DataGeneral

TECHNICAL STATEMENT

TEXT LISTING

068-001140-01

PROGRAM

6098,6099,6100,6103 MOVING HEAD
DISK/DISKETTE FORMATTER PROGRAM

TEXT TAPE

097-001140-01

ABSTRACT

THE NOVA ECLIPSE MOVING HEAD DISK/QUAD DENSITY DISKETTE FORMATTER PROGRAM IS A UTILITY PROGRAM DESIGNED TO FORMAT AND CHECK DISK PACKS TO BE USED ON THE ABOVE DISK SYSTEMS.

NOTICE

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 0001  .MAIN    AOS ASSEMBLER REV 03.01          18:39:35 10/24/79
01
02
03
04
05
06              ;************************************************************
07              ;
08              ; NAME: EFDF.TX                    PART NUMBER: 097-001140
09              ;
10              ;
11              ; DESCRIPTION: 6098, 6099, 6100, 6103 MOVING HEAD DISK/DISKETTE
12              ;              FORMATTER PROGRAM
13              ;
14              ;
15              ; REVISION HISTORY:
16              ;
17              ;       REV.            DATE
18              ;
19              ;       00              06/13/79
20              ;       01              10/24/79
21              ;
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39              ; TURED IN ACCORDANCE HEREWITH.
40              ;************************************************************
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!0002  .MAIN
01              ;1.0    PROGRAM NAME:
02              ;       ~~~~~~~~~~~~
03
04              ;       EFDF.SR
05
06              ;       6098, 6099, 6100, 6103 MOVING HEAD DISK/DISKETTE SYSTEM
07              ;       FORMATTER PROGRAM.
08
09              ;2.0    REVISION HISTORY:
10              ;       ~~~~~~~~~~~~~~~~
11
12              ;       01      ADDITION OF 6100, 6103 (25 MB) DISK SYSTEMS
13
14              ;3.0    MACHINE REQUIREMENTS:
15
16              ;       NOVA/ECLIPSE FAMILY CENTRAL PROCESSOR
17              ;       16K READ/WRITE MEMORY
18              ;       TELETYPE OR CRT AND CONTROL (4010)
19              ;       DGC 6098, 6099, 6100, 6103 MOVING HEAD DISK SYSTEM
20              ;       AND 0-3 6096-C,D ADD ON DISKETTE DRIVES
21
22              ;4.0    TEST REQUIREMENTS:
23              ;       ~~~~~~~~~~~~~~~~~
24
25              ;       N/A
26
27              ;5.0    SUMMARY:
28              ;       ~~~~~~~
29
30              ;       THE NOVA ECLIPSE MOVING HEAD DISK/QUAD DENSITY
31              ;       DISKETTE FORMATTER PROGRAM IS A UTILITY
32              ;       PROGRAM DESIGNED TO FORMAT AND CHECK DISK
33              ;       PACKS TO BE USED ON THE ABOVE DISK SYSTEMS.
34              ;       THE PROGRAM IS !NOT! A MAINTENANCE PROGRAM
35              ;       AND ASSUMES THE HARDWARE TO BE IN WORKING ORDER.
36              ;       THE PROGRAM WILL, ON DETECTING A NON-DATA
37              ;       RELATED ERROR, PRINT THE ERROR INFORMATION AND TAKE
38              ;       THE CORRESPONDING UNIT OFFLINE. IF MORE THAN ONE
39              ;       UNIT WAS CONFIGURED, THE PROGRAM WILL CONTINUE FORMAT-
40              ;       TING AND/OR TESTING THE REMAINING UNITS. IF ONLY
41              ;       ONE UNIT WAS CONFIGURED OR IF ALL CONFIGURED UNITS
42              ;       HAVE ENCOUNTERED NON-DATA ERRORS THE
43              ;       PROGRAM WILL PAUSE PENDING OPERATOR INTERVENTION.
44
45              ;       THE CONTROL CAN BE ANY DEVICE 20-76 OCTAL
46              ;       THE DEFAULT IS 33 ## SEE 9.
47
48              ;6.0    RESTRICTIONS:
49              ;       ~~~~~~~~~~~~
50
51              ;       N/A
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!0003  .MAIN
01              ;7.0    PROGRAM DESCRIPTION/THEORY OF OPERATION:
02              ;       ========================================
03
04              ;       A.      FORMATTER PROGRAM (STARTING ADDRESS <SA> 500)
05              ;       THE DISK IS FIRST FORMATTED AFTER WHICH A FORMAT DONE
06              ;       MESSAGE IS PRINTED.  THEN A 155555 PATTERN IS WRITTEN
07              ;       TO THE ENTIRE PACK AND READ BACK 2 TIMES, AND PASS
08              ;       IS PRINTED.  THE DATA PATTERN IS THEN ROTATED 1 BIT
09              ;       AND THE WRITE/READ/READ PROCESS IS REPEATED.
10              ;*************************************************************
11              ;       IT IS RECOMMENDED THAT AT LEAST 4 PASSES (WRI/REA/REA)
12              ;       BE ALLOWED TO INSURE PACK QUALITY.  IF TIME PERMITS,
13              ;       LONGER RUNS WILL FURTHER INSURE QUALITY.
14              ;
15              ;*************************************************************
16              ;       ANY HARD DATA OR ADDRESS ERRORS WILL RESULT IN THE
17              ;       BAD SECTOR FLAG BEING SET IN THAT SECTOR.  ANY "SOFT
18              ;       DATA" OR "ADDRESS ERROR" ADDRESS ENCOUNTERED TWICE
19              ;       CAUSE THAT BAD SECTOR FLAG TO BE SET.  ANY OTHER
20              ;       ERROR WILL CAUSE THE PROGRAM TO PRINT THE FAILURE TO
21              ;       THE TTY AND TAKE THE CORRESPONDING UNIT OFFLINE. IF
22              ;       NO UNITS REMAIN  TO BE TESTED THE PROGRAM WILL PAUSE ELSE
23              ;       TESTING WILL RESUME ON THE REMAINING UNITS.
24              ;       THIS PROGRAM IS NOT INTENDED TO BE A RELIABILITY FOR THE
25              ;       DISK SYSTEM AND IN GENERAL ASSUMES THE CONTROL AND DRIVE
26              ;       TO BE IN WORKING ORDER.
27              ;       BAD SECTOR FLAGS PERTAIN TO ECHO DISK MEDIA ONLY!
28
29              ;       A HARD ADDRESS ERROR IS DEFINED AS SUCH AFTER TWO
30              ;       ATTEMPTS HAVE BEEN MADE BOTH RESULTING IN AN ADDRESS
31              ;       ERROR.  A HARD DATA ERROR IS DEFINED AS SUCH AFTER
32              ;       2 OR MORE OF 10 READ TRY'S HAVE BEEN UNSUCCESSFUL.
33
34              ;       B.      CHECK PROGRAM ONLY (SA 501)
35              ;       SAME AS SA 500 EXCEPT THAT INITIAL PACK FORMAT
36              ;       OPERATION IS BYPASSED.
37
38              ;       B.1.    STATISTICS
39              ;       TYPE L FOR 1ST 100. DISK ADDRESSES OF BAD SECTORS,
40              ;       DATA AND ADDRESS ERRORS.
41
```

