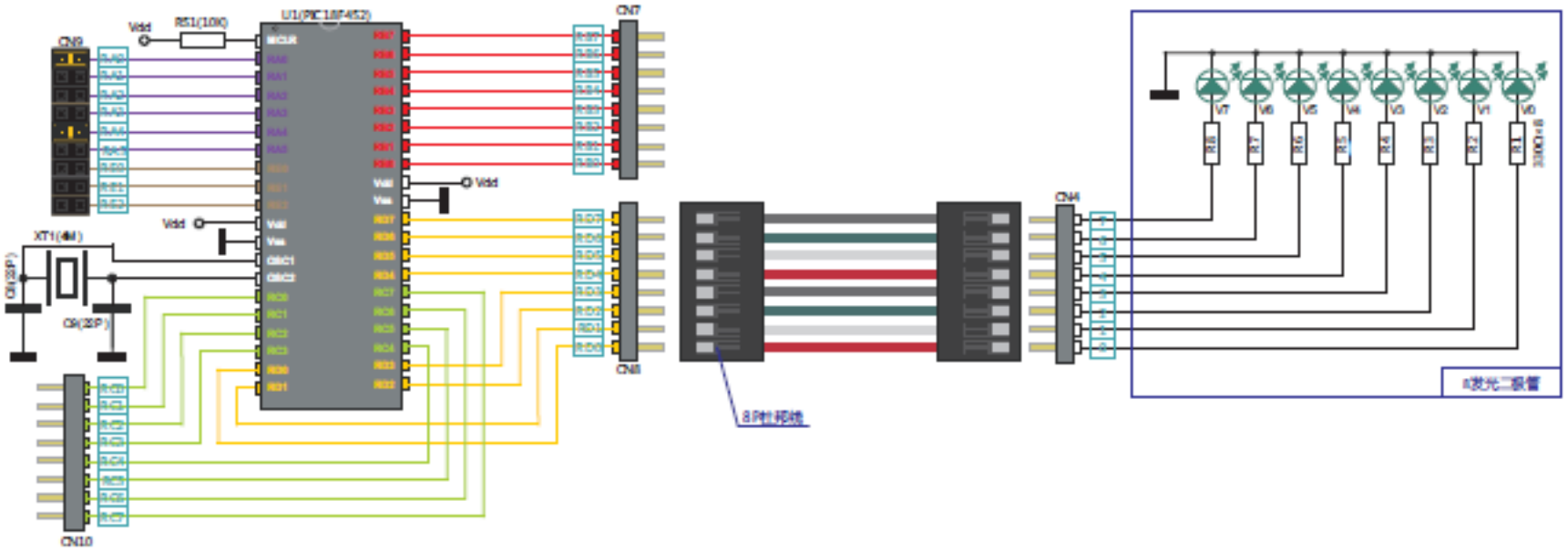
Upload program to development kit

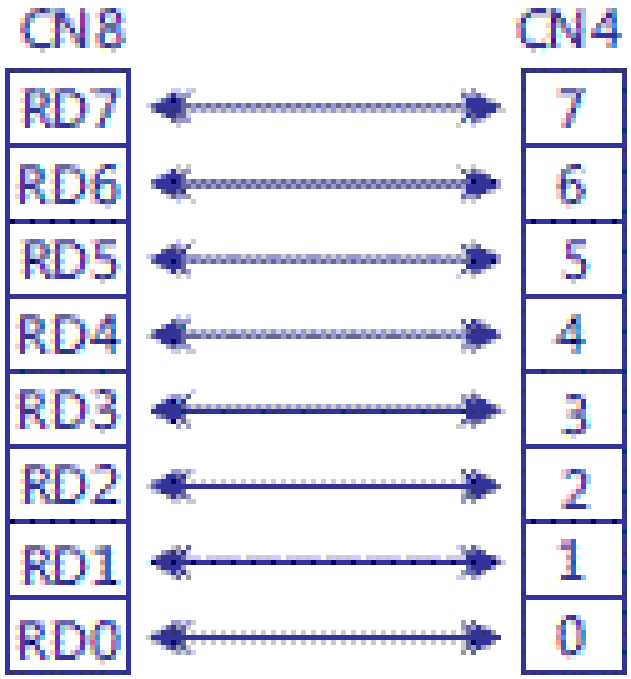
Hardware Configuration

- One of the most important features of the microcontroller is that a number of input/output (I/O) pins can be used for connection with peripherals.
- In PIC18 there are many sets of IO pins. Each set is called IO port.
- Each I/O pin can be configured as either input or output.
- Note that the hardware and program should match.



