MPLAB IDE v6.xx
Quick Start Guide

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Chapter 1. Getting Started with MPLAB IDE

1.1 INTRODUCTION

MPLAB Integrated Development Environment (IDE) is a comprehensive editor, project manager and design desktop for application development of embedded designs using Microchip PICmicro® microcontrollers.

This document covers the installation and set up of MPLAB® IDE version 6.20 and later. An overview of debugging capabilities will be discussed using an example application as a guide. In addition, a few of the many MPLAB IDE system features are presented to help finish applications quickly.

This document is meant to help users get started, but some aspects of the user interface will likely change in future releases, and new features will be added as additional parts are released. This guide may quickly become out of date; for product updates, check the Microchip web site. The on-line help is always the most up-to-date reference for the current version of MPLAB IDE.

1.2 HIGHLIGHTS

The first section of this document details the installation of MPLAB IDE on the user's PC. Section two is a simple step-by-step tutorial that creates a project and explains the debug capabilities of MPLAB. The last section covers the use of other tools and how to customize MPLAB for a specific debugging environment.

- Getting Started with MPLAB IDE
- Debugging a Simple Project
  - Creating a Project
  - Running the Simulator
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- Next Steps
  - Programming a Device
  - Debugging with Advanced Simulator Features
  - Accessing MPLAB IDE On-line Help
  - Configuring Workspace and Project Debug Settings

1.3 GETTING STARTED WITH MPLAB IDE

MPLAB IDE is a Windows® OS based Integrated Development Environment for the PICmicro® MCU families and the dsPIC™ Digital Signal Controllers. The MPLAB IDE provides the ability to:

- Create and edit source code using the built-in editor.
- Assemble, compile and link source code.
- Debug the executable logic by watching program flow with the built-in simulator or in real time with MPLAB ICE 2000 and 4000 emulators or MPLAB ICD 2 in-circuit debugger.
- Make timing measurements with the simulator or emulator.
- View variables in Watch windows.
- Program firmware into devices with MPLAB ICD 2, PICSTART® Plus or PRO MATE® II device programmers.
- Find quick answers to questions from the extensive MPLAB IDE on-line help.

Note:	Selected third party tools are also supported by MPLAB. Check the release notes or `readme` files for details.

1.3.1 System Requirements

The following minimum configuration is required to run MPLAB IDE:

- PC-compatible Pentium® class system
- Microsoft Windows 98 SE, Windows 2000 SP2, Windows NT® SP6, Windows ME, Windows XP
- 64K MB memory (128MB recommended)
- 45 MB of hard disk space
- Internet Explorer 5.0 or greater

1.3.2 Install/Uninstall MPLAB IDE

To install MPLAB IDE on your system:

- For some Windows OS's, administrative access is required in order to install software on the PC.
- If installing from a CD-ROM, place the CD-ROM into the drive. Follow the on-screen menu to install MPLAB IDE. If no on-screen menu appears, use Explorer to find and execute the CD-ROM menu by double-clicking on the executable file `menu.exe`.
- If downloading MPLAB IDE from the Microchip web site, double-click on the downloaded executable file to begin installation.

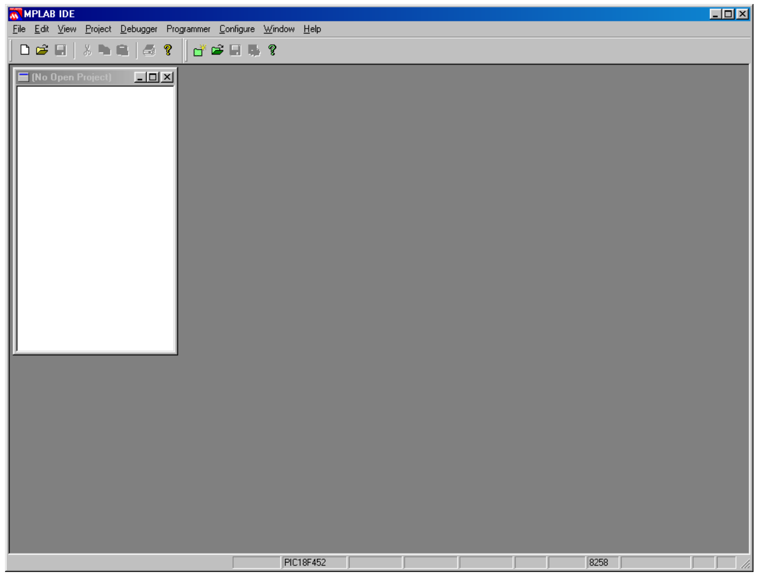
To uninstall MPLAB IDE:

- Select **UNWISE32** from the <u>*Start>Programs>Microchip MPLAB IDE*</u> menu, or
- Execute the file `unwise32.exe` in the MPLAB IDE installation directory.

1.3.3 Running MPLAB IDE

To start the IDE, double click on the icon installed on the desktop after installation or select *Start>Programs>Microchip MPLAB IDE>MPLAB IDE*. A screen will display the MPLAB IDE logo followed by the MPLAB IDE desktop (Figure 1-1).

FIGURE 1-1: MPLAB IDE DESKTOP



NOTES:

Chapter 2. Debugging a Simple Project

2.1 INTRODUCTION

In order to create code that is executable by the target PICmicro MCU, source files need to be put into a project and then the code is built using selected language tools (assemblers, compilers, linkers, etc.). In MPLAB IDE, the project manager takes care of this process.

The first step is writing a very short source code file. Next, a project is created, source code added, language tools are assigned to the project and finally, the code is built and tested.

2.2 CREATING SOURCE CODE

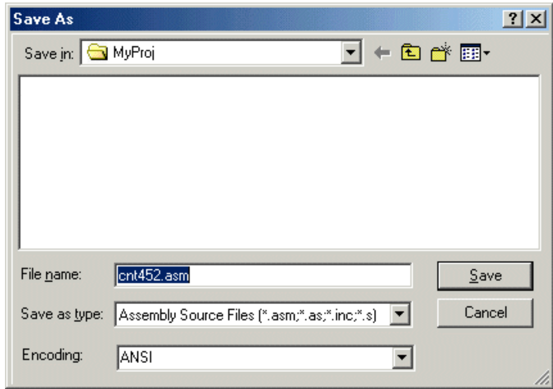
Begin by writing code for the application using the MPLAB IDE editor.

Select *File>New*. A blank edit window should open in the workspace. Enter the example assembly code listed (or copy and paste from this document).

```
         title "PIC18F452 counting program"
         list p=18f452,f=inhx32
         #include <p18f452.inc> ; This “header file” contains all
                                ;  the PIC18F252 special function
                                ;  register names and addresses.
                                ; This file is located in the same
                                ;  directory as MPASMWIN.EXE.

COUNT     equ     0x00
DVAR      equ     0x01
DVAR2     equ     0x02

        org    00h              ;reset vector
        goto   Start

        org    1Ch
Start
        clrf   WREG             ;clear W register
        movwf  PORTC            ;clear PORTC
        movwf  TRISC            ;config PORTC as outputs
Init
        clrf   COUNT            ;clr count
IncCount
        incf   COUNT,F          ;increment count
        movf   COUNT,W          ;
        movwf  PORTC            ;display on port c

        call   Delay            ;wait
        goto   IncCount         ;loop

Delay
        movlw  0xFF             ;set delay loop
        movwf  DVAR2            ;
D0
        movwf  DVAR             ;reset inner loop
D1
        decfsz DVAR,F
        goto   D1

        decfsz DVAR2,F
        goto   D0
        return
        end
```

Once entering the code is completed, select *File>Save* and save the file in a new directory named `C:\MyProj` as `cnt452.asm`.