```
!0004  .MAIN
01              ;       C.      COMMAND STRING INTERPRETER (SA 503)
02              ;       AS A TROUBLE SHOOTING AID THE SERVICE ENGINEER
03              ;       MAY TYPE IN HIS OWN TEST LOOP.  AFTER STARTING
04              ;       AT 503, THREE ARGUMENTS MUST BE ENTERED IN
05              ;       RESPONSE TO THREE PROGRAM QUESTIONS; "UNIT",
06              ;       "DATA", AND "COMMAND STRING".  ALL NUMBERS MUST
07              ;       BE ENTERED IN OCTAL.
08
09              ;       I.      UNIT:   TYPE UNIT # OR CARRIAGE TO USE
10              ;                       THE PREVIOUS ENTRY
11
12              ;       II.     DATA:   RAN=RANDOM
13              ;                       ALO=ALL ONES
14              ;                       ALZ=ALL ZEROS
15              ;                       PAT=110110
16              ;                       FLO=FLOATING ONE PATTERN
17              ;                       FLZ=FLOATING ZERO PATTERN
18              ;                       ADR=ALTERNATING CYLINDER AND
19              ;                       HEAD, SECTOR WORDS
20              ;                       VAR=EXISTING WORDS ENTERED
21              ;                       PREVIOUSLY AS DESCRIBED BELOW
22              ;                       ALTERNATIVELY ENTER A STRING OF UP
23              ;                       UP TO 7 OCTAL 16 BIT WORDS TO BE
24              ;                       USED AS DATA.  THE WORDS ENTERED
25              ;                       ARE USED REPEATEDLY TO MAKE UP A
26              ;                       SECTOR BLOCK.  TYPE CARRIAGE TO
27              ;                       USE THE PREVIOUS ENTRY.
28
29              ;       III.    COMMAND STRING:
30
31              ;       OPTIONS 1.      READ HEAD,SECTOR,#SECTORS
32              ;               2.      WRITE SAME
33              ;               3.      SEEK CYLINDER
34              ;               4.      RECALIBRATE
35              ;               5.      LOOP (GO TO BEGINNING OR LR)
36              ;               6.      DELAY N (N=DELAY IN MS)
37              ;               7.      LR (BEGIN LOOP HERE)
38              ;               8.      BAD (BAD SECTOR) CYL,HD,SECTOR
39              ;               9.      FORMAT CYL,HD,SECTOR
40
41              ;               NOTE:   ITEMS 8 & 9 INCLUDE THE NECESSARY SEEK
42              ;                       AND IS NOT A DISKETTE OPTION.
43
44              ;               10.     TYPE CARRIAGE RETURN TO USE THE
45              ;                       PREVIOUS COMMAND STRING,UNIT,OR
46              ;                       DATA.
47
48              ;               11.     TYPE ESCAPE TO BYPASS UNIT & DATA
49              ;                       PROMPT TO COMMAND STRING PROMPT,
50              ;                       USING PREVIOUSLY ENTERED UNIT #
51              ;                       & DATA.
52              ;
53              ;               12.     TYPE ANY KEY TO INTERRUPT EXECUTION
54              ;                       OF CURRENT COMMAND AND RETURN TO
55              ;                       UNIT#.
56
57              ;               13.     TYPE A "^O" TO ENTER ODT
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10005  .MAIN
01
02              ;               NOTE THAT EITHER SPACES OF A COMMA MAY
03              ;               BE USED AS AN ARGUMENT DELIMITER.  EACH
04              ;               RESPONSE IS TERMINATED BY TYPING CARRIAGE
05              ;               RETURN.  IF MORE ROOM IS NEEDED ON A LINE,
06              ;               TYPE LINE FEED TO SPACE TO THE NEXT LINE.
07              ;               A "LF" DOES NOT ELIMINATE THE NEED FOR A
08              ;               DELIMITER.
09
10              ;               SHOULD THE COMMAND STRING ENTRIES EXCEED
11              ;               THE INPUT BUFFER CAPACITY, THE PROGRAM
12              ;               RESPONDS WITH THE MESSAGE "INPUT OVERFLOW"
13              ;               AND THE OPERATOR MUST THEN DEPRESS ONE OR
14              ;               MORE "RUBOUTS" FOLLOWED BY A "CR" TO
15              ;               POSITION THE POINTER TO THE LAST VALID
16              ;               COMMAND IN THE STRING FOR EXCUTION.
17              ;               THE WORD "SAME" USED WITH READ, OR WRITE,
18              ;               WILL CAUSE THE PREVIOUS DISK ADDRESS
19              ;               PARAMETERS TO BE USED.
20
21              ;       AN "R" TYPED WHILE A STRING IS BEING EXECUTED WILL
22              ;       CAUSE THE PROGRAM TO RETURN TO CSI UNIT PROMPT.
23              ;       THE ESCAPE KEY WILL BYPASS UNIT AND DATA PROMPTS TO
24              ;       THE COMMAND STRING PROMPT.
25
26              ;       THE FOLLOWING EXAMPLE WOULD CAUSE UNIT 1 TO SEEK
27              ;       CYLINDER 50, THEN REPEATEDLY WRITE SECTORS 2 AND 3
28              ;       OF HEAD 1, THEN READ IT BACK AND CHECK.  DATA IS
29              ;       SPECIFIED AS ALTERNATE WORDS OF ZEROS THEN ONES.
30
31              ;       UNIT:  1
32              ;       DATA:  0,177777
33              ;       COMMAND STRING:  SEEK 50 LR WRITE 1,2,2 READ SAME LOOP
34
35              ;       D.      ERROR LOG RECOVERY (SA 510)
36              ;       ERROR LOGS MAY BE RECOVERED AT THIS STARTING ADDRESS.
37              ;       OPERATOR MUST NOT RESTART PROGRAM AT ANY OTHER ADDRESS
