



ΕΘΝΙΚΟ ΜΕΤΣΟΒΙΟ ΠΟΛΥΤΕΧΝΕΙΟ

ΣΧΟΛΗ ΗΜ&ΜΥ

Εργαστήριο Μικροϋπολογιστών 1^η Εργαστηριακή Άσκηση
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Ομάδα C07

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Άσκηση 1.ii

Χρονόμετρο δευτερολέπτων

```
1  START:
2      CALL BEEP
3      LXI B,03E8H
4      MVI A,FEH
5  LOOPA:
6      STA 3000H
7      CALL DELB
8      CPI FOH
9      JZ START
10     DCR A
11     JMP LOOPA
12  END
```

Άσκηση 2.i

```
1  START:
2      LDA 2000H
3      MOV D,A
4      RRC
5      RRC
6      RRC
7      RRC
8      ANI OFH
9      MOV E,A
10     ;E has MSB needed for ANAMMA
11     MOV A,D
12     ANI OFH
13     MOV D,A
14     ;D has LSB needed for SBHSIMO
15     CALL ANAMMA
16     CALL SBHSIMO
17     JMP START
18  ANAMMA:
19     LXI B,0000H
20     LXI H,0000H
21     MOV C,E
22     CALL SHIFTBC
23     CALL SHIFTBC
24     DAD B
25     CALL SHIFTBC
26     CALL SHIFTBC
27     CALL SHIFTBC
28     DAD B
29     CALL SHIFTBC
30     DAD B ;HL has the needed delay
31     MOV C,L
32     MOV B,H
33     ;need to turn on the led(s)
34     CALL ONN
35     CALL DELB
36     RET
37
38  SBHSIMO:
39     LXI B,0000H
40     LXI H,0000H
41     MOV C,D
42     CALL SHIFTBC
43     CALL SHIFTBC
44     DAD B
45     CALL SHIFTBC
46     CALL SHIFTBC
47     CALL SHIFTBC
48     DAD B
49     CALL SHIFTBC
50     DAD B ;HL has the needed delay
51     MOV C,L
52     MOV B,H
53     ;need to turn on the led(s)
```

```

54         CALL OFF
55         CALL DELB
56         RET
57 SHIFTBC: ;shifts BC a bit to the left :)
58         MOV A,C
59         RAL
60         CC ROTC
61         CNC ROTNC
62         RET
63
64 ROTNC:
65         MOV C,A
66         MOV A,B
67         RLC
68         MOV B,A
69         RET
70 ROTC:
71         MOV C,A
72         MOV A,B
73         RLC
74         MOV B,A
75         INR B
76         RET
77 ONN:
78         MVI A,00H
79         STA 3000H
80         RET
81 OFF:
82         MVI A,FFH
83         STA 3000H
84         RET
85
86
87 END

```

Άσκηση 2.ii

```

1  START:
2      CALL CHECK_INPT
3      CALL MDELAY
4      CALL INC_COUNT
5      CALL SHOW_COUNTERS
6      JMP START
7
8  CHECK_INPT:
9      LDA 2000H
10     RAL
11     CC DIAKOPH
12     RET
13
14 SHOW_COUNTERS:
15     MOV A,D
16     RAL
17     RAL
18     RAL
19     RAL
20     ADD E
21     CMA
22     STA 3000H
23     RET
24 MDELAY:
25     CALL MINI_DELAY
26     CALL CHECK_INPT
27     CALL MINI_DELAY
28     CALL CHECK_INPT
29
30 MINI_DELAY:
31     DI
32     LXI B,0032H
33     CALL DELB
34     RET
35
36 INC_COUNT:
37     MOV A,E
38     INR A

```

```

39         ANI OFH
40         MOV E,A
41         RET
42 INC_INTR:
43         MOV A,D
44         INR A
45         ANI OFH
46         MOV D,A
47         RET
48
49 DIAKOPH:
50         MVI A,ODH
51         SIM
52         EI
53         RET
54
55 INTR_ROUTINE:
56         CALL MINI_DELAY
57         PUSH B
58         PUSH D
59         CALL BEEP
60         POP D
61         POP B
62 LP:      RIM
63         CALL MINI_DELAY
64         ANI 10H
65         CPI 10H
66         JZ LP
67         CALL INC_INTR
68         EI
69         RET
70 END

```