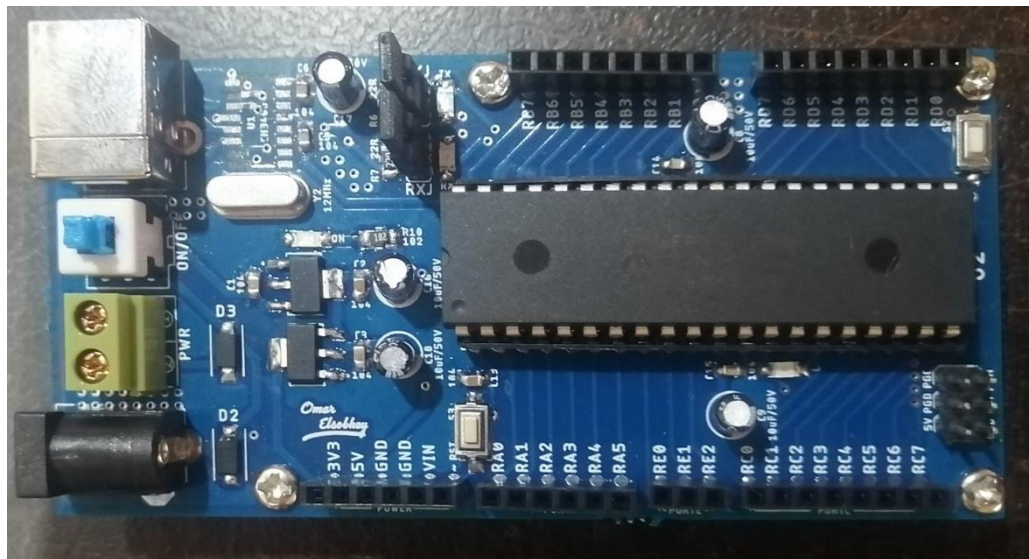


PIC16F877A Educational Board

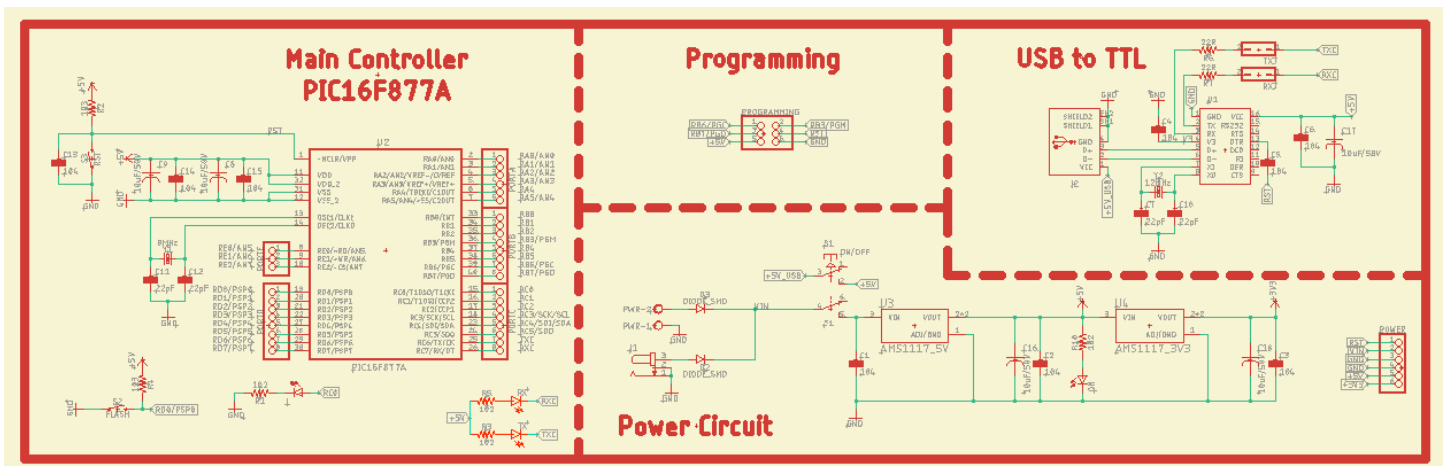
General Description

PIC16F877A Educational Board

- is a PIC development board designed particularly for Students and beginners to provide easy developing of PIC microcontroller projects.
- supports PIC16F877A microcontroller chip.
- provides the most common primary devices and circuits, such as LED, UART, serial interface and more. Thus, it reduces time and effort in hardware design and test, hence, the developer can focus his efforts on firmware development. All I/O pins are brought out via pin header for direct port access.
- Comes preprogrammed with UART bootloader, which eliminates the need for an external burner where Hex code is downloaded using the [MicroBootloader](#) tool from MicroC. Also, a standard 6 pin header socket is included (ICSP) for external programmers.



