

## Assignment #2 – Binary Counter

### Objectives

- Students will be able to have a basic understanding of writing a program in PICBasic Pro (PBP).
- Students will be able to convert between 8-bit binary to decimal.
- Students will be able to control LEDs with a microcontroller.
- Students will be able to wire a microcontroller onto a breadboard.

### Materials

- Breadboard – wire w/ 5V power regulator, switch, and LED
- Jumpers
- Solid copper wire
- Wire strippers
- Non-serrated needle nose pliers
- 9 V battery clip
- 0.1  $\mu$ F disk capacitor
- PIC18F45K22
- 4.7 k $\Omega$  resistor
- 8 – 470  $\Omega$  resistors
- 9 – LEDs
- 9 V battery
- Computer w/ MPLAB XC8 w/ C
- PICKit 3

### Directions

- Fully document everything in your lab notebook.
- Keep all of the wiring from Assignment #1. Add 8 LEDs with 8-470  $\Omega$  resistors to all of the pins on PortA.
  - LEDs must be in a straight line
  - The 1<sup>st</sup> LED in the row must be connected to PORTC.0, then the remaining LEDs in order through PORTC.7
  - Keep the wiring as neat as possible
- When complete, have Mr. Evans inspect the circuit
- Write the program (provided on page 2). *Make sure you set the chip to PIC18F45K22.*
- Compile the program.
- Load the program on the chip.
- When functioning as planned, have Mr. Evans inspect.
  - Part 1: \_\_\_\_\_ (10 points)
  - Part 2: \_\_\_\_\_ (3 points)
  - Part 3: \_\_\_\_\_ (2 points)
  - Wiring: \_\_\_\_\_ (5 points)
  - Lab notebook: \_\_\_\_\_ (10 points)
- Turn this sheet in with your notebooks together.

## Program

```
/*
 * File:   BinaryCounter.c
 * Author: Mark Evans
 *
 * Created on January 26, 2015, 10:58 AM
 */

#include <xc.h>

#pragma config MCLRE=EXTMCLR,WDTEN=OFF,FOSC=8 //Internal oscillator block
#define _XTAL_FREQ 8000000 //Frequency needed for __delay_ms(x)
#define LEDS LATA

int main(int argc, char** argv) {
    OSCCON = 0x67; //8MHz, See page 32 of 18F45K22 datasheet
    ANSELA=0; //PortA as digital
    TRISA=0; //All pins on PortA as outputs
    LATA=0; //All pins on PortA as Low

    unsigned char i=1; //8-bit variable
    for(;;) //Loops continuously
    {
        //Blinks A.0 on and off
        LATAbits.LATA0=1;
        __delay_ms(50);
        LATAbits.LATA0=0;
        __delay_ms(50);

        //Counts in binary, 8-bits
        /*for(i=0;i<256;i++)
        {
            LEDS=i;
            __delay_ms(50);
        }
        */

        //Cycles from A0 through A7 and starts back over at A0.
        /*
        LEDS=i;
        __delay_ms(50);
        i=(i<<1) | (i>>7); //Page 180 of the MPLAB XC8 Compiler User's Guide
        */
    }
}
```