DataGeneral

TECHNICAL STATEMENT

TEXT LISTING

068-000670-01

PROGRAM

6070 CARTRIDGE DISK FORMATTER PROGRAM

TEXT TAPE

097-000670-01

ABSTRACT

THE CARTRIDGE DISK FORMATTER PROGRAM IS A UTILITY PROGRAM DESIGNED TO FORMAT AND CHECK DISK PACKS. THE PROGRAM IS NOT A MAINTENANCE PROGRAM AND ASSUMES THE HARDWARE TO BE IN WORKING ORDER.

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 0001 .MAIN    MACRO REV 06.30          08:55:29 05/16/79
01
02
03
04
05
06
07
08              ;*************************************************************
09              ;
10              ; NAME: CDFG.TX                  PART NUMBER: 097-000670
11              ;
12              ;
13              ; DESCRIPTION: 6070 CARTRIDGE DISK FORMATTER PROGRAM
14              ;
15              ;
16              ; REVISION HISTORY:
17              ;
18              ;       REV.            DATE
19              ;
20              ;       00              02/27/78
21              ;       01              12/22/78
22              ;
23              ;
24              ;
25              ;
26              ; COPYRIGHT (C) DATA GENERAL CORPORATION, 1978
27              ; ALL RIGHTS RESERVED.
28              ;*************************************************************
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!0002 .MAIN
01              ;1.0    PROGRAM NAME:  CDFG.SR
02              ;       6070 CARTRIDGE DISK FORMATTER PROGRAM
03
04              ;2.0    REVISION HISTORY:
05              ;
06              ;       01      12/22/78
07              ;       02      ---
08              ;
09
10              ;3.0    MACHINE REQUIREMENTS:
11
12              ;       NOVA/ECLIPSE FAMILY CENTRAL PROCESSOR
13              ;       16K READ/WRITE MEMORY
14              ;       TELETYPE OR CRT AND 4010 CONTROL
15              ;       DGC 6070 CARTRIDGE DISK SYSTEM
16              ;       0-3 DGC 6070A ADD ON DISK DRIVES
17
18              ;4.0    TEST REQUIREMENTS:      N/A
19
20              ;5.0    SUMMARY:
21
22              ;       THE CARTRIDGE DISK FORMATTER PROGRAM IS A
23              ;       UTILITY PROGRAM DESIGNED TO FORMAT AND CHECK DISK
24              ;       PACKS TO BE USED ON THE ABOVE DISK SYSTEMS.
25              ;       THE PROGRAM IS !NOT! A MAINTENANCE PROGRAM
26              ;       AND ASSUMES THE HARDWARE TO BE IN WORKING ORDER.
27              ;       THE PROGRAM WILL, ON DETECTING A NON-DATA
28              ;       RELATED ERROR, PRINT THE ERROR INFORMATION AND TAKE
29              ;       THE CORRESPONDING UNIT OFFLINE. IF MORE THAN ONE
30              ;       UNIT WAS CONFIGURED, THE PROGRAM WILL CONTINUE FORMAT-
31              ;       TING AND/OR TESTING THE REMAINING UNITS. IF ONLY
32              ;       ONE UNIT WAS CONFIGURED OR IF ALL CONFIGURED UNITS
