A-3	4	SIERRA	40M VETICAL LOOP
VA	N4ROA	13,888	124	16	5	A-2	2.5	QRP+	DIPOLES
MT	AA7WT	13,850	55	10	2	A-2	3.5	NORCAL 40, NN1G (20)	YAGI @ 50', INV VEE @ 45'
NJ	W2JEK	11,470	35	6	2.5	A-2	1	OHR 40, NN1G (20)	DIPOLE, GP ON 20
DE	K3AS	10,560	20	4	1.5	A-2	3	HW-8	55' MARCONI IN ATIC
WI	WW9H	10,252	12	3	4	A-2	1	OHR 400	YAGI, DIPOLE
OK	AB5UA	10,040	72	10	4	A-2	3	EXPLORER 2, TS-450	VERTICAL, YAGI @ 50'
PA	K3WWP	8,770	22	5	5	A-4	0.25	HB 6Y6 FINAL	RANDOM WIRE, DIPOLE
PA	KB3BFQ	1,134	27	6	4	A-4	0.5	QRP+	WIRE ANTENNAS
Lo Band									
OH	N8UOO	45,672	196	26	3	L-2	4	HW-8	80M LOOP

FALL QSO PARTY

Date/Time:
Oct. 19, 1996, 1200Z through Oct. 20, 2400Z
Exchange:
Member - RST, State/Province/Country, ARCI Number
Non-Member - RST, State/Province/Country, Power Out
QSO Points:
Member = 5 Points
Non-Member, Different Continent = 4 Points
Non-Member, Same Continent = 2 Points
Multiplier:
SPC (State/Province/Country) total for all bands.
The same station may be worked on more than one band for QSO points and SPC credit.
Power Multiplier:
0 - 250 MW = X 15; 250 MW - 1 Watt = X 10
1 W - 5 W = X 7; Over 5 W = X 1.
Suggested Frequencies:

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

Score:
Points (total for all bands) X SPCs (total for all bands) X Power Multiplier.
Team Competition: Competition between teams consisting of 2 to 5 members will be a separate category apart from individual entries. Team members will be listed as individuals and the team score will be the total of the members' scores. The team captain must send a list of team members to the contest manager postmarked at least one day prior to the QSO Party.

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

HOLIDAY SPIRITS HOMEBREW SPRINT

Date/Time:
December 1, 1996; 2000 - 2400 Z
Exchange:
Member - RST, State/Province/Country, ARCI Number
Non-Member - RST, State/Province/Country, Power Out
QSO Points:
Member = 5 Points
Non-Member, Different Continent = 4 Points
Non-Member, Same Continent = 2 Points
Multiplier:
SPC (State/Province/Country) total for all bands.
The same station may be worked on more than one band for QSO points and SPC credit.
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:
0 - 250 MW = X 15; 250 MW - 1 Watt = X 10
1 W - 5 W = X 7; Over 5 W = X 1.
Suggested Frequencies:

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

Score:
Points (total for all bands) X SPCs (total for all bands) X Power Multiplier + Bonus Points.

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 three scores, to the top score in each Single-band, Lo-band and Hi-band class, and to the top score 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. 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
959 Bridgeport Ave.
Claremont, CA 91711

QRP ARCI AWARDS

Quarterly Awards Column written by Chuck Adams, K5FO

Due to budgetary constraints and a limited number of pages per issue of the quarterly those of us that have continuing columns are all restricted in the amount of space we can take up each issue. Thus, I will periodically opt to not include text and go for the extra page or two for the data that is being printed in each issue in this column. I hope you don't mind. My intention is to get all the data published for the record. I realize that some may feel that old data may be a waste of space, but I assure you that it is not. Hopefully this will become self evident in a short period of time and the person achieving the award is not the only one that wants to see it in print.

The SASE

A SASE is a self addressed stamped envelope having your complete name and address on it. But over the past few years I've been having a problem with some of the envelopes. I prefer to have them all the same size as the #10 business envelope. This envelope measures 24 centimeters wide by 10.5 centimeters high or close to it. This simplifies my life greatly since I use a laser printer and the standard 21.6 cm by 28 cm sheets of paper that fold twice to fit the above envelope nicely. Makes things neat and fast. I also use a large envelope to mail the certificate(s) in so that they are not folded and hopefully not damaged by the postal service in transit. So don't send a SASE for the certificate. The cost of the award covers the printing costs of the certificate and the costs of the postage. It will save me time if you could also include a sticky label with your name and address on it so that I don't have to spend five or so minutes doing it myself. I know that it doesn't seem like a big deal, but it will save me hours of work per month if everyone does it. This label to be stuck on the award envelope. I have found that in QSLing if I include a label it increases my returns and I usually get a note that the other person appreciates the fact that it saves them a lot of time.

Damaged Mail

I get back from the US Postal Service the following message on a plastic envelope with damaged mail inside:

Dear Postal Customer:

The enclosed letter was damaged in handling in the Postal Service.

We realize that you mail is important to you and you have every right to expect it to be delivered intact and in good condition. The Postal Service makes every effort to properly hand the mail entrusted to it, but, due to the large volume, occasional damage does occur.

They go on to mention the handling of five million pieces of mail daily and their mechanical methods. So sometimes the only thing that I get back in the envelope is my return address portion of the envelope, thus I have no idea what was in the envelope and to whom it was sent. So I am happy to announce at this time I have sent out all awards and if you have not heard from me send me email if you are on the internet or a postcard otherwise and I'll let you know the status of your application. If I show that an award has been sent then I'll assume that it is lost forever in the mail and will send out another at my expense and not the expense of the club. If you sent a check and it has not been cashed, then send another one. If the bank charges you to cancel payment on a check, then save yourself the charge and do not cancel it. I promise that I have the records online and will not charge you twice. If I should happen to do this, I will refund the extra. I don't need the money. I know that the previous printing shows that checks should be made out to the club but it will speed up things if you make it out to me. The club will get the money.

Endorsements

If you read the fine print for the awards, there are endorsements given for single band achievements, single mode, natural power, Novice, or two-way QRP contacts and no other. I get requests for endorsements for wire antennas only, straight key only, battery powered, and a multitude of others. I would like to honor all requests for all kinds of things but let's keep the requests to a minimum. QRPp levels or all contacts at or lower than a particular level are fine.

Quarterly Issues prior to 1985

I have all the issues of the quarterly since 1985 and KI6DS has them available. I have been trying for years to find someone who has all issues of the Quarterly since the beginning of the club. Surely someone has all of them. Please drop me a card if you have any complete issues prior to this time and I would like to make arrangements to get a clean copy. It would be nice if there existed several complete sets of the Quarterly in each region of the country for the purpose of making sure that all of our history does not disappear. You will get credit for your contribution to this personal project. So check the book cases, boxes, closets, files, etc. Do it before you forget about it. My personal thanks to all that help in advance.

KWM Awards Listings

The following pages of data are a continuation of the one-thousand mile per watt awards. Each is numbered in sequence, date in form of year-month-day, call of station getting award, power level, other station, his/her power, miles per watt, band in MHz, mode of operation, and QSO date. We've made the print smaller than previous printings to get more in.

