DataGeneral

TECHNICAL STATEMENT

TEXT LISTING

068-000669-01

PROGRAM

6070 CARTRIDGE/DISK RELIABILITY PROGRAM

TEXT TAPE

097-000669-01

ABSTRACT

THE MOVING HEAD DISK RELIABILITY PROGRAM IS A MAINTENANCE PROGRAM DESIGNED TO EXERCISE AND TEST THE 6070 CARTRIDGE DISK CONTROLLER AND 1-4 DISK DRIVES.

```
 0001 .MAIN    MACRO REV 06.30          08:53:46 05/16/79
01
02
03
04
05
06
07
08              ;*****************************************************************
09              ;
10              ; NAME: CDRG.TX                  PART NUMBER: 097-000669
11              ;
12              ;
13              ; DESCRIPTION: 6070 CARTRIDGE DISK RELIABLILITY PROGRAM
14              ;
15              ;
16              ; REVISION HISTORY:
17              ;
18              ;       REV.             DATE
19              ;
20              ;        00              02/27/78
21              ;        01              12/22/78
22              ;
23              ; COPYRIGHT (C) DATA GENERAL CORPORATION, 1978
24              ; ALL RIGHTS RESERVED.
25              ;*****************************************************************
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10002 .MAIN
01              ;1.0    PROGRAM NAME: CDRG.SR
02              ;       6070 CARTRIDGE DISK RELIABILITY PROGRAM
03
04              ;2.0    REVISION HISTORY:
05              ;       01      12/22/78
06              ;       02      ---
07
08              ;3.0    MACHINE REQUIREMENTS:
09
10              ;       NOVA/ECLIPSE FAMILY CENTRAL PROCESSOR
11              ;       16K READ/WRITE MEMORY
12              ;       TELETYPE OR CRT AND CONTROL (4010)
13              ;       DGC 6070 CARTRIDGE DISK SYSTEM
14              ;       0-3 6070A ADD ON DISK DRIVES
15
16              ;4.0    TEST REQUIREMENTS:      N/A
17
18              ;5.0    SUMMARY:
19
20              ;       THE MOVING HEAD DISK RELIABILITY PROGRAM
21              ;       IS A MAINTENANCE PROGRAM DESIGNED TO
22              ;       EXERCISE AND TEST THE 6070 CARTRIDGE DISK CONTROLLER
23              ;       AND 1-4 DISK DRIVES.  THE DISK DRIVES MAY BE
24              ;       SHARED BETWEEN TWO COMPUTERS IN WHICH CASE
25              ;       THE FOLLOWING PROGRAMS MAY BE RUNNING IN
26              ;       EACH COMPUTER:
27              ;
28              ;       ONE COMPUTER RUNNING TEST
29              ;       (SA 501 "EVEN"), THE OTHER (SA 501 "ODD")
30              ;       WITH SURFACE RANGE (0 THRU 3) OR ANY STARTING
31              ;       ADDRESS, ONE CPU WITH SURFACE RANGE (0 THRU 1)
32              ;       & THE OTHER CPU WITH SURFACE RANGE (2 THRU 3).
33
34              ;       IF NO DRIVES ARE TO BE SHARED, THERE ARE
35              ;       NO OTHER RESTRICTIONS AS TO THE RUNNING OF
36              ;       THESE PROGRAMS ON A DUAL PROCESSOR SYSTEM.
37
38              ;       THE CONTROL CAN BE ANY DEVICE CODE 20-76
39              ;       OCTAL.  THE DEFAULT IS 33 -SFE 9.0 FOR OTHER
40              ;       SETTINGS.
41
42              ;6.0    RESTRICTIONS:
43              ;       IF A DISK DRIVE IS SHARED BETWEEN TWO
44              ;       COMPUTERS THEN EITHER :
45
46              ;       (A) ONE CPU MUST RUN (SA 501 "EVEN") AND THE
47              ;       OTHER (SA501 "ODD") WITH SURFACE RANGES
48              ;       (0 THRU 3). OR...
49              ;       (B) BOTH WITH ANY STARTING ADDRESS BUT 1 CPU
50              ;       WITH SURFACE RANGE (0 THRU 1) AND THE OTHER WITH
51              ;       SURFACE RANGE (2 THRU 3).
52
```

```
!0003 .MAIN
01              :7.0    PROGRAM DESCRIPTION/THEORY OF OPERATION:
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,
07              :       AND NUMBER OF CONSECUTIVE SECTORS.  RANDOM
08              :       DATA IS THEN GENERATED, WRITTEN, AND READ.
09              :       THE SEQUENCE IS REPEATED INDEFINITELY.
10
11              :       B. RELIABILITY TEST (SA 501) WITH OPTIONS
12              :          ------------------------------------
13
14              :       SAME AS A, EXCEPT THAT OPERATOR IS GIVEN
15              :       THE OPTION OF SELECTING "ODD" OR "EVEN" CYL-
16              :       INDERS FOR RUNNING DUAL PROCESSORS BY TYPING
17              :       "O" FOR ODD OR "E" FOR EVEN. TYPING 'CR'
18              :       OPTIONS ALONE GETS SINGLE PROCESSOR
19              :       ON DATA PATTERNS (SEE 7D II) FOR
20              :       CHOOSING A CONSTANT CYLINDER, HEAD, SECTOR
21              :       OR # OF SECTORS.  ANY LETTER RESPONSE TO
22              :       CYL, HEAD ETC. GETS RANDOM FUNCTION FOR THAT
23              :       VARIABLE.  A CARRIAGE RETURN ONLY GETS THE
24              :       RANDOM FUNCTION FOR ALL VARIABLES.  ALL
25              :       INPUTS ARE RANGE CHECKED AND REJECTED IF OUT
26              :       OF RANGE.
27
28              :       C. INCREMENTAL DISK ADDRESS TEST (SA 502)
29
30              :       OPERATOR IS GIVEN OPTION ON DATA (SEE 7D II)
31              :       AND SURFACE RANGE.
32              :       REQUESTED DATA IS FIRST WRITTEN OVER THE
33              :       ENTIRE PACK.  THEN THE DATA IS READ FROM
34              :       ALL SECTORS.  THIS INSURES THAT ALL DISK PACK
35              :       BLOCKS ARE USEABLE AND ARE FORMATTED PROPERLY.
36              :       THE TEST IS THEN REPEATED FOR ALL READY DISCS,
37              :       AND PASS IS PRINTED.  THE SEQUENCE IS REPEATED
38              :       INDEFINITELY.
39              :       NOTE:  SHOULD A WRITE ERROR OCCUR ON THE
40              :       WRITE PASS (IE. ADDRESS OR BAD SECTOR ERROR)
41              :       WHICH TERMINATES THE WRITE TRANSFER, A
42              :       READ ERROR WILL ALSO OCCUR AT THE FAILING
43              :       ADDRESS ON THE READ PASS. IN SUCH INSTANCES,
44              :       DISCOUNT THE READ ERROR.
45
46              :       #NOTE
47              :       SWREG7=1, PROGRAM HALTS AFTER WRITE WITH READ
48              :       VERIFICATION ALLOWING OPERATOR TO CHANGE PACKS.
49              :       SWREG8=1, PUTS PROGRAM INTO READ ONLY MODE
50              :       ## SA'S 501,502 ONLY.  IF SA 501=DATA MUST
51              :       !NOT! BE RANDOM (SEE 7D II)
52
53              :       ALL NUMBERS ENTERED ABOVE MUST BE IN OCTAL.
54              :       ANY NON-OCTAL INPUT IS TREATED AS A LETTER.
55              :       ANY LETTER INPUT FOR CYL, HEAD, SECTOR, OR
