

DataGeneral

**TECHNICAL
STATEMENT**

TEXT LISTING

068-000171-09

PROGRAM

MOVING HEAD DISK RELIABILITY
PROGRAM

TEXT TAPE

097-000171-09

ABSTRACT

THE MOVING HEAD DISK RELIABILITY PROGRAM IS A MAINTENANCE PROGRAM DESIGNED TO EXERCISE AND TEST THE 4046 DISK CONTROLLER AND 1-4 DISK DRIVES. THE DISK DRIVES MAY BE SHARED BETWEEN TWO COMPUTERS IN WHICH CASE THIS PROGRAM MAY BE RUNNING IN EACH COMPUTER.

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E. ERRORS - ERROR STATUS IS PRINTED
WHENEVER ENCOUNTERED. WHEN DATA ERRORS
ARE FOUND ONLY THREE ARE PRINTED PER
ENCOUNTER. (SEE PARAGRAPH 5)

SWITCH SETTINGS
SW1=0 FROM ERROR, GO SCOPE LOOP
SW1=1 FROM ERROR, GO TO NEXT TEST
SW2=1 INHIBIT TTY OUTPUT
SW3=1 OUTPUT TO LPT
SW6=1 HALT AFTER ERROR
SW7=1 INHIBIT CHECK WORD AND DATA ERROR MESSAGES
SW8=1 BREAK TO ALLOW DISK INTERCHANGE
SW9=1 FOR READ ONLY MODE

F. STATISTICS - TYPE ANY KEY DURING
RANDOM TESTING TO GET A REPORT OF THE
NUMBER OF WORDS WRITTEN AND READ, PLUS
THE NUMBER OF ERRORS.
*** NOTE ***
THE PROGRAM WILL ACCOUNT FOR UP TO A MAX.
OF 2*31 WORDS WRITTEN OR READ. SPECIAL
TEST RUNS EXCEEDING THIS FACILITY WILL
REQUIRE AN OPERATOR'S TEST LOG TO AUGMENT
SOFTWARE ACCOUNTING.

PROGRAM RUNTIME
PROGRAM RUNTIMES ARE SUBSTANTIALLY REDUCED WITH
MEMORIES OF 8K OR LARGER. RUNTIMES BELOW ARE FOR
AN 8K CORE MEMORY.

RUNTIME IS DEFINED AS TIME FROM
START TO A "PASS" MESSAGE. TYPICAL
RUNTIMES ARE LISTED AS FOLLOWS:
RUNALL (SA 2): APPROX. 27 MIN.
(NOVA 800, CORE, & 2 SURFACE DISK)
SEEKEXERCISER (SA 514): APPROX. 5 MIN.
(NOVA 800, CORE, & 2 SURFACE DISK)

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

PROGRAM DESCRIPTION

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A. RELIABILITY TEST (SA 200)
A RANDOM NUMBER GENERATOR IS USED TO SELECT A
DISK DRIVE, CYLINDER, HEAD, BEGINNING SECTOR,
AND NUMBER OF CONSECUTIVE SECTORS. RANDOM
DATA IS THEN GENERATED, WRITTEN, AND READ.
THE SEQUENCE IS REPEATED INDEFINITELY.

B. RELIABILITY TEST (SA 501)
SAME AS A. EXCEPT THAT ONLY EVEN
NUMBERED CYLINDERS ARE USED. THIS
ALLOWS A TWO COMPUTER SYSTEM TO RUN
SIMULTANEOUS RELIABILITY TESTS.

C. RELIABILITY TEST (SA 502)
SAME AS B. ONLY FOR ODD NUMBERED
CYLINDERS.

D. DISK ADDRESS TEST (SA 503)
RANDOM DATA IS FIRST WRITTEN THEN READ
FROM ALL SECTORS ON EACH READY DISK. THIS
INSURES THAT ALL DISK PACK SURFACES ARE
USABLE AND THAT THE DISK PACK IS FORMATTED
PROPERLY.

F. COMMAND STRING INTERPRETER (SA 505)
AS A TROUBLE SHOOTING AID THE SERVICE
ENGINEER MAY TYPE IN HIS OWN TEST LOOP.
AFTER STARTING AT 505, THREE ARGUMENTS
MUST BE ENTERED IN RESPONSE TO THREE
PROGRAM QUESTIONS: "UNIT", "DATA", AND
"COMMAND STRING".

I. UNIT: TYPE UNIT # OR CARRIAGE TO
USE THE PREVIOUS ENTRY

II. DATA:
RAN=RANDOM
AL=ALL ONES
AZ=ALL ZEROS
PAT=110110 PATTERN
FL=FLOATING ONE PATTERN
FLZ=FLOATING ZERO PATTERN
ALTERNATIVELY ENTER A STRING OF
OCTAL 16 BIT WORDS TO BE
USED AS DATA. THE WORDS
ENTERED ARE USED REPEATEDLY
TO MAKE UP A SECTOR BLOCK.
TYPE CARRIAGE TO USE THE
PREVIOUS ENTRY.

