ECE 372/3 Lab

Lab# 7

Pulse Width Modulation Using the OCx Interrupt

Objective:

To generate a waveform with a constant frequency and decreasing duty cycle.

Tasks:

In this lab, we are using an OCx interrupt to dim an LED from full brightness to off, in 1 second, and repeat.
The internal clock of the HC11 is 2 MHz, i.e. 2 million ticks/second. The OCx interrupt happens when TOCx matches the internal counter. By changing TOCx, we can control the frequency of the interrupt. A sample waveform, for a frequency f, is shown in Fig1 below.

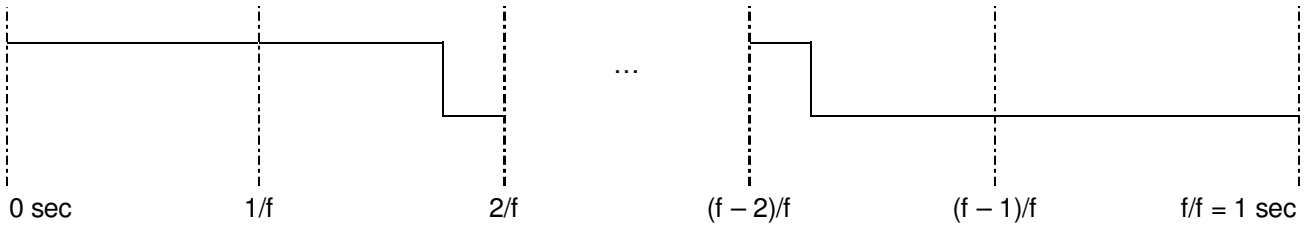

Fig.1, Sample Waveform (not to scale)

Hints:

- Functions you wrote in previous labs might be helpful.
- You can use any output pin; make sure you have the right circuit (don't burn your HC11!).
- Make sure that ontime + offtime = constant = 2 million ticks/sec * 1 / freq.
- Offtime is incremented by a constant x. When you reach the time (f-1)/f, offtime should be 2 million/ freq, and ontime = 0.
- At time 1/f, offtime = x, and at time (f-1)/f, offtime = (f-1) * x.
- From the previous 2 hints, you can calculate x to the closest whole number.
- Make sure x is 16-bit at most.
- Make sure your ISR doesn't take more than x ticks to finish. Otherwise, OCx will not reset correctly.