

K9YA Telegraph

Robert F. Heytow Memorial Radio Club

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QRPometer

QRP/SWR Meter Kit by NMØS and the 4SQR Group

Philip Cala-Lazar, K9PL

He who hesitates is lost.
Cato, acc. Joseph Addison

This spring the 4SQR Group announced their latest kit, the QRPometer—a power/SWR meter, another innovative design by David Cripe, NMØS. I visited their

Website only to find that within hours the first run had sold out. Same story with the second run, but as the old saw states: “Three times is the charm.” Not only the charm, but also a bonus: starting with the second kit run RCA to BNC adapters are included at no additional cost. So, my third run kit arrived with the adapters and a full inventory of parts, nothing missing! Another thoughtful and sophisticated touch, the resistors are packed separated by value in a segmented plastic bag, kudos to Bart Lawson, WØIIT, of 4SQR.

The meter’s construction is unusual, rather than the customary white silk-screened green PCB, the QRPometer uniquely features two white silk-screened glossy black PCBs. The second board serves as the meter’s front panel. Spacers, screws, lock washers and nuts at the panel’s four corners form the side-free enclosure.

The QRPometer features a built-in 50 Ω , 16-watt dummy load. When measuring power “the 16 watt dummy load is switched in, and the connection to the Antenna disconnected. This permits testing of a QRP transmitter without radiating QRM. The accuracy of the power meter is typically 2% or better from 100 mW to over 8 W.”

“In the VSWR mode, a resistor bridge type circuit is switched in. This inserts 6 dB of attenuation between

the QRP rig and antenna, which limits the VSWR presented to less than 2:1 during tune-up into an unknown antenna. This is a valuable feature for use with QRP transmitters that lack VSWR protection. Once the VSWR of the antenna circuit has been nulled, the QRPometer should be switched to remove this attenuation.”

Construction Notes

No hurdles were encountered during construction, and for the toroid averse—nothing to wind. In all I spent about eight hours spread over two days building the kit. That’s more than double the Website’s suggested time of three hours, but that was a very laid-back period and included time to meter the kit’s many resistors, color in the overlay and check off steps in the construction manual and parts list.

Before inserting the internal dummy load’s eight 100 Ω 2-watt resistors into the PCB I formed their heavy gauge leads with needle nose pliers.

An included 5-inch length of four-conductor ribbon cable electrically joins the PCB and front panel-mounted digital meter.

“...nothing missing!”

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A Direct Conversion Receiver

Paul Ross, W3FIS



In the past, I've written about some very interesting QRP transceivers, which among other things, use what are known as "Direct Conversion" receivers. Well, in this article, I would like to review an exceptionally interesting product that serves not only as a quite usable receiver, but is a nice platform for experimentation and learning just what makes a direct conversion receiver "tick."

To begin, we need to go back to the early days of radio. One

of the technologies competing against the superheterodyne receiver was a variation on the regenerative receiver known as the Homodyne. We need to keep firmly in mind that in the early days of radio, there was a veritable free-for-all in patent protections, as well as an attempt to keep the parts count down, especially with those new-fangled vacuum tubes, which were quite expensive.

The Homodyne, or by its other name, the Synchrodyne, is a radio receiver design that demodulates the incoming signal by mixing it with a local oscillator signal synchronized in frequency to the carrier of the wanted signal. Instead of a heterodyne approach to convert the incoming signal to some convenient intermediate frequency, followed by some filtering, and eventual detection, we have a local oscillator at the same frequency as the incoming frequency. This results in what we might think of as a "zero IF" frequency.

Unfortunately, developing a stable oscillator was a difficult problem. Within a few moments, the local oscillator would happily drift away from the desired value, requiring that the receiver be re-tuned. Of course, the answer to this is to lock in the local oscillator with the incoming carrier with a phase-locked loop.

Oops! What started out as apparently a very simple idea has now morphed into a much more complicated

receiver, now known as the "phase locked loop" design. The Homodyne receiver became one more entry into the boneyard of ideas that didn't work out.

However, time moves on, and for HF amateur work, Single sideband transmission (including digital modes), and CW have become the dominant life forms.

