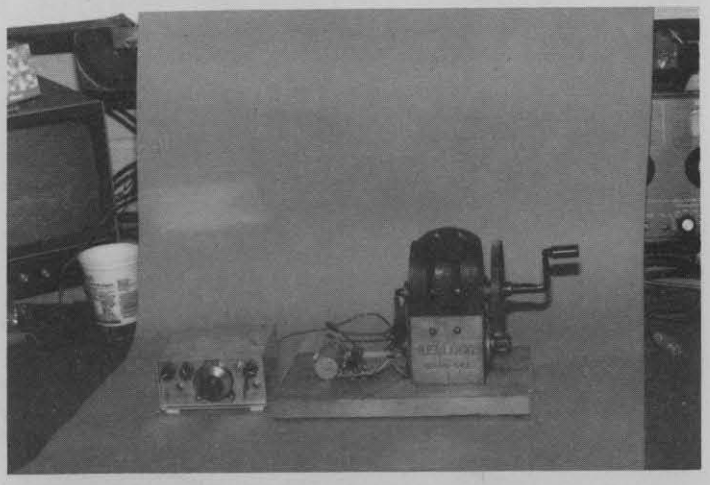
QRP Quarterly

Journal of the QRP Amateur Radio Club, International

April 1989 Volume XXVII Number 2

The Lil' Sucre — surprises come in small packages. See page 4.



The Huff-n-Puff power source with optimized QRP transceiver by CBS was one of the items on display at the Maryland Radio Center QRP Show & Tell held in December. See story on page 16.

Contest Results:

1988 Holiday Spirits Sprint
1989 Winter Fireside SSB Sprint

Late-breaking news from TenTec. See Letters to the Editor column on page 27.

President's Message

Dear Club Member,

I am writing this column from a crowded ski lodge in the village of Woodstock, located in the White Mountains of New Hampshire.

My two daughters (ages 13 and 17) and I are enjoying their school vacation with a week-long ski-trip, but I am not skiing because of a summer time leg injury. I have rented a laptop computer in an attempt to catch up on club correspondence and it is a wonder of technology.

This week the skiing has not been all that great, but the shopping has been awesome, so the girls, preferring to shop rather than ski, have left me with little time for writing. They are so spectacular that I do not mind at all.

The $99 rental bill for the computer that I am not putting to full use is causing me to seriously doubt my sanity. In attempting to keep up with club responsibilities, some of us ultimately discover that QRP-ARCI, although quite a compelling hobby, is not a genuine necessity of life. The road (to someplace), I am told, is paved with good intentions.

QRP-Dallas

The Board of Directors will meet in Dallas in June and it is hoped that there will be enough board members present for a quorum. This means that in order to pass any new resolutions, there will have to be at least a 2/3 majority, or seven directors present. Otherwise, a proxy vote can be used for the absent directors. The board members will be advised of items for consideration prior to the meeting.

QRP Dayton

This year, all available hotel rooms were filled by early March. This probably was due to the great time we had last year and the enjoyment of spending time with Doug DeMaw and the others who are at the very core of the QRP movement. Myron, N8DHT, tells me that most of the people coming to Dayton this year are repeats from last year. A QRP schedule appears elsewhere in this issue.

In a club as widespread as ours, it is almost impossible to see enough board members in one place for a quorum. If those who frequently attend QRP gatherings at major conventions would consider running for a position on the board of directors, it would give us a greater chance for quorums in the future. The only responsibility of a director is to vote. Simple, effective and very, very important. A director, through club mailings, often receives the latest happenings in QRP long before it becomes general knowledge.

An item that I would like to address now is the logo. As you may know from previous letters to the editor, some members are concerned by the appearance of K6JSS on the oval logo sometimes used in The Quarterly and always used by the Candy Store.

The way I see it, some are pleased with it, a vocal few are displeased and most just do not see what the fuss is about. The amount of mail generated by this controversy is really insignificant compared to the number of active members in the club. It is amazing to me to see how such a few that express dissatisfaction are successfully able to browbeat or otherwise mentally control some of the hard working club volunteers.

So far, the few making objections have neither provided an alternative logo nor offered to foot the bill for new logo material or machine dies. Where were they when the club was in a state of financial disaster and with no Quarterly editor a short time ago?

I would ask the membership and officers to not become swept up into this logo lunacy, otherwise serious issues already starting to develop could blossom into disaster. How natural it is to yield to a single negative force when there is such an overwhelming abundance of positivity all around us. It is a fight against human nature to resist negativity, but well worth the battle. It is a quick and easy downward slide if we do not resist.

It is important not to surrender control of your hobby (or any other part of your life) to the negative forces, farces, faces or fears. Aside from some trivialities, QRP and QRP-ARCI are very healthy.

Members frequently ask if there is anything they can do to help out the club. Since QRP ARCI is all volunteer, there are a number of things an individual can do to ensure the club continues as a first rate entity. Please encourage the officers to continue with their creativity and enthusiasm.

A fact to keep in mind is that authors do not get paid for articles, but they do write for a reason. They love the hobby and are willing and eager to share and give to others. Write a short note or QSL card to an author whose work you enjoy. Do you know how many articles die on the notepad because of a lack of response and feedback from readers? There are many. Some excellent authors have stopped writing because no one told them they were worth it.

Go through some back issues and thank the author who gave you the inspiration for that project that you are so proud of or that article you enjoyed so much.

An all-volunteer force is very fragile at best and some of us tend to lose sight of this fact. It is pretty easy to deflate the esteem of someone who is struggling with family, career and personal problems by taking potshots at their performance.

There are ways to get things changed and they must assuredly be in the most positive and uplifting way possible. Remember that a positive action generates a positive result; a negative action will surely generate a negative result.

In this club can we see the tremendous possibilities? Positively! That's it for now. Hope to see you in Dayton and (hopefully) in Dallas.

Jim Fitton, W1FMR

Nominations Now Open For Board Of Directors

The terms of office expire on Dec. 31, 1989 for four members of the Board of Directors.

Any member of QRP ARCI may place his/her name in nomination for one of these positions on the Board by sending a brief biographical sketch to the QRP ARCI Secretary/Treasurer, Bob Brown, NM7M. The sketch should include a definitive statement of the candidate's goals and interests in QRP. A ballot for these positions will be published in the October issue of The Quarterly and the election will be completed by Dec. 1, 1989.

The Directors whose terms will expire are G. Danny Gingell, K3TKS; Bill Harding, K4AHK; Fred Turpin, K6MDJ; and Terry Young, K4KJP.

Those wishing to have their names placed on the ballot should sent resumes to Bob Brown, NM7M, QRP ARCI Secretary/Treasurer, 504 Channel View Dr., Anacortes, Washington 98221 U.S.A. All biographical sketches must be received no later than Aug. 15, 1989.

Special message from the Editor on page 22.

The QRP ARCI is a non-profit organization dedicated to increasing world-wide enjoyment of QRP operation and experimentation. QRP, as defined by the club, is 5 watts output CW and 10 watts output PEP.

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The Lil' Sucre

Donald Kelly, KA5UOS
703 West 8th St.
Edmond, Oklahoma 73034

On slow evenings, I enjoy browsing through some of the back issues of my ham magazines, especially those that feature construction of QRP gear. It is particularly interesting to note how many of the projects were developed from one simple idea.

Many of the projects began as a means of trying a clever new circuit, a new device or perhaps featuring a new application from an old circuit or device. In fact, the critical portion of the VFO circuit in this receiver was borrowed from a January 1988 QST article by Doug DeMaw, W1FB, in which an experimental tuning method, described as "electronic tuning," was applied.

My project began partially from the need for a simple rig with usable performance, but in great part because I wanted to find a use for a very common container.

I use a lot of discard household bottles and boxes to store parts in. One of my favorites is the Sucrets box because it is solid, constructed of metal and can be opened and closed many times. These are important features for the protection, portability and durability of my gear.

This container is ideal for many QRP projects. The box measures 2-5/16" wide by 3-1/16" long by 11/16" high, or roughly 4.85 cubic inches and has a simple but durable hinge. The major limitation during construction was the depth of the box. All the components had to be less than 5/8" in height and even less in the VFO section.

Although there is a real good parts store in Oklahoma City (Worldwide Electronics), many of the small sized, large value tantalum and electrolytic capacitors came out of junked broadcast radios and computers. Also, sufficient room around the perimeter had to be provided for antenna, power and earphone jacks as well as tuning and volume controls.

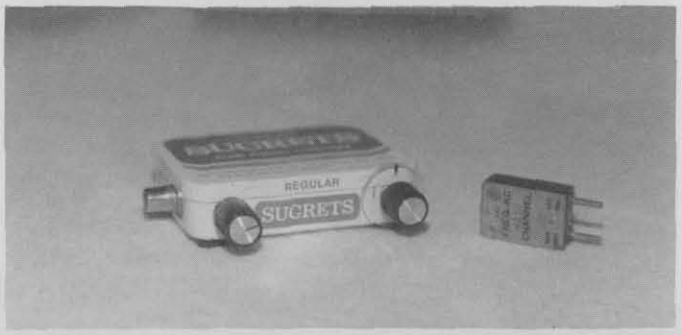
I spent more time sitting and staring at the box in the planning stage than I spent during the actual construction stage. Regardless of the type of project, careful planning time is more critical than construction time and usually leads to neater and more successful projects.

The detector audio amp section is straightforward and the design should be familiar to many. I first constructed four test boards using a TL082, a TL081 and one with two conventional amps using 2N3565's before deciding on this simpler format.

I could install an RF amp stage to increase the overall gain since the whole top of the box is open. However, I built a one square inch by 4/16" high, one watt transmitter and someday I may install that in the roof of the box.

Alternatively, an active audio filter would fit very nicely in the lid. Obviously, the transmitter produces some heat and since the stability and the sensitivity of the receiver sis already very satisfactory, I probably won't install either the RF amp or the transmitter in the near future. I am more of a listener than an operator and the novelty of a transmitter doesn't outweigh my desire for stable receiver operation. Besides, I have a companion self-contained switchable five-crystal transmitter with T-R relay to augment this receiver. (In another Sucrets box, naturally!)

The VFO was the most challenging and satisfying aspect of the project. The stability approximates that of my VFO's, using tuning capacitors. I have boxes of suitable tuning caps but the physical size of the project suggested a unique approach



A standard FT-243 crystal offers a size comparison for the rig. The right knob controls the frequency 7.020-7.060 MHz. The left knob controls volume.

was needed to provide compactness while maintaining proper performance.

The January 1988 issue of QST, page 33, illustrates one unique approach. Additional background is provided in a previous article in the July 1985 QST on page 23. Both articles by W1FB presented simple tuning methods he described as "reactance" and "electronic tuning." His 1985 innovation used a linear taper potentiometer in series with a variable cap. As the resistance is lowered, the capacitance has greater influence on the circuit, thus lowering the frequency.

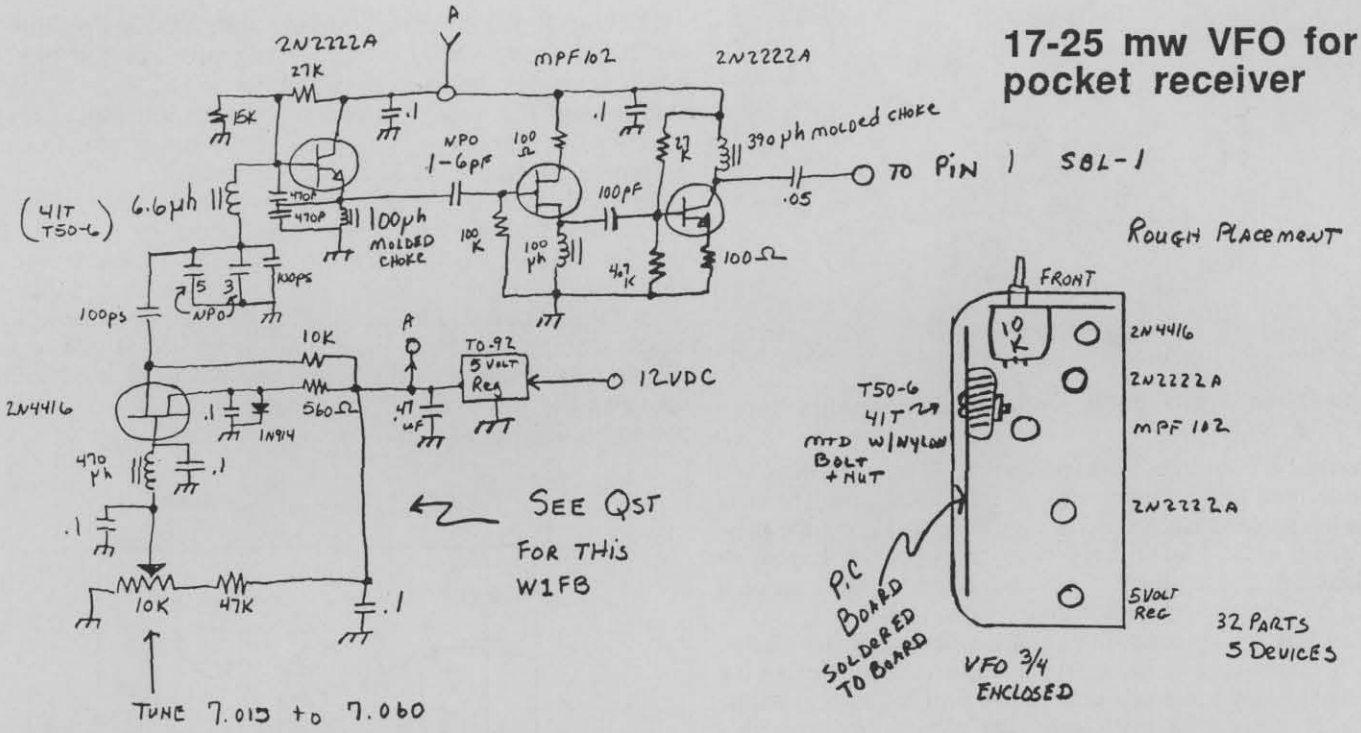
DeMaw's electronic attenuator, described in the 1988 article and as applied in my receiver VFO, uses a 2N4416 FET. As the gate bias is varied by the 10K pot, the junction resistance also varies, thus influencing the series capacitance much like the linear taper potentiometer did. This method works great and has additional advantages: it reduces both the physical size and the possibility of mechanical instability. In addition, those homebrewers who don't have boxes of caps or a big bank account can begin to relax.

The VFO board occupies 1.5 cubic inches and contains 32 components and five devices. Originally I was going to use a VXO controlled LO, but I'm certain now I would have been less than satisfied with the limitations imposed by a crystal LO. This VFO covers 7.02 to 7.06 MHz. At first it covered 7.01 to 7.20 MHz but the half inch knob was too small for comfortable tuning, so I reduced frequency coverage.With this VFO 40 kHz tunes smoothly and there is no feeling of compression of frequency change at either extreme of the tuning range.

As crude as my measurement techniques are, I measure 17 to 23 mw across a 50 ohm resistor. This reasonably high output directly contributes to the pleasant operation of the receiver. AM detection of foreign broadcast stations is not a problem and strong signals do not overload the receiver.

The detector is an SBL-1 DBM and I'm convinced a DBM also contributes to the lack of AM detection problems. In my first DC transceiver, I used a two diode detector and the AM detection drove me crazy. The use of various diode substitutions and a low pass filter helped, but the only things that really cured the FB/AMD problem was stronger LO injection and the use of any DBM. I've made my own DBM's as well as using the SBL-1 and I don't perceive any difference except in a higher price for the SBL-1 as opposed to the greater inconvenience (greater satisfaction) of making your own. In a more critical application or when external balancing is necessary, homebrew might be superior.

The tuning and volume controls were the best quality (Allen-Bradley Type W) I could find. The VFO and Detector/Audio Amp were constructed on separate boards so both could be removed easily. The eventual removal and replace-



ment of these pots will be a pain, so I hope using better quality controls postpones this problem as long as possible.

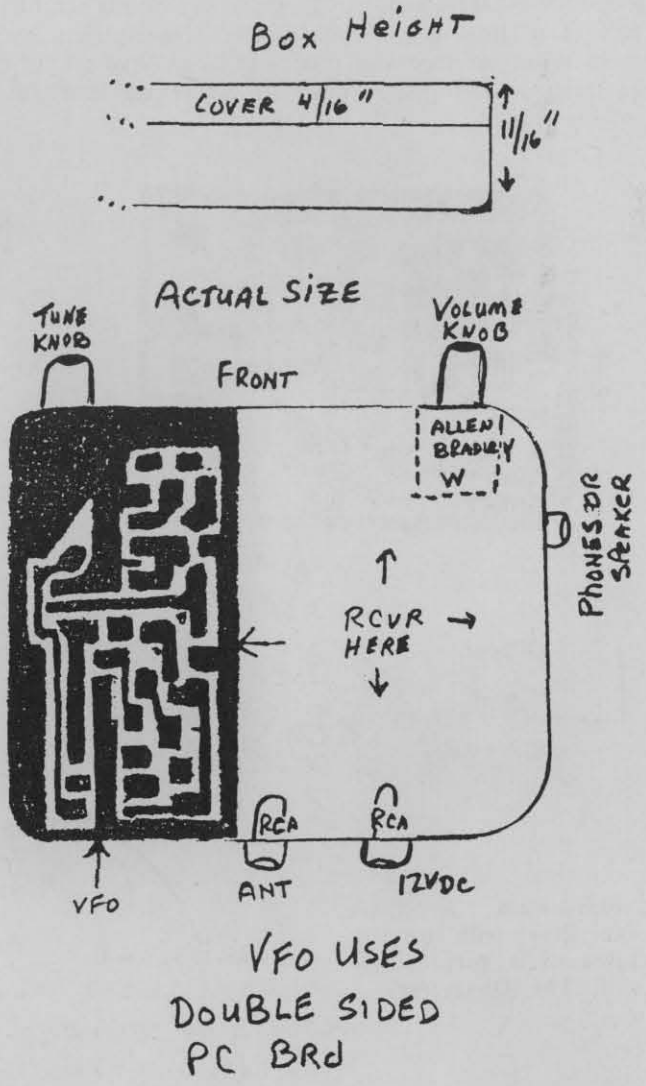
Both VFO and D/AA boards have TO-92 three-terminal regulators. I originally included an additional stage of audio amplification on the D/AA board but removed it to make room for the 8 volt regulator. Both regulators aid stability and permit the use of 9-12 volt batteries when operating portable.

