

Electronic Design for Windows
EDWinXP



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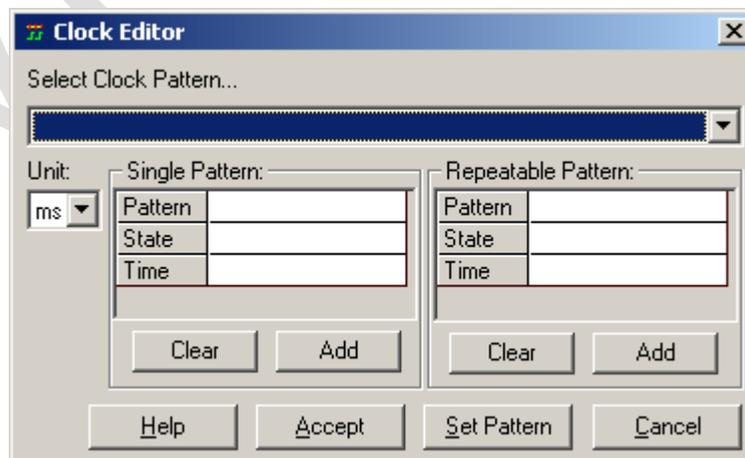
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8051 Microcontroller in EDWinXP

The 8051 microcontrollers in EDWinXP help the users to build real-time circuits. The 8051 can be interfaced with external devices like seven segment displays, interrupt generator, serial/pattern generator etc.

Using the 8051 microcontroller in EDWinXP

1. Open EDWinXP Main from **Start** → **Programs** → **EDWinXP** → **Ver x.xx** → **EDWinXP Main**.
2. Open the **Schematic Page (Mixed-Mode Simulator)** by double clicking on the **Page {MAIN PAGE}** under **Project** → **Circuit [MAINHIER]** → **Diagram** → **Page {MAIN PAGE}**.
3. Load 8051 microcontroller and Preprocess it.
4. The necessary timing for the controller is given by connecting a crystal across the pins XTAL1 and XTAL2. The timing can be provided manually by applying a clock of the desired frequency of the crystal to the pin XTAL1/XTAL2. This is done by selecting **Tools** → **Instruments** → **Preset Logic** → **Clock Generator**
5. Connect nodes on **XTAL1/XTAL2**
6. Now by clicking on either of the two nodes **XTAL1/XTAL2** the following window appears



7. Provide the desired frequency,

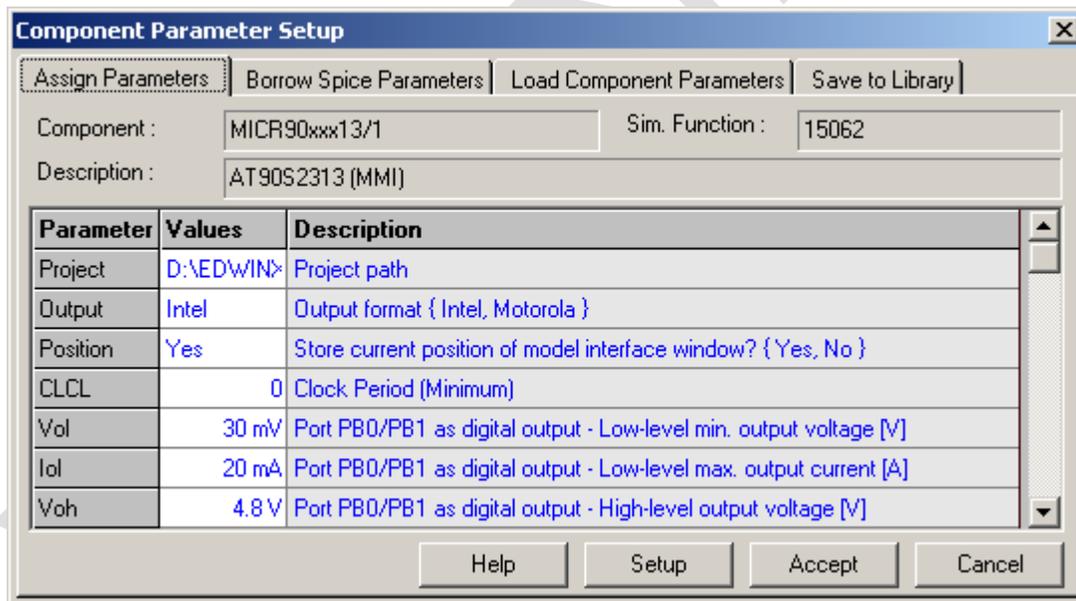
Eg: if the crystal frequency is 6MHz, then the time period will be $(1)/(6 \times 10^6)$ i.e. 0.1667×10^{-6}

