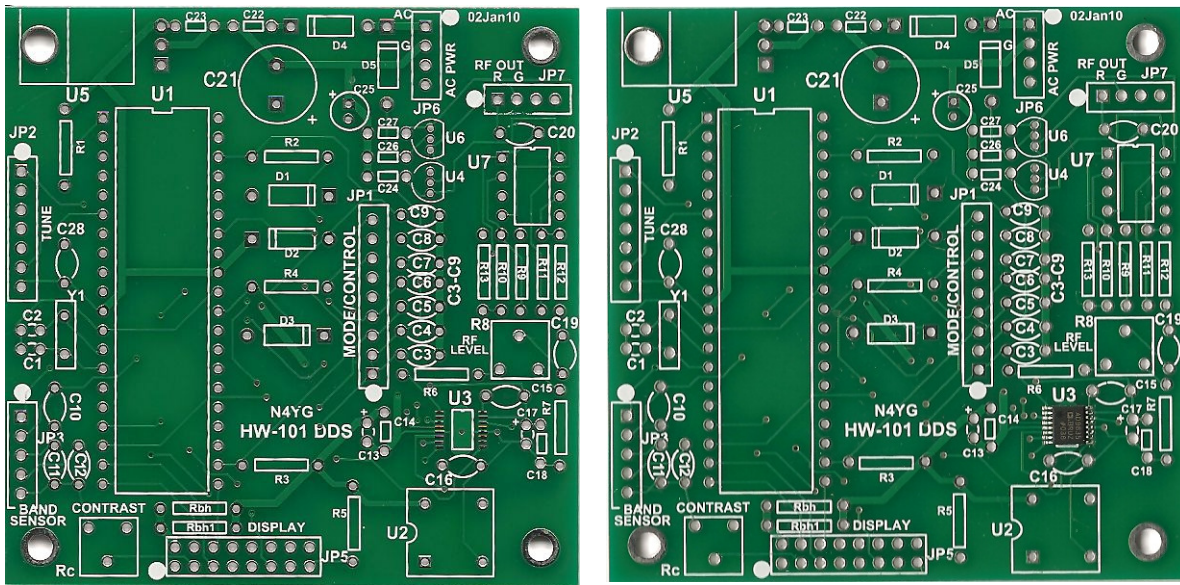


Standalone VFO DDS Board Assembly Procedure

You will find a photo of a completed board at the end of these instructions. Refer to it whenever clarification is required.

1. AD9835 Attachment - If you purchased the kit or PC board with the AD9835 chip attached, you may skip this step. Otherwise, the AD9835 chip should be attached before placing any other components on the board. You will find several procedures for accomplishing this.



The one that has become our favorite will be described along with some of the other techniques. The above shows the bare board and the board after the AD9835 has been attached. Tweezers and a magnifier headset are very useful. These are inexpensive if purchased from Harbor Freight. The following is the recommended procedure.

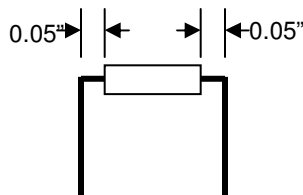
- A. Position the AD9835 atop the PC board as shown, making sure that the pin-1 indicator is at the upper left.
- B. While applying pressure to the top of the chip with the tweezers, press tip of the soldering iron down firmly on one of the corner pins for about 2 seconds, continuing to apply pressure to the top of the chip for another 3 or 4 seconds. Do the same for each corner pin and then for the remaining pins.
- C. Use an ohm meter to check for continuity from the pins of the chip to points on the board to which there should be continuity. If there is no continuity for any pin, repeat the process in B above for that pin.
- D. Additional solder can be applied to each of the pins to assure good bonding. It is helpful to have small solder of about 0.015 inch diameter solder for this.

E. This should complete the process, but check once again for continuity.

Note: Some recommend applying solder with little regard for solder bridges. We recommend that you make every effort to avoid solder bridges. It can be difficult to remove them. Care should be used when using solder wick to remove them. Do not apply heat for more than a second or two. Another method for removing the bridges is to place the tip of an Exacto knife blade between the bridged pin and heat the blade while applying light downward pressure on the knife.