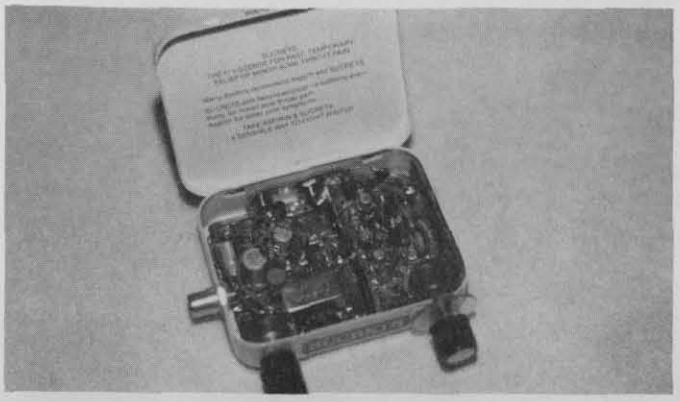
Incidentally, I have been using two throw-away battery packs removed from Polaroid instant film packs. They provide about 6VDC each or 12 volts for two in series and seem to last forever with this receiver. I have also made several contacts using these power pack with my QRP transmitters. (Field Day should include a power supply category for recycled power sources.)

The low pass filter uses a 22mh choke. An FT50-75 with 62 turns of #30 (the inductor I use in an LP filter in my bigger transceiver) should work better. About 11mh gives me the audio response I like. I experimented with capacitors and resistive termination until managing a peak of about 800 cycles and all that irritating 40 meter noise went QRT. It is a simple, cheap and effective filter that is a lot less bulky than 88mh chokes. This LP filter also helps to match the lower impedance of the detector port to the higher input impedance of the first audio amp.

One helpful construction technique I employed was to use double sized PC board for the VFO and mount the components directly on the unetched pads of the board surface. I drilled no holes in either board. The D/AA board is etched on the bottom side except for a border about 1/4 inch wide around the outside to avoid feedback problems in the high gain audio amps. The components, including the SBL-1 and the LM 386 socket, are mounted on the surface pads.

Randy, WI5W, suggested this surface technique to me a few years ago and it has worked well in many of my projects in both low and high level stages. If there was more room, I would have used single sided board underneath the oscillator stage of the VFO and mounted the whole board above the chassis in a separate box. Despite this trade-off, stability is fine.





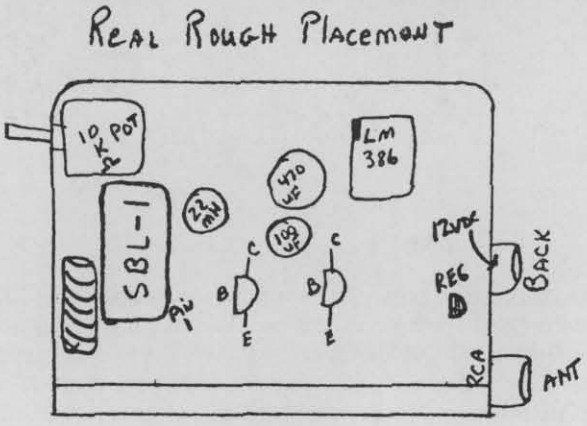
Homebrewers can pack a lot of components into the tiny box.

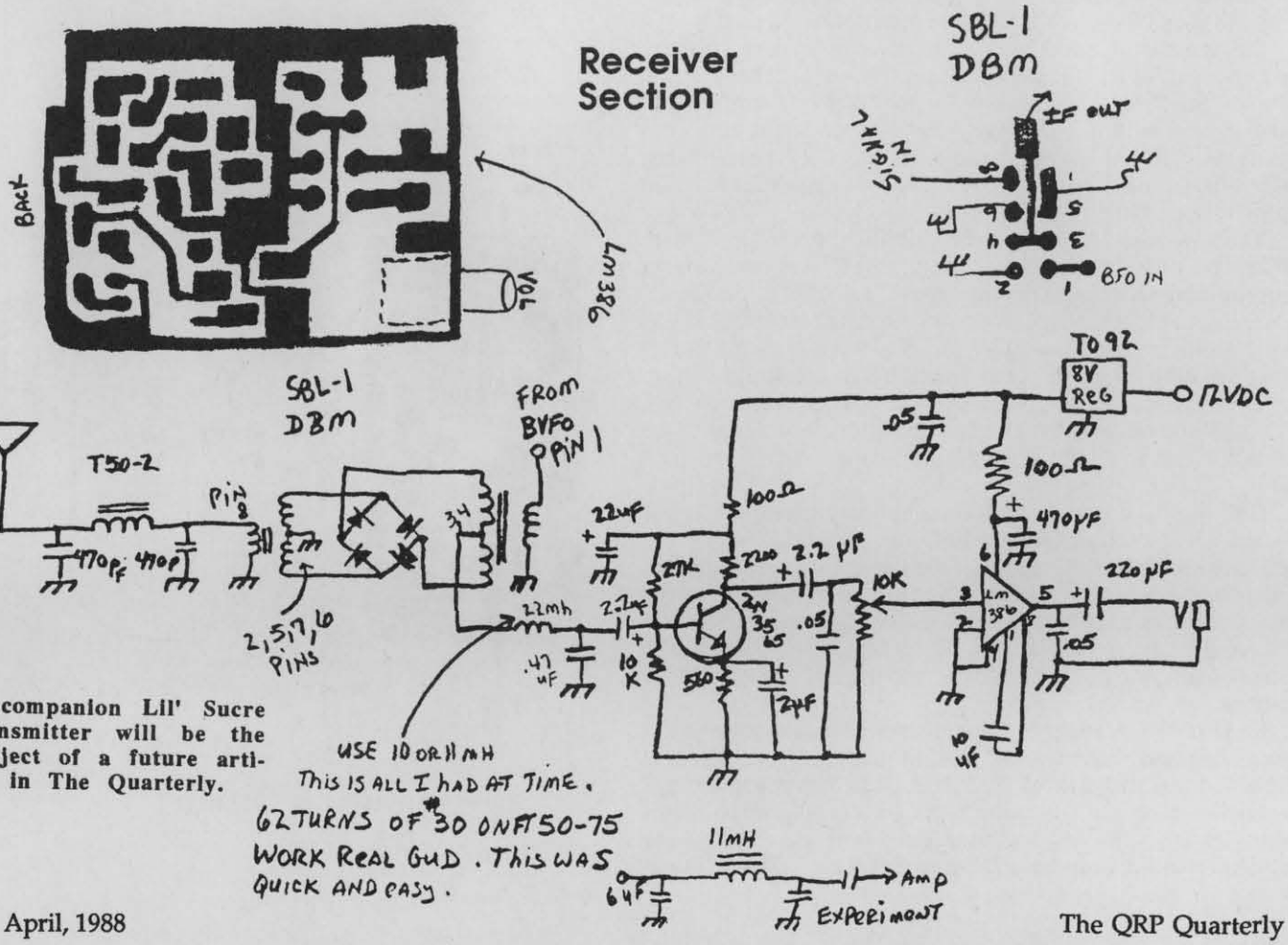
Certainly, this might be a frivolous endeavor and there is a definite limit on the practicality of miniature gear. The coax from the antenna has a tendency to drag the rig off the table and once, when I left the rig in my coat pocket, I spent an anxious day looking for it. I was convinced someone sat on it or tossed it away without knowing what it was.

Notwithstanding these limitations, there are many pluses. Non-homebrewing hams enjoy playing with it. Homebrewing is what I enjoy most about hamming and if I can stimulate that interest in others, that pleases me. Also, no matter what I build, I always learn something. Above my workbench I have a box full of great ideas that didn't work. Nevertheless, every one of those unsuccessful pieces of gear have taught me something. Knowing what doesn't work is just as useful as knowing what does.

The biggest plus is the rig performs well. It is ultra portable and easy to carry when I travel. Two or three times a year I make hit or miss business trips and nothing is more boring than sitting in a strange motel room with nothing to do. Throw a wire out the window, hook up the power, plug in the earphones and I'm in radioland.

Last and certainly not least, it seems I need a name. There are Mousefets, Optimized Transceivers, Oners, Twofers, etc. I thought maybe I would call it the KA5UOS Minimized Receiver, or maybe the "Goofer" but, to tell the truth, I knew what it would be called before building it. When I prefaced this article with a comment on how some gear evolves from one simple idea, I was serious. What I really wanted to do was construct any piece of QRP gear and put it in a Sucrets box just so I could call it the Lil' Sucre (pronounced 'sucker'.)





A companion Lil' Sucre transmitter will be the subject of a future article in The Quarterly.

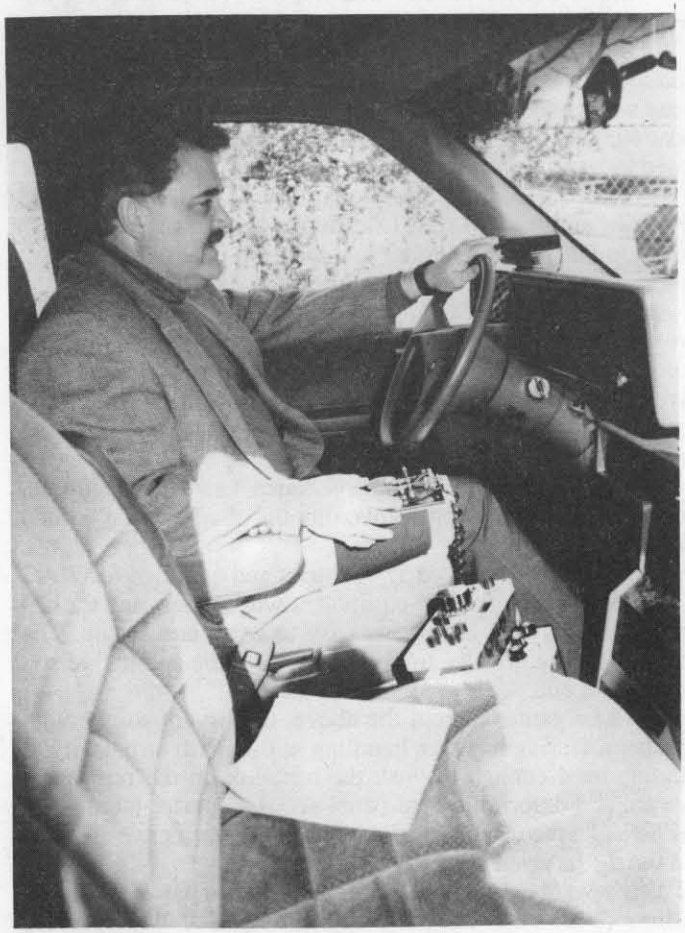
MOBILE CW—QRP STYLE

Dave Little, AF5U
702 Rollingwood Drive
Richardson, TX 75081

Why mobile CW QRP? Perhaps we spend too much of our time in cars rather than being at home on QRP. I have never been a natural at Cw. At home, I enjoy 10 to 15 wpm QSO's and I copy on paper. Mobile Cw QRP is a real challenge from an operational point of view.

Some QRPer's are able to carry on a basic QSO (RST, QTH, name, rig and weather) without total dependency on paper. I run into problems when the other guy starts telling me things off the beaten track. So, I have learned to tell the other guy up-front and in plain language that I am mobile and QRP. I also ID as AF5U/QRPm.

By using a steno notebook (6 x 9 inch) for all writings, it becomes my logbook and note pad. After 2,000 miles of CW QRP QSOs, I have gotten much better at copying CW in my head. Sending CW is made easy by use of a knee paddle and a homebrew keyer built inside my rig.



Dave Little, AF5U, with his modified paddle clamped to his leg and ready for a mobile CW QSO. His transceiver and antenna tuner can be seen between the seats of his van.

Most low end QRP rigs do not have noise limiters or blankers to reduce receiver noise. But if the receiver becomes more selective by use of a narrow IF filter and/or audio filter, the effective ignition noise is also reduced. However, some QRP rigs do not have enough gain to overcome losses in those filters, and it is difficult to hear what is being sent. I recommend using an active audio filter with an internal audio amplifier (Heath HD-1410).

Radio Shack makes a very nice battery powered amplified speaker (RS #32-2031) if you still have trouble hearing the code. The use of headphones is not recommended for safety reasons. When I use a Ten Tec Century 22mobile, I find that I don't need extra filters or audio amplifier. But when I use the HW-9, I do need the HD-1418 audio filter.

I have not observed signal flutter during HF mobile CW operation except for local (ground wave) contacts. Changes in direction of the vehicle will yield corresponding changes in S-meter readings on both ends of the QSO due to directivity of the antenna on the car body.Passing over conductive ground objects such as bridge supports will cause receiver noise due to the changes in capacitance of the car body to earth ground.

Passing over creeks and low places often increases received signals (S2 to S9+) as if those signals are being collected and directed toward the car antenna (parabolic effect). Strangely though, driving up on high places such as mountains, may have little positive effect on the average stateside HF QSO. I have found that positive effects, if any, will come before the car reaches the crest of the high place. Metal objects can reflect or direct the pattern of the antenna - I once used a baseball backstop and a flagpole as a reflector and director.

I use a bugcatcher or a helically wound antenna on the front of my van. In general, the higher the frequency that is open the better the results on HF QRP CW mobile. I adjust the antenna length for lowest VSWR and then use a tuner.

My best DX QRPm was Japan on 20 meters. I am most proud of those American amateurs who have taken the patience to come back to me and stick it out. They get a real charge out of having a QSO with a 5-watt mobile. Often I get a better signal report than I can give the station with the power and antenna.

As can be seen from the accompanying photographs, I use a straight-paddle key on a modified, military surplus knee clamp while driving. These clamps were used in World War II and turn up in surplus sales and/or fleamarkets for just a few dollars. There also is a good photograph one on page 70 of CQ magazine for February 1989.

My paddle is an old Brown Brothers Co. model held in place by a Velcro strip. I can use my paddle with or without the knee clamp.

My keyer is homebrewed around a Curtis 8044 chip and is mounted inside my Century/22 transceiver.

I will be glad to correspond with other mobile CW fans, but please include an s.a.s.e.

QRPing Through Oceana

By Herbert "Pete" Hoover III, W6ZH
Suite 410
100 South Los Robles Avenue
Pasadena, California 91101-2453

In late 1987, my wife Meredith and I started planning a two-month trip to Australia and New Zealand to arrive in Cairns, Australia, about Sept. 1, 1988. We were to visit some spots we missed in 1986 and then go to New Zealand to "do" the Milford Track.

In April 1988, we added Indonesia to our itinerary, changing our schedule. We would go first to Bali, then to VK-land via Perth, go to the bush country east of there, then to the south-west corner of West Australia, Tasmania and back to Sydney. From there we were to go to Lord Howe Island and Norfolk before going to the North Island of New Zealand. The "Track" was out because it was too early in the spring (read "too much snow").

Coincident with the schedule change, I decided to include an HF station in addition to the 2-meter gear I planned to take. Previous experiences while operating as 5W1EX, A35ZH, /KH8, etc. and lugging an FT-757 plus accessories around convinced me that smaller was better. Besides, Meredith wasn't all that interested in being a sherpa for a 50-pound equipment suitcase!

So around April 15, I started building a QRP rig derived from the K1BQT design for 20 meters (14-14.1 MHz), 10 watts output, CW only and requiring 12.6 VDC at 3 amps, shown in the June 1987 issue of "Ham Radio"

The rig was finished on Aug. 22, and it tuned out quite well, if I say so myself (see accompanying photograph). The rest of my station consisted of a power supply capable of working off 117 VAC or 230 VAC and delivering 13.4 VDC at 6 amps, so I could use it with my IC-28A 2-meter rig, a 20-meter dipole made of Radio Shack speaker wire, 30 feet of RG-8X plus assorted bits and pieces, such as a keyer paddle, compass (which way to the Deserving W6s?) and earphones. The package weighed in at 14 pounds.

We left for Bali on Sept. 3 but did not operate from YB0. We arrived in Perth on Sept. 12, and the following day it took me all of 23 minutes to apply for and get an Australian license — VK6BCW — good for a year. From Sept. 14 to Oct. 8, I operated from 9 locations in VK6, VK7 and VK3. I had a total of 104 QSOs and worked 38 countries, qualifying for WAC twice from different locations.

Operating typically was during the "cocktail hour" plus sometimes an hour or two after dinner. On hearing this, Jim Rafferty, N6RJ, opined that this might have been incoherent CW.

We flew to Lord Howe Island Oct. 10, where we stayed two days. With a poor location but an interesting call, I had 70 QSOs and worked 14 new countries (five new ones for VK6BCW/xxx). The island is beautiful, we spent most of our time outside feeding the fish with stale bread and generally lazing. We flew to Norfolk on Oct. 12 for four days.

In addition to spending quite a bit of time with Jim and Kristi Smith, we drove on all the paved roads of Norfolk plus most of the unpaved ones. We wandered through what was left of the most notorious prison in Australia's early days, flew kites, ate, drank Fosters Lager and generally played tourist. Oh, yes, I also had 216 QSOs with 16 countries (another

The business end of W6ZH's 20m QRP transceiver, which accompanied him on visits to VK and ZL. (Photo by W6ZH)

WAC), including four new ones for VK6BCW.

It was on to New Zealand on Oct. 16, where ZL1HV handed me my license as I came through customs in Auckland. I had applied two months earlier, and I was instantly ZL0AJH. But the license was good only for two weeks. This call was another finger-twister on CW and not all that easy to get untwisted on phone either.

We spent the next two weeks traipsing around the Coromandel Peninsula and East Cape of North Island — two areas we missed on a previous trip. They are very nice rural locations that still reflect life in New Zealand as it was supposed to be 50 years ago.

I operated HF from four locations with 101 QSOs, 48 countries and two WACs. Locations varied from Puka Park Lodge in Pauanui (67 QSOs) to a motel in Pokeno (21 QSOs) to a luxury corner room on the 8th floor of the Regency Hotel in Auckland (three QSOs). We drove some of the worse roads I've ever seen, particularly the spectacular one from Wairoa to Rotorua, 100 miles of twisting, land-and-a-half wide, unpaved, rutted mountain road, shown on maps, correctly, as National Highway No. 5. Our total mileage in New Zealand was 2,200.

In summary, instead of a baggage-laden, harried DXpedition, we had a related vacation — two months of wandering around VK- and ZL-lands.

