

## Lab 3

### Example 1

```
ORG 0x00      ; Program start address
GOTO MAIN     ; Jump to main program
MAIN:

; Initialization

BANKSEL PORTC ; Select bank containing PORTC
CLRF PORTC    ; Clear PORTC (all outputs low initially)

BANKSEL TRISC ; Select bank containing TRISC
MOVLW 0x01    ; Set RC0 as input, others as output (0000 0001)

MOVWF TRISC   ; RC0 = input, RC1 = output
NKSEL PORTC   ; Return to bank with PORTC for operations

; ===== Your logic code starts here =====

; Check bit 0 of PORTC

BTFSC PORTC, 0 ; If bit 0 is clear
GOTO LED_ON    ; Jump to LED_ON
BTFSS PORTC, 0 ; If bit 0 is set
GOTO LED_OFF   ; Jump to LED_OFF

LED_ON:
BSF PORTC, 1   ; Set bit 1 of PORTC → LED ON
GOTO END_PROGRAM

LED_OFF:
BCF PORTC, 1   ; Clear bit 1 of PORTC → LED OFF
GOTO END_PROGRAM

END_PROGRAM:

NOP            ; End of program / do nothing

GOTO MAIN     ; Loop back to keep checking

END
```

lab3 - MPLAB IDE v8.10 - Special Function Registers

File Edit View Project Debugger Programmer Tools Configure Window Help

Checksum: 0x0c14

lab3.mcp

lab3.asm

```

BANKSEL PORTC ; Select bank containing PORTC
CLR PORTC ; Clear PORTC (all outputs low initially)
BANKSEL TRISC ; Select bank containing TRISC
MOVW 0x01 ; Set RC0 as input, others as output (0000 0001)
MOVWF TRISC ; RC0 = input, RC1 = output
BANKSEL PORTC ; Return to bank with PORTC for operations

; ===== Your logic code starts here =====
; Check bit 0 of PORTC

BTFSF PORTC, 0 ; If bit 0 is clear
GOTO LED_ON ; Jump to LED_ON
BTFSF PORTC, 0 ; If bit 0 is set
GOTO LED_OFF ; Jump to LED_OFF

LED_ON:
BSF PORTC, 1 ; Set bit 1 of PORTC ? LED ON
GOTO END_PROGRAM

LED_OFF:
BCF PORTC, 1 ; Clear bit 1 of PORTC ? LED OFF
GOTO END_PROGRAM

END_PROGRAM:
NOP ; End of program / do nothing
GOTO MAIN ; Loop back to keep checking
END
  
```

Program Memory

Line	Address	Opcode
1	0000	2801 GOTO 0x1
2	0001	1283 BCF 0x3, 0x5
3	0002	1303 BCF 0x3, 0x6
4	0003	0187 CLRW 0x7
5	0004	1683 BSF 0x3, 0x5
6	0005	1303 BCF 0x3, 0x6

Special Function Registers

Address	SFR Name	Hex
000	WREG	0x01
001	INDF	--
002	TMR0	0x00
003	PCL	0x01
004	STATUS	0x1C
005	FSR	0x00
006	PORTA	0x00
007	PORTB	0x00
008	PORTC	0x00
009	PORTD	0x00