FIGURE 2-1: SAVE SOURCE FILE



> **Note:** After saving the code, the text is shown with identifying colors, denoting code, reserved words, comments, etc. This context sensitive coloration is customizable. For more information about the editor, see *Help>MPLAB Editor Help*.

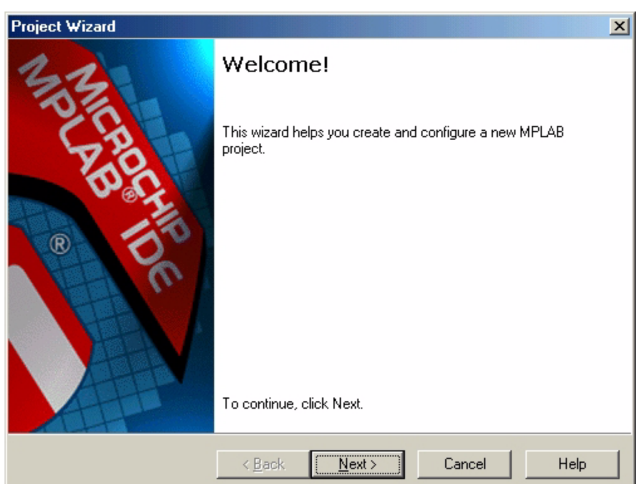
2.3 CREATING A PROJECT

The next step for developing an application is to set up a project. The easiest way to do this is to use the MPLAB Project Wizard.

2.3.1 Starting the Wizard

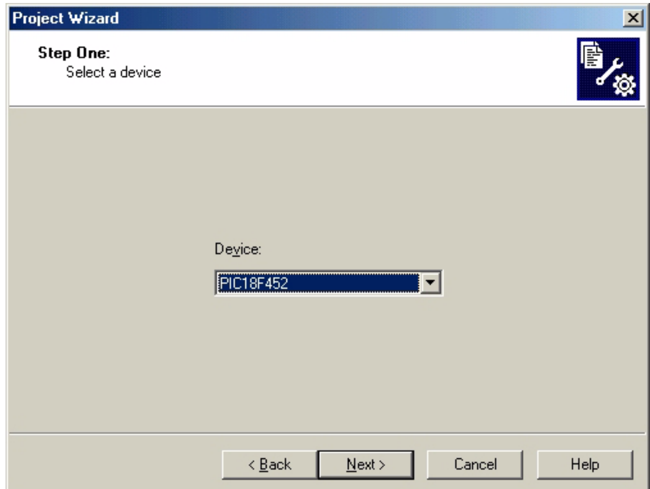
1. Start the Project Wizard by selecting *Project>Project Wizard*. The Welcome! screen will be displayed. Select the **Next** button to continue.

FIGURE 2-2: PROJECT WIZARD



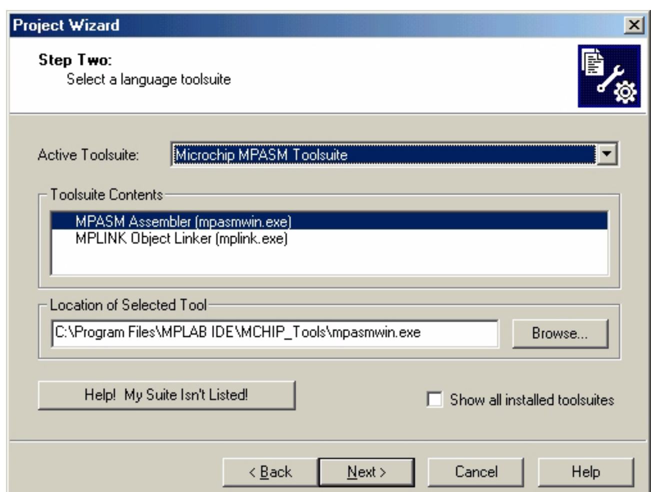
2. Choose `PIC18F452` from the Device pull-down list. This will be the PICmicro MCU used for this demonstration. Select the **Next** button to advance to the next step of the Project Wizard.

FIGURE 2-3: PROJECT WIZARD: SELECT DEVICE



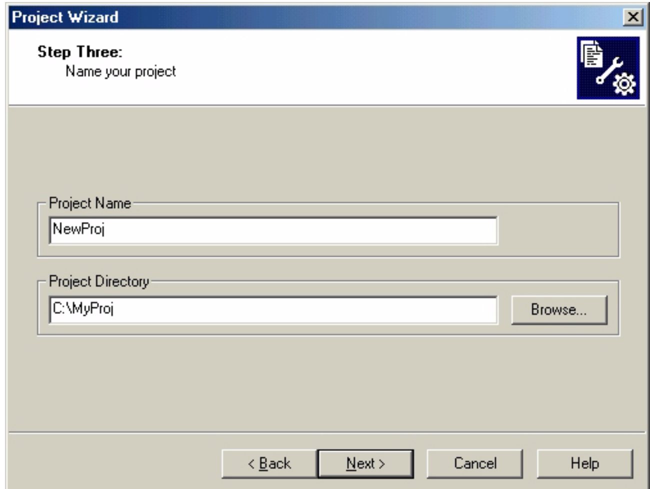
3. Confirm the location of the Microchip Toolsuite. Click on `MPASM Assembler (mpasmwin.exe)`. The full path to the MPASM Assembler executable should appear in the Location of Selected Tool field as shown. If it is incorrect or empty, click **Browse** to locate `mpasmwin.exe`. If MPLAB has been installed into the default directories, the path should appear as shown below. Select the **Next** button to advance to the next step of the Project Wizard.

FIGURE 2-4: PROJECT WIZARD: SELECT TOOLSUITE



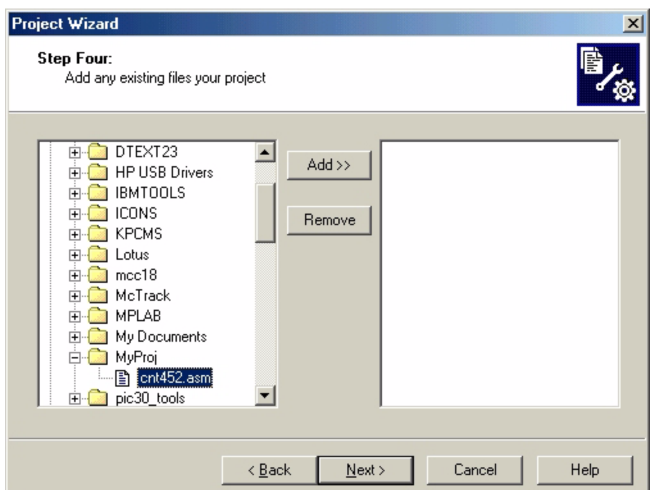
4. Enter a name for the project. For the purposes of this demonstration, use `NewProj` and press **Browse** to set the project in the directory that was created for the source file typed in previously, `C:\MyProj`.

