

DataGeneral

**TECHNICAL
STATEMENT**

TEXT LISTING

068-000298-08

PROGRAM

CARTRIDGE/DISKETTE
DIAGNOSTIC

TEXT TAPE

097-000298-08

ABSTRACT

THE CARTRIDGE/DISKETTE DIAGNOSTIC PROGRAM IS USED TO PERFORM COMPREHENSIVE TESTING ON THE CARTRIDGE/DISKETTE CONTROLLER. THE DIAGNOSTIC IS CONCLUDED BY A SEQUENCE OF TESTS WHICH EVALUATE SPECIFIC OPERATIONAL FUNCTIONS OF THE CARTRIDGE DISK DRIVE UNITS BY A UNIQUE COMPARISON OF THEIR TIMING RELATIONSHIPS, ONE TO ANOTHER.

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MACRO REV 06.30

00:34:33 03/27/79

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PROGRAM NAME = CDD.SR = 4234
CARTRIDGE/DISKETTE SYSTEM DIAGNOSTIC

REVISION HISTORY
07 ADD OVERLAP SEEK TEST
AND DL78 I/O PACKAGE
08 ADD DIAGNOSTIC ERROR MESSAGES

MACHINE REQUIREMENTS

1. NOVA OR ECLIPSE FAMILY CENTRAL PROCESSOR
2. MINIMUM OF 8K READ/WRITE MEMORY
3. CARTRIDGE/DISKETTE CONTROLLER
4. CARTRIDGE DRIVE TYPE 4234
5. CARTRIDGE STORAGE MEDIA TYPE 4234C OR 4234D
6. DISKETTE DRIVE
7. DISKETTE STORAGE MEDIA TYPE 1098-A.
7. TELETYPE OR CRT AND 4010 CONTROL

TEST REQUIREMENTS - N.A.

SUMMARY

THIS PROGRAM IS A HARDWARE DIAGNOSTIC FOR THE
4234 CARTRIDGE/DISKETTE SYSTEM CONTROL AND DRIVES.
THE DEVICE CODE MAY BE 33 OR 73 OCTAL.

RESTRICTIONS - N.A.

PROGRAM DESCRIPTION

THE CARTRIDGE/DISKETTE DIAGNOSTIC PROGRAM
IS USED TO PERFORM COMPREHENSIVE TESTING
ON THE CARTRIDGE CONTROLLER.
THE DIAGNOSTIC IS CONCLUDED BY A SEQUENCE
OF TESTS WHICH EVALUATE SPECIFIC
OPERATIONAL FUNCTIONS OF THE CARTRIDGE
DISK DRIVE UNITS BY A UNIQUE COMPARISON
OF THEIR RELATIONSHIPS, ONE TO ANOTHER.
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? NAME: CDD.TX
? PART NUMBER: 097-000298
? DESCRIPTION: CARTRIDGE/DISKETTE DIAGNOSTIC
? REVISION HISTORY:
? REV. DATE
? 00 05/16/75
? 01 06/13/75
? 02 09/19/75
? 03 01/09/76
? 04 05/07/76
? 05 12/31/76
? 06 03/25/77
? 07 01/05/79
? 08 03/02/79
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? ALL RIGHTS RESERVED.
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SWITCH SETTINGS

LOCATION "SWREG" IS USED TO SELECT THE PROGRAM OPTIONS (NOT SYSTEM CONFIGURATION). WHILE RUNNING UNDER DTOS, THIS LOCATION WILL BE LOADED BY THE MONITOR. HOWEVER UNDER STAND ALONE AND PROGRAM LOAD MODES THIS LOCATION WILL BE SET ACCORDING TO THE ANSWERS SUPPLIED BY THE OPERATOR. IN ANY CASE THE OPTIONS CAN BE CHANGED OR VERIFIED BY USING ONE OF THE COMMANDS GIVEN IN SEC. 8.3