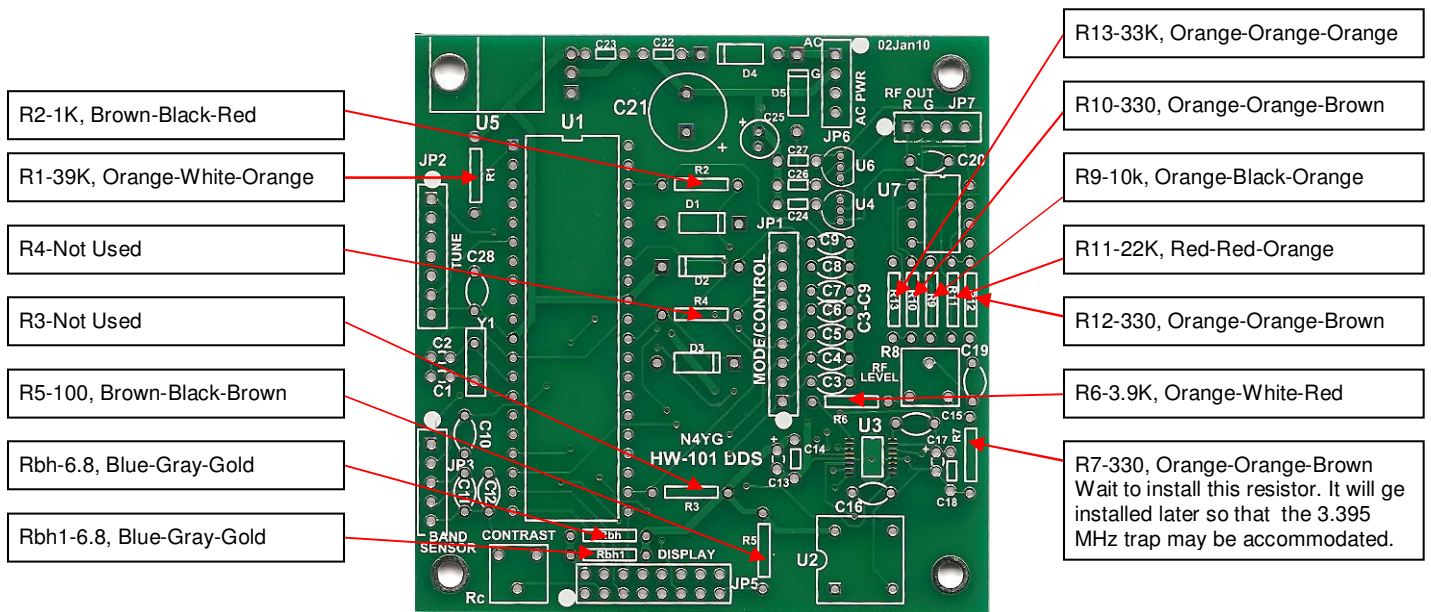
2. Resistors

A. Form the leads of the 12 resistors as shown below.



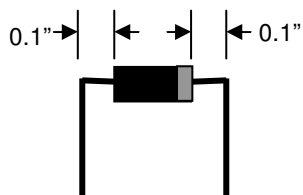
B. Place the 12 resistors on the board in positions shown below and bend the protruding leads outward at about 30 degrees to hold them in place until soldered.

