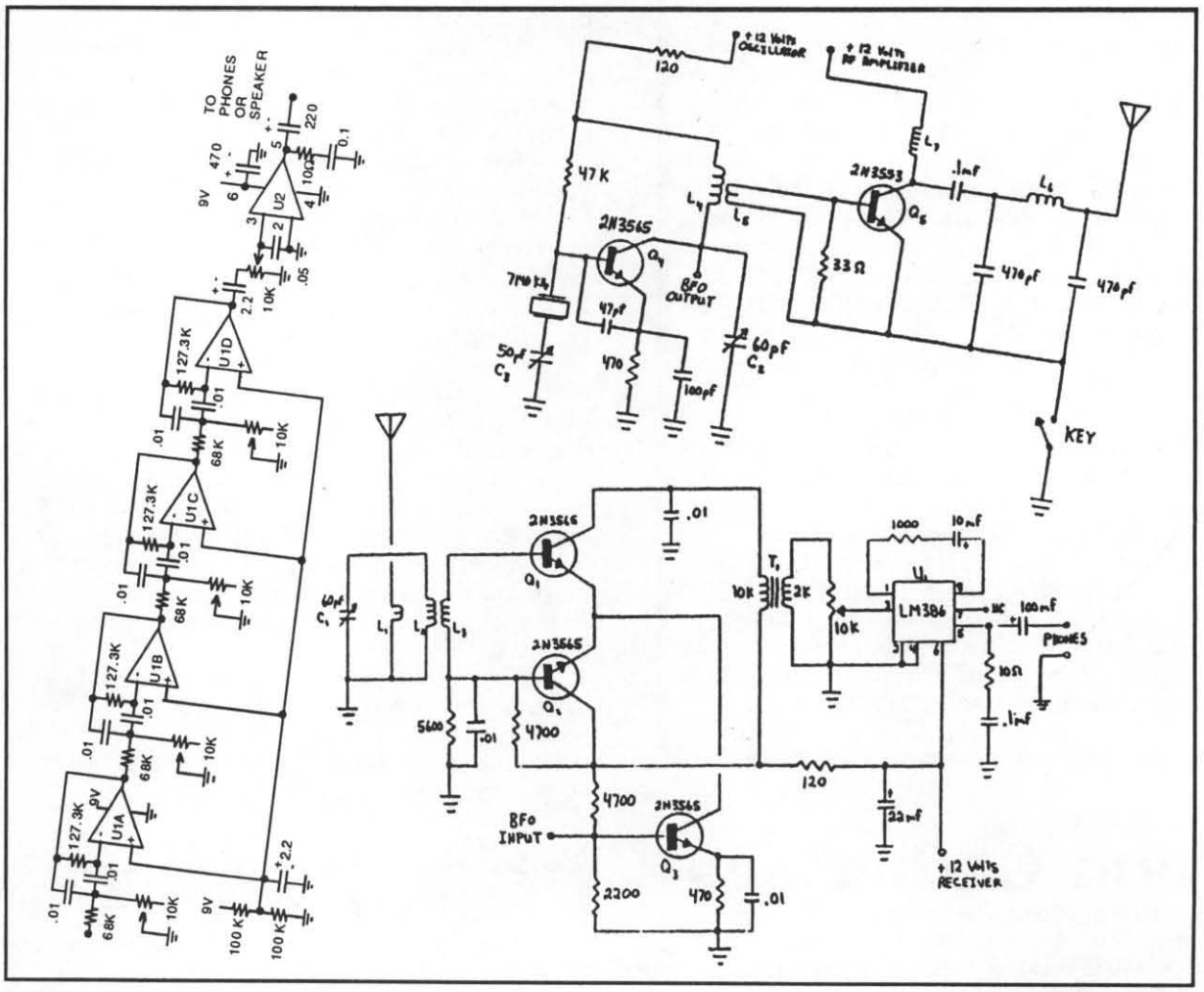
QRP Quarterly

Journal of the QRP Amateur Radio Club, International
April 1994 Volume XXXII Number 2



Get out the soldering iron!
There's a project or two inside to get
you in the mood for a homebrew Field Day.

Club News

Silent Key

It is with deep regret that we report the passing of Luke Dodds, W5HKA.

He suffered a massive heart attack and stroke on January 11 and died five days later without ever regaining consciousness.

Luke served the club very well for four years as secretary-treasurer and had turned the reins (and the treasury) over to his successor just days before he was stricken. During his two terms, Luke kept a close hand and eye on the club's funds and also took on the added responsibility of acting as American agent for the G-QRP so that those of us on this continent no longer had to worry about how to pay our dues.

He also did a tremendous job of promoting QRP, both at home and worldwide. In particular, Luke's efforts were invaluable in improving and strengthening ties between the ARCI and G-QRP Club.

Luke's assistance during my two terms was immeasurable, especially during the last two years. I am glad I had the chance to let him know that before it was too late. My only regret is that he didn't have enough of his new-found spare time to take more photographs.

–Paula Franke, WB9TBU

President's Message

by Paula Franke WB9TBU

This is my last note to all of you as president.

Les Shattuck WN2V has agreed to take over as ARCI president. Les comes to the job with experience, having previously served as president in the 1980's.

It's been an exceptional (and many times exhausting) four years for me. I've had the opportunity to meet and talk with many club members the world over.

QRP interest and enthusiasm continues to grow every year. I like to think that the ARCI has had more than a little to do with kindling that interest, through the Quarterly and the club's presence at the Dayton Hamvention, Dallas Hamcom and other amateur radio gatherings around the world.

While I look forward to being more active in the club again in the future, for the time being personal constraints must take precedence. Any pretense of the concept of "spare time" disappeared at least a year ago; I am now existing on borrowed time, looking forward to being able to retire within the next few years and moving to a less stressful and more inexpensive area of the country (the hills of my old Kentucky home are looking very attractive).

In any event, I'll still be around from time to time (maybe even on the air!)

Please make Les welcome. And thanks to everyone who helped make the last four years very memorable.

Ham Gatherings

The QRP faithful will gather in Dayton April 29, 30 and May 1 for the annual Hamvention.

Three QRP-related forums are scheduled, one for each day. The ARCI, M-QRP, and G-QRP contingents will also be staffing booths at the arena. The booths have always been convenient contact point for attendees. Myron Koyle is once again handling housing chores; give him a call at 216-477-5717 if you need a room.

For information about Hamcom in Texas in June, drop an SASE to Jerry Bland, KI5AY, 4321 Bradford Drive, Grapevine, TX 76051.

ERROR MESSAGE

Somehow, somewhere between the typesetter and the printer, the photograph, which should have accompanied Fred Bonavita's article in the January issue of the Quarterly, disappeared. We've experienced other disappearances in the past, but this is a first for a photograph.

Our apologies to Fred and our readers. In the future, we'll consider riveting the photos to the page.

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Reduced Power for Your Icom 720, 725, 728/729, 730, 735, 740, 745 and 751

by Michael A. Czuhajewski WA8MCQ
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In the Idea Exchange in the April 1992 issue of the QRP Quarterly I gave some info on running the various Kenwood solid state rigs at QRP levels on CW. In many cases they will go somewhere into the milliwatts on their own with the front panel power control cranked down, and in others an internal control must be tickled a bit before you can go below an artificial minimum of 5 or 10 watts. The same basic principles apply to Icom rigs.

Almost all radios with solid state final amplifiers have an internal control which determines the power level when the front panel power is set to maximum, and is usually referred to in the service manuals as an ALC adjustment. Some units have a second internal control which sets that lower power limit to 5 or 10 watts when the front panel knob is cranked all the way down, although the rigs are capable of going much lower. This makes good sense for the casual QRP operator who wants to crank it down to the 5 watt level for some fun without having to worry about monitoring the power output and setting a finicky control to keep it under 5 watts. The only problem is that some folks want to go under 5 watts, so on those radios you have to open them up and adjust that second control downward.

In that old Idea Exchange I included the info for one Icom rig, the IC-730, and since then I did some digging in the service manuals to save you the trouble of looking up the rest. For those who may not have that issue, I'll start out with a repeat of the info for the 730 (with somewhat modified text). I've also included some crude drawings of all the rigs to help you find the pots mentioned.

How about SSB? On some rigs, from various manufacturers, the front panel power control affects SSB as well as CW. Some examples are the Kenwood TS-850S, and Icom 751 and 728. On others, they work on CW only. With those, you can try an ALC power controller. Those have been described many times over the years, for various rigs. The principle is simple. Most rigs have an ALC input on the rear, either as one pin on a multi-pin connector or a dedicated socket. This is for ALC input from a linear amplifier, which is a low DC voltage used to reduce power output of the transceiver to prevent overdriving the amp. There's nothing which says you can't use this input yourself, with a DC voltage (usually negative) to reduce your power on SSB. The rig doesn't care whether the volts come from a linear amp or from a power supply and variable resistor–it still cuts back the power output. (That's the subject of another article or Idea Exchange item.)

Before we start, a disclaimer. As always, anything you do to the inside of your rig before the warranty expires is between you and the manufacturer. I don't know how Icom would take to your adjusting the power floor downward, although I would suspect they wouldn't say as much as they would if they caught you cranking up the maximum power. Many Icom and Kenwood rigs, and probably most others, are capable of running more power than the published specification, with a simple internal adjustment. To the best of my knowledge, most people who do that get away with it for years and years without any problems, although it does put additional strain on power supplies and other parts, and probably voids the warranty. Most knowledgeable QRPers would probably not do that, anyhow, knowing that an increase of less than 3 dB (doubling) in power will have minimal effect on their signal.

For the most part, I am simply reporting on information found in the service manuals. I have not tried most of these, since I don't often see some of these models in the service shop. These all come with the standard disclaimer that the author does not in any way warrant their performance or effect on equipment warranty. With that legality out of the way, let's "Milliwatt your Icom!"

QRP FOR THE ICOM 730

I did some experiments with a pair of Icom 730's in the service shop for repair. The CW power adjustment in the service manual calls for cranking up the front panel power knob all the way and adjusting R150 on the "Main" board for 100 watts. (That's the board under the top cover with the mechanical filter. R150 is in the front, right hand corner, near 2 other pots.) Next, crank the power knob all the way down, and adjust nearby R149 for 10 watts. (Watch out for the third pot between those two; it's for the AM power adjustment.)

I'll be slinging around peak volts, peak to peak volts and powers. To eliminate possible confusion, here are some basics: power is equal to voltage squared, divided by resistance (which will usually be 50 ohms). That's DC voltage, or RMS for AC (including RF). Diode detectors measure peak voltage, and scopes show peak to peak. Power is also equal to (peak voltage X 0.707) squared, divided by ohms, or (peak to peak voltage X 0.3535) squared, divided by ohms.

RF probes contain diode detectors. Most of them include a built-in resistor which forms a voltage divider in conjunction with the input resistance of a high impedance voltmeter, such that the voltage reading on the meter is scaled down to the RMS value. The probe converts the signal to a DC voltage equal to the peak of the signal, but then divides it down to the RMS value. You need to determine if your detector or probe does this conversion; most do. Using RMS instead of peak, or vice versa, can make a big difference in your calculations–it will throw off the results by a factor of 2. See the Idea Exchange for July 90, April 91 and July 91 for more information on diode detectors. (Convention states that an AC voltage, including RF, is assumed to be RMS unless stated otherwise.)

Can you set R149 for a really low power and still retain the 100 watts on the high end? You bet, although you may see some interaction between the two pots and have to adjust R150 to 100 watts again after setting R149 down in the mud. By cranking R149 down even further, the power floor

was reduced to 2 volts peak to peak, or 1 volt peak (as seen on a Tektronix 465B scope), which is 10 milliwatts. Although it was very touchy, I could get it down to 0.4 volt peak to peak, or about 400 microwatts. I played with the other IC-730, and could get it down to 0.1 volt peak to peak, but all this is going a bit too far–very difficult to measure without an oscilloscope or RF microvoltmeter.

The best bet would be to set R149 so the power floor is about 10 milliwatts, which is about as low as you want to go if using a diode detector wattmeter. That generally equates to one volt DC out of the detector in a 50 ohm system, and below that level the relation between RF peak voltage and DC output falls off. (See the W7EL QRP wattmeter article in the February 1990 issue of QST for some excellent information on diode behavior at low levels, and a chart showing how the diode response falls off at low voltages. The most intriguing part is that at very low levels the response differs sharply for DC and AC.)

You must account for the voltage drop across the diode in the detector, but sometimes it's not worth worrying about, depending on the load resistance it sees. If the resistance is fairly low, the drop will approach the "normal" drop expected, such as 0.7 volts for a silicon diode, and this is very significant if you're looking at a one volt output. One volt vs. 1.7 volt is 10 vs. 28.9 milliwatts. But if the load resistance is high, the drop will be much lower. In the case of my own detector wattmeter, using a 10 megohm meter as the only load resistance, I ignore the voltage drop when doing calculations since it is negligible–about 6 millivolts at the one volt output, or 10 vs. 10.12 milliwatts. The key factor is the amount of forward current through the diode. (This is another Idea Exchange topic for the future!)

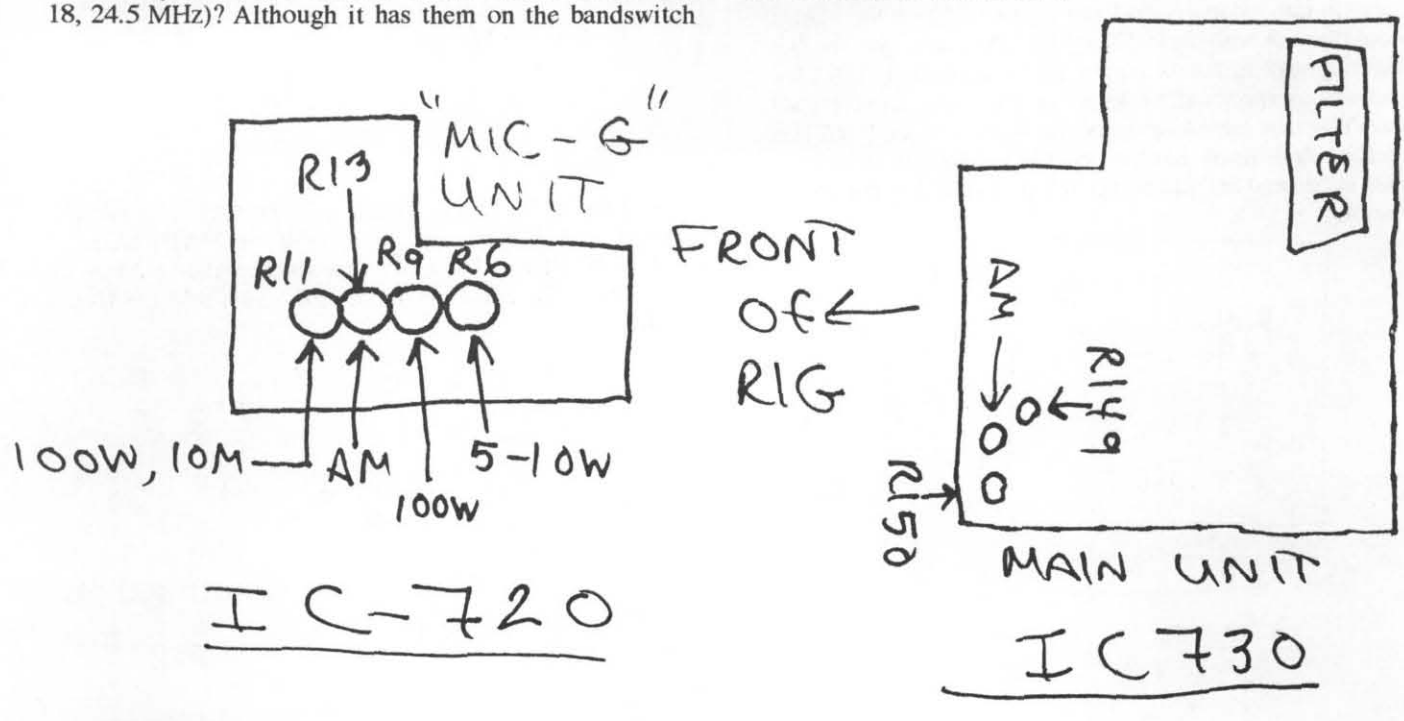
Next came the hardest part of all: restoring the settings of the two pots in both rigs so they went from 10 to 100 watts, as the book specifies. I found that painful, as a QRPer, but had to maintain my integrity as a repairman! (I didn't do any experiments to see how the IC-730 works on QRP SSB.)

Does your IC-730 transmit on the WARC bands (10, 18, 24.5 MHz)? Although it has them on the bandswitch and you can receive them, it would not transmit there when it left the factory. It was built in an era when the bands had been reserved for hams but not yet authorized for use, hence the inhibit on the transmit. Removing it is quite simple, and mentioned in the owners manual (page 23). Look at the RF board, which is the vertical board on the left side of the rig. In the lower right corner is a small ceramic IF filter with three IF transformer cans near it. There is a green wire snaking between them, with each end connected to a stake-pin labeled "D". Cut the wire, and you can transmit on the WARC bands. (There ARE still some unmodified rigs out there–I clipped the wire on one in November 1992.)