Port D as output to drive 8 LEDs

1. Use the ribbon cable to connect CN4 and CN8. Please note that RD0 of CN8 should connect to pin 0 of CN4.



2. Use PICkit 3 to connect the development kit and host PC.

Run the program on board

1. Open MPLAB IDE.
2. Start a new project and then input the following program.

```
LIST        P=18F4520                ; directive to define processor
            #include <P18F4520.INC>; CPU specific variable definitions

;--------------------
;Configuration bits definitions
;
                        CONFIG    OSC = XT
                        CONFIG    WDT = OFF
                        CONFIG    LVP = OFF
;--------------------
;Variable definitions
;
                        CBLOCK    0x000
                        location0
                        DELAY_H
                        DELAY_L
                        ENDC
;------------
;Reset vector
;
```

```
                ORG     0x0000      ; code origin, program starts from here
                goto    Main
; Start of main program
Main:           movlw   0x0F
                movwf   ADCON1
                clrf    TRISD       ; set Port D direction “output”
                clrf    PORTD
                clrf    location0
MainLoop:
                incf    location0
                movff   location0, PORTD
                call    Delay
                bra     MainLoop
;.....................
Delay:          movlw   0x0F
                movwf   DELAY_H
LOP_1:          movlw   0xFF
                movwf   DELAY_L
LOP_2:          decf    DELAY_L, F
                bnz     LOP_2
                decf    DELAY_H, F
                bnz     LOP_1
                return

                END                 ; End of program
```

3. Remember to add your asm file to the project.

4. Click “Project”, “Build All” and select “Absolute”.

5. “BUILD SUCCEEDED” should appear at Output window.

6. Set ICSP Power Switch to “ON” position. It will allow PICkit3 supply power to the development kit. Click “Programmer”, “Setting…”, “Power” and tick the “Power target circuit from PICkit 3” check box. Click “OK”. You should see the LED light up at right hand side of the development kit indicating system power is turning ON.

7. Click “Programmer” and “Reconnect” to make sure connection is well established.

8. Click “Programmer”, “Program…”. MPLAB IDE will change from DEBUG to RELEASE mode and ask to assemble the code again. PICkit3 then starts the device programming process. “Programming/Verify complete” should be shown at Output window upon finished. LED should blink accordingly.

Answer Question 1

In-Circuit Debugger (ICD)

In general you won't code programs without faults in first trial, which leads you to the process of program debugging. PICkit3 is not only a Device Programmer but also a tool for code debugging process.

1. Change the delay function to

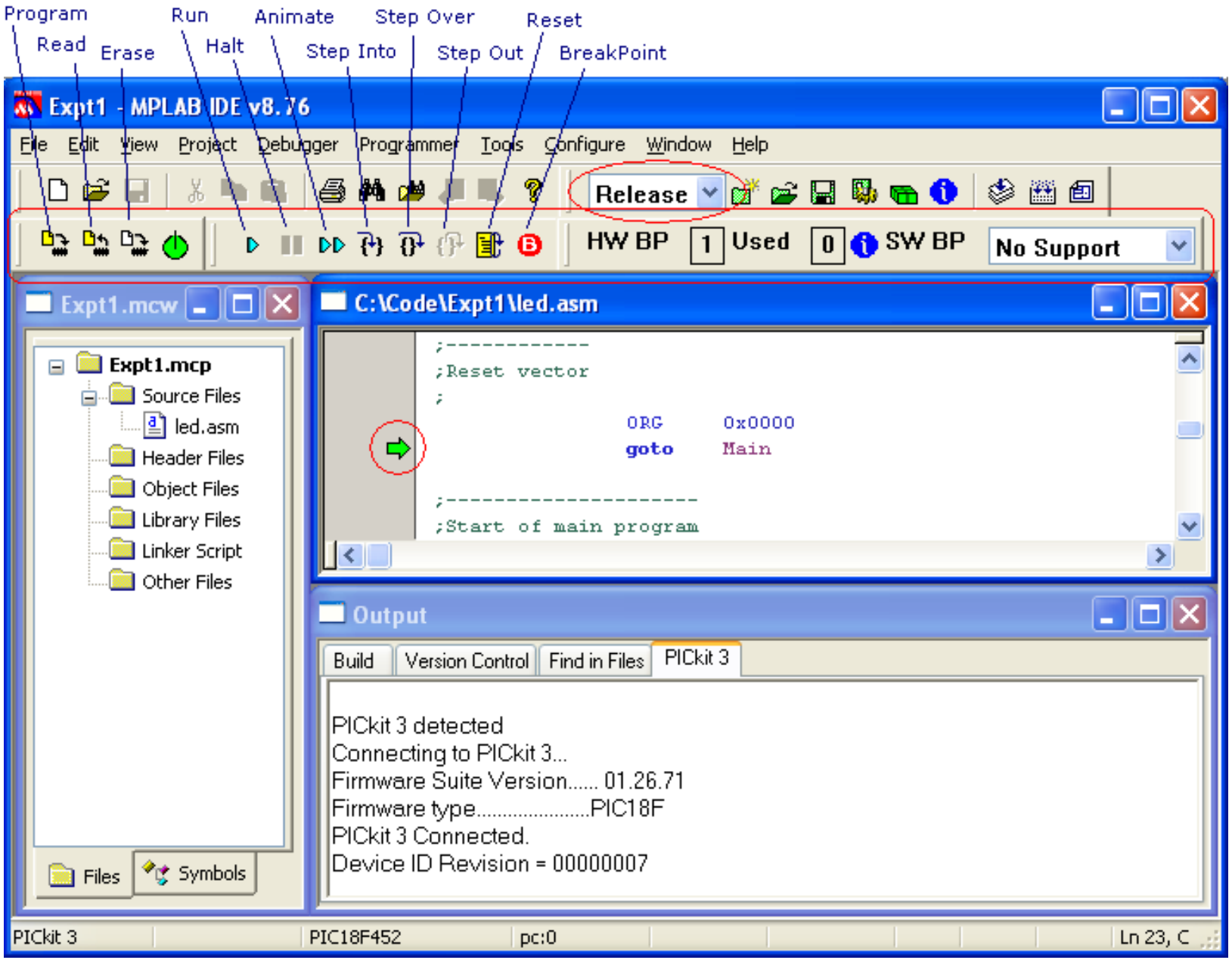
```
Delay:      movlw   0x02
            movwf   DELAY_H
LOP_1:      movlw   0x02
            movwf   DELAY_L
LOP_2:      decf    DELAY_L, F
            bnz     LOP_2
            decf    DELAY_H, F
            bnz     LOP_1
            return
```

2. Click “Debugger”, “Select Tool”, “2 PICkit 3” to start an ICD connection. Depend on previous setting, you may need to turn on the PICkit3 ICSP power feature. It can be done by clicking “Debugger”, “Settings…”,”Power”. The power status of the development kit is always indicated by the LED located at right hand side.

