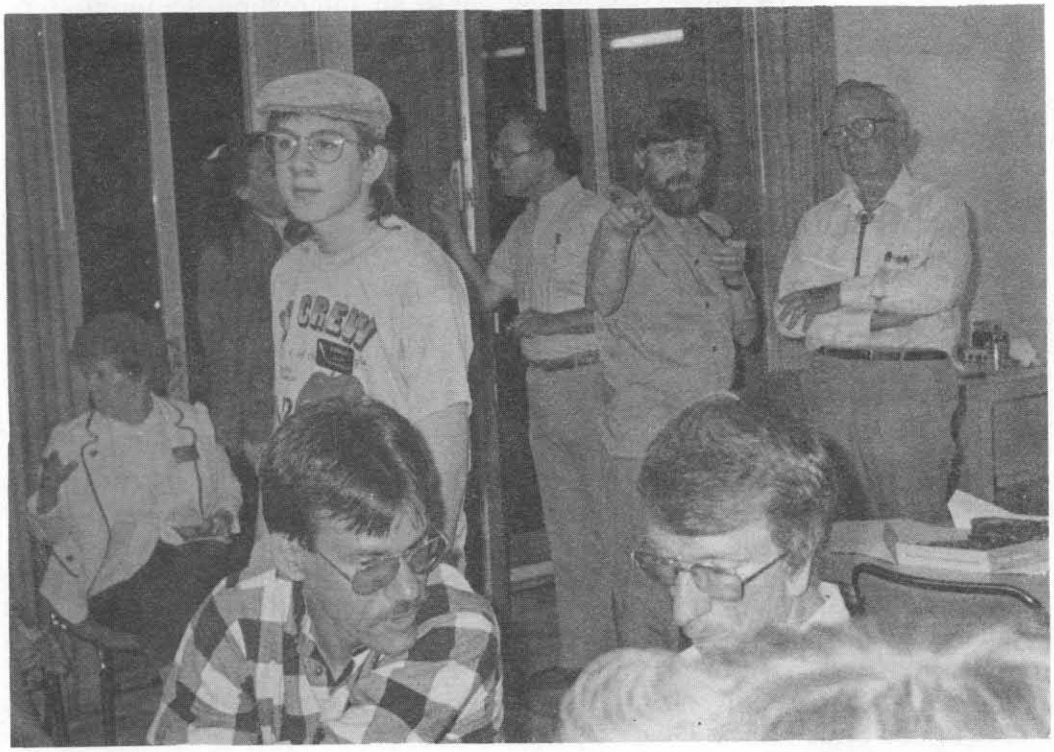
QRP Quarterly

Journal of the QRP Amateur Radio Club, International

July 1990 Volume XXVIII Number 3



The QRP hospitality suite is open for business at the 1990 Dayton Hamvention. Turn to pages 12 and 13 to get in on the action!

News Flash:
ARRL Drops Proposed Band Allocation Plan (see page 2) but strikes again with something else (see President's Message on page 24.)

Nominations are open for the board of directors. See announcement on page 2.

Spring 1990 QSO Party Results begin on page 14.

Nominations Now Open For Board Of Directors

The terms of office of three members of the Board of Directors expire on December 31, 1990.

Any member of QRP ARCI may place his/her name in nomination for one of these positions on the Board by sending a brief biographical sketch to the Secretary/Treasurer of QRP ARCI. The sketch should include a definitive statement of the candidate's goals and interests in QRP. A ballot for these positions will be published in the October QRP Quarterly and the election completed by December 1, 1990.

The Directors whose terms will expire are Red Reynolds, K5VOL; John Collins, KN1H; and Jim Fitton, W1FMR.

Those wishing to have their names placed on the ballot should send their resume to Luke Dodds, W5HKA, 2852 Oak Forest, Grapevine, Texas 76051, U.S.A. All biographical sketches must be received no later than August 20, 1990 to be included on the ballot.

Editor's Word

by Chaz Wooten, KD4XX

Hi gang,

Plans change fast. After saying I was not going, two weeks before Dayton a friend says "I've got room for you" (in other words a bed). So off we go. It was good to meet the voices behind the calls I've been reading about and talking to. I kind of kept a low profile this time. I will be more official next year (got a room already waiting for me). But I had a great time, spent lots of cash! Hope to see everyone next year...

As you read this issue of The Quarterly you will see an article about the St. Louis QRP Society, very active group. We would like to hear from other local QRP groups. Tell us little bit about what going on in your area, QRP-wise that is. And drop a note, or a story abut it to us.

For those who have written about a Writer's Guide, I've finally got it ready for the most part. It's not quite in the form that I want it to be, but it will do for now. The only thing that I am going to change about it is the layout. So if you have be thinking about writing something for The Quarterly, but didn't know the fine points of doing it, drop me a S.A.S.E. and I'll send you one right back.

Since I started this job, we have spread things out so everyone is not trying to do everything by themselves. And for the most part it has worked well. But the way you can help us keep it running smoothly is to contact the right person with the right expertise to handle whatever might come up.

Continued on page 23

ARRL Drops Proposed Band Allocation Plan

by Paula Franke, WB9TBU

The best news from the Dayton Hamvention is that the ARRL has withdrawn its band allocation plan proposed to the FCC. Buck Switzer, N8CQA and I, along with MQRP president Lowell Corbin KD8FR, attended the ARRL session at Dayton. The original intent of the session was to explain the details of the plan; it turned into an interesting 45 minutes of listening to League officials trying to salvage a disastrous move on their part. Apparently there was widespread negative reaction to the plan, not only from the QRP community but also from packet and other digital mode enthusiasts, VHF'ers, RTTY, SSB and other special interest groups.

League Membership Communications Services Manager John Lindholm W1XX conducted the session. He said there was a perception among the League membership that the plan was formulated in secret and much of the negative reaction concerned the League's failure to get input from the ARRL membership. During the session Lindholm focused on a method of reviewing and recommending future band allocation plans. He said one of the specific complaints was the general membership's "perception" that the plan was formulated by a secret group behind closed doors with no input from the general membership. He thinks the committee outlined in this newest proposal would satisfy everyone.

This latest proposal will be on the ARRL Board of Directors' July agenda. Should the committee structure be approved, applications for committee members would be solicited and, at some unspecified point in time, the ARRL president would appoint the members. Lindholm said anything regarding the committee and its progress would be published in QST.

I believe it is imperative that an active QRPer be named a member of this committee should it come to pass. I don't say this just because we as a group have a vested interest in protecting the gentleman's agreement for our QRP frequencies. I believe QRPers are generally representative of the entire amateur community. Our group includes enthusiasts of packet, RTTY, ATV, satellite, high band, low band, CW, SSB, etc. The only difference is we do it with less power. Given this, it makes sense QRPers are more than nominally familiar with band allocations and therefore highly qualified to be a member of the League's proposed committee. Food for thought, folks.

QRP ARCI OFFICERS

Managing Editor
Charles Wooten Jr., KD4XX
103 W. 7th St.
Jasper, Tennessee 37347
615-942-5116

Technical Editor
John Devon, KI6DQ
P.O. Box 3236
South Pasadena, Calif. 91031
818-441-5523

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

Table of Contents

Technical

Antennas

Reviews

Miscellaneous

Columns

Product Review

W7EL QRP Transceiver

The Small Parts Center Version Kit

(First of two parts)

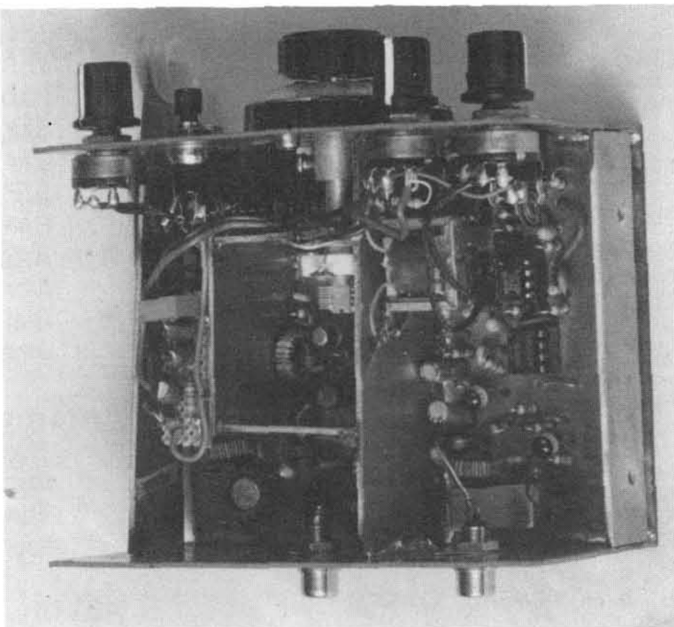
By Bill Hickox, K5BDZ
9215 Rowan Lane
Houston, Texas 77036

Roy W. Lewallen, W7EL, designed a fantastic little QRP transceiver that appeared in QST for August, 1980, in an article entitled, "An Optimized QRP Transceiver". Now almost ten years later, Roy's design is more popular than ever. Although the original article featured point-to-point wiring, two companies now offer their versions of the famous W7EL transceiver in kit form, including circuit boards for easier construction. These companies are Circuit Board Specialists and the Small Parts Center, whose kit is reviewed here.

Having been a satisfied customer of Chris Hethorn, KM8X, and his Small Parts Center, I was happy to meet him in the QRP hospitality suite at Dayton in 1989. His caring attitude and thorough manner are evident on both personal and business levels. When Chris pulled a little box out of his briefcase, the entire group in the hospitality suite became silent.

His version of the W7EL transceiver looked great just sitting on the table. Only 4-1/2" W x 4-1/4" D x 2-1/2 H, the rig's front panel included a main tuning vernier surrounded by controls for AF gain, RIT, spot, keyer, speed, and a single keyer paddle. It was a real show stopper. The antenna in the hospitality suite was a long wire that dropped from our 11th floor location to the ground below. When it was connected to the transceiver, the little rig came alive. Watching others operate the rig, I could easily see the two watts were getting out. When my turn came, I spent my time playing with the receiver and the keyer. Both worked extremely well. The small single-lever paddle was quite different from my Bencher and Kent iambic paddles, and the only problem was operator error. QLF.

I decided to buy a complete 30 meter kit from Chris and build my own. When I returned to Houston, I opened the kit and began to read the instructions. Once again I was very impressed. It was obvious Chris and his wife had put in many hours of homework to produce a good kit with quality components and excellent instructions that almost anyone with some building experience could follow.



THE KIT

The instructions include a nice pre-construction section, followed by separate sections for building the VFO, keyer, sidetone, transmitter, receiver, and cabinet. The instructions even include pictorials for easily winding toroid coils and exact measurements for installing shields and building the cabinet of pre-cut, double-sided PC board furnished with the kit. As each section is built, it is tested before the builder goes on to the next section (excellent for learning or teaching). The layout of components is very neat and compact. All components are mounted on one board, with shielding separating the VFO, transmitter, and receiver sections. The top and sides are made from a single piece of aluminum supplied with the kit, but it must be bent to proper dimensions by the builder. All panel holes must be drilled by the builder (just follow the easy instructions). Panel lettering is optional, so I used rub-on lettering. It's much easier than it sounds. As you can see in the photographs, it looks good, too.

The SPC kit is unique in that it uses the well known SBL-1 mixer. This time saving "drop in and solder" unit saves the builder from having to wind and mess with two tri-filar coils, thus lessening the chance for error by builders with little experience.

Having built more than 50 QRP receivers, transmitters, and transceivers over the last four years, I was tempted to "do it my way". However, common sense prevailed, and I followed the instructions instead. Each section worked perfectly the first time tested. Total construction time; three to five evenings, depending on your experience. Hint: DO NOT RUSH!!!

COMMENTS

I did note a few changes in construction that I suggested to Chris. The most important deals with the VFO capacitor shaft not fitting into the vernier dial. My shaft diameter was an extremely tight fit, and it needed to be filed down before being installed on the board (not only is it easier to do before mounting on the board, it also keeps metal filings from getting into the electronic). Also when installing the VFO capacitor and its mounting board, be sure the shaft does not extend too far forward preventing the vernier drive from mounting flush against the front panel.

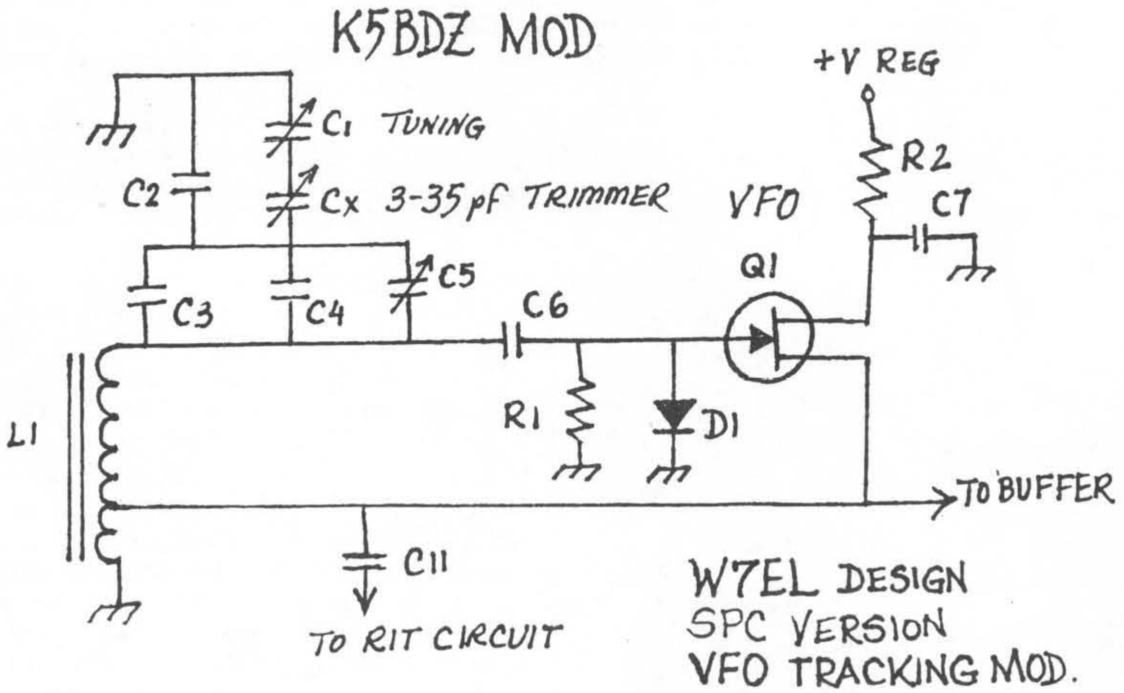
While on the subject, let me note that the VFO in my kit did not track with the 0-100 readings on the vernier (my VFO range was 150 kHz). To change my VFO to track with the vernier, I added a 8-35 pF trimmer capacitor in series with the main tuning capacitor (C1) to narrow the tuning range. When calibrated, my 10.100 to 10.150 MHz frequency tracked exactly with the 0-50 calibration scale of the front panel vernier dial.

How did mine work? Great—just as well as the showroom sample in Dayton! The only problem I found was the RIT circuit. As in the original W7EL design, the RIT is actually an XIT (transmitter incremental tuning). And it only tunes one side of VFO zero beat. I am writing a separate article to modify it to a true RIT.