IC-720:

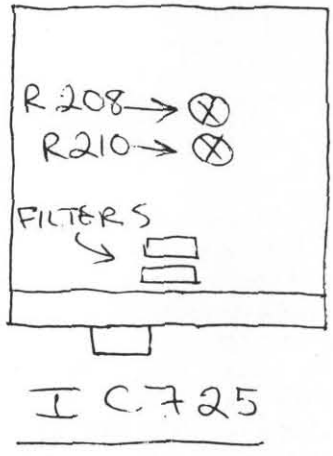
Yes, there are still some of these venerable rigs out there–we get them in the service shop from time to time. You have to make adjustments on the "MIC-G" unit–this is a tiny little board, just a couple inches long. It's exact location within the rig doesn't seem to be shown in the manual, and I don't have one available to check, but I'd suggest looking near the front panel somewhere. It has four pots, a couple transistors, a jack or two, and few other parts. This is the adjustment sequence listed in the manual; this rig is different from any other I've seen, because it has one maximum power adjustment for 1.8 through 24.5 and another for 28 MHz.

Put it on 14 MHz, either CW or RTTY, and turn the COMP control to maximum. Adjust R9 on the MIC-G board for 100 watts. Next, still on 14 MHz, turn COMP to minimum and adjust R6 for 5 to 10 watts, or lower if desired. Omit the next step if you don't use this mode–14 MHz AM, COMP back to maximum, and set R13 for 35 to 40 watts. Finally, on 28 MHz CW or RTTY, COMP still at maximum, set R11 for 100 watts. (I've never yet seen a 720 which would go much over 80 watts on ten meters.) I haven't experimented with one of these, so I don't know how well the R6 low power adjustment holds on ten meters, or if it even functions on that band.



IC-725:

Transmit on 1.910 MHz CW with the power control set to maximum. Adjust R210 on the MAIN board (the one with the IF filters) for 100 watts. Set the power control to minimum and adjust R208 to 10 watts as specified or lower as desired. As is the case with all these rigs, it may be necessary to repeat both adjustments.

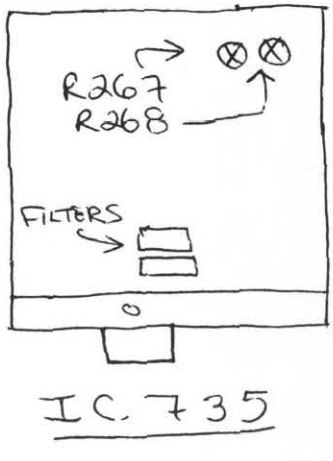


IC-728/729:

Adjust R210 for 100 watts input with the power control set to maximum. Crank it down to minimum and adjust R208 for 10 watts (their specification) or power level of your choice. They are located in approximately the same position as on the IC-725. The IC-728 I tested would not go under about one watt with R208. The RF power knob also controls SSB power. The IC-729 is the IC-728 with 6 meters added.

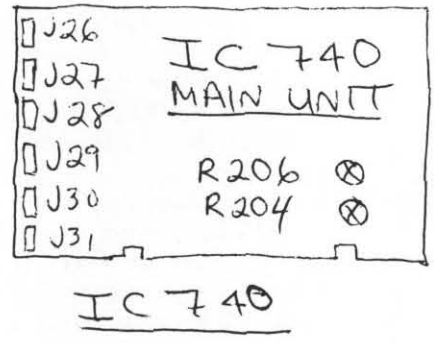
IC-735:

Put the unit on 20 meters. Set S3 on the MAIN board to the 100W position if not already there. (Some other rigs also have a switch to select 50 or 100 watts as the maximum power.) Set the RF power control to maximum. Transmit into a dummy load and adjust R268 on the MAIN board (the one with the IF filters) for 100 watts. Set the RF power control to the minimum position. Adjust R267 for ten watts as specified, or set to a lower level to suit your taste. You may have to go back and forth between R267 and R268 several times, but you should be able to get milliwatts at one end and full power at the other end of the power control.



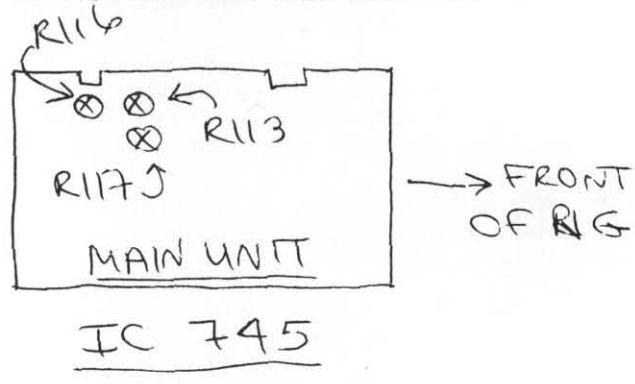
IC-740:

Set the rig to 14 MHz, and mode to RTTY. (Keying up in CW should also work.) Turn COMP off and set RF POWER to maximum. Adjust R206 on the main board for 100W. Set RF POWER to minimum and adjust R164 for 5 to 10 watts, or to power level of your choice. (R204, which is right next to R206, is used to set maximum power output at 50 watts when S1 on the MAIN unit is in the "50W" position.)

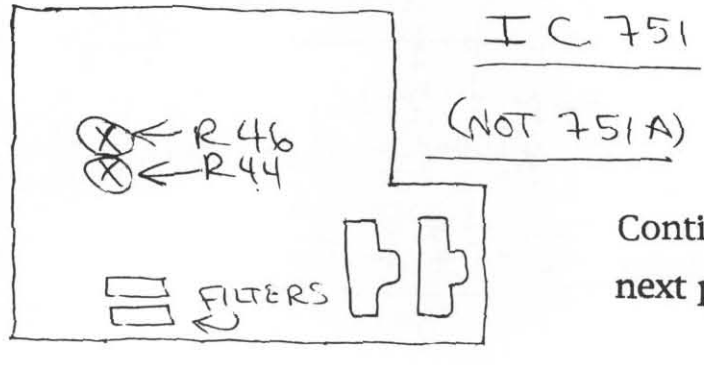


IC-745:

Transmit on 14 MHz CW with the RF power control set to maximum. Set S1 on the MAIN unit to the 100W position if not already there. Adjust R117 on the MAIN board (top of rig, right side) for 100 watts. Set the RF power control for minimum and adjust R113 for 5 to 10 watts as specified or to lower level as desired.



IC-751 (not IC-751A)–Transmit on 14 MHz CW with RF power set for minimum. Adjust R46 on MAIN board (one with IF filters) for ten watts as specified or lower power. Set RF power for maximum and adjust R44 for 100 watts. Repeat as needed.



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The New QRP'er

by Jay F. Chamberlain, KD4OOI
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So let's take a look at the word "NEW".

Fresh, innovative, inventive, novel, current, faddish, fashionable, modern, popular, pristine, untouched, virgin, contemporary, original, unique.

Other descriptions of the word "new" come to mind as I remember my last 14 months as a "new" ham with a growing QRP interest.

Excited, frustrated, impressionable, inspired, willing, encouraged, reluctant and motivated.

At one time or another, we were all new QRP'ers. Five weeks, five years or five decades ago, we have experienced frustration when our homebrewed VFO's didn't start or the overwhelming QRM that 500 watts couldn't get through.

I still haven't forgotten the excitement of my first QRP contacts, in the woods of Fort A.P. Hill, Va., a wire dipole slung in the trees, 20 feet overhead and two watts of "Ugly", homebrewed power. I had six, first grade "Tiger Cubs" gathered in a circle around me listening to Mr. Chamberlain's strange beeps. My "Ugly Weekender" was built to take on Scout campouts. The boys wondered why anyone in their right mind would be using a fishing pole, in the woods.

They didn't believe I was looking for a Basswood tree? Was the yellow wire in the trees for drying the towels? Are you trying to fly your kites? In the woods? What is Ham Radio? Something for lunch? QRP? Do you have the Hiccups?

"Oh yea, we forgot, it's Mr. Chamberlain." I only made four contacts that weekend. Those QSO's will be remembered through the smiles of my young audience.

I am so glad my friend and Elmer, W3GNC, Dave steered me to 40 meters and QRP operation before I started my first QRP project. I had myself convinced that 15 meter QRP was where I wanted to start out. He knew better, and realized that 15 meters closes at night and is very dependent on solar activity. He also knew that starting out in QRP right after I got my ticket would be a frustrating mistake. He gave me his original 1953 WRL Globe Scout, 50 watt Tx. It would only tune up on 40. I installed an attic dipole and jumped into the great HF-CW pond. The Globe Scout was all I needed to get off on the right foot. I still want that long distance, to reach out and touch someone, DXCC, WAS, WAC, QRP rig. I'll have to try 15 soon or wait until I upgrade to General and homebrew a 20 or 30 meter rig.

So, are you a synonym of the word "new"? Inventive, original, current, novel etc.; or the antonym, stale, old-fashioned, spoiled. QRP can lead a ham away from the stale and spoiled, and bring back the hands-on, building experiences or years gone by. It can also be your introduction to today's modern discrete or surface mount components. You can build-it-yourself from kits, operate right out of the box, commercial rigs or homebrew. Is CW your pleasure or poison? Try SSB?

QRP is but one small slice of the larger Amateur Radio pie. Try it, you'll like it!

Drop me a line or two about your "New QRP Experiences". I hope to do a few more of these articles.

Milliwatt Your Icom...

(Continued)

IC-751A and IC-761: Hobson's Choice?

The manual for the IC-751A instructs you to set the 100 watt level, then set RF power to minimum and verify that it is in the 5 to 10 watt range. No adjustment is mentioned for the lower level, and I did not have an IC-751A available to experiment with. It may well have a pot somewhere which performs this function. If anyone knows what it is, please let us know.

The service manual for the IC-761 has the adjustment for 100 watts only, and does not even mention the minimum power level. Again, if you can help us out on this, please do so.

POWER LEVEL STABILITY

Not having any of these rigs at home, I cannot vouch for how stable the power level will be at lower levels. All I can go by is my Kenwood TS-430S, which will go down into the milliwatts by turning down the CAR knob, without any internal adjustments. I run it between 4 watts and a few milliwatts, and find that the output level drifts up slowly for the first couple hours after it's turned on, making it necessary to correct it from time to time. It also varies from band to band. The limited experience I've had with several TS-440S'es on the bench suggests that model acts the same way, and I suspect the Icom rigs would do likewise. The inconvenience is minor, and running them at QRP levels is great fun.

After this article was 98% complete I received a letter from **Kris Merschrod, KA2OIG/HR3** (formerly TI2QRP). He passed on a copy of a letter Icom sent him about running the 728 at QRP levels. Their senior technical customer service rep mentioned that they have been using this method for years on the 735 and 725 with great success, as well as the 728, which amounts to a semi-official endorsement of the technique. Although I already had the information on the 728, I appreciate Kris sharing the letter with me.

Later, at the 99.5% complete level I received the December 1992 issue of QST and saw Tech Talk topic #84 by Icom in their ad. They repeat the same information for the IC-728 that Kris shared with me, and also mention the ALC controller. They use a 100K pot in series with a 1.5 volt battery, with the positive side grounded. That's a good starting point for experimenting on other rigs, although some may require higher voltage; I used a 9 volt battery with my TS-430S once.

The same principle of adjusting internal pots to set the power floor may well apply to much of the Yaesu equipment. Unfortunately, I don't have any contact with their units. If anyone has similar information available for any of the Yaesu rigs, please share it with us–you'll probably make a lot of QRPers happy!

QRP

Ruminations upon "Classic QRP"

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As miniaturization finally begins to push the laws of physics the QRP impulse will need a new direction. Are we ready for the era of Revisionist Retro Radio as foreseen by the Sage of South Dakota and others? If so, now is the time to act! We minimalists will not co-opt the Classics Exchange Contest unless we sequester the proper old equipment. As someone who has traded over 250 rigs in an attempt to make up for not finding radio until age 27, I can suggest a few things to look for under the table at the next hamfest.

Any kind of old VFO is a treasure, since they make great stand-alone transmitters. Moreover, an old Johnson or Gonset 2 and 6M VFO has an 8 MC output *("Megacycles"- they were called before the unpoetic "Hertz" became all the rage -NN1G)* which easily triples to the new 12 Meter band. I use an modified 1947 Harvey Wells Bandmaster for this band. With 275 volts on the plate, the magic output level will be found somewhere around 25 mA. This kind of power may usually be taken from an a vacuum tube receiver, and if you're not familiar with dipping a final just ask someone who is QCWA-eligible. It's an ancient and honored ritual, much like the Wouff Hong!

A "Novice" VFO, which is something of an oxymoron as Novices were crystal-controlled until 1975, will usually have 3.5 or 7 MC outputs. You can put one on the air directly, or as I did when 30M became available, load them down to drive vintage equipment on modern bands. I pulled the 40M section of a Heathkit VF-1 down to 5 MC and doubled to 30M with a WRL Globe Scout for my first 10 MC contact, but pulling the 80M section down to 3.3 MC and tripling would be better. Our transistors are often used as doublers in push-pull, but the tubes preferred odd multiples. If you can't find any old VFOs it doesn't matter- even your ONER can be tricked into driving a QRO (to us) vintage rig. It will be fun to tell 'em "RIG HR KNIGHT T-60 WIDOUT PA ES DRIVEN BY UGLY WEEKENDER".

All this was systematically explored by Ade Weiss' *The Joy of QRP —Strategies for Success*, 1984, Milliwatt Books (out of print), from the academic reaches of South Dakota. He provided detailed instructions on lowering the outputs of commercial gear, and his one-wire QRP conversion of the Heathkit HW-16 CW transceiver has the elegant simplicity of a math theorum. The trouble is, WØRSP is a Shakespeare professor! Might we ask, "Oh, Mighty Heathkit, how doth thou go so low"?

Ade's list of desirables included the Heathkit HX-20 SSB/CW mobile transceiver for its heterodyne VFO system. It is a great choice but all the Heathkits are easy to modify as they were designed for non-professional assembly. There is no reason you cannot put a 65-pound Seneca on 6 and 2 meters without its 6146s, and who will be the first to earn a QRP certificate with their feet resting on a 100-pound DX-100 or B&W 5100? If you tape the 1,000 volt secondaries safely away the transformer should last forever.

But dusty old Heathkits and Johnsons are not the only opportunities. How about a dying Swan? The May 1987 issue of 73 describes WA4UZM's scheme for taming a drifty old '250 for 6 meters. All of the black Swans, 260 through '700 series should be convertable to 30M - see WAØKHV's extensive article in the February, 1983 issue of CQ. It is not usually hard to talk a residuary legatee out of a Swan or any other vacuum tube transceiver. It is especially easy if no power supply is included, and for us, the required 12 V, and say, 250 V is easy to come by. You will need -130 V as well, but not at more than 25 or 30 mA so just hook up a filament transformer backwards, rectify and filter it, and add a pot to set the voltage. The Collins rigs and big-gun AM equipment is trading at a premium right now, but prices are falling for the 20-year-old Heathkit SB-104 which is all solid-state with digital display and 1 W out. In fact, some of these rigs are so cheap that I bought a $15 Galaxy III just to loan out to prospective hams. It is the cheapest 3-band receiver in town, but I can't see a strong argument for putting old receivers back into service. Modern receivers are a lot better than the old stuff, despite what you may have heard about a Collins or a National.

Resurrecting old rigs adds a new dimension to the QRP experience and widens our appeal to old-timers, but is a caution that cannot be overstated: Big voltages are dangerous! No modern products liability attorney would ever bless a rig with 300 volts accessible and you can bet that JRC's new 48-MOSFET kilowatt amp is offered partly because it runs on just a few volts (at 200 amps?). For old gear, get a big clip lead and learn how to discharge filter caps. Then snip and insulate the high voltage transformer secondaries to leave them inaccessible forever. And even after that, recall that "just" 200-300 volt demands a respect bordering on reverence. The new study questions for the Technician test lists 30 volts as potentially fatal. A friend, whom I asked to fix my solid-state Heath HR-1681, did so, but the first thing he did was to put it on a 12 V bench supply. He would not even consider working around the 117VAC input, and he has his 6M WAS earned with 2000 volts on his kilowatt final. That wise fellow will be around when the sunspots come back. Let's make sure we will be, too!

A Beginner's Level Construction Project-

A 40 Meter Transmitter/Receiver

(This article was submitted in response to Rock (W9SCH)'s previous correspondence with its eloquent plea for simplicity and ease of construction in homebrewing. Jim's offering takes me back to the "olden" days- I hope you enjoy it also - NN1G)

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INTRODUCTION

One of the biggest thrills in my life was my first CW amateur radio contact. It was a cold January morning and I was on Christmas break from college. At the time I lived in Fort Worth, Texas and used to call CQ on a homemade one watt direct conversion battery operated transceiver that I was certain didn't work. That day, to my great surprise, my callsign came booming out of the headphones from another amateur operator in Wichita, Kansas. Imagine a radio constructed from a handful of parts that reached over 300 miles- it still thrills me!