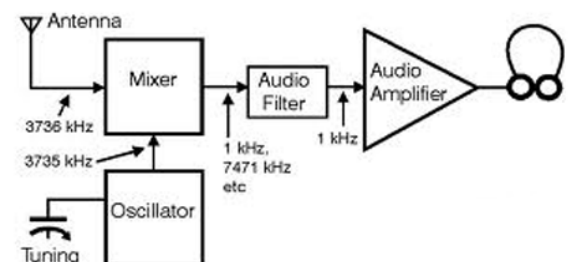
The wanted modulated signal is obtained immediately by low-pass filtering the mixer output, without requiring further detection. Thus, a direct-conversion receiver requires only a single stage of detection and filtering, as opposed to the more common superheterodyne receiver design, which converts the carrier frequency to an intermediate frequency first before extracting the modulation, which requires two stages of detection and filtering.

The circuit is not without other problems. Reverse-transmission paths can occur in the receiver. Local-oscillator energy can leak through the mixer to the antenna input and then re-enter the mixer. However,

since a little of the local oscillator energy get back to the antenna, receiver calibration is easy! Just look for the signal with your general coverage receiver. Also, insertion of an un-tuned buffer amplifier on the front end removes most of the problem, along with the use of a well-shielded case for the receiver components.

The project I undertook was the Ten-Tec "single band direct conversion receiver," model 1056. This retails for a very modest price, and can be enhanced with their case and power supply. I also purchased their model 1001 broadband amplifier, as I wanted to see if I could add an "active antenna" capability, so that a simple whip could be used for band monitoring.

*"...dominant
life forms."*



ALIVO-ZL Receiver Block Diagram



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Well, what do you get for your money? A very nice printed circuit board, an excellent manual, and a big bag of parts. In fact, you get two bags—one for the basic receiver, and another bag of parts so that you can select the desired band of operation from 160-through 10-meters. Changing bands is not going to be in the cards, as it involved removing and replacing parts in the front-end filter and local oscillator. If I want another band, I'll simply buy another board and build another receiver.

About three hours later, including a careful inventory of the parts (all were there), I have the basic board assembled. I'm now ready for a "smoke" test. I plugged a pair of headphones into the phone jack, hooked up the power from a lead acid gel cell I use for a "bench" power supply, and connected a long piece of wire to the antenna connection. Whee! Stations aplenty! What am I listening to? Well, I broke out my handy Pixie II transceiver, which has a crystal for 7030 kHz. The local oscillator runs all the time, so close in, it makes a good signal generator. I tuned the local oscillator in the receiver so that it came in at the low end of the main tuning dial. I then turned the Pixie II off, and peaked the front end of the receiver for maximum noise. That is all there is to it!

OK, now on to the case. In the interest of making a nice job of it, and having it more-or-less match the rest of my equipment in my shack, I opted for the un-drilled case from Ten-Tec that was offered as an accessory. I covered the front and back with masking tape to protect the paint, and provide a place to mark holes.

A trip to the local electronics supply store was necessary to get some knobs, a couple of UHF chassis connectors, a pilot light, power jack, two audio jacks and three toggle switches. I scrounged a 2 1/4" loudspeaker

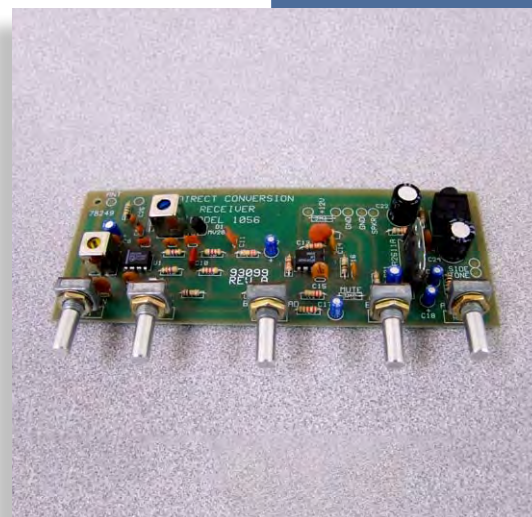


Ten Tec Receiver PCB in Enclosure

from a fellow ham. A speaker from a cheap computer speaker would have done the trick.