56              :       # OF SECTORS GET RANDOM FUNCTION IN THE
57              :       RELIABILITY TEST WITH OPTIONS.
```

```
!0004 .MAIN
01              :
02
03              :       D. COMMAND STRING INTERPRETER (SA 503)
04
05              :       AS A TROUBLE SHOOTING AID THE SERVICE
06              :       ENGINEER MAY TYPE IN HIS OWN TEST LOOP.
07              :       AFTER STARTING AT 503, THREE ARGUMENTS
08              :       MUST BE ENTERED IN RESPONSE TO THREE
09              :       PROGRAM QUESTIONS: "UNIT", "DATA", AND
10              :       "COMMAND STRING". ALL NUMBERS MUST BE
11              :       ENTERED IN OCTAL.
12              :       STATISTICS LOGS ARE VALID ONLY FOR THE
13              :       COMMAND STRING BEING EXECUTED.
14
15              :       I.      UNIT:   TYPE UNIT # OR CARRIAGE RETURN
16              :                       TO USE PREVIOUS ENTRY.
17
18              :       II.     DATA:   ROT=ROTATED 110110 PATTERN - THIS
19              :                       DATA OPTION APPLIES TO (SA 502)
20              :                       INCREMENTAL DISK ADDRESS TEST ONLY
21              :                       AND RESULTS IN A TOTAL OF 4 PASSES
22              :                       ACROSS THE PACK ROTATING THE PATTERN
23              :                       AFTER EACH PASS BEFORE PRINTING THE
24              :                       MESSAGE-"***PASS***".  THIS IS TO
25              :                       INSURE THAT A PEAK PHASE SHIFT IS
26              :                       EVOKED ACROSS EACH BIT CELL OF THE
27              :                       PACK.
28              :                       THIS TEST PATTERN IS RECOMMENDED WHEN
29              :                       RUNNING ERROR RATES.
30
31              :                       RAN=RANDOM
32              :                       ALO=ALL ONES
33              :                       ALZ=ALL ZEROS
34              :                       PAT=110110 PATTERN
35              :                       ALT=52525 PATTERN
36              :                       FLO=FLOATING ONE PATTERN
37              :                       FLZ=FLOATING ZERO PATTERN
38              :                       ADR=ALTERNATING CYLINDER AND
39              :                           HEAD, SECTOR WORDS
40              :                       VAR=EXISTING WORDS ENTERED PREVIOUSLY
41              :                           AS DESCRIBED BELOW:
42
43              :                       ALTERNATIVELY ENTER A STRING OF UP TO 7
44              :                       OCTAL 16 BIT WORDS TO BE USED AS
45              :                       DATA.  THE WORDS ENTERED ARE USED
46              :                       REPEATEDLY TO MAKE UP A SECTOR BLOCK.
47              :                       TYPE "CR" TO USE THE PREVIOUS ENTRY.
```

```
!0005 .MAIN
01              ;       III.    COMMAND STRING:
02              ;
03              ;       OPTIONS 1.      READ HEAD,SECTOR,#SECTORS
04              ;               2.      WRITE SAME
05              ;               3.      SEEK CYLINDER
06              ;               4.      RECALIBRATE
07              ;               5.      LOOP (GO TO BEGINNING OR LR)
08              ;               6.      DELAY N (N= DELAY IN MS)
09              ;               7.      LR (BEGIN LOOP HERE)
10              ;               8.      FORMAT (CYL,HD,SECTOR)
11              ;               9.      BAD (INSTALL BAD SECTOR FLAG) CYL,HD,SEC
12              ;               NOTE: ITEMS 8 & 9 INCLUDE THE NECESSARY SEEK
13              ;
14              ;               10.     TYPE CARRIAGE RETURN TO USE THE
15              ;                       PREVIOUS UNIT, DATA, OR COMMAND
16              ;                       STRING.
17              ;               11.     TYPE ESCAPE TO BYPASS UNIT & DATA
18              ;                       PROMPT TO COMMAND STRING PROMPT,
19              ;                       USING PREVIOUSLY ENTERED UNIT# &
20              ;                       DATA.
21              ;               12.     TYPE "R" TO INTERRUPT EXECUTION
22              ;                       OF CURRENT COMMAND AND RETURN TO
23              ;                       UNIT# PROMPT.
24              ;               13.     TYPE "^O" TO ENTER ODT
25              ;               14.     TYPE "W" FOR STATISTICS LOG
26              ;               15.     TYPE "L" FOR ERROR LOGS
27              ;
28              ;               NOTE:  OPTIONS 14 & 15 ARE VALID ONLY FOR
29              ;               THE COMMAND STRING BEING EXECUTED: LOGS
30              ;               ARE CLEARED PRIOR TO EACH COMMAND STRING
31              ;               ENTRY.
32              ;
33              ;               THE FOLLOWING EXAMPLE WOULD CAUSE UNIT
34              ;               1 TO SEEK CYLINDER 50, THEN REPEATEDLY
35              ;               WRITE SECTORS 2 AND 3 OF HEAD 1, THEN
36              ;               READ IT BACK AND CHECK.  DATA SPECIFIED AS
37              ;               ALTERNATE WORDS OF ZEROS THEN ONES :
38              ;
39              ;               UNIT:  1
40              ;               DATA:  0,177777
41              ;               COMMAND STRING:  SEEK 50 LR WRITE 1,2,2 READ SAME LOOP
42              ;
43              ;               NOTE:  EITHER SPACES OR A COMMA MAY BE
44              ;               USED AS AN ARGUMENT DELIMITER.  EACH RE-
45              ;               SPONSE IS TERMINATED BY TYPING CARRIAGE
46              ;               RETURN.  IF MORE ROOM IS NEEDED ON A LINE,
47              ;               TYPE LINE FEED TO SPACE TO THE NEXT LINE. A "LF"
48              ;               DOES NOT ELIMINATE THE NEED FOR A DELIMITER.
49              ;               THE WORD "SAME" USED WITH READ, OR WRITE,
50              ;               WILL CAUSE THE PREVIOUS DISK ADDRESS
51              ;               PARAMETERS TO BE USED.
52              ;
53              ;               SHOULD COMMAND STRING ENTRIES EXCEED INPUT
54              ;               BUFFER CAPACITY, THE PROGRAM RESPONDS WITH
55              ;               THE MESSAGE "INPUT OVERFLOW".THE OPERATOR MUST
56              ;               DEPRESS ONE OR MORE "RUBOUTS" FOLLOWED BY
57              ;               A "CR" TO POSITION THE BUFFER POINTER TO
58              ;               THE LAST VALID COMMAND IN THE STRING AND
59              ;               BEGIN EXECUTION.
```

