PIC Development Board User Guide

A green electronic device with a blue screen

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# Introduction

The PIC development board (PDB)was designed to make programming microcontrollers accessible to hobbyists. Although there are no restrictions on what programming language you use, the design was geared around using Flowcode; a graphical based programming language.

The company behind flowcode recently made a version that is free to the hobbyist, with some restrictions and a reduced set of target devices. However, one of the devices available, the 16F18877 has been chosen. With a relatively high I/O count it means there are quite a few devices available to experiment with as follows:

* 20x4 I2C LCD
* 7 segment display
* 3 LED’s
* 4x3 keypad
* DHT22 temperature/ humidity sensor
* HCSR04 Ultrasonic distance sensor
* 3 momentary switches
* 3 slide switches
* Analogue potentiometer
* Light dependent resistor

With such a rich range of devices you will be able to experiment with many fun projects in the future. The PDB comes with a USB to 5V adaptor to power the device, making it much more convenient, but also has an on-board regulator if you wish to supply it with 12V, via the green connector. NOTE: the black power socket is designed for the supplied USB adaptor do not connect anything else here.

Your board has been fully tested and comes delivered with the temp/humidity test routine loaded.

# Board Layout

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7 Seg display

LED’s

Microcontroller reset

Keypad

LDR

Temp/humidity sensor

Ultrasonic sensor

Push button switches

Analogue pot

Slide switches

ICSP socket

20 x 4 LCD

12V socket

USB to 5V socket

# Connections

The table below details the microprocessor connections, for your convenience the I/O has also been screen printed on the PCB next to various components.

|  |  |  |
| --- | --- | --- |
| Pin number | I/O pin | Description |
| 1 | MCLR | Pulled high but resets the micro using the reset switch |
| 2 | A0 | Analogue pot varies this input between 0 – 5V |
| 3 | A1 | Connected to segment C of 7 segment display |
| 4 | A2 | Connected to the red LED |
| 5 | A3 | Connected to the amber LED |
| 6 | RA4 | Connected to com on 7 segment display |
| 7 | A5 | Connected to the green LED |
| 8 | E0 | Connected to echo line on HCSR04 |
| 9 | E1 | Connected to LDR |
| 10 | E2 | Connected toDHT22 Temperature/humidity sensor |
| 11 | VDD | Power rail (5V) |
| 12 | VSS | Power rail (ground) |
| 13 | OSC1 | Connected to Crystal |
| 14 | OSC2 | Connected to Crystal |
| 15 | C0 | Connected to segment B of 7 segment display |
| 16 | C1 | Connected to segment A of 7 segment display |
| 17 | C2 | Connected to segment G of 7 segment display |
| 18 | SCLK | I2C clock line |
| 19 | D0 | Connected to HCSR04 trigger |
| 20 | D1 | Connected to momentary switch, SW6 |
| 21 | D2 | Connected to momentary switch, SW5 |
| 22 | D3 | Connected to momentary switch, SW4 |
| 23 | SDAT | I2C data line |
| 24 | C5 | Connected to segment F of 7 segment display |
| 25 | C6 | Connected to segment E of 7 segment display |
| 26 | C7 | Connected to segment D of 7 segment display |
| 27 | D4 | Connected to slide switch, SW3 |
| 28 | D5 | Connected to slide switch, SW2 |
| 29 | D6 | Connected to slide switch, SW1 |
| 30 | D7 | Connected to keypad C3 |
| 31 | VSS | Power rail (ground) |
| 32 | VDD | Power rail (5V) |
| 33 | B0 | Connected to keypad R1 |
| 34 | B1 | Connected to keypad R2 |
| 35 | B2 | Connected to keypad R3 |
| 36 | B3 | Connected to keypad R4 |
| 37 | B4 | Connected to keypad C1 |
| 38 | B5 | Connected to keypad C2 |
| 39 | B6 | ICSP clock line |
| 40 | B7 | ICSP data line |

# Installing the software

Although you can use whatever tool you like to program the microcontroller, the intention was to use flowcode and that is what is now described. The first thing you need to do is create a login on the flowcode site. Not only is this neccesary to download the free software, but it also gives to access to their support forum. This is a great place for getting help if you are struggling with something.

Go to the following site and register, following the instructions to download and set up flowcode, [Flowcode - Visual Programming Language](https://www.flowcode.co.uk/). Also install the 8 bit toolchain from the site. Once you have done this come back to this document for further guidance.

Please note I do not offer programming support but there is a wealth of information on the flowcode site and great help available on their forum also.

# Programming the board

Once you are happy with your program you need to program the device. To do this you need to create a hex file, this can be found in the Build menu. Take the USB programmer out of the pack and connect it to the ICSP socket which can be located towards the top left of the board. It is important to connect this the correct way round. Pin 1 is located next to the white dot (the top connection). You will see that one of the wires on the programmer ribbon cable is coloured red. This is pin 1 and goes towards the top of the board. Note some programming leads only have 5 connections so the bottom connection will not be connected to anything in this instance. The USB to 5V adaptor cable can plugged into J2. Now both can be plugged into your USB sockets on your PC.

The board is now powered and will run the test program until you overwrite the program. You are now ready to program your board for the first time. To do this, run the pickit 2 programming software. Once the program starts you will see that the pickit 2 is connected and towards the top it should have PIC16F18877 in device. Also make sure /MCLR has a tick in it.

With this connected all you need to do is import the hex file, which can be found in the file menu. Once the file is imported, simply click Write to program your device.

# Example programs

There are a number of example programs found on the USB stick, each in its own dedicated folder. You will find the hex file and the flowcode file. These are basic files to test the individual sensors, etc. An experienced programmer will be able to enhance these. Hopefully they will inspire you enough to get started.

Happy programming.