38              ;       PRIOR TO RECOVERING LOGS AS THE LOGS ARE INITIALIZED ON
39              ;       RESTART.
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10006  .MAIN
01              ;8.1    SWITCH SETTINGS:
02              ;       ~~~~~~~~~~~~~~~
03              ;
04              ;       LOCATION "SWREG" IS USED TO SELECT THE PROGRAM OPTIONS
05              ;       (NOT SYSTEM CONFIGURATION).  WHILE RUNNING UNDER DTOS,
06              ;       THIS LOCATION WILL BE LOADED BY THE MONITOR.  HOWEVER,
07              ;       UNDER STAND ALONE AND PROGRAM LOAD MODES THIS LOCATION
08              ;       WILL BE SET ACCORDING TO THE ANSWERS SUPPLIED BY THE
09              ;       OPERATOR.  IN ANY CASE THE OPTIONS CAN BE CHANGED OR
10              ;       VERIFIED BY USING ONE OF THE COMMANDS GIVEN IN SEC. 8.3.
11              ;
12              ;8.2    SWITCH OPTIONS
13              ;       DIFFERENT BITS AND THEIR INTERPRETATION AT LOCATION
14              ;       "SWREG" IS AS FOLLOWS:
15              ;
16              ;       BIT     OCTAL   BINARY  INTERPRETATION
17              ;               VALUE   VALUE
18              ;
19              ;       1               0       LOOP ON ERROR
20              ;               40000   1       SKIP LOOPING ON ERROR
21              ;
22              ;       2               0       PRINT TO CONSOLE
23              ;               20000   1       ABORT PRINT OUT TO CONSOLE
24              ;
25              ;       5               0       DO NOT PRINT ON THE LINE PRINTER
26              ;               02000   1       PRINT ON THE LINE PRINTER
27              ;
28              ;       11(8)           0       N/A
29              ;               00020   1       ENABLE BAD SECTOR PRINTOUT
30              ;
31              ;8.3    SWITCH COMMANDS
32              ;       ONCE THE PROGRAM STARTS EXECUTING THE STATE OF ANY OF
33              ;       THE BITS CAN BE CHANGED BY HITTING KEYS 1-9, A-F.  THE
34              ;       PROGRAM WILL CONTINUE RUNNING AFTER UPDATING THE OPTIONS
35              ;       EACH KEY WILL COMPLEMENT THE STATE OF THE BIT AFFILIATED
36              ;       WITH IT, THUS BIT 4 CAN BE ALTERED BY HITTING KEY 4.
37              ;       SETTING OF ANY BIT OF LOCATION "SWREG" WILL SET BIT 0.
38              ;       (DEFAULT MODE IS DEFINED AS ALL BITS OF SWREG SET TO 0)
39              ;
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10007  .MAIN
01              ;8.4    OTHER COMMANDS  (^ = CONTROL KEY)
02              ;
03              ;       "CR"    A "RETURN" CAN BE TYPED TO CONTINUE THE PROGRAM
04              ;               AFTER ITS LOCKED IN A SWITCH MODIFICATION MODE.
05              ;
06              ;       ^D      THIS COMMAND GIVEN AT ANY TIME WILL RESET "SWREG"
07              ;               TO DEFAULT MODE AND RESTART THE PROGRAM.
08              ;
09              ;       ^R      THIS COMMAND GIVEN AT ANY TIME WILL RESTART THE
10              ;               PROGRAM.  SWITCHES ARE LEFT WITH THE VALUES THEY
11              ;               HAD BEFORE THE COMMAND WAS ISSUED.
12              ;
13              ;       ^O      THIS COMMAND GIVEN AT ANY TIME WILL CAUSE THE
14              ;               PROGRAM CONTROL TO GO TO ODT (NOTE:  THIS IS AN
15              ;               OPTIONAL COMMAND AND IS AVAILABLE ONLY IF ODTPK
16              ;               IS PRESENT)
17              ;
18              ;       M       THIS COMMAND GIVEN AT ANY TIME WILL PRINT THE
19              ;               CURRENT OPERATING MODES.
20              ;
21              ;       0       THIS COMMAND GIVEN AT ANY TIME WILL LOCK THE
22              ;               PROGRAM INTO SWITCH MODIFICATION MODE WHERE
23              ;               MORE THAN 1 BIT CAN BE CHANGED.
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10008  .MAIN
01              ;9.0    OPERATION PROCEDURE/OPERATOR INPUT:
02              ;       ==================================
03
04              ;       A.  VERIFY DRIVE (DRIVES) ARE READY ON-LINE
05              ;       B.  LOAD PROGRAM USING BINARY LOADER
06              ;       C.  RESET, LOAD ONE OF THE STARTING ADDRESSES
07              ;           SHOWN BELOW INTO THE DATA SWITCHES AND HIT
08              ;           START.
09
10              ;       STARTING ADDRESS (SA)
11              ;         4     ENTER ALTERNATE DEVICE CODE(DEFAULT =33)
12              ;        11     ODT - DIRECT ENTRY ONLY
13              ;       200     FORMATTER/CHECK PROGRAM
14              ;       500     FORMATTER/CHECK PROGRAM
15              ;       501     CHECK PROGRAM ONLY
16              ;       503     COMMAND STRING INTERPRETER
17              ;       510     ERROR LOG RECOVERY (SEE 7.D)
18
19              ;       INITIALLY, THE OPERATOR IS REQUESTED TO ENTER A TTY
20              ;       BAUD RATE( NO RTC PRESENT) FOR TIMING, DATE -DAY,
21              ;       MONTH, YEAR, HOUR, & MINUTE (A [CR]
22              ;       RESPONSE WILL IGNORE THIS ROUTINE), & (UNIT#,MIN
23              ;       SURFACE, MAX SURFACE) FOR EACH UNIT TO BE TESTED.
24              ;       EX. 0,0,3 1,0,3 ETC. OR (UNIT#,F) IF FLOPPY.
25              ;       WHEN THE UNIT SPECIFIED IS A FLOPPY, THE MIN/MAX
26              ;       RANGE DEFAULTS TO ALL SURFACES. (0,1)
27              ;       SUBSEQUENT PROGRAM RESTARTS MAY USE PREVIOUSLY ENTERED
