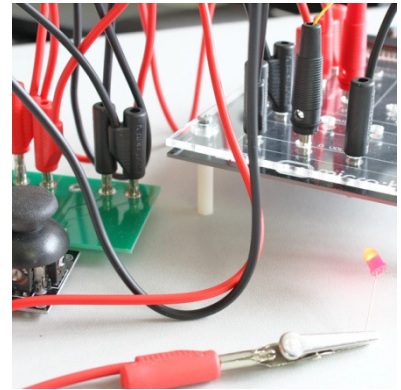# Instruction Sheet: Micro:bit Prototyping Kit

Included

- 1 x Breakout Board
- 1 x Sound Cable
- 1 x Joystick
- 3 x Red 4mm Banana Cable
- 3 x Black 4mm Banana Cable
- 10 x Crocodile Clips
- 1 x Red LED
- 1 x Yellow LED
- 1 x Green LED
- 1 x LDR
- 1 x 10K Resistor
- 1 x 147 ohm Resistor
- 1 x 69.8 ohm Resistor
- 1 x 40.2 ohm Resistor
- 1 x Temperature Sensor

The BBC micro:bit school prototyping kit is everything you need to begin using the BBC micro:bit in a practical and visual way. This comprehensive school prototyping kit has been designed for use with standard 4mm banana cables and crocodile clips to eliminate the need for soldering therefore making prototyping easier and safer for your students. The kit includes the new ScienceScope micro:bit breakout board, a range of BBC micro:bit compatible products as well as a variety of components.

Activities

Activities for the micro:bit prototyping kit can be found on our website online at https://sciencescope.uk/product/microbit-school-prototyping-kit/.

Activities include create your own night light, car sound simulator and thermostat.
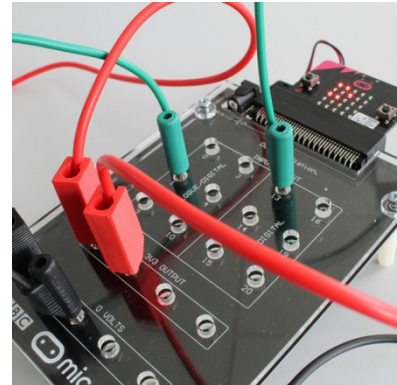
Breakout Board Assembly Instructions

The micro:bit breakout board has been designed to increase the functionality of the micro:bit by exposing the edge connector into multiple 4mm input and output, digital and analogue connections. This enables basic or advanced electronic circuits and control systems to be created and programmed using both the micro:bit specific coding environments and traditional C/C++ coding languages.

Features

- Works with standard 4mm banana plug cables
- 12 input/output channels
    - 6 analogue/digital input and outputs
    - 4 digital input and outputs
    - 2 i2c/digital input and outputs
- 4 3V3 power output
- 4 GND channels
- External 5V DC power boost input

Assembly

The instructions below reference the "Assembly Images" sheet.