33              ;       HAVE ENCOUNTERED NON-DATA ERRORS THE
34              ;       PROGRAM WILL PAUSE PENDING OPERATOR INTERVENTION.
35
36              ;       THE CONTROL CAN BE ANY DEVICE 20-76 OCTAL
37              ;       THE DEFAULT IS 33 ## SEE 9.
38
39              ;6.0    RESTRICTIONS:
40
41              ;
42              ;
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!0003 .MAIN
01              ;7.0    PROGRAM DESCRIPTION/THEORY OF OPERATION:
02
03              ;       A.      FORMATTER PROGRAM (STARTING ADDRESS <SA> 500)
04              ;       THE DISK IS FIRST FORMATTED AFTER WHICH A FORMAT DONE
05              ;       MESSAGE IS PRINTED.  THEN A 155555 PATTERN IS WRITTEN
06              ;       TO THE ENTIRE PACK AND READ BACK 2 TIMES, AND PASS
07              ;       IS PRINTED.  THE DATA PATTERN IS THEN ROTATED 1 BIT
08              ;       AND THE WRITE/READ/READ PROCESS IS REPEATED.
09              ;*************************************************************
10              ;       IT IS RECOMMENDED THAT AT LEAST 4 PASSES (WRI/REA/REA)
11              ;       BE ALLOWED TO INSURE PACK QUALITY.  IF TIME PERMITS,
12              ;       LONGER RUNS WILL FURTHER INSURE QUALITY.
13              ;
14              ;*************************************************************
15              ;       ANY HARD DATA OR ADDRESS ERRORS WILL RESULT IN THE
16              ;       BAD SECTOR FLAG BEING SET IN THAT SECTOR.  ANY "SOFT
17              ;       DATA" OR "ADDRESS ERROR" ADDRESS ENCOUNTERED TWICE
18              ;       CAUSE THAT BAD SECTOR FLAG TO BE SET.  ANY OTHER
19              ;       ERROR WILL CAUSE THE PROGRAM TO PRINT THE FAILURE TO
20              ;       THE TTY AND TAKE THE CORRESPONDING UNIT OFFLINE.
21              ;       THEN TESTING WILL RESUME ON THE REMAINING UNITS.IF
22              ;       NO UNITS REMAIN  TO BE TESTED THE PROGRAM WILL PAUSE.
23              ;       THIS PROGRAM IS NOT INTENDED TO BE A RELIABILITY FOR THE
24              ;       DISK SYSTEM AND IN GENERAL ASSUMES THE CONTROL AND DRIVE
25              ;       TO BE IN WORKING ORDER.
26
27              ;       A HARD ADDRESS ERROR IS DEFINED AS SUCH AFTER TWO
28              ;       ATTEMPTS HAVE BEEN MADE BOTH RESULTING IN AN ADDRESS
29              ;       ERROR.  A HARD DATA ERROR IS DEFINED AS SUCH AFTER
30              ;       2 OR MORE OF 10 READ TRY'S HAVE BEEN UNSUCCESSFUL.
31
32              ;       B.      CHECK PROGRAM ONLY (SA 501)
33              ;       SAME AS SA 500 EXCEPT THAT INITIAL PACK FORMAT
34              ;       OPERATION IS BYPASSED.
35
36              ;       B.1.    STATISTICS
37              ;       TYPE L FOR 1ST 100. DISK ADDRESSES OF BAD SECTORS,
38              ;       DATA AND ADDRESS ERRORS.
39
```

