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**TECHNICAL  
STATEMENT**

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TEXT LISTING

068-001117-00

PROGRAM

6101,6102 MOVING HEAD DISK  
AND DISKETTE DIAGNOSTIC

TEXT TAPE

097-001117-00

ABSTRACT

THIS PROGRAM IS A LOGIC LEVEL TEST OF THE 6101/6102 SERIES  
MOVING HEAD DISK SUB-SYSTEMS LISTED IN PART 5.0 OF THIS LISTING.

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19:40:44 06/04/79
ADS ASSEMBLER REV 02.04

*****
NAME: MFDD.TX
PART NUMBER: 097-001117
DESCRIPTION: 6101, 6102 MOVING HEAD DISK/DISKETTE DIAGNOSTIC
PROGRAM TEXT FILE
REVISION HISTORY:
REV. DATE
00 06/04/79
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PROGRAM NAME:
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MFDD - 6101, 6102 MOVING HEAD DISK/DISKETTE
DIAGNOSTIC PROGRAM

REVISION HISTORY:
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REV 00 - 06/04/79

MACHINE REQUIREMENTS:
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1. MICRO NOVA OR MP100/200 SERIES CENTRAL PROCESSOR
WITH AT LEAST 16K READ/WRITE (RAM) MEMORY
2. ASYNCHRONOUS INTERFACE BOARD (STANDARD TTY I/O)
3. TELETYPE OR CRT TERMINAL
4. PAPER TAPE READER AND/OR DISKETTE DRIVE

TEST REQUIREMENTS:
-----
1. ONE OF THE FOLLOWING MODEL DISK SUB-SYSTEMS:
6101 OR 6102 (SEE BELOW)
2. 6101, 6102 MOVING HEAD DISK DIAGNOSTIC
- LISTING PART # 096 - 0001117
- PROGRAM PART # 095 - 0001117

SUMMARY:
-----
THIS PROGRAM IS A LOGIC LEVEL TEST OF THE FOLLOWING
6101/6102 SERIES MOVING HEAD DISK SUB-SYSTEMS:

6101: DISK CONTROLLER BOARD
POWER SUPPLY
1 NON-REMOVABLE (12.5 MB, RIGID) DRIVE
1 DISKETTE (FLEXIBLE) DRIVE
1 OR 2 ADD-ON DISKETTE DRIVES

6102: DISK CONTROLLER BOARD
POWER SUPPLY
1 NON-REMOVABLE (12.5 MB, RIGID) DRIVE
1 OR 2 ADD-ON DISKETTE DRIVES
1 ADD-ON DISKETTE DRIVES

NOTES: 1) THE DISK CONTROLLER BOARD AND POWER SUPPLY
RESIDES IN THE NON-REMOVABLE DRIVE.
2) THE ADD-ON DISKETTE DRIVES ARE MODEL 6096C
(1 ADD-ON DRIVE) OR 6096D (2 ADD-ON DRIVES).

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16.
RESTRICTIONS:
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1. NO DISK WRITES CAN BE PERFORMED IF THE WRITE PROTECT
DISKETTE IS WRITE-PROTECTED (NOTCH NOT COVERED). THIS
WILL SERIOUSLY DECREASE THE TESTABILITY OF THE DISK
BY THIS PROGRAM THE ONLY TIME THAT DISKETTES SHOULD
BE WRITE-PROTECTED IS WHEN THE OPERATOR IS CHECKING
THE WRITE PROTECT FEATURE FOR PROPER FUNCTIONING.
FOR NON-REMOVABLE DRIVES, IF YOU ARE CONCERNED
ABOUT DATA LOSS FROM DIAGNOSTIC TESTING, SPECIFY THAT
ALL READ/WRITE OPERATIONS BE PERFORMED ON THE DIAGNOS-
TIC TRACK ONLY. IF THE DRIVE IS SUSPECTED OF SEEKING
ERRORS AND YOU WISH TO PROTECT ANY DATA LOSS, THEN
PUT THE WRITE-PROTECT SWITCH ON BEFORE TESTING.
2. FOR THE NON-REMOVABLE DISK DRIVES, IF ALLOWED TO
ACCESS (WRITE/READ) THE USER DATA TRACKS (0-277),
THE DIAGNOSTIC ASSUMES THAT THESE AREAS ARE ALREADY
FORMATTED. NO FORMAT OPERATIONS ARE EVER PERFORMED ON
THESE AREAS. IF THIS AREA IS NOT PROPERLY FORMATTED,
THIS DIAGNOSTIC CAN STILL BE RUN BY SPECIFYING THAT
ONLY DIAGNOSTIC TRACKS CAN BE WRITTEN TO (UNLESS OF
COURSE THE DISK IS IN WRITE-PROTECT MODE, IN WHICH
CASE NO DISK WRITE OPERATIONS WILL BE PERFORMED).
FORMATTING FOR BOTH NON-REMOVABLE DRIVE SURFACES AND
QUAD-DENSITY DISKETTES (DGC MODE) CAN BE ACCOMPLISHED
BY USING THE FOLLOWING PROGRAM:
"6096, 6101, 6102 MOVING HEAD DISK/DISKETTE
RELIABILITY/FORMATTER PROGRAM"
- LISTING PART # 096 - 0001138
- PROGRAM PART # 095 - 0001138
3. THIS IS PRIMARILY A LOGIC, FUNCTION AND CONTROL
TEST. IT DOES NOT TEST THE DISKS FOR MAXIMUM DATA
THROUGHPUT AND/OR SPEED. AS IS NOT INTENDED TO BE
USED FOR LONG TERM SYSTEM ANALYSIS (I.E. DATA ERROR
RATES ETC). THIS CAN BE ACCOMPLISHED BY USING THE
SAME PROGRAM AS LISTED ABOVE IN RESTRICTION 2.
4. DRIVES MUST HAVE A UNIQUE UNIT # (0-3). FOR EXAMPLE
TWO DISKETTES CANNOT BOTH BE UNIT 1. THIS WILL CAUSE
ERRORS IN STATUS AND OPERATION TO OCCUR.
5. THERE MUST BE NO DEVICES WITH DEVICE CODE 0 IN THE
SYSTEM (USED AS DUMMY DEVICE CODE) REMOVE ANY I/O
TESTER BOARDS IF THEY EXIST. THIS PROGRAM DOES NOT
RUN WITH THE CATS/KITTEN DCH EXERCISER PROGRAM.

