DataGeneral

TECHNICAL STATEMENT

TEXT LISTING

068-000469-04

PROGRAM

MOVING HEAD DISK RELIABILITY

TEXT TAPE

097-000469-04

ABSTRACT

; THE MOVING HEAD DISK RELIABILITY PROGRAM IS A MAINTE-
; NANCE PROGRAM DESIGNED TO EXERCISE AND TEST THE 6060,
; 6061,6067,6122 DISK SYSTEMS AND 1-4 DISK DRIVES.

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 0001 .MAIN    MACRO REV 06.30          00:12:55 11/15/79
01
02
03
04
05
06
07              ;*****************************************************************
08              ;
09              ; NAME: MHDRZ.TX                          PART NUMBER: 097-000469
10              ;
11              ;
12              ; DESCRIPTION: 6060,6061,6067,6122 MOVING HEAD DISK RELIABILITY
13              ;
14              ;
15              ; REVISION HISTORY:
16              ;
17              ;       REV.            DATE
18              ;
19              ;       00              12/03/76
20              ;       01              03/11/77
21              ;       02              04/28/78
22              ;       03              12/15/78
23              ;       04              11/06/79
24              ;
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36              ;
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46              ; MANUFACTURED IN ACCORDANCE HEREWITH.
47              ;*****************************************************************
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 0002 .MAIN
01
02              ;1.0    PROGRAM NAME:   MHDRZ.SR
03              ;       6060,6061,6067,6122 MOVING HEAD DISK RELIABILITY
04
05              ;2.0    REVISION HISTORY:
06              ;       3. IMPLEMENT OVERLAP SEEK AND MAP DRIVERS, AND
07              ;          DTOS I/O MODULE LINKS.
08              ;       4. 6122 ADDITION
09              ;          REPLACED ADR (DISK ADDRESS DATA) WITH 2ND RANDOM DATA
10              ;          IN RUNALL (SA 505)
11
12              ;3.0    MACHINE REQUIREMENTS:
13
14              ;       NOVA/ECLIPSE FAMILY CENTRAL PROCESSOR
15              ;       16K READ/WRITE MEMORY
16              ;       TELETYPE OR CRT AND CONTROL (4010)
17              ;       DGC 6060,6061,6067,6122 MOVING HEAD DISK SYSTEM
18              ;       0-3 6060,6061,6067,6122-A ADD ON DISK DRIVES
19
20              ;4.0    TEST REQUIREMENTS:      N/A
21
22              ;5.0    SUMMARY:
23
24              ;       THE MOVING HEAD DISK RELIABILITY PROGRAM
25              ;       IS A MAINTENANCE PROGRAM DESIGNED TO
26              ;       EXERCISE AND TEST THE 6060,6061,6067,6122 DISK SYSTEMS
27              ;       AND 1-4 DISK DRIVES.  THE DISK DRIVES MAY BE
28              ;       SHARED BETWEEN TWO COMPUTERS IN WHICH CASE
29              ;       THE FOLLOWING PROGRAMS MAY BE RUNNING IN EACH
30              ;       COMPUTER:
31
32              ;       STARTING ADRESSES'S (SA) 500,501 RANDOM RELIABILITY
33              ;       SA 503 COMMAND STRING (IF A RELEASE COMMAND IS
34              ;       INCLUDED IN THE COMMAND STRING)
35
36              ;       THE CONTROL CAN BE ANY DEVICE CODE 20-76 OCTAL.
37              ;       THE DEFAULT IS 27 -SEE 9.0 FOR OTHER SETTINGS
38
39              ;6.0    RESTRICTIONS:
40
41              ;       1. THE DISK DRIVES MAY BE
42              ;       SHARED BETWEEN TWO COMPUTERS IN WHICH CASE
43              ;       THE FOLLOWING PROGRAMS MAY BE RUNNING IN EACH
44              ;       COMPUTER:
45
46              ;       STARTING ADRESSES'S (SA) 500,501 RANDOM RELIABILITY
47              ;       SA 503 COMMAND STRING (IF A RELEASE COMMAND IS
48              ;       INCLUDED IN THE COMMAND STRING)
49
50              ;       IF NO DRIVES ARE TO BE SHARED, THERE ARE NO OTHER
51              ;       RESTRICTIONS AS TO THE RUNNING OF THESE PROGRAMS ON
52              ;       A DUAL PROCESSOR SYSTEM.
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10003 .MAIN
01                ;7.0    PROGRAM DESCRIPTION/THEORY OF OPERATION
02
03                ;7.1    THEORY OF OPERATION
04
05                ;       A. GENERAL OVERVIEW
06
07                ;       MAIN RELIABILITY PROGRAMS (SA'S 500,501,502) ARE BASED
08                ;       AROUND THE USE OF TWO I/O BLOCKS LOCATED AT PROGRAM
09                ;       LOCATIONS APOINT AND BPOINT, AND DESIGNATED AS THE
10                ;       A=I/O BLOCK AND THE B=I/O BLOCK. TWO OTHER IMPORTANT
11                ;       TERMS FOREGROUND (FG) AND BACKGROUND (BG) ARE DEFINED
12                ;       AS FOLLOWS:
13                ;
14                ;       FOREGROUND(FG)  ALL I/O PROCESSES. FALLING UNDER THIS
15                ;                       CATEGORY ARE DISK I/O DRIVERS, DISK
16                ;                       OPERATION CHECKS (EXCEPT CORE COMPARE
17                ;                       WITH NO ECC DETECTION), INTERRUPT
18                ;                       HANDLERS AND RETURNS, DISK ERROR HANDLERS,
19                ;                       AND ALL CONSOLE I/O. AS A RULE, THIS
20                ;                       CODE IS EXECUTED WITH INTERRUPT OFF, AND
21                ;                       IS DESIRED TO BE AS QUICK AS POSSIBLE,
22                ;                       WITH THE EXCEPTION OF ERROR HANDLING AND
23                ;                       CONSOLE I/O, CONSIDERED TO HAVE A LOW
24                ;                       FREQUENCY OF OPERATION, THE PROGRAM LOC.
25                ;                       FGPT POINTS TO THE I/O BLOCK UNDER (FG)
26                ;                       PROCESS.
27                ;
28                ;       BACKGROUND(BG)  ALL NON=I/O PROCESS. FALLING UNDER THIS
29                ;                       CATEGORY ARE DISK DATA GENERATION, DISK
30                ;                       DATA CHECKING (UNLESS ECC ERROR), DISK
31                ;                       TRANSFER DEFINITION AND SETUP. AS A RULE
32                ;                       THIS CODE IS EXECUTED WITH INTERRUPT ON,
33                ;                       AND CONTAINS THE BULK OF TIME CONSUMMING
34                ;                       CODE. PROGRAM LOCATION BGPT POINTS TO
35                ;                       THE I/O BLOCK UNDER THE (BG) PROCESS.
36
```