| BIT | OCTAL VALUE | BINARY VALUE | INTERPRETATION |
|-----|-------------|--------------|---|
| 1 | 40000 | 1 | LOOP ON ERROR SKIP LOOPING ON ERROR |
| 2 | 20000 | 1 | PRINT TO CONSOLE ABORT PRINT OUT TO CONSOLE |
| 3 | 10000 | 1 | DO NOT PRINT % FAILURE PRINT % FAILURE |
| 5 | 02000 | 1 | DO NOT PRINT ON THE LINE PRINTER PRINT ON THE LINE PRINTER |
| 6 | 01000 | 1 | DO NOT HALT ON ERROR HALT ON ERROR |
| 7 | 00400 | 1 | ALLOW ERROR STATUS REPORTS INHIBIT ERROR STATUS REPORTS |
| 8 | 00200 | 1 | DO NOT RECAL U1,U2 ON ERRORS RECAL U1,U2 ON ERRORS(504,505 ONLY) |

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SWITCH COMMANDS

ONCE THE PROGRAM STARTS EXECUTING THE STATE OF ANY OF THE BITS CAN BE CHANGED BY HITTING KEYS 1-9, A-F. THE PROGRAM WILL CONTINUE RUNNING AFTER UPDATING THE OPTIONS. EACH KEY WILL COMPLEMENT THE STATE OF THE BIT AFFILIATED WITH IT, THUS BIT 4 CAN BE ALTERED BY HITTING KEY 4. SETTING OF ANY BIT OF LOCATION "SWREG" WILL SET BIT 0. (DEFAULT MODE IS DEFINED AS ALL BITS OF SWREG SET TO 0)

OTHER COMMANDS (^ = CONTROL KEY)

"CR" A "RETURN" CAN BE TYPED TO CONTINUE THE PROGRAM AFTER ITS LOCKED IN A SWITCH MODIFICATION MODE

"D" THIS COMMAND GIVEN AT ANY TIME WILL RESET "SWREG" TO DEFAULT MODE AND RESTART THE PROGRAM.

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

"O" THIS COMMAND GIVEN AT ANY TIME WILL CAUSE THE PROGRAM CONTROL TO GO TO ODI (NOTE: THIS IS AN OPTIONAL COMMAND AND IS AVAILBLE ONLY IF ODTPK IS PRESENT)

M 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.

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OPERATING PROCEDURE

1. LOAD USING THE BINARY LOADER (OR DTOS)
 IF THE PROGRAM HAS BEEN LOADED BY THE BINARY LOADER,
 SET THE CONSOLE SWITCHES TO 200 AND START.
 THE PROGRAM WILL REQUEST THE UNIT # OF EACH UNIT
 TO BE TESTED, AND THE # OF SURFACES FOR EACH UNIT.
 TYPE IN THE STRING DATA AS FOLLOWS:
 UNIT#, #OF SURFACES, UNIT#, #OF SURFACES, ETC. FOR EXAMPLE,
 ASSUMING 3 - 4 SURFACE UNITS, THE STRING WOULD BE
 TYPED: 0, 4, 1, 4, 2, 4.
 THE STRING INPUT IS TERMINATED BY A CARRIAGE RETURN,
 OR A LINEFEED. IN THE EVENT THE OPERATOR WISHES TO ERASE
 DATA ALREADY TYPED IN, TYPING A RUBOUT WILL PERFORM THIS
 FUNCTION. AFTER TYPING A RUBOUT, ALL DATA MUST BE RETYPED.
 THE PROGRAM WILL RUN UP TO THE POINT, WHERE OPERATOR
 INTERVENTION IS REQUIRED (IF THERE ARE LESS THAN 4 DRIVES
 IN THE SYSTEM). THE PROGRAM WILL INSTRUCT THE OPERATOR TO
 CHANGE THE UNIT ADDRESS ON THE FRONT PANEL OF THE DISK
 DRIVE UNIT. THE NUMBER OF ADDRESS CHANGES DEPENDS ON THE
 NUMBER OF DISK DRIVE UNITS IN THE SYSTEM. AFTER THIS TEST
 HAS BEEN COMPLETED, THE PROGRAM WILL RUN UNPAID TO
 COMPLETION, AT WHICH TIME THE WORD "PASS." WILL BE PRINTED.
 CERTAIN TESTS PERTAINING TO DRIVE PERFORMANCE ARE NOT
 EXECUTABLE ON DISKETTES. THE PROGRAM AUTOMATICALLY SKIPS
 THESE TESTS WHEN THE TEST DRIVE IS A DISKETTE. THEREFORE
 THERE WILL BE A DIFFERENCE IN RUN TIMES.
 RUN TIME ON A 4 SURFACE DRIVE IS APPROX. 20 MIN.
 RUN TIME ON A DISKETTE IS APPROX. 13 MIN.

