

MICROPOLIS DISK DIAGNOSTIC

8.1 INTRODUCTION

The Micropolis Disk Diagnostic is an 8080 Assembly Language Program which runs under Micropolis PDS. The diagnostic provides the proper test environment to perform the maintenance and adjustment of Micropolis 1040/1050 Series Subsystems described in this manual.

8.2 SYSTEM REQUIREMENTS

The standard version of the diagnostic requires the following minimum system configuration:

- a. S100-bus computer with Z-80, 8080, or 8085 processor.
- b. A minimum of 16K of RAM memory starting at address 0. RAM access requirements are described in the 1040/1050 Series Users Manual.
- c. A 1040/1050 Series Subsystem consisting of a Controller-B and 1 or more Micropolis Storage Modules.
- d. A system terminal device consisting of a keyboard entry and display device and the necessary interface board.
- e. A configured PDS DOS Diskette.
- f. Scratch diskettes as required by the maintenance programs.
- g. Micropolis Diagnostic Diskette.

8.3 OPERATING PROCEDURE

8.3.1 Loading the Diagnostic

The diagnostic is a PDS overlay file which may be invoked as follows:

- a. Boot a configured PDS system diskette.
- b. When MODS completes its sign-on, load the diagnostic diskette into drive 0 and type DIAG{↵denotes carriage return).

- c. The diagnostic will sign on at the terminal:

Micropolis Disk Diagnostic VS X.X
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Front Panel (Y or N)?

If your computer has a front panel with program sense switches which may be read by an IN OFFH, then respond to the prompt with Y , otherwise enter N .

- d. The diagnostic will prompt:

"Enter High Track."

Enter 76 if the drive to be tested is a Mod II (IV) drive and 35 if it is a Mod I (III).

- e. The diagnostic is now initialized and will prompt for a command. Remove the diagnostic diskette from drive 0.

8.3.2 Warm Starting the Diagnostic

If it is necessary to reset your system, the diagnostic may be restarted by starting execution at the standard PDS warm start address. Refer to the Micropolis User's Manual, Document Number 100089-1.

8.3.3 Exiting the Diagnostic

The diagnostic overlays MDOS and parts of RES so it is not possible to return to MDOS without rebooting.

8.3.4 Entering Commands

The diagnostic is an interpretive language processor which executes command strings entered at the terminal. A command string consists of one or more test commands. Commands must be separated from each other by one or more blanks. A command string is terminated by a carriage return. During entry, a command line is subject to the following editing facilities:

- a. Entering the rubout key deletes the last previously typed character from the command string.

- b. Depressing the control key and entering the X key (CTL/X) deletes the current command string.
- c. Entering a line feed as a separator between commands causes a carriage return/line feed at the terminal without terminating the command. (This feature is helpful if a command string exceeds one line on the terminal and the auto-wrap feature in the PDS terminal handler is not enabled).

A list of the valid test commands is given in Para. 8.4 of this section.

Execution of a command string may be suspended by depressing the control key and entering the C key (CTL/C). The diagnostic will prompt with "Interrupt?". Entering C will cause resumption of the interrupted command string. Entry of any other key will abort the command string.

8.3.5 Error Messages

Command Errors

If an invalid command is entered, the following message is printed:

Error Message P** Cnn

where P** indicates the error is in the command string entered at the terminal and Cnn indicates the error is in command nn of that command string.

The error message will be "Invalid Command" if the command is not found or "Invalid Parameter" if a parameter associated with the flagged command is not valid.