```
10004 .MAIN
01                ;       IN GENERAL, ROUTINES PROCESSING I/O BLK. VARIABLES, SAVE
02                ;       AC2 AND USUALLY REQUIRE AC2 TO POINT TO THE I/O BLOCK
03                ;       UNDER PROCESS. SOME CODE IS RE=ENTRANT AND REQUIRES
04                ;       THAT AC2 NOT BE USED FOR ANY OTHER PURPOSE(CHECK,SETP).
05                ;       ALL SUCH VARIABLES ARE DEFINED AS DISPLACEMENT VALUES TO
06                ;       THE START OF THE BLOCK (0=N). THUS IF THE 4TH VARIABLE
07                ;       OF THE BLOCK IS DESIRED, AN LDA 0,XX,2 MAY BE USED, IF
08                ;       AC2 POINTS TO THE BLOCK START AND XX IS DEFINED AS 4
09                ;       (XX=4).
10
11                ;       THE FOREGROUND PROCESS CAN BE THOUGHT OF AS THE
12                ;       EXECUTION OF I/O TRANSFER (N), WHILE THE
13                ;       BACKGROUND CAN BE THOUGHT OF AS THE CHECKING
14                ;       (CORE=COMPARE) OF I/O TRANSFER (N=1) AND THE SETUP
15                ;       OF TRANSFER (N+1). THE GATE BETWEEN THE TWO
16                ;       PROCESSES IS THE EOT FLAG DEFINED AS (XD,2/XD=1).
17                ;       WHEN THE FOREGROUND TASK HAS COMPLETED,
18                ;       IT SETS ITS FLAG (XD,2) AND DOES A BACKGROUND
19                ;       RETURN VIA A CALL IBGEOT. WHEN THE BACKGROUND TASK HAS
20                ;       FINISHED, IT WAITS VIA A CALL XFRDN, WHICH MONITERS
21                ;       THE FOREFROUND EOT FLAG VIA (@0,2), WHICH POINTS TO THE
22                ;       OTHER BLOCK'S XD,2 FLAG.
23
24                ;       AFTER THE (BG) HAS DETECTED THE (FG) EOT FLAG, THE
25                ;       FLAG IS CLEARED, INTERRUPTS ARE DISABLED, A PSUEDO
26                ;       (BG) RETURN IS LOADED TO LOC 0, AND THE (BG) AND (FG)
27                ;       I/O BLOCKS ARE SWAPPED VIA THE CALL INTFB. AFTER THE
28                ;       NEW (FG) I/O IS INITIATED, THE NEXT (BG) TASK BEGINS.
29
30
31                ;       B. OPERATING MODES
32
33                ;       1 OF 5 DIFFERENT MEMORY/INTERRUPT MODES MAY BE IN USE
34                ;       IN THIS PROGRAM AND ARE DESCRIBED AS FOLLOWS:
35
36                ;       1=BACKGROUND ONLY, WAIT ON INTERRUPT.
37                ;       MAX # OF SECTORS = ALL OF AVAILABLE CORE (IE NOT TAKEN
38                ;       BY PROGRAM) OR 64 SECTORS MAX. USED FOR SA'S 503,506,507
39
40                ;       2=BACKGROUND/FOREGROUND MODES, 2 BUFFERS USED FOR
41                ;       BOTH READ AND WRITE PURPOSES. MAX # OF SECTORS
42                ;       = 1/2 OF AVAILABLE CORE OR 64 SECTORS MAX. USED
43                ;       FOR CONSTANT DATA PATTERNS.
44
45                ;       3.=BACKGROUND/FOREGROUND MODES, 4 BUFFERS ( 2 FOR READ
46                ;       AND 2 FOR WRITE). MAX # OF SECTORS =1/3 OF AVAILABLE
47                ;       CORE OR 64. MAX. USED FOR VARIABLE DATA(EXPECT ADR).
48
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!0005 .MAIN
01                ;       4. -IF ECLIPSE (MMPU1) OR NOVA-3 MAPS ARE IN THE SYSTEM,
02                ;       AND MAPPING IS REQUESTED, ONE OF TWO MAPPING SCHEMES
03                ;       WILL BE IN EFFECT.
04                ;
05                ;       4.1 -NO HSC(BMC)
06                ;       THE 1ST N PHYSICAL 1K BLOCKS CONTAINING THE PROGRAM
07                ;       WILL BE MAPPED TO THE 1ST N 1K LOGICAL BLOCKS IN BOTH
08                ;       THE A AND B USER MAPS. THIS MAPPING WILL REMAIN
09                ;       CONSTANT.  A 28. K PHYSICAL BLOCK WITH THE
10                ;       START 1K DESIGNATED BY THE PROGRAM VARIABLE MPB?N
11                ;       WILL BE ALLOCATED TO THE DISK I/O BUFFER AS FOLLOWS:
12                ;
13                ;       THE 28K I/O BUFFER IS DIVIDED INTO 3 NON-CONTIGUOUS
14                ;       BUFFERS, 10K OF COMMON(TO BOTH THE A AND B I/O BLOCKS)
15                ;       WRITE BUFFER(WAB), 9K OF READ BUFFER ALLOCATED TO THE
16                ;       A-I/O BLOCK(RA) VIA THE A USER AND DCH MAPS, AND 9K
17                ;       OF READ BUFFER ALLOCATED TO THE B-I/O BLOCK(RB) VIA
18                ;       THE B USER AND DCH MAPS. THE 1K BLOCKS OF THE 3 BUFFERS
19                ;       ARE INTERLEAVED IN THE PHYSICAL SPACE IN THE FOLLOWING
20                ;       MANNER:
21                ;
22                ;       WAB1,RA1,RB1,WAB2,RA2,RB2,WAB3 ETC.
23                ;
24                ;       5.1 HSC(BMC) IN SYSTEM/VARIABLE DATA
25                ;       5.1A SAME AS 4.1
26                ;
27                ;       5.1B 2 HSC MAP TABLES ARE LOADED AS COPIES OF THE A AND
28                ;       B USER MAPS AND ASSIGNED TO THE A AND B I/O BLOCKS.
29                ;
30                ;       5.1C THE 28K I/O BUFFER IS MOVED ACROSS 256.K DURING A
31                ;       PASS OF SA'S 500 OR 501. A PASS OF THE 502 SA TESTS
32                ;       WILL MOVE THE I/O BUFFER 8K EACH PASS.
33                ;
34                ;       5.2 -HSC(BMC) OR A/B DCH MAPS/CONSTANT DATA
35                ;       THE 1ST N PHYSICAL 1K BLOCKS CONTAINING THE PROGRAM
36                ;       WILL BE MAPPED TO THE 1ST N LOGICAL BLOCKS IN
37                ;       BOTH THE A AND B USER MAPS, AND TO EITHER THE
38                ;       A AND B DCH MAPS OR THE 2 HSC(BMC) MAP TABLES.
39                ;
40                ;       A 32K PHYSICAL I/O BLOCK IS DIVIDED INTO 2 16K
41                ;       BUFFERS. THE 1ST 16K IS MAPPED TO THE A USER MAP,
42                ;       AND EITHER THE A DCH MAP OR TO THE 1ST OF
43                ;       2 HSC(BMC) MAP TABLES. THE 2ND 16K IS MAPPED TO THE
44                ;       B USER MAP, AND TO EITHER THE B DCH MAP OR THE
45                ;       2ND HSC(BMC) MAP. BOTH BUFFERS ARE MAPPED TO THE
46                ;       SAME LOGICAL SPACE POINTED TO BY THE PROGRAM
47                ;       POINTER BUFF.
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!0006 .MAIN
01
02                ;7.2    PROGRAM DESCRIPTION
03
04                ;       A. RELIABILITY TEST (SA 500)
05
06                ;       A RANDOM NUMBER GENERATOR IS USED TO SELECT A
07                ;       DISK DRIVE,CYLINDER,HEAD,BEGINNING SECTOR,
08                ;       AND NUMBER OF CONSECUTIVE SECTORS.  RANDOM
09                ;       DATA IS THEN GENERATED, WRITTEN, AND READ.
10                ;       THE SEQUENCE IS REPEATED INDEFINITELY.
11                ;       IF RUNNING MULTIPLE UNITS, OVER LAPPED SEEKS ARE
12                ;       EMPLOYED IF THE NEXT RANDOM UNIT IS DIFFERENT FROM
13                ;       THE CURRENT UNIT UNDER I/O EXECUTION.
14
15                ;       B. RELIABILITY TEST (SA 501) WITH OPTIONS
16
17                ;       SAME AS A, EXCEPT THAT OPERATOR IS GIVEN
18                ;       OPTIONS ON DATA PATTERNS (SEE 7D II)
19                ;       AND MAY CHOOSE A CONSTANT CYLINDER,HEAD,SECTOR
20                ;       OR # OF SECTORS. ANY LETTER RESPONSE TO CYL,HEAD ETC.
21                ;       GETS RANDOM FUNCTION FOR THAT VARIABLE. A CARRIAGE
22                ;       RETURN ONLY GETS THE RANDOM FUNCTION FOR ALL VARIABLES.
23
24                ;       THE OPERATOR IS ALSO ASKED TO RESPOND TO
25                ;       JITTER OPTION(YES/NO). IF YES, A RANDOM DELAY(0-40,50MS)
26                ;       IS INSERTED INTO THE BACKGROUND LOOP TO CREATE
27                ;       A MORE ASYNCHRONOUS DISK I/O LOOP. **A YES RESPONSE
28                ;       WILL ALSO RESULT IN A LONGER TEST RUNTIME.
29
30                ;       C. INCREMENTAL DISK ADDRESS TEST (SA 502)
31
32                ;       OPERATOR IS GIVEN OPTION ON DATA (SEE 7D II)
33                ;       REQUESTED DATA IS FIRST WRITTEN (SEE SWPAK10) OVER
34                ;       THE ENTIRE PACK. THEN THE DATA IS READ FROM
35                ;       ALL SECTORS . THIS INSURES THAT ALL DISK
36                ;       PACK BLOCKS ARE USEABLE AND ARE FORMATTED
37                ;       PROPERLY.  THE TEST IS THEN REPEATED FOR ALL
38                ;       READY DISCS, AND PASS IS PRINTED.  THE
39                ;       SEQUENCE IS REPEATED INDEFINITELY.
40
41
42                ;       #NOTE
43                ;       SWPAK7=1, PROGRAM WAITS AFTER WRITE WITH READ
44                ;       VERIFICATION ALLOWING OPERATOR TO CHANGE PACKS.
45                ;       SWPAK8=1, PUTS PROGRAM INTO READ ONLY MODE
46                ;       ## SA'S 501,502 ONLY. IF SA 501-DATA MUST BE
47                ;       CONSTANT (SEE 7D II).
48
49                ;       ALL NUMBERS ENTERED ABOVE MUST BE IN OCTAL.
50                ;       ANY NON-OCTAL INPUT IS TREATED AS A LETTER.
51                ;       ANY LETTER INPUT FOR CYL,HEAD,SECTOR, OR # OF
52                ;       SECTORS GETS RANDOM FUNCTION IN THE RELIABILITY
53                ;       TEST WITH OPTIONS.
54
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10007 .MAIN
01
02              ;       D. COMMAND STRING INTERPRETER (SA 503)
03              ;       AS A TROUBLE SHOOTING AID THE SERVICE
04              ;       ENGINEER MAY TYPE IN HIS OWN TEST LOOP.
05              ;       AFTER STARTING AT 503, THREE ARGUMENTS
06              ;       MUST BE ENTERED IN RESPONSE TO THREE
07              ;       PROGRAM QUESTIONS; "UNIT", "DATA", AND
08              ;       "COMMAND STRING". ALL NUMBERS MUST ENTERED
09              ;       IN OCTAL.
10              ;
11              ;       I.      UNIT:   TYPE UNIT # OR CARRIAGE TO
12              ;                       USE THE PREVIOUS ENTRY
13              ;
14              ;       II.     DATA:   RAN=RANDOM
15              ;
16              ;                       ALO=ALL ONES
17              ;                       ALZ=ALL ZEROS
18              ;                       PAT=155555 PATTERN
19              ;                       ROT=155555 PATTERN ROTATED ON
20              ;                       SUCCESSIVE PASSES.
21              ;                       ALT=52525 PATTERN
22              ;                       FLO=FLOATING ONE PATTERN
23              ;                       FLZ=FLOATING ZERO PATTERN
24              ;                       ADR=ALTERNATING CYLINDER AND
25              ;                       HEAD,SECTOR WORDS
26              ;                       VAR=EXISTING WORDS ENTERED PREVIOUSLY AS
27              ;                       DESCRIBED BELOW
28              ;
29              ;                       ALTERNATIVELY ENTER A STRING OF UP TO 7
30              ;                       OCTAL 16 BIT WORDS TO BE
31              ;                       USED AS DATA.  THE WORDS
32              ;                       ENTERED ARE USED REPEATEDLY
33              ;                       TO MAKE UP A SECTOR BLOCK.
34              ;                       TYPE CARRIAGE TO USE THE
35              ;                       PREVIOUS ENTRY.
36              ;
37              ;       III.    COMMAND STRING:
38              ;
39              ;       OPTIONS 1.      READ HEAD,SECTOR,#SECTORS
40              ;               2.      WRITE SAME
41              ;               3.      SEEK CYLINDER
42              ;               4.      RECALIBRATE
43              ;               5.      LOOP (GO TO BEGINNING OR LR)
44              ;               6.      DELAY N (N= DELAY IN MS)
45              ;               7.      DISABLE (WRITE DISABLE)
46              ;               8.      TRESPASS
47              ;               9.      STOP DISK
48              ;               10.     RELEASE
49              ;               11.     OFF (OFFSET FORWARD)
50              ;               12.     OFR (OFFSET REVERSE)
51              ;               13.     LR  (BEGIN LOOP HERE)
52              ;               14.     VERIFY (WRITE)
53              ;               15.     FORMAT CYL,HD,SEC
54              ;               16.     BAD SECTOR FORMAT (CYL,HD,SEC)
55              ;               ## NOTE A SEEK IS INCLUDED IN ABOVE 2
56              ;               17.     TYPE CARRIAGE RETURN TO USE THE
57              ;                       PREVIOUS COMMAND STRING.
```

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10008 .MAIN
01
02              ;               NOTE THAT EITHER SPACES OR A COMMA
03              ;               MAY BE USED AS AN ARGUMENT DELIMITER.
04              ;               EACH RESPONSE IS TERMINATED BY
05              ;               TYPING CARRIAGE RETURN.  IF MORE
06              ;               ROOM IS NEEDED ON A LINE, TYPE
07              ;               LINE FEED TO SPACE TO THE NEXT LINE.
08              ;               THE WORD "SAME" USED WITH READ, OR WRITE,
09              ;               WILL CAUSE THE PREVIOUS DISK
10              ;               ADDRESS PARAMETERS TO BE USED.
11              ;
12              ;               AN R TYPED WHILE A STRING IS BEING EXECUTED
13              ;               WILL CAUSE THE PROGRAM TO  RETURN TO THE
14              ;               COMMAND STRING START. THE ESCAPE KEY WILL
15              ;               BYPASS THE UNIT AND DATA PROMPTS TO THE
16              ;               COMMAND STRING PROMPT.
17              ;
18              ;       THE FOLLOWING EXAMPLE WOULD CAUSE UNIT
19              ;       1 TO SEEK CYLINDER 50, THEN REPEATEDLY
20              ;       WRITE SECTORS 2 AND 3 OF HEAD 5,
21              ;       THEN READ IT BACK AND CHECK.  DATA IS SPECIFIED
22              ;       AS ALTERNATE WORDS OF ZEROS THEN ONES.
23              ;
24              ;       UNIT: 1
25              ;       DATA: 0,177777
26              ;       COMMAND STRING: SEEK 50 LR WRITE 5,2,2 READ SAME LOOP
27              ;
28              ;       E. QUICKIE FORMATTER (SA 504)
29              ;       FORMATS PACK IN APPROXIMATELY 4 MINUTES AND HALTS.
30              ;       THERE IS NO VERIFY, NO FLAGS ARE SET, AND NO ERROR
31              ;       CHECKING.
32              ;
33              ;       F. RUNALL (SA 505)
34              ;       PROGRAM ALTERNATES BETWEEN THE PROGRAMS DESCRIBED
35              ;       IN 7.B(4 DATA PATTERNS =PAT,RAN,FLZ,FLO) AND
36              ;       7.C(6 DATA PATTERNS =PAT,RAN,RAN=2,ALT1,ZEROES,ONES)
37              ;       AND 7.H, AND IN THAT ORDER.
38              ;
39              ;       G. SEEK EXERCISER (SA 506)
40              ;       PROGRAM PROVIDES A SEEK SCAN SEQUENCE
41              ;       CONVERGING FROM THE EXTREME OUTERMOST TRACKS INTO THE
42              ;       ADJACENT TRACK IN THE CENTER, THEN DIVERGING AGAIN TO
43              ;       THE EXTREMES.
44              ;
45              ;       H. RANDOM SEEK EXERCISER (SA 507)
46              ;       PROGRAM PROVIDES A RANDOM SEEK SEQUENCE
47              ;
48              ;       #G,H ALL SEEKS IN G/H ARE FOLLOWED BY A 1 SECTOR READ
49              ;       BUT WITH NO DATA CHECK. ALL SEEKS ARE TIMED
50              ;       WITH MAX,MIN, AND AVE. TIMES BEING LOGGED IN MS.
51              ;       SEEK PATHS FOR MAX,MIN VALUES ARE ALSO LOGGED.
52              ;       #CAUTION -ECC ERRORS WILL RESULT IN SA'S 506,507 UNLESS
53              ;       PACK IS WRITTEN TO AFTER FORMATTING.
54              ;
55              ;       I.  ERROR COUNT/LOG RECOVERY (SA 510)
56              ;       IN THE EVENT A PROGRAM WAS STOPPED DURING A RUN, THE
57              ;       ERROR LOGS MAY BE RECOVERED AT THIS STARTING ADDRESS.
58              ;       ***MUST BE DONE BEFORE ANY PROGRAM RESTART AS PROGRAM
59              ;       INITIALIZATION ZEROES ALL LOGS.
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10009 .MAIN
01              ;8.1    SWITCH SETTINGS
02              ;
03              ;       LOCATION "SWREG" IS USED TO SELECT THE PROGRAM OPTIONS
04              ;       (NOT SYSTEM CONFIGURATION). WHILE RUNNING UNDER DTOS,
05              ;       THIS LOCATION WILL BE LOADED BY THE MONITOR.
06              ;       HOWEVER UNDER STAND ALONE AND PROGRAM LOAD MODES THIS
07              ;       LOCATION WILL BE SET ACCORDING TO THE ANSWERS SUPPLIED
08              ;       BY THE OPERATOR. IN ANY CASE THE OPTIONS CAN BE CHANGED
09              ;       OR VERIFIED BY USING ONE OF THE COMMANDS GIVEN IN SEC.
10              ;       8.3
11              ;
12              ;
13              ;8.2    SWITCH OPTIONS
14              ;       DIFFERENT BITS AND THEIR INTERPRETATION AT LOCATION
15              ;       "SWREG" IS AS FOLLOWS:
16              ;
17              ;       BIT     OCTAL   BINARY  INTERPRETATION
18              ;               VALUE   VALUE
19              ;
20              ;       1               0       LOOP ON ERROR
21              ;               40000   1       SKIP LOOPING ON ERROR
22              ;
23              ;       2               0       PRINT TO CONSOLE
24              ;               20000   1       ABORT PRINT OUT TO CONSOLE
25              ;
26              ;       4               0       PRINT PASS
27              ;               04000   1       DO NOT PRINT PASS
28              ;
29              ;       5               0       DO NOT PRINT ON THE LINE PRINTER
30              ;               02000   1       PRINT ON THE LINE PRINTER
31              ;
32              ;       6               0       DO NOT EXIT TO ODT ON ERROR
33              ;               01000   1       EXIT TO ODT ON ERROR
34              ;                               HIT P TO CONTINUE
35              ;
36              ;       7               0       **** N/A
37              ;               00400   1       BREAK FOR PACK INTERCHANGE
38
39              ;       8               0       **** N/A
40              ;               00200   1       FOR READ ONLY MODE (SA 501,502)
41              ;
42              ;       9               0       N/A
43              ;               00100   1       BYPASS DATA CHECK
44              ;
45              ;       10(A)           0       N/A
46              ;               00040   1       DO VERIFY AFTER WRITE (SA 502 ONLY)
47              ;
48              ;       11(B)           0       N/A
49              ;               00020   1       ENABLE BAD SECTOR PRINTOUTS
50
51              ;       12(C)           0       N/A
52              ;               00010   1       EXIT TO ODT ON DRIVE ERROR PRIOR TO
53              ;                               RECOVERY RECALIBRATE OPERATION
54              ;                               HIT P TO CONTINUE
55
56              ;       13(D)           0       N/A
57              ;               00004   1       PRINT I/O TRACE ON ERROR
58              ;                               (LAST 5 I/O CALL PC'S + COMMANDS)
```