C. Solder the leads and cut off excess leads.

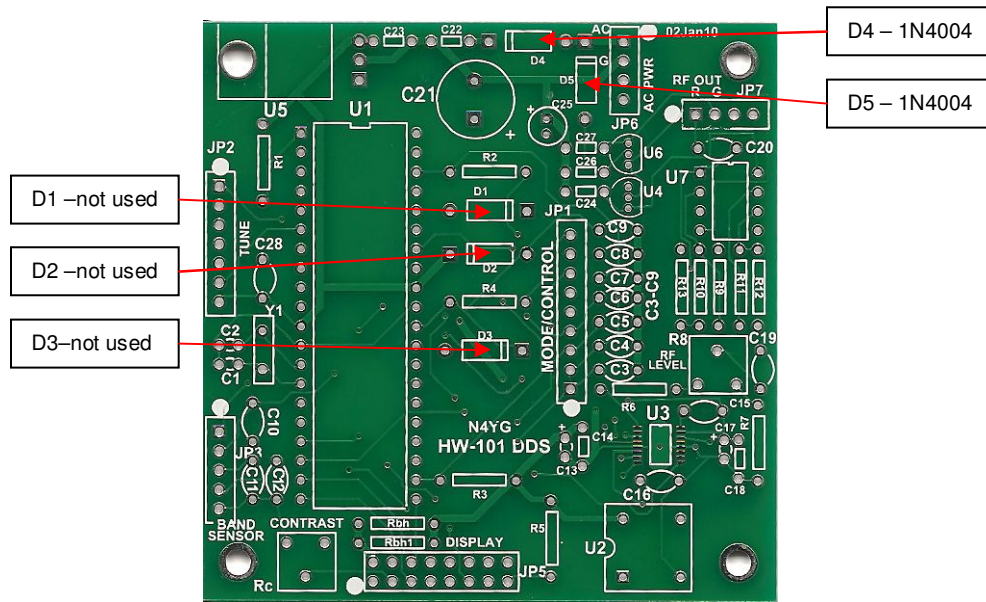


3. Diodes

A. Form the leads of the 2 1N4004 diodes as shown below.

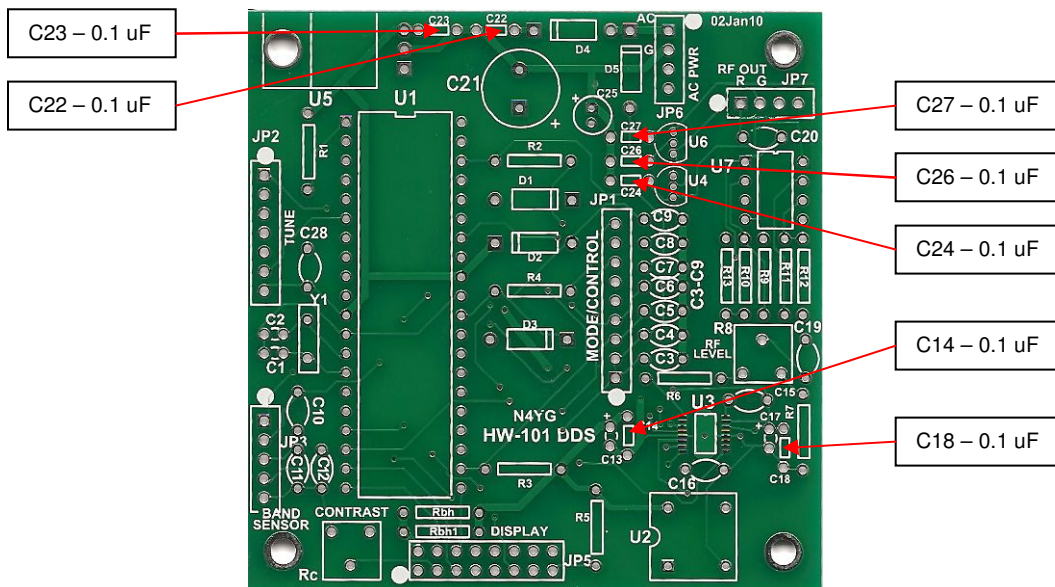


- B. Place the 5 diodes on the boards as shown below. Make sure the banded end is in the position shown on the PC board. Bend the protruding leads outward at an angle of about 30 degrees to hold them in place.
- C. Solder the leads and cut off excess leads.



