

## 1. Kit Contents :

The EDSPIC16F87X development kit contains the following items.

- EDSPIC16F870/16F877A Target Board populated with 16F877A chip.
- USB Serial Cable.
- Product Information CD-ROM. CD contents include:
  - EDS16F87X Communicator Assembler for Microchip family (Mpsasmwin.exe)
  - Installation utility (SETUP.EXE).
  - Drivers software for USB cable.
  - Source code examples (demo1.asm, demo2.asm)
  - Schematic diagram of the circuit board (Schematics.pdf).
  - AC Power adapter (220V AC to 9V AC).
  - EDSPIC16F87X Development Kit User's Guide.

## 2. EDSPIC16F87X Hardware Setup:

- A. The target board is connected to a PC running the EDS16F87X Communicator program via the USB communicator cable.
- B. Connect one end of the USB cable to a USB port on the PC. Connect the other end of the USB cable to the USB connector on the target board.
- C. Connect the AC Power adapter to power jack on the target board.

## 3. EDSPIC16F87X Software Setup:

The CD-ROM contains the EDS16F87X communicator tools that are required to program the flash memory of the Microchip 16F870/ 16F877A and additional documentation. Insert the CD-ROM into the PC's CD-ROM drive and run the SETUP.EXE file for installing the programming software on to your PC. By default the programming software is installed in the directory C:\Programfiles\EDS16F87X. You may change the name of the destination directory.