dit dit de K5FO/QRP

NR	DATE	TO	POWER	WITH	POWER	MI/WATT	BAND	MDE	QSO DATE
763	820926	N4FSZ	1.4	KA7KCQ	QRO	1,642	21	CW	820420
764	820926	N4FSZ	2.0	EA4BJC	QRO	1,999	14	CW	820423
765	820926	N7DGZ	1.4	K1JD/KH6	QRO	1,928	14	CW	820821
766	821017	N7DHA	1.4	K4HZK	QRO	1,692	14	CW	820829
767	821017	N7DHA	1.06	KH6OZ	QRO	2,544	21	CW	820901
768	821017	WD9IFF	0.5	JH1BAY	QRO	12,698	28	CW	811003
769	821017	KE6VY	2	W3RMD	QRO	1,163	21	CW	830912
770	821017	SM1CNS	0.65	ZK1CQ	QRO	15,071	21	CW	820419
771	821029	WB2IPX	3	CT4BD	QRO	1,144	3.5	SSB	791216
772	821029	VE3KTZ	2	ZL2MM	100	4,330	21	CW	820322
773	821029	K4KJP	0.37	WB5LUA	400	1,678	1296	CW	820609
774	821029	G4OSE	2.7	WB0YJQ	160	1,508	21	CW	820915
775	821029	WB9WGM	2.5	ZS1XR	QRO	3,396	21	CW	801024
776	821029	N7GDZ	0.92	AX2PBK	QRO	8,324	21	CW	820913
777	821031	WB9WOM	0.5	KA1W	0.5	1,618	14	CW	820306
778	821031	KA9NZI	0.37	WB0UCQ	0.37	2,462	21	CW	831016
779	821113	JE2MFE	0.5	K7WA	160	9,834	7	CW	820307
780	821113	W7OKE	2	ZL1JM	QRO	3,508	21	SSB	821011
781	821113	KE6VY	2	VK2DZZ	QRO	3,766	14	CW	820717
782	821113	K5IS	2MW	JA7IL	KW	2,987,500	21	CW	821115
783	821113	KA7HRE	1	VK3XB	QRO	8,166	21	CW	800623
784	821113	G4EBO	2	ZL4CO	100	4,688	14	CW	811008
785	821121	N7DGZ	2.2	W4IOL	100	1,142	7	CW	821104
786	821121	KM9Q	1	F6HKD	QRO	4,134	21	CW	820523
787	821130	KH6UN	100	KA7KLH	2	1,529	21	CW	821026
788	821130	WB3GNJ	0.5	ON6PQ	QRO	6,622	21	CW	820207
789	821227	N7DHA	2.1	W3QWW	100	1,021	7	CW	821120
790	821227	WA2BTG	2	OZ1GCC	100	1,857	28	CW	821018
791	821227	JH1KRC	1	EA6HI	QRO	6,570	14	SSB	820826
792	821227	JH1KRC	1	LU1EWL	QRO	11,417	14	CW	820829
793	830124	KA7MNZ	5	VK4NPK	QRO	1,589	21	CW	821207
794	830124	VE6ER	2	VK0KS	QRO	5,723	14	SSB	800425
795	830124	N4BP	50MW	3B8CF	QRO	194,800	14	CW	820111
796	830124	W5HKA	1.25	N7DHA	1.28	1,362	14	CW	821017
797	830129	WB5YVG	1	KZ5OJN	QRO	1,773	21	CW	770715
798	830129	KA2KMU	2	N6EZC	QRO	1,269	14	CW	820323
799	830129	W3UCS	1	VK5DP	QRO	10,356	14	CW	820422
800	830129	WB7OJV	1	WB9WOM	2	1,681	14	CW	821118
801	830129	KB9KX	1	KW6WH	100	1,713	21	CW	820814
802	830129	WB0BEK	0.9	W6VD	200	1,764	10	CW	830115
803	830129	JR3ELR/0	0.2	JH7YNZ/7	20	1,110	144	SSB	820807
804	830129	SM6HQK	2.5	JA0DAI	QRO	2,038	21	SSB	820328
805	830129	K4TWJ	4	YJ8IR	QRO	1,916	28	SSB	800726
806	830221	KB3ND	2.5	ZL3AGI	70	3,582	14	CW	820821
807	830221	WD6EKR	4	ZS5SP	QRO	2,698	21	SSB	811029
808	830221	WD6EKR	4	F9YZ	4	1,409	21	SSB	810901
809	830221	N6HY	67uW	KD5OB	QRO	21,597,015	28	CW	830109
810	830221	KD5OB	QRO	N6HY	67uW	21,597,015	28	CW	830109
811	830221	W2JEK	2	UA9NN	QRO	2,761	14	CW	810822
812	830221	W2JEK	2	YU4GYZ	QRO	2,229	7	CW	820115
813	830228	WD4SMH	2	KA6IYE	QRO	1,155	21	CW	811008
814	830228	KA6UTU	2	KH6OU	120	1,291	21	CW	830202
815	830228	KA1CZF	2	CT3BZ	QRO	1,550	3.5	CW	811128
816	830401	KA4QZH	70	KN1H	1	1,252	21	CW	830129
817	830401	VK3KHI	1	DJ7YE	500	10,046	21	SSB	811227
818	830528	W1FMR	1.3	VK3MR	QRO	8,115	7	CW	820727
819	830528	KB9KX	1	N6HTR	100	1,620	14	CW	830311
820	830528	AI2T	2	G8DV	2.5	1,680	21	CW	820524
821	830528	K4KJP	0.232	OE5BOL	200	34,957	28	CW	830310
822	830528	ZS6BCR	3	W6KH	KW	3,507	14	CW	810907
823	830528	ZS6BCR	5	JA1HLR	22	2,800	28	CW	810416
824	830528	ZS6BCR	5	JM1CAX	100	2,794	21	SSB	811014
825	830528	JF2QHC	300MW	JH8VQX	10	2,493	21	SSB	830216
826	830528	JH1HHE	1	5W1BG	QRO	4,639	21	SSB	771124
827	830528	JH5UJL	400MW	JA8YNE	10	2,198	21	SSB	820922
828	830528	AD2Y	2	C5ACG	100	2,010	14	SSB	810705
829	830528	AD2Y	2	CN8CY	100	1,793	14	CW	811126
830	830528	AD2Y	2	A4XIU	100	3,448	21	SSB	811008
831	830528	AD2Y	2	W4GSM/CE0	KW	2,759	21	CW	810305
832	830528	AD2Y	2	ZK2ZZ	KW	3,842	28	SSB	811024
833	830528	AD2Y	2	ZB2EO	100	1,792	28	CW	811015
834	830630	WA1WLU	2	9Y4BR	2	1,146	21	CW	770410
835	830630	K4KJP	1.55MW	W4ODW	25	8,129	144	FM	830601
836	830630	KA6SVQ	QRO	KA9NZI	1.5	1,132	21	CW	830423
837	830630	KA9OLS	0.4	KA3DCM	180	1,658	7	CW	830527

NR	DATE	TO	POWER	WITH	POWER	MI/WATT	BAND	MDE	QSO DATE
838	830630	G4KKI	1.25	VK2VA	QRO	8,454	14	CW	810109
839	830630	G4KKI	1.25	WB4AGH	0.7	5,489	14	CW	810811
840	830730	WD4DSS	36MW	W9GJS	QRO	10,361	7	CW	830606
841	830730	W9GJS	QRO	WD4DSS	36MW	10,361	7	CW	830606
842	830730	AA2U	0.68MW	WD4NAN	500	1,595,588	21	CW	800102
843	830730	AD1C	50MW	GU3MBS/M	50	64,320	28	CW	801206
844	830905	N9DHX	2	VK2WU	QRO	4,639	7	SSB	830709
845	830905	N9DHX	2	FB8WG	QRO	5,136	14	SSB	821014
846	830905	N9DHX	2	VK2WU	QRO	4,639	21	SSB	830709
847	830905	N9DHX	2	ZL2AAS	QRO	4,100	28	SSB	830318
848	830905	VU2SAZ	0.5	VU2ATH	60	2,362	14	CW	770115
849	830905	YV6ABM	1.2	W7MCG	KW	2,868	21	CW	830330
850	830905	WA1PNQ	2	OK3AUI	5	2,130	14	CW	820718
851	830905	K4KJP	0.037	WB0ZKG	1	23,351	50	SSB	830723
852	830905	VK3KPJ	1.5	KA6EED	2	5,289	28	SSB	830305
853	830905	SM7HVQ	1.5	KD2X	QRO	2,623	14	CW	800621
854	830905	OZ4LS	2	WA6SYR	QRO	2,766	28	SSB	791030
855	830905	DE1BMH	SWL	JY5OL	1	2,242	14	SSB	820326
856	830905	K9PNG	2	3B8FK	QRO	4,968	14	CW	821119
857	831113	WB2IPX	3	ZL2OD	120	2,943	7	CW	820610
858	831126	AI2T	0.150	KA4CKL	180	1,713	7	CW	830821
859	831126	WA3GYW	1.5	N6DYZ	180	1,547	21	CW	810805
860	831126	N5CNH	3	JA5FMP	20	2,305	21	CW	821001
861	831126	KC5EV	3	ZL3RK	QRO	2,570	21	SSB	810420
862	831126	KC5EV	2	VK2NEC	9	4,323	21	CW	790624
863	831126	JA3PAV	2.4MW	JA8EVV	0.6	272,083	50	SSB	810822
864	831126	JL1GOG	0.250	JA8JDM	10	2,488	50	SSB	820705
865	831126	JL1GOG	300MW	JA7IFI	15	8,663	21	SSB	830422
866	831225	JJ1OSG	13.8MW	JH1MBQ	13.8MW	11,377	50	AM	810719
867	831225	N9EEP	1.6	TI2PZ	QRO	1,383	14	CW	831121
868	840225	KW9N	5	YU3DT	500	1,002	14	CW	831227
869	840225	WA3NXA	2.5	ON4OU	QRO	1,356	14	CW	720204
870	840225	JA1CKE	1	LU6CT	5	11,419	21	CW	821014
871	840225	N4BP	1MW	WA6GFE/5	150	1,684,000	28	SSB	831019
872	840225	N4ELM	1.5	KA7ZA	QRO	1,570	14	CW	830720
873	840225	DE1BMH	SWL	N8CQA	2	2,007	14	CW	820606
874	840225	KO7V	1.3	VK5NPS	QRO	6,552	21	CW	830509
875	840225	VK5AGX	5	CT4CH	5	2,062	21	CW	820425
876	840225	G5CSU	2	VK3PR	QRO	5,223	14	SSB	800409
877	840225	ZL2NCC	5	OE6JGG	70	2,253	28	SSB	831224
878	840225	JA7AS	1	LU6DKS	QRO	11,304	14	CW	790729
879	840325	VK4ZSH	0.001	VK4ZNC	0.001	124,000	10G	FM	780414
880	840515	WA9FWO	5	FK8CE	QRO	1,526	28	CW	830810
881	840515	WA9FWO	5	4K1A	QRO	1,695	14	CW	820603
882	840515	W1XH	1.1	W6JHQ	5	2,230	21	CW	831022
883	840524	N0DSG	3	ZK9RW	QRO	1,943	21	CW	831019
884	840524	KH6JOI	2	W1FZY	200	2,512	7	CW	840405
885	840524	K2JT	3.5	ZL2ACW	QRO	1,517	21	CW	821031
886	840524	KA2KMU	2	AL7FD	QRO	1,666	21	CW	840227
887	840524	VK2ERJ	10	JF2SMW	1.1	4,461	21	SSB	830114
888	840524	JA9MJR	0.25	JR8DQG	10	2,204	50	SSB	820803
889	840524	JA4CTL	QRO	W8ILC	1	6,834	14	CW	771127
890	840524	AI2T	0.4	KI4AC	QRO	1,163	3.5	CW	840126
891	840524	AI2T	0.5	W9ZEN	QRO	1,366	14	CW	831030
892	840524	K4KJP	0.1	W9PNE	5	5,650	3.5	CW	840314
893	840524	KW9N	1	PY2GNU	QRO	5,386	21	CW	840413
894	840531	KF4JU	150uW	W4ODW	QRO	2,306,670	1296	CW	840429
895	840531	JH7BDS	1	KH6CP	4.5	3,940	7	CW	830524
896	840531	WD6DMY	5	JA7AS	2	1,047	21	CW	840422
897	840531	JA7IFI	15	JL7GOG	0.3	8,313	21	SSB	840422
898	840531	GM4JJG	2	UL7LDR	40	1,310	14	CW	820529
899	840531	GM4JJG	2	W7WW	QRO	2,279	21	CW	820104
900	840531	JA4REP	0.3	JR6WEN	10	2,497	21	SSB	830721
901	840531	VE3JFH	2	VK1GP	QRO	4,829	14	CW	840317
902	840531	VE3JFH	2	ZS3PH	QRO	3,862	21	CW	830121
903	840531	VE3JFH	2	VK4VKX	9	4,689	28	CW	811128
904	840731	W3TS	0.9	KU7I	QRO	1,840	21	CW	840422
905	840731	W3TS	3	VK3BYN	QRO	3,405	14	SSB	820418
906	840802	KA3LPW	1	W9KTE	QRO	1,331	21	CW	840131
907	840802	VK4ZSH	3	JR7VNJ	QRO	1,538	50	SSB	830418
908	840802	KB1MW	0.05	KA4CKL	QRO	6,300	7	CW	840616
909	840807	N6GTI	1.2	JE3MUZ	QRO	4,689	21	CW	831008
910	840807	KX5L	5	VK2WU	QRO	1,753	14	CW	830710
911	850113	K9EIJ	2	ZL2UW	QRO	4,075	7	CW	840812
912	850113	KZ9H	2	KH6IJS	2	2,165	21	CW	840421

