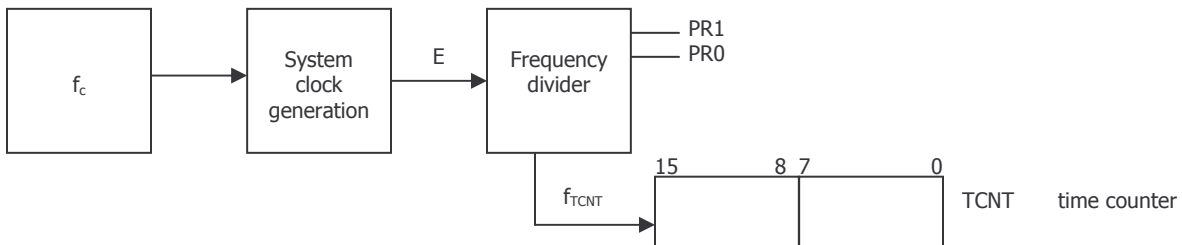


HC11 Timer

Principal Timer Functions

1. Real Time Interrupt
 - a. You are guaranteed it will happen at the right time. It is a precision circuit.
 - b. Its intent is to be used in a real time application that has events that must occur at certain time intervals.
2. Input Capture
 - a. Program the timer to monitor one of the timer input pins (TIC1, 2, 3, perhaps even 4)
 - b. Wait, like a spiral until an edge occurs. Record the time the edge occurs and save it.
3. Output Compare (Match, make equal, talk about in the same way)
 - a. Four things can happen:
 - i. Pin left alone
 - ii. Pin driven low
 - iii. Pin driven high
 - iv. Pin toggles
 - b. This can be used for controlling the robot’s speed.
4. Pulse Accumulation
 - a. Count the number of times a pulse occurs
 - b. Count the width of a pulse.

How time is implemented in the HC11



	PR1	PR0	f _{TCNT}	TOVI or TOI
Default	0	0	÷ 1	32.768 ms
	0	1	÷ 4	131.072 ms
	1	0	÷ 8	262.144 ms
	1	1	÷ 16	524.288 ms

$$TOV = 65536 \cdot T_{TCNT} = 65536 \div F_{TCNT}$$

E is driven externally from the chip for those devices external to the microcontroller that might need to be driven by this waveform.

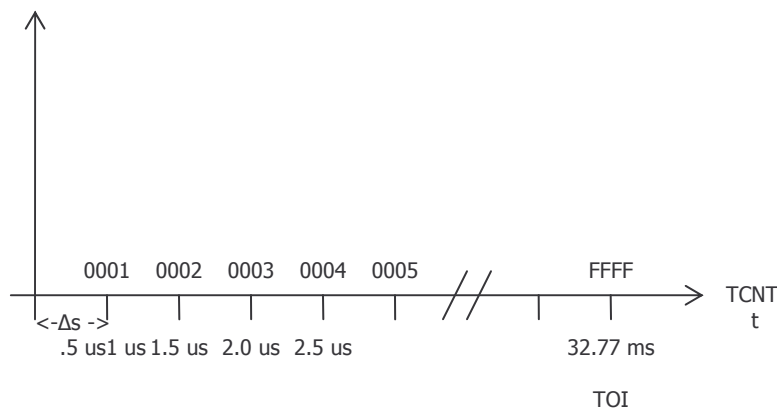
One of the ways to know that the HC11 has come up correctly is that its E clock is being generated.

Timer Registers

Control Registers:	TCTL1, TCTL2, PACTL
Mask Registers:	TMSK1, TMSK2
Flag Registers:	TFLG1, TFLG2
Function Variables:	TOC
Results:	TIC, PACNT

To mask means to hide. These are the registers we use to determine whether the timer event generates an interrupt. Is it hidden from the software or not?

The flag bit goes high when the timer event occurs so that the controller can determine what has happened when the interrupt occurs. **The ISR must clear this flag bit** to prevent the ISR from executing again immediately after it is done.



PR1 and PR0 must be set within **64 clock cycles** of boot. Therefore, we do not have control to change it. But, when bringing up the OS in special test mode and our OS kicks in, it is able to do this. Therefore, we can change PR1 and PR0 in normal or special test mode.

In special mode, though, you can write to these values any time you want. PR1 and PR0 are privileged bits.

Summary:

PR1 and PR0 set the time axis. They must be set within the first 64 clock cycles (32 microseconds) in normal mode, but they are privileged in special mode and can be changed at any time.

Dr. Meier has never slowed it down. For anything. Ever.