I had 491 QSOs, worked 57 countries and qualified for WAC at least four times. My HF equipment was modest and the antenna extremely so, but it was easy to carry and set up. The results were continually surprising, both to me and the person on the other end.

As can be gathered from the above, the rig got some rough treatment. During baggage handling at the Perth airport, it got a thump hard enough to push the heatsink on the rear panel forward and deform the real panel about a quarter-inch! Karl, VK7CW, let me use his shop for necessary corrective surgery, and the rig survived beautifully.

I also have obtained another TenTec case to match the Travel Radio into which I will put a 117/230 VAC, 50/60 cps 12.6 VDC 5 amp power supply. The one I have been using is too large. I'll also put in a rudimentary antenna-tuning unit. I used a wire dipole without a balun at the center, and on more than

☞

The Case for the End-Fed Half-Wave

Denton Bramwell, K70WJ
c/o Heath Company
Benton Harbor, Michigan 49022

Several years ago, I went through a vertical antenna stage, where I experimented with different types of vertical antennas, and read extensively about their theory of operation. Like most hams. I formed some opinions about what works, and what doesn't, and have often found myself using one particular form of antenna that I grew fond of during that period: the end fed half wave.

The simplest embodiment of the antenna is often not really a vertical, but rather an inverted L style--usually a piece of wire running vertically up some support for a distance, and then horizontally. In my case, I used two trees, one just outside my ham shack, and the second a hundred feet away. For 80 meters, that comes out to 40 feet of vertical wire, followed by 100 feet of horizontal wire. The end of the wire is fed against ground, using an antenna tuner. I have used scaled versions of the same thing on 40 and 20 with very good results. In fact, it has become my preferred antenna for QRP portable operation.

OK, the most obvious question is, "Why a half wave?" The answer is that (ironically enough), you end up using less wire than you would for a quarter wave fed in the same fashion! The reason is this:

Antennas fed against ground will have ground losses, created by rf currents circulating in the earth. These ground losses appear as a resistance in series with the antenna, and you can minimize the resistance in a couple of different ways: l) use lots and lots of ground radials, or 2) use a few radials and get your antenna well up away from ground, in ground plane fashion, or 3) make your antenna such that the effective resistance of ground is much much smaller than the impedance of your antenna. It is this third alternative that makes the end fed half wave work well.

Consider for a moment a ground mounted vertical antenna, a bit shorter than 1/4 wave. It will have a feed point impedance of perhaps 25 ohms, and a capacitive reactance. Now suppose that we have installed a lossy ground system under the antenna, and that it contributes 50 ohms of series resistance. Obviously, we haven't done too well — most of our rf is going to go to warming the earthworms.

Of course. we can greatly increase the number of radials in the ground system, and reduce the ground losses. By the way, if you have a ground mounted typical commercial vertical antenna, and four quarter wave radials, you're not going to do very well, unless your installation is on the beach or in a swamp. For a ground mounted system, at least 16 radials are needed, and you get improvement up to 120 radials. And (let me toss kerosene on the fire) there is absolutely nothing sacred about the radials being a quarter wave. If you're going to run only 16 radials, you might as well keep them to 1/8 wave. There will be very little difference in performance.

Well, that might be the long way 'round the barn, but the point is this: if vou are going to run verticals that are quarter wave or less, you are going to end up burying a lot of wire. It is a lot simpler to just use a higher impedance antenna, and let the ground losses shrink into insignificance.

Now consider the case of an end fed half wave (vertical or inverted L). Here, we are looking at a feed point impedance of about 1000 ohms, and if we should have 50 ohms of series resistance, it will be completely negligible. And we have not had to bury a bunch of wire. In fact, for portable operation, four 15 foot radials flopped out on top of the ground are completely satisfactory on 40 meters. With this system, my rule of thumb is that if touching the rig does not change the SWR, I have enough of a ground. (More kerosene: Ground rods are for power safety, and frequencies below HF. If you are using a ground rod rather than radials, your ground is safe, but ineffective for HF. If you have salted around your ground rod, all you have done is increased corrosion, and made life tough for the petunias.)

For portable operation, I simply tie a small weight to the end of a half wave of wire, toss it up over a tree, and then repeat the process with a tree far enough away to give me my L shape. At home, the installation is quite similar. The end of the wire is simply attached to the antenna tuner, and the case of the tuner is attached to ground. At home, the ground is just a convenient junction of soldered-together copper pipe.

One important point on dimensions: Cut the antenna about 5% longer than a dipole for the same frequency. Yes, that will make it a little reactive, but your tuner will handle that for you. The extra length will make the antenna a lot less finicky.

This simple antenna has a number of virtues: no feedline is required, it works well at twice the frequency (for the same reasons), it requires only a minimal ground, and it performs very well. Yes, it does require a tuner. but that is a very acceptable disadvantage, all things considered. All things considered, it has become my favorite portable antenna.

QRPing Through Oceana.....

(continued)

one occasion, I found the transmitter either wouldn't load correctly or that there was more than a little RF on the outside of the coax feedline.

The Curtis keyer is very susceptible to RF, and there were several times when I would have to change the physical location of the keyer paddle so that I wouldn't get extraneous dits and dahs. I also will include some form of SWR bridge in the new unit.

Also on my list of things to do is coming up with some form of vertical antenna for those situations where there is no form of vertical support for a dipole or when I'm in a 10th-floor hotel room. I have a bread-board version of a whip that is 12 feet long assembled but collapses to 18 inches for travel.

Stay tuned.

Dwarfed by the nearby telly, the QRP rig is ready for business from Karri Valley, West Australia, signed VK6BCW. (Photo by W6ZH)

Equipment Review:
Fluke model 77 Digital Multimeter

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Today's quiz is a two-parter: 1) What would a QRPer do with a digital multimeter (DMM)? 2) Why pay well over $100 when you can get one for much less?

Answers: 1) The same thing he/she does with an analog meter, but with much better resolution, and usually better accuracy as well. (Is the needle zeroed? Is it sticking? Am I looking at it from an angle? Shall I call that 12-1/2 or 12-3/4 volts? Slap on the DMM--it's 12.63 volts and that's that!) Among other things, I use mine to calibrate attenuators and make power output readings in conjunction with a peak-reading diode detector. The serious QRPer or homebrewer can't afford to be without one.

2) While you can buy DMMs for less, you probably won't find the same combination of accuracy, quality and features that the 77 has. Regardless of the type of product, people seldom regret spending a bit more to buy a first-rate unit. The John Fluke Mfg. Co. is a well-respected firm that has been putting out high quality instruments for quite a few years, and they give it a three year limited warranty.

First off, the accuracy: at 0.3% it outranks any analog meter found in the average shack, and should more than satisfy the most demanding home user. The 10 megohm input impedance insures that it places virtually no load on circuits under test. In addition to measuring up to 1000V, 32 megohms, and 10 amps, it also sports a diode test mode as well as continuity beeper. Below the 3-1/2 digit display, which shows a maximum count of 3200, is a fast-updating analog bar readout which is good for making peak adjustments.

The 77 has a slim, trim, deceptively simple appearance. Having autoranging, there are only eight positions on the function knob. You simply select DC volts, AC volts, etc and connect the test leads, and it selects the optimum range. Don't worry about getting the polarity of the leads wrong — it takes care of that, too. If you prefer to have a fixed decimal point instead of floating, you can override the autorange feature by pushing the button in the center of the function knob. Pushing it again changes the range by factors of 10.

An indicator appears in the display when the factory installed 9-volt transistor battery has about 100 hours of life left. You don't need to worry about hastening its demise by leaving it turned on overnight, as it gets bored after an hour of inactivity and goes to sleep. The instruction manual, which is in six languages, gives typical life as 1600 hours, and 2000+ with an alkaline battery. There is a brief self-test at power on, activating all portions of the display in the process.

If you power-up while holding down the button in the center of the knob, it enters the touch hold mode. This allows you to connect the leads to a circuit without having to look at the meter at the same time, a definite safety factor when working on higher voltages or awkward positions. After the reading remains constant for about a second, the meter locks it in and beeps.

The lowest price I've seen is from Heathkit, which continues to list it as model number SM 77 for $129.95 in their Winter 1989 catalog, number 215. This is $10 to $15 cheaper than most places, and in return for giving you the best price, Heath puts its name side by side with Fluke on the case. (But don't worry, it's a completely assembled unit!) Heath doesn't give you the plastic holster case which Fluke normally includes in the price. However, they will throw in a free zip-up soft carrying case, at least as long as the Christmas catalog is in effect (through 28 Dec. 88), if you put it down separately on the order form and write "no charge" in the price column. It's probably more useful to most folks than the holster, anyhow.

A present to myself on my 38th birthday, I've enjoyed my meter thoroughly. It's an incredible improvement over the old Lafayette VOM that I used to have (how many of you remember that name?), and makes me much more confident about the accuracy of my attenuators and power measurements. It's yet another one of those things that you know you really don't need and can't justify spending the money for, then wonder how you ever got along without it. The Fluke 77 is an excellent compromise between price, quality, and accuracy for serious home use, and you'll never regret buying one.

Two Simple Mods For Optimum Performance of the HW-9

By Herb Ley, N3CDR
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The Heath HW-9 has been featured many times in "The Quarterly", and as a result I "bagged" several of these transceivers, two dead and one alive with an ad in QST.

This may seem to be overkill, but having done a mod on the older Heath HR-1680 [1], I'm firmly convinced of the need to have an "original" working model of the transceiver/receiver with which to compare the results of any modifications. Cam Hartford's [2] and Tim Groat's [3] articles in the July 1988 issue of "The Quarterly" gave me several directions to go with the mods, but first I had to resuscitate the two "dead" HW-9's! That task, which took a bit of effort in itself, produced two simple checks or mods which could be applied to any HW-9. I'd like to share those two mods with the QRP crowd and here they are!

Active AF Filter

As Cam Hartford pointed out the schematic for the active AF filter is not correct in the Heath Manual for the HW-9. Both sections of the filter use 1.5 Meg resistors (R354 and R359) and 1000 pf capacitors (C339, C341, C344 and C345) in all versions of the HW-9 that I am aware of, regardless of the values shown in the schematic.

The resistors appear to be 5% precision units on the basis of my measurements in the three HW-9's, and are acceptable for use in the filter. The capacitors, on the other hand, appear to be standard disc ceramic units with a plus or minus 20% tolerance. This wide tolerance is not acceptable for use in the filter.

I have found variations of 10% or more in the nominal 1000 pf values for some of these capacitors, as measured with a calibrated General Radio type bridge. This much variation in the values of these four capacitors broadens the normally narrow passband of the filter and reduces the gain of the filter. I recommend removal of these four capacitors, and replacement with four matched units as close as possible to the design value of 1000 pf.[4]

The critical element is *matching* the four capacitors; they can have values from 950 to 1050 pf, but all should be the same. The center frequency is influenced by the absolute value of the capacitors and the resistors; the sharpness and gain of the filter is a function of the *matching* of the capacitors and resistors.

You can also check the values of the two resistors. All have been 1.5 Meg within the limits of measurement of my VTVM. Replacement of the capacitors in my HW-9's with units matched to 2% resulted in a clearly apparent increase in sharpness of the filter, and disappearance of the loss of gain that had occurred when the filters were switched in before replacement of the capacitors.

BFO Injection Voltage to U-303

Two of the three HW-9's produced a much lower audio output on the same test signal that produced a good response on the third. This problem took some time to solve, but to make a long story short, it was traced to a low BFO injection voltage to U-303.

In one of the HW-9's that voltage was as low as 20 mv RF (RMS) as measured with a simple diode probe and my VTVM. In the HW-9 with the maximum output, the same voltage was measured at 650 mv RF (RMS). I recommend that you measure the RF voltage at TP104. If it is less than about 400 mv RF (RMS), first replace Q113 and then Q112 if it is still low. The end result with 400 mv RF or more at TP104 is a good conversion gain in the mixer, U-303.

Comments and Conclusion

These two mods require no comparison with another HW-9, and will greatly improve the performance of the transceiver if either the AF filter element matching or the BFO injection voltage is sub-optimal. The improvement is well worth the effort! But a word to the wise!

If you get into replacement of parts in the HW-9, you may want to get a simple desoldering iron like the Radio Shack #64-2060. It is a giant leap ahead of solder wick! As a result of these simple mods, I now have two HW-9's ready for further "improvements" ala Hartford and Groat, with one unit in it's pristine "original" state for comparison. When I finish, that third unit will be up for sale, so watch "The Quarterly"!

[1] Ley, H. L., Jr., HR-1680 receiver modifications - try them, ARRL, QST, pp. 22-25, November 1982.

[2] Hartford, Cam, Filter mods for the HW-9, QRP ARCI, The Quarterly, pg. 10, July 1988.

[3] Groat, Tim, Preamp and filter mods for the HW-9, QRP ARCI, The Quarterly, pp. 11-12, July 1988.

[4] Polystyrene caps are preferred because of their high Q and stability. High Q disk ceramic caps are also satisfactory; the NPO type would be preferable, if available.

PROPAGATION AND DX

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As QRPers, we certainly should know something about the Q- signals used in ham radio; after all, we use one in our club name. But in plying our trade, as it were, we get into a number of situations where other Q-signals are used. Thus, we all complain to each other about the mindless QRM on the bands and some unfortunate souls have QTH's that are plagued by QRN from time to time. And we're always concerned how our signals are getting through, asking questions like "QRK?" or "QSA?". More often than not, we get something back like "UR QRP SIGS FB RST 349 ES QSB". That last one, QSB, is the bane of our existence. While there's not an awful lot we can do to change things, let's at least talk about it and see where it comes from.

In our discussions to date, I've touched on the idea that our rf takes off on hops, bouncing or being reflected off the ionospheric layers. For local situations, say something like checking into a 7 MHz QRP net on Saturday mornings, we depend on the E-layer for our contacts. But when it comes checking into TCN (the QRP ARCI Transcontinental Net) or to DXing on 14 or 21 mHz, we depend on the F-layer, up there about 300-400 km. In addition to being returned from those layers, our signals pass through the D-layer and suffer absorption in the process.

Now it is not hard to think that any change in those layers, say critical frequencies or electron densities (as in the case of the D-layer), would affect our signals, causing their strength to change. Thus, if we were operating close to the MUF (maximum useable frequency), say on 15 or 20 meters, we could experience fading during a QSO if there was a significant change in the MUF on the path for some reason or another; that might change the skip and perhaps make the link untenable.

Another cause of fading would be an increase in the electron density in the D-region with a burst of x-rays from a solar flare; that would make signals fade badly on the sunlit portion of the earth. The time-scale for such fading is fairly long, some tens of minutes before signals return to their former level. That type of fading is not too common nowadays but such disturbances (SID's or Sudden Ionospheric Disturbances) can be expected to occur more often now that we're on the upswing of Cycle 22.

Another type of fading, more geometrical in its origins, is the so-called "interference fading" where the resultant of several signals varies in amplitude because of phase differences between the signals which combine. This is easy to understand in the case of a ground-wave and sky-wave combining to give the resultant signal at a receiver; thus, if the two waves are of comparable amplitude, fading can be very deep when the two waves are out of phase by 180 degrees. The phase difference between the two waves is usually expressed in terms of path differences, combining waves being in phase when the difference in their paths to the receiver is an integral multiple of a wavelength and out of phase when the path difference is an odd multiple of a half-wavelength.

Yet another form of interference fading can occur when there is no ground-wave involved, the combining signals involving different ionospheric modes from the transmitter to the receiver. Thus, rf from a transmitting antenna can reach a receiver by several modes at the same time, say from 5F, 6F and 7F hops. Clearly, the path length from the transmitter to the receiver differs with the various modes, according to the slant range involved; the relative amplitudes of the signals in the different modes depends on the vertical pattern of the transmitting antenna and the D-region absorption per hop. Thus, depending on the height of the antenna, the different modes could arrive at the receiver with comparable amplitudes but differing path lengths or, equivalently, phases. The final signal amplitude will be a sum of the various signals, taking into account their amplitudes and phases. Any change or vertical movement of the reflecting layer along the path could alter the path differences or phases and thus affect the strength of the signal.

While it is hard to give values to the time-scale of such fading, it is easy to see that it will be faster on high frequencies than on low frequencies. That is the case as the wavelengths are shorter at higher frequencies and any given vertical movement of the ionosphere produces greater path differences at shorter wavelengths than on longer wavelengths. A more complicated form of fading results from changes in wave polarization of the signal reaching a receiving antenna. True, one can speak of the polarization of the signals leaving the transmitting antenna but the final polarization after all the hops may be entirely different, depending on the direction the wave travels relative to the geomagnetic field. This gets right down to the nitty-gritty of ionospheric physics, treating the ionosphere as a magneto-ionic medium and with theory to match.

Sudden Ionospheric Disturbances can be expected to occur more often now that we're on the upswing of Cycle 22.

In the simplest of cases, theorists discuss the propagation of waves in their motion through an ionized medium imbedded in a magnetic field. Two elementary cases result, one where the wave travels along the direction of the magnetic field and the other when the wave travels perpendicular to the magnetic field. All well and good but as QRPers, we're going in every direction imaginable, sometimes sending our rf poleward, then again perhaps on an E-W path or even cutting across lines of magnetic force at odd angles. We don't make life easy for ourselves or the theorists. But maybe we can make a bit of sense out of this by looking at polarized radiation and how it propagates through the ionosphere; that should shed some light on polarization fading. To do this, you have to do some mental gymnastics, thinking about how to represent a linearly polarized wave.

Now we know that we're dealing with electric and magnetic fields which are changing at the rf frequency. Those fields are polarized so lets take the easiest case, rf coming from a dipole which is set up parallel to the ground. In the direction perpendicular to the wire, the radiation coming from the dipole will be oscillating with the electric field E parallel to the direction of the wire and also the earth's surface; we term that a horizontally polarized wave and represent it with a vector, an arrow whose length gives the strength of the electric field at a given instant and which oscillates sinusoidally at the rf frequency, first pointing parallel to one end of the dipole during half a cycle and the other end during the other half.

