KN-Q9 HF Transceiver Kit Building
Text and Photo by BD6CR/4

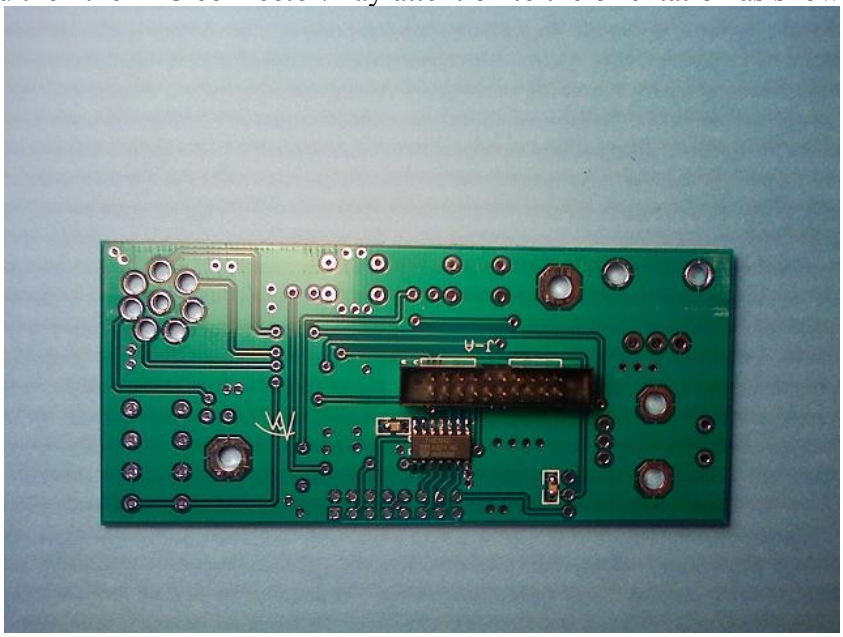
Day 1: January 18, 2010

The kit arrived in my office this morning. I opened it up, and it is a black metal box. All components and PCBs are inside.

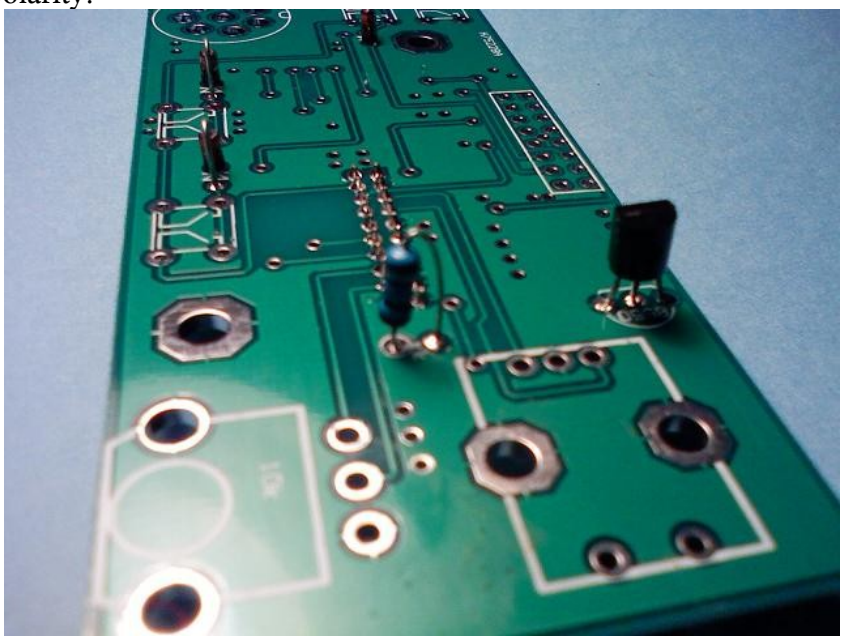
Now use screwdriver to open the box, and you will see all the parts and PCBs. You may need a big working area to layout the parts. Although my ThinkPad top cover is robust enough, but apparently it is not big enough.

