

PX-200

OEM-PIC kit2 Programmer

1.Features :

- Interface with the USB port and does not require any external power supply
- Program the PIC/dsPIC microcontroller via ICD jack (compatible ICD2 jack pin assignment)
- 3 LED status (POWER, TARGET and BUSY status)
- Upgradable Operating System firmware with Software
- Support microcontroller (early 2007 - can see the update at our website) :

Baseline Devices

PIC10F200, 202, 204, 206, 220, 222 PIC12F508, 509, 510 PIC16F505, 506, 54, 57, 59

Midrange Devices

PIC12F615, HV615, 629, 635, 675, 683	PIC16F616, HV616
PIC16F627A, 628A, 648A,	PIC16F630, 631, 636, 676
PIC16F677, 684, 685, 687	PIC16F688, 689, 690
PIC16F72, 73, 74, 76, 77	PIC16F716, 737, 747, 767, 777, 785,
PIC16F84A, 87, 88,	PIC16F818, 819
PIC16F870, 871, 872, 873, 874, 876, 877	PIC16F873A, 874A, 876A, 877A
PIC16F883, 884, 886, 887	PIC16F913, 914, 916, 917, 946

PIC18 Devices

PIC18F242, 252, 442, 452, 458	PIC18F1220, 1320, 2220, 2320
PIC18F2331, 2410, 2420, 2431	PIC18F2450, 2455, 2480
PIC18F2510, 2515, 2520, 2525, 2550,	PIC18F2580, 2585, 2610, 2620, 2680
PIC18F4220, 4320, 4331,	PIC18F4410, 4420, 4431,
PIC18F4450, 4455, 4480,	PIC18F4510, 4515, 4520, 4525, 4550, 4580, 4585
PIC18F4610, 4620, 4680	PIC18F6520, 6620, 6720, 8520
PIC18F8620, 8720	PIC18F6527, 6622, 6627, 6722
PIC18F8527, 8622, 8627, 8722	
PIC18F24J10, 25J10, 44J10, 45J10	PIC18F65J10, 65J15, 66J10, 66J15
PIC18F67J10, 66J60, 66J65, 67J60	PIC18F85J10, 85J15, 86J10, 86J15
PIC18F87J10	PIC18F86J60, 86J65, 87J60
PIC18F96J60, 96J65, 97J60	

PIC24 Devices

PIC24FJ64GA006, 64GA008, 64GA010
 PIC24FJ96GA006, 96GA008, 96GA010
 PIC24FJ128GA006, 128GA008, 128GA010

dsPIC30F/33F Devices

Includes : PX-200 board with base, USB cable, ICD cable, CD-ROM and Documentation.

2. Introducing the PX-200 programmer

The PX-200 Microcontroller Programmer is a low-cost development programmer. It is capable of programming most of Microchip's Flash microcontrollers. It is OEM from PICkit2 programmer from Microchip. For specific products supported, see the latest information at Microchip website www.microchip.com.

The PX-200 Microcontroller Programmer Operating System (firmware) can be easily upgraded from the programming software. New device support can be added by updating the operating system. The latest firmware is available on Microchip's web site at www.microchip.com.

The PX-200 Microcontroller Programmer overview is shown in Figure 1.