1. Check you have the correct parts. (Image 1)
    a. 1 x Breakout Board.
    b. 1 x Acrylic Cover.
    c. 4 x Screws.
    d. 4 x Legs.
2. Insert one screw though any one of the four corner holes on the acrylic cover. (Image 2)
3. Place one spacer over the screw as per image 3. Use a finger to hold the screw in place.
4. Line up the same hole on the breakout board with the screw from the acrylic board whilst still using your finger to hold the screw in place. The spacer should be between the acrylic cover the breakout board. (Image 4)
5. Place the breakout board on top of the acrylic cover ensuring the screw has gone through the corner hole. (Image 5)
6. Screw a leg onto the end of the screw. Do not fully tighten. (Image 5)
7. Repeat for the remaining three corner holes ensuing that you do not tighten the legs fully. (Image 7)
8. Once all legs have been attached tighten the legs fully. Do this using your finger as shown in image 8.
9. Insert the pre-coded or un-coded micro:bit into the edge connector. (Image 9)
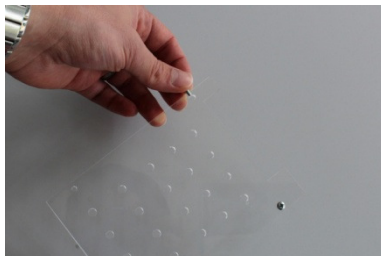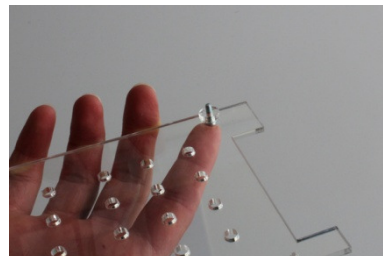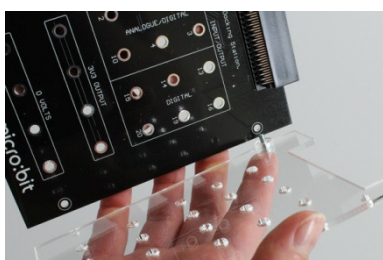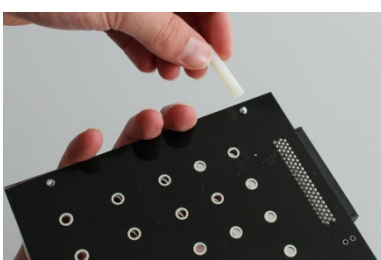10. Get coding!
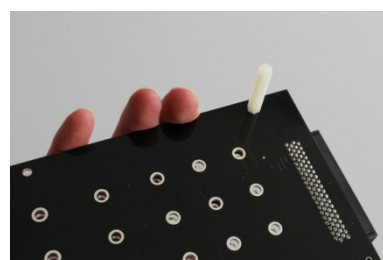
Assembly Images

1
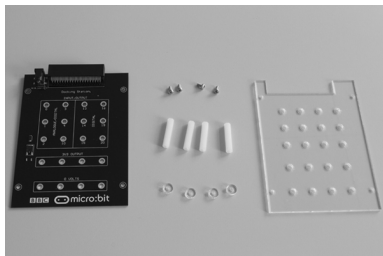
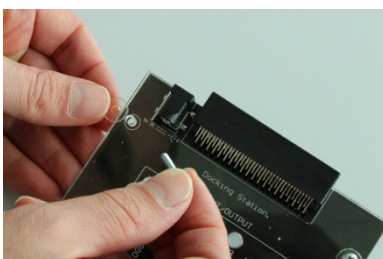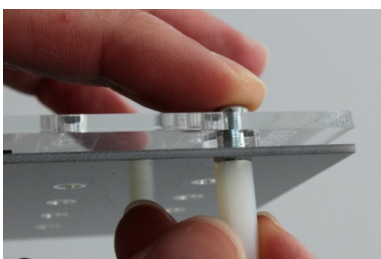
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Breakout Board User Instructions

Input/output Channels

The table below illustrates each channel. (✔) shows that the channel is compatible.

Channel	Pin Number	Processor Number	Digital	Analogue	i2c
0	P0	P0_3	✔	✔	
1	P1	P0_2	✔	✔	
2	P2	P0_1	✔	✔	
3	P3	P0_4	✔	✔	
4	P4	P0_5	✔	✔	
10	P10	P0_6	✔	✔	
13	P13	P0_23	✔		
14	P14	P0_22	✔		
15	P15	P0_21	✔		
16	P16	P0_16	✔		
19	P19	P0_0	✔		✔
20	P20	P0_30	✔		✔

Channel
- Represents the channel number as per the breakout board.

Pin Number
- Represents the micro:bit edge connector input/output. (These numbers are used for programming in micro:bit specific coding environment).