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10004 .MAIN

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17.
PROGRAM DESCRIPTION/THEORY OF OPERATION:
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NON-REMOVABLE DISK PRODUCT DESCRIPTION:
THE NON-REMOVABLE (OR 5.25) DISK DRIVE HAS A TOTAL
STORAGE CAPACITY OF 12.5 MEGABYTES. THE DISK(S) IS
FORMATTED AND NON-REMOVABLE. THE DRIVE UNIT, WHICH
IS BASED ON WINCHESTER TECHNOLOGY, HAS 4 HEADS,
192 TRACKS PER HEAD, AND 32 SECTORS PER TRACK. EACH
SECTOR CONTAINS 4096 BITS OR 256 WORDS (16 BITS EACH)
OF DATA STORAGE. THE DISK CONTROLLER USES AN INTEL (TM)
8-BIT MICROCOMPUTER FOR A MAJOR SECTION OF THE CONTROL-
LER'S LOGIC FUNCTIONS. ITS PURPOSE IS TO HANDLE SEEKING
ACTIVITIES, INITIAL COMMAND DECODING, MULTIPLE SECTOR
READ/WRITE DATA TRANSFERS, FAULT MONITORING AND POWER
SEQUENCING. THE CONTROLLER ALSO HAS A MICRO-CODED TTL
MICROPROCESSOR USING 6-1K PROMS. IT'S FUNCTIONS INCLUDE
FINAL COMMAND DECODING, DISK READ/WRITE LOGIC CONTROL
(INCLUDING SERIAL DATA TRANSFERS TO AND FROM THE DISK),
TIMING, DISK ADDRESS AND CYCLIC REDUNDANCY CHECK (CRC)
OPERATIONS. THE CONTROLLER HAS A 256 WORD DATA BUFFER
(RAM) THAT IS USED FOR DATA CHANNEL TRANSFERS TO/FROM
THE HOST COMPUTER AND FOR READ/WRITE OPERATIONS ON THE
DISK. THE BUFFER ELIMINATES DATA LATE ERRORS. IT ALLOWS
THE DISK TO BE WIRED TO THE LOWEST DATA CHANNEL PRIORITY
IF DESIRED. THE STRUCTURE OF THE SYSTEM DOES NOT ALLOW
RD/WR OPERATIONS TO BE PERFORMED ON PHYSICALLY CONTIG-
UOUS SECTORS. HOWEVER, MULTIPLE SECTOR TRANSFERS ARE
POSSIBLE. THE MICROCOMPUTER HANDLES LOGICAL TO PHYSICAL
SECTOR MAPPING FOR MAXIMUM THROUGHPUT. IT WILL PERFORM
THE FOLLOWING NORMAL MODE OPERATIONS: READ, WRITE,
SEEK, RECALIBRATE AND FORMAT. THERE IS ALSO AN EXTEN-
SIVE DIAGNOSTIC COMMAND SET THAT ALLOWS THE ABILITY
TO SINGLE-STEP DISK OPERATIONS (COMMAND SIMULATION),
TO STEP THE HEAD ASSEMBLY IN OR OUT AND TO READ CERTAIN
REGISTERS INTERNAL TO THE MICROPROCESSOR. SEE SECTION
11.4 FOR THE COMPLETE INSTRUCTION SET.
17-2
QUAD-DENSITY DISKETTE PRODUCT DESCRIPTION:
THE MODEL 6096C/D SUB-SYSTEMS ARE QUAD-DENSITY (1.2 MB)
DISKETTE DRIVES. EACH DRIVE HAS 2 HEADS, 77 TRACKS AND
16 SECTORS PER TRACK (EACH SECTOR IS 256 16-BIT WORDS).
THE DISKETTES ARE CONTROLLED BY A FD17918 QUAD-DENSITY
DISKETTE CONTROLLER CHIP THAT IS RESIDENT ON THE DISK
CONTROLLER BOARD (IN THE CPU). THE DISKETTES ALSO USE
THE INTEL (TM) MICROPROCESSOR AND OTHER HARDWARE ON THE
CONTROLLER BOARD (I/O SIGNALS, PHASE-LOCK LOOPS ETC).
NORMAL MODE COMMANDS ARE THE SAME AS FOR NON-REMOVABLE
DRIVES (SEE 7.1). THERE ARE SEVERAL DIAGNOSTIC COMMANDS
THAT ALLOW OPERATIONS SUCH AS WRITE/READ OPERATIONS TO
1791 INTERNAL REGISTERS, STEPPING IN/OUT OF THE HEAD
ASSEMBLY ETC. SEE SECTION 11.4 FOR THE INSTRUCTION SET.