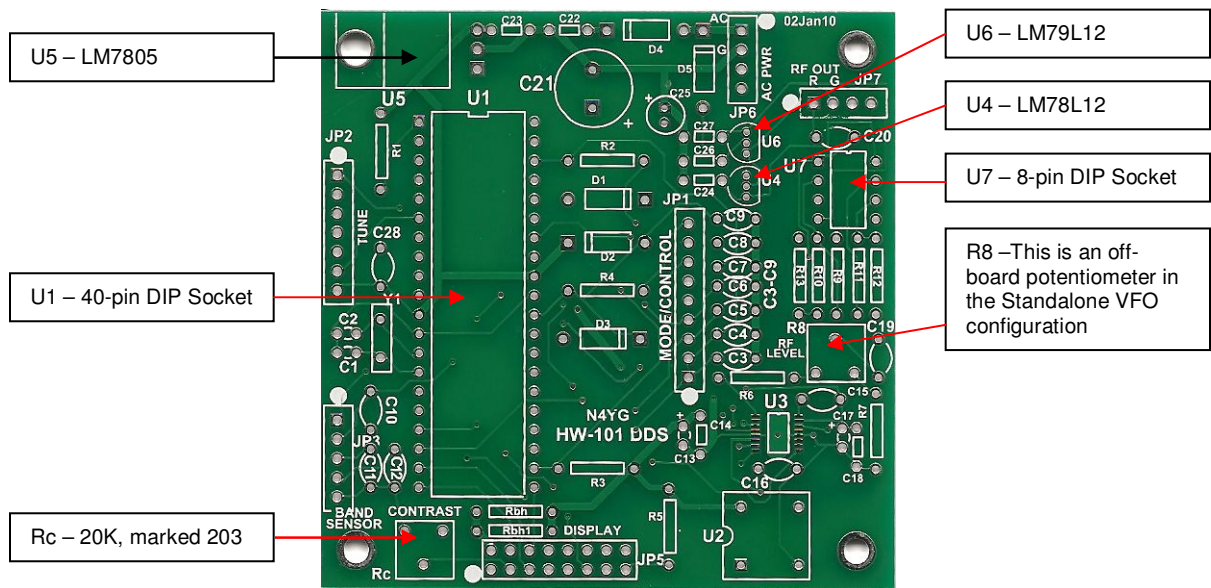
4. Axial Capacitors

- A. Form the leads of 7- 0.1 uF axial-leaded capacitors similarly to the resistors and diodes.
- B. Place the capacitors on the board in the positions shown below. Similarly solder in place and cut off excess leads.



5. IC Sockets, Unsocketed ICs, and Trim Potentiometers

- A. Place the 8-pin and 40-pin DIP sockets on the board as shown at U7 and U1 respectively, one at a time, making sure the pin 1 markings are at the top as shown below.
- B. Solder the pins to the board in turn.
- C. Form the leads of the 7805 Regulator (marked LM7805 or similar), place on the board so that its flat side is snug against the board and the hole in the tab is aligned with the hole in the board. Solder and cut off excess leads.
- D. Place the LM78L12 and the LM79L12 in the orientation shown. Leave the body of these about 1/16 inch above the board. Solder the leads and cut off excess leads.
- E. Place trim pot Rc onto the board and solder in place.
- F. Place 3 wires in the holes intended for trim pot R8 and solder in place. These should be of sufficient length to reach the place where R8 will be mounted on the front panel.