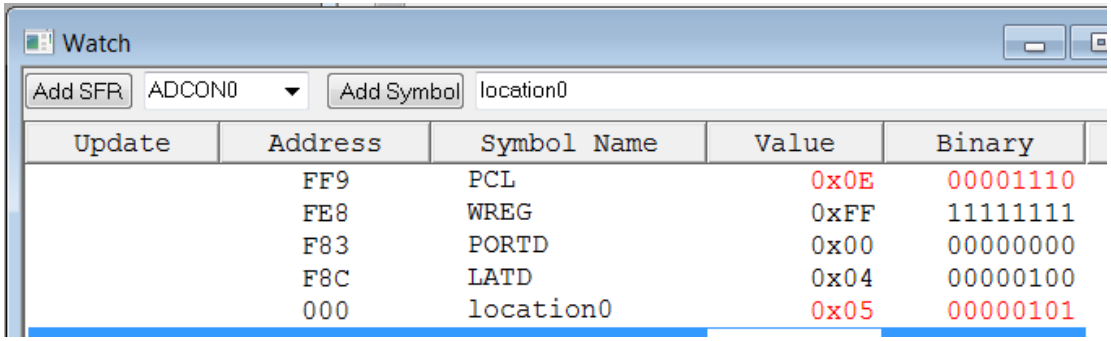
3. You can also click “Debugger”, “Reconnect” to restart an ICD session. Session connection status will be shown at Output window. Note that a green arrow now appears at source file window indicating the initial Program Counter position. A new icon tab for debugging also appears. You may use it as debug command shortcut.

4. Click “Project”, “Build All”.

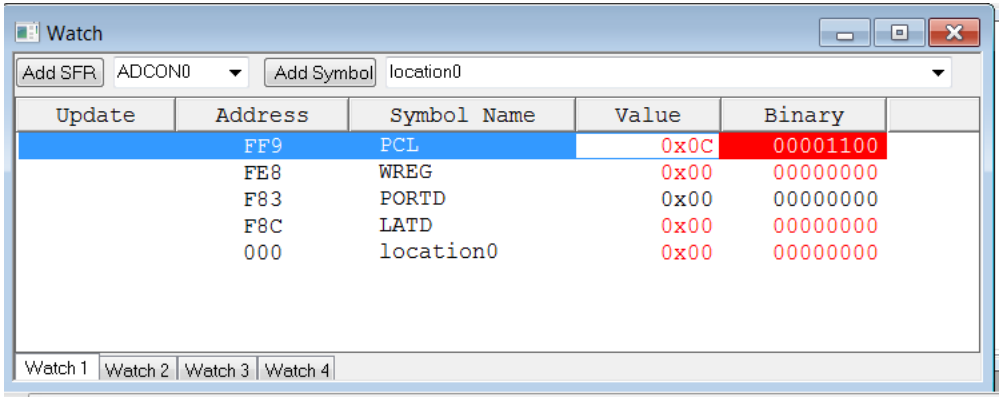
5. Click “Debugger”, “Program” to download the code. It may prompt you to rebuild the code again. Note that the Build Configuration will be changed from Release to Debug after rebuild by click ‘OK’. This is due to the debugger requires a small monitor agent and program debug information to be download. This information can be generated during Build process with Build Configuration set to Debug.


Program
Read
Erase
Run
Halt
Animate
Step Into
Step Over
Step Out
Reset
BreakPoint
Expt1 - MPLAB IDE v8.76
File Edit View Project Debugger Programmer Tools Configure Window Help
Release
HW BP 1 Used 0 SW BP
No Support
Expt1.mcw
Expt1.mcp
Source Files
led.asm
Header Files
Object Files
Library Files
Linker Script
Other Files
Files
Symbols
C:\Code\Expt1\led.asm
;------------
;Reset vector
;
ORG 0x0000
goto Main
;---------------------
;Start of main program
Output
Build
Version Control
Find in Files
PICkit 3
PICkit 3 detected
Connecting to PICkit 3...
Firmware Suite Version..... 01.26.71
Firmware type.....PIC18F
PICkit 3 Connected.
Device ID Revision = 00000007
PICkit 3
PIC18F452
pc:0
Ln 23, C

6. In Watch window, select PCL, WREG, PORTD, LATD, and location0. Click “Debugger”, “Reset”, “Processor Reset”.



7. In Watch window, set all the values of the selected registers to zeros.



Answer Questions 2 to 4