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17.3
OTHER INFORMATION:
THE CONTROLLER BOARD HAS TWO SWITCHES ON IT THAT DEFINE
THE CONFIGURATION. ONE DEFINES WHETHER A NON-REMOVABLE
DRIVE IS ATTACHED TO THE CONTROLLER (ON IF PRESENT). IF
THERE IS NO NON-REMOVABLE DRIVE, THEN UP TO 4 DISKETTES
CAN BE IN THE SYSTEM, OTHERWISE 1-3 DISKETTE DRIVES ARE
ALLOWED. THE OTHER SWITCH DEFINES THE NON-REMOVABLE
UNIT # AS EITHER 0 OR 1. IF IT IS UNIT 0, THE INITIAL
PROGRAM LOAD SEQUENCE (IPL) WILL BE PERFORMED FROM THE
NON-REMOVABLE DRIVE. IF IT IS UNIT 1, THE IPL CAN OCCUR
FROM A DISKETTE DRIVE WITH UNIT # 0.
17.4
SUB-SYSTEM MODULE BREAKDOWN:
NON-REMOVABLE/DISKETTE COMMON MODULES:
= DISK CONTROLLER BOARD (UNDER TOP COVER IN THE
NON-REMOVABLE DRIVE).
= POWER SUPPLY BOARD (TOP BACK IN NON-REMOVABLE DRIVE).
NON-REMOVABLE ONLY MODULES (IN DRIVE):
= READ/WRITE HEAD CURRENT DRIVER/CLOCK BOARD
(UNDER FRONT PANNEL)
= DRIVE UNIT ASSEMBLY
= 1 FIXED DISK (RIGID) PLATTERS (2 SURFACES)
= HEAD POSITIONER, DRIVE CAM, STEPPING MOTOR,
SPINDLE, DRIVE MOTOR W/DAMPER, SECTOR DISK,
HOME INDICATOR, BLOWERS, FILTERS ETC.
DISKETTE ONLY MODULES (IN DRIVE):
= READ/WRITE/HEAD STEPPER BOARD
= DRIVE ASSEMBLY
= READ/WRITE HEADS (2) AND HEAD POSITIONING MECHANISM
(INCLUDING STEPPING MOTOR)
= DISKETTE DRIVE MOTOR ETC
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17.5
PROGRAM OPERATION:
THIS DIAGNOSTIC PROGRAM IS USED TO TEST LOGIC, CONTROL,
FIRMWARE ETC ON THE DISK CONTROLLER BOARD AND PROPER
FUNCTIONING (SEEK, READ, WRITE/FORMAT, RECAL) OF ANY
DRIVE(S) ATTACHED TO IT (SEE SECTION 5) AND CONFIGURED
FOR DURING DIAGNOSTIC INITIALIZATION (SEE SECTION 9).
IT IS A PROGRESSIVE SERIES OF INDIVIDUAL SUB-TESTS.
IN GENERAL, EACH TEST ASSUMES THAT PREVIOUS LOGIC
AND FUNCTION SUB-TESTS PASSED WITHOUT ERROR. THE
TEST COMPLEXITY USUALLY INCREASES WITH THE TEST
PROGRESSION. THE SUB-TESTS THEMSELVES, CONSIST OF
A SERIES OF SUB-ROUTINES THAT PERFORM VARIOUS
FUNCTIONS AND OTHER INSTRUCTIONS THAT SET FLAGS,
POINTERS, ADDRESSES, PARAMETERS ETC. MANY OF THE
SUB-ROUTINES PERFORM COMPLICATED DATA, STATUS AND/OR
REGISTER CHECKS. DETAILED ERROR AND COMMAND SUMMARY
INFORMATION IS PRINTED ON DETECTION OF AN ERROR. ALSO
CONTAINED IN SUB-ROUTINES THAT PERFORM ERROR CHECKING
IS A "PROBABLE FAILING MODULE" REPORT THAT TELLS THE
OPERATOR WHAT THE FIRST AND SECOND MOST LIKELY CAUSES
FOR THE DETECTED ERROR ARE. THE "CAUSES" ARE USUALLY
A MODULE SUCH AS THE DISK CONTROLLER BOARD. REFER TO
SECTION 10 FOR MORE ERROR INFORMATION. THE SUB-TESTS
ARE SEPARATED INTO SEVERAL DIFFERENT CLASSES:
1) DISK CONTROLLER ONLY BASIC FUNCTION TESTS
(INCLUDING NOVA/ECLIPSE I/O INTERFACE TESTS)
2) DIAGNOSTIC MODE TESTS
(COMMON, DISKETTE ONLY & NON-REMOVABLE ONLY)
3) DRIVE UNIT FUNCTION TESTS
(COMMON, DISKETTE ONLY & NON-REMOVABLE ONLY)
THE FIRST CLASS OF TESTS ARE THE DISK CONTROLLER
BASIC LOGIC & CONTROL FUNCTION TESTS. THESE TESTS
CHECK THE FOLLOWING: BUSY, DONE, START, CLEAR, IOPLS,
IOPST, DISK COMMAND REGISTER (DCR), DISK ADDRESS
REGISTER (DOR), DISK STATUS REGISTER (DIS), DEVICE
SELECTION, LOAD/READ MEMORY ADDRESS REGISTER (DOB/DIB),
INTERRUPT REQUEST LOGIC, INTERRUPT DISABLE (MSKD),
DCH RANDOM ADDRESS EXERCISERS, I/O COMMANDS WITH NO
DEVICE SELECTION AND MISCELLANEOUS FUNCTIONS.
THE SECOND CLASS OF TESTS ARE THOSE THAT MAKE USE
OF THE DIAGNOSTIC COMMANDS AND STATUS (11,4,2). THESE
COMMANDS ENABLE THE PROGRAM TO HELP DETECT & ISOLATE
FAULTS, MAINLY TO THE DISK CONTROLLER. ALL DIAGNOSTIC
TESTS ARE PERFORMED BEFORE ANY ACTUAL DISK WRITE
OPERATIONS ARE ATTEMPTED. NON-REMOVABLE DRIVES ALSO
HAVE A DIAGNOSTIC TRACK AREA TO CHECK DISK WRITE/READ
OPERATIONS WITHOUT AFFECTING USER DATA AREAS. NOTE
THAT WRITE-PROTECT IS ENABLED ON THE RIGID DRIVE WHEN
DIAGNOSTIC MODE IS SET (DIAG CMND 0). THESE FEATURES
WILL HELP PROTECT ANY DATA THAT EXISTS ON THE DISK.
EXAMPLES OF FUNCTIONS AND OPERATIONS TESTED FOLLOWS:
COMMON TESTS: SET/RESET DIAGNOSTIC MODE, CHECK DIA
AND DCA REGISTER BITS (STATIC), READ CERTAIN MICRO-
PROCESSOR INTERNAL REGISTERS (TRACK ADDRESS, PROGRAM

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REVISION #); NON-REMOVABLE ONLY; READ/WRITE COMMAND
SIMULATION (DISK SURFACES NOT AFFECTED), CHECK DATA
BUFFER AND DATA CHANNELING, CHECK SECTOR COUNTER AND
STEPPER MOTOR PHASES AND READ HEADER; DISKETTE ONLY;
SET/RESET FORMAT MODES, WRITE/READ DISKETTE CONTROLLER
CHIP INTERNAL REGISTERS AND READ HEADER. IN ADDITION,
BOTH DRIVE TYPES CAN HAVE THEIR HEAD ASSEMBLIES MOVED
EITHER IN OR OUT ONE TRACK.