28              ;       PARAMETERS FOR UNIT#'S & RANGE BY TYPING A "CR" IN
29              ;       RESPONSE TO MESSAGE PROMPT.
30              ;
31
32              ;       OPERATOR INPUT CONTROLLED PRINTOUTS ARE AS FOLLOWS:
33              ;
34              ;       L       = FIRST 100. BAD SECTORS, DATA, OR ADDRESSES
35
36              ;10.0   PROGRAM OUTPUT/ERROR DESCRIPTION:
37              ;       ================================
38
39              ;       1.  ERRORS- ERROR STATUS IS PRINTED WHENEVER
40              ;       ENCOUNTERED.  WHEN DATA ERRORS ARE FOUND ONLY
41              ;       THREE ARE PRINTED PER ENCOUNTER.  (SEE PARA-
42              ;       GRAPH 10.3)
43
44              ;       2.  IF DATA OR ADDRESS ERRORS ARE ENCOUNTERED MORE
45              ;       THAN ONCE, A COUNT WILL BE RECORDED AND A BAD
46              ;       SECTOR FLAG SET(ECHO ONLY).  ALL ADDRESS INFO.
47              ;       WILL BE PRINTED IN OCTAL.
48
```

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!0009  .MAIN
01                ;       3.  ERROR REPORTING AND RECOVERY
02
03                ;       ALL ERRORS ARE IDENTIFIED, AND THE PROGRAM IS
04                ;       ROUTED VIA BASE TO A CALL TO CKSW.
05                ;       HARD ADDRESS ERRORS, DATA WITH CRC ERRORS, AND
06                ;       BAD SECTOR WILL CAUSE A BAD SECTOR FLAG TO
07                ;       SET (HARD DISK ONLY) AND THE PROGRAM WILL
08                ;       CONTINUE. ALL OTHER ERRORS ARE CONSIDERED
09                ;       FATAL TO THIS PROGRAM, AND THE PROGRAM WILL
10                ;       EXIT TO ODT.
11
12                ;       RECALIBRATE- ANY UNUSUAL STATUS IS REPORTED IM-
13                ;       MEDIATELY AND AN ERROR RETURN EXECUTED.
14
15                ;       SEEK- POSITIONER FAULT STATUS RESULTS IN
16                ;       STATUS PRINTOUT AND ERROR RETURN.
17                ;       WRITE- FOLLOWING "DONE" ON A WRITE, ERRORS ARE
18                ;       CHECKED IN THE SEQUENCE SHOWN BELOW.  ERROR
19                ;       RECOVERY PROCEDURE IS OUTLINED FOR EACH CASE.
20                ;       IF THE ERROR IS NOT PRESENT THE NEXT CHECK IS MADE.
21
22                ;
23                ;
24
25                ;       4.  READ/WRITE TIMEOUTS, ILLEGAL SECTOR, OR
26                ;       CHECKWORD (DATA OK) PRINT THE ILLEGAL STATUS AND DO
27                ;       AN ERROR RETURN.
28
29                ;       5.  ADDRESS ERROR- REPEAT THE WRITE, IF TEST PASSES
30                ;       THE SECOND TIME, DO A NORMAL RETURN; OTHERWISE
31                ;       FLAG AS HARD, SET THE BAD SECTOR FLAG FOR THAT SECTOR
32                ;       AND DO AN ERROR RETURN.
33
34                ;       IF A HARD CYLINDER ADDRESS ERROR OCCURS, A READ
35                ;       ON AN ADJACENT HEAD WILL BE ATTEMPTED TO DETERMINE
36                ;       WHETHER THE FAULT SHOULD BE CLASSED AS A SEEK ERROR
37                ;       OR AN ADDRESS ERROR.  THE FIRST 30. HARD ADDRESS
38                ;       ERRORS WILL HAVE THEIR ADDRESS LOGGED.
39
40                ;       6.  ENDING MEMORY ADDRESS- PRINT THE ERROR MESSAGE,
41                ;       CHECK FOR A DISK ADDRESS AND DO AN ERROR RETURN.
42
43                ;       7.  ENDING DISK ADDRESS- PRINT THE ERROR MESSAGE AND
44                ;       DO AN ERROR RETURN.
45
46                ;       READ- ALL READ ERRORS WITH THE EXCEPTION OF DATA RELATE
47                ;       ERRORS ARE HANDLED THE SAME AS DESCRIBED FOR THE WRITE
48                ;       OPERATIONS
49
50                ;       DATA ERRORS- DATA IS REREAD 9 TIMES,
51                ;       IF DATA IS BAD ON 2 OR MORE OF 10 PASSES, A HARD ERROR
52                ;       COUNT IS INCREMENTED, THE BAD SECTOR FLAG IS SET IN THAT
53                ;       SECTOR, AND AN ERROR RETURN IS TAKEN.  IF DATA IS GOOD ON
54                ;       ALL RETRIES, THE ERROR IS CONSIDERED SOFT AND A NORMAL
55                ;       RETURN IS TAKEN.
56
57                ;       THE 1ST 100. DATA ERRORS (HARD OR SOFT) ARE LOGGED.
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!0010  .MAIN
01                ;11.0   DEBUG HELP:
02                        O?DTD   11
03
04                ;11.    OCTAL DEBUG TOOL (ODT)
05                ;
06                ;       THIS DIAGNOSTIC IS EQUIPED WITH A BUILT IN ODT WHICH CAN
07                ;       BE ACCESSED BY HITTING CONTROL O (^O) AT ANY TIME DURING
08                ;       THE EXECUTION OF THE PROGRAM (AFTER SETTING THE PARA-
09                ;       METERS).
10                ;       ON ENTERING ODT THE ADDRESS OF THE LOCATION HAVING THE
11                ;       NEXT INSTRUCTION TO BE EXECUTED WILL BE TYPED-OUT.
12                ;
13                ;11.1   CONVENTIONS AND SYMBOLS
14                ;       THE FOLLOWING CONVENTIONS ARE USED BY THE ODT:
15                ;       ?       PRESSING ANY ILLEGAL KEY CAUSES THE ODT TO RES-
16                ;               POND WITH A "?".
17                ;       @       ODT IS READY AND AT YOUR SERVICE.
18                ;
19                ;11.2   COMMAND STRUCTURE
20                ;       AN ODT COMMAND HAS THE FOLLOWING FORMAT:
21                ;               [ARGUMENT][COMMAND]
22                ;       AN ARGUMENT MAY BE ONE OF THE FOLLOWING:
23                ;       "EXP"   AN OCTAL EXPRESSION CONSISTING OF OCTAL NUMBERS