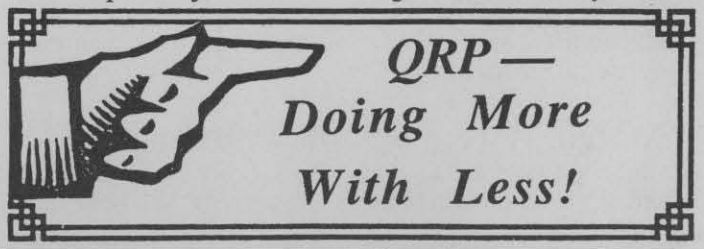
continued on page 13

All of the above is treated in most of the ham antenna handbooks and should be no mystery to Joe QRP or you. But the next idea may grab you a bit differently, the fact that a linearly polarized electric field E from an antenna can be represented as the vector sum of two circularly polarized waves of constant amplitude E/2 rotating in opposite directions. How about that? Anyway, with a linearly polarized electric field replaced by two circularly polarized waves, the question is what happens to those waves: in going through the magneto-ionic medium, do they advance with the same speed or not?

If the two circularly polarized waves, right-handed and left-handed looking along the direction of propagation, do not travel at the same speed, then there will be a change in the direction of polarization of the linearly polarized wave, so-called Faraday Rotation. That means that a horizontally polarized wave can change in the course of transmission from point A to point B and end up being polarized at an angle with a receiving antenna which was set up in anticipation of receiving the signal from the horizontally polarized transmitting antenna. That would serve to reduce the signal strength at the receiving station. Moreover, any changes in the ionosphere which would change the path length between the transmitting and receiving sites would affect the rotation angle of the linearly polarized wave, making for further fading in the signal strength at the receiver. This can take place either rapidly or slowly.

As a case in point, let me say that having both a dipole and a vertical antenna here at this QTH, it has been possible to observe such changes in the angle of polarization. The most striking example was in connection with monitoring the W1AW Bulletins back during solar minimum; then, it was possible to note a fade on the dipole and switch to the vertical and regain the signal strength that was lost from the dipole. Of course, there was a difference in gain between the two antennas, dipole vs vertical, so there was some residual effect noticed in the switching. But it was apparent that the polarization was changing and one could make up for the fading by changing antennas. I have to say that's about the only case I know of where a QRPer can get around what Mother Nature is serving us from her ionospheric cupboard; otherwise, it's like it and/or lump it!

All of the above depends on the angle between the direction of travel of your rf and the local geomagnetic field direction. If you look at a map giving details of the field direction, you can see how complicated life can be. The real good news, at least for QRP DXers, is that all of this becomes important at rf frequencies which are comparable to the gyrofrequencies of ionospheric electrons about the field lines, typically 1.4 mHz. So after leaving the 14 mHz band and going upward toward 21 and 28 mHz, magneto-ionic effects are less of a problem. I don't know of any low-band QRP DXers who regularly look into the jaws of the D- region; if they do exist, magneto-ionic effects represent just one more thing for them to worry about.



Field Day Operation with Small Antennas

by Brice Anderson, W9PNE
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For many years I put up the largest antennas possible, including vee beams, for Field Day operation. However, for the past few years, I've felt that small portable antennas, which could be set up quickly by one or two persons, would provide true emergency capability.

With this in mind, I planned to use loops and other small portable antennas for my single-operator effort in the 1988 Field Day, with 900 milliwatts output. For the 14 MHz band, I built a square half-wave loop, using a light weight X-shaped support and mast of short pieces of wood, which were easily bolted together. Number 14 wire was used for the loop, which was eight feet on a side.

About ten minutes were required to take the parts from the VW Vanagon and assemble. A U-bolt to a horseshoe game stake and three nylon guys held it upright with the bottom wire five feet above the ground. I fed the loop directly with RG8X at the center of the east side, with the plane of the loop east-west. The loop gave 38 QSOs all over the US plus VEs; 16 QSOs were made the first hour.

I used my three feet diameter circular version of the W5QJR micro-loop on 21 MHz. It is made with one-inch outer diameter copper tubing fed with a gamma match. I placed the loop on a folding card table about 30 inches above ground. Set-up time was about two minutes. This loop covers the 14, 21, & 28 MHz bands, but I used it on 21 MHz alone, to avoid having to retune it. With the plane of the loop east-west, it did an outstanding job, providing 29 QSOs. Joining a pile-up on KV4FZ, I got him on the first "W9PNE".

For 7 MHz, I built a version of the shorted transmission line antenna described by Ted Hart, W5QJR, in his book "Small High Efficiency Antennas Alias The Loop". It is actually an elongated rectangular loop. I used one-inch outer diameter copper tubing to make a six-ft. long by one-ft. wide antenna. I fed it with a #8 wire Gamma match.

I hung this strange looking piece of plumbing horizontally on a piece of plywood propped against a saw horse. It was about three feet above the ground. Set-up time was about two minutes. I had a few QSOs with this antenna, but it was too sharp to be of much value in a contest, where frequency changes are required. The SWR was 1.O at resonance but rose to 1.5 with a frequency change of +/- 10 kHz. Beyond this, the SWR went sky-high in a hurry. On reception, the signal to noise ratio was outstanding.

I didn't have time to prepare any compact antennas for 3.5 or 28 MHz, so I threw a center-fed 134-ft. wire in the trees, fed with twin lead through an antenna tuner. This was a mistake, since it took more than an hour in the 100 degree heat. I never did cool down and quit operating at 10:30 p.m.

The center-fed did provide contacts on 3.5 & 28 MHz and on 7 MHz outside the resonance of the rectangular antenna.

I would like to develop small portable antennas for the 3.5 and 7 MHz bands with wide bandwidth and quick set-up. I would then be truly ready for an emergency situation.

Idea Exchange

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Lead Acid Battery Caution

Mike Czuhajewski, WA8MCQ, sends a safety reminder along about sealed lead-acid batteries.

"Sealed, rechargeable lead-acid batteries with the tradename Cyclon, made by Gates Energy Products, have appeared a few times locally at hamfests and from other sources. The ones seen most often are rated at 2.5 amp-hours, and are the same size as a regular D cell, although they are 2 volts each.

"One of the cautions printed on the label says to avoid shorting, and this should be followed scrupulously. The Cyclon cells have, according to the manufacturer's data sheet, low internal impedance and are capable of high discharge rates. The X cell can put out 200 amps, the J cell 250 amps, and the BC cell is capable of 600 amps. Even the lowly D cell is capable of delivering (for a short time) over 100 amps!

"A local ham accidentally shorted a battery pack made up of four of these D cells in series. The connecting wires were melted, and the cells spit out drops of molten metal and were destroyed. Anyone using the Gates Cyclon cells should be well aware of their tremendous short-circuit capability, make sure they are fused as closely as practical to the battery terminals, and use care in installation."

Endfed Wire Portable Antenna

John Collins, KN1H, and I have been discussing endfed wire antennas on our Monday night skeds. We both like to take our homebrew QRP rigs along when we go on vacation. We have come to the conclusion that for 80,40 and 20 meter portable operation an endfed wire is the best. But we have decided that a 1/4 wave is not the best.

We have been using a length of about 90 feet. We chose this length because it is 3/8 wave on 80 meters and gives a feed resistance of about 5O ohms with inductive reactance. This reactance is easily cancelled with a series capacitor of 365pF. On 40 meters this wire can be trimmed to a 3/4 wave wire and you don't even need a tuner.

On 20m it is a random wire that can be tuned with a simple "L-NETWORK". This length has a few other advantages, it is low to medium impedance on most bands so it is easy to tune up. It has a bit higher feed impedence on 80 than a 1/4 wave wire so the ground connection doesn't have to be as good for good results. With this length the current point on most bands is out in the clear top span. (the current points do most of the work and they fall at points 1/4 wave from the far unfed end of the wire and the first of these points usually can be arranged in the clear top span.)

Doctoring Japanese Planetary-Drive Vernier Dials

C. F. "ROCK" Rockey, W9SCH, writes with some "HAM" ingenuity:

"These dials are widely used by builders of home built apparatus. They perform well for a considerable period of time. But after awhile they become "sticky" and electrically noisy. Being expensive these days, we don't like to replace them. So, let's fix the thing.

"Take off the knob (unscrew the setscrew) and carefully squirt cleaning fluid into the space around the shaft. Work it into the mechanism by repeatedly rotating the dial. Unless you are dreadfully lucky, you will now find that the dial slips badly.

"Go to a REAL drug store and buy a bit of rosin, as little as they will sell. Put a small bit of rosin in a dish. Then add a bit of alcohol, rubbing alcohol will do or some of the stuff they sell to add to your gas tank in the winter. Dissolve the rosin in the alcohol, making the solution is so dilute that it is just a light, golden yellow color. Then carefully drop this solution, drop by drop, into the space around the shaft and turn the dial back and forth until the solution works in and coats the little wheels inside with just a very thin film of rosin so that they grip each other properly. DON'T USE TOO MUCH, you'll jam the works! Just a thin film on each little wheel does it.

"If you get too much rosin on them, add a bit of straight alcohol to wash a bit out. With some practice you can get the dial back as good as new. Try it, it's cheaper than a new dial. These dials now cost about $10 apiece and are getting hard to find, so it pays to 'DOCTOR' them."

Making a Good Better—HW-9 Mods

Larry East, W1HUE, writes with some mods for the popular HW-9.

Internal Keyer and Calibration Oscillator

"The first enhancement that I made to my HW-9 was to add an on-board keyer (using a Curtis keyer IC) and 100 kHz calibration oscillator. A schematic of the circuit I used has been published in the "Technical Correspondence" column of the October 1988 issue of QST. I'll send a copy (including parts list overlooked by QST) to anyone sending me an SASE.)

"After installing the keyer, I noticed the weighting was a little heavy. Investigation revealed this was caused by the slow return to +12V of the transmitter keying line. This was fixed by adding a one kohm pull-up resistor from the keying line to +12V. I recommend this simple mod, whether a keyer is being used or not. The pull-up resistor can be installed on the T/R board between the top end of R434 (the end that connects to C514) and the left end of R435 (the end that connects to the emitter of Q407) without removing the board. As an alternative, it can be included in an on-board keyer as shown in my schematic."

Attempts to Reduce Warm-up Drift

"My HW-9 exhibits a negative warm-up drift of about 2 kHz on 20 meters, most of which occurs in the first 30-40 minutes of operation. I've tried many things—including painting the inside of the VFO shield black—with little or no noticeable

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reduction in the drift. I even tried replacing the VFO coil slug with ones made of "high stability" ferrites (mix #6 and #7), again with no noticeable change. (VFO coil alignment is a little easier using a mix #6 slug, but I wouldn't recommend anyone going to the effort required.)

"I also tried a suggestion made by Dick McIntyre, K4BNI, of placing back-to-back diodes across the tuning cap. Again, no noticeable improvement. (Dick's rig originally had a positive drift.)"

Curing Transmitter Stability Problems

"Some, but not all, HW-9's exhibit stability problems to some degree on the high bands. The output meter on my rig would slam hard right at power levels above 3 watts on 15 meters and observation of the 10 meter output on a scope showed evidence of instability under some power level and loading conditions.

"Heath is aware of the problem and will supply a 2N5770 on request to replace Q402. This will probably cure the problem, but it will also reduce the transmitter output on the high bands (in my case, to about one watt in 10 meters!)

"After trying a number of things, I found replacing Q402 with a 2N4401 cured the instability problem without decreasing output on 10 meters (in fact, output on 10 increased slightly.) If your rig has stability problems, try replacing Q402 with 2N4401. Since the circuit seems quite sensitive to transistor parameters, more than one might have to be tried. In real stubborn cases, try also changing C434 to a slightly smaller value; better yet, replace C434 with a 51 or 68 pF fixed cap in parallel with a small 5-50 pF trimmer cap and 'tune' it for best stability and reasonable 10 meter output."

Attempts to Improve Receiver Sensitivity

"An article in 73 Magazine (Helping and Hopping the HW-9" February 1988, p.50) indicated that receiver sensitivity, particularly on 10 meters, could be improved by replacing the T/R switching diodes in the receive path with Shottkey diodes and replacing Q107 (the first mixer) with a "hotter" MOSFET.

"I replaced D301, D303, D403, D404 and D407 with 1N6263 Shottkey diodes and Q107 with a 3N201. Very little, if any, improvement was noted and I do not believe it was worth the effort (particularly changing the diodes.) However, some improvement might be gained by using a 3N211 instead of the slightly lower gain 3N201 for Q107.

"A note of caution: the 73 article recommended HP 5082-2835 diodes, but this type has a very low voltage rating and should not be used to replace D407. Low voltage devices are probably OK for the other diodes, but a diode with at least a 50V rating should be used for D407 which has a lot of RF across it during transmit."

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Mike Czuhajewski, WA8MCQ, also sends some mods for the HW-9.

"A friend's HW-9 had barely one watt output on all bands. The problem turned out to be a faulty D407 in the electronic T/R switching. In transmit it's biased to keep the output signal out of the receiver but this one didn't, so most of the RF was sucked up by input transformer T404. No damage resulted, although an ammeter in series with the final collector line showed it took six watts input to produce that one watt at the antenna connector—not especially good efficiency.

"I noticed something interesting about the MRF237 output transistors while troubleshooting—the lead configuration is backward. While most transistors in the TO-39 case have the familiar triangular E-B-C pattern, the MRF237 is C-B-E, as confirmed by the Motorola data book. (The case is connected to the emitter rather than the collector.) Keep that in mind if you ever think of replacing the finals with another transistor type. You'll have to reverse the leads.

"In his HW-9 article in the February 1988 issue of 73 magazine, W0WUZ complained about the inadequate heat sinks on the finals, saying the MRF's run how and 'eat up your fingerprints without a burp.' He said he lost a pair of finals and glued additional heat sinks on top of the old ones. After fixing the HW-9, I noticed that one of the finals was running near meltdown but the other was stone cold. I checked and found it was burned out.

"The rig had over half the rated output with only one good final; with two good MRFs it came up a couple watts higher, and both finals then ran at an acceptable temperature with the stock heatsinks. The moral here is that if you find one of your finals exceptionally hot, don't assume the heat sink is inadequate. It might be just carrying the entire load itself.

"Finally, a request for info. After I got the rig working and tuned up according to the book, I found that full power on 10 meters gives a horrendous chirp and click. Cutting the power down cleans up the signal, but it starts going bad again above one watt. Does anyone have any fixes for this?"

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THANKS TO ALL WHO CONTRIBUTE please keep the ideas coming. Being interested in QRP and portable operation, I am also interested in any suitcase or spy-type radios. I am also interested in military HF manpack sets too.I have a small collection of units and I am always on the look out for additions to my collection. So, if any of the readers have info, schematics, manuals, sets for sale or loan, I would like to hear from them.

Well thats it for this time.

73 es GL,

Mike Michael, W3TS

QRP Show and Tell

Mike Czuhajewski, WA8MCQ
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I've never been to the Dayton Hamvention, but I got a good taste of the QRP excitement recently at Maryland Radio Center, in Laurel, Maryland, where I work part-time.

Jim Reid, KD3S, a relative newcomer to the QRP ARCI, recently joined the MRC staff. He suggested holding a QRP Show and Tell session, and the owner, Jerry Johnson, WA3WZF, agreed to let us use MRC's public ham radio library.

I arrived at the appointed time on Dec. 10, 1988 to find Jim already set up. He was mildly surprised at the large box I brought, having quite a few more things than he did. Then Danny, K3TKS, showed up and put both of us to shame! By the time all three of us were unpacked the area resembled a hamfest. We were eventually joined by John, KA3GNG, a non-member with a high tolerance for QRPers.

Jim showed off his Circuit Board Specialists (CBS) version of the W7EL Optimized QRP Transceiver from the August 1980 QST, with an alternative energy source. As the label on the base of his "huff 'n puff" generator says, "Solar Power is for wimps!" It's an 80 to 100 year old generator from a hand-cranked telephone, along with a rectifier, filter and 12V regulator.

Sending CW while providing your own power is a bit tricky, and even scanning the band quickly gets to be a chore, but it's a great novelty item. It adds new meaning to the "multioperator" class! He added a digital display to his 20 Meter Travelradio by K1BQT (Radiokit), making a really classy unit.

Jim splurged on the "cubic incher" transmitter from the ARRL handbook, putting it into a 10 cubic inch chassis with a genuine British spy key on top. He had an 80 meter crystal in a glass "can" plugged into it, something not seen too often, and it was fascinating to watch a blue glow dancing on the quartz every time he pressed the key. (I later tried it with two 4MHz frequency standard crystals in glass holders, with the same results, probably due to ionization of an inert gas filling the holder.) Finally, to the delight of many old- and not-so-old-timers, Jim had a homebrew wouff hong to deal with any QRO troublemakers who might show up.

I set up my HW9, HW8 and modified HW7 side by side and had a ball giving the relative merits of the rigs and a history of Heath QRP. I also showed off a semi-finished 15 watt 40/20M CW transmitter kit from CBS, described by W1FB in an excellent four-part series in QST in 1978. Although the complete kit goes for considerably over $100, Marc, KA3TMZ, got the second best deal of 1988 when I sold it to him at the end of the day for $5. (The best deal was my getting it at a hamfest for $2—and someone had already soldered all the parts on the boards!)

I brought along a few homebrew rigs from my college days, circa 1969. While W7ZOI legitimized "ugly construction" in his August 1981 QST article, my old 80M transmitter used an alternate technique, "hideous construction", but at least it puts out good clean RF! My old 80/40 meter direct conversion receiver made from the Ten-Tec MR-1 module set still works although it has the same drawbacks as an unmodified HW7. The 40 meter transmitter was a project from one of my electronics classes, and along with the Ten-Tec based receiver gave me a lot of fun in the 1970 Field Day. Topping off my box of QRP goodies was an assortment of accessories, such as T-R switch/QRP SWR meter, attenuator and diode-detector wattmeter.