ACTUAL DISK SEEK, READ, AND WRITE OPERATIONS ARE
CHECKED IN THE THIRD CLASS OF TESTS. SEEK COMMANDS
ARE CHECKED FIRST. SEVERAL DIAGNOSTIC COMMANDS ARE
USED DURING THIS TIME TO CHECK THE TRACK ADDRESSES,
STEPPER PHASES (RIGID DRIVE ONLY) AND PERFORM READ
HEADER OPERATIONS TO INSURE PROPER HEAD POSITIONING.
FOR THE NON-REMOVABLE DRIVE, A CHECK IS MADE TO
INSURE THAT THE HEADS CAN STEP INTO THE HOME AREA
FOR WRITE/READ OPERATIONS ON THE DIAGNOSTIC TRACKS.
THE WRITE/READ TESTS FOLLOW THE SEEK EXERCISERS. IF
NO TEST RESTRICTIONS EXIST (SEE SECTION 6), THEN THE
FOLLOWING TESTS WILL BE PERFORMED: NON-REMOVABLE ONLY
(ALL ARE PERFORMED ON TRACK 301 (DIAG TRACK) ONLY):
FORMAT HEAD 0/SECTOR 0, FORMAT ALL SECTORS, READ
HEADER ALL SECTORS, FORMAT ALL HEADS, READ HEADER FROM
ALL HEADS, FORMAT/WRITE HEAD 0/SECTOR 0, FORCE UNSAFE
ERROR AND FORCE BAD SECTOR ERROR. THE STATUS, DISK
ADDRESS AND MEMORY ADDRESSES REGISTER ARE ALL CHECKED
DURING THESE OPERATIONS. DISKETTE/NON-REMOVABLE TESTS:
DATA CHANNEL EXERCISER, WRITE/READ TO HEAD 0/SECTOR 0,
WRITE/READ TO ALL SECTORS, READ ALL SECTORS, READ/WRITE
ALL HEADS, READ ALL HEADS, WRITE/READ PATTERNS ON ALL
HEADS, WRITE/READ MULTIPLE SECTORS (WITH AND WITHOUT
CROSSING A HEAD BOUNDARY), FORCE END OF CYLINDER ERROR,
WRITE/READ ALL TRACKS, READ ALL TRACKS, RANDOM WRITE/
READ EXERCISER AND PERFORM IPL SEQUENCE (UNIT 0 ONLY).
THE STATUS, DISK ADDRESS AND MEMORY ADDRESS REGISTERS
ARE ALL MONITORED FOR CORRECT OPERATION DURING THESE
TESTS. NO WRITE OPERATIONS ARE PERFORMED IF A DRIVE IS
WRITE-PROTECTED. THIS SERIOUSLY CUTS DOWN THE TEST
ABILITY OF A DRIVE AND SHOULD ONLY BE DONE IF DATA ON
A NON-REMOVABLE DRIVE IS TO BE PRESERVED. NO FORMAT
OPERATIONS ARE PERFORMED ON DISKETTE DRIVES OR ON THE
USER TRACKS OF THE NON-REMOVABLE DRIVE IN THIS PROGRAM.

THE PROGRAM CHECKS THE ABOVE THROUGH A SERIES OF SUB-
TESTS. IF NO ERROR IS FOUND, THE PROGRAM WILL PERFORM
THE TESTS IN A LOGICAL PROGRESSION, UNTIL THE LAST
TEST. THE PROGRAM WILL THEN TEST THE NEXT CONFIGURED
DRIVE (IF ANY). AN END OF PASS MESSAGE IS PRINTED
AFTER ALL OF THE CONFIGURED DRIVES HAVE BEEN TESTED.
IF ANY ERROR(S) ARE DETECTED, THE OPERATOR WILL BE
INFORMED OF IT. TO FIND THE PROBLEM, REFER TO THE
REPORTED ERROR ADDRESS (CONTENTS OF PROGRAM COUNTER-1)
IN THE DIAGNOSTIC LISTING. TO FIND THE ACTUAL HARDWARE
FAILURE, SET UP A SCOPE LOOP (SEE SECTION 8) AND TRACE
THE FAILURE WITH AN OSCILLOSCOPE. THE COMMENTS IN THE
LISTING WILL GIVE THE OPERATOR INFORMATION ABOUT THE
PROBLEM AS WELL AS INFORMATION CONCERNING THE ACCUMU-
LATOR CONTENTS.

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OPERATING MODES/SWITCH COMMANDS:
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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.
8.2

BIT OCTAL BINARY INERPRETATION
VALUE VALUE
1 40000 1 LOOP ON ERROR
2 20000 1 ABORT PRINT OUT TO CONSOLE
3 10000 1 DO NOT PRINT % FAILURE
4 04000 1 ALLOW END OF PASS PRINT OUT
5 02000 1 SUPPRESS END OF PASS PRINT OUT
6 01000 1 DO NOT PRINT ON THE LINE PRINTER
8 00200 1 PRINT ONLY THE FIRST ERROR
PRINT EVERY ERROR

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18.1
SWITCH OPTIONS
DIFFERENT BITS AND THEIR INTERPRETATION AT LOCATION
"SWREG" IS AS FOLLOWS:
BIT OCTAL BINARY INERPRETATION
VALUE VALUE
1 40000 1 LOOP ON ERROR
2 20000 1 ABORT PRINT OUT TO CONSOLE
3 10000 1 DO NOT PRINT % FAILURE
4 04000 1 ALLOW END OF PASS PRINT OUT
5 02000 1 SUPPRESS END OF PASS PRINT OUT
6 01000 1 DO NOT PRINT ON THE LINE PRINTER
8 00200 1 PRINT ONLY THE FIRST ERROR
PRINT EVERY ERROR