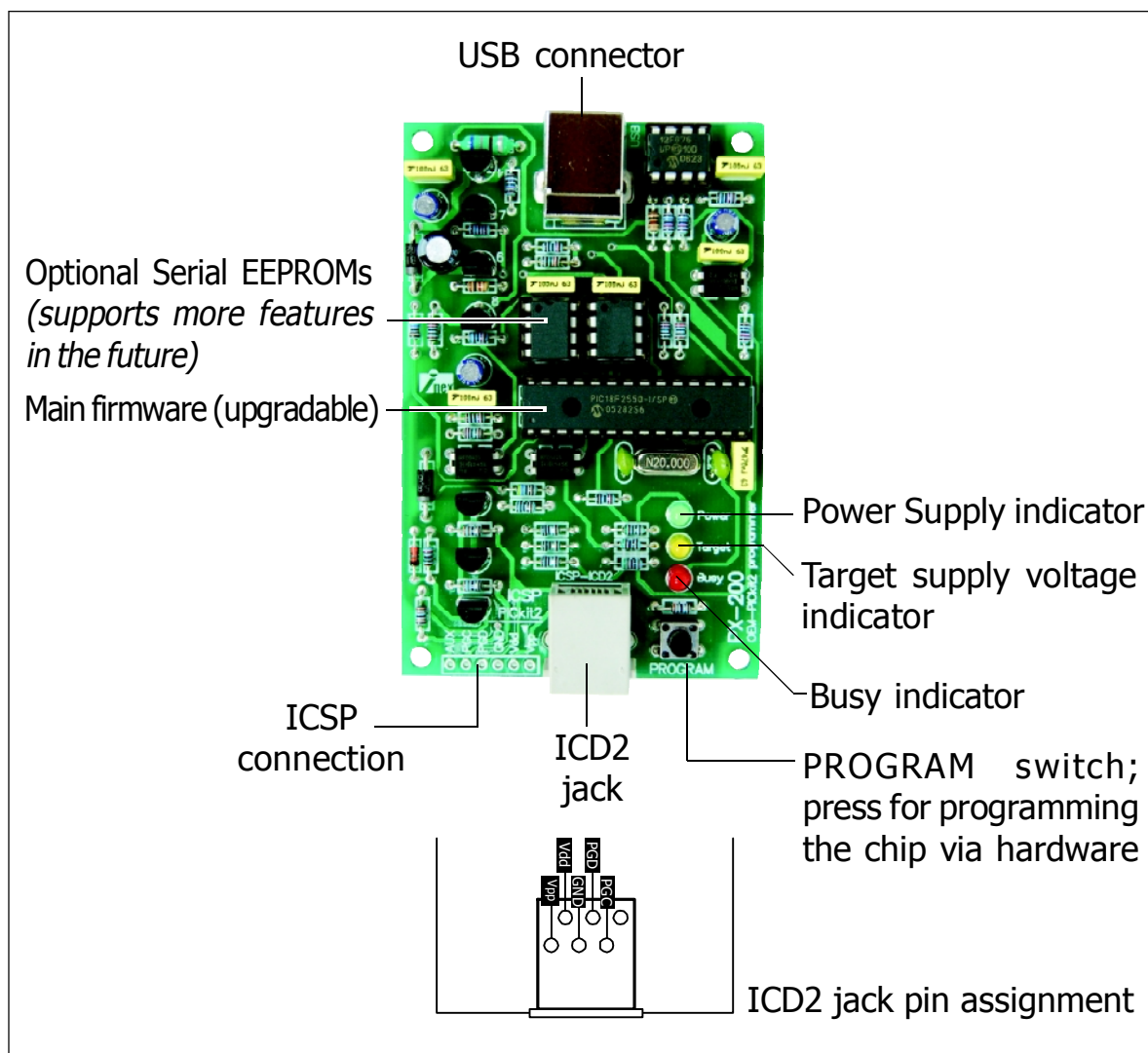


Figure 1 The overview of PX-200 the In-Circuit Serial Programmer for PIC/dsPIC microcontroller via USB port

3. System requirements

- WindowME/2000/XP operating system. Windows XP SP2 is recommended.
- 10MB Harddisk space
- CD-ROM or World Wide Web access for downloading the software via internet.
- One free USB port. Do not operate via the USB hub.

4. Software installation

4.1 Install from PX-200 CD-ROM

The working software of the PX-200 programmer is PICkit2™ Programming Software. The newer version is developed from Microsoft.NET. Thus, user must install the Microsoft.NET Framework first.

4.1.1 Install of the Microsoft .NET Framework

First thing to do is to install the Microsoft.NET Framework. Select from the folder **PICkit 2 Setup v2.01 dotNET → dotnetfx** in the bundled CD-ROM. Double-click at **dotnetfx.exe** file. After complete, install the PICkit2™ Programming Software by double-click at **PICkit2Setup.msi** file. The software installation will start.

4.1.2 Microsoft .NET Framework is installed ready

User can install the PICkit2™ Programming Software by enter to folder **PICkit 2 Setup v2.01x** in the bundled CD-ROM of PX-200. Double-click at **PICkit2Setup.msi** file. The software installation will start.

4.2 Install from the internet.

Visit the Microchip website at www.microchip.com. Select **Development tools** webpage and enter to **PICkit 2 Programmer/Debugger** webpage.

4.2.1 Install of the Microsoft .NET Framework

For user who have not install Microsoft .NET Framework, they will need to install it first via downloading the file from topic **PICkit2V2.01 Install with .NET Framework**. You will get the **PICkit 2 Setup v2.01 dotNET.zip** file (*version number may vary*). Extract this file and store it in the folder **PICkit 2 Setup v2.01 dotNET**. Enter to this folder and into the **dotnetfx** folder. Double-click at **dotnetfx.exe** file to start Microsoft .NET Framework installation. After this is completed, install the PICkit2™ Programming Software by double-clicking on the **PICkit2Setup.msi** file. The software installation will start.

4.2.2 Microsoft .NET Framework is installed ready

Users who have Microsoft .NET Framework already installed can download the setup file from **PICKit2V2.01 Install** header. You will get file **PICKit 2 Setup v2.01.zip** (version number may be vary) Extract this file and store in the folder **PICKit 2 Setup v2.01**. Enter to this folder and double-click on the **PICKit2Setup.msi** file to start the software installation.

