TEXT LISTING

068-001141-01

PROGRAM

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

TEXT TAPE

097-001141-01

ABSTRACT

THE MOVING HEAD DISK/QUAD DENSITY DISKETTE RELIABILITY PROGRAM IS A MAINTENANCE PROGRAM DESIGNED TO EXERCISE AND TEST THE MODELS 6098, 6099, 6100 AND 6103 MOVING HEAD DISK/DISKETTE CONTROLLER AND ASSOCIATED DRIVES.

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0001 MAIN AUS ASSEMBLER REV 03.01 1854:22 10/24/74

01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41
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| NAME: EFDN TX | PART NUMBER: 097-001141 |
| DESCRIPTION: 6098, 6099, 6100, 6103 MOVING HEAD DISK/DISKETTE RELIABILITY PROGRAM |
| REVISION HISTORY: |
| REV. | DATE |
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| 01 | 10/24/79 |
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11.0 PROGRAM NAME:
1

12.0 REVISION HISTORY:
1

13.0 MACHINE REQUIREMENTS:
1

14.0 TEST REQUIREMENTS:
1

15.0 SUMMARY:
1

26.0 RESTRICTIONS:
1

1. HARDWARE DOES NOT SUPPORT DUAL PROCESSOR OPERATION (THE CPU'S SHARING SAME DRIVE'S).  
2. HARDWARE DOES NOT SUPPORT OVERLAPPED I/O.
01 17.0 PROGRAM DESCRIPTION/THEORY OF OPERATIONS
02
03 A. RELIABILITY TEST (SA 500)
04
05 A RANDOM NUMBER GENERATOR IS USED TO SELECT A
06 DISK DRIVE, CYLINDER, HEAD, BEGINNING SECTOR, AND NUMBER OF CONSECUTIVE SECTORS. RANDOM
07 DATA IS THEN GENERATED, WRITTEN, AND READ.
08
09 THE SEQUENCE IS REPEATED INDEFINITELY.
10
11 B. RELIABILITY TEST (SA 501) WITH OPTIONS
12
13 SAME AS A, EXCEPT THAT OPERATOR IS GIVEN
14 THE OPTION OF SELECTING DATA PATTERNS (01 II) AND
15 CHOOSING A CONSTANT CYLINDER, HEAD, SECTOR, OR # OF SECTORS, ANY LETTER RESPONSE TO
16 CYL, HEAD ETC., GETS RANDOM FUNCTION FOR THAT
17 VARIABLE, A CARRIAGE RETURN ONLY GETS THE
18 RANDOM FUNCTION FOR ALL VARIABLES. ALL
19 INPUTS ARE RANGE CHECKED AND REJECTED IF OUT
20
21 OF RANGE.
22
23 C. INCREMENTAL DISK ADDRESS TEST (SA 502)
24
25 OPERATOR IS GIVEN OPTION ON DATA (SEE TO II)
26 AND SURFACE RANGE.
27
28 REQUESTED DATA IS FIRST WRITTEN OVER THE
29 ENTIRE PACK. THEN THE DATA IS READ FROM
30 ALL SECTORS. THIS INFURSES THAT ALL DISK SURFACE
31 BLOCKS ARE USEABLE AND ARE FORMATTED PROPERLY.
32 THE TEST IS THEN REPEATED FOR ALL READY DISCS,
33 AND PASS IS PRINTED. THE SEQUENCE IS REPEATED
34 INDEFINITELY.
35
36 NOTE: SHOULD A WRITE ERROR OCCUR ON THE
37 WRITE PASS (IE, ADDRESS ON BAD SECTOR ERROR)
38 WHICH TERMINATES THE WRITE TRANSFER, A
39 READ ERROR WILL ALSO OCCUR AT THE FAILING
40 ADDRESS ON THE READ PASS. IN SUCH INSTANCES,
41 DISCOUNT THE READ ERROR.
42
43 #NOTE
44
45 SWREG31: PROGRAM MALTS AFTER WRITE WITH READ
46 VERIFICATION ALLOWING OPERATOR TO CHANGE PACKS.
47 SWREG61: PUTS PROGRAM INTO READ ONLY NODE
48 # # SA'S 501,502 ONLY, IF SA 501- DATA MUST
49 # INFIX BE RANDOM (SEE TO II)
50
51 ALL NUMBERS ENTERED ABOVE MUST BE IN OCTAL.
52 ANY NON-OCTAL INPUT IS TREATED AS A LETTER.
53 # OF SECTORS GET RANDOM FUNCTION IN THE
54 RELIABILITY TEST WITH OPTIONS.
55
56 U. COMMAND STRING INTERPRETER (SA 503)
57 AS A TROUBLE SHOOTING AID TO THE SERVICE
58 ENGIINEER MAY TYPE IN HIS OWN TEST LOOP,
59 AFTER STARTING AT 503, THREE ARGUMENTS
60 MUST BE ENTERED IN RESPONSE TO THREE
61 PROGRAM QUESTIONS: "UNIT", "DATA", AND
62 "COMMAND STRING". ALL NUMBERS MUST BE
63 ENTERED IN OCTAL.
64 STATISTICS LOGS ARE VALID ONLY FOR THE
65 COMMAND STRING BEING EXECUTED.
66
67 1. UNIT: TYPE UNIT 8 OR CARRIAGE RETURN
68 TO USE PREVIOUS ENTRY.
69
70 2. DATA:
71 NOT ROTATED 110110 PATTERN - THIS
72 DATA OPTION APPLIES TO (SA 502)
73 INCREMENTAL DISK ADDRESS TEST ONLY
74 AND RESULTS IN A TOTAL OF 4 PASSES
75 ACROSS THE PACK ROTATING THE PATTERN
76 AFTER EACH PASS BEFORE PRINTING THE
77 MESSAGE "<<<PASS>>>". THIS IS TO
78 INSURE THAT A PEAK PHASE SHIFT IS
79 EVOKED ACROSS EACH BIT CELL OF THE
80 PACK.
81 THIS TEST PATTERN IS RECOMMENDED WHEN
82 RUNNING ERROR RATES:
83 RAN=RANDOM
84 AL= ALL ONS
85 AL2= ALL ZEROS
86 PATH10110 PATTERN
87 ALT=52525 PATTERN
88 FLD#FLOATING ONE PATTERN
89 A# # ALTERNATING CYLINDER AND
90 HEAD, SECTOR WORDS
91 VAR=EXISTING WORDS ENTERED PREVIOUSLY
92 AS DESCRIBED BELOW:
93 ALTERNATIVELY ENTER A STRING OF UP TO 7
94 OCTAL 16 BIT WORDS TO BE USED AS
95 DATA, THE WORDS ENTERED ARE USED
96 REPEATEDLY TO MAKE UP A SECTOR BLOCK.
97 TYPE "CA" TO USE THE PREVIOUS ENTRY.
III. COMMAND STRING:

0005 .MAIN
01 OPTIONS 1.
02 READ HEAD, SECTOR, #SECTORS
03 WRITE SAME
04 SEEK CYLINDER
05 RECALIBRATE
06 LOOP (GO TO BEGINNING OR LR)
07 DELAY (N = DELAY IN MS)
08 LR (BEGIN LOOP HERE)
09 BAD (BAD SECTOR) CYL, HO, SECTOR
10 FORMAT CYL, HO, SECTOR

NOTE: ITEMS 8 & 9 INCLUDES THE NECESSARY SEEK &
IS NOT A DISKETTE OPTION.

10. TYPE "CR" TO USE THE PREVIOUS UNIT, DATA
OR COMMAND STRING.

11. TYPE "ESC" TO BYPASS BOTH UNIT & DATA
PROMPT, USING PREVIOUSLY ENTERED UNIT
& DATA.

12. TYPE "R" TO INTERRUPT EXECUTION OF THE
CURRENT COMMAND AND RETURN TO UNIT PROMPT

13. TYPE "N" TO ENTER ODT
14. TYPE "M" FOR STATISTICS LOG
15. TYPE "L" FOR ERROR LOGS

NOTE: OPTIONS 13 & 14 ARE VALID ONLY FOR THE
COMMAND STRING BEING EXECUTED; LOGS ARE CLEARED
PRIOR TO EACH COMMAND STRING ENTRY.

THE FOLLOWING EXAMPLE WOULD CAUSE UNIT 1 TO
SEEK CYLINDER 50, THEN REPEATEDLY WRITE SECTORS
2 AND 3 OF HEAD 1, THEN READ IT BACK AND CHECK
DATA IS SPECIFIED AS ALTERNATE WORDS OF ZEROS
THEN ODDS.

UNIT 1
DATA 5, 177777
COMMAND STRING: SEEK 50 LR WRITE 1, 2, 2 READ SAME LOOP

NOTE: EITHER SPACES OR A COMA MAY BE USED
AS AN ARGUMENT DELIMITER. EACH RESPONSE IS
TERMINATED BY TYPING CARRIAGE RETURN, IF MORE
SPACE IS NEEDED ON A LINE, TYPE LINE FEED TO
SPACE TO THE NEXT LINE, A "LF" DOES NOT ELI-
MINATE THE NEED FOR A DELIMITER. THE WORD
"SAME" USED WITH READ, OR WRITE, WILL CAUSE
THE PREVIOUS DISK ADDRESS PARAMETERS TO BE
USED.

SHOULD COMMAND STRING ENTRIES EXCEED INPUT
BUFFER CAPACITY, THE PROGRAM RESPONDS WITH
THE MESSAGE "INPUT OVERFLOW", THE OPERATOR MUST
DEPRESS ONE OR MORE "RUBOUTS" FOLLOWED BY A
"CR" TO POSITION THE BUFFER POINTER TO THE
LAST VALID COMMAND IN THE STRING AND BEGIN
EXECUTION.

IV. INPUT VALIDATION:

A. UNIT: THE PROGRAM WILL ACCEPT ONLY THOSE
UNIT'S PREVIOUSLY CONFIGURED BY
THE OPERATOR DURING STARTUP. AFTER
A "LOSS OF READY" ON A PARTICULAR
UNIT THAT UNIT'S WILL BE REJECTED
UNTIL THE UNIT HAS BEEN RE-INSTATED.
SEE SECTION 12 NOTE 1.

B. DATA: THE PROGRAM WILL ACCEPT ONLY THOSE
PATTERNS DESCRIBED IN SECTION 5 D. II.
SPELLING ERRORS OR NON-RECOGNIZED
PATTERNS WILL BE REJECTED.

C. COMMANDS: SA 501 RAN RELI WITH OPTIONS...
THE PROGRAM REJECTS ANY UN-
RECOGNIZED COMMANDS OR ANY OUT OF
RANGE PARAMETERS FOR THE SPECIFIED
UNIT. ANY VALID PARAMETERS WHICH
WILL RESULT IN AN "EOC" ARE ADJUSTED
BY THE PROGRAM TO COMPLETE THE
CURRENT CYLINDER.

SA 503 COMMAND STRING INTERPRETER...
THE PROGRAM WILL ALLOW ANY INPUT WITHIN
THE BIT FIELD BOUNDARIES OF THE APPLICABLE
PARAMETER WITH THE EXCEPTION OF THE #
OF SECTORS TO BE TRANSFERRED, THE ALLOW-
ABLE RANGE FOR # OF SECTORS IS DETERMINED
BY THE AVAILABLE BUFFER SIZE AND CANNOT
BE ZERO.
E. QUICK FORMATTER (SA 504)

THE PROGRAM DOES A QUICK FORMAT (NO PACK VALIDATION)

AND BREAKS TO ALLOW OPERATOR TO RESTART PROGRAM.

TO RESTART PROGRAM THE OPERATOR MUST ENTER THE

DESIRED STARTING ADDRESS FOLLOWED BY AN "R".