Having used my SPC version of the W7EL transceiver for over two months now, I am extremely pleased. The receiver sensitivity and performance are excellent. The transmitter is clean with more than 2.5 watts output (variable from 0-2.5 watts). The built-in non-iambic keyer works well and is extremely handy. The compact size makes for easy packing. I have since made four modifications in addition to the VFO trimmer capacitor mentioned above. They involved personal taste and include the improved RIT circuit, replacing the AF pot with one that has a switch for on/off power control, adding a miniature stereo plug which allows me to use my iambic paddles, and adding two buttons superglued to the PC board keyer handle. Not only do the buttons add to the fit and feel of my fingers, the "matching pearl handles" are a family tradition.

So if you have the urge to build your own, this is a good one! Kits are available in either 40 or 30 meter versions for about $95.00 each plus shipping. For more information, contact Small Parts Center, 6818 Meese Drive, Lansing, Mich. 4891.

[Part Two will appear next issue.]



The Care and Feeding of Open Wire Lines

by Dave Benson, NN1G
(203) 667-3536

Open-wire line features negligible line loss and therefore interests QRPers. My link-coupled tuner effectively couples to balanced lines to feed such antennas as Zepps and loops.

The Zepp antenna in particular presents a high-impedance load to a transmission line, and often poses a challenge to effective operation (on low bands) when a balun is used. The link-coupled tuner is an efficient means of matching these high impedances. In addition, the inductively-coupled arrangement provides DC isolation and a bandpass characteristic. If you're blessed with nearby AM broadcast stations, as I am, you'll appreciate this tuner's ability to discriminate against low frequencies as well as transmitter harmonics.

A schematic of the link-coupled tuner is shown in Figure 1. This classic design is still featured in the Radio Amateurs Handbook. Complexity may be kept to a minimum by omitting the series tuning cap. Cost is lowered through the use of open construction (see photo). Pine 1x6 stock is used for the base mounting plate and components may be bolted or screwed directly to the wooden base if ceramic standoffs are not available.

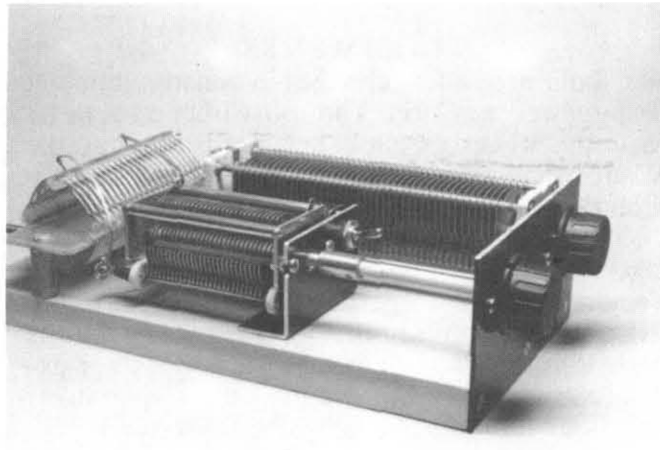
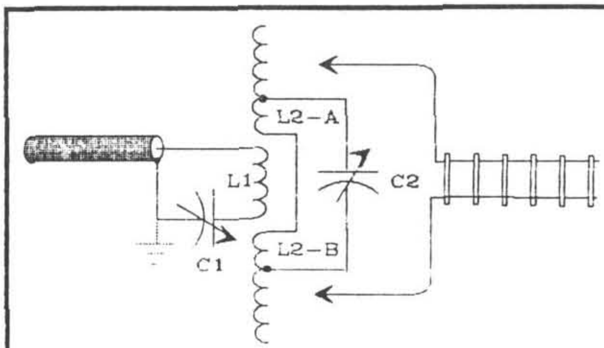


FIGURE 1.



Values shown for 80/40M

C1: 500 pF max

C2: 300-500 pF max

L1: 8 turns centered in L2

L2: Coil stock, 48T 2"dia., 12 tpi tapped 8T each side of center

Representative values for the components are shown on the schematic for operation on 80 through 30 meters. By scaling down the component values, operation on the upper bands is easily achieved. To some extent, the design values are driven by the components found lurking about your shack. The link-coupled tuner acts as a step-up transformer with L2-C2 tuned at or near resonance at the operating frequency, with antenna tap points selected for lowest SWR. In practice, any reactance introduced by the combination of antenna/line mismatch and line length is absorbed into the tank-circuit tuning.

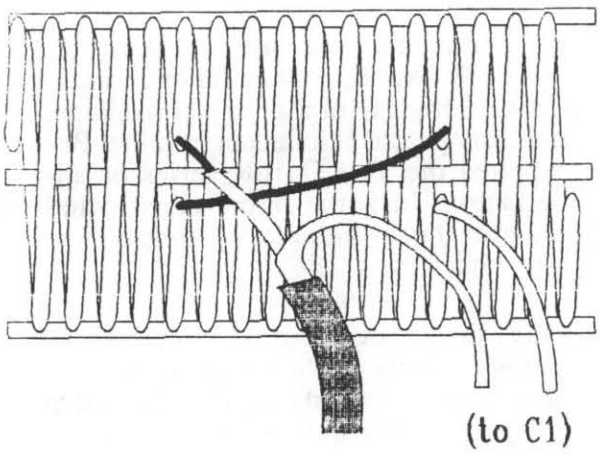
Tuning capacitors should be a transmitting-type variable with a plate spacing of .03 inches or more, at least for higher power applications. The inductor Ll is a length of preformed coil stock, made by B&W, Airdux and others, and should by 6-12 turns per inch to permit easy tapping. I've found a variety of coils and capacitors at swapfests.

Link-coupling sometimes conjures visions of unwieldy wire loops; refer to the figure for a better way. Isolate the center eight turns by snipping as shown. The two link ends connect to the coax and series cap Cl, or in the case of the simplified version, directly to the coax. A cable clamp on the coax furnishes strain relief for the link turns. The two remaining points are connected together with a short length of wire to form the center-tap of the secondary. Solder wick (or RG-174 braid) is a good choice for interconnect wiring, ensuring low-inductance connections throughout. Tap points for the parallel tuning cap, as well as clip-lead connections to the transmission line, are always an equal number of turns out from the center-tap for balanced operation. As both ends of C2 are "hot", this part must be insulated from ground, and a knob or insulating shaft is therefore recommended.

I use the tuner shown during operation on 80 through 30 meters, and by switching in a 470 pf Mica cap across C2, I get 160 meter capability as well. I've also built several of the simplified versions of the tuner, bypassing the series capacitor Cl entirely, for use in matching various antennas on the 20 through 10 meter bands. A compact version of this tuner goes along on vacations to match an open-wire fed doublet on those bands.

In practice, I haven't found it necessary to solder feedline taps to the tuner coil. Alligator clips on the feedline ends serve well, permitting band changes without extra switches.

These tuners lend a historical flavor to the shack. Give one a try...the old-timers were onto something good!



Update on the "Miles-Per-Watt" Computer Program

Larry East, W1HUE
P.O. Box 51445
Idaho Falls, Idaho 83405

In the process of converting the "Miles-Per-Watt" program shown in the January 1990 issue of QRP Quarterly to run on my Apple II, I found three "glitches", two of which are minor but the third is rather major.

The major glitch concerns the value of the constant used to convert the output to kilometers: The value assigned to K on line 100 should be 92.20862 rather than 111.11 as shown in the published listing. The minor glitches are as follows:

1. On lines 380, 390, 400 and 410, a construction of the form X= INT(100*(X+.51)/100) is used. This is entirely equivalent to simply X = INT(X+.51). If the intent was to print output values with no more than two decimal places (instead of a variable number depending on how BASIC decides to round the value), then the following should be used:

X = INT((100*X)+.51)/100.

2. Lines 320 through 370 calculate a value for a variable "C" and make some tests on the resulting value. I'm not sure what the original intent was, but in the current version of the program, "C" is never used for anything! Therefore these six program lines can be eliminated without affecting the final printed values. (Eliminating these lines won't speed up the program noticeably, but it will save some typing if you are entering it by hand.)

After fixing these glitches —plus some of my own making—I now have aversion that runs on Apple II computers. I also added a few refinements, like saving the coordinates of the user's QTH in a disk file and allowing the values to be changed (without editing the program) if necessary.

If you would like to have a copy of my Apple version, send me a blank disk (either 5.25 or 3.5 inches) and a prepaid mailer. I'll also include a couple of other useful programs: one that calculates antenna trap parameters and another that calculates lengths of transmission line impedance matching sections.

Slug-tuned Inductors as an Alternative to Toroids

by Chip Owens, NWØO
1363 Tipperary
Boulder, Colorado 80303

Toroidal inductors have been successfully used for years by experimenters. They're inexpensive, provide high Q in a compact package, and can yield any practical inductance value. Recently, I applied the TOKO 10K series of adjustable inductors in some home-constructed gear. How do these inductors compare to toroidal-core inductors?

To answer this, a review of design considerations follows. First, we need to know the needed inductance value and unloaded Q (Qu) at the operating frequency before selecting an inductor for a particular application. This is critical for predicting insertion loss when designing a bandpass filter. Temperature coefficient (TC) and operating environment are other important considerations. Is the gear going to be subjected to wide temperature extremes, as in field work? Or will it simply sit on your desk at room temperature?

Despite claims to the contrary, toroids can and do couple energy one to another. Is the inductor convenient to use? Does it require hand winding, coating with coil dope and drying time, or can you solder it directly into the circuit? These considerations impact final selection of an inductor for your application.

Inductors using powdered iron toroid cores offer many benefits. They are compact, stable with temperature, easily obtainable, and offer a degree of self-shielding. Toroids can yield unloaded Q values of 25O and more with minimal effort. The drawbacks include: the need for hand-winding, uncertainty of the actual inductance value of the completed inductor, inconvenient mounting requirements, and the lack of adjustability.

The TOKO slug-tuned inductors offer attractive benefits. They are pre-wound, easily obtainable, inexpensive, and well shielded. Adjustable over a wide range (+ or - 6%), they eliminate the need for trimmer capacitors. The metal shield is easily soldered onto a circuit board for either a quick trial or for permanent use.

Low Q and poor temperature coefficient are two trade-offs of using these components. The TC of the ferrite material used in the TOKO 10K series is +220 ppm +/- 150 ppm/degree C, making it a poor choice where stability over a wide temperature range is desirable. They work fine at room temperature.

Their low Q results from the very small gauge wire used to wind them, and the layered turns required for a specified inductance value. Typical unloaded Q's vary from 60-140, depending on the application frequency and the position of the slug.

Despite these limitations, I have found the TOKO inductors very convenient in use with matching networks, tuned amplifiers, and bandpass filters. With knowledge of their limitations, and information on their Q vs. frequency performance, the home constructor can intelligently apply them to a new rig.

I investigated several inductors and reported the results in Table 1. Inductance and unloaded Q were measured with a HP 4342A Q meter within 7%, close enough for amateur work.

The unloaded Q values were measured with the inductor adjusted to the specified inductance value. As the slug is turned in, the unloaded Q peaks and then falls. Therefore, the listed value for Qu is not the maximum attainable, but is a convenient value for design purposes. The blank spaces in the table represent either areas where the combination of inductance and frequency put the Q meter out of range, or where the Qu falls below a useable value.

The TOKO slug-tuned inductors offer a good alternative to toroids in room temperature applications, and make prototyping RF circuits quick and painless. Once the builder gains experience, they can be used in a wide variety of applications. While you would not wish to use one as a VFO inductor, they have use in most circuits in either receivers or transmitters, especially at room temperature.

SLUG-TUNED INDUCTORS

TABLE 1 TOKO INDUCTOR DATA — MEASURED Qu AT SELECTED FREQUENCIES

	SERIES	DIGI-KEY PN.	TOKO PN.	L NOM. µH	L MIN.	L MAX	Qu @ L MIN.	Qu @ L MAX.	Qu @ L NOM	1.8	3.5	5	7	10	15	20	30	50	65
*	10K	TK 1405	BTKENS-T1046Z	0.22	0.15	0.25	50	76	70						58	65	75	90	95
*	10K	TK 1407	KEN-K 4028DZ	0.41	0.25	0.42	55	82	80						68	75	86	97	
	10K	TK 1420	BKAN-K5552AXX	1.0	0.57	1.50	58	87	66				63	73	79	69	43		
	10K	TK1411	BTKXNS-T1050Z	1.0	0.5	1.26	69	94	80					90	106	118	128		
	10K	TK 1412	BTKANS-9449HM	1.5	0.65	1.90	55	110	92			80	90	103	79	48			
	10K	TK1413	BTKANS-9447HM	2.2	1.34	3.3	55	123	85			72	115	130	102				
	10K	TK 1414	BTKANS-9445HM	3.3	1.6	4.6	57	125	94		95	108	120	135	90				
	10K	TK 1415	BTKANS-9443HM	4.7	2.2	6.4	56	112	90		69	78	87	100	95				
	10EZ	TK 1203	154ANS-T1005Z	4.7	3.5	5.2	140	166	166		144	155	164	170	168				
		TK1203	ADJUSTED TO 4.3 µH						160			145	155	165	165				
		TK1203	ADJUSTED TO 3.7 µH						155			132	140	153	160				
o	10EZ	TK 1210	154ANS-T1012Z	18	14	24			135	135	130	120	105						
		TK 1210	ADJUSTED TO 20 µH							140	130	120							
		TK 1210	ADJUSTED TO 22 µH							143	130	115							
		TK 1210	ADJUSTED TO 23 µH							142	125	110							

* Q MEASURED AT 25 MHz AT L NOM.

o Q MEASURED AT 1.8 MHz AT L NOM

NOTE: UNLESS OTHERWISE SPECIFIED INDUCTANCE VALUES WERE MEASURED AT 7.9 MHz.

TEMPERATURE COEFFICIENTS:

10K SERIES: 220 ± 150 PPM/°C

10EZ SERIES: 0 ± 250 PPM/°C

CHIP OWENS NWØO
BOULDER, COLORADO
APRIL 1990

A Tailored Dial for the Heathkit HW-9

by Frank A. Allard, WB7O

While operating my HW-9, I have noticed that, at some dial setting, the rig was not tuned to the frequency indicated by the dial. Realignment of the VFO by carefully following Heath's instructions didn't help. For example, it was difficult locating WSN (7040 kHz at 1700Z Saturdays) for check-in. My HW-9's VFO error was mostly due to a difference between the "tuning curve" defined by the dial markings, and the actual tuning curve of the VFO.

This article describes a procedure to make the dial conform to the VFO's tuning curve, and to permit re-zeroing the dial in case of offset errors. And the cost is only a few dollars.

I recommend that you install a 100 kHz calibrator first, such as Larry East's, W1HUE (The Quarterly, July 1989, pg. 10).