Two antistatic bags contain most of the parts, but they are not categorized by any means. So I poured them on desktop and did some categorization and put them into many small plastic bags. Actually you can use any small containers you have, for example, paper cups sold in supermarket.

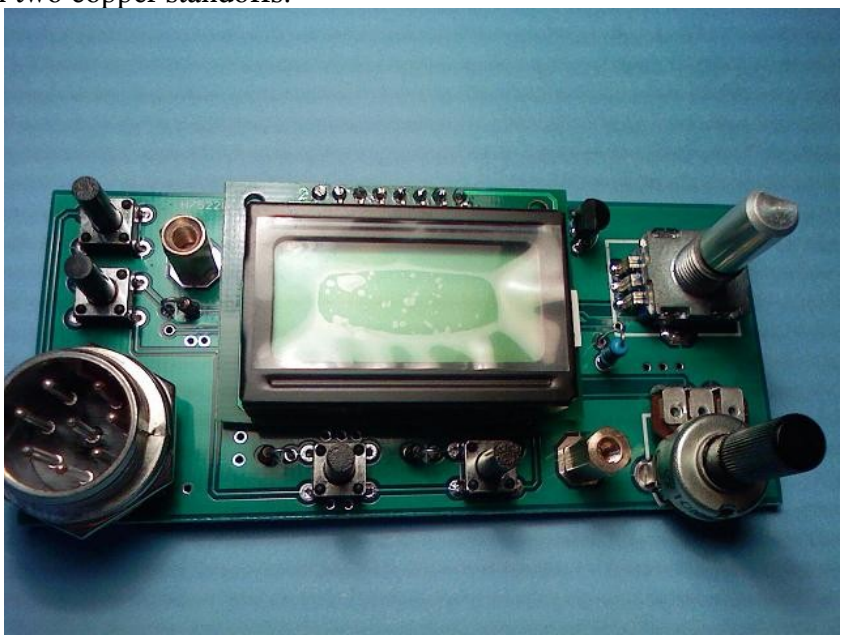
Start from the simplest board. I call it display and control board, or you can call it internal front panel, whatever you like. I haven't seen any part list posted yet, but you can easily figure out what to install by the printing on board. Solder two chip capacitors and SMD IC first on bottom layer (solder layer), and then the IDC connector. Pay attention to the orientation as shown.



Solder small parts on top layer (component layer) first. For 1k resistor, it is suggested you solder on top layer as shown, if not, you may melt the plastic on IDC connector. For diodes, use 1N4148, and pay attention to polarity.



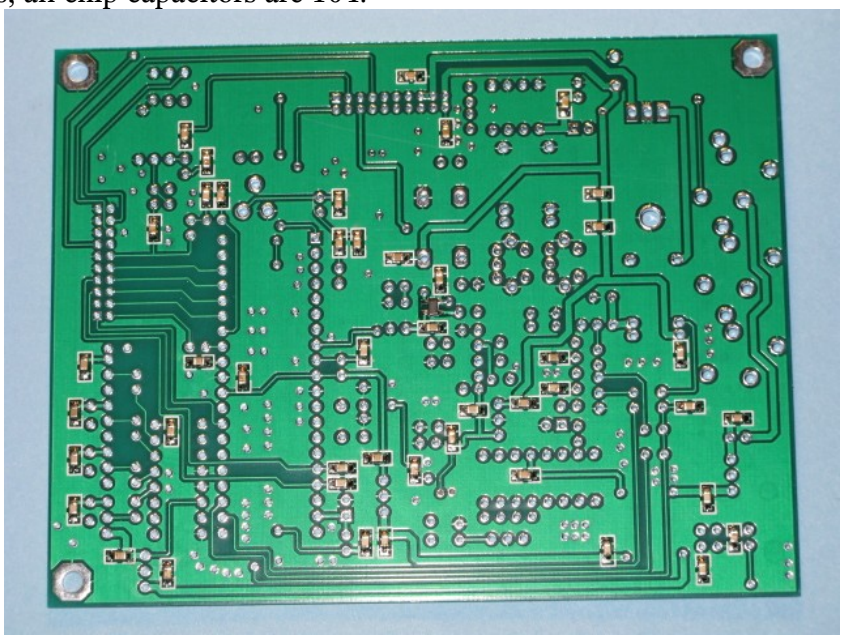
Fit push buttons, encoder, volume control, microphone connectors in place, and solder. For LCD, you may need to scratch the pads to make sure it is shining, so you can solder it well. Find M3x4 screws and install two copper standoffs.



