

ECE 425 Introductions to Microprocessors Laboratory Work 3

Objective:

- 1) Concept of command cycle.
- 2) One cycle and two cycle commands.
- 3) Learning how to write delay segments.

Preparation:

No report is required for preparation. Study the followings.

- 1) Review your lecture notes and compute command cycles for those oscillators.
 - a) 4 MHz Oscillator
 - b) 16 MHz Oscillator
 - c) 32 MHz Oscillator
- 2) Open a project using MPLAB, copy and paste the following program segment and compile it. Using the simulator logic analyzer view the signal at RB0. Press F7 in a sequential manner and observe the waveform at RB0. How many cycles are there between RB0=low and RB0=high, why?

```
LIST P=16F84A
INCLUDE "P16f84A.INC"

__config _CP_OFF&_WDT_OFF&_XT_OSC

clrf   PORTB;
bsf    STATUS, RP0;
clrf   TRISB;
bcf    STATUS, RP0;

bsf PORTB,0;

nop;
nop;
nop;
nop;

bcf PORTB,0;

end
```

- 3) Open a project using MPLAB, copy and paste the following program segment and compile it. Using the simulator logic analyzer view the signal at RB0. Press F7 in a sequential manner and observe the waveform at RB0. How many cycles are there between RB0=low and RB0=high, why?

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bsf  STATUS, RP0;
clrf  TRISB;
bcf  STATUS, RP0;

bsf PORTB,0;

nop;
nop;

bcf PORTB,0;

nop;
nop;
nop

bsf PORTB,0;

nop

bcf PORTB,0;

end
```

- 4) Which commands need two cycles to complete, list them.
- 5) Read the following program segment, and write an explanation sentence after each line. What happens after the execution of each line? Trace the program using F7 button. And draw the waveform at RB0.

```

LIST P=16F84A
INCLUDE "P16f84A.INC"

__config __CP_OFF&_WDT_OFF&_XT_OSC

Counter    equ 0x0C ; free RAM location 12
N          equ 0x0A ; decimal constant 10

clrf      PORTB;
bsf       STATUS, RP0;
clrf      TRISB;
bcf       STATUS, RP0;

movlw N;
movwf Counter;

bsf PORTB,0;

LOOP

    decfsz Counter, F;

goto LOOP;

bcf PORTB,0;

end

```

Laboratory Work:

- 1) Repeat the works in preparation 2, 4, and 5 in laboratory hour. And draw all the waveforms and comment on them.
- 2) Write 100 μ Sec delay segments using 100 KHz, 4 MHz, 16 MHz, and 32 MHz oscillators.
- 3) Write 1mSec delay segment for 4 MHz oscillator.

During your LAB work show every step that you complete to the LAB assistant. Get a copy of assembly files you write during the LAB hour via a flash disk for future reference.