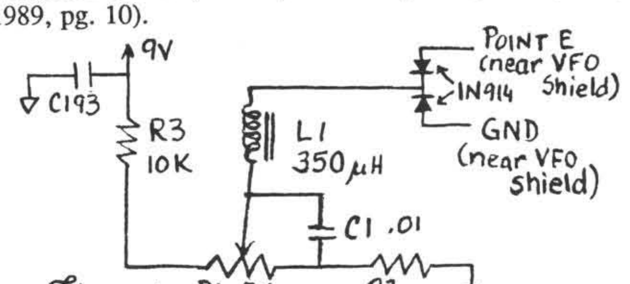


Figure 1

See figure 1. First, I installed a dial zero set control, Rl. The back-to-back 1N914 diodes were recommended by KB4NI (The Quarterly, January 1989). The balance of components functions as follows: Rl, the Dial Zero Set control, is a Radio Shack 5 kΩ pot (#271-1714), which I mounted through the front panel to the left of the meter. R2 keeps Rl from loading down the VFO, preventing oscillations. R3 limits current drain on the 9V supply. Ll (Radio Shack #273-1601) keeps the VFO signal out of the regulated 9V supply. Cl is also from Radio Shack (#272-1065).

The source of the 9V regulated supply is the right lead of C193 ; I hooked one lead of R3 to it, and soldered it around the capacitor lead. Install Ll on a short terminal strip, to the right of the VFO shield. Install Cl at the rear of Rl.

Adjustment of Rl from the front panel permits swinging the VFO frequency several KH2, permitting adjustment of zero-beat to coincide with the dial markings. After installation of the Dial Zero Set control, readjust the VFO alignment to put the zero point back to its proper position (adjust L118). See The Quarterly, April 1985 for an alternate method.

One unexpected result of installing the Dial Zero Set circuit was the virtual elimination of VFO warm-up frequency drift. Cl was left in the circuit after the installation of R2. Drift will occur, however, if the temperature changes, as in outdoor operation during variable cloudy conditions.

To make a dial with markings which correspond to the actual tuning curve of the VFO, make sure the Dial Zero Set control is set to mid-range, and remove the front panel knobs. Carefully draw an index mark on the front inner panel, directly behind the red index line used to read the dial. Remove the outer front panel. Make certain the dial is set at zero, and note how the mounting screw holes are positioned with respect to the inner panel.

Remove the tuning dial, and drill two mounting screw holes in it, at 90 degrees from the original pair. (See Figure 2) Using 400 grit sandpaper, lightly sand the white surface on the dial back. Next, use a compass and #2 pencil to draw two circles contric with the dial center, with radii of 1-13/32" and 1-7/32".

Reinstall the dial, white side forward, positioning it as before with respect to the limit stop cut and the limit stop screw.

Using a frequency counter or a crystal calibrator, slowly turn the tuning shaft clockwise, and make tick marks every 5 kHz around the outer dial edge. Remove the dial, and mark with pencil lines the 5 kHz intervals, placing longer lines at 10 kHz, and the longest lines at 50 kHz points. Remount this "tailored dial" and reinstall the outer front panel and knobs.

You are now the proud owner of a tuning dial with markings which conform to the actual tuning curve of your VFO. If you need to adjust the dial calibration points to re-zero the dial, set the dial to a calibration point, and adjust the Dial Zero Set.

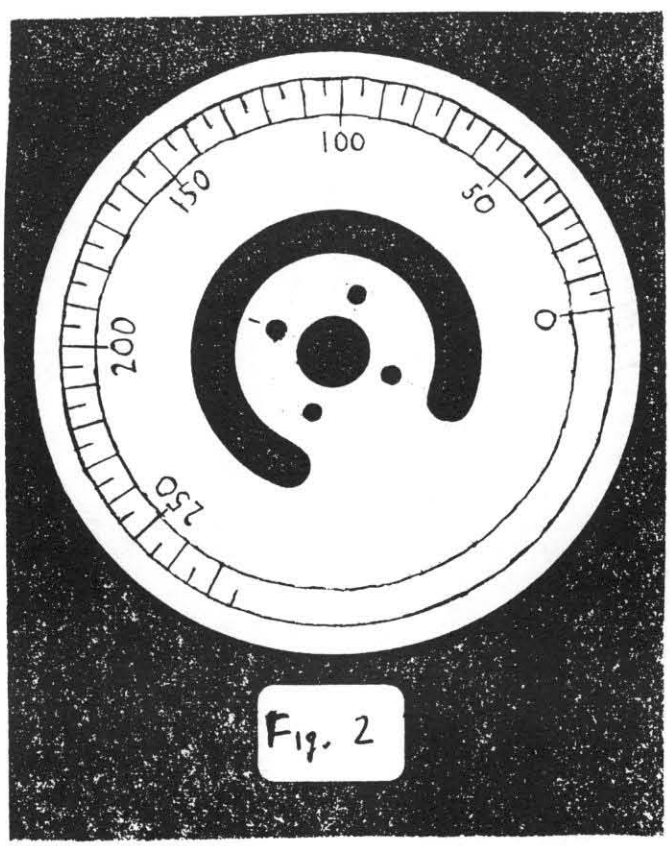


Fig. 2

A Stable VFO

by Antoine F. Gallindo
10941 Allen Drive
Garden Grove, CA 92640
(714) 537-7843

If you build VFO's, chances are you discovered how hard they are to stabilize. Most articles feature the same, old circuits, and the Franklin VFO is almost never mentioned, despite its inherent stability. It's a two transistor or tube feedback oscillator with sufficient gain to permit extremely loose coupling to its resonant circuit, making it very stable. My first perfboard version drifted only 50 Hertz/hour after a 1/2 hour warmup, convincing me I had a winner!

It tunes from 5.225 MHz to 5.575 MHz, as I intend to use it in a SSB/CW rig with a 1.75 MHz IF. With proper adjustment of frequency dependent parts, the circuit should be useful from 1 MHz to 25 MHz.

I built the final version on a single-sided PC board. All components except the 50 pf air trimmer and the 5-35 pf air variable fit on the board. I enclosed the VFO in a minibox reinforced on the bottom with a small aluminum plate.

When winding L2, don't substitute for the T-68-6 toroid, as the -6 material used with polystyrene capacitors make a good low drift combination. For the sake of compactness, I tried an L-43-6, but its low Q dropped the output down 1/3 from what had been obtained with the T-68-6.

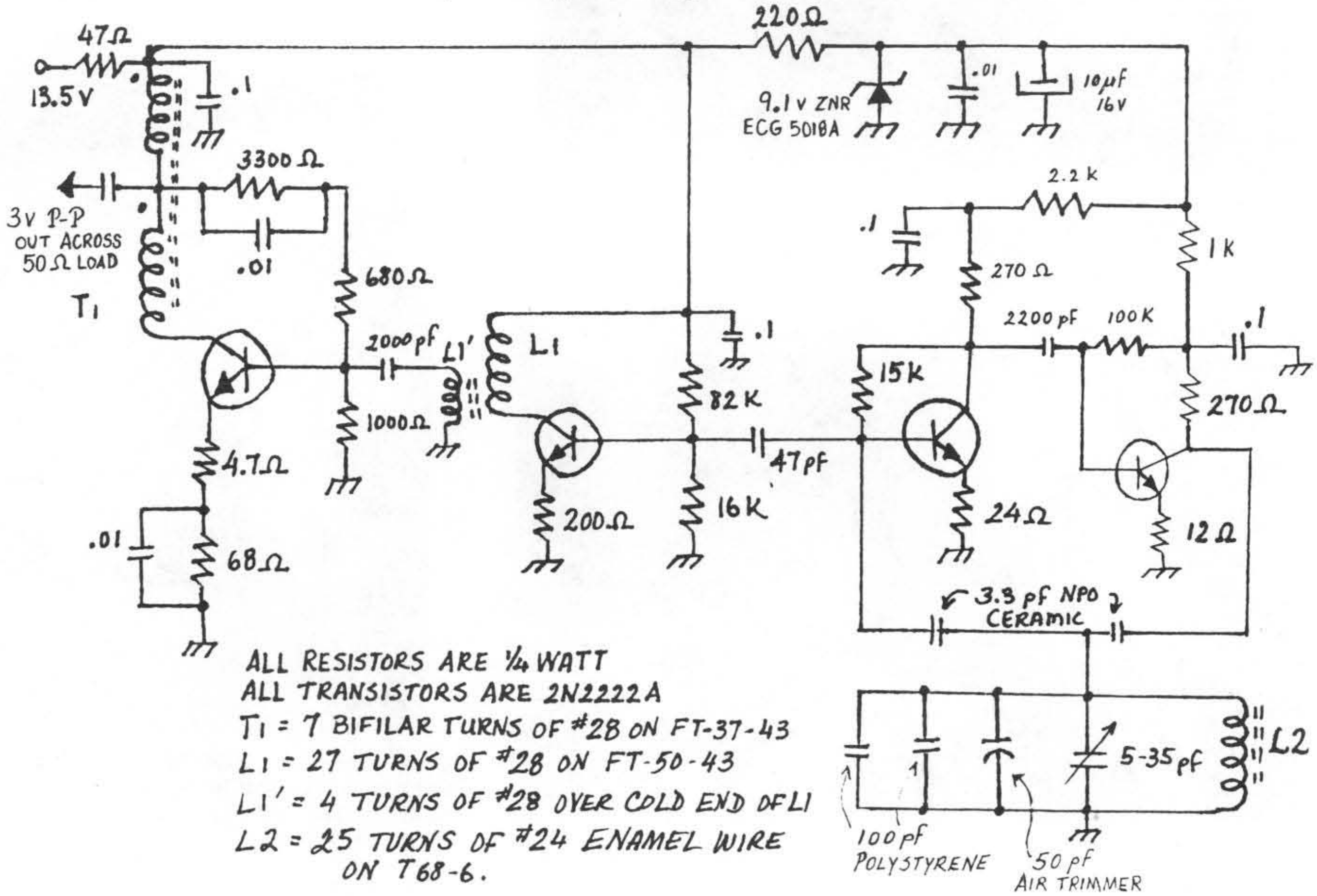
I secured L2 by first drilling in the board two holes inside and two outside the toroid, then tying it down with string. After squeezing and spreading the turns to get the right bandspread, I glued it and the polystyrene capacitors down. The VFO will drift quite a bit while the glue is drying, but will stabilize after a few hours.

Use a good quality, double bearing variable capacitor with brass plates for tuning—aluminum plates are a no-no. The coupling capacitors should be just large enough to sustain oscillation—too large and there goes the stability! I was lucky enough to find two 3.3 pf NPO ceramic coupling capacitors, but two 2 pf polystyrenes should work as well.

My VFO drifts 200 HZ after 10 minutes and then drifts about 15 Hz per hour. After a 14 hour burn-in, drift was down to 3 Hz per hour. When I QSY, however, it takes a few minutes for the VFO to stabilize, due to backlash or torsion in the variable's shaft.

It would be interesting to build this multivibrator oscillator using an integrated circuit. I may try that when I run out of projects.

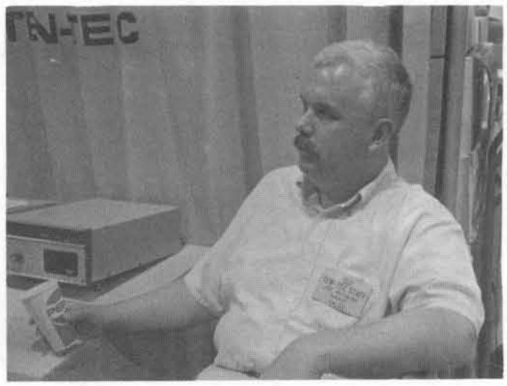
Franklin VFO: Frequency Range 5.225 MHz to 5.575 MHz



1990 Dayton Hamvention

Photos by
Paula Franke, WB9TBU

The welcoming faces at the GQRP booth belong to (l. to r.) Dick Pascoe, GØBPS; Danny Gingell, K3TKS; and Ian Keyser, G3ROO.



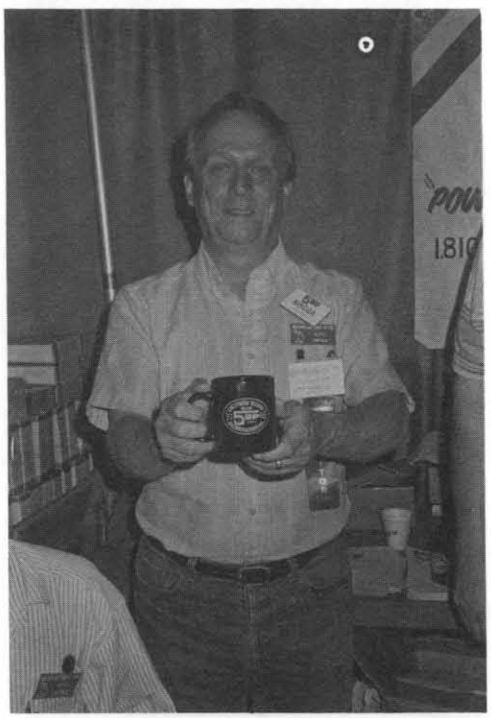
The face behind the call—Ten Tec's Joe Redwine, N4AVF.

Meeting of heads of state? Close, but not quite: (l. to r.) Michigan QRP president Lowell Corbin, KD8FR; QRP ARCI president Paula Franke, WB9TBU; and GQRP secretary and editor of SPRAT Rev. George Dobbs, G3RJV.

Luke Dodds, W5HKA takes Ten Tec's new Argonaut out for a spin.

Dick Pascoe, GØBPS explains the details of kit building during his forum talk at the 1990 Dayton Hamvention.

There's just something about a little rig that Danny Gingell, K3TKS just can't resist!



QRP ARCI 'vice-president Buck Switzer, N8CQA is mighty proud of his new club coffee mug. (Sorry, Buck hasn't yet found a way to sell them individually by mail for a resonable price but the mugs will travel to various QRP gatherings across the country. Contact Buck for information; don't forget the SASE!)

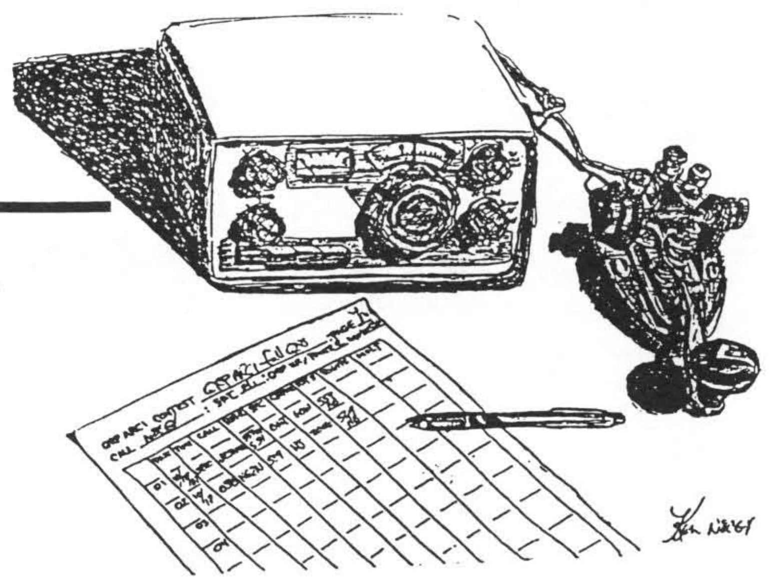
Taking time out in the flea market are (l. to r.) QRP ARCI secreatary/treasurer Luke Dodds, W5HKA; Pat Murray, NW2I; and Lynn Hawkins, KA8MUT.