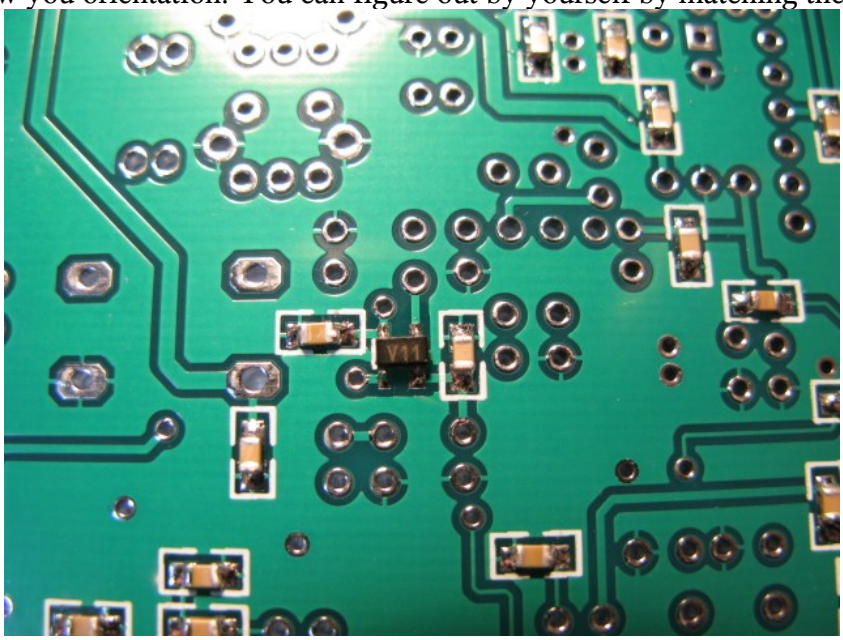
Put on black front panel and check the locations of push buttons, controls to extrude out properly, and this is the end of the simplest board installation. There is no way to apply power supply to do some actual smoke test now. Enjoy the completed work, and stay tuned.

Day 2: January 19, 2010

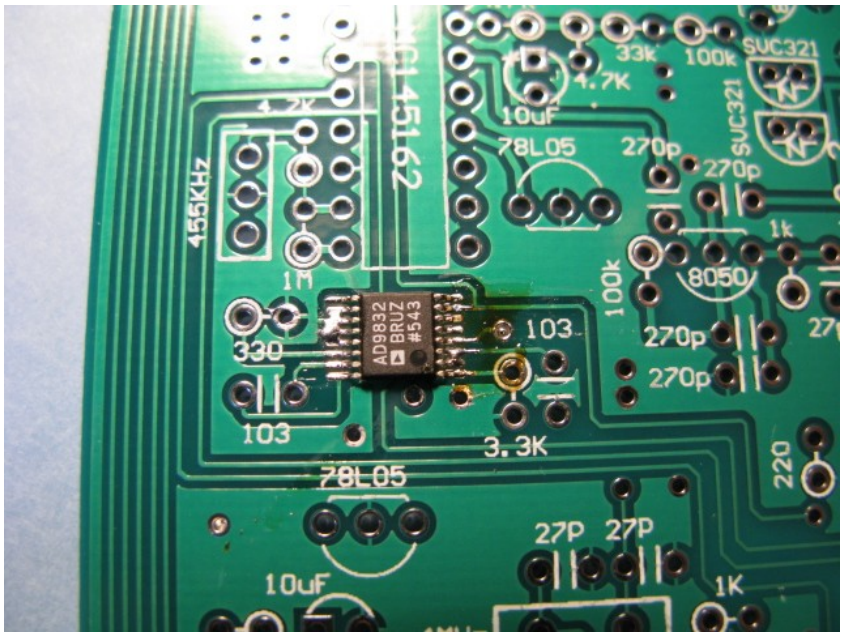
Continue with digital board tonight. This board contains MCU, DDS, PLL, VCO, Audio amplifier and some other functions. Again, start from soldering all SMD parts on bottom layer (solder layer). One good thing is, all chip capacitors are 104.



