

## Timer 1

The timer TMR1 module is a 16-bit timer/counter with the following features:

- 16-bit timer/counter with two 8-Bit registers TMR1H/TMR1L
- Readable and writable
- software programmable Prescaler up to 1:8
- Internal or external clock select
- Interrupt on overflow from FFFFh to 00h
- Edge select for external clock

## Timer1 Registers

Registers associated with the PIC16f877A Timer1 module.

### Registers and their use

**T1CON:** This register is used to configure the

TIMER1 Prescaler, Clock Source etc

**TMR1H** This register holds the higher 8-bits of timer value.

**TMR1L** This register holds the lower 8-bits of timer value.

**PIR1** This register contains the Timer1 overflow flag(TMR1IF).

**PIE1** This register contains the Timer1 Interrupt Enable flag(TMR1IE).

### T1CON Register 8 bit (0 to 7)

7 -

6 -

5 T1CKPS1

4 T1CKPS0

3 T1OSCEN

2 T1SYNC

1 TMR1CS

0 TMR1ON

**T1CKPS1:T1CKPS0:** Timer1 Input Clock Prescale Select bits

11 = 1:8 prescale value

10 = 1:4 prescale value

01 = 1:2 prescale value

00 = 1:1 prescale value

**T1OSCEN:** Timer1 Oscillator Enable Control bit

1-Oscillator is enabled

0-Oscillator is shut-off

**T1SYNC:** Timer1 External Clock Input Synchronization Control bit

1-Do not synchronize external clock input

0-Synchronize external clock input

**TMR1CS:** Timer1 Clock Source Select bit

1-External clock from pin RC0/T1OSO/T1CKI (on the rising edge)

0-Internal clock (FOSC/4)

**TMR1ON:** Timer1 On bit

1-Enables Timer1

0-Stops Timer1

Delay Calculations for 100ms @20Mhz with Prescaler as 8:

$$\text{RegValue} = 65536 - (\text{Delay} * \text{Fosc}) / (\text{Prescaler} * 4) = 65536 - ((100\text{ms} * 20\text{Mhz}) / (8 * 4)) = 3036 = 0x0BDC$$

Below are the steps for configuring and using the Timer1 for delay generation:

1. Calculate the Timer Count for the required delay.
2. Set the Prescaler bits in **T1CON** as per the delay calculations.
3. Select the Clock Source Internal/External using **TMR1CS** bit.
4. Load the timer value into **TMR1H, TMR1L** register.
5. Enable the Timer1 Interrupt by setting **TMRIE** bit
6. Enable the Global and Peripheral interrupts by setting **GIE** and **PIE** bits
7. Finally, start the timer by setting **TMR1ON** bit