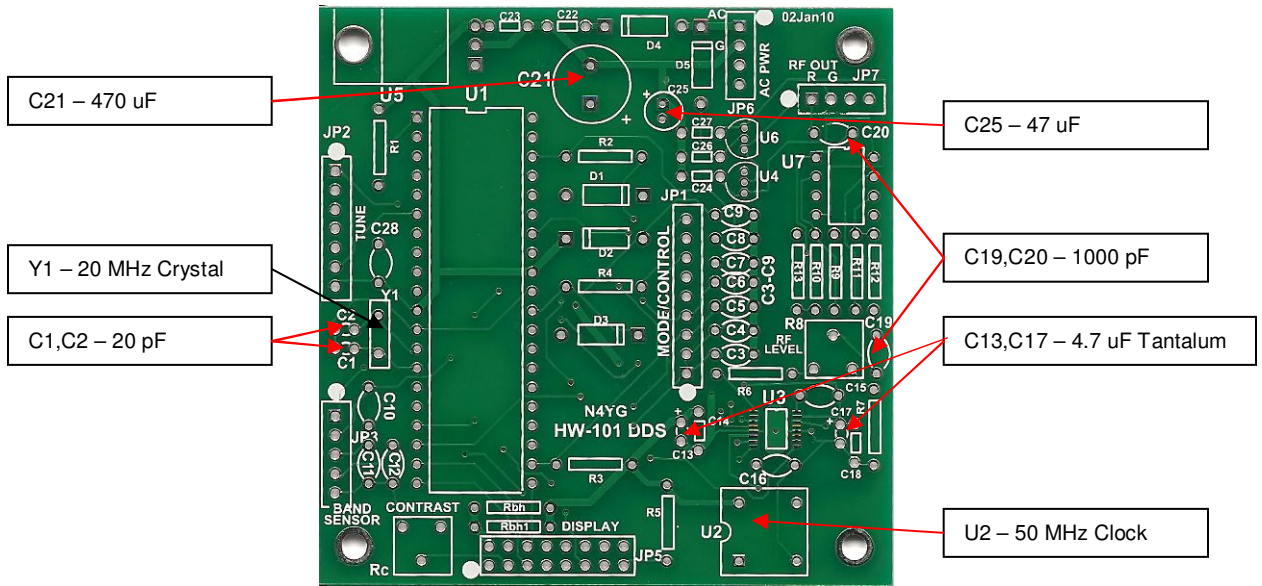


6. Crystal, Clock and Miscellaneous Capacitors

- A. Place the 50 MHz clock can in position U2. Notice the pin 1 marking. It should be over the square pad of U2 and the writing on the can should be in the same orientation as the horizontal text on the board. Solder in place and cut off excess leads.
- B. Place the two 4.7 uF Tantalum capacitors on the board at positions C13 and C17, making sure that the polarity markings on the

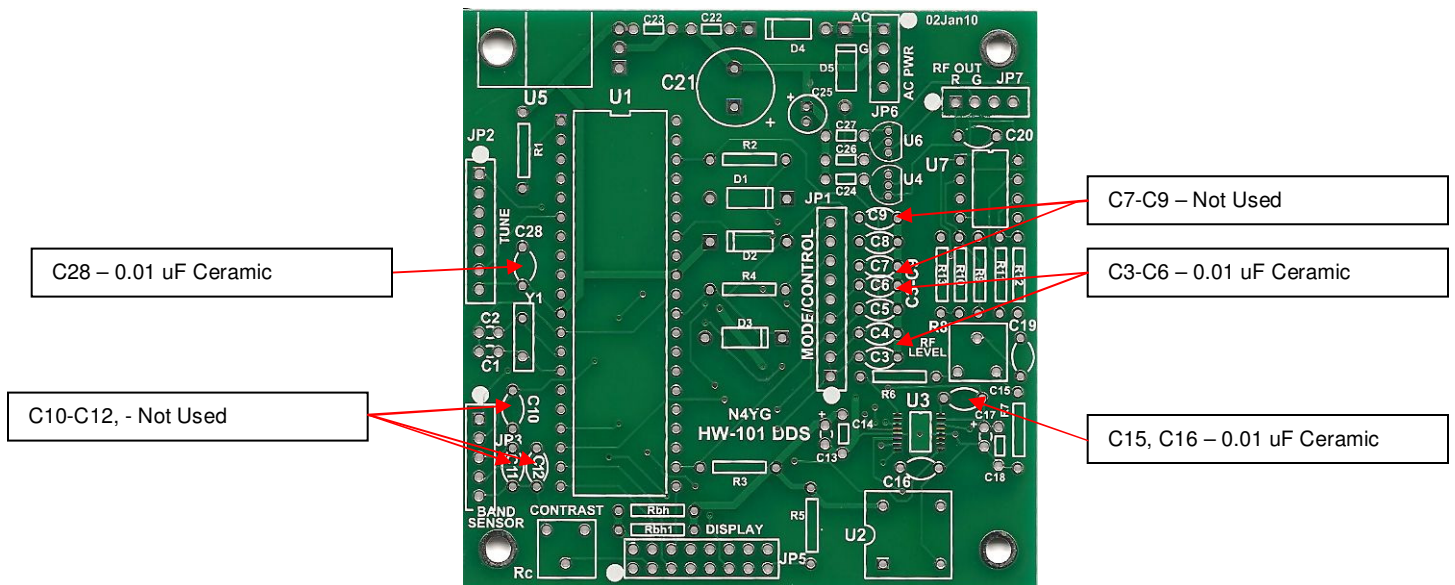
capacitors and those on the board are in agreement. Solder in place and cut off excess leads.