The clock fed to the XTAL pin is {L1us, H1us} as **Repeatable Pattern**

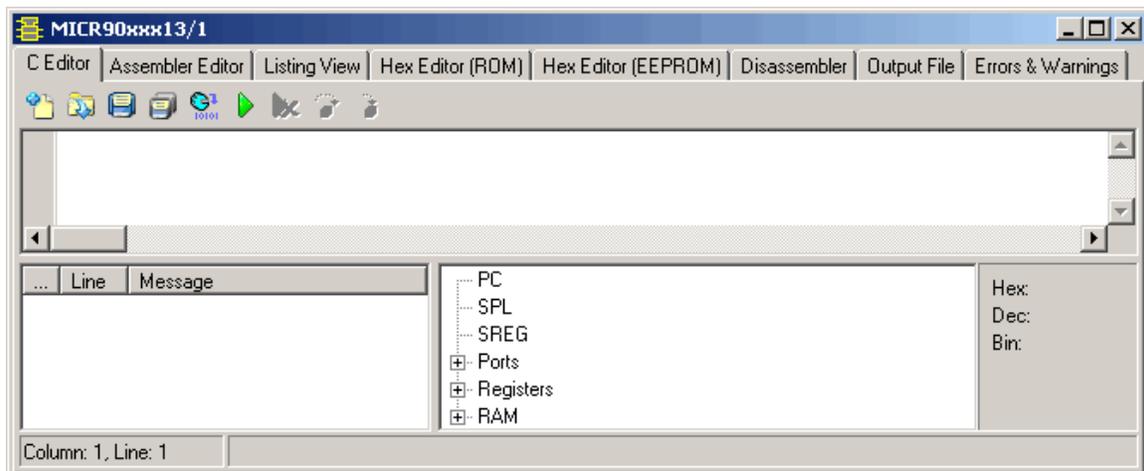
8. Click on Add → **Set Pattern** → **Accept**

Writing code for 8051 microcontroller

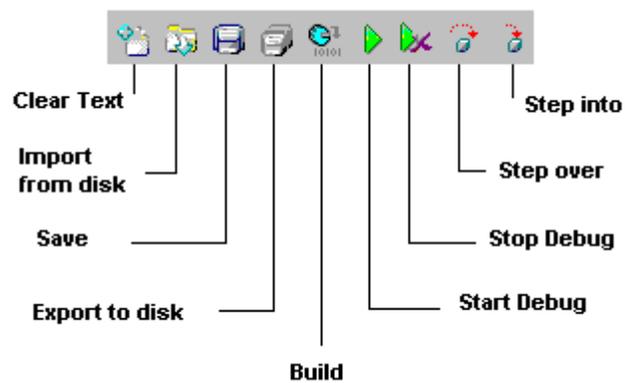
1. Select **Components** from the **Tool** Menu.
2. Choose **Component Properties** (second Function tool) → **Change Simulation parameters** (second option tool) and **Click** on the **8051** microcontroller. A new window pops up.



3. **Click Setup** tab, the code editor window pops up. Code can be written in this window. Code can be written either in C language or assembly language.



The tool bar in the code editor window is shown below



- Clear text** - Clears the source code in the code editor window.
- Import from disk** - Displays the 'Open' dialog box and allows loading a new text file
- Save** - Allows to save the source code.
- Export to disk** - Displays the 'Save' dialog box and allow to save the source code.
- Build** - Enables compilation of the source code.
- Start Debug** - Enters the Debug mode.
- Stop Debug** - Terminates debug mode.
- Step over** - Generates an event to notify model to step over the currently debugged part of the code.
- Step into** - Enables to view the line by line execution of the source code in debug mode.