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10010 .MAIN
01
02              ;8.3    SWITCH COMMANDS
03              ;       ONCE THE PROGRAM STARTS EXECUTING THE STATE OF ANY OF
04              ;       THE BITS CAN BE CHANGED BY HITTING KEYS 1-9, A-F. THE
05              ;       PROGRAM WILL CONTINUE RUNNING AFTER UPDATING THE OPTIONS.
06              ;       EACH KEY WILL COMPLEMENT THE STATE OF THE BIT AFFILIAT-
07              ;       ED WITH IT, THUS BIT 4 CAN BE ALTERED BY HITTING KEY 4.
08              ;       SETTING OF ANY BIT OF LOCATION "SWREG" WILL SET BIT 0.
09              ;       (DEFAULT MODE IS DEFINED AS ALL BITS OF SWREG SET TO 0)
10              ;
11              ;8.4    OTHER COMMANDS  (^ = CONTROL KEY)
12              ;
13              ;       "CR"    A "RETURN" CAN BE TYPED TO CONTINUE THE PROGRAM
14              ;               AFTER ITS LOCKED IN A SWITCH MODIFICATION MODE
15              ;
16              ;       ^D      THIS COMMAND GIVEN AT ANY TIME WILL RESET "SWREG"
17              ;               TO DEFAULT MODE AND RESTART THE PROGRAM.
18              ;
19              ;       ^R      THIS COMMAND GIVEN AT ANY TIME WILL RESTART THE
20              ;               PROGRAM. SWITCHES ARE LEFT WITH THE VALUES THEY
21              ;               HAD BEFORE THE COMMAND WAS ISSUED.
22              ;
23              ;       ^O      THIS COMMAND GIVEN AT ANY TIME WILL CAUSE THE
24              ;               PROGRAM CONTROL TO GO TO ODT (NOTE: THIS IS AN
25              ;               OPTIONAL COMMAND AND IS AVAILBLE ONLY IF
26              ;               ODTPK IS PRESENT)
27              ;
28              ;       M       THIS COMMAND GIVEN AT ANY TIME WILL PRINT THE
29              ;               CURRENT OPERATING MODES.
30              ;
31              ;       0       THIS COMMAND GIVEN AT ANY TIME WILL LOCK THE
32              ;               PROGRAM INTO SWITCH MODIFICATION MODE WHERE
33              ;               MORE THAN 1 BIT CAN BE CHANGED.
34              ;
35
```

