Lesson Eight

8085 Instruction Set

Lesson Objectives:

- **To illustrate the instruction set of the 8085 µp.**
- **To learn how to write several programs**

Pre Test:

- **Write a program count the odd numbers in a set of 10 numbers stored in ML starting at 2050.**
- **Write a program to add a set of 10 numbers stored in ML starting at 2050.**

EX.1:

Write a program to transfer 10 bytes stored in M.LS starting at 2080 to another M.Ls starting 2090.

```
MVI   L, OA   ⟶  10 bytes counter
LXI   B, 2080 ⟶  Source index
LXI   D, 2090 ⟶  Destination index

next: LDAX  B     ((BC)) ⟶ (A)
      STDX  D     ((DE)) ⟵ (A)
      INX   B     (BC) + 1 ┐ increment index
      INX   D     (DE) + 1 ┘
      DCR   L     (L) - 1
      JNZ  next   If (L) ≠ 0 then transfer the next bytes
      HTL ⟶ end
```

EX. 2:

Write a program to add 20 bytes stored in M.L starting at 2070 (discard the carry).

```
   MVI C, 14 H  ⟶  20 bytes counter
   XRA, A       ⟶  Rest A_CC
   LXI H, 2070  ⟶  Memory index
* :ADD M       ⟶  (A)+ (M) ⟶ (A)
   INX H        ⟶  Increment index
  DCR C         ⟶  Decrement the counter
  JNZ *         ⟶  Check for 10 bytes completion go to add if not
  HLT           ⟶  end
```

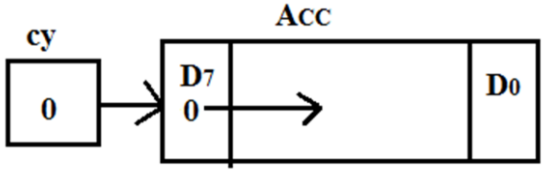
EX. 3:

Write a program to compare 2 number, which are stored in A_{cc} and Reg. B.

1- **If (A_{cc}) > (B) ⟶ reset the carry**
2- **If (A_{cc}) = (B) ⟶ set the 1st bit in (B) using rotate instruction**
3- **If (A_{cc}) < (B) ⟶ Reset the last bit in (B) using rotate instructions.**

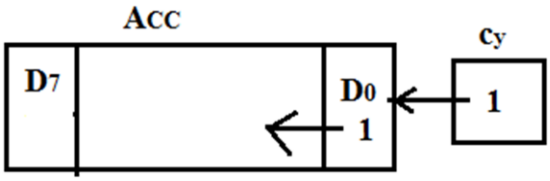
```
2000: CMP B   ⟶  Compare (A_cc) with (B)
      JC 2080 ⟶  Compare (A_cc) < (B)
      JZ 2090 ⟶  Compare (A_cc) = (B)
      STC     ⟶  Set carry                ┐ Reset the carry
      CMC     ⟶  Complement carry         ┘
      JMP 20A0
```

```
2080: STC  ┐ Load c_y by (0)
      CMC  ┘
     MOV A, B
     RRC
```



MOV B, A
JMP 20A0

2090: STC
MOV A, B
RLC
MOV B, A
JMP 20A0



20A0 RST5 (end) of the program

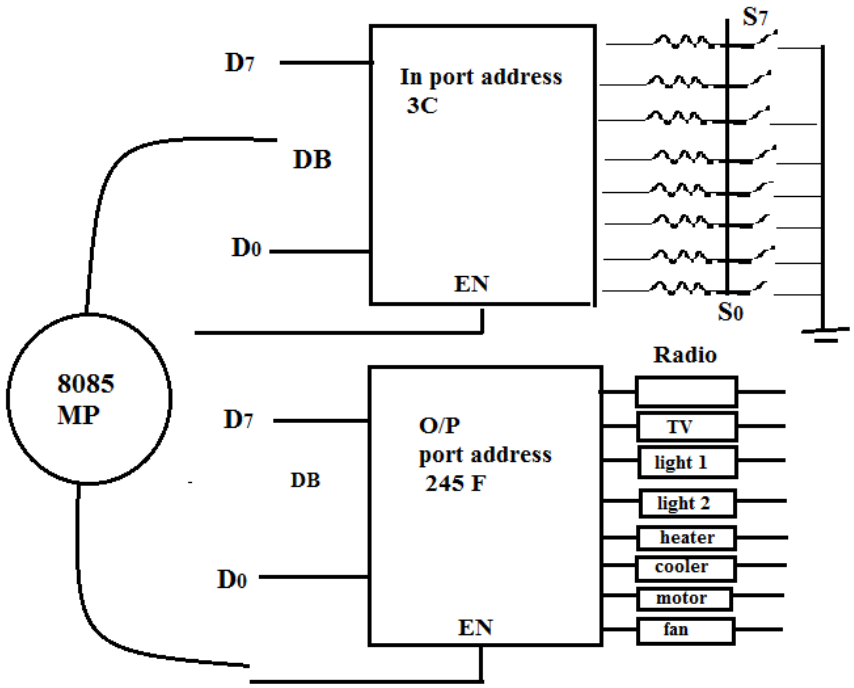
EX.4 **write a program to switch ON the heater despite the corresponding switches status and return OFF the cooler despite corresponding switches status.**