The QRP forums at Dayton always draw a capacity crowd.

Randy Rand, AA2U (left) and Jim Fitton, W1FMR found a moment to chat in the hospitality suite.

Contests

Red Reynolds, K5VOL
835 Surryse
Lake Zurich, Illinois 60047



Upcoming Contests

Summer Homebrew Sprint (CW)
July 15, 1990; 2000-2400 UTC

***

Summer Daze Sprint (SSB)
August 12, 1990; 2000-2400 UTC

***

Fall QSO Party (CW)
1200 UTC October 20 to
2400 UTC October 21, 1990

***

Holiday Spirits Homebrew Sprint (SSB)
December 2, 1990; 2000-2400 UTC

1990 Spring QSO Party Results

Comments: Neatest log—WØNGB. Nearly everyone complained of poor band conditions, guess Easter eggs and propagation do not mix well. KH6CP/1 worked his 500th ARCI member in the contest. WG5G set the record for HI-BAND 20-6). NN1G set the record for LO-BAND (160-40).

------TOP TEN ----------

1	W3TS	1,163,580
2	W1XE	1,000,650
3	KH6CP/1	723,440
4	WB2CZB	581,025
5	K3TKS	546,000
6	WG5G	535,542
7	AA2U	515,520
8	WB5FKC	486,864
9	W5HKA	409,920
10	N9FVN	390,285

-----SINGLE BAND ---------

40 M	W8MVN	280,128
20 M	PY7FNE	22,414
15 M	NN9K	8,652

-----HI/LO BAND ----------

HI-B	WG5G	535,542
LO-B	NN1G	165,894

****

CALL	SCORE/POINTS/SPC	POWER	BANDS /TIME	RIG	ANTENNA
ALABAMA					
W4DGH	36,708/ 152/ 23	4.0 B	H-2/ 8	Argosy-2	Yagi
N4OHB	22,400/ 160/ 20	4.5	3 / 4	IC-735	Quad/Dipole
AB4QL	8,960/ 56/ 8	.90 S	40M/ 3	Argo 515	Loop/Vertical
CALIFORNIA					
WOKEA/6	334,866/ 476/ 67	5.0 B	5 / 6	Argo 509	Yagi/Dipole
W6MVW	65,520/ 234/ 40	5.0	5 / 6	TS-440	Gp/Inv Vee
K6QWH	11,970/ 95/ 18	2.5	H-3/ 2	Argo 509	Spider
W9PRI	5,830/ 53/ 11	.90	20M/ 2	FT-757GX	Vertical

COLORADO							
W1XE	1,000,650/ 953/ 75	4.0	S	7 /19	IC-740/IC-551	Yagi/Dp/Vert
KR0U	126,882/ 318/ 38	5.0	B	7 / 6	IC-745/FT-726	Yagi/ Vert
N0IBT	25,368/ 151/ 24	5.0		H-2/ 6	TS-830S	Trap Dipole
KI0G	10,796/ 46/ 12	2.0	B	20M/ 3	2-FER XCVR	Yagi/G5RV
CONNECTICUT							
KH6CP/1	723,440/ 728/ 70	4.7	S	7 /24	Argo 515/HW-9/HB	Dipole/Vrt
NN1G	165,894/ 416/ 38	4.0	B	L-3/11	TS-130SE	Windom
W1FD	35,378/ 133/ 19	3.0	2	3 / 2	Argosy	Yagi/Inv Vee
KA5GIS	20,880/ 116/ 18	1.0		4 / 3	Argo 509	Dipole
FLORIDA							
WN2V	226,044/ 414/ 52	5.0	B	4 /10	HW-9	Zepp/Vertical
ILLINOIS							
WD9IWP	68,540/ 149/ 23	.90	S	3 / 4	IC-735	Inv Vee
K5VOL	41,720/ 108/ 17	.72	S	20M/ 4	2-FER XCVR	Longwire
WM9X	23,562/ 153/ 22	4.0		H-2/ 6	Drake TR-7	Yagi
NF9X	22,725/ 101/ 15	.80	B	H-2/ 3	TS-130V	Vertical
WA9QMO	11,662/ 119/ 14	3.0		3 / 5	Argo 509	Yagi/Zepp
NN9K	8,652/ 103/ 8	4.0	B	15M/21	Argo 509	Quad
INDIANA							
KA9JKK	25,080/ 132/ 19	.90		4 /10	Argosy	Mini Quad/Loop
MAINE							
KX1E	22,248/ 176/ 14	3.0		40M/ 2	HB XCVR (S)	Dipole
WA1WPR	10,584/ 72/ 14	4.0	B	4 / 2	HW-9	Longwire
MARYLAND							
K3TKS	546,000/ 546/ 50	.90	S	5 /17	Argo 509	Loop/Dp/Vert
K4JSI	57,456/ 228/ 24	3.0	B	5 /12	Argo 515	Attic AL Foil
WA3GYN	19,751/ 99/ 19	2.0	B	4 / 2	HW-8	Dipoles
WA8MCQ	10,584/ 108/ 14	4.0		3 / 4	TS-430S	Dipoles
KA3PMK	2,989/ 61/ 7	3.0		15M/ 7	Century-21	Attic Dipole
MASSACHUSETTS							
K1KDG	59,987/ 197/ 29	4.0	B	4 / 9	Argo 509	Dipole/Vert
MICHIGAN							
K8CV	113,022/ 299/ 36	5.0	B	4 / 5	Argo 515	Yagi/Dp/Vert
N8LA	85,470/ 231/ 37	.90		5 / 9	Argo 515	Quad/Inv Vee
K8KIR	5,460/ 65/ 12	4.0		3 / 8	Argosy-2	Zepp/Vertical
K8DD	8,057/ 89/ 13	5.0		6 / 1	TS-820	Yagi/Dp/Vert
KW8B	308/ 22/ 2	5.0		15M/ 2	TS-120S	Butterfly Beam
MINNESOTA							
WA0RPI	89,670/ 305/ 28	3.0	B	3 /11	HW-9	Loop
W0NGB	44,460/ 156/ 19	.95	B	2 / 6	TS-440S	Yagi/Vert
MISSOURI							
W0RCZ	287,820/ 369/ 39	.90	S	3 /13	Argosy	Yagi/Inv Vee
W0AV	106,862/ 449/ 34	4.0		3 / 8	TS-940	Slopers
N0EID	40,396/ 214/ 27	2.0		3 / 9	Argosy	Vertical

NEW JERSEY					
WB2CZB	581,025/ 635/ 61	.95 B	5 /17	HW-9	Yagi/G5RV
AA2U	515,520/ 537/ 48	.95 S	5 /16	IC-730	Yagi/Inv Vee
K2JT	65,480/ 288/ 20	2.0 B	40M/ 6	HB DC/SSD TX	G5RV
W2JEK	34,616/ 87/ 16	4.0 B	4 / 5	2-FER	Dp/Hertz/Gp
NEW MEXICO					
W5OXM	137,788/ 266/ 37	3.0 S	3 /11	Argo 509	Dipole/Gp
NEW YORK					
W2QYA	141,525/ 255/ 37	.90 B	4 /18	HW-8	Longwire
NI2R	15,860/ 110/ 18	4.0	L-2/ 5	HB 6AQ5 TX	G5RV
WN2Q	15,554/ 101/ 22	4.0	4 / 6	HW-9	Attic Loop
OHIO					
W8MVN	280,128/ 578/ 34	2.0 B	40M/19	HB XCVR	Delta Loop
NN8B	164,500/ 235/ 35	.90 S	5 /11	Argosy-525	Yagi/G5RV
WV8P	13,475/ 129/ 15	5.0	L-2/ 4	TS-440S	Loop
OKLAHOMA					
K5DP	66,300/ 195/ 34	.90	3 / 5	HW-9	Loop/Longwire
WD5GLO	17,360/ 124/ 20	4.0	4 / 2	Argo 509	Yagi/Inv Vee
OREGON					
WX7R	119,952/ 252/ 34	4.0 S	H-3/ 6	IC-735	Quad/Loop/Lw
PENNSYLVANIA					
W3TS	1,163,580/ 773/ 73	.90 S	7 /15	HB XCVR (S)	Yagi/Vee/Tee
N3FYW	214,368/ 348/ 44	5.0 S	4 / 8	HW-9	Inv Vee
N3FGQ	5,824/ 64/ 13	5.0	2 / 2	Argo 505	Dipole/Vert
RHODE ISLAND					
KA9HAO	39,240/ 109/ 18	4.0 S	4 / 8	Argo 515	Random wire
TENNESSEE					
WG5G	535,542/ 933/ 82	5.0	H-3/20	TS-130V	Quad
KV4B	239,940/ 372/ 43	.90 B	3 / 8	Argosy	Yagi/Inv Vee
TEXAS					
WB5FKC	486,864/ 552/ 63	3.6 S	6 /16	TT Delta	Inv L
W5HKA	409,920/ 427/ 48	.90 S	5 /18	HW-9	Verticals
W5LXS	383,400/ 399/ 48	.50 S	H-3/ 8	Argo 515	Yagi
KB5ILS	20,560/ 116/ 16	.30	20M/ 3	HB XTAL TX/ Drake TR-7 RX	Yagi
VIRGINIA					
N3OS	52,232/ 276/ 26	2.3	40M/10	HB 12BY7 TX/ SB-301	Yagi/Loop
WISCONSIN					
N9FVN	390,285/ 590/ 63	5.0 B	4 /10	Argosy-2	Yagi/Zepp/Vee
KB9W	9,919/ 109/ 13	4.0	40M/ 3	Omni-C	Dipole
BRITISH COLUMBIA					
VE7ASR	3,528/ 42/ 8	2.0 B	20M/ 1	Argo 509	Yagi

QUEBEC					
VE2ABO	42,735/ 185/ 22	3.0 B	3 / 9	HW-9	Yagi/Loop/Vee
VE2BLX	5,166/ 82/ 9	5.0	40M/ 2	FT-101	Longwire
BRAZIL					
PY7FNE	22,414/ 191/ 22	4.0	20M/ 7	HW-9	Inv Vee

Team Competition: Colorado QRP Group (W1XE, KRØU, WØKEA, KIØG) 1,473,194
Check Logs: NN1G, W4ZCT, W5TTE, N9GPF

Time of operation rounded to nearest hour

B=battery power
S=solar/natural
/m=modified
HB=homebrew

(S)=superhet
(Lw)=longwire
(Dp)=dipole
(Gp)=groundplane

(H-)=high bands (20-6)
(L-)=low bands (160-40)
(SPC)=states/provinces/countries

Book Review

The ARRL Antenna Compendium, Vol. 2

by Fred Bonavita, W5QJM
P.O. Box 2764
San Antonio, Texas 78299-2764

The ARRL Antenna Compendium, Vol. 2
Edited by Gerald L. (Jerry) Hall, K1TD
208 pp. Newington Conn.
American Radio Relay League Paper, $12.00

When it began this series in 1985, the ARRL said the purpose was to get into print antenna articles of merit but for which it did not have space in the pages of QST.

In keeping with that notion, the League has trotted out a second volume of antenna and antenna-related articles for our consideration and consumption. On a purely arbitrary rating scale of 0-10 from the perspective of the QRPer who found lots to like and use in the first volume, this second effort weighs in at a 6.5 at best.

Vol. 1 was something of a hit with QRPers, who constantly are on the lookout for antenna articles offering good design, ready adaptability to the needs of low-power enthusiasts who must get every ounce of rf possible into the air. There was a casual, almost free-wheeling feeling about Vol. 1 (it was typeset on a computer, for instance) that seemed to invite readers to give some of the designs a try. At last count, I'd experimented with at least a half-dozen with a mix of successes and failures—mostly successes.

In contrast, Vol 2 is almost stuffy. The first volume referred to "material" submitted (and solicited) for publication, while this latest version refers to the articles as "papers," as though it were the proceedings of an engineering society. And it seems intent on playing to those who are "into" computers for crunching numbers on designs and characteristics.

For example, one piece on phasing vertical antennas devotes slightly more than four pages to text and six pages of non-stop computer programs. A few articles later is a tome on beam-antenna pattern design factors (seven pages of text) followed by—you guessed it—16 pages of computer programs. No wonder there was insufficient room for that "paper" in QST!

For my $12.00 (a $2.00 increase over the cost of Vol. 1, which is still available), I would rather have seen the editors devote the space to more readily useable articles and let those interested in the computer end of things send a disk to Newington for a copy of whatever programs are desired. That's the tack the League is taking on QST pieces which include lengthy programs, and it's a logical thing to do here, too.

This is not to say Vol. 2 is not a worthwhile buy. To the contrary, it has some fine articles on verticals, compact beams and a version of the old standby G5RV wire antenna for the typical urban-dwelling ham where a well-performing antenna is needed and where living under an aluminum overcast is a no-no.

There are several pieces that invite the reader to go after them, such as a novel application of a balun on the coax between the transmitter output and the input of the antenna tuner. And there is an interesting piece on a multiband groundplane for a vertical.

Maybe by the time Vol. 3 is ready, the League's editors will have found more old-fashioned antenna articles (as opposed to papers) of the caliber of Vol. 1—pieces that encourage the Amateur Radio operator to get out and build and enjoy and use them. After all, that is the underlying purpose of antenna compendiums, isn't it?

Idea Exchange

Michael A. Czuhajewski WA8MCQ
P.O. Box 232
Jessup, Maryland 20794-0232

First, I must apologize for the blurb in the last column about the Maryland Radio Center BBS with the QRP section. Once again, the system is down, perhaps permanently. It has been plagued by software and hardware problems over the years and is becoming more trouble than it's worth for the operator. It's especially embarrassing for me, since it always seems to die right about the time I get it mentioned somewhere in print, and that happened again. They may have it back up by the time you read this, at 301-725-8307, or it may be gone for good.

Double Balanced Mixers For Sale

P. David Ingalls, KD7SE, of 671 Morton St., Ashland, Oregon 97520 has some SCM-1 DBMs for sale. It's a fairly new product from Mini Circuits Labs and has the same specifications and pin-out as their SBL-1 which is frequently used in QRP circuits. It's not in a metal case, which isn't too important for most of us.

Compared to the SBL-1, he says these "are about half the size and configured for surface mounting. The leads are plenty long enough for ugly or 'dead bug' construction methods." He has about 50 to sell at $5.50 each, postpaid. For comparison, CCI in Xenia, Ohio sells the SBL-1 for $6.5O, and Dave says Radiokit now lists it for $10.95 and neither price includes shipping.