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!0006 .MAIN
01
02              ;               AN "R" TYPED WHILE A STRING IS BEING
03              ;               EXECUTED WILL CAUSE THE PROGRAM TO RETURN
04              ;               TO THE UNIT# PROMPT.  THE ESCAPE KEY WILL
05              ;               BYPASS THE UNIT AND DATA PROMPTS TO THE
06              ;               COMMAND STRING PROMPT, USING PREVIOUSLY
07              ;               ENTERED UNIT# AND DATA.
08              ;               AFTER COMPLETION OR TERMINATION OF A COM-
09              ;               MAND STRING, TYPING A CARRIAGE RETURN WILL
10              ;               CAUSE THE PROGRAM TO ADVANCE TO THE NEXT
11              ;               PROMPT USING THE UNIT, DATA, OR COMMAND
12              ;               STRING PREVIOUSLY ENTERED.
13
14              ;               TO CHANGE THE CURRENT VALUE OF "SWREG" AND/OR
15              ;               ENTER THE OCTAL DEBUGGER WHILE IN "COMMAND
16              ;               STRING INTERPRETER", THE PROGRAM MUST BE
17              ;               EXECUTING A COMMAND.  IF NO COMMAND HAS BEEN
18              ;               ENTERED, PROCEED TO COMMAND STRING PROMPT AND
19              ;               TYPE IN THE LOOP COMMAND.
20
21              ;       IV.     INPUT VALIDATION:
22
23              ;               A. UNIT:  THE PROGRAM WILL ACCEPT ONLY THOSE
24              ;                         UNIT#'S PREVIOUSLY CONFIGURED BY
25              ;                         THE OPERATOR DURING STARTUP.  AFTER
26              ;                         A "LOSS OF READY" ON A PARTICULAR
27              ;                         UNIT THAT UNIT'S # WILL BE REJECTED
28              ;                         UNTIL THE UNIT HAS BEEN RE-INSTATED.
29              ;                         SEE SECTION 12 NOTE #1.
30
31              ;               B. DATA:  THE PROGRAM WILL ACCEPT ONLY THOSE
32              ;                         PATTERNS DESCRIBED IN SECTION 5 D. II.
33              ;                         SPELLING ERRORS OR NON-RECOGNIZED
34              ;                         PATTERNS WILL BE REJECTED.
35
36              ;               C. COMMANDS: THE PROGRAM REJECTS ANY UN-
37              ;                         RECOGNIZED COMMANDS AND WILL ALLOW
38              ;                         ANY INPUT WITHIN THE BIT FIELD
39              ;                         BOUNDARIES OF THE APPLICABLE PARA-
40              ;                         METER WITH THE EXCEPTION OF THE
41              ;                         # OF SECTORS TO BE TRANSFERED.
42              ;                         THE ALLOWABLE RANGE OF # OF SECTS
43              ;                         IS DETERMINED BY THE AVAILABLE BUFFER
44              ;                         SIZE AND CANNOT BE ZERO.
45
```

```
10007 .MAIN
01
02              ;       E. QUICK FORMATTER (SA 504)
03              ;       THE PROGRAM DOES A QUICK FORMAT (NO PACK VALIDATION)
04              ;       AND BREAKS TO ALLOW OPERATOR TO RESTART PROGRAM.
05              ;       TO RESTART PROGRAM THE OPERATOR MUST ENTER THE
06              ;       DESIRED STARTING ADDRESS FOLLOWED BY AN "R".
07              ;       FOR EXAMPLE: 502R
08              ;        ANY ERROR ENCOUNTERED IS CONSIDERED
09              ;       CATASTROPHIC AND THE UNIT IS PLACED "OFFLINE".
10              ;       THE PROGRAM THEN FORMATS ANY REMAINING UNITS.  IT
11              ;       SHOULD BE NOTED THAT SA 502 ROT SHOULD BE RUN
12              ;       FOLLOWING QUICK FORMATTER AND BAD SECTOR FLAGS
13              ;       SET MANUALLY (SA 503) TO INSURE PACK RELIABILITY.
14
15              ;       F. RUNALL (SA 505)
16              ;         EXECUTES IN "TOP DOWN" FASHION THE FOLLOWING PROGRAMS:
17              ;               (SA501)RANDOM RELIABILITY
18              ;                       PAT,RAN,FL7,FLO
19              ;               (SA502) INCREMENTAL DISC ADDRESS
20              ;                       ROT1-4,RAN,CAD,ALT,ALZ,ALO
21              ;               (SA507) RANDOM SEEK EXERCISER
22
23              ;       THE OPERATOR IS GIVEN THE OPTION TO RUN "RUNALL"
24              ;       ON TWO DEVICE CODES WITH THE NUMBER OF PASSES PER
25              ;       DEVICE CODE SPECIFIED. A "CR" DEFAULTS TO THE
26              ;       CURRENT DEVICE CODE. IF THE SECOND DEVICE CODE AND
27              ;       A PASS COUNT ARE ENTERED, THE PROGRAM RUNS "RUNALL"
28              ;       (N) PASSES AND PRINTS OUT THE ERROR & STATISTICS
29              ;       LOG FOR EACH DEVICE ALTERNATELY.
30
31              ;       G. SEEK EXERCISER (SA 506)
32              ;       PROGRAM PROVIDES A SEEK SCAN SEQUENCE
33              ;       CONVERGING FROM THE EXTREME OUTERMOST TRACKS INTO THE
34              ;       AJDACENT TRACK IN THE CENTER, THEN DIVERGING AGAIN TO
35              ;       THE EXTREMES.
36
37              ;       1. ALL SEEKS IN F/G ARE FOLLOWED BY A 1 SECTOR READ AT
38              ;       RANDOM SECTOR WITH NO DATA CHECK.  ALL SEEKS ARE TIMED
39              ;       WITH MAX,MIN, AND AVE. TIMES BEING LOGGED IN MS. SEEK
40              ;       PATHS FOR MAX,MIN VALUES ARE ALSO LOGGED.  INCREMENTAL
41              ;       DISK ADDRESS TEST (SA 502) SHOULD BE RUN PRIOR TO
42              ;       RUNNING EITHER SEEK EXERCISER TO AVOID POSSIBLE CHECK-
43              ;       WORD ERRORS DURING READS.
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```
10008 .MAIN
01
02              ;       H. RANDOM SEEK EXERCISER (SA 507)
03              ;       PROGRAM PROVIDES A RANDOM SEEK SEQUENCE
04
05              ;       I. ERROR COUNT/LOG RECOVERY (SA 510)
06              ;       IN THE EVENT A PROGRAM WAS STOPPED DURING A RUN, THE
07              ;       ERROR LOGS MAY BE RECOVERED AT THIS STARTING ADDRESS.
08              ;       ***MUST BE DONE BEFORE ANY PROGRAM RESTART AS PROGRAM
09              ;       INITIALIZATION ZEROES ALL LOGS.
10
11              ;       J. RELIABILITY TEST(SA 511), SAME AS SA 501
12
13              ;       K. RELIABILITY TEST(SA 512), SAME AS SA 501
14
15              ;       L. MEMORY DUMP ROUTINE (SA 513)
16              ;       SEE SECTION 11.2.0 FOR DESCRIPTION
17
18              ;       M. DIRECT ENTRY ODT (SA 11)
19              ;       SEE SECTION 11.0. FOR DESCRIPTION
20
21              ;       N. CHANGE DEVICE CODE (SA 4)
22              ;       USER IS REQUESTED TO ENTER THE NEW DEVICE CODE.
23              ;       THE PROGRAM THEN CHANGES ALL I/O INSTRUCTIONS
24              ;       FROM THE CURRENT DEVICE CODE TO THE NEW DEVICE
25              ;       AND RETURNS CONTROL TO THE USER FOR RESTART
```