PIC16F877A Educational Board



PIC16F877A Educational Board (SCH)

Features

- **Power supply unit**

- 1) Wide input voltage range (12-20V). Also, can be powered from the USB port.
- 2) Reverse polarity protection.
- 3) ON/OFF switch.
- 4) Green LED indicator.

- **Microcontroller**

- 1) PIC 16F877A Microcontroller (40 PDIP).
- 2) 16MHz crystal.
- 3) Reset switch.
- 4) Two LED indicators for Tx and Rx.
- 5) Bypass capacitors on power pins and VREF/GND.

- **Serial Communication**

- 1) USB/Serial TTL converter (CH340) for PC communication.
- 2) UART Communication
- 3) I²C

- **Analog Inputs/outputs and sensors**

- 1) Analog output 0-5V (PWM-controlled).

- **Outputs / Inputs**

- 1) Red Led Connected to RC0
- 2) Pull-Up switch connected to RD0

- **On-board connections**

- 1) 2x3 pin header socket ICSP for connecting external programmers.
- 2) All microcontroller I/O pins are brought out via pin header.

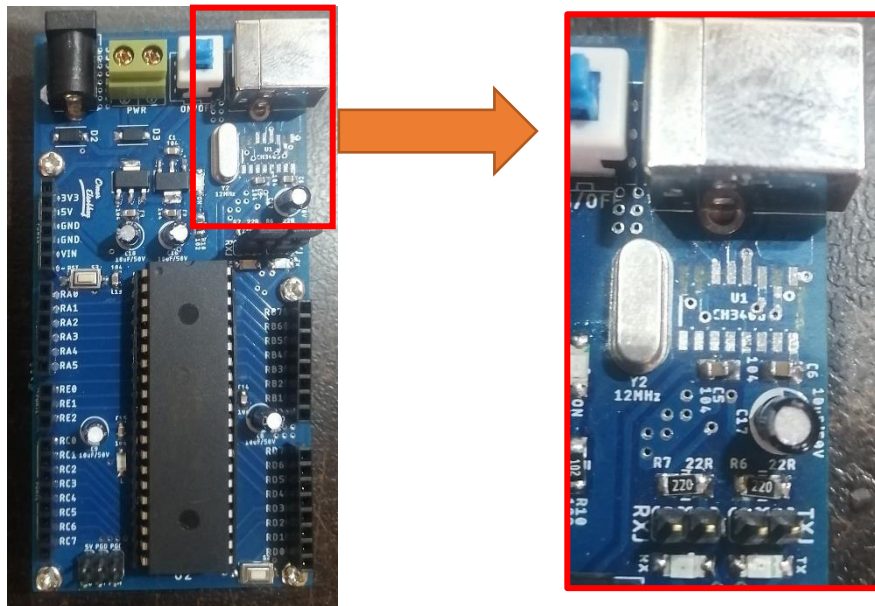
Power supply unit

Power could be supplied from a DC power supply adaptor via a DC power socket (12V - 20V) or from USB power via a USB type B socket.

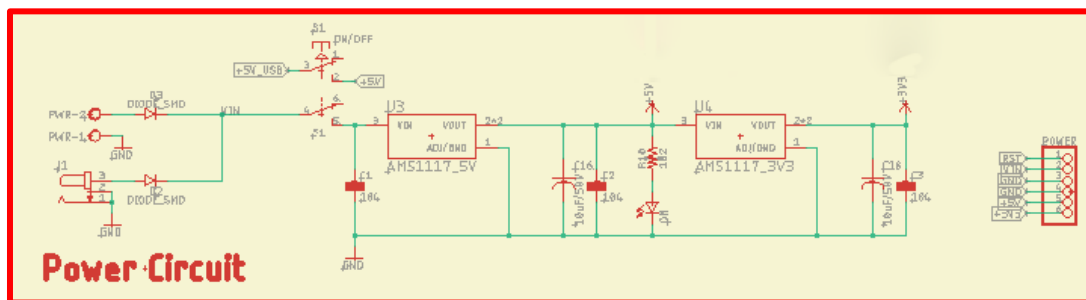
Power supply unit features:

- On/Off Power switch.
- Green LED power indicator.
- AMS1117-5V, AMS1117-3V3.
- GND, 5V, 3.3V and adaptor voltage (VOUT) are brought out for external use via header sockets.