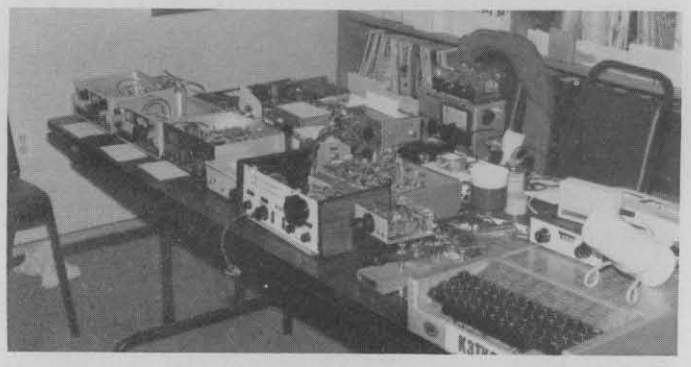
Danny really flaunted his love of CW with three electronic keyers, a beautiful, massive, brass straight key made from a kit from England, a paddle made from pieces of printed circuit board from a design in a 1982 issue of SPRAT, and a pair of Morse keyboards. KA3TMZ used one of the latter to satisfy himself that I really could copy at least 50 wpm as claimed. Not necessarily agreeing with the sentiment expressed on the base of Jim's huff 'n puff generator, Danny brought along his 10 watt solar panel, gel cells and lead-acids. He provided more Ten Tec nostalgia in the form of a complete MR-1 module set and a vintage PM-3A. (For you whippersnappers, the MR-1 was their very first product, and consisted of four ready-made circuit boards to be assembled into a chassis of your choice. They were a VFO, direct-conversion mixer, high gain audio amplifier and transmitter. They were also the basis of the Power Mite series, after which they made the Argonaut, etc. and the rest is history.)

Danny had three Twofer transmitters, one of which was built into an old commercial CB antenna tuner, which he calls his Johnson Viking Twofer. Danny kept his Welz RP-120 wattmeter chained to his wrist, since several QRPers eyed it with lust in their hearts — it has ranges of 20, 2 and 0.2 watts. He brought along a large spool of wire and plastic insulators to give away semi-invisible loop antenna kits, but in all the excitement he forgot about it until near the end. He did give away two 40-meter kits, though. Finally, sitting beside his 40 meter Neophyte receiver (February 1988 QST), Danny had an almost finished 20 transceiver from Radiokit, by K1BQT, described in the January 1989 issue of *ham radio*. It's a beautiful and impressive little rig, and easily has the most features, performance and sophistication per cubic inch of any QRP rig I've ever seen.

John, KA3GNG, displayed high tech state of the art QRP with his 2-meter packet station. Running 1-1/2 watts output from a Daiwa handie talkie, everything was zipped into a soft carrying case barely larger than the Tandy model 100 laptop computer.

We planned for four hours, but stayed for seven. Our sign-in sheet quickly got lost in the shuffle, but we estimate that we had between 30 and 40 people stop by. Some were already QRPers, and the rest got an enthusiastic sales pitch for QRP.

Danny sold several sample copies of the QRP Quarterly, and seven people signed up for membership in the QRP ARCI. in all, the event was a great success and we immediately started plans for another one in a few months.



A wide array of QRP gear awaits visitors at the Maryland Radio Center QRP Show & Tell.

Members' News

Fred Bonavita W5QJM
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The thought for the quarter: In any electrical circuit, components and wiring will burn out to protect fuses.

WELCOME ABOARD! The G-QRP Club in the U.K. has announced it has upped its power levels to match those of QRP ARCI and other clubs to qualify for awards. According to the latest issue of SPRAT, the club's quarterly newsletter, G-QRP now has a maximum power output level of five watts, up from the 3.3 watts RF output the club formerly recognized. The club's SSB output limit already matched that of the rest of the world at 10 watts PEP.

NEW QRP INTEREST is surfacing in Eastern Europe and in Russia, SPRAT also notes. Add Bulgaria (LZ) to the list of countries with low-power enthusiasts. And the UQRP Club has been founded in the Soviet Union with UA3GVR, UA3EAC and UW3DM in the leadership posts.

TRAVEL PLANS ANEW: Mark your calendars and listen around the QRP frequencies for members who are planning trips with their QRP rigs in coming months.

Mark Miller, K5DP, says he will be away from his home in McAlester, Okla., July 9-14 while hiking the mountains of New Mexico on a backpacking outing. He's taking along an HW-7, batteries, key and antenna and will be on the air after 8 p.m. Mountain Time.

Mark had a run at operating from the area last summer while at a church retreat. He set up his station on the second floor of a dormitory and tossed 25 feet of No. 32 wire out the window as an antenna—an almost invisible one. While listening on 20 meters one evening, he heard an exceptionally loud signal from **KA5DSL**, who, it turned out, was at the same retreat.

Lou Berry, KF50W, whose QRP balloon flight at the Albuquerque, N.Mex., festival was pictured in the January issue of The QRP Quarterly, will be at it again on at least two occasions later this year. In mid-September, Lou will be airborne over VE7 land (date and time to be announced later), and he will be back at the 1989 Balloon Festival in Albuquerque on Oct. 1-9. again operating QRP from his balloon.

In addition to 10m and 20m operating, Lou says he will be on 12m this Year for those wanting a truly rare contact. He also asks those who call him not to launch into the traditional chit-chat exchange about their hometowns, weather, antennas, etc. "It's hard enough to pilot a balloon and communicate with the ground crew and airport approach control," he says. "If people would delete all the nonsense that could be put on a QSL card, then I could pick up more stations. Keep the QSOs short."

Brian Prior, WD2H, of Fulton, N.Y., and his father, **Harold, W2PFS**, plan to be back on the hamfest circuit with the return of warmer weather this year. Brian reports he set up a table, his Century/22 transceiver, a battery and his homebrew 40m antenna from which he operated and ran a QRP information booth.

"We drew plenty of attention from the people just trying to figure out what it was," he says of his antenna. "It looks more like a bird feeder than an antenna. We checked into NEN several times with this set up, running as little as 1/4-watt and managed to hand out more than 100 copies of QRP ARCI membership forms and net schedules."

In addition to boosting the club, Brian says, it helped boost sales of gear he and his father were offering.

EVER WONDER what happens to all those components which fall to the floor in the midst of a homebrewing project and can't be located? **Dell McCuaid, W70KE**, of Auburn, Wash., who describes himself as "an incurable homebrewer," says he's discovered those parts travel into the future. "They usually reappear just after they no longer are needed," he says.

CHIPPING AWAY: **Luke Dodds, W5HKA**, of Grapevine, Texas, has his sights set on WAS/QRP with less than 2 watts output and using solar power. He has 39 states confirmed out of 45 worked, but he still needs Arkansas, Alaska, Hawaii, North Dakota and West Virginia.

Luke is an active member of the loose-knit QRP gang in the Dallas area. In fact, those flying into DFW Airport to attend the ARRL Convention in June will pass not far from his home and station. He expects to be in the thick of things at the QRP functions during that convention.

A regular check in for the GSN, Luke says he became interested in QRP because of the challenge: "I have been a ham so long that a fellow needs something new. I have done most things, other than AMSAT, so I took on QRP and have had aheck of a lot of fun. With QRP you can build more things."

LUKE DODDS, W5HKA

THE FIRESIDE SPRINT in January was the occasion for **Bob Wymer, KA6HGT**, Of Los Angeles, to enter his first contest in 21 years in ham radio, and he reports it was "a lot of fun and a great learning experience." Bob used an Argonaut 509 and a four-element monoband yagi on 15m to amass more than 48K points. He says he hopes to work out filtering problems before the March contest.

MORE LUNCHTIME FUN: **Martin Hartwell, KD8BJ**, reports he takes his Argonaut to work in his briefcase and runs it from his company's club station during the lunch hour. Listen for him around the QRP frequencies.

ANOTHER WEST COASTER heard from this period was **Bob Spidell, W6SKQ**, of Lancaster, Calif., who reports snagging **George Burt, GM30XX**, for a nice 20-minute chat on 10m last fall -- their first. He had George's QSL in hand a few days later.

Bob and his wife managed a combined business and pleasure trip to Hawaii in late October where he got to sign /KH6 and meet with QRPers **Alan Jay, AH6EK**, of Waimanalo, and **John Morgan, KH6U**, of Kailua. Bob managed to get on 30m while in Hawaii and reports a nice ragchew with **W6VD**.

Back at home, Bob was burning up the ether on 10m. In addition to GM3OXX, he landed Y24EA, I6DQE, Y21PE, DF9HW, FF6TNB, 3W8CW (Vietnam), UA0KCL, BY4RB,BV2DA and JA7EDZ.

SPEAKING OF 30 METERS, there is increasing QRP activity on that band, especially around 10.106 and 10.110 MHz. It's proving to be a good band, almost around the clock.

AND NO KEY CLICKS, EITHER: **Lynn H. Wilke, WA2DAC**, is having fun running his Century/22 from his Peru, N.Y., home these days. Your editor ran into him on 15m recently and was surprised to learn Lynn was using an 1885-era key made for Western Union.

Geno McGahey, AL7GQ, reports the early January storm, commonly known as the Alaska Express, took down several of his antennas (and some trees holding them) around his Jackson, Miss., home.

At one point, Geno says, he was without commercial power and was operating from a storage battery and 12-volt lights, gasoline lanterns and other emergency equipment.

He is mulling a move to Denver later this year and may be there by the time this see print. If he goes, Geno is promising an expedition to neighboring Wyoming to put that scarce state on the air QRP.

TRANSPLANTED HAWAIIAN **Zach Lau, KH6CP**, who is doing great things for QRP at QST these days in Newington, Conn., turned in a fine WAC effort from a recent afternoon on 15 and 20 meters. Within 33 minutes, Zach logged EA9EA. VP2EQ, AH6AZ, JA8YBY and CW8B. He flipped over to 40 meters where he landed YT0A 13 minutes later.

Reporting from Honolulu, where he was vacationing at year's end, Zach said he'd managed to work only one other QRP ARCI member during the trip -- **NH6LT**. He reports 10m in good shape but QRPers scarce.

"I wonder if anyone is on all modes/all bands QRP?" Zach asks. "Due to a lack of time, I'm usually busy on only a few bands/modes at a time. However, if there is interest in, say, 9cm Amtor, I might be interested in setting up a schedule." He can be reached by mail at ARRL headquarters.

ANOTHER FAST-TRACK WAC/QRP effort was reported by **Keith Clark, W6SIY**, of Ridgecrest, Calif. After qualifying for the award in three hours in May 1987 during a contest, Keith made another stab during the Fall 1988 CQ WW Contest and came up with what he thought was a qualifying time of 25 minutes. However, shortly after reporting that effort, Keith learned one of his contacts may have been a pirate CT2NH. CT2 calls now are CU calls, he advises, and the CT does not show in the Callbook.

Despite that potential setback, Keith managed to snag four new countries during that contest, including his first ZS6, to bring his total to 147 worked, all QRP. He uses four watts output into a Mini-Quad antenna at 24 feet.

INTEREST IN WAZ/QRP comes from **Randy Rand, AA2U**, of Denville, N.J., who read about the suggestion in the January issue of The Quarterly. (See the members' news section.) "I've worked 222 countries QRP but still am missing Zone 26," Randy says. But he advises it's taken almost 12 years to reach that count.

"The accomplishment I am most proud of breaking the pileup for VK9ZM on Mellish Reef on the first day on the first call!" he says. "I couldn't believe it myself because I was tuning across the pileup, measuring its width in kHz (SSB). Then, above the fray, I heard a (local) station work the VK9 with some difficulty.

"I figured he would never hear me, since the local runs a kw, so I listened further and heard another local work him on the same frequency," Randy recalls. "I figured it was worth a call. so I set the rig for split operation and called. The VK9 came back to '2U?' so I sent my call twice and told him I was QRP, which he announced.

"I'm sure that surprised the other stations calling in the pileup. I guess we all get 'gifts' like that once in a great while," Randy says.

That's it for this quarter. Mega-thanks for all the contributions of items and photographs. This is the kind of response we like and the other members enjoy. Shower down your offerings to me at the above address before June 1 so they can make the July issue. Meanwhile, I look forward to meeting as many of you as possible at the QRP forum at the ARRL convention in June in Dallas.

The SMURF (South Mountain Unorganized Radio Flops) field day operators are (l. to r.) Paul KA3PVD; Jack, K2RS; and Don, W3GBG.

A Tri-Band Loop

Brice Anderson, W9PNE
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My Field Day half-wave square loop was the inspiration for this tri-band loop. The 8 1/2 ft. on a side 14 MHz loop performed so well that I wondered how smaller loops for 21 & 28 MHz, strung inside the 14 MHz loop, would work.

There is nothing new in the tri-band concept nor the half-wave loop. My work was to determine the best dimensions and method of feeding.

To measure the actual performance of the loop, I compared the signals from the loop with those of my dependable Hustler 4BTV vertical, which is mounted on top of a 20 ft. pipe. The loop was 6 1/2 ft. above ground, in the vertical plane. Both antennas were surrounded by large trees, and the loop was almost lost in foliage.

On 14 MHz, the loop was always at least as good as the vertical and usually better. On receiving, the loop gave a better signal to noise ratio. Stations all over the U.S. were worked, and I could not notice any directivity.

I did not complete the loop until the day before the QRP/ARCI Fall QRP CW contest. This gave me insufficient time to test it on 21 & 28 MHz. On 21 MHz, I found the loop was better on receiving than the vertical. On transmitting, I found it very effective. The 28 MHz band was very poor during the contest. At times, no signals could be heard on either antenna. When signals did come through, the vertical was the best. However, I did use the loop for some contacts. I hope to compare the antennas when the 28 MHz band is good.

I put a SWR bridge right at the feed point and checked the SWR. The table below shows the results:

Fq.MHz	SWR	Fq.MHz	SWR	Fq.MHz	SWR
14.0	1.3	21.0	1.6	28.0	1.2
14.1	1.2	21.1	1.5	28.2	1.2
14.2	1.4	21.2	1.5	28.4	1.5
14.3	1.5	21.3	1.6	28.6	2.0
				28.8	2.1
				29.0	2.1

I than ran SWR measurements using the meter on the panel of the Argonaut 515. The feedline consisted of 22 ft. 6 in. of RG8X coax. The table below shows the results:

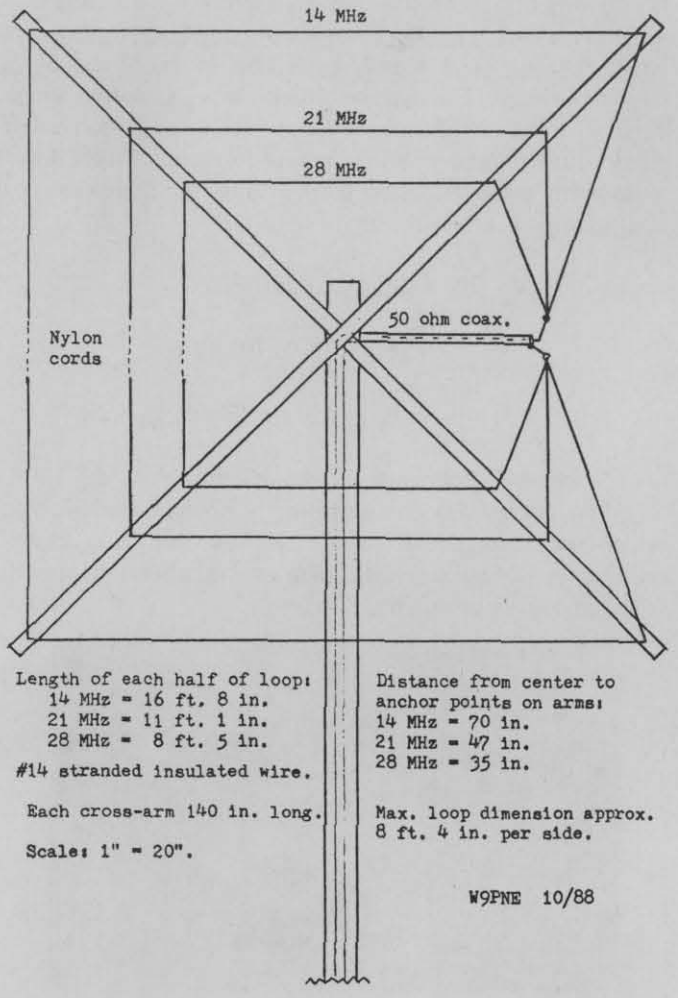
Fq.MHz	SWR	Fq.MHz	SWR	Fq.MHz	SWR
14.0	1.2	21.0	1.8	28.0	1.5
14.1	1.4	21.1	1.2	28.2	1.2
14.2	1.6	21.2	1.1	28.4	1.1
14.3	1.8	21.3	1.0	28.6	1.0
				28.8	1.0
				29.0	1.1

I adjusted the lengths of the loop wires to achieve best SWR in the CW portions of the bands, with the SWR bridge at the feed point. The apparent shift in resonant frequency at the end of the feedline may be due to the length of the RG8X being not exactly an electrical half-wave on 14 MHz. Or, the Argonaut's SWR bridge may be slightly in error.

For the QRP/ARCI CW contest, I fed the loop with a 70 ft. length of Radio Shack RG8M cable. The SWR was low at the Argonaut.

I used the lightweight structure that I had used for the Field Day loop. It consisted of pieces of 3/4" X 1" wood bolted together. The support mast was of 1-1/2" X 3/4" wood. This was fine for Field Day, but I found it too light for home use. I had to use a number of guy ropes to keep the loop together during some thunderstorms. Heavier construction would be better for home use. I may rebuild it with white PVC pipe of sufficient strength, using nylon guys.

The drawing shows the dimensions and arrangement of the loop. An additional piece of wood was used to support the coax on its horizontal run to the feed point. I found it essential to bring the coax as I have shown it, horizontally over to the support pole



continued on page 20

Triband Loop.....

and then straight down to the ground level. Otherwise, the coax detunes the loop and the SWR is erratic.

