Don’t Touch Instructor Guide

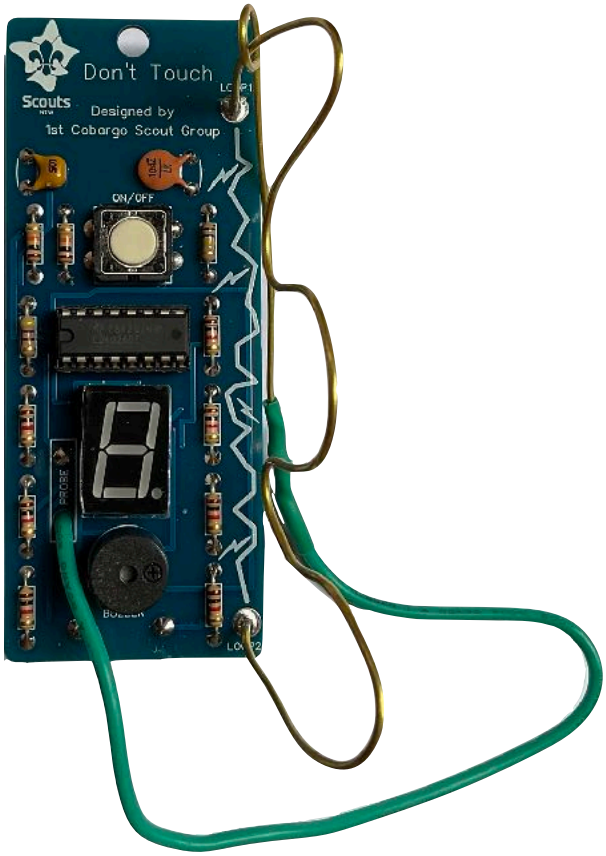
Design principles

The Don’t Touch Kit, is designed to be built by young Scouting youth members with limited to no soldering experience. It has many design principles that should ensure lower assembly failure rate, and a longer lasting robust kit

This kit involves moving a probe with a loop on the end, from one end to the other over a bent piece of brass wire, without the two coming into contact. If they come into contact, the buzzer will make a tone and the display will increment by 1.

Design features

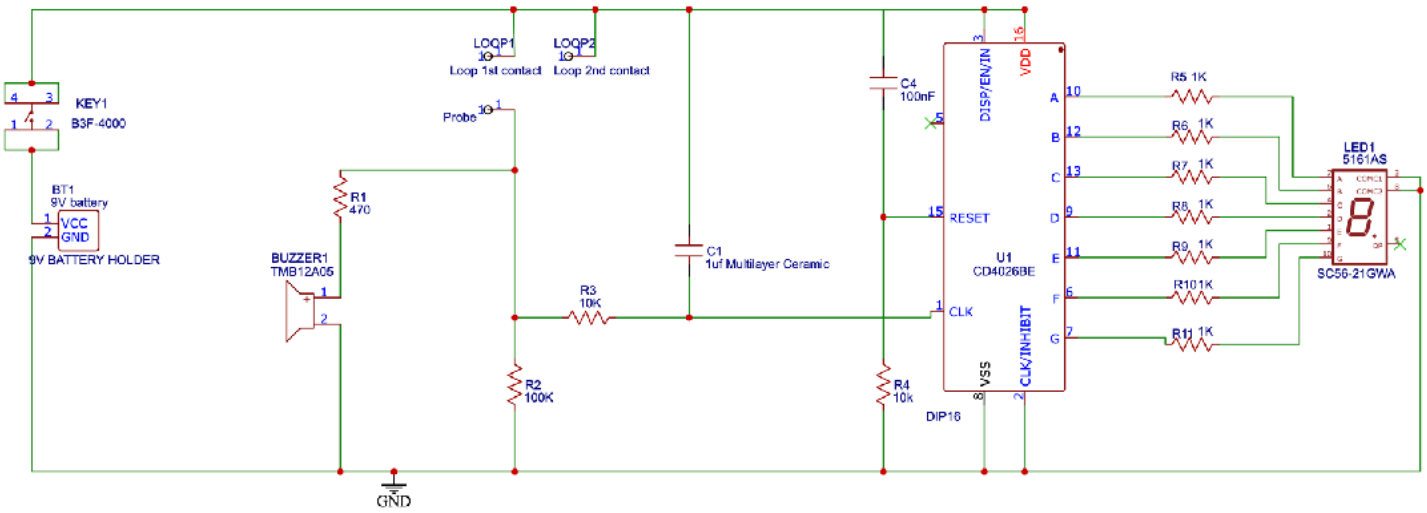
- PCB Mount battery holder
- Recommend using a small 2mm thick piece of double sided tape to help hold the battery holder on - see assembly section.
- Larger solder pads 2.5-3mm, to make soldering easier for Scouts
- Wider spacing for radial component leads to prevent solder bridges, and components laid down to prevent breakage.
- Hole at the top for connecting to a Lanyard
- Wider tracks so that if through holes are delaminated, then the component lead can be soldered to the track - saves replacing the board and starting again,
- No more than 1 track connected to a through hole to reduce the number of tracks to be reconnected if a pad is delaminated.