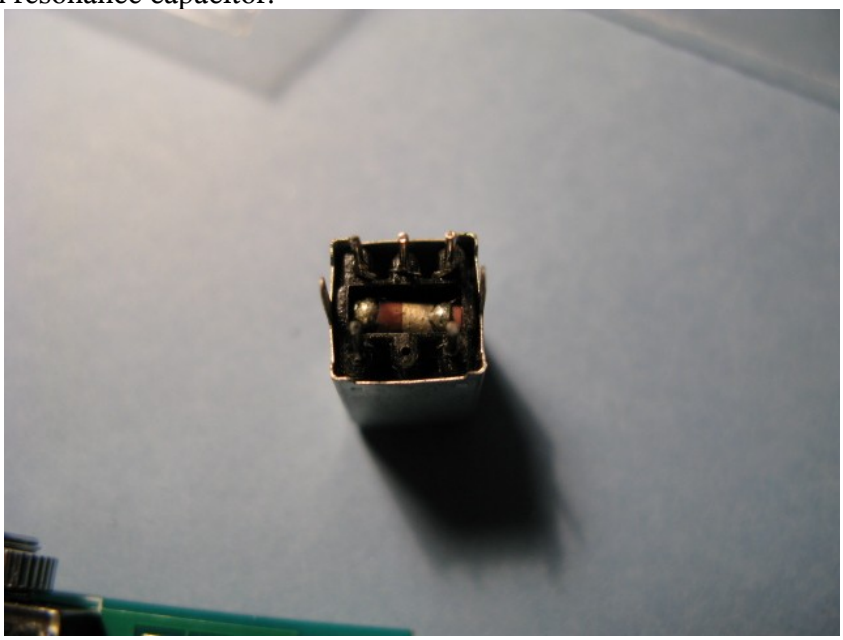
One four legged part is a dual-gate MOSFET, used for VCO buffer amplifier. This is a static sensitive part, so please don't pick it up with your hand without proper protection. I would suggest you solder it with the remaining heat after unplugging your solder iron from AC power. This is a close look to show you orientation. You can figure out by yourself by matching the big pin and pad.



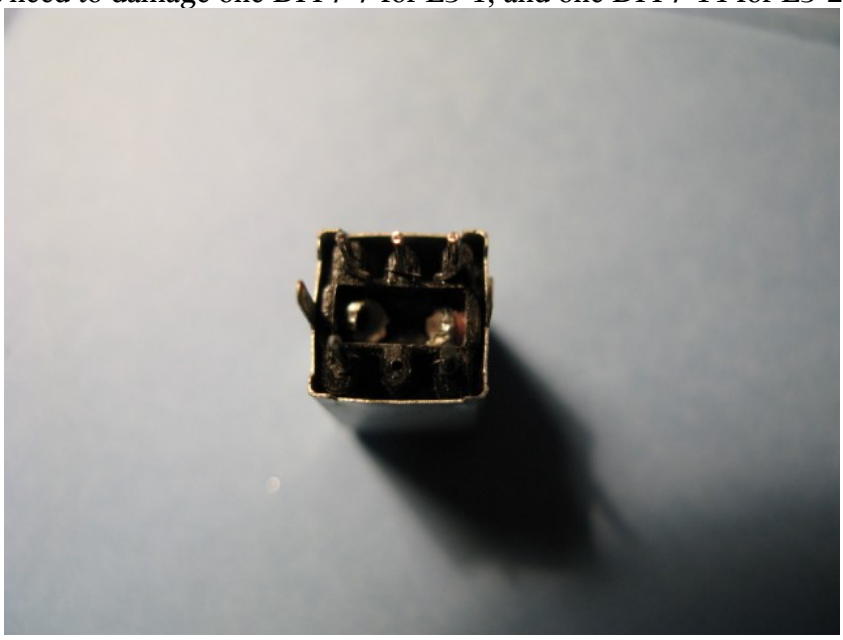
Solder DDS chip carefully on top layer (component layer). If you don't have experience soldering SMD IC, please find some readings and read it carefully. Or more wisely, ask experienced guys for help. This chip is expensive and weak, so do it carefully and slowly. You can see some pins are connected together, never mind, this is by design to have 4 pins connected on one side, and 2 pins on another.