NR	DATE	TO	POWER	WITH	POWER	MI/WATT	BAND	MDE	QSO DATE
913	850113	W6SIY	1.25	OH0AM	QRO	4,317	14	CW	840421
914	850113	AA2U	480uW	KW9O	200	1,612,500	10	CW	841005
915	850113	JR3ELR	0.1	JJ1OSG	2	1,080	50	AM	840505
916	850113	W6JHQ	5	ZF2AL	1.75	1,460	14	CW	841227
917	850113	NW6V	5	ZF2AL	1.75	1,416	14	CW	841227
918	850929	WB3ALL	0.5	G4BUE	0.95	7,002	21	CW	840421
919	850929	WB3ALL	1	KH6XX	QRO	4,866	21	SSB	840325
920	860131	KH6CP	0.343	K5LZO	QRO	4,431	1.8	CW	850309
921	860131	K5NT	3.5	YB9ADE	QRO	1,079	21	CW	820528
922	860131	KS7R	2	JA9EEH	QRO	2,665	21	CW	830903
923	860131	JP1JYU	0.25	JA8UDE	10	2,324	50	SSB	840816
924	860131	JH6KZI	0.4	JA8NYP	QRO	1,703	50	SSB	740526
925	860131	JE1PMZ	0.3	N6RZ	QRO	17,290	21	SSB	841027
926	860215	W0DBZ	2	SM3BU	QRO	2,104	21	CW	810923
927	860215	JA6GCG	0.25	JH8IOJ	10	3,608	50	SSB	950429
928	860215	G4VGA	2	W8PJ	1	1,864	14	CW	850907
929	860215	EA2SN	2	LU2FDR	QRO	3,193	28	SSB	831029
930	860215	EA2SN	2	PY3CB	QRO	2,930	21	SSB	820627
931	860215	EA2SN	2	LU3DGO	QRO	3,289	28	SSB	820626
932	860215	EA2SN	2	ZS1CT	QRO	2,735	28	SSB	840324
933	860215	EA2SN	2	PP2ZDD	QRO	2,524	28	SSB	820710
934	860215	EA2SN	2	JF1EQA	QRO	3,276	21	SSB	830326
935	860215	EA2SN	2	ZL2AH	QRO	6,135	14	SSB	830326
936	860215	EA2SN	2	VP2EC	QRO	1,941	7	SSB	830326
937	860215	JR3EZH	0.3	A35PP	QRO	16,363	21	SSB	830224
938	860215	N0ETQ	1	ZL1BRQ	QRO	8,429	14	CW	850825
939	860215	WA1MBK	2	KH6XX	QRO	2,490	7	CW	850525
940	860215	DL2HCB	3	N4WW	QRO	1,618	14	CW	850217
941	860705	SN9GOM	3	JA7AHO	QRO	2,585	14	CW	840916
942	860705	DL2HCB	2	VE1ZZ	QRO	1,232	7	CW	851024
943	860705	N7CEE	0.375	NL7CZ	QRO	2,720	7	CW	850119
944	860705	K9EIJ	2	3B8CF	QRO	5,016	21	CW	851118
945	860705	KD9NT	5	3B8CF	QRO	2,006	21	CW	851119
946	980706	KA2YKZ	2	EA8AJS	QRO	1,687	21	CW	850922
947	860706	KA2YKZ	2	F6HWV	QRO	2,049	21	CW	851109
948	860706	KA2YKZ	2	IK3AFW	QRO	2,107	21	CW	850812
949	860706	KY9Y	1.2	ON4APO	QRO	3,590	21	CW	840404
950	860706	NF5Y	3	VK7VV	3	3,121	14	CW	850615
951	860706	VK7VV	3	NF5Y	3	3,121	14	CW	850615
952	860706	KA8NRC	1.9	OH1WIX	QRO	3,449	21	CW	831005
953	860706	JR3ELR	0.2	JR8VJO	QRO	2,060	144	SSB	850804
954	860706	JQ1BPV	0.8	JF2EGV/1	10MW	2,200	50	AM	840902
955	860706	N4KEZ	0.35	VE2NTO	QRO	1,365	7	CW	841013
956	860706	VE3NTO	QRO	N4KEZ	0.35	1,365	7	CW	841013
957	860706	WA7TUX	5	VK4AI	QRO	1,612	7	SSB	840421
958	860929	K4KJP	0.6MW	W4ODW	2	21,000	13CM	CW	860626
959	860929	W4ODW	2	K4KJP	0.6MW	21,000	13CM	CW	860626
960	861005	G4ASL	0.45	EV6AW	QRO	4,853	14	CW	850314
961	861005	G4ASL	0.8	VO5OIO	QRO	1,658	7	CW	860315
962	861005	G4ASL	1.4	OI9AHO	QRO	1,462	14	CW	861218
963	861005	N8HOB	1.3	W7EOF	QRO	1,552	14	CW	860822
964	861116	WB8VQU	1.5	DL9YA	QRO	2,615	14	CW	860715
965	861116	KB7M	4	CE4BQO	QRO	1,430	28	SSB	860301
966	861110	WA4PFG	2	G0AHT	QRO	2,091	14	CW	860616
967	870102	NM5S	2	CE0FFT	QRO	2,129	21	CW	860526
968	870112	KA0DQZ	3	CT1UA	QRO	1,615	14	SSB	860530
969	870112	JA3HZT	1	ZS2RM	QRO	8,512	21	CW	800917
970	870112	KA0JWO	5	ZL4CO	QRO	1,519	14	CW	840329
971	870112	KH6JOI	1.8	ZS1H	QRO	6,420	14	CW	861026
972	870128	JG2MWA	5	W6CN	5	1,116	21	SSB	831030
973	870208	ND1J	0.35	W6OXN	QRO	5,791	7	CW	870109
974	870208	W6OXN	QRO	ND1J	0.35	5,791	7	CW	870109
975	870210	JV3CSE	0.1MW	JR3WML	0.1MW	9,000	50	AM	860816
976	870210	JR2TRC	10	CX2OQ	QRO	1,087	28	SSB	810908
977	870210	G4RAW	0.8	VA6LTL	QRO	1,996	14	CW	840613
978	870210	KE7JH	5	ON7ZM/EA8	QRO	1,089	14	SSB	860107
979	870210	AA2U	80uW	N4RM	QRO	16,181,168	14	CW	840714
980	870228	WB9TBU	5	ZS6YW	QRO	1,734	14	CW	870112
981	870228	ZS6YW	QRO	WB9TBU	5	1,734	14	CW	870112
982	870228	WD9BGA	0.5	N7EUT	QRO	2,456	7	CW	861220
983	870228	N7EUT	QRO	WD9BGA	0.5	2,456	7	CW	861220
984	870419	KA9UVD	5	WX4V	QRO		3.5	CW	870309
985	870419	WS6L	5	JA7OYF	QRO		14	CW	861006
986	870419	G0BVZ	3	WB2GAY	QRO	1,111	14	CW	870427
987	870523	KF5OW	4	ZL1BHG	QRO	7,360	7	SSB	870122