FOR EXAMPLE: S02R

ANY ERROR ENCOUNTERED IS CONSIDERED

CATASTROPHIC AND THE UNIT IS PLACED "OFFLINE".

THE PROGRAM THEN FORMATS ANY REMAINING UNITS. IT

SHOULD BE NOTED THAT S02 R0T SHOULD BE RUN

FOLLOWING QUICK FORMATTER AND BAD SECTOR FLAGS

SET MANUALLY (SA 503) TO INCREASE PACK RELIABILITY.

F. RUNALL (SA 505) EXECUTES IN "TOP DOWN" FASHION THE FOLLOWING PROGRAMS:

[SAS501] RANDOM RELIABILITY

[SAS502] INCREMENTAL DISC ADDRESS

[SAS507] RANDOM SEEK EXERCISER

THE OPERATOR IS GIVEN THE OPTION TO RUN "RUNALL"

ON THE DEVICE CODED WITH THE NUMBER OF PASSES PER

CURRENT DEVICE CODE, IF THE SECOND DEVICE CODE AND

A PASS COUNT ARE ENTERED, THE PROGRAM RUNS "RUNALL"

AND PRINTS OUT THE ERRORS & STATISTICS

LOG FOR EACH DEVICE ALTERNATELY.

G. SEEK EXERCISER (SA 506)

PROGRAM PROVIDES A SEEK SCAN SEQUENCE

CONVERGING FROM THE EXTREME OUTERMOST TRACKS INTO THE

ADJACENT TRACKS IN THE CENTER, THEN DIVERTING AGAIN TO

THE EXTREMES.

1. ALL SEeks IN F/J ARE FOLLOWED BY A 1 SECTOR READ AT

RANDOM SECTOR WITH NO DATA CHECK. ALL SEeks ARE TIMED

WITH MAX, MIN, AND AVE. TIMES BEING LOGGED IN MS. SEEK

PATHS FOR MAX, MIN VALUES ARE ALSO LOGGED. INCREMENTAL

DISK ADDRESS TEST (SA 502) SHOULD BE RUN PRIOR TO

RUNNING EITHER SEEK EXERCISER TO AVOID POSSIBLE CHECK-

WORD ERRORS DURING READ.
18.3 SWITCH COMMANDS

ONCE THE PROGRAM STARTS EXECUTING THE START OF ANY
OF THE BITS CAN BE CHANGED BY HITTING KEYS 1-0, A-F,
THE PROGRAM WILL CONTINUE RUNNING AFTER UPDATING
THE OPTIONS EACH KEY WILL COMPARE THE STATE OF THE
BIT AFFILIATED WITH IT, IF BIT 4 CAN BE ALTERED BY
HITTING KEY 4, SETTING OF ANY BIT OF LOCATION "SHREG"
WILL SET BIT 0, (DEFAULT MODE IS DEFINED AS ALL BITS
OF SHREG SET TO 0)

OTHER COMMANDS (* = CONTROL KEY)

"CH" A "RETURN" CAN BE TYPED TO CONTINUE THE PROGRAM
AFTER IT S LOCKED IN A SWITCH MODIFICATION MODE

"U" THIS COMMAND GIVEN AT ANY TIME WILL RESET
"SHREG" TO DEFAULT MODE AND RESTART THE PRO-
GRAM.

"H" THIS COMMAND GIVEN AT ANY TIME WILL RESTART
THE PROGRAM. SWITCHES ARE LEFT WITH THE
VALUES THEY HAD BEFORE THE COMMAND WAS
ISSUED.

"D" THIS COMMAND GIVEN AT ANY TIME WILL CAUSE
THE PROGRAM CONTROL TO GO TO UDT (NOTE:
THIS IS AN OPTIONAL COMMAND AND IS AVAIL-
ABLE ONLY IF UDT MK IS PRESENT)

"H" THIS COMMAND GIVEN AT ANY TIME WILL PRINT
THE CURRENT OPERATING MODES.

"0" THIS COMMAND GIVEN AT ANY TIME WILL LOCK
THE PROGRAM INTO SWITCH MODIFICATION MODE
WHERE MORE THAN 1 BIT CAN BE CHANGED.

NOTE: INITIALLY, THE PROGRAM PROMPTS THE
OPERATOR TO ENTER THE DESIRED SWITCH SET-
TINGS. A "CH" MUST BE GIVEN TO EXIT THIS

---

NOTE: "SHREG" BIT 0 IS CLEARED BY PROGRAM AUTOMA-
TICALLY AT STARTUP.
OPERATING PROCEDURE/OPERATOR INPUT:

10011 .MAIN
01 01
02 12
03 04
04 05
05 06
06 07
07 08
08 09
09 10
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12 13
13 14
14 15
15 16
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110

1. OPERATING MODES

A. VERIFY DRIVE (DRIVES) ARE READY ON-LINE
B. LOAD PROGRAM USING BINARY LOADER
C. RESET, LOAD ONE OF THE STARTING ADDRESSES
D. SHOWN BELOW INTO THE DATA SWITCHES AND
E. HIT START,

STARTING ADDRESS

A. SET DEVICE CODE TO OTHER THAN 33
B. DOT - DIRECT ENTRY ONLY
C. 000 - RUNALL TESTS
D. 000 - RELIABILITY TEST, ALL CYLINDERS
E. 001 - RELIABILITY TEST, OPTIONS
F. 002 - INCREMENTAL DISK ADDRESS TEST
G. 003 - COMMAND STRING INTERPRETER
H. 004 - QUICKIE FONIX
I. 005 - RUN ALL
J. 006 - SEEK EXERCISER (CONVERGING, DIVERGING PATTERN)
K. 007 - SEEK EXERCISER (RANDOM PATTERN)
L. 008 - ERROR COUNT/LOG RECOVERY
M. 010 - MEMORY DUMP ROUTINE

INITIALLY, THE OPERATOR IS REQUESTED TO ENTER A TTY BAUD RATE (NO RTC PRESENT) FOR TIMING, DATE - DAY,
MONTH, YEAR, HOUR, & MINUTE (A 'CR'
RESPONSE WILL IGNORE THIS ROUTINE), & (UNIT#,MIN
SURFACE, MAX SURFACE) FOR EACH UNIT TO BE TESTED,
EX. 0, 0, 1.2, ETC. OR (UNIT#, F) IF Floppy,
WHEN THE UNIT SPECIFIED IS A Floppy, THE Min/Max
RANGE DEFAULTS TO ALL SURFACES. (0,1)
SUBSEQUENT PROGRAM RESTARTS MAY USE PREVIOUSLY ENTERED
PARAMETERS FOR UNIT'S & RANGE BY TYPING A 'CR' IN
RESPONSE TO MESSAGE PROMPT.