- C. Place 2 20pF ceramic capacitors on the board at positions C1 and C2. Solder in place and cut off excess leads.
- D. Place the 20 MHz crystal at position Y1, solder in place and cut off excess leads.
- E. Place 470 uF and 47 uF electrolytic capacitors at positions C21 and C25, matching the polarity marking on the capacitors with those on the board. Solder in place and cut off excess leads.
- F. Place 1000 pF ceramic capacitors at positions C19 and C20, solder in place and cut off excess leads.



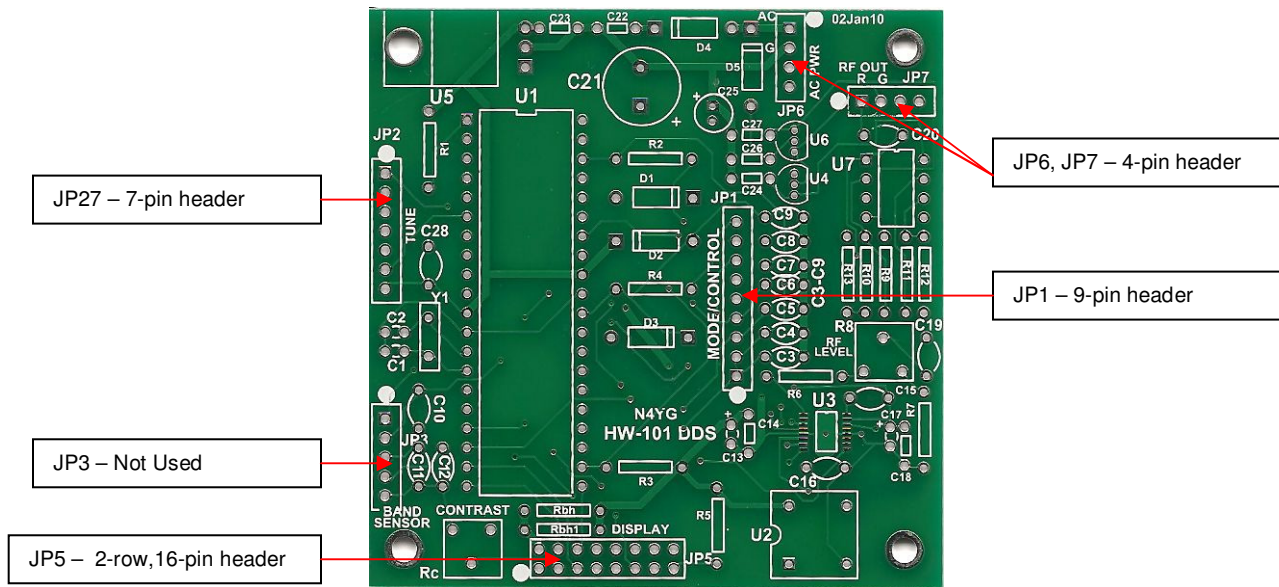
7. RF Bypass Capacitors

Place 7 0.01 uF ceramic disc capacitors at positions C3-C6, C15, C16 and C28. Solder all in place and cut off excess leads.



