

Assignment #3 – Seven-Segment LED Counter

Objectives

- Students will be able to have a basic understanding of writing a program in MPLAB XC8.
- 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 identify appropriate anode and cathodes on a 7-segment LED.

Goals

- Use a 7-segment LED to count from 0 through 9 repeatedly.
- Use a 7-segment LED to count from 0 through 99 repeatedly.

Materials

- Breadboard – wire w/ 5V power regulator, switch, and LED
- 22 AWF Solid copper wire
- Wire strippers
- Non-serrated needle nose pliers
- 9 V battery clip
- PIC18F45K22
- 4.7 k Ω resistor
- ? – 560 Ω resistors
- Dual seven-segment LED (QDSP-K347)
- 9 V battery
- Computer w/ MPLAB XC8
- PICKit™ 3
- Digital multimeter

Directions

- You will be documenting your work in your lab notebook.
- Determine which pins correspond to positive/negative and specific LED bars
 - In your lab notebook draw a diagram of the dual 7-segment LED provided to you. Include the LED bars and the pins. Label the bars and pins for future reference.
 - Make a table for each LED bar and record which pins are need to light up the LED bar. Include which is positive and which is negative.
- Make a table to indicate which LED bars will be needed to create the numbers 0 through 9 (binary).
- Draw the schematic in your lab notebook of the circuit that you will build to connect the dual 7-segment LED to your breadboard with the PIC18F45K22.
- Create a parts list.
- Build the circuit that you drew. Have Mr. Evans review your circuit.
- Task 1:
 - Write a program that will make the dual 7-segment LED count from 0 through 9 repeatedly.
 - Compile the program and test it. Have Mr. Evans review your functioning LED counter.
 - After you complete program with comments, put it in your lab notebook.
- Task 2:
 - Write a program that will make the dual 7-segment LED count from 0 through 99 repeatedly. The LED must be multiplexed.
 - Compile the program and test it. Have Mr. Evans review your functioning LED counter.
 - After you complete program with comments, put it in your lab notebook.

Grading

- When functioning as planned, have Mr. Evans inspect.
 - Task 1: _____ (10 points)
 - Task 2: _____ (10 points)
 - Wiring: _____ (5 points)
 - Efficiency of code: _____ (5 points)
 - Lab notebook: _____ (10 points)
 - Turn this sheet in with your notebooks together.