THE OPERATOR IS THEN ASKED TO RESPOND TO -
LOWER/UPPER TEST TRACK LIMIT PAIRS,
TYPE LCN (FOR CURRENT TRACK CONFIGURATION.
BY TYPING UP TO 5 PAIRS OF NUMBERS TO REPRESENT
THE TESTABLE DISK AREAS, FOR EXAMPLE A
RESPONSE OF:
0.17 24 24 28.48
WOULD TEST TRACKS 0-17, 24, AND 28-48.
IF THERE IS NO CHANGE, A CARRIAGE RETURN MAY BE TYPED.
UPON LOADING ALL TRACKS ARE TESTABLE. ANY LETTER
RESPONSE FOLLOWED BY A 'CR' WILL SET A PRINTOUT OF
THE CURRENT TRACK CONFIGURATION.
THE 1ST NUMBER OF EACH PAIR MUST BE AT LEAST
2 GREATER THAN THE 2ND NUMBER OF THE PRECEEDING
PAIR. THE 2ND NUMBER OF EACH PAIR MUST BE GREATER
THAN OR EQUAL TO THE 1ST NUMBER OF THE PAIR.

OPERATOR INPUT CONTROLLED PRINTOUTS ARE AS FOLLOWS:

L = FIRST 100, BAD SECTORS, DATA, OR ADDRESSES
G = SEEK TIMING STATISTICS (506,507 ONLY)
N = SECTORS #/R PLUS ERROR COUNTS
**NOTE** ANY CHARACTER TYPED WILL END PRINTOUTS AT
THE NEXT CHANGE OF DATA TYPE.

1. OPERATING MODES

1) BACKGROUND ONLY, WAIT ON INTERRUPT

MAX # OF SECTORS = ALL OF AVAILABLE CORE (IE NOT TAKEN
BY PROGRAM) OR 16 SECTORS MAX. USED FOR SA'S 503,504,
506,507

2) BACKGROUND/FOREGROUND MODES, 2 BUFFERS USED FOR
BOTH READ AND WRITE PURPOSES. MAX # OF SECTORS =
1/2 OF AVAILABLE CORE OR 16 SECTORS MAX. USED FOR
INCREMENTAL ADDRESS TEST, OR RANDOM RELIABILITY
WITH CONSTANT DATA PATTERNS (501,502).

3) BACKGROUND/FOREGROUND MODES, 3 BUFFERS

PROGRAM OUTPUT/ERROR DESCRIPTION:

ALL ERRORS ARE IDENTIFIED, COUNTED, AND THE
PROGRAM IS ROUTED VIA BASE TO A CALL TO
CASH, ON THE BASIS OF ERROR SETTINGS (SEE
8.2). THE PROGRAM WILL GO INTO A SCOPE LOOP,
OR PROCEED.

IN ALL TESTS EXCEPT (SA 503) COMMAND STRING
INTERPRETER, A "LOSS OF READY" WILL RESULT
IN THE FOLLOWING:

UPON LOSS OF READY AND A SINGLE DRIVE, THE
PROGRAM WILL PRINT THE APPROPRIATE ERROR
MESSAGE AND WILL HALT. IF MULTIPLE DRIVES
EXIST, THE PROGRAM WILL CONTINUE WITH THE
REMAINING DRIVES. IF THE DOWN DRIVE IS
PLACED BACK ONLINE, THE PROGRAM WILL RESUME
TESTING OF THAT DRIVE. SEE 12.1

A "LOSS OF READY" IN (SA 503) COMMAND STRING
INTERPRETER CAUSES THE APPROPRIATE ERROR
MESSAGE TO BE PRINTED BUT DOES NOT REMOVE
THE FAILING DRIVE FROM TESTING (ALLOWS LOOP-
ING ON "LOSS OF READY" FAILURES).

RECALIBRATE - ANY UNUSUAL STATUS IS REPORTED
IMMEDIATELY AND AN ERROR RETURN IS EXECUTED.
10.1 SEEK - POSITION ERRORS FAULT STATUS INCREMENTS SEEK ERROR COUNTER. ANY ERROR STATUS RESULTS IN
10.2 WRITE - FOLLOWING "DONE" ON A WRITE, ERRORS ARE
CHECKED IN THE SEQUENCE SHOWN BELOW. ERROR
RECOVERY PROCEDURE IS OUTLINED FOR EACH CASE.
IF THE ERROR IS NOT PRESENT THE NEXT CHECK IS
MADE.