```
10009 .MAIN
01              :8.1    SWITCH SETTINGS
02              :
03              :       LOCATION "SWREG" IS USED TO SELECT THE PROGRAM
04              :       OPTIONS (NOT SYSTEM CONFIGURATION).  WHILE
05              :       RUNNING UNDER DTOS, THIS LOCATION WILL BE
06              :       LOADED BY THE MONITOR.
07              :       HOWEVER UNDER STAND ALONE AND PROGRAM LOAD MODES
08              :       THIS LOCATION WILL BE SET ACCORDING TO THE
09              :       ANSWERS SUPPLIED BY THE OPERATOR.  IN ANY CASE
10              :       THE OPTIONS CAN BE CHANGED OR VERIFIED BY USING
11              :       ONE OF THE COMMANDS GIVEN IN SEC. 8.3.
12              :
13              :
14              :8.2    SWITCH OPTIONS
15              :       DIFFERENT BITS AND THEIR INTERPRETATION AT
16              :       LOCATION "SWREG" IS AS FOLLOWS:
17              :
18              :       BIT     OCTAL   BINARY  INTERPRETATION
19              :               VALUE   VALUE
20              :
21              :        1                0     LOOP ON ERROR
22              :               40000     1     SKIP LOOPING ON ERROR
23              :
24              :        2                0     PRINT TO CONSOLE
25              :               20000     1     ABORT PRINT OUT TO CONSOLE
26              :
27              :        5                0     DO NOT PRINT ON THE LINE PRINTER
28              :               02000     1     PRINT ON THE LINE PRINTER
29              :
30              :        6                0     DO NOT HALT ON ERROR
31              :               01000     1     HALT ON ERROR
32              :
33              :        7                0     **** N/A
34              :               00400     1     BREAK FOR PACK INTERCHANGE
35              :
36              :        8                0     **** N/A
37              :               00200     1     FOR READ ONLY MODE (SA 501,502)
38              :
39              :        9                0     N/A
40              :               00100     1     BYPASS DATA CHECK
41              :
42              :       10(A)             0     N/A
43              :               00010     1     ENABLE BAD SECTOR PRINTOUTS
44              :
45              :       11(B)             0     N/A
46              :               00020     1     ENABLE SEEK TIMING STATISTICS
47              :                               AT END OF PASS (SA 506 ONLY)
48              :
49              :       12(C)             0     N/A
50              :               00040     1     ENABLE EXPANDED ERROR PRINTOUTS
51              :                               (SEE SECT. 10.4 "ERRORS")
52              :
53              :       NOTE: "SWREG" BIT 2 IS CLEARED BY PROGRAM  AUTO-
54              :             MATICALLY AT STARTUP.
```

```
10010 .MAIN
01              :8.3    SWITCH COMMANDS
02              :       ONCE THE PROGRAM STARTS EXECUTING THE STATE OF ANY
03              :       OF THE BITS CAN BE CHANGED BY HITTING KEYS 1-9, A-F.
04              :       THE PROGRAM WILL CONTINUE RUNNING AFTER UPDATING
05              :       THE OPTIONS EACH KEY WILL COMPLEMENT THE STATE OF THE
06              :       BIT AFFILIATED WITH IT, THUS BIT 4 CAN BE ALTERED BY
07              :       HITTING KEY 4.  SETTING OF ANY BIT OF LOCATION "SWREG"
08              :       WILL SET BIT 0. (DEFAULT MODE IS DEFINED AS ALL BITS
09              :       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
17              :               "SWREG" TO DEFAULT MODE AND RESTART THE PRO-
18              :               GRAM.
19              :
20              :       ^R      THIS COMMAND GIVEN AT ANY TIME WILL RESTART
21              :               THE PROGRAM.  SWITCHES ARE LEFT WITH THE
22              :               VALUES THEY HAD BEFORE THE COMMAND WAS
23              :               ISSUED.
24              :
25              :       ^O      THIS COMMAND GIVEN AT ANY TIME WILL CAUSE
26              :               THE PROGRAM CONTROL TO GO TO ODT (NOTE:
27              :               THIS IS AN OPTIONAL COMMAND AND IS AVAIL-
28              :               ABLE ONLY IF ODTPK IS PRESENT)
29              :
30              :       M       THIS COMMAND GIVEN AT ANY TIME WILL PRINT
31              :               THE CURRENT OPERATING MODES.
32              :
33              :       0       THIS COMMAND GIVEN AT ANY TIME WILL LOCK
34              :               THE PROGRAM INTO SWITCH MODIFICATION MODE
35              :               WHERE MORE THAN 1 BIT CAN BE CHANGED.
36              :
37              :               NOTE: INITIALLY, THE PROGRAM PROMPTS THE
38              :               OPERATOR TO ENTER THE DESIRED SWITCH SET-
39              :               TINGS.  A "CR" MUST BE GIVEN TO EXIT THIS
40              :               PROMPT. IF SWREG INFORMATION IS TYPED IN,
41              :               A 'CR' MUST ALSO BE TYPED TO EXIT FROM THE
42              :               SWITCH MODIFICATION MODE.
43
```