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10009 .MAIN
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02 SWITCH COMMANDS
03 ONCE THE PROGRAM STARTS EXECUTING THE STATE OF ANY OF
04 THE BITS CAN BE CHANGED BY HITTING KEYS 1-9, A-F. THE
05 PROGRAM WILL CONTINUE RUNNING AFTER UPDATING THE OPTIONS.
06 EACH KEY WILL COMPLEMENT THE STATE OF THE BIT AFFILIAT-
07 ED WITH IT, THUS BIT 4 CAN BE ALTERED BY HITTING KEY 4.
08 SETTING OF ANY BIT OF LOCATION "SWREG" WILL SET BIT 0.
09 (DEFAULT MODE IS DEFINED AS ALL BITS OF SWREG SET TO 0)
10 THE PROGRAM CAN BE LOCKED INTO SWITCH MODIFICATION MODE
11 BY TYPING A 0, IN WHICH CASE MORE THAN ONE BIT CAN BE
12 CHANGED BEFORE CONTROL IS ALLOWED TO RETURN TO THE
13 MAIN PROGRAM.
14
15 18.2.1 OTHER COMMANDS
16 "CR" A "RETURN" CAN BE TYPED TO CONTINUE THE PROGRAM
17 AFTER ITS LOCKED IN A SWITCH MODIFICATION MODE
18
19 "D" THIS COMMAND GIVEN AT ANY TIME WILL RESET "SWREG"
20 TO DEFAULT MODE AND RESTART THE PROGRAM.
21
22 "R" THIS COMMAND GIVEN AT ANY TIME WILL RESTART THE
23 PROGRAM. SWITCHES ARE LEFT WITH THE VALUES THEY
24 HAD BEFORE THE COMMAND WAS ISSUED.
25
26 "O" THIS COMMAND GIVEN AT ANY TIME WILL CAUSE THE
27 PROGRAM CONTROL TO GO TO 00T (NOTE: THIS IS AN
28 OPTIONAL COMMAND AND IS AVAILBLE ONLY IF
29 ODTPK IS PRESENT)
30
31 M THIS COMMAND GIVEN AT ANY TIME WILL PRINT THE
32 CURRENT OPERATING MODES.
33
34 18.3 SETTING UP A SCOPE LOOP:
35
36 THIS DIAGNOSTIC CAN BE USED TO TRACE FAILURES ON
37 DETECTION OF AN ERROR. IF, AND WHEN AN ERROR IS
38 DETECTED DURING TESTING, A DIAGNOSTIC SCOPE LOOP CAN
39 BE FORMED BY DOING THE FOLLOWING:
40
41 1) "SWRES" SWITCH 1 MUST BE EQUAL = 0 (LOOP ON ERROR).
42 2) NOTE THE PROGRAM COUNTER (PC) CONTENTS (THE FAILING
43 ADDRESS*1) AND THE ACCUMULATOR CONTENTS.
44 3) SUPPRESS ALL ITV/IPT OUTPUTS BY SETTING SWITCH 2 = 1
45 AND SWITCH 5 = 0.
46 4) GO TO THE FAILING ADDRESS (= PROGRAM COUNTER-1) IN
47 THE DIAGNOSTIC LISTING FOR THE INSTRUCTION SEQUENCE
48 (AND INFORMATION) THAT CAUSED OR DETECTED THE ERROR.
49 IF THE SCOPE LOOP CONTAINS AN I/O RESET (IORST) IN IT,
50 THE SCOPE LOOP FORMED WILL BE SLOW. IT CAN BE SPEEDED
51 UP BY FOLLOWING THE INSTRUCTIONS IN SECTION 11.6.
52 6) THE SCOPE LOOP SHOULD NOW BE READY TO USE. (HELPFUL
53 ITEMS ARE AN OSCILLOSCOPE, SCHEMATICS, PHYSICAL).
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10010 .MAIN
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02 OPERATING PROCEDURE/OPERATOR INPUT
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04 *****
05 * PROGRAM STARTING ADDRESS = 500 (OCTAL) *
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08 TO RUN THIS DIAGNOSTIC:
09
10 1. ALL DRIVES TO BE TESTED MUST BE CONNECTED TO
11 THE CONTROLLER BOARD BY THE APPROPRIATE RIBBON
12 CABLE WHICH RUNS FROM THE DRIVE TO THE STANDARD
13 I/O CONNECTOR ON THE CPU CHASSIS. EACH DRIVE
14 MUST HAVE A UNIQUE UNIT # AND ALL MUST HAVE THE
15 POWER ON AND THE UNIT MUST BE INSERTED IN ORDER TO
16 SCRATCH DISKETTE(S) MUST BE INSERTED IN ORDER TO
17 TEST DISKETTE DRIVES. THE CONTROLLER MUST HAVE
18 ITS INTERRUPT PRIORITY (/INTP/) AND DATA CHANNEL
19 PRIORITY (/DCHP/) I/O LINES PROPERLY JUMPED.
20
21 SIGNAL BACKPANNEL I/O PIN #
22 -----
23 DCHP OUT R21
24 DCHP IN R22
25 INTP OUT R19
26 INTP IN R20
27
28 2. LOAD THE DIAGNOSTIC. THIS CAN BE DONE MANUALLY
29 VIA PAPER TAPE. AUTOMATIC LOADING AND STARTING
30 IS ACCOMPLISHED BY LOADING THE PROGRAM FROM A
31 DDOS DISKETTE. THE DDOS DISKETTE IS MADE FROM A
32 DIAGNOSTIC TAPE OPERATING SYSTEM (OTOS) MODEL
33 3 OR 4 MAGNETIC TAPE THAT HAS THE PROGRAM NAME
34 "6100 DIAG" IN ITS DIRECTORY (COMMAND = "DIR").
35 (THE DISK BUILDER PROGRAM IS "MBLD", WHICH SHOULD
36 BE IN THE DIRECTORY OF THE DTOS TAPE. IT IS INVOKED
37 BY A DTOS "LOAD" COMMAND ONCE THE TAPE IS PROPERLY
38 MOUNTED ON THE DRIVE, AND A BLANK DISKETTE IS PUT
39 IN THE DISKETTE DRIVE UNIT). TO LOAD FROM A DDOS
40 DISKETTE, PLACE THE DISKETTE IN UNIT # 0 AND DO A
41 LOAD FROM THE DRIVE'S DEVICE CODE (I.E. IF USING
42 THE CONSOLE DEBUG OPTION THE COMMAND WOULD BE "XXL"
43 WHERE "XX" IS THE DEVICE CODE). THE FOLLOWING TEXT
44 WILL BE TYPED IF PROPERLY LOADED:
45
46 "TOP OF MEMORY = XXXXXX
47
48 DTOS REV NEW=YYY
49
50 *LOAD 6100 DIAG"
51 -----
52
53 "R" IS THE DTOS/DDOS PROMPT, WHICH INDICATES IT
54 IS READY FOR A COMMAND. THE COMMAND TYPED IN TO
55 LOAD THE PROGRAM IS UNDERLINED. ONCE ENTERED
56 (A "CR" FOLLOWS ANY COMMAND), THE PROGRAM IS THEN
57 LOADED (IF IN THE DIRECTORY) AND THE DIAGNOSTIC
58 INITIALIZATION SEQUENCE IS STARTED. THE FOLLOWING
59 TEXT IS PRINTED DURING THIS TIME:

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10015 .MAIN
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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.
"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.
+"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 OBTAINED BY TYPING A "." OR "-.-" 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.
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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 CELLS
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 "2" 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

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10017 .MAIN
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11.4 INSTRUCTION SET:
11.4.1 NORMAL MODE INSTRUCTIONS:
DOA: SPECIFY DISK COMMAND
BIT(S) FUNCTION
0 - 1 SECTOR COUNT-1 (DISKETTE ONLY)
2 - 3 DRIVE UNIT # SELECT
4 - 6 DISK COMMAND
7 - 15 MULTI-PURPOSE FIELD
NORMAL MODE DISK COMMANDS:
DOA BITS
# 4 5 6 COMMAND
0 0 0 0 READ
1 0 0 1 READ HEADER **
2 0 1 0 WRITE
3 0 1 1 FORMAT
4 1 0 0 DIAGNOSTIC COMMAND
5 1 0 1 READ SECTOR *
6 1 1 0 SEEK
7 1 1 1 RECALIBRATE
* FOR DISKETTE ONLY: RETURNS LAST SECTOR TRANSFERRED
IN DIA BITS 12-15, HEAD IN DIA BIT 11 AND DRIVE #
IN DIA BITS 9-10.
** FOR NON-REMOVABLE ONLY
MULTI-PURPOSE FIELD DEFINITIONS (RANGES ARE OCTAL):
I. READ/WRITE COMMANDS (NORMAL COMMAND #'S 0-31):
BITS FUNCTION RANGE DRIVE
8-10 HEAD NUMBER 0-3 NON-REMOVABLE
11-15 SECTOR NUMBER 0-37 NON-REMOVABLE
0-17 DISKETTE
II. SEEK COMMAND (NORMAL COMMAND # 6):
BITS FUNCTION RANGE DRIVE
7-15 TRACK ADDRESS 0-277 NON-REMOVABLE
0-114 DISKETTE
III. DIAGNOSTIC COMMANDS (NORMAL COMMAND # 4):
SEE SECTION 11.4.2 FOR MORE INFORMATION