```
!0004 .MAIN
01              ;       C.      COMMAND STRING INTERPRETER (SA 503)
02              ;       AS A TROUBLE SHOOTING AID THE SERVICE ENGINEER
03              ;       MAY TYPE IN HIS OWN TEST LOOP.  AFTER STARTING
04              ;       AT 503, THREE ARGUMENTS MUST BE ENTERED IN
05              ;       RESPONSE TO THREE PROGRAM QUESTIONS; "UNIT",
06              ;       "DATA", AND "COMMAND STRING".  ALL NUMBERS MUST
07              ;       BE ENTERED IN OCTAL.
08
09              ;       I.      UNIT:   TYPE UNIT # OR CARRIAGE TO USE
10              ;                       THE PREVIOUS ENTRY
11
12              ;       II.     DATA:   RAN=RANDOM
13              ;                       ALO=ALL ONES
14              ;                       ALZ=ALL ZEROS
15              ;                       PAT=110110
16              ;                       FLO=FLOATING ONE PATTERN
17              ;                       FLZ=FLOATING ZERO PATTERN
18              ;                       ADR=ALTERNATING CYLINDER AND
19              ;                       HEAD, SECTOR WORDS
20              ;                       VAR=EXISTING WORDS ENTERED
21              ;                       PREVIOUSLY AS DESCRIBED BELOW
22              ;                       ALTERNATIVELY ENTER A STRING OF UP
23              ;                       UP TO 7 OCTAL 16 BIT WORDS TO BE
24              ;                       USED AS DATA.  THE WORDS ENTERED
25              ;                       ARE USED REPEATEDLY TO MAKE UP A
26              ;                       SECTOR BLOCK.  TYPE CARRIAGE TO
27              ;                       USE THE PREVIOUS ENTRY.
28
29              ;       III.    COMMAND STRING:
30
31              ;       OPTIONS 1.      READ HEAD,SECTOR,#SECTORS
32              ;               2.      WRITE SAME
33              ;               3.      SEEK CYLINDER
34              ;               4.      RECALIBRATE
35              ;               5.      LOOP (GO TO BEGINNING OR LR)
36              ;               6.      DELAY N (N=DELAY IN MS)
37              ;               7.      LR (BEGIN LOOP HERE)
38              ;               8.      FORMAT CYL,HD,SECTOR
39              ;               9.      BAD (BAD SECTOR) CYL,HD,SECTOR
40              ;               10.     TYPE CARRIAGE RETURN TO USE THE
41              ;                       PREVIOUS COMMAND STRING,UNIT,OR
42              ;                       DATA.
43
44              ;               11.     TYPE ESCAPE TO BYPASS UNIT & DATA
45              ;                       PROMPT TO COMMAND STRING PROMPT,
46              ;                       USING PREVIOUSLY ENTERED UNIT #
47              ;                       & DATA.
48              ;
49              ;               12.     TYPE ANY KEY TO INTERRUPT EXECUTION
50              ;                       OF CURRENT COMMAND AND RETURN TO
51              ;                       UNIT#.
52
53              ;               13.     TYPE A "^O" TO ENTER ODT
54              ;
```

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!0005 .MAIN
01
02              ;               NOTE THAT EITHER SPACES OF A COMMA MAY
03              ;               BE USED AS AN ARGUMENT DELIMITER.  EACH
04              ;               RESPONSE IS TERMINATED BY TYPING CARRIAGE
05              ;               RETURN.  IF MORE ROOM IS NEEDED ON A LINE,
06              ;               TYPE LINE FEED TO SPACE TO THE NEXT LINE.
07              ;               A "LF" DOES NOT ELIMINATE THE NEED FOR A
08              ;               DELIMITER.
09
10              ;               SHOULD THE COMMAND STRING ENTRIES EXCEED
11              ;               THE INPUT BUFFER CAPACITY, THE PROGRAM
12              ;               RESPONDS WITH THE MESSAGE "INPUT OVERFLOW"
13              ;               AND THE OPERATOR MUST THEN DEPRESS ONE OR
14              ;               MORE "RUBOUTS" FOLLOWED BY A "CR" TO
15              ;               POSITION THE POINTER TO THE LAST VALID
16              ;               COMMAND IN THE STRING FOR EXCUTION.
17              ;               THE WORD "SAME" USED WITH READ, OR WRITE,
18              ;               WILL CAUSE THE PREVIOUS DISK ADDRESS
19              ;               PARAMETERS TO BE USED.
20
21              ;       AN "R" TYPED WHILE A STRING IS BEING EXECUTED WILL
22              ;       CAUSE THE PROGRAM TO RETURN TO COMMAND STRING START.
23              ;       THE ESCAPE KEY WILL BYPASS UNIT AND DATA PROMPTS TO
24              ;       THE COMMAND STRING PROMPT.
25