Output

Build Version Control Find in Files MPLAB SIM

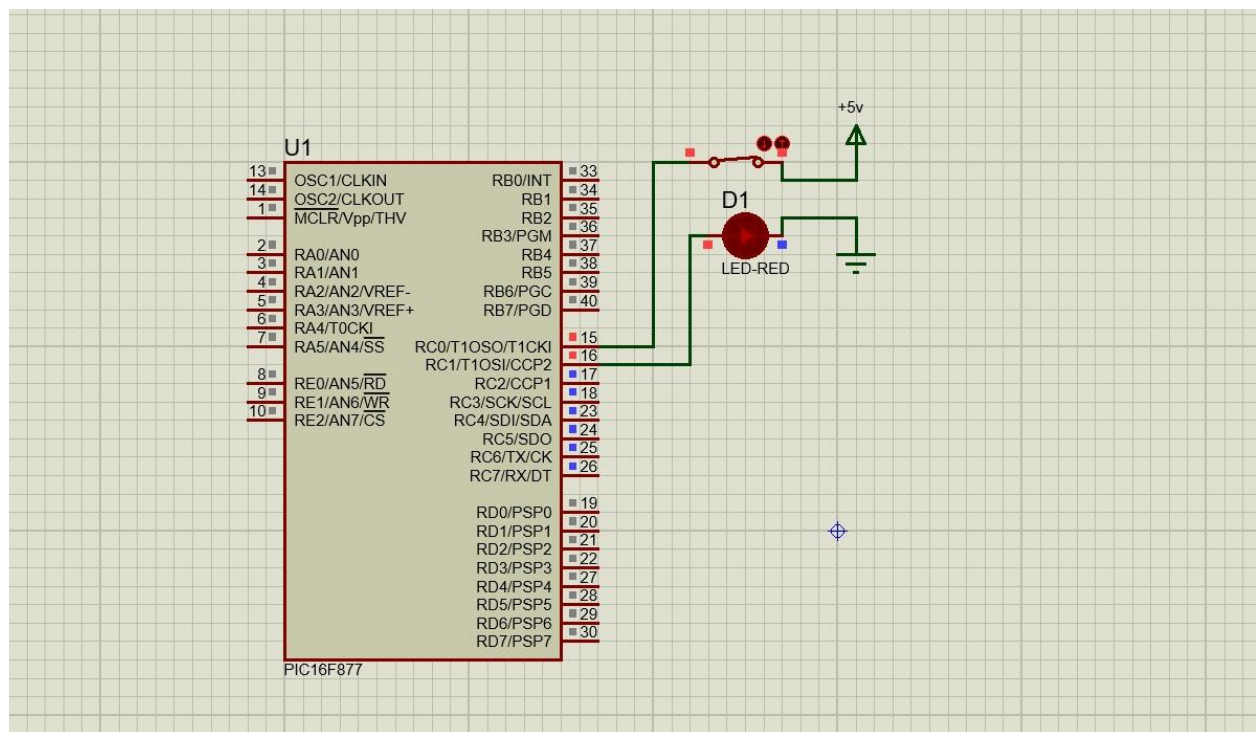
Debug build of project 'C:\Users\l236006\Desktop\lab3.mcp' started.  
Preprocessor symbol 'DEBUG' is defined.  
Thu Sep 11 12:23:41 2025

Make: The target 'C:\Users\l236006\Desktop\lab3q1.o' is out of date.  
Executing: "C:\Program Files (x86)\Microchip\MPASM Suite\MPASMWIN.exe" /q /p1  
Warning[205] C:\Users\l236006\Desktop\LAB3Q1.ASM 1: Found directive in col  
Warning[205] C:\Users\l236006\Desktop\LAB3Q1.ASM 2: Found directive in col  
Warning[205] C:\Users\l236006\Desktop\LAB3Q1.ASM 4: Found directive in col  
Warning[203] C:\Users\l236006\Desktop\LAB3Q1.ASM 5: Found opcode in col.  
Warning[205] C:\Users\l236006\Desktop\LAB3Q1.ASM 9: Found directive in col  
Warning[203] C:\Users\l236006\Desktop\LAB3Q1.ASM 10: Found opcode in co  
Warning[205] C:\Users\l236006\Desktop\LAB3Q1.ASM 11: Found directive in cc  
Warning[203] C:\Users\l236006\Desktop\LAB3Q1.ASM 12: Found opcode in co  
Warning[203] C:\Users\l236006\Desktop\LAB3Q1.ASM 13: Found opcode in co  
Message[302] C:\Users\l236006\Desktop\LAB3Q1.ASM 13: Register in operan  
Warning[205] C:\Users\l236006\Desktop\LAB3Q1.ASM 14: Found directive in cc  
Warning[203] C:\Users\l236006\Desktop\LAB3Q1.ASM 19: Found opcode in co  
Warning[203] C:\Users\l236006\Desktop\LAB3Q1.ASM 21: Found opcode in co  
Warning[203] C:\Users\l236006\Desktop\LAB3Q1.ASM 22: Found opcode in co  
Warning[203] C:\Users\l236006\Desktop\LAB3Q1.ASM 23: Found opcode in co  
Warning[203] C:\Users\l236006\Desktop\LAB3Q1.ASM 26: Found opcode in co  
Warning[203] C:\Users\l236006\Desktop\LAB3Q1.ASM 27: Found opcode in co  
Warning[203] C:\Users\l236006\Desktop\LAB3Q1.ASM 30: Found opcode in co  
Warning[203] C:\Users\l236006\Desktop\LAB3Q1.ASM 31: Found opcode in co  
Warning[203] C:\Users\l236006\Desktop\LAB3Q1.ASM 34: Found opcode in co  
Warning[203] C:\Users\l236006\Desktop\LAB3Q1.ASM 35: Found opcode in co  
Warning[205] C:\Users\l236006\Desktop\LAB3Q1.ASM 36: Found directive in cc  
Loaded C:\Users\l236006\Desktop\lab3q1.cod.