Over the past 15 years I have dabbled, tinkered, and assembled several simple transmitters and receivers. Some worked well, some were disappointments, some looked esthetically pleasing, and others were downright ugly (these seemed to work the best). The bottom line is that I had fun experimenting, building, and actually operating these rigs. The intention of this article is to generate some enthusiasm, and hopefully prompt fellow amateurs to experience the thrills that I have enjoyed for many years.

This project was intentionally designed for simplicity and to utilize readily available items. Keep in mind that things do not have to be exactly as described, there is room for some flexibility. The major point to remember is that the key word in Amateur Radio is *Amateur.*

CIRCUIT DESCRIPTION

I direct your attention to the block diagram (Figure 1). In receive mode the mixer combines the inputs from the antenna and Oscillator and feeds the summation of these two signals to a high gain audio amplifier. In the transmit mode the oscillator feeds into a one transistor RF amplifier.

The receiver is a direct conversion design which is easy to construct and get operating. In this type of receiver the signal is picked up by the antenna and amplified entirely in the audio channel. It functions this way: Suppose the oscillator providing the beat frequency (BFO or Beat Frequency Oscillator) into the mixer is 7140.0 kHz.

Now further suppose there is a strong signal into the antenna at 7140.8 kHz. The frequency difference between these two signals is 0.8 kHz or 800 Hz, which is presented to the audio amplifier and is what you'll hear in the headphones. If there was also a signal into the antenna at 7139.2 kHz you would hear another 800 Hz note in addition to the first one. As you can see, signals are received on both sides of the BFO frequency.

Fortunately, this is not much of a problem because the chances of having two strong signals of the same tone is very slim, and when copying CW tone focuses on a single tone and ignores the others. The oscillator includes a variable capacitor which allows for minor changes in the crystal frequency.

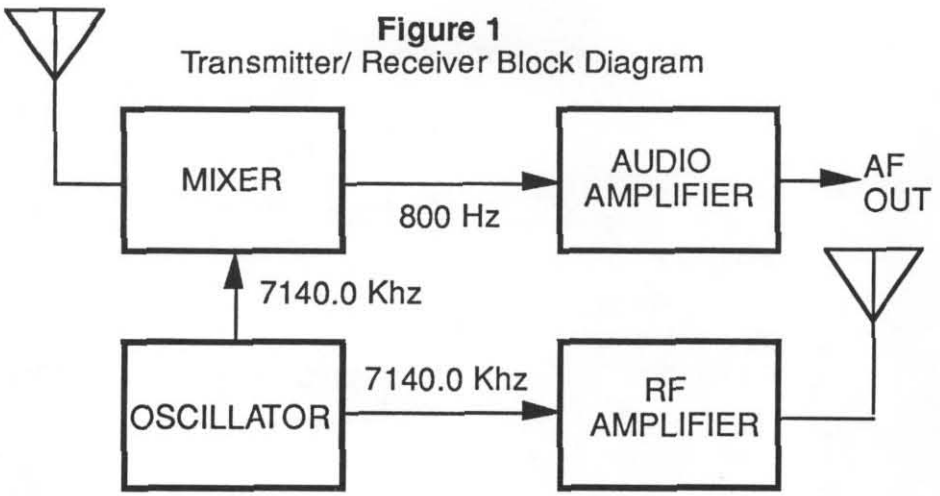


Figure 1
Transmitter/ Receiver Block Diagram

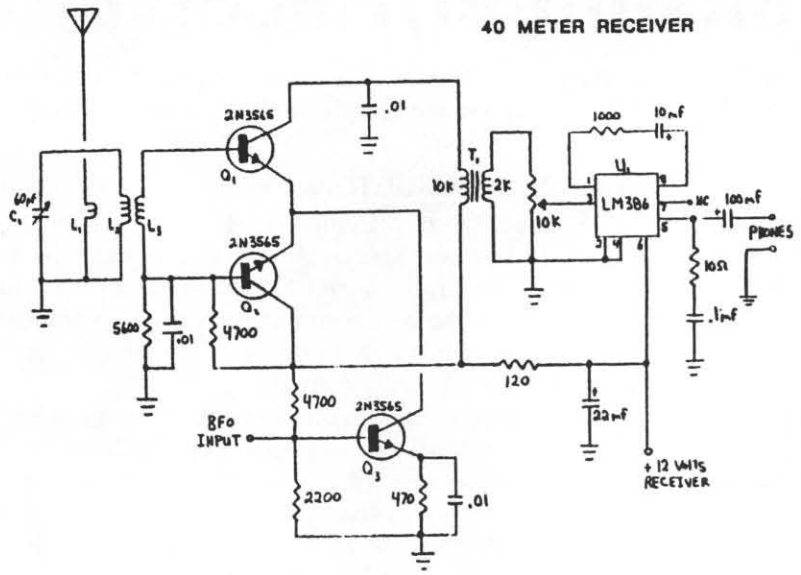
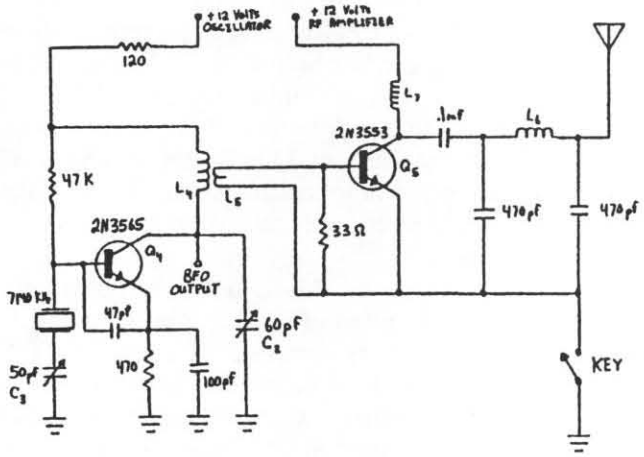


Figure 2
Receiver Schematic

RECEIVER PARTS LIST

Q1, Q2, Q3 2N3565 (Mouser #333-MPS3565)
2N2222
2N3904
2N4401
U1 LM386 (Radio Shack #276-1731)
T1 Transformer 10K:2K (Mouser #42TU002)
C1 60pf Trimmer Cap (Digi-Key #SG1007)
L1 5 Turns #30 enameled wire around L2
L2 24 Turns #26 enameled wire on a 7/8" diameter form (Lifesaver candy plastic cannister)
L3 10 Turns #30 enameled wire around L2 (#26, #30 enameled wire: Radio Shack #278-1345)



40 METER TRANSMITTER

Figure 3
Transmitter Schematic

TRANSMITTER PARTS LIST

Q4 2N3565 (see Receiver list)
Q5 2N3553, 2N2102, 2N3866, 2N3053 (Mouser #570-2N2102, #511-2N3866, #511-2N3053)
C2 60pf Trimmer Cap (Digi-Key #SG1007)
C3 50pf (Approx.) Variable Cap
L4 24 Turns #26 enameled wire on a 7/8" diameter form (Lifesaver candy plastic cannister)
L5 5 Turns #30 enameled wire around L4
L6 6 Turns #26 enameled wire on a 7/8" diameter form (Lifesaver candy plastic cannister)
L7 Approximately 50 turns #26 enameled wire on a 1 Megohm resister (use super glue)

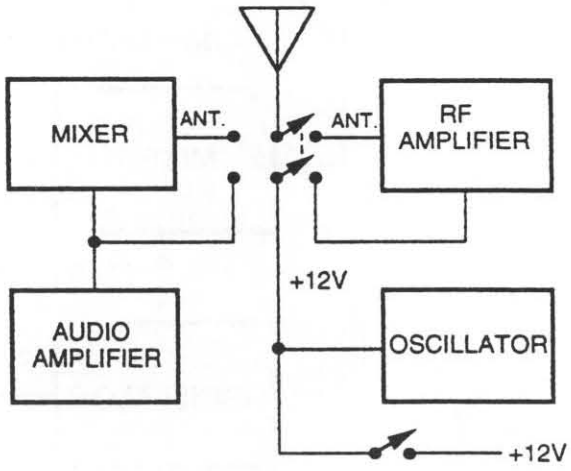


Figure 4
Transmitter/ Receiver Antenna & Power Switching

This is needed if by chance someone is calling you exactly on your frequency. We won't hear the resulting low-frequency signal so we need to create a differential between his frequency and yours to obtain an audio frequency which can be heard. These are minor inconveniences when the tradeoff is a simple receiver. (*You may wish to add a switch to bypass the oscillator's variable capacitor C3 on transmit (or receive) to furnish a distinct frequency offset between those two modes.- NN1G*)

CIRCUIT BOARDS

I created a pair of circuit boards made from PC-board material for the transmitter and receiver sections of this project. These were prepared using a motor tool to cut isolated islands on the copper side of the boards. After this I cleaned the boards with steel wool to make sure that none of the "islands" connected- an unneeded source of frustration later. There is no need to drill any holes since the components will be soldered on the foil side of the boards. Working at 40 Meter frequencies it is not critical to have super-short leads on the parts, however they should be kept as short as possible to avoid problems with interactions of the components. Send me a SASE if you're interested in layout drawings for this method of construction.

COILS

Many times I look at a schematic diagram eagerly only to discover that the coils are wound on toroid forms I just don't have. What a turn-off! Needless to say, those projects never get built. The coils in this circuit are wound single layer on 7/8" diameter plastic canisters. Lifesaver® candy containers provide the coil forms, and they are readily available at your favorite store. These coils make up the resonant circuits and the calculations have been made with the dimensions given, using #26 enameled wire which can be found at Radio Shack. A combination of scotch tape and super glue will keep the windings in place. Deviations from the diameter and number of turns on these coil forms may put you out of the ballpark for 7 MHz resonant circuits, so check your work carefully.

PARTS PROCUREMENT and CONSTRUCTION

The parts are available through Radio Shack or mail order companies. I have listed the stock numbers of a few that may not be at your local shop. In this particular rig I used a fundamental mode crystal on my favorite 40 meter frequency. You may experiment with the variable capacitor associated with crystal. Small air-spaced variables seem to be a little hard to come by, however, a possible source for this part might be the small section from a junked AM radio. If you are good at desoldering try to salvage the volume control with the on/off switch, they are generally 10,000 ohms and will work just fine. Switching the antenna and power between the receiver and the transmitter is accomplished with a DPDT slide switch. Add suitable plugs and jacks for power, phones, key, and antenna and you are in business. It's best to use a socket for the LM386, in case you ever need to replace it. Shielded cable to and from the volume control will decrease the potential for howling in the audio amplifier. Just about any small signal NPN transistors will work for Q1, Q2, Q3 and Q4. A 2N3565 is shown in the schematic diagrams (Figures 2 and 3), however, the 2N2222, 2N3904 or 2N4401 will work as well. Q5 is a 2N3553; but the 2N2102, 2N3053, or 2N3866 will also work. Figure 4 shows the switching of the antenna and power supply between the Receiver and the Transmitter.

OPERATION

After thoroughly checking your work for errors, attach a 40 meter antenna, and apply power. The first order of business is to get the oscillator working. Listening on another radio at the crystal frequency is a good way to determine if the oscillator is functioning. Next, adjust the trimmer capacitor in the mixer circuit for peak signal strength. If you have a signal source that is great, otherwise use "on the air" signals to peak this resonant circuit. With the high gain associated with the audio channel, a squealing or howling sound sometimes occurs. As I mentioned earlier, the potential for this to occur can be reduced by using shielded cable to and from the volume control and phone jack. If this does not cure the problem, experiment with the value of the capacitor which injects the BFO signal into the mixer- 5 pf is a good starting point for eliminating this difficulty.

After you are satisfied with the receiver, move on to the transmitter. Attach a volt meter (ampere setting) in the voltage line to the RF amplifier and adjust the trimmer cap in the oscillator circuit for maximum reading on the meter. That's all there is to it! It's reasonable to expect several hundred miles with a transmitter such as this. When adjusting the transmitter attach the RF output to a dummy load so as not to generate QRM for your fellow amateurs.

CONCLUSION

Hopefully this article has stimulated your interest in constructing this simple CW rig. Nothing beats the thrill of making that first QSO on a piece of equipment that you constructed yourself. Good luck and remember to have fun!

Product Review -

MFJ-1796 Vertical Antenna

Bruce Milne, WB2QAP
3701 Baynard Dr.
Punta Gorda, FL 33950

I am now spending the winter months in Punta Gorda, Florida. The RV park where I am staying has a very enlightened attitude about antennas, and permitted me to put up a "modest" ham antenna as long as it did not interfere with the residents' ability to watch television.

I had been eyeing the MFJ-1796 vertical since MFJ first started advertising it. (A couple of years ago!!) When they finally became available, I placed my order. The antenna arrived in Florida via UPS in one box, and all the parts were there. The instruction manual is fairly complete, and the antenna went together in 2-3 hours. The vertical is center fed with separate loading coils and capacitance hats at each end of the antenna.

One of the appealing features of this antenna is that it does not require ground radials and can be tower or pole mounted. The antenna covers 40, 20, 15, 10, 6 and 2 meters. (That's right, six and two meters!) Maximum power rating is 1500 watts on 40-10 meters. CW power ratings are 500 watts on 40 meters, 750 watts on 20 and 10 meters, and 1000 watts on 15 meters. The antenna weighs approximately 15 lbs., requires a 1 1/2" pipe to mount it on, and has a wind load of approximately 2 square feet.

MFJ suggests that you prepare a temporary ground-level mounting mast for initial testing, but I didn't do this. (More about my installation later.) The manual begins by offering instructions on assembling the "L" brackets that hold the six and two meter portions of the antenna. The balun is then attached to the lower half of the antenna, and finally the loading coils are assembled. If you follow MFJ's instructions carefully, you should not have trouble putting this antenna together. Since 99% of my operation is QRP-CW operation, I paid particular attention to their instructions for installing the longer capacitance spokes (furnished) for operation near the bottom of the band. Extra spokes are included in case you need to lower the resonant frequency of the antenna for a particular band.

Tuning the antenna was fairly straightforward. Each loading coil has four sets of capacitance spokes (40, 20, 15, 10 meters). You select two spokes per band, one spoke from the top loading coil, and one from the bottom loading coil. These two spokes are trimmed until the antenna resonates on the frequency you wish it to resonate.

I found MFJ's figures to be fairly accurate in determining how much to trim off each spoke to achieve the desired frequency. Always begin with 40 meters, then 20, 15 and 10 meters. The two and six meter portions are tuned by adjusting the two rods for each band closer or further apart. In my case I was shooting for the QRP frequencies of 7.040, 14.060, 21.060 and 28.060.

I still have a bit of fine tuning to do, but the following SWR tables will give you a rough idea of how the antenna resonates.

MFJ-1796 Vertical Antenna SWR -Test Results

40 Meters		20 Meters		15 Meters	
7.000	6:1	14.000	2:1	21.000	1.6:1
7.025	2.3:1	14.060	1.1:1	21.060	1.45:1
7.040	1.4:1	14.100	2.2:1	21.200	1.6:1
7.075	4:1	14.200	10:1	21.400	2.2:1

10 Meters		6 Meters	2 Meters	
(see text)		figures not available -	144.00	4:1
		The antenna may be	145.00	3:1
28.000	3:1	installed and tuned	146.00	1.5:1
28.100	2.8:1	without the 6M element.	147.00	1.8:1
28.200	2.5:1		148.00	2.6:1
28.500	2.2:1			
29.000	2:1			

A word of caution about these tables. Living in a RV park, I am surrounded by aluminum. My antenna is mounted at the top of a 17 ft. pivoting flagpole. There are two aluminum park models (large trailers) within 10 feet of the base of the flagpole. This may account for the fact that on 10 meters, the antenna would not tune below 2:1.

The quality of construction is fair. Although it uses stainless steel parts, the "hose clamp" method of fastening the upper and lower loading coils, as well as the two main halves of the antenna, leads me to wonder how this antenna would survive some of the winter storms that we have in the northern part of the country. Also, the capacitance spokes are held in place by the pressure of screws, a potential trouble spot.

I have been consistently able to check in to the SEN (QRP net-Tuesday nights 8:00 p.m. EST on 7.030), as well as the NEN (QRP net-Saturday mornings 8:00 am EST on 7.040), using only three watts. Net control stations are in Maryland and Massachusetts respectively.

I have also worked the west coast on 20 and 15 meters (QRP, naturally) with little problem. Unfortunately, band conditions have been such that I have not been able to give it a good workout chasing DX.

Overall, I am pleased with this antenna. Even with a SWR of 10:1 on 20 meter phone, I can keep skeds with my friends in upstate New York. On two meters, I can access bulletin boards 30-40 miles from my QTH with little problem.

To me, the ultimate test for an antenna is to see how well it does in two way QRP communications. In a recent Michigan QRP club contest (1/1-1/2/94) with conditions being fair at best, using my Ten-Tec Argonaut II, I was able to work 32 states, 3 Canadian provinces, Puerto Rico and Panama during the contest. (111 QSO's) I had scarcely any situations where I was unable to complete the two way report, and reports were generally favorable.