IN 3C ⟶ Transfer the switches status to DB then to A_{CC}

ORI 08 ⟶ Always the heater is switched ON

ANI FB ⟶ Always the cooler is switch OFF

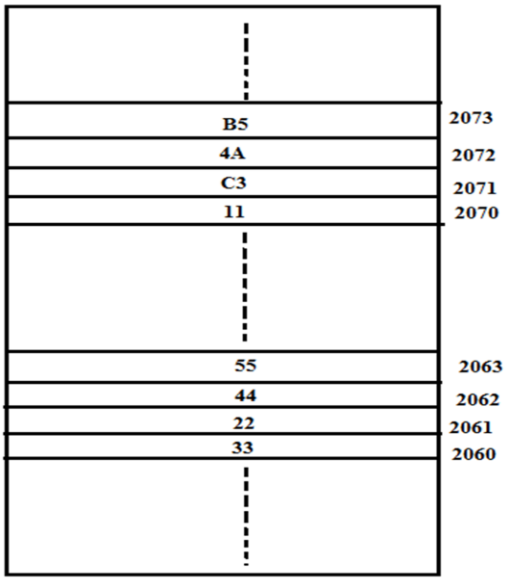
STA 245F ⟶ Enable the O/P port to send the data.



EX.5:

Write a program to add 2 numbers (24 bits each) stored in M.L starting 2060 and 2070 respectively, stored the results in M.L starting at 2080.

```
LXI D, 2080
LXI H, 2060
LXI B, 2070
LDAX  B
ADD   M
STAX  D
INX   H
INX   B
INX   D
LDAX  B
ADC   M
STAX  D
INX   H
INX   B
INX   D
LDAX   B
ADC    M
STAX   D
INX   H
INX   B
INX   D
LDAX   B
ADC    M
STAX   D
```



55 44 66 33

B5 4A C3 11

0A 8F 29 44

EX. 6:

Write a program to add 10 bytes stored in M.L starting at 2090 (discard the carry).

MVIC, OA ⟶ Counter for 10 bytes
XRA A ⟶ Reset A
LXI H, 2090 ⟶ Memory index
*:ADD M ⟶ (A) + (M) ⟶ (A)
INX H ⟶ Increment index
DCR C ⟶ Decrement the counter
JNZ * ⟶ Check for 10 bytes completion and go to ADD if not
RSTS ⟶ Else end the program

***EX.*7 Write a program to:-**

1- **Complement the content of (A) and (C).**
2- **Set the 1st and the last bits of (E).**
3- **Reset the first 4 bits of (D).**

Sol.

1- CMA ⟶ Complement the contents of (A)

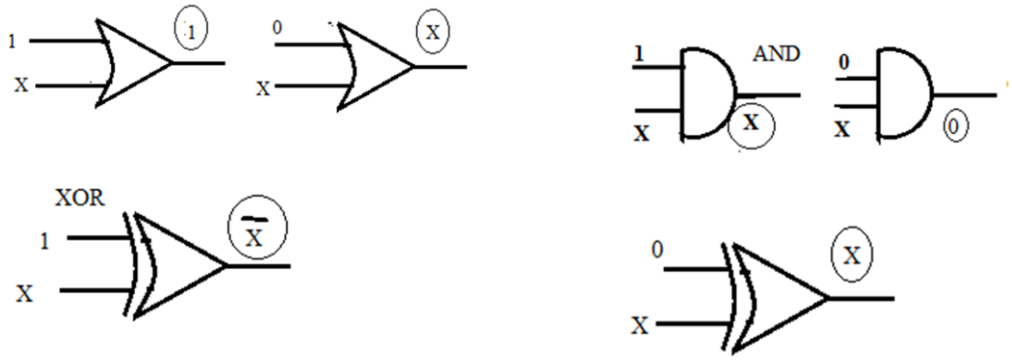
MOV A,C
XRI, FF ⟶ Complements the contents of (C)
MOV C,A

2- MOV A, E
ORI 81 ⟶ Reg. E

XXXX	XXXX
1 0 0 0	0 0 0 1
1X X X	X X X 1

3- MOV A, D
ANI FO ⟶ Reg. D

XXXX	XXXX
1 1 1 1	0 0 0 0
XXXX	0 0 0 0



EX.8: **Write a program to count the number of blank M.Ls that are contained within a set of 20 bytes stored in M.L starting at 2088. Store the results in 2090.**

LXI H, 2088
MVI B, 00

```
        MVI C, 14
Next: MOV A, M
        CPI 00
        JNZ reject
         INR B
Reject: INX H
          DCR C
         JNZ Next
         MOV A, B
        STA 2090
```

EX.9: **Compare 2 I/P values from port A and B which are addressed 3E and 072A respectively if (port A) > (port B), then reset flag else end program.**

```
2000:    IN   3E
2002:    MOV  C, A
2003:    LDA  072A
2006:    CMP  C
2007:    JC  200B
2008:    JZ  200B
2009:    STC
200A:    CMC
200B:     RST 5
```

Examples

H.W.

Rewrite the program in Example (6) taken into account the carry.

Reference:

8085 µp architecture and programming_Gonkar