1. INTERRUPT TIMEOUTS,
2. HARD SECTOR ERROR = SECTORS WHICH HAVE THEIR BAD
SECTOR FLAG SET DENOTING SURFACE DEFECTS,
(APPLIES TO MOVING HEAD DISK ONLY- NON FLOPPY DRIVES)
3. ADDRESS ERROR = REPEAT THE WRITE, IF
TEST PASSES THE SECOND TIME, INCREMENT THE
SOFTWARE ADDRESS ERROR COUNT AND DO A NORMAL
RETURN; OTHERWISE INCREMENT THE HARD AD-
RESS ERROR COUNTER AND DO AN ERROR RETURN
4. ENDING MEMORY ADDRESS = INCREMENT THE
MEMORY ADDRESS ERROR COUNT, PRINT THE ERROR
MESSAGE, CHECK FOR A DISK ADDRESS ERROR AND
DO AN ERROR RETURN
5. ENDING DISK ADDRESS = INCREMENT THE DISK
ADDRESS ERROR COUNT, PRINT THE ERROR MESSAGE,
AND DO AN ERROR RETURN
10015 .MAIN
10.4 ERRORS - ERROR STATUS IS PRINTED WHENEVER
1 ENSCOUNTERED AS FOLLOWS:
3 "MODE" UNIT: "N"
4 CYL = "N" HEAD "N" SECT "N" #SECT "N"
7 START HD = "N" START SECT = "N" ATT = # OF SECT = "N"
9 ("SHRED" bit 12# 1) = EXPANDED ERROR PRINTOUT
10 DI A STATUS = "N" "DESCRIPTIVE MESSAGE"
11 WHERE CYL, HEAD, SECT REFER TO THE FINAL DISK ADDRESS
13 AT THE POINT OF ERROR, AND #SECT REFERS TO THE NUMBER
14 OF SECTORS ALREADY DONE IN THE MULTI SECTOR TRANSFER,
15 AND WHERE START HD, START SECT, & ATT, # OF SECT, REFER
16 TO THE STARTING PARAMETERS FOR THE FAILING TRANSFER.
17 WHEN DATA ERRORS ARE FOUND, ONLY THREE ARE PRINTED PER
18 ENCOUNTER, (SEE PARAGRAPH 10.3) WHEN LOOPING IS INVOLVED
20 INTESTING OR FOR SCOPING) STATUS IS PRINTED ON THE
21 1ST PASS ONLY, IF "SHRED" BIT 12# 1 THEN
22 THE STARTING ADDRESS FOR THE WRITE/READ BUFFERS ARE
23 PRINTED AFTER THE DATA ERROR PRINTOUT FOR USE IN
24 UTILIZING THE MEMORY DUMP UTILITY (SA 513) SHOULD
25 THE USER DESIRE TO EXAMINE MORE THAN THE FIRST THREE
26 DATA ERRORS.
27
28 10.5 STATISTICS = TYPE A "N"
30 DURING RANDOM TESTING TO GET A REPORT OF THE
31 NUMBER OF SECTORS WRITTEN (AND/OR) READ, PLUS
32 ERROR COUNTS IN DECIMAL.
33 TYPE "LT" FOR FIRST 100, DISK ADDRESSES OF BAD SECTORS AND
34 DATA ERRORS, AND FIRST 20, OF ADDRESS ERRORS AND SEEK
35 ERRORS (SEEK PATH). IF ADDRESS ERRORS ARE ENCOUNTERED
36 MORE THAN ONCE (1ST PASS), A COUNT OF UP TO 32, WILL
37 BE RECORDED IN THE LOG. ALSO A COUNT OF UP TO 15
38 HARD ERRORS WILL BE RECORDED, THIS COUNT WILL
39 BE A SUBSET OF THE 1ST COUNT.
40 NOTE: ADDRESS INFORMATION WILL BE IN OCTAL WHILE THE
41 COUNTS WILL BE DECIMAL.
42 TYPE "MS" FOR SEEK TIMING STATISTICS IF RUNNING EITHER
43 SEEK EXERCISER.
44 **** NOTE ****
46 THE PROGRAM WILL ACCOUNT FOR UP TO A MAX.
47 OF 2**31 SECTORS WRITTEN OR READ, SPECIAL
49 TEST HUNS EXCEEDING THIS FACILITY WILL REQUIRE
51 AN OPERATOR'S TEST LOG TO AUGMENT SOFTWARE
52 ACCOUNTING. 2**31 SECTORS = APPROX. 5,52
53 10**11 WORDS.
54 TYING ANY KEY DURING "LT" OR "MS" STATISTICS
55 WILL TERMINATE THE TYPESOUT.
11016 .MAIN
11.0 DEBUG HELP: (SA 11) & (SA 513)
11.0 .---
11.0 00 TO 11.1 (SA 11)
11.1 OCTAL DEBUG TOOL (ODT)
11.1 THIS DIAGNOSTIC IS EQUIPPED WITH A BUILT IN ODT WHICH CAN
11.2 BE ACCESSED BY HITTING CONTROL O ("O") AT ANY TIME DURING
11.3 THE EXECUTION OF THE PROGRAM (AFTER SETTING THE PARA-
11.4 METERS). ON ENTERING ODT THE ADDRESS OF THE LOCATION HAVING THE
11.5 NEXT INSTRUCTION TO BE EXECUTED WILL BE TYPED-OUT.
11.1.1 CONVENTIONS AND SYMBOLS
11.1.2 THE FOLLOWING CONVENTIONS ARE USED BY THE ODT:
11.1.3 PRESSING ANY ILLEGAL KEY CAUSES THE ODT TO RES-
11.1.3.1 POND WITH A "??".
11.1.3.2 OUT IS READY AND AT YOUR SERVICE.
11.1.2 COMMAND STRUCTURE
11.1.3.2 AN ODT COMMAND HAS THE FOLLOWING FORMAT:
11.1.3.2 (ARGUMENT) (COMMAND)
11.1.3.3 AN ARGUMENT MAY BE ONE OF THE FOLLOWING:
11.1.3.4 "EXP" AN OCTAL EXPRESSION CONSISTING OF OCTAL NUMBERS
11.1.3.5 SEPARATED BY PLUS (+) OR MINUS (-) SIGNS, LEAD-
11.1.3.6ING ZEROS NEED NOT BE TYPED.
11.1.3.7 "ADR" AN ADDRESS IS THE SAME AS AN EXPRESSION EXCEPT
11.1.3.8 THAT BIT 0 IS NEGLECTED.
11.1.3.9 A COMMAND IS A SINGLE TELETYPE CHARACTER.
11.1.3.10 OCTAL COMMANDS
11.1.3.11 THE LOCATIONS THAT CAN BE EXAMINED AND MODIFIED BY THE
11.1.3.12 USER ARE CALLED CELLS. THESE CELLS ARE OF TWO TYPES:
11.1.3.13 INTERNAL CPU CELLS AND MEMORY LOCATIONS.
11.1.3.14 OPENING INTERNAL CELLS
11.1.3.15 THE COMMAND TO OPEN UP THE INTERNAL REGISTERS IS OF
11.1.3.16 THE FORM "*A" WHERE N IS ANY OCTAL EXPRESSION BETWEEN
11.1.3.17 0 AND 7
11.1.3.18 0-3 FOR ACCUMULATORS 0-3
11.1.3.19 4 FOR PC OF THE NEXT INSTRUCTION TO BE EXECUTED IN
11.1.3.20 THE EVENT OF A "??" COMMAND.
11.1.3.21 5 CPU AND ITO STATUS
11.1.3.22 6 BIT INTERPRETATION
11.1.3.23 15 STATUS OF TTO DONE FLAG
11.1.3.24 16 STATUS OF INTERRUPTS (ION FLAG)
11.1.3.25 ADDRESS OF THE LOCATION HAVING THE BREAK POINT (IF
11.1.3.26 ANY
11.1.3.27 7 INSTRUCTION AT THE BREAK POINT LOCATION
11.1.3.28 OTHER COMMANDS TO OPEN CELLS ARE:
11.1.3.29 "ADR" OPEN THE CELL AND PRINT ITS CONTENTS
11.1.3.30 "A#" OPEN THE CELL CURRENTLY POINTED TO BY THE
11.1.3.31 OPERATOR AND PRINT ITS CONTENTS.
11.1.3.32 "+ADR" ADD "ADR" TO THE POINTER, OPEN THE CELL
11.1.3.33 AND PRINT ITS CONTENTS.
11.1.3.34 "-ADR" SUBTRACT "ADR" FROM THE POINTER, OPEN
11.1.3.35 THE CELL AND PRINT ITS CONTENTS.
"CR" THE RETURN KEY IS USED TO CLOSE THE OPEN CELL
WITH OR WITHOUT MODIFICATION.
"LF" LINE FEED IS USED TO CLOSE THE OPEN CELL WITH OR
WITHOUT MODIFICATION AND TO OPEN THE SUCCEEDING
CELL,
" " CLOSE THE OPEN CELL WITH OR WITHOUT MODIFICATION
AND OPEN THE PRECEEDING CELL
/ CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND
OPEN THE CELL POINTED TO BY ITS CONTENTS.
"+"A"R" OPEN THE OPEN CELL WITHOUT MODIFICATION, AND
OPEN THE CELL POINTED TO BY ITS CONTENTS + "A"R".
"-"A"R" CLOSED THE OPEN CELL WITHOUT MODIFICATION, AND
OPEN THE CELL POINTED TO BY ITS CONTENTS - "A"R".
MODIFICATION OF A CELL
ONCE A CELL HAS BEEN OPENED ITS CONTENTS CAN BE MODIFIED
BY TYPING THE NEW VALUE THE CELL IS TO CONTAIN IN THE
FORM OF AN OCTAL EXPRESSION FOLLOWED BY "CR" OR "LF".
IF A + OR - IS TYPED AS THE FIRST CHARACTER OF THE EXP-
RESSION THEN THE VALUE OF THE EXPRESSION IS ADDED TO OR
SUBTRACTED FROM THE OLD CONTENTS OF THE CELL. THE
ADDRESS ITSELF OR AN EXPRESSION RELATIVE TO THE ADDRESS
CAN BE DEPOSITED BY TYPING A "," OR "+/−/OCTAL-EXP-
PRESION" A RUNOUT COMMAND GIVEN RIGHT AFTER OPENING A CELL
ALLOWS THE MODIFICATION OF ITS CONTENTS AS IF THEY WERE
TYPED IN JUST BEFORE THE COMMAND WAS ISSUED.