FIGURE 2-5: PROJECT WIZARD: NAME PROJECT



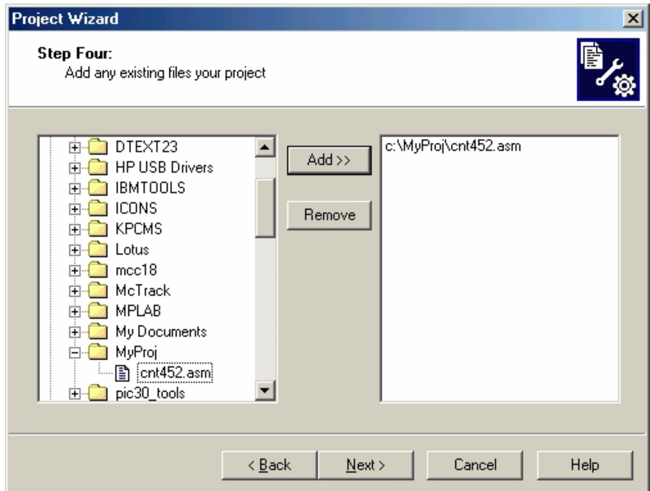
5. Press **Next**. A prompt will ask for existing files to be added to your project. Browse to the `C:\MyProj` folder and select `cnt452.asm`.

FIGURE 2-6: PROJECT WIZARD: SELECT SOURCE FILE



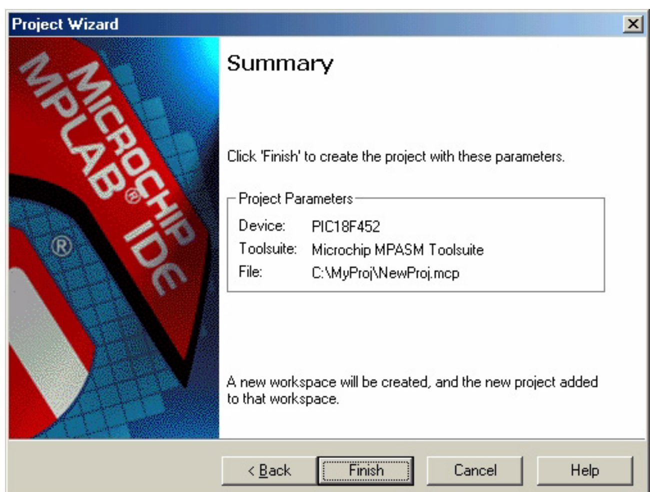
6. Press the **Add>>** button to add cnt452.asm to the project. This is the only file needed for this project (with the exception of the `P18F452.H` file which is "included" in `cnt452.asm`, and doesn't need to be added to the project list of files).

FIGURE 2-7: PROJECT WIZARD: ADD SOURCE FILE



7. Select the **Next** button to complete creation of the project and see the summary Project Wizard dialog. Look at the information in this final dialog to verify that the project has been set up correctly.

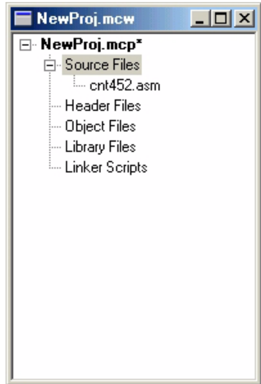
FIGURE 2-8: PROJECT WIZARD: SUMMARY



8. Click on **Finish** to exit the wizard.

The project window on the desktop should now look like Figure 2-9.

FIGURE 2-9: PROJECT WINDOW



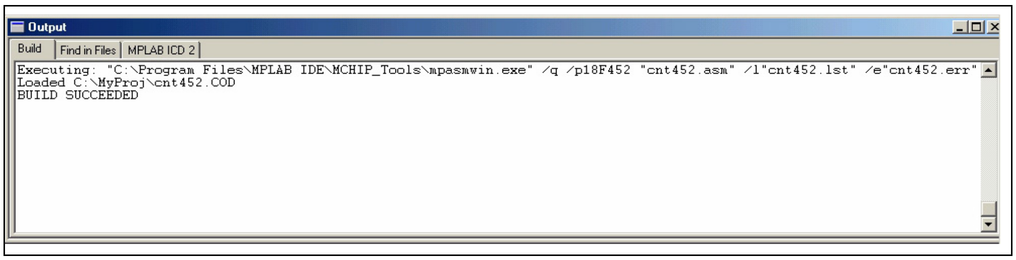
TIP:	Files can be added and projects saved by using the right mouse button in the project window. In case of error, files can be manually deleted by selecting them and using the right mouse click menu.

2.4 BUILDING THE PROJECT

When finished creating the project, it is time to build the project. This will assemble the source code using the Microchip MPASM toolsuite.

Select *Project>Build All* to build the project. The file should assemble successfully and the Output window should look like Figure 2-10.

FIGURE 2-10: OUTPUT WINDOW



If the file does not assemble successfully, check the following items and then build the project again:

- Check the spelling and format of the code entered in the editor window. If the assembler reported errors in the Output window, double click on the error and MPLAB will open the corresponding line in the source code with a green arrow in the left margin of the source code window.
- Check that the correct assembler (MPASM assembler) for PICmicro devices is being used. Select *Project>Set Language Tool Locations*. Click MPASM Assembler (`mpasmwin.exe`) and review its location in the display. If the location is correct, click **Cancel**. If it is not, change it and then click **OK**.

Upon a successful build, the output file generated by the language tool will be loaded. This file contains the object code that can be programmed into a PICmicro MCU and debugging information so that source code can be debugged and source variables can be viewed symbolically in Watch windows.

Note: The real power of projects is evident when there are many files to be compiled/assembled and linked to form the final executable application – as in a real application. Projects keep track of all of this. Build options can be set for each file that access other features of the language tools, such as report outputs and compiler optimizations.

2.5 RUNNING THE SIMULATOR

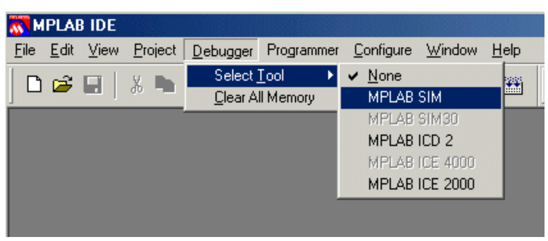
Now that the project is built, the user will want to check that it is functioning. To do this, select a debug tool. A debug tool is a hardware or software tool that is used to inspect code as it executes a program (in this case `cnt452.asm`). For this tutorial use MPLAB SIM simulator.

The simulator is a software program that runs on the PC to *simulate* the instructions of the PICmicro MCU. It does not run in "real time," since the simulator program is dependent upon the speed of the PC, the complexity of the code, overhead from the operating system and how many other tasks are running. However, the simulator accurately *measures* the time it would take to execute the code if it were operating in real time in an application.

Note: Other debuggers include MPLAB ICE 2000, MPLAB ICE 4000 and MPLAB ICD 2. These are optional hardware tools to test code on the application PC board. Most of the MPLAB IDE debugging operations are the same as the simulator, but unlike the simulator, these tools allow the target PICmicro MCU to run at full speed in the actual target application.

Select the MPLAB SIM simulator as the debugger by selecting *Debugger>Select Tool>MPLAB SIM*.