Disk Errors

A disk error will be reported as follows:

Pnn Cnn Unn Hnn Snn Tnn Enn

where:

- Pnn = Test program in which error occurred
- Cnn = Command in program which resulted in error
- Unn = Drive unit number selected

- Hnn = Selected head
 - 0 — Lower Surface
 - 1 — Upper Surface (Mod III or IV only)
- Snn = Desired sector
- Tnn = Desired track
- Enn = Error code
 - 1 = Drive not operational
 - 2 = Header check error
 - 3 = Restore operation cannot find track 0
 - 4 = Checksum error
 - 5 = Track address error (VT command only)
 - 6 = Unit address error (VU command only)
 - 7 = Data buffer verify error
 - 8 = Write protect error

Additional information will be printed after some errors as follows:

- a. Error 2: Contents of header read from sector in error as follows:
 - HH SS TT
 - where HH = Head address, SS = Sector address, and TT = Track address.
- b. Error 5: Track address read from a sector on the offending track.
- c. Error 6: Unit address read from a sector on the offending unit.
- d. Error 7: Expected data and data found for first byte in error in a buffer compare
 - S/B XX WAS XX

8.4 TEST COMMANDS

A test command consists of a command keyword and zero or more parameters. Parameters must be separated from the keyword and each other by a comma (,). Numeric parameters may be specified in decimal notation or hexadecimal notation. Decimal values must be unsigned numbers from zero to

65529. Hexadecimal notation is indicated by appending the letter "H" to the number entered. Hexadecimal values may be in the range 0H to FFFFH. Most commands require single byte parameters and will ignore the most significant byte of the converted binary value of parameters entered.

Three system variables are also available for use as parameters:

T% = Max track value specified in initialization dialogue

U% = Last unit selected

H% = Last head selected

Select Unit

U, u, h — Select drive unit u, Head h where h = 0 — lower surface; = 1 — upper surface (dual head unit only) ($0 \leq u \leq 3$)

Z, u, h — Select drive unit u, Head h and restore selected drive to track 0

Position Unit

T, n — Position drive to track n
($0 \leq n \leq \text{Trackmax}$) — where trackmax is high track specified in sign on dialogue
if n = 99 a random track address is used
if $n > \text{trackmax}$ and $n \neq 99$ then track address = 0

SI,n — Step in n tracks from current track (must be preceded by a Z or T command when unit is selected)
if $(\text{current track} + n) > \text{trackmax}$ then track reverts to zero

SO,n — Step out n tracks from current track (must be preceded by a Z or T command when unit is selected)
if $(\text{current track} - n) < 0$ then track reverts to trackmax

Read/Write Commands

s = Sector address ($0 \leq s \leq 15$)

p = Data pattern

0 —Switch register — 1 byte pattern read from the sense switches of a computer with a front panel. In computers without a front panel, pattern 0 may be specified with the SP command.

1 —Random

2 —Binary count

3 —All 1's

4 —Alternate 1's and 0's

n = Number of sectors ($1 \leq n \leq 16$)

I,p — Initialize selected surface of selected drive with pattern p

IW,p,s — Write pattern p to sector s without verifying header

W,p,s — Verify header then write pattern p on sector s

WT,p — Verify header then write pattern p to all sectors of current track

WD,p — Verify header then write pattern p to all sectors of all tracks of currently selected drive/surface

MW,p,n —Write pattern p to first n sectors of current track — n sectors are written in 1 revolution

R,p,s — Read sector s of current track
Verify header and compare data
Read with pattern p

RT,p — Read and compare all sectors of current track

RD,p — Read and compare all sectors of all tracks on currently selected drive/surface

MR,n — Read first n sectors of current track
Header and checksum only are verified
n sectors read in 1 revolution

SP,m — Set pattern 0 to m

VT — Read first sector which comes around and verify track address against desired track

VU — Read first sector which comes around and verify unit address against desired unit

