ΕΘΝΙΚΟ ΜΕΤΣΟΒΙΟ ΠΟΛΥΤΕΧΝΕΙΟ
ΣΧΟΛΗ ΗΛΕΚΤΡΟΛΟΓΩΝ ΜΗΧΑΝΙΚΩΝ ΚΑΙ ΜΗΧΑΝΙΚΩΝ ΥΠΟΛΟΓΙΣΤΩΝ

Εργαστήριο Μικροϋπολογιστών

$1^{η}$ εργαστηριακή άσκηση

mLab 8085

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Άσκηση 1

```
LXI B,03E8H ; B = 1000d -> delay = 1s
MVI D,00H

START:
        LDA 2000H
        ANI 0FH
        JZ START        ;check if zero dip switches are turned on
        MOV E,A            ;make E the LSB value
        CALL CHECK         ;if MSB is on continue, else wait for it to turn on
INC:
        MOV A,D
        CMA
        STA 3000H         ;show the value of D in the LEDS
        CALL DELB         ;delay 1 sec
        CALL CHECK         ;same as before
        INR D                 ;D++
        MOV A,D
        CMP E
        JC INC                 ;while D<E go to INC
DEC:
        MOV A,D
        CMA
        STA 3000H
        CALL DELB
        CALL CHECK
        DCR D                 ;D--
        JNZ DEC         ;while D>0 go to DEC
        JMP START         ;if D = 0 then go to Start to refresh the value of E



CHECK:
        LDA 2000H
        ANI 80H
        CPI 80H
        JNZ CHECK
        RET

END
```

Άσκηση 2

```
MVI A,10H        ;empty space on 7seg
STA 0B53H
STA 0B54H
```

```
STA 0B55H

START:
CALL KEYBOARDINPUT        ;read the first number
MOV B,A
CALL KEYBOARDINPUT        ;read the second number
MOV C,A

MOV A,B
RLC
RLC
RLC
RLC
ADD C
CALL HEXTODEC
LXI D,0B50H
CALL STDM
CALL DCD
JMP START

KEYBOARDINPUT:        ;routine that reads a 1-bit number [0-F] from the keyboard
CALL KIND
CPI 10H
JNC KEYBOARDINPUT
RET

HEXTODEC:

MVI B,00H        ;counts the # of hundreds/tens/ones


HUNDREDS:
CPI 64H        ;if  A < 100 store B for hundreds
JC STOREHUNDREDS
; else inr # of hundreds and decrease number by 100 and repeat
INR B
SUI 64H
JMP HUNDREDS
STOREHUNDREDS:
MOV C,A        ;temp store number
MOV A,B        ;store # of hundreds in random address 0B52H for STDM
STA 0B52H
MOV A,C
MVI B,00H        ;reinitialize B for tens

TENS:
CPI 0AH        ;if A < 10
JC STORETENS
```

```
;same as hundreds
INR B
SUI 0AH
JMP TENS
STORETENS:
MOV C,A
MOV A,B
STA 0B51H
MOV A,C
MVI B,00H

ONES:
CPI 01H         ; if A<1
JC STOREONES
;same as ones
INR B
SUI 01H
JMP ONES
STOREONES:
MOV C,A
MOV A,B
STA 0B50H
MOV A,C

RET

END
```

Άσκηση 3

```
LXI B,01F4H             ; B = 500d -> delay = 0.5s
MVI D,01H               ;counter
MVI E,01H               ;register to remember the state of the LSB

INC:
        MOV A,D
        CMA
        STA 3000H           ;show the value of D in the LEDS
        CALL DELB           ;delay 0.5 sec
INCN:                       ;checking if the MSB is on, if not then we wait
        CALL CHECK
        LDA 2000H
        ANI 01H
        CMP E                   ;checks if the state of the LSB has changed
        JNZ CHANGESTATE1    ;if yes, then goes to CHANGESTATE1
CONT:
        MOV A,D
```

```
        CPI 80H
        JZ DEC                ;if it has reached the MSB then go to DEC
        RLC                    ;else move it one position to the left
        MOV D,A
        JMP INC

DEC:
        MOV A,D
        CMA
        STA 3000H            ;show the value of D in the LEDS
        CALL DELB            ;delay 0.5 sec
DECN:                        ;checking if the MSB is on, if not then we wait
        CALL CHECK
        LDA 2000H
        ANI 01H
        CMP E                    ;checks if the state of the LSB has changed
        JNZ CHANGESTATE2 ;if yes, then goes to CHANGESTATE2
CONT2:
        MOV A,D
        CPI 01H
        JZ INC                ;if it has reached the LSB then go to INC
        RRC                    ;else move it one position to the right
        MOV D,A
        JMP DEC

;change the value of E and check if the change went from ON->OFF
CHANGESTATE1:
        MOV E,A            ;E changes State
        CPI 00H
        JZ DECN            ;if A=0 the LSB went from ON->OFF so we change
        ↪  direction
                               ;DECN if we don't want double delay for the
                               ↪  displayed led
                               ;if we don't mind we can simply put DEC
        JMP CONT        ;else it continues

;change the value of E and check if the change went from ON->OFF
;same as CHANGESTATE2
CHANGESTATE2:
        MOV E,A
        CPI 00H
        JZ INCN
        JMP CONT2

;CHECK POWER (ON-OFF) ROUTINE
CHECK:
    LDA 2000H
        ANI 80H
```

```
64          CPI 80H
65          JNZ CHECK
66          RET
67
68  END
```