OTHER OOT COMMANDS
RUNOUT THIS KEY IS USED TO DELETE ERRONEOUSLY TYPED
DIGITS. EACH TIME THE KEY IS PRESSED THE RIGHT MOST
DIGIT IS DELETED AND SCROLLED ON THE TERMINAL. IF THE
RUNOUT KEY IS PRESSED RIGHT AFTER OPENING A CELL
THEN IT DELETES THE RIGHT MOST DIGIT OF THE CELLS
CONTENTS. THIS ALLOWS THE MODIFICATION OF THE CELL
AS IF ITS CONTENTS WERE TYPED IN JUST BEFORE THE
KEY WAS PRESSED.
"A"R" INSERT A BREAK POINT AT LOCATION "A"R".
ONLY ONE BREAK POINT CAN BE INSERTED AND ANY
ENTRY TO OOT AFTER EXECUTING A BREAK POINT WILL
CAUSE IT TO BE DELETED.
DELETE THE BREAK POINT IF ANY.
RESTART THE EXECUTION OF THE PROGRAM AT LOCATION
POIITED BY 4A.
"A"R" START EXECUTING THE PROGRAM AT "A"R" AFTER AN
I-O-RESET.
KILL THE STRING TYPED SO FAR. THE OOT RESPONSES
WITH A "?" AND THE OPEN CELL IS CLOSED WITHOUT
MODIFICATION.
PRINT THE OCTAL VALUE OF THE INPUT ONLY.
THIS WILL CLOSE ANY OPEN CELLS WITHOUT
MODIFICATION AND WILL NOT OPEN A CELL
NOTE IN PROGRAMS WHICH RELOCATE THEMSELVES THE
THE USER SHOULD PLACE BREAK POINTS ONLY IN THE
THE ORIGINAL PROGRAM AREA. IF A BREAK POINT IS
PLACED OUTSIDE THIS AREA THE RESULTS WILL
BE UNPREDICTABLE.