FIGURE 2-11: SELECT SIMULATOR AS THE DEBUGGER

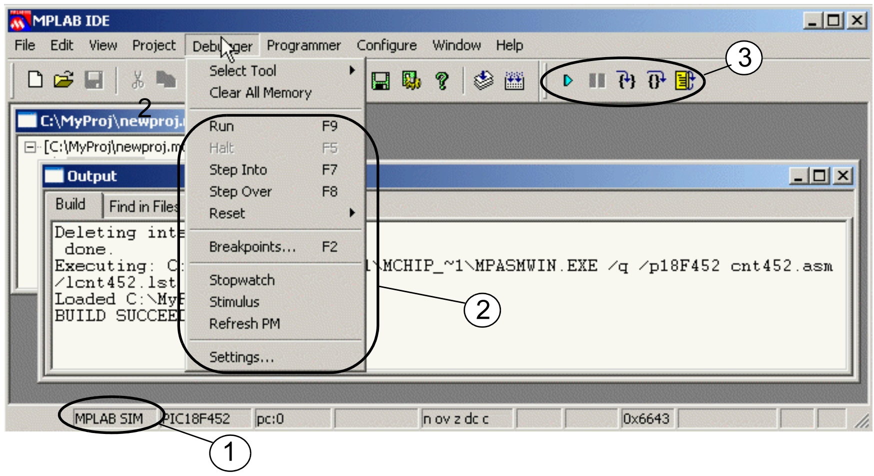


After selecting MPLAB SIM, the following changes should be seen (see corresponding numbers in Figure 2-12).

1. The status bar on the bottom of the MPLAB IDE window should change to "MPLAB SIM".
2. Additional menu items should now appear in the Debugger menu.
3. Additional toolbar icons should appear in the Debug Tool Bar.

TIP:	Position the mouse cursor over a toolbar button to see a brief description of the button's function.

FIGURE 2-12: MPLAB IDE DESKTOP WITH MPLAB SIM AS DEBUGGER



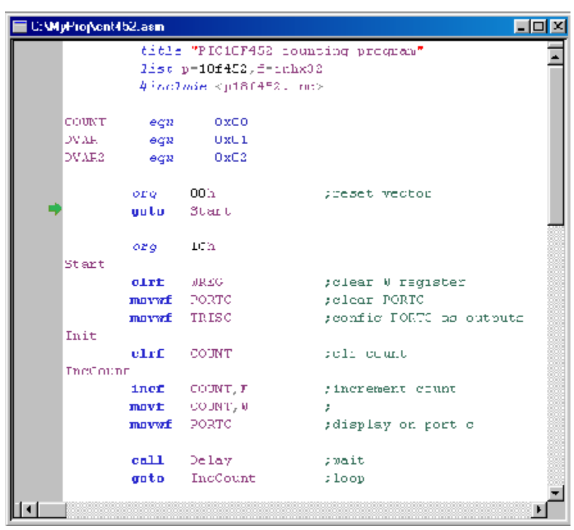
2.6 DEBUGGING THE APPLICATION

The application is now ready to run.

2.6.1 Running the Code

First, select Debugger>Reset. There should be a green arrow in the left margin of the source code window, indicating the first source code line to be executed.

FIGURE 2-13: SOURCE CODE WINDOW - AFTER RESET



Select *Debugger>Run* to run the application. A text message “Running…” will appear on the status bar.

To halt program execution, select *Debugger>Halt*. The line of code where the application halted will be indicated by the green arrow.

To single step through the application program, select *Debugger>Step Into*. This will execute the currently indicated line of code and move the arrow to the next line of code to be executed.

There are shortcuts for these commonly used functions in the Debug Tool Bar.

FIGURE 2-14: DEBUG SHORT CUT ICONS

Debugger Menu	Toolbar Buttons	Hot Key
Run		F9
Halt		F5
Step Into		F7
Reset		F6

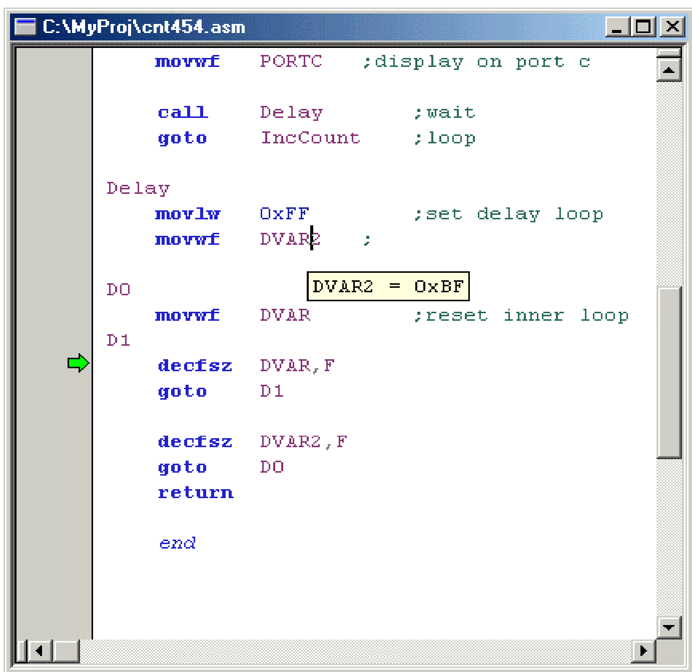
> **TIP:** Click on the appropriate icon on the toolbar or use the hot key shown next to the menu item. This is usually the best approach for repeated stepping.

2.6.2 Viewing Variables

The values of variables can be seen at any time by putting the mouse cursor over variable names anywhere in the source file. A small window will pop up to show the current value.

> **Note:** The pop-up variable value feature can display local variables only when the program has been compiled and linked to generate such information.

FIGURE 2-15: MOUSE OVER VARIABLE

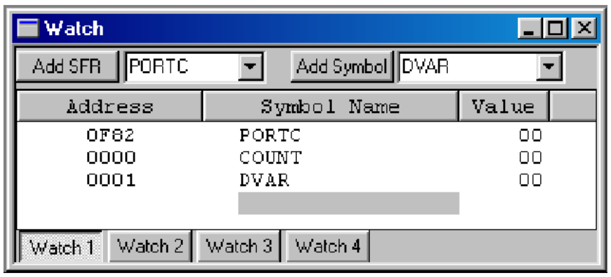


2.6.3 Watch Windows

Users often want to watch certain key variables all the time. Rather than floating the mouse cursor over the name each time to see the value, a watch window can be opened. The watch window will remain on the screen and show the current variable values. Watch windows may be found under the View menu.

1. Select *View>Watch* to open a new Watch window.
2. Select `PORTC` from the SFR selection box at the top of the window. Click **Add SFR** to add it to the Watch window list. To quickly advance through the list, start typing `PORTC` after selecting the pull down icon.
3. Select `COUNT` from the symbol selection box at the top of the window. Click **Add Symbol** to add it to the Watch window list.
4. Symbols can be entered directly or selected from the pull down menu. To enter directly, move the cursor down to the next blank line and type "DVAR" then press **Enter**. Or select `DVAR` from the pull down symbol selection box at the top of the window. Click **Add Symbol** to add it to the Watch window list.

