

## Lab 4

### Task 2:

```
LIST P=16F877
#include <P16F877.inc>
ORG 0x00 ; Program start address
GOTO MAIN ; Jump to main program

COUNT1 EQU 0x20
COUNT2 EQU 0x30

MAIN:
    BANKSEL TRISB      ; Select bank containing PORTC
    CLRF TRISB          ; Clear PORTC (all outputs low initially)
    BANKSEL PORTB
    CLRF PORTB

BLINK1:
    BANKSEL PORTB
    BSF PORTB, 0

CALL DELAY

    BANKSEL PORTB
    BCF PORTB, 0

CALL DELAY

GOTO BLINK1

DELAY:
    MOVLW D'10'
    MOVWF COUNT1

OUTER:
    MOVLW D'40'
    MOVWF COUNT2

INNERLOOP:
    NOP
    NOP
    DECFSZ COUNT2, F
    GOTO INNERLOOP
    DECFSZ COUNT1, F

    GOTO OUTER

RETURN
END
```

The diagram shows two blue arrows indicating loops. The first arrow points from the instruction 'DECFSZ COUNT1, F' back to the 'GOTO INNERLOOP' instruction, forming the inner loop. The second arrow points from the instruction 'DECFSZ COUNT1, F' back to the 'GOTO OUTER' instruction, forming the outer loop.

Screenshot of the MPLAB X IDE showing the project structure and assembly code.

**Project Structure:**

- lab4.mcp
- Source Files
  - task1lab4.asm
  - Header Files
  - Object Files
  - Library Files
  - Linker Script
  - Other Files

**Assembly Code (task1lab4.asm):**

```

LIST P=16F877
#include <P16F877.inc>
ORG 0000
JMP MAIN
MAIN:
        MOVC SBUF, 0230

        ;MAIN1
        BANLSEL TRISB
        CLRF TRISB
        BANLSEL PORTB
        CLRF PORTB

        BANLSEL BICK1
        BANLSEL PORTB
        BCF PORTB, 0

        CALL DELAY
        GOTO BICK1

DELAY:
        MOVWF D'150
        DECFSZ COUNT, F
        GOTO WAIT1
        RETURN

WAIT1:
        NOP
        NOP
        DECFSZ COUNT, F
        GOTO WAIT1
        RETURN

        END

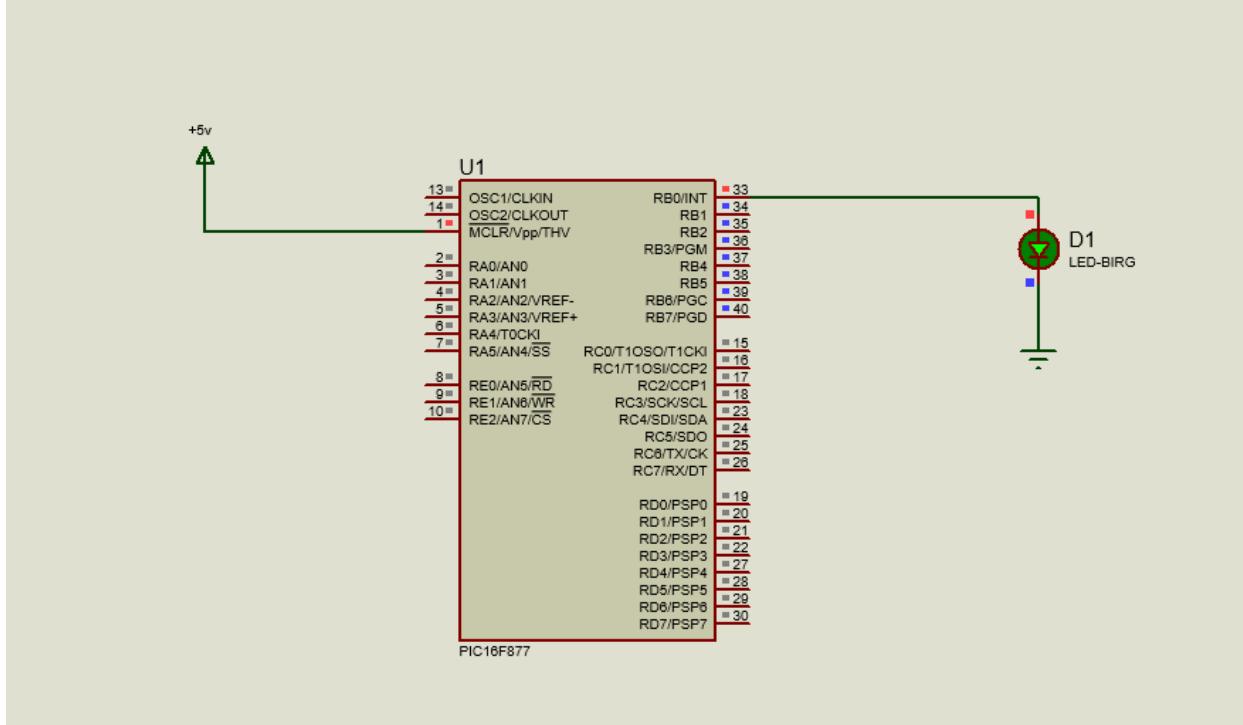
```