After run the installation setup file ; **PICKit2Setup.msi**. Click on the accept button on each step and follow the installation progress until it is finished.

5. Using PICKit2™ Programming Software

5.1 Testing hardware connection

5.1.1 Connect the USB cable between PX-200 board and Computer's USB port. Open the software Pickit2™ Programming Software by entering the Start → All programs → Microchip → Pickit 2 V201. The main window will appear as shown in figure 2.

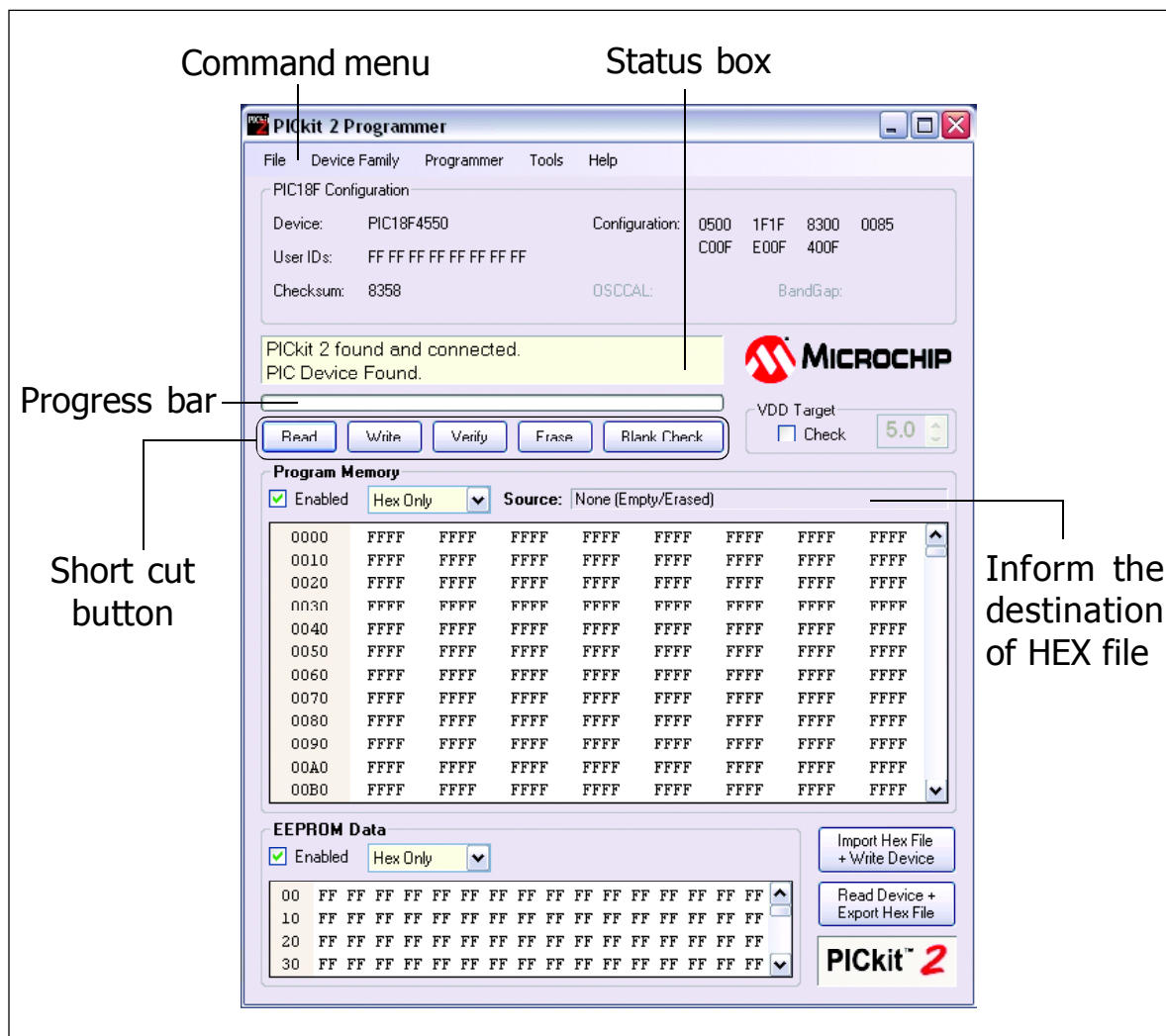
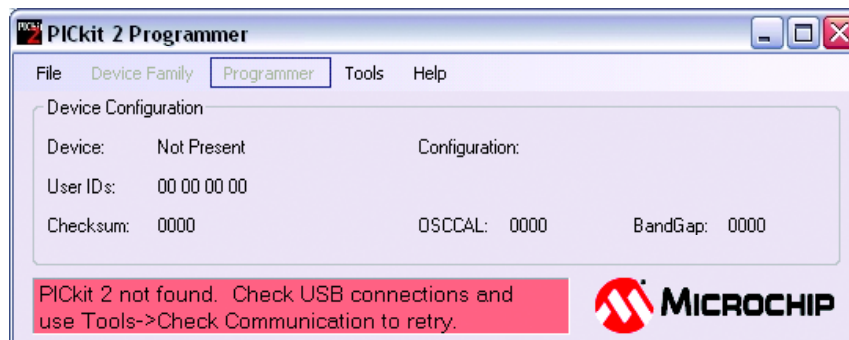