```
10011 .MAIN
01              ;9.0    OPERATING PROCEEDURE/OPERATOR INPUT:
02
03              ;       A. VERIFY DRIVE (DRIVES) ARE READY ON-LINE
04              ;       B. LOAD PROGRAM USING BINARY LOADER
05              ;       C. RESET ,LOAD ONE OF THE STARTING ADDRESSES
06              ;          SHOWN BELOW INTO THE DATA SWITCHES AND HIT
07              ;          START.
08
09              ;       STARTING ADDRESS
10              ;         4     SET DISK CONTROL ADDRESS TO OTHER THAN 27
11              ;        11     ODT - DIRECT ENTRY ONLY
12              ;       200     RUNALL TESTS
13              ;       500     RELIABILITY TEST, ALL CYLINDERS
14              ;       501     RELIABILITY TEST, (OPTIONS)
15              ;       502     INCREMENTAL DISK ADDRESS TEST
16              ;       503     COMMAND STRING INTERPRETER
17              ;       504     QUICKIE FORMATTER
18              ;       505     RUN ALL
19              ;       506     SEEK EXERCISER (CONVERGING,DIVERGING PATTERN)
20              ;       507     SEEK EXERCISER (RANDOM PATTERN)
21              ;       510     ERROR COUNT/LOG RECOVERY
22
23              ;       OPERATOR IS REQUESTED TO ENTER A TTY BAUD RATE
24              ;       (IF RTC IS NOT PRESENT) FOR TIMING, DATE -DAY,
25              ;       MONTH, YEAR (I.E. 77...), HOUR, & MINUTE (A (CR)
26              ;       RESPONSE WILL IGNORE THIS ROUTINE),  UNIT NUMBERS
27              ;       TO BE TESTED (0-3), AND A DATA CHANNEL BLOCK SIZE.
28
29              ;       IF THE SYSTEM CONTAINS THE ECLIPSE MAP OPTIONS
30              ;       (MMPU1, OR HSC(BMC)), OR NOVA-3 MAP, THE OPERATOR
31              ;       IS GIVEN THE OPTION(YES/NO) TO EXERCISE THE MAPS
32              ;       AND PHYSICAL MEMORY. SEE 9.D(OPERATING MODES)
33
34              ;       ## A (CR) ONLY RESPONSE TO UNIT NUMBERS, WILL LEAVE
35              ;       UNIT/SIZE INFORMATION IN PREVIOUS STATE.
36              ;       ## ONLY THE ECLIPSE HIGH SPEED CHANNEL (HSC) MAY HAVE
37              ;       A 20 WORD BUFFER.
38
39              ;       OPERATOR INPUT CONTROLLED PRINTOUTS ARE AS FOLLOWS:
40
41              ;       L       = FIRST 100. BAD SECTORS, DATA, OR ADDRESSES
42              ;       S       = SEEK TIMING STATISTICS (506,507 ONLY)
43              ;       W       = SECTORS W/R PLUS ERROR COUNTS
44              ;       **NOTE** ANY CHARACTER TYPED WILL END PRINTOUTS AT THE
45              ;       NEXT CHANGE OF DATA TYPE.
```