26              ;       THE FOLLOWING EXAMPLE WOULD CAUSE UNIT 1 TO SEEK
27              ;       CYLINDER 50, THEN REPEATEDLY WRITE SECTORS 2 AND 3
28              ;       OF HEAD 1, THEN READ IT BACK AND CHECK.  DATA IS
29              ;       SPECIFIED AS ALTERNATE WORDS OF ZEROS THEN ONES.
30
31              ;       UNIT:  1
32              ;       DATA:  0,177777
33              ;       COMMAND STRING:  SEEK 50 LR WRITE 1,2,2 READ SAME LOOP
34
35              ;       D.      ERROR LOG RECOVERY (SA 510)
36              ;       ERROR LOGS MAY BE RECOVERED AT THIS STARTING ADDRESS.
37              ;       OPERATOR MUST NOT RESTART PROGRAM AT ANY OTHER ADDRESS
38              ;       PRIOR TO RECOVERING LOGS AS THE LOGS ARE INITIALIZED ON
39              ;       RESTART.
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!0006 .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.  HOWEVER,
06              ;       UNDER STAND ALONE AND PROGRAM LOAD MODES THIS LOCATION
07              ;       WILL BE SET ACCORDING TO THE ANSWERS SUPPLIED BY THE
08              ;       OPERATOR.  IN ANY CASE THE OPTIONS CAN BE CHANGED OR
09              ;       VERIFIED BY USING ONE OF THE COMMANDS GIVEN IN SEC. 8.3.
10              ;
11              ;8.2    SWITCH OPTIONS
12              ;       DIFFERENT BITS AND THEIR INTERPRETATION AT LOCATION
13              ;       "SWREG" IS AS FOLLOWS:
14              ;
15              ;       BIT     OCTAL   BINARY  INTERPRETATION
16              ;               VALUE   VALUE
17              ;
18              ;       1               0       LOOP ON ERROR
19              ;               40000   1       SKIP LOOPING ON ERROR
20              ;
21              ;       2               0       PRINT TO CONSOLE
22              ;               20000   1       ABORT PRINT OUT TO CONSOLE
23              ;
24              ;       5               0       DO NOT PRINT ON THE LINE PRINTER
25              ;               02000   1       PRINT ON THE LINE PRINTER
26              ;
27              ;       11(8)           0       N/A
28              ;               00020   1       ENABLE BAD SECTOR PRINTOUT
29              ;
30              ;8.3    SWITCH COMMANDS
31              ;       ONCE THE PROGRAM STARTS EXECUTING THE STATE OF ANY OF
32              ;       THE BITS CAN BE CHANGED BY HITTING KEYS 1-9, A-F.  THE
33              ;       PROGRAM WILL CONTINUE RUNNING AFTER UPDATING THE OPTIONS
34              ;       EACH KEY WILL COMPLEMENT THE STATE OF THE BIT AFFILIATED
35              ;       WITH IT, THUS BIT 4 CAN BE ALTERED BY HITTING KEY 4.
36              ;       SETTING OF ANY BIT OF LOCATION "SWREG" WILL SET BIT 0.
37              ;       (DEFAULT MODE IS DEFINED AS ALL BITS OF SWREG SET TO 0)
38              ;
39              ;       NOTE: INITIALLY, THE PROGRAM PROMPTS THE
40              ;       OPERATOR TO ENTER THE DESIRED SWITCH SET-
41              ;       TINGS.  A "CR" MUST BE GIVEN TO EXIT THIS
42              ;       PROMPT. IF SWREG INFORMATION IS TYPED IN,
43              ;       A 'CR' MUST ALSO BE TYPED TO EXIT FROM THE
44              ;       SWITCH MODIFICATION MODE.
45
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!0007 .MAIN
01              ;8.4    OTHER COMMANDS  (^ = CONTROL KEY)
02              ;
03              ;       "CR"    A "RETURN" CAN BE TYPED TO CONTINUE THE PROGRAM
04              ;               AFTER ITS LOCKED IN A SWITCH MODIFICATION MODE.
05              ;
06              ;       ^D      THIS COMMAND GIVEN AT ANY TIME WILL RESET "SWREG"
07              ;               TO DEFAULT MODE AND RESTART THE PROGRAM.
08              ;
09              ;       ^R      THIS COMMAND GIVEN AT ANY TIME WILL RESTART THE
10              ;               PROGRAM.  SWITCHES ARE LEFT WITH THE VALUES THEY
11              ;               HAD BEFORE THE COMMAND WAS ISSUED.
12              ;
13              ;       ^O      THIS COMMAND GIVEN AT ANY TIME WILL CAUSE THE
14              ;               PROGRAM CONTROL TO GO TO ODT (NOTE:  THIS IS AN
15              ;               OPTIONAL COMMAND AND IS AVAILABLE ONLY IF ODTPK
16              ;               IS PRESENT)
17              ;
18              ;       M       THIS COMMAND GIVEN AT ANY TIME WILL PRINT THE
19              ;               CURRENT OPERATING MODES.
20              ;
21              ;       0       THIS COMMAND GIVEN AT ANY TIME WILL LOCK THE
22              ;               PROGRAM INTO SWITCH MODIFICATION MODE WHERE
23              ;               MORE THAN 1 BIT CAN BE CHANGED.
```

