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Laboratory Task Sheet 07

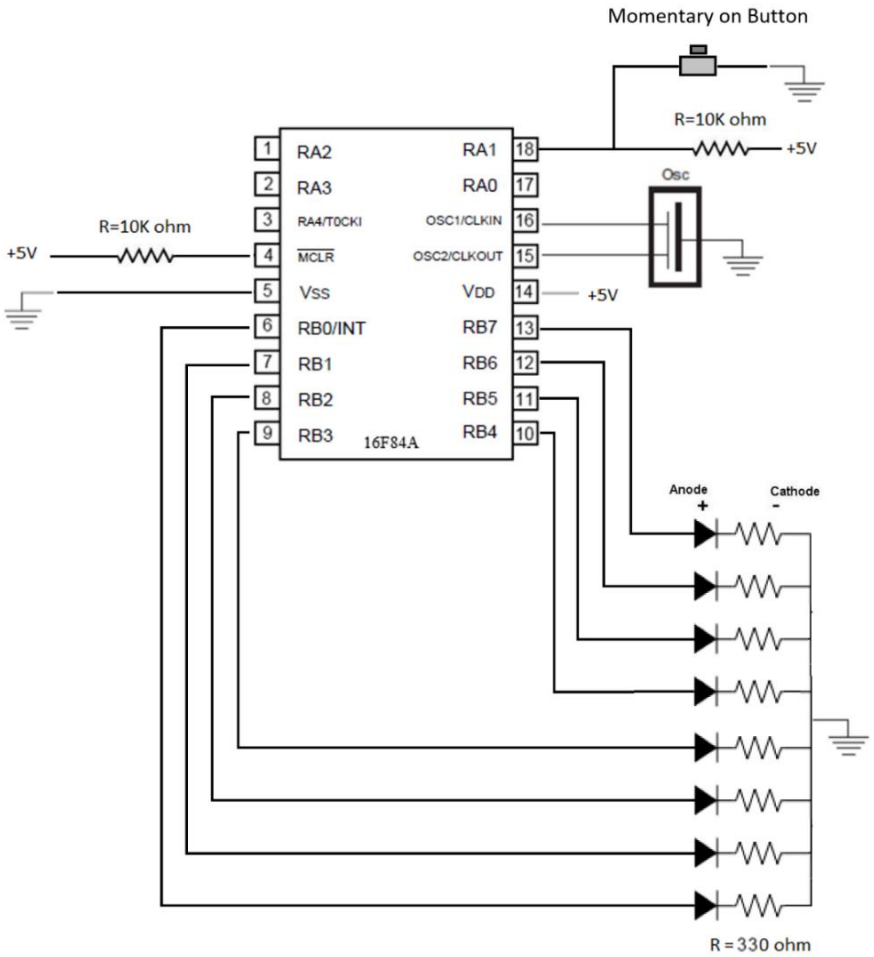
Title: Nightrider with Internal Interrupt

Registers to be learned: INTCON,GIE & INTCON,T0IE & INTCON,T0IF

Objective: Program the microcontroller such that by keeping the push button pressed, the linear array of LEDs displays only one active LED at a time, starting from the rightmost LED (PORTB0), and **every time the Internal Interrupt happens (caused by Timer0)** the active LED shifts one bit to the left. When the active LED reaches the leftmost LED (PORTB7), reverse the direction and consequently when the active LED reaches the rightmost LED reverse the direction again. When the button is not pressed all the LEDs must turn off.

Tasks

1. Create the circuit below using a linear array of LEDs, a bank of resistors, and a push button.



2. Make a copy of the P16f84A_Template file and name it TASK07Group00. Open the file in MPLAB Software and use the table below to construct the code

Suggested Code Structure
Define Bits as memory file Define Direction as memory bit
Start
Call Initialization **Go to Main**
Interrupt Service Routine - ISR Call CheckDirection Call Rotate Reset Timer0 Reset Timer0 Flag
Main Use INTCON Register to turn off the Internal Interrupt Turn off all the LEDs To check if the button is pressed, test PORTA1 If it is not pressed, stay here If it is pressed, go ahead Use INTCON Register to turn on the Internal Interrupt Reset Timer0 Reset Timer0 Flag Turn on the most right-hand side LED Clear Direction Clear STATUS C To check if the button is pressed, test PORTA1 If it is pressed, stay here If it is not pressed, go to Main **CheckDirection** Check if the most right-hand side LED, connected to PORTB0, is ON If it is ON, clear Direction Check if the most left-hand side LED, connected to PORTB7, is ON If it is ON, set Direction Return **Rotate** Check Direction Based on the value of Direction, rotate PORTB to the left or right and then return

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Initialization
Bank1
Use TRISA to define PORTA1 as input
Use TRISB to define PORTB (all pins) as output
Use OPTION_REG Register to choose the longest possible pre-scaler rate
Use OPTION_REG Register to assign the pre-scaler to the Timer0 module
Use OPTION_REG Register to define Internal Oscillator as the Timer0 clock source
Bank0
Use INTCON Register to turn on the master switch for all the Interrupts
Initialize PORTB to turn off all the LEDs
Return

end
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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.