FIGURE 2-16: WATCH WINDOW WITH SYMBOLS



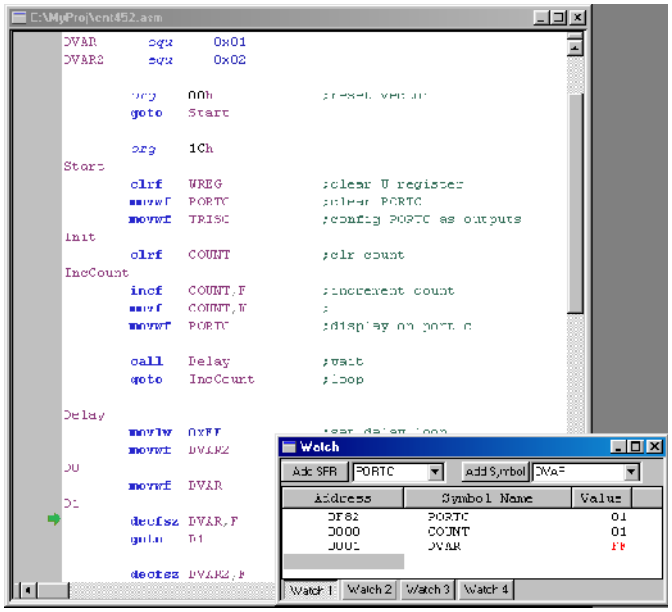
Three symbols should now appear in the Watch window. The file register address of the symbols is listed first, followed by the symbol name and finally the value of the symbol. Users can watch the symbol values change as they step through the program.

1. Select *Debugger>Reset* to reset the application.
2. Select *Debugger>Step Into* (or click the equivalent toolbar icon) until stepping to the following program line:

```
incf    COUNT,F         ;increment count
```

3. Step one more time to see the value of `COUNT` in the Watch window change from `0` to `1`.
4. Step twice more to see the value of `PORTC` in the Watch window change from `0` to `1`.
5. Step four more times to see the value of `DVAR` in the Watch window change to `FF`. Note that the values in the Watch window are red if they were changed by the previous debug operation and are black if they were not changed by the previous debug operation.

FIGURE 2-17: STEPPING THROUGH CODE



2.6.4 Setting Breakpoints

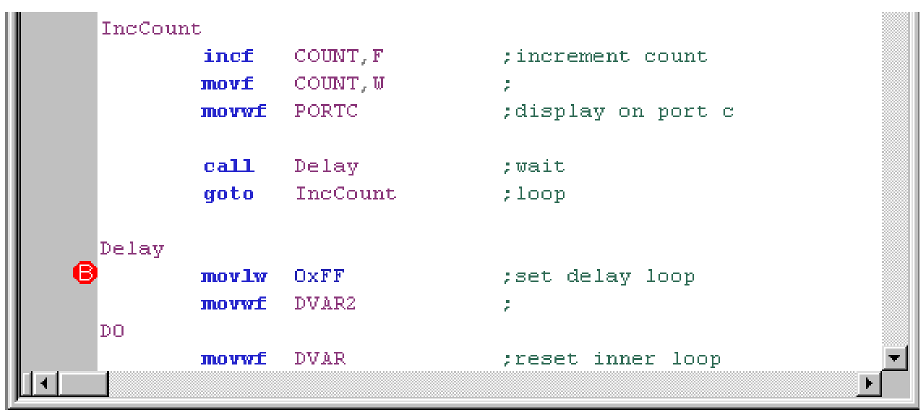
By using breakpoint, code can be to run to a specific location and then halt. This is accomplished as follows:

1. Select *Debugger>Reset* to reset the application.
2. Find the following line of code and use the right mouse button to click on it:

```
movlw   0xFF               ;set delay loop
```

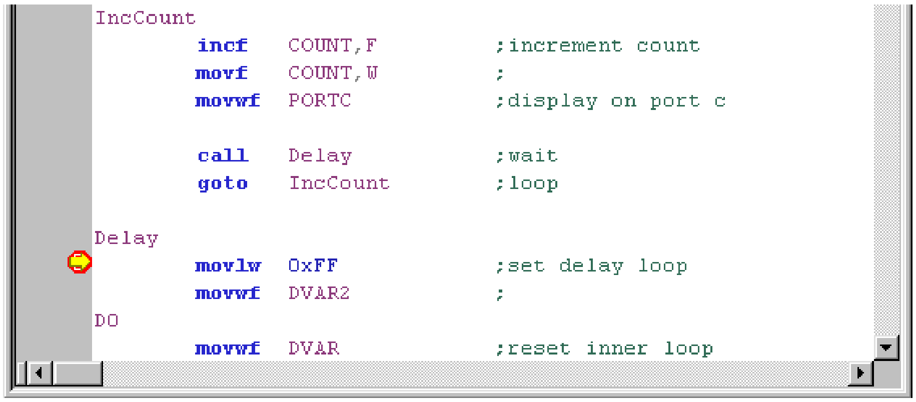
3. From the pop-up menu that appears with the right mouse click, select *Set Break Point*. A stop sign should appear in the margin next to the line (Figure 2-18).

FIGURE 2-18: SOURCE CODE WINDOW - SET BREAKPOINT



4. Select *Debugger>Run* to run the application. It should run briefly and then halt on the line at which the breakpoint was set.

FIGURE 2-19: SOURCE CODE WINDOW - BREAKPOINT HALT

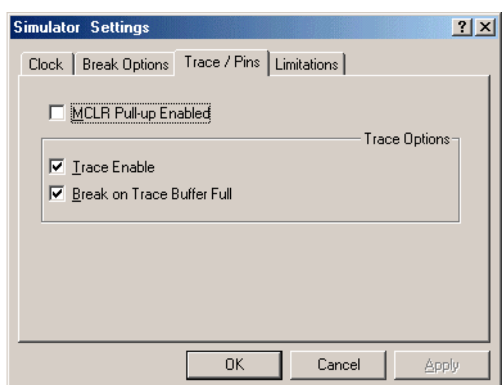


> **Note:** When halted at a breakpoint, a convenient way to run to a location later in the code is to place the cursor on any instruction line and use the right mouse button to select “Run to Cursor.” A permanent breakpoint is not added at that point, and the breakpoint symbol will not be seen on the line – only the run arrow will move. If that instruction is never executed, however, the application will continue to run until *Debugger>Halt* is selected.

2.6.5 Tracing Code

The simulator trace can be used to record the execution of the program. Rather than single step through lines of code, the code can be captured in action. Enable the simulator trace by *Debugger>Settings* and choose the “Trace/Pins” tab.

FIGURE 2-20: SIMULATOR TRACE ENABLE

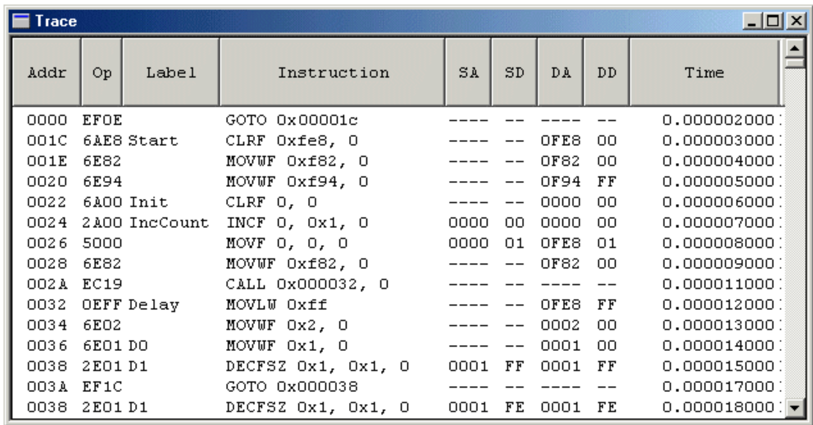


There are two check boxes in the **Trace Options** area to control the simulator trace collection. When only the top box is checked, the simulator collects data when the simulator is in Run mode. It collects data until halted at a breakpoint or manually the simulator is manually stopped. It will show the last 8192 cycles collected. This mode is useful to see the record of instructions leading up to a breakpoint.