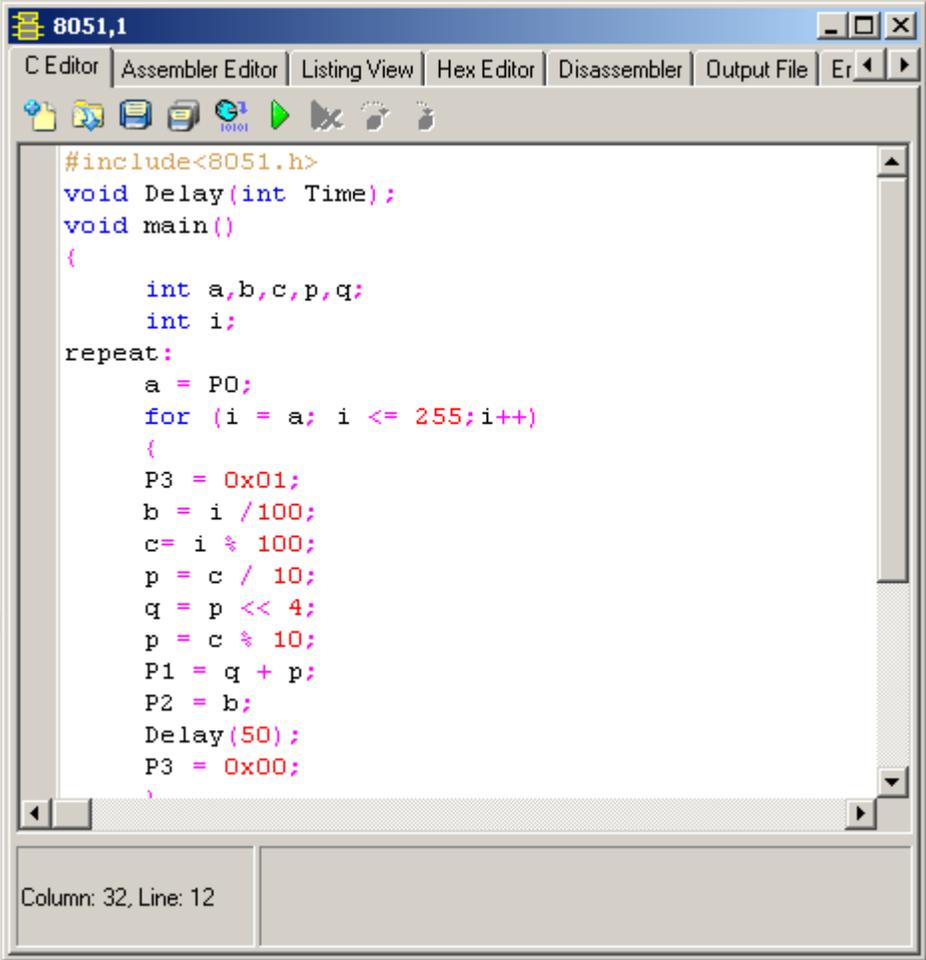
Writing source code in C language

Basic structure for writing code in **C** language is

```
#include<8051.h>
void main ()
{
}
```

The code is written within the **main ()** function. For better understanding, the case of **8051_Counter** is taken. Load **8051_Counter** and the steps mentioned till now in **Writing code for 8051 microcontroller** are executed.

The code for **8051_Counter** is as follows:

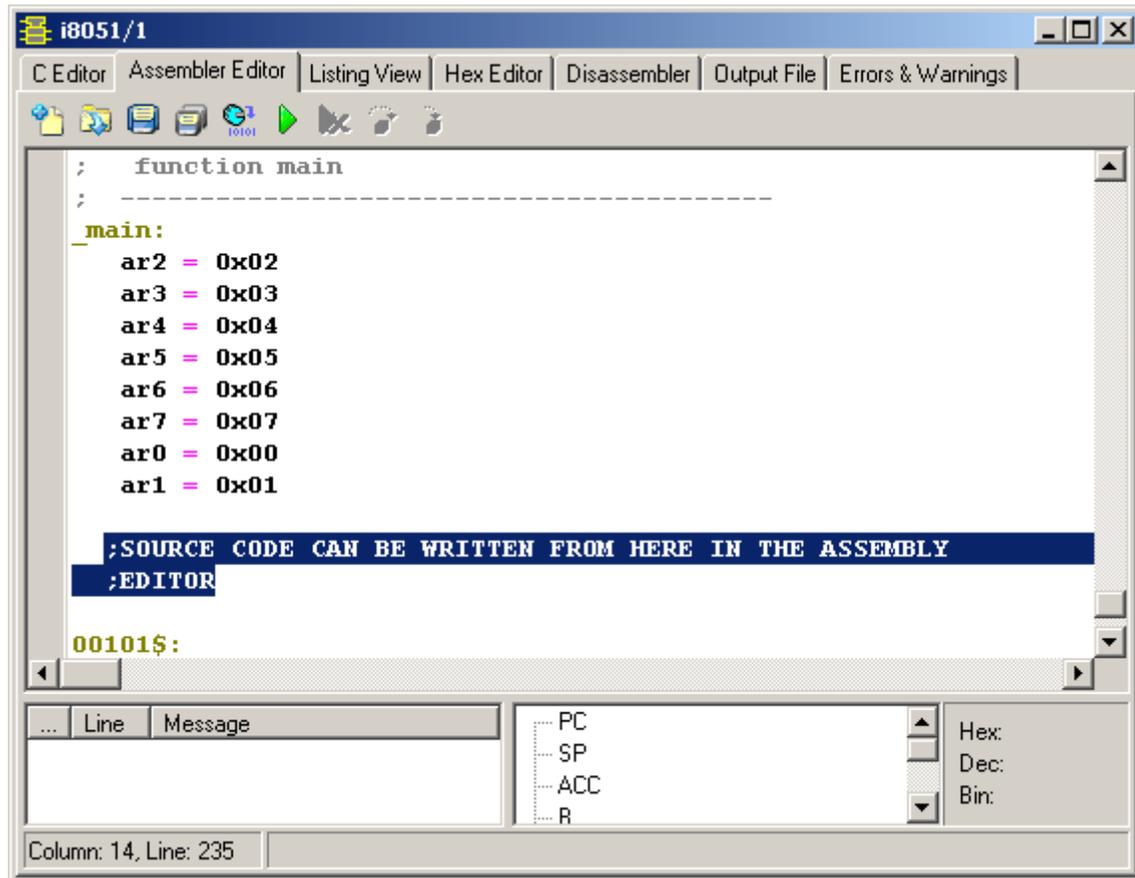


```
#include<8051.h>
void Delay(int Time);
void main()
{
    int a,b,c,p,q;
    int i;
repeat:
    a = P0;
    for (i = a; i <= 255;i++)
    {
        P3 = 0x01;
        b = i /100;
        c= i % 100;
        p = c / 10;
        q = p << 4;
        p = c % 10;
        P1 = q + p;
        P2 = b;
        Delay(50);
        P3 = 0x00;
    }
}
```

