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MCS80 MACRO ASSEMBLER FOR THE 8080 CPU

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## 1.0 INTRODUCTION

The 8080 Macro Assembler is now available on the LLL 7600 system. This report is a user's manual for executing the 8080 assembler on the 7600 computers.

The MCS80 program accepts as input programs written in Intel 8080 CPU assembly language (Ref. Intel Corp. 8080 Assembly Manual, Volume 1 and 2). The program will write a magnetic tape in Intel BNPF format or BIN DEC binary format which can be used to punch a paper tape utilizing the CDC 160A computer in Building 117.

## 2.0 READING MCS80 FROM PHOTOSTORE

The MCS80 program is stored in the elephant photostore under the "take" directory: 558850:NEWINTEL.

After logging onto the Octopus System on a CDC-7600 computer system read MCS80 from the photostore as follows:

Note: In the following examples, lines prefixed with a right arrow (→) are those typed by the user. All others are typed by the program.

```
→ELF/.5.1
→.RDS .558850: NEWINTEL: MCS80
→.END
RDS
ALL DONE
```

After the above operations, the assembler program will exist on disk file available for use as described in the following section.

## 3.0 CREATING AN INPUT FILE

Before running MCS80, an ASCII disk file containing the 8080 program in the 8080 symbolic assembly language must be available. This data file can be created in a number of ways.

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For example, cards can be punched and read onto disk through an online card reader or RJET, or one of the Octopus editor routines (TRIX, NAB, MICROPUS) can be used for illustrative purposes. Figure 1 shows a data file created with TRIX:

```
TRIX AC / .5 .1
.C(TEST2)
.EL1
&      LXI SP,1000
&; SAMPLE PROGRAM FOR 8080 PROCESSOR
&START: MVI L,200
&      MVI H,0
&LOOP:  MOV A,M
&      CPI 46
&      JZ FOUND
&      CALL INCR
&      MOV A,L
&      CPI 220
&      JNZ LOOP
&FOUND: HLT
&INCR:  INR L
&      RNZ
&      INR H
&      RET
&      END
.&
.END
ALL DONE
```

Figure 1.

Sample data file created using Trix.

The details of this use of TRIX are referenced at the end of this report; TRIX is by far the most powerful editor on the Octopus system. It is well worth the user's time to learn how to use it.

#### 4.0 RUNNING MCS80 FROM A TELETYPE

Once we have obtained MCS80 from the photostore and have created a data file we are able to run MCS80. To start the program into execution:

→MCS80/.5.1

TYPE INPUT FILE AND OUTPUT TAPE

TEST 2 \*OTAPE

8080 MACRO ASSEMBLER, VER 1.1

NO PROGRAM ERRORS

ALL DONE

WHERE: TEST 2 = Input Data File

\*OTAPE = Output Tape, \*is a message to label and hang a classified tape called OTAPE.

During execution two disk files are created. They are:

MCS BIN - The formatted object code in BNPF or DEC binary format, as shown in Figure 2 below.

```

001 BLOCK01 0
002 A 000070
003 B 000000
004 C 000010
005 D 000020
006 E 000030
007 FOUND 000260
008 H 000040
009 INCR 000270
010 L 000050
011 LOOP 000070
012 M 000060
013 PSW 000060
014 SP 000060
015 START 000030
#
0 BNPPPNNNNPF BNPNNNNNNF BNNNNNNNNF BNPNPPPNF
4 BPPNNPNNNF BNNPNNNPPNF BNMMNNNNNF BNPPPPPPNF
6 OPPPPPPPPNF BNMPNPPPNF BPPNNIPPNPF BNMMNPNNNF
12 BNNNNNNNNF BPPNNNPPNPF BNNNPNHPPPF BNHHNNNNNF
16 BNPPPPPPNPF BPPPPPPPPNF BPPNPPPNNF BPPNNNNPPNF
20 BNMMNNNPF BNNMMNNNNF BNFFFNPPPNF BNPNPPNNF
24 BPPNNNNNNF BNPNNNPNMF BPPNNPNHNF

```

Figure 2. Sample MCS BIN disk file BNPF format.

MCS OUT - Standard output which contains a symbol table and source and object code, as shown in Figure 3 below:

1 8080 MACRO ASSEMBLER, VER 1.1 ERRORS = 0 PAGE 1

```

8080 314000      LXI SP,1000
                  SAMPLE PROGRAM FOR 8080 PROCESSOR
8003 2E08      START: MOV L,200
8005 2600      MOV H,0
8007 7E      LOOP: MOV A,M
8008 FE2E      CPI 46
800A CA1600      JZ FOUND
800D CD1700      CALL INCR
8010 7D      MOV A,L
8011 FEDC      CPI 220
8013 C20700      JNZ LOOP
8015 16      FOUND: HLT
8017 20      INCR: INR L
8018 C8      RNZ
8019 24      INR H
801A C9      RET
END

```

NO PROGRAM ERRORS

1 8080 MACRO ASSEMBLER, VER 1.1 ERRORS = 0 PAGE 2

#### SYMBOL TABLE

\* 81

|    |      |       |      |   |      |      |      |
|----|------|-------|------|---|------|------|------|
| A  | 8007 | S     | 8000 | C | 8001 | D    | 8002 |
| E  | 8003 | FOUND | 8016 | H | 8004 | INCR | 8017 |
| L  | 8005 | LOOP  | 8007 | M | 8006 | PSW  | 8006 |
| SP | 8006 | START | 8003 | * |      |      |      |

Figure 3. Sample MCS OUT disk file.

IF A LINEFEED COMMAND IS USED IN PLACE OF INPUT TAPE AT RUN TIME NO MAGNETIC TAPE WILL BE CREATED.

Note: Output tape will be in DEC binary format unless specified otherwise in the assembly format.

## 5.0 OBTAINING AN OUTPUT LISTING

To obtain an output listing of your program, type:

ALLOUT PRINTER MSC OUT BOX nn NAME/.2.1

WHERE: nn = Your box number

NAME = Your name

## 6.0 PUNCHING PAPER TAPE

The CDC-160A computer in Building 117 is used for punching a paper tape using the magnetic tape. The instruction book at the CDC-160A tells how to use the computer; LER71-10506 "Preparing and Verifying Punched Paper Types for the CLI Program," also contains instructions for preparing a paper tape.

## 7.0 NEED HELP?

If you need help in running the MCS80 assembler or the CDC-160A please contact Walter Benge or Terry Allison.

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