If the second button is also checked, then the trace memory will collect 8192 cycles of data then stop collecting and halt the application at a breakpoint. This mode is useful for seeing the record of instructions after pressing run.

Select *View>Simulator Trace* (Figure 2-21). The simulator trace shows more information than just the sequence of executed instructions. The trace display shows a timestamp at every cycle. Data that was read from or written to file registers will be captured and displayed in the SA, SD, DA and DD columns as shown below:

FIGURE 2-21: SIMULATOR TRACE DISPLAY



Trace

Addr	Op	Label	Instruction	SA	SD	DA	DD	Time
0000	EF0E		GOTO 0x00001c	----	--	----	--	0.000002000
001C	6AE8	Start	CLRF 0xfe8, 0	----	--	0FE8	00	0.000003000
001E	6E82		MOVWF 0xf82, 0	----	--	0F82	00	0.000004000
0020	6E94		MOVWF 0xf94, 0	----	--	0F94	FF	0.000005000
0022	6A00	Init	CLRF 0, 0	----	--	0000	00	0.000006000
0024	2A00	IncCount	INCF 0, 0x1, 0	0000	00	0000	00	0.000007000
0026	5000		MOVF 0, 0, 0	0000	01	0FE8	01	0.000008000
0028	6E82		MOVWF 0xf82, 0	----	--	0F82	00	0.000009000
002A	EC19		CALL 0x000032, 0	----	--	----	--	0.000011000
0032	0EFF	Delay	MOVLW 0xff	----	--	0FE8	FF	0.000012000
0034	6E02		MOVWF 0x2, 0	----	--	0002	00	0.000013000
0036	6E01	D0	MOVWF 0x1, 0	----	--	0001	00	0.000014000
0038	2E01	D1	DECFSZ 0x1, 0x1, 0	0001	FF	0001	FF	0.000015000
003A	EF1C		GOTO 0x000038	----	--	----	--	0.000017000
0038	2E01	D1	DECFSZ 0x1, 0x1, 0	0001	FE	0001	FE	0.000018000

The display is made up of columns. On the left is the Program Counter address (Addr) and the machine code value of the instruction (Op). The Label column shows any symbolic label from the source code. Next, the disassembled instruction is shown. The four columns to the right of the “Instruction” column show data values being read and written to file registers:

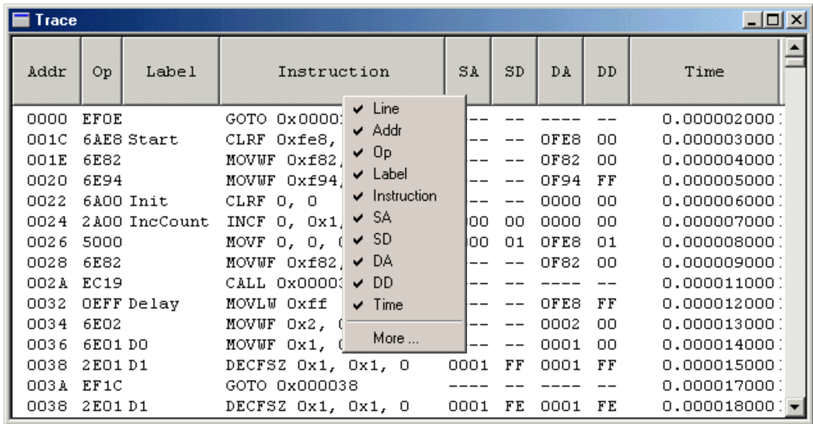
- SA - is Source Address, the register address of *read* operations
- SD - is Source Data, the data read from the register
- DA - is Destination Address, the register address of *write* operations
- DD - is Destination Data, the data written to the register

If there are dashes in the row for these values, it means that the operation did not access any file registers for this instruction.

On the far right is the timestamp. This can be used to measure the execution time of routines. The time is calculated based upon the clock frequency entered in the *Debugger>Settings*, Clock tab.

By putting the cursor over the top row of the trace display where the column headings are listed and right clicking, a configuration dialog will pop up.

FIGURE 2-22: SIMULATOR TRACE CONFIGURE



The checked items will appear in the Trace window. To reduce clutter, uncheck columns to remove them from the display if the data in those columns is not of interest.

Chapter 3. Next Steps

3.1 INTRODUCTION

For on-line tutorials, look under the Help menu of MPLAB IDE. Much of the documentation for MPLAB IDE and its components is available on line, part of the help system of MPLAB IDE. The following sections will point out some of the features that were not covered in the project tutorial, but which may be areas of interest.

3.2 PROGRAMMING A DEVICE

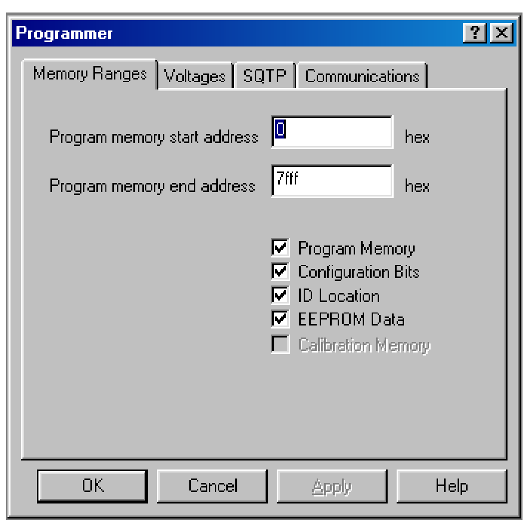
Once the application code is running as desired, the next step is to program an actual device. If you have a PIC18F452 device and one of the following programmers, the example code can be programmed into the device:

- MPLAB ICD 2
- PICSTART Plus Development Programmer
- PRO MATE II Device Programmer

To select and set up the programmer, do the following:

1. Select *Programmer>Select Programmer*, and select the desired programmer. The Programmer menu items will change appropriately for the selected tool, and toolbar items will be added.
2. Establish communications with the programmer. For the PICSTART Plus or PRO MATE II, select *Programmer>Enable Programmer*. For the MPLAB ICD 2, select *Programmer>Connect*.
3. Use the *Programmer>Settings* dialog to select the proper communications method for the selected programmer. For this example, use the default memory ranges.

FIGURE 3-1: PRO MATE II SETTINGS DIALOG



4. Specify the configuration bits. If using this tutorial, the default configuration bit settings are fine. If using an application of your own, specify the configuration bits setting in the source code (recommended), or set them manually by using the Configuration Bits window, invoked by selecting _Configure>Configuration Bits_.

> **TIP:** If setting configuration bits in your source code, they will affect the debugger operation. For example, if the source code specifies the oscillator configuration, then the debugger will use that oscillator configuration.