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!0008 .MAIN
01              ;9.0    OPERATION PROCEDURE/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 (SA)
10              ;         4     ENTER ALTERNATE DEVICE CODE(DEFAULT =33)
11              ;        11     ODT - DIRECT ENTRY ONLY
12              ;       200     FORMATTER/CHECK PROGRAM
13              ;       500     FORMATTER/CHECK PROGRAM
14              ;       501     CHECK PROGRAM ONLY
15              ;       503     COMMAND STRING INTERPRETER
16              ;       510     ERROR LOG RECOVERY (SEE 7.D)
17
18              ;       INITIALLY, THE OPERATOR IS REQUESTED TO ENTER A TTY
19              ;       BAUD RATE( NO RTC PRESENT) FOR TIMING, DATE -DAY,
20              ;       MONTH, YEAR, HOUR, & MINUTE (A [CR]
21              ;       RESPONSE WILL IGNORE THIS ROUTINE), & (UNIT#,MIN
22              ;       SURFACE, MAX SURFACE) FOR EACH UNIT TO BE TESTED.
23              ;       EX. 0,0,3 1,0,3 ETC..(SURFACE RANGE IS 0 TO 3).
24              ;       SUBSEQUENT PROGRAM RESTARTS MAY USE PREVIOUSLY ENTERED
25              ;       PARAMETERS FOR UNIT#'S & RANGE BY TYPING A "CR" IN
26              ;       RESPONSE TO MESSAGE PROMPT.
27              ;
28
29              ;       OPERATOR INPUT CONTROLLED PRINTOUTS ARE AS FOLLOWS:
30              ;
31              ;       L       = FIRST 100. BAD SECTORS, DATA, OR ADDRESSES
32
33              ;10.0   PROGRAM OUTPUT/ERROR DESCRIPTION:
34
35              ;       1.  ERRORS- ERROR STATUS IS PRINTED WHENEVER
36              ;       ENCOUNTERED.  WHEN DATA ERRORS ARE FOUND ONLY
37              ;       THREE ARE PRINTED PER ENCOUNTER.  (SEE PARA-
38              ;       GRAPH 10.3)
39
40              ;       2.  IF ERRORS ARE ENCOUNTERED MORE THAN ONCE,
41              ;       A COUNT WILL BE RECORDED AND A BAD SECTOR FLAG
42              ;       SET.  ALL ADDRESS INFO. WILL BE PRINTED IN OCTAL.
43
44              ;       3.  ERROR REPORTING AND RECOVERY
45
46              ;       ALL ERRORS ARE IDENTIFIED, AND THE PROGRAM IS
47              ;       ROUTED VIA BASE TO A CALL TO CKSW.  WITH THE
48              ;       EXCEPTION OF ADDRESS AND DATA ERRORS THE PROGRAM
49              ;       WILL THEN LOOP FOR OPERATOR INTERVENTION, ON THE
50              ;       BASIS OF SWPAK (SEE 8.)
51
52              ;       RECALIBRATE- ANY UNUSUAL STATUS IS REPORTED IM-
53              ;       MEDIATELY AND AN ERROR RETURN EXECUTED.
54
55              ;       SEEK- POSITIONER FAULT STATUS RESULTS IN
56              ;       STATUS PRINTOUT AND ERROR RETURN.
57              ;       WRITE- FOLLOWING "DONE" ON A WRITE, ERRORS ARE
58              ;       CHECKED IN THE SEQUENCE SHOWN BELOW.  ERROR
59              ;       RECOVERY PROCEDURE IS OUTLINED FOR EACH CASE.
60              ;       IF THE ERROR IS NOT PRESENT THE NEXT CHECK IS MADE.
```