```
10012 .MAIN
01
02              ;10.0   PROGRAM OUTPUT/ERROR DESCRIPTION:
03
04
05              ;       ALL ERRORS ARE IDENTIFIED, COUNTED, AND THE
06              ;       PROGRAM IS ROUTED VIA BASE TO A CALL TO CKSW.
07              ;       ON THE BASIS OF SWITCH SETTINGS (SEE 8.2) THE
08              ;       PROGRAM WILL GO INTO A SCOPE LOOP, OR PROCEED,
09              ;       DEPENDING ON THE SWPAK SETTINGS.
10
11              ;       UPON LOSS OF READY AND A SINGLE DRIVE, THE PROGRAM
12              ;       WILL PRINT THE APPROPRIATE ERROR MESSAGE AND WILL NOT
13              ;       PROCEED UNTIL READY IS RETURNED. IF MULTIPLE
14              ;       DRIVES EXIST, THE PROGRAM WILL CONTINUE WITH THE
15              ;       REMAINING DRIVES. IF THE DOWN DRIVE IS PLACED BACK
16              ;       ONLINE, THE PROGRAM WILL RESUME TESTING OF
17              ;       THAT DRIVE. THE ABOVE ALSO APPLIES TO THE LOSS
18              ;       OF WRITE ENABLE IF THE PROGRAM IS IN A WRITE MODE.
19
20              ;       RECALIBRATE - ANY UNUSUAL STATUS IS REPORTED
21              ;       IMMEDIATELY AND AN ERROR RETURN EXECUTED.
22
23              ;10.1   SEEK - POSITIONER FAULT STATUS INCREMENTS SEEK
24              ;       ERROR COUNTER.  ANY ERROR STATUS  RESULTS
25              ;       IN STATUS PRINTOUT AND ERROR RETURN.
26              ;       A RECALIBRATE WILL BE PERFORMED BY THE ERROR HANDLER.
27              ;       PROGRAM WILL LOG THE FIRST 20. CYLINDERS
28              ;       TO/FROM ON FINDING SEEK ERRORS
29
```

```
10013 .MAIN
01              ;10.2   WRITE - FOLLOWING "DONE" ON A WRITE, ERRORS ARE
02              ;       CHECKED IN THE SEQUENCE SHOWN BELOW.  ERROR
03              ;       RECOVERY PROCEEDURE IS OUTLINED FOR EACH CASE.
04              ;       IF THE ERROR IS NOT PRESENT THE NEXT CHECK IS MADE.
05
06              ;       DRIVE STATUS (DIB) IS CHECKED 1ST FOR BOTH READ AND
07              ;       WRITE BEFORE ANY DIA CHECKS ARE MADE
08
09              ;       1. READ/WRITE TIMEOUTS, DATA LATE, ILLEGAL SECTOR,
10              ;       PARITY,DATA VERIFY, OR ANY DRIVE FAULTS- INCREMENT THE
11              ;       APPROPRIATE ERROR COUNT, PRINT THE ILLEGAL STATUS
12              ;       AND DO AN ERROR RETURN. ANY DRIVE FAULT WILL CAUSE
13              ;       A RECALIBRATE TO BE PERFORMED BY THE ERROR HANDLER.
14
15              ;       2. ADDRESS ERROR- REPEAT THE WRITE, IF TEST PASSES
16              ;       THE SECOND TIME, INCREMENT THE SOFT ADDRESS ERROR
17              ;       COUNT AND DO A NORMAL RETURN; OTHERWISE INCREMENT
18              ;       THE HARD ADDRESS ERROR COUNT AND DO AN ERROR RETURN
19
20              ;       IF A HARD CYLINDER ADDRESS ERROR OCCURS, A READ
21              ;       ON AN ADJACENT HEAD WILL BE ATTEMPTED TO DETERMINE
22              ;       WHETHER THE FAULT SHOULD BE CLASSED AS A SEEK ERROR
23              ;       OR AN ADDRESS ERROR.THE FIRST 20. ADDRESS
24              ;       ERRORS WILL HAVE THEIR ADDRESSES LOGGED.
25
26              ;       3. BAD SECTOR- LOG THE DISK ADDRESS (1ST 100.) AND DO
27              ;       A NORMAL RETURN. NO PRINTOUT WILL RESULT UNLESS SW11=1,
28              ;       ALTHOUGH THE I/O OPERATION WAS PREMATURELY TERMINATED.
29              ;       A "SOFT" ERROR WILL BE RECORDED IF THE SECTOR UNDER
30              ;       TEST PASSES AT LEAST 1 OF 4 RETRYS.  THE LOG DENOTES
31              ;       SOFT ERRORS BY A COUNT GREATER THAN 0, REPRESENTING
32              ;       THE ERROR COUNT TALLIED.
33              ;       ***SEE 10.3A.
34
35              ;       4. ENDING MEMORY ADDRESS - INCREMENT THE MEMORY ADDRESS
36              ;       ERROR COUNT, PRINT THE ERROR MESSAGE, CHECK FOR A
37              ;       DISK ADDRESS ERROR AND DO AN ERROR RETURN
38
39              ;       5. ENDING DISK ADDRESS - INCREMENT THE DISK ADDRESS
40              ;       ERROR COUNT, PRINT THE ERROR MESSAGE, AND
41              ;       DO AN ERROR RETURN
42
```