5. Click _Programmer>Program_ to program the information currently loaded in the MPLAB IDE into the device. The operation progress is indicated in the status bar. Results will be displayed in the Output window under the programmer tab, e.g., for PRO MATE II:

```
PRO MATE Error Log File
Programming
31-May-2002. 13:06:19
Device Type: PIC18F452

Programming/Verification Successful!
```

When the device is programmed, it is also automatically verified. To perform an extra verification that the device programmed correctly, click _Programmer>Verify_.

3.3 DEBUGGING WITH ADVANCED SIMULATOR FEATURES

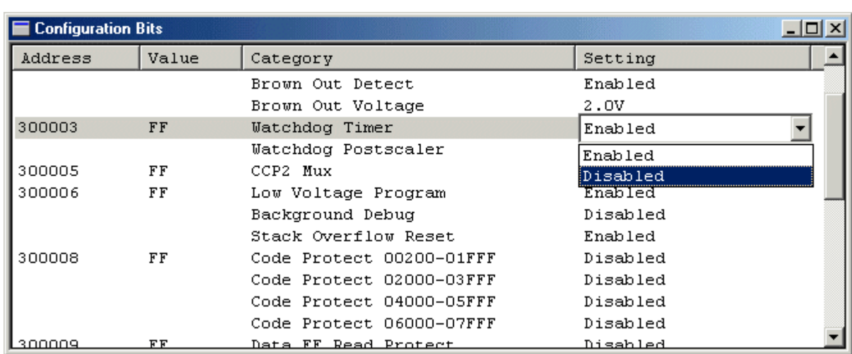
There are other characteristics of the simulator that can be configured from MPLAB IDE dialogs.

3.3.1 Configuration Bits Settings

Normally, the default condition of the configuration bits has the Watchdog Timer (WDT) enabled. This will cause the simulator to reset when the internal WDT times out.

- Select _Configure>Configuration Bits_ to bring up this dialog.
- Click on the Setting item to change the Watchdog Timer to `Disabled`.

FIGURE 3-2: DISABLE THE WATCHDOG TIMER

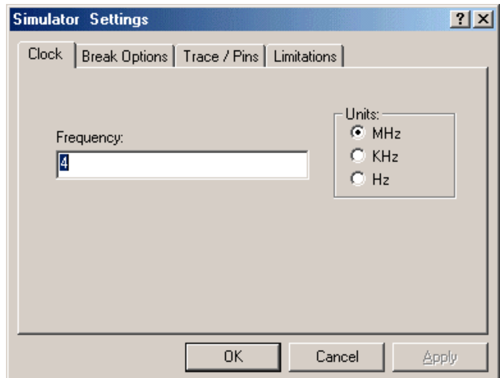


3.3.2 Debugger Settings for the Simulator

Select *Debugger>Settings* to bring up the dialog to configure the debugger, which in this case, is the MPLAB SIM simulator.

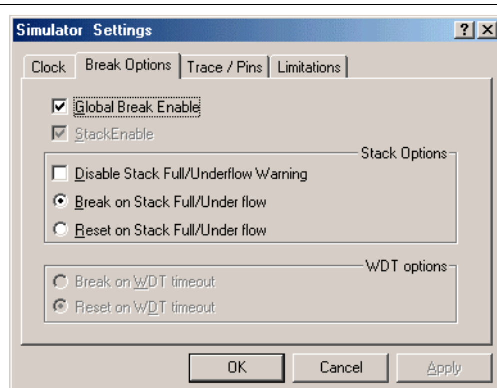
The Clock tab sets the frequency of the simulator's clock. This is important because the timestamp in the simulator trace as well as times in the Stopwatch dialog are calculated based upon this setting. This allows users to make accurate time measurements based upon the actual speed of the intended application.

FIGURE 3-3: SIMULATOR SETTINGS: CLOCK



The Break Options tab contains additional breakpoint features. If Global Break Enable is unchecked, then breakpoints will not operate. This is useful when many breakpoints are inserted and the user wishes to disable them all without clearing them. The breakpoints can be activated again by going back to this dialog and re-enabling them.

FIGURE 3-4: SIMULATOR SETTINGS: BREAK OPTIONS

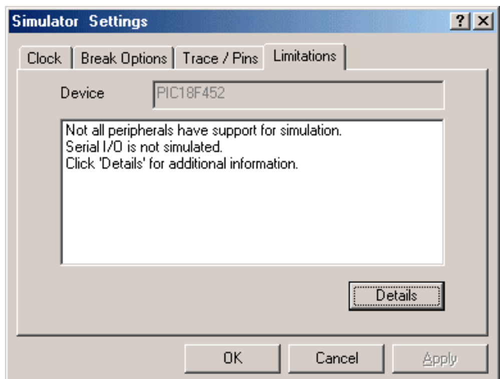


3.4 ACCESSING MPLAB IDE ON-LINE HELP

MPLAB IDE comes with extensive on-line help, which is constantly being expanded. If questions arise while using MPLAB IDE, be sure to check here for answers. Most importantly, the on-line help lists the support limitations that exist for a particular tool in its support of a particular device. Always try to review this section before working with a new device/tool combination.

The Limitations tab displays any limitations the simulator has compared to the actual device being simulated. General limitations are shown in the text area.

FIGURE 3-5: SIMULATOR SETTINGS: LIMITATIONS



Press the **Details** button to show specific limitations of the device being simulated. From this display you can also access help on general limitations related to the simulator.

