

Proto-Pic board for the BBC micro:bit

In Bulletin 262, we suggested that you could use BBC micro:bits as an aid to teaching potential dividers and switching circuits. We directed you to some programs we had written and showed how you could wire up “choc block” connectors to use the devices with electronic components such as LDRs and LEDs. We had some very interesting, rather contradictory feedback. Some teachers reported that their students loved wiring up the block connectors. Others found the approach too fiddly. If you fall into the latter camp, you may be interested in the Proto-Pic board and accessories (Figure 1).

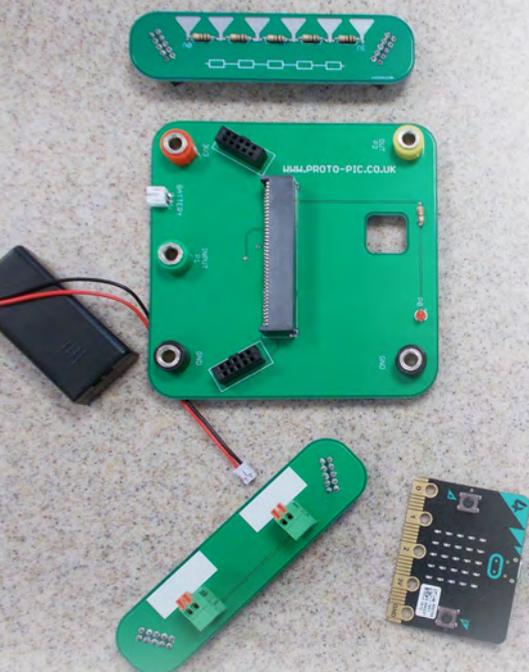


Figure 1 - Proto-Pic board, accessories and BBC micro:bit.

Proto-Pic[1] are based in Kirkcaldy. When the company heard that SSERC was promoting the use of the micro:bit in physics lessons, they asked if we felt there was a need for additional hardware. From the discussions that followed, a board was born. It has a connector for the micro:bit (which is not supplied with the board), plus input and output sockets. There are also accessory boards. Figure 2 shows a set of five resistors connected in series. The micro:bit is running SSERC’s bar voltmeter program. A lead plugged into the board can be touched on pads between the resistors, creating a potential divider. As described in Bulletin 262, the two columns on the micro:bit display represent the voltages across each arm.

There is also a component holder board (Figure 3). Resistors, capacitors, LDRs and so forth can be fitted into spring-loaded holders. Our program is designed to switch on an output when the voltage across the lower arm is 3 bars (about 2.1 V). Two versions of the program exist. One uses an onboard LED as the output. The other allows you to connect an external output device across the black and yellow sockets at the right of the board.

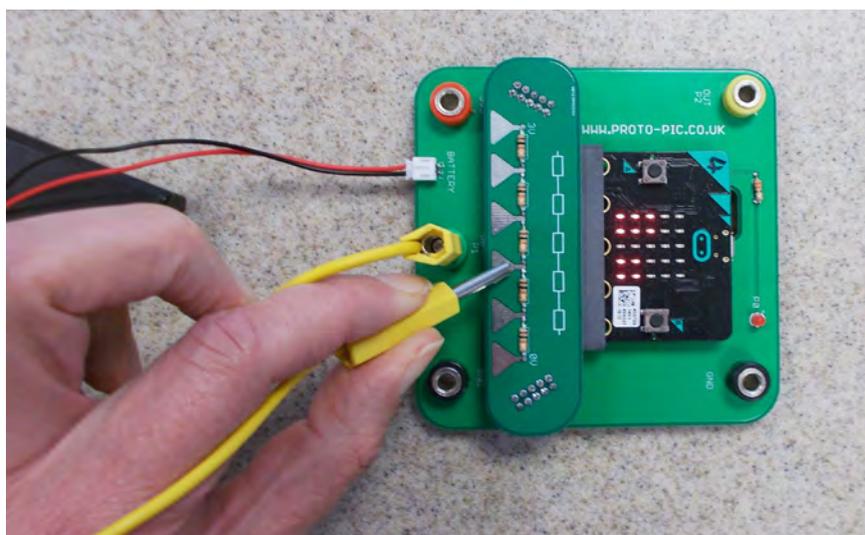


Figure 2 - Resistor chain.