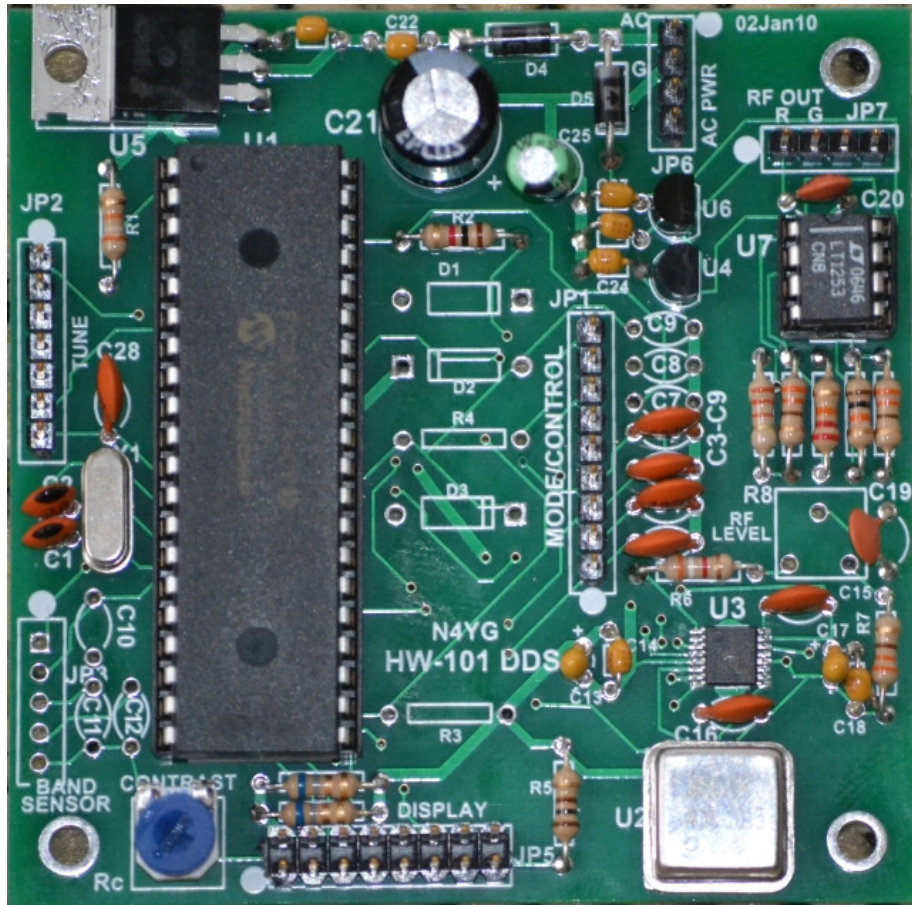
8. Header Pins

- Place 4-pin headers at positions JP6 and JP7 and solder all pins.
- Place a 9-pin header at position JP1 and solder all pins.
- Place a 7-pin header at position JP2 and solder all pins.
- Place a 16-pin, two-row header at position JP5 and solder all pins.