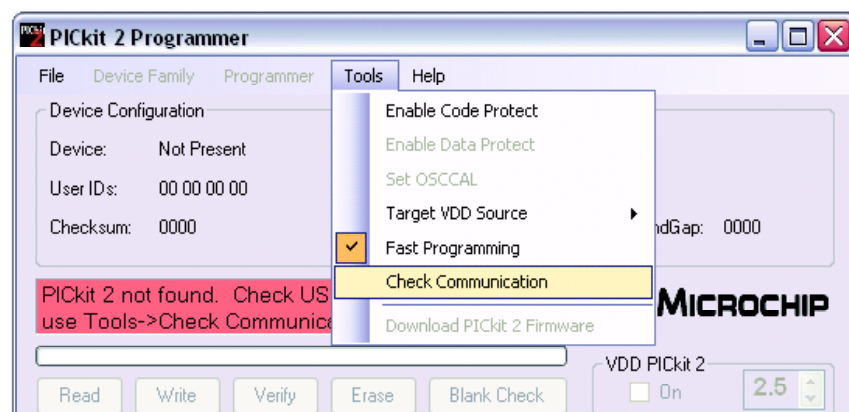
Figure 2 The screen of Pickit2™ Programming Software

5.1.2 On successful connection, the message **PICkit 2 found and connected** will appear in the Status box.

5.1.3 If the connection is incompleted. The message **PICkit 2 not found. Check USB connections and use Tools → Check Communication to retry** will appear in the Status box. Check the cables and connections.



5.1.4 Go to **Tools** menu and select **Check Communication** command. If all's correct, the message **PICkit 2 found and connected** will be show in the Status box.



However if everytime during re-connection or checking hardware, it does not connect the target microcontroller at ICD2 jack and ICSP point or any mismatch in number, the warning dialog box will appear. It will warn you about any error supply voltage. You need not worry about this, click on the **OK** button to continue.



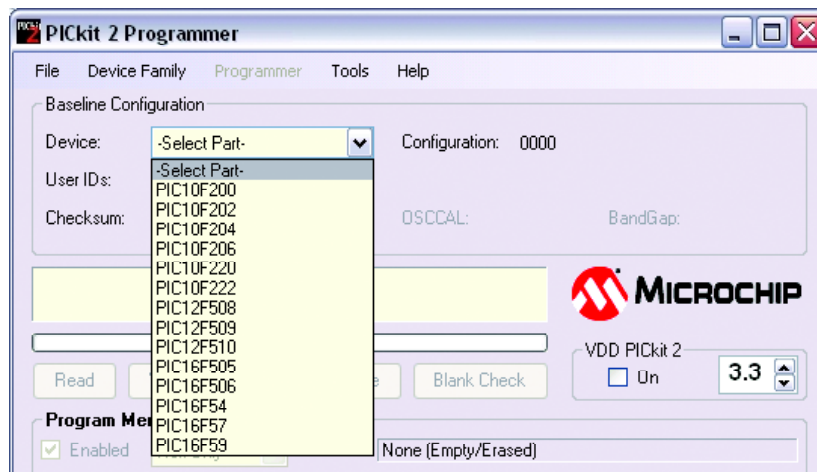
5.2 Command menu description

5.2.1 FILE

- **Import File** – Import a hex file for programming
- **Export File** – Export a hex file read from a device
- **Exit** – Exit the program (duplicated with the **Quit** button)

5.2.2 DEVICE FAMILY

- **Baseline** (12-bit Core) – Configures the programming software for baseline Flash devices



- **Mid-range** - Configures the programming software for 14-bit core flash devices. The devices in this range include *PIC12F6xx* and *16F6xx*, 7x, 7xx, 8x, 8xx. When selected, software will check the connection target at ICD2 and ICSP terminal. If found the correct device, device number will appear at **Device** line in **Midrange Configuration** box. If not, the warning dialog box about the error supply voltage will appear. Click the **OK** button to continue.