For those with limited space, campers, and those who operate portable, the MFJ-1796 vertical antenna is an excellent choice. It can be easily broken down and stored in a matter of a few minutes. All in all, I'd give this antenna high marks!

"LOGGER" ... Revisited and Revised

Bruce Milne, WB2QAP

A few years ago, I wrote an article for the *QRP Quarterly* describing a computer program called "Logger" that I wrote using GW-BASIC, and which was designed to use in the ARCI contests. The program logged stations, checked for duplicate contacts, and printed out a ready to mail log in ARCI format. A year or so later, a few "revisions" were made to the original program which included a database for entering the first name of people worked, etc. Logger has been very well received by the ARCI group, and was recently reviewed in the Quarterly by Jack Coster, WF8X.

I have just completed a major revision of Logger, with the following improvements:

1) You no longer have to worry about setting the CAPS key on. The computer takes care of it.

2) An on-screen running clock and calendar are displayed at all times.

3) The program, while written in GW-BASIC, has been compiled using Microsoft Quick Basic and now is distributed as a stand-alone EXE file. The means that you no longer have to first load GW-BASIC and then the Logger program. The program also runs faster now.

4) Instructions are now on the disk in a special instructions menu, which is accessible from the main menu. The "names" data base was deleted from this version.

5) The bottom of the screen now shows a constantly updated chart of how you are doing in regard to multipliers and points for each band!

6) A new main menu option (Update multiplier screen) has been added. Selecting this option provides you with a visual display of what multipliers you have worked (or not worked) on each band (North America only).

7) On the disk provided, versions of Logger for the Michigan QRP Club contests and the NW QRP club contests are provided.

8) For those "hackers" out there who like to play with these programs, a copy of the source code in GW-BASIC is provided.

My thanks to all who have written to me expressing their appreciation for this program. Particular thanks go to Harry Maddox, KE8DC, who in conjunction with Ross (Ed) Weston, (WA8HQO), made some significant suggestions for ways to improve the program.

Copies of "Logger" are available on 3.5" or 5.25" disk. I prefer 3.5" disk format. Send a formatted disk (without the label please) and $2.00 to me at one of the two following addresses:

(Mid-April to Mid-October) 2350 Clark Road, Penn Yan, New York 14527

(Mid-October to Mid-April) 3701 Baynard Drive, Punta Gorda, Florida 33950

Members' News

Richard Fisher, KI6SN
1940 Wetherly St.
Riverside, CA 92506

QRZ QRP Dayton?

The Dayton Hamvention — April 29, 30, and May 1 this year — is perhaps the greatest opportunity annually for QRPers from around the nation and world to converge on one piece of North American turf.

KI6SN
. . .Richard Fisher

Most QRPers who have attended, and even those who have not, agree that there's just nothing like it.

Stories from QRP Suite have become the stuff of legend in the low power world. The QRP forums and seminars are discussed, debated and rehashed long after the door is closed and the lights turned off.

For those fortunate enough to attend, Dayton is a chance to bask in the warmth of the friendship shared by so *many QRPers over the years. It's also* an opportunity to rekindle old acquaintances and to make new ones.

For those of us unable to attend, Dayton is a source to hear — albeit second hand — what's foremost on the mind of the QRP world, from the rank and file to "the big guns."

Unfortunately, the number of QRPers able to attend Dayton are far, far outnumbered by those who cannot.

But that's where the attendees come in.

How about some QRP ARCI Members' News reports from Dayton? If you're going, take a camera and capture some of the action on film to be shared with those of us unable to make the scene.

Jot down your thoughts and impressions of the event — whether it was your first ever, or whether you're a seasoned veteran — and send them along on MN.

Here's a chance to don a reporter's hat, grab a camera and share some of the fun with those of us left behind.

We look forward to seeing your reports and photographs from "the front."

— R. E. F.

QRP from 'the cornstalks of Iowa'

John Stanford, NN0F, writes from Ames, Iowa, that he's "looking for a two-way QRP QSO with Alabama and Hawaii for two-way WAS. For Alabama, maybe I can hook up with **AB4QL, (Barry Strickland** of Sylvania, AL) who I see is active in contests. But Hawaii is a tough one from here.

"Anyone going there for a holiday-QRP-expedition?"

John adds that he has tried QRP on 160 meters for the first time. "Soon worked friend **WA0RPI, Jim Lageson,** in South Dakota. Also tried the recent winter 160 meter contest and worked several states QRP.

"When the band is in good shape, QRP is a reasonable possibility, it seems. Others want to try it?

"I haven't tried 160 meters much, but I see we have a suggested QRP frequency there, 1.810 MHz, so I'll try it.

"My HW-9 doesn't hit 160, so I use my TS-140 throttled down to five watts. For an antenna, I use my trusty old 120-foot dipole, open wire feed, and link tuner from the ARRL Handbook. With careful tuning, it works fine on 160 meters."

John says that he doesn't do much DXing these days, but "did hook up with my 150th, one watt DXCC country, and also No. 181 with five watts or less.

"Recently I worked North Dakota for my 40th state QRP on 80 meters. I wonder if it would ever be possible to get all 50 states on 80 meters using QRP? Probably not from here, among the corn stalks of Iowa.

"On all these contacts I used my secret DX super death-ray beam antenna: the cf zepp dipole, at 30 feet in the middle. Yes, I know 'cf zepp' isn't supposed to be the proper name. But, why not? It's short to send and everybody knows what you mean! On the other hand, these antennas are so versatile and used by so many people these days, what say we call 'em 'ABD,' . . . *All Band Dipole,* or has someone already tried that name?"

Keeping in QRP contact

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

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

Here's the only mailing address you need:

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

QRP on the 'Trail' again

Bil Paul, KD6JUI, writes from San Mateo, CA, that a second hamming trip along the Pacific Crest Bicycle Trail is being planned for this summer.

"The week-long July trip (last year) involved four hams and one non-ham, and covered about 400 miles along mountainous *paved and unpaved roads between Mt. St. Helens, WA, and* Crescent Lake, OR," Bil writes.

The four hams — **Guy Hamblen** of Troutdale, OR; **Dan Arbogast,** of Corvallis, OR; **John Talstad,** of Montebello, CA; and **Bil Paul** — operated CW QRP on 40, 20 and 15 meters and used 2 meter HTs.

"Solar cells were used to charge batteries during each day's ride," Bil says. "All contacts were stateside with the exception of one Finland contact on 20 meters using a tree-hung ground *plane.*

"The upcoming week-long trip will be in **July or August '94,** and will begin at Crescent Lake and include Crater Lake, Ashland, and Siskiyou Pass, OR; and Horse Creek and Callahan, CA; ending near Mt. Shasta. The tour will primarily camp and cook out."

Bil says that "again, experienced bicycle touring folks who are hams are invited to join the free trip." For more information, write: **Bil Paul, KD6JUI, PO Box 5183, San Jose, CA 95150.**

In search of an Argonaut

James B. Geer, WB5LXZ, of Bedford, Tex., is "very anxious to acquire a TEN-TEC Argonaut 515."

Anyone who can help him in his search is encouraged to contact James at 604 King Dr., Bedford, TX 76022-7124.

His telephone number is (817) 268-1985.

A QRPer's story

"I just got into QRP one year ago," writes **Bruce Williams,**

N9JCV, from Lakevilla, Ill.

"I would have never believed it to be this much fun. I was using my Icom 728 with power set to five watts. Recently I have built and used a Tejas Backpacker II for 40 meters, a 4.5 watt homebrew VXO transmitter and a Ramsey 40 meter receiver and transmitter.

"The antenna is a 40 meter inverted V dipole. In 1993 I made about 200 QRP contacts. I even operated my first QRP contest, and had a blast.

"I am so happy to see QRP ARCI suggesting and endorsing members to use the novice frequencies. I am a general who operates about 10 words-per-minute casually, and frequently use the novice frequences.

"One item I thought that should be of interest to all QRP ARCI readers is an album/CD by **Roger Waters.** He has produced a conceptual album about a ham radio operator and a handicapped man who can hear and receive radio signals without the use of a radio.

"The music frequently uses morse code in the background. The cover of the album has morse code in dot/dash written format. This is a rock music CD, but not heavy metal," Bruce says.

The recording is called **"Radio Kaos."**

QRP — Ramsey Style

Jim Hale, KJ5TF, writes from Kingston, Ark., that he's "having fun with my modified Ramsey QRP-20, 17 and 15 meter CW transmitters.

"First, some good DX with the 15 meter rig . . . a nice chat with a ham at Palmer Station, Antarctica. Talk of penguins, glaciers, and my arrowhead hunting!," Jim says. "This is really a lot of fun.

"This 'former' QRP-20 has a 15 meter output filter, and CB final transistor. The antenna is a two element homebrew quad up 60 feet on my small piece of mountain top in the Ozarks.

"So, I bought another Ramsey QRP-20, and ordered 18.080 and 18.090 crystals from Jan Crystals. I used a 2N3866 final, not finding a 2SC1017 as is in the QRP-15 rig. **Ian, VE7DJI,** got it out of a junk CB (radio) he found.

"The crystals came and I built a seven element 17 meter filter. All component values came from the 'W1FB Design Notebook,' chosen between those given for 15 and 20 meters.

"So, with the 2N3866, my filter, and dipole, I called CQ and minutes later I had two QSOs, and the second, a DX QSO with a ham in Costa Rica.

"After a dozen QSOs with this rig, and pretty good reports, I'm writing this story to get feedback.

"How can I improve the other stages for best efficiency and output for 15 and 17 meters?

"Has anyone put a VFO on a Ramsey QRP transmitter? Please write!

"I would enjoy hearing from others who have done *any* mods on Ramsey QRP transmitters and Ramsey HR receivers.

"Who knows how to put the Ramsey HR-20 receiver on 15 and 17 meters?

"I need to build a QRP antenna tuner, and use my 15 meter quad on 17, 20 and 30 meters. I think I found one in the 'W1FB Design Notebook.' In the same book is a circuit to measure watts and SWR. The board is available from FAR Circuits.

"Like they say in the ads, 'Work the World on a Watt.' Maybe I can!"

To contact Jim, write him at: **HC65 Box 261-B, Kingston, AR 72742.**

Goodie Giveaway

Many QRP builders will agree that one of the most difficult items to find on the homebrewers market is the variable capacitor.

But that won't be the case for **Bruce Williams, N9JCV,** of Lakevilla, Ill. He's this month's Goodie Giveaway recipient of a beautiful **HF-15 variable capacitor and vernier drive.**

It's the result of a generous contribution from **Pat Bunn, N4LTA,** owner of **624 Kits,** based in Spartanburg, SC.

The HF-15 could see service in everything from a VXO transmitter, to a tidy direct conversion receiver or superhet. Or, how about a VFO?

The possibilities are many.

A "72" and QRP salute to Bruce for his contribution, and here's hoping lots of QRP Quarterly readers will take a moment to drop Members' News a card, letter or photograph and get in the running for next quarter's giveaway.

Items for the Members' News column should be sent to Richard Fisher, KI6SN, 1940 Wetherly St., Riverside, CA 92506. Photographs — either black and white or color — are welcomed. Please include a self addressed, stamped envelope if you would like pictures returned.

UPCOMING EVENTS

HOOT OWL SPRINT MAY 29, 1994 2000 - 2400 LOCAL TIME

SUMMER HOMEBREW SPRINT JULY 10, 1994 2000 - 2400 UTC

MILLIWATT FIELD DAY JUNE 25 - 26

A Six-Pack of Ten-Tec Scout Modifications

Steve Pituch, N2MNN
28 Crescent Road
Livingston, NJ 07039

For several years I have been dreaming of a QRP multiband digital solid state HF rig that was also great for mobile, and portable use, and that cost half the price of what entry level rigs usually run. I can happily report that the Ten-Tec Scout 555 lives up to my dreams. I received mine last December and have been enjoying it ever since. Performance out of the box is as good as rigs costing twice as much, and with a few extra parts, and a little time, you can make this rig's performance unbeatable.

There have been favorable product reviews of this rig in the ham magazines so I'll refer you to those articles for the details[1]. Ten-Tec designed this rig to give hams the most in an HF transceiver for $495.00. The result is a 4-to-50 Watt rig with digital readout, internal keyer, RIT, and variable IF passband tuning. After thoroughly inspecting and disassembling the rig, I can tell you that I am extremely impressed with the rig's design, layout, and circuit board quality. There's a lot of radio packed into this small box! What this rig doesn't have is dual VFOs, memory storage, and the countless other features that put the cost of a typical HF rig over the $1000 mark. The first two items I can live without because I have never owned a computerized radio. The exciting thing that I discovered is that you can add the necessary bells and whistles to this rig for under $20.00. In this article I'll describe the modifications I've made to my Scout.

Yes, I modified a brand new rig! I did use it "stock" for a while to get used to its characteristics. I also called Ten-Tec to discuss my proposed modifications, and asked them why they hadn't incorporated these simple features in the original rig. They indicated it was because of cost.

The first step was to figure out where to put all the controls required by these modifications. Being as small as it is, there is no extra room on the front or rear panels of the Scout for any extra controls. My solution was to buy a small plastic box (RS #270-223) to house the new controls. Then I had to figure out how to wire the box to the radio. I estimated that I would need about a dozen wires between both units. I also wanted the two units to be easily detachable. The logical choice was to use mating DB15 pin connectors, but Radio Shack doesn't carry these. The answer came to me when I was rebuilding a PC at work. Most PC I/O cards these days come with a wiring harness that contains a male DB15 connector attached to a ribbon cable. This connector is normally used as a game port. Since games are forbidden where I work, I suddenly had access to over one hundred connector/ wiring harnesses! I cut a hole in the left rear of the Scout's top cover plate to accommodate one of these assemblies, and installed an identical assembly onto the back of the control box. If you feel squeamish about cutting apart a new rig, you can always pass the flat ribbon cable out the gap between the top cover and rear panel.

The cable between the rig and the control box was fabricated from an old cutdown floppy drive ribbon cable, and two DB25 male connectors from two PC COM2 ports. They are also available from Radio Shack (RS #276-1429/1430). How does a 25 pin connector mate to a 15 pin connector? It doesn't until you take them apart, cut them down to 15 pins, and then reassemble them. Of course, if you have a cheap supply of male DB15 connectors, you can avoid the rebuilding step.

All that was left to do was to solder the new control wires to the appropriate locations on the rig's circuit boards, and then to the corresponding locations on the controls in the control box. The actual connections are rather simple, but finding the correct circuit board lands in the Scout to connect the control wires to can take a lot of time. Here are the modifications I made to my Scout in order to customize it for my own use:

1. Sidetone Spot - As it comes from Ten-Tec, you can hear the CW sidetone only when you

are transmitting. I like to zero- beat the other station's signal while I am in receive, so that I end up right on his frequency. To do this you must be able to hear the CW sidetone while you are in the receive mode. In this rig the sidetone is normally activated by a 9 V DC bias transmit signal. It is an easy matter to activate the sidetone in receive by applying a 9.6 V bias available from a regulated source located next to the sidetone oscillator. Adding a silicon diode with a .6 V drop to the circuit gives the exact voltage that is needed. Just connect one control wire to the oscillator, at the plus end of D8 on the audio board, and one to the voltage source, near connector 12. For convenience, these connections can be made on the solder side of the board. In the control box, connect the two wires to a pushbutton switch, in series with an IN914 diode. Now you can hear the sidetone in receive at the touch of a button.

2) Sidetone Volume - I hate having to turn a rig on its side to access the internal sidetone volume pot. Since I am tone deaf, I have difficulty zero beating a signal unless the sidetone volume is approximately equal to the volume of the incoming signal. This means that I must constantly adjust the sidetone volume in order to be on the correct frequency. For this modification, remove the adjustment pot, R70, on the audio board, and attach three of the control wires in its place. Save the pot in case you ever want to restore the rig to stock condition. The three wires are connected in the control box to a 10K pot. Using this technique, you can get within a few Hz of another signal, greatly increasing your chances of making contact on the first try. With the help of this new control, virtually all of my contacts have heard my 5-watt call correctly the first time.

3. Audio Filter On, and audio filter volumn - This modification is the only one that does not require a connection from the ribbon cable. An Audio filter was built using a quad Op- Amp IC (RS # 276-1711). Each of its four sections has a bandwidth of 250 Hz, and an adjustable center frequency is set to 750 Hz. The filter is followed by an LM-386 audio amplifier IC (RS #271-1731). A DPDT toggle switch is used to select or bypass the filter, and a 10K pot is used to adjust the audio volume. A 1/4 inch phone plug is used to plug the unit into the headphones jack on the front of the radio, and the headphones or a speaker plug into the outboard control box. The perf board needed for this circuit is quite small and fits easily into the control box. Power for this circuit board is provided by the appropriate control wire from modification No. 1.

