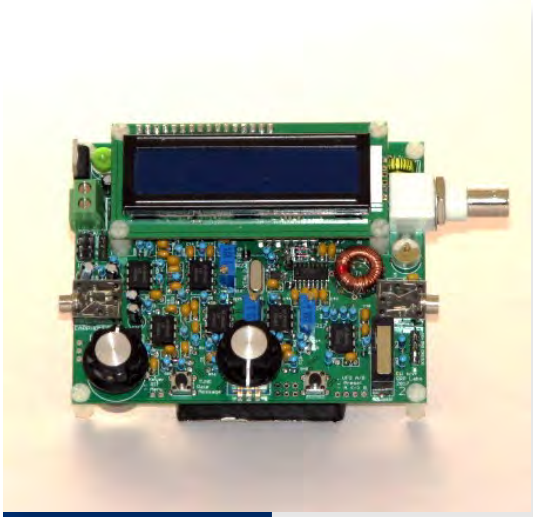
K9YA Telegraph

Robert F. Heytow Memorial Radio Club

Volume 15, Issue 3 March 2018



QCX

QRP Labs Moves the Goalposts

Philip Cala-Lazar, K9PL

"The QCX (**Q**RP Labs **C**W **X**cvr) is a single-band five-watt CW transceiver kit."

August 2017 and QRP-L was abuzz with news of the recently announced QCX transceiver kit. An innovative and groundbreaking design featuring a Tayloe Detector, Class E amplifier, comprehensive menus, and a two-line LCD; all directed and masterminded by an ATmega328/P. The QCX was designed and is offered by Hans Summers, GØUPL, of QRP Labs. Its availability stirred many QRPers hearts and set their soldering fingers to itching.

"…innovative and groundbreaking design…"

First introduced in limited numbers for a "Buildathon" at that summer's European Youth on the Air (YOTA) event, it was then offered for sale, in slightly modified form, to hams worldwide through the QRP Labs website: http://shop.qrp-labs.com/qcx

I preordered a 40-meter kit (also available in 80-, 60-, 30-, 20- and 17-meter versions) in late August, that order was promptly acknowledged, and followed by another e-mail notification citing the kit's serial number as 806. In early November, all the way from Tokyo, in a very compact, but fully packed parcel, #806 arrived in my mailbox with firmware revision 1.00c. It was one of the second batch of 500 produced. QCX kits were flying off the virtual shelves. I expected this extended lead-time; QRP Labs' website and e-mail updates minimize QRPers' anticipatory frustration levels.

The QCX is priced right, at $49 (plus shipping); the right power, five watts, QRPers' "full gallon"; just challenging enough to construct with confidence of success; fully featured with a bright two-line LCD and onboard diagnostics including alignment tools and test instruments; and menu offerings to provide a high degree of customization.

The two-month wait was well invested in reading the construction manual and, on the QRP Labs forum, kept abreast of builders' experiences, suggested modifications, requested changes to the firmware and firmware updates.

Building

The 138-page (version 1.08) QCX assembly manual is of a very high order in its concise, detailed and clear instructions. It includes a thorough circuit description and operating and troubleshooting guides. Every assembly step is illustrated with a depiction of the board overlay. Components inserted at that step are colored red, components already mounted are colored gray and components not yet installed, colored white. Thus, at a glance, builders can easily locate the position of components installed at each step and, in consequence, the board's populated status at every step. The manual, in this reinvention, is certainly one of the best, if not the best, electronics assembly manual

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Inside This Issue...

Philip Cala-Lazar, K9PL
Editor

Mike Dinelli, N9BOR
Layout

Jeff Murray, K1NSS
Staff Cartoonist

Dick Sylvan, W9CBT
Cartoonist Emeritus

Rod Newkirk, VA3ZBB (SK)
Contributing Editor
2004 - 2012

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

ISSN 2472-2340

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since the demise of the late, lamented and legendary Heathkit manuals.

Despite the number of parts and their proximity on the 4.0 x 3.2 inches (101.6mm x 81.3mm) board, the fully silk-screened high-quality PCB simplifies component placement. Assembly was mostly uneventful, requiring only a deft hand, magnifier (as needed) and a temperature-controlled soldering iron with a small tip.