III. COMMAND STRING:
OPTIONS 1. READ HEAD, SECTOR, #SECTORS
2. WRITE SAME

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3. SEEK CYLINDER
4. RECALIBRATE
5. LOOP (GO TO BEGINNING)
6. DELAY (N) 12.5MS INCREMENTS
7. TYPE CARRIAGE TO USE THE PREVIOUS COMMAND STRING.

NOTE THAT EITHER SPACES OR A COMMA MAY BE USED AS AN ARGUMENT DELIMITER. EACH RESPONSE IS TERMINATED BY TYPING CARRIAGE RETURN. IF MORE ROOM IS NEEDED ON A LINE, TYPE LINE FEED TO SPACE TO THE NEXT LINE. THE WORD "SAME" USED WITH READ, OR WRITE, WILL CAUSE THE PREVIOUS DISK ADDRESS PARAMETERS TO BE USED.

THE FOLLOWING EXAMPLE WOULD CAUSE UNIT 1 TO REPEATEDLY SEEK CYLINDER 50, WRITE SECTORS 2 AND 3 WITH HEAD 5, THEN READ IT BACK AND CHECK. DATA IS SPECIFIED AS ALTERNATE WORDS OF ZEROS THEN ONES.

UNIT: 1
DATA: 0,177777
COMMAND STRING: SEEK 50 WRITE 5,2,2 READ SAME LOOP

6. ONES TEST (DATA = ALL 1'S)
ZEROS TEST (DATA = ALL 0'S)
110110 TEST (DATA = WORDS OF 1101101101101)
FLOATING ONE TEST (EACH SUCCESSIVE WORD CONTAINS ONE 1 BIT WHICH IS MOVED RIGHT ONE BIT EACH WORD)
FLOATING ZERO TEST (COMPLEMENT OF THE FLOATING 1 TEST)

EACH OF THE ABOVE USE THE BASIC DISK ADDRESS TEST, SUBSTITUTING THE APPROPRIATE DATA. ANY OF THESE PATTERNS INCLUDING THE RANDOM DATA USED FOR THE DISK ADDRESS TEST MAY BE RUN IN THE "READ ONLY" MODE. THIS IS USEFUL FOR CHECKING THE INTERCHANGEABILITY OF DISK PACKS BETWEEN VARIOUS DISK DRIVES.

TO GENERATE A DATA PATTERN START AT THE APPROPRIATE LOCATION AND SET SW8 TO 1. WHEN THE ENTIRE PACK HAS BEEN WRITTEN AND READ THE TELETYPE PRINTS "INTERCHANGE DISK" AND THE PROGRAM HALTS. THIS PACK MAY NOW BE READ FROM OTHER DISK DRIVES IN THE READ ONLY MODE (SW9=1).

15. ERROR REPORTING AND RECOVERY
ALL PHASES OF THE SOFTWARE WORK THROUGH 4 MAIN SUBROUTINES DESCRIBED BELOW. EACH SUBROUTINE HAS A NORMAL RETURN (+3) AND

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AN ERROR RETURN (+1). EACH SUBROUTINE WAITS FOR DISK COMPLETION WITH INTERRUPT ENABLED. A FAILURE TO DETECT INTERRUPT WITHIN 500MS (.3 SEC FOR RECALIBRATE) RESULTS IN A "TIMEOUT" ERROR.

RECALIBRATE - ANY UNUSUAL STATUS IS REPORTED IMMEDIATELY AND AN ERROR RETURN EXECUTED.

SEEK - SEEK ERROR STATUS INCREMENTS SEEK ERROR COUNTER. ANY ERROR STATUS RESULTS IN STATUS PRINTOUT.

WRITE - FOLLOWING "DONE" ON A WRITE, ERRORS ARE CHECKED IN THE SEQUENCE SHOWN BELOW. ERROR RECOVERY PROCEDURE IS OUTLINED FOR EACH CASE. IF THE ERROR IS NOT PRESENT THE NEXT CHECK IS MADE.

1. READ/WRITE DONE STATUS - IF NONE, INCREMENT THE MISC ERROR COUNT, PRINT ILLEGAL STATUS MESSAGE AND DO AN ERROR RETURN.

2. MISC STATUS BITS - (ANY SEEK DONE, ANY SEEKING BIT, SEEK ERROR, END CYLINDER, OR DATA LATE). IF ANY ERROR INCREMENT THE MISC ERROR COUNT. PRINT THE ILLEGAL STATUS, AND DO AN ERROR RETURN.

3. ADDRESS ERROR
3.1 FIRST TIME - INCREMENT ADDRESS ERROR COUNT AND REPEAT THE WRITE.
3.2 SECOND SUCCESSIVE FAILURE - INCREMENT PERMANENT ADDRESS ERROR COUNT AND DO A ERROR RETURN.

4. ENDING MEMORY ADDRESS - INCREMENT THE MISC ERROR COUNTER, PRINT THE ERROR MESSAGE, SET THE FATAL FLAG, AND GO TO 5.

5. ENDING