Continuity Tester Construction Kit

Contents:

- 1 PCB "Continuity Tester v1"
- 1 Transistor BC327-40 (PNP)
- 5 Transistors BC337-40 (NPN)
- 1 LED bright red, 3 mm diameter
- 1 Diode 1N4148
- 1 Resistor, 1 kΩ
- 2 Resistors, 2.2 kΩ
- 2 Resistors, 27 kΩ

- 1 Ceramic Capacitor, 10 nF
- 1 Electrolytic Capacitor, 10 µF
- 1 Electrolytic Capacitor, 33 µF
- 1 Inductor, 3.3 mH
- 1 Piezo Transducer
- 2 Battery contacts (positive and negative)
- 2 4 mm connectors (red and black)
- 1 Enclosure (main, lid and 2 screws)

General Soldering Advice

Insert the components one at a time and bend the leads outward slightly to prevent the component from falling out. Heat up the solder joint for a second before feeding some solder wire between the soldering iron's tip, the board and the component's lead. Wait for a few more seconds before removing the tip from the solder joint. Don't move the board until the solder has solidified. After soldering, trim the leads with a wire cutter to about 1 mm length.

See http://mightyohm.com/files/soldercomic/FullSolderComic_EN.pdf for more detailed instructions.

I recommended soldering the components in the order listed below.

1. Diode (D1): Bend the leads 90° gently before inserting the diode into the board. The black ring on the diode must match the thick line on the silkscreen outline.

2. Resistors (R1~R5): Bend the leads 90° as close to the resistor body as before inserting them into the board. Orientation doesn't matter.

| Resistor	Value	Colour Code
R1, R5	27 kΩ	red, violet, orange, gold *or* red, violet, black, red, brown
R2, R4	2.2 kΩ	red, red, red, gold *or* red, red, black, brown, brown
R3	1 kΩ	brown, black, red, gold *or* brown, black, black, brown, brown

3. Inductor (L1): The inductor looks like a fat resistor. Bend the leads 90° gently before inserting it into the board. Orientation doesn't matter.

4. Piezo Transducer (SP1): Orientation is not important. If there is a label on top of the transducer, remove it after soldering.

5. Transistors (T1~T6): There are two types of transistors in the kit with very similar part numbers, make sure you insert the transistors to the correct locations. Orientation is important, the flat side of the transistor must match the silkscreen outline. Insert the transistors as far as possible before soldering.
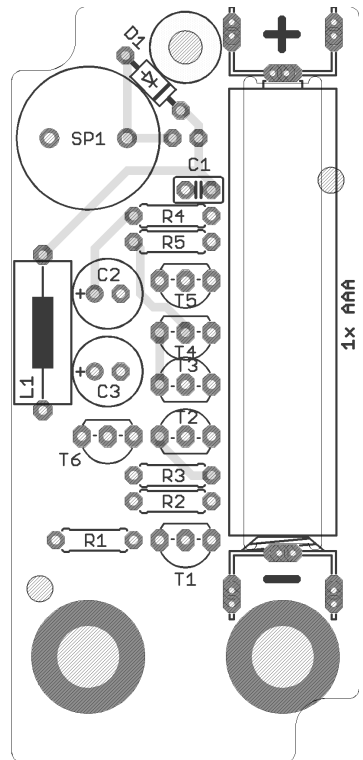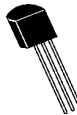
Transistor	Type	Part number / marking
T1~T5	NPN	BC337-40
T6	PNP	BC327-40

Top side of PCB

6. Capacitors (C1~C3): The kit contains two types of capacitors: ceramic and electrolytic. Orientation is only important for the electrolytic capacitors: the *negative* side is indicated with a printed bar containing (–) signs on the side of the capacitor, which also has the shorter lead. On the board, the *positive* side is marked with a small (+) sign next to the pad. For C1, make sure it doesn't foul the battery area.

| Capacitor	Value	Type	Marking
C1	10 nF	Ceramic	103 (for $10 \cdot 10^3$ pF = 10 nF)
C2	10 µF	Electrolytic	10 µF
C3	33 µF	Electrolytic	33 µF
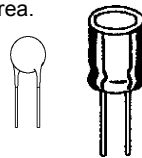
7. Battery Contacts: before installing the battery contacts, cut off about 1 mm of metal from the top edge of both contacts (as shown to the right) with **heavy-duty** side cutters (**DO NOT USE THE SNIPS USED FOR CUTTING LEADS**). Alternatively, you can use a file.
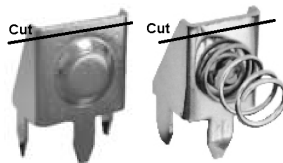
Insert the contacts into the board as far as they will go and solder them. The contact with the spring goes into the (–) position, the other ones goes into the (+) position. Avoid getting solder on the large round pad (X2).

8. LED (LED1): The LED is installed on the bottom side of the board and must stand off a bit. The shorter pin (cathode) corresponds to the pad the arrow symbol is pointing to. For correct height, remove a plastic washer from one of the 4 mm sockets and use it as a guide (as shown). Solder one pin first, then make sure the LED is straight and at correct height before soldering the other pin.
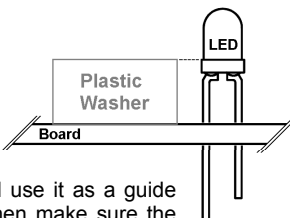
9. Test the Circuit:

Let the board cool down before testing! The circuit only works correctly if the T1 and T2 are at exactly the same temperature.

Insert an AAA battery between the contacts (it's a tight fit) and short the two metal rings at the bottom with a metal object (e.g. a cut off component lead, or scissors). The tester should now beep and the red LED should light up. If you have them available, you can also test with resistors: 10 Ω should produce the same beep, 33 Ω should produce a weaker beep, 47 Ω should produce hardly any beep, and 100 Ω shouldn't register at all.

10. 4 mm Connectors (X1, X2) and enclosure:

Remove the nuts, metal washers and plastic washers from the 4 mm connectors. Cut off the unthreaded end of the connectors with **heavy-duty** side cutters or a small saw as shown to the right (use a file to remove burrs). Insert the connectors into the enclosure holes, then add the plastic washers from the inside. Insert the circuit board and check that the LED has come through its hole. Add the metal washers and finally the nuts. Tighten the nuts with an 8 mm socket wrench or needle-nose pliers. Mount the lid on the enclosure with the two screws.
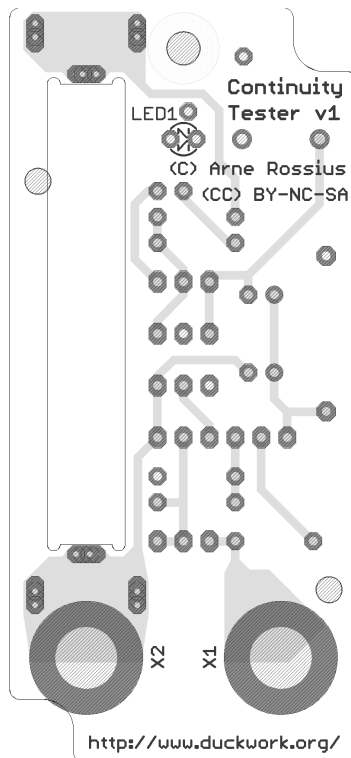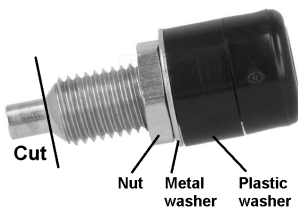
Bottom side of PCB

Questions? Problems? Comments? Ideas?   Please contact me!
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