The performance of the Scout's variable IF filter is quite good, but when it is used with the new audio filter performance is outstanding. Increasing the filter volume control seems to peak the signal, and pull it out of the noise. I'd highly recommend the audio filter for anyone using the Scout for 40-meter CW, especially in the Novice portion. It really tames the off-frequency broadcast stations!

4. RF Transmit - The built in electronic keyer in the Scout is a very nice feature, but there's no semi-auto button to let you transmit a continuous carrier when you want to tune your antenna. The tune toggle switch on the front panel is too awkward for me; I need a pushbutton so that I can quickly turn the carrier on and off. There is a hand key jack on the rear panel, but I don't want to bring both a hand key and a keyer with me when I go portable. I connected two control wires across the hand key jack and connected the corresponding ends to a momentary push button switch on the control box. Adjusting my antenna tuner is now a cinch.

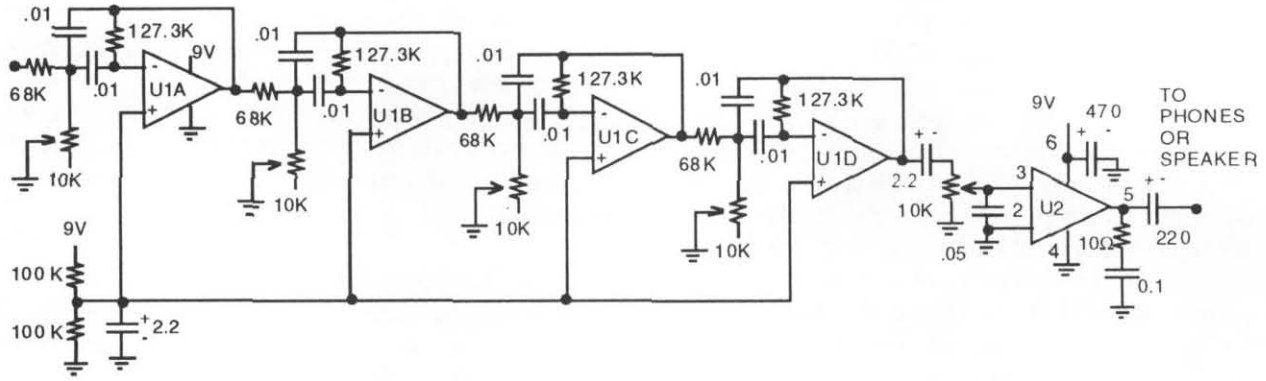
5. RF Output Adjustment - The output of the Scout can be set from 4 to 50 watts by adjusting a 10K pot, R21 on the ALC board, accessible through a small hole in the bottom cover. For this modification, the pot is removed and replaced with three control wires and a 10K pot in the control box. Refer to the previously-described sidetone volume control modification for more details. I can now go from 50 watts output down to QRP in about five seconds. Peaking your output to 5 watts when switching bands is also easy. Note that in comparing the Scout wattmeter to other meters, I found it to be quite accurate.

6. AGC - The Scout comes from the factory with a characteristic which prevents it from being the perfect radio right out of the box. When you are tuned to a weak CW signal and there is another much stronger signal on a slightly lower frequency within the IF passband,

the stronger signal, even though you can not hear it because of your new audio filter, will take over the automatic gain control. When the weak signal volume starts to pulse, you know that a strong nearby CW signal has taken over the AGC. By disabling the AGC, the pulsing disappears. The AGC speed is regulated by a 10 uf capacitor, C19 on the audio board, which has one lead grounded. By attaching a 100 uf capacitor to the circuit in parallel to C19, the AGC is made so slow that it can be considered disabled. To do this a control wire is connected to the ungrounded end of C19, and the corresponding end is attached the 100 uf capacitor in series with a grounding toggle switch located in the control box. Now, off frequency signals will not bother you. *(The AGC characteristic which Steve mentions is by no means peculiar to the Scout. His suggested mod makes the response time long enough that individual CW elements don't noticeably affect the gain. You'll still know the AGC is on when a "tuner-upper" appears within the IF passband. - NN1G)*

Since I've made the changes I described above, I really love my Tentec Scout! Before the modifications, it was an affordable radio. Now I also consider it competitive, and a pleasure to use as well.

AUDIO FILTER FOR THE TEN-TEC SCOUT



U1: LM324
U2: LM386
R1-R4: RADIO SHACK #271-243- USE DIGITAL VOLTMETER TO CENTER EACH FILTER TO 750 HZ BY PEAKING VOLTAGE WHEN LISTENING TO SIDETONE.

Fc ≈ 750 Hz
BW≈ 250 Hz
Q ≈ 3

RESISTORS AND FILTER CAPS 5% TOLERANCE OR BETTER.

N2MNN

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1. "The TenTec Scout Model 555 MF/HF Transceiver, p. 77, December 1993, QST
" The TenTec Scout 555 HF Transceiver, p. 32, November 1993 CQ Magazine.

The WU2J Dayton '91 Loop

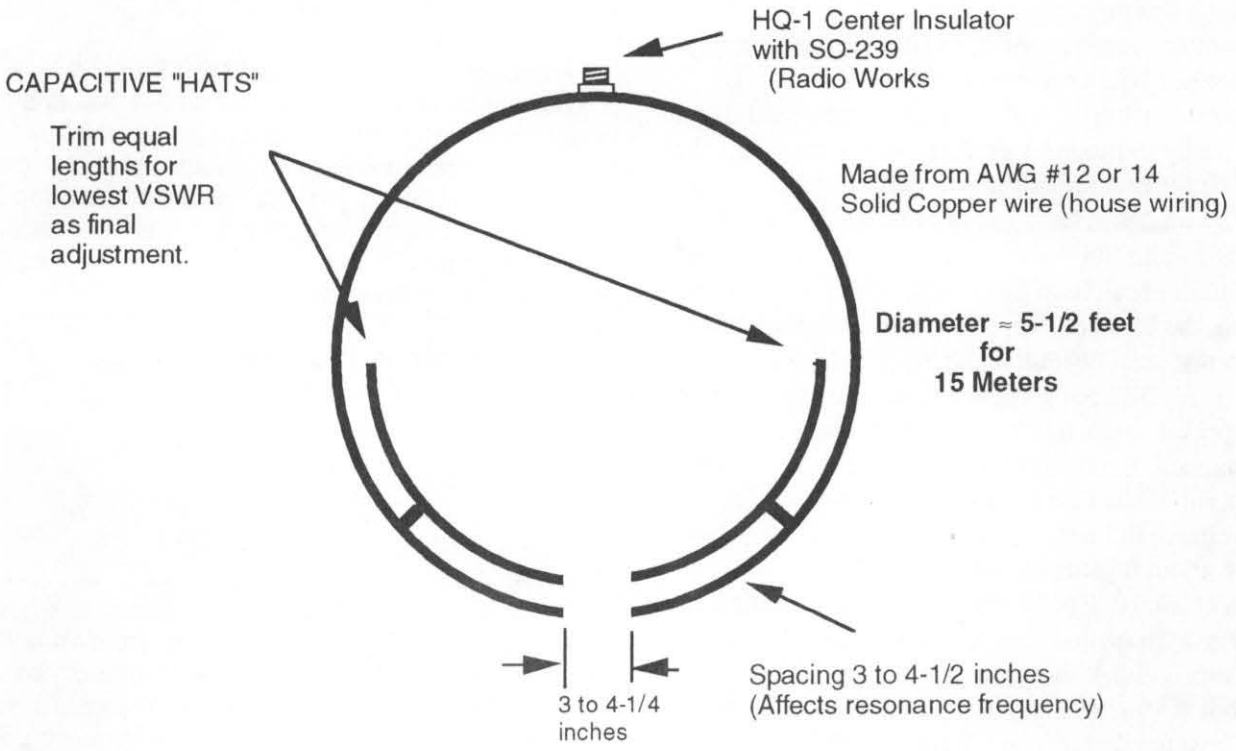
Byron C. Weaver, WU2J
P.O Box 22912
Melbourne, FL 32902

Those QRPers who attended the Dayton suite in 1991 may recall my exercise in taping a half-wavelength of wire circularly to the ceiling of the 11th floor QRP suite.

I had originally experimented with this antenna from my home QTH. It was taped to a large round wooden kitchen table at a height of 11 feet above ground. I was able to maintain daily skeds between New Jersey and Florida for a few weeks during a home remodelling project. On 15 meters, SSB signal reports were 59 to 59 using an Argonaut 509.

The Dayton version used black vinyl tape to hold the antenna to the ceiling. The diameter was reduced until resonance was obtained and the unit was matched with a homebrew 50-to-28 ohm transformer and a bead balun. Thanks to K3TKS (on the floor with a VSWR bridge) for calling out the readings while I pruned!

My impression is that this antenna is almost omnidirectional, but I haven't had a chance to measure this under repeatable conditions. Since this was an expedient antenna, no detailed evaluation was ever undertaken. Now, has anyone got a high terrace with a plastic garden table?



IDEA EXCHANGE

Technical Tidbits for the QRPer

Michael A. Czuhajewski WA8MCQ
7945 Citadel Drive
Severn, MD 21144

IN THIS EDITION OF THE IDEA EXCHANGE–

OBSERVING TANTALUM POLARITY

From me, WA8MCQ–

Several months ago I read a bulletin on packet warning against bad tantalum capacitors from Radio Shack–one exploded after about 20 minutes of use. Someone replied that it was probably good but most likely had been installed with reversed polarity, and that this is the normal failure mode of backward tantalums.

I hooked some up with the wrong polarity to find out. Do they really explode? I couldn't say–I stunk up the room so badly and so fast that I wasn't about to wait another 20 minutes to see what would happen! First, I put three caps in parallel inside a box with cover screwed down tight for protection. They were 0.47 F at 35 volts, well within the 13.8 volts I applied from a supply current-limited to one amp. Within about 5 seconds one shorted out. It looked OK, but I cut it out and tossed it. With voltage applied again, it took about 20 seconds for something to happen. Even with the cover screwed down, the stench was horrible. Cap #2 was now a smoking piece of tantalum charcoal. I didn't push my luck with #3. (These caps were about 6 years old but unused.)

Next, I took 10 F at 25 volts from a scrap computer board. This one took less than 30 seconds to start smoking and stinking. It didn't show any severe signs of overheating yet, but it was drawing maximum current from the supply. I assume that it would have exploded or at least burned up shortly. The moral–be very sure you have the correct polarity on the tantalum capacitors in your next QRP project or you may have a nice mess on your hands.

–DE WA8MCQ

EASIER CW OPTION SELECTION ON THE TS-50S

From Phil Salas, AD5X of Richardson, TX–

I read with interest the Kenwood TS-50S article by N8MUU in the July 1993 issue. I also have one of these fine radios which I use on CW more than 50% of the time. To ease the CW options selections, I programmed these into the four function buttons on the microphone. This gives me one-touch access to the several functions I use. I programmed the four buttons as follows:

Button 1: Power Output
Button 2: CW Reverse
Button 3: CW Break-in Times
Button 4: SSB/CW Filter Selection

Of course, you have to have to have the microphone connected in order to be able to do this without accessing them through the normal menus as described by N8MUU.

–DE AD5X

DIFFERENT SCALE MULTIPLIERS FOR Q METERS

From Dave Nordquest, KE9ED of Erie, PA–

Your recent articles on Q meters have whetted the appetites of many QRPers for one of those useful instruments. The Boonton models are no doubt the Cadillacs of Q meters, but Heathkit put out an inexpensive model many years ago which also provides good performance. It shows up occasionally at hamfests and has many of the same ranges as the Boonton–

Frequency	Inductance range
7.9 MHz	1-10 H
2.5	10-100 H
790 kHz	100-1000 H
250	1-10 mH

(It does not have the 25 MHz, 0.1-1.0 H range, or 79 kHz for 10-100 mH.)

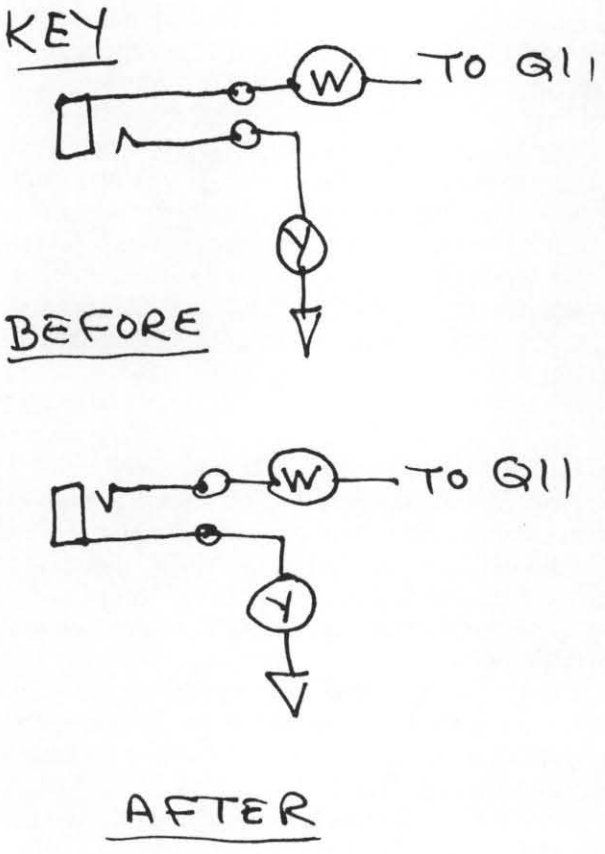
Interestingly, if you change the frequency setting by multiplying (or dividing) it by the square root of a number X, the inductance scale is divided (or multiplied) by X. Thus, if you multiply 7.9 MHz by the square root of 5, you get 17.66 MHz. With the dial reset to that frequency, the 1 to 10 H scale is then divided by 5 (NOT by the square root of 5) and becomes 0.2 to 2 H. This also works on other Q meters, and provides a way of conveniently expanding the ranges in both directions.

–DE KE9ED

REVERSING THE BACKWARD HW-8 KEY JACK

From me, WA8MCQ–

Why is the HW-8 key jack "backward"? It's insulated from the chassis with some plastic washers and the body and hardware are connected to the hot side of the keying circuit. (Look at the schematic and assembly instructions–that's the way they designed it.) Instead of connecting to the hot keying lead, as on just about every other radio known to man, the tip of a plug on an HW-8 connects to ground.



Why did they do it this way? Maybe they wanted to be able to key it in an emergency when no key is available by simply touching a grounded wire to the jack body. It does have some drawbacks, though. If your keyer output has one side grounded, you have to connect that side to the tip of the plug instead of the sleeve; otherwise, plugging it in would key up the radio continuously (assuming that the keyer shares a common ground with the radio). It's simple enough to change the plug, but then it becomes incompatible with all your other CW rigs. The best bet is to reverse the two connections to the HW-8 key jack to make it the same as everything else (hot tip, grounded sleeve), and you get a free bonus of two insulating shoulder washers to use in some future project.

–DE WA8MCQ

HOMEBREW ANTENNA CENTER INSULATORS

From Wes Spence, AC5K of Silsbee, TX–

I have a great method for making my own antenna feed point insulators for wire antennas, and have been using it for years. I use a mold and polyester resin (the kind used with fiberglass) and cast them. The resin starts out as a liquid and cures to a hard plastic.

I build the wire antenna, solder on the feedline and put the whole feed point in a small plastic bowl, such as the type soft butter comes in. It should be clean, as well as expendable. If desired, a screw eye can also be added for hanging the antenna. Be sure it does not touch any part of the antenna or feedline. If you are building a large wire antenna, you may want to add a few scrap pieces of fiberglass cloth to the mold to give it added strength.

Mix the resin and hardener in a separate container and pour it into the bowl. The resin will adhere to the wire, coax, etc., and after it cures it will provide a strong and weatherproof center insulator. This type of insulator is ideal for anyone experimenting with double bazooka antennas, because of their complex feed point wiring but it works just as well with a common dipole.

As a center insulator, the polyester resin will last for a long time in ultra-violet light and I have used up to 600 watts into them with no signs of breakdown. One additional note–be sure that the plastic in the bowl used for a mold will not react chemically with the resin and "melt" before it cures.

–DE AC5K

JOE'S QUICKIE #9: NEATEN UP THAT WIRING!

The latest in the inexhaustible series of Technical Quickies from **Joe Everhart, N2CX** of Brooklawn, NJ–

One frustration in homebrewing is keeping wiring neat. Whether it's power and signal cabling between modules in a multi-board project or just the connections to panel mounted controls and connectors, many radio projects are far from wireless. Keeping this rats nest orderly is a matter of both neatness and good practice. In industry, mass produced assemblies use pre-made wiring harnesses and lab-built units use lacing cord or "ty-raps" to organize wiring. But they're both tedious and tough to use in a small chassis like a QRP rig.

What I like to use is ribbon cable. The best kind is multi-colored to keep track of which wire is which, and has individual wires that you can just peel back. To use it, just lay the cable in your chassis, peel back the individual conductors to length, strip them and solder in place.

