

How to calculate the TMR0 value

The Timer0 increment period is given by:

$$\text{Increment period} = \frac{\text{Prescaler}}{\text{Instruction Frequency}}$$

1: Work out the Instruction Frequency

Instruction frequency (F_{instr}):

For a system clock of 2 MHz (XTAL_FREQ=2000000), the instruction frequency is:

$$F_{Finstr} = \frac{F_{Fosc}}{4} = 500 \text{ kHz}$$

Because pre scaler is set to 1:64

$$\text{Increment Period} = \frac{64}{100} = 128_{\mu s}$$

2: Now we can calculate the Timer 0 overflow

Timer0 is an 8-bit timer, so it overflows after counting 256 ticks. The time to overflow is then as follows :

$$\text{Overflow Time} = 256 \times \text{Increment Period}$$

Hence we have

$$256 \times 128_{\mu s} = 32.768_{ms}$$

If you want a delay smaller than this, you need to preload TMR0 with a value less than 256.

Continued

3: Preload Calculation

The preload value sets the starting point of TMR0 so that it overflows sooner.
The formula for the preload value is:

$$\text{Preload Value} = 256 - \left(\frac{\text{desired time}}{\text{increment Period}} \right)$$

For a **1 ms interrupt**:

Desired Time = 1ms = 1000μs

Preload Value Thus equals

$$256 - \left(\frac{1000_{\mu s}}{128_{\mu s}} \right)$$

This equates to :

$$256 - 7.8125 \approx 248$$