Note: PIC16 kit is protected against reversed polarity of power.



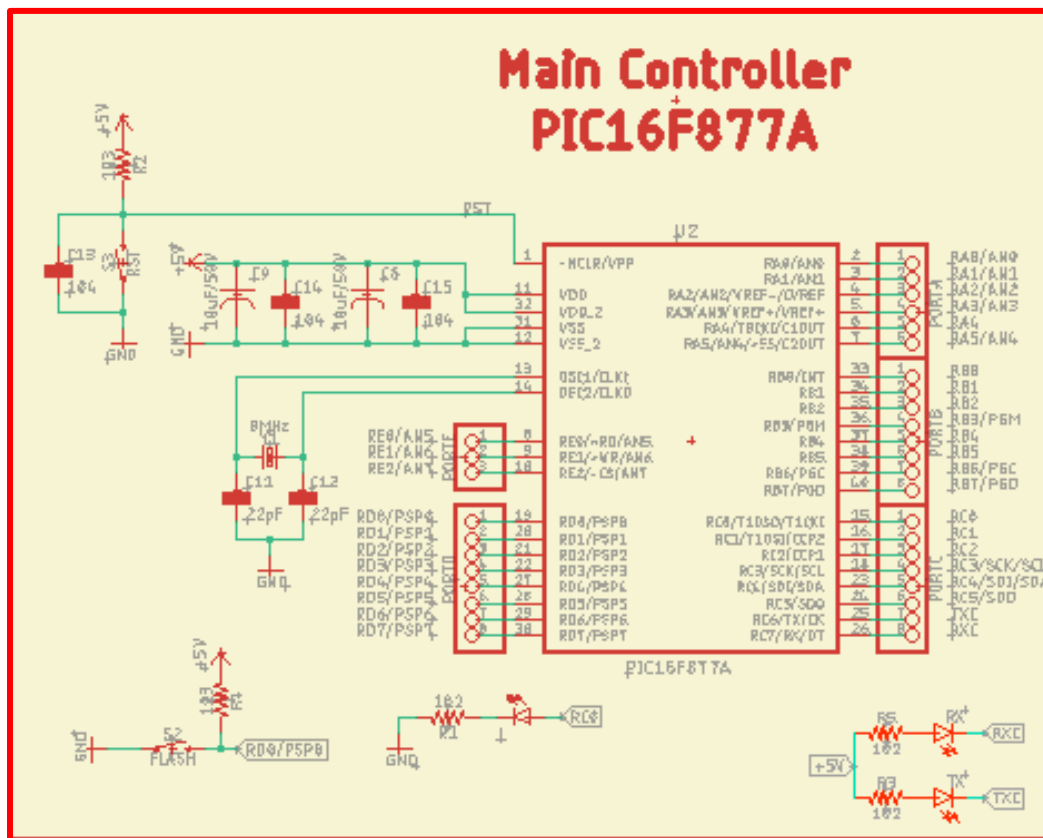
Power supply unit



Power supply unit (SCH)

Microcontroller Unit

40 pin PDIP PIC16F877A chip with 16 MHz crystal oscillator and Push button reset switch. Two yellow LEDs are included to indicate Tx and Rx status. All required bypass capacitors are included



Microcontroller Unit (SCH)

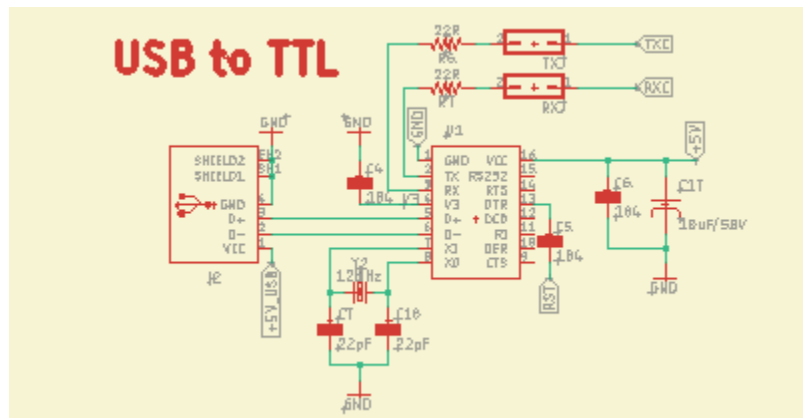
Serial Communication

UART is one of the most famous ways to communicate between microcontrollers and PC. UART is a byte-oriented protocol that determines a specific way to transmit a byte serially between two devices.

This type of protocol sends data as a string of characters. UART only requires two signal lines to successfully communicate, a TXD (transmit data) and RXD (receive data) line as well as a common ground line (used as a reference point). When communicating with another UART device, the TXD line will be attached to a corresponding RXD line, and vice-versa.

No clock line is used with the UART protocol. Rather, users instead specify a particular baud rate for the two devices to operate at. A baud rate indicates how many bits, including data, start, stop, and parity bits, are transferred over the data lines in one second time frame. A common UART communication configuration uses a start bit, 8 data bits, no parity, and a single stop bit.

USB/TTL Converter chip (CH340G) is connected to PIC16F877A microcontroller port pins RC7 (RX) and RC6 (TX)



USB to TTL (SCH)

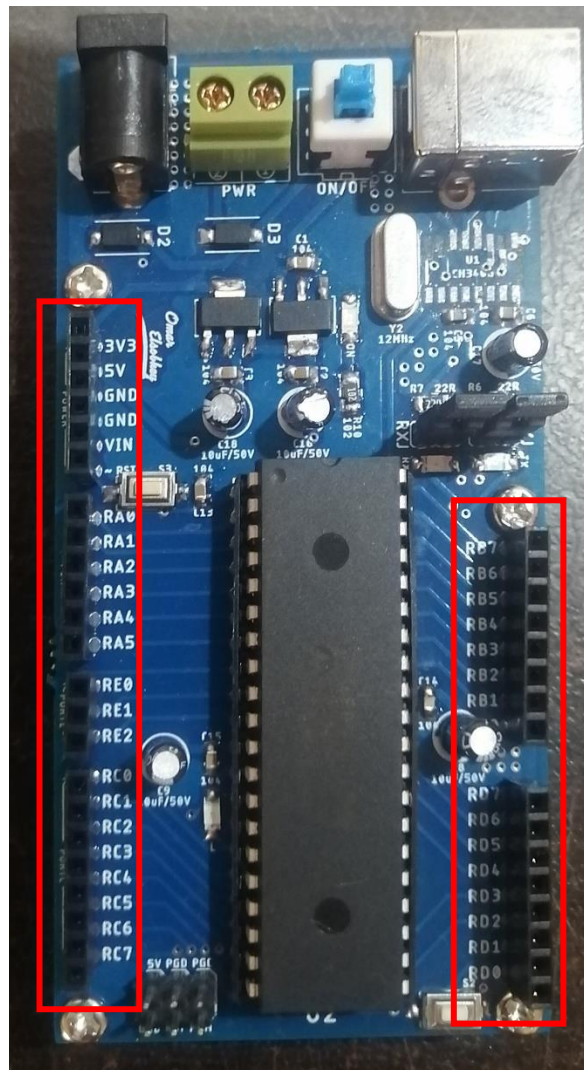
PIC16 kit contains onboard LED indicators for TX and RX signal statuses

I/O PORT

In addition to the popular built-in circuits and devices included in the [PIC16](#) kit, all microcontroller port pins are brought out for external use via header sockets.

External connectors are grouped into 4 units:

- PORTA
- PORTB
- PORTC
- PORTD
- PORTE
- POWER (VIN, +5V, +3.3V, GND, RST)



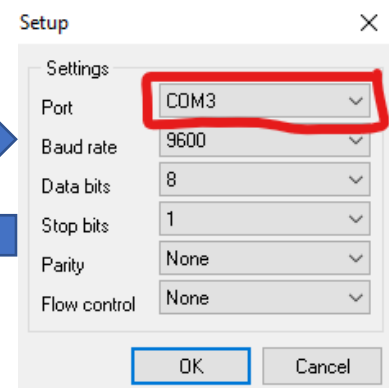
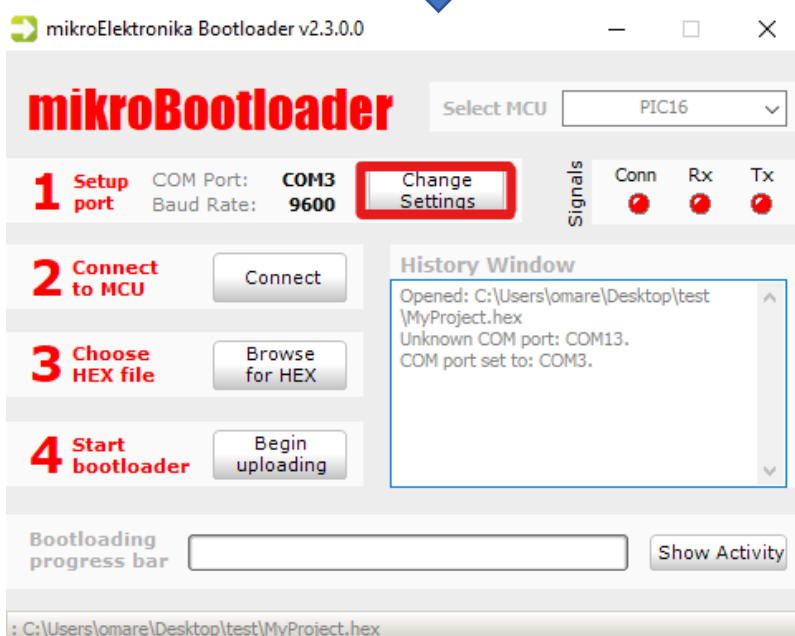
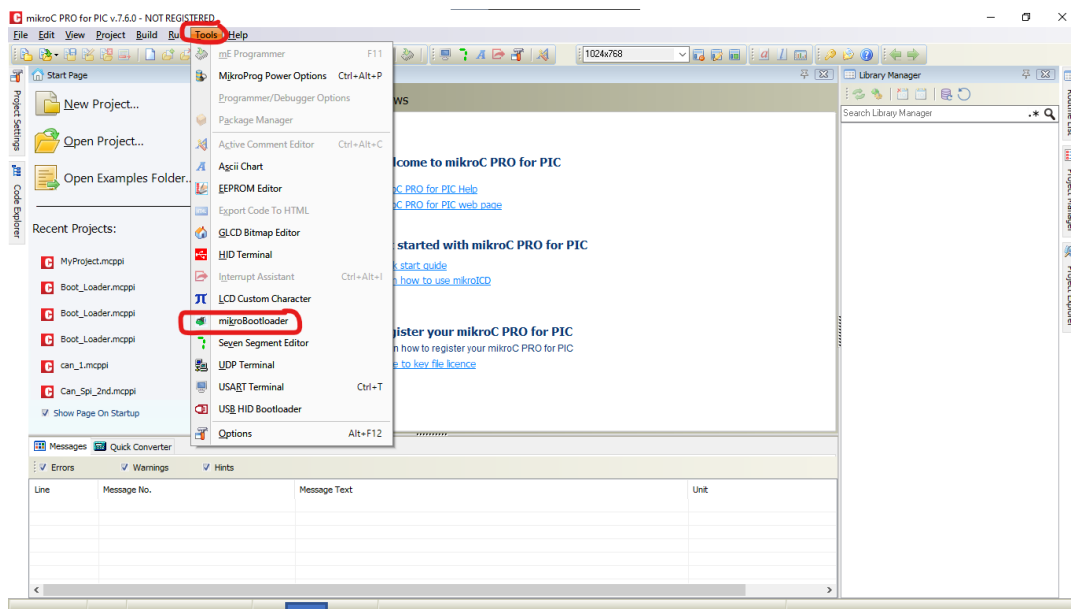
Code Burning

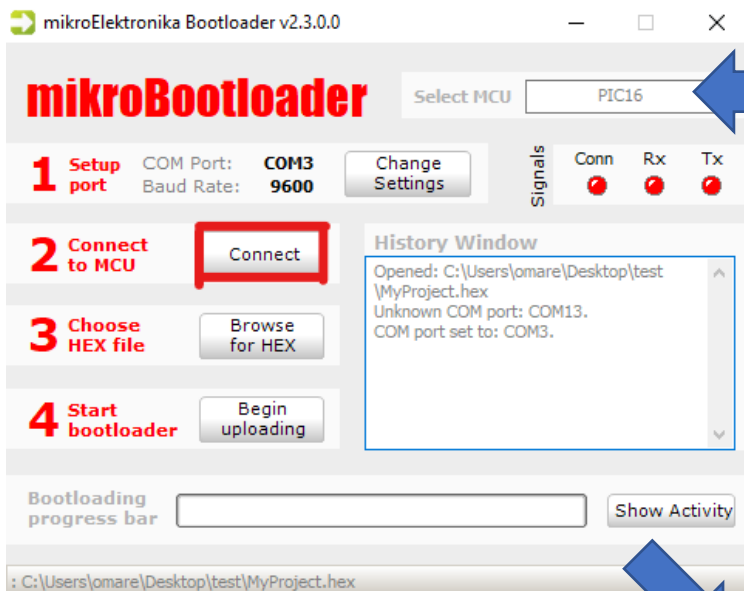
There are two ways to burn your hex code on the **PIC16** kit.

- 1) **MicroBootloader** software tool (PIC bootloader from MicroC).
- 2) External programmer (ICSP).

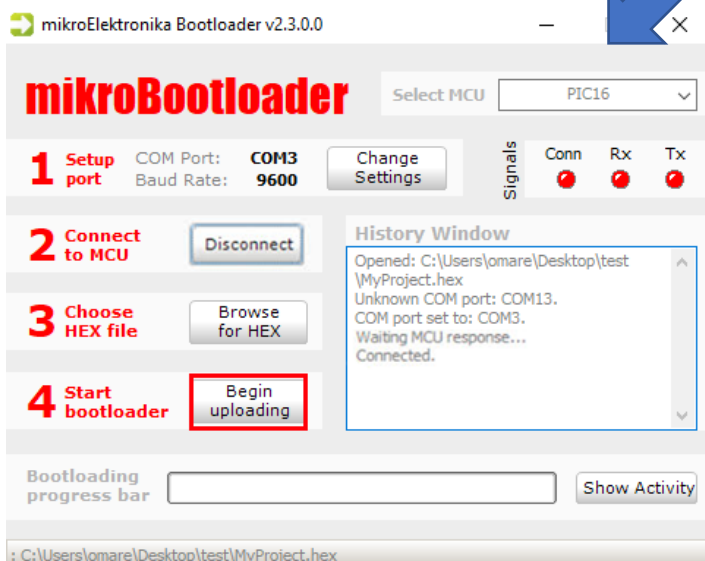
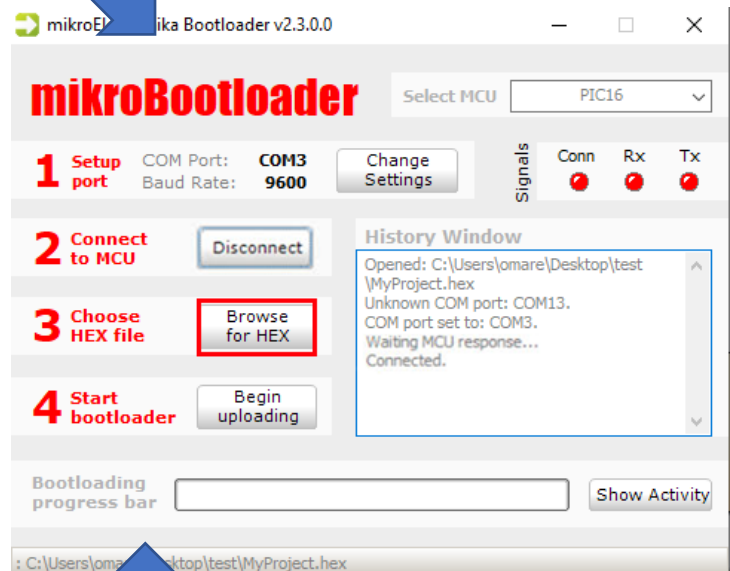
Programming using the MicroBootloader Burner tool

PIC16 kit does not require any external burners to download hex code. it comes with a PIC16F877A bootloader, which interfaces with the **MicroBootloader** Software tool. **MicroBootloader** is used to download/upload hex code to the PIC16F877A microcontroller.



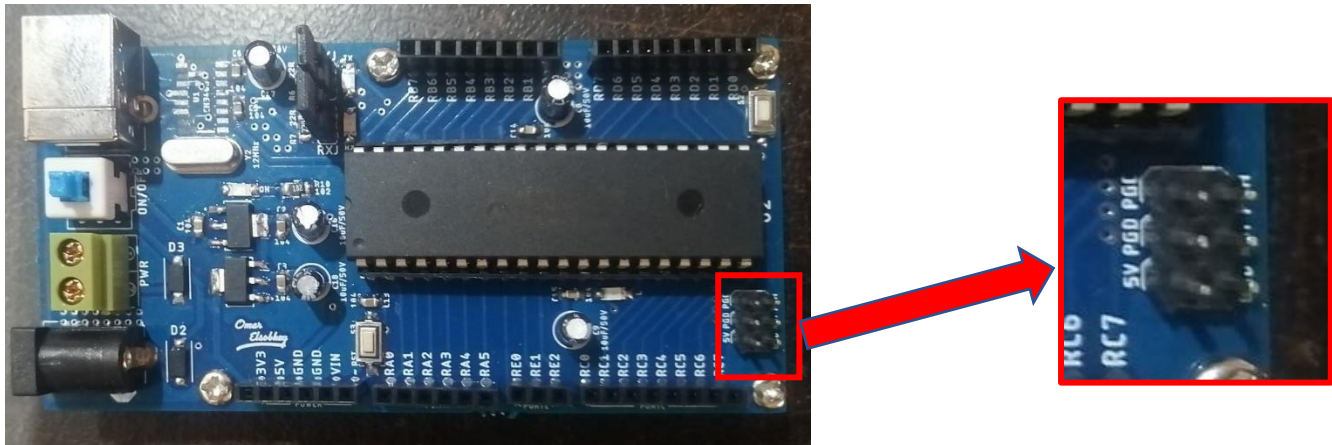


**Hold the flash button
then press the reset button**

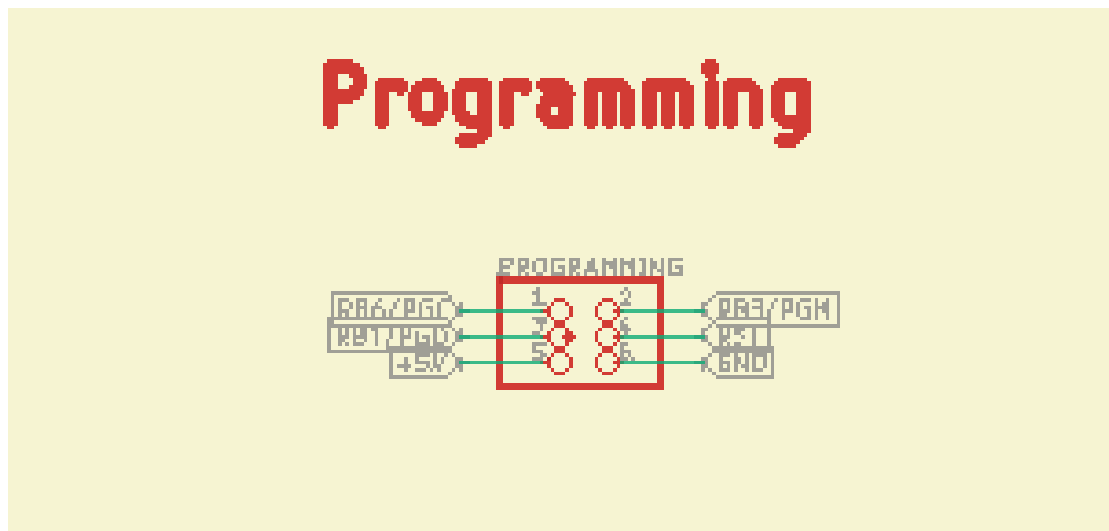


Programming using an external programmer

PIC16 is designed mainly to be programmed using the bootloader. However, it offers an ICSP socket to enable programming and debugging using any external programmer that supports a standard 6 pin ICSP socket, such as the PICKit2 programmer. Use an external programmer to download your application code or even a bootloader firmware.



Programming Pins



Programming Pins (SCH)