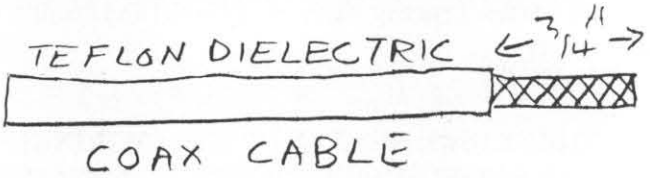
Instead of a random bunch of wires running all over the place, ribbon cable gives a tidy appearance without having to tie or wrap the individual wires. The multiple colors help you tell what goes where and look more attractive than a bunch of single color wires. By the way, have you ever tried to trace a wire though a bundle of 10 white wires?

Naturally, the ribbon cable is only good for low frequency and low impedance wiring. RF and other sensitive wiring should be done with coaxial or shielded cable. In a small chassis, coax can be used for both. My choice for coax is small diameter (1/8 inch or so) Teflon dielectric cable. It's kind of expensive per foot but you

don't need much. [It's often available in small scraps at hamfests. –WA8MCQ] The small diameter makes it easy to use in tight places and the Teflon dielectric lets you take advantage of some tricks I learned from a friend.

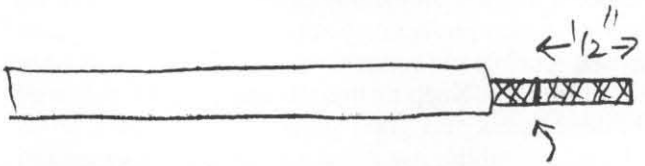
One problem in using coaxial cable in point to point wiring is handling the shield. It's bulky and awkward to fan out and then twist together to connect to a PCB or potentiometer terminal. Once you have it dressed properly it's usually too big in diameter to easily connect. You have to be very careful soldering the braid so you don't overheat it and short the cable because the dielectric softens too much with heat. Once soldered, it becomes very stiff as solder wicks up the braid. The Quickie solution takes advantage of the heat resisting properties of Teflon insulation.

As shown in Figure 2A, strip about 3/4 inch of the outer jacket, exposing the braid. Next, tin the braid thoroughly, leaving a smooth surface with no extra solder. This will not damage the Teflon dielectric as it would ordinary plastic coax. Now score the tinned braid all the way around, about 1/2 inch from the end (Fig. 2B). An excellent technique is to hold a very sharp knife (like an Xacto hobby knife) against the braid and roll it across a hard surface. The tinned braid is rather brittle, so you can grasp the far end with a pair of pliers and carefully snap it off where it was scored. Remove the end and you have about a half inch of center conductor and dielectric to work with. Carefully strip about 1/4 inch of dielectric from the center conductor (Fig 2C).



Remove outer jacket. Don't nick shield.

FIGURE 2A



Tin braid thoroughly. Score braid 1/2 inch from end. Break off tinned braid at scoring & remove.

Figure 2B

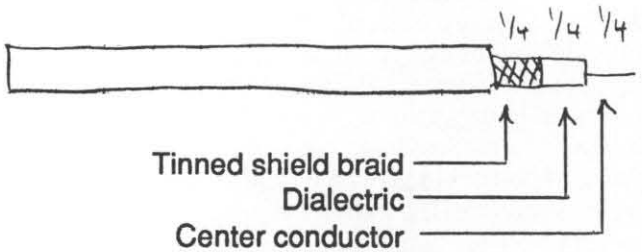
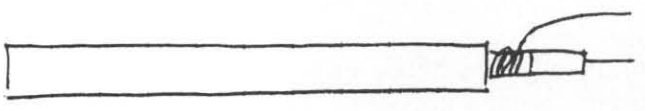


FIGURE 2C



Wrap 22 gauge bus wire on braid & solder. Cover with heat shrink tubing if desired.

Figure 2D

Now you can make a good ground connection. Take some bare, tinned 22 gauge wire and wrap it around the tinned shield starting near the outer jacket as shown in Fig. 2D. Solder the wire to the shield. (For physical protection you may want to cover the shield with heat-shrink tubing, but this is optional.) Now you have both conductors of the coax available for soldering to a PCB, terminal strip or front panel control. The resulting connections will be more rugged and easier to use than ordinary coax or shielded cable.

Both ribbon cable and Teflon coax are more expensive than common wire and coax, but by using them you can make your homebrew projects much "cleaner" and more professional. You will probably also take less time doing a good job. The cost of a few feet of either cable is very low if you're an experienced scrounger and/or hamfest buyer. From my experience, most QRPers are extremely talented at both!

–DE N2CX

VFO ASSEMBLY IN AN OLD I. F. CAN

From Jeff Glissmeyer, WK7D of South Jordan, UT–

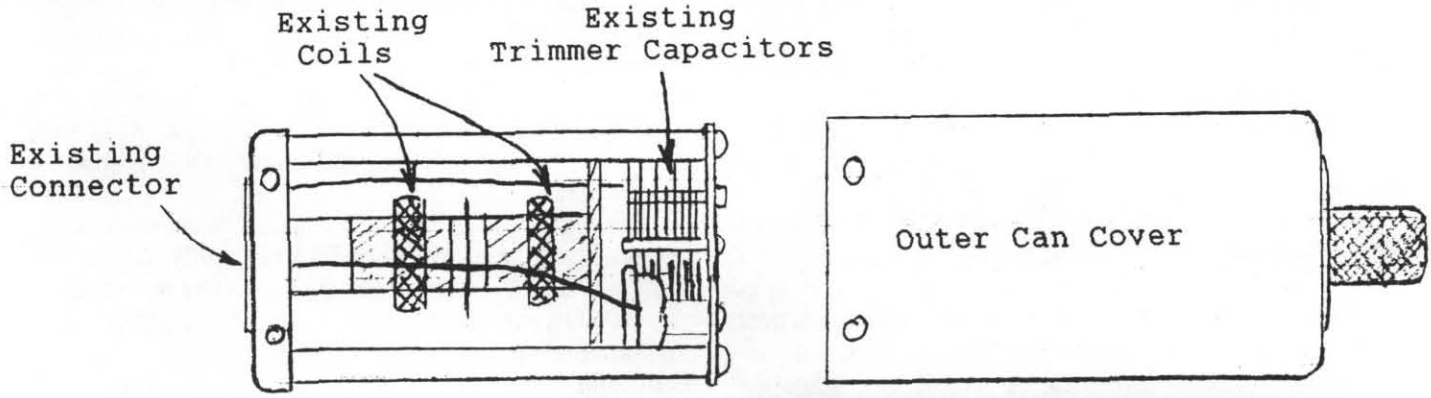
In the July 1993 issue of the QRP Quarterly I described a two band version of the W7EL transceiver. I attempted to describe how I built the VFO in an old surplus IF transformer can. Here is a more complete description of that.

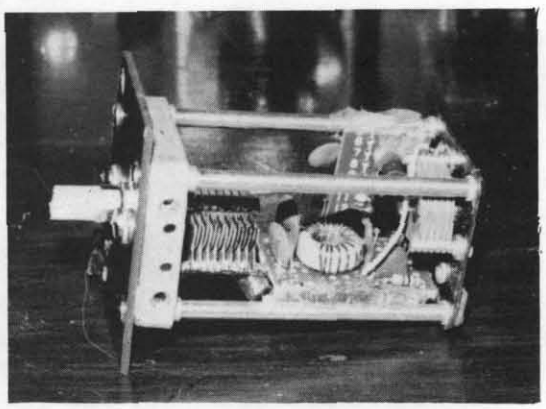
The IF can provides a compartment that is well shielded from and RF and moderates swings in the temperature of the air surrounding the VFO components. It is very compact with dimensions of about 1.25 X 1.25 X 2.5". To modify the can, I removed the existing coils, connector, one of the two trimmer capacitors, and the other 2 capacitors. I also discarded the trimmer access cover (knurled knob) from the outer can cover. I left the remaining trimmer capacitor in place to use as the VFO band set control.

The main tuning capacitor is mounted on a piece of two-sided PCB which is attached to the front of the assembly where the can chassis connector used to be. The oscillator and buffer circuitry is on two separate copper clad perf board pieces, hot-glued onto the existing IF can support posts. Parts are mounted on both top and bottom of the oscillator board.

The B+, ground, output and RIT control connections are made to a small piece of printed circuit board which I added after carefully cutting away a small piece of the rear mica wall and gluing it in place. This terminal board has four segregated pads through which I drilled small holes. I placed the internal connecting wires through these hold from the inside and soldered them to the pads on the outside. I also made a rectangular hole in the rear of the

I.F. CAN BEFORE "SURGERY"





outside can cover just big enough to allow the terminal pads to be exposed to make the external VFO connections when the cover is in place.

–DE WK7D

THE CASE FOR HIGH Z (IMPEDANCE) PHONES

From long-time QRPer ***John Collins, KN1H,*** *designer of the immortal Two-Fer and technical editor for the New England QRP Club newsletter–*

It has crossed my mind that when we design simple HF receivers that maybe we're starting at the wrong end. We pay a lot of attention to high dynamic range mixers and low loss front ends but very little is ever said about the "radio/operator interface"; that is, headphones.

Being a fan of crystal sets as well as a QRPer, I have quite a pile of headphones hanging around the shack, and one day I undertook to measure their various parameters just to see what the differences were. With an RCL meter, AF generator and an oscilloscope I was able to measure DC resistance of each set of phones, its inductance, and its minimum discernible signal (MDS). The results are shown below. Interestingly, most of the "good" headphones had about the same MDS, around 200 V, regardless of their impedance. However, as we'll see, the power required to make that 200 V is a lot less in high Z phones than in low Z.

The fourth column shows the audio power required to create the MDS shown in the third column. The last column is a little exercise with Ohms Law. It shows the voltage required in microvolts to create the power shown in the fourth column in a 50 ohm system. This is a way of creating the well-known "level playing field" for all the phones, and a way to express the numbers in radio terms. The data seems to suggest that if one could make a lossless transformation from 50 to 16477 ohms, the Alnico phones could hear a 10.9 microvolt signal. Is this true?

To find out I wired up a simple receiver consisting of

Phones	DC ohms	Z, 1 kHz	MDS	Power	V @ 50 ohms
Alnico	5000	16477	0.2 mV	2.4 pW	10.9 V
Argonne	3900	15568	0.5 mV	16 pW	28 V
Trimm	2750	15320	0.2 mV	2.6 pW	11.4 V
Murdock	2000	9323	0.2 mV	4.3 pW	14.6 V
Walkman	32	32	1.5 mV	70,000 pW	1875 V
Nova 37	31.5	31.5	0.2 mV	1269 pW	250 V
Murdock	16	16	0.2 mV	2500 pW	353 V
Kenwood HS8	14.3	14.3	0.2 mV	2797 pW	375 V

a passive double balanced mixer (an SBL-1), a signal generator at 7 MHz for the local oscillator (LO), and a 50:20K audio transformer (the closest I had on hand). With my 40 meter antenna connected to the RF port of the DBM and the Alnico phones connected to the transformer, dozens of CW and SSB signals were clearly heard. At night, even known QRPers were copied on 7040 kHz with this arrangement. During the ARRL DX contest the signals were downright loud. Amazing!

Obviously we can't make an everyday practical receiver with no AF amplification, but with good high Z phones we don't need the 100+ dB voltage gain now used in simple direct conversion receivers. Neither do we need to spend lots of battery power just to make the transformation down to low Z phones. A simple two stage AF amplifier carefully matched to both the mixer and the headphones is more than adequate, and will require a volume control of some sort for comfortable listening. One such simple receiver was built and used only 2.4 mA at 9 volts. The little rig ran for a solid week on a 9 volt battery! Careful design can all but eliminate that sinking feeling of operating portable with a dying battery!

Unfortunately, I don't know of a source for the first three phones on the list, aside from flea markets, which is where mine came from, but the Murdock 2000 ohm phones are available as HS-23 headphones from Fair Radio Sales in Lima, Ohio. They also offer a nice set of chamois cushions for the HS-23's, which I strongly recommend. (Old timers out there will remember the "burn" caused by bare Bakelite on bare ears!)

Next time you're playing around with simple receivers, give some thought to the end where the noise comes out. High Z phones may be just what you need.

–DE KN1H

WA8MCQ comments–At the QRP hospitality suite at Dayton in 1990, John let me play with a cute little NE602 receiver he made. I tuned around the band for a while and noticed that the audio seemed a little weak. I opened it up and found out that it did, indeed, contain an NE602–and nothing else! He was running the headphones directly off the '602, with no audio amplification. I later found out that he was using high Z phones with it. They may be hard to find now, and may be old and beat up, but they have a lot of advantages; give them a try if you can find some. (This item originally appeared in the April 1993 issue of "72", journal of the New England QRP Club. Some of the data in the table was changed to correct typos.)–WA8MCQ

BIODEGRADABLE TOROIDS FOR APRIL FIRST PROJECTS

From me, WA8MCQ–

Full blame for this goes to **Jim Reid, KD3S**. To get even for something I had done to him, he told me he had a toroid he wanted me to test and laid a coil on the counter, wound on a donut. Ann Arundel County still has an old law on the books against letting the air out of the tires of former Navy pilots with Electrical Engineering degrees, so there was little I could do except admire his winding technique.

After I thought about it for a while, I realized that we've been overlooking a valuable electronic component. We sometimes refer to toroids as "little iron donuts", so why not wind our cores on real donuts? They have numerous advantages, and in some ways are better than powdered iron and ferrite. In addition to being biodegradable, they are easier to get and easier to see without a microscope.

Biodegradable: We live in an environmentally conscious age, and we have to be Earth Friendly. Just as we don't want our styrofoam cups to be found by an archeologist 10,000 years from now, we should likewise design our homebrew projects with biodegradable parts. There is increasing concern about the hazardous materials found in common household items sent to landfills. Ni-cad batteries leach cadmium into the environment, while other things spew out lead, mercury and a wide variety of nasty things.

Do we want our old QRP projects contributing to excessive levels of ferrite in the environment? I think not. (While ferrite has not yet been declared a hazardous material, it's inevitable–eventually, every substance known to Civilization will have been found to be a carcinogen.)

Availability: Although you can only get powdered iron and ferrite cores from a few vendors by mail order, donut cores are locally available at thousands of locations throughout the country, often just a few minutes' drive from home. You don't have to wait a couple weeks for your order–in many locations you can get them 7 days a week and, in some cases, 24 hours a day. Sending a check off to Amidon is so cold and impersonal–you get a few cores and a box full of plastic peanuts to throw in the trash; when you buy donut cores you get a cheery smile and a cup of coffee.

Visibility: Can't find your bifocals? Is your arthritis flaring up and you have trouble winding a T25-2 core? No need to worry, as these cores can be used easily with the unaided eye. The size does have its drawbacks, though; for the most part, the stereotypical "QRP rig in a Band-Aid box" that every QRPer builds at some point is out of the question unless you can find the giant, economy size which contains 5,000 bandages. Even something as simple as a homebrew double balanced mixer, with two cores, requires at least a cigar box.

Mechanical Considerations: Unfortunately, the donut cores are not quite as sturdy as ferrites or powdered irons, especially when fresh, and much easier to break or smash. Use care when winding–don't wind too tightly or you can crush the core; use nice, loose turns or you'll end up tossing it to the dog for a snack. There can be some variation in donut size from batch to batch, which can make the actual inductance different from what you calculated. If it isn't quite what you need, add or take off a turn or two; the old trick of spreading or squeezing turns can have disastrous results, resulting in a hand full of crumbs. Long periods of dry air can strengthen them

somewhat and make them tougher and less prone to falling apart during winding; unlike ferrites, you should let donut cores sit out in the open for a few weeks to properly dry out.

They also react rather poorly to high humidity, becoming stickier and more difficult to wind as the sugary coatings absorb water. Consider dipping in latex paint and building up a few coats before winding, to protect them from the effects of humidity. If you do, make that green paint; if left unpainted, dip them in green food coloring. Why? To proudly announce to other homebrewers that you're part of the Green Revolution and using Earth Friendly Components (EFC's), which do not deplete the ozone layer or cause cancer in fuzzy little bunnies.

Oldtimers probably remember a mounting technique used sometimes in the past–bolting a toroid between two pieces of plastic or phenolic. Since the donut cores aren't as strong, you'll need an alternate method, something a bit softer; I'd suggest sandwiching them between two pieces of bread, held together with cooked spaghetti. (If the project doesn't work properly, all is not lost–you can still get a midnight snack out of it.)

Part Numbers: There is currently no standardized system of part numbers for donut cores, so I propose the following. First, we need standard donuts. There are a great many different donut shops across the country, each with their own recipes and techniques, so we should use a large, widely known chain. I am more familiar with Dunkin Donuts than Mister Donut, so I suggest we use the former. All part numbers should thus start with "DD". Traditional toroids come in many sizes but donuts are all essentially the same, so size indicators are not really necessary. Some sample cores–

DD-P, plain donut
DD-G, glazed donut
DD-CC, chocolate covered
DD-DC, double chocolate–chocolate icing over chocolate donut
DD-MI, plain donut, maple flavored icing
DD-RPI, raised donut, pink icing (indeterminate flavor)
DD-B, plain donut with blueberries

Tests on Real Donut Cores: Now for the results of some actual experiments. (As humorist Dave Barry says, "I am not making this up.") I tried winding some #16 plastic insulated, stranded wire on a DD-P but the core kept cracking–the wire was very springy and unruly due to the type of insulation. The core finally broke in half, so I gave up and ate it. Try THAT with a broken ferrite!