More QRP Parts

Danny Stevig, KA7QJY of Box 7970, Jackson, Wyoming 83001, passes along the following offer, a portion of the parts he has available for sale:

- Toroids, 3/$1: T37-2, T50-2, T68-2, T37-6, T50-6, FT37-43, FT50-43, FT37-61, FT50-61 (not all cores arrived yet, but expected soon)
- Toroids, T68-6, 55¢ each
- MPF102 FET, 4/$1
- 2SC799, CB output transistor usable in place of 2N3553 in Twofer
transmitters, etc., 3/$1
- 33 volt 1 watt zener diodes, QRP final amp protection, 6/$1
- Jackson Brothers 10:1 miniature dial drives, same as in HW-9, $4
each or 10/$37.50
- NE602, $1.65 each
- 2N2222A, metal, 5/$1
- 14S8 dual op amp, 28¢ each
- NPO caps, 50 assorted for $1
- Ferrite beads, FB43-101, 90¢ per dozen
- Ferrite beads, FB43-801, $2.75 per dozen
- Ferrite balun cores, BLN43-2402, 10/$3
- TO-5 heat sinks, 8 /$1
- 10.7 MHz IF transformer, green, as used in Neophyte receivers, 2/$1
- FT243 crystal sockets, new, 3/$1 r
- LM386 audio amp, 70¢ each
- 2N4427, HW-8 output transistor, 40¢ each (limited quantity)
- 2N3904, 15/$1
- Air variable cap, 4-17 pf, 1/4" shaft, 7:1 reduction drive, $2.50 each
- Ceramic coil forms with slug, 5/$1

Include $2.50 per order for packing and postage. His phone is 307-739-1634, nights only. If you want a list of other items available, send a business size SASE.

Hot Flash

Limited offer which I am authorized to pass on to a limited number of folks: KA7QJY has SBL-1 DBMs by MCL; 10 for $35. Minimum order is 10, but more can be added to that at $3.5O each. After the 150 are gone, the remaining 350 will go on public offer at $4.5O or $5 each. Several of us have gotten lots of good parts at great prices from him.

Micro Miniature "Neophyte" Receiver Board

As usual, the G-QRP Club delegation from England showed off some of their homebrew gear at Dayton. Those of you getting their newsletter, SPRAT, are familiar with their "Sudden Receiver", which is essentially the Neophyte from the February 1988 QST.

They have had a kit for a while; new this year is their surface mount device (SMD) version of the Sudden. Everything on the board is an SMD, including the IC's and transformers, and it's 2.08" by 1.08". It has some enhancements over the basic Sudden/Neophyte—there is an added transistor in the AF amp for more gain, an LM2931 voltage regulator, and the VFO has been converted to varicap tuning.

A kit is available from Blue Rose Electronics, 538 Liverpool Road, Great Sankey, Warrington, Cheshire, WA5 3LU, Great Britain. According to SPRAT, the kit contains the PCB and all board mountable components. As usual, some external items are required such as gain and tuning pots. The kit is for 40 meters, although 80 meters is available on request. Don't forget, this kit is entirely SMDs, requiring special techniques, and is not intended for the neophyte (pun intended). The price is listed at £22.95 (note: that's pounds not dollars).

MFJ QRP Wattmeter?

At a recent hamfest, **Danny Gingell, K3TKS,** picked up an MFJ-840 2 meter handheld wattmeter and wondered aloud if it would work well on HF too. This is a neat little item with a male BNC plug on the bottom, which you stick on your 2 meter HT to measure the output with a scale from 0-5 watts.

I couldn't resist opening it on the spot and the answer is, yes, it will work on HF. Figure 1 is the schematic. It's your common, ordinary dummy load, diode detector wattmeter, with a trimmer cap added to tune out inductive reactance for a minimum SWR at 144 MHz.

I later checked the calibration against a Bird wattmeter on 2 meters and found it to be pretty good, although it crunched up a bit at the high end. Four watts and below read properly on the scale, but 5 watts only pushed it up to the 4-1/2 watt mark. The SWR was quite low as adjusted by the factory.

I did some HF tests with my homebrew wattmeter for comparison and it was pretty good down there too. Again, it got a bit funky at the top; take it with a grain of salt over the 4 watt mark. The two resistors got quite hot at 5 watts; MFJ recommended not running it at that level for over 15 seconds. The BNC plug is a slight drawback but, in all, it's a handy little device, which will pull double duty on HF QRP and your 2 meter HT.

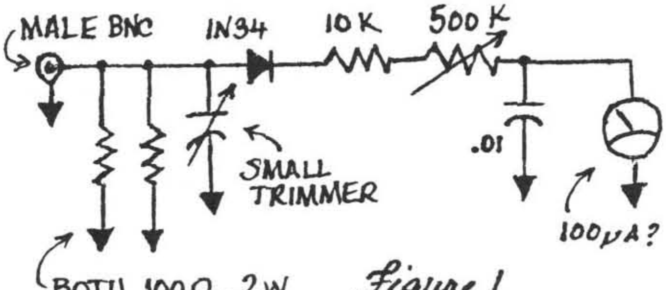


Figure 1
MFJ 840

Recent QRP Wattmeters

The March 1990 issue of CQ carried a QRP dummy load wattmeter by KB4ZGC. He added an interesting twist to the standard diode detector by not calibrating the meter and only using it for a reference point. He uses a panel mounted potentiometer with calibrated dial, setting it until the meter reaches an arbitrarily selected reference point and reading the power from the scale on the pot.

It's a great deal easier to calibrate a dial or panel than a fragile, tiny meter face—an excellent idea. Unfortunately, he did make a slight error in his calibration procedure, where he neglected to take into consideration that the capacitor in a diode detector charges to the peak rather than RMS value of a sine wave. This caused his chart to be off by a factor of two. Thus, the calibration point with 10 volts DC applied is equal to one watt of RF power, 20 volts is 4 watts, etc.

Some references for further reading on diode detector wattmeters: Solid State Design, page 146; WØRSP, The Joy of QRP, page 137; WØRSP in ham radio for October 1973, page 26; KM8X, Michigan QRP Club's The Five Watter for June 1988; WA8MCQ, The Quarterly for April 1988.

The February 1990 issue of QST contained all excellent in-line QRP SWR/wattmeter by **Roy Lewallen, W7EL**. This well-designed unit gives good accuracy down to 5 milliwatts, and has full scale powers of 10, 1 and 0.1 watts. Roy has a very simple scheme to get around detector nonlinearity at low voltage levels, and he gives an excellent description of diode behavior. Particularly interesting is the fact that diode voltage response at very low levels is quite different for AC than for DC.

There are only two IC's that can be used for U1, the CA3160 or CA3130, since extremely low input bias current is required to maintain accuracy at low levels. Both Digi-Key and Jameco have them, as well as the LM358 used for a meter amp. As for the FT37-72 toroids, which he said not to substitute, I asked Roy if I could use the FT37-43's already on hand. He said they would probably work if I stacked two of them for each coil. The permeability of the -72 core is much high than the -43; the coils must present a certain amount of impedance to maintain the accuracy on 80 meters, requiring the higher permeability. (While using stacked cores may work, it uses a lot since there are three coils in the detector head.)

Do You Trust Your RF Probe?

I was given an old Heath RF probe of unknown origin last year but found that when I compared it to my diode detector wattmeter the readings didn't correlate. A voltmeter connected to the output of a diode detector gives a reading in peak volts, whereas we expect RF probes to show RMS volts, about 71% of peak.

RF probes area a special subset of diode detectors. They also develop a peak reading, but they follow the detector with a resistor to form a voltage divider network with the input impedance of the meter used, to automatically scale the output down to RMS which is 0.707 of the peak value. (See Figure 2.)

They are typically used with a 10 or 11 megohm input VTVM, and the resistor is usually 4.7 megohms. With my 10 megohm input Fluke 77 DVM, this particular probe gave a reading much closer to the peak than the RMS value. I opened it up and found the circuit shown in Figure 3. Obviously the probe was designed to work with something other than a standard 10 or 11 megohm voltmeter.

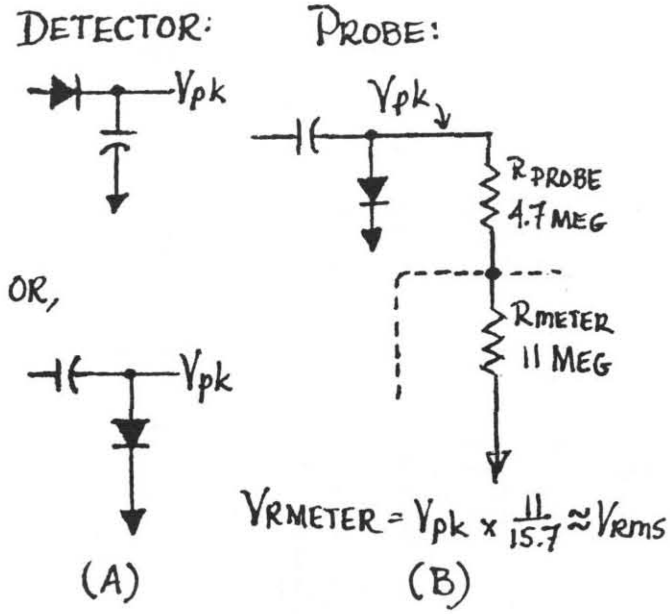


Figure 2 Diode Detector Vs. Probe

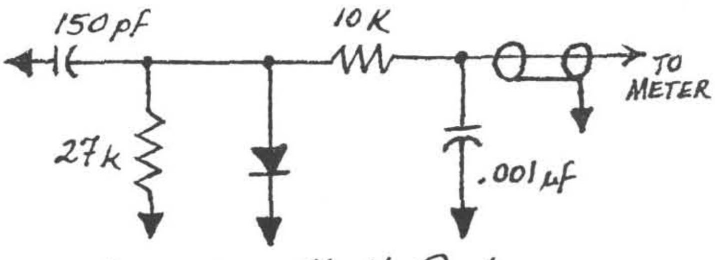


Figure 3 ~ Heath Probe

I removed the parts and rewired it as shown in Figure 4, which is the standard RF probe circuit. I changed the value of the resistor from the normal 4.7 meg to 4.1 meg. The former is based on the 11 megohm input of older VTVMs, while the latter is the correct value to use for the 10 megohm meters wisely available now.

Since it isn't a standard value, I used carefully selected resistors in series to get the right value. I ran 4 watts into my wattmeter and compared the RMS voltage from the probe with the RMS equivalent of the peak voltage shown on the diode detector, and they agreed closely. The moral of this story is to be sure your RF probe is designed to work with the impedance of the meter you use.

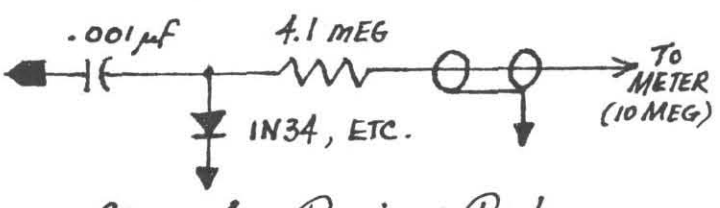


Figure 4 ~ Rewired Probe

Cooking With Toroids

I'd read that when toroids are overheated they will show a change in permeability and that after they cool down, powdered irons will return to the original value but ferrites will not. I ran across a bad HW-3 which had this problem (the subject of an upcoming article) and after fixing it I decided to do some experiments to observe the phenomenon first hand. The test setup is shown in Figure 5.

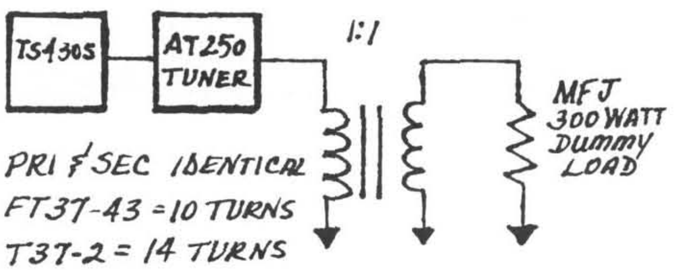


Figure 5 - Toroid Zapping

The procedure was to tune up the radio and run power through the cores until they were overloaded, retuning as necessary to allow power to keep flowing. The inductance of one winding on each core were measured before and at least 12 hours after cooking, on a Hewlett-Packard 4276A LCZ meter at 1 kHz. One transformer each on FT37-43 and T37-2 cores never had power applied, to act as controls in the experiment.

Tests were done at various frequencies, 3.5 through 14 MHz. Ferrite cores A and B were gently cooked at moderate power, until the honey colored enamel insulation on the primary winding smoked a bit and turned dark brown. Watching the SWR meter on the tuner (automatically computed from forward and reverse power), the ferrites held under 1.2:1 for a while and then suddenly jumped to 10:1. Core C was the control and did not have power applied.

One T37-2 powdered iron, Core D, was gently cooked with the power carefully limited to a maximum of 20 watts and the enamel blackened and smoked. The SWR slowly crept up to 1.7:1 over three minutes. The second T37-2, Core E, was brutalized at 100 watts, with heavy smoke from the wire, which eventually ran red hot. On a later test run, the wire was lit up again. This T37-2 showed the same SWR jump as the ferrite. Core F was the control.

Here are the results: as predicted, the powdered irons did return to the original values, while the ferrites did not. (None of the cores fractured or cracked.)

Core	Initial Inductance	Test	End Inductance
A: FT37-43	69 µh	Browned	82.4 µh
B: FT37-43	65 µh	Browned	81.6 µh
C: FT37-43	68 µh	Not cooked	68 µh
D: T37-2	1.8 µh	Browned	1.8 µh
E: T37-2	1.8 µh	Scorched	1.8 µh
F: T37-2	1.8 µh	Not cooked	1.8 µh

Audio Muting for Transceivers

Dave Benson, NN1G, of Newington, Connecticut, passes along this circuit and writes:

The schematic (Figure 6) uses a CD4016 CMOS analog switch to provide clean audio muting for QSK applications. No adjustment of operating biases is necessary with this circuit, as the switch is self-contained on a 14 pin DIP (39¢ from Digi-Key or similar). The only restriction on the operation of this device is that the input and output voltages should be at least several volts above ground, and below the positive supply.

The circuit takes care of this by taking its input signal directly from a preamp or active filter output without a blocking capacitor. The blocking cap on the switch output takes care of the bias constraint on that side of the circuit. This results in as clean a muting function as I've heard anywhere.

[Ed.: Dave is working on a QSK transceiver for 80 meters using the NE602 IC. He has it up and running, though not QSK yet; for the time being, he is using an SPDT relay and delay for antenna switching. He hopes to have the QSK functional soon, and will write it up for The Quarterly.]

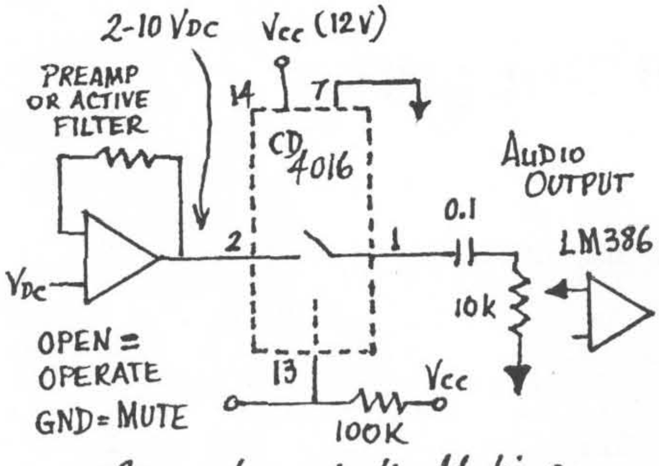


Figure 6 - Audio Muting

More HW-9 Mods

From **Marc Ressler, K3NCO** of College Park, Maryland:

I've been cursed with a number of problems with my HW-9 and haven't solved them all yet. However, I thought I'd pass on a few notes before the next millennium begins.

