

Tutorial-5

Eg-1. Write an assembly language program in 8085 to count continuously in hexadecimal from CCH to 00H in a system with $0.5 \mu s$ clock period. Use register to set up a 1 millisecond delay b/w count and display the numbers at one of the output ports.

Eg-2 Write an assembly language program in 8085 to count from 0-9 with a 1 second delay between each count. At the count of 9, the counter should reset itself to 0 & repeat the sequence continuously. Use register pair HL to set up the delay and display each count at one of the output ports. Assume the clock frequency of the microprocessor is 1 MHz

Sol-1

MVI B, FFH 7T states
 LOOP: DCR B 4T states
 MVI C, Count 7T states

LOOP2: DCR 4T states
 JNZ loop2 10/7T states

MOV A, B 4T states
 out Port 10T states
 JMP loop
 HLT

loop 2

$$\begin{aligned} \text{Total} &\rightarrow [(4+10)^* (\text{Count}-1) + (4+7)] T \text{ states} \\ &= [14^* \text{Count} - 14 + 11] T \text{ states} \\ &= [14^* \text{Count} - 3] T \text{ states} \end{aligned}$$

loop:

$$\begin{aligned} \text{Total} &= [4 + 7 + (14^* \text{Count} - 3) + 4 + 10 + 10] T \text{ states} \\ &= [32 + 14^* \text{Count}] T \text{ states} \end{aligned}$$

$$T = 0.5 \text{ microseconds} = 0.5 \times 10^{-6} \text{ s}$$

$$\text{Delay} = 1 \text{ milisec} = 1 \times 10^{-3} \text{ s}$$

$$\therefore (32 + 14^* \text{Count}) 0.5 \times 10^{-6} = 10^{-3}$$

$$\therefore \text{Count} = \frac{10^3 - 16}{7} = 140.57$$

Sol-2
 MVI B, 00H 7T
 Loop: INR B 4T
 LXI H, Count 10T
 Loop2: DCX H 6T
 JNZ Loop2 10/7T
 MOV A, B 4T
 OUTPST H 10T
 CPI 09 7T
 JNZ Temp 10/7T
 MVI B, 00H 7T
 Temp: JMR Loop 10/7T
 HLT

$$\begin{aligned}
 \text{Loop2:} \\
 &\Rightarrow (6+10) * (\text{Count} - 1) + 6 + 7 \\
 &\Rightarrow 16 * \text{Count} - 3
 \end{aligned}$$

$$\begin{aligned}
 \text{Loop: } 4T + 10T + (16 * \text{Count} - 3) + 4T + 10T \\
 + 7T + 10T + 7T + 10T \\
 \Rightarrow 14 + 14 + 14 + 20 + (16 * \text{Count} - 3) \\
 \Rightarrow 59 + 16 * \text{Count}
 \end{aligned}$$

$$\Rightarrow (59 + 16 * \text{Count}) T \& \text{state} = 1 \& \text{sec}$$

$$(59 + 16 * \text{Count}) \times \frac{1}{10^6} = 1$$

$$\text{Count} = \frac{10^6 - 59}{16} \approx 62496$$