CTEC1904/2017W Lab#1, PIC Programming (LED Output)

PIC18F8722 Microcontroller

Pre-Lab Work

Note- Save your program listings for future use.

1. Explain how to set the port pins to inputs or outputs and create a code example.
2. Use the online PIC Delay Calculator application to create three delay subroutines:
   a. 20 ms
   b. ¼ s
   c. 1 s

Lab Work

Setup

Obtain a PICTRAINER BOARD with AC Adapter.

Download the two sets of instructions and program archive files from the course web site:

http://technology.niagarac.on.ca/courses/ctec1904/

- Opening an existing MPLAB project
- Creating a new MPLAB project
- The lab files (`.7z`)
- The lab introduction (PDF)
- The "PIC18F8722 Family Data Sheet" (PDF)
- The "PICTRAINER REV1-28" schematic (PDF)

Program 1

Open the "L1P1" workspace in the "Program1" folder. Complete the code. Build, program and run the project. It should light up one LED on the PICTRAINER BOARD.

Make sure that SW2-1 (labeled "BAR LED") is set to the ON position, and that the other SW2 DIP switches are OFF.

To set up an I/O port, the "TRIS" register for that I/O port must be loaded with an 8-bit binary number. The ones in that number determine which I/O pins are inputs or are unused; the zeroes determine which I/O pins are outputs.

For the information that you need, refer to the "PIC18F8722 Family Data Sheet" and the "PIC18F Instruction Set" reference (also from the web page.)

The details for PORTE and TRISE are on page 146 of the data sheet.

Demonstrate your program when you are done.

Program 2

Open the "L1P2" workspace in the "Program2" folder. Complete the code. Build, program and run the project. It should blink one LED on the PICTRAINER BOARD.

This program contains a delay subroutine, which results in a time delay by executing instructions just to take up the microcontroller's time.

The "Delay" subroutine was created by the "PIC Delay Loop Calculator" tool:

http://technology.niagarac.on.ca/cgi-bin/mboldin/delay.cgi

You can use this tool yourself, and copy and paste the resulting code into the later programs.

Demonstrate your program when you are done.

Program 3

This program rotates a one bit from LED to LED, to the left, continuously.

Generate and include a ¼ second delay in this program.

The STATUS register details are on page 80 of the data sheet. In particular, the Carry bit is called "C" (*don't use a zero in your code.)*

Demonstrate your program when you are done.

Program 4

This program rotates in both directions. Include the same ¼-second delay routine.

Demonstrate your program when you are done.

Program 5

This program displays a pattern on four LEDs. Use the **`tblrd *+`** instruction. A code example is on page 91 of the data sheet.

Demonstrate your program when you are done.

Program 6

Create this program by copying your `.asm` file from Program 4.

Make the LED rotation program work with *all eight* LEDs connected to PORTE.

Demonstrate and hand-in your program when you are done.

Program 7

Create this program by copying your `.asm` file from Program 6.

Make the LED rotation program work with *all ten* LEDs – LEDs 9 and 10 are connected to PORTH.

Demonstrate and hand-in your program when you are done.

ALL PROGRAMS ARE DUE by the end-of-day, Friday, January 27, 2017

Late labs lose 10% per day late, and receive a zero after 5 days late (Feb. 2.)

YOU MUST COMPLETE THE COMMENT BLOCK FOR EACH PROGRAM (1 mark per program), AND

YOU MUST DEMONSTRATE EACH PROGRAM RUNNING IN L19 (1 mark per program), AND

YOU MUST HAND IN THE CODE FOR EACH PROGRAM (1 marks per program);

Total 21 marks for Lab 1.