

This is revision A of the [PIC Serial Adaptor Board](#) and it is currently a [work in progress](#).

EMDP1 PIC Serial Adaptor Board (Rev. A)

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Introduction

There is a [PDF](#) version of this file available.

The PIC Serial Adaptor Board is used to program [Microchip](#) PIC microcontrollers using one of their serial programming protocols.

In order to serially program a PIC, 5 Volts (V_{dd}), 13 Volts (V_{pp}), Ground, Clock and Data need to be routed to the appropriate pins on the chip.

This adaptor board directly supports the PIC microcontrollers that are in 8, 14, 18, 28, and 40 pin DIP (Dual Inline Package) packages. Any surface mount PIC microcontrollers will need an alternative adaptor; since I am perfectly happy to use DIP packaging for all of my projects that use PIC microcontrollers, I am in no particular hurry to design an adaptor for surface mount PIC chips.

My going in design decision was that there was going to be a single 40-pin ZIF (Zero Insertion Force) socket *and* that I would always place pin 1 of each PIC microcontroller in the upper left corner of that socket, irrespective of whether the chip is in an 8, 14, 18, 28, or 40 pin DIP package. The table below summarizes my investigations regarding which PIC chips require which voltages and signals on which pins. If the chip is in a 40-pin package, the pin numbers are straight forward. For 8, 14, 18, and 28 pin packages, any pin which falls on the right side of the package has its corresponding location on the 40-pin socket listed in parenthesis. For example, for the PIC16F62x, pin 20 on the 28-pin chip corresponds to pin 32 on the 40-pin chip. The table is listed immediately below:

| Proc. | Class | Pkg. | Clk. | Data | V_{pp} | V_{dd} (+5V) | V_{ss} (Gnd) | LVP |
|--------------------------------------|-------|---------|---------|---------------------|----------|-------------------|----------------|------------|
| Class A | A | 28/40 | 39 | 40 | 1 | 11, 32 | 8, 12, 31 | 36 |
| 16F62x | A | 28 | 27 (39) | 28 (40) | 1 | 20 (32) | 8,19(31) | 24 (36) |
| 16F64x/66x, 16C6x/7x/9x, 16F7x | A | 28/(40) | 27 (39) | 28 (38), 26 (40) | 1 | 20 (32) | 8,19 (31) | – |
| 16C6x/7x/9x, 16F64x/66x | A | 40 | 39 | 40 | 1 | 11,32 | 12,31 | – |
| 16F87x | A | 40 | 39 | 40 | 1 | 11,32 | 12,31 | 36 |

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| | | | | | | | | |
|--|---|------|--|------------------------------|----------------------|---------------------------|---------------------------------------|------------|
| 16F7x | A | 40 | 39 | 40 | 1 | 11,32 | 12,31 | – |
| Class B | B | 8/14 | 38 | 39 | 4 | 1 | 40 | – |
| 12C5xx,12C67x | B | 8 | 6 (38) | 7 (39) | 4 | 1 | 8 (40) | – |
| Class C | C | 18 | 34 | 35 | 4 | 36 | 5 | 32 |
| 16C6x/7x/9x, 16C715, 16C84, 16F8x, 16C55x | C | 18 | 12 (34) | 13 (35) | 4 | 14 (36) | 5 | – |
| 16F62x | C | 18 | 12 (34) | 13 (35) | 4 | 14 (36) | 5 | 10 (32) |
| 16C432 | – | 20 | 13 (33) | 14 (34) | 5 | 15 (36) | 6 | – |
| 16C433 | – | 18 | 12 (34) | 13 (35) | 8 | 5 | 2,3,14(36),16(38) | – |
| 14000 | – | 28 | 12 | 11 | 13 | 9 | 20 (32) | – |
| Union | ? | 40 | 12, 33, 34, 38, 39 | 11, 34, 35, 38, 39, 40 | 1, 4, 5, 8, 13 | 1, 5, 9, 11, 32, 36 | 2, 3, 5, 6, 12, 31, 32, 36, 38, 40 | 32, 36 |
| All Pins | ? | ? | 1, 2, 3, 4, 5, 6, 8, 9, 11, 12, 13, 31, 32, 33, 34, 35, 36, 38, 39, 40 | | | | | |