The audio circuit has more than enough power to drive the speaker. The metal-working—I only have hand tools—took about another two hours. The speaker is attached to the top of the case with dabs of "hot glue" from a glue gun; very handy stuff. A piece of window screen was placed under the holes in the top of the case to keep things from falling into the loudspeaker.

I set up one audio output jack to be "hot" all the time, and the other to switch the speaker out when headphones were plugged in. The "hot" audio jack is used to feed my computer sound card to recover PSK-31 and other digital modes. After a modest warm-up period, the local oscillator is sufficiently stable for such work. I also rigged the "mute" function so that I could leave the receiver powered up, but "kill" the audio, which added greatly to the local oscillator stability; I could simply leave the receiver powered up without having to hear the audio.



*"... 'hot' all
the time..."*

I added one more modification, which really isn't necessary—the broad band amplifier. This gives about 20 db of gain, which makes an "active" antenna whip feasible. This is selected with a front panel toggle switch to select either of two antenna input connectors on the back panel. You have to be a little careful and cut back the RF gain, as it is quite

easy to overload the mixer.

The audio chain contains a very nice "tone" control, which appears to be a tunable filter. In the "narrow" mode, it is perfect for CW, and in the "wide" setting, excellent SSB voice is produced. With a little care in tuning, you can also recover the rather strong AM short wave broadcast stations at the top end of the 40-meter band. The "main" tuning appears to cover around 500 kHz, and the "fine" tuning about 50 kHz.

All told, a couple of evening's work, and a very useful monitoring receiver was constructed. A 12-volt battery or other power supply could have been used instead of the power supply I purchased from Ten-Tec. There might have been space enough inside for batteries, but I wanted space for the speaker and the antenna amplifier. ■



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My Introduction to Ham Radio

Fred Muehlen, N5WLA, SK



Fred, N5WLA, SK

I wish I had known about it at a younger age, but my introduction to ham radio didn't come until the age of 29. I was working on an electrical engineering degree at the University of Texas at Arlington and had gone to the school to study with two of my classmates, who turned out to be hams. I discovered that when Rick, ex-WD5EBU, came into our study building and proclaimed with great excitement, "Ten meters is open!"

He and Greg, NJ5Q, started talking about "working the band" and other cryptic phrases and I got drawn in. I wondered what all the excitement was about. Rick and Greg proceeded to enlighten me. Eager to share their hobby with a "newbie," Rick agreed to run home and pick up an old Heathkit® transceiver and bring it up to the school. In no time, he had a wire strung up, flipped the switch on the Heathkit® and we were listening to CW from Germany, among other exotic faraway places. Although I didn't understand Morse code at the time and had to rely on them to explain what was being said, it was obvious that there was some type of communication taking place and I was hooked! At the time though, I didn't pursue ham radio any further, because I didn't want to take time away from my studies. In hindsight, this was probably a mistake, as I believe it would have made a number of my engineering courses easier to understand and likely would have affected my career path.

Once I graduated and things settled down a bit, I eventually attained my ham ticket and immersed myself in CW. I bought a TS-140, put up a dipole just above the roof and listened to W1AW code practice and lots of QSOs before getting up the nerve to try my first contact. One evening, after listening for a while, I decided to go for it. I gritted my teeth and called CQ at a slow comfortable speed, then listened for a reply. I was petrified when I heard my call answered by Ken, N8NKX. I got over my initial fright and, an hour later, my first QSO was in the bag. Ken was extremely patient with me, providing fills when needed, but

I was still soaked with sweat when it was done. He also followed up with a nice handmade QSL, letter of congratulations on making my first contact and a pamphlet describing the outstanding salmon fishing up in Michigan. Ken had just come in from one of his fishing trips before our QSO. That initial thrill, the communication that followed, and the QSL packet that arrived later in the mail confirmed I had chosen a wonderful hobby to pursue.