NR	DATE	TO	POWER	WITH	POWER	MI/WATT	BAND	MDE	QSO DATE
988	870523	N2GGW	0.75	KB7ID	QRO	2,691	7	CW	861019
989	870610	KD2JC	3	9Q5KI	QRO	2,119	14	CW	870226
990	870610	K2UD	0.15	K4ADI	QRO	4,667	50	SSB	870615
991	870611	KF5OW	3	KH6JEB	QRO	1,385	21	SSB	870325
992	870611	WF6D	5	VK2BHG	QRO	1,484	7	CW	870503
993	870617	AI2S	3	KH6XX	QRO	1,564	21	CW	850217
994	870617	JP1NDO	0.3	AH2U	QRO	5,370	21	SSB	850331
995	870702	KA3OQQ	0.35	WA5ZKL	4	3,360	14	CW	870510
996	870712	K3DML	1	NM7M	4	2,746	14	CW	870419
997	870728	JA1VDJ	2.16	ZS1H	QRO	4,169	14	CW	870504
998	870911	N1EAV	3	PY5BAB	QRO	1,513	14	CW	860928
999	870911	KF5OW	5	SM6CVX	QRO	1,037	14	SSB	870925
1000	870912	G4XVE	2.4	W8RSW	QRO	1,631	14	CW	870313
1001	870912	NX0Q	5	VK4VG	QRO	1,558	14	CW	870620
1002	890925	KF5OW	3	J37AH	QRO	1,079	3.5	SSB	870307
1003	870925	KF5OW	1	TI2LCR	QRO	2,238	28	SSB	861214
1004	870925	KF5OW	5	EA8ACH	QRO	1,021	7	SSB	870725
1005	870925	KF5OW	4	KX6AO	QRO	1,435	14	SSB	870606
1006	870925	KA0MGR	4	CT2AK	QRO	1,043	21	RTTY	870127
1007	871010	KF5OW	2	VE4CW	10	1,100	50	SSB	870718
1008	871010	KJ6BZ	QRO	KF5OW	4	2,028	21	SSB	870922
1009	871010	WY5L/KH3	QRO	KF5OW	4	2,028	21	SSB	870922
1010	871010	VE4CW	10	KF5OW	2	1,100	50	SSB	870718
1011	871108	VE6AML	0.562	CE3ZU	QRO	11,377	14	CW	661024
1012	871115	KA7SCW	5	JJ1FSK	QRO	1,092	14	CW	870802
1013	871122	W9SCH	0.3	F6DKQ	QRO	14,153	28	CW	810312
1014	871212	OK1DKW	0.38MW	OH9RE	QRO	2,960,526	21	CW	800421
1015	871212	WA1KWJ	3	KR0U	0.9	1,703	14	CW	871018
1016	871212	KD8FR	3	F8NB	QRO	1,374	10	CW	870516
1017	871212	F3NB	QRO	KD8FR	3	1,374	10	CW	870516
1018	880109	W0NGB	0.5	NF3K	QRO	2,404	14	CW	871121
1019	880109	WB4LTS	1	W6SJC	1	2,070	28	SSB	880101
1020	880117	NW2I	3	7X2FK	QRO	1,399	14	CW	850708
1021	880117	JP1NDO	0.25	KG6DX	QRO	6,444	50	SSB	871114
1022	880129	VE3NVP	3	4Z4DX	QRO	1,830	7	CW	870807
1023	880129	VE3NVP	3	ZB2X	QRO	1,147	21	SSB	871024
1024	880129	VE3NVP	3	TR1G	QRO	1,992	14	SSB	871025
1025	880130	OK2BPG	2	UL7PAC	QRO	1,247	3.5	CW	811212
1026	880130	KF5OW	3.5	T32BM	QRO	1,135	1.8	CW	870823
1027	880305	KA0USE	3	YV6BXN	QRO	1,086	28	SSB	871221
1028	880312	AA2U	43uW	KJ0H	QRO	19,965,425	28	CW	871212
1029	880312	KJ0H	QRO	AA2U	43uW	19,965,425	28	CW	871212
1030	880314	KA4TMJ	5	VK4KRP	QRO	1,861	28	SSB	870911
1031	880319	KA1MJR	0.25	N6PKT	QRO	10,760	21	CW	871216
1032	880319	N6PKT	QRO	KA1MJR	0.25	10,760	21	CW	871216
1033	880319	WB2CZB	3	JA3OAW	QRO	2,298	14	CW	880101
1034	880319	KF5OW	5	YU3AI	QRO	2,862	21	SSB	871107
1035	880327	JE1PMZ	0.3	CX7BY	QRO	38,516	21	SSB	871024
1036	880305	YV6BXN	QRO	KA0USE	3	1,086	28	SSB	871221
1037	880409	KA1CKZ	2.5	W7WHO	QRO	1,002	28	CW	880206
1038	880415	KB5CJB	0.5	KA1KWE	QRO	3,068	7	CW	880109
1039	880415	KA1KWE	QRO	KB5CJB	0.5	3,068	7	CW	880109
1040	880416	N8GJR	0.9	NM7M	5	2,238	7	CW	860816
1041	880528	WA8MCQ	0.05	WB2WIK	QRO	3,240	7	CW	880110
1042	880529	WA8MCQ	0.9	KV0I	QRO	4,349	14	CW	880409
1043	880529	NF5Y	0.9	WA8MCQ	0.5	1,482	14	CW	880409
1044	880529	WA8MCQ	0.9	WG5G	5	1,557	21	CW	880410
1045	880529	WA8MCQ	1	WD5GLO	0.9	1,270	21	CW	880410
1046	880529	WA8MCQ	1	W7EOF	QRO	2,319	28	CW	880416
1047	880611	JJ1FSK	QRO	W7JH	5	1,092	14	CW	870702
1048	880612	N0ISL	QRO	WL7BQM	1	2,474	28	SSB	880417
1049	880612	WL7BQM	1	N0ISL	QRO	2,474	28	SSB	880417
1050	880612	WL7BPY	1	N0ISL	1	2,474	28	SSB	880417
1051	880709	WB5CTS	1.25	KH6U	4	2,982	21	CW	880116
1052	880709	KA4TMJ	3.5	VK6VP	QRO	3,229	28	SSB	880414
1053	880717	KH6JOI	1	ZS6BSZ	QRO	11,951	28	CW	880504
1054	880717	NX0Q	2.5	YU2EZA	QRO	2,570	14	CW	880124
1055	880717	VE2ABO	2	W6HAL	QRO	1,234	14	CW	871004
1056	880717	KF5OW	3	HL9EP	QRO	2,123	14	SSB	880602
1057	880717	HL9EP	QRO	KF5OW	3	2,123	14	SSB	880602
1058	880717	KF5OW	3	AX9LF	QRO	1,888	14	SSB	880228
1059	880717	KF5OW	3	KC4AAC	QRO	3,004	14	SSB	870311
1060	880723	KF5OW	3	F2YT	QRO	1,717	21	SSB	880227
1061	880723	KF5OW	3	7P8DP	QRO	3,255	21	SSB	880114
1062	880723	KF5OW	3	FO0JM	QRO	1,526	14	SSB	880120

