ΕΘΝΙΚΟ ΜΕΤΣΟΒΙΟ ΠΟΛΥΤΕΧΝΕΙΟ

ΣΧΟΛΗ ΗΜ&ΜΥ
Εργαστήριο Μικροϋπολογιστών

$2^{η}$ Εργαστηριακή Άσκηση
Ακ. έτος 2011-2012

Ομάδα C07:

Ελένη Ευαγγελάτου A.M.: 03108050
Γρηγόρης Λύρας A.M.: 03109687
Βασιλεία Φραγκιαδάκη A.M.: 03108026

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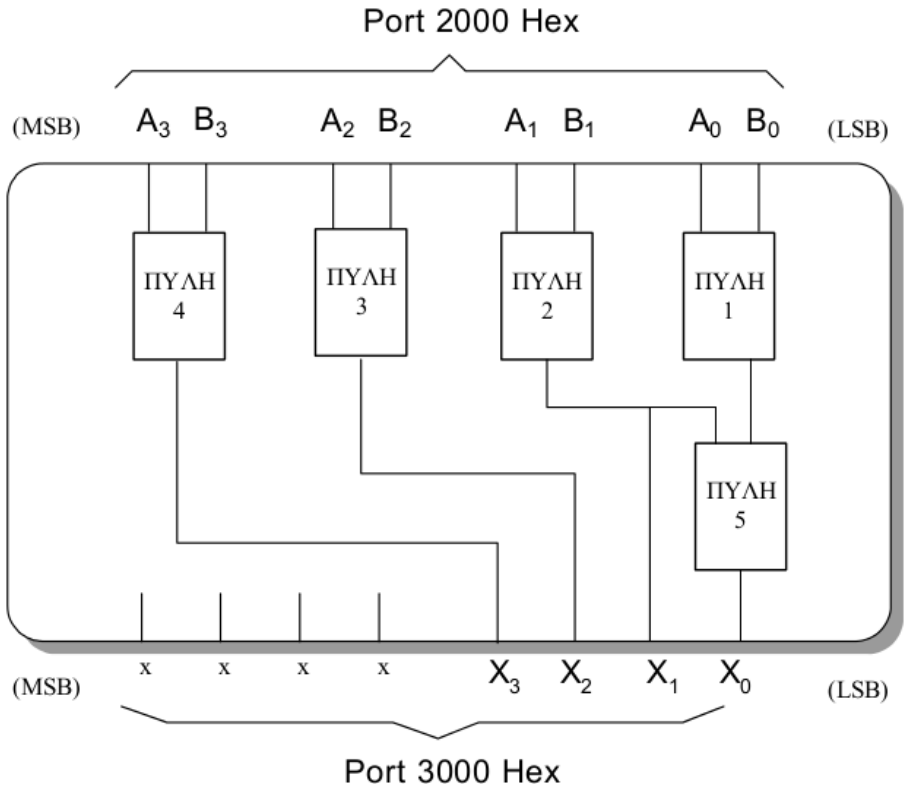

Σχήμα 1: Το IC του θέματος

Άσκηση 3(i)

```
START:
    LDA 2000H
    CALL XOR
    CALL XOR
    CALL XOR
    CALL XOR
    MOV D,C
    MOV A,C
    RAR
    MOV C,A
    MOV A,D
    RAL
    RAL
    RAL
    RAL
    RAL
    RAL
    CALL OR
    MOV A,C
    ANI 0FH
    CMA
    STA 3000H
    JMP START

XOR:
    RAL         ;CALL XOR
    JC ONE      ;XY
    RAL         ;0Y
    JC TRUE     ;0Y
    JMP FALSE   ;00
ONE:            ;1Y
    RAL         ;1Y
    JC FALSEX   ;11
    JMP TRUE    ;10

OR:
```

```
    RAL          ;CALL OR;XY
    JC TRUE      ;1Y
    RAL          ;0Y
    JC TRUE      ;11
    JMP FALSE    ;00

TRUE:
    MOV B,A      ;USE B AS BUFFER
    MOV A,C      ;LOAD PREVIOUS OUTCOME FORM C
    RAL          ;SHIFT A
    ORI 01H      ;ADD 1 IN THE END
    JMP RESTORE

FALSE:
    MOV B,A      ;USE B AS BUFFER
    MOV A,C      ;LOAD PREV FROM C
    RAL          ;SHIFT A
    ANI FEH      ;ADD 0 IN THE END
    JMP RESTORE

RESTORE:
    MOV C,A      ;RESTORE BUFFERS AS THEY WERE
    MOV A,B
    RET
END
```