```
10014 .MAIN
01
02              ;10.3   READ - ALL READ ERRORS WITH THE EXCEPTION OF DATA RELATED
03              ;       ERRORS ARE HANDLED THE SAME AS DESCRIBED FOR THE WRITE
04              ;       OPERATIONS
05
06              ;       DATA ERRORS - DATA IS REREAD 3 X (4X IF ECC UNDETECTED)
07              ;       IF PROGRAM IS IN WRITE/READ MODE AND DATA IS BAD ALL
08              ;       4 TRIES, A HARD ERROR COUNT IS INCREMENTED AND AN
09              ;       ERROR RETURN IS TAKEN. IF DATA IS GOOD ON ANY OF FOUR
10              ;       TRIES, A SOFT ERROR COUNT IS INCREMENTED AND A
11              ;       NORMAL RETURN IS TAKEN
12
13              ;       IF THE PROGRAM IS IN A READ ONLY MODE (IE. READ MODE
14              ;       FOR ANY 502 PROGRAM OR WHEN 505 IS RUNNING A 502
15              ;       PROGRAM), THE DATA WILL BE REREAD AN ADDITIONAL
16              ;       4 TIMES IN BOTH OFFSET FORWARD AND OFFSET REVERSE
17              ;       MODES BEFORE THE PROBLEM IS CLASSED AS A HARD ERROR
18
19              ;       THUS TOTAL RETRIES FOR A HARD ECC DETECTED ERROR IN
20              ;       A READ ONLY MODE IS 12 (13 FOR ECC UNDETECTED), AND
21              ;       4 IF IN A WRITE/READ MODE (5 IF ECC UNDETECTED).
22              ;       ***SEE 10.3A
23
24              ;       ANY SUCCESSFUL REREADS WHILE IN AN OFFSET MODE
25              ;       WILL BE PRINTED AND LOGGED. THE DISK ADDRESSES
26              ;       OF ALL DATA PROBLEMS WILL BE PRINTED AND THE FIRST
27              ;       100. WILL BE LOGGED. THE FIRST THREE GOOD/BAD
28              ;       WORD PAIRS AND RESPECTIVE ADDRESSES WILL BE PRINTED.
29
30              ;       IF SWPAK9=1 (BYPASS DATA CHECK) HARD OR SOFT DATA
31              ;       ERRORS WILL BE DETERMINED BY ECC STATUS.
32
33              ;10.3A  ECC (ERROR CORRECTION CODE) ANALYSIS
34
35              ;       ALL READ PASSES INCLUDING RETRIES WILL HAVE THE ECC
36              ;       RESULTS LOGGED AS PER THE FOLLOWING 4 CATEGORIES:
37
38              ;       1. ECC CORRECTED -THE ECC DETECTED AND SUCCESSFULLY
39              ;       CORRECTED THE DATA ERROR.
40
41              ;       2. NON-CORRECTABLE ECC -THE ECC DETECTED AND CORRECTLY
42              ;       DIAGNOSED THE ERROR PATTERN AS UNCORRECTABLE.
43
44              ;       3. ECC UNDETECTED -THE ECC FAILED TO DETECT A DATA ERROR.
45              ;       THIS MAY BE A MALFUNCTION OF THE ECC LOGIC, BUT IT IS
46              ;       MORE LIKELY ONE OF THE FOLLOWING PROBLEMS:
47
48              ;       A FAILURE OF THE DRIVE OR ADAPTER TO WRITE A SECTOR.
49              ;       ***NOTE- A CHECK SHOULD BE MADE IN THE BAD SECTOR
50              ;       LOG TO SEE WHETHER A WRITE OPERATION MAY HAVE
51              ;       ENCOUNTERED A SOFT OR FAULTY BAD SECTOR INDICATION,
52              ;       WHICH WOULD HAVE TERMINATED THE WRITE.
53
54              ;       A FAILURE IN THE DCH INTERFACE,CONTROLLER, OR ADAPTER
55              ;       DATA PATHS.
```

```
10015 .MAIN
01                ;       4. ECC FAILED -TWO CONDITIONS MAY FALL INTO THIS CATEGORY.
02                ;
03                ;       4A. AN ECC ERROR WAS DETECTED BUT WITH NO ACCOMPANYING
04                ;       DATA ERROR. A CHECK IS MADE TO SEE WHETHER THE ECC
05                ;       WORDS POINT TO AN ERROR WITHIN THE TWO APPENDED
06                ;       WRITE ECC WORDS. IF SUCH AN ERROR IS
07                ;       DETERMINED TO BE THE CASE, THE ERROR WILL BE LOGGED AS
08                ;       CORRECTABLE AND NO ECC FAILED MESSAGE WILL RESULT.
09                ;       THIS TYPE OF ERROR SHOULD REPRESENT ONLY A VERY SMALL
10                ;       PERCENTAGE OF THE DATA ERRORS (<1%- LARGE SAMPLE). IF
11                ;       A SIGNIFICANTLY HIGHER PERCENTAGE OF THIS ERROR RESULTS,
12                ;       THEN AN ECC PROBLEM WOULD BE INDICATED.
13                ;
14                ;       IF THE ECC DOES NOT POINT TO THE TWO APPENDED WRITE ECC
15                ;       WORDS, THEN AN ECC FAILED MESSAGE (1ST PASS ONLY) WILL
16                ;       RESULT AND THE ACTUAL ECC WORDS READ FROM THE CONTROLLER
17                ;       WILL BE PRINTED.
18                ;
19                ;       4B. AN ECC ERROR WAS DETECTED, BUT THE ECC EITHER FAILED
20                ;       TO CORRECT A CORRECTABLE ERROR, OR TRIED TO CORRECT AN
21                ;       UNCORRECTABLE ERROR. THESE CONDITIONS (POSSIBLY CAUSED
22                ;       BY PROBLEMS OTHER THAN ECC) WILL RESULT IN A PRINTOUT
23                ;       (1ST PASS ONLY) OF THE SIMULATED WRITE AND SIMULATED
24                ;       READ ECC WORDS PLUS THE ACTUAL READ ECC WORDS AS READ
25                ;       FROM THE CONTROLLER.
26                ;
27                ;       THE SIMULATED WRITE ECC WORDS ARE THE RESULT OF A
28                ;       PROGRAM SIMULATION OF THE ECC LOGIC ON WHAT THE PROGRAM
29                ;       BELIEVES TO BE THE WRITE DATA (A WRITE ERROR WILL CAUSE
30                ;       THIS ASSUMPTION TO BE FALSE), AND REPRESENTS WHAT THE
31                ;       PROGRAM BELIEVES SHOULD HAVE BEEN WRITTEN AS THE ACTUAL
32                ;       TWO WRITE ECC WORDS ON THE DISK.
33                ;
34                ;       THE SIMULATED READ ECC WORDS ARE THE RESULT OF ANOTHER
35                ;       PROGRAM SIMULATION OF THE ECC LOGIC ON THE READ DATA
36                ;       IN MEMORY, AND REPRESENT WHAT THE PROGRAM BELIEVES
37                ;       SHOULD BE READ FROM THE CONTROLLER AS THE TWO ECC
38                ;       WORDS. THE ACTUAL READ ECC WORDS ARE THOSE TWO WORDS
39                ;       AS READ FORM THE DISK CONTROLLER.
```

```
10016 .MAIN
01
02                ;10.4   ERRORS- ERROR STATUS IS PRINTED WHENEVER ENCOUNTERED
03                ;       AS FOLLOWS:
04                ;
05                ;       'MODE'  UNIT:   'N'
06                ;       CYL-  'N'       HEAD  'N'       SECT  'N'    #SECT  'N'
07                ;       DIA/DIB STATUS= 'N'     'DESCRIPTIVE MESSAGE'
08                ;
09                ;       WHERE CYL,HEAD,SECT REFER TO THE FINAL DISK ADDRESS AT
10                ;       THE POINT OF ERROR, AND #SECT REFERS TO THE NUMBER OF
11                ;       SECTORS ALREADY DONE IN THE MULTIPLE SECTOR TRANSFER.
12                ;
13                ;       WHEN DATA ERRORS ARE FOUND, ONLY THREE ARE PRINTED PER
14                ;       ENCOUNTER PLUS THE TOTAL NUMBER OF ERRORS.(SEE PARA 5)
15                ;       IF THE DATA ERROR IS ECC UNDETECTED AND THE SYSTEM IS
16                ;       MAPPED, THE MAP, PHYSICAL 1K ADDRESS, AND THE DCH
17                ;       LOGICAL ADDRESSES ARE ALSO PRINTED.
18                ;
19                ;       WHEN LOOPING IS INVOLVED (RETRIES OR FOR SCOPING)
20                ;       STATUS IS PRINTED ON THE 1ST PASS ONLY.
21                ;
22                ;10.5   STATISTICS - TYPE W
23                ;       DURING RANDOM TESTING TO GET A REPORT OF THE
24                ;       NUMBER OF SECTORS WRITTEN(AND/OR)READ, PLUS
25                ;       ERROR COUNTS IN DECIMAL.
26                ;
27                ;       TYPE L FOR FIRST 100. DISK ADDRESSES OF BAD SECTORS AND
28                ;       DATA ERRORS, AND FIRST 20. OF ADDRESS ERRORS AND
29                ;       SEEK ERRORS (SEEK PATH). IF ERROR ADDRESSES ARE
30                ;       ENCOUNTERED MORE THAN ONCE (1ST PASS), A COUNT OF UP TO
31                ;       32. WILL BE RECORDED IN THE LOG. ALSO A COUNT OF UP TO
32                ;       15. HARD ERRORS WILL BE RECORDED. THIS COUNT WILL BE
33                ;       A SUBSET OF THE THE FIRST COUNT.
34                ;
35                ;       THE ADDRESS INFORMATION WILL BE IN OCTAL WHILE THE
36                ;       COUNTS WILL BE DECIMAL.
37                ;
38                ;       TYPE S FOR SEEK TIMING STATISTICS IF RUNNING
39                ;       EITHER SEEK EXERCISER.
40                ;
41                ;       **** NOTE ****
42                ;       THE PROGRAM WILL ACCOUNT FOR UP TO A MAX.
43                ;       OF 2**31 SECTORS WRITTEN OR READ. SPECIAL
44                ;       TEST RUNS EXCEEDING THIS FACILITY WILL
45                ;       REQUIRE AN OPERATOR'S TEST LOG TO AUGMENT
46                ;       SOFTWARE ACCOUNTING. 2**31 SECTORS =
47                ;       APPROX. 5.5* 10**11 WORDS.
```

