

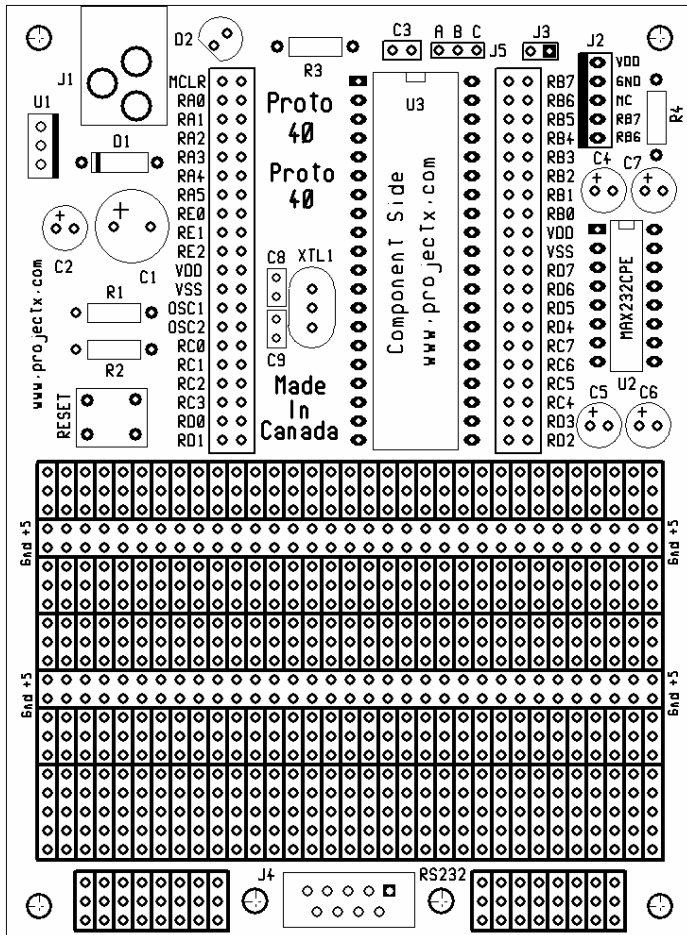


Proto-40 – PICmicro Prototype Board

The **Proto-40** is a general-purpose prototyping platform to evaluate Microchip PIC based microcontroller products. Supported devices include most of the Microchip 40-pin devices including the PIC 16F877(A), 18F442, 18F452 and others. Included onboard is a full peripheral set including a header for in-circuit programming of flash devices, true RS-232C serial input/output with mounting for an onboard DB-09 connector, regulated power supply circuitry, reset circuitry and over 700 plated-through holes on the prototype surface.

The **Proto-40** is a high quality prototype board, complete with solder masks on both sides of the board, plated holes along with a high-contrast silk-screen labeling component positions. Board size is a compact 3 5/8" x 5" (9.2cm x 12.7cm) ready to fit into standard size project cases such as the Radio Shack ABS plastic project case (270-1806 or 270-1807).

Parts List



Resistors 1/4 watt, 5% Carbon Film:

- [] (2) 1K Ω (brown-black-red-gold) **R1, R4**
- [] (1) 100 Ω (brown-black-brown-gold) **R2**
- [] (1) 330 Ω (orange-orange-brown-gold) **R3**

Capacitors:

- [] (1) 100uF 35v **C1**
- [] (1) 10uF 25v **C2**
- [] (1) .1uF **C3**
- [] (4) 1uF 35v **C4, C5, C6, C7**
- [] (2) 15pF **C8, C9**

Semiconductors:

- [] (1) 1N4002..... **D1**
- [] (1) Red LED Power Indicator..... **D2**
- [] (1) LM7805 – 5 volt regulator TO-220 Case ... **U1**
- [] (1) MAX232CPE **U2**
- [] (1) 40-Pin PIC Processor Location **U3**

Crystal:

- [] (1) 4Mhz-20Mhz Crystal HC49 Case **XTL1**
optional
- [] (1) 4Mhz-20Mhz Ceramic Resonator..... **XTL1**

Sockets, Headers, Connectors and Switches:

- [] (1) 16-pin DIP Socket **Position U2**
- [] (1) 40-pin DIP Socket **Position U3**
- [] (1) 2.1mm or 2.5mm Coaxial Jack PCB..... **J1**
- [] (1) 5-pin ICP Programming Header **J2**
- [] (1) 1x2-pin male header..... **J3**
- [] (1) DB9 Female PCB right angle connector.... **J4**
- [] (1) 1x3-pin male header..... **J5**
- [] (1) PCB mount pushbutton switch **RESET**
- [] (2) 2-pin Jumper – Push On .. **positions J5 & J3**

On-board Power Supply

The power supply circuit on the **Proto-40** board is designed to accept an 8-15v DC power source. Power should be applied to the connector at **J1**, with the centre pin of the connector being positive (+). Total current available from the regulator will be about 1/2 amp, but can be pushed to about 1 amp with the addition of a heat sink on the LM7805 regulator.

LED Power Indicator

An LED option has been included on the **Proto-40** at position **D2** along with a current limiting resistor at **R3**. Although a handy option to show when the **Proto-40** is powered on, the LED arrangement draws approximately 20mA of current. In applications where lower power consumption is desired, the LED (**D2**) or current limiting resistor (**R3**) can be removed without effecting the operation of the rest of the board.

System Reset

Included on the board at position **RESET** is an optional reset switch. When depressed, the processor will restart.

ISP (In-Circuit Programming Port)

A special port is included on the **Proto-40** board at **J2**. This port allows for the programming of the microprocessor while it remains on the prototype board.

Programming port **J2** has been designed to plug directly into the WARP-13a ISP port. The pin connections are a one-for-one match, meaning pin-1 of the **Proto-40** connects directly to pin-1 of the WARP-13a ISP port.

During the in-circuit programming process, certain pins on the microcontroller are toggled by the programmer. Pins 40 (RB7), 39 (RB6) and 1 (MCLR) are all connected to the programmer. If your custom circuit constructed on the **Proto-40** board uses any of these pins, they may interfere with the programming process.

As an added step during programming, specific processor pins need to be at certain logic levels. On the 16F series processor, pin 36 (RB3) needs to be pulled low; while with 18F series processors, pin 38 (RB5) is required to be pulled low. Our board design provides for a jumper to be installed to enable these pins to be pulled low during the programming process. A jumper block should be installed at **J5** between pins **A-B** for 16F devices, while the jumper should be installed across pins **B-C** for 18F devices. Jumper **J3** allows for the VDD (+5v) from the ICP port to be connected to the **Proto-40** board. The normal configuration for this port is to leave the jumper removed from port **J3**.

Clock Source

An important feature of the **Proto-40** is the ability to support various clock options. The system has been tested with crystals ranging from 4Mhz to 20Mhz at position **XTL1**. As an added feature, position **XLT1** on the **Proto-40** can be substituted with a ceramic resonator. When using a ceramic resonator, please ensure that you remove capacitors **C8** and **C9** as they are only required when using a crystal.

Prototype Area

The prototype area of the **Proto-40** has been optimized to provide maxim overall space and power options. Over 700 holes have been provided with two sets **+5v** and **GND** power tracks. In addition each of the specific processor pins has been extended out to two separate pins for each signal to allow for easy access during interfacing.

Board Mounting

During the design phase of the **Proto-40**, much consideration was given to mounting the PCB in a case. The board has been designed to fit securely in the Radio Shack ABS plastic project case (270-1806 or 270-1807).