Assembly Notes, 4 and 8 channel IR receiver kits. Ver 1.4 3/02/04
Please read before assembling your kit.

Both boards:

0 Ohm resistor between input and output of voltage regulator should not be installed if voltage regulator is used.

The 47 uF capacitor is polarized, and must be installed correctly. The square pad is the **positive** end. The **negative** end of the capacitor is marked with a bar and a minus sign.

Make sure that the notch on the chip(s) is next to the square pad (pin 1) before soldering.

The voltage regulator (if used) and transistor must be installed as shown on the parts placement diagram.

Make sure you have the polarity correct before applying voltage to your board. Incorrect polarity can damage the voltage regulator, the TinyIR chip, and the IR sensor. Pin 1 (square pad) of the header should be connected to the positive voltage input.

Check the chip documentation to determine which of the D1-D3 diodes you want to install. This determines how many pulse or toggle outputs you will have. The parts placement diagram shows which way the diodes should face. The band on one end of the diode indicates the cathode. This is the end shown with a line on the schematic symbol.

If you are using the remote sensor board, mount both the 47 uF filter capacitor and the IR sensor on that board, and leave these locations empty on the main board. If you need to mount the sensor further than 12" from the main board, you can use pretty much any 18-26 gauge 3-conductor wire to connect them. Please contact me if you intend to have them more than a few feet apart.

The flat side of the LED should be closer to the negative, or cathode lead. This end connects to the 2N3904 transistor. The lead farther away from the flat is the positive, or anode end, which connects to the 240 ohm resistor. You may want to bend the LED leads so that the LED will face sideways, instead of straight up. If the LED doesn't light when you have power applied to the kit and you press the "learn" pushbutton, it may be installed backwards. This won't hurt it, it just won't light. If you want to use a brighter LED, Digi-Key and Radio Shack both sell LEDs with a wide range of MCD (brightness) ratings, which may be easier to see from a distance. If the LED is very bright, you may need to place a shield between it and the IR sensor to prevent interference during the learning process. This should not be necessary if the IR sensor is mounted remotely.

The "learn" switch is symmetric, but not square. Its pins will fit into the board two different ways (180 degrees apart) and either one will work. If you rotate it 90 degrees from one of these correct orientations, it will not fit into the holes.

Pin one of the connector header has a square pad on the pc board. Pin two is across from it. The odd-numbered pins are down the outside of the connector, and the even-numbered ones are down the inside.

To attach the connector to the ribbon cable, slide one end of the cable into the interior of connector, and allow about one half inch of it to stick out the other side. The ribbon cable should fit nicely into the ribbed lower side of the top part of the connector. Check the centering of the cable to insure that there is a wire above each of the contacts in the lower section. The connector should lie across the ribbon cable, perpendicular to it. You may want to place a small piece of scotch tape from the ribbon cable, across the top part of the connector, and to the ribbon cable on the other side, to hold the connector in the correct position. Once you have it placed properly, place the connector in a vise and squeeze the two halves of the connector together slowly until the top half locking pieces snap into place on both sides. This will force the cable onto the contacts in the lower part of the connector, which will cut through the insulation and make contact to the wires. (If you are not sure pleased with the way it looks after the two halves are pressed together, you can gently pry out the locking pieces at either end of the connector and slide the top part up, then carefully remove the cable from the contacts and try again. Don't try taking the connector apart after squeezing it unless you are pretty sure you need to. An ohmmeter can be used to check for shorts or open contacts. You can use a resistor lead to probe the connector contacts.) The outer wire of the cable on the pin, near the pin one side of the header connects to pin one of the header. The next wire connects to pin 2, etc.

8 Channel board only:

R6 is only installed if you want to use this board as a four channel board, without the 74HC259.
In this case, you would need to jumper across the 74HC259, and not install R5. For normal use of this board, install R5, and not R6.

Components R7, D5, and C5 form a power-on-reset circuit to clear the output latch when power is first applied to the board. The Tiny IR chip will also clear the latch, but if the power-on reset circuit is not used, some latch outputs may pulse high for approximately ½ second before they are cleared. This will only happen when power is applied to the circuit. R7 should always be installed, even if the hardware reset function is not needed.

Voltage and current:

The 78L05 regulator supplied with the 4 and 8 channel boards requires approx 6.7V minimum to provide 5V. It can tolerate a maximum input voltage of 35 volts. This regulator is rated for 100 mA maximum output current. With no heatsink, the regulator can dissipate approx 0.7 watts. (Exceeding this value will cause it to shut down.) Regulator power dissipation is equal to the voltage across the regulator times the output current. If you are drawing 50 mA from the regulator, and feeding 15 volts into it, the regulator would have 15-5 or 10 volts across it. Multiply this times 50 mA, and you get 500 mW, or 0.5 watts.

Typical idle current for the 8 channel board alone is about 4.75 mA. 3 mA of this is the idle current of the 78L05 regulator.

Other voltage regulators can be used in place of the 78L05, if you need lower idle current, or minimum input voltage lower than 6.7Volts. Two choices might be LP2950 or LM2931 types. The TO-92 versions of these have the same pinout as the 78L05. The output voltage must be 5 volts for the IR sensor module to work properly. If you select a lower quiescent current regulator, you may also want to change to a 50-100 uF electrolytic capacitor on the output of the voltage regulator, for better dynamic regulation.

Resistor color bands:

0 Ohm shorting jumper	single black band
47 Ohms	yellow violet black gold
240 Ohms	red yellow brown gold
4.7K Ohms	yellow violet red gold
470K Ohms	yellow violet yellow gold
1M Ohm	brown black green gold

Capacitor Marking:

0.1 uF caps may also be marked “104”

And finally, to quote Heathkit:

Always use rosin core, radio type solder (60:40 or 50-50 tin lead content) for all of the soldering in this kit. The warranty will be void for any kit in which acid core solder or paste has been used.