MEMORY DUMP UTILITY (SAS13)

11.2.1 DIALOGUE
11.2.1.1 PROGRAM DIALOGUE TERMINATED BY A "?" REQUIRES A
USE RESPONSE BEFORE PROGRAM EXECUTION CAN CON-
INUE. IN THE FOLLOWING DIALOGUE USER RESPONSE IS
INDICATED BY "*":
WHERE IS "AAAAAA" IS ANY OCTAL NUMBER IN THE RANGE OF 000000
THRU 177777.
"BBBBBB" IS ANY OCTAL NUMBER IN THE RANGE OF 000000
THRU 077777 AND EQUAL TO, OR LESS THAN "CCCCCC".
"CCCCCC" IS ANY OCTAL NUMBER IN THE RANGE OF 000001
THRU 077777 AND EQUAL TO, OR GREATER THAN "AAAAAA".
A RESPONSE OF "0", "CR", "LF", "TAB", OR "SPACE" TO ANY REQUEST WILL BE INTERPRETED AS A "0" RE-
SPONSE.
111.2.2 ERRORS

111.2.1 AN ILLEGAL RESPONSE TO A REQUEST, (I.E. A NON-

OCTAL CHARACTER), WILL RESULT IN A REPEAT OF THAT

REQUEST.

111.2.2 A RANGE ERROR RESPONSE, (I.E. FIRST ADDRESS

GREATER THAN LAST ADDRESS), WILL RESULT IN THE RE-

START OF THE PROGRAM IF ENTERED MANUALLY; ON A

RETURN TO PC +3 IF ENTERED DYNAMICALY.

111.2.3 TYPICAL PROGRAM RESPONSE

|ADR| 0 1 2 3 4 5 6 7 |
|---|---|---|---|---|---|---|---|
|   | N=NN NN=NN NN=NN NN=NN NN=NN NN=NN NN=NN |
| 10 | NN=NN NN=NN NN=NN NN=NN NN=NN NN=NN NN=NN |
| 110| NN=NN NN=NN NN=NN NN=NN NN=NN NN=NN NN=NN |
| 110| NN=NN NN=NN NN=NN NN=NN NN=NN NN=NN NN=NN |
| 27 | FND'S FOUND: MM=NN |
| 28 | 29 |
| 30 | 31 |
| 32 | 33 |
| 34 | 35 |
| 36 | 37 |
| 38 | 39 |
| 40 | 41 |
| 42 | 43 |
| 44 | 45 |

111.2.3.1 WHERE:

THE "NN=NN" ENTRIES ABOVE CORRESPOND TO THE CON-

ENTS OF THE ASSOCIATED ADDRESSES.

111.2.3.2 IN THE EXAMPLE ABOVE IT IS ASSUMED THAT THE

CONTENTS OF LOCATIONS 10 THRU 107 INCLUSIVE ARE IDENTICAL.

THEMEREFORE THE ABBREVIATED OUTPUT, (I.E. LOCATIONS 20

THRU 107 INCLUSIVE ARE REPLACED BY THE TEXT MESSAGE

"SAME").

111.4 INSTRUCTION SET:

<table>
<thead>
<tr>
<th>BITS</th>
<th>NAME</th>
<th>CONTENTS/FUNCTION</th>
</tr>
</thead>
</table>
|0 0 0| CLEAR| ANY OF THESE BITS = 1 WILL SET THE FOLLOWING = 0 FOR ANY AND ALL DEVICES CONNECTED TO THE CONTROLLER (R/W DEVICE) DONE, SEEK DONE, D/A ERROR STATUS R/W 7 8 10-15.
|0 1| I/O| SPECIFY THE DISK COMMAND FOR THE SELECTED DRIVE AS FOLLOWS:
|0 0| NORMAL MODE COMMAND|
|0 1| WRITE|
|1 0| SEEK|
|1 1| RECALIBRATE|
|0| NO CYLINDER SPECIFIED CYLINDER #5 ARE AS FOLLOWS:
|0-27| (OCTAL) |
|0-114| |

10020 .MAIN

<table>
<thead>
<tr>
<th>BITS</th>
<th>NAME</th>
<th>CONTENTS/FUNCTION</th>
</tr>
</thead>
</table>
|0 0 0| CLEAR| ANY OF THESE BITS = 1 WILL SET THE FOLLOWING = 0 FOR ANY AND ALL DEVICES CONNECTED TO THE CONTROLLER (R/W DEVICE) DONE, SEEK DONE, D/A ERROR STATUS R/W 7 8 10-15.
|0 1| I/O| SPECIFY THE DISK COMMAND FOR THE SELECTED DRIVE AS FOLLOWS:
|0 0| NORMAL MODE COMMAND|
|0 1| WRITE|
|1 0| SEEK|
|1 1| RECALIBRATE|
|0| NO CYLINDER SPECIFIED CYLINDER #5 ARE AS FOLLOWS:
|0-27| (OCTAL) |
|0-114| |
START HEAD
STARTING HEAD # FOR READ/WRITE OPERATION, VALID HEAD #5S ARE:
NON-REMOVABLE: 0-3
DISKETTE: 0-1
7-11 START SECTOR SELECT STARTING SECTOR FOR A READ/WRITE OPERATION, VALID SECTOR NUMBERS ARE:
NON-REMOVABLE: 0-37
DISKETTE: 0-17
12-15 SECTOR COUNT # OF SECTORS TO READ/WRITE (TWO'S COMPLEMENT).
DIA1 READ DISK STATUS
--- ------------------
0 READ/WRITE DONE:
--- ------------------
1 SEEK DONE:
2 SEEK/RECALIBRATE COMPLETED FOR DRIVES 0-3, ONLY SEEK DONE FOR THE SELECTED DRIVE CAN BE SET. IOPLS, START, IOIRST AND/OR CLEAR WILL RESET.
5 DISKETTE:
6 WRITE-PROTECT:
--- ------------------
7 BAD SECTOR (ECHO) / DATA MARK (FLOPPY):
--- ------------------
8 UNSAFE:
--- ------------------
9 UNIT READY:
--- ------------------
10 OPERATION TIMEOUT
--- ------------------
11 END OF CYLINDER:
--- ------------------
12 ADDRESS (HEADER) ERROR:
--- ------------------
13 CHECKWORD (CRC) ERROR:
--- ------------------
14 DATA LATE:
--- ------------------
15 ERROR:
--- ------------------
DIS: READ MEMORY ADDRESS
--- ------------------
BITE 0-15 INDICATE THE NEXT MEMORY WORD LOCATION FOR A DATA CHANNEL TRANSFER. BIT 0 IS THE MAP SELECT BIT (0 = MAP A SELECTED, 1 = MAP B SELECTED).
DIC: HEAD DISK ADDRESS AND SECTOR COUNT
--- ------------------
BITE NAME CONTENTS/FUNCTION
--- ------------------
0-1 DRIVE CURRENTLY SELECTED DRIVE (0-3)
2 FORMAT IF 1, THE CONTROLLER IS IN FORMAT MODE.
3 DIAGNOSTIC COMMAND IF 1, DIAGNOSTIC COMMANDS ARE ENABLED.
CURRENT HEAD INDICATES THE HEAD # SELECTED FOR THE NEXT SECTOR TRANSFER. *  
CURRENT SECTOR INDICATES THE SECTOR NUMBER SELECTED FOR THE NEXT SECTOR TRANSFER. *  
SECTOR COUNT INDICATES THE # OF SECTORS REMAINING FOR DATA TRANSFER (THO'S COMPLEMENT).  
* UNLESS THE OPERATION TERMINATES WITH THE ADDRESS ERROR STATUS BIT SET = 1, THE HEAD & SECTOR #S INDICATE THE NEXT LOGICAL SECTOR FOR A DATA TRANSFER.  