NR	DATE	TO	POWER	WITH	POWER	MI/WATT	BAND	MDE	QSO DATE
1063	880723	WA8MCQ	3.72MW	WA1JXR	5	94,430	7	CW	880514
1064	880723	SM6PRX	1.25	UI8IAY	QRO	2,136	21	CW	880112
1065	880724	JE1PMZ	0.01	JF6DJL	25	58,800	50	AM	880605
1066	880724	HB9XY	3	JA6ZXR	QRO	1,935	14	CW	840901
1067	880724	NJ3B	2.5	VK6HQ	QRO	4,621	14	CW	880107
1068	880724	NG7D	2	KA1NKZ	QRO	1,349	21	CW	880320
1069	880725	K4BNI	2	VK4UR	QRO	4,723	14	CW	831017
1070	880725	W5TB	0.9	3B8CF	QRO	11,822	14	CW	880423
1071	880821	K5DP	4	JA5DQH	QRO	1,676	7	CW	870413
1072	880827	WB2CZB	0.65	G3POI	QRO	4,883	50	CW	880606
1073	880910	VR6ID	QRO	KF5OW	3	1,476	21	SSB	880805
1074	880910	KF5OW	3	VR6ID	QRO	1,476	21	SSB	880805
1075	881014	WJ7H	5	VK3BKU	10	1,688	14	CW	880417
1076	881014	VK3BKU	10	WJ7H	5	1,688	14	CW	880417
1077	881014	JM1SOX	QRO	AH6EK	4	1,018	14	CW	840715
1078	881014	WD5GLO	100MW	KX3U	QRO	11,490	14	CW	880723
1079	881014	JH8BOE	2	WB2IPX	QRO	2,991	21	CW	840321
1080	881014	JF1QLX	2	CX4BBH	QRO	5,889	21	SSB	871129
1081	881015	WA3GYW	3	G3COJ	25	1,204	50	SSB	880606
1082	881015	N0BQW	4	JA2KSO	QRO	1,492	28	CW	820110
1083	881015	N0BQW	4	YD1KKM	QRO	2,395	21	CW	880415
1084	881015	N0BQW	5	5Z4DU	QRO	1,721	14	CW	861026
1085	881015	N0BQW	5	VK3BKU	QRO	1,786	10	CW	850501
1086	881015	N0BQW	5	VK3CAX	QRO	1,786	7	CW	860926
1087	881015	KA3RVH	1	WA6SFA	QRO	2,525	21	CW	880914
1088	881015	WA6SFA	QRO	KA3RVH	1	2,525	21	CW	880914
1089	881022	W5WO	0.9	W2KW/KV4	QRO	2,483	14	CW	880116
1090	881022	W2KW/KV4	QRO	W5WO	0.9	2,483	14	CW	880116
1091	881022	XE2IOF	3.5	SN0WRE	QRO	2,155	14	SSB	870529
1092	881029	KA0USE	3	KH6CY	QRO	1,084	28	SSB	880822
1093	881029	KA0USE	3	JH1LBR	QRO	1,949	28	SSB	880904
1094	881029	KA0USE	3	ZL1BRX	QRO	2,556	28	SSB	880905
1095	881114	WB5KYK	5	ZS1JO	QRO	1,659	28	SSB	880919
1096	881124	N5DUQ	0.4	CO7KR	QRO		21	SSB	880201
1097	881124	N5DUQ	0.5	KC4USU	QRO		14	SSB	880904
1098	881124	N5DUQ	2	NH6MC	QRO		3.5	SSB	880111
1099	881124	N5DUQ	2	NH6C	QRO		7	SSB	880111
1100	881125	N2HOS	5	YC3HUO	QRO	2,011	21	SSB	880819
1101	881125	K3IVO	0.02	W0KEA	QRO	79,450	28	CW	881009
1102	881125	WA8MCQ	0.022	W1BNS	QRO	20,727	10	CW	880922
1103	881125	W2PFS	0.9	G4JFN	QRO	3,719	28	CW	881009
1104	881126	KA5PVB	5	2D2ER	QRO	1,329	14	SSB	870726
1105	881126	KA5PVB	5	CE3BFZ	QRO	1,012	21	SSB	870308
1106	881126	KA5PVB	5	ZL1AAS	QRO	1,536	28	SSB	871025
1107	881126	WJ7H	5	IK1AUS	QRO	1,107	14	CW	880805
1108	881126	IK1AUS	QRO	WJ7H	5	1,107	14	CW	880805
1109	881126	WA8MCQ	4	GM3OXX	1	3,447	28	CW	881009
1110	881203	N0DA	3	VK7VV	3	2,711	14	CW	880814
1111	881203	WA8YWK	QRO	WA8MCQ	0.9	1,360	14	CW	880410
1112	890113	JH3DMA	0.08	JH8JKQ	QRO	1,1487	50	SSB	880626
1113	890114	NH6LT	0.9	ZS4TX	QRO	13,172	28	SSB	881003
1114	890114	NH6LT	0.9	ZS6BYE	QRO	13,294	28	CW	881013
1115	890114	G0EIR	0.5	N5DUQ	1	7,654	21	SSB	880204
1116	890225	KB3WK	2.5	VK6WT	QRO	4,618	14	CW	880604
1117	890228	K1EXE	QRO	WA8MCQ	0.09	4,389	7	CW	880604
1118	890228	HI3JH	0.05	AA2U	8MW	30,280	14	SSB	880424
1119	890228	WB0RFG	2	K8NOQ/OX	QRO	1,389	21	CW	790710
1120	890222	G4BUE	0.1	K4EWG	QRO	41,200	7	CW	880221
1121	890326	KA3PVD	2.5	VK3DQS	QRO	4,021	14	CW	890117
1122	890423	AA2U	0.613MW	CH9ASJ	QR2	851,339	3.	CW	880203
1123	890423	CH9ASJ	QRO	AA2U	0.613M2	851,339	3.	CW	880203
1124	890423	KA6HGT	2.5	GM4VCM	QRO	2,015	21	SSB	890118
1125	890423	AJ1Q	2.8	VK3MR	QRO	3,747	7	CW	810920
1126	890423	KA1RWT	0.5	G0EIR	3	6,452	28	SSB	890206
1127	890429	KA1SRZ	0.5	G0EIR	3	6,452	28	SSB	890206
1128	890429	VE3SCH	50	W5TB	0.9	1,341	21	CW	890122
1129	890429	ZL1BKY	80	W5TB	5	1,485	28	CW	890205
1130	890529	N7GQC/PA	1.5	RA9UFH	QRO	1,229	21	CW	890324
1131	890529	N2HOS	0.125	JA9BFN	QRO	53,816	21	SSB	881227
1132	890529	KB1MJ	0.75	DF4IQ	QRO	4,917	7	CW	881211
1133	890529	KB1MJ	2	GM3OXX	1	1,544	14	CW	870418
1134	890529	N7JXS	QRO	JJ3JJL	4	1,525	28	CW	890219
1135	890531	WJ7H	5	ZX4XA	QRO	1,627	14	CW	880417
1136	890531	AX4XA	QRO	WJ7H	5	1,627	14	CW	880417
1137	890531	WJ7H	5	ZL1AYO	QRO	1,417	28	CW	881007