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10018 .MAIN

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DOB: SPECIFY MEMORY ADDRESS
BITS 1-15 SPECIFY THE STARTING MEMORY ADDRESS FOR A
DATA CHANNEL OPERATION. BIT 0 IS THE MAP SELECT BIT
(0 = MAP A, 1 = MAP B).
DOC: SPECIFY WORD COUNT
LOADS BITS 0-15 OF THE SPECIFIED AC INTO THE WORD COUNT
REGISTER. THE WORD COUNT MUST BE A TWO'S COMPLEMENT #
AND EQUAL TO 256. TIMES THE NUMBER OF SECTORS BEING
TRANSFERRED (ALWAYS 1 SECTOR FOR NON-REMOVABLE DRIVES).
DIA: READ DISK STATUS
COMMON DISK INFORMATION STATUS BITS (0-7):
BIT(S) FUNCTION/DESCRIPTION
0 WRITE-PROTECT (WP):
IF = 1, THE SELECTED DRIVE IS WRITE-PROTECTED.
FOR NON-REMOVABLE, WRITE-PROTECT = 1 IF THE
DRIVE IS IN DIAGNOSTIC MODE (DIA BIT 7 = 1).
1 HOME (H)/TRACK0 (TK0):
IF = 1, INDICATES THAT THE HEADS OF THE SELECTED
DRIVE ARE POSITIONED OVER THE HOME AREA FOR NON-
REMOVABLE DRIVES (TRACK #'S > 300 OCTAL) OR OVER
TRACK 0 FOR DISKETTE DRIVES. FOR STATUS CHECKER,
THE EXPECTED STATE OF THIS BIT IS TAKEN FROM THE
STATE SWITCH (UUTS) FOR DRIVE TYPE AND "TRACK#"
FOR THE CURRENT TRACK ADDRESS.
2-4 IDENTIFY SELECTED DRIVE (2=ID2, 3=ID1, 4=ID0):
FOR STATUS CHECKER, INFO TAKEN FROM "UUTS".
ID - 2 1 0 DRIVE TYPE
0 0 0 DISKETTE
1 0 0 NON-REMOVABLE 12.5 MEGABYTE
5 IBM MODE:
FOR DISKETTE DRIVES ONLY. IF = 1, INDICATES
THAT THE DISKETTE IS IN IBM FORMAT MODE (SET
VIA DIAGNOSTIC COMMAND 22). SHOULD ALWAYS = 0
FOR NON-REMOVABLE DRIVES.
6 FM MODE:
FOR DISKETTE DRIVES ONLY. IF = 1, INDICATES
THAT THE DISKETTE IS IN FM FORMAT MODE (SET
VIA DIAGNOSTIC COMMAND 23). IBM MODE (BIT 5)
SHOULD ALSO BE SET = 1. SHOULD ALWAYS = 0 FOR
NON-REMOVABLE DRIVES.

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10019 .MAIN
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7 DIAGNOSTIC MODE (DIAGM):
IF = 1, THE DISK CONTROLLER IS IN DIAGNOSTIC
MODE (SET BY DIAGNOSTIC COMMAND = 0). SETS
WRITE PROTECT = 1 (DIA BIT 0) IF SELECTED
UNIT IS A NON-REMOVABLE TYPE DRIVE. CAN BE
RESET BY DIAGNOSTIC COMMAND # 36, BY ISSUING
ANY NORMAL MODE COMMAND, AN IORST OR A CLEAR.

8 NORMAL ERROR STATUS BIT DESCRIPTIONS (8-15):

9 BIT DRIVE SELECTED
-----
10 NON-REMOVABLE
-----
11 POWER SWITCH OFF (POE):
IF = 1, THE NON-REMOVABLE
DRIVE'S POWER SWITCH IS IN
THE "OFF" POSITION.
ALWAYS = 0.

12 DISKETTE
13 NON-REMOVABLE

14 SPEED FAULT (SPF):
IF = 1, INDICATES THAT THE NON-
REMOVABLE DISK IS ROTATING AT
AN INCORRECT SPEED & WILL TERM-
INATE ANY OPERATION IN PROGRESS.
TRACK INFORMATION IS LOST IF IT
OCCURS DURING SEEK/RECALIBRATE.
A SUCCESSFUL RECALIBRATION WILL
RESTORE THE TRACK INFORMATION.

15 /READY/ (LOW ACTIVE):
IF = 0, THE SELECTED DISKETTE
DRIVE IS NOT PERFORMING ANY
HEAD MOVEMENTS AND IS READY TO
ACCEPT A COMMAND.

16 SEEK ERROR (SKF):
IF = 1, AN ERROR OCCURRED IN THE
LAST SEEK OR RECALIBRATION, OR
A SEEK TO AN ILLEGAL TRACK #
WAS ATTEMPTED (DISKETTE > 114,
NON-REMOVABLE > 277 OCTAL). FOR
NON-REMOVABLE, WILL SET IF HOME
NOT FOUND DURING RECALIBRATION.

17 READ/WRITE ERROR (RWE):
IF = 1, ONE OF THE FOLLOWING
READ/WRITE ERRORS IS INDICATED:
NO HEAD SELECT, MULTIPLE HEAD
SELECT, NO WRITE CURRENT, WRITE
CURRENT WITH NO WRITE COMMAND,
OR CLOCK FAULT. CAN BE CLEARED
WITH START, CLEAR, IOPLS, IORST
BUT THIS WILL NOT REMOVE THE
UNSAFE CONDITION. TRY POWERING
DOWN, THEN UP.