I installed the QST article mods (SWR/PWR bridge, AF filter, thump suppressor) directly on the existing PC board by scraping the resist off the copper in the area I was working, cutting extra pads with a scalpel and a pad cutting bit and drilling holes with a hand held pin vise. Soldering components flush against t.he backside of the board or instant-gluing standoff insulators on the top took care of the rest.

The thump suppressor works great, especially if you take the hint of hand selecting a gate bias resistor as suggested in the article. The filter works well too, but the trick here is to use well matched components and 1% resistors if you can find them. I also replaced the headphone jack with a 1/4" stereo jack so I can use Walkman-style headphones as well. Most of these headphones aren't 8 ohms, but are close to 40 or 50. So, if you put a resistor in series with the amplifier output to each of the channels, when you plug in mono headphones you will load the output with a resistor instead of shorting it out. Any value between 39 and 75 ohms should work well, the trade-offs being available output versus loading when using mono headphones and the true impedance of whatever headphones you use.

My first problem was spurious receiver responses on 40 and 80 meters. Backing off on the HFO level (R173) helped quiet the reverse tuning Shortwave Broadcast birdies on 40 meters, but not the AM broadcast birdies, which were worse on 80 meters and downright disastrous when using an endfed wire. Being an average of five miles from three 50 kW AM stations doesn't help.

I tried cutting D406 out of the circuit, but that didn't help. Then I figured it was most likely D403, D404 and D407, which are all small signal silicon diodes being used in T/R switching duty. Not having any PIN diodes available at the time, I tried the old standby of using high voltage rectifiers as sloppy bulk effect: diodes (I used 1N4937s) and this helped some. If any of you are having similar problems, I would suggest that you try the following first, since I think they make much more of a difference (unless you have some PIN diodes to try). Don't try putting a high pass filter in the antenna line, though; I did and it does a great job of sucking out virtually all of the transmitter output.

There is no need to improve the noise figure of the rig at low frequencies, so try replacing C443 with 1000 pf. This will attenuate BC signals a lot. Make a small change on 80 meters and be virtually unnoticeable on 10. If this doesn't help, you need to increase the standing current through the diode switches in the "ON" state. This will cost you a few extra mils of current during receive, but this is probably not critical.

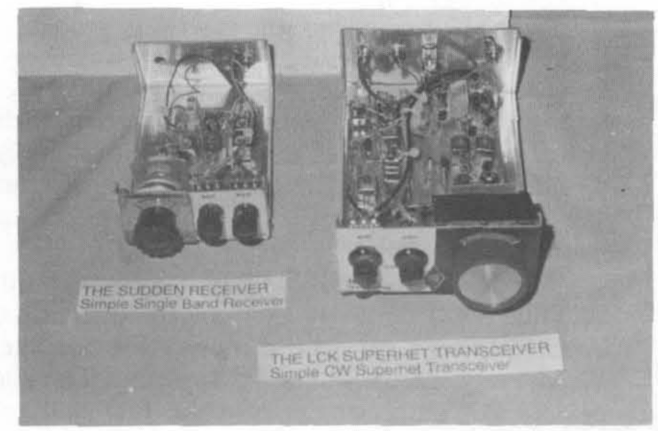
Replace R423 with 1000 ohms and, to keep the bias points about the same, also change R401 to 2200 ohms. If you still have some problems left, you can further increase current by not sharing the path with D407. Remove W417 and replace it with a 1k resistor in series with a small RF choke. I used a 68 µh unit I had. (W417 feeds the junction of C442 and D407 from the junction of R423 and L427.) Put heat shrink tubing over the pair and solder them on the bottom side of the board to get around the shield walls. If you still have problems, use a balanced antenna; that helped a lot, too.

Another problem has been high band transmitter instability, which is still there, even after trying a lot of published and homebrew fixes. However, some of the following have helped some and might fix your problem.

Try damping the Q of T403 by bridging it with 220 ohms. Then parallel L426 (final base choke) with 100 ohms or less. Since T402 provides a DC return for the base, once you get down to about 51 ohms you can just take out L426 and use the resistor alone. By the time you get down to about 39 ohms, you may not have enough drive left. At this point, rewind T402 for a higher turns ratio—8:3 seems to work well until you get below 20 ohms, although you can still make 2 watts output with even 15 ohms there.

The Fine Print

This column and The Quarterly neither warrant nor endorse any offers herein. Anyone having technical tidbits too small for a formal article is more than welcome to send them to me for the Idea Exchange. Keep those ideas coming!



Two of the newest QRP rigs from the gang in Great Britain.

Local Club News:

The Notorious HW-8 Subgroup

By Hilliard Goldman, KYØU
321 Way Ave.
Kirkwood, Missouri 63122

Around November 1988, Dave Gauding, NFØR, telephoned me to come to a meeting of QRP enthusiasts to explore starting a local QRP club. The turnout was beyond expectations. About 50 people showed up and from this meeting came the St. Louis QRP Society. Keith Arns, KCØPP, volunteered to conduct the monthly meetings and to edit the Peanut Whistle, the society's monthly newsletter, and Dave agreed to write articles for it.

From the beginning, the club was guided by three principles. First, the club would by devoted to QRP. Second, the emphasis would by on building equipment. Third, the club would be completely devoid of formalities—that is, no minutes, rules of order, or election of officers. We were all just interested in having fun and learning about QRP.

The St. Louis QRP Society has been an outstanding success. It has a paying membership of about 30 (we need a little money for postage). We average 15 members per meeting. The success of the club comes from the fact that just about everyone makes some sort of contribution. We do have a treasurer, Fred Schmidt, NØJFZ, and our engineering committee is made up of Tom Berryhill, ABØQ; Mel Whitten, KØPFX; and Lee Johnson, KEØMC. Over the last year this group, with the help of Pete Eaton, WB9FLW, was able to collect parts and instructions for a one-watt transmitter, VFO, receiver, audio filter, keyer, and resonate speaker enclosure. We also had a Field Day at Bill Jamison's large, elevated, swimming pool-equipped backyard. Last August, Keith helped organize a special event station with the Kansas City QRP Club for which Larry Walton, NZØP, made some beautiful computer-generated certificates. Not bad for the club's first year of existence.

Several of us in the club have HW-8's, and have formed the "Notorious HW-8 Subgroup." The HW-8 begs to be improved through modifications; to wit, the numerous articles describing such modifications which have appeared over the past ten years or so in such periodicals as QST, 73, and CQ. I have collected many of those articles along with Adrian Weiss's CQ HW-8 brochure and The Hotwater Handbook, editions one and two. Some of the articles have different procedures to achieve the same results. For example, there are several RIT procedures. Some of the procedures are of dubious value. The problem for me was to determine which procedure was best for the various modifications I wanted to perform on my HW-8. I was not technically savvy enough to separate the chaff from the wheat. At a meeting of the St. Louis QRP Society I mentioned my problem and told of my collection of HW-8 modification articles.

Lou Harken, KFØFS, offered to make copies of my articles and then assemble them in a binder to make a booklet. Several of these booklets were reproduced by the other HW-8 owners. After everyone had a booklet and had a chance to read it I proposed we get together and, as a group, decide which modifications we wanted to make and which procedures seems the most promising for each modification. Thus, technically wanting individuals such as myself could tap the knowledge of homebrewing experts. Dave Gauding wrote about using the Peanut Whistle, and thus was born the "Notorious HW-8 Subgroup".

About a month later, Andy Becker, WØNVM, volunteered his house for the subgroup to hold its first meeting. My wife volunteered the cookies, and we were off and running. The members in the picture showed up with their HW-8's to explain what modifications they had made, which modifications they wished to make and which procedures they wished to use.

It was my thought that if we all decided to do an RIT and if we all decided to use the same procedure, we could get together another afternoon and actually make the RIT modifications as a group. By looking over each other's shoulders as we made the modifications, we could nip each other's mistakes in the bud. Although the meeting was announced for HW-8 owners, the spirit of the St. Louis QRP Society was such that non-HW-8 owners showed up to give their advice. When my wife saw the picture, she said we looked like a bunch of boys showing off our new Christmas toys.

Lou Harken showed us his HW-8 in which he replaced the RF amp in the original circuit with a 40673. We listened to his receiver and then listened to an unmodified version. Lou's was definitely louder, so we decided we wanted to make the same modification on our rigs. Mike Floren put an 8-ohm audio transformer in his rig. When used with an 8-ohm Walkman-type headphone, his produced a louder sound than an unmodified receiver using the same headphone. By doing side-by-side comparison, we each got an idea which modifications we wanted to make. Lou also convinced us that W3TS's RIT was simpler to make than the one in Adrian Weiss', WØRSP, CQ article. And so it went all afternoon.

Since our first meeting, Mike and Lou have raced ahead with other modifications. Mike installed a homebrew MFJ CWF 3 audio filter, a voltage regulator Zener diode for the VFO oscillator, a PL259 antenna connector, an 8-ohm audio transformer, and a speaker built into the lid. Lou did all the above except he used a BNC instead of a PL259 connector. Lou also added a RIT, S-meter, a drive control for QRP, a zerobeat switch, switchable pilot light, and a new RF amp.

Andy Becker, WØNVM, built an antenna tuner in an old HW-8 cabinet so that his antenna tuner now matches his rig. The rest of us are bringing up the rear. In order to spur us laggards along, Lou invited us to his house where he has a long work bench and four soldering irons. We can cut into our rigs there under his expert supervision and finally get those modifications finished.

During our first meeting after we stopped talking about modifications and the pros and cons of one procedure over the other, we sat around drinking coffee and talked about our favorite QRP activity.

The activities of Al Plucunski, NØIFL, sounded the most romantic. Al said he liked to have picnics in local parks and take his HW-8 along. He would throw a simple antenna up into the branches of a tree, operate from the picnic table, and pretend he was on an DXpedition in some remote and exotic place. The challenge of portable QRP lends itself to such pipedreams.

Editor's Word

continued from page 2

For an example, I've received letters about subscription problems. This is not my department, that's the Membership Chairman's department. It only slows it down even more by having to re-mailed it to someone else. So to help you decide who and where to send your items of interests, here is a quick list:

•Managing Editor, Chaz Wooten, KD4XX: all nontechnical articles; my job is to put all the other stuff together.

•Technical Editor, John Devon, KI6DQ, gets all technical articles.

•Membership News, Fred Bonavita, W5MJQ: If you have something of interest, but don't think it would make it as a full blown article, this is where you send it.

•Idea Exchange, Mike Czuhajewski, WA8MCQ: If you have á technical tidbit that's not quite big enough for an article, but you think would help others, then this is where you send it.

•Net Manager G. Danny Gingell, K3TKS, gets anything to do with club net operations.

•Awards Chairman Bob Gaye, K2LGJ, can answer questions about the club's awards program.

•Contests Chairman Red Reynolds, K5VOL, organizes club contests, receives logs and distributes certificates to winners.

Hope this helps out. You can find the addresses of the above on the table of contents page of the Quarterly. Please, *this is very important*, enclose a self-addressed stamped envelope whenever you write to any of the officers or chairmen. We all get a lot of mail and postage costs are very high if we answer each one.

So until next time, have a good summer and look for me on the bands.

President's Message

Paula Franke, WB9TBU

Things have been popping around the homestead lately: building a new shed (the old one flew across the state line during a wind storm a few months ago), getting the garden started (it finally stopped raining) and some local political/civic responsibilities that appear to be getting out of hand.

Another Dayton Hamvention has come and gone. I'm very happy to inform the membership that, in addition to having a great time, the weekend was productive in terms of QRP ARCI business. A board of directors meeting was held April 27. In attendance were directors John Collins KN1H, Jim Fitton W1FMR, Mike Czuhajewski WA8MCQ, Mike Bryce WB8VGE and Danny Gingell K3TKS, vice-president Buck Switzer N8CQA, secretary-treasurer Luke Dodds W5HKA and awards chairman Bob Gaye K2LGJ. In response to Luke's April letter to the directors, written proxies were on hand from Les Shattuck WN2V, Lou Berry KF7TQ and Red Reynolds K5VOL. This produced a quorum and several items of old business were settled.

Family Memberships

Details of a family membership category were hammered out and approved as follows:

Where one member of a family is already an active (current dues paid) member, other members of the family (spouse and children) may join the club for $5. This fee will entitle the family member to his or her own QRP ARCI number, voting and awards. Only the full dues paying member will receive The Quarterly.

Hot Water Handbook

Mike Bryce expects the newest edition to be off the presses and available by the end of the year.

Publicity Chairman

Mike Bryce is the QRP ARCI's new Publicity Chairman. Joe Sullivan, WA1WLU, has held this position for a number of years and we thank him for all the time and effort he put into the job.

Mike has already begun a plan of attack for publicizing QRP and the organization. Along these lines, Mike will also be contacting lapsed members with reminders for renewal in an effort to bring the number of our active members more in line with the amount of growth we've seen. This, along with Membership Chairman Mike Kilgore's stamping "last issue" on The Quarterly label at renewal time, should have a positive impact on retaining members.

Fees For Awards

Bob Gaye reported that the supply of certificates is low and soon it will be time to reorder. He is also concerned with the possibility of a postal increase in the near future. Since the awards are mailed flat in large envelopes, postage costs could become significant. The board members agreed to keep the current fee structure in place ($2 for basic awards and $1 for endorsement stickers) for now and review the question again next year.

EUCW

Luke Dodds has been appointed our liaison to the European CW Association. Items of appropriate interest, such as the ARRL band plan proposal, should be forwarded to Luke so the information can be disseminated properly. He will also keep us informed of international developments that require our attention.

Talley Ho

As some of you are probably aware, Luke Dodds and I have been invited to spend some time in England in October. Since accommodations, local transportation and meals will be provided by the GQRP folks, this is an opportunity not to be missed. The Brits have each year managed to send a contingent representing GQRP to Dayton and, last year, to Dallas. Luke and I are looking forward to representing QRP ARCI on the other side of the pond. We'll take lots of pictures, so look for a report in the January 1991 issue of The Quarterly.

Name Change

Our technical editor has recently had his first name legally changed from "Gary" to "John". So, please address future technical article mail to John Devon, KI6DQ. His address and telephone number remain the same as listed on the table of contents page.

The ARRL Strikes Again

I've recently received a note from Fred Bonavita, W5QJM, regarding an item appearing on page 75 of the June 1990 issue of QST ("Results, 1990 ARRL January VHF Sweepstakes"). In the third column on that page, paragraph beginning "The overall scores...", there is a comment from that contest's QRP-portable winner. He suggests the power limit for QRP be raised to a "more realistic" 25 watts. The column writer, ARRL Contest Manager Billy Lunt, KR1R is asking for opinions from QRPers. What say we all drop him a note and tell him what we think? Keep it diplomatic, guys.