Processer Number
- Represents the micro:bit processer channel. (These numbers are used for programming in mbed).
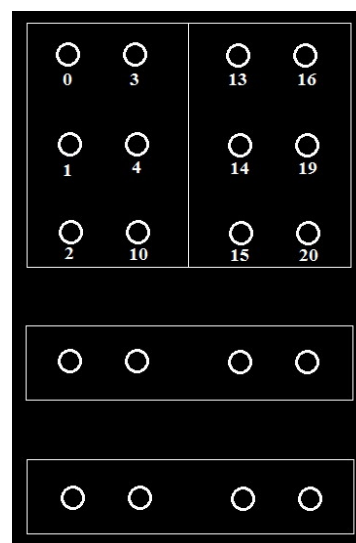
Digital
- Shows if the channel can be controlled using digital signal.

Analogue
- Shows if the channel can be controlled using analogue signal.

I2c
- Shows if the channel is used for i2c.

3V3 Power Output

The 4 x 3V3 OUTPUT channels offer a voltage of up to 3.3 volts from the micro:bit. This enables multiple components to be powered without the need for multiple connections through one input.

GND

The 4 x 0 VOLTS channels represent the GND input for your circuit. This enables multiple components to be used without the need for multiple connections through one channel.
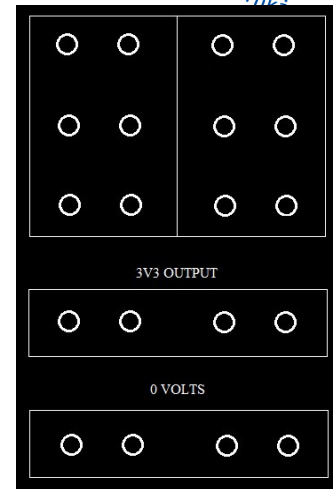
Micro:bit Specific Coding Environment

The micro:bit specific coding environment which includes blocks and Java Script can be found at www.pxt.io as well as information on how to use these coding languages.

Mbed Coding Environment

The mbed coding environment can be used for programming in C/C++. It allows access and full functionality to all of the micro:bit input/output channels. When programming the micro:bit in mbed for use with the breakout board the channels are represented by the processor numbers as per the input/output channels table.

See example below which shows how to represent the channels in mbed. The example will send a digital out signal for 2 seconds to channel 0 on the micro:bit breakout board. It will then stop the signal for 2 seconds. This will repeat indefinitely.

```
1  #include "mbed.h"
2
3  DigitalOut channel0(P0_3);
4
5  float Delay=2;
6
7  int main() {
8      while(1) {
9          channel0= 1;
10         wait(Delay);
11         channel0= 0;
12         wait(Delay);
13             }
14 }
```

External 5V DC Power Supply

The micro:bit breakout board does not include a 5V DC power supply due to the fact that the micro:bit offers up to 3.3 volts using it's battery pack.

If you are using a component that requires a higher voltage you can purchase a compatible 5V DC power supply from the ScienceScope website www.sciencescope.uk.

Sound Cable User Instructions

Included:
- 1 x sound cable.

Required
- Speakers or headset.

- Open the code editor of your choice and use the Play Note function to start coding music.
- Compile your code and transfer to the micro:bit.
- Insert the Black 4mm plug into the GND input of the BBC micro:bit and the RED 4mm plug into the P0 input.
- Insert the speakers or headphones into the jack connection.
- You are now ready to play your music!

There is sample code in the form of a piece of music (Three Blind Mice) on our website at the following link. https://sciencescope.uk/product/microbit-sound-cable/. Download the code which can be found in the product description.

Joystick User Instructions

Included

- 1 x Joystick

Assembly

- Use one of the 4mm cables to attach the left most output from the joystick to channel 0 on the BBC Micro:bit.
- Use another 4mm cable to connect the second from the left output of the joystick to channel 1 on the BBC micro:bit.
- Repeat this across all of the remaining outputs of the joystick.
- See the diagram below representing the connections.
- You are now ready to code.
- For starter code go to our website at the following location https://sciencescope.uk/product/microbit-joystick/. This code uses the joystick to control an LED on the micro:bit LED matrix.

Channels for Joystick Direction

- 0 = Push
- 1 = Horizontal
- 2 = Vertical