Timer1 in PIC 16F877

Mr. Ravindra N. Chavan

(rchavan836@gmail.com)

Assistant Professor, Department of Electronics Engineering

Walchand Institute of Technology, Solapur
(www.witsolapur.org)

Learning Outcome

- At the end of this session student can
  - Demonstrate the operation of Timer1 in PIC 16F877.
  - Implement Timer1 in different applications.

Outline

- Timer1 special function registers
- Working of Timer1
- Setup of Timer1

Timers in PIC 16F877

- Three Timers: Timer0, Timer1, Timer2
- Timer0: 8-bit timer/counter
- Timer1: 16-bit timer/counter
- Timer2: 8-bit timer

Timer1

- Features:
  - 16-bit timer/counter
  - Readable and writable
  - Input Clock Prescaler
  - Internal or external clock select
  - Interrupt on overflow from FFFFh to 0000h

Timer1 registers

- The Timer1 module is a 16-bit timer/counter consisting of two 8-bit registers (TMR1H and TMR1L), which are readable and writable. The TMR1 Register pair (TMR1H:TMR1L) increments from 0000h to FFFFh and rolls over to 0000h.
- T1CON: To be used to control the operation of Timer1

T1CON Register

----	----	T1CKPS1	T1CKPS0	T1OSCEN	T1SYNC	TMR1CS	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

T1CON Register

----	----	T1CKPS1	T1CKPS0	T1OSCEN	T1SYNC	TMR1CS	TMR1ON

T1SYNC: Timer1 External Clock Input Synchronization Control bit

When TMR1CS = 1:

1 = Do not synchronize external clock input

0 = Synchronize external clock input

When TMR1CS = 0:

This bit is ignored. Timer1 uses the internal clock when TMR1CS = 0.

T1CON Register

---	---	T1CKPS1	T1CKPS0	T1OSCEN	T1SYNC	TMR1CS	TMR1ON

TMR1CS: Timer1 Clock Source Select bit

1 = External clock from pin RC0/T1OSO/T1CKI (rising edge)

0 = Internal clock (FOSC/4)

TMR1ON: Timer1 On bit

1 = Enables Timer1

0 = Stops Timer1

Operation of Timer1

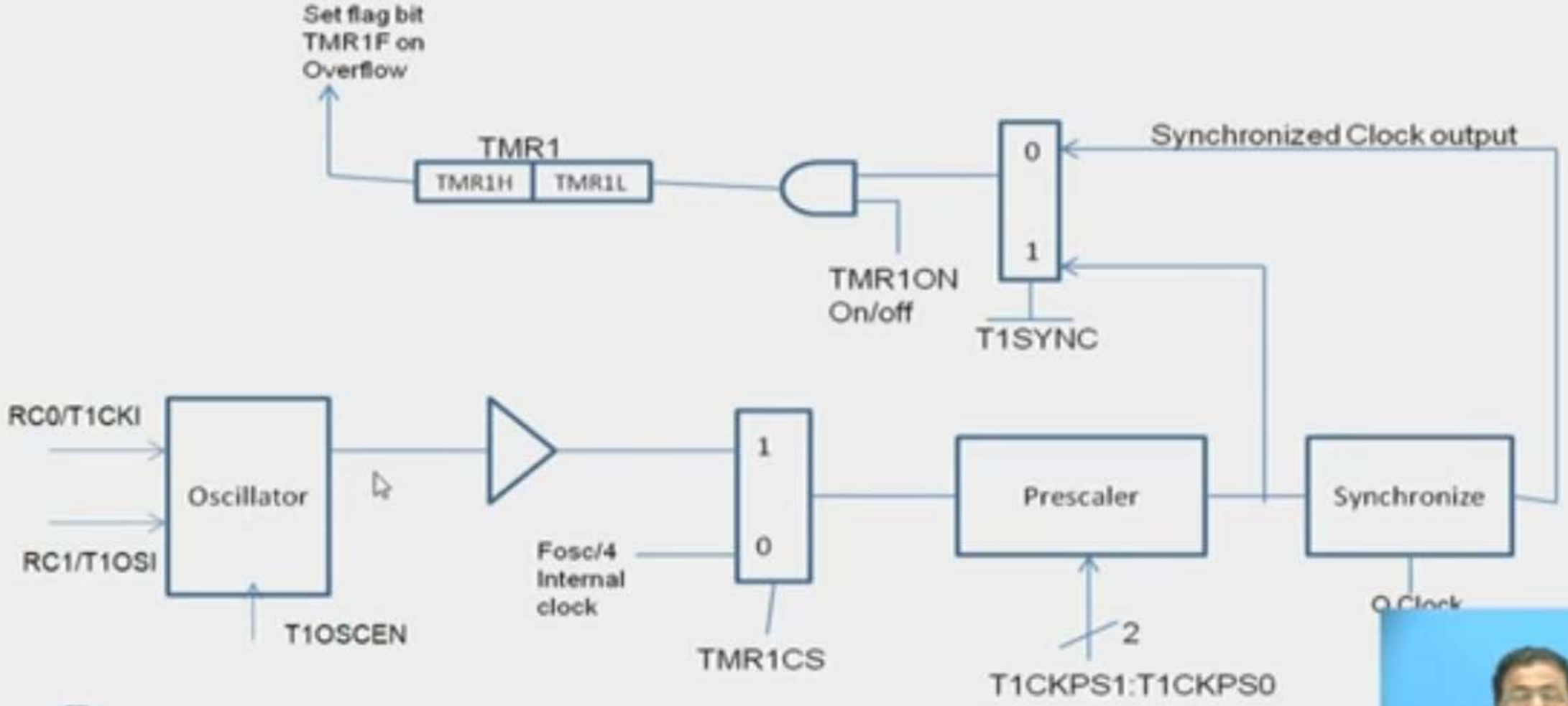
- TMR1 is increment either on every instruction cycle or on external clock at RC0/T1CKI pin.

Think how to select timer and counter mode of Timer1

Operation of Timer1

- To select Timer or counter mode use TMR1CS bit from T1CON register.
- Make TMR1CS=0 to select Timer mode (internal clock)
- Make TMR1CS=1 to select Counter mode (external clock)

Operation of Timer1



Setup of Timer1

- Select Timer or counter mode using TMR1CS bit from T1CON reg.
- Use T1CKPS1:T1CKPS0 bits to select prescaler rate
- Put the initial count in TMR1H:TMR1L register
- Turn on Timer1 by using TMR1ON bit
- TMR1H:TMR1L will increment and rollsover from FFFFh to 0000h and T1IF will set

References

- PIC 16F877 Data Sheet
- Microcontrollers by Ajay Deshmukh