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Lawrence Livermore Laboratory

SIMULATOR PROGRAM FOR THE MCS-80 8080 CPU

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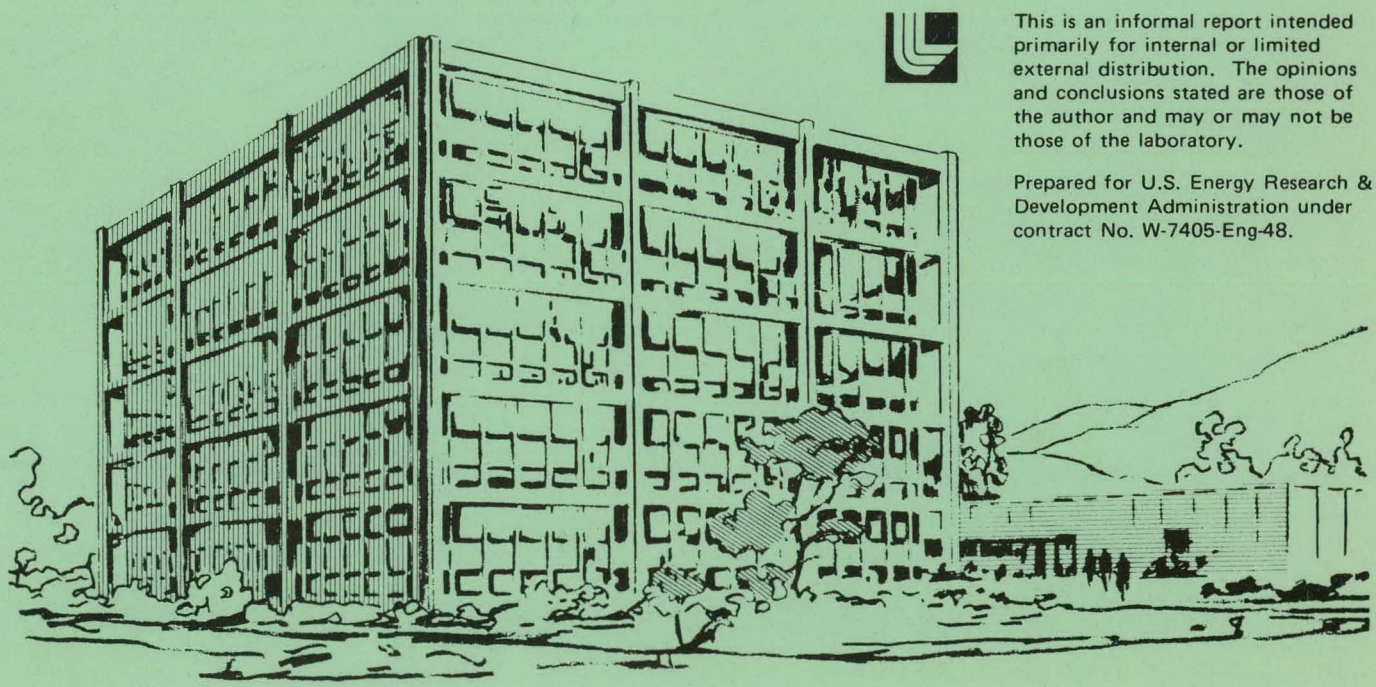

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REPORT

LER 74-101302

ORIG Benge/Allison
APPROVED

SIMULATOR PROGRAM FOR THE MCS-80 8080 CPU

DATE 11/20/74
REV.
PAGE 1 OF 4

1.0 INTRODUCTION

The Intel 8080 CPU simulator program is now available on the LLL Octopus CDC-7600 computer system. The program (MCS80SIM) provides a software simulation together with simulator execution commands to aid in program development for the MCS-80.

Besides accepting 8080 machine code the simulator allows: manipulation of the simulated memory and 8080 registers, breakpoint insertion, program tracing, symbolic and numeric dumps, single stepping, and other operations during the simulation.

This report details how the simulator (MCS80SIM) is accessed and how it is run on the Octopus network. The Intel manual "8080 Simulator Software Package" describes the simulator, the simulator commands, and error messages. (The program is called MCS80SIM at LLL rather than INTERP/8 as in the Intel Manual.)

