Duck Mini Construction Kit

Contents:

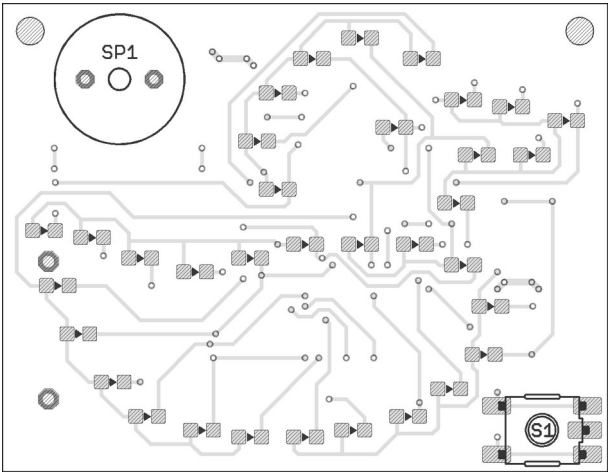
- 1 Printed Circuit Board “Duck Mini Rev. 3.1”
- 1 Microcontroller PMS152, prog'd (SO14/16)
- 1 EEPROM 24C64, programmed (SO8)
- 2 PNP Transistors BC807-40 (SOT-23)
- 8 NPN Transistors BC817-40 (SOT-23)
- 1 Ceramic Capacitor 100 nF (0805)
- 1 Resistor 2.7 kΩ (0805)
- 1 Tantalum Capacitor 100 µF (size C)
- 1 Electromagnetic Speaker, 16 Ω (THT)
- 1 Tactile Push-button switch (SMD)
- 1 Battery Holder for 3x AAA (THT)

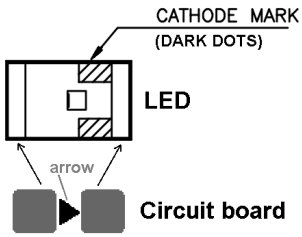
SMD Soldering Advice

To solder the SMD components, tin only one of the pads, then grab the component with tweezers, re-heat the tinned pad and slide the component in sideways. When the component is aligned properly, remove the soldering iron, let the solder joint cool and solder the remaining pins (starting with the diagonally opposite pin for ICs). Solder bridges between adjacent pins can be removed with desoldering wick or by heating up the solder joint, then very quickly knocking the board against the table (with the heated solder bridge facing down).

For some illustrated soldering instructions, scan the QR code or visit
http://talkingelectronics.com/projects/SurfaceMount/SurfaceMount-P1.html#table2

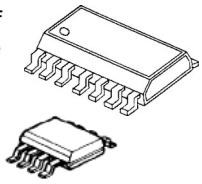
I recommended soldering the components in the order listed below.





1. LEDs (top): The orientation is important for the LEDs. You can see two small green (or dark) dots inside the LED on one side (cathode). This side must face in the direction the little arrow on the board is pointing to, as shown above. All LEDs face the same way. Don't solder too long on the LEDs, they will have reduced brightness if they become too hot during soldering. The kit contains a spare LED in case you break one.

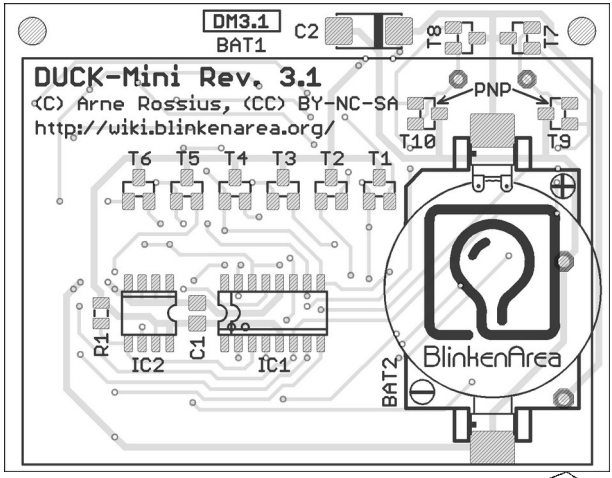
2. Integrated Circuits (IC1, IC2, bottom): The circular dent in one corner of the IC (indicating pin 1) must face towards the notch in the outline on the board. If your kit has a 14-pin microcontroller, align it to the right (leave the 2 pads next to the notch free). A 16-pin microcontroller uses all available pads on the board.



3. Transistors (T1~T10, bottom):
The transistors only fit in one orientation. There are two different types, they can be identified by their marking:
T1~T8: BC817-40, marked “6C”
T9, T10: BC807-40, marked “5C”

4. Resistor (R1, bottom):
The resistor is marked “272” or “2701”.
Orientation doesn’t matter.

5. Capacitors (C1, C2, bottom):
There are two different capacitors. The ceramic capacitor **C1** is the small brown component without marking, orientation doesn’t matter. **C2** is a tantalum electrolytic capacitor, the printed bar on top must match the thick bar on the board.



6. Push-button switch (S1, top): Solder the switch to the intended location on the board. Orientation is not important if your switch has only 4 pins, the fifth pad remains unused. 5-pin switches will only fit in one orientation.

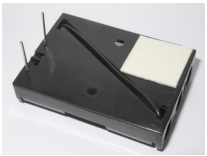
7. Speaker (SP1, top): Orientation doesn’t matter. You can experiment whether the speaker sounds better with a label stuck over the hole on top, or with it removed. Often it sounds “fuller” (less “tinny”) with the label in place, but is louder without it.

8. TEST THE DUCK! **Do this before soldering the battery holder!**

Insert batteries into the holder, then insert the two pins of the holder into the board from below and angle it to make good contact. Hold down the push-button until the LEDs start flashing. Push it again to make the duck quack. Hold the button down again until the LEDs turn off.
Test mode (sequence LEDs): hold down button while connecting batteries for 5 seconds.

- If a single LED lights up at the wrong time, it’s likely installed the wrong way around.
- If a group (6 adjacent LEDs or every 6th LED) doesn’t work, check the soldering on IC1 pins 6, 7, 9~11, 14, 15. For a group of adjacent LEDs, also check T1~T6.
- If nothing works, check IC1 pins 5 & 12 (power) and pin 8 (button input).
- If quacking doesn’t work, the LEDs might flash off a number of times to indicate the error.
  If the LEDs just fade on and back once, check IC1 pins 4 & 6 and transistors T7~T10.
  If the LEDs flash off after fading on, check IC1 pins 3 & 13, all IC2 pins and the resistor.
  Flash off 1x = EEPROM SDA pin stuck low; 2x = SDA stuck high, 3x = invalid data read.

9. Battery Holder (BAT1): Remove batteries before soldering the holder. To make it a bit sturdier, apply a piece of double-sided tape on the back of it as shown to the right. Trim the leads to just stick out a tiny amount on the LED side *before* soldering. **Use large, sturdy side cutters to cut leads, small snips will be ruined by the hard metal!**



Questions? Problems? Comments? Ideas? Please contact me: arne@blinkenarea.org

Project webpage: http://wiki.blinkenarea.org/index.php/DuckMiniEnglish