

Using Timer2/4/8 of Microchip PIC18F Microcontrollers

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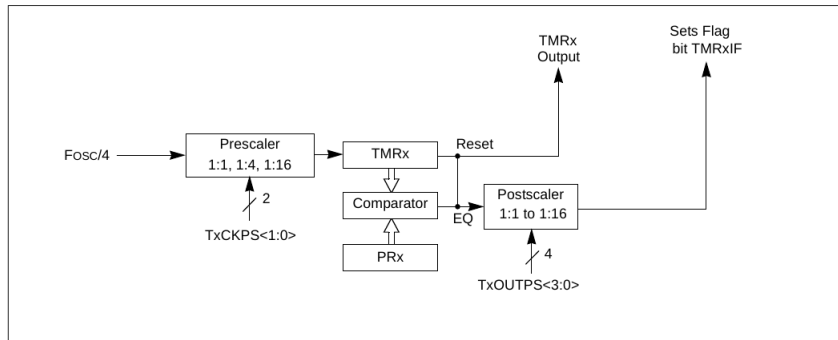
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The other timers of of PIC18

- In addition to **TIMER0**, PIC18 Family has other 6 timers, subdivided in two families
- First family includes **TIMER1**, **TIMER3** and **TIMER5**
- Second family includes **TIMER2**, **TIMER4** and **TIMER6**
- Timers of the same family have the same structure and working scheme

The timers 2/4/6 of PIC18

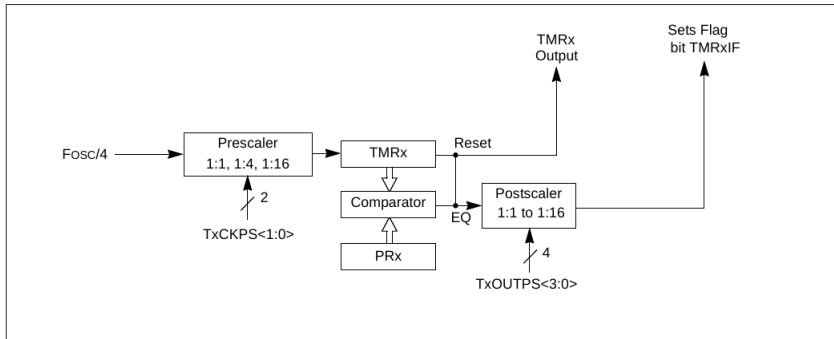
FIGURE 13-1: TIMER2/4/6 BLOCK DIAGRAM



- **Timers2/4/6 are 8-bit timers with period register;**
- Clock source can be only $F_{osc}/4$;
- A prescaler is present and performs division by **1, 4 or 16**;

Working scheme of timers 2/4/6

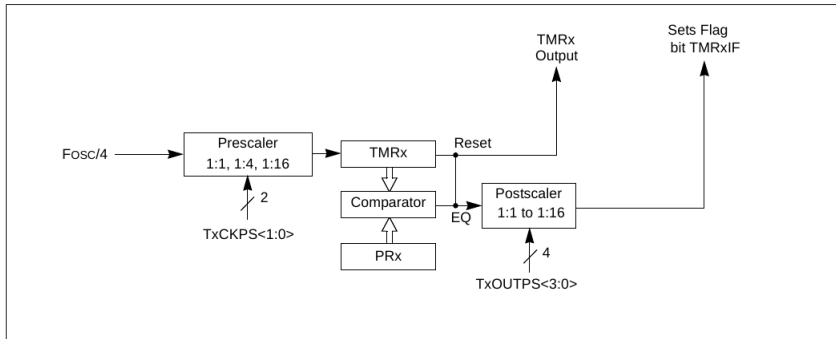
FIGURE 13-1: TIMER2/4/6 BLOCK DIAGRAM



- **TMRx** increments according to clock source and prescaler;
- When **TMRx** becomes **equal to PRx**, the internal **EQ** event is generated
- The EQ event causes an **automatic reset to 0** of TMRx;

