Assignment 5

Chapter 9

7. What is the job of the TMOD register?

Answer:

TMOD is used to set the various timer operation modes. TMOD is an 8-bit register in which the lower 4 bits are set aside for timer 0 and the upper 4 bits are set aside for timer 1. In each case, the lower 2 bits are used to the timer mode and the upper 2 bits to specify the operation.

11. Indicate the size of the timer for each of the following modes?
(a) mode 0 (b) mode 1 (c) mode 2

Answer:

(a) 13-bit timer
(a) 16-bit timer
(a) 8-bit timer, auto reload

16. Assuming XTAL = 11.0592MHz, indicate when the TF0 flag is raised for the following program.

```
MOV     TMOD, #01
MOV     TL0, #12H
MOV     TH0, #1CH
SETB    TR0
```

Answer:

FFFFH-1C12H+1H=E3EEH=58350
f=11.0592MHZ/12=921.6KHZ
T=1/f=1.085us
58350*1.085=63309.75us
The TF0 flag is raised after 63309.75us

20. Assuming that XTAL = 11.0592MHz. Find the TH1, TL1 value to generate a time delay of 2 ms. Timer 1 is programmed in mode 1.

Answer:

f=11.0592MHZ/12=921.6KHZ
T=1/f=1.085us
2ms/1.085=1843
65536-1843=63693=F8CDH
TL=CDH

TH=F8H

25. Assuming that XTAL = 11.0592MHz, and we are generating a square wave on pin P1.2, find the lowest square wave frequency that we can generate using mode 1.

Answer:

T= 2*65536*1.085us=$1.422*10^{-1}$s

f=1/$1.422*10^{-1}$=7.03HZ

```
        MOV     TMOD,#01H
AGAIN:  MOV     TL0,#00H
        MOV     TH0,#00H
        SETB    TR0
BACK:   JNB     TF0,BACK
        CLR     TR0
        CPL     P1.2
        CLR     TF0
        SJMP    AGAIN
```

36. Assuming that XTAL = 11.0592MHz, and we are generating a square wave on pin P1.3, find the lowest square wave frequency that we can generate using mode 2.

Answer:

T=2*256*1.085us=$5.5552*10^{-4}$s

f=1/$5.5552*10^{-4}$=1.8KHZ

```
        MOV     TMOD,#02H
        MOV     TL0,#00H
        MOV     TH0,#00H
AGAIN: SETB     TR0
BACK:   JNB     TF0, BACK
        CLR     TR0
        CPL     P1.3
        CLR     TF0
        SJMP    AGAIN
```

47. Program timer 1 to be an event counter. Use mode 1 and display the binary count on P1 and P2 continuously. Set the initial count to 20,000.

Answer:

```
MOV   TMOD , #50H
MOV   TH1, 4EH
MOV   TL1, 20H
```

```
        SETB   TR1
LOOP:   MOV    A, TL1
        MOV    P1, A
        MOV    A, TH1
        MOV    P2, A
        JNB    TF1, LOOP
        CLR    TR1
        CLR    TF1
        END
```