- **PIC18F** - Configures the programming software for PIC18F core flash devices. When selected, software will check the connection target at ICD2 and ICSP terminal. If found the correct device, device number will appear at **Device** line in **PIC18F Configuration**. If not, the warning dialog box about error supply voltage will appear. Click the **OK** button to continue.

- **PIC18F_J** - Configures the programming software for *PIC18FxxJxx* low voltage devices. When selected, software will check the connection target at ICD2 and ICSP terminal. If found the correct device, device number will appear at **PIC18F_J Configuration**. If not, the warning dialog box about error supply voltage will appear. Click the **OK** button to continue.

- **PIC24** - Configures the programming software for 16-bit core devices; *PIC24FJxx*. When selected, software will check the connection target at ICD2 and ICSP terminal. If found the correct device, device number will appear at **PIC24 Configuration**. If not, the warning dialog box about error supply voltage will appear. Click the **OK** button to continue.

- **dsPIC30** - Configures the programming software for 16-bit core devices; *dsPIC30Fxx*. When selected, software will check the connection target at ICD2 and ICSP terminal. If found the correct device, device number will appear at **dsPIC30 Configuration**. If not, the warning dialog box about error supply voltage will appear. Click the **OK** button to continue.

- **dsPIC33** - Configures the programming software for 16-bit core devices; *dsPIC33Fxx*. When selected, software will check the connection target at ICD2 and ICSP terminal. If found the correct device, device number will appear at **dsPIC33 Configuration**. If not, the warning dialog box about error supply voltage will appear. Click the **OK** button to continue.

5.2.3 PROGRAMMER

- **Read Device** – Reads the program memory, data EEPROM memory, ID locations, and Configuration bits.

- **Write Device** – Writes the program memory, data EEPROM memory, ID locations, and Configuration bits.

- **Verify** – Verifies the program memory, data EEPROM memory, ID locations and Configuration bits read from the target MCU against the code stored in the programming software.

- **Erase** – Performs a bulk erase of the target MCU. OSCCAL and band gap values are preserved (PIC12F629/675 and PIC16F630/676 only).

- **Blank Check** – Performs a blank check of program memory, data EEPROM memory, ID locations and Configuration bits.

- **Verify on Write** - Verifies program memory, data EEPROM memory, ID locations and Configuration bits read from the target MCU against the code stored in the programming software with word per word.

- **Full Erase (OSCCAL and BG erased)** – Performs a bulk erase including the OSCCAL and Band Gap (BG) values (PIC12F629/675 and PIC16F630/676 only).

- **Regenerate OSCCAL** – Regenerates the OSCCAL value (only for PIC12F629/675 and PIC16F630/676). The AUX line must be connected to the RA4/T1G pin.

- **Set Band Gap Calibration Value** – Sets the band gap value (only for PIC12F629/675 and PIC16F630/676).

- **Write on PICkit Button** - Set for supporting of programming the target microcontroller with PROGRAM switch on PX-200 board.

5.2.4 TOOLS

- **Enable Code Protect** – Enables code protection for Flash program memory.
- **Enable Data Protect** – Enables code protection for EEPROM data memory.
- **Set OSCCAL** - Sets the OSCCAL value for alignment internal clock frequency (only for PIC12F629/675 and PIC16F630/676).
- **Target VDD Source** – Power target from PX-200 Microcontroller Programmer.

Auto-Detect : Select to PX-200 turn on or off the supply voltage to target microcontroller automatically (not suggest to use this option).

Forced PICkit2 : Set PX-200 to supply the suitable voltage to target microcontroller. After select, LED at Targer position will light and at VDD PICkit2 box on screen will check atr On position. User can adjust the supply voltage from selection box in the right-hand (not suggest to use this option).

Forced Target : Select to inform the software knows about the target has voltage applied. Suggest to use this option for safty operation. Also in this option, user must apply the supply voltage to the target PIC microcontroller.

- **Fast Programming** - Select the PX-200 to programs the Flash device with high speed.
- **Check Communication** – Verifies communication with the PX-200 Microcontroller Programmer and reads the device ID of the target MCU.
- **Download PICkit 2 Firmware** – Performs a download of the PX-200 Microcontroller Programmer firmware operating system. (PX-200 is compatible PICkit2™ Programmer). Sometime call this function to OS update.

5.2.5 Help

Displays all user manual, technical document and a dialog box indicating the version and date.

5.3 Important things to know in using the PICkit2™ Programming Software

5.3.1 Device Configuration

The Device Configuration window displays the PICmicro MCU device, User ID, Configuration Word and Checksum. It also displays OSCCAL and Band Gap, which are available only on PIC12F629/675 and PIC16F630/676 devices.

For mid-range (14-bit core), PIC24, dsPIC30 and dsPIC33 devices, the PICkit™ 2 Microcontroller Programmer reads the device ID and displays it in the window.

