

Technical Report CS74006-T

A DOS-M PRIMER

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I. Bringing up DOS-M.

- A. Turn teletype switch to line.
- B. Insert the key into the central processor power switch and turn the key to the straight up ("power on") position. This allows the internal registers to be manipulated.
- C. Turn the disk power on (the toggle switch is located below the paper tape reader) and the "load-unload" switch on the disk unit to "unload". When the "door unlocked" indicator lights, insert the DOS-M disk pack, close the door, and set the "load-unload" switch to "load". When the "disk-ready" indicator lights, the disk is up to speed and ready.
- D. Push the "P" switch on the central processor, displaying the program counter address. Toggle 37750_8 into the display register. Push any other register switch to load the P-register. Push "S" to display the switch register. Clear the display register and push any other register button to load the S-register with 0_8 . Push the "external preset", "internal preset", "loader enable", and "run" switches. If the loader program ran properly, the display register will display 102077_8 . If the loading failed, execute this step again. The DOS-M bootstrap loader is in core.
- E. Push "S" and load the display register with a 1_8 to indicate DOS-M is on subchannel one, the cartridge disk. Push any other register switch to load the S-register. Push the "internal preset", "external preset", and "run" switches on the central processor. If DOS-M has been loaded properly, the system will ask for the date and time at the system console (teletype).
- F. To bring DOS-M down push "halt" on the central processor, turn the power key to locked position, unload the disk, and turn off the teletype.

II. This is a summary of some DOS-M directives (commands). These commands were chosen because they are useful for running FORTRAN programs under DOS-M.

- A. :JOB,name
This directive creates a job. A job must be created before the other directives can be entered.

- B. :EJOB
This directive ends the present job.
- C. :STORE,S,file name,1
This directive is used to create a source file on disk. The file is given the file name. The 1 indicates input is from unit 1, the teletype keyboard. Input is terminated by typing two colons (::) on the keyboard as the first characters of a new record (i.e. line).
- D. :LIST,U,6
This directive lists the file names of programs stored on disk on unit 6, the teletype printer. This directive informs a user of the file names presently in use.
- E. :LIST,S,6,file name
The source file stored on disk under the file name is listed on unit 6, the teletype printer.
- F. :EDIT,file name,1
This directive allows the file to be edited from the keyboard (unit 1). Editing must be done in order from top to bottom of program, i.e. once line 5 has been edited, line 4 cannot be.
Subcommands:
/DELETE,m
Line m is deleted.
/REPLACE,m
The next line typed replaces line m.
/INSERT,m
The next line typed is inserted after line m.
/END
Editing is complete. The edited file is saved.
- G. :PURGE,file name
Delete the file from disk.
- H. :ABORT
This directive abnormally terminates the present job. (See Section III, Part B).
- I. :OFF
This directive stops processing of the running program or command and returns to command mode. (See Section III, Part B).
- J. :PROG,name,options
This directive is used to run program "name". This command is used to call FORTRAN and the Loader and will be described in section V.
- K. :JFILE,file
Specifies a source file on the disc for the assembler or compiler. A. disk file must be "JFILED" before it can be used for input to a compiler.
- L. :RUN,name
This directive runs user program "name", a program that has been successfully loaded.
- M. :LU,i,j
Equipment table entry j is given the unit number i for the duration of the present job.

N. :GO and :UP,eq, num.

These commands are used in loading an object tape. When the Loader is directed to load an object tape, it will ask for the tape to be loaded. When the tape is loaded and ready to be read, :GO should be issued. When the tape is read, the loader waits for another tape. To indicate the last (or only) tape has been read, :UP,3 and :GO,1 should be issued.

:UP - makes a device ready

:GO - starts a device

III. Communicating with DOS-M

- A. When DOS-M is ready for input, it prints an @ and sounds the teletype bell.
- B. When DOS-M is busy and a character is struck on the keyboard, an asterisk (*) is typed. The system will then respond to a limited number of commands. (:OFF and :ABORT are two directives that will be accepted).
- C. After each directive is typed, both the line feed and return keys must be typed.
- D. CTRL/A deletes the previous character.
- E. "Rubout", "Line Feed", "Return" deletes an entire input line.

IV. Using the teletype to punch a paper tape

- A. Turn the teletype switch to "Local." Push "on" on the paper tape punch (on the left side of the teletype).
- B. Pushing the "Here Is" key produces leader tape.
- C. Type data or program with a "line feed", "return" at the end of each line or record.
- D. Push "Here Is" to produce trailer tape. Push "off" on the punch.

V. FORTRAN under DOS-M

- A. The first line of each FORTRAN program must be as follows:
 FTN,options
 If no options are indicated a source listing is not produced and an object tape cannot be punched. It also appears that at least one option must be specified in order to have the program compiled.
 FTN,L for listing
 FTN,B for object tape
 FTN,L,B for listing and object tape
- B. Line two of a FORTRAN program must begin in column seven and be of the following form.
 PROGRAM name
 This statement names the program.

