James Martin

Madison Area Technical College
Microcontroller
Laboratory Activity   Name:_____

Laboratory Activity - Capture Mode

The Microchip PIC 18F4520 has two Capture and Compare Modules. During lecture we studied how to combine the Capture circuit with the Overflow circuit to determine the Period/Frequency of a TTL square wave signal connected to the input of the Capture and Compare circuit.

Activity Description

Use the Capture and Compare Module 1 to calculate the Revolutions Per Minute of a DC Motor with an encoded shaft. The Encoded Motor can be found in the Proteus simulator by searching MOTOR-ENCODER.
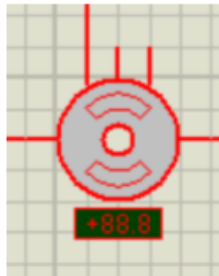
Complete the following table

Vin	Motor RMP Meter	Calculated RPM
5V		
4V		
3V		
2V		
1V		

5V – 180 – 179.60

4V – 148 – 147.72

3V – 109 – 108.70

2V – 71 – 71.04

1V – 36.2 – 36.22

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```
1    #include <18f4520.h>
2    #use delay (clock = 20000000)
3    #fuses HS, NOWDT, NOLVP
4    #include "../../Library/myLibrary.h"
5    #include "../../Library/modifiedlcd.h"
6
7    unsigned int x = 0;
8    unsigned int16 tstop, tstart, telapsed;
9
10   #INT_TIMER1
11   void int_timer1_isr(){
12       x++;                        // Count the overflows
13       output_toggle( PIN_C0 );
14   }
15
16   #INT_CCP1
17   void int_ccp1_isr(){
18       tstop = *CCPR1;
19       telapsed = x * 0x10000 -tstart + tstop;
20       x = 0;    // Rest Overflowwe
21       tstart = tstop;
22       output_toggle( PIN_C1 );
23   }
24
25   main(){
26       float T1c = 4 * 1 / 20000000.0;
27       lcd_init();                // Initializing the LCD Panel
28       *TRISC = 0x4;              // 0000 0100   C2 is input
29       // Capture System Setup
30       CCP1CON->CCPxMx = 0x4; //Capture every falling
31
32       // Timer Setup
33       T1CON->TMR1ON = 1;         // Timer is ON
34       T1CON->TMR1CS = 0;         // Fosc / 4
35       T1CON->T1CKPSx = 0;        // PS = 1;
36
37       // Interrupt System Setup
38       PIE1->TMR1IE = 1;          // Timer 1 overflow interrupt system 0n
39       PIE1->CCP1IE = 1;          // CCP1 Interrupt Systen ON
40       INTCON->PEIE = 1;
41       INTCON->GIE = 1;           // Interrupt System Enabled
42       while(1){
43           // Just show me the data
44           printf(lcd_putc,"\f F = %f", 60 / ( 161 * (T1c * telapsed ) ) );
45           delay_ms(100);
46       }
47   }
48
49
50
```

I worked with Chloe quite a bit early on when trying this, but, Alberto took things down a notch and explained to us how we were overthinking everything.