

NHRC-4 Repeater Controller Kit Assembly Guide

1. Organize your parts as per the Bill of Materials. All resistors in this kit are mounted vertically on the PCB. You may want to form the resistor leads ahead of time. Simply bend the resistor lead over. (*Hint: Try to keep the color code bands consistent top to bottom throughout the board, oriented such that the tolerance bands of the resistors all face in the same direction*) You will be working from your parts list and matching components from the parts list to their appropriate location on the PCB. You can use the “Board Layout” image located on page 1 of your Installation Guide as a reference for parts placement.
2. Install the capacitors into the PCB. Be careful to install the polarized caps correctly. The square pad always goes to the positive (+) lead of the capacitor. Capacitors such as the 0.1uF bypass caps are non-polarized and do not have a square pad. They may be inserted either way. (*Note: Double check your work, tantalum capacitors may explode upon power up if they are inserted backwards. Be careful not to mix up C22 (100pF) with any of your bypass caps, they look similar.*)
3. Install the resistors. The PCB silkscreen has a circle around the pad that the resistor body will sit above and a line from the circle indicates where the other lead goes. Be careful to match the reference designator to the proper component location. If in doubt find the component in the schematic and use an ohmmeter to identify the component location in question. Some reference designators may be crowded among other reference designators and may have a line drawn to the proper component location. (*Note: Pay special attention to the placement of resistors R5, R6, R20 & R21. Resistor R5 is located next to C4 and R20 is located next to C11.*)
4. Install the voltage regulator, U2 and power MOSFETs Q1, Q2 & Q6. All of these components are installed with the heat sink surface facing out from the board. (*Note: These parts should not require mounting to a heat sink.*)
5. Install the LEDs. D1 & D3 should be red, D2 & D4 should be green and D5 should be yellow. Install the LEDs with the flat side (cathode) as shown on the silkscreen, the anode will be inserted in to the square hole. (*Note: You may optionally use any colors you prefer in any of these locations.*)
6. Install the other transistors and FETs. Q3, Q5, Q8 & Q9 are 2N3904, Q4 & Q7 are MPF102 JFETs and Q10, Q12 & Q13 are 2N7000 MOSFETs. (*Note: All of the transistors and FETs are installed so that the flat side of these parts face the edge of the PCB with the LEDs.*)
7. Install the crystal, Y1.

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8. Install pots, VR1, VR3, VR4 & VR6 which are 10K (marked "103") and VR2 & VR5 which are 500K (marked "504").
9. Install connectors J1, J2, J3, J4 & J5, and 2 pin headers JP1, JP2 & JP3.
10. Install the chip sockets. (*Note:* Install them so that designator for pin 1 is per the notch shown on this chip socket on the silkscreen.) **Do not install your chips at this time.** You will need to do some power up checks first.
11. Solder all of your connections with rosin core solder. Use care not to overheat the PCB. (*Note:* We recommend using "63/37" rosin core solder and the use of a soldering iron, do not use a soldering gun or acid core flux solder.) Carefully trim the leads of the bottom of the PCB. Clean the PCB with alcohol to remove flux residue.
12. Double check your work. Check for any unsoldered parts, solder bridges, or improper part placement.
13. Install 2 pin shorting jumpers on headers JP1 & JP2. If you are not using the NHRC-DAD digital audio delay option, then you must install a shorting jumper on pins 2 and 3 of the delay connectors J4 & J5.
14. You are now ready to apply power to the PCB and check some voltages before installing the IC chips. See the installation instructions and operating instructions for assistance with assembly of the connections required. Apply power and check that the 5V regulator is working and that 5 volts (VCC) is being supplied where needed. Check that VREF is approximately 1/2 of your input supply voltage is at U1 pins 3, 5, 10 & 12. When you are confident that all of your voltages are OK, then you can install the IC chips into their sockets and power the PCB back up. If you encounter problems go back and recheck your work, look for unsoldered connections and solder bridges.

Look at the NHRC-4 web site (<http://www.nhrc.net/nhrc-4>) for more detailed trouble shooting instructions. We also offer troubleshooting support by email (hardware-support@nhrc.net). The circuit is fairly simple and most problems can be resolved quickly.