24                ;               SEPARATED BY PLUS (+) OR MINUS (-) SIGNS. LEAD-
25                ;               ING ZEROS NEED NOT BE TYPED.
26                ;       "ADR"   AN ADDRESS IS THE SAME AS AN EXPRESSION EXCEPT
27                ;               THAT BIT 0 IS NEGLECTED.
28                ;       A COMMAND IS A SINGLE TELETYPE CHARACTER
29                ;
30                ;11.3   ODT COMMANDS
31                ;       THE LOCATIONS THAT CAN BE EXAMINED AND MODIFIED BY THE
32                ;       USER ARE CALLED CELLS. THESE CELLS ARE OF TWO TYPES:
33                ;       INTERNAL CPU CELLS AND MEMORY LOCATIONS.
34                ;
35                ;11.3.1 OPENING INTERNAL CELLS
36                ;       THE COMMAND TO OPEN ONE OF THE INTERNAL REGISTERS IS OF
37                ;       THE FORM "NA" WHERE N IS ANY OCTAL EXPRESSION BETWEEN
38                ;       0 AND 7
39                ;       0-3     FOR ACCUMULATORS 0-3
40                ;       4       FOR PC OF THE NEXT INSTRUCTION TO BE EXECUTED IN
41                ;               THE EVENT OF A "P" COMMAND.
42                ;       5       CPU AND TTO STATUS
43                ;               BIT     INTERPRETATION
44                ;               15      STATUS OF TTO DONE FLAG
45                ;               14      STATUS OF INTERRUPTS (ION FLAG)
46                ;               13      STATUS OF CARRY BIT
47                ;       6       ADDRESS OF THE LOCATION HAVING THE BREAK POINT (IF
48                ;               ANY)
49                ;       7       INSTRUCTION AT THE BREAK POINT LOCATION
50
51                ;       OTHER COMMANDS TO OPEN CELLS ARE:
52                ;
53                ;       "ADR"/  OPEN THE CELL AND PRINT ITS CONTENTS
54                ;       ./      OPEN THE CELL CURRENTLY POINTED TO BY THE POINTER
55                ;               AND PRINT ITS CONTENTS.
56                ;       .+"ADR"/        ADD "ADR" TO THE POINTER, OPEN THE CELL
57                ;               AND PRINT ITS CONTENTS.
58                ;       .-"ADR"/        SUBTRACT "ADR" FROM THE POINTER, OPEN
59                ;               THE CELL AND PRINT ITS CONTENTS.
60                ;       "CR"    THE RETURN KEY IS USED TO CLOSE THE OPEN CELL
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 0011  .MAIN
01              ;               WITH OR WITHOUT MODIFICATION.
02              ;       "LF"    LINE FEED IS USED TO CLOSE THE OPEN CELL WITH OR
03              ;               WITHOUT MODIFICATION AND TO OPEN THE SUCCEEDING
04              ;               CELL.
05              ;       ^       CLOSE THE OPEN CELL WITH OR WITHOUT MODIFICATION
06              ;               AND OPEN THE PRECEDING CELL
07              ;       /       CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND
08              ;               OPEN THE CELL POINTED TO BY ITS CONTENTS.
09              ;       +"ADR"/ CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND
10              ;               OPEN THE CELL POINTED TO BY ITS CONTENTS + "ADDR".
11              ;       -"ADR"/ CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND
12              ;               OPEN THE CELL POINTED TO BY ITS CONTENTS - "ADR".
13              ;
14              ;11.3.2 MODIFICATION OF A CELL
15              ;       ONCE A CELL HAS BEEN OPENED ITS CONTENTS CAN BE MODIFIED
16              ;       BY TYPING THE NEW VALUE THE CELL IS TO CONTAIN IN THE
17              ;       FORM OF AN OCTAL EXPRESSION FOLLOWED BY "CR" OR "LF".
18              ;       IF A + OR - IS TYPED AS THE FIRST CHARACTER OF THE EX-
19              ;       PRESSION THEN THE VALUE OF THE EXPRESSION IS ADDED TO OR
20              ;       SUBTRACTED FROM THE OLD CONTENTS OF THE CELL. THE
21              ;       ADDRESS ITSELF OR AN EXPRESION RELATIVE TO THE ADDRESS
22              ;       CAN BE DEPOSITED BY TYPING A "." OR ".+/-OCTAL EXPRESS-
23              ;       ION". A RUBOUT COMMAND GIVEN RIGHT AFTER OPENING A CELL
24              ;       ALLOWS THE MODIFICATION OF ITS CONTENTS AS IF THEY WERE
25              ;       TYPED IN JUST BEFORE THE COMMAND WAS ISSUED.
26              ;
27              ;11.3.3 OTHER ODT COMMANDS
28              ;       RUBOUT  THIS KEY IS USED TO DELETE ERRONEOUSLY TYPED
29              ;               DIGITS. EACH TIME THE KEY IS PRESSED THE RIGHT MOST
30              ;               DIGIT IS DELETED AND ECHOED ON THE TERMINAL. IF
31              ;               THE RUBOUT KEY IS PRESSED RIGHT AFTER OPENING A
32              ;               CELL THEN IT DELETES THE RIGHT MOST DIGIT OF THE CELLS
33              ;               CONTENTS. THIS ALLOWS THE MODIFICATION OF THE CELL
34              ;               AS IF ITS CONTENTS WERE TYPED IN JUST BEFORE THE
35              ;               KEY WAS PRESSED.
36              ;       "ADR"B  INSERT A BREAK POINT AT LOCATION "ADR".
37              ;               ONLY ONE BREAK POINT CAN BE INSERTED AND ANY
38              ;               ENTRY TO ODT AFTER EXECUTING A BREAK POINT WILL
39              ;               CAUSE IT TO BE DELETED.
40              ;       D       DELETE THE BREAK POINT IF ANY.
41              ;       P       RESTART THE EXECUTION OF THE PROGRAM AT LOCATION
42              ;               POINTED BY 4A.