Miscellaneous Commands

DL,nn — Wait nn milliseconds

PB,m — Print contents of read buffer

m ≠ 0 — Dump buffer without conversion

m = 0 — Print in hex notation as follows:

```

ENTER COMMAND T,76
ENTER COMMAND W,2,15
ENTER COMMAND R,2,15
ENTER COMMAND PB,0
4C 0F 00 00 5B FF 00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D
0E 0F 10 11 12 13 14 15 16 17 18 19 1A 1B 1C 1D 1E 1F 20 21
22 23 24 25 26 27 28 29 2A 2B 2C 2D 2E 2F 30 31 32 33 34 35
36 37 38 39 3A 3B 3C 3D 3E 3F 40 41 42 43 44 45 46 47 48 49
4A 4B 4C 4D 4E 4F 50 51 52 53 54 55 56 57 58 59 5A 5B 5C 5D
5E 5F 60 61 62 63 64 65 66 67 68 69 6A 6B 6C 6D 6E 6F 70 71
72 73 74 75 76 77 78 79 7A 7B 7C 7D 7E 7F 80 81 82 83 84 85
86 87 88 89 8A 8B 8C 8D 8E 8F 90 91 92 93 94 95 96 97 98 99
9A 9B 9C 9D 9E 9F A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 AA AB AC AD
AE AF B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC BD BE BF C0 C1
C2 C3 C4 C5 C6 C7 C8 C9 CA CB CC CD CE CF D0 D1 D2 D3 D4 D5
D6 D7 D8 D9 DA DB DC DD DE DF E0 E1 E2 E3 E4 E5 E6 E7 E8 E9
EA EB EC ED EE EF F0 F1 F2 F3 F4 F5 F6 F7 F8 F9 FA FB FC FD
FE FF 00 01 02 03 04 05
ENTER COMMAND

```

Handwritten note: Head 0, 1, 2

PE,m — Printer echo — if the I/C handler on the PDS diskette is configured for a line printer then:

m = 0 — Disable printer

m = 1 — Echo console output on line printer

Program Control

X,m — Execute one of the built-in maintenance programs (0 ≤ m ≤ 19)

L — Repeat the current command string (Example U,0,0 L Selects unit 0, head 0 until interrupted)

LC,m — Repeat the current command string until the iteration count (which starts from 0) is equal to m

Example:

Z,0,0

MR,16 SI,1 LC,76

This example reads all sectors of tracks 0 thru 76

PL — Print value of the iteration count associated with the current command string

8.5 MAINTENANCE ADJUSTMENT PROGRAMS

The programs required to perform the maintenance adjustments specified in this manual are provided as built in programs which may be invoked, by the X command described in Para. 8.4. Use of the programs is described in Section 4.

Table 8-1 shows equivalent program listings of the built-in Test Programs. The built-in programs exercise their own control over error handling, so printouts obtained from these programs will be different from results obtained by executing command strings consisting of these commands.

8.6 SUBSYSTEM VERIFICATION

Overall performance of a subsystem may be verified by executing the following commands which perform a mix of data handling and positioning functions.

Z,u,h X,4 PL L — for Mod I subsystems

Z,u,h X,3 PL L — for Mod II subsystems

Handwritten: Z,0,0 X,3 PL L

Handwritten: Z,1,0 X,3 PL L

TABLE 8-1. MAINTENANCE PROGRAMS

0	MR,16 SI,1 LC,T%
1	MW,2,16 SI,1 LC,T%
2	MW,1,16 SI,1 LC,T%
3	X,1 RD,2 X,2 RD,1 X,5 X,11
4	X,1 RD,2 X,2 RD,1 X,5 X,10
5	T,99 MR,16 LC,99
6	DL,2500 DL,2500
7	T,40 T,36 X,6 T,30 T,36 X,6 L
8	T,22 T,16 X,6 T,10 T,16 X,6 L
9	Z,U%,H% DL,250 T,1 DL,250 L
10	T,17 VT T,15 VT T,19 VT T,13 VT T,22 VT T,25 VT T,7 VT T,30 VT T,4 VT T,34 VT T,0 VT LC,5
11	T,38 VT T,37 VT T,39 VT T,36 VT T,40 VT T,34 VT T,42 VT T,30 VT T,46 VT T,22 VT T,54 VT T,6 VT T,70 VT T,0 VT T,76 VT LC,5
12	Z,U%,H% T,T% L
13	U,U%,H% L
14	MW,0,16 X,13
15	Z,0,0 MW,0,16 Z,1,0 MW,0,16 X,19
16	T,T% MW,0,16 X,13
17	T,5 U,U%,H% X,6 T,76 U,U%,H% X,6 L
18	T,1 U,U%,H% X,6 T,35 U,U%,H% X,6 L
19	U,0,0 U,1,0 L

8.7 DISKETTE FORMAT

The sector format used by the diagnostic is given below:

