Chapter-9

Stack and Subroutines

9.1 STACK

The stack in an 8085 microcomputer system can be described as a set of memory locations in the R/W memory, specified by programmer in main memory. The beginning of the stack is defined in program by using the instruction LXI SP, 16-bit memory address of a stack.

INSTRUCTIONS

Opcode	Operand
LXI	SP, 16-bit memory address of a stack
PUSH	Rp
PUSH	B
PUSH	D
PUSH	H
PUSH	PSW

Opcode	Operand
POP	Rp
POP	B
POP	D
POP	H
POP	PSW

9.2 SUBROUTNE

A subroutine is a group of instructions written separately from main program to perform a function that occurs repeatedly in the main program. A subroutine is like a procedure or function of a high-level language and it is called using the instruction CALL 16-bit memory address of a subroutine.

INSTRUCTIONS

Opcode	Operand
CALL	16-bit memory address of a subroutine
RET	

9.21 Illustrative Program: Traffic Signal Controller

PROBLEM SATEMENT

Write a program to provide the given on/off time to three traffic lights (Green, Yellow, and Red) and two pedestrian signs (WALK and DON'T WALK). The signal lights and signs are turned on/off the data bits of an output port as shown below:

Lights	Data Bits	On Time
1.Green	D0	15 seconds
2.Yellow	D2	5 seconds
3. Red	D4	20 seconds
4. WALK	D6	15 seconds
5. DON'T WALK	D7	25 seconds

PROBLEM ANALYSIS

Time	DON'T WALK	WALK		Red		Yellow		Green	Hex
0	D_7	D_6	D_5	D_4	D_3	D_2	D_1	D_0	
↓ (15)									
15	0	1	0	0	0	0	0	1 =	41H
↓ (5)									
20	1	0	0	0	0	1	0	0 =	84H
↓ (20)									
40	1	0	0	1	0	0	0	0 =	90H

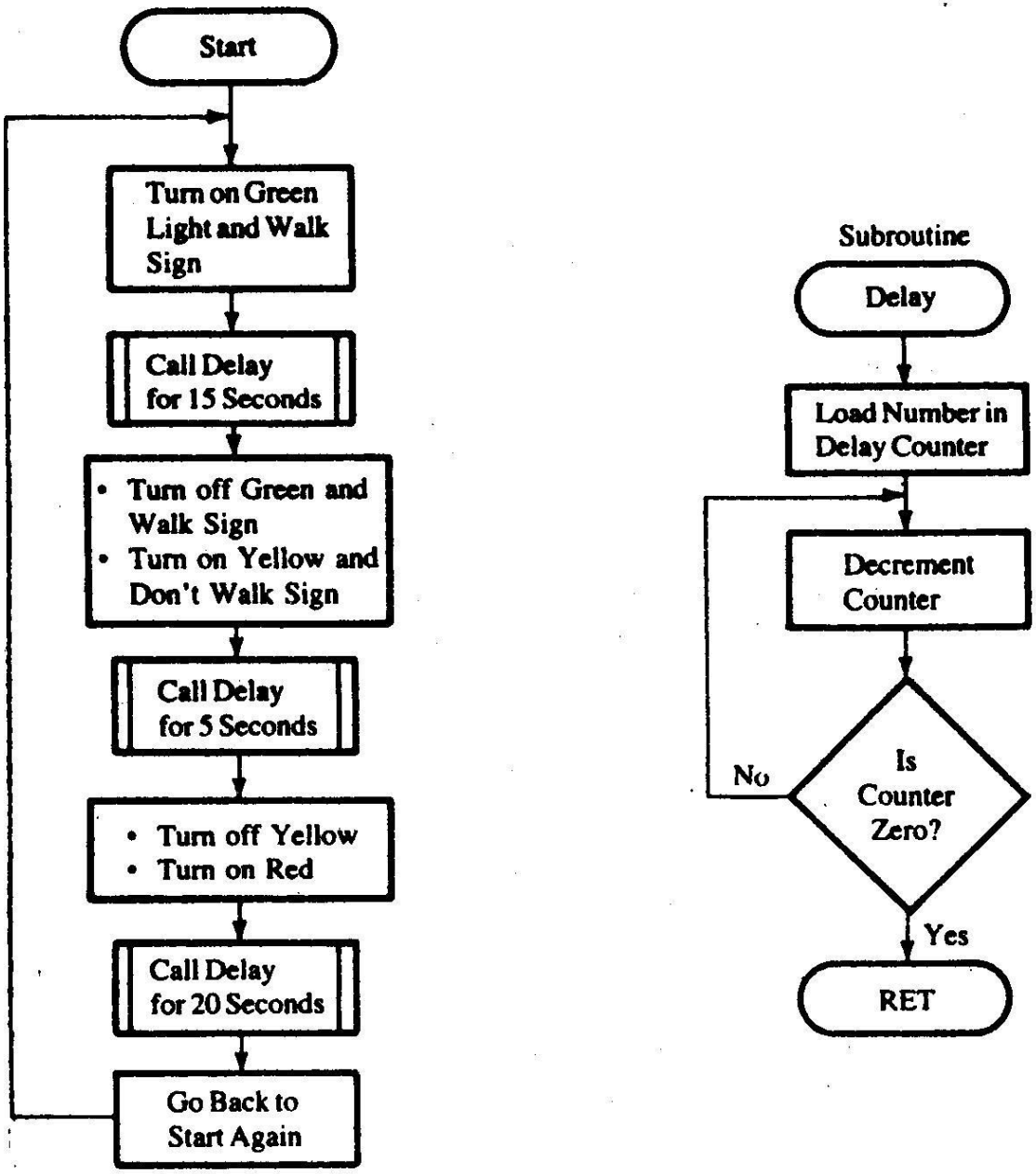

FIGURE 9.13
Flowchart for Traffic Signal Controller

PROGRAM

```
                LXI SP, XX99H

START:          MVI A, 41H
                OUT PORT#

                MVI B, 0FH
                CALL DELAY

                MVI A, 84H
                OUT PORT#

                MVI B, 05H
                CALL DELAY

                MVI A, 90H
                OUT PORT#

                MVI B, 14H
                CALL DELAY

                JMP STATR
```

```
DELAY:    PUSH D
          PUSH PSW

SECOND:   LXI D, COUNT
          CALL DELAY

LOOP:     DCX D
          MOV A,D
          ORA E
          JNZ LOOP

          DCR B
          JNZ SECOND

          POP PSW
          POP D
          RET
```