```
10011 .MAIN
01              ;9.0    OPERATING PROCFDURE/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
07              ;          HIT START.
08
09              ;       STARTING ADDRESS
10              ;         4     SET DEVICE CODE TO OTHER THAN 33
11              ;         10    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              ;       511     SAME AS 501
23              ;       512     SAME AS 501
24              ;       513     MEMORY DUMP ROUTINE
25
26              ;       INITIALLY, THE OPERATOR IS REQUESTED TO ENTER A TTY
27              ;       BAUD RATE( NO RTC PRESENT) FOR TIMING, DATE -DAY,
28              ;       MONTH, YEAR, HOUR, & MINUTE (A [CR]
29              ;       RESPONSE WILL IGNORE THIS ROUTINE), & (UNIT#,MIN
30              ;       SURFACE, MAX SURFACE) FOR EACH UNIT TO BE TESTED.
31              ;       EX. 0,0,3 1,0,3 ETC..(SURFACE RANGE IS 0 TO 3).
32              ;       SUBSEQUENT PROGRAM RESTARTS MAY USE PREVIOUSLY ENTERED
33              ;       PARAMETERS FOR UNIT#'S & RANGE BY TYPING A "CR" IN
34              ;       RESPONSE TO MESSAGE PROMPT.
35
36
37              ;       OPERATOR INPUT CONTROLLED PRINTOUTS ARE AS FOLLOWS:
38
39              ;       L       = FIRST 100. BAD SECTORS, DATA, OR ADDRESSES
40              ;       S       = SEEK TIMING STATISTICS (506,507 ONLY)
41              ;       W       = SECTORS W/R PLUS ERROR COUNTS
42              ;       **NOTE** ANY CHARACTER TYPED WILL END PRINTOUTS AT
43              ;       THE NEXT CHANGE OF DATA TYPE.
44
```

```
10012 .MAIN
01              ;       D. OPERATING MODES
02
03              ;       1 OF 3 DIFFERENT MEMORY/INTERRUPT MODES MAY BE IN
04              ;       USE IN THIS PROGRAM AND ARE DESCRIBED AS FOLLOWS:
05
06              ;       1-BACKGROUND ONLY, WAIT ON INTERRUPT
07              ;       MAX # OF SECTORS = ALL OF AVAILABLE CORE (IE NOT TAKEN
08              ;       BY PROGRAM) OR 16 SECTORS MAX. USED FOR SA'S 503,
09              ;       506,507
10
11              ;       2-BACKGROUND/FOREGROUND MODES, 2 BUFFERS USED FOR
12              ;       BOTH READ AND WRITE PURPOSES. MAX # OF SECTORS =
13              ;       1/2 OF AVAILABLE CORE OR 16 SECTORS MAX.  USED FOR
14              ;       INCREMENTAL ADDRESS TEST, OR RANDOM RELIABILITY
15              ;       WITH CONSTANT DATA PATTERNS.
16
17              ;       3-BACKGROUND/FOREGROUND MODES, 3 BUFFERS
18
19              ;10.0   PROGRAM OUTPUT/ERROR DESCRIPTION:
20
21              ;       ALL ERRORS ARE IDENTIFIED, COUNTED, AND THE
22              ;       PROGRAM IS ROUTED VIA BASE TO A CALL TO
23              ;       CKSW.  ON THE BASIS OF SWITCH SETTINGS (SEE
24              ;       8.2) THE PROGRAM WILL GO INTO A SCOPE LOOP,
25              ;       OR PROCEED, DEPENDING ON THE SWREG SETTINGS.
26
27              ;       IN ALL TESTS EXCEPT (SA 503) COMMAND STRING
28              ;       INTERPRETER, A "LOSS OF READY" WILL RESULT
29              ;       IN THE FOLLOWING:
30
31              ;       UPON LOSS OF READY AND A SINGLE DRIVE, THE
32              ;       PROGRAM WILL PRINT THE APPROPRIATE ERROR
33              ;       MESSAGE AND WILL HALT.  IF MULTIPLE DRIVES
34              ;       EXIST, THE PROGRAM WILL CONTINUE WITH THE
35              ;       REMAINING DRIVES.  IF THE DOWN DRIVE IS
36              ;       PLACED BACK ONLINE, THE PROGRAM WILL RESUME
37              ;       TESTING OF THAT DRIVE.  SEE 12.1
38
39              ;       A "LOSS OF READY" IN (SA 503) COMMAND STRING
40              ;       INTERPRETER CAUSES THE APPROPRIATE ERROR
41              ;       MESSAGE TO BE PRINTED BUT DOE'S NOT REMOVE
42              ;       THE FAILING DRIVE FROM TESTING.(ALLOWS LOOP-
43              ;       ING ON "LOSS OF READY" FAILURES)
44
45              ;       RECALIBRATE - ANY UNUSUAL STATUS IS REPORTED
46              ;       IMMEDIATELY AND AN ERROR RETURN IS EXECUTED.
47
48              ;10.1   SEEK - POSITIONER FAULT STATUS INCREMENTS SEEK
49              ;       ERROR COUNTER.  ANY ERROR STATUS RESULTS IN
50              ;       STATUS PRINTOUT AND ERROR RETURN.  A RECALI-
51              ;       BRATE WILL BE PERFORMED BY THE ERROR HANDLER.
52              ;       PROGRAM WILL LOG THE FIRST 20. CYLINDERS TO/
53              ;       FROM ON FINDING SEEK ERRORS.
```

```
10013 .MAIN
01              :10.2   WRITE - FOLLOWING "DONE" ON A WRITE, ERRORS ARE
02              :       CHECKED IN THE SEQUENCE SHOWN BELOW.  ERROR
03              :       RECOVERY PROCEDURE IS OUTLINED FOR EACH CASE.
04              :       IF THE ERROR IS NOT PRESENT THE NEXT CHECK IS
05              :       MADE.
06
07              :       1. INTERRUPT TIMEOUTS,
08              :       ANY DRIVE FAULTS - INCREMENT THE
09              :       APPROPRIATE ERROR COUNT, PRINT THE ILLEGAL
10              :       STATUS AND DO AN ERROR RETURN.
11
12              :       2. BAD SECTOR - LOG THE DISK ADDRESS (FIRST 100.)
13              :       AND DO A NORMAL RETURN.  NO PRINTOUT WILL RESULT
14              :       UNLESS SWREG 10=1.  A "SOFT ERROR WILL BE RECORDED
15              :       IF THE SECTOR UNDER SCRUTINY PASSES AT LEAST 1
16              :       OF 4 RETRYS.  A SOFT ERROR IS DENOTED IN THE LOG
17              :       BY A COUNT GREATER THAN ZERO AND = TO THE NUMBER OF
18              :       OCCURENCES OF THAT ERROR. SOFT ERRORS WILL BE
19              :       PRINTED OUT REGARDLESS OF THE STATE OF SWREG 10.
20
21              :       3. ADDRESS ERROR - REPEAT THE WRITE, IF
22              :       TEST PASSES THE SECOND TIME, INCREMENT THE
23              :       SOFT ADDRESS ERROR COUNT AND DO A NORMAL
24              :       RETURN; OTHERWISE INCREMENT THE HARD AD-
25              :       DRESS ERROR COUNT AND DO AN ERROR RETURN
26
27              :       IF AN ADDRESS ERROR OCCURS ON THE FIRST
28              :       SECTOR TRANSFERED, A READ ON AN ADJACENT
29              :       HEAD WILL BE ATTEMPTED TO DETERMINE
30              :       WHETHER THE FAULT SHOULD BE CLASSED AS A
31              :       SEEK ERROR OR AN ADDRESS ERROR.  THE FIRST
32              :       20. ADDRESS ERRORS WILL HAVE THEIR ADDRESSES
33              :       LOGGED.
34
35              :       4. ENDING MEMORY ADDRESS - INCREMENT THE
36              :       MEMORY ADDRESS ERROR COUNT, PRINT THE ERROR
37              :       MESSAGE, CHECK FOR A DISK ADDRESS ERROR AND
38              :       DO AN ERROR RETURN
39
40              :       5. ENDING DISK ADDRESS - INCREMENT THE DISK
41              :       ADDRESS ERROR COUNT, PRINT THE ERROR MESSAGE,
42              :       AND DO AN ERROR RETURN
43
```