43              ;       "ADR"R  START EXECUTING THE PROGRAM AT "ADR" AFTER AN
44              ;               IO-RESET.
45              ;       K       KILL THE STRING TYPED SO FAR. THE ODT RESPONDS
46              ;               WITH A "?" AND THE OPEN CELL IS CLOSED WITHOUT
47              ;               MODIFICATION.
48              ;       =       PRINT THE OCTAL VALUE OF THE INPUT ONLY.
49              ;               THIS WILL CLOSE ANY OPEN CELLS WITHOUT
50              ;               MODIFICATION AND WILL NOT OPEN A CELL
51              ;
52              ;
53              ;       NOTE:   IN PROGRAMS WHICH RELOCATE THEMSELVES THE
54              ;               THE USER SHOULD PLACE BREAK POINTS ONLY IN THE
55              ;               THE ORIGINAL PROGRAM AREA. IF A BREAK POINT IS
56              ;               PLACED OUTSIDE THIS AREA THE RESULTS WILL
57              ;               BE UNPREDICTABLE.
58              ;
59              ;
```

```
 0012  .MAIN
01              ;11.4   INSTRUCTION SET:
02              ;       ---------------
03              ;
04              ;       DOA:    SPECIFY COMMAND AND CYLINDER
05              ;       ---     ---------------------------
06              ;
07              ;       BITS    NAME            CONTENTS/FUNCTION
08              ;       ----    ----            -----------------
09              ;       0-4     CLEAR           ANY OF THESE BITS = 1 WILL SET
10              ;                               THE FOLLOWING = 0 FOR ANY AND
11              ;                               ALL DEVICES CONNECTED TO THE
12              ;                               CONTROLLER: R/W (DEVICE) DONE,
13              ;                               SEEK DONE, DIA ERROR STATUS
14              ;                               BITS 7, 8, 10-15.
15              ;
16              ;       5-6     COMMAND         SPECIFY THE DISK COMMAND FOR
17              ;                               THE SELECTED DRIVE AS FOLLOWS:
18              ;
19              ;                               5 6     NORMAL MODE COMMAND
20              ;                               - -     ------------------
21              ;                               0 0     READ
22              ;                               0 1     WRITE
23              ;                               1 0     SEEK
24              ;                               1 1     RECALIBRATE
25              ;
26              ;       7-15    CYLINDER        SPECIFY DESIRED CYLINDER FOR
27              ;                               A SEEK OR READ/WRITE OPERATION.
28              ;                               CYLINDER #'S ARE AS FOLLOWS:
29              ;
30              ;                               NON-REMOVABLE:  0-277 (OCTAL)
31              ;                               DISKETTE:       0-114    "
32              ;
33              ;       DOB:    SPECIFY MEMORY ADDRESS
34              ;       ---     ----------------------
35              ;
36              ;       BITS 1-15 SPECIFY THE STARTING MEMORY ADDRESS FOR A
37              ;       DATA CHANNEL OPERATION. BIT 0 IS THE MAP SELECT BIT
38              ;       (0 = MAP A, 1 = MAP B).
39              ;
40              ;       DOC:    SPECIFY DISK ADDRESS AND SECTOR COUNT
41              ;       ---     ------------------------------------
42              ;
43              ;       BITS    NAME            CONTENTS/FUNCTION
44              ;       ----    ----            -----------------
45              ;       0-1     DRIVE           SELECT DRIVE (0-3)
46              ;
47              ;       2       FORMAT          IF = 1, PLACE CONTROLLER IN
48              ;               MODE            FORMAT MODE.
49              ;
50              ;       3       DIAGNOSTIC      IF = 1, DIAGNOSTIC COMMANDS ARE
51              ;               COMMAND         ENABLED. THE DIAGNOSTIC COMMAND
52              ;               ENABLE          IS SPECIFIED IN BITS 11-15 OF
53              ;                               THE DOA COMMAND REGISTER.
```

```
!0013  .MAIN
01                ;       4-6     START HEAD      STARTING HEAD # FOR READ/WRITE
02                ;                               OPERATION. VALID HEAD #'S ARE:
03                ;
04                ;                               NON-REMOVABLE: 0-3
05                ;                               DISKETTE:      0-1
06                ;
07                ;       7-11    START SECTOR    SELECT STARTING SECTOR FOR A
08                ;                               READ/WRITE OPERATION. VALID
09                ;                               SECTOR NUMBERS ARE:
10                ;
11                ;                               NON-REMOVABLE:  0-37
12                ;                               DISKETTE:       0-17
13                ;
14                ;       12-15   SECTOR COUNT    # OF SECTORS TO READ/WRITE
15                ;                               (TWO'S COMPLEMENT).
16                ;
17                ;       DIA:    READ DISK STATUS
18                ;       ~~~     ~~~~~~~~~~~~~~~~
19                ;
20                ;       BIT(S)  FUNCTION/DESCRIPTION
21                ;       ~~~~~~  ~~~~~~~~~~~~~~~~~~~~
22                ;       0       READ/WRITE DONE:
23                ;               IF = 1, READ OR WRITE OPERATION COMPLETED.
24                ;               THIS IS THE DISK DEVICE DONE FLAG, AND IS