FIGURE 3-6: LIMITATIONS DETAIL

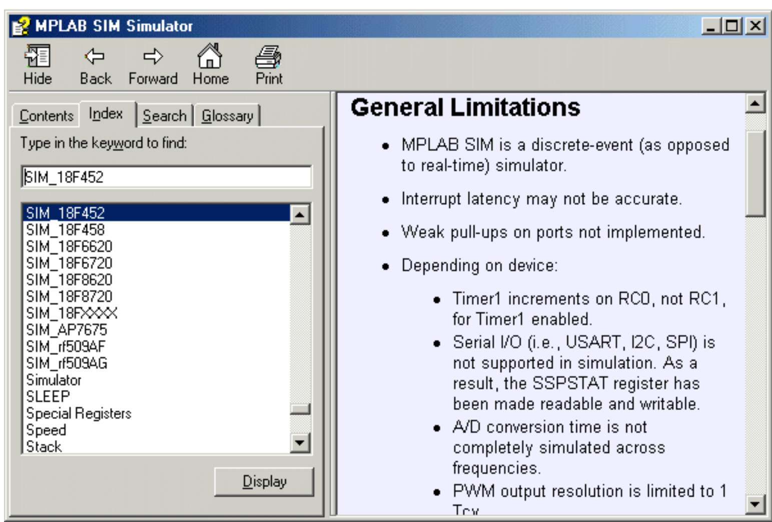
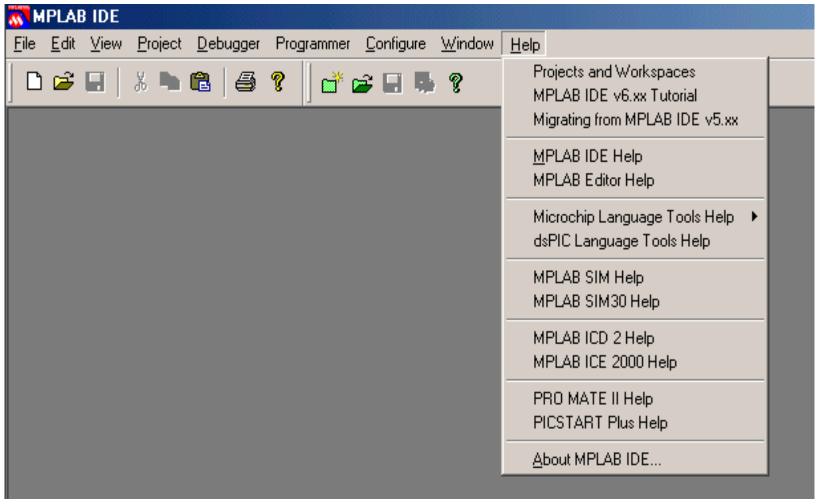
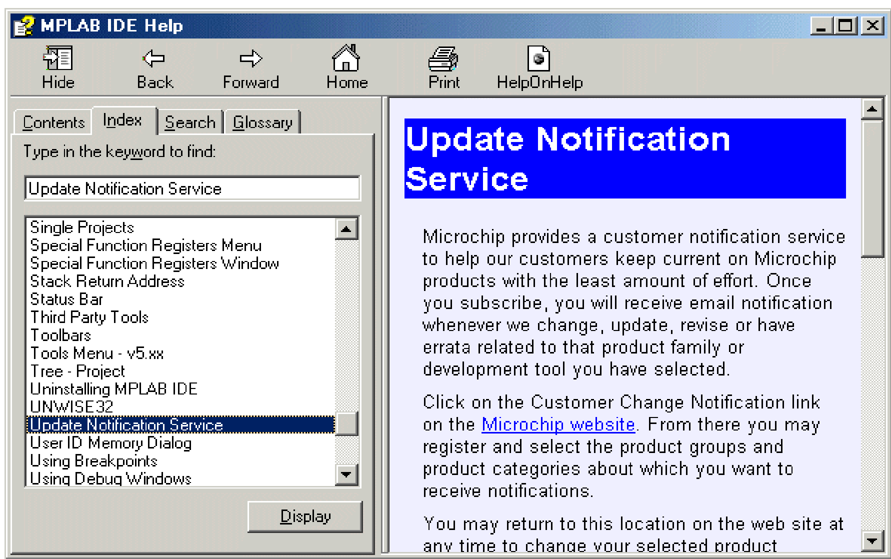


FIGURE 3-7: MPLAB IDE HELP MENU



MPLAB IDE Help covers all aspects of MPLAB IDE and all of the Microchip Tools. It also directs users to other types of assistance, such as the Microchip Update Notification system.

FIGURE 3-8: MPLAB IDE HELP DIALOG



3.5 CONFIGURING WORKSPACE AND PROJECT DEBUG SETTINGS

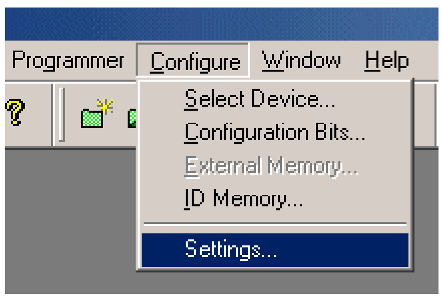
MPLAB IDE uses both workspaces and projects to help users manage their application code development.

The MPLAB IDE workspace is the desktop area in the MPLAB IDE application window. The workspace remembers which windows are open, which PICmicro device is selected, which debugger and programmer is being used, and how the hardware tools are connected to the PC. Generally, the workspace needs to be set up before starting to make a project.

Projects are opened in the MPLAB IDE workspace and they contain the source files, how to build them and which tools are used to build them. Projects are portable and can be moved to different directories or to a different computer.

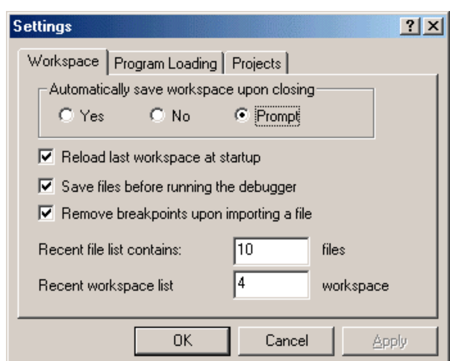
The *Configure>Settings* dialog (Figure 3-9), fine tunes the debugging desktop workspace on MPLAB IDE. No changes are necessary from the default settings for the Quick Start in this document, but users should be aware of these settings in case they want to change them later.

FIGURE 3-9: SETTINGS MENU SELECTION



The first thing users will see is the left tab on this multiple tabbed dialog, named “Workspace.”

FIGURE 3-10: SETTINGS: WORKSPACE TAB



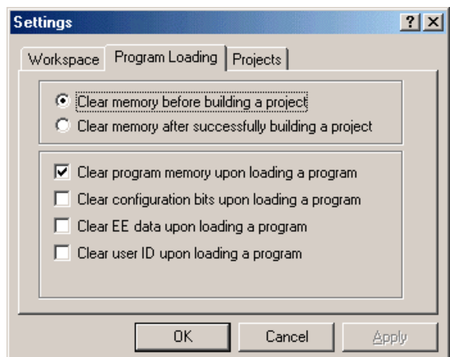
The Workspace tab on the Configure>Settings dialog allows users to:

- Reload their last workspace when entering MPLAB IDE. This is useful if users want to continue working on a project where they last left off.
- Save all their text files before starting emulation or simulation. This ensures that work will be saved and any changes are recompiled into the application before debugging starts.
- Remove breakpoints when importing a HEX file. Typically this is the desired action, but if for some reason, small changes to code are being made manually and then reloaded into the HEX file, users may not want to clear all breakpoints.

Note: The main reason for importing a HEX file is to program a device with previously compiled code. Every project produces a HEX file when it is built.

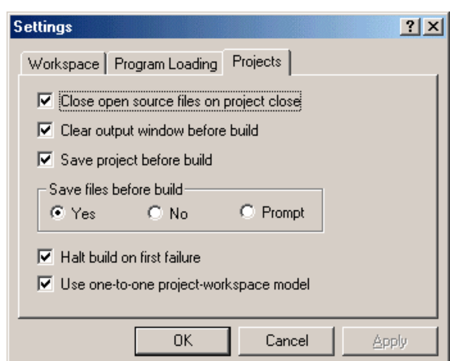
The Program Loading tab on the Configure>Settings dialog tab allows users to choose between clearing various areas of memory when a new program is loaded.

FIGURE 3-11: SETTINGS: PROGRAM LOADING TAB



The Projects tab on the Configure>Settings dialog has additional controls to customize actions when projects are built.

FIGURE 3-12: SETTINGS: PROJECTS TAB



This tab determines actions related to projects. These are the default settings and it is recommended that these settings are maintained. Unchecking some boxes may result in the loss of edited material if users are not careful. The last option, Use one-to-one project-workplace model, is related to how MPLAB IDE treats projects. When this is checked, the workspace allows only one project and, for all practical purposes, the workspace is the same as the project.

Note:	If this box is unchecked, then the workspace can contain more than one project. This is useful when building an application "a block at a time," where different areas of code are compiled into separate memory blocks. An example would be a project that has a bootloader and the first version of an application. The bootloader is independent of the application, and will be used in the future to download an updated version of the application. See the MPLAB IDE on-line help for more information.

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