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1138	890531	ZL1AYO	QRO	WJ7H	5	1,417	28	CW	881007
1139	890603	WA3EOP	2	WS6L	5	1,197	21	CW	881008
1140	890603	WE2P	5	3B8CF	QRO	1,847	14	CW	880711
1141	890611	KT1H	2.5	YC0JIV	QRO	3,953	21	SSB	880805
1142	890702	K5WZF	0.75	W4TNF	QRO	1,215	7	CW	890101
1143	890702	K7OWJ	5	ZL7BSG	QRO	1,651	21	CW	880920
1144	890716	G0CCS	2.5	JS2US	QRO	1,151	50	SSB	890326
1145	890716	WA8MCQ	0.012	KP4TIN	QRO	129,917	28	CW	890106
1146	890716	WA8MCQ	6.72uW	KD3EH	QRO	53,971	28	CW	890107
1147	890716	GW0DYT	3	JE6BDR	QRO	1,955	28	CW	881015
1148	890716	T20AA	5	W5TB	50	1,242	14	CW	890524
1149	890716	JO1XWH	0.05uW	JH1MBQ	4	134,200,000	5	AM	890503
1150	890722	PE1MHO	2.75	LU9AEA	QRO	2,663	50	SSB	890518
1151	890723	WJ7H	5	PY4MNF	QRO	1,207	14	CW	880630
1152	890805	KF5OW	2.5	OA8ABI	QRO	1,518	24	SSB	890107
1153	890812	K7IRK	2.1MW	VK2ABW	QRO	4,151,429	28	CW	890421
1154	890812	K7IRK	2.1MW	VK4FM	QRO	3,988,810	28	CW	890408
1155	890814	AA6MN	5	HL5BDS	QRO	1,458	21	CW	890427
1156	890814	JH6FZN	0.456MW	JE8FYJ	QR4	2,245,614	5	AM	890504
1157	890826	AA6MN	5	VK5AMA	QRO	1,632	21	SSB	890704
1158	890826	VK5AMA	QRO	AA6MN	5	1,632	21	SSB	890704
1159	890826	KI4QH	0.8	N6UJB	QRO	2,465	28	CW	890519
1160	890827	KA0NAY	1.9	ZP5JCY	QRO	2,418	28	SSB	890503
1161	890902	KB7GYS	1	KB5IQV	QRO	2,252	28	SSB	890324
1162	890902	N5DUQ	0.1	KU9RG	QRO	84,540	28	SSB	890214
1163	890903	KA4TMJ	1	VK6XA	QRO	11,300	28	SSB	890706
1164	890909	AA6LM	2	KA2RKR	QRO	1,263	21	CW	800724
1165	890909	AA6LM	2	NH6HF	QRO	1,294	21	CW	890807
1166	890909	N9IHS	1	KF7QF	QRO	1,709	7	CW	890423
1167	890910	OK1OCE	5	VK2PTE	10	1,952	28	CW	851113
1168	890910	JH6FZN	0.02	JH1MBQ	0.02	53,100	50	AM	820510
1169	890910	JH1MBQ	0.02	JH6FZN	0.02	53,100	50	AM	820510
1170	800917	WB2CZB	1	EA8/G3JVL	10	3,302	50	CW	890709
1171	891006	WD8DWM	4.125	KC4AAC	QRO	2,354	28	SSB	890430
1172	891021	JS1BVK	0.01	JN1JIV	0.011	7,911	50	SSB	890726
1173	891021	N0ISL	6	G3ZIB	6	1,332	28	SSB	890923
1174	891022	WB8NYV	2	EA8BEX	QRO	2,011	7	CW	860115
1175	891022	JH3DMA	0.1	JH8DBJ	QRO	7721	50	SSB	890503
1176	891230	JH1SBW/JD1	2	K3ZO	QR2	3,511	1	CW	890918
1177	891226	OK1DKW	160NW	OK1OFK	QRO	87,800,000	144	SSB	870620
1178A	891230	K7IRK	6uW	WA6YPE	QRP	218,333,333	2	CW	891025
1178B	891230	WA6YPE	QRP	K7IRK	6uW	218,333,333	2	CW	891025
1179	891230	WJ7H	5	ZS6BCR	QRO	1,980	28	CW	891008
1180	891231	JR8DAG	0.15	8J6APX	QRO	6,260	50	AM	890812
1181	891231	GM3JIH	3	W2HDW	QRO	1,124	14	CW	890826
1182	891231	NW0O	200MW	F3NB	QRO	25,395	10	CW	890419
1183	900224	WB2QAP	4	VK7CW	QRO	2,606	14	CW	891029
1184	900224	KB1IFK	4	3B8CF	QRO	2,260	14	CW	800824
1185	900224	HB9XY	3	ZL4IJ	QRO	3,916	14	CW	890326
1186	900225	KB2FNU	2.5	EA2CAK	QRO	1,502	21	CW	891107
1187	900225	WA0HYK	1	JJ1FSK	QRO	6,614	14	CW	890409
1188	900317	N8AXA	5	KG6DX	QRO	1,518	50	SSB	891126
1189	900317	KF7ET	2	NK1L	QRO	1,020	14	CW	880424
1190	900408	SZ4BP	QRO	W9NYB	2	4,061	14	SSB	891203
1191	900417	N2BYM	2	N7JRE	5	1,075	28	CW	881224
1192	900528	KB8ICD	QRO	G0DBE	1	3,747	28	SSB	900104
1193	900528	W5HKZ	0.9	PY7FNE	4	5,519	14	CW	900415
1194	900627	PY7FNE	4	W5HKA	0.9	5,519	14	CW	900415
1195	900629	N7IKC	4	ZL2BIT	QRO	1,795	21	CW	900311
1196	900629	YZ4TG	5	VK2BKH	QRO	2,187	7	CW	870907
1197	900729	NN1G	1.65	OE2PAL	QRO	2,439	7	CW	890309
1198	900729	AA5BT	5	JA4YJA	QRO	1,389	14	CW	890826
1199	901014	W6TKV	4	FT4ZE	QRO	1,566	14	SSB	891025
1200	901014	GW0ONR	5	VS6DL	QRO	1,204	28	CW	891027
1201	901015	PY5VX	3	BY1QH	QRO	3,710	14	CW	890323
1202	901015	I3MDU	3	ZS6KT	QRO	1,691	28	CW	880721
1203	901015	I3MDU	3	KZ1L	4	1,318	14	CW	881009
1204	901202	KH6CP/1	0.01	K1LPS	0.035	4,700	10G	FM	900916
1205	901202	GM4UYI	3	VS6VT	QRO	1,974	21	CW	881227
1206	901202	GW4ITO	QRO	WB3JJK	1	3,363	14	CW	870215
1207	901202	KI5AY	0.7	PY7LY	QRO	7.096	14	CW	900929
1208	901202	NN1G	0.07	K3TKS	1	4,186	3.5	CW	901107
1209	901230	KX5X	2	EA2CAK	QRO	2,043	21	CW	891124
1210	901231	KF6TE	2	W1WSE	QRO	1,283	14	CW	881214
1211	901231	G0NAT	0.5	W6EVQ	QRO	10,420	28	CW	900110

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1212	901231	K2YOF	3	GM0EWX	QRO	1,039	50	SSB	891120
1213	910223	WA8MCQ	69NW	N3GGP	0.5	7,246,376	28	CW	901230
1214	910223	N3GGP	0.5	WA8MCQ	69NW	7,246,376	28	CW	901230
1215	910223	WA8MCQ	1.23MW	WA1JXR	QRP	285,365	7	CW	901229
1216	910223	WA1JXR	QRP	WA8MCQ	1.23MW	285,365	7	CW	901229
1217	910224	KB5IQV	0.5	VK7NHT	0.5	17,918	28	SSB	890325
1218	910224	KA3SDO	1	W6DDB	QRO	2,361	28	CW	901020
1219	910224	WA9PWP	4	ZL1ATW	4	2,042	14	CW	901010
1220	910302	W9CGI	0.1	CX9DH	QRO	54,490	28	SSB	890725
1221	910302	KV4B	5	OD5VT	QRO	1,265	28	SSB	890930
1222	910302	KV4B	5	ZK2OQ	QRO	1,333	28	CW	900427
1223	910302	ZS6PT	2	AH6GJ	QRO	5,993	14	CW	860805
1224	910304	KE0UQ	0.9	KC4GFW	QRO	1,179	21	CW	900415
1225	910304	KC4GFW	QRO	KE0UQ	0.9	1,179	21	CW	900415
1226	900310	G0KYF	0.05	WD4AHZ	QRO	87,200	28	CW	891002
1227	910310	WD4AHZ	QRO	G0KYF	0.05	87,200	28	CW	891002
1228	910310	W9SCH	0.1	JA1QFT	QRO	62,180	28	CW	891007
1229	910310	W2PJW	0.5	F2WW	QRO	7,160	7	CW	880718
1230	910310	W2PJW	5	VK3BYE	QRO	2,059	14	CW	900920
1231	910407	SM5OCK	3	VK2DZD	QRO	3,245	21	CW	880511
1232	910407	WU2J	0.9	5Z4BI	QRO	8,207	21	SSB	910108
1233	910407	N8KCG	4	ZD9BV	QRO	1,842	21	SSB	901124
1234	910422	W3FAF	5	JA2AJA	QRO	1,341	28	CW	900312
1235	910422	W3FAF	5	VP8ANT	QRO	1,472	10	CW	820411
1236	910422	W3FAF	0.5	G4BLX	QRO	6,908	7	CW	910317
1237	910422	W3FAF	5	VK4AIX	QRO	1,910	28	CW	820325
1238	910422	W3FAF	5	3B8CF	QRO	1,864	14	CW	880704
1239	910422	PE1LIF	4	VK6PA	QRO	2,198	50	SSB	910203
1240	910519	VE3DN	0.1	KJ4GA	QRO	8,590	1.8	CW	901220
1241	910519	5Z4FM	5	N8DHT	5	1,541	28	SSB	910419
1242	910519	N8DHT	5	5Z4FM	5	1,541	28	SSB	910419
1243	910519	K7JBQ	5	CX3EU	5	1,106	28	CW	901016
1244	910519	G0FTO	3	JF7UNG	QRO	1,909	21	CW	880513
1245	910519	VE5DC	1	GM3KPD	1	3,787	28	CW	920303
1246	910609	N6QKP	4	JA8DA	QRO	1,209	21	CW	901224
1247	910803	N4ROA	1.5	YT2SC	QRO	3,316	21	CW	900207
1248	910803	N4ROA	1.5	JH2WIX	QRO	4,513	21	CW	900215
1249	910803	JA1AA	0.005	H44RW	100	687,800	21	CW	900726
1250	910803	K2LUQ	2	WX7R	4	1,223	28	CW	910407
1251	910815	VE3FAO	4.65	VK7GV	QRO	2,175	14	CW	910703
1252	910815	VK7GV	QRO	VE3FAO	4.65	2,175	14	CW	910703
1253	910925	WW9H	1	DF6KN	QRO	4,253	14	CW	910729
1254	910925	G4MQC	2	ZS6KO	5	3,978	28	CW	910327
1255	910925	G4CFS	1	VS6UW	QRO	5,952	28	CW	910310
1256	910925	JL1FXW	2	A35QC	QRO	2,445	24	SSB	900731
1257	910925	N7LGI	2	JH2BCN	QRO	2,678	28	SSB	901028
1258	911124	N2MAU	5	YL0LOG	75	1,949	28	SSB	910415
1259	911124	N2MAU	5	VK3BYE	300	2,073	14	CW	910709
1260	910119	WX7K	0.9	VK4XA	QRO	8,008	28	CW	900104
1261	920119	JA6PA	4	GM4UYE	0.2	28,420	28	CW	911018
1262	910119	GW0LBI	0.5	W8ELL	40	7,136	21	CW	900405
1263	920119	VE3EQP/VP9	2	VK2BFE	QR9	10,389	1	SSB	910804
1264	920119	SM6SLC	4	PY7FNE	4	1,305	21	CW	900507
1265	920119	DL2SDL	5	V31BB	QRO	1,125	28	SSB	900122
1266	920119	WA0RPI	4	WA8MCQ	1.69MW	558,580	21	CW	920104
1267	920119	SM7GR	5	VK3NZO	QRO	1,930	21	CW	900420
1268	920209	N0MEH	4	VP8CFM	QRO	1,848	14	SSB	911226
1269	920209	WJ7H	0.5	JA6PA	5	11,878	28	CW	911018
1270	920209	JA6PA	5	WJ7H	0.5	11,878	28	CW	911018
1271	920209	KC6P	2.75	KH3AE	QRO	1,218	10	CW	910901
1272	940209	KE9DZ	1	KD4YD	3	1,047	21	CW	920101
1273	920209	OK2PJD	0.95	JH5WAK	100	5,877	14	CW	910301
1274	920315	JA3UNA	50	VK7VV	3	1,782	14	CW	881123
1275	920315	W5WO	0.9	VK7AE	QRO	9,984	14	CW	890325
1276	920315	KE9DZ	0.8	W6KNP	13	1,280	28	RTTY	920214
1277	920322	JA2ODV	0.2MW	JA7BVA	50	2,290,000	50	CW	910816
1278	920322	G4JZO	1.5	VK3EGN	100	6,991	14	CW	910309
1279	920412	W8MVN	2	ZL1BLR	100	4,126	7	CW	901208
1280	920412	GM4UYE	0.2	JA6PA	5	28,420	28	CW	911018
1281	920525	GM4XQJ	0.5	VK6WT	100	13,368	28	CW	901108
1282	920525	N8SIL	1.4	EA5CHT	125	3,006	28	CW	920320
1283	920525	KB8KCR	4	2S4AE	QRO	2,131	28	SSB	NA
1284	920525	JR9OPJ	0.001	JR6HI	100	829,000	21	CW	910412
1285	920525	WA7RQP	5	YW4NM	40	1,013	14	CW	920320
1286	920525	KC4TSA	3	VK4DD	100	2,999	28	SSB	920126