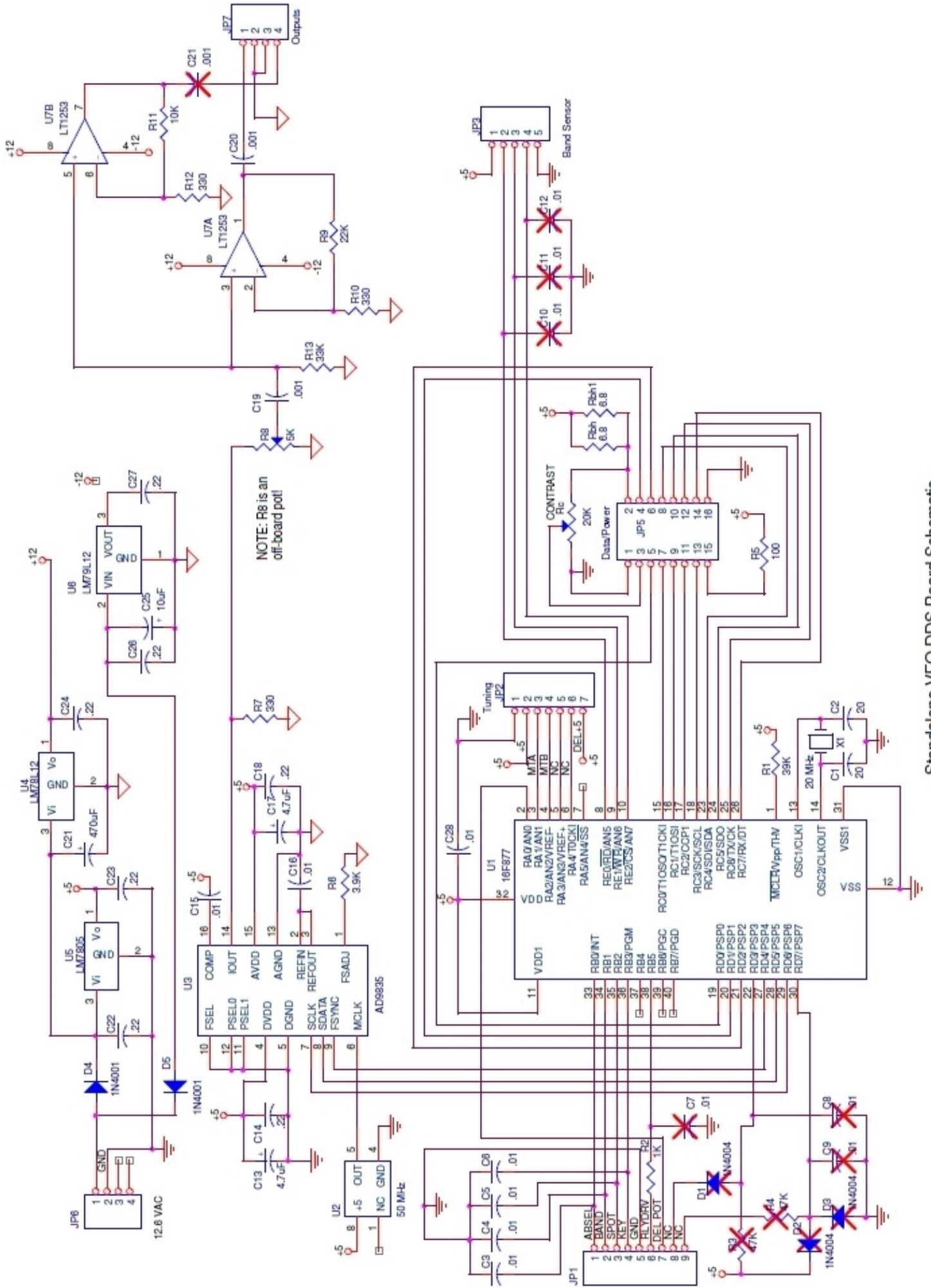


9. Testing the Board

- Connect the 12.6 VAC power cable to the 12.6 volt filament supply. Place the board on a non conductive surface and plug the power cable into JP6. Measure the voltage at the outside pin (the one at the top of the board) of voltage regulator U5. It should read about 5 volts. Ground potential can be taken from the tab of U5.
- Measure the voltage on pins 4 and 8 of DIP socket U7. These should be about -12 and +12 volts. Unplug JP6.
- If all is well, insert U1, 16F877A, and U7, LT1253, into their respective sockets.
- At this point, **you must ground both pins 4 and 7 of J1 or else there will be not RF output. This is very important. Later when you all connections are made, there will be RF output whenever the VFO is keyed.** Again apply power.
- Connect an oscilloscope, counter, RF voltmeter or other RF sensor to pin 1 of JP7 and check for presence of RF.
- This completes board assembly and test.



Completed Standalone DDS VFO Board



Standalone VFO DDS Board Schematic