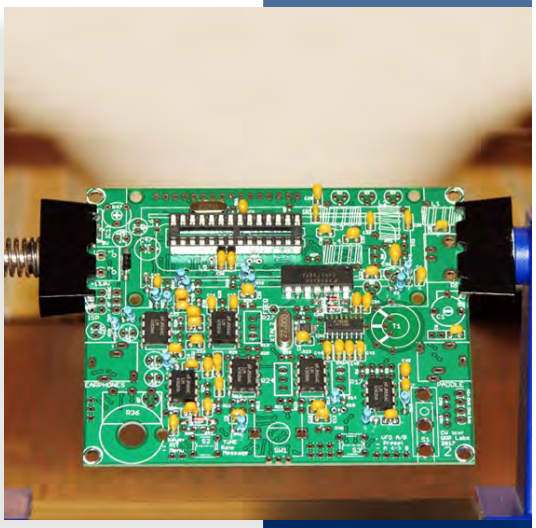
The only component that might prove problematic to some builders is transformer T-1. T-1 is wound on a 1/2" ferrite core and consists of four windings. The number of turns needed varies with band. The 40-meter version requires three five-turn windings–the primary and two secondaries–and 38 turns on the third secondary. From the manual: *The four windings must all be in the same "sense"*. However you wind it, "...all the four windings have to be the same, to be sure to get the phasing to the quadrature sampling detector correct."

The manual includes the suggestion to do all four windings in one go, with one length of wire. I preferred to wind them separately. It was all a bit fiddly, as was getting all eight leads into their pads on the board. Cutting the windings' leads long and graduated in length-simplified insertion. Long leads first, followed by next longest, and so on.

When the time came to align the rig I found the procedure was not proceeding as described in the manual; my readings, viewed on the QCX's LCD, were mostly stationary and truncated. I decided to check voltages as detailed in the extensive list included in the manual. While probing IC6, a LM4562 8-pin dual op-amp, I spotted a spider's-silk-narrow solder bridge between the pads of two nearby components. A touch of the soldering iron and the alignment was then successfully completed. At 13.3 volts input (following the reverse polarity protection Schottky diode) my rig outputs 4.9 watts into a dummy load. Receive current was measured at 111 mA and transmit current at 598 mA.

The QCX's operation and menu access are managed by four controls, from left to right, Gain, left pushbutton Select, Tune (combination rotary encoder and pushbutton), and right pushbutton Exit. A bit daunting at first, their operation is quite logical and soon mastered.

More sophisticated than most monoband QRP kits, the QCX offers two VFOs with split operation available, frequency memories, receiver incremental tuning, iambic A, B and Ultimatic keying modes, message memories, Morse decoder on transmit and receive, beacon and WSPR modes, S-meter, battery power meter, microswitch straight key, and much, much more.



On the Air

My first QCX QSO: tuning around the band with the just completed rig, I was not expecting to make a QSO on this first excursion, so no key connected. Then, out of a mostly silent band popped up W8F, the Edmund Fitzgerald special event station located near Livonia, Mich. (370 miles), loud and clear, too good to ignore. I sent my call with the onboard microswitch key and W8F's op came right back with a RST 579 report, W8F was RST 599 and running QRO.

> *"…too good to ignore."*

Calling CQ, my next few QSOs took me to Hickory, N.C. (560 miles); Columbiaville, Mich. (233 miles); Sandusky, Ohio (266 miles); and Fort Ashby, W.Va. (503 miles) with RSTs between 559 and 589 during slack propagation with my low 40-meter dipole. The ops' reports were unanimously positive as to signal stability and the QCX's T9 note. On those occasions when CQing failed to accomplish a QSO, I checked the Reverse Beacon Network where I was gratified at the number of stations and their locations, coast to coast, reporting my signal.