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1287	920525	N3IUT	4	SP9DLY	QRO	1,087	28	CW	920317
1288	920525	OK1DCE	3	ZL1AH	100	3,730	14	CW	911010
1289	920525	PA0ATG	2.1	KA2ADA	QRO	1,713	21	CW	810102
1290	920525	9V1YS	1	VK6WT	1	2,426	14	CW	911002
1291	920523	VK6WT	1	9V1YS	1	2,426	14	CW	911002
1292	920525	KF9FU	QRO	WA8MCQ	0.013	46,029	14	CW	920105
1293	920525	N9BDL	0.02	K8TKS	1	39,643	3.5	CW	920108
1294	920525	WA0QII	1.2	N1BYT	0.16	16,656	21	CW	910119
1295	920525	N1BYT	0.16	WA0QII	1.2	16,656	21	CW	910119
1296	920703	GW0OSQ	1.2	AC8W	4	2,970	28	CW	910321
1297	920703	WG0I	2	EC8ARX	QRO	2,153	21	CW	890906
1298	920703	K4TWJ	0.250	VK6HG	QRO	49,380	18	CW	920416
1299	920703	NM1K	5	YJ0AMH	QRO	1,702	14	CW	900921
1300	920703	WA8RJF	5	PY5CC	QRO	1,022	50	SSB	NA
1301	920703	JA1GTF	5	KP2J	QRO	1,662	10	CW	920428
1302	920703	JA1GTF	0.05	ZP6CW	QRO	222,880	14	CW	920424
1303	920703	WA8HQO	5	ZL1ATW	4	1,678	28	CW	921015
1304	920703	WA3ULH	5	ZL1AH	QRO	1,679	14	CW	920604
1305	920703	KC6QOQ	3	JA8DEB	100	1,704	14	CW	920415
1306	920829	WA9OHR	1	K7ZR	10	2,299	7	CW	920219
1307	920829	G4CLD	5	VK2ACG	QRO	1,112	14	CW	910307
1308	920829	KD6GNQ	25	KB0IWV	0.25	5,372	14	SSB	920624
1309	920829	N5SAN	0.5	KC6BLW	80	3,294	14	CW	920626
1310	920829	N5SAN	0.5	WB7CRK	5	2,056	24	CW	920623
1311	920829	N8PCX	0.5	PY2ZI	QRO	12,592	14	CW	920301
1312	920829	G4MQC	2	VK5FE	5	5,048	14	CW	920617
1313	920829	VK5LG	0.03	VK6ALC	QRO	37,037	14	CW	870214
1314	920829	DL6FBQ	1	V0GK	QRO	4,656	21	CW	920318
1315	920829	PA3FGI	0.2	VE1YX	QRO	16,140	50	SSB	891109
1316	920829	VE1YX	QRO	PA3FGI	0.2	16,140	50	SSB	891109
1317	920829	JL2LPX	4	FT5ZB	QRO	1,579	28	SSB	880101
1318	920829	G4WQW	5	VK6WT	100	11,822	14	CW	920126
1319	920920	KF7GD	2	WN1F	QRO	1,053	7	SSB	920892
1320	921024	AA0JS	0.1	WB4IUY	QRO	9,620	14	RTTY	920901
1321	921024	WB4IUY	QRO	AA0JS	0.1	9,620	14	RTTY	920901
1322	921024	KM4ZH	0.9	3DA0AH	QRO	9,659	28	SSB	891207
1323	921024	KM4ZH	0.9	D68JM	QRO	9,739	28	SSB	910201
1324	921024	KM4ZH	0.9	ZL4KF	QRO	9,767	21	SSB	920102
1325	921024	KM4ZH	0.9	5H3TW	QRO	9,103	28	SSB	891229
1326	921024	KM4ZH	0.9	ZD5TF	QRO	9,758	28	SSB	910418
1327	921024	JG4VGN	0.25	JR7CLS	10	2,248	50	SSB	910531
1328	921024	9V1YS	1	ZS4X	100	5,299	7	CW	920911
1329	921024	AB5GC	3	ZL3JF	100	2,648	14	CW	920801
1330	921128	9V1YL	1	K0AB	100	9,063	10	CW	920921
1331	921128	9V1UD	1	K0AB	100	9,063	10	CW	920921
1332	921128	KC4GTO	0.5	N9JXY	QRO	1,872	7	CW	901125
1333	921128	KM6TU	4.5	ZL2BCH	30	1,484	14	CW	920906
1334	921128	9V1YS	1	JA8LP	QRO	3,615	10	CW	920910
1335	921128	N5SAN	4	KH3AE	QRO	1,190	18	CW	920611
1336	921128	VE3DOM	5	JE1VTZ	QRO	1,215	21	SSB	900617
1337	921220	WB7NKD	5	I5XIU	100	1,103	21	CW	920412
1338	930213	VE1BUG	2	VK3EBM	QRO	5,389	14	SSB	890818
1339	930213	JF2NMY	0.01	JQ1QFO	10	4,000	50	SSB	920809
1340	930213	KB8FNQ	5	JH1EVE	QRO	1,309	28	SSB	920101
1341	930213	VE2BLX	5	VK6LW	QRO	2,273	21	CW	900310
1342	930213	WJ7H	2	NH6T	QRO	1,464	21	CW	921127
1343	930213	NH6T	QRO	WJ7H	2	1,464	21	CW	921127
1344	930213	G4WQW	0.5	KB1FK	4	6,276	28	CW	921216
1345	930213	KA4YAE	2	KH6U	3	2,418	28	CW	871111
1346	930213	WF8X	5	AX4XA	QRO	1,860	28	CW	881112
1347	930213	WF8X	1	RA3RV	QRO	5,161	14	CW	890402
1348	930213	VE2XLT	0.1	WB2UJS	5	3,200	1.8	CW	921102
1349	930213	K3HCX	5	KH3AE	QRO	1,104	10	CW	921125
1350	930213	KB5KXQ	5	VK4ATS	QRO	1,720	21	CW	920317
1351	930425	G0HHT	0.75	WB2CZB	1	4,440	28	CW	891007
1352	930425	KB5KXQ	5	JA0CIU	QRO	1,359	21	CW	920305
1353	930425	KB5KXQ	5	JA9GO	QRO	1,369	21	CW	920314
1354	920425	KB5KXQ	5	JA2ODB	QRO	1,386	21	CW	920314
1355	930425	KB5KXQ	5	IK6DIN	QRO	1,038	14	CW	920715
1356	930425	KB5KXQ	5	HB9BU	QRO	1,023	21	CW	921017
1357	930425	KB5KXQ	5	OK3KAG	QRO	1,103	14	CW	920305
1358	930425	KB5KXQ	5	DL6NB	QRO	1,012	14	CW	920208
1359	930425	KB5KXQ	5	OK2ON	QRO	1,096	14	CW	920320
1360	930425	KB5KXQ	5	HB9KAJ	QRO	1.026	21	CW	920329
1361	930425	KB5KXQ	5	SP9PDF	QRO	1,087	21	SSB	920606