These programs use a digital output - connected devices are either on or off. Documentation mentioned an analogue output. We decided to make use of this in another pair of programs. Sure enough, we could make the brightness of an LED increase as a capacitor charged or an LDR was covered. However, the range of brightness possible from the LED puzzled us. It was greater than we expected. We attached an oscilloscope across the output. Figure 4 shows what we found.

Is the output truly analogue? It appears to be either zero or 3.3 V. All that changes are the times for which the pulsed output remains high or low. Set the analogue output to a small value and the signal is zero for much longer than it is at 3.3 V. Make it higher and the time for which the output is at 3.3 V increases, with a corresponding decrease per cycle in the time that it is at zero volts. This type of output is called Pulse Width Modulation (PWM). You may be interested to know that electric cars use PWM to control motor speeds. >>>

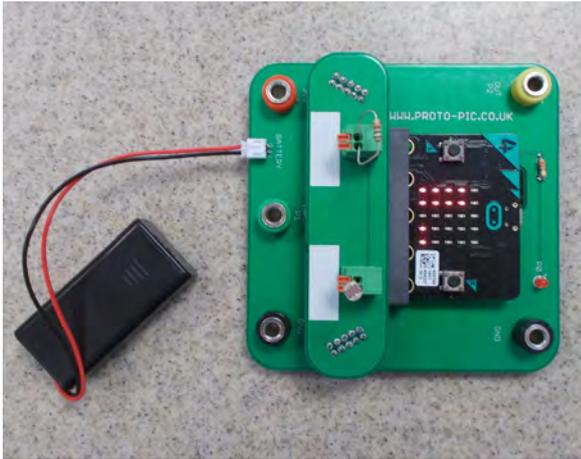


Figure 3 - Component holder board with LDR and fixed resistor.

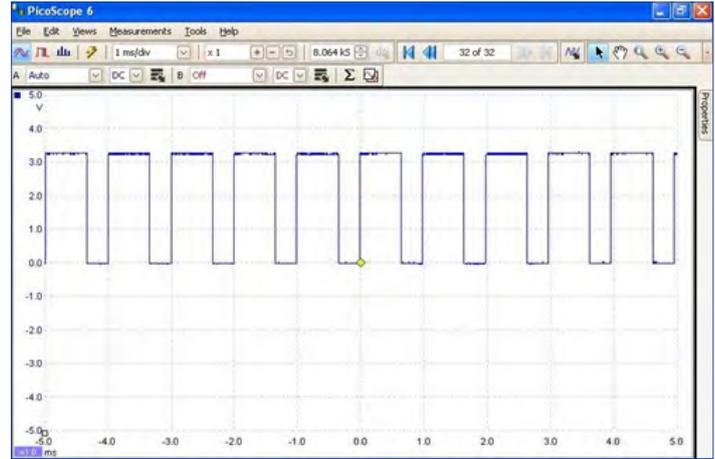


Figure 4 - "Analogue" output from the micro:bit.

Interestingly, some delegates at a two part course who had been unsure of using the micro:bit with their pupils having been introduced to the "fiddly" approach in Part 1 pronounced themselves to be converts after having been introduced to the boards.

Pricing depends on the number of boards ordered, but Proto-Pic, as part of their design brief, set the goal of making them comparable in cost to the micro:bit itself. We have asked them if they can supply resistor boards separately without the components soldered in place.

We think this could be a useful activity for Practical Electronics students. As ever, we are eager to hear your own ideas. <<

Reference
 [1] www.proto-pic.co.uk.

Changes to National 5 Biology Coursework Assessment Task

SQA have recently published some revisions to the documentation related to the National 5 Coursework Assessment Task [1].

Factors in Photosynthesis and Fertiliser and the Growth of Algae which are available on the SSERC website [2].

Please send any feedback on this article to biology@sserc.scot. <<

As a result of these changes we have made some 'minor tweaks' to the Student Guides related to our exemplar resources packs (*Limiting*

References

- [1] https://www.sqa.org.uk/files_ccc/BiologyN5CAT.pdf.
- [2] <http://info.sserc.org.uk/biology/biology-national-4/4239-test>.

