CPE 301 Timer Notes: written by D. Egbert, version 1.2, March 6, 2014

ATmega2560 Timer1 (16 bit timer) in NORMAL Mode

Prescaler	Timer Frequency	Timer Period = time between timer ticks
1	16MHz	0.0625 microseconds
8	2MHz	0.5 microseconds
64	250 KHz	4.0 microseconds
256	62.5 KHz	16.0 microseconds
1024	15.625 KHz	64.0 microseconds

Assume we want a 477 Hz Square wave (50% duty cycle):

1/477 = 2.0964360587 milliseconds

1/2 period = 1.04821802935 milliseconds

Thus, we want the timer to delay 1.04821802935 milliseconds.

The question is how many timer ticks in 1.04 milliseconds?

1.04821802935 milliseconds = 1048.21802935 microseconds

At Prescaler = 1: 1048.21802935 microseconds/0.0625 microseconds = 16,771 timer ticks

At Prescaler = 64: 1048.21802935 microseconds/4.0 microseconds = 262.05 timer ticks -> 262

To generate this 477 Hz signal load the timer with -262, use a prescaler of 64

(or load the timer with -16,771 and use a prescaler of 1)

and each time TOV goes high toggle the output pin.

In a loop the steps are:

1. Stop the timer

2.Load the timer count

3. Start the timer

4. Wait for TOV to go high

5. Stop the timer

6. Reset TOV to 0 (by writing a 1 to the TOV bit)

7. Toggle the output pin

8. Go to 2.