```
10014 .MAIN
01              :10.3   READ - ALL READ ERRORS WITH THE EXCEPTION OF DATA
02              :       RELATED ERRORS ARE HANDLED THE SAME AS DESCRIBED
03              :       FOR THE WRITE OPERATIONS
04
05              :       DATA ERRORS - DATA IS REREAD 3X (4X IF CHECKWORD ERROR
06              :       UNDETECTED). IF PROGRAM IS IN WRITE/READ MODE AND DATA
07              :       IS BAD ALL 4 PASSES, A HARD ERROR COUNT IS INCREMENTED
08              :       AND AN ERROR RETURN IS TAKEN.  IF DATA IS GOOD ON ANY
09              :       FOUR PASSES, A SOFT ERROR COUNT IS INCREMENTED AND A
10              :       NORMAL RETURN IS TAKEN.
11
12              :       THE DISC ADDRESSES OF ALL DATA PROBLEMS
13              :       WILL BE PRINTED AND THE FIRST
14              :       100. WILL BE LOGGED.  THE FIRST THREE GOOD/BAD
15              :       WORD PAIRS AND RESPECTIVE ADDRESSES WILL BE PRINTED.
16              :
17              :       IF SWREG9=1 (BYPASS DATA CHECK) HARD OR SOFT DATA
18              :       ERRORS WILL BE DETERMINED BY CHECKWORD STATUS.
19
20
21              : 10.3A CHECKWORD FAILED - TWO CONDITIONS MAY FALL INTO
22              :       THIS CATEGORY.
23
24              :       1. A CHECKWORD ERROR WAS DETECTED BUT WITH NO AC-
25              :       COMPANYING DATA ERROR.
26              :       THIS TYPE OF ERROR SHOULD REPRESENT ONLY A VERY SMALL
27              :       PERCENTAGE OF THE DATA ERRORS (<1%- LARGE SAMPLE). IF
28              :       A SIGNIFICANTLY HIGHER PERCENTAGE OF THIS ERROR RESULTS,
29              :       THEN AN CHECKWORD PROBLEM WOULD BE INDICATED.
30
31              :       2. A DATA ERROR OCCURED WITHOUT A CORRESPONDING
32              :       CHECKWORD ERROR.
33
34              :       BOTH OF THESE CHECKWORD FAILURES WILL BE COUNTED
35              :       ONCE PER ERROR PATH UNDER THE CORRESPONDING
36              :       DRIVE STATISTICS SUMMARY HEADINGS.
```

```
!0015 .MAIN
01              ;10.4   ERRORS - ERROR STATUS IS PRINTED WHENEVER
02              ;       ENCOUNTERED AS FOLLOWS:
03
04              ;       'MODE'  UNIT:   'N'
05              ;       CYL -   'N'     HEAD  'N'  SECT  'N'   #SECT  'N'
06
07              ;       STRT HD=  'N'   STRT SECT=  'N'  ATT. # OF SECT=  'N'
08              ;       ("SWREG" BIT 12= 1)=EXPANDED ERROR PRINTOUT
09
10              ;       DIA STATUS = 'N'        'DESCRIPTIVE MESSAGE'
11
12              ;       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 STRT HD, STRT SECT, & ATT. # OF SECT, REFERS
16              ;       TO THE STARTING PARAMETERS FOR THE FAILING TRANSFER.
17
18              ;       WHEN DATA ERRORS ARE FOUND, ONLY THREE ARE PRINTED PER
19              ;       ENCOUNTER. (SEE PARAGRAPH 10.3) WHEN LOOPING IS INVOLVED
20              ;       (RETRIES OR FOR SCOPING) STATUS IS PRINTED ON THE
21              ;       1ST PASS ONLY.  IF "SWREG" BIT 12=1 THEN
22              ;       THE STARTING ADDRESSES 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 "W"
29              ;       DURING RANDOM TESTING TO GET A REPORT OF THE
30              ;       NUMBER OF SECTORS WRITTEN (AND/OR) READ, PLUS
31              ;       ERROR COUNTS IN DECIMAL.
32
33              ;       TYPE "L" 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 ERROR ADDRESSES 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 BE
39              ;       A SUBSET OF THE FIRST COUNT.
40
41              ;       NOTE: ADDRESS INFORMATION WILL BE IN OCTAL WHILE THE
42              ;       COUNTS WILL BE DECIMAL.
43
44              ;       TYPE "S" FOR SEEK TIMING STATISTICS IF RUNNING EITHER
45              ;       SEEK EXERCISER.
46
47              ;       **** NOTE ****
48              ;       THE PROGRAM WILL ACCOUNT FOR UP TO A MAX.
49              ;       OF 2**31 SECTORS WRITTEN OR READ. SPECIAL
50              ;       TEST RUNS EXCEEDING THIS FACILITY WILL REQUIRE
51              ;       AN OPERATOR'S TEST LOG TO AUGMENT SOFTWARE
52              ;       ACCOUNTING.  2**31 SECTORS = APPROX. 5.5*
53              ;       10**11 WORDS.
54              ;       TYPING ANY KEY DURING "L" OR "W" STATISTICS
55              ;       WILL TERMINATE THE TYPEOUT.
```

```
!0016 .MAIN
01              ;11.0   DEBUG HELP: (SA 11)&(SA 513)
02                      O?DTO   11.1 (SA 11)
03
04              ;11.1.  OCTAL DEBUG TOOL (ODT)
05              ;
06              ;       THE DIAGNOSTIC IS EQUIPED WITH A BUILT IN ODT WHICH CAN
07              ;       BE ACCESSED BY HITTING CONTROL O (^O) AT ANY TIME DURING
08              ;       THE EXECUTION OF THE PROGRAM (AFTER SETTING THE PARA-
09              ;       METERS).
10              ;       ON ENTERING ODT THE ADDRESS OF THE LOCATION HAVING THE
11              ;       NEXT INSTRUCTION TO BE EXECUTED WILL BE TYPED-OUT.
12              ;
13              ;11.1.1 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              ;11.1.2 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              ;11.1.3 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              ;11.1.3.1       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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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              ;11.1.3.2       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              ;11.1.3.3       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              ;
```