```
10017 .MAIN
01              ;11.0   DEBUG HELP:
02                      ODDTD   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 0 (^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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 0018 .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              ;
60
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```
 0019 .MAIN
01              ;11.4   PROGRAM LISTING INDEX(INCLUDING THIS TEXT FILE)
02
03              ;       PAGES           GENERAL DESCRIPTION
04
05              ;**     1-23            .TX FILE
06              ;**     24-34           BASE SECTOR
07              ;**     35-37           MACRO MACRO DEFINITIONS
08              ;**     38-40           MASTER INITIALIZATION AND PROGRAM
09              ;                       PROGRAM DISPATCH
10
11              ;**     40-93           MEMORY/MAP SIZING AND CONTROL
12
13              ;       40-52           DLIB PRE-MACRO (P?REM)
14              ;       53-54           PROCESS P?REM MEMORY/MAP SIZING INFOR-
15              ;                       MATION
16              ;       55-59           HSC(BMC) MAP DRIVER (.MHSC)
17              ;       60-67           MMPU,MMPU1,NOVA-3 MAP DRIVERS (MPI?T)
18              ;       68-71           RELATED TEXT MESSAGES
19              ;       72-76           LOG/PHYS AND MAP INFORMATION PRINTOUT
20              ;                       (PYINF) CALLED ON DATA ERROR WITHOUT ECC
21              ;                       DETECTION.
22              ;       77              PRINT MAP TYPE AND PHYSICAL MEMORY SIZE
23              ;       78-80           ECLIPSE SYSTEM CALL,PROTECTION FAULT AND
24              ;                       STACK HANDLERS
25              ;       81-88           MASTER MAP CONTROL (M.MP,M.PSS)
26              ;       89-93           LOGICAL MEMORY PARTITIONING (SM/SMEM)
27
28              ;**     94-114          GENERAL PROGRAM INITIALIZATION
29
30              ;       94-97           SET UNIT DATA (SET/SETU)
31              ;       98              UNIT SEQUENCER (ALL/DOALL)
32              ;       99-101          INPUT/OUTPUT TEST START TIME (RTIM/WTIM)
33              ;                       FATAL ERROR EXIT (HATL)
34              ;       102-106         GENERAL SOFTWARE INITIALIZATION
35              ;                       (INIL.,INRN,SINL,FXADD)
36              ;       107-114         TIMEBASE GENERATION (STBO,PTIME) AND
37              ;                       TIME CONTROL (DLTYM/DELAY)
38
39              ;**     115-151         MAIN PROGRAMS (TESTS)
40
41              ;       115-122         SA'S 500,501 (RANDOM RELIABILITY)
42              ;       123-124         SA 505 (RUNALL TESTS)
43              ;       125-131         SA 502 (INCREMENTAL DISK ADDRESS TEST)
44              ;       132-139         SA'S 506,507 (SEEK EXERCISERS)
45              ;       140-151         SA 504 (FORMATTER) + BAD/FORMAT
46              ;                       COMMAND STRING ROUTINES (BSEX,BSPAR)
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10020 .MAIN
01              ;       PAGES           GENERAL DESCRIPTION
02
03              ;**     152-166         ADDRESSING AND SETUP ROUTINES
04
05              ;       152-156         RANDOM DISK ADDRESSING (.RANP,.RSK)
06              ;                       AND OVERLAP SEEK DRIVER (.QSK)
07              ;       157-159         SETUP NEXT I/O TRANSFER (.SET/SETP)
08              ;       160-162         CALCULATE NEXT SEQUENTIAL DISK
09              ;                       ADDRESS (.NWADD,.SADD,.NWHS)
10              ;       163             KEEP R/W STATISTICS (STBMP/BPSTT)
11              ;       164-165         SKIP SECTOR ROUTINES (.SKPS,.WSKP)
12              ;                       (USED IN SA 502 FOR INCREASED
13              ;                       THRUUGHPUT)
14              ;       166             KEEP SEEK STATISTICS (.STSK/SETSK)
15
16              ;**     167-181         INTERRUPT CONTROL AND DISK DRIVERS
17
18              ;       167             GENERAL INTERRUPT HANDLER
19              ;       168             POWER FAIL HANDLER
20              ;                       WAIT ON INTERRUPT (WAIT)
21              ;                       SAVE/RESTORE AC'S + CARRY (SAC,STAC)
22              ;       169-170         FOREGROUND/BACKGROUND SWAP (.IFB/INTFB)
23              ;                       DISK INTERRUPT HANDLER (INT.1)
24              ;                       ERROR LOOP SETUP (.ADDS/ADDSET)
25              ;                       BACKGROUND RETURNS (.IBGR/IBGRET AND
26              ;                       IEOT/IBGEOT-SETS EOT FLAG (XD,2))
27              ;       171             WAIT ON EOT FLAG (XD,2-FOREGROUND)
28              ;                       BACKGROUND WAIT FOR FOREGROUND FLAG
29              ;                       TO SET
30              ;       172-173         PROCESS ALL DISK FLAGS (.CLLG/CLLOG)
31              ;       174-175         TTI OR CONSOLE INTERRUPT HANDLER (ITTI)
32              ;       176             WAIT ON INTERRUPT MASTER DISK DRIVERS
33              ;                       (.XFER,.SEKM,.RCAL,RCALL)
34              ;       177-179         DISK OPERATION DRIVERS (.SEEK,.RDWR,RECR)
35              ;                       INITIATE OPERATIONS ONLY
36              ;       180-181         I/O TRACE CONTROL/PRINTOUT
37
38              ;**     182-214         DISK OPERATION CHECKS AND ERROR HANDLERS
39              ;                       (EXCEPT DATA AND ECC ERRORS)
40
41              ;       182             CHECK DRIVE STATUS PRIOR TO OPERATION
42              ;                       (.SDIB/SDIB)
43              ;       183-189         DRIVE FAULT HANDLERS
44              ;       190-194         DISK OPERATION CHECK (.STTD/CHKST)
45              ;       195             WAIT ON CONTROL FULL (.DIA0/WDIA0)
46              ;                       BMC STATUS FAULT HANDLER
47              ;       196             CHECK ENDING DRIVE STATUS (.DIB0/WDIB0)
48              ;                       PROCESS CONTROL FULL AND STATUS INVALID
49              ;                       TIMEOUTS
50              ;       197-208         DISK CONTROLLER FAULT HANDLERS
51              ;       209-210         GET FAILING DISK ADDRESS
52              ;                       (.GSC,.LSTD,.LAST)
53              ;       211-212         ERROR LOOP CONTROL (.CSW/CKSW)
54              ;       213-214         PRINT FAILING MODE AND DISK ADDRESS
55              ;                       (HED/HEADER,HEDR/HEADR)
```