Circuit details

The circuit is based on a CD4026BE decade counter, driving a 7 segment common cathode display.

As the probe and loop come into contact with each other, the buzzer is activated through a 470 ohm resistor. R2,R3, R4 and C1 debounces the probe and loop contact and creates a “one shot” pulse, so that display only increases by 1 count. C4 resets the CD4026BE to Zero on power up.

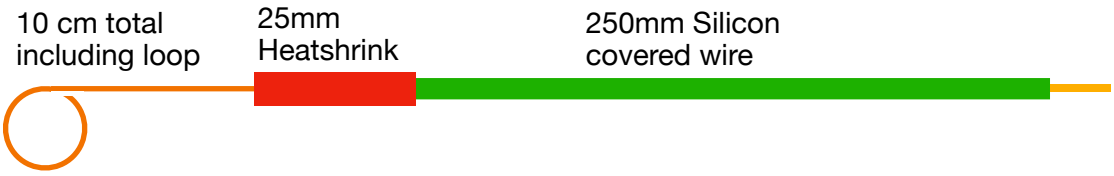


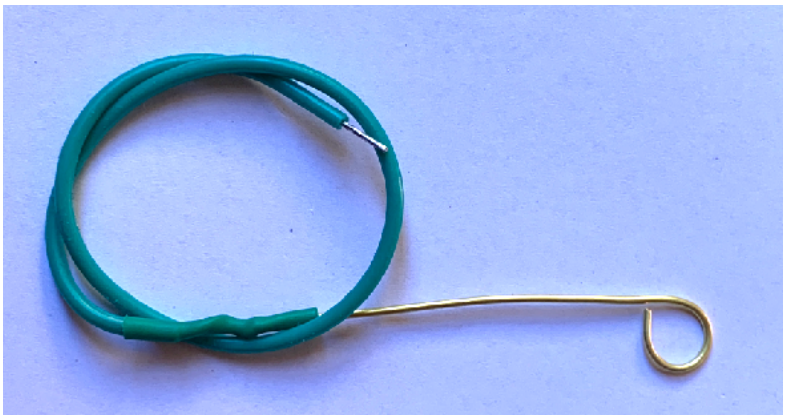
To Do list before the Day

1) Order Boards
2) Order Components
3) Put the double sided tape on the battery holder.

4) Make the Probe

Cut an 10cm piece of Brass wire to use as a loop. Curl one end round a pencil to create a loop. Cut a 25cm piece of the silicon covered wire, and strip of 10mm of each end and tin it with the soldering iron. Solder one end to the straight end of the probe, and cover it with a 20mm long piece of 4mm wide heat shrink.





5) Cut the Brass Loop.

Cut a 25cm piece of brass wire to use as the loop.

6) Print one copy of the Component Sorter per Soldering station, and laminate them. These are used by the Scouts to sort the components, do not let them start soldering until you have checked that they have sorted them correctly

7) Print two copies of the Assembly guide (double sided) per table (4 - 6 scouts) - they can just share them. It is recommended that you laminate them.

9) Package only the following components

- 11 * Resistors
- 2 * Capacitors
- 1* IC socket
- 1 * 7 Segment display
- 1 * Switch
- 1* Buzzer
- 1 * Probe
- 1* Loop
- PCB
- Solder

- Do not give out the battery holder, or battery or IC. When the youth members are assembling them, get the Youth to assemble all the components up to and including step 19, on the assembly guide, then test the board by putting a batteries in the battery holder and just putting it into the board and twisting is slightly so that it contacts the battery socket pads, and check that it works. Also check that the switch turns off and on

Assembly guide suggestion

Install the components in the following order (the board will stay relatively flat on the bench this way, and will not require you to splay the wires much to keep the component from falling out.

1. Resistors - 11
2. Capacitors - 2
3. IC Socket
4. 7 Segment display
5. Switch
6. Buzzer
7. Probe
8. Loop
9. Battery Holder

Check the soldering before going any further

10. Check the soldering for dry joints etc, as its hard to remove the battery holder to fix anything, once its soldered and stuck in.
11. Put in the CD4026BE IC's, then put in the battery, and put the battery holder into the board and twist it slightly, so that the pins make contact with the holes/pads. Touch the probe to the loop 9 times to ensure that the display counts up ok, and that it shows each number clearly, to check that there are no shorted pins that run the display., if so its ok to proceed. Remove the battery at this stage.

12. Battery Holder - remember to remove the double sided tape cover, this will hold the bottom end of the battery holder onto the board, to help prevent it getting broken off
13. Get them to write their name and Scout Group on the label on the side of the battery holder..
14. Put a piece of Kapton tape over the battery holder pins on the front of the board to cover to help prevent electrical shorts, and on the back of the board to protect fingers from the exposed pins

Picture of Kapton tape front and back.