25                ;               TESTABLE VIA AN I/O SKIP INSTRUCTION. IT WILL
26                ;               BE SET ONLY AFTER A READ/WRITE OPERATION. AN
27                ;               IOPLS, START, IORST AND/OR CLEAR WILL RESET.
28                ;
29                ;       1-4     SEEK DONE:
30                ;               IF = 1, SEEK/RECALIBRATE COMPLETED FOR DRIVES
31                ;               0-3. ONLY SEEK DONE FOR THE SELECTED DRIVE CAN
32                ;               BE SET. IOPLS, START, IORST OR CLEAR WILL RESET.
33                ;
34                ;       5       DISKETTE:
35                ;               = 0 IF NON-REMOVABLE IS SELECTED
36                ;               = 1 IF DISKETTE IS SELECTED
37                ;
38                ;       6       WRITE-PROTECT:
39                ;               IF = 1, THE SELECTED DRIVE IS WRITE-PROTECTED.
40                ;               FOR THE NON-REMOVE, WRITE-PROTECT = 1 IF THE
41                ;               DRIVE IS IN DIAGNOSTIC MODE (PAGE 0 "DIAGM"=1).
42                ;
43                ;       7       BAD SECTOR/FLOPPY DATA MARK:
44                ;               IF = 1, THE LAST DATA TRANSFER ATTEMPTED TO
45                ;               READ OR WRITE A SECTOR PREVIOUSLY DESIGNATED
46                ;               AS BAD (ECHO ONLY). IF FLOPPY, DATA FIELD
47                ;               IS NOT VALID.
48                ;
49                ;       8       UNSAFE:
50                ;               IF = 1, THE SELECTED DRIVE IS IN AN UNSAFE CON-
51                ;               DITION. FOR NON-REMOVABLE, A READ/WRITE ERROR
52                ;               IS INDICATED (NO HEAD SELECT, MULTIPLE HEAD
53                ;               SELECT, NO WRITE CURRENT, WRITE CURRENT WITH
54                ;               NO WRITE COMMAND OR CLOCK FAULT). STATUS WILL
55                ;               RESET WITH START, CLEAR, IOPLS OR IORST, BUT
56                ;               THIS WILL NOT REMOVE THE DISK'S UNSAFE CON-
57                ;               DITION. TRY POWER DOWN/UP.
```

```
!0014  .MAIN
01                ;       BIT     FUNCTION/DESCRIPTION
02                ;       ~~~     ~~~~~~~~~~~~~~~~~~~~
03                ;       9       UNIT READY:
04                ;               IF = 1, SELECTED DRIVE NOT PERFORMING ANY HEAD
05                ;               MOVEMENTS AND IS READY FOR A COMMAND. FOR NON-
06                ;               REMOVE, IF = 0, A DISK SPEED FAULT IS INDICATED.
07                ;
08                ;       10      OPERATION TIMEOUT
09                ;               IF = 1, AN ERROR OCCURED IN THE LAST SEEK OR
10                ;               RECALIBRATE OPERATION. FOR NON-REMOVABLE, HOME
11                ;               NOT FOUND DURING A RECALIBRATION OR A SEEK
12                ;               COMMAND WITH CYLINDER > 277 (OCTAL) WAS ISSUED.
13                ;
14                ;       11      END OF CYLINDER:
15                ;               IF = 1, THE LAST READ/WRITE COMMAND ATTEMPTED
16                ;               TO CONTINUE BEYOND THE LAST HEAD OF THE DRIVE.
17                ;
18                ;       12      ADDRESS (HEADER) ERROR:
19                ;               IF = 1, THE ADDRESS READ FROM THE ADDRESS FIELD
20                ;               OF THE SELECTED DRIVE'S STARTING SECTOR DID NOT
21                ;               EQUAL THE LAST ADDRESS SPECIFIED TO THE DISK
22                ;               CONTROLLER.
23                ;
24                ;       13      CHECKWORD (CRC) ERROR:
25                ;               IF = 1, THE CYCLIC REDUNDANCY CHECK (CRC) WORD
26                ;               READ AT END OF SECTOR WAS NOT EQUAL TO THE CRC
27                ;               WORD CALCULATED BY THE CONTROLLER DURING THE
28                ;               DATA TRANSFER.
29                ;
30                ;       14      DATA LATE:
31                ;               IF = 1, THE DATA CHANNEL FAILED TO RESPOND IN
32                ;               TIME TO A DATA CHANNEL REQUEST. FOR NON-REMOVA-
33                ;               BLE DRIVES, THIS BIT SHOULD ALWAYS = 0.
34                ;
35                ;       15      ERROR:
36                ;               IF = 1, ONE OR MORE OF THE ABOVE ERROR STATUS
37                ;               BITS = 1 (LOGICAL "OR" OF 7, 8, 10-14).
38                ;
39                ;       DIB:    READ MEMORY ADDRESS
40                ;       ~~~     ~~~~~~~~~~~~~~~~~~~
41                ;
42                ;       BITS 0-15 INDICATE THE NEXT MEMORY WORD LOCATION FOR A
43                ;       DATA CHANNEL TRANSFER. BIT 0 IS THE MAP SELECT BIT
44                ;       (0 = MAP A SELECTED, 1 = MAP B SELECTED).
45                ;
46                ;       DIC:    READ DISK ADDRESS AND SECTOR COUNT
47                ;       ~~~     ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
48                ;
49                ;       BITS    NAME            CONTENTS/FUNCTION
50                ;       ~~~~    ~~~~            ~~~~~~~~~~~~~~~~~
51                ;       0-1     DRIVE           CURRENTLY SELECTED DRIVE (0-3)
52                ;
53                ;       2       FORMAT          IF = 1, THE CONTROLLER IS IN
54                ;               MODE            FORMAT MODE.