Working scheme of timers 2/4/6

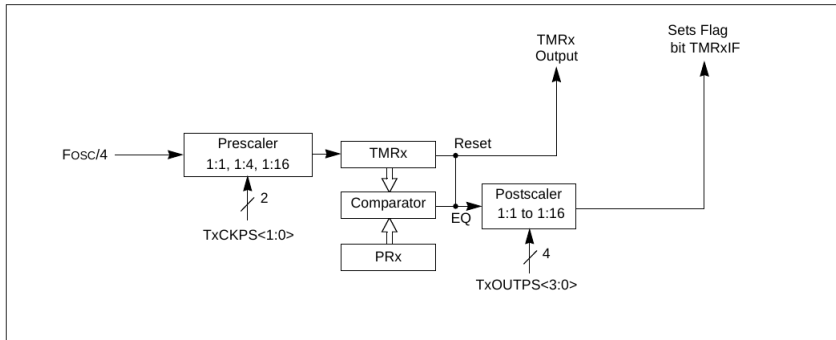
FIGURE 13-1: TIMER2/4/6 BLOCK DIAGRAM



- The EQ event goes through the **postscaler**;
- The postscaler **counts** for n EQ events, with $1 \leq n \leq 16$ programmable, and then activates **TMRxIF**.

Special Functions Registers of timers 2/4/6

FIGURE 13-1: TIMER2/4/6 BLOCK DIAGRAM



- **TxCON**: Controls Prescaler and Postscaler
- **TMRx**: The timer count variable
- **PRx**: The timer period register

Control Register of timers 2/4/6

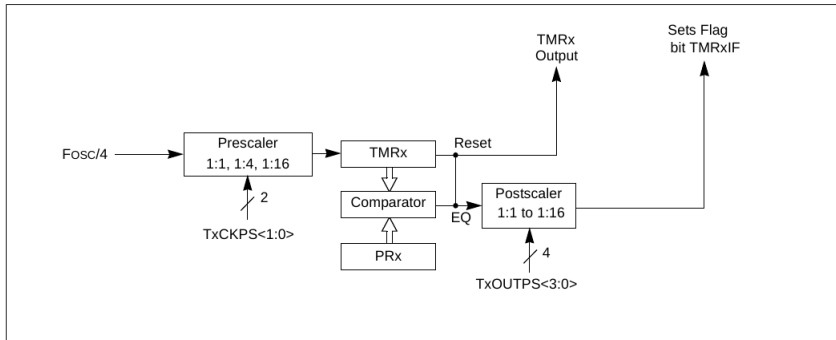
REGISTER 13-1: TxCON: TIMER2/TIMER4/TIMER6 CONTROL REGISTER

U-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0	R/W-0
—	TxOUTPS<3:0>				TMRxON	TxCKPS<1:0>	
bit 7							bit 0

- **TxOUTPS**: Postscaler setup
 - **0000** = 1:1 postscaler
 - **0001** = 1:2 postscaler
 - ...
 - **1110** = 1:15 postscaler
 - **1111** = 1:16 postscaler
- **TMRxON**: Timer On/Off control
- **TxCKPS**: Prescaler setup
 - **00** = 1:1 prescaler
 - **01** = 1:4 prescaler
 - **1x** = 1:16 prescaler

Interrupt flags of timers 2/4/6

FIGURE 13-1: TIMER2/4/6 BLOCK DIAGRAM

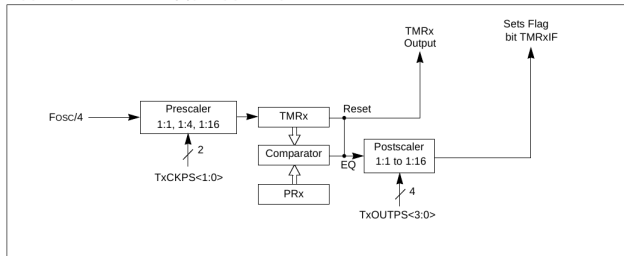


Interrupt (period-match) flags of timers 2/4/6 belong to various special function registers:

- TMR2IF $\Rightarrow$ **PIR1bits.TMR2IF**
- TMR4IF $\Rightarrow$ **PIR5bits.TMR4IF**
- TMR6IF $\Rightarrow$ **PIR5bits.TMR6IF**

Times and Prescalers

FIGURE 13-1: TIMER2/4/6 BLOCK DIAGRAM



With $F_{osc}/4 = 16\text{MHz}$, $4 \cdot P_{osc} = 62.5\text{ns}$:

- TxCKPS = 1:1, bit period = 62.5ns , max period = $255 \cdot 62.5 = 15.9\mu\text{s}$;
- TxCKPS = 1:4, bit period = 250ns , max period = $255 \cdot 62.5 \cdot 4 = 63.75\mu\text{s}$;
- TxCKPS = 1:16, bit period = $1\mu\text{s}$, max period = $255 \cdot 62.5 \cdot 16 = 255\mu\text{s}$;

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