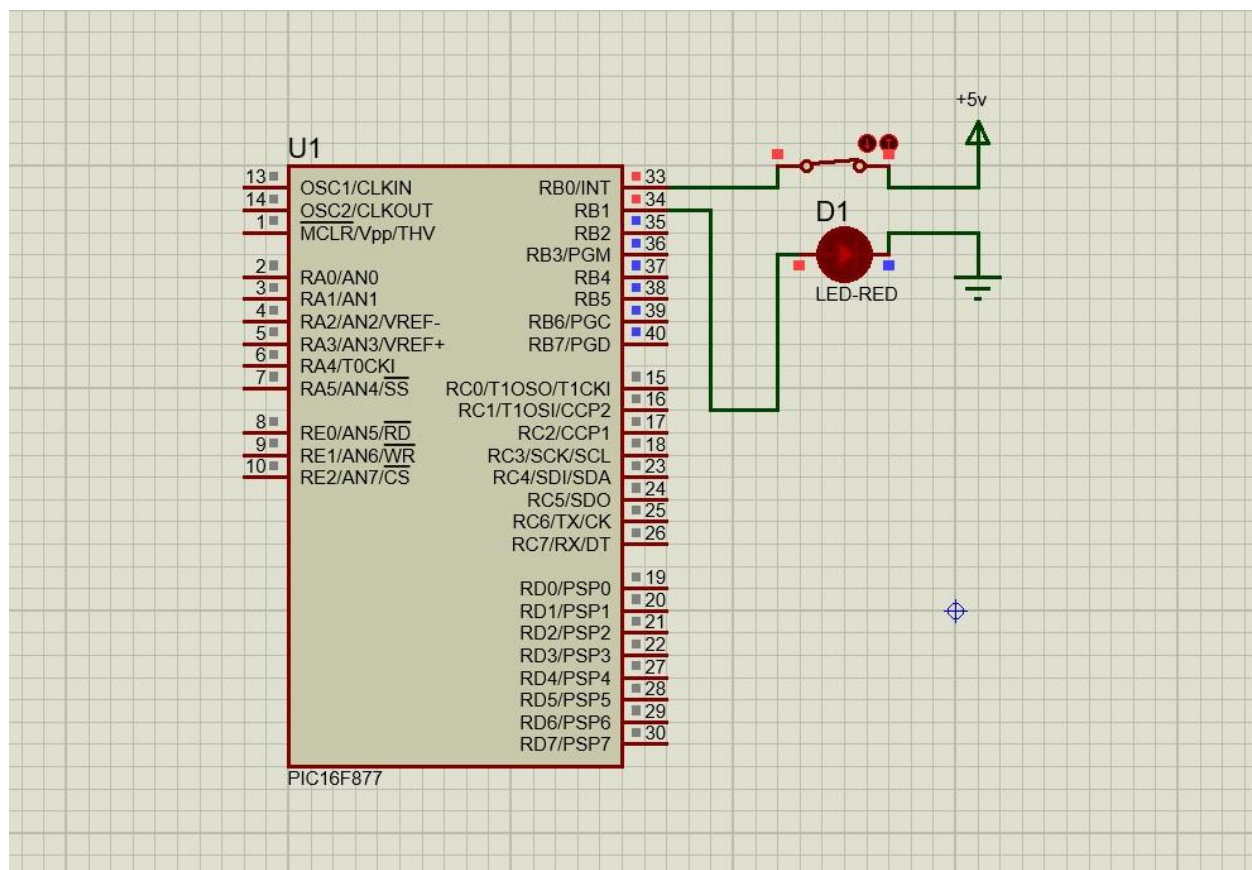
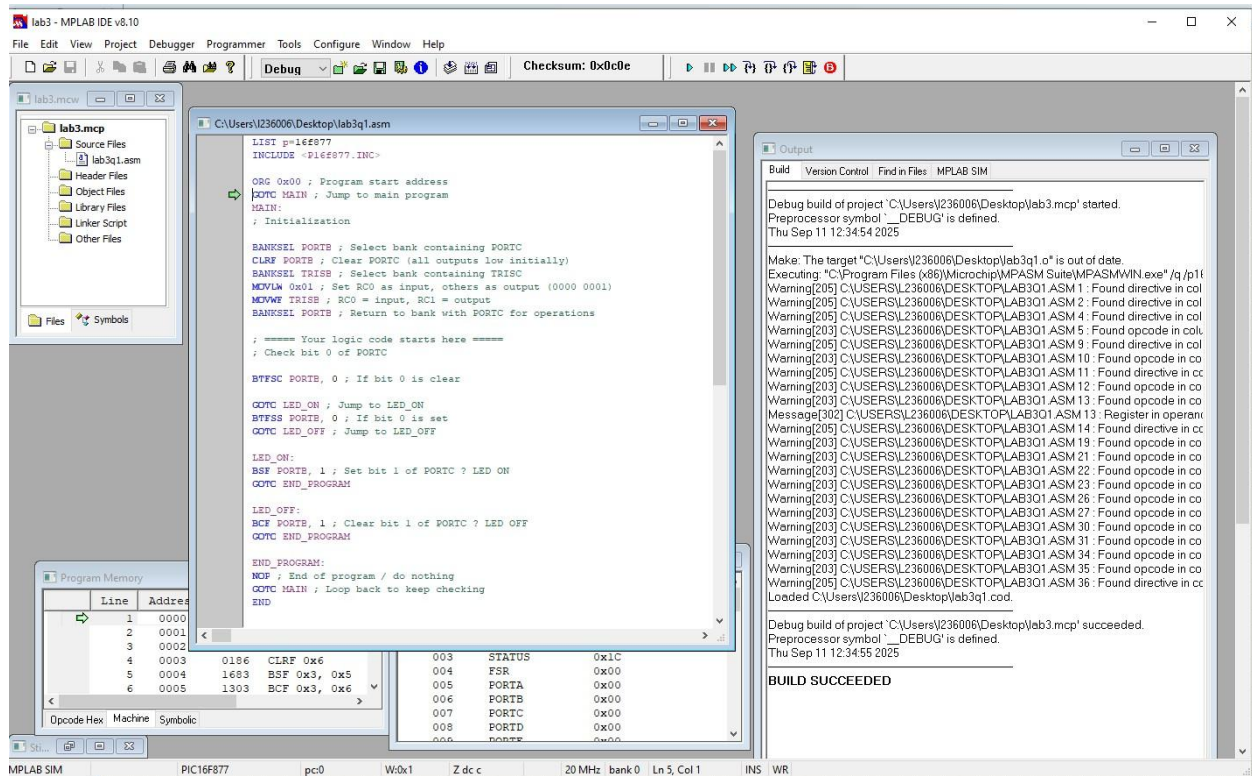
Debug build of project 'C:\Users\l236006\Desktop\lab3.mcp' succeeded.  
Preprocessor symbol 'DEBUG' is defined.  
Thu Sep 11 12:23:43 2025

