MicroControllers

Lab3

William L. Cole & Romeo Djeulong

Circuitry

Red LED to PB0 (Task 1)

Sounder to PB0 (Task 2)

Program

Task1

To get a pre-scaler of 256, the CS12 bit is set to 1 in TCCR1B.

To get a cycle of 1 second the light needs to be off for half a second and on for the other half second. In order to get the needed count, the following formula is used:

$$Timer\ Counter = \frac{Required\ Delay}{Clock\ Time\ Period}$$

$$= \frac{0.5\ sec}{\frac{1}{31250}\ sec} = 0.5\,\text{sec} * 31250\ sec^{-1} = 15625$$

An if-statement is used to check if the timer count TCNT1 is greater than the specified value of 15625. Once it has reached this point, the Timer Counter is reset, and the light is toggled using the '^=' operator.

Task2

To use a timer without a prescaler (or a prescaler of 1) CS10 is set to 1 for TCCR1B.

A frequency of 300 Hz means a period of 1/300 seconds. A 50% duty cycle requires that period to be divide in half again to 1/600 seconds.

$$8 * 10^6\ Hz * \frac{1}{600}\text{sec} = 13{,}333.33$$

Just as in Task1, an if-statement checks to see if the Timer reaches a count of 13,333. Once it has, the Timer is reset, and the sounder is toggled using the '^=' operator.