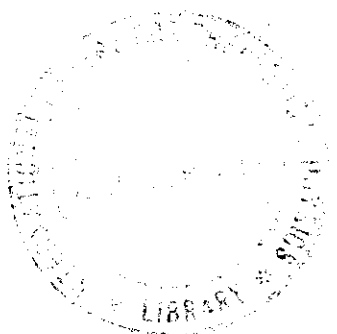




INTERNATIONAL ATOMIC ENERGY AGENCY
UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION



INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS
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CABLE: CENTRATOM - TELEX 460392-I

SMR/90 - 33

COLLEGE ON MICROPROCESSORS:
TECHNOLOGY AND APPLICATIONS IN PHYSICS

7 September - 2 October 1981

SOLUTIONS TO PIA EXERCISES

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These are preliminary lecture notes, intended only for distribution to participants. Missing or extra copies are available from Room 230.

EXERCISE NO. 4

CROSS ASSEMBLER FOR MOTOROLA 6800 PROCESSOR
VERS. 1.0, RUN AT CERN'S CDC COMPUTER CENTRE

81/09/21, PAGE 4
15.26.17.

LINE ADDR CODE EXTENSIONS SOURCE - STATEMENT 73....80

```

1 0090
2
3 0090 7F BF09
4 0093 7F BF08
5 0096 B6 06
6 0098 B7 BF09
7 0099 7D BF08
8 009E 7F BF08
9 00A1 7F BF08
10 00A4 73 BF0A
11 00A7 B6 04
12 00A9 B7 BF08
13
14
15
16
17 00AC B6 BF09
18 00AF 2A F8
19 00B1 B6 BF08
20 00B4 B8 BF0A
21 00B7 E7 BF0A
22 00BA 20 F0
23
24
25
26
27
28
29
30 00C0
31 00C3 7F BF09
32 00C6 B6 16
33 00C8 B7 BF09
34 00CB 7D BF08
35 00CE 7F BF08
36 00D1 7F BF0A
37 00D4 73 BF0A
38 00D7 B7 BF08
39
40
41
42
43 00DA B6 BF09
44 00DD 2A 06
45 00DF 7C BF0A
46 00E2 F6 BF08
47
48
49 00E5 B6 BF09
50 00E8 48

```

```

EX4
ORG $90
CLR CRA
CLR DORA
LDA A #6
STA A
TST CRA
CLR CRB
CLR DORB
COM DORB
LDA A #4
STA A CRB
WAIT FOR FLAG, READ SWITCHES, ADD OLD DATA, STORE RESULT
EX4LP
LDA A CRA
BPL EX4LP
LDA A CRA
ADD A CRB
STA A CRB
BRA EX4LP

```

```

EX5
ORG $C0
CLR CRA
CLR DORA
LDA A #16
STA A
TST CRA
CLR CRB
CLR DORB
COM DORB
STA A CRB
FIND FLAGS, COUNT UP OR DOWN
EX5LP
LDA A CRA
BPL CR2
INC CRB
LDA B CRA
CR2
LDA A CRA
ASL A

```

```

EX6
ORG $100
CLR CRA
CLR DORA
LDA A #16
STA A
TST CRA
CLR CRB
CLR DORB
COM DORB
LDA A #32
STA A CRB
FIND FLAGS, COUNT UP OR DOWN
EX6LP
LDA A CRA
BPL CR2
INC CRB
LDA B CRA
CR2
LDA A CRA
ASL A

```

150LUTIONS TO EXERCISES 4.1 TO 4.6

EXERCISE NO. 5

CROSS ASSEMBLER FOR MOTOROLA 6800 PROCESSOR
VERS. 1.0, RUN AT CERN'S CDC COMPUTER CENTRE

81/09/21, PAGE 5
15.26.17.

LINE ADDR CODE EXTENSIONS SOURCE - STATEMENT 73....80

```

1 00E9 2A 06
2 00EE 7A BF0A
3 00EE F6 BF08
4
5
6 00F1 20 E7
7
8
9
10
11
12
13 0100
14
15 0100 7F BF09
16 0103 7F BF08
17 0104 B6 16
18 0108 B7 BF09
19 010B 7D BF08
20 010E 7F BF0A
21 0111 7F BF0A
22 0114 73 BF0A
23 0117 B6 3C
24 0119 B7 BF08
25
26
27
28
29
30 011C B6 BF09
31 011F B4 C0
32 0121 27 F9
33 0123 48 08
34 0124 24 08
35 0126 7C BF0A
36 0129 F6 BF08
37 012C 20 08
38
39 012E 2A 06
40 0130 7A BF0A
41 0133 F6 BF08
42
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44
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46 0136 F1 BF0A
47 0139 26 00
48 013B B6 BF08
49 013E B8 08
50 013E B8 08

```

```

EX6
ORG $100
CLR CRA
CLR DORA
LDA A #16
STA A
TST CRA
CLR CRB
CLR DORB
COM DORB
LDA A #32
STA A CRB
FIND FLAGS, COUNT UP OR DOWN
CHECK FOR MATCH IN INPUT
EX6LP
LDA A CRA
AND A #40
BEQ EX6LP
ASL A
BCC DOWN
TNC ORB
LDA B CRA
BRA CHECK
DOWN
BPL CHECK
DEC ORB
LDA B CRA
CHECK
IF CRA-6=1, THEN
CLEAR FLAG