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2. STARTING ADDRESSES
 200 - RUN ALL DIAGNOSTIC TESTS
 501 - RESTART DIAGNOSTIC
 502 - CHANGE DEVICE CODES

503 - BYPASS SEEK DONE TESTS
 NOTE: STARTING AT LOC. 503
 WILL SKIP THOSE TESTS REQUIRING
 OPERATOR CHANGE DRIVE UNITS NUMBERS

504 - OVERLAP SEEK TESTS (WITH PROGRAM INITIALIZE)
 505 - OVERLAP SEEK TESTS (NO INITIALIZE)
 REQUIRES 2 OR MORE DRIVES
 ***RUN WITH CARTRIDGE DISK ONLY
 ***REQUIRES 16K MEMORY

3. THE PROGRAM PRINTS "PASS" FOLLOWING EACH
 COMPLETE PASS THROUGH THE TESTS.

5. OPERATOR INPUTS

WHEN THE PROGRAM REQUESTS THE UNIT NUMBER & THE
 NUMBER OF SURFACES FOR EACH UNIT TO BE TESTED,
 TYPE THE ACTUAL NUMBER OF SURFACES WHICH THE PROGRAM
 MAY USE FOR WRITING & READING DURING PROGRAM
 EXECUTION. 1 SHOULD ONLY BE TYPED FOR DISKETTE
 DRIVES. EITHER 2 OR 4 ONLY MAY BE TYPED FOR
 CARTRIDGE DRIVES.

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BYPASS STARTING ADDRESS (503) STARTING AT LOCATION
 503 WILL SKIP THOSE SEEK DONE TEST THAT REQUIRE THE
 OPERATOR TO CHANGE DRIVE UNIT NUMBERS IN INSTANCES
 WHERE 4 DRIVES ARE NOT PRESENT IN THE SYSTEM. IF
 4 DRIVES ARE PRESENT AND AVAILABLE FOR TESTING IN
 THE SYSTEM, A START FROM LOCATION 200 IS RECOMMENDED.

504, 505 OVERLAP-I/O SEEK TESTS (16K MEMORY REQUIRED)
 THIS SA CONSISTS OF TWO SEPARATE TESTS OF 1024
 ITERATIONS EACH. EACH ITERATION OF THE 1ST TEST
 CONSISTS OF THE FOLLOWING:

TWO RANDOM CYLINDER NUMBERS ARE GENERATED AND 4
 SECTORS OF CYLINDER DATA ARE GENERATED IN TWO
 CONSECUTIVE BUFFERS. TWO SEKS ARE THEN STARTED TO
 THE TWO DRIVES DESIGNATED BY U1 AND U2. TWO 4 SECTOR
 WRITES TO HEAD 0, SECTOR 0 ARE DONE TO EACH UNIT
 THE BASIS OF WHEN THE RESPECTIVE SEKS ARE COMPLETED.
 THE 1ST WRITE IS INITIATED WHEN THE 1ST SEEK
 IS COMPLETED AND THE 2ND WRITE IS STARTED WHEN BOTH
 THE 2ND SEEK AND THE 1ST WRITE HAVE COMPLETED.

THE RANDOM NUMBER GENERATOR IS RE-INITIALIZED FOR THE
 2ND TEST AND THE WRITES ARE REPLACED BY READS. A
 MEMORY COMPARE IS MADE FOR EACH READ AFTER BOTH
 READS HAVE COMPLETED.