2.0 READING THE MCS80SIM PROGRAM FROM PHOTOSTORE

MCS80SIM is stored in the elephant photostore under the "take" directory: .558850:NEWINTEL and can be read 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:MCS80SIM

→.END

 RDS

 ALL DONE
```


3.0 INPUT TO MCS80SIM

When the simulator program is executed, the program types a request for information:

```
TYPE INPUT FILE, OUTPUT FILE, CODE FILE
```

The proper responses are:

INPUT FILE: TTY or Disk File where the code file in simulator execution command format is stored. If TTY is typed the program expects commands to be input from the teletype.

OUTPUT FILE: TTY or Disk File name where all simulator output is to go. The disk file will be created by the program. If TTY is typed output will be to the teletype.

CODE FILE: Disk File name which contains 8080 machine code in "BNPF" format produced by the 8080 assembler and the symbol table file also in a form produced by the MCS8080 assembler.

All Disk File names must be seven or fewer characters in length.

The load command of the simulator causes the symbol tables and code to be loaded into the simulated MCS80 memory. The proper unit numbers when running MCS80SIM are:

LOAD 1. If input is from teletype.

LOAD 5. If running from disk file in simulator execution command format.

LOAD 6. If running from disk file in code (BNPF) format.

LOAD 6. If running from disk code.

4.0 EXAMPLE SIMULATOR RUNS

To better show how the simulator is used at LLL two figures have been prepared. Figure 1 illustrates; #1. The operations needed to transfer the MCS-80 assembler and simulator to Disk File. #2. The creating of a sample assembly language 8080 program (using Trix). #3. The assembly of a program.

Figure 2 shows the use of the simulator with input and output on a teletype.

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sm

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```
ELF / .5 .1
.RDS .558850:NEWINTEL:MCS80SIM
.RDS .558850:NEWINTEL:MCS80
.RDS
RDS
.END

 ALL DONE
TRIX AC / .5 .1
.C(TEST2)
.BL1
&       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
MCS80 / 1 .7
TYPE INPUT FILE AND OUTPUT TAPE
TEST2
 8080 MACRO ASSEMBLER, VER 1.1

 NO PROGRAM ERRORS

 ALL DONE
```

Figure 1. Transferring the assembler and simulator to Disk File.

```
MCS80SIM / 1 .6
TYPE INPUT FILE, OUTPUT FILE, CODE FILE
TTY TTY MCSBIN
 INTERP/80 VERS 1.0

LOAD 6 6.
 27 LOAD OK

DISPLAY SYMBOLS.
 0000000 00000 0000H  BLOCK01
 0000070 00007 0007H  A
 0000000 00000 0000H  B
 0000010 00001 0001H  C
 0000020 00002 0002H  D
 0000030 00003 0003H  E
 0000260 00022 0016H  FOUND
 0000040 00004 0004H  H
 0000270 00023 0017H  INCR
 0000050 00005 0005H  L
 0000070 00007 0007H  LOOP
 0000060 00006 0006H  M
 0000060 00006 0006H  PSW
 0000060 00006 0006H  SP
 0000030 00003 0003H  START

DI MEM 0 TO 50 HEX, MEM 0 TO 50 CODE.
 00000 31H 40H 00H 2EH C8H 26H 00H 7EH FEH 2EH CAH 16H 00H CDH 17H 00H
 00016 7DH FEH DCH C2H 07H 00H 76H 2CH C0H 24H C9H 00H 00H 00H 00H 00H
 00032 00H 00H 00H 00H 00H 00H 00H 00H 00H 00H 00H 00H 00H 00H 00H 00H
 00048 00H 00H 00H
 00000 LXI SP   064      000      MVI L    200      MVI H    000
 00007 MOV AM   CPI      046      JZ       022      000      CALL
 00014 023      000      MOV AL   CPI      220      JNZ      007
 00021 000      HLT      INR L    RNZ      INR H    RET      NOP
 00028 NOP      NOP      NOP      NOP      NOP      NOP      NOP

 00049 NOP      NOP

SET MEM 200 TO 210 = 43 46 48 20H 11110000B.
 SET OK

GO.
 HLT CYCLE 134

DI CPU.
 CYZSP  A   B   C   D   E   H   L    HL     SP     PC
 *0101*046*000*000*000*000*000*201*00201*00064*00023

TIME.
 TIME=134 (67 USEC)

END.
$EOF


 ALL DONE
```

Figure 2. Creating a sample assembly-language program.

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