```

```

EX6
ORG $100
CLR CRA
CLR DORA
LDA A #16
STA A
TST CRA
CLR CRB
CLR DORB
COM DORB
LDA A #32
STA A CRB
FIND FLAGS, COUNT UP OR DOWN
CHECK FOR MATCH IN INPUT
EX6LP
LDA A CRA
AND A #40
BEQ EX6LP
ASL A
BCC DOWN
TNC ORB
LDA B CRA
BRA CHECK
DOWN
BPL CHECK
DEC ORB
LDA B CRA
CHECK
IF CRA-6=1, THEN
CLEAR FLAG

```

```

EX6LP
LDA A CRA
AND A #40
BEQ EX6LP
ASL A
BCC DOWN
TNC ORB
LDA B CRA
BRA CHECK
DOWN
BPL CHECK
DEC ORB
LDA B CRA
CHECK
IF CRA-6=1, THEN
CLEAR FLAG

```

```

HERE WE COMPARE REGISTER AND SWITCHES
CMP B ORB
BNE NEXT
LDA A CRB
EOR A #B

```

150LUTIONS TO EXERCISES 4.1 TO 4.6

EXERCISE NO. 6

CROSS ASSEMBLER FOR MOTOROLA 6800 PROCESSOR
VERS. 1.0, RUN AT CERN'S CDC COMPUTER CENTRE

81/09/21, PAGE 6
15.26.18.

LINE ADDR CODE EXTENSIONS SOURCE - STATEMENT 73....80

```

EX6
ORG $100
CLR CRA
CLR DORA
LDA A #16
STA A
TST CRA
CLR CRB
CLR DORB
COM DORB
LDA A #32
STA A CRB
FIND FLAGS, COUNT UP OR DOWN
CHECK FOR MATCH IN INPUT
EX6LP
LDA A CRA
AND A #40
BEQ EX6LP
ASL A
BCC DOWN
TNC ORB
LDA B CRA
BRA CHECK
DOWN
BPL CHECK
DEC ORB
LDA B CRA
CHECK
IF CRA-6=1, THEN
CLEAR FLAG

```

```

1 0140 B7 BFOB STA A CRB
2 0143 B8 OB EOR A #B
3 0145 B7 BFOB STA A CRB
4
5
6 014B 20 D2 BRA EX6LP
7
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9 014A END PIA
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```

CROSS ASSEMBLER FOR MOTOROLA 4800 PROCESSOR
VERS. 1.0, RUN AT CERN'S CDC COMPUTER CENTRE 81/09/21. PAGE 15.26.19.

```

1 0140 B7 BFOB STA A CRB
2 0143 B8 OB EOR A #B
3 0145 B7 BFOB STA A CRB
4
5
6 014B 20 D2 BRA EX6LP
7
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9 014A END PIA
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```

END OF ASM 4800- 5.003 CP SECONDS ASSEMBLY TIME.

1

--EOR--

1 PAGE 1 81/09/21. 15.26.23. CUFOM LINKAGE EDITOR (1.1)

--0==) ** LINKED (VERSION 1.1) ON CDC/N05/BE (81/09/21..).

--1==) FROM MODULE X PIA
--1==) SOLUTIONS TO EXERCISES 4.1 TO 4.6
--1==) CROSS ASSEMBLER FOR MOTOROLA 4800 PROCESSOR, VERS. 1.0
--1==) RUN AT CERN'S CDC COMPUTER CENTRE 81/09/21. 15.26.15.
ABSOLUTE SECTION 0
START ADDRESS IN SECTION 0, OFFSET = 0

>>>> 0 ERROR DETECTED IN INPUT MODULES <<<<<<

--EOR--

1 PAGE 1 81/09/21. 15.26.43. CUFOM -> MOTOROLA TRANSLATOR (1.1)

THE CONTROL CARD PARAMETERS ARE

OPTION INPUT FILE IS- OPTIONS
CUFOM INPUT FILE IS- CUFOUT
BINARY OUTPUT FILE IS- LOADMOD
LIST OUTPUT FILE IS- LISTING

THE SECTION ORIGINS ARE SPECIFIED AS FOLLOWS

1 SECTION(0,ABSOLUTE)=0000.
1 PAGE 2 81/09/21. 15.26.43. LOAD MAP FOR CUFOM -> MOTOROLA TRANSLATOR (1.1)

MODULE ENTRY SECTION ADDRESSES X PROCESSOR COMMENTS
NAME TYPE AND NAME MEMORY ORIGIN LISTING

PIA
MODULE TRANSFER ADDRESS IS X 000000
LINKED (VERSION 1.1) ON CDC/N05/BE (81/09/21.)
SOLUTIONS TO EXERCISES 4.1 TO 4.6
CROSS ASSEMBLER FOR MOTOROLA 4800 PROCESSOR, VERS. 1.0
RUN AT CERN'S CDC COMPUTER CENTRE 81/09/21. 15.26.15.

>>>> 0 ERROR DETECTED IN CUFOM INPUT FILE <<<<<<
END OF FILE