```
01
02
03              ;11.2.0 MEMORY DUMP UTILITY (SA513)
04
05              ;
06              ;
07              ;11.2.0.1       THIS UTILITY AFFORDS THE USER THE CAPABILITY
08              ;       OF DISPLAYING; IN OCTAL FORMAT; THE CONTENTS
09              ;       OF CONTIGUOUS MEMORY LOCATIONS OF VARIABLE BLOCK
10              ;       LENGTHS.
11              ;
12              ;11.2.0.2       BLOCKS OF CONTIGUOUS MEMORY THAT ARE IDENTICAL
13              ;       AND GREATER THAN 64 ENTRIES IN LENGTH ARE OUT-
14              ;       PUT IN AN ABBREVIATED FORMAT. (SEE PAR. ^1.3.2).
15              ;       THIS FEATURE WILL CONSERVE HARD COPY AND EXECUTION
16              ;       TIME.
17              ;
18              ;11.2.0.3       THE USER MAY ALSO SPECIFY A SEARCH WORD. THE
19              ;       TOTAL NUMBER OF ENTRIES FOUND; MATCHING THIS
20              ;       WORD; WILL BE DISPLAYED AT THE END OF THE PRINTOUT
21              ;
22              ;11.2.0.4       THIS PROGRAM MAY BE MANUALLY STARTED AT LOCATION
23              ;       " (SA513) " SYMBOLIC (I.E. THE FIRST ADDRESS OF
24              ;       THE UTILITY).
25
26
27
28
29              ;11.2.1 DIALOGUE
30              ;
31              ;11.2.1.1       PROGRAM DIALOGUE TERMINATED BY A "?" REQUIRES A
32              ;       USER RESPONSE BEFORE PROGRAM EXECUTION CAN CON-
33              ;       TINUE. IN THE FOLLOWING DIALOGUE USER RESPONSE IS
34              ;       INDICATED BY "  ":
35              ;
36              ;       WD? "AAAAAA"
37              ;       FST ADR? "BBBBBB"
38              ;       LST ADR? "CCCCCC"
39              ;
40              ;       WHERE:
41              ;       "AAAAAA" IS ANY OCTAL NUMBER IN THE RANGE OF 000000
42              ;       THRU 177777.
43              ;
44              ;       "BBBBBB" IS ANY OCTAL NUMBER IN THE RANGE OF 000000
45              ;       THRU 077776; AND EQUAL TO, OR LESS THAN "CCCCCC".
46              ;
47              ;       "CCCCCC" IS ANY OCTAL NUMBER IN THE RANGE OF 000001
48              ;       THRU 077777; AND EQUAL TO, OR GREATER THAN "AAAAAA".
49              ;
50              ;11.2.1.2       A RESPONSE OF "0", "CR", "LF", "TAB", OR "SPACE"
51              ;       TO ANY REQUEST WILL BE INTERPRETED AS A "0" RE-
52              ;       SPONSE.
53
```

```
!0019 .MAIN
01
02
03
04              ;11.2.2 ERRORS
05
06              ;11.2.2.1       AN ILLEGAL RESPONSE TO A REQUEST, (I.E. A NON-
07              ;       OCTAL CHARACTER), WILL RESULT IN A REPEAT OF THAT
08              ;       REQUEST.
09
10              ;11.2.2.2       A RANGE ERROR RESPONSE, (I.E. FIRST ADDRESS
11              ;       GREATER THAN LAST ADDRESS), WILL RESULT IN THE RE-
12              ;       START OF THE PROGRAM IF ENTERED MANUALLY; OR A
13              ;       RETURN TO PC +3 IF ENTERED DYNAMICALLY.
14
15
16
17
18
19              ;11.2.3 TYPICAL PROGRAM RESPONSE
20
21              ;ADR:>  0      1      2      3      4      5      6      7
22              ;0      NN-NN NN-NN NN-NN NN-NN NN-NN NN-NN NN-NN NN-NN
23              ;10     NN-NN NN-NN NN-NN NN-NN NN-NN NN-NN NN-NN NN-NN
24              ;SAME
25              ;100    NN-NN NN-NN NN-NN NN-NN NN-NN NN-NN NN-NN NN-NN
26              ;110    NN-NN NN-NN NN-NN NN-NN NN-NN NN-NN NN-NN NN-NN
27              ;WD'S FOUND= MM-MM
28              ;
29              ;11.2.3.1       WHERE:
30              ;       THE "NN-NN" ENTRIES ABOVE CORRESPOND TO THE CON-
31              ;       TENTS OF THE ASSOCIATED ADDRESSES.
32              ;
33              ;       THE "MM-MM" ENTRY ABOVE REPRESENTS THE TOTAL NUMBER OF
34              ;       WORDS (OCTAL) FOUND MATCHING THE SEARCH WORD.
35
36              ;11.2.3.2       IN THE EXAMPLE ABOVE IT IS ASSUMMED THAT THE
37              ;       CONTENTS OF LOCATIONS 10 THRU 107 INCLUSIVE ARE IDENTICAL.
38              ;       THEREFORE THE ABBREVIATED OUTPUT. (I.E. LOCATIONS 20
39              ;       THRU 107 INCLUSIVE ARE REPLACED BY THE TEXT MESSAGE
40              ;       "SAME").
41              ;
42              ;       NOTE:
43              ;       FOR MANUAL MODE OF OPERATION SWITCH "2" IN LOCATION
44              ;       "SWREG" MUST BE "0" OR THE PROGRAM WILL HANG IN A
45              ;       LOOP.
46
```

