Binary Desktop Temperature display


You’ll find the latest versions of the instructions and source code at the address above.

Thank you for purchasing the Binary Desktop Temperature kit! I hope you have lots of fun with it!

If you have any suggestions for future boards then please let me know. I’ll send you some free boards if I like your idea!

Kit Contents

This kit was put together by a team of highly skilled octopuses; it should contain the following items:

1) The main PCB
2) 8x 5mm LEDs
3) 1x PICAXE 08M2+ microcontroller
4) 1x button
5) 1x slide switch
6) 1x DS18B20 temperature IC
7) 1x 74HC595 shift register
8) 1x 4.7k resistor or 2.2k resistor
9) 8x 330Ω resistors
10) 2x 10K resistors
11) 1x 16 pin DIP sockets
12) 1x 8 pin DIP socket
13) 2x 0.1µF capacitors
14) A 2 pin connector for power
15) Battery box and connector clip
16) 2x M3 screws
17) 4x washers
18) 2x 18mm hex spacers
Important Things to Remember

This kit is designed to run from 5V. **Do not exceed 5V** or the ICs and LED components will be damaged. It will work fine from 4x 1.2V rechargeable batteries or 3x 1.5V alkaline batteries. *Never* connect a 9V battery to the battery clip.

The LEDs and IC sockets (and corresponding ICs) must be placed on the board in the correct orientation or it will not work.

The two shift registers and PICAXE ICs are sensitive to static shocks so handle them with care and avoid touching the legs (pins).

*Before* soldering any components check and then double-check that they are correctly oriented.

Don’t rush, and have lots of fun!

If you need a good tutorial on soldering then SparkFun Electronics has a good one ([https://www.sparkfun.com/tutorials/106](https://www.sparkfun.com/tutorials/106)) as does Adafruit Industries ([http://www.ladyada.net/learn/soldering/thm.html](http://www.ladyada.net/learn/soldering/thm.html))
Building Instructions

You will need a soldering iron, solder, an octopus (or a set of handy helper things) and wire cutters. To keep some of the large components in place while soldering you might find Blue-Tac useful to stop them moving around or falling off, but be careful not to put it on anything that will get hot (resistor leads, LED leads etc.) or you’ll end up with a hot squidy mess on your components.

Take your time and check the placement of every component before soldering them in place!

**STEP 1 – 330Ω Resistors** (orange orange brown)

Solder each of the 8 330 ohm resistors on to the board first. These protect the LEDs from excessive current. It doesn’t matter which way around they go (but I like to make them all face the same way!).

They are labelled on the PCB as R1 to R8.

**STEP 2 – 10kΩ Resistors** (brown black orange)

Solder each of the 2 10K ohm resistors next. The first goes just above the temperature IC, the second to the right of the switch.

**STEP 3 – 4.7kΩ or 2.2kΩ resistor** (yellow purple red) or (red red red)

If your kit came with a waterproof external sensor module then you need to select the 2.2k resistor, otherwise use the 4.7k resistor.

**STEP 4 – 16 pin socket**

This socket will eventually hold the 74HC595 shift register. Don’t put the chip in until the end.

The socket should be positioned so the notch faces to the right.

**STEP 5 – 8 pin socket**

This socket will eventually hold the PICAXE microcontroller. Place it so the notch faces the right. Pin 1 can be identified by the square solder pad.

**STEP 6 – The Capacitors (yellow or orange)**

There is one capacitor for the shift register and one for the PICAXE microcontroller. They are not polarised, they can go in anyway round. They are labelled C1 and C2.

**STEP 7 – Button**

The button goes at the bottom of the board.

**STEP 8 – Slide switch**

The switch goes on the underside of the board, solder on the top side.
**STEP 9 – Power Connector**

The 2-pin power connector goes in to the location marked “power” on the PCB. It should be fitted so that the connector part is underneath the board, the pins are soldered on the top side. Position it so the screw terminal holes are facing inwards.

**STEP 10 – 5mm LEDs**

The long lead of the LED goes in the bottom hole, the shorter lead in the top hole.

**STEP 11 – DS18B20 temperature IC**

The outer legs of this device need to be carefully pulled apart a few millimetres so that it will fit correctly. Don’t push it flush to the PCB, there should be a gap of around 4-5mm between the PCB and the bottom of the IC.

For the external thermometer: Solder the red lead top (closest to the LEDs), yellow in the centre, and black at the bottom (closest to the button).

**STEP 12 – ICs in to the sockets**

Now all of the components have been soldered to the board it’s time to place the 74HC595 chip and the PICAXE microcontroller in to their sockets. They should be socketed so the notch on the chip is on the same side as the notch on the socket, all ICs face the right.

Before you try to carefully slot the chips in to sockets you’ll notice that the legs are spread out too much to fit. They’ll need to be bent inwards before they’ll fit. DO NOT FORCE THEM.

The way I like to do this is by very carefully pressing each side of the chip on my desk until both sets of pins are parallel. Once the legs are parallel it will take a bit of force to push the chips in to the sockets, be gentle and patient.

That’s all the hard work finished, you should now have something that looks like the image below.
Making the kit stand on your desk (or shelf)

**STEP 1 – Hex spacers**

For each of the two hex spacers, place a washer on one of the M3 screws then place it in one of the holes on the PCB, so the head of the screw is on the top of the board. Now place another washer on the screw, this should be on the bottom side, and screw the hex spacer on to the screw, but not too tight.

**STEP 2 – Battery clip**

Connect the wires to the battery connector, and the clip to the battery box. Check the polarity! Red wire to 5V, black wire to ground. **NEVER** connect a 9V battery to the battery clip.

**STEP 3 – Battery box**

Connect the box to the battery clip.
The source code for the on-board PICAXE 08M2+ can be found here: www.MaximumOctopus.com/electronics/dbinarytemperature.htm

Please feel free to modify and publish the code as you see fit, but please let me know so that others can get the benefit from your code.

If you have any comments or suggestions for this kit then please let us know.

For more information, updates and details of new kits check out the following links:

- Website: www.MaximumOctopus.com
- Twitter: http://www.twitter.com/maximumoctopus
- Blog: http://maximumoctopus.wordpress.com
- Online store: http://store.MaximumOctopus.com
- YouTube: https://www.youtube.com/user/freshneyorg

This kit was designed and manufactured in the UK.

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