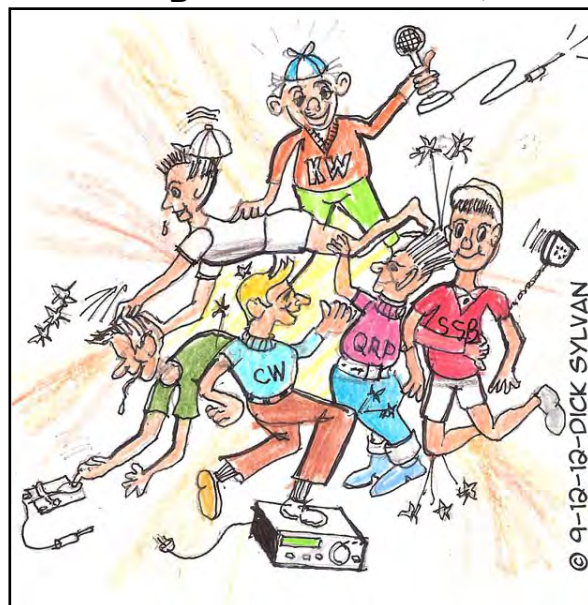
For years I did nothing but ragchew and got my WAS on 40m CW with most of my QSOs being at least an hour long. I then got bitten by the contest bug and have since concentrated my efforts on lightning quick exchanges. Ham radio has been a great hobby and I've made lots of friends over the years, many of them people I wouldn't have crossed paths with otherwise. I love the technical side of the hobby as well, but it's the bonds made with others, regardless of social stature, I treasure most. Sure wish I had started earlier. ■

Congratulations MFJ

MFJ Enterprises celebrated their 40th year in business on October 5 - 6 at *ARRL Day in the Park*. The celebration included free prizes, factory tours, free lunch, special event station and more.

Ham Lingo

DICK SYLVAN, W9CBT



"PILEUP"



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Part V

5

Scott B. Laughlin, N7NET

I bought a RCA 201A (still have it) and built a tube receiver using a regenerative Reinartz circuit. For plate voltage in the receiver I went to the dime store and bought a batch of flashlight batteries and connected them in series until I got about 45 or 50 volts DC. The receiver worked well and many signals could be heard. With the tube transmitter and tube receiver my operating skill increased and I began to make contacts several hundred miles from Des Moines. My folks were amazed when I told them I had talked with a fellow in Chicago, Detroit or Omaha.

Back in the early '20s most of we amateurs used the straight key for pounding brass. Many Friday and Saturday nights I would be at my station pounding the key all night. One morning my arm was as stiff as a board. I had the well-known "GLASS ARM." My arm felt just like a hunk of glass. I tried to send with my left arm, but the results were not very good. *QST* came out with an article on how to make a bug key. I fashioned one according to directions using a clock spring for the vibrating mechanism, brass bolts and nuts for the contact, etc. By using this homemade version of a Vibroplex® my glass arm disappeared. Many of you old timers can well remember the glass arm epidemic and the cootie key that would give that famous "Lake Erie Swing."

By 1923 there were quite a few amateurs in Des Moines. Several of us got together and organized a radio club called The Capital City Radio Club. Membership included Fred Crowell, 9DIP; Jack Duncan, 9BRS; Glen Case, 9BOG; Mack Sweighart, 9CLQ; Shorty Tarr, 9TR; and a few others that for the life of me I cannot remember.



Art Collins

We would meet in various homes of the membership and discuss our latest construction programs, who we worked on the air, and other topics.

Every year at Ames, Iowa there was a get-together of all amateurs throughout the state. This convention was called "Radio Short Course" and of course our club was represented. One year our club put on a skit called "Pity A Poor Sailor On a Night Like This." The local was on board a ship and it was raining a storming.

I was the radio operator, 9DIP was the Captain, 9BRS was the First Mate, and 9TR was the sailor who came out of the storm into the wireless room with water dripping from his raincoat and could barely say, "pity a poor sailor on a night like this" while I was trying to send SOS on a broken down transmitter. BRS and DIP rushed into the wireless room and said the ship was sinking fast. We were going down to Davy's Locker. We had a lot of fun giving that skit and the audience really enjoyed it.