```
 0009 .MAIN
01
02
03              ;       4.  READ/WRITE TIMEOUTS, ILLEGAL SECTOR, OR
04              ;       CHECKWORD (DATA OK) PRINT THE ILLEGAL STATUS AND DO
05              ;       AN ERROR RETURN.
06
07              ;       5.  ADDRESS ERROR- REPEAT THE WRITE, IF TEST PASSES
08              ;       THE SECOND TIME, DO A NORMAL RETURN; OTHERWISE
09              ;       FLAG AS HARD, SET THE BAD SECTOR FLAG FOR THAT SECTOR
10              ;       AND DO AN ERROR RETURN.
11
12              ;       IF A HARD CYLINDER ADDRESS ERROR OCCURS, A READ
13              ;       ON AN ADJACENT HEAD WILL BE ATTEMPTED TO DETERMINE
14              ;       WHETHER THE FAULT SHOULD BE CLASSED AS A SEEK ERROR
15              ;       OR AN ADDRESS ERROR.  THE FIRST 30. HARD ADDRESS
16              ;       ERRORS WILL HAVE THEIR ADDRESS LOGGED.
17
18              ;       6.  ENDING MEMORY ADDRESS- PRINT THE ERROR MESSAGE,
19              ;       CHECK FOR A DISK ADDRESS AND DO AN ERROR RETURN.
20
21              ;       7.  ENDING DISK ADDRESS- PRINT THE ERROR MESSAGE AND
22              ;       DO AN ERROR RETURN.
23
24              ;       READ- ALL READ ERRORS WITH THE EXCEPTION OF DATA RELATE
25              ;       ERRORS ARE HANDLED THE SAME AS DESCRIBED FOR THE WRITE
26              ;       OPERATIONS
27
28              ;       DATA ERRORS- DATA IS REREAD 9 TIMES,
29              ;       IF DATA IS BAD ON 2 OR MORE OF 10 PASSES, A HARD ERROR
30              ;       COUNT IS INCREMENTED, THE BAD SECTOR FLAG IS SET IN THAT
31              ;       SECTOR, AND AN ERROR RETURN IS TAKEN.  IF DATA IS GOOD
32              ;       ON ALL RETRIES, THE ERROR IS CONSIDERED SOFT AND A
33              ;       NORMAL RETURN IS TAKEN.
34
35              ;       THE 1ST 100. DATA ERRORS (HARD OR SOFT) ARE LOGGED.
```