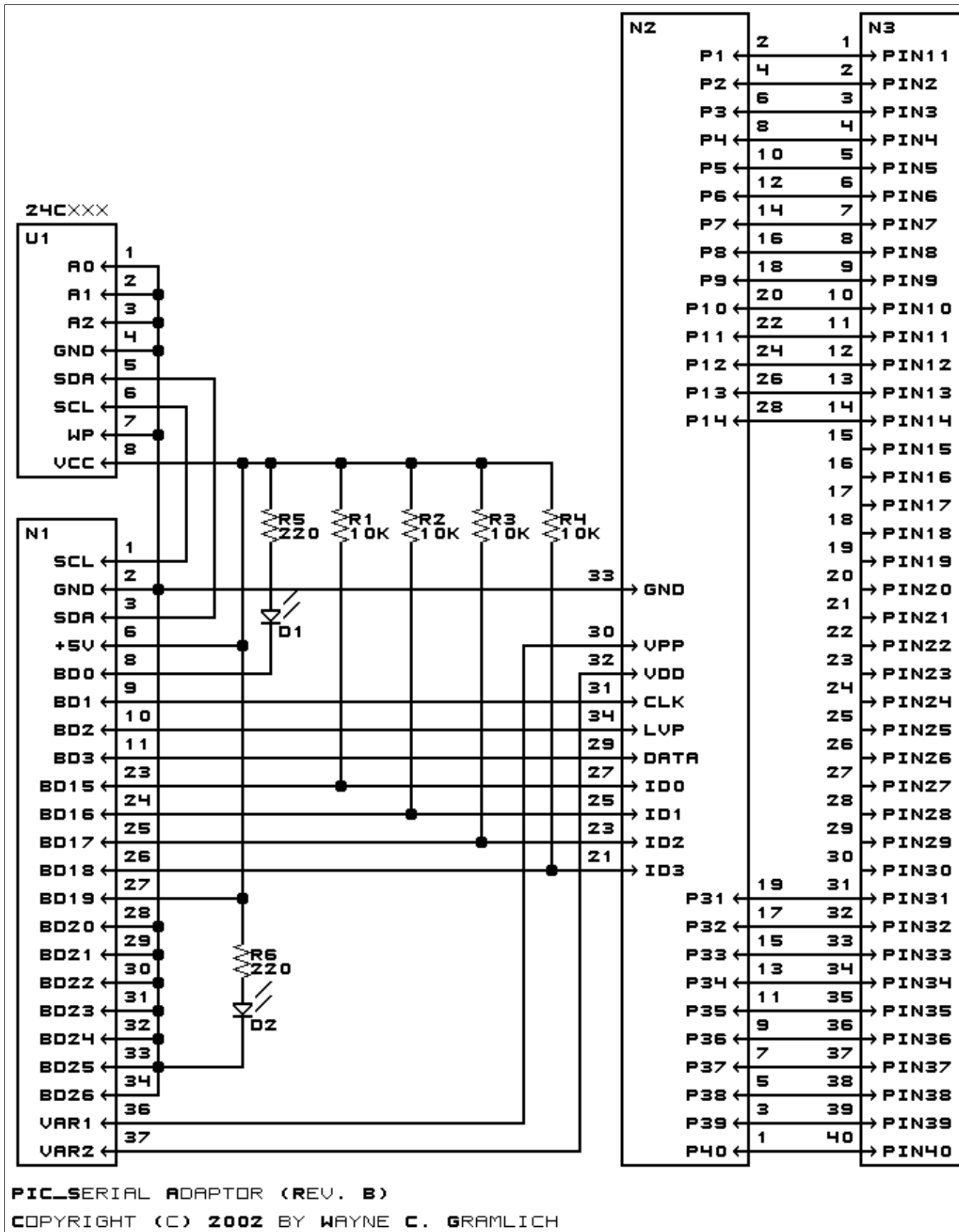
What I discovered is that most of the PIC chips fell into three broad classes, called imaginatively enough class A, B, and C. Given that I already use PIC microcontrollers in each class, I want it easy to flip between the classes.

I ultimately decided to have one class plug for each different PIC package. This plug is made out of a 2×17 pin male header. One final requirement for the class plug is that I want the software in the EMDP1 to be able to determine which plug has been activated. There requires some plug identification lines that feed back to the EMDP1.

Schematics

The schematic for the PIC Serial Adaptor is shown below:

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The [parts list](#) is kept in a separate file.

Printed Circuit Board

The various printed circuit board files are listed below:

[pic_serial_artwork.png](#)

The artwork (silk screen) layer.

[pic_serial_back.png](#)

The back (solder side) layer.

[pic_serial_front.png](#)

The front (component side) layer.

[pic_serial.gal](#)

The RS274X "Gerber" artwork (silk screen) file.

[pic_serial.gbl](#)

The RS274X "Gerber" back (solder side) file.

[pic_serial.gtl](#)

The RS274X "Gerber" top (component side) file.

[pic_serial.gml](#)

The RS274X "Gerber" mask (solder mask) file.

[pic_serial.drl](#)

The Excellon drill file.

[pic_serial.tol](#)

The drill rack file.

[pic_serial.ptl](#)

The parts list (bill of materials) file.

Issues

Any fabrication issues will be listed here.

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