Open Letter to *ham radio* Magazine:

from: Michael A. Czuhajewski, WA8MCQ
8 May 1990
Box 232
Jessup, MD 20794

to: CQ Communications, Inc.
76 North Broadway
Hicksville, NY 11801

An open letter regarding your press release/ obituary of 26 April 1990, at Dayton, Ohio--

I don't know the motives and business strategies behind the demise of *ham radio* Magazine, but I must say I am shocked and appalled. Even though it seems to me that it had gone downhill somewhat in recent years (such as the shift to the 'New Ham Radio', which seems to fit in perfectly with the perceived and widely hailed "dumbing down of America"), this is a black day for the technically inclined radio amateur, and a serious loss to the community.

I reread your press release carefully several times in case I had missed a statement saying you would initiate a major upgrade of the technical content and size of CQ to compensate for the decapitation of *ham radio*. It must have been inadvertently omitted by the typesetting, since I never did find it. The only glimmer of hope is the vague promise of some high-tech quarterly.

The disappearance of *ham radio* will leave a gaping hole in the amateur press. From the conspicuous silence on the issue in your press release, it is apparent that CQ will not attempt to fill it. Realistically, we cannot expect QST to, since they have a finite amount of space to devote to technical articles.

73 might step in and seize the opportunity, although they too could only absorb a limited about of new material. Perhaps someone with the vision of Jim Fisk might come along again, and resurrect the concept of a magazine targeted at a technical audience.

It had crossed my mind briefly that this was a move to kill off the competition, but your two magazines were aimed at widely different audiences and gave limited credence to that theory. According to the postal form in the December 1989 issue of *ham radio*, they had about 32,000 subscribers who will now receive CQ on an issue-for-issue basis. Naturally, a certain portion of that includes people who also subscribed to CQ.

Nonetheless, it does represent a goodly number on net, new "subscribers" to CQ. (The word must be placed inside quotes, since they are subscribers by default and not by choice; they might be better described as "receivers" of CQ.)

I wonder if anyone at CQ Communications seriously believes that any significant portion of these new "subscribers" will remain after their subscriptions to *ham radio* expires. I, for one, will not. If the contents of CQ fit my particular interests in ham radio, I would already be a subscriber. They do not, I am not, and, barring a substantial change in editorial content, I will not be in the future. This is not intended as a value judgement of a condemnation of CQ, which I feel covers its target market quite well, but a simple statement of reality. I do not subscribe to the majority of computer magazines for the same reason.

It will be interesting to see how much of a public outcry, if any, results from the death of *ham radio*. I hate to think that I might find myself in a very distinct minority, and I pray that I'm wrong about that. Perhaps I should not mourn the magazine's death so much as the declining technical state of American hamdom, a subject which has already been beat to death in the media.

To paraphrase a line by a young, radical priest in an old "Dirty Harry" movie, said to Clint Eastwood, who had just blown away someone in the sanctuary, "I hope Jim Fisk forgives you, because I certainly don't."

Mournfully yours,
Michael A. Czuhajewski, WA8MCQ

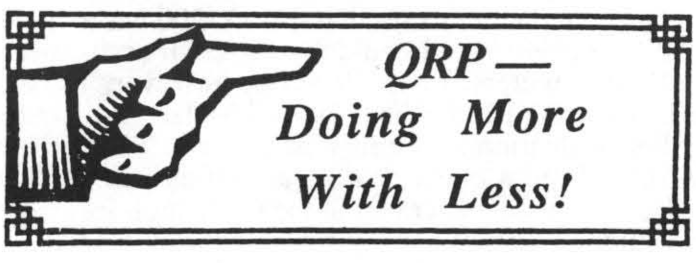
[copies to (among others) W1NLB, K2MGA, NX1G, KA1STC, K4IPV, W6ASI, W1SL, W9JUV, WA2LQQ, W3NQN, KA1GT, K4MT, W2EBS, K1ZJH, K2BT, W1SI, ARRL, W2NSD, Maryland Radio Center newsletter, Worldradio, QRP Quarterly, Westlink Report, W5YI Report]

QRP QSLs, Name Badges

Some new suppliers have been found who can provide QSLs and name badges displaying the QRP ARCI logo.

QSL companies are Gazebo Press, Rt. 4, Box 4148, La Plata, Maryland 20646; and Little Print Shop, P.O. Box 1160, Pflugerville, Texas 78660. Mike Czuhajewski WA8MCQ got his cards from Gazebo Press and Danny Gingell K3TKS got his from Little Print Shop.

"The Sign Man of Baton Rouge" (Rick Pourciau, NVSA) has name badge blanks with our logo on them. Prices range from $4-$5.50 plus 65¢ per badge postage and handling. Several members got new badges at Dayton and are very happy with them. Contact Rick at 879 Castle Kirk Drive, Baton Rouge, Louisiana 70808. Send an SASE for his flyer (there are a lot of color combinations available.)



Product Review

SX-200 Meter

by Mike Czuhajewski, WA8MCQ

An SWR/ power meter may be the most commonly purchased ham accessory, and the Diamond Antenna model SX-200 is one of those which works QRP right out of the box. It sure looked nice sitting there on display at the Maryland Radio Center (MRC), but I never paid too much attention to it. One day, it finally sunk in that its lowest power rating was five watts, and I couldn't resist borrowing one and putting it through its paces. Check the ad on page 115, March 1990 QST. Though the SX-200 isn't pictured, it resembles the SX-1000.

This unit covers what most QRPer's do, 160 through 2 meters (up to 200 MHz). It reads power at 5, 20, and 200 watts ranges, giving good resolution at low power levels, and at QRO levels of most solid state transceivers (sometimes even QRPer's need to crank up the rig a bit). The 5-watt range features major divisions at 0.5, 1, 2, 3, 4, and 5 watts, with tick marks down to 100 milliwatts (mw).

The SX-200 FUNCTION switch has three positions. "POWER" allows you to read either forward or reflected power, with full scale values of 5, 20, or 200 watts selected by the RANGE switch. In the "CAL" position, you adjust the CAL knob for full scale on the meter, then flip down to "SWR" for a direct reading. The RANGE switch does not function while in "CAL" or "SWR".

The rear panel has a socket to connect 13.6 volts DC, which is not required for the unit to function as there are no active devices. You don't need it if you don't mind an unlit meter.

The single sensor unit, mounted in a shielded box right on the connectors, uses four toroidal core transformers. The circuit appears similar to the directional coupler in W7EL's QRP wattmeter (February 1990 QST). I desperately wanted to know how the transformers were connected, but didn't want to disturb the cores and possibly break a wire or two. After all, this was a borrowed display model.

The manufacturer says that the SX-200 has a 0.2 dB insertion loss. I couldn't measure it accurately at 2 meters, or at 29 MHz; however, I measured 0.06 dB insertion loss at 7 MHz.

For evaluation as a milliwatt meter at 7 and 29 MHz, I did a quick power calibration using the "CAL" mode and cranking the CAL knob for maximum sensitivity. I used a homebrew 5 Ω dummy load and germanium diode combination peak detector, me assuring the detector's DC output with my Fluke 77 DVM. I got the following peak voltages (reading the 20 watt scale "marks"):

Mark	Peak Volts	Milliwatts
20	6.07	368
15	5.50	302
10	4.75	226
5	3.70	137
4	3.46	120
3	3.14	99
2	2.80	78
1	2.25	51

(7 MHz source)

I calculated powers by squaring the peak voltages and dividing by 100 (2 X 50 Ω=100). If voltages are measured with an RMS reading probe, divide by the load resistance, 50 Ω. Refer to my article in The Quarterly, April 1989, explaining this in more detail. A similar test at 29 MHZ yielded results about 5% lower. Anyone who wants to use the SX-200 as a millivoltmeter this way should make their own calibration chart, since individual units may show some variation.

According to Diamond, the minimum power for SWR tests with the SX200 is one watt. SWR accuracy suffers a bit at lower power levels than this. With about 360 mw for full scale deflection, and a 4:1 SWR from a 200 ohm load, I read 3.3:1 on 40 meters, and 3.5:1 on 10 meters. At one watt, 10 meters gave 4:1, although at 40 meters, I got only 3.7:1. We don't normally need to know the SWR that precisely--the important thing is to get it down to a minimum. Practically speaking, SWR readings below one watt are rarely needed.

If you have access to an accurate, well-calibrated wattmeter, you may calibrate the SX-200 by adjusting the three potentiometers near the sensor unit. From left to right, they adjust the 200, 20, and 5 watt scales.

The fourth pot, which is all by itself, adjusts the SWR scale for accuracy when the FUNCTION switch is in the SWR position. For this adjustment, I disconnected the antenna from the SX-200 to give an infinite SWR, and fed in about five watts. I set the CAL knob to full scale, then flipped down to SWR and adjusted the pot for infinite SWR—reflected equal to forward power. I rechecked the SWR with a 200 Ω dummy load and observed the precise 4 :1 SWR reading I expected . See figure below.

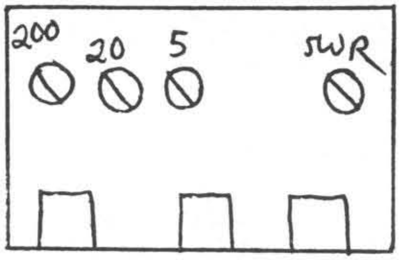


Figure 1: Range Calibration

In comparison with the less expensive Heath HM-9, the SX-200 features some additional capabilities. The HM-9 requires assembly, the SX-200 doesn't. According to Heath, the HM-9 has to be wired to cover only one of three possible ranges: HF, 6, or 2 meters. The SX-200 covers all three at once, without rewiring or bandswitching.

It also reads 200 watts full scale, compared to the HM-9's 50 watts full scale, making the SX-200 capable of checking your "big rig's" output. The SX-200's SWR scale has calibration marks for 3, 4, 5, and 10 to 1 SWR, while the Heath HM-9's marks stop at 3. Heath could have calibrated the HM-9 more precisely, but if your SWR is over 3:1, you don't care about precision, you just want to get it below 3:1. After all, the only calibration marks an SWR meter really needs are 1, 2, 3, and "TOO #$%& HIGH!"

As of March, 1990, the SX-200 listed for $125, but Maryland Radio Center had it for under $100. For the latest price, call the order/inquiry number: 800-447-7489. Neither I nor the folks at MRC get commissions if you buy!

The SX-200 is a very handy little device. It'll take care of you whether you run QRP or full-throttle QRO, and covers up to two meters as well. It may cost a bit more than some folks care to spend, but it's a very nice looking unit with good capabilities. It will make a handsome and useful addition to any shack, from QRP to "barefoot QRO" levels.

QRP -- Apocalyptic Proportions

by Rev. Nicholas J, Parker, VE7NJP
P.O. Box 137
Qualicum Beach, B.C. VØR 2TØ Canada

So, like there I was, a newly ordained amateur radio operator, ready to set the airwaves a fire with my 100 watts. With the real radio "glow in the dark" syndrome upon me and a bump started Hallicrafter taxing around my desk top, nothing but nothing could prevent me from making that first contact.

Undaunted by the newly acquired theory and with all systems go, I hit the key and waited for that glorious note. No sound, no spark, no glow—absolutely nothing! The ionosphere was safe for yet another day.

To prevent Murphy from getting the upper hand, I used some of that Ham ingenuity that I had heard so much about and ventured down the road to a fellow amateur and borrowed his Yaesu FTDx400. For my class of licence, this was the ultimate fossil fuel gobbler. When you hit the power button you knew you were in for a melt down experience. So with one hand behind my back and my feet on an insulated rubber mat, I reached for the switch.

We're talking illumination! No need for lights in my shack, this little baby did it all. Indeed, I was in love, infatuated with sending my rapturous CQ to the here and beyond.

Unfortunately, none of my shenanigans had gone unnoticed. You guessed it, the cat thought this hobby was great too. He decided that the warmth of the rig sure beat the great outdoors.

Yup, he did his pleasure in it and zap, smoke city! Transistors, resistors, and caps, you name it, they all went boom. I didn't know they could put so much smoke in those little components. Yet, never to be outdone, I quickly scared up a Kenwood TS-520. The steel blue/gray finish, the black knobs with their chrome trim, the cute lights and the husky feel said "now this is a radio". So I let loose on the key; dah di dah dit, dah dah di dah. Then it happened!

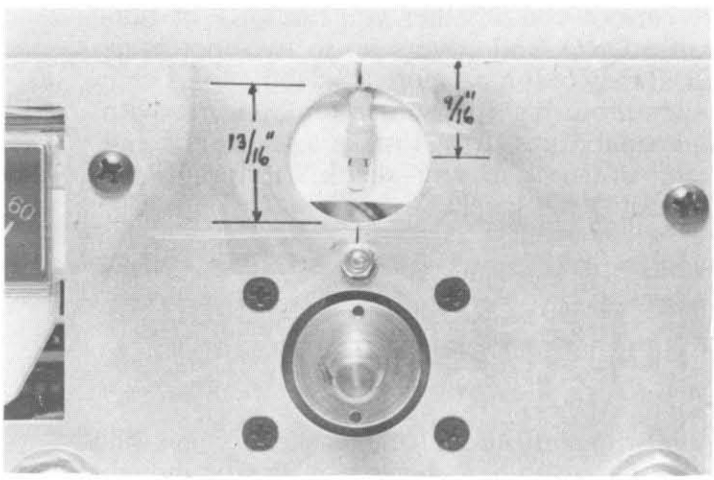
We're talking apocalyptic proportions, as glowing before my eyes was a digital display. Sure, I know that the 520 doesn't have a LED readout as a standard feature, but when I pinned the needle and saw the lightening flash, I saw numbers! I don't know what happened, but the rig died some mystical death that still befuddles me.

Yet, there can be no doubt in my mind that what I saw an apocalyptic event. For there, etched upon the wall of my shack, carved by the megavolts and illuminated by the burning gyperock, were the initials and words QRP—*Quit Running Power!*

Dial Lights for the HW-9

John F. Cleary, WN2Q
420 Cayuga Street
Syracuse, New York 13204

After staring into its cold, dark front panel for months, I finally added dial lamps to my HW-9. While lighting the meter is a simple matter of gluing and taping a bulb to its back, lighting the calibrated dial requires more careful work. Here is how I did it.



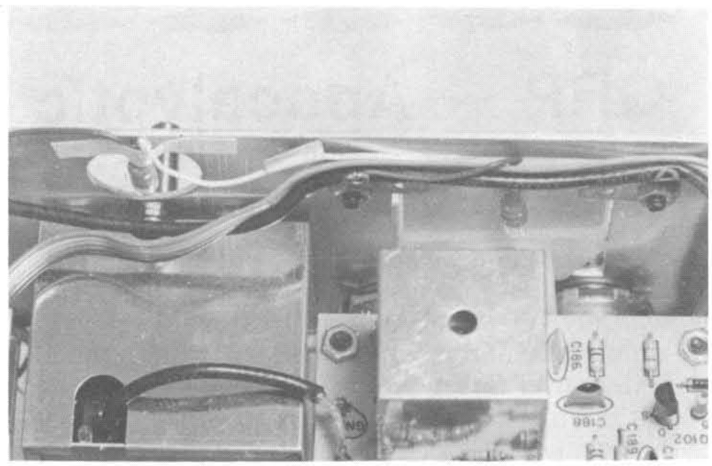
HW-9 front chassis panel showing the dial lamp and white graphic tape. Center hole is located vertically with dial shaft and 9/16" down from top edge. The bulb filament is placed behind the calibration digits for max brilliance.