Next, 13 turns of #18 solid, enameled wire on a glazed, chocolate-cake core. This wire was much easier to handle and the coil tested well–it was 2.3 H (measured at 7.9 MHz on the Boonton 260A Q meter), with a Q of 130. I made up a special jig to test the donut cores on the 260A–the coil sits on a paper plate to catch the crumbs, and the wires are passed through two holes punched in the

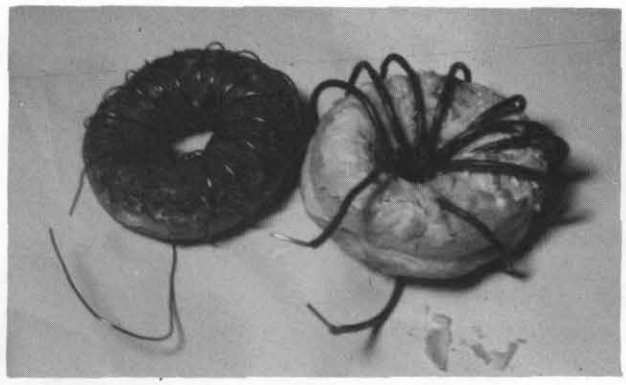


plate. This jig is not normally needed with ferrites or powdered irons.

Next I wound nine turns of plastic covered #14 solid wire stripped from some AC wiring cable. The core was a DD-RPI/S, raised donut with pink icing and multicolored sprinkles. It had an inductance of 2.0 H, with Q of 154 at 7.9 MHz. I didn't do any tests to see if the sprinkles had an effect on inductance or Q. A drawback of this core is that the icing was dried out and kept breaking off in small chunks which got ground into the carpet. (No effort was made to chart inductance vs. icing.) Had I used it a few days earlier, before it dried out, the workbench would have ended up pink and sticky.

When the weather gets warmer and the ants start coming out again, they could be a problem, especially with the iced cores. You may find it helpful to go to your local hardware store and buy some ant poison to put in your projects. While you're there, buy a window screen repair kit and cut out some small pieces to glue over the open holes on the input and output jacks.

A look at the dictionary shows that "toroid" is related to "torus", both of which are donut shapes. This may explain the unconfirmed reports of higher efficiency when wound by people born under the sign of Taurus. No formal research has been done yet, but it appears the cores may also subtly affect automobile preferences; is it mere coincidence that the most popular car among homebrewers is the Ford Taurus? "Toroid Cores and the Car Owners Who Wind Them...Next Geraldo!"

Future experiments, to be reported next April:
Chocolate vs. blueberry
Donuts vs. bagels
Use of "donut holes" in place of ferrite beads
Bundt cakes for baluns
Inner tubes for legal limit 160 meter loading coils
–DE WA8MCQ

THE FINE PRINT

A veteran QRPer once called the Idea Exchange "the heart and soul of the QRP Quarterly". Is it? I don't know, but all unsolicited comments on the column have been quite positive. Do I take any credit for it? Very little–all I do is gather (and sometimes touch up) all the technical tidbits sent in by readers and pass them on. Remember, YOU write this column and it depends on your inputs. Keep those ideas coming to Severn!

Contests

by Cam Hartford, N6GA
QRP ARCI Contest Manager
1959 Bridgeport Ave.
Claremont, CA 91711

This month we bring you three old contests and two recent ones. The 1993 Spring QSO Party results were tabulated by Dave Little, AF5U, whom I would like to thank for his help. The January 1993 Fireside SSB Sprint was not well attended, but look what a difference a year makes! Check out the results of the 1994 running of this event.

Where are the homebrewers? A comparison of the results of the Holiday Spirits Homebrew Sprint for 1992 and 1993 shows a drop in entries in the '93 running. I know there are more of you out there–I estimate that the combined total of NorCal 40's and NN1Gs alone stands at over 400. Not to mention all of the other kits and non-kit from-scratch rigs. Must be that most guys just couldn't decide which one of their many HB rigs to use!

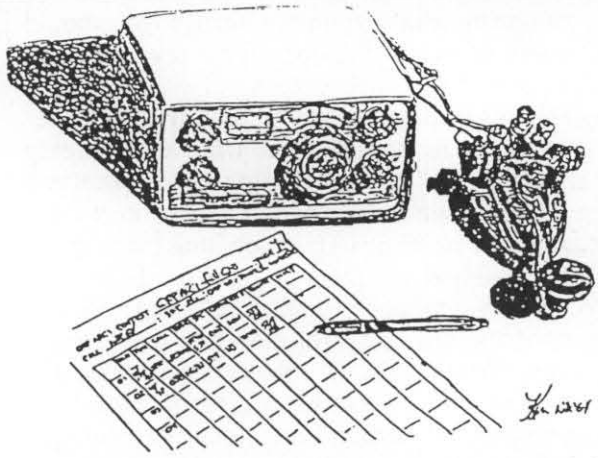
It would have been very easy for someone to pick up a certificate in some of the unrepresented classes. *One* QSO on 80 meters would have won that class, and *one* QSO on 80 and *one* QSO on 40 would have won the Lo-Band class! I'm sure there are many out there who competed but didn't submit logs. Try sending yours in–you might be surprised at the results.

One unique homebrew lashup bears mentioning. Bob Melville, K3WRV, sent along a description of his receiving set up. It consists of an Argo 509's front end, mixer and IF stage as a tunable converter ahead of a Drake 2-B, to give him quadruple conversion, bandpass tuning and 500 Hz selectivity. Isn't that what they used to call a Q-5er? Hope that idea gets written up in the Quarterly soon.

Upcoming contests include the Hootowl in May and the Summer Homebrew in July. Good chances for you *Homebrewers* to shake down all those new rigs. Please note that the Hootowl gets its name from the late hour, and the fact that it rolls across the country as the skies darken, from 8 p.m. to midnight *Local Time*. Otherwise, rules for both of these contests are the same as for the Holiday Spirits Homebrew Sprint, as published in the October 1993 Quarterly.

We have also chosen to re-resurrect the Milliwatt Field Day trophy (and plaque) dash. Too many of you labor too hard under the hot summer sun the last weekend in June just to have your names buried in the endless pages of the ARRL FD results. And Field Day is really the premier event in which to showcase the capabilities of QRP operating (just a little bit of personal bias here). If you browse the ARRL FD results you will see that the big winners in every class are the QRP stations.

It's easy to enter–just photocopy your ARRL entry and send it in, along with the other station, operator and entry class info we need per the announcement located elsewhere in this column.



Finally, a word about certificates. We end up giving out quite a few certificates for contest winners–a QSO Party usually generates about 50 winners, and some of the Sprints are almost as big. The Summer Homebrew 1991 had 28 entries, from which 25 certificates were issued! Needles to say, there is a pretty big backlog of certificates pending. As soon as I have a new supply printed up, and have all the back contests scored, I will begin issuing the certificates. So if you feel you have one or two coming, please be patient. They will come.

Meanwhile, Happy Contesting!

Milliwatt Field Day Competition Rules

Sponsored by the M-QRP Club and QRP ARCI

DATE/TIME: June 25, 1994 – 1800Z, through June 26, 1994 – 1800Z

EXCHANGE: Class/ARRL section, per ARRL Field Day rules

POINTS: One point per completed exchange

MULTIPLIER: x4 for 1-5 watts; x8 for one watt or less, out

POWER SUPPLY MULTIPLIER: x1.5 for fully battery/natural power

ENTRY CLASSES:

- •One watt, one or two operators, one transmitter
- •Five watts, one or two operators, one transmitter
- •Club, more than two operators, one or more transmitters

BONUS POINTS: 150 points for fully portable set up

SCORE=(Points * Power Multiplier * Power Supply Multiplier) + bonus

Trophies to the top score in each one- or two-operator class/ plaque to the top club score. Trophy or plaque may be won by the same winner only once in a three year period.

Entry is a duplicate of the ARRL Field Day entry, consisting of summary sheet and alpha-numeric listing of QSO's by band, or dupe sheets. Sample summary sheet and logs are available from the ARRL. All ARRL Field Day rules are to be followed.

All entries must contain complete name, call, address, and must be received within 30 days of the contest. Late entries will be counted as check logs. Include a description of equipment, power source and antennas. Also include an SASE for a copy of the contest results.

Send entries to Cam Hartford, N6GA; QRP ARCI Contest Manager; 1959 Bridgeport Ave.; Claremont, CA 91711.

1992 FALL QRP ARCI QSO PARTY

TOP TEN

1	N4BP	1,246,676
2	W3TS	1,006,740
3	WG5G	950,460
4	WB2QAP	918,160
5	K3TKS	867,840
6	W7BD	862,722
7	WA8RJF	797,940
8	WAØRPI	733,824
9	NØTHT	654,240
10	VE5VA	599,400

SINGLE BAND

40M	W8MVN	137,628
20M	N4HIM	194,180
15M	N6GA	40,320

HI / LO BAND

HI-B	N4BP	1,264,676
LO-B	KN1H	54,467

RESUSTS OF 92 FALL QRP ACRI CW QSO PARTY

SPC	CALL	SCORE	X PTS	X SPC	PWR	(0-1W= x10 or >1-5W= x7) BANDS	TIME	RIG	ANTENNA
* USA *									
AL	N4OHB	143031	417	49	5.0	40>15	6.0	HW-9	GEM QUAD/DIPO
AZ	N7HID	46172	194	34	4.0	80>15	3.5	HW-9 BAT	3 EL BEAM
AR	KI5EZ	3549	39	13	5.0	20/15	3.0	?	?
CA	N6GA	40320	168	24	1.0	15M	3.0	ARGO 515	BEAM
	KI6SN	10605	101	15	2.0	40M	2.0	HB SUPERH	40M DIPOLE
CO	NØIBT	68523	251	39	5.0	40>10	11.0	TS830S	TRAP DIPOLE
	KIØG	9555	91	15	4.0	20M	1.0	HB	YAGI
CT	KH6CP/1	8148	97	12	3.5	40M	1.0	HB SEE QST	DIPOLE @ 35'
FL	N4BP	1264676	1457	124	5.0	20>10	19.0	TS-130V	TH7-DXX
	KE8P/4	36750	140	25	3.0	20/15	14.0	ARGO 509	R5 VERT
	K4KS	36148	238	38	5.0	20>10	4.0	?	?
GA	KE2WB	376124	707	76	5.0	80>10	24.0	?	?
	KN4QV	237888	531	64	5.0	40>10	6.2	?	?
IL	NN9K	104006	437	34	4.5	40M	9.5	IC735	HORZ LOOP
	W9NJP	89257	311	41	5.0	40>10	6.0	FT890	C-F-ZEPP
	NF9X	52920	189	28	0.8	20>10	10.5	TS130V	DELTA LOOP
	W9CUN	25326	201	18	5.0	80>20	4.5	DELTA 580	DIP/LOOP/GAP
	WD9IWP	15680	112	20	5.0	40>15	2.5	IC735/MOD	INV V @ 35'
	W9PNE	13940	82	17	0.6	80/40	2.0	TX-HB RX-COM	SLOPER
IN	WD9CTB	359910	837	43	0.9	80>10	18.0	CORSAIR II	HF6V/D-ZEPP
	K9JWI	49245	201	35	5.0	80>20	6.0	?	?
KY	NY4N/4	596148	906	94	5.0	80>10	17.3	ARGO 509	175' INV VEE
LA	AB5GC	17640	120	21	5.0	20M	4.5	MFJ9020	DIPOLE @ 40'
ME	KX1E	33516	228	21	4.0	80/40	10.0	HB	DIPOLE/WINDOM
	WW1P	23660	169	20	3.0	40>10	7.0	HW-8	INV-VEE
MD	K3TKS	867840	904	96	0.9	80>10	22.0	ARGO 509	LOOP HOR & VER
	WA8MCQ	55769	257	31	4.0	40>10	6.0	HB/TX-RX	?
	WA3GYW	2632	47	8	2.0	40>20	4.0	HW8	DIPOLE
MA	N1JAC	174405	453	55	5.0	40>10	14.0	?	?
	NO1R	122850	325	54	4.0	80>10	5.0	HW9/HTX100	ZEPP/INV VEE
	W1XH	58786	247	34	3-5	80>10	6.0	TS140	40M DIPOLE
	WF1V	46410	221	30	3.0	40>15	3.3	HW9	DIPOLE
MI	N8CQA	326508	598	78	4.0	80>10	8.0	TS830S	A-4/INV L
	KM8X	312256	656	68	5.0	40>10	14.0	HB 1-BANDERS	40M LOOP
	K8DD	99330	473	30	4.0	40M	8.5	ICOM	YAGI & DIPOLE
	W8NDG	28490	77	37	0.5	80>10	6.3	?	?
	K8CVV	12320	110	16	5.0	40>28	2.2	?	?
MN	WAØRPI	733824	1008	104	3.0	80>10	18.0	IC735	DELTA LOOP
	NØTHT	654240	752	87	1.0	80>10	19.5	CENTURY 22	DIPOLE
MO	WØGWT	157934	389	58	5.0	80>10	10.0	IC735	WIRE/R-5/TA33
	AAØEN	85420	184	22	5.0	40M	5.0	HB QSK/SH RX	PHASED DIPOLES
	WØAV	41762	82	33	1.7	80>15	5.0	TS940	R7/SLOPER
	NØIZZ	25564	166	22	3.0	80/40	5.0	?	?
NE	WAØVBW	25921	161	23	2.5	20>10	5.0	ARGO 509	DIPOLE
NV	W6JHQ/7	4158	54	11	4.0	40>15	4.0	ARGOSY 2	?
NH	N1CUU	331968	456	52	5.0	80>15	20.0	HW9	WINDOM
	KN1H	54467	251	31	5.0	80/40	4.0	OMNI	DIPOLE 140 FT
NJ	N1HFE	462266	742	89	5.0	80>10	18.0	TS440	DIPOLE/LOOP
	N2CQ	196168	452	62	4.0	80>15	8.0	FT101ZD/MFJ	ZEPP/3BANDER
	W2JEK	55454	233	34	4.0	80>10	6.3	2-FER	DIPOLE/GP/LW
	WA1YCP	9898	101	14	5.0	40/20	2.2	?	?
NY	WB2QAP	918160	998	92	0.9	80>10	20.0	ARGO II	INV VEE/YAGI
	WA2VEZ	471200	620	76	0.8	80>10	23.0	ARGO 509	ZEPP/BUTTERFLY
	W2QYA	254650	463	55	0.9	80>15	17.0	HW-8	100M MARCONI
	K2LGJ	117670	287	41	0.9	80>10	7.0	ARGO II	TH3JR/LONG WI
	WA2IPZ	100800	252	40	0.9	40>10	7.0	ARGO 515	40M DIP/3BANDE
	N2KPY	56980	259	22	2.5	40M	4.0	HW8	G5RV
	W2FB	8750	250	35	3.5	40>10	4.0	HW9	TH7DX/1/4 VERT
	N3CZB	2576	46	8	5.0	14>28	0.2	MFJ/CEN21/RS	INDOOR MOBILE
	KD2IX	980	28	5	5.0	15M	3.4	IC725	DIPOLE
NC	AC4QX	5600	80	10	3.0	40M	2.0	OHR	DIPOLE
OH	WA8RJF	797940	858	93	0.9	80>10	22.0	ARGO 515	LONG WIRE @18"
	N8PCX	213440	464	46	0.9	40/20	24.0	RAMSEY 40/20	DIPOLE
	W8MVN	173628	636	39	2.0	40M	23.0	HB XCVR	DELTA LOOP @60
	NZ8J	67116	282	34	4.0	40>15	10.3	TS450S/AT	135'ZEPP/3BAND
	W8DYF	3430	49	10	2.0	40/20	1.5	ARGOSY 2	EXT DOUBLE ZEPP
OK	W7BD	862722	1002	123	4.0	80>10	21.0	DELTA 580	INV VEE
	K5DP	38740	149	26	0.9	20/15	3.0	HW9	40M LOOP
OR	WX7R	86460	262	33	0.9	15>10	15.0	IC735/BATT	YAGI/LW/V-BEA
PA	W3TS	1006740	987	102	0.9	160/6	9.5	HB XCVR + 6	INV VEES/A3
	K7YHA	205500	411	50	1.0	40>10	8.0	ARGO 509	CAROLINA WIND
	W3DP	15540	148	15	5.0	40M	2.3	?	?
RI	WA1OFT	4900	70	10	4.0	40M	3.0	HW9	DIPOLE
SC	N4HIM	194180	730	38	5.0	20M	15.0	ARGO II	TH6 50 FT
TN	AC4HF	11900	100	17	5.0	20M	4.0	?	?
TX	WG5G	950460	1022	93	0.9	20>10	21.5	HW-9/BAT	QUAD
	WB5FKC	210100	382	55	0.9	40>10	3.0	DELTA/ATTENU	INV VEE
	WA6EEM	22400	112	20	1.0	20M	5.0	BACKPACK 1	DIPOLE
	K5JHP	18375	125	21	3.0	20/15	9.0	HW9	TA33JR @ 40'
VA	K4JM	535717	841	91	5.0	80>15	13.0	CORSAIR II	135'LW/20M DIP
	N4ROA	516243	793	93	4.0	80>15	17.0	HW8/OH 40MTR	2 EL QUAD/DIPO
	W4XD	506856	862	84	5.0	80>15	10.5	HW9	G5RV @ 40"
	WR4I	230020	530	62	0.9	80>10	10.9	ARGO II	DIP/G5RV/3BAND
	KB8IDW	39480	94	60	5.0	80>10	8.0	TS140S	G5RV @ 35'/DIP
WA	KF7MD	328860	522	63	0.9	20/10	14.0	HB XCVR	8 EL LOG/LOOP
	KG7ME	203889	511	57	5.0	20>10	17.0	OMNI-D	40M LOOP
WV	WF8X	157465	409	55	5.0	40>10	9.0	TS430S	G5RV
	N8MUU	94752	282	48	5.0	80>10	7.5	ARGO II	R5/INV VEE
	KB8AOB	532	19	4	2.0	40>20	14.0	HW8	ISO-LOOP/WIRE
WI	WN9U	72090	267	27	0.8	20M	3.2	HW8/ARGO 515	80M INV VEE
** PUERTO RICO **									
PR	KP4DDB	206052	446	66	5.0	20>10	9.3	ARGO II	TA53-M
** CANADA **									
ON	VE3KQN	339600	566	60	1.0	40>10	20.0	ARGO II	DR QRP CLUB
	VE3FAO	54466	58	11	4.7	20M	5.0	HB K1BQT/MOD	20M DIPOLE 30'
QU	VE2DRB	442400	800	79	5.0	40>10	20.0	ARGOSY 2	YAGI/DIPOLE
	VE2ABO	64701	237	39	5.0	80>10	11.0	HW9	BEAM/LOOP/VEE
	VE2BLX	79499	277	41	2.0	20>10	15.0	HW7/MOD	LONG WIRE
SK	VE5VA	599400	740	81	0.9	20>10	17.0	IC735	2 EL QUAD
** UNITED KINGDOM **									
UK	GØNMD	1960	40	7	5.0	20/15	9.0	ARGO 515	DOUBLET