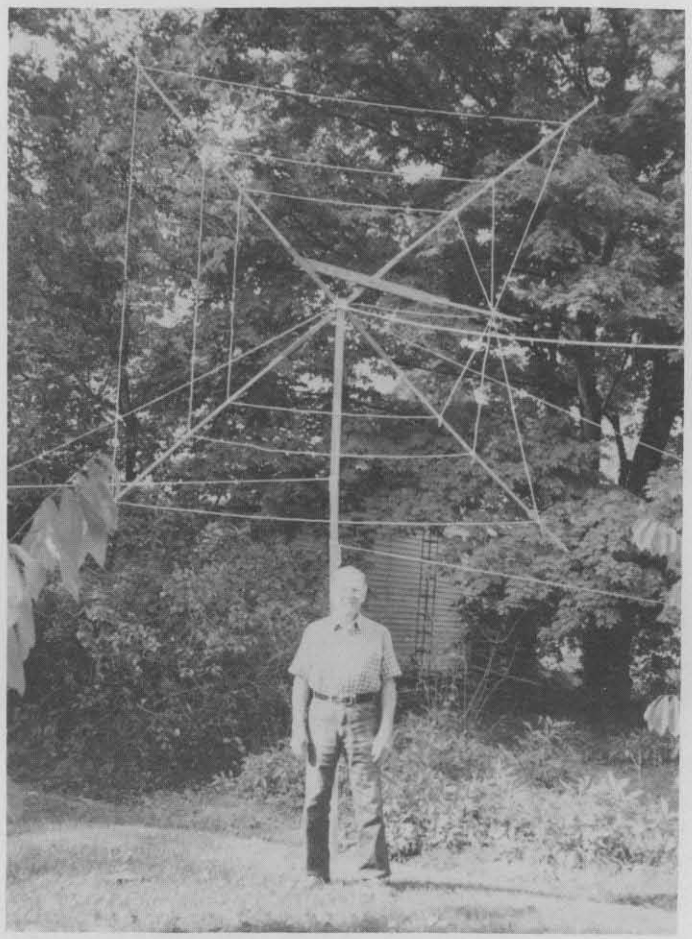
The loop performs well with the bottom wire of the loop from 5 to 6 1/2 feet above the ground. I wonder if it would work better at a greater height, such as 35 feet. I found the performance to be good in all directions. For the QRP/ARCI test, I oriented the plane of the loop NE-SW, with the feed on the NE side. Radiation is supposed to be better in the direction of the fed side. I did manage some European contacts with 900 milliwatts output. But it also worked the west coast easily.

I doubt if the loop is as good as three high dipoles, but the loop is very compact. It should fill the bill for someone with limited space.

To sum up:

1. The antenna is fed with a single 50 ohm coax and no antenna tuner is needed.
2. It is quite broadband.
3. It does not require much space.
4. It is inexpensive to build.
5. It gives good performance even when mounted close to the ground and among trees.
6. It is essentially omni-directional.
7. It should be handy for Field Day use.

I hope someone else builds and tries this loop. I would like to know how it performs for others. Good luck!



BRICE ANDERSON, W9PNE, with his triband loop.

E^2/R Explained

Michael A. Czuhajewski, WA8MCQ
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I often see the formula for RF power given as $E^2/2R$. This could be confusing to the new or non-technical QRPer familiar only with the standard E^2/R. A related formula is the one used to find the impedance of the output state in a transmitter, $Z = E^2/2Po$. Although the accompanying text often states that the "/2R" or "/2Po" formula is applicable to a sine wave, that still might not help some people, and this explanation of the derivation of it might be helpful.

DC power is the familiar E^2/R. Power in a sine wave is $E_{RMS}{}^2/2R$, where E_{RMS} is the effective value of the signal. A 10 volt RMS sine wave will produce the same amount of work as 10 volts DC. However, the sine wave reaches both a positive and negative peak of 14.14 volts, or a peak-to-peak value of 28.28 volts. As long as the sine wave is measured in RMS, the voltage can be plugged into the familiar E^2/R. However, if it is read in peak instead, it must be converted to RMS first.

The peak-reading diode detector is popular in the QRP community for measuring power, having been described by WØRSP in the Joy of QRP, W7ZOI in Solid State Design for the Radio Amateur, and recently by KM8X in the Michigan QRP Club newsletter. This type of circuit has a DC output which is equal to the peak value of the RF, which must be converted to RMS before plugging into the power formula. This is done by multiplying peak voltage by 0.707. Thus, the derivation of the sine wave power formula is:

$$E_{RMS}{}^2/R = (E_{PEAK} \times 0.707)^2/R$$

$$= [E_{PEAK}{}^2 \times (0.707)^2]/R$$

$$= (E_{PEAK}{}^2 \times 1/2)/R = E_{PEAK}{}^2/2R$$

Some RF probes used in conjunction with a VTVM or DVM are designed to give a reading in RMS instead of peak, in which case the usual E^2/R is used. The main thing is to determine whether the particular system being used is calibrated for peak or RMS, and apply the appropriate formula.

Jim, KD3S prepares to attack a linear amplifier with his wouff hong at the Maryland Radio Center QRP Show & Tell held in December.

The Bazooka Antenna

Hans Tscharner, HB9XY
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CH-8152 Opfikon/ZH, Switzerland

In DX circles, there is a coax-dipole antenna known under the name "The Bazooka Antenna". It is of very simple construction, especially for the higher bands, and is quite suitable for hams who travel a lot or who operate without the benefit of a beam. The "Bazooka" needs only a single fixed support and the ends are easily tied in position using short runs of nylon rope.

One of the strong points of the Bazooka is that it has a broad resonance and generally shows a low SWR for a considerable range in frequency. As shown in the accompanying diagram, it does not use a balun at its center and the feed-point impedance can, on occasions, be close to 50 ohms, thus not requiring a transmatch. The only one negative side of the Bazooka is that it operates only on a single band.

The Bazooka in the diagram was cut for the 20 meter band with the center frequency at 14.2 MHz. The Table in the figure gives all the dimensions needed for operating on bands from 15 meters to 80 meters. For any other bands or operating frequencies, you can use the formula given in the Table. Be sure to note, however, that the dimensions are given in meters; to cut the antenna using English units, you should use the following conversion formula: 1 meter = 3.28 feet.

If you set up this antenna for permanent use, you would do well to waterproof the center connections, either with a small PVC box or a piece of hard plastic with the center connections covered with epoxy resin. The connections between the coax radiators and the wire radiators are less of a problem; after soldering them together, you can cover them with pieces of heat-shrink tubing and the waterproofing there should be quite satisfactory, especially since the wires slope downward. The wire ends of the antenna should be isolated with ceramic egg insulators or pieces of Bakelite before the two ends are tied down to hold the radiators at a 90 degree angle.

When put in place and with the correct angle of 90 degrees, the Bazooka gives quite good results. As I recall, my first test of a 14 MHz "Bazooka" was with 3 watts output and it yielded five QSO's, all with RST 599 reports, from a SM5, OH8, GO, Y2 and 4N2! And that was not in a contest. Moreover, the stations at the other ends of those QSO's could not believe that all I had was an Argonaut 509 and a Bazooka!

All in all, I have found that Bazookas give good results on 40 and 80 meters and are particularly useful for field operation. My experience has not shown that the radiation pattern of the Bazooka has any strong maxima or minima; rather, it seems to be about the same as an Inverted Vee antenna. I have cut, tested and fired up Bazookas on the 20, 40 and 80 meter bands; if you're interested, you might just try one and have some fun with it.

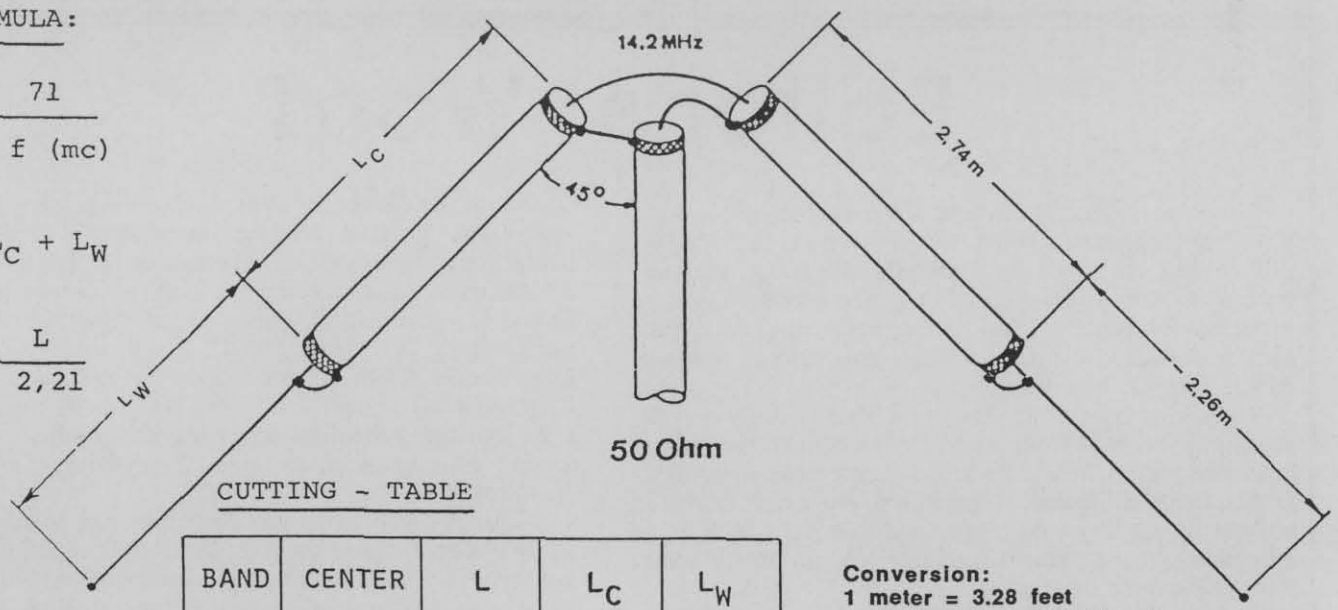
Editor's Note: The Bazooka is really a shortened dipole and its capacitive reactance is compensated for by placing a suitable inductance across its feed point. In the present instance, the inductance is made up of two shorted pieces of coax in series. The antenna currents flow on the outer parts of the coax braid while the inductor currents flow on the inner braid and the center wire of the coax. Being a dipole with a balanced electrical configuration with respect to ground, it is best fed with a balun and if ground proximity effects are too great, it may require the use of a transmatch.

FORMULA:

$$L = \frac{71}{f\ (mc)}$$

$$L = L_C + L_W$$

$$L_W = \frac{L}{2,21}$$



CUTTING - TABLE

BAND	CENTER	L	L_C	L_W
80	3,600	19,72	10,80	8,92
40	7,050	10,07	5,52	4,55
20	14,100	5,03	2,76	2,27
15	21,100	3,36	1,84	1,52

Conversion:
1 meter = 3.28 feet
1 centimeter = 0.3937 inch

Construction: For QRP-operation, make the coax part, including the transmission line, with RG-58/U. For QRO, use RG-8/U. The wire radiators are 1.5 mm PVC insulated CU wire or AGW 15 or 16 in the U.S.

Dallas Convention
June 2-4, 1989

Some of the leading names in low-power Amateur Radio communications, design and construction will be featured during the QRP sections of the ARRL 75th Anniversary National Convention the weekend of June 2, 3 and 4 in the Dallas/Fort Worth area.

George Dobbs, G3RJV, founder of the G-QRP Club in Great Britain; Ian Keyser, G3ROO, designer of the well-known "Oner" transmitter series; Adrian Weiss, W0RSP, QRP editor for CQ; and others will address various technical sessions set for the weekend.

The club's board of directors is scheduled to meet during the convention, whose QRP-related activities also will feature a homebrew-rig construction competition, with a first prize of a $50 gift certificate from a well-known mail-order parts house, a hospitality suite, a QRP station and other events.

A group of tables in the fleamarket area has been obtained, and members of any of the recognized QRP clubs are welcome to use them to sell, swap or give away low-power gear and as a place to meet and greet friends. A special QRP information booth will be operated in the main commercial exhibitors' area, and information about all participating clubs will be distributed, questions answered and the QRP story told.

Headquarters hotel for the QRP activities is the Marriott Courtyard, immediately adjacent to the parking lot of the main convention center and within easy walking distance of virtually everything. Forty rooms have been reserved at a special rate, but the deadline for making reservations is **May 19.**

Call Marriott's reservation office (1-800-321-2211) and ask for Group G-1357. We have 23 double-bed rooms which can sleep up to four people for a flat rate of $62 per night; 15 rooms with king-size beds at $62 per night; and two two-room suites for $68 per night. One suite has been taken for our hospitality operation, and it's scheduled to open at noon Friday, June 2, for the duration. Remember: May 19 is the deadline for booking at this special rate.

A reminder, too, that the convention center at Arlington, Texas, is across the street from the famous Six Flags Over Texas amusement park and close by other recreation-related facilities, all of which make for a fine family oriented vacation early in the season. This is not one convention where the QRPer has all the fun and games and the rest of the family goes begging.

Plans also are under way for a banquet on Saturday night with a no-host "happy hour" followed by the meal and awards and, if all goes well, an after-dinner speaker.

Full details about the weekend will be available at the hospitality suite at the Marriott Courtyard Hotel, Arlington, Texas. Questions may be referred to the club's vice president, Fred Bonavita, W5QJM, at PO Box 420321, Houston, Texas 77242-0321, or by telephoning him after 0100Z weekdays at 1-713-952-9847 or after 1300Z weekends. No collect calls, and an s.a.s.e. is appreciated.

Editor's Word

Somehow I thought I would never find myself writing this particular Editor's Word. I've enjoyed the job of editor and putting together The Quarterly. However, personal circumstances on the homefront (which have been mentioned in the last few issues) are now taking up a great deal of time and have reached the point where I now have to resign as editor. This will be my last issue.

There have been many changes in The Quarterly over the years as it evolved from a small newsletter to the present magazine format. While the project itself looks more like a professional publication, I like to think we haven't sacrificed content for splashy looks. I've tried to have a little bit of everything from technical stuff to gossip so there's something of interest for everyone.

The membership is beginning to communicate with the officers and become more involved in the general working of the QRP ARCI. These days we now find ourselves with choices at election time, officers are (generally speaking) accessible, and membership has been growing at a phenomenal rate over the last couple of years. I like to think that The Quarterly was in some small part responsible.

One of the drawbacks to producing the present day version of The Quarterly is the time investment needed. Unlike many club newsletters, The Quarterly can be put together in a weekend by one person. I'd like to thank everyone who has helped ease the load by typing, typesetting and preparing manuscripts: Tim Groat, KR0U, Randy Jones KA9HAO, Leon Bruner NT8B, Chuck Fitzsimmons KB8AHS, Fred Bonavita W5QJM, and Bob Brown NM7M. It's been a good team and the system of spreading the production work around was successful, as long as I had the time to keep it coordinated.

I'll be glad to help my successor, whoever he or she may be, to ensure a smooth transfer. I think a group of members who live near each other and can get together on a regular basis will have a good chance to put together the best possible magazine. Any volunteers? Drop me a letter.

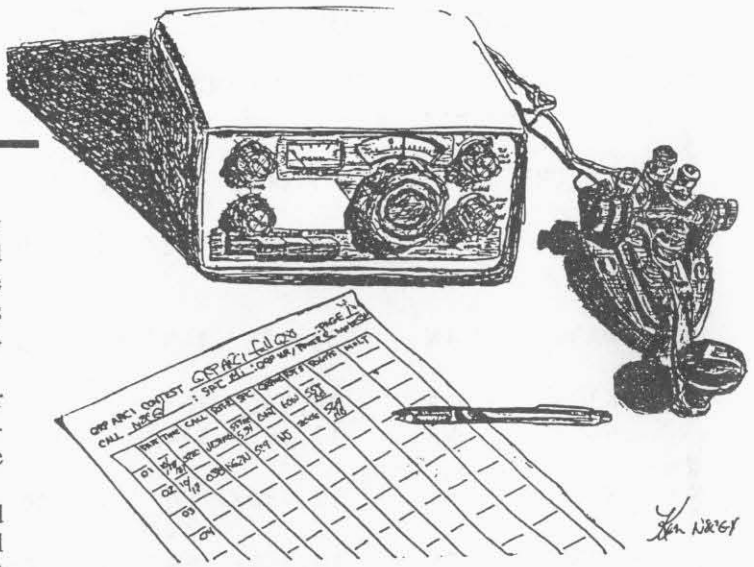
Even though I will no longer be editor, I will continue as a member of the board of directors and be available for correspondence and work on club and QRP related issues. Maybe I'll even be able to start QNIing the nets again!

Thanks for the memories.

Paula Franke, WB9TBU

Contests

Red Reynolds, K5VOL
835 Surryse
Lake Zurich, Illinois 60047



Where are all the Homebrew Rigs?

Included in this issue of The Quarterly is the Holiday Spirits Homebrew results. Take a look at the homebrew and mixed sections. Do you remember all the excitement of the club's Two-Fer project and double bonus points in this sprint for Two-Fer rigs? Only SEVEN Two-Fers were entered!

The club sold 125 Two-Fer kits, the Small Parts Center sells both transmitter and receiver kits for it (about 400), reports of Two-Fer transmitters being built appear in The Quarterly and CQ Magazine. Where are all the Two-Fers?

My own Two-Fer consists of a cut down and modified transmitter board and an "ugly sky-wired" receiver. Are all the rest being used as paper weights? To be an official kit Two-Fer homebrewer requires that after getting the kit you put it together and then maybe use it! With the kits it's a cinch.

Other well-known homebrew transceivers in the contest that are available as kits or at least have or had PC boards for purchase include the W7EL, MAVTI-40 and the FOXX. It is understandable that these fellows, as well as others having homebrew transceivers, may not be interested in the Two-Fer. But they do not account for all the Two-Fer kits.

Guys, half the fun of being a QRPer is homebrewing. Parts and "kits" are still available. Look at the parts bins at the next hamfest or check out all the defunct CB transceivers—parts galore!

Bonus points for homebrew are available in our contests and are specially tailored to both homebrew sprints. Why not take advantage of them? Working with homebrew gear is twice as much fun as using the latest kilo-buck commercial stuff (and a lot cheaper!)

One of the major reasons for the Two-Fer project was to introduce members to homebrewing with an easy to build transmitter and complete it with a receiver section. What happened to that idea? I don't see much of it in the contests or in day-to-day operation. I also don't see anything wrong with the project, maybe someone else can figure it out and let me know.

Finally, examination of the Holiday Spirits sprint logs received lists 55 different calls using homebrew gear. We didn't get anywhere near that number of logs. Maybe some people just don't want to be identified as a "homebrewer." Only eight of last year's entrants returned this year!

One positive note, in the '87 sprint commercial entries outnumbered homebrewers. This year (1988) there are more homebrew entries than commercial entries. Notice the call of our single entry from Costa Rica!