```
 0010 .MAIN
01              ;11.0   DEBUG HELP:
02                      O?DTD   11
03
04              ;11.    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   CONVENTIONS AND SYMBOLS
14              ;       THE FOLLOWING CONVENTIONS ARE USED BY THE ODT:
15              ;       ?       PRESSING ANY ILLEGAL KEY CAUSES THE ODT TO RES-
16              ;               POND WITH A "?".
17              ;       @       ODT IS READY AND AT YOUR SERVICE.
18              ;
19              ;11.2   COMMAND STRUCTURE
20              ;       AN ODT COMMAND HAS THE FOLLOWING FORMAT:
21              ;               [ARGUMENT][COMMAND]
22              ;       AN ARGUMENT MAY BE ONE OF THE FOLLOWING:
23              ;       "EXP"   AN OCTAL EXPRESSION CONSISTING OF OCTAL NUMBERS
24              ;               SEPARATED BY PLUS (+) OR MINUS (-) SIGNS. LEAD-
25              ;               ING ZEROS NEED NOT BE TYPED.
26              ;       "ADR"   AN ADDRESS IS THE SAME AS AN EXPRESSION EXCEPT
27              ;               THAT BIT 0 IS NEGLECTED.
28              ;       A COMMAND IS A SINGLE TELETYPE CHARACTER
29              ;
30              ;11.3   ODT COMMANDS
31              ;       THE LOCATIONS THAT CAN BE EXAMINED AND MODIFIED BY THE
32              ;       USER ARE CALLED CELLS. THESE CELLS ARE OF TWO TYPES:
33              ;       INTERNAL CPU CELLS AND MEMORY LOCATIONS.
34              ;
35              ;11.3.1 OPENING INTERNAL CELLS
36              ;       THE COMMAND TO OPEN ONE OF THE INTERNAL REGISTERS IS OF
37              ;       THE FORM "NA" WHERE N IS ANY OCTAL EXPRESSION BETWEEN
38              ;       0 AND 7
39              ;       0-3     FOR ACCUMULATORS 0-3
40              ;       4       FOR PC OF THE NEXT INSTRUCTION TO BE EXECUTED IN
41              ;               THE EVENT OF A "P" COMMAND.
42              ;       5       CPU AND TTO STATUS
43              ;               BIT     INTERPRETATION
44              ;               15      STATUS OF TTO DONE FLAG
45              ;               14      STATUS OF INTERRUPTS (ION FLAG)
46              ;               13      STATUS OF CARRY BIT
47              ;       6       ADDRESS OF THE LOCATION HAVING THE BREAK POINT (IF
48              ;               ANY)
49              ;       7       INSTRUCTION AT THE BREAK POINT LOCATION
50
51              ;       OTHER COMMANDS TO OPEN CELLS ARE:
52              ;
53              ;       "ADR"/  OPEN THE CELL AND PRINT ITS CONTENTS
54              ;       ./      OPEN THE CELL CURRENTLY POINTED TO BY THE POINTER
55              ;               AND PRINT ITS CONTENTS.
56              ;       .+"ADR"/        ADD "ADR" TO THE POINTER, OPEN THE CELL
57              ;               AND PRINT ITS CONTENTS.
58              ;       .-"ADR"/        SUBTRACT "ADR" FROM THE POINTER, OPEN
59              ;               THE CELL AND PRINT ITS CONTENTS.
60              ;       "CR"    THE RETURN KEY IS USED TO CLOSE THE OPEN CELL
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0011 .MAIN
01              ;               WITH OR WITHOUT MODIFICATION.
02              ;       "LF"    LINE FEED IS USED TO CLOSE THE OPEN CELL WITH OR
03              ;               WITHOUT MODIFICATION AND TO OPEN THE SUCCEEDING
04              ;               CELL.
05              ;       ^       CLOSE THE OPEN CELL WITH OR WITHOUT MODIFICATION
06              ;               AND OPEN THE PRECEDING CELL
07              ;       /       CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND
08              ;               OPEN THE CELL POINTED TO BY ITS CONTENTS.
09              ;       +"ADR"/ CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND
10              ;               OPEN THE CELL POINTED TO BY ITS CONTENTS + "ADDR".
11              ;       -"ADR"/ CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND
12              ;               OPEN THE CELL POINTED TO BY ITS CONTENTS - "ADR".
13              ;
14              ;11.3.2 MODIFICATION OF A CELL
15              ;       ONCE A CELL HAS BEEN OPENED ITS CONTENTS CAN BE MODIFIED
16              ;       BY TYPING THE NEW VALUE THE CELL IS TO CONTAIN IN THE
17              ;       FORM OF AN OCTAL EXPRESSION FOLLOWED BY "CR" OR "LF".
18              ;       IF A + OR - IS TYPED AS THE FIRST CHARACTER OF THE EX-
19              ;       PRESSION THEN THE VALUE OF THE EXPRESSION IS ADDED TO OR
20              ;       SUBTRACTED FROM THE OLD CONTENTS OF THE CELL. THE
21              ;       ADDRESS ITSELF OR AN EXPRESION RELATIVE TO THE ADDRESS
