EE 308 – Homework 4
Due 3-07-07

For all problems below assume you are using a MCU with a 24 MHz bus clock and a 4 MHz oscillator clock.

1. What setup do you need to do to have the HC12 generate an interrupt on the rising edge of Input Capture 3? Write some C code to do this.

2. An engineer is using the HC12 to determine the speed of a motor in RPM. A pulse is generated on Bit 1 of PORT T 16 times every revolution of the motor. Bit 1 of PORT T is set up for input capture mode, and captures the time of the rising edge. The prescaler bits PR2:0 are set to 010. It is known that the time between pulses is less than the timer overflow time. When the first edge is captured, the TC1 register has a value of 0xF87A. When the second rising edge is captured, the TC1 register has a value of 0x0DB4.

(a) What it the length of time between the two rising edges?

(b) How long does it take the motor to make one revolution?

(c) What is the motor speed in RPM?

3. What setup do you need to do to have the HC12 toggle bit 3 of PORT T on a successful output/compare? Write some C code to do this.

4. The table below shows some values in the HC12's PWM registers:

PWMCAE	PWMCLK	PWMPRCLK	PWMPOL	PWME	PWMSCLA
0x00	0x02	0x84	0xFF	0x0F	0X2A
PWMSCLB	PWMPER0	PWMPER1	PWMDTY0	PWMDTY1	PWMCTL
0XA5	0X64	0XC8	0X32	0X51	0X00

(a) What is the period (in seconds) of the pulse width modulated signal generated on PWM channel 0?

(b) What is the duty cycle of the pulse width modulated signal on PWM channel 0?

(c) What is the period (in seconds) of the pulse width modulated signal generated on PWM channel 1?

(d) What is the duty cycle of the pulse width modulated signal on PWM channel 1?

5. Write some C code to set up PWM channel 2 to generate a pulse width modulated signal with a frequency of 5 kHz and a duty cycle of 60%. Be sure your code does not change the function of any other PWM channel?