I remember one year Mr. Collins, the producer of the famous Collins receivers and transmitters, gave a talk on the PI network for tuning the final amplifier on a CW rig. After he finished giving a long presentation I went up to the platform and introduced myself. I shook his hand not knowing then that he would one day be a famous radio personality. For years I kept in contact with Collins via radiograms.

Note: Red was a firm believer in the value of CW. For many years, and until he became a silent key, he operated the Institute of Radio Communications in District Heights, Maryland. From this location he taught Morse code, radio theory, radar and Teletype®. Despite the implementation of newer modes of communications, Red continued to teach Morse code to selected members of the United States Air Force. ■

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*"Pity a Poor
Sailor on a Night
Like This."*



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Louie Carlson, WA8CID



Vic's Folly

I was chewing the rag with a couple of fellows on the 2-meter frequency the other night when the subject worked around to the lack of activity by the local group of ham radio operators. Butch Meny, K8VXO, reminisced: Remember when we done this, or sometimes we done that, and I began to wonder, had the old gang really slowed down or were the good old times more a trick of our memory?

Five Dollar Bet

May 1969 we were standing in the swap and shop area of the Michigan Radio Amateur Radio Convention in Grand Rapids. Vic Jackson, W8BLP, of Lansing was ably holding the floor with the topic of conversation being discussed. He said I have a five-dollar bet with my boss that I can cross Lake Michigan in a bathtub. I am going to need communications and that's where you fellows from Ludington come in, I will be depending on you. I figured it was just so much talk and didn't think too much more about it until a couple of months later.

"...cross Lake Michigan in a bathtub."

Fred Richter, W8VTM, called me, "Guess what? Vic is in town and he has his bathtub ready to cross Lake Michigan." We hurried down to Vic's father's house and there it was, an old time bathtub with the drain welded shut, a couple of used oil drums painted a phosphorus red secured to each side for flotation, an outboard motor attached to the back for propulsion. It was a unique but attractive vessel.

The next day was the Fourth of July and Vic entered his craft in the local parade with a sign on the side declaring, "VIC'S FOLLY." July 5th dawned calm with a heavy early morning fog covering the lake. After an interview with the local radio station Vic left the local yacht club around 6 am, destination Manitowoc, Wisconsin. For communication

Vic had onboard a commercial battery-operated transceiver converted to 146.94 MHz and a 40-meter CW transceiver. Vic's wife and friend, Chuck, were to take the car ferry to Manitowoc and meet Vic on the other side of the lake with a car and trailer so they could retrieve *Vic's Folly* and return it to Michigan. Chuck also had a battery-operated transceiver tuned to 146.94 MHz with him on the car ferry.

At 6:35 am I turned on my ham radio station and John Schmock, W8VHQ; Bob, WA8PIE; Butch Meny, K8VXO; Helen Schmock, W8GJX; Clay Dewey, K8CKD; Amy Lake, WA8ORC; and Phyllis Covert, WB8BJP, were all on 146.94 MHz communicating with Vic. At 7:55 am I had to sign clear and leave for work, wondering all the time how Vic was doing in his conquest of Lake Michigan.

To the uninformed, the Great Lakes comprise the largest body of fresh water in the world, and sailing from the sight of their shores is not for the novice without knowledge of the sea. Some 200 ships of varying sizes have met their fate between Big Point Sable to the north of Ludington and Little Point Sable to the south. In modern history the worst disaster in this area took place on November 11, 1940 when three large lake freighters went down. Two of the ships sunk with the loss of all aboard, some fishermen and their fish-

ing tug rescued the third ship's crew. A car ferry went aground trying to enter Ludington Harbor with no loss of life, it was later floated and returned to service.

Abandon Ship

At noon I returned home to find Vic had aborted his trip about ten miles out of Ludington. The wind had come up and the sea started running four to five foot waves. The 40-meter transceiver, although sealed in a plastic bag, had failed and Vic had to stand up and hold the portable transceiver on 146.94 MHz above his head to request someone call the local Coast Guard for assistance.