During the CQ DX contest weekend with crowded bands and a combination of powerful and weak stations, the QCX's 200 Hz filter did a great job separating signals. It's so good, that when tuning at the 1 kHz rate, you'll miss many stations as you traverse the band thanks to the rig's stonewall selectivity. It is much better to choose (by pressing the rotary encoder/tuner knob) the 100 Hz rate and then shift, where necessary, to the 10 Hz rate.

It is a cliché to say whatever signals I can hear on my Yaesu FT-1000MP, I can hear on the QCX. But it's

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Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org

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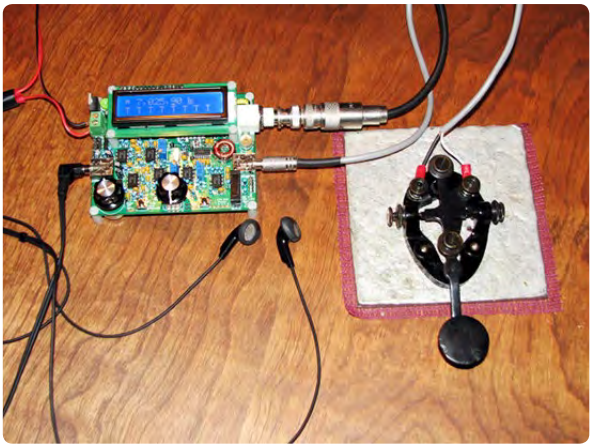
true, a remarkable little rig in size, but not in performance, value or smiles per QSO.



Keyer Anomaly

Familiarizing myself with the rig's built-in keyer and my Bencher paddle, I noticed that in iambic A, B and Ultimatic modes the keyer does not reliably buffer dit inputs and insert the dit following a dah–the timing is off. It was most apparent when sending the letter F, but also whenever a final dit follows a dah. (Breaking my sending rhythm, by pausing a bit, I could "force" the trailing dit.)

Repeating the alphabet and numerals several times at 15-, 20-, 25-, 30- and 35-wpm, both in practice mode (transmitter off) and in normal mode (transmitting into a dummy load) the result was the same. I then repeated the same test run with my LogiKit CMOS-4 keyer and the same paddle. The LogiKit performed flawlessly, always inserting the dit following the dah. Hopefully, in a future firmware revision, this keying anomaly will be resolved.

This keyer fault has little impact on my overall excellent opinion of, and on the air experience with, the QCX. That is because when operating QRP I very rarely use a keyer and paddle, preferring the instantaneous flexibility a straight key offers in emphasizing code elements. I have found this flexibility especially helpful during low power QSOs in poor and noisy band conditions.

Conclusion

The QCX in all its facets, from ordering to delivery, manufacturer support, mailing list, array of features and sterling performance has been a revelation to this longtime kit builder. Assembly is just demanding enough to reward the builder with a precise, sensitive and selective compact transceiver. With its introduction of the QCX, QRP Labs has substantially moved the goalposts for QRP transceiver kits. As I mentioned to Mike, N9BOR, the QCX behaves like a monoband, QRP slice out of a QRO high-end rig with deep, deep menus—very innovative and a joy to operate.

So, how pleased am I with my QCX experience? So pleased that I ordered a 20-meter version and the QLG1 GPS receiver kit for WSPR mode. ■

Resources

Assembly manual: http://qrp-labs.com/images/qcx/assembly_LT.pdf

Dave Casler, KEØOG
Overview: https://www.youtube.com/watch?v=A0BkDoVcaQ4

Hans Summers, GØUPL
Overview: https://www.youtube.com/watch?v=VlMOZistkCs&feature=youtu.be

Kevin Loughin, KB9RLW
Building: https://www.youtube.com/watch?v=Zp4SP9ewXes
Demo: https://www.youtube.com/watch?v=F1YoDIpKAzY
Keyer anomaly: https://www.youtube.com/watch?v=De6zVFqYaeE

Modifications: http://qrp-labs.com/qcx/qcxmods.html

Roberto Pietrafesa, IZ7VHF
Complete build: https://www.youtube.com/watch?v=_Y89tMETDsQ

QRP Labs group forum
https://groups.io/g/qrplabs

Robert F. Heytow
Memorial Radio Club

www.k9ya.org
telegraph@k9ya.org