For baseline (12-bit core) devices, the user must select the device from the Device drop-down menu.

The PICkit2™ Programming Software would not support about editing and setting the Configuration bit before programming. User must define from your sourcecode except the clock frequency calibration in PIC12F629/675 and PIC16F630/676 only.

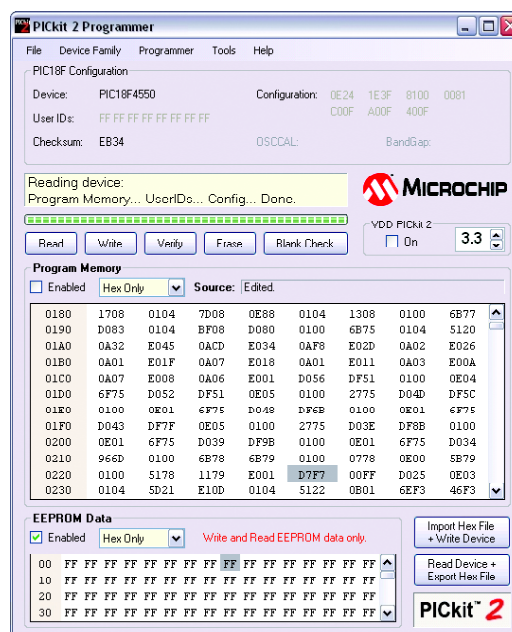
5.3.2 Editing memory value

The PICkit2™ Programming Software supports the editing memory value in each address, both Flash program and data EEPROM memory. User can click at any address that need to change the value and input the new value directly.

Moreover user can select to access both memory types and only one.

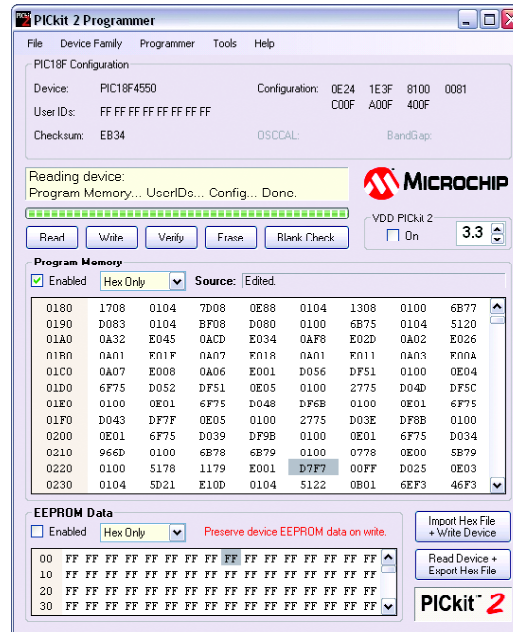
5.3.2.1 Access only EEPROM data memory

Click at Enabled box in Program Memory border to remove the mark. At EEPROM data border will show **Write and Read EEPROM data only** in red message. It means user can read and write only EEPROM data memory. See the illustration below.



5.3.2.1 Access only Flash program memory

Click at Enabled box in EEPROM data border to remove the mark. At EEPROM data border will show **Preserve device EEPROM data on write** in red message. It means the EEPROM data memory will be protected. User can access only Flash program memory. See the illustration below.

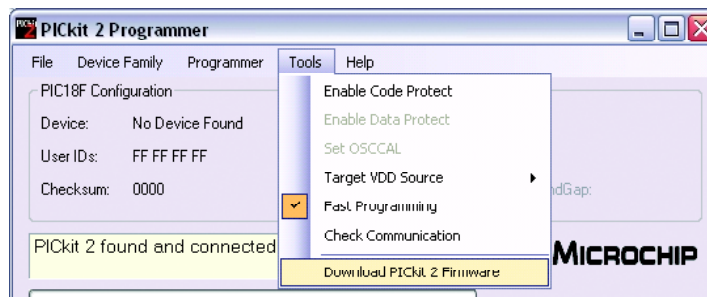


5.4 Updating the PX-200 Microcontroller Programmer Firmware

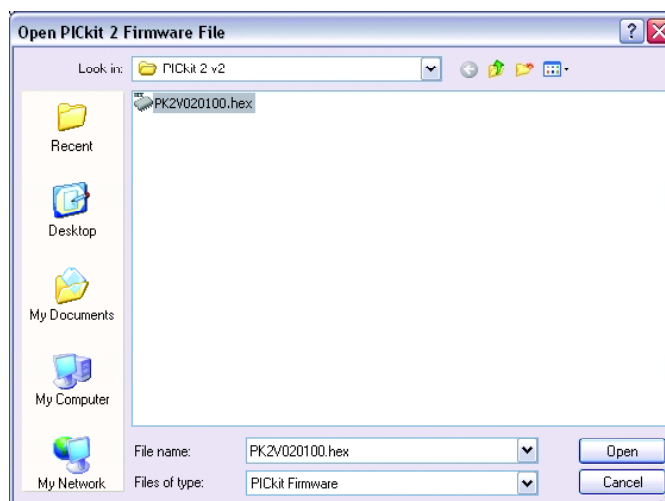
To update the PX-200 Microcontroller Programmer firmware Operating System, complete the following steps.