SA 502 - CHANGE DEVICE CODE
 THE PROGRAM WILL ASK FOR A NEW DEVICE CODE IN OCTAL.
 AFTER ENTERING A LEGAL DEVICE CODE, THE
 PROGRAM WILL CHANGE ALL NECESSARY I/O INSTRUCTIONS AND
 EXIT TO ODT. RESTART PROGRAM AT EITHER LOCATION 200
 OR 501 (WHICHEVER IS APPROPRIATE) TO RESUME TESTING.

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10.0 ERROR DESCRIPTION

WHEN AN ERROR IS DETECTED THE PROGRAM PRINTS THE
 ERROR PC AS WELL AS AC'S 0,1,2 AT THE POINT OF ERROR.
 THE PROGRAM THEN GOES INTO A SCOPE LOOP BETWEEN THE
 ENTRIES TO SETUP AND LOOP ALLOWING THE OPERATOR TO
 MAKE ANY MODIFICATION IN 'SWPAK', AS DESIRED. THE SIGNIF-
 ICANCE OF THE AC'S IS EXPLAINED IN THE LISTING. HOWEVER,
 IN GENERAL ACO CONTAINS THE PROPER STATUS WHILE AC1
 CONTAINS THE RECEIVED STATUS. AC2 IS GENERALLY
 THE BEGINNING OF A BLOCK OR THE STATUS LOCATION.
 THE 'SWPAK' DETERMINES THE LOOP EXIT, PRINTOUTS,
 ETC. (SEE SWPAK).

DATA ERRORS WILL RESULT IN THE 1ST 3 PAIRS OF DATA
 AND THEIR ADDRESSES BEING PRINTED ALONG WITH THE TOTAL
 COUNT. IF AN ECC ERROR IS DETECTED, THE CALL EHECC WILL
 ACKNOWLEDGE THE ERROR AND RETURN TO THE MAIN PROGRAM
 FOR DATA COMPARE. PRINTOUTS RESULT ON THE 1ST ERROR
 PASS ONLY.

IN GENERAL EACH SUCCESSIVE TEST ASSUMES ALL
 PREVIOUS TESTS WORK. BYPASSING ERRORS
 CAN RESULT IN CONFUSING SITUATIONS
 IN THE SETUP OF MORE COMPLEX TESTS.

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OCTAL DEBUG TOOL (ODT)

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THE DIAGNOSTIC IS EQUIPPED WITH A BUILT IN ODT WHICH CAN BE ACCESSED BY HITTING CONTROL 0 ("0") AT ANY TIME DURING THE EXECUTION OF THE PROGRAM (AFTER SETTING THE PARAMETERS).
ON ENTERING ODT THE ADDRESS OF THE LOCATION HAVING THE NEXT INSTRUCTION TO BE EXECUTED WILL BE TYPED-OUT.

CONVENTIONS AND SYMBOLS

THE FOLLOWING CONVENTIONS ARE USED BY THE ODT:
? PRESSING ANY ILLEGAL KEY CAUSES THE ODT TO RESPOND WITH A "?".
@ ODT IS READY AND AT YOUR SERVICE.

COMMAND STRUCTURE

AN ODT COMMAND HAS THE FOLLOWING FORMAT:

[ARGUMENT][COMMAND]

AN ARGUMENT MAY BE ONE OF THE FOLLOWING:

"EXP" AN OCTAL EXPRESSION CONSISTING OF OCTAL NUMBERS SEPARATED BY PLUS (+) OR MINUS (-) SIGNS. LEADING ZEROS NEED NOT BE TYPED.

"ADR" AN ADDRESS IS THE SAME AS AN EXPRESSION EXCEPT THAT BIT 0 IS NEGLECTED.

A COMMAND IS A SINGLE TELETYPE CHARACTER

ODT COMMANDS

THE LOCATIONS THAT CAN BE EXAMINED AND MODIFIED BY THE USER ARE CALLED CELLS. THESE CELLS ARE OF TWO TYPES: INTERNAL CPU CELLS AND MEMORY LOCATIONS.