```
!0021 .MAIN
01                ;       PAGES           GENERAL DESCRIPTION
02
03                ;**     215-251         DISK DATA GENERATION/CHECKING
04                ;                       AND DATA/ECC ERROR HANDLERS
05
06                ;       215-217         LOAD PROGRAM DISK DATA AND
07                ;                       OPTIMIZE DATA HANDLING (DTL.D/DTLOD)
08                ;       218-228         DISK DATA GENERATION (G/GEN) AND
09                ;                       CHECKING (C/CHECK)
10                ;       229-232         ECC SIMULATION
11                ;       233-236         NUMBER GENERATORS (DISK DATA&ADDRESSING)
12                ;       237-251         DATA/ECC ERROR HANDLERS
13
14                ;**     252-266         STATISTICS AND ADDRESS LOG ROUTINES
15
16                ;       252-257         STATISTICS TABLE OUTPUT (WTAB)
17                ;                       PROCESSED BY TTI INTERRUPT HANDLER (ITTI)
18                ;       258-259         ADDRESS LOG ENTRY ROUTINES
19                ;                       (.FM2W/FM2W,.STO2W/STO2W,.SRCH/SRCH)
20                ;       260-265         ADDRESS LOG OUTPUT ROUTINES (LGOUT)
21                ;       266             LOGS AND STATISTICS STORAGE
22
23                ;**     267-294         GENERAL UTILITIES
24
25                ;       267             MULTIPLY AND DIVIDE
26                ;       268-288         DLIB O?DTO MACRO (TTY,SWREG,ODT)
27                ;       289-290         BUFFERED TTI LINE SCAN ROUTINE
28                ;                       (GA.O/GETATM) USED WITH (INP/INPUT)
29                ;       291-292         DOUBLE PRECISION DECIMAL OUTPUT
30                ;       293-294         BUFFERED TTI INPUT (INP/INPUT)
31
32                ;**     295-328         COMMAND STRING (SA 553), TEXT, VARIABLE
33                ;                       STORAGE AND DIRT BLOCK
34
35                ;       290-298         COMMAND STRING UNIT:,DATA:,COMMAND
36                ;                       STRING: PROMPTS
37                ;       299-303         INDIVIDUAL COMMAND ROUTINES
38                ;       304             GET DISK ADDRESS ROUTINE (HSS/GETPAR)
39                ;       305-306         COMMAND AND DATA DISPATCH TABLES
40                ;       307-324         TEXT MESSAGES
41                ;       325-328         VARIABLE STORAGE AND DIRT BLOCK
```

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!0022 .MAIN
01                ;12.0   SPECIAL NOTES/SPECIAL FEATURES:
02
03                ;       1. A CR ONLY RESPONSE TO UNIT NUMBERS, WILL LEAVE
04                ;       UNIT/CYLINDER INFORMATION IN PREVIOUS STATE.
05
06                ;       2. ONLY THE ECLIPSE (HSC) MAY HAVE A 20 WORD BUFFER.
07
08                ;       3. THE PROGRAM WILL ACCOUNT FOR UP TO A MAX.
09                ;       OF 2**31 SECTORS WRITTEN OR READ. SPECIAL
10                ;       TEST RUNS EXCEEDING THIS FACILITY WILL
11                ;       REQUIRE AN OPERATOR'S TEST LOG TO AUGMENT
12                ;       SOFTWARE ACCOUNTING. 2**31 SECTORS =
13                ;       APPROX. 5.5* 10**11 WORDS.
14
15                ;       4. SWPAK7=1, PROGRAM HALTS AFTER WRITE WITH READ
16                ;       VERIFICATION ALLOWING OPERATOR TO CHANGE PACKS.
17                ;       SWPAK8=1, PUTS PROGRAM INTO READ ONLY MODE
18                ;       ## SA'S 501,502 ONLY. IF SA 501-DATA MUST !NOT! BE
19                ;       VARIABLE.  START AT THE ABOVE SELECTED ADDRESS.
20
21                ;       5. ALL NUMBERS ENTERED IN 7.0 MUST BE IN OCTAL.
22                ;       ANY NON-OCTAL INPUT IS TREATED AS A LETTER.
23                ;       ANY LETTER INPUT FOR CYL,HEAD,SECTOR, OR # OF
24                ;       SECTORS GETS RANDOM FUNCTION IN THE RELIABILITY
25                ;       TEST WITH OPTIONS.
26
27                ;       6. AT TIMES THE ECC MAY ATTEMPT TO CORRECT A NON-CORRECTABLE
28                ;       DATA ERROR AND THE SIMULATED ECC AND ACTUAL ECC WILL
29                ;       MATCH EVEN THOUGH AN ECC FAILURE WILL HAVE BEEN PRINTED.
30                ;       THIS IS DUE TO A FAILURE OF THE ECC POLYNOMIAL ITSELF TO
31                ;       DISTINGUISH BETWEEN TWO DIFFERENT ERROR PATTERNS, ONE
32                ;       CORRECTABLE AND ONE UNCORRECTABLE. THIS IS !NOT! A
33                ;       HARDWARE FAILURE.
34
35                ;13.0   PROGRAM RUNTIME:
36
37                ;       PROGRAM RUNTIMES ARE SUBSTANTIALLY REDUCED WITH
38                ;       MEMORIES OF 16K OR LARGER. PROGRAM CAN USE UP TO
39                ;       24K USING 2 BUFFERS AND UP TO 32K USING 4 BUFFERS
40                ;       IN THE RANDOM RELIABILITY TESTS. ## SEE 9D
41
42                ;       RUNTIME IS DEFINED AS TIME FROM
43                ;       START TO A "PASS" MESSAGE.  TYPICAL RUNTIME
44                ;       FOR A READ ONLY OR WRITE ONLY PASS OF SA 502
45                ;       (INCREMENTAL DISK ADDRESS TEST) IS APPROX.
46                ;       3 AND 1/2 MINUTES WITH A NOVA 800 (OR FASTER CPU)
47                ;       WITH AT LEAST 24K OF MEMORY, AND 96 MEGABYTE.
48
49                ;       READ, WRITE AND SEEK OPERATIONS ARE TIMED
50                ;       BY SPECIAL ROUTINES. WHEN THE PROGRAM IS
51                ;       FIRST STARTED, THE TIMING ROUTINE WILL TEST
52                ;       FOR THE PRESENCE OF A REAL TIME CLOCK (RTC)
53                ;       TO DERIVE TIMING FROM IT. IF NO RTC IS
54                ;       PRESENT, THE PROGRAM WILL TYPE "TTO BAUD
55                ;       RATE". THIS MESSAGE REFERS TO THE BAUD RATE
56                ;       OF THE CONSOLE TERMINAL (DEVICE 10 & 11).
57                ;       TYPE IN THE BAUD RATE. IF A TYPING ERROR OCCURS
58                ;       IN THE NUMBER STRING (BEFORE THE CARRIAGE RETURN),
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!0023 .MAIN
01
02                ;       SIMPLY TYPE A NON-NUMERIC CHARACTER AND
03                ;       THE REQUEST FOR THE BAUD RATE WILL BE
04                ;       REPEATED. IF THE CARRIAGE RETURN HAS BEEN
05                ;       GIVEN AFTER A TYPING ERROR, RELOAD THE PROGRAM.
06
07                ;       APPROXIMATE TIMES (MINUTES) FOR PASSING ARE AS FOLLOWS:
08
09                ;                               50MB    96MB    190MB   277MB   ***
10
11                ;       500     "RAN"           10      10      10      10
12
13                ;       501     PAT             10      10      10      10
14                ;               RAN             10      10      10      10
15                ;               FLZ             10      10      10      10
16                ;               FLO             10      10      10      10
17
18                ;       THE ABOVE TIMES ARE REDUCED FOR MULTIPLE DRIVES AS
19                ;       OVERLAPPED SEEKS ARE EMPLOYED.
20
21                ;       502     PAT             4       7       14      14
22                ;               RAN             6       12      24      20
23                ;               ADR             12      24      48      60
24                ;               ALZ             4       7       14      14
25                ;               ALO             4       7       14      14
26                ;               ALT             4       7       14      14
27
28                ;       504
29
30                ;       505     PAT             (SEE 501)
31                ;               RAN
32                ;               FLZ
33                ;               FLO
34                ;               PAT             (SEE 502)
35                ;               RAN
36                ;               RAN-2           **SAME AS RAN BUT WITH DIFFERENT
37                ;                                 RANDOM NUMBER SEED.
38                ;               ALZ
39                ;               ALO
40                ;               ALT
41                ;               RNSK(507)       15      15      15      15
42
43                ;       506     OPERATOR CONTROLLED
44                ;       507         "       "
45
46
47                ;       *** 277MB TIMES ARE FOR S/250 ECLIPSE WITH BMC.
```

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!0024 .MAIN

**00000 TOTAL ERRORS, 00000 PASS 1 ERRORS
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0025 .MAIN
0?DTD 000520  MC   17/02
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