5.4.1 Download the latest PICkit 2 Operating System from the Microchip web site at www.microchip.com. Because PX-200 is compatible Microchip's PICkit2 programmer.

5.4.2 From the menu, select **Tools → Download PICkit 2 OS Firmware**, as shown in figure below



5.4.3 Browse to the directory where the latest Operating System code was saved, Select the **PK2*.hex** file and click on the **Open** button as shown in figure below.



5.4.4 The progress of the OS update will be displayed in the status bar of the programming software and the Busy LED on the PX-200 Microcontroller Programmer will flash. When the update completes successfully, the status bar will display **“Operating System Verified”** and the Busy LED will go out. The operating system update is then complete.

5.5 Short cut button

The PICkit2™ Programming Software has 7 short cut buttons as follows :

5.5.1 **Read** : Read data from target MCU.

5.5.2 **Write** : Write or program the code into target MCU.

5.5.3 **Verify** : Verify programming.

5.5.4 **Erase** : Erase data in target MCU.

5.5.5 **Blank Check** : Check blank data in target MCU.

5.5.6 **Import Hex File + Write Device** : Open the HEX file and program into target MCU automatically

5.5.7 **Read Device + Export Hex File** : Read device and save as the HEX file automatically.

6. Programming device with PROGRAM button

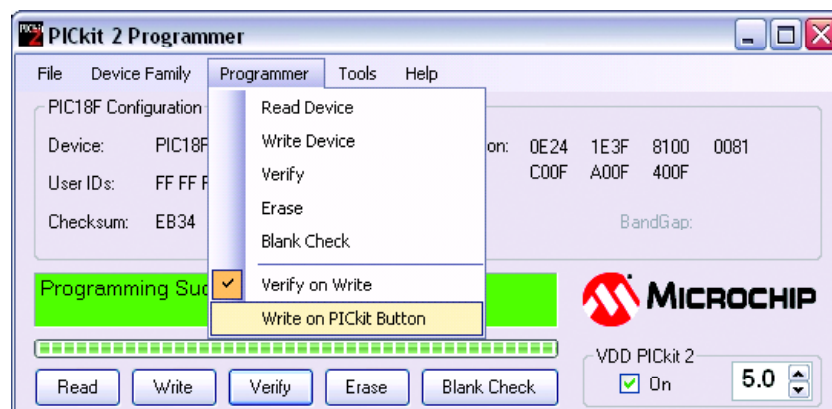
The PX-200 Microcontroller Programmer has a button to support programming device with hardware component. This function is benefits and help user to program many MCU with same code. Replace many clicks with a hardware button on PX-200 Programmer board.

The step of this operation as :

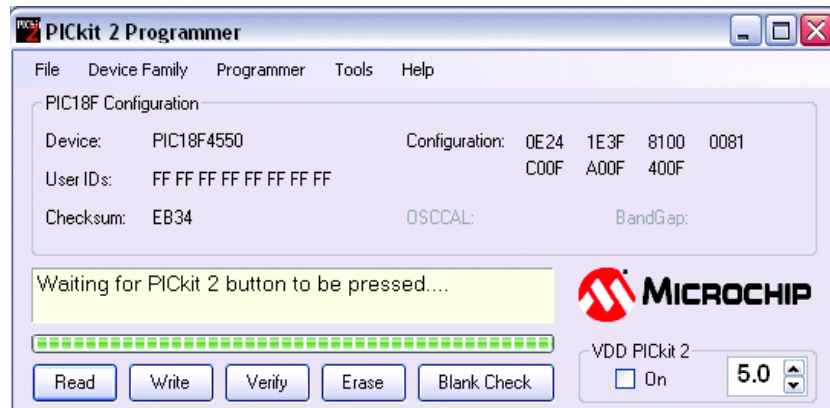
6.1 Connect PX-2000 with target microcontroller.