WINTER FIRESIDE SSB SPRINT 1994

SSB IS ALIVE AND WELL IN CANADA!

The ranks of the Sidebanders were greatly augmented in this year's Fireside SSB Sprint by a group of QRPers from VE7 land. Since most QRP activity is on CW (we assumed!) the pace during this contest is usually on the slow side. But the usual dozen-or-so logs submitted for this contest was doubled by a large group of submissions by members of the QRP Club of British Columbia. Derry Spittle, VE7QK, said in his cover letter "...the SSB Sprint has given us an opportunity to both demonstrate the effectiveness of QRP SSB communication and let others know of our existence."

Consider both objectives accomplished! All of the club members were operating 80 Meter homebrew SSB tranceivers. Their submissions included block diagrams of their rigs, and it appears they are all variations of two simple, yet effective, designs based on the NE602. Looks like a very successful club project. Our congratulations to the members of the QRP Club of British Columbia, and out thanks for their SSB QRP shot in the arm.

WINTER FIRESIDE SSB SPRINT 1994									
STATE				SPC		BANDS			
	CALL	SCORE	POINTS		POWER		TIME	RIG	ANTENNA
******	**********								
15 METER ENTRIES									
CO	KAØJJK	6,643	73	13	2 PEP	15M	1	ARGO 509	YAGI
TX	N5JWL	4,025	46	10	5 PEP	15M	1	TS 660	DIPOLE
80 METER ENTRIES									
BC	VE7TX	9,313	115	3	1PEP	80M	4	HB 80M SSB TCVR	DELTA LOOP, INV VEE
BC	VE7QK	7,075	83	2	1PEP	80M	3.5	HB 80M SSB TCVR	INV VEE
BC	VE7AKA	6,420	71	2	2PEP	80M	4	HB 80M SSB TCVR	?
BC	VE7GO	6,190	68	2	4 PEP	80M	1	HB 80M SSB TCVR	INV VEE
BC	VE7GE	5,980	49	2	2PEP	80M	3	HB 80M SSB TCVR	?
BC	VE7PCC	5,786	63	1	.85PEP	80M	3	HB 80M SSB TCVR	DIPOLE
BC	VE7JO	5,530	53	1	2PEP	80M	3	HB 80M SSB TCVR	HORIZ. GERMAN QUAD
BC	VE7FSX	5,385	55	1	5PEP	80M	3	HB 80M SSB TCVR	?
BC	VE7GC	5,329	47	1	>2PEP	80M	4	HB 80M SSB TCVR	G5RV
BC	VE7DT	5,313	25	1	2PEP	80M	3	HB 80M SSB TCVR	INDOOR RANDOM WIRE
BC	VE7DZO	5,290	29	1	2PEP	80M	2	HB 80M SSB TCVR	252' WINDOM
QUE	VE2XLT	315	15	3	10PEP	80M	0.25	IC 728	DELTA LOOP
ALL-BAND ENTRIES									
PA	W3TS	36,300	42	12	2 PEP	A-6	1	HB TCVR	YAGI / INV VEE
AR	N5SAN	13,846	86	23	8PEP	A-3	3.5	FT 747GX	650 FT ZEPP
HI-BAND ENTRIES									
OK	W7BD	10,773	81	19	10 PEP	H-2	2.5	TEN-TEC DELTA	TRAPPED DIPOLE
PR	KP4DDB	5,390	55	14	5 PEP	H-2	1.5	ARGO II	YAGI
MD	K3WRV	3,311	43	11	2 PEP	H-3	2	ARGO 509	YAGI
OH	WD8OJC	2,009	41	7	5 PEP	H-2	1.5	ARGO II	MINI-QUAD
ID	KF7ET	1,092	26	6	8PEP	H-2	1.5	IC 751	YAGI
CA	W6SIY	560	20	4	4 PEP	H-2	2.5	ARGO 515	MINI-QUAD

1992 QRP ARCI HOLIDAY SPIRITS HOMEBREW SPRINT									
STATE		SCORE		SPC		BANDS			
	CALL	POINTS			POWER		TIME	RIG	ANTENNA
******	**********								
SINGLE BAND ENTRIES -- 15 METERS									
NY	KD2IX	336	16	3	5.0	15M	1	IC 725	DIPOLE
20 METERS									
CO	K9AY	66,408	242	29	5.0 B	20M	4	HB K9AY TCVR	YAGI
PR	KP4DDB	12,513	77	13	.95 B	20M	1	ARGO 2	YAGI
FL	KE8P/4	10,250	60	10	3.0 B	20M	2.5	OHR - 20	R5 VERT
ONT	VE3FAO	9,004	52	11	5.0	20M	3	HB TCVR	DIPOLE
NJ	N2CQ	8,722	89	14	4.0	20M	2.5	MFJ 9020	YAGI
NY	WN2Q	2,835	45	9	4.0	20M	1	HW-9	ATTIC 20M LOOP
40 METERS									
QUE	VE2DRB	18,200	88	12	0.9 B	40M	3	SIMPLE TX / RX	DIPOLE
CT	KH6CP / 1	17,985	106	14	4.0 B	40M	3.5	HB TCVR	DIPOLE
NC	AC4QX	10,005	65	11	4.0	40M	2	OHR TCVR	DIPOLE
NJ	W2JEK	7,100	40	6	2.0 B	40M	1	OHR TCVR	DIPOLE
ALL BAND ENTRIES									
PA	W3TS	124,300	184	41	.90 S	A-6	4	HB XCVR	160M TEE/INV VEE/YAGI
GA	KE2WB	63,252	251	36	5.0	A-4	4	HW-9	G5RV
VA	N4ROA	60,877	206	31	4.0 B	A-3	3	HW-8 / OHR 40	DIPOLES
WV	WF8X	45,276	196	33	5.0	A-3	4	TS 430S	G5RV
CT	KV1M	44,800	200	32	4.0	A-5	4	IC-761	G5RV / YAGI / VERT
RI	WA1OFT	43,456	194	32	4.0	A-4	4	HW-9	R5; DIPOLES
IL	N9ND	39,270	187	30	5.0	A-4	3	ARGO 515	2L QUAD, INV VEES
QUE	VE2BLX	36,666	194	27	4.0	A-3	3.5	IC-735	100' WIRE
OK	WD5GLO	25,496	122	24	3.0	A-3	3	ROCK BNDR, HW-9	YAGI / LOOP
NY	W2FB	10,115	85	17	4.0	A-3	3		
NB	VE1BUG	3,780	60	9	5.0	A-3	2	ARGOSY 2	YAGI / GAP / WINDOM
IL	W9CUN	1,960	40	7	5.0	A-2	2	DELTA	GAP
LOW-BAND ENTRIES									
MO	AAØEN	22,792	86	17	2.0 B	L-2	2.5	HB TX / RX (2)	DIPOLE / SLOPERS
PA	WA3SRE	12,750	85	15	0.9	L-2	3	ARGO 515	40M LOOP / 80M VERT

UPCOMING EVENTS

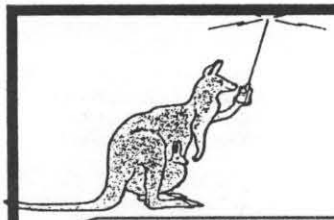
HOOT OWL SPRINT MAY 29, 1994 2000 - 2400 **LOCAL TIME**

SUMMER HOMEBREW SPRINT JULY 10, 1994 2000 - 2400 UTC

MILLIWATT FIELD DAY JUNE 25 - 26

HOLIDAY SPIRITS HOMEBREW SPRINT DECEMBER 1993									
STATE				SPC		BANDS			
	CALL	SCORE	POINTS		POWER		TIME	RIG	ANTENNA
******	**********	**********	**********	**********	**********	**********	**********	**********	**********
20 METER ENTRIES									
AZ	WO7T	22,225	127	20	4.0 S	20M	2	ARGO 509	5 EL LOG PERIODIC
WI	WA9PWP	20,624	124	18	4.0	20M	4	RADIOKIT QRP-20	YAGI
TN	N4QZU	10,642	62	13	5.0	20M	2	A & A 20M K9AY	40M LOOP
40 METER ENTRIES									
TN	WS4S	18,440	120	16	3.0	40M	4	NORCAL 40	DIPOLE
NY	K2LGJ	17,120	101	12	0.9	40M	3	NN1G 40M	LONG WIRE
NC	AC4QX	10,390	77	10	4.0	40M	3	OHR 40	SHORT ATTIC DIPOLE
NJ	KE2KW	9,200	60	10	5.0	40M	4	OHR SPIRIT	INVERTED VEE
QUE	VE2BLX	8,752	67	8	2.0	40M	3	MAVTI-40	LONG WIRE
PA	KM3D	4,640	58	8	1.0	40M	1.5	FT 101ZD	?
ALL-BAND ENTRIES									
PA	W3TS	104,400	186	32	0.1 S	A-6	3	HB TCVR	160M TEE / INV VEE / YAGI
WV	WF8X	48,832	218	32	5.0	A-4	4	TS 120V	G5RV
NM	KN5S	44,250	125	22	5.0	A-5	4	HB TCVR	VERTICAL / DIPOLE
CT	NN1G	33,360	102	18	0.9	A-3	2	HB TCVRS (3)	WINDOM
CA	N6GA	25,750	120	15	2.0 S	A-4	3	HB TCVR(S) / HW-9	YAGI / LOOP
MD	K3WRV	24,024	132	26	2.5	A-5	4	509 / DRAKE 2B	YAGI / DIPOLE / LW
NJ	W2JEK	17,940	42	8	2.0 S	A-3	1.5	2FER / OHR 40 / NN1G	GP / DIPOLE / HERTZ
RI	WA1OFT	1,470	35	6	4.0	A-2	0.75	HW-9	DIPOLE / VERTICAL
HI-BAND ENTRIES									
CO	NØIBT	28,700	164	25	5.0	H-2	4	TS 830S	DIPOLE
PAN	HP1AC	27,225	127	25	4.0	H-2	3	K9AY / K1BQT 15M	YAGI

Winter Fireside SSB Sprint					January	1993			
STATE				SPC		BANDS			
	CALL	SCORE	POINTS		POWER		TIME	RIG	ANTENNA
*******	**********	**********	**********	**********	**********	**********	**********	**********	**********
NH	NO1E	35	5	1	5 PEP	10M	5M	FT 707	G5RV
UT	KF7CD	1008	24	6	5 PEP	H 2	1.5	?	?
WV	WF8X	3080	44	10	5 PEP	A 3	3	TS 120V	G5RV
OH	WA8RJF	3430	49	10	5 PEP	A 5	2	IC 735	LONG WIRE / YAGI
HOL	PE1MHO	5220	22	1	2 PEP	6M	0.75	IC 730 / HB TVRTR	4 EL YAGI
TX	N5JWL	23175	103	18	2 PEP	H 2	2.5	NCG 15 / CORSAIR	YAGI



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Dave Ingram, in his new book "How to get started in QRP" states: "One of the most impressive producers of QRP kits I have found is Kanga"

A selection of kits from the UK, many from the pages of SPRAT the journal of the G-QRP CLUB of England and from Dick G0BPS of Kanga UK

$2 gets you our free catalog

Many of the kits from KANGA have become WORLD STANDARDS. The *ONER* is spoken of throughout the known world.This little Transceiver is based on just one square inch PCBs.

Our receivers are also well known. The *SUDDEN* receiver is a simple DC receiver that anyone can build. It WORKS! and very well too.

Our *DIRECTIONAL WATTMETER* is used by the British BBC for their local broadcast stations, what more can we say! It works!

The *DUMMY LOAD* will take 100 watts for over 1 minute, we are so sure that we GUARANTEE it for a full 60 seconds at 100 watts of RF.

Our full range covers almost 50 various kits for you to build. Some have appeared in the US press but most are classified! British eyes only, Well I have a lot of friends over here so... what the hell.

Other kits supplied by KANGA include.. *Simple CW Audio Filter, The OXO crystal Transmitter, A Two Tone Oscillator, Power Supply Safety Unit, Iambic Keyers, Transistor & Diode Tester, Code Trainer, TRF Receiver, DSB Generator, Crystal Marker, Medium Wave Radio, Audio Amplifier, LCK Superhet transceiver, Dual Band Crystal Mixer, Frequency Counter, Transmit / Receive Control, DC to DC converter, 5 volt PSU, Light Operated Relay, Top Band for the FT707 & FT77, Audio Mixer Unit, A V.F.O. The Crystal set and finaly the Inductance Meter.* Many more are on the stocks.

Our US Rep, Bill N8ET is also available at 3521 Spring Lake Drive, Findlay OH 45840

Problems, Questions, Comments?

Who To Contact—***PLEASE include an SASE of an appropriate size if you expect a response.***

- **Subscriptions, dues, membership problems:** Mike Kilgore, KG5F; 2046 Ash Hill Road; Carrollton, Texas 75007
- **Technical articles:** Dave Benson, NN1G, 80 East Robbins Ave., Newington, Conn. 06111
- **Idea Exchange:** Mike Czuhajewski, WA8MCQ, 7945 Citadel Drive, Severn, Maryland 21144
- **QRP Contests:** Cam Hartford, N6GA; 1959 Bridgeport Ave.; Claremont, California 91711
- **Member News:** Richard Fisher, KI6SN, 1940 Wetherly St. Riverside, CA 92506
- **Nets:** Danny Gingell, K3TKS; 3052 Fairland Road; Silver Spring, Maryland 20904
- **Awards:** Chuck Adams, K5FO; 830 Waite Drive; Copper Canyon, Texas 75067
- **Club Operations:** Les Shattuck, WN2V, 7878 Mill Creek Road, Surfside Beach, SC 29575
- **Club Information packets** (include $2): Mike Bryce, WB8VGE; 2225 Mayflower, N.W.; Massilon, Ohio 44647

New Member/Renewal Data Sheet

Full Name_____ Call_____ QRP #_____

Mailing Address_____

City_____ State/Country_____ Post Code_____

❑ New Address? ❑ New Call?

USA

❑ New Member, $12 (DX: $14)
❑ Renewal, $10 (DX: $12)
Amount enclosed in U.S. funds____
Check or MO in U.S. funds
payable to "QRP-ARCI".
Do not send cash.
Mail to: Mike Kilgore, KG5F
2046 Ash Hill Road
Carrollton, Texas 75007

DX

❑ New Member, £7
❑ Renewal, £6
Check or MO in British pounds
payable to "G-QRP" or "R. Pascoe GØBPS"
Mail to: Dick Pascoe, GØBPS
Seaview House
Crete Road East
Folkestone, Kent CT18 7EG
England

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QRP Quarterly
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P.O. Box 776
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