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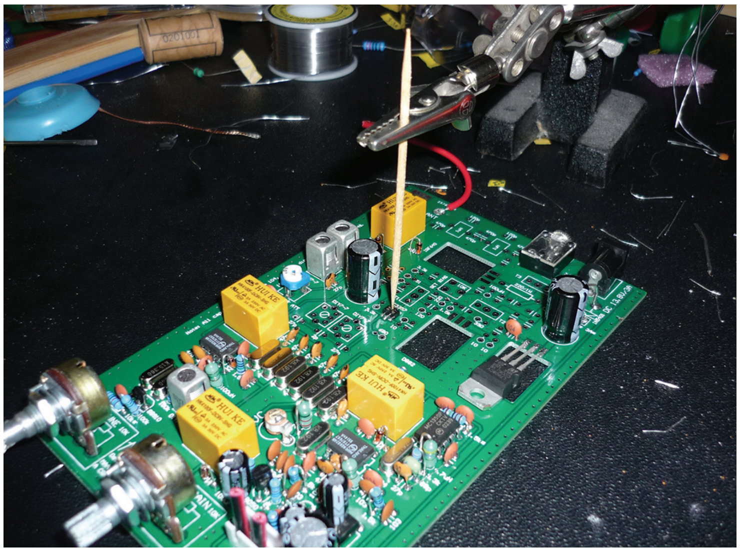
Building the KN-Q7A 40m QRP SSB transceiver kit

The QRP page of *RadCom* October 2012 had a short review of QRP kits for SSB, including the KN-Q7A designed by Shi Ke, BA6BF. I ordered mine direct from China via http://crkits.com; it arrived a few days later in a thick padded bag, accompanied by a Post Office bill for VAT and handling. The kit includes a metal enclosure and the PCB was inside, with a bag containing all the components. I revisited the web site and downloaded the parts inventory, construction manual, etc plus information about the Yahoo user group. I checked off the parts against the list and was pleased to find everything present.



Part way through construction, holding down a surface mount device prior to soldering it.

Assuming that a kit is designed to be reliable and reproducible then there are three main areas where the construction can fail: poor soldering, wrong parts placement or wrong part values. I set about checking all the component values using my LRC tester from PEAK Electronic Design Ltd. Then I grouped the parts by value and type and placed them in small containers so that everything was pre-sorted and tested before starting the build. I used lids off plastic milk cartons. A little time put in here helps with parts identification, especially if you are not so familiar with the way components look. The construction manual was well laid out and divided the project into small manageable segments with tests at the end of each segment. This approached worked well and seemed like a very good idea as troubleshooting a completed board would be very difficult for a novice constructor like me.

After a few very enjoyable evenings with a hot soldering iron I had completed the receiver section and was gratified to hear plenty of signals on the 40m band. Receiver alignment was straightforward and worked OK without test gear. I suggest you do this during daylight hours as 40m can be very noisy at night, making it hard to find signals 'in the clear'.

Building the transmitter section was more daunting with less in the way of testing as you go other than voltage checks. Extreme care was taken in parts placement here and I only made one mistake, which I spotted immediately and quickly removed the part from the board with solder wick braid. The small bifilar toroids were tricky to make but plenty of wire was supplied. I suggest cutting the wire lengths needed and putting them to one side. Use the surplus for a few trial runs making the bifilar wire and then putting on the specified 5 turns. I found that after a couple of practice goes I was able to wind the three transformers quite easily.

Mechanical assembly was straightforward with the exception of the method used to insulate the fixing stud for the IRF640 device. I was unfamiliar with the method but I am sure this would not be a problem for anyone familiar with these devices. With the TX section completed and the mechanical assembly done I had reached the alignment stage.

There was a neat method to accurately align the BFO using a sound card and a simple audio spectrum analyser program found at www.qsl.net/z1lan/Software/Spectrum3.zip. After completing the alignment I hooked up my bhi DSP extension speaker, which gave very nice audio.

The bias setting for the final amplifier proved problematic. As I slowly advanced the bias trim pot the current suddenly increased alarmingly, indicating thermal runaway. The MOSFET was hot; I purchased a replacement from Rapid Electronics for 66p, installed it, and all was well.

As soon as I had confirmed that the Tx was OK and peaked up the Tx filter I was keen to try a contact or two. Brian, G0BFJ in Huddersfield gave me a report and kindly offered to put me in contact with others on a WAB net. I had a range of reports from around the UK, with the best being a 59 from the Lake District some 400+ kilometres from me in South Devon. This was with about 3.5W output on the speech peaks.

I had a lot of fun building the kit and would encourage anyone to blow the dust off the soldering station and have a go at homebrew.

As an example, taking a fairly typical value of 10 for n and assuming a transmitter supplying a forward power of 100W in a 50Ω line gives a peak line voltage of 100V. The rectified forward indication will therefore be 100/10 V = 10V – a reasonable voltage that is large enough to swamp any potentially serious inaccuracies due to rectifier drops etc.

Finally, it must be noted that the 50Ω resistors in this circuit must be chosen to be equal in value to the characteristic impedance of the line if correct readings are to be obtained – a constraint not present in the earlier, single transformer circuit. It is also recommended that these components are selected with care: carbon film types are now available with excellent HF characteristics – although they are rather expensive!

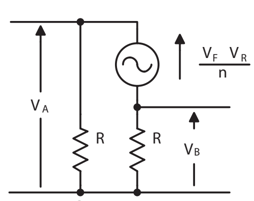


FIGURE 4: Figure 3 with current generator suppressed.

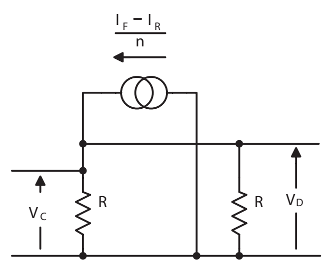


FIGURE 5: Figure 3 with voltage generator suppressed.

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