After removing the top, bottom, front panels and the dial, I applied masking tape to the back of the inside front panel. I turned the chassis upside-down on the work bench, and drilled a small center hole, as shown in Photo 1, at slow speed with a hand drill. This hole was enlarged to 3/8" and then to 13/16" with a chassis punch.

Two 6 volt, 2 mA. bulbs (Radio Shack #272-1140) were then connected in series and I centered one within the punched hole. The dial lamp is held in place with tape; a bit of fast drying glue applied to the insulation secured the meter bulb in place. To reflect light forward, the back of each bulb was painted white. Two pieces of white graphic tape cut 3/4" x 2" long were then taped to each bulb to add support and reflectivity. Lining the tape with aluminum foil enhanced the front lighting.

I added a 150 Ohm resistor in series with the bulbs to extend their life. Since my power supply runs at 13.65 volts, the bulbs operate at about 5 volts each, softly illuminating the meter and dial.

The results are dramatic and well worth the work. It's just like old time radio! And thank goodness, no more squinting into a dark front panel while chasing elusive DX on cold winter nights!



View from back of HW-9 chassis. Meter bulb is first glued in place then secured with white graphic tape. Ground connection of bulb string is shown at lug between shield cans.

The "Chef's Secret" Antenna Relay Box

Paul R. Schaffenberger, KB8N/7J6CAM
USAF7J6CAMPSC 1
Box 20272
APO San Francisco, CA. 96230

During the 1986 Field Day, Ron, WA9IRV, and myself used a vee-beam antenna switching system which was built in a small Tupperware food storage container. Since it was one of our "secret weapons" which helped us win the five watt trophy, we dubbed it the "Chef's Secret."

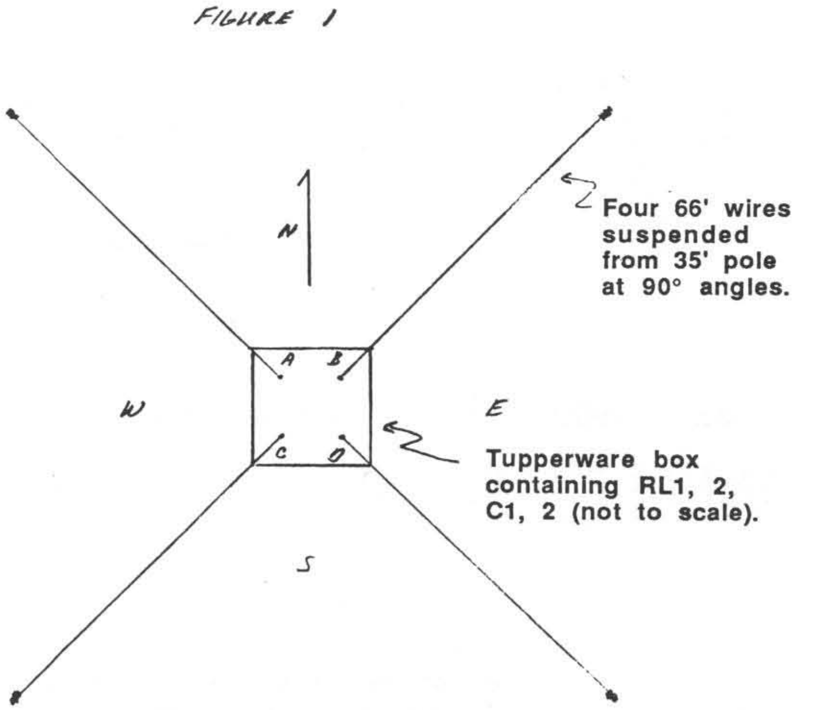
Vee beams provide good directivity and gain; they can be used over a wide range of frequencies with an appropriate matching network. They exhibit greater gain as the frequency increases. Their biggest disadvantage is that they cannot be rotated. I devised the "Chef's Secret" relay box to avoid the difficulties of a Vee beam for each direction.

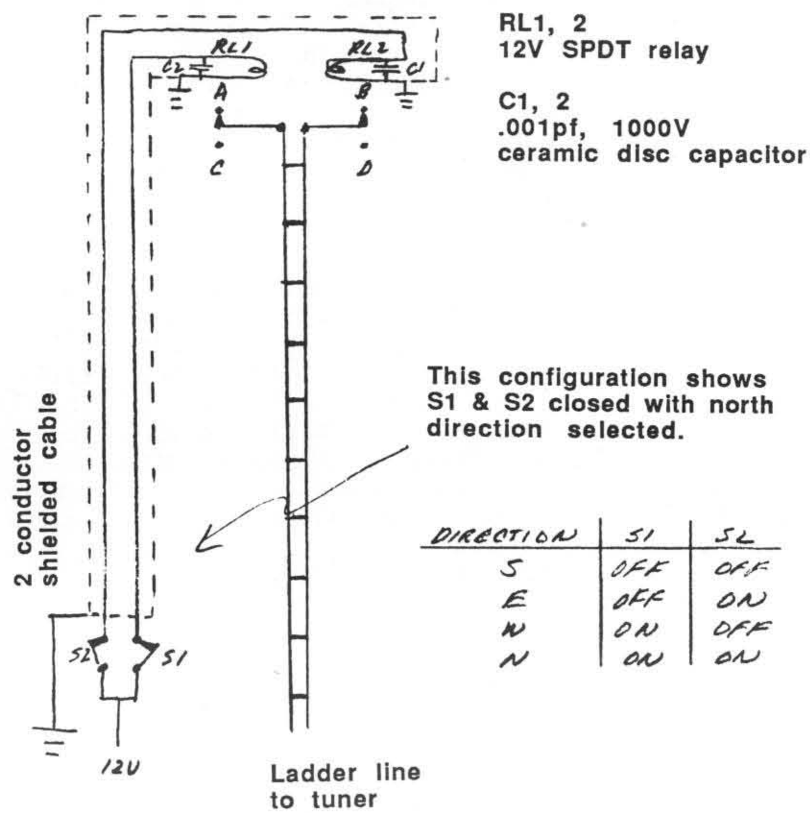
We mounted four wires, 90° apart, on one central support, with a relay switching arrangement for selecting any leg pair (figure 1). Only one feedline and one control line handle the selection. We selected a default position of South, our most desired location, in case the relays lost power.

Figure 1 shows the relay switching arrangement for a four direction Vee beam. Four 66-foot legs spaced 90° apart will produce a 3 dB bi-directional gain over a dipole on 14 MHz., favoring the direction of the wire.

Figure 2 shows a single relay solution for switching between two adjacent legs of a vee. This may be an easy system if 360° coverage is not needed. Ideally, select latching or impulse type relays, as they require only a short-duration voltage to activate. Failing this, select relays with high resistance coils to save power. Make sure that you place a RF bypass capacitor across the coil (figure 3). Also, return to the default position during slow periods to avoid battery drain.

To reduce the chance of RF pickup, we used two conductor shielded cable, and fed the control cable inside the metal support mast. Any wire in the field of the antennas, including the control cable can affect overall station performance.





DIRECTION	S1	S2
S	OFF	OFF
E	OFF	ON
W	ON	OFF
N	ON	ON

How did the system perform? We noticed amazing directivity as we rotated the system through the different directions on 20M, 15M, and 10M. Some directivity was also noted on 40M and 80M. However, one of our control cables kept shorting out for one direction. Despite this, we made a strong showing on 20M, normally a difficult band.

More testing and prior experimentation would have helped our effort. If any of you wish to try our "Chef's Secret" design at home or in the field, I wish you the best of luck. Please let me know your results!

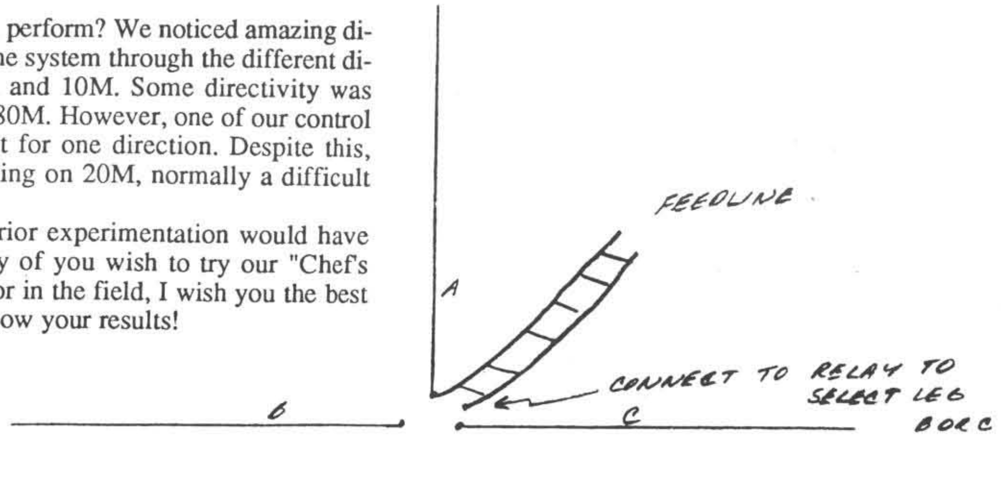


FIGURE 2

WHO'S CODE?

by Louis Varney, G5RV

In the "Century Magazine" for April 1888, published in the USA, appeared a fascinating article entitled "The American Inventor of the Telegraph" by Franklin Leonard Pope. In it he described the work of Samual Finley Breese Morse and his assistant Fred Vail in the design, construction, testing and operation of the first overland wire telegraph system.

In 1835, the then recently organized University of the City of New York established a professorship of the Literature of the Arts and Design and chose Samual Morse, who had already achieved a reputation as an historical painter, as incumbent. Up to this time Morse had led and itinerant life typical of an artist seeking experience and study abroad and commissions for paintings. Although he had received no technical or scientific education or training, he had read a number of scientific papers written by such eminent workers in the field of electricity and magnetism as Professor Joseph Henry, Professor Leonard D. Gale and others. In the year 1832, while on a voyage from Le Havre to New York in the packet Sully, Morse conceived the idea of an apparatus for sending and recording signals at a distance over a wire circuit by electromagnetism.

In 1837, he had constructed a crude, but nevertheless working experimental model based on the principle of the recording telegraph, which he had devised on board the Sully. He took Professor Gale onto his confidence and demonstrated his invention to him.

Professor Gale became deeply interested in the work and plans of his colleague, and thenceforth the assistance which he rendered Morse in his experiments to develop and perfect his invention was of the utmost value. Later in the same year Alfed Vail, a son of Judge Stephen Vail who, in addition to his work as a Judge, owned the Speedwell Iron Works, attended a demonstration given by Morse of his invention. The demonstration was given to the visiting Professor Daubeny of Oxford University and others at the University of New York, from where Vail had recently graduated. This demonstration produced a profound effect upon the mind of Vail who, from an early age had shown a marked fondness for study and investigation in matters relating to the natural sciences.

His inherited and acquired mechanical skill, and the knowledge of construction which his apprenticeship in his father's works had given him, satisfied him that Professor Morse's basic idea was sound and that, although the mechanical design of his demonstration equipment was crude, this could be vastly improved.

At the conclusion of the demonstration Vail spoke to Professor Morse about the development of his invention. Morse said that he lacked the capital necessary for the development as well as suitable workshop facilities. Vail then offered to work as his assistant and to provide the necessary capital and a workshop in his father's ironworks. In return Vail requested that Morse make him a partner and admit him to a share of the invention. Morse agreed to this arrangement.

The story of the development of Morse's basic mechanical and electrical design and the enormous improvements made in the electrical components and circuitry is another fascinating story. However, we are concerned here with a brilliant improvement in the method of signalling which was entirely due to Vail.

Morse had devised a purely numerical code consisting entirely of groups of dots. According to his scheme, a specially prepared dictionary was required in which every word in the English language was represented by an arbitrary number. This meant, of course, that the transmission and reception of a message over there telegraph wire circuit required two translations. The first, the translation of the original text into number groups and the second, the translation of the received numbers by reference to the dictionary back into words! An extremely cumbersome and time consuming procedure.

It was Vail who hit upon the idea of using combinations of dots and dashes to represent, directly, letters; thus avoiding the clumsy inefficient and time wasting double translation required by Morse's method. Vail also had a brilliant idea of visiting the local newspaper printer and, from an examination of the compositor's type case, he immediately realized that the letter "E" was the most frequently used letter in English. He therefore assigned to it the shortest symbol in his new code, a single dot; and so on throughout the alphabet assigning to the less frequently used letters the longer combinations of dots and dashes.

Vail also invented what we know as the "Morse" key, which he used to send the alphabet and numerical characters instead of the clumsy and time consuming "port rule". This contained lead castings of groups of dots only, devised by Morse to actuate a crude keying system to make and break the current in the line.

From the account of the greatly improved progress of Professor Morse's basic invention of the wire telegraph system from the time that Alfred Vail joined him as his chief assistant and partner, it is quite evident that Morse was determined to take all the credit for the many improvements to his basic system, which were quite clearly due to the ingenuity of Vail. Of course, it is far too late now to rectify the unhappy misnomer and to give credit where credit is due, but I for one wish to salute Alfred Vail.

—reprinted from the Winter 89 issue of FOCUS, Journal of the First Class CW Operators Club

New Member / Renewal Data Sheet

Full Name ______________________ Call__________ QRP Number__________

Address ____

City ______________________ State or Country__________Postal Code __________

[ ] **New Address?**
[ ] **New Call?**
Amount enclosed $__________
**** Please do not send cash! ****
New Member Applications Only:
License Class________ Age______
Year 1st Licensed____________
Other Calls Held____________
Rig__________ Ant__________
Bands Most Used____________
Please circle your chief interests:
Ragchewing, DXing, Contests, Traffic, Awards, Homebrew, VHF/UHF, Packet, CW, SSB, RTTY, ATV, Satellite, Other.

[ ] **New Member (U.S. $12.00, DX $14.00)**
[ ] **Renewal (U.S. $10.00, DX $12.00)**
Please make your check or money order payable to: **QRP ARCI.**
Note: Renewals must be received 30 days before publication.

	Yes	No	Maybe
Would you like to be an officer/director of club?	[ ]	[ ]	[ ]
Would you help write for the QRP Quarterly?	[ ]	[ ]	[ ]

What subjects____________________________
What QRP awards/achievements have you won?__________
____
Why do you run low power? ______________

Mail to: **Mike Kilgore, KG5F**
2046 Ash Hill Rd.
Carrollton, TX 75007

QRP ARCI

Spring/Summer Net Schedule

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

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

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

+ Evening of the day before for W/VE

Other QRP Nets

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

Upcoming Contests

Summer Homebrew Sprint
(CW)
July 15, 1990
2000-2400 UTC

***

Summer Daze Sprint
(SSB)
August 12, 1990
2000-2400 UTC

***

Fall QSO Party
(CW)
1200 UTC October 20 to
2400 UTC October 21, 1990

***

Holiday Spirits
Homebrew Sprint
(SSB)
December 2, 1990
2000-2400 UTC

QRP Quarterly
P.O. Box 776
Alpine, Texas 79831

Bulk Rate
U.S. Postage
PAID
Permit #5
Alpine, Texas