**BUILD SUCCEEDED**

MPLAB SIM PIC16F877 pc0x1 W0x1 Z dc c 20 MHz bank 0 WR



Task1



## Task2

```
LIST P=16F877
INCLUDE <P16F877.INC>

OUTER_COUNT EQU 0x20 ; File register for outer loop counter
INNER_COUNT EQU 0x21 ; File register for inner loop counter

ORG 0x00
GOTO MAIN

MAIN:
    ; Initialize PORTB = 55H
    MOVLW 0x55
    MOVWF PORTB

    ; Outer loop counter = 10
    MOVLW 0x0A
    MOVWF OUTER_COUNT

OUTERLOOP:
    ; Inner loop counter = 70
    MOVLW 0x46
    MOVWF INNER_COUNT

INNERLOOP:
    COMF PORTB, F ; Complement PORTB
    DECFSZ INNER_COUNT, F ; Inner counter--
    GOTO INNERLOOP

    DECFSZ OUTER_COUNT, F ; Outer counter--
    GOTO OUTERLOOP

END
```

newpl.asm

Asm Source
History

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```

LIST F=16F877
INCLUDE <P16F877.INC>

OUTER_COUNT EQU 0x20 ; File register for outer loop counter
INNER_COUNT EQU 0x21 ; File register for inner loop counter

ORG 0x00
GOTO MAIN

MAIN:
; Initialize PORTB = 55H
MOVLW 0x55
MOVWF PORTB

; Outer loop counter = 10
MOVLW 0x0A
MOVWF OUTER_COUNT

OUTERLOOP:
; Inner loop counter = 70
MOVLW 0x46
MOVWF INNER_COUNT

INNERLOOP:

```

Output
Variables
Call Stack
Breakpoints
SFRs x
File Registers

Address /	Name	Hex	Decimal	Binary	Char
002	PCL	0x0C	12	00001100	','
003	STATUS	0x08	8	00001000	','
004	FSR	0x00	0	00000000	','
005	PORTA	0x00	0	00000000	','
006	PORTB	0x55	85	01010101	'U'
007	PORTC	0x00	0	00000000	','
008	PORTD	0x00	0	00000000	','
009	PORTE	0x00	0	00000000	','

Memory
SFRs
Format
Individual

### Task3

```
1.      LIST P=16F877
2.      #include <P16F877.inc> 3.
      ORG 0x00          ; Reset vector
      GOTO MAIN

MAIN:
      ; Disable ADC so RA0/RA1 work as digital inputs
      BANKSEL ADCON1
      MOVLW 0x07
      MOVWF ADCON1

      ; Configure PORTA as input
      BANKSEL TRISA
      MOVLW 0xFF
      MOVWF TRISA

      ; Configure PORTB as output
      BANKSEL TRISB
      CLRF TRISB

      ; Clear ports initially
      BANKSEL PORTA
      CLRF PORTA
      BANKSEL PORTB
      CLRF PORTB

; ----- Main Loop -----
REDO:
      BANKSEL PORTA

      ; Check RA0 (active-low button)
      BTFSS PORTA,0      ; Skip if RA0=1 (not pressed)
      CALL SET_HEX       ; If RA0=0 (pressed), load 0x55

      ; Check RA1 (active-low button)
      BTFSS PORTA,1      ; Skip if RA1=1 (not pressed)
      CALL CLR_HEX       ; If RA1=0 (pressed), clear PORTB
      GOTO REDO          ; Keep monitoring

; -----

; Subroutine: load 0x55 into PORTB

SET_HEX:
      BANKSEL PORTB
      MOVLW 0x55
      MOVWF PORTB
      RETURN

; Subroutine: clear PORTB

CLR_HEX:
      BANKSEL PORTB
```

. BTFSS PORTA,0

BTFSS = Bit Test File Skip if Set

It checks bit 0 of PORTA (RA0).

If RA0 = 1 → skip next instruction.

If RA0 = 0 → execute next instruction

BTFSS PORTA,1

Similar to before, checks bit 1 of PORTA (RA1).

If RA1 = 1 → skip next line.

If RA1 = 0 (button pressed) → execute next line.

CLRF PORTB  
RETURN

END

