

Hendricks PFR-3 Portable Field Radio

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One of the facets of QRP operation is the ability to “take it with you.” This has resulted in QRP vendors offering portable rigs that can easily be slipped into a suitcase or backpack and taken along on trips. Many times I have worked people on hiking trails or in hotel rooms that are using these portable rigs.

At FDIM2008, Hendricks QRP Kits announced its newest entry into this portable category. The PFR-3 (Portable Field Radio) is a three band self-contained transceiver kit covering 40, 30 and 20 meters. It is self-contained in that the transceiver, antenna tuner, memory keyer and 8 AA batteries are contained in one small case. External power can be supplied through a separate jack, and the user can switch between batteries and external power from a front panel switch. There is one option available. It is the PFR paddle that plugs directly into the front of the PFR-3 (see Figure 1). With the paddle, one only need add antenna and headphones to be QRV. The complete construction manual for the transceiver and the paddle is available at the Hendricks QRP Kits Web site at <http://www.qrpkits.com/>

Hendricks QRP Kits list the specifications as follows:

- Bands: 40 meters, 30 meters and 20 meters
- Tuning range: Full band coverage
- Mode: CW only
- Receiver MSD: 0.2 μ V typical
Selectivity: 300 Hz
- Receive current, no signal typical:
Active, 47 mA, Idle, 34 mA
- Transmitter: 5 watts at 12 volts, all bands
- Spurs: -50 dBc maximum, all bands
- 5 to 35 wpm internal iambic keyer.
Two (2) 63 character keyer memories.
- Coax or balanced line output. Built in BLT (balanced line tuner)
- Size: 7.2" long, 4.2" wide, 1.5" high (less knob height).
- Power supply voltage: 8 volts minimum, 12.5 volts maximum. 12 to 9 volts recommend.
- External power or internal battery pack



Figure 1—The PFR-3, showing the optional plug-in paddle.

The PFR is designed by Steven Weber, KD1JV, and the custom Ten Tec enclosure is from Ken Locasale, WA4MNT. The PFR-3 includes digital read out (four digits), a DDS VFO and microprocessor control. Firmware for the PFR is provided free for life. Parts for this kit are through-hole, with some pre-mounted SMT components.

Building the Kit

If working alone, the builder of this kit should have intermediate skill as some areas of the board have close component spacing (see Figure 2). Also, there are two transformers to wind that require some interpretation. However, if the builder is a beginner but has basic soldering skills and access to an Elmer, this kit will be doable and a good learning experience. There are a few components that will not mount flush to the board. These are resistors R16 through R23. The holes on the board are slightly narrower than the resistor leads when bent at 90 degrees to the body. This is a minor issue, but the builder should know in advance to mount one end of each resistor flush to the board and the opposite end slightly elevated.

The manual is well designed to aid the builder. A full-page drawing of the board is provided to help the builder in installing the parts. Each part is shown with the value in red (2.2K) and the part number in black (R21). This helps to reduce the time required to find the various locations when installing parts. Further, Hendricks divides the building into five groups. In each group, a blow up of the section from the full page drawing is provided to further

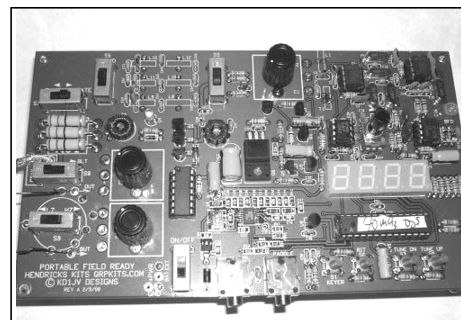


Figure 2—The pc board has closely-spaced parts in some areas, but should be buildable with moderate experience.

help with location of parts. Also, testing of sections is done at the completion of Groups 1, 2 and 5. This allows for early success as well as trouble detection should it be needed. The groups are as follows:

Group 1—Microprocessor and Display

Care should be taken in this section when installing the LED display. It needs to go in one way with the missing pins on the LED corresponding to the missing holes on the PCB. Pay attention when mounting R16 through R23 to insure a good fit. When complete, LED operation is verified along with Tune UP, Tune DN, RIT switches and DDS operation.

Group 2—Receiver Section

Inductor L1 and transformer T1 are wound in this section. Both use number 30 wire which is thin—take care when stripping and tinning as the leads can be easily broken. When winding T1, pay attention to the diagram to insure proper phasing (Starting here, and with other inductors and transformers, an Elmer would be an asset for the beginner). When complete, you can verify electronic keyer operation, listen to 40 meters, then calibrate the DDS, and adjust the IF offset and BFO.

Groups 3 (Transmitter), 4 (Low Pass Filters) and 5 (SWR Bridge and BLT)

These groups are built as a unit, and no testing is done until Group 5 is complete. In Group 5, a picture of both T2 and T3 would help explain what is required. I recommend that when winding T3, use a bit of masking tape, and the leads of the 16

turn winding be labeled cap and ct, the leads of the 12 turn winding be labeled Hi Z, and the leads of the 6 turn winding be labeled Lo Z. This will aid with the installation of T3. At completion of Group five, transmitter operation is verified on each band. I had exactly five watts output to a dummy load on each band.