OPENING INTERNAL CELLS

THE COMMAND TO OPEN ONE OF THE INTERNAL REGISTERS IS OF THE FORM "NA" WHERE N IS ANY OCTAL EXPRESSION BETWEEN 0 AND 7

FOR ACCUMULATORS 0-3

FOR PC OF THE NEXT INSTRUCTION TO BE EXECUTED IN THE EVENT OF A "CP" COMMAND.

CPU AND I/O STATUS

INTERPRETATION

15 STATUS OF I/O DONE FLAG

14 STATUS OF INTERRUPTS (ION FLAG)

13 STATUS OF CARRY BIT

6 ADDRESS OF THE LOCATION HAVING THE BREAK POINT (IF ANY)

7 INSTRUCTION AT THE BREAK POINT LOCATION

OTHER COMMANDS TO OPEN CELLS ARE:

"ADR"/ OPEN THE CELL AND PRINT ITS CONTENTS
"/ OPEN THE CELL CURRENTLY POINTED TO BY THE POINTER AND PRINT ITS CONTENTS.

."ADR"/ ADD "ADR" TO THE POINTER, OPEN THE CELL AND PRINT ITS CONTENTS.

."ADR"/ SUBTRACT "ADR" FROM THE POINTER, OPEN THE CELL AND PRINT ITS CONTENTS.

"CR" THE RETURN KEY IS USED TO CLOSE THE OPEN CELL WITH OR WITHOUT MODIFICATION.

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; "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 PRECEDING CELL
; / CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND
; OPEN THE CELL POINTED TO BY ITS CONTENTS, AND
; +"ADR"/ CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND
; OPEN THE CELL POINTED TO BY ITS CONTENTS + "ADR".
; ="ADR"/ CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND
; OPEN THE CELL POINTED TO BY ITS CONTENTS - "ADR".

; 11.3.2 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 EX-
; PRESSION 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 "n" OR "n"*/-OCTAL EXPRESS-
; ION". A RUBOUT 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.

; 11.3.3 OTHER ODT COMMANDS
; RUBOUT THIS KEY IS USED TO DELETE ERRONEOUSLY TYPED
; DIGITS. EACH TIME THE KEY IS PRESSED THE RIGHT MOST
; DIGIT IS DELETED AND ECHOED ON THE TERMINAL. IF
; THE RUBOUT KEY IS PRESSED RIGHT AFTER OPENING A
; CELL THEN IT DELETES THE RIGHT MOST DIGIT OF THE CELL
; CONTENTS. THIS ALLOWS THE MODIFICATION OF THE CELL
; AS IF ITS CONTENTS WERE TYPED IN JUST BEFORE THE
; KEY WAS PRESSED.
; "ADR"B INSERT A BREAK POINT AT LOCATION "ADR".
; ONLY ONE BREAK POINT CAN BE INSERTED AND ANY
; ENTRY TO ODT AFTER EXECUTING A BREAK POINT WILL
; CAUSE IT TO BE DELETED.
; D DELETE THE BREAK POINT IF ANY.
; P RESTART THE EXECUTION OF THE PROGRAM AT LOCATION
; POINTED BY 4A.
; "ADR"R START EXECUTING THE PROGRAM AT "ADR" AFTER AN
; IO-RESET.
; K KILL THE STRING TYPED SO FAR. THE ODT RESPONDS
; 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
; ORIGINAL PROGRAM AREA. IF A BREAK POINT IS
; PLACED OUTSIDE THIS AREA THE RESULTS WILL
; BE UNPREDICTABLE.

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; 12.0
; SPECIAL NOTES - DISK PACKS
; THE DIAGNOSTIC PROGRAM WILL WRITE OVER MOST OF
; THE DISK SURFACE BETWEEN THE LOWER/UPPER TRACK
; LIMITS SPECIFIED BY THE OPERATOR

; 13.0
; RUN TIME - THE RUNNING TIME IS APPROXIMATELY
; 20 MINUTES FOR EACH CARTRIDGE AND
; APPROXIMATELY 13 MINUTES FOR EACH
; DISKETTE

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