The University of Arizona
Department of Aerospace and Mechanical Engineering
Mechatronics Laboratory
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Laboratory Task Sheet 10

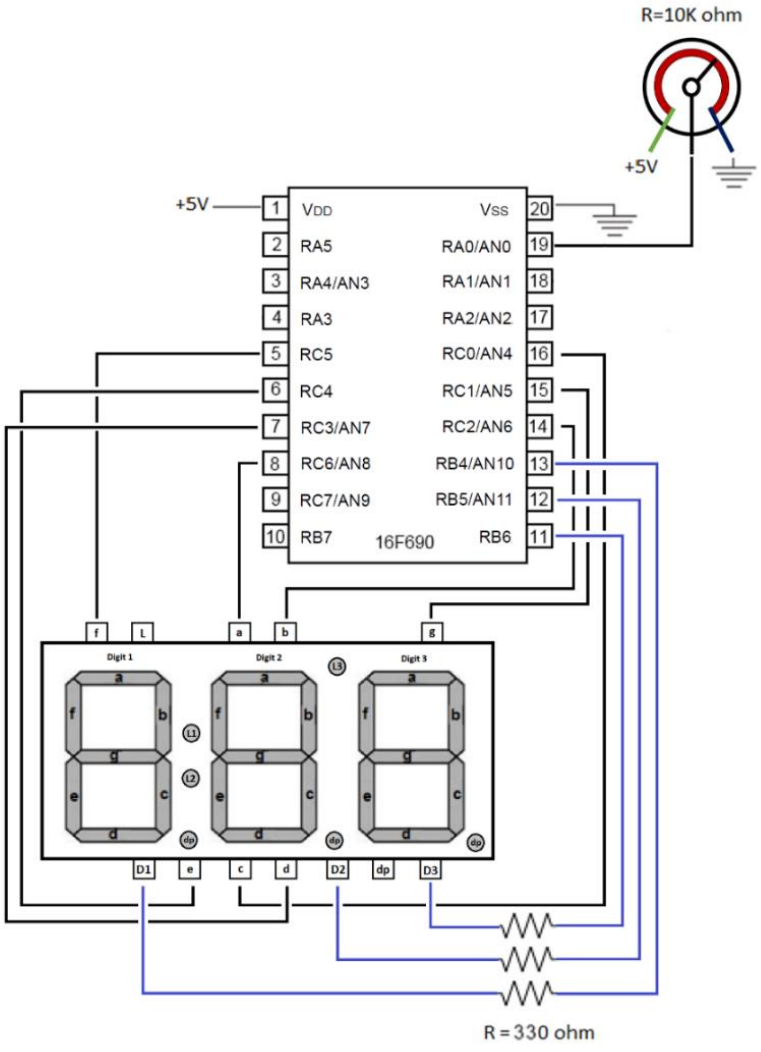
Title: Sensor Readout

Registers to be learned: ADCON0 & ADCON1 & ADRESL & ADRESH

Objective: Program the microcontroller to read the potentiometer's analog signal via Analog to Digital Convertor (ADC). Divide the result of the conversion by decimal 100 and then by decimal 10 to find the three digits. Display the result on the three digits Seven Segments LED.

Tasks

1. Create the circuit below using a Three Digits Seven Segments LED, three resistors, and a potentiometer.



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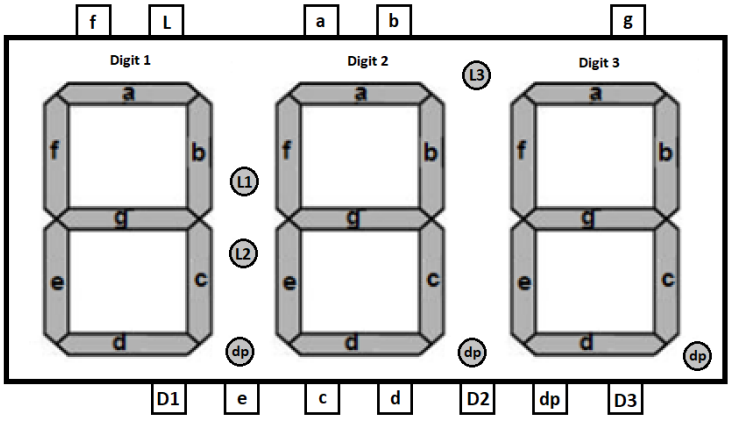
LTC-4624JR

Display Modules - LED Character and Numeric Red 7-Segment 3 Character Common Anode 2V 20mA 0.504" H x 1.182" W x 0.276" D (12.80mm x 30.02mm x 7.00mm) 16-DIP



Pin	Connection
D1	Digit 1 Common Anode
D2	Digit 2 Common Anode
D3	Digit 3 Common Anode
c	Cathode c
g	Cathode g
b	Cathode b
d	Cathode d
e	Cathode e
f	Cathode f
a	Cathode a
dp	Cathode dp
L	Cathode L1, L2, L3

2. Make a copy of the P16f690_Template file and name it TASK10Group00. Open the file in MPLAB Software and use the table below to construct the code.

Suggested Code Structure
Define all the necessary memory Bytes
Start
Call Initialization **Go to Main**
Main Use ADCON0 register to initiate the conversion Wait until the conversion is done (by checking ADCON0, GO) Use ADRESH Register to get the result of the conversion Call Division to divide the result of the conversion by decimal 100 Move the result of the division (Quotient) to the Work Register Call GetCode Move the Work Register to PORTC Activate Digit 1 and deactivate Digits 2 & 3 of the three digits seven segments LED Call Delay Call Division again to divide the remainder of the previous division by decimal 10 Move the result of the Division (Quotient) to the Work Register Call GetCode Move the Work Register to PORTC Activate Digit 2 and deactivate Digits 1 & 3 of the three digits seven segments LED Call Delay Move the remainder of the last division to the Work Register Call GetCode Move the Work Register to PORTC Activate Digit 3 and deactivate Digits 1 & 2 of the three digits seven segments LED Call Delay Go to Main **Delay** Make a delay for almost 750 µs Return **Division** Like previous tasks Return **Get Code** Like previous tasks Return
Initialization

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Bank2
Use ANSEL and ANSELH Registers to define all the ports as digital
Use ANSEL and ANSELH Registers to define PORTA0 as analog
Bank1
Use OSCCON register to set the oscillator on 8 MHz
Use ADCON1 register to set the ADC (Analog to Digital Convertor) clock on FOSC/16
Use TRISA Register to define PORTA0 as input
Use TRISB Register to define PORTB4-6 as output
Use TRISC Register to define PORTC (all pins) as output
Bank0
Use ADCON0 register to enable ADC
Use ADCON0 register to make sure there is no ongoing conversion
Use ADCON0 register to set PORTA0 as input channel of the convertor
Use ADCON0 Register to make the convertor Left Justified
Initialize PORTC to turn off all the LEDs
Return

end
```

3. Program the microcontroller and test it on the circuit.
4. Demonstrate the result to the instructor.
5. Upload the code on D2L and save it for yourself.