That morning it looked like the crossing was a failure, but by evening Vic had consulted with a couple of ferry boat captains and found out that usually during the last of August arrived a spell of good weather



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when the lake remains calm for two or three days at a time. The next time he would rely on 2-meters and use a commercial FM transceiver of the 100-watt class, also he was bringing a 2-meter beam antenna to Ludington. The idea was that a mobile could drive south of town on the bluffs that rise 200 to 250 feet above Lake Michigan and, maybe, extend the range of the shore station to *Vic's Folly*.

Surprise

One Sunday afternoon, Fred Richter, W8VTM, and myself, Louie Carlson, WA8CID, took Fred's mobile and beam antenna up to the bluffs. To our satisfaction Wisconsin was alive with 2-meter stations. One surprised Wisconsin mobile was heard to comment, "I have never worked mobile to mobile across Lake Michigan before." So, knowing our ace-in-the-hole communication-wise was ready, all we had to do was wait for fair weather and a chance for Vic and his improved bathtub to again arrive in Ludington.

The faithful day arrived August 24, 1969. The weather was clear and calm, a beautiful Sunday on Lake Michigan. Stretched out to the west of Ludington a fleet of small boats fishing for the silvery Coho and Chinook salmon which the Department of Natural Resources had planted in Lake Michigan.

Launching this time near the harbor entrance about 6:25 am and out through the fleet of fishing boats sailed *Vic's Folly*. The local group of ham radio operators was on frequency anticipating Vic's departure. Among the group were the "Kings of 2-Meters," Bob, WA8PIE, with his high-power and 100-foot tower high on a bluff overlooking Lake Michigan near Little Point Sable and across the lake was Tim, WA9SRU. I lost contact shortly with my low ¼-wave wave vertical antenna, but hams with beams were in solid contact as Vic sailed merrily along on his historic voyage. I signed clear and went to church.

Monitoring the frequency in early afternoon found Vic still making radio contact and apparently good progress toward his goal. Late afternoon and the first inkling of trouble, Vic crossed the path of a car ferry he recognized as sailing from Frankfort, Michigan. His compass was off, probably from all the metal in the bathtub and he was sailing on a too northerly course. Realizing he was sailing far north of his track, Vic changed course and followed the ferryboat's track.

The bathtub had very little freeboard and Vic spent the day sitting in a few inches of water. Water, that was

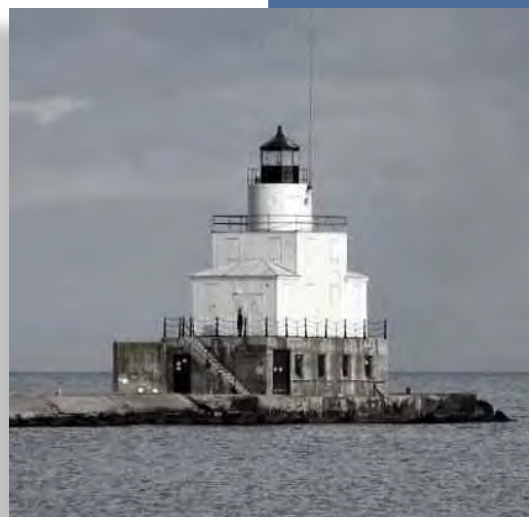
about to cause trouble to the generator charging the batteries and causing Vic to suspend transmitting to an emergency-only basis. About this time I headed to the local Baptist church for the evening service. After church, about 8:30 pm, we drove over to Fred's, W8VTM.

Throughout the day Fred's home had been the command post for "OPERATION BATHTUB." Hams stopped by to monitor Vic's progress; UPI, API, TV and radio stations kept Fred's phone buzzing for updated *Vic's Folly* news. "What is the progress of *Vic's Folly*?" we asked. WA8PIE and WA9SRW have been calling him, but no answer. Vic's father called the Coast Guard and they were searching for him. By this time darkness was settling in and everyone was wondering, "Where is Vic?"

Sitting in his bathtub vessel, battery going dead, low on gas, wet and darkness settling in, Vic was about to reconcile himself to a night of drifting alone on Lake Michigan.