18 DATA LATE:
IF = 1, THE DATA CHANNEL FAILED
TO RESPOND IN TIME TO A DATA
CHANNEL REQUEST.

10020 .MAIN
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12 BIT DRIVE SELECTED
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13 ANY
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14 ANY
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FUNCTION/DESCRIPTION
-----
ADDRESS ERROR (ADRES):
IF = 1, THE ADDRESS READ FROM
THE ADDRESS FIELD OF THE SELECTED
DRIVE'S (STARTING) SECTOR DID
NOT EQUAL THE LAST ADDRESS SPEC-
IFIED TO THE DISK CONTROLLER.
FOR NON-REMOVABLE DRIVES, BAD
SECTOR = 1 (DIA 15) ALSO SETS
ADDRESS ERROR. FOR DISKETTES, AN
ATTEMPTED R/W OPERATION BEYOND
THE LAST SECTOR OF HEAD 1 (END
OF CYLINDER) WILL SET THIS BIT.

CRC ERROR (CRCE)
IF = 1, THE CYCLIC REDUNDANCY
CHECK (CRC) WORD READ FROM LAST
SECTOR WAS NOT EQUAL TO THE CRC
WORD CALCULATED BY THE CONTROL-
LER DURING THE DATA TRANSFER.

OPERATION TIME OUT (OPTO):
IF = 1, THE LAST ATTEMPTED
READ/WRITE OPERATION ON THE
SELECTED DRIVE DID NOT COMPLETE
IN A REASONABLE AMOUNT OF TIME.
FOR NON-REMOVABLE, A SECTOR
FAULT IS INDICATED.

BAD SECTOR:
IF = 1, THE LAST DATA TRANSFER
ATTEMPTED TO READ OR WRITE TO A
SECTOR PREVIOUSLY DESIGNATED AS
BAD. ADDRESS ERROR (BIT 12) WILL
ALSO SET IF NON-REMOVABLE DRIVE.
FOR DISKETTE, THIS IS ONLY VALID
IF IBM MODE IS SET (DIA BIT 5).

DIB: READ MEMORY ADDRESS
-----
BITS 0-15 INDICATE THE NEXT MEMORY WORD LOCATION FOR A
DATA CHANNEL TRANSFER. BIT 0 IS THE MAP SELECT BIT
(0 = MAP A SELECTED, 1 = MAP B SELECTED).

DIC: READ HEADER OR CRC WORD (NON-REMOVABLE ONLY)
-----
THIS REGISTER CONTAINS EITHER THE HEADER WORD OR CRC
(CHECKWORD) DEPENDING ON THE LAST DISK OPERATION THAT
WAS EXECUTED AS FOLLOWS:
CONTENTS ----- CONDITION
HEADER ----- AFTER A READ/WRITE OPERATION THAT
RESULTED IN AN ADDRESS ERROR OR AFTER
A READ HEADER OPERATION, THE FORMAT IS:

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10023 .MAIN
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THESE 4 DIAGNOSTIC COMMANDS ARE USED FOR NON-REMOVABLE COMMAND SIMULATION. THE COMMAND UNDER SIMULATION IS SPECIFIED BY DOA AS FOLLOWS:

COMMAND BIT
-----
READ 0 0
READ HEADER 0 1
WRITE 1 0
FORMAT 1 1

SERIAL READ DATA IS SIMULATED BY DOA BIT 7 FOR READ AND READ HEADER COMMAND SIMULATION. SERIAL WRITE DATA IS OBTAINED FROM DIA BIT 8 (LOW ACTIVE) FOR WRITE AND FORMAT COMMAND SIMULATION.

THE NON-REMOVABLE MUST BE SELECTED IN DOA BITS 0-1 & BITS 4-6 = 4 (DIAG). DIAGNOSTIC COMMANDS 1, 2 AND 3 ARE THE ONLY COMMANDS THAT RETURN DIAGNOSTIC STATUS INFORMATION (DIA). ALL OTHERS RETURN NORMAL STATUS. DIAGNOSTIC COMMANDS (0-3) SHOULD BE SPECIFIED AND STARTED VIA "DOAS". SERIAL DATA HANDLING IS ALWAYS TO/FROM THE NON-REMOVABLE 256. WORD DATA BUFFER. THE DISK SURFACE IS NOT AFFECTED BY COMMAND SIMULATION. FOR THE START PROM OPERATION COMMAND (#2), THE CONTENTS OF DOA 0-3 & 7-10 (DIAG DOA) ARE LOADED INTO BITS 0-7 AND 8-15 OF THE HEADER REGISTER. DIAGNOSTIC MODE CAN BE RESET BY ISSUING DIAGNOSTIC COMMAND #36 OR ANY NORMAL MODE COMMAND. ISSUE A "DIC" COMMAND TO READ THE HEADER OR CHECKWORD FROM THE NON-REMOVABLE SHIFT REGISTER.

DOA BITS 0-3 & 7-10 TRANSFERRED TO DIA BITS 8-15.

DATA CHANNEL DIRECTION CONTROLLED BY DOA BIT 8:
= 0: DATA CHANNEL IN (READ)
= 1: DATA CHANNEL OUT (WRITE)

FOR NON-R THE TRANSFER IS BETWEEN HOST MEMORY AND THE 256. WORD DATA BUFFER. FOR DISKETTES, ON A READ (DCH INPUT) THE 1791 DATA REGISTER (8-BITS) IS CHANNELLED IN SUCCESSIVELY UNTIL 256. WORDS (512. BYTES) ARE DONE. ON A WRITE (DCH OUTPUT) THE SPECIFIED DATA IN MEMORY IS CHANNELLED OUT TO THE 1791 DATA REGISTER UNTIL 256. WORDS (512. BYTES) ARE DONE. AT THE END, THE 1791 DATA REGISTER WILL CONTAIN THE LAST BYTE SENT.

RESULTS REPORTED BY DIA BIT 10 (SKFLT): 0=PASS, 1=FAIL. IN ADDITION, IF "TEST SECTOR COUNTER" FAILS, FAILING SECTOR LINES (XSC16, 8, 4, 2, 1) ARE LOADED AND READABLE BY DIA (RETURNED IN BITS 11-15).

RETURNED IN DIA REGISTER (BITS 12-15 FOR STEPPER PHASE, BITS 11-15 FOR CYLINDER ADDRESS).

