Madison Area Technical College
Electrical Engineering and Electronic Technology Dept.
Microcontrollers

Laboratory Activity on External Interrupts

Preparatory Questions

1. Write the C instruction that makes the EXTERNAL INTERRUPT pin RB0 detect a falling edge.

2. Write the C instruction that makes the EXTERNAL INTERRUPT pin RB1 detect a rising edge.

3. Write the C instruction that enables the Global and Peripheral Interrupt Enable. Why are they important?

Application

4. The following code is used to create the knight rider light sequence at two different rates using PORTC. Study the code carefully. Do you understand the purpose of every instruction in this code?

```
#include <18F4520.h>
#use delay (clock = 20000000)
#fuses HS, NOWDT, NOLVP
#include "../Library/Registers4520.h"

main(){
  int x;
  *ADCON1 = 0xFC;
  *TRISB = 0x01;
  *TRISC = 0x00;   // All outputs
  *PORTC = 0x01;   // Starting Value
  while(1){
     if( *PORTB & 0x01){
          if( x == 255){x = 100;}else{ x = 255;}
    }
     while(*PORTC < 0x80){
       *PORTC = *PORTC << 1;
       delay_ms(x);
     }
     while(*PORTC > 0x01){
       *PORTC = *PORTC >> 1;
       delay_ms(x);
     }
  }
}
```

5. Create the proper circuit in Proteus and test the code presented above. Note: The code presented above will only change the light display speeds when the last light PIN_C7 was serviced.

6. From the last exercise is obvious that performance is has not drastically improved. However, we can make the system better by changing the placement of the if-statement. Where will you place it? Why is it better?

7. Repeat the problem above but with External Interrupts.

```
#include <18F4520.h>
#use delay (clock = 20000000)
#fuses HS, NOWDT, NOLVP
#include "../Library/Registers4520.h"

int x;
#INT_EXT void int_ext_isr(){
     (x==255)?(x=100):(x=255);
}

main(){
          *ADCON1 = 0xFC;
          *TRISB = 0x01;
          *TRISC = 0x00;       // All outputs
          *PORTC = 0x01;      // Starting Value
          *INTCON = 0xD0; // Global, Peripheral, INT0
          while(1){}
}
```

8. Utilize the Interrupt system in the 18f4520 to implement a push button “debouncing” strategy without using delays or external circuits.