- C. After the last subroutine, an END\$ is typed to terminate input.
- D. Logical unit number.
 Logical unit 1 in a FORTRAN READ is used to accept input from the teletype. Unit 5 can be used to read from the paper tape reader. A WRITE using unit 6 prints output on the teletype.
- E. Double quotes (") are used in FORTRAN FORMAT statements.
- F. Calling the FORTRAN compiler.
1. FORTRAN source program from a disk file.
 :JFILE,file name
 :PROG,FTN4,2,6,6,15,99
 The JFILE command specifies a source file for the assembler or a compiler. The FTN4 specifies that the program to be executed is the FORTRAN IV compiler. The 2 indicates that the input to the compiler is from the disk. The two sixes indicate that the source listing output and object code (if FTN4,B was specified) are routed to the teletype printer/punch. 15 is the page size, i.e. the forms, etc.) In order to conserve paper on short programs, the page size should be approximately 10 larger than the number of lines in the program. 99 indicates object code is placed in the job binary area for later loading.
 2. FORTRAN source program from a source paper tape.
 :PROG,FTN4,5,6,6,15,99
 3. FORTRAN source program input from the console (unit 1).
 :PROG,FTN4,1,6,6,15,99
 An END\$ terminates input. (FTN,L should not be used in this mode because it will cause a copy of the input record to be echoed on the line immediately following the record).
- G. Punching an object tape.
 If FTN,B is used and unit 6,1 or 4 is indicated as the punch unit (third FORTRAN option on :PROG directive), a tape can be punched after the compiler message "NO ERRORS" is typed. Turn the punch on. The object tape will be punched. When the system starts punching trailer tape, punch about 2 inches and turn the punch off.
- H. Loading and executing a compiled FORTRAN program.
1. Input from the job binary area.
 :PROG,LOADR,0,6,0,1,1
 This directive calls the Loader. The first option is 0 for input from the job binary area. 6 is the list device (teletype). The 0,1,1 indicates no dynamic debugging or maps.
 When the Loader completes,the loaded program may be run.
 :RUN,program name
 2. Input from the paper tape reader (an object tape).
 :PROG,LOADR,5,6,0,1,1
 When the Loader asks for file names, type/EE.
 When the Loader asks for the tape, load it into the paper tape reader and type :GO.
 When the Loader asks for the next tape, type
 :UP,3
 :GO,1
 When the Loader completes, the program may be run.
 :RUN,program name

VI. Examples of running FORTRAN under DOS-M.

- A. Storing a source file on disk and running it. Input to the program is from the teletype.

```
:JOB,EX1
:STORE,S,SAMPL,1
FTN,L
    PROGRAM DEMO
    INTEGER X
    WRITE (6,3)
    3 FORMAT("ENTER X")
    READ(1,1)X
    1 FORMAT(=5)
    X=X**2
    WRITE(6,2)X
    2 FORMAT("X SQUARED=",I5)
    END
    END$
```

```
::
:JFIL,SAMPL
:PROG,FTN4,2,6,6,15,99
:PROG,LOADR,0,6,0,1,1
:RUN,DEMO
ENTER X
    5
```

X SQUARED = 25

- B. To enter the above program from paper tape, the following directives would be used.

```
:JOB,EX2
:PROG,FTN4,5,6,6,15,99
```

load the tape and push read

```
:PROG,LOADR,0,6,0,1,1
:RUN,DEMO
ENTER X
    5
```

X SQUARED = 25

- C. Entering data from paper tape.

```
:JOB,EX3
:STORE,S,APROG,1
FTN,L
    PROGRAM DEMOA
    INTEGER X
    READ(5,1) X
    1 FORMAT(I5)
    WRITE(6,2) X
    2 FORMAT(I5"WAS READ FROM PAPER TAPE.")
    END
    END$
```

```

::
:JFIL,APROG
:PROG,FTN4,2,6,6,15,99
:PROG,LOADR,0,6,0,1,1
:RUN,DEMOA

```

load a paper tape and push "read" on the paper tape reader.

5 WAS READ FROM PAPER TAPE.

D. Entering FORTRAN source from the teletype.

```

:JOB,EX4
:PROG,FTN4,1,6,6,15,99
FTN
    PROGRAM DEMOB
    WRITE(6,1)
    1 FORMAT("IT WORKED.")
    END
    END$
:PROG,LOADR,0,6,0,1,1
:RUN,DEMOB
IT WORKED

```

E. Loading and running an object tape.

```

:JOB,EX5
:PROG,LOADR,5,6,0,1,1
/E

```

load tape and push "read" on the paper tape reader.

```

:GO
:UP,3
:GO,1
:RUN,DEMO

```

VII. Acknowledgement.

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VIII. Reference.

Moving-head Disk Operating System (02116-91779), Hewlett-Packard, 11000 Wolfe Road, Cupertino, California 95014, March, 1971.