```
!0020 .MAIN
01              ;12.0   SPECIAL NOTES/SPECIAL FEATURES:
02
03              ;       12.1  "LOSS OF READY" - SEVERAL CONSIDERATIONS
04              ;       ARE GIVEN TO LOSS OF READY STATUS DURING
05              ;       PROGRAM EXECUTION AS FOLLOWS:
06
07              ;       (1.A) DURING INITIAL RECAL OF CONFIGURED DRIVES-
08              ;       A LOSS OF READY RESULTS IN AN ERROR MESSAGE
09              ;       AND PROGRAM RESUMES RECAL OF REMAINING DRIVES.
10              ;       THIS ALLOWS THE OPERATOR TO CONFIGURE "OFFLINE"
11              ;       DRIVES FOR FUTURE TESTING BY CONFIGURING DRIVES
12              ;       THAT ARE NOT READY AT START UP TIME.
13              ;       SUCH DRIVES WILL BE CONFIGURED WITH AN "OFFLINE"
14              ;       STATUS.
15
16              ;       (1.B) ANY LOSS OF READY DURING PROGRAM EXECUTION-
17              ;       RESULTS IN THE APPLICABLE DRIVE BEING PLACED
18              ;       IN AN OFFLINE STATUS.  AN ERROR MESSAGE IS
19              ;       PRINTED AND TESTING RESUMES ON THE REMAINING
20              ;       DRIVES.  IF ALL CONFIGURED DRIVES ARE "OFFLINE"
21              ;       THE PROGRAM PRINTS A MESSAGE TO THAT EFFECT &
22              ;       REQUESTS A NEW STARTING ADDRESS. PROGRAM MUST
23              ;       THEN BE STARTED AS PER SECTION 3 (OPERATING PROCEDURES).
24
25              ;       (1.C) "OFFLINE" DRIVES - ANY DRIVE INITIALLY CON-
26              ;       FIGURED BUT SUBSEQUENTLY OFFLINE AS DEFINED
27              ;       IN SECTION 10.4 (LOSS OF RDY) MAY BE PLACED ONLINE
28              ;       WITH THE FOLLOWING CONSIDERATIONS:
29
30              ;       (1.C.1) SINGLE PROCESSOR MODE - DRIVE COMING READY
31              ;       RESULTS IN IMMEDIATE ONLINE STATUS OF THE
32              ;       APPLICABLE DRIVE AND TESTING WILL RESUME ON
33              ;       THAT DRIVE.
34
35              ;       (1.C.2) DUAL PROCESSOR MODE/BOTH CPU'S RUNNING -
36              ;       A DRIVE COMING READY RESULTS IN AN ONLINE
37              ;       STATUS FOR THE CPU CURRENTLY SELECTED WHEN THE
38              ;       READY ATTN OCCURS.  THE DE-SELECTED CPU WILL
39              ;       RE-INSTATE ALL OFFLINE DRIVES THAT HAVE COME
40              ;       READY AT THE COMPLETION OF ITS CURRENT PASS.
41
42              ;       (1.C.3) DUAL PROCESSOR MODE/SINGLE CPU - IF A DRIVE
43              ;       COMES READY WHILE THE CPU IS SELECTED, (SEEKING,
44              ;       READING, OR WRITING), IT IS IMMEDIATELY RE-
45              ;       INSTATED.  IF READY OCCURS WHILE THE CPU IS NOT
46              ;       SELECTED, THE DRIVE OR DRIVES WILL BE REINSTATED
47              ;       AT THE COMPLETION OF THE CURRENT PASS.
48
49              ;       ALL DRIVES NOT PREVIOUSLY CONFIGURED AT START OF
50              ;       PROGRAM ARE IGNORED.
51
52              ;       12.2  THE PROGRAM WILL ACCOUNT FOR UP TO A MAX. OF
53              ;       2**31 SECTORS WRITTEN OR READ. SPECIAL TEST RUNS
54              ;       EXCEEDING THIS FACILITY WILL REQUIRE AN OPERATOR'S
55              ;       TEST LOG TO AUGMENT SOFTWARE ACCOUNTING. 2**31
56              ;       SECTORS = APPROX. 5.5* 10**11 WORDS.
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10021 .MAIN
01
02                :       12.3  SWREG7=1, PROGRAM HALTS AFTER WRITE WITH READ
03                :       VERIFICATION ALLOWING OPERATOR TO CHANGE PACKS.
04                :       SWREG8=1, PUTS PROGRAM INTO READ ONLY MODE
05                :       ## SA'S 501,502 ONLY.  IF SA 501-DATA MUST !NOT!
06                :       BE RANDOM.  START AT THE ABOVE SELECTED ADDRESS.
07
08                :       12.4  ALL NUMBERS ENTERED IN 7.0 MUST BE IN OCTAL
09                :       ANY NON-OCTAL INPUT IS TREATED AS A LETTER.
10                :       ANY LETTER INPUT FOR CYL,HEAD,SECTOR, OR # OF
11                :       SECTORS GETS RANDOM FUNCTION IN THE RELIABILITY
12                :       TEST WITH OPTIONS.
13
14                :13.1   PROGRAM RUNTIME
15                :       THE EFFICIENCY OF THIS PROGRAM IS CORE DEPENDENT.
16                :       MAXIMUM THROUGHPUT UTILIZING
17                :       THE FULL CAPABILITY OF THE CONTROLLER IS ACHEIVED
18                :       WITH MEMORIES OF 16K OR LARGER.  ON SYSTEMS USED
19                :       FOR RUNNING ERROR RATES IT IS RECOMMENDED THAT 16K
20                :       OR LARGER MEMORIES BE USED.  IN ORDER TO ACTIVATE
21                :       THE DOUBLE BUFFERING FEATURE - SEE 9.D (OPERATING
22                :       MODES)
23
24                :       PROGRAM RUNTIMES ARE SUBSTANTIALLY REDUCED WITH
25                :       MEMORIES OF 16K OR LARGER.  PROGRAM CAN USE UP
26                :       TO 16K USING 2 BUFFERS AND UP TO 24K USING 4
27                :       BUFFERS IN THE RANDOM RELIABILITY TESTS. ## SEE 9.D
28
29                :       A TYPICAL RUNTIME IS  60 MIN FOR 1 PASS OF SA 505
30                :       (RUNALL) ON 1 DRIVE WITH 16K OF MEMORY.
31
32                :       READ, WRITE AND SEEK OPERATIONS ARE TIMED BY
33                :       SPECIAL ROUTINES.  WHEN THE PROGRAM IS FIRST
34                :       STARTED, THE TIMING ROUTINE WILL TEST FOR THE
35                :       PRESENCE OF A REAL TIME CLOCK (RTC) TO DERIVE
36                :       TIMING FROM IT.  IF NO RTC IS PRESENT, THE
37                :       PROGRAM WILL TYPE "TTO BAUD RATE". THIS MESSAGE
38                :       REFERS TO THE BAUD RATE OF THE CONSOLE TERMINAL
39                :       (DEVICE 10 & 11).  TYPE IN THE BAUD RATE.  IF A
40                :       TYPING ERROR OCCURS IN THE NUMBER STRING (BEFORE
41                :       THE CARRIAGE RETURN), SIMPLY TYPE A NON-NUMERIC
42                :       CHARACTER AND THE REQUEST FOR THE BAUD RATE WILL
43                :       BE REPEATED.  IF THE CARRIAGE RETURN HAS BEEN
44                :       GIVEN AFTER A TYPING ERROR, RELOAD THE PROGRAM.
45
46
47                        .EJECT
```

```
0022 .MAIN

**00000 TOTAL ERRORS, 00000 PASS 1 ERRORS
```

```
0023 .MAIN
02DTD 000524  MC   16/02
```