55                ;
56                ;       3       DIAGNOSTIC      IF = 1, DIAGNOSTIC COMMANDS
57                ;               COMMAND         ARE ENABLED.
58                ;               ENABLE
```

```
10015  .MAIN
01              ;       4-6     CURRENT HEAD    INDICATES THE HEAD # SELECTED
02              ;                               FOR THE NEXT SECTOR TRANSFER. *
03              ;
04              ;       7-11    CURRENT SECTOR  INDICATES THE SECTOR NUMBER
05              ;                               SELECTED FOR THE NEXT SECTOR
06              ;                               TRANSFER. *
07              ;
08              ;       12-15   SECTOR COUNT    INDICATES THE # OF SECTORS
09              ;                               REMAINING FOR DATA TRANSFER
10              ;                               (TWO'S COMPLEMENT).
11              ;
12              ;       * UNLESS THE OPERATION TERMINATES WITH THE ADDRESS
13              ;         ERROR STATUS BIT SET = 1, THE HEAD & SECTOR #'S
14              ;         INDICATE THE NEXT LOGICAL SECTOR FOR A DATA TRANS-
15              ;         FER.
16              ;
17              ;       CONTROL PULSE FUNCTIONS:
18              ;       ------------------------
19              ;
20              ;       PULSE           ACTION TAKEN
21              ;       -----           ------------
22              ;       NIOS (START)    SET DONE, READ/WRITE DONE AND SEEK
23              ;                       DONE FLAGS = 0. SET ALL ERROR STATUS
24              ;                       BITS (7-8 & 10-15) = 0. SET BUSY = 1
25              ;                       AND START A PREVIOUSLY DEFINED READ
26              ;                       OR WRITE OPERATION.
27              ;
28              ;       NIOC (CLEAR)    SET BUSY, DONE, READ/WRITE DONE, SEEK
29              ;                       DONE = 0. SET ALL ERROR STATUS BITS
30              ;                       (7-8 & 10-15) = 0. TERMINATES ANY
31              ;                       OPERATION IN PROGRESS.
32              ;
33              ;       NIOP (IOPLS)    SET DONE, READ/WRITE DONE, SEEK DONE
34              ;                       FLAGS = 0. SET ALL ERROR STATUS BITS
35              ;                       (7-8 & 10-15) = 0. START A PREVIOUSLY
36              ;                       DEFINED SEEK OR RECALIBRATION OPERA-
37              ;                       TION. DOES NOT AFFECT BUSY.
38              ;
39              ;       IORST (RESET)   PERFORMS SAME FUNCTIONS AS NIOC. IN
40              ;                       ADDITION, SET INTERRUPT DISABLE FLOP
41              ;                       = 0, SET MEMORY ADDRESS REGISTER = 0,
42              ;                       SET INITIAL PROGRAM LOAD FLAG = 1.
43              ;                       TRACK POSITION INFORMATION FOR ALL
44              ;                       DRIVES IS LOST. HOWEVER, IF A SEEK IS
45              ;                       ISSUED AFTER AN IORST, A RECALIBRATION
46              ;                       IS PERFORMED, FOLLOWED BY THE SEEK.
```

```
10016  .MAIN
01              ;12.0   SPECIAL NOTES/SPECIAL FEATURES:
02              ;       ---------------------------
03              ;
04              ;       1.  THE PROGRAM IS !NOT! A MAINTENANCE PROGRAM
05              ;       AND ASSUMES THE HARDWARE TO BE IN WORKING ORDER.
06              ;
07              ;       2.  IT IS RECOMMENDED THAT AT LEAST 4 PASSES
08              ;       (WRI/REA/REA) BE ALLOWED TO INSURE PACK QUALITY.
09              ;       IF TIME PERMITS, LONGER RUNS WILL FURTHER INSURE
10              ;       QUALITY.
11              ;
12              ;
13              ;13.1   PROGRAM RUNTIME:
14              ;       ---------------
15              ;
16              ;       PROGRAM RUNTIMES ARE SUBSTANTIALLY REDUCED WITH
17              ;       MEMORIES OF 16K OR LARGER.
18              ;       ;
19              ;       TYPICAL RUNTIME (4 PASSES) IS APPROXIMATELY 16 MINS
20              ;       FOR A SINGLE DRIVE , TWO SURFACES ON NOVA 800 SERIES
21              ;       CPU'S.
22              ;       ;
23              ;
24              ;
25              ;
26              ;       FOUR PASSES AFTER FORMAT ARE RECOMMENDED FOR
27              ;       SURFACE VERIFICATION.
28              ;
29              ;       READ, WRITE AND SEEK OPERATIONS ARE TIMED BY
30              ;       SPECIAL ROUTINES.  WHEN THE PROGRAM IS FIRST
31              ;       STARTED, THE TIMING ROUTINE WILL TEST FOR THE
32              ;       PRESENCE OF A REAL TIME CLOCK (RTC) TO DERIVE
33              ;       TIMING FROM IT.  IF NO RTC IS PRESENT, THE
34              ;       PROGRAM WILL TYPE "TTO BAUD RATE".  THIS
35              ;       MESSAGE REFERS TO THE BAUD RATE OF THE CONSOLE
36              ;       TERMINAL (DEVICE 10 & 11).  TYPE IN THE BAUD
37              ;       RATE.  IF A TYPING ERROR OCCURS IN THE NUMBER
38              ;       STRING (BEFORE THE CARRIAGE RETURN), SIMPLY
39              ;       TYPE A NON-NUMERIC CHARACTER AND THE REQUEST
40              ;       FOR THE BAUD RATE WILL BE REPEATED.  IF THE
41              ;       CARRIAGE HAS BEEN GIVEN AFTER A TYPING ERROR,
42              ;       RELOAD THE PROGRAM.
43
44              .EJECT
```

0017 .MAIN

**00000 TOTAL ERRORS, 00000 FIRST PASS ERRORS

0018 .MAIN

07DTD 010322 MC 10/02