6.2 Read the HEX file into buffer with Import Hex commad.

6.3 From the menu, select **Programmer → Write on PICkit Button**



6.4 At Status box will show the message **Waiting for PICkit 2 button to be pressed...**

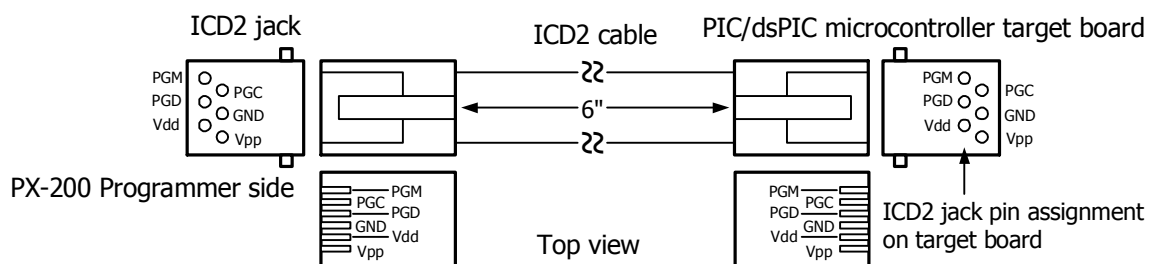


6.5 Press a PROGRAM button on PX-200 Programmer to start programming.

6.6 If you require to program with the same HEX file, user can press a PROGRAM button continue.

7. ICD2 cable assignment

The PX-200 Microcontroller Programmer comes with an ICD2 cable for connecting between the PX-200 programmer and the target board, the microcontroller. The wire assignment of this cable is shown below.



8. PX-200 Programmer and ICSP

The PX-200 Microcontroller Programmer can program PICmicro® microcontrollers that are installed in an application circuit using In-Circuit Serial Programming™ (ICSP™). In-Circuit Serial Programming (ICSP) requires five signals:

- **V_{PP}** – Programming Voltage; when applied, the device goes into Programming mode.
- **ICSPCLK** or **PGC** – Programming Clock; a unidirectional synchronous serial clock line from the programmer to the target.
- **ICSPDAT** or **PGD** – Programming Data; a bidirectional synchronous serial data line.
- **V_{DD}** – Power Supply positive voltage.
- **V_{SS}** – Power Supply ground reference.

However, the application circuit must be designed to allow all the programming signals to be connected to the PICmicro device without distorting the programming signals. Figure 3 shows a typical circuit as a starting point when designing an application circuit for ICSP. For successful ICSP programming, the precautions in the following sections need to be followed.

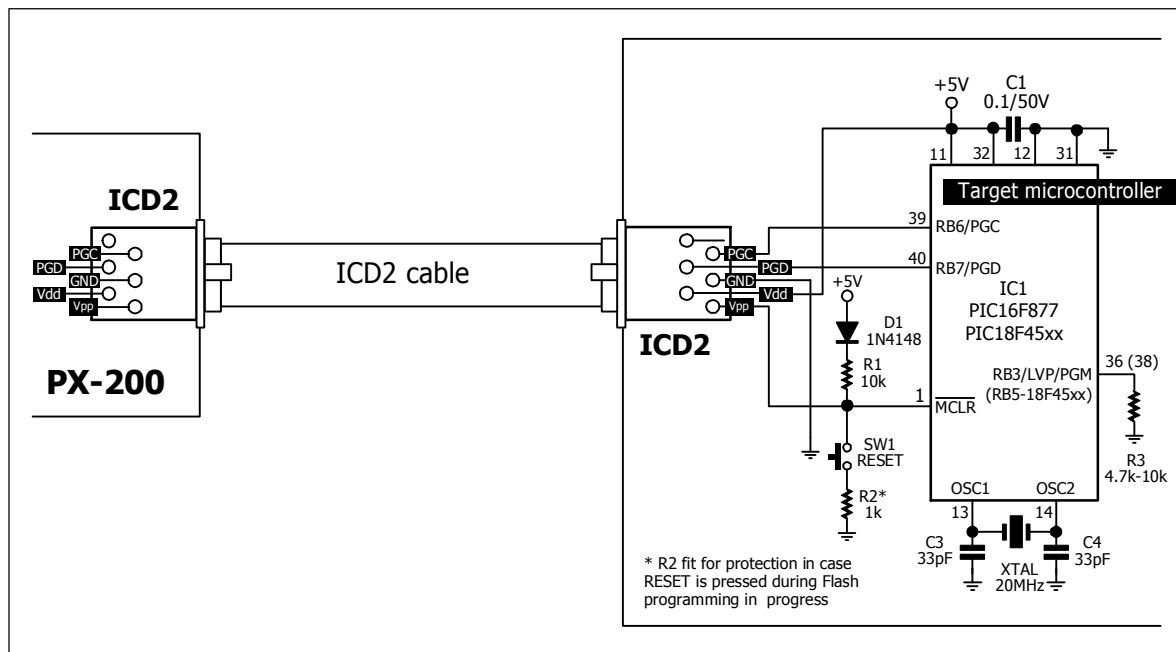


Figure 3 Typical ICSP™ application circuit of PX-200 Microcontroller Programmer