**Output Window:**

Build Version Control Find in File MPLAB SIM

Debug build of project 'C:\Users\l236006\Documents\lab4.mcp' succeeded.  
Preprocessor symbol '\_DEBUG' is defined.  
Thu Sep 18 12:26:13 2025

BUILD SUCCEEDED



### Task 3:

```
LIST P=16F877
#include<P16F877.inc>
ORG 0x00;
GOTO MAIN

COUNT1 EQU 0x20
COUNT2 EQU 0x30

MAIN:

BANKSEL TRISB;
CLRF TRISB;

BANKSEL PORTB
CLRF PORTB

    MOVLW 0x0F
    MOVWF PORTB

CALL DELAY

    SWAPF PORTB, F

DELAY:
    MOVLW D'10'
    MOVWF COUNT1
OUTER:
    MOVLW D'40'
    MOVWF COUNT2
INNERLOOP:
    NOP
    NOP
    DECFSZ COUNT2,F
    GOTO INNERLOOP
    DECFSZ COUNT1,F
GOTO OUTER
RETURN
END
```

labMcp

- task1lab4.asm
- Header Files
- Object Files
- Library Files
- Linker Script
- Other Files

```

C:\Users\I236006\Documents\task1lab4.asm*
List P:\labMcp
$include "14F9877.iinc"
ORG 0x00
GOTO MAIN
COUNT EQU 0x20

MAIN:
    BANKSEL TRISB ;
    CLRF TRISB ;
    BANKSEL PORTB
    CLRF PORTB ;
    MOVWF 0x0F
    MOVWF PORTB
    CALL DELAY
    SLEEP PORTB, F

    DELAY:
    MOVWF D'280'
    MOVWF COUNT

    WAIT1:
    NOP
    NOP
    NOP
    GBCFS COUNT, F
    GOTO WAIT1
    RETURN

    END

```

Output

```

Build Version Control Find in File: MPLAB SIM
Warning[203] C:\USERSL236006\DOCUMENTS\TASK1\LAB4\ASM\10.Found
Message[302] C:\USERSL236006\DOCUMENTS\TASK1\LAB4\ASM\10.Reg
Warning[203] C:\USERSL236006\DOCUMENTS\TASK1\LAB4\ASM\12.Found
Warning[203] C:\USERSL236006\DOCUMENTS\TASK1\LAB4\ASM\14.Found
Warning[203] C:\USERSL236006\DOCUMENTS\TASK1\LAB4\ASM\15.Found
Warning[203] C:\USERSL236006\DOCUMENTS\TASK1\LAB4\ASM\16.Found
Warning[203] C:\USERSL236006\DOCUMENTS\TASK1\LAB4\ASM\18.Found
Warning[203] C:\USERSL236006\DOCUMENTS\TASK1\LAB4\ASM\19.Found
Warning[203] C:\USERSL236006\DOCUMENTS\TASK1\LAB4\ASM\20.Found
Warning[203] C:\USERSL236006\DOCUMENTS\TASK1\LAB4\ASM\23.Found
Warning[203] C:\USERSL236006\DOCUMENTS\TASK1\LAB4\ASM\26.Found
Warning[203] C:\USERSL236006\DOCUMENTS\TASK1\LAB4\ASM\27.Found
Warning[203] C:\USERSL236006\DOCUMENTS\TASK1\LAB4\ASM\28.Found
Warning[203] C:\USERSL236006\DOCUMENTS\TASK1\LAB4\ASM\29.Found
Warning[203] C:\USERSL236006\DOCUMENTS\TASK1\LAB4\ASM\30.Found
Warning[203] C:\USERSL236006\DOCUMENTS\TASK1\LAB4\ASM\32.Found
Loaded C:\User\I236006\Documents\task1lab4.cod

Debug build of project 'C:\User\I236006\Documents\lab4.mcp' succeeded.
Preprocessor symbol '_DEBUG' is defined.
Thu Sep 18 12:44:21 2025
BUILD SUCCEEDED

```