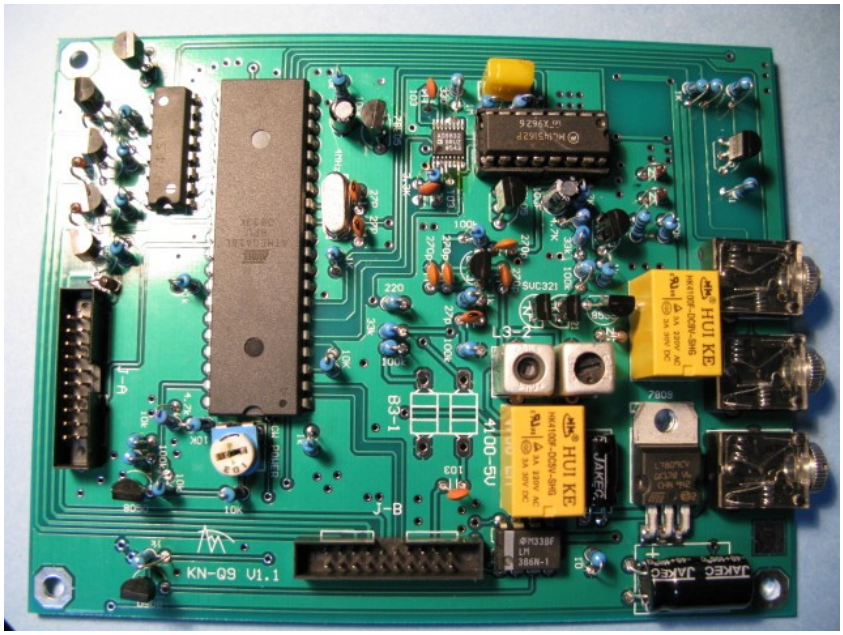
You will need to do some pre-treatment for IF transformer looking L3-1 and L3-2. This photo shows the built in resonance capacitor.



What you need to do, is to damage it by a screwdriver or similar tool. After you are done, you will see like this. You need to damage one DIY7-7 for L3-1, and one DIY7-14 for L3-2.



Because I hate to wound transformer on toroid, so I just skip one RF transformer marked as B3-1 for now. This is used to convert the buffered VCO signal to balanced transmission. If there is anything to remind you, use correct relay. One is 9V type and the other is 5V type. There are multiple 8050 and 8550 transistors. Make sure you install the correct one. Although there is no socket comes together with this kit, I still recommend you get one for MCU, so you replace it easily. Again, all diodes by default are 1N4148. Make sure the relays define the height of the board, or you will have mechanical issue when assemble the whole radio. See the finished work now.



Now it is exciting time. Let's apply power supply and do some smoke test (no, I don't smoke at all!). The setup is pretty straightforward. Just connect the digital board to display and control board using pre-made cable, and apply 12V power supply to the pins of 7809 regulator. You know which pin is input and which pin is ground, right? Good news, no smoke! Overall current seems normal, well under 100mA, and LCD has no display. Is there anything wrong? No. You need to power it on first. So press and hold the power button, you will see hello world message pop out, and it goes to frequency display. Mine shows 14.270, and yes, this is the hottest calling frequency in China. Try to adjust frequency and you will see the step is 4 times than expected. This is a known bug and you will need to modify the encode a little bit, and I will cover it later. Anyway, you can live with it now. If your display is not blinking, it means that your PLL locks well. If it is blinking like me, you need to figure out the reason. Start from checking DDS output by a scope, and then free running VCO output. If both look good, maybe you can try to replace PLL chip. Time for sleep, and stay tuned.