CONTROL PULSE FUNCTIONS:  
---------------------------  
PULSE ACTION TAKEN  

--- --- --- --- --- --- --- ---  
NIOS (START) SET DONE, HEAD/READ DONE AND SEEK DONE FLAGS = 0, SET ALL ERROR STATUS BITS (7-8 & 10-15) = 0. SET BUSY = 1 AND START A PREVIOUSLY DEFINED READ OR WRITE OPERATION.  

--- --- --- --- --- --- --- ---  
NIOC (CLEAR) SET BUSY, DONE, READ/READ DONE, SEEK DONE, = 0, SET ALL ERROR STATUS BITS (7-8 & 10-15) = 0, OPERATE IN PROGRESS  

--- --- --- --- --- --- --- ---  
NIOP (IOPLS) SET DONE, READ/READ DONE, SEEK DONE, FLAGS = 0, SET ALL ERROR STATUS BITS (7-8 & 10-15) = 0, START A PREVIOUSLY DEFINED SEEK OR RECALIBRATION OPERATION, DOES NOT AFFECT BUSY.  

--- --- --- --- --- --- --- ---  
IORSB (RESET) PERFORMS SAME FUNCTIONS AS NIIC. IN ADDITION, SET INTERRUPT DISABLE FLOP = 0, SET MEMORY ADDRESS REGISTER = 0, SET INITIAL PROGRAM LOAD FLAG = 1, TRACK POSITION INFORMATION FOR ALL DRIVES IS LOST, HOWEVER, IF A SEEK IS ISSUED AFTER AN IORSB, A RECALIBRATION IS PERFORMED, FOLLOWED BY THE SEEK.
12.3 SHRGT#1, PROGRAM HALTS AFTER WRITE WITH READ
VERIFICATION ALLOWING OPERATOR TO CHANGE PACKS.
SHREG#1, PUTS PROGRAM INTO READ ONLY MODE
## 94'S 501, 502 ONLY. IF 94 501-DATA MUST INOT;
BE RANDOM, START AT THE ABOVE SELECTED ADDRESS.
12.4 ALL NUMBERS ENTERED IN 7.0 MUST BE IN OCTAL
ANY NON-Octal INPUT IS TREATED AS A LETTER.
ANY LETTER INPUT FOR CYL., HEAD, SECTOR, OR # OF
SECTORS GETS RANDOM FUNCTION IN THE RELIABILITY
TEST WITH OPTIONS.

13.1 PROGRAM RUNTIME
THE EFFICIENCY OF THIS PROGRAM IS CORE DEPENDENT.
MAXIMUM THROUGHPUT UTILIZING
THE FULL CAPABILITY OF THE CONTROLLER IS ACHIEVED
WITH MEMORIES OF 16K OR LARGER. ON SYSTEMS USED
FOR RUNNING ERROR RATES IT IS RECOMMENDED THAT 16K
OR LARGER MEMORIES BE USED. IN ORDER TO ACTIVATE
THE DOUBLE BUFFERING FEATURE - SEE 9.0 (OPERATING
MODES)

PROGRAM RUNTIMES ARE SUBSTANTIALLY REDUCED WITH
MEMORIES OF 16K OR LARGER. PROGRAM CAN BE UP
TO 16K USING 2 BUFFERS AND UP TO 24K USING 3
BUFFERS IN THE RANDOM RELIABILITY TESTS. ## SEE 9.0

READ, WRITE AND SEEK OPERATIONS ARE TIMED BY
SPECIAL ROUTINES. WHEN THE PROGRAM IS FIRST
STARTED, THE TIMING ROUTINE WILL TEST FOR THE
PRESENCE OF A REAL TIME CLOCK (RTC) TO DERIVE
TIMING FROM IT. IF NO RTC IS PRESENT, THE
PROGRAM WILL TYPE "TTO BAUD RATE". THIS MESSAGE
REFERS TO THE BAUD RATE OF THE CONSOLE TERMINAL
(DEVICE 10 & 11). TYPE IN THE BAUD RATE. IF A
TYING ERROR OCCURS IN THE NUMBER STRING (BEFORE
THE CARRIAGE RETURN), SIMPLY TYPE A NON-NUMERIC
CHARACTER AND THE REQUEST FOR THE BAUD RATE WILL
BE REPEATED. IF THE CARRIAGE RETURN HAS BEEN
GIVEN AFTER A TYPING ERROR, RELOAD THE PROGRAM.

.EJECT