Evil Mad Scientist

Kit Assembly Instructions

Kit Contents:
1. Circuit board with threaded inserts
2. Transistors: • 2N3904 (13 pcs.) • 2N3906 (7 pcs.)
3. Capacitor: 33 pF Ceramic
4. Diodes: BAT85 (2 pcs.)
5. Resistors: • 4.7 k (2 pcs.) • 9 others in resistor wallet
6. Aluminum “IC Legs” stand (two halves)
7. Mounting screws & spacers for “IC Legs” stand (6 pcs. each)
8. Thumbscrews with color-coded caps: • Gray, Yellow (3 each) • Red, Black (1 each)

Required Tools and Materials (not included with kit):
A. Soldering iron
   Recommended: 25-50 W pencil type, e.g., Weller WLC100
B. Solder
   Recommended: Rosin-core solder, 0.020 - 0.035” diameter
C. Small “flush” wire clippers
   Recommended: Sears Craftsman #45660 diagonal cutting pliers
D. Phillips head screwdriver, “#2” size

Basics: How to Solder Components to a Circuit Board

0. For resistors or diodes only, pre-bend the leads as shown
1. Insert a component at its given location.
   Push it down gently, as far as it will go.
   • Resistors should go down flush to the board.
   • Other components may not quite sit flush.
2. Gently bend its leads out, up to 45°, to hold it in place while you solder.
3. One at a time, from the back side, solder the leads of the component to the circuit board.

   i. The tip of your iron needs to be shiny (tinned) for soldering to work well. If it isn’t, melt some fresh solder against it and quickly swipe it clean against a wet sponge.
   ii. Place the solder against the joint that you wish to connect.
   iii. Touch the iron to the solder and joint for about one second. Count it out: “one thousand one.”
   iv. The solder should melt to the joint and leave a shiny wet-looking joint. If not, let it cool and try again.

4. From the bottom side, clip the excess leads, close to the board. (But, not so close that you’re clipping the board itself.)
1. Identify the strip of thirteen 2N3904 transistors, and gently remove them from the tape.

2. Install the first 2N3904 transistor at location Q1. Transistor orientation is very important. Match the flat face of the transistor to the flat face of the drawing on the circuit board. (Double check! Installing a transistor backwards is the most common assembly error.) Push the transistor in gently, as far as it will go, and then solder and clip its leads.

3. Install the remaining 2N3904 transistors at Q2, Q5-7, Q10-11, Q14-18, and Q22.

4. Install the 2N3906 transistors (with equal care) at locations Q3-4, Q8-9, Q12-13, and Q20.

- The XL741 Op-Amp can be used as a direct substitute for a μA741 op-amp IC in most circuits. See the XL741 v2.0 datasheet for detailed electrical specifications and much more information.
- Suggested simple test circuit: Voltage follower, or “analog buffer”
- You can find additional resources about this kit and about the 741 op-amp on our documentation wiki. Please visit: wiki.evilmadscientist.com/741

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