Column: 32, Line: 12

By compiling (using the **Build**  button) the basic structure in the **C Editor**, the default structure in the **Assembly Editor** will be obtained.

The code is written within the **_main function**. The location to write the code is shown in the figure below.



The code in **Assembly Editor** is also compiled by using the **Build**  button in the code editor Window.

Compilation messages will be shown under the **Line Message column**.

After successful compilation **click** the **Save** button and close the code editor window.

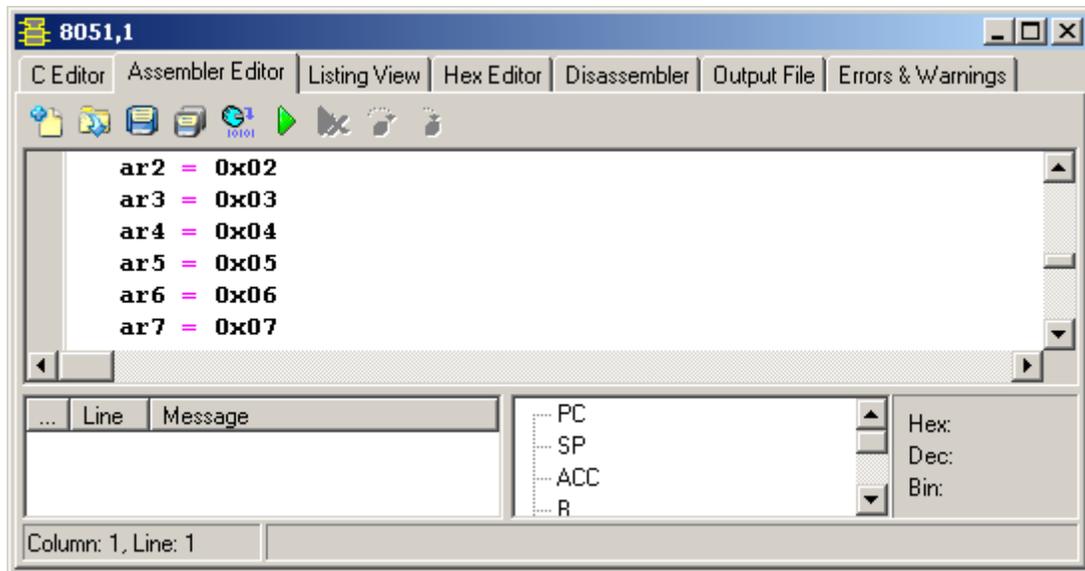
Click Accept in the **Component Parameter Setup window**.

After completing the schematic the circuit is **Preprocessed** and **Analysis** is **Run**.

Debugging the code

Place breakpoints to keep **track of program execution**.

Breakpoints can be placed by clicking on the gray space on left of the code statements.



Note: To remove *Breakpoints* right click on them.

Click on **Start Debug**  button in the code editor window. This will turn on the debug mode.

Close the **Code Editor** window and click **Accept** in **Component Parameter Setup**. Go to **Schematic Editor** and **Run Analysis**, the code editor window pops up.

The program can be debugged using the **Step Over**  (switching between breakpoints) and **Step Into**  (step by step execution) buttons.

By clicking on the required ports and registers the changes in them can be viewed during the process.



After debugging the **Stop debug button**  is clicked to exit the Debug mode. The Analysis continues till simulation time ends.