Construction Notes - Universal VFO

Check to be sure that all the parts are in the kit! If any are missing, let me know and I will send the missing part.

The diagram that is included is looking down on the parts side of the board. The parts are mounted on the side away from the copyright notice “copyright 1999 KK7B\K7TAU”. There is nothing too critical. Be sure to insert the transistors and voltage regulators correctly. Also be sure that the electrolytic capacitors are inserted with the “+” lead in the square pad. The 4 diodes are mounted vertically, and the banded end is UP on D1 and D2, but is DOWN on D4 and D5 if they are mounted as shown in the layout diagram. The flat side of the MV2109 (or MV2107) is mounted towards the edge of the board - the curved side faces the variable capacitor. It looks like a two legged transistor.

The variable capacitor C1 can be mounted several ways:

A) There are three mounting holes on the rear of the capacitor frame that line up with three holes on the PC board so that the board can be mounted on the capacitor. A stiff piece of hookup wire (like a scrap resistor lead) is used to connect PD3 on the PC board to the variable capacitor..

B) There are 4 mounting holes on the bottom of the capacitor frame. These four holes line up with four holes on the PC board so that the board and capacitor can be mounted together. The sample capacitors I had did not have threads tapped in these four holes however, so you will have to *carefully* tap them yourself! A stiff piece of hookup wire can be used to connect the capacitor to PD3 on the PC board

C) The variable capacitor can also be mounted separately from the PC board and a stiff wire used to connect the capacitor to PD3.

Note that two schematics are included with the Universal VFO. One (labeled “Receive Only UVFO”) shows only the parts necessary to use the VFO for receive only. If you are going to use the Universal VFO for the Binaural Receiver, you can construct the VFO using only the parts shown on this schematic. Be sure to insert the jumper between the collector and emitter holes of Q8. J2 and J3 are the output pads. You can solder directly to the pads or use small pins and connectors (not supplied). Note that the pads are labeled “I” and “Q” on the bottom of the PC board.

The second schematic shows all the parts necessary to provide an output for a transmitter, for RIT, and switching of the transmit and receive outputs from the UVFO.

Components are included so you can build the UVFO for 20, 30, or 40 meters. 40 meter values are shown on the schematic.

Toroids

For some reason toroids seem to scare a lot of homebrewers. They are actually quite simple to use, and work as well or better than most of the commercially available “IF

can” type of inductors that are so popular today.

A turn is counted every time the wire passes through the center hole in the toroid. A straight piece of wire passing through the toroid is one turn. Bring the end of the wire back around and through the center hole again and you have two turns..... The wire should be wound neatly and on the toroid and the turns spaced evenly around the core. I make a tap by removing the enamel from about ½" of the wire, twisting a small loop in the wire and tinning the loop. Then I wind from that point out to each end of the inductor. For example, the 40 meter version of L1 is wound 9 turns from the tap in one direction, and 27 turns the other direction from the tap.

For the T37 cores provided with the kit, you can determine how much wire you will need to wind a toroid by multiplying the number of turns time ½" and then adding about 2 to 4 inches so have some wire to work with when you are done. The T50 used for L1 will use slightly more.

Bifilar and trifilar toroids are constructed by twisting two (or three for trifilar) equal length pieces of enameled pieces of wire together until they have 6 - 8 turns per inch twisted in the wire. I fasten one end of the two wires in a vise, and the other end of the pair in a drill, and let the drill do the twisting while keeping a little tension on the wire. After winding the twisted pair on the toroid the proper number of turns, untwist the ends and strip off the enamel. Use an ohm-meter to determine the ends of each winding. The PC board is laid out so that each winding goes in an adjacent pair of holes. For example, the first winding on T1 goes in the two holes closest to C10. The second winding goes in the pair of holes that is equidistant between C10 and C11, and the last winding goes in the pair of holes closest to C11. I found that 5" of the twisted wire (3 wires) was needed to make the 8 turns for each of T1, 2, and 3, so make at least 15" of twisted (3) wire.

The enamel can be scraped of (carefully) with a knife, and the wire tinned with solder. I prefer to take it off by pinching the end of the wire between the hot tip of a soldering iron and a piece of wood, and pulling the wire out from under the soldering iron. Lay the wood on the table, lay the wire on the wood, press down with the tip of your iron on the wire, and pull the wire out from under the tip, This cleans the enamel off nicely.