1988 Holiday Spirits Sprint

ALL-HOMEBREW

CALL	SPC	SCORE/POINTS/SPC	POWER	BANDS /TIME	RIG	ANTENNA
NOEIC	MO	24,404/ 154/ 18	4.0	20M/ 3	VXO TX/RX(S)	Loop
KZ1L	MA	8,822/ 39/ 7	4.0 S	20M/ 1	XCVR	Loop
*K5VOL	IL	54,010/ 163/ 18	.98 B	20M/ 3	2-FER XCVR	Longwire
W1KKF	CT	78,206/ 249/ 21	3.0 S	40M/ 4	W7EL XCVR	G5RV
KH6CP/1	CT	61,448/ 252/ 16	4.7 S	40M/ 4	XCVR (S)	Dipole
KB1MJ	MA	25,280/ 169/ 12	.75	40M/ 3	XCVR (S)	Dipole
VE2BLX	QUE	13,820/ 105/ 8	5.0 B	40M/ 2	MAVTI XCVR	Longwire
KQ3D	PA	13,568/ 102/ 8	5.0 B	40M/ 3	XCVR	Unipole
WONKU	MN	9,536/ 81/ 8	5.0	40M/ 2	807/Sup RX	Dipole
NR5A	SD	6,260/ 45/ 4	3.5	40M/ 1	XCVR	G5RV
W2JEK	NJ	5,600/ 20/ 2	.80 B	40M/ 3	FOXX XCVR	Dipole
W3TS	PA	452,380/ 431/ 49	.90 S	6 / 4	XCVR (S)	Yagi/Vee
KN1H	NH	181,460/ 287/ 29	.90 S	3 / 3	VXO TX/RX(S)	G5RV
WAOZPT	SD	76,050/ 305/ 30	5.0	2 / 4	2-FER XCVR/m	Vertical

MIXED-COMMERCIAL/HOMEBREW

CALL	SPC	SCORE/POINTS/SPC	POWER	BANDS /TIME	RIG	ANTENNA
TI2QRP	C.R.	7,600/ 30/ 12	1.0	10M/ 1	2-FER TX/TR4	Quad
WA9S	IN	33,280/ 122/ 16	1.0 B	20M/ 2	2-FER TX/ FT757GX	Gnd Plane
WA9S	IN	33,055/ 149/ 13	1.0 B	40M/ 2	2-FER TX/ FT757GX	Dipole
N3OS	VA	24,736/ 203/ 16	2.3	40M/ 2	12BY7/SB301	Loop/Yagi
NC8X	VA	17,167/ 114/ 11	1.5 B	40M/ 4	2-FER TX/ 309-B	Longwire
WD8DWM	MI	12,280/ 69/ 8	.90 B	40M/ 4	2-FER TX/ HQ-129X	---
WD5GLO	OK	10,280/ 69/ 8	1.0 B	40M/ 3	VX0 TX/ 509	Inv Vee
W6JHQ	CA	4,394/ 57/ 6	4.0	40M/ 4	TX/HR-1680	G5RV
NWOO	CO	2,675/ 15/ 3	1.0 B	40M/ 1	TX/FT-101	Vertical
AB4LX	GA	244,775/ 451/ 50	3.5 B	4 / 4	TX/R-1000	Loop/Quad
KD8FR	MI	6,095/ 65/ 9	1.5	2 / 1	6AQ5/Tempo-1	Loop

ALL-COMMERCIAL

CALL	SPC	SCORE/POINTS/SPC	POWER	BANDS /TIME	RIG	ANTENNA
WB5KYK	MS	17,696/ 158/ 16	5.0	20M/ 3	TS-440S	Yagi/Vert
W8KYD	OH	2,940/ 60/ 7	4.0	80M/ 1	HW-8	Dipole
N8CQA	MI	129,654/ 343/ 36	3.0 B	4 / 4	HW-9	Longwire
WB7SNH	WA	125,235/ 253/ 33	1.0 B	2 / 4	HW-8	Yagi
WD9IWP	IL	21,600/ 96/ 15	.95 B	3 / 3	IC-735	Inv Vee
AF5U	TX	19,635/ 110/ 17	5.0 B	2 / 2	Century-22	Yagi
W5HKA	TX	18,960/ 79/ 12	.90 S	4 / 4	HW-8	Zepp
KC9UR	IN	13,244/ 172/ 11	5.0	2 / 4	HW-9	Vertical
WONGB	MN	12,768/ 114/ 16	5.0	4 / 2	TS-440S	Yagi/Vert
VE2ABO	QUE	9,450/ 90/ 15	4.0	3 / 3	HW-9	Yagi/Loop
W2QYA	NY	9,045/ 67/ 9	.90 B	2 / 2	HW-8	Longwire
K2HPV	NJ	8,470/ 110/ 11	5.0	2 / 2	IC-735	Yagi/G5RV
N9GPF	WV	5,775/ 75/ 11	4.0	2 / 2	HW-9	Zepp

****
CHECK LOGS: KA9JKK
****
Time of operation rounded to nearest hour
B = Battery power
S = Solar / natural
/m = Modified
(S) = Superhet
* = Contest manager - inelligible
****

Soapbox

Contacting Wes Howard, W7ZOI, made my day—KC9UR...14060 should be declared national tune-up frequency—WB5KYK...Keyer batteries died during the sprint—KH6CP/1...Lots of activity, better than twice my usual number of QSO's in a sprint—KN1H...It was a lonely four hours on 40 meters—W6JHQ...Many calls, few QSO's, improvement needed in rig—W2JEK...Total hours 2.5 (Bears game priority)—WD9IWP...Being rock-bound is not the way to rack up points—KD8FR...The others (ARRL and CQ contests) are so insane, it was very nice to have a sane contest to work—W0NGB...Gotta get the beam fixed—N8CQA...Not enough contesters—WA9S...Shorter contests are better fro me (via XYL HI!)—AB4LX...It was my first contest. I had a blast!—W0NKU

1989 Winter Fireside SSB Sprint

CALL	SPC	SCORE/POINTS/SPC	PEP POWER	BANDS /TIME	RIG	ANTENNA
WA6IET	CA	107,184/ 352/ 29	4.0 B	10M/ 4	Swan SS-15	Yagi
N5JWL	TX	19,050/ 127/ 15	1.5	10M/ 2	Argo 505	Yagi
W2PFS	NY	6,972/ 83/ 12	4.0	10M/ 4	TS-130V	Loop
WD8DWM	MI	6,090/ 58/ 10	5.0 B	10M/ 4	CB/m	GP
WB3CDX	MD	3,920/ 56/ 10	10.	10M/ 4	IC-720A	Yagi
KA4TMJ	FL	1,470/ 30/ 7	3.0	10M/ 3	TS-670	Yagi
KA6HGT	CA	48,720/ 116/ 28	2.0 B	15M/ 4	Argo 509	Yagi
N5DUQ	OK	32,560/ 148/ 22	2.0	15M/ 4	Argo 509	Yagi
VE7EQA	BC	1,428/ 34/ 6	4.0	15M/ 1	---	---
N1FGW	MA	450/ 15/ 3	2.0	15M/ 4	---	---
WB5KYK	MS	32,039/ 199/ 23	5.0	20M/ 3	TS-440S	Yagi/Vert
K2LGJ	NY	18,300/ 90/ 17	2.0	20M/ 4	HB-RX/TS-940 HB RX	Yagi
KW8N	OH	139,062/ 301/ 44	10.0 B	5 / 4	---	---
W3TS	PA	76,080/ 96/ 24	1.0 S	6 / 4	HB Xcvr	Yagi/Vee
W5TTE	NM	57,120/ 136/ 21	2.0 S	2 / 3	Argo 505	Botton Bm
KF7MD	WA	26,150/ 95/ 17	1.0	2 / 4	HB	Log Per.
VE6GUS	ALB	11,850/ 79/ 15	2.0	3 / 1	---	---
KA5PVB	TX	7,480/ 68/ 11	2.0	3 / 4	TS-520	Verticle
W6SIY	CA	6,370/ 65/ 14	4.0	4 / 4	Delta	Dp/Mini-Q
KB7CFR	OR	3,528/ 56/ 9	4.0	3 / 4	IC-735	Vee Beam
VE6AGH	ALB	2,856/ 34/ 12	8.0	3 / 4	---	---
NO1E	NH	2,772/ 44/ 9	5.0	2 / 2	FT-707	Loop
K5VOL	IL	2,184/ 39/ 8	4.0	4 / 2	ARGO 509	Longwire
WD9IWP	IL	1,260/ 24/ 5	10.0 B	4 / 2	IC-735	I-Vee/Ver
W2JEK	NJ	560/ 20/ 4	2.0	3 / 1	Argo 505	Gp/Dipole

****

CHECK LOGS: none

****

Time of operation rounded to nearest hour

B = Battery power

S = Solar / natural

/m = Modified

HB = Homebrew

****

Soapbox

Four hours was enough SSB for a while—K2LGJ...I enjoyed the sprint immensely—WA6IET...Good Contest. Keep the sprints coming—WB5KYK...SSB on Sunday?? It'd be better crossing I-90 on foot at 5 p.m.—WD9IWP [ed. note: similar to swimming UP Niagara Falls)...I just got started working GRP (10w SSB) this month—WB3CDX...Got called away from the contest due to XYL QRM—N5JWL

Upcoming Contests

Spring QSO Party
April 8 (1200Z) to April 9 (2400Z)

* * *

Hootowl Sprint
May 28 (2000-2400 local time)

* * *

Field Day
June 24-25

* * *

Summer Homebrew Sprint
July 9 (2000-2400)

* * *

Summer Daze Sprint
Aug. 13 (2000-2400 local time)

* * *

Fall QSO Party
Oct. 21 (1200Z) to Oct. 22 (2400Z)

* * *

Holiday Spirits Homebrew Sprint
Dec. 10 (2000-2400 local time)

* * *

NET ACTIVITY REPORT

by Danny Gingell
3052 Fairland Rd.
Silver Spring, Maryland 20904

QRP ARCI 1988 Net Activity Report

Month	TCN	NEN	SEN	GLN	GSN	WSN	Total
January	90	67	47	53	34	74	**365**
February	79	97	45	60	17	60	**358**
March	83	92	86	97	43	48	**449**
April	69	88	59	59	16	48	**339**
May	76	90	54	64	14	42	**340**
June	60	60	50	62	14	26	**272**
July	60	86	36	33	6	58	**279**
August	42	63	52	20	7	43	**227**
September	60	74	58	35	2	45	**274**
October	94	76	77	35	7	49	**338**
November	59	102	72	40	16	46	**335**
December	53	87	51	41	29	64	**325**
Totals	**825**	**982**	**687**	**599**	**205**	**603**	**3901**

Comparing 1988 with 1987, we can see that we have an increase of four QNI per net for an estimated 45% increase in net activity this year.

The average number of check-ins per station 352/3901 = 11.08. We seem to have gained a small number of members participating on the nets in 1988 with 352 active on the nets compared to 312 in 1987.

We welcome the new active members to the nets and also extend our thanks to the regular gang on the nets.

QRP DX TU ES CU ON NETS de K3TKS

1988 Compared with Previous Years

Year	East	West	Total	Trend
1984	540	1368	1908	000
1985	473	1124	1597	-311
1986	728	1071	1799	+202
1987	1061	1623	2684	+885
	(7 months = 1566)			
1988	2268	1633	3901	+1217
	(43.34% increase)			

1987 average QNI per net was 8.8874
(302 sessions, 2684 QNI)
Average QNI per month, all nets = 224

•••

1988 average QNI per net was 13.2237
(295 sessions, 3901 QNI)
Average QNI per month all nets = 325

QRP ARCI Spring/Summer Net Schedule

Net	QRG	NCS	Day	UTC
TCN*	14060	W5LXS	Sunday	2300
		ANCS-NM7M		
SEB**	7030	K3TKS	+Wednesday	0001
		ANCS-KH6CP/1		
GSN	3560	W5LXS	+Thursday	0100
		ANCS-W5XE		
GLN	3560	K2JT	+Thursday	0100
		ANCS-KH6CP/1		
NEN	7040	WA1JXR	Saturday	1200
		ANCS-W1FMR/K3TKS		
WSN	7040	W6RCP	Saturday	1600
		ANCS-W6JHQ/W6SIY/NJ7M/NM7M		

* On weekends of major contests, TCN will meet one hour later.
** If conditions on 7030kHz are poor, QSY to 3535kHz at 0030Z.
+ Evening of the day before for W/VE

Other QRP Nets

MI-QRP	535	K8JRO	+Wednesday	0100
VE-QRP	14060	VE6BLY	Sunday	1800

Please remember to tell your friends about the QRP Nets. They might decide to join us after seeing how friendly we can be.

New QNI-100 Certificates

WA1JXR	Greg Algieri	MA
NJ1T	Doug Crittendon	MA
KD2JC	Joe Vrabel	NJ
K5VOL	Red Reynolds	IL
W5XE	Ray Colbert	TX
WA3SRE	John Salony	PA
WF6D	Bill Young	CA
WQ4C	Namon Cagle	AL
WD4LOO	Ed Lappi	NC

QNI-100 Seals

XE2IOF	QNI-200	(211)
W3TS	QNI-200	(274)
K5VOL	QNI-200	(200)
W5TTE	QNI-200	(214)
WB9TBU	QNI-200	(200)
KH6CP/1	QNI-200	(346)
KH6CP/1	QNI-300	(346)
W5LXS	QNI-300	(338)
W6JHQ	QNI-300	(350)
NM7M	QNI-500	(500)
W6RCP	QNI-600	(645)
K3TKS	QNI-800	(832)

QRP ARCI Net Awards December 1988

K2JT	SEN-40
W2PFS	SEN-40
W2PFS	GLN-80
WA3SRE	NEN-40
W3TS	SEN-40
W3TS	TCN-20
WQ4C	SEN-40
KA4LKH	NEN-40
WD4LOO	SEN-40
NY6G	WSN-40
WL7BDK	TCN-20
K8DD	GLN-80

QRP ARCI Net Awards August 1988

W1CFI	NEN-40
W1FMR	GLN-80
KA3K	SEN-40
WA3SRE	GLN-80
NF5Y	TCN-20
KH6CP/1	NEN-40
N6GA	WSN-40
KK7C	WSN-40
N7FEG	WSN-40
NO7V	WSN-40
N8CQA	GLN-80
K8DSL	NEN-40
WA8MCQ/3	NEN-40
K9IFO	GSN-40
WB9TBU	SEN-40
W4FOA	NEN-40
WQ4C	TCN-20

✉✉ Letters to the Editor ✉✉

Ten Tec Update

In the January 88 "Letters to the Editor" it was suggested that Ten Tec would probably start making another series of this fantastic transceiver.

I wrote to them to the extent that I was very interested—in fact I was (and still am) ready to book one. However, there's complete silence on this subject and my question to you is...what about it?

Fokke Gerrits, PA3FHC and N7GQC
W. Elschotsingel 65
2182 ZS Hillegom, Netherlands

(The latest word from TenTec is the release of a new generation Argonaut sometime later this year. The new rig, designed by Jack Burchfield, K4JU, is a synthesized PLL design which includes a general coverage receiver. Maximum power is 5 watts out. Features include SSB, CW and optional FM. AM will be on receive only. It uses an LCD display. The filter scheme is a continuously variable bandwidth crystal network, for which Ten Tec is applying for a patent.

They plan to show the new rig at the Dayton Hamvention in April and should have production units in June in time for tfe ARRL national convention in Dallas. The word is that a rig will be made available for use at the Dallas QRP hospitality suite. TenTec is also doing a new Argosy, which is the Argonaut with a 100 watt amp on its tail. Target prices at ham net are $900 and $1100, respectively.)

✉ ✉ ✉ ✉ ✉

Finding Small Parts

Absolutely the best, fastest and cheapest place for QRP parts for homebrew is: Small Parts Center, 6818 Meese Dr., Lansing Michigan 48911 (owned by Chris, KM8X, and Deb, N8DHR, Hethorn. By all means ask for their catalog. SASE would be nice.)

The three-band QRP CW xcvr I am designing and building uses a KSD288 (TO-220) CB transistor fro 4 watts out (at the moment). Small Parts Center has this transistor for 90¢ each! In CB service it was designed for 15 watts out, 20 watts dissipation. It is (theoretically, at least) a substitute for the MRF475 ($6.75 elsewhere).

They also sell the 2N213 N-channel (similar to 40673) for 75¢, the 40673 for $1.50. The NE602 oscillator/mixer used in the Neophyte receiver sells for $2 there. They have practically every value and kind of part any QRPer could possibly need and at very cheap prices. If they don't have it, they'll try to get it for you.

Surplus Sales of Nebraska, 1315 Jones, Omaha, Nebraska 68102 (Phone: 402-346-4750) sends two thick catalogs free on request. Parts selection is excellent—prices in general are astronomical, to me at least. However, they do offer ARCO photovoltaic modules from 1-22 watts (75 mA to 1.5 amperes) at prices ranging from $40 to $215.

The ARCO G100 5 watt, 14.5 volt (loaded) 350 mA (loaded) panel is $74 each. All are ready to use in any environment, encapsulated in glass, sealed and guaranteed. This seems to me to be pretty cheap for a solar panel this handy. It's 13.7 x 13.7 x 0.5 inches. No weights given.

By the way, Small Parts Center now has the discontinued MRF472 fro $1.50. This was used in some of the ARRL Handbook transmitters of the past couple of years or so and this is the only place know that has them at this price.

J.F. Brumbaugh, KB4ZGC
82 Liddell Street
Buffalo, New York 14212

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Quarterly Kudos

I found The QRP Quarterly to be a great document. Lots of interesting construction articles, improvement/modification articles and comments from other QRPers.

Our QRP rag has come a long way! I'm glad to see our corner of ham radio take on a definitive form. With The Quarterly representing the development and maturity of our hobby, it's sure to grow. So keep our enthusiasm and QRP spirit up with more of the same!

After several years of not having time for ham radio, I re-activated my lil' HW-8 that was sitting in the corner. With a 10 watt solar panel, a 42AH Gel-Cell, Century 22, Argonaut/mod, HW-8/mod and a few wire antennas, I'm beating up the airwaves with my QRP signal and having a BLAST! Just keep the sun shining and the solar flux index up!

Steve Galchutt, N0TU
740 Blackhawk Drive
Colorado Springs, Colorado 80919

(I just knew somebody out there thought I was doing OK!)

HW-9 Dial Marking Calibration Problem

After having spent many hours performing the calibration procedure outlined in Heathkit's assembly manual, my dial marking indication is only correct at two positions, 0 and 250, the ends of the bandspread. Most dial marks indicate 3 to 5 kHz low. I am assuming there is really nothing major here, just a non-linear bandspread by design of the the VFO circuit and particular components.

Upon contacting Heathkit, I got a "well, that's life" type of answer with no help to resolve the problem. Is this, in fact, something I must live with or is there anyone who has any comment or conclusions on this matter? Please contact me with any information, even if just to verify the dial calibration accuracy of your HW-9.

