

# The Timer Module

## EXERCISES

**ex. 1)** Generate a rectangular waveform having a periodicity of 20us.  
Use channel 7 in Output compare mode.

```
TIOS=0x80;  
TSCR2=0x08;  
TC7=??;  
TCTL1=0b01000000;  
TSCR1=0x80;
```

**ex. 2)** Generate a rectangular waveform with a periodicity of 2 sec.  
(Turn the LED connected to PBO ON for 1 sec, OFF for 1 sec.)

To solve this exercise you can use interrupts:

- Add this the last line (marked in red) in SoftTec\_Linker.prm file

```
VECTOR 0 _Startup /* Reset vector: this is the default entry point for a C/C++ application. */  
//VECTOR 0 Entry /* Reset vector: this is the default entry point for an Assembly application. */  
//INIT Entry /* For assembly applications: that this is as well the initialisation entry point */  
VECTOR ADDRESS 0xFFE0 my_ISR_TimCh7 // **** ADD THIS LINE -- Interrupt Vectors pp. 60 datasheet S12
```

- Define the desired interrupt service routine in CodeWarrior:

```
#pragma CODE_SEG __NEAR_SEG NON_BANKED  
interrupt void my_ISR_TimCh7(void)  
{  
    /*Add interrupt handling here*/  
}  
#pragma CODE_SEG DEFAULT
```

**ex. 3)** Write an application that uses the timer to count the number of seconds and milliseconds elapsed since the start of the program. The least significant byte of the variable holding the number of seconds elapsed should be displayed on the LEDs connected to Port B.

**ex. 4)** Use the input capture functionality to measure the period of a signal that is generated on the pin associated to the TIM channel 6.

**ex. 5)** Measure the execution time of a function, use the input capture functionality.

**ex. 6)** Use the pulse accumulator functionality to count the number of pulses generated on the PT7 pin.

The rising edge should be considered as the event counter active edge.

Use the ON/OFF switch connected to PT7 to generate the pulses.

Display the least significant byte of the Pulse Accumulator counter register (PACTL) on the LEDs associated to Port B.