NR	DATE	TO	POWER	WITH	POWER	MI/WATT	BAND	MDE	QSO DATE
1362	930425	KB5KXQ	5	JA7YFB	QRO	1,332	21	CW	920314
1363	930425	KB5KXQ	5	JO1MEE	QRO	1,369	21	CW	920314
1364	930425	KB5KXQ	5	UA3PIP	QRO	1,201	14	CW	920214
1365	930425	KB5KXQ	5	EA5WX	QRO	1,000	14	CW	920208
1366	930425	KB5KXQ	5	JA1BNW	QRO	1,371	21	CW	920304
1367	930425	KB5KXQ	5	JA3ENQ	QRO	1,403	21	CW	920314
1368	930510	VR2GO	5	N6RA	QRO	1,378	14	SSB	931031
1369	930510	OK2POH	1.5	W2OKM	QRO	2,876	3.5	CW	910222
1370	930510	WJ7H	0.3	N5QBY	QRO	4,157	21	CW	930228
1371	930510	N5QBY	QRO	WJ7H	0.3	4,157	21	CW	930228
1372	930520	WJ7H	2	KH6CD	QRO	1,494	21	CW	930116
1373	930520	KH6CD	QRO	WJ7H	2	1,494	21	CW	930116
1374	930520	WJ7H	0.5	KD8A	2	2,934	21	CW	930412
1375	930520	KD8A	2	WJ7H	0.5	2,934	21	CW	930412
1376	930520	N4ROA	2	WA8MCQ	0.009	40,333	7	CW	930103
1377	930520	WB0NQM	5	ZL3RG	QRO	1,614	21	CW	930328
1378	930520	JM6ABS	2	KL7RA	QRO	1,950	21	CW	930330
1379	930520	DL7UKT	5	ZS6EZ	QRO	1,193	21	CW	920531
1380	930520	ZS2ACP	5	I8UDB	QRO	1,044	7	SSB	920822
1381	930520	ZS2ACP	5	UB5RCL	QRO	1,167	28	SSB	900415
1382	930626	VK7FJ	100	VO1AQ	5	2,288	14	CW	930305
1383	930626	VO1AQ	5	VK7FJ	100	2,288	14	CW	930305
1384	930626	WJ7H	0.5	YV5BHI	100	6,890	21	CW	930321
1385	930626	YV5BHI	100	WJ7H	0.5	6,890	21	CW	930321
1386	930626	K5JJX	4	ZL1RA	100	2,106	14	CW	930307
1387	930801	WU2J	5	V7A	100	1,110	14	SSB	930306
1388	930801	V7A	100	WU2J	5	1,110	14	SSB	930306
1389	930801	WJ7H	5	ZD8LII	100	1,397	21	CW	920127
1390	930801	ZD8LII	100	WJ7H	5	1,397	21	CW	920127
1391	930803	WJ7H	1	AC8W	100	1,513	14	CW	930516
1392	930803	AC8W	100	WJ7H	1	1,513	14	CW	930516
1393	930805	WJ7H	0.25	VE7XLA	100	3,060	3.5	CW	930320
1394	930805	VE7XLA	100	WJ7H	0.25	3,060	3.5	CW	930320
1395	980808	WB0JNR	0.5	K2LGJ	0.9	2,716	28	CW	920117
1396	930816	KE2WB	5	V73C	QRO	1,367	7	CW	930221
1397	930816	KE2WB	5	C9RJJ	QRO	1,713	14	CW	921106
1398	930816	KE2WB	5	VK7AAQ	QRO	1,934	18	CW	920311
1399	930816	KE2WB	5	ZL4JO	QRO	1,735	21	CW	910827
1400	930816	KE2WB	4	ZS6KO	QRO	1,991	28	CW	910205
1401	930816	7Z2AB	1	DF9DE	QRO	2,541	14	CW	930406
1402	930816	NG6U	5	VK6MV	80	1,870	14	SSB	930630
1403	930901	WA1OFT	4	WA8MCQ	0.024	13,375	7	CW	930104
1404	930901	WA1OFT	4	WA8MCQ	0.012	26,750	14	CW	930105
1405	930918	WB0JNR	0.5	KC4THA	5	2,908	28	CW	921127
1406	930920	OK1HPP	2	VP2EBN	QRO	2,352	28	SSB	930225
1407	930924	VE4BDH	50	WJ7H	0.5	2,187	14	CW	930919
1408	930925	WB7O	4.0	HB9BJA	4.6	1,331	21	CW	910121
1409	930926	JA2FGL	0.01	JN2TDV	QRO	10,500	432	FM	930112
1410	930926	WJ7H	0.35	LW2DFM	QRO	18,394	21	CW	930301
1411	930926	LW2DFM	QRO	WJ7H	0.35	18,394	21	CW	930301
1412	931001	WB3HLH	0.75	WB6CZJ	QRO	3,248	7	CW	930321
1413	931026	WD8OJC	5	ZS6AOO	QRO	1,684	28	SSB	930307
1414	931030	KD4OOI	2	VE7API	QRO	1,192	7	CW	930422
1415	931030	KE2WB	5	BQ9QM	QRO	1,982	24	CW	920722
1416	931030	6D5XMT	2	VK6PI	3	5,045	21	SSB	921029
1417	931108	VE3IAY	2	OK1DAV	QRO	1,970	10	CW	930602
1418	931216	WA6HYB	1	WA7ONH	QRO	1,031	7	CW	931026
1419	931217	VE5VA	0.9	4K1AH		9,602	14	CW	870812
1420	931218	KE3HY	600	EA3BYN	0.5	8,172	14	SSB	931010
1421	940110	G0KCA	2.0	VK6WT	100	7,936	14	CW	891211
1422	940110	NG7D	5	9X5HG	2	4,706	21	CW	901023
1423	940110	KD6SX	2	KA1BAR		1,296	21	CW	921203
1424	940113	AC4XL	5	A22MV	5	1,677	21	SSB	931031
1425	940124	GM4JJG	1	LU9CV		6,997	14	CW	910706
1426	940131	KB5ZYA	1	KG8FL	5	1,072	7	CW	940129
1427	940215	JS1BVK	10MW	JA8LON	QRO806		50	Hz	930704
1428	940301	KB4BGE	3	OK1DCE	QRO	2,183	28	CW	900219
1429	940301	KE2WB	5	V73C	QRO	1,367	7	CW	930221
1430	940301	KE2WB	5	C9RJJ	QRO	2,691	14	CW	921106
1431	940301	KE2WB	5	ZL4JO	QRO	1,735	21	CW	910827
1432	940301	KE2WB	4	ZS6KO	QRO	1,991	28	CW	910205
1433	940301	KE2WB	5	VQ9QM	QRO	1,980	24	CW	920722
1434	940312	JF0CGP	100MW	JA6HHI	QRO	5,281	7	CW	931026
1435	940315	WV7T	3	VK4ABD	QRO	2,791	14	CW	780514
1436	940317	WO7T	0.75	KH6AQ	QRO	3,872	21	CW	940228

The Fine Print

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 the appropriate volunteer editor for review, with a copy to the Managing Editor. 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.

The QRP Quarterly will occasionally consider reprinting articles previously published elsewhere if the information is especially useful to members of QRP ARCI. In all such cases, the QRP Quarterly will obtain permission to reprint from both the author and the original publication and acknowledge the source of the material.

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

Copyright of materials published in the QRP Quarterly remains with the author. Although the author retains the right to reuse the material, the QRP Quarterly requests that reprints of the material in other publications acknowledge first publication in the QRP Quarterly. de **Ron, KU7Y**

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

CW and HF

This is the new topic! Should the requirement for passing a CW test before being allowed to use the HF bands be kept or should it be dropped? Should we, the QRP ARCI, take a position on either side? I know where I stand, (keep the CW requirement), but I need to know where you stand. Please write, either via snail mail or E-Mail and let me know. I will pass the information on to Buck. de **Ron, KU7Y**

New Member / Renewal Application Form

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

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New Member, $17. Renewal, $15	New Member, $20. Renewal, $18	New Member, $27. Renewal, $25

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Check or Money Order in U.S. Funds
Make checks payable to: "QRP-ARCI"

Mike Bryce, WB8VGE
QRP ARCI Membership
P.O.Box 508
Massillon, OH 44648-00508
For a Club Information Pack, send $2 to the above address.

We hope to announce another DX agent in the January, 1997 issue of the Quarterly.

In the meantime, please send all funds, in US dollars, to Mike Bryce as listed to the left.

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