

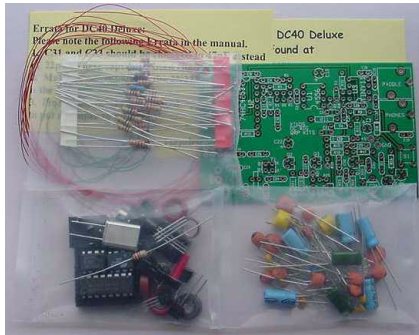
DC40 Deluxe Transceiver



A new 40 meter transceiver from KD1JV and Hendricks QRP Kits.

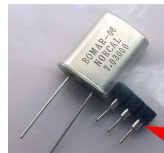
Features and functions include:

- High immunity to SWBCI interference
- Keyer with iambic mode or straight key mode and sidetone.
- Muting and T/R control
- Tune mode simulating keydown.
- Audio filter centered on 600Hz
- Power output 750mW to 1 Watt



DC40 Kit Contents

Note: Initial shipments of kits did not include the SIP crystal socket and 7030 crystal. Contact Hendricks QRP Kits, <http://www.qrpkits.com>



Snip off the middle pin

Unpacking and Inventory

Packaging for the DC40 includes an over-pack for the groups of components. Resistors and capacitors are in individual packs as are the remaining parts. Lengths of wire in two colors for winding toroids are provided. Inventory the parts and check them off on the parts list.

Plan ahead before starting your assembly to allow experimenting later. Install DIP/SIP pins and sockets at key component locations. Experiment with different parts in the PA stage. You may want to add an audio amplifier and so on.

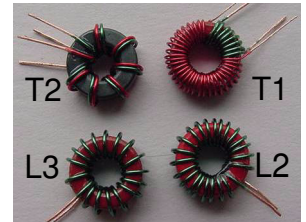
It's a pretty good idea to stuff the board and perform the tests in the sequence outlined in the manual. The functions included in group 1 provide controls for the rest of the sections. If something gets messed up in group 1 all the rest of the groups may not function correctly.

Continue with the remaining assembly groups as described in the DC40 manual.

Winding the Transformers and Coils

Having said that you should stuff the board in the sequence described, I deviated a little.

Toroid winding is described at each point in the manual where the coils are installed. My preference is to prepare all the toroids at the beginning of the assembly process. That way you don't need to stop and start while installing a group of components. Power output testing produced the most power using about 1.2uH for L3 (18t) and 1.7/2.0 for L2 (20/21t).



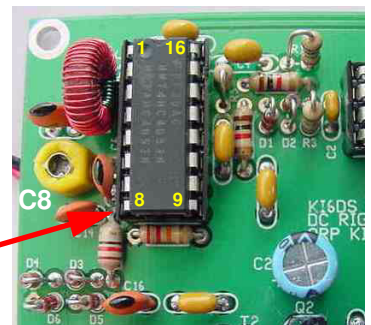
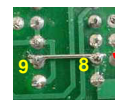
Group 1 Assembly

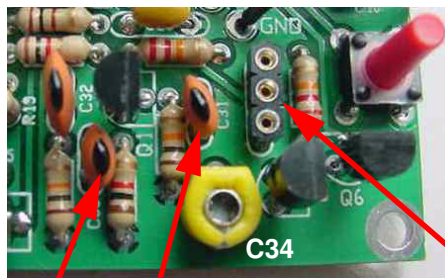
Parts installed here provide the supply voltage and controls for operation of the DC40. In addition to iambic keying, the unique keyer chip (U3) controls muting and T/R functions.

This is probably the most important section of the DC40. If supply voltages are not correct and the muting and T/R functions don't work, the other sections of the rig may not operate. Be sure to perform the smoke test for this group as described in the manual.

Group 2 Assembly

This is the business end of the DC40 receiver. Incoming signals from your antenna are mixed with the oscillator signal. The result is audio fed to the filter stage. The initial shipment of boards were found to have pin 9 of U2 ungrounded. Be sure to solder a jumper from pin 8 to pin 9 as shown in the small picture. A length of clipped component lead does the job. One of the features of the DC40 receiver is immunity to SWBCI. On-the-air use has been positive with no evidence of interference. The mixer is a logic switch called a multiplexer. If there is enough signal input from the antenna and LO to operate the logic circuits, that's all that matters. There will be audio to the audio amp U1a.





C33 and C31 should be 47pF

Group 3 Assembly

After the parts in this group are installed you are ready to check the crystal oscillator and set the 600Hz transmit offset. The procedures to do these operations are described in the manual. Get as close to 600Hz as you can to match the 600Hz audio filter. My FT-847 has a 25Hz filter so a zero beat to the DC40 oscillator will put it fairly close. It will be slightly different between the 7040 and 7030 crystals. If you plan to use both, then average the offset between the two frequencies. You won't be off the filter center frequency enough to make a whole lot of difference.

Note use of SIP (or DIP) pins as a crystal socket

Group 4 Assembly

This group includes the Q2 PA output transformer and the parts for the low pass filter. Once these parts are in place, you can test for received signals. After you apply power for this smoke test, you can peak C8 for maximum signal. In the absence of a signal this may be just a peak in the background noise.



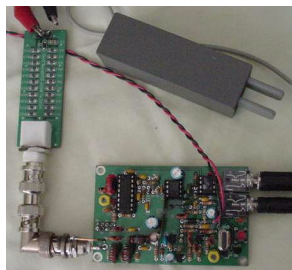
Group 5 Assembly

Once you get these parts installed, you're ready for the final smoke test. Anything that may be wrong here has the potential for damaged parts. Carefully check everything again before you apply power. Be sure to follow the instructions in the manual.

Don't be too anxious to do the final test drive. Blowing something now would spoil all the fun.

Power Up and Testing

The test setup here includes the NorCal surface mount technology dummy load and the Elecraft XG-1 signal generator. The XG-1 provides a standard S9 50uV signal and a 1uV signal. In the absence of noise, the 1uV signal provided a low level for final peaking of C8.



A BNC jack is connected to the DC40 antenna terminals. To keep it in the picture, an angle adapter is used to connect the DL. Power measurements with the NorCal DL used the peak

detector output (V_{pk}). Calculations were made using the equation:

$$P_o = ((V_{pk} \times .707) + .15)^2 / R_L$$

My dummy load R measured 49 Ohms. The value .15 is the voltage drop for the schottky diode used in the dummy load peak detector. After adjusting the inductance of L3 and L2, the power output was consistently over 1 Watt.

Peak for max signal strength



You may want a heatsink here.

Adjust for ~600 Hz offset

Final Thoughts

This was a fun little rig to build, test and operate. My usual build process is to start someplace in the middle and work out. Putting this one together in predetermined groups was an interesting change. It worked out quite well, in fact, being able to test and measure things along the way.

Probably the most frequent complaint about the DC40 is the low audio level. Some folks with reduced hearing may have difficulty. A simple LM386 audio amplifier easily takes care of this little deficit.

Making Qs with the DC40 is about what you'd expect from low power and limited frequency agility. The reports are all good so far with no complaints. All in all, another winner in the stable of fun and inexpensive QRP transceivers.