22              ;       CAN BE DEPOSITED BY TYPING A "." OR ".+/-OCTAL EXPRESS-
23              ;       ION". A RUBOUT COMMAND GIVEN RIGHT AFTER OPENING A CELL
24              ;       ALLOWS THE MODIFICATION OF ITS CONTENTS AS IF THEY WERE
25              ;       TYPED IN JUST BEFORE THE COMMAND WAS ISSUED.
26              ;
27              ;11.3.3 OTHER ODT COMMANDS
28              ;       RUBOUT  THIS KEY IS USED TO DELETE ERRONEOUSLY TYPED
29              ;               DIGITS. EACH TIME THE KEY IS PRESSED THE RIGHT MOST
30              ;               DIGIT IS DELETED AND ECHOED ON THE TERMINAL. IF
31              ;               THE RUBOUT KEY IS PRESSED RIGHT AFTER OPENING A
32              ;               CELL THEN IT DELETES THE RIGHT MOST DIGIT OF THE CELLS
33              ;               CONTENTS. THIS ALLOWS THE MODIFICATION OF THE CELL
34              ;               AS IF ITS CONTENTS WERE TYPED IN JUST BEFORE THE
35              ;               KEY WAS PRESSED.
36              ;       "ADR"B  INSERT A BREAK POINT AT LOCATION "ADR".
37              ;               ONLY ONE BREAK POINT CAN BE INSERTED AND ANY
38              ;               ENTRY TO ODT AFTER EXECUTING A BREAK POINT WILL
39              ;               CAUSE IT TO BE DELETED.
40              ;       D       DELETE THE BREAK POINT IF ANY.
41              ;       P       RESTART THE EXECUTION OF THE PROGRAM AT LOCATION
42              ;               POINTED BY 4A.
43              ;       "ADR"R  START EXECUTING THE PROGRAM AT "ADR" AFTER AN
44              ;               IO-RESET.
45              ;       K       KILL THE STRING TYPED SO FAR. THE ODT RESPONDS
46              ;               WITH A "?" AND THE OPEN CELL IS CLOSED WITHOUT
47              ;               MODIFICATION.
48              ;       =       PRINT THE OCTAL VALUE OF THE INPUT ONLY.
49              ;               THIS WILL CLOSE ANY OPEN CELLS WITHOUT
50              ;               MODIFICATION AND WILL NOT OPEN A CELL
51              ;
52              ;
53              ;       NOTE:   IN PROGRAMS WHICH RELOCATE THEMSELVES THE
54              ;               THE USER SHOULD PLACE BREAK POINTS ONLY IN THE
55              ;               THE ORIGINAL PROGRAM AREA. IF A BREAK POINT IS
56              ;               PLACED OUTSIDE THIS AREA THE RESULTS WILL
57              ;               BE UNPREDICTABLE.
58              ;
59              ;
60
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0012 .MAIN
01              ;12.0   SPECIAL NOTES/SPECIAL FEATURES:
02
03              ;       1.  THE PROGRAM IS !NOT! A MAINTENANCE PROGRAM
04              ;       AND ASSUMES THE HARDWARE TO BE IN WORKING ORDER.
05
06              ;       2.  IT IS RECOMMENDED THAT AT LEAST 4 PASSES
07              ;       (WRI/REA/REA) BE ALLOWED TO INSURE PACK QUALITY.
08              ;       IF TIME PERMITS, LONGER RUNS WILL FURTHER INSURE
09              ;       QUALITY.
10              ;
11
12              ;13.1   PROGRAM RUNTIME:
13
14              ;       PROGRAM RUNTIMES ARE SUBSTANTIALLY REDUCED WITH
15              ;       MEMORIES OF 16K OR LARGER.
16              ;
17              ;       TYPICAL RUNTIME (4 PASSES) IS APPROXIMATELY 16 MINS
18              ;       FOR A SINGLE DRIVE , TWO SURFACES ON NOVA 800 AND LATER SERIES
19              ;       CPU'S.
20              ;
21              ;
22
23
24              ;       FOUR PASSES AFTER FORMAT ARE RECOMMENDED FOR
25              ;       SURFACE VERIFICATION.
26
27              ;       READ, WRITE AND SEEK OPERATIONS ARE TIMED BY
28              ;       SPECIAL ROUTINES.  WHEN THE PROGRAM IS FIRST
29              ;       STARTED, THE TIMING ROUTINE WILL TEST FOR THE
30              ;       PRESENCE OF A REAL TIME CLOCK (RTC) TO DERIVE
31              ;       TIMING FROM IT.  IF NO RTC IS PRESENT, THE
32              ;       PROGRAM WILL TYPE "TTO BAUD RATE".  THIS
33              ;       MESSAGE REFERS TO THE BAUD RATE OF THE CONSOLE
34              ;       TERMINAL (DEVICE 10 & 11).  TYPE IN THE BAUD
35              ;       RATE.  IF A TYPING ERROR OCCURS IN THE NUMBER
36              ;       STRING (BEFORE THE CARRIAGE RETURN), SIMPLY
37              ;       TYPE A NON-NUMERIC CHARACTER AND THE REQUEST
38              ;       FOR THE BAUD RATE WILL BE REPEATED.  IF THE
39              ;       CARRIAGE HAS BEEN GIVEN AFTER A TYPING ERROR,
40              ;       RELOAD THE PROGRAM.
41
42              .EJECT
```

```
0013 .MAIN
**00000 TOTAL ERRORS, 00000 PASS 1 ERRORS
```

```
0014 .MAIN
O?DTD 000524  MC   10/02
```