This Week
1. Lecture: TOC
2. Lab Demo remote by Monday, May 31
    a. Quiz: Chip select, timer input capture and the Sony remote control.
3. No Friday lecture
4. No availability after 10 am Thursday

Counter Review
PR1 and PR0 are privileged and can be changed at any time in the special modes.

Resolution of time = resolution of TCNT = $\tau_{TCNT} = \dfrac{1}{f_{TCNT}}$ = 0.5 microseconds

The maximum time, then, before the timer overflows and goes back to zero is:

T_{MAX} = $65536 \cdot \tau_{TCNT}$ = 65536 * 0.5 us = 32.768ms

T_{Range} = 0 to T_{MAX} = T_{MAX} – 0 = 32.768 ms

DC Motors
The applied voltage spins the DC motor. Motor rating is where the manufacturer expects you to drive it at so that you don't damage it. Driving it at higher voltages can burn it out, but it is safe to drive it at lower voltages.

The speed is proportional to the voltage.
The speed is proportional to the duty cycle because the duty cycle limits the voltage.

$$duty\ cycle = \frac{pulse\ width}{pulse\ period} = \frac{high\ time}{period}$$

All we have to do for speed control, then, is to generate this type of waveform chip to the enable pin on the motor. We'd leave the direction we want to go constant.

Generating this Waveform
The HC11 does not have a pulse width modulation function, as many other microcontrollers have. Instead, it has the output compare function which can be combined with interrupts to complete pulse width modulation behavior.

All we have to do is vary the duty cycle, not the period. Our hardware views time from 0 to 32.768 ms. Then we get a timer overflow interrupt (TOI or TOVI) that tells us time is rolling over.

There is a limit to how fast we can turn the motor on and off because it has spin-up delay.
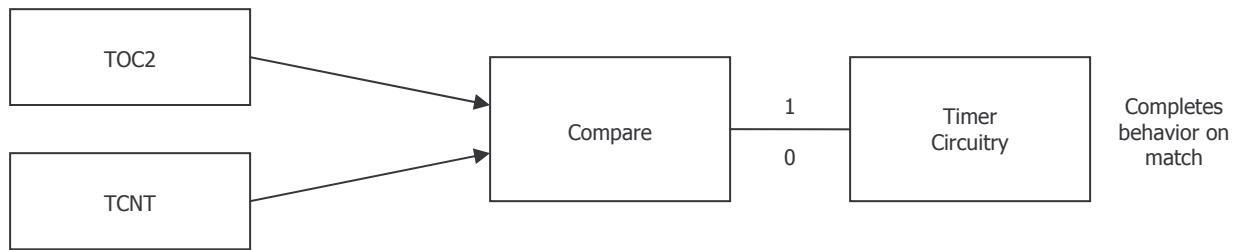
Initialization
1. Control Registers: TCTL1
2. Parameters: TOC2
3. Flag Clear: TFLG1
4. Mask   MSK1

TCTL1

OM2	OL2	OM3	OL3	OM4	OL4	OM5	OL5

0	0	No action on pin voltage
0	1	Toggle pin voltage
1	0	Drive pin voltage to 0
1	1	Drive pin voltage to 1

1. Load TCTL1
2. Use bit set and bit clear to set the pattern you want in that behavior. Do no damage to the lower bits of TCTL1.