Michael Smith, N4KZO
9023 Quail Run Drive
Chattanooga, Tennessee 37421

(Are there any HW-9 owners out there who can help Michael?)

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Where is Everybody?

I have been working on my list of ARCI members worked (more than 150) and came up with what I thought was an interesting statistic.

I had one with a three digit number and three with 2000 series numbers. After that, 13% were in the 3000 group, 19% 4000, 36% 5000 and 31% were in the 6000 series. I suppose a certain amount of silent keys accounts for this, but I can't help but think that most of it is just "silent keys" where QRP is concerned.

At any rate, I thought this might be something for us to ponder. What is happening to those members who joined a few years ago?

Max Adams, KA9JKK
1335 N. Harbison Ave.
Indianapolis, Indiana 46219

(It's hard to say, Max. Perhaps the QRP ARCI didn't offer something necessary to those lost members. Once they left, they would have no knowledge of the improvements made in the club. It is food for thought. Anyone have ideas on finding and attracting lapsed members back into the QRP ARCI fold?)

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Busy Signal on 28.885

Over the past year, I have made many attempts to try QRP SSB contacts on 28.885 MHz. My normal practice is to ask if the frequency is being used before I call CQ. I always get a response that the frequency is indeed in use.

It seems to me that there are a number of six meter enthusiasts who feel the frequency belongs to them. They are apparently monitoring this frequency for the purpose of scheduling six meter contacts in the event another ham with similar aspirations should show up. Meanwhile, the designated "policeman" makes sure nobody else uses the frequency by telling inquirers that it is in use.

Enough is enough! Is anyone interested in meeting on the air to discuss possible resolutions to this problem? Let's meet on 28.885 MHz.

Larry Feick, NF0Z
3333 W. Wagontrail Dr.
Englewood, Colorado 80110

(Now that 10 meters is beginning to show some life again, I think this is a problem that will be coming up from time to time. Of course, no one "owns" a frequency although nets and other special interest groups have informal holds on particular frequencies. The 10 meter QRP SSB frequency is relatively new and, perhaps, the six meter enthusiasts have held court there long before we got there. I agree that a frequency is not in use if it isn't being used, however, I can't see starting a war over it with the six meter folks. I'm sure an equitable resolution can be found if the 10 meter QRP SSB people can get together to work on the problem.)

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WA5OIH HW-9 Mods; Two-Fers

The article on the HW-9 by Rod Breau, WA5OIH, in the January 88 issue proved to be very helpful to me. I am finally happy with the performance of my HW-9. Obviously, I enjoyed the other HW-9 articles appearing in 1988 as well, but Rod's article was a real turning point for me.

Next, a thank you to the designer of the Two-Fer—John Collins, KN1H. I enjoyed building mine and am in the process of completing the receiver that goes with it. I'd like to see a follow-up article on Two-Fers and any variations on this project.

Carl Heidenblad, N1CUU
40 Martins Ferry Road
Hooksett, New Hampshire 03106

Listening on 30 Meters the Easy Way

A.F. Galindo, AC6G
10941 Allen Dr.
Garden Grove, California 92640

It has been a while that I have been thinking to try the 30 meter band. I decided to do it as easy and as economical as possible.

I didn't want to build another D.C. or Superhet receiver that I may use only once in a while. An alternative was to build a converter. Looking at some literature on the subject, I found out that most of the circuits used too many parts and were too complicated for a simple project. After talking with AA6CZ on our daily schedule, we came up with the idea that the Signetics NE602 would be the answer to simplicity I was looking for.

The NE602 comes in a 8 pin in-line integrated circuit. That tiny package contains a double balanced mixer, an on-board oscillator and a voltage regulator. I found a 5 MHz crystal in the junk box, which is used in the oscillator.

Beating the incoming 10.1 MHz with the 5 MHz results in a 15.1 MHz I.F. It happens that my TS-520-SE has that band for WWV. I have to keep in mind that when looking at the dial at 15.1 MHz I am actually seeing 10.1 MHz. Referring to the schematic, it can be seen that a minimum of parts are needed to build the converter. Despite the simplicity, the unit works very well.

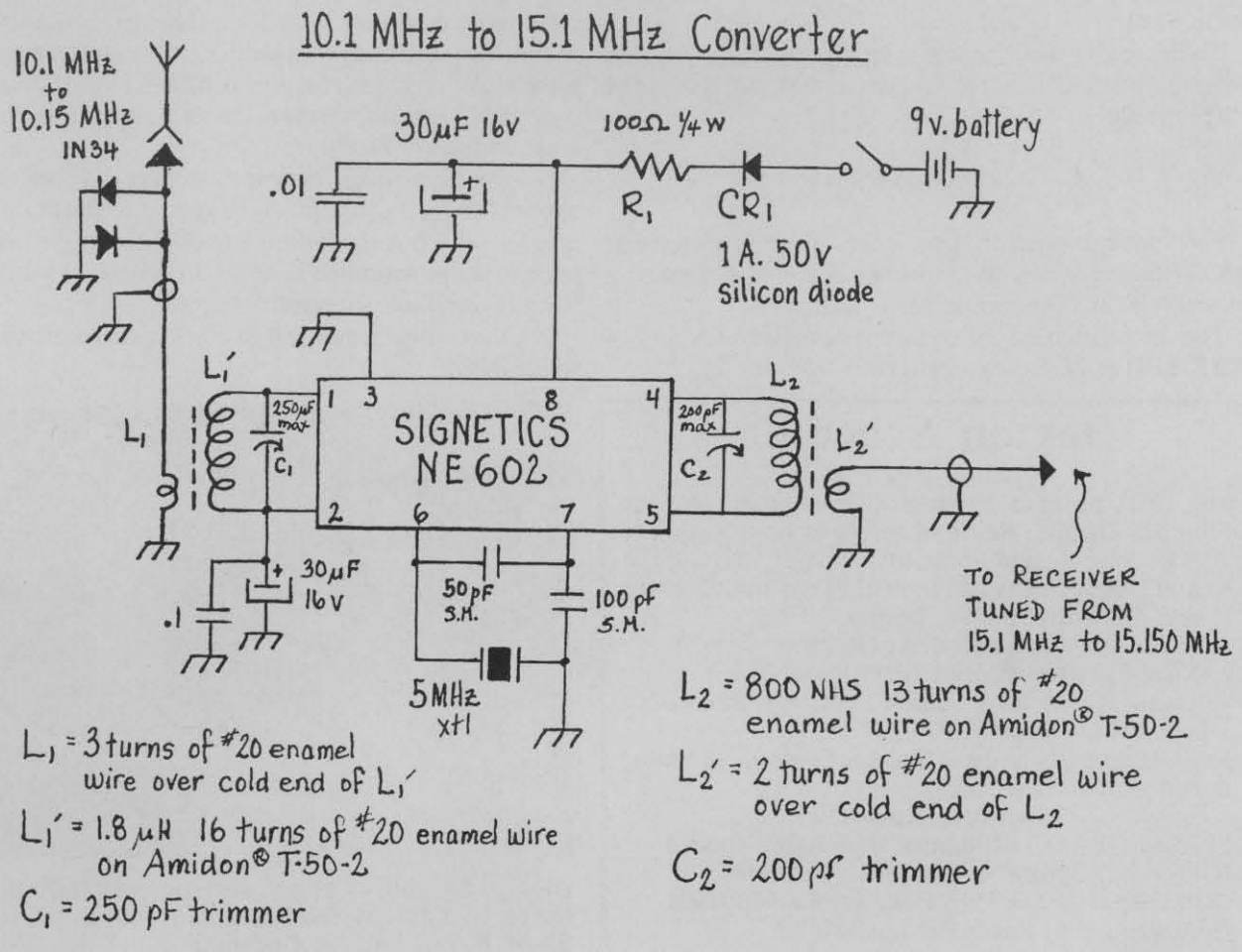
The complete unit, including the 9V battery is contained in a 2-3/4(L) X 2-1/8(W) X 2-1/8(H), L.M.B.® C.R. 2-3-4 box. No PC board was made. The parts were mounted on a Radio Shack® I.C. board(270-326).

It is imperative that, if a 9V battery is used, CR1 and R1 are included in the circuit. The maximum allowable voltage for the NE602 is 9V at 2.4 mA. A fresh battery can deliver as much as 9.5V. The voltage drop across the silicon diode CR1 and resistor R1 should protect the NE602.

The crystal I am using runs a little bit high, around 5.0012 MHz. I could have installed a little trimmer in parallel with it to bring it down to 5 MHz, but, remember, I wanted to make it as simple as possible.

Tune C1 and C2 on a weak station, or use a signal generator, dipper, QRP transmitter, etc for maximum signal strength on your receiver's S-meter. Don't try to adjust them on WWV, the third harmonic of 5 MHz will probably overload your receiver. On the first try, from the west coast, I was able to hear some F, G and OK stations, not very strong, but solid copy.

I want to thank Norm, AA6CZ for his technical support.



Lightning Power

Al Bates, W1XH
2 Coach Rd.
Chelmsford, Massachusetts 01824

A local ham got it into his head to use the ultimate earthly natural power source for his QRP rig: Lightning! With all that power there, it seems a waste to let it all go up in a flash, as it were. Why not harness that power and reduce its voltage to something useful?

At this point most of us would dismiss the scheme as impractical, dangerous and fool-hardy and crack open another beer. I decided to give it at least fair consideration, make some basic assumptions, do some calculations and then dismiss it as impractical, dangerous and fool-hardy. I discovered that there are one or two slightly difficult situations to correct, but basically the static electricity scheme will work.

First of all, I'm talking of static electricity, not lightning. Static is the build up of charge a few seconds before lightning hits. Now, assume a static build-up of 10,000,000 volts(10MV and that's not milli volts). We want to accumulate that on the plates of a capacitor which we assume will be made of two 4' X 8' plywood sheets covered with aluminum foil because that is reasonably practical to build. At a breakdown voltage of 75kV per inch, the spacing between these two plates needs to be about 133 inches or a little over 11 feet.

To figure how much charge is on this capacitor, you have to know what the capacitance is. Out comes the handbook and we find the formula

$$C = 0.225K(N-1)A/S \quad pF$$

K=1 for air, A=area in square inches which is 4608 square inches, S=spacing which is 133 inches and N=the number of plates which is (2). The capacitance is 7.79 pF.

The charge, in coulombs, on this capacitor is Q=CV or (7.79 pF) X (10 MV) or 77.9 micro coulombs.

Now, to reduce the voltage on a capacitor you can reduce the spacing. Transposing the formula from above to get C=Q/V, we find that you can reduce the voltage to 12 volts by increasing the capacitance to 6.49 micro farads. This is done by reducing the spacing between the plates to 159 micro inches (Go back to the formula for capacitance above.). The 10 MV on the 7.79 pF, 11 feet spacing capacitor is reduced to 12 volts on a 6.49 micro farad capacitor when the spacing is reduced to 159 micro inches.

Now, lets find out how long we can power a rig with this charged capacitor. Assume the QRP rig works on 100 mA at 12 Volts and stops working when the current drops to 83 mA at 10 Volts. It looks like a 120 ohm resistor. Again to the handbook and we find that the time it takes for this to happen is in the time constant chapter with 100mA as initial current, 83 mA as final current, R equals 120 ohms, C equals 6.49 micro farad and the mangled formula looks like

$$T = R\ C\ \ln(I_{final}/I_{initial})$$
$$= (120) \times (6.49 \times 10^{-6}) \times (-0.1863296)$$
$$= 145 \text{ micro seconds}$$

So there we are: Take two 4' X 8' aluminum plates spaced 11 feet apart, charge them to 10,000,000 volts, remove the charging voltage, reduce the spacing to 159 micro inches to get 12 volts and it will power your 12 V, 100 mA rig for 145 micro seconds. To get more or less continuous voltage and current, just repeat the process.

In case the impractical isn't obvious, here are some of the assumptions I ignored. How do you make sure you have a steady source of 10,000,000 volts? How do you switch it on and off the plates of the capacitor? How do you ignore the effect of humidity in the air on your charged capacitor? How do you move a 4' X 8' piece of aluminum covered plywood from 11' to 159 micro inches accurately? How do you move the same plates instantaneously at a rate of nearly 7 kHz?

There is room for improvement, of course, but these are left as exercises for the student. Areas of improvement are increased capacitor area (my roof has an area of about 1500 square feet) or more plates or substitute dielectrics. High speed motor driven variable capacitors are possible, too.

After all that, I think I'll go crack open a beer and forget the whole thing.

Dayton Schedule

Friday, April 28

6 p.m., QRP Dinner at the Spaghetti Warehouse, 36 West Fifth St., Dayton. Reservations have been made for 100. Be sure to sign up as soon as you arrive at the hotel (Country Suites Inn, formerly Days Inn, formerly Belton. 404 West First St., Dayton.)

Saturday, April 29

9-9:45 a.m. QRP forum, Hara Arena Room 7
"Design, Construct & Publish Homebrew Projects" by Rich Littlefield, K1BQT

6 p.m.-? Hospitality Suite at Country Suites Inn: forums, workshops and conversation.

Sunday, April 30

11:15 a.m.-1 p.m. QRP forum, Hara Arena Room 3
"QRP ARCI Update" by Jim Fitton, W1FMR
"KP2 QRP Dxpedition" by Paula Franke, WB9TBU
"Milliwatting" by Randy Rand, AA2U

Danny Gingell, K3TKS enlists KA3TMZ into the ranks of QRP at the Maryland Radio Center QRP Show & Tell held in December.

The QRP Candy Store

Operated for QRP ARCI by Bob Spidell, W6SKQ 45020 N. Camolin Ave., Lancaster, CA. 93534

The QRP Candy Store is a clearing house for all member or ARCI sponsored, QRP related products. Promote QRP in your area; send your ideas, suggestions and a sase to Bob Spidell, W6SKQ for store flyer.
LOGO: T-Shirts, Ball Caps, Hat Pins, Stickers, Stationary & more.

Please make check payable to Bob Spidell.

Classified Ads

For Sale: HW-9 with WARC and thump suppressor, PSA-9, $175
HM-9 and HFT-9, $48
Millen tube model GDO with coils, $40
Box miscellaneous parts including Neophyte and Two-Fer PCB, 3 vernier dials, 4 variables, 100 kHz marker oscillator, transistors, etc. Good buy, $50
Dick McIntyre, K4BNI, PO Box 403, Basye, Virginia 22810

Ten Tec Argonaut 515 with filters and mic. Factory checked and aligned. $250. Call Joe Garzik AA4CO at 919-756-5862 after 6 p.m. EST.

I'm interested in finding old articles and modifications on the 509. I recently acquired an early vintage 509. It needs some TLC and I would like to make any improvements while it's on the bench. I also need the schematic of the control board for later models that went to PIN diode TR switching so I can toss that noisy reed relay into the trash.
Steve Galchutt, N0TU, 740 Blackhawk Dr., Colorado Springs, Colorado 80919

New Member/ Renewl Data Sheet

Call_____ Age_____
Recommended by:_____
License Class_____
Other Calls Held_____
Bands Most Used_____
Please circle your interests and elaborate if desired on a separate sheet. Thanks!
Ragchewing, DXing, Contests, Traffic, Awards, Homebrew, Experimenting, CW, SSB, RTTY, ATV, Packet, VHF/UHF, Satellite, Other

Do you plan to participate in club activities? Y/N
Would you like to be a club officer/director? Y/N
Do you have access to duplicating equipment? Y/N
Are you interested in our awards program? Y/N
Have you applied for any of the club awards? Y/N
Are you in favor of QRP calling frequencies? Y/N
Are you in favor of member QSO parties? Y/N
Would you help write for the Quarterly? Y/N
What subjects?
What QRP awards/achievements have you won?
Why do you run low power?

[ ] Renewal (U.S. $10, DX $12) [ ] New Address
[ ] New Member (U.S. $12, DX $14) [ ]New Call

Name_____Address_____

City_____State/Country_____Postal Code_____

Amount Enclosed_____QRP ARCI #_____Callsign_____
Please make your check or money order payable to:
QRP Amateur Radio Club, International
Please Do Not Send Cash

Mail to: Bill Harding, K4AHK
10923 Carters Oak Way
Burke, Virginia 22015 USA

QRP #_____ Inc Rec_____ Apl Rec_____
List File_____ MCert_____ Rep Cpy_____

QRP ARCI
Spring/Summer Net Schedule

Net	QRG	NCS	Day	UTC
TCN*	14060	W5LXS	Sunday	2300
		ANCS-NM7M		
SEB**	7030	K3TKS	+Wednesday	0001
		ANCS-KH6CP/1		
GSN	3560	W5LXS	+Thursday	0100
		ANCS-W5XE		
GLN	3560	K2JT	+Thursday	0100
		ANCS-KH6CP/1		
NEN	7040	WA1JXR	Saturday	1200
		ANCS-W1FMR/K3TKS		
WSN	7040	W6RCP	Saturday	1600
		ANCS-W6JHQ/W6SIY/NJ7M/NM7M		

* On weekends of major contests, TCN will meet one hour later.

** If conditions on 7030kHz are poor, QSY to 3535kHz at 0030Z.

+ Evening of the day before for W/VE

Other QRP Nets

MI-QRP	535	K8JRO	+Wednesday	0100
VE-QRP	14060	VE6BLY	Sunday	1800

Every Sunday QSO Party

UTC	CW	SSB	Novice
1400-1600	14.060	14.285	
1600-1700	21.060	21.385	21.110
1700-1800	28.060	28.885	28.110
1800-1900	7.040	7.285	7.110
1900-2000	14.060	14.285	
2000-2100	21.060	21.385	21.110
2100-2200	28.060	28.885	28.110
2200-2300	7.040	7.285	7.110
2300-0000	14.060	14.285	
0000-0100	7.040	7.285	7.110
0100-0300	3.560	3.985	3.710

Upcoming Contests

Spring QSO Party
April 8 (1200Z) to April 9 (2400Z)

***

Hootowl Sprint
May 28 (2000-2400 local time)

***

Field Day
June 24-25

***

Summer Homebrew Sprint
July 9 (2000-2400)

Summer Daze Sprint
Aug. 13 (2000-2400 local time)

***

Fall QSO Party
Oct. 21 (1200Z) to Oct. 22 (2400Z)

***

Holiday Spirits Homebrew Sprint
Dec. 10 (2000-2400 local time)

***

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Alpine, Texas 79831

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