Final Assembly

Once testing is completed with Group 5, the next step is to put the PFR-3 into its custom case. Before mounting it in the case, various jacks and connectors are mounted on the case and wired to the PFR-3 pcb. The specifications list the maximum supply voltage at 12.5 volts. My bench supply measures 13.6 volts, so to insure safe operation, I added two 1N4007 diodes in series with the external power lead. These diodes drop the voltage approximately 1.6 volts, thus insuring that external supply voltage never exceeds the 12.5 volts per the specification. So, if you plan on operating from an external source above 12.5 volts, consider adding the diodes prior to mounting the pcb into the case.

With wiring from the pcb to the connectors on the case complete, it is an easy process to slide the pcb into the case. The case is remarkably well engineered and the pcb fits perfectly as if a glove.

Using the PFR-3

Using the PFR-3 on the air requires a bit of training, but it is a quick learning curve. On power up, the PFR-3 will come up on 7.030 on 40 meters, 10.110 on 30 meters and 14.060 on 20 meters. The main difference between the PFR-3 and other transceivers is frequency control. The PFR-3 uses two switches to change frequency as opposed to a single knob on a variable capacitor or POT. These switches are labeled "Tune DOWN" and "Tune UP." Tune DOWN lowers the frequency and Tune UP raises the frequency.

These tuning switches are operated best by "clicking" them to the side, rather than pushing straight down. Tuning steps are in 50 Hz increments. A momentary click of the switch will change the frequency by 50 Hz. Since the display only has 100 Hz resolution, it will take two clicks of the switch to see a change of frequency on the display. Holding one of the tuning switches closed for longer than about one second will start an auto tune

mode, where the frequency will change in 100 Hz steps at a rate of about 10 steps per second, so long as the switch is held closed. When the switch is released, normal 50 Hz "one click" tuning is restored.

Changing bands involves two slide switches that are used to select the operating band. Both switches MUST be in the same band position for proper operation. The band switch, located near the top center of the cabinet, tells the processor which band you want to use and will indicate the selected band on the display for a second when the band is changed or on power up. The switch located near the top left of the cabinet is used to connect the output of the low pass filter to the antenna. If the two band switches are not in sync, there will be no signals in the receiver, and the transmitter might be damaged if you transmit at this time.

Clicking the RIT switch will activate RIT. The left-most decimal point on the display will light when you are in RIT mode. When in RIT mode, the receive frequency is changed by the tuning switches, and the transmit frequency stays were it was when RIT was activated. Clicking the RIT switch again will exit RIT mode and restore the original receive frequency.

It can be cumbersome trying to move around a band at 50 Hz per click. To help with fast frequency changes, a direct frequency entry (DFE) mode is available. This mode allows you to go directly to a specific frequency by entering it in with the paddle. Clicking and holding closed the RIT switch for longer than one second will activate this mode. The display will blank when DFE mode is enabled. The frequency you wish to go to is entered via the paddle or key, starting with the 100 kHz digit and finishing with the 100 Hz digit. As each digit is entered, it will be shown on the display and shift from right to left as additional digits are entered. If a number is not recognized, a "?" will be sent by the side tone. Once the 100 Hz digit is entered, the rig will re-tune to that frequency provide it is within the normal tuning limits of the current band. If it outside the band, the frequency at which the rig was tuned to when DFE was enabled will be restored. If you make a mistake or wish to exit the DFE mode at anytime before the 100 Hz digit is entered, you can escape by clicking any of the switches.

Other functions are available that use

the "MENU" switch in combination with the paddle. These include storing a message in one of two memories; sending one of the two stored messages; changing the keyer speed; and selecting either iambic mode A or mode B.

If a monaural plug is in the paddle jack at power up (the sleeve grounds the dash input pin), the rig will power up in straight key mode. This allows using either a straight key or external keyer. While in straight key mode, none of the keyer switch functions will be available.

On the Air & Conclusions

My first time on the air with the PFR-3 was in the early afternoon on 20 meters. As I was tuning around, I came across a "small" pile up. It was John, ON4UN. It took one call to snag him! Since then, I have used the PFR-3 with my Tri-Bander, an eighty meter dipole fed with ladder line and a W3EDP end fed. I have worked into Europe, South America and Africa on all three bands using various antennas. The 300 Hz crystal filter is wide enough to allow one to tune around the bands, yet narrow enough to aid in eliminating close by signals. I have found the direct frequency and the RIT to be pluses. The versatility of the BLT tuner allows one to use any antenna configuration from coax direct, end fed against ground and balanced line. There is a built in SWR bridge using an LED as an indicator of low SWR. This is a plus, although the tuning of the BLT can be sharp and requires "slow" tuning to see the LED dim at the low SWR point.

All in all, QRPers will probably enjoy traveling with the PFR-3. It covers the three most popular amateur bands. It provides functionality useful to the QRPer. The built-in tuner allows for a wide range of antennas. The PFR-3 is available from Hendricks QRP Kits (<http://www.qrpkits.com/>). The PFR-3 is priced at \$200.00 plus shipping cost of \$20 US and \$22.50 DX. The PFR Paddle is \$40.00.