About to give up hope Vic looked out to the horizon. Was he imagining things? A familiar Manitowoc landmark, a grain elevator, was in sight. With the last few drops of gas Vic made the pier at the mouth of Manitowoc Harbor. Instead of a cold night on Lake Michigan it was a victory dinner with the mayor.

Remember back when? Well, maybe things *have* been a little dull lately. ■



Manitowoc Breakwater
Lighthouse

"OPERATION BATHTUB"

A Winning Formula...

Like what you're reading in this month's *K9YA Telegraph*? If so, you're in good company, as amateur radio operators in more than 100 countries agree with you. Know what else? Hams just like you write the *K9YA Telegraph*.

Evidenced by your feedback we know we've hit on a winning formula:

YOU + K9YA Telegraph = A Great Read

But without your side of the equation, it just doesn't add up.

http://www.k9ya.org/write_for_us.htm



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Be sure to build your kit from the latest edition of the construction manual, mine was built from version 4, which includes updated calibration information, i.e., *three* resistors, R11, R35 and R40 are *not* installed during construction. They are soldered in following meter calibration and after the temporary test jumper is snipped out.



During the first part of Step 8—Calibration, a DVM is connected between test point TP1 and ground while trimpot R33 is adjusted for 5 volts. TP1 is located adjacent to trimpot R33, the temporary jumper labeled TEST next to SW2 is *not* the one used.

On the silk-screen parts overlay diagram resistor R42 is depicted positioned horizontally, on the PCB it is located vertically.

The supplied self-adhesive rubber feet are not thick enough to extend past the nuts and lock washers at the meter's corners.

4SQRP QRPometer to NorCal Power Meter Comparison

With a NorCal Power Meter already in the shack the opportunity to compare the two QRP club offerings presented itself. The NorCal meter's accuracy, quoted from its Assembly & Operating Manual, Revision 1A, is: "within +/- 10% for 0.5 watt to 9.9 watt."

The test set-up included the Tucker T-1000's (Vec-tronics) and QRPometer's built-in dummy loads and my shack's complement of QRP rigs.

Hendricks PFR-3 on 40-meters—12-volt power supply

- QRPometer = 5.00 watts
- SWR into dummy load = 1.19
- NorCal Power Meter = 5.00 to 5.01 watts
- SWR into dummy load = 1.2

Wilderness Radio NorCal 40A on 40-meters—13.6-volt power supply

- QRPometer = 3.00 watts
- SWR into dummy load = 1.19
- NorCal Power Meter = 2.7 watts
- SWR into dummy load = 1.2

Arizona ScQRPions Ft. Tuthill 80 on 80-meters—13.6-volt power supply

- QRPometer = 3.7 watts
- SWR into dummy load = 1.19
- NorCal Power Meter = 3.6 watts
- SWR into dummy load = 1.2

NorCal 2N2/20 on 20-meters—13.6-volt power supply

- QRPometer = 4.46 watts
- SWR into dummy load = 1.19
- NorCal Power Meter = 4.5 watts
- SWR into dummy load = 1.2

Hendricks DC40A on 40-meters—13.6-volt power supply

- QRPometer = 1.10 watts
- SWR into dummy load = 1.17
- NorCal Power Meter = 0.9 watt
- SWR into dummy load = 1.2

The differences in readings between the two meters were small. The NorCal Power Meter offers several features such as an analog meter, power/SWR annunciator and peak power display not available on the QRPometer; is more expensive; and is not currently available.

Conclusion: The 4SQRP Group has another winner on its hands and the amateur radio community benefits from this useful, precise, economically priced and fun to build QRP shack accessory. ■

Join the QRPometer group at:

<http://groups.yahoo.com/group/qrpometer/>

K9YA Telegraph Product Reviews

NorCal Power Meter, November 2008

Hendricks DC40A, June 2007

Wilderness Radio NorCal 40A, June 2008

Hendricks PFR-3, October 2008

NorCal 2N2/20, June 2009

Arizona ScQRPions Ft. Tuthill 80, June 2010