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: <6> FOR DISKETTE, READS THE HEADER FOR THE NEXT SECTOR ENCOUNTERED AFTER THE COMMAND IS ISSUED (HEAD # IS SPECIFIED BY DOA BIT 10). THE 1 WORD HEADER IS DATA CHANNELLED INTO HOST MEMORY STARTING AT THE ADDRESS IN THE DCH MEMORY ADDRESS REGISTER (DOA). THE WORD COUNT (DOA) MUST BE SET TO -3 BEFORE STARTING.
:
: WORD 1: 0-7 = TRACK, 8-15 = SIDE NUMBER
: WORD 2: 0-7 = SECTOR, 8-15 = SECTOR LENGTH (2)
: WORD 3: 0-15 = CRC
:
: DIA 0-15 = DISKETTE STATUS.
:
: <7> DOA 0-3 & 7-10 TRANSFERRED TO SELECTED 1791 REGISTER.
:
: <8> SELECTED 1791 REGISTER TRANSFERRED TO DIA BITS 8-15.
:
: <9> DOA BITS 8-15 TRANSFERRED TO DIA 8-15. BITS 8-10 ONLY WILL VARY.
:
: <10> DOA BITS 0-7 TRANSFERRED TO DIA 8-15. BITS 0-3 & 7 ONLY WILL VARY.
:
: NON-REMOVABLE DIAGNOSTIC STATUS BIT SUMMARY (8-12):
:
:
: DIAGNOSTIC STATUS IS RETURNED IN THE DIA REGISTER ONLY IF THE UNIT UNDER TEST IS A NON-REMOVABLE DRIVE, AND ONLY ON EXECUTION OF DIAGNOSTIC COMMANDS 1-3. STATUS BITS 0-7 ARE THE SAME AS FOR NORMAL NON-REMOVABLE STATUS. BITS 8-15 ARE RE-DEFINED AS FOLLOWS:
:
: BIT FUNCTION/DESCRIPTION
: ---
: 8 /WRITE DATA/ (LOW ACTIVE): SERIAL DATA COMING OUT OF THE READ/WRITE SHIFT REGISTER ON A WRITE OR FORMAT OPERATION.
:
: 9 WRITE GATE: IF = 1, SERIAL WRITE DATA IS ENABLED AND VALID. THIS IS ONE OF THE MAJOR DATA CONTROL SIGNALS.
:
: 10 READ GATE: IF = 1, SERIAL READ DATA IS ENABLED AND VALID. THIS IS ONE OF THE MAJOR DATA CONTROL SIGNALS. SERIAL READ DATA IS SIMULATED BY DOA BIT 7.
:
: 11 /PROM OPERATION/ (LOW ACTIVE): IF = 1, THE PROM SEQUENCER IS ENABLED (STARTED BY DIAGNOSTIC COMMAND # 2).
:
: 12 ADDRESS ERROR: SAME AS FOR NORMAL STATUS (SEE ABOVE).

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13 CRC ERROR:
   SAME AS FOR NORMAL STATUS (SEE ABOVE).

14 SECTOR FAULT:
   IF = 1, A SECTOR PULSE OCCURFD WHEN EITHER
   READ GATE (BIT 10) OR WRITE GATE (BIT 9) WAS
   ACTIVE AND IS AN OPERATION TIME OUT (SEE ABOVE).

15 BAD SECTOR:
   SAME AS FOR NORMAL STATUS (SEE ABOVE).

11.5 DISK SUBSYSTEM MODELS 6101, 6102
     JUMPER/SWITCH CONFIGURATION INFORMATION
     (ON MAIN CONTROLLER BOARD):

SWITCHES      FUNCTION(S)/NOTES (+ = ON)
-----
SW1 - 2      DEVICE CODE SELECT 0 (ON IF 1) MSR
SW1 - 3      DEVICE CODE SELECT 1 "
SW1 - 4      DEVICE CODE SELECT 2 "
SW1 - 5      DEVICE CODE SELECT 3 "
SW1 - 6      DEVICE CODE SELECT 4 "
SW1 - 7      DEVICE CODE SELECT 5 " LSR

JUMPERS
-----
W1           ALWAYS OUT
W2           NON-REMOVABLE DISK CAPACITY
            ALWAYS IN (SELECTS 12.5 MB CAPACITY)

11.6 SCOPE LOOP SPEED-UP INFORMATION:

TESTS THAT HAVE AN I/O RESET IN THEM (MNRST) USE
"L20P" (JSR @IC7C) AS THE SCOPE LOOP HANDLER ROUTINE.
WHEN LOOPING ON AN ERROR, THIS ROUTINE ADDS A
RATHER LARGE DELAY IN THE SCOPE LOOP IN ORDER TO ALLOW
TTY INPUTS TO BE RECOGNIZED AND PROCESSED WITHOUT BEING
CLEARED BY THE I/O RESET COMMAND IN THE LOOP. TO SHORTEN
THE SCOPE TRACE TIME SIGNIFICANTLY WHEN LOOPING ON AN
ERROR OCCURRING IN ONE OF THESE TYPE OF LOOPS, SIMPLY
CHANGE THE "L20P" INSTRUCTION TO A "L200P" (JSR @IC7CE)
INSTRUCTION. THIS CAN BE DONE BY ENTERING THE OCTAL
DEBUG TOOL (OBT). THE CONSTANTS "IC7C" AND "IC7CE" ARE
IN PAGE ZERO. REFER TO THESE LABELS IN THE LISTING TO
OBTAIN THEIR RESPECTIVE ADDRESSES FOR THE COMMAND.

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12. SPECIAL NOTES/SPECIAL FEATURES:
-----
STARTING ADDRESS 4, ENTERED FROM THE INTERNAL OCTAL
DEBUGGER, IS THE NON-REMOVABLE HOME TRANSDUCER ALIGNMENT
PROCEDURE. THIS IS A STEP-BY-STEP SERIES OF INSTRUCTIONS
WHICH IS PRINTED ON THE OUTPUT DEVICE. THE INSTRUCTION
SEQUENCE IS SIMPLE AND SELF-EXPLANATORY.

RUN TIME:
-----
THE PROGRAM WILL TEST ALL DRIVES SPECIFIED FOR TESTING
ONE AT A TIME, STARTING WITH UNIT 0. THE PROGRAM PRINTS
AN END OF PASS MESSAGE AFTER ALL UNITS HAVE BEEN TESTED.
ON PASS # 1, ALL SUB-TESTS ARE PERFORMED ONCE ONLY (NO
MULTIPLE SURTEST ITERATION COUNTS). THE TIME FOR TWO
PASSES ON AN INDIVIDUAL DRIVE IS AS FOLLOWS:

DRIVE TYPE      TIME (FIRST TWO PASSES)
-----
DISKETTE        < 10 MINUTES (EACH)
NON-REMOVABLE  < 5 MINUTES

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10027 .MAIN

\*\*00000 TOTAL ERRORS, 00000 FIRST PASS ERRORS