Άσκηση 4(ii)

```
    MVI A,10H    ;fortwnoume to 10H
    STA 0BB0H    ;wste na ka8arisei
    STA 0BB1H    ;to display
    STA 0BB2H
    STA 0BB3H
    STA 0BB4H
    STA 0BB5H
    LXI D,0BB0H
    CALL STDM
LP:
    CALL KIND    ;h kind 8a ferei ton
    MOV B,A      ;kwdiko pshfiou ston A
    ANI 0FH      ;xrhsimopoioume ton B ws buffer
    STA 0BB54H   ;grafoume ta 4LSB sthn 8esh tou pemptou pshfiou
    MOV A,B
    RLC          ;me kuklikh olis8ish 4fores
    RLC          ;fernoume ta 4MSB sta 4LSB
    RLC          ;gia na ta grapsoume sth dieu8unsh
    RLC          ;tou ektou pshfiou
    ANI 0FH
    STA 0BB5H
    LXI D,0BB0H ;dinoume ston DE th 8esh pou 8a
    CALL STDM    ;xrhsimopoihsei h STDM gia na kanei to refresh
    JMP LP       ;tou display
END
```

Άσκηση 4(iv)

```
START:
    IN 10H

READ_BINARY:
    LDA 2000H
    RAL
    JC NEGATIVE
    JNC POSITIVE

;ARNHTIKOS EINAI MONO OTAN MSB==1 , OPOTE KAI TON "METATREPW"

NEGATIVE:
    RAR         ;GIA UNDO THN RAL
    CMA         ;TO SUMPLHRWMA WS PROS 2 TOY SUMPLHRWMATOS WS PROS 2 MAS DINEI TON ARX ARI8MO
    INR A
    MVI E,1CH   ;O E EXEI TO PROSHMO. 17 GIATI AYTO ANTISTOIXEI SE - STHN DCD
    ;CMA         ;TO CMA XREIAZETAI GIATI PLEON OLOI ARITHMOI MOU EINAI 8ETIKOI
    JMP DEC_CONVERTION
```

```
19
20  POSITIVE:
21      RAR         ;GIA UNDO RAL
22      MVI E,10H   ;O E EXEI TO PROSHMO , TO 10 GIATI AUTO ANTISTOIXEI SE KENO STHN DCD
23
24  DEC_CONVERTION:
25
26      MVI C,00H   ;STON C OI MONADES
27      MVI B,FFH   ;STON B OI DECADES , EBALA FF GIATI META KSEKINAW KANONTAS INR
28      MVI D,00H   ;STON D OI EKATONTADES
29
30  BCD_FINDER:
31      CPI 64H        ;SUGKRINW ME TO 100
32      JM ELEGX_DEC ;AN EINAI DHL. NUMBER<100 H' ALLIWS (A)-100<0 TOTE ELEGXEI DECADES
33      MVI D,01H    ;ALLIWS O ARITHMOS MAS EXEI MIA EKATONTADA
34      SUI 64H ;AFAIRW TO 100 KAI SUNEXIZW GIA DECADES
35
36  ELEGX_DEC:
37      INR B
38      SUI 0AH ;AFAIRW 10 KAI METRAW POSES DECADES AFAIRESA
39      JNC ELEGX_DEC ;MEXRI NA MEINOUNE MONADES
40      ADI 0AH ;DIORTHWSH YPOLOIPOU, PROSTHETW 10
41      MOV C,A ;STON C OI MONADES
42
43  EMFANISH_STA_3DEKSIA_7SEGM:
44
45      ;===1o LSB PSHFIO===
46      LXI H,0990H ;BAZW STON H::=C =LEAST SIGN BIT, TIS MONADES @ THESH MNHMHS 0990
47      MOV M,C
48
49      ;===2o LSB PSHFIO===
50      LXI H,0991H ;BAZW STON H::=B =2o LSB TIS DEKADES @ THESH MNHMHS 0991
51      MOV M,B
52
53      ;===3o LSB PSHFIO===
54      LXI H,0992H ;BAZW STON H::=L THN EKANTONTADA (AN YPARXEI) @ THESH MNHMHS 0991
55      MOV M,D
56
57      ;===4o LSB PSHFIO===
58      LXI H,0993H ;BAZW STON H::=E TO PROSHMO
59      MOV M,E
60
61      ;===5o lSB PSHFIO===
62      LXI H,0994H ;EMFANIZEI KENA TA YPOLOIPA BITS
63      MVI M,10H
64
65      ;===6o (MSB)PSHFIO===
66      LXI H,0995H
67      MVI M,10H
68
69
70      LXI D,0990H ; BAZW STON D THN THESH APO OPOU ARXIZEI TO LSB
71      CALL STDM   ; TA METAFEREI TA BITS NA TA PAREI H DCD KAI NA TA PAEI STA 7SEG
72      CALL DCD
73      JMP START ; H DCD PAIRNEI TA PSHFIA KAI TA BAZEI STOUS 7SEGMENTS
74  END
```