The following files will be found in the destination directory after installation.

- A. **EDS16F87X.EXE** -Used to program the flash memory of 16F870/ 16F877A.
- B. **SCHEMATICS.pdf**-Schematic drawing of the target board.
- C. **Assembler and support files**

### 4. The Target Board:

The target board contains the Microchip 16F877A by default that has the following features.

- 2K x 14 Words of In-System Reprogrammable Downloadable Flash memory
- 64 Bytes EEPROM memory
- 128 x 8-bit RAM
- Clock - 6 MHz
- 10-bit Multichannel A/D Converter
- Three timers, Capture Compare PWM Module and watchdog timer.

The target board can be run in two modes PROGRAM mode and RUN mode. In the PROGRAM mode, the flash memory can be programmed with the user developed code in hex format from the PC to the target device Microchip 16F870/ 16F877A. In the RUN mode the code that was just downloaded can be executed from a position of RESET as a standalone embedded system.

The I/O Port pins of the target device are accessible connectors

- PORT A – CN4
- PORT B – CN9
- PORT C – CN6
- PORT D – CN7
- PORT E – CN8

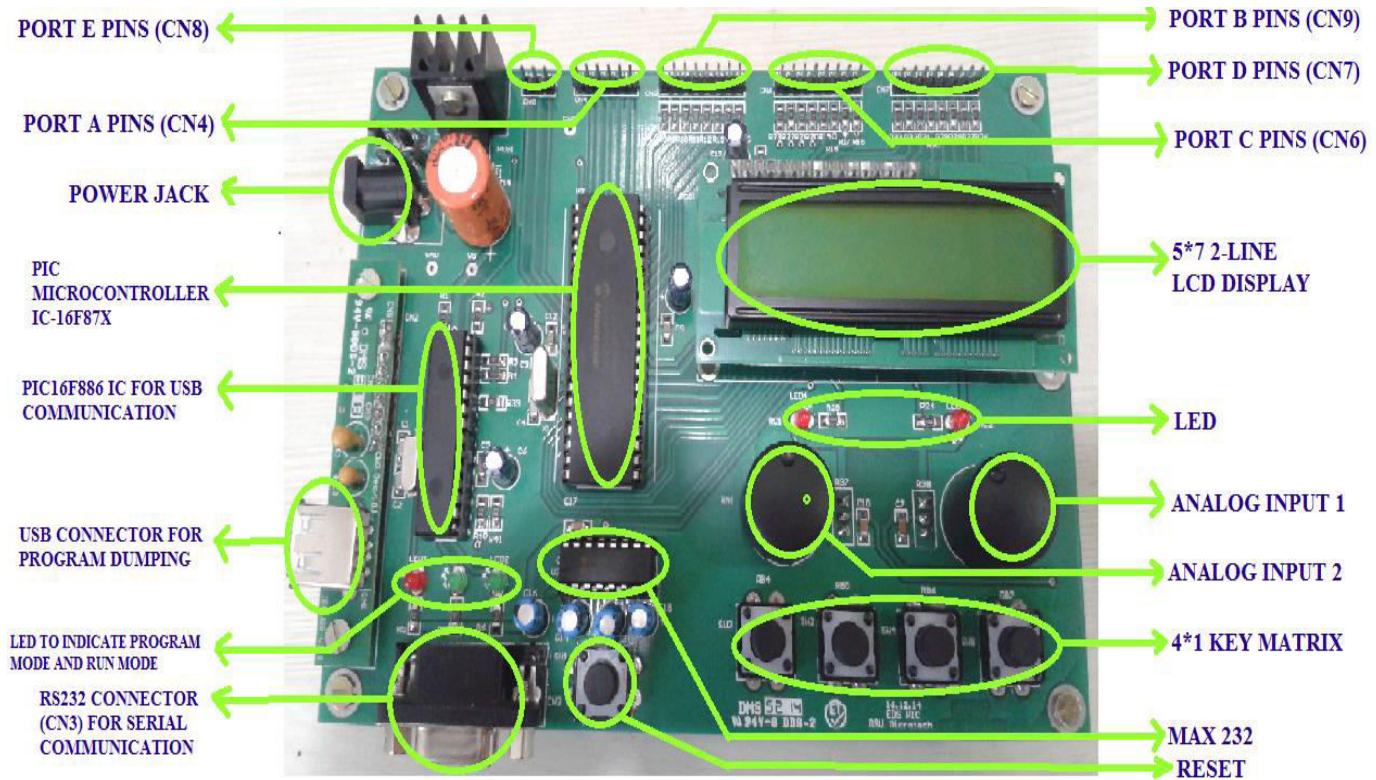
Also two LEDs are provided at the PORTC i.e. RC0 and RC1 to verify test programs and interface other peripheral devices such as relays and motor coils. The other connections are as follows,

USB communicator port – CN1

Serial communication cable (RS232) – CN3

The LED1, LED2, LED3 indicate the status of the flash program. While the program is being flashed the LED1 and LED2 will glow. When the programming is completed the LED2 will be off and LED3 will glow, which indicates the RUN mode of the program.

**5. EDS PIC 16F87X HARDWARE BOARD:**

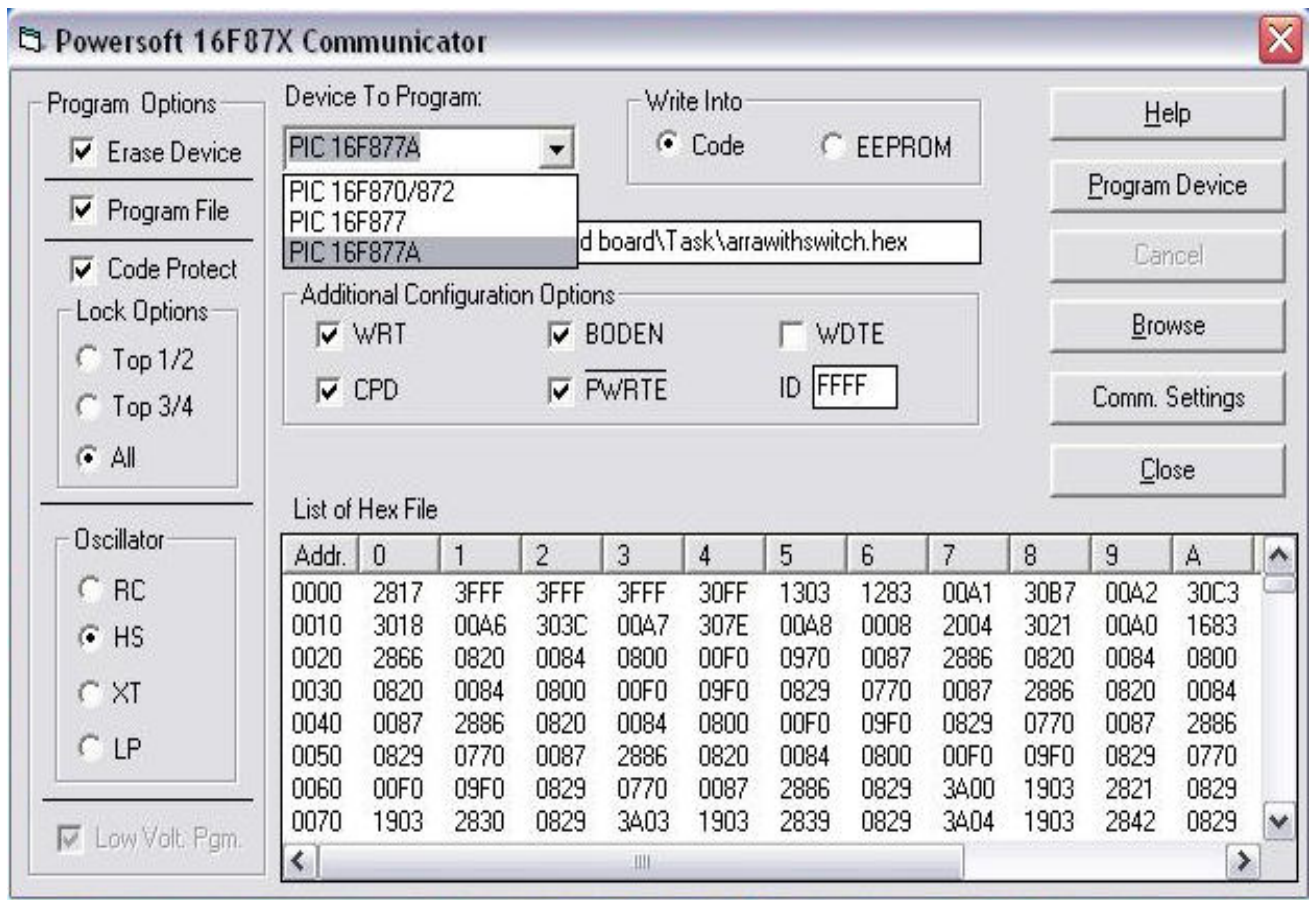


**6. Install the USB driver software.**

Install the **CP210xVCPInstaller\_x64/x32.exe** from the folder **CPX210x\_VCP\_windows**. For **32 bit** windows OS install **CP210xVCPInstaller\_x32.exe** and for **64 bit** windows OS install **CP210xVCPInstaller\_x64.exe**

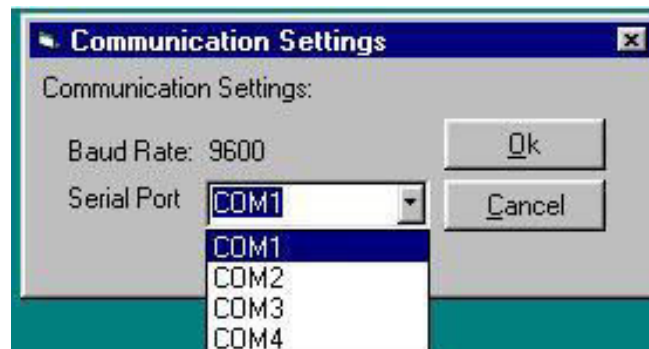
**7. Description of the Flash Programmer Software.**

1. Run SETUP.EXE from the CD-ROM provided to install the programmer portion of the software on your PC. Follow the instructions and this would create an icon EDS16F87X on your taskbar. The corresponding filename for this software is EDS16F87X.exe.
2. After connecting the target board, power up the board through the AC adapter provided.
3. Launch the program EDS16F87X by double-clicking on the icon from the Windows taskbar. The program launches a graphical user interface that lets you select the following



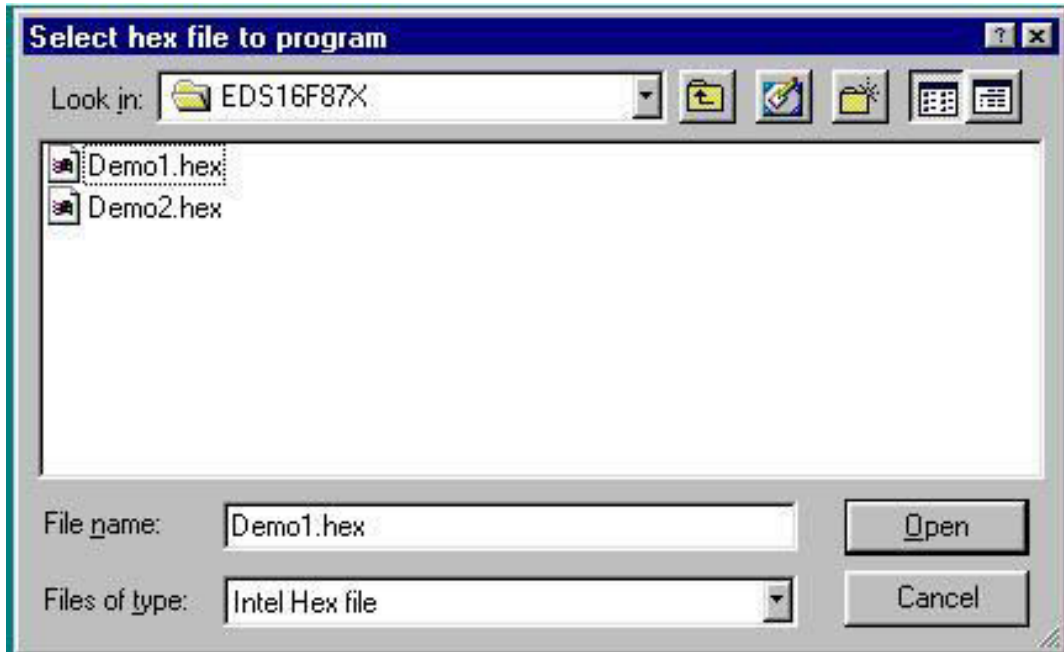
4. Select the device to be programmed as PIC 16F877A.

5. COM Port: Select COM1, COM2, COM3 or COM4. Baud Rate is 9600 by default.



## EDS PIC 16F87X Development Kit User's Guide

6. Browse: Click on this and select the object file (Hex format) to be downloaded to the chip after selecting the source directory and filename of the object file, example-DEMO1.OBJ.



7. Programming options are Erase, Program, Code Protect, and Oscillator and configuration bits. Make the appropriate selections or use the default mode. Select the device to program. Note: Oscillator option is HS by default. EDS16F87X board works with this option only. You can use the other oscillator options to program the 16F87X chip installed. However your program may not run with other options in the EDS16F87X board.
8. Click the Program Device button. After successful programming of the device, the PC responds with a message indicating the successful download of the program into the flash memory of the chip.



## 8. How to assemble, download and run a program.

- a) The 16F87X assembler related files are: Mpasmwin.exe, mplink.exe. The file **Mpasmwin.exe** is the executable version of the assembler. This assembler from Microchip is distributed free for evaluation purposes.
- b) There are two example source code programs **DEMO1.ASM** and **DEMO2.ASM**.
- c) Invoke the assembler from Windows by launching Mpasmwin using Explorer. Browse and select the file DEMO1.ASM and click on 'Assemble'.
- d) There are three files created: **DEMO1.LST**, **DEMO1.OBJ** and **DEMO1.HEX**. Download the file DEMO1.HEX following the instructions from the previous section. The file DEMO1.LST shows a listing of the assembler routine and the machine code generated by the assembler.

## 9. Other documentation

### SCHEMATICS.PDF:

The schematic files are in Adobe PDF format. The document shows the serial programming circuit that uses a PIC16F886 microcontroller to program the Flash memory of the Microchip 16F870/ 16F877. The circuit also shows the I/O ports brought to edge connectors with connectors. The two LEDs that can be included for verifying the programs. With this a **5\*7- 2line LCD** module to display the LCD output. A **4\*1 line keypad** is provided to give input when key pressed. And **2-variable POTs** are provided to give the analog input to the target board.

## 10. Status and Troubleshooting guide:

The target board has three status LEDs located close to the chip PIC16F886.

- When Power is turned ON LED1 lights up.
- LED2 lights up when the EDS16F87X communicator is programming the 16F87X chip on-board.
- If there is an error in programming LED3 is turned on.

If LED3 comes on during Program mode the fault could be traced to the following events.

- Check the USB cable for loose connections.
- Power to board is ON.
- File loaded is in not in the correct format

## 11. Limitations of EDS16F87X

- 1) **RB3** is used for serial downloading of programs into the 16F87X chip. User **cannot use this port pin for external interface.**
- 2) **LVP** bit in the configuration word is programmed as **1** while using EDS16F87X. **Programming this bit to 0 using an external programmer** will disable further programming of this chip using this development board.
- 3) **Choose HS** option for Oscillator selection if you want to use this board for **PROGRAM** and **RUN** mode of development.
- 4) The other options (**RC, XT and LP**) can be used if the chip needs to be programmed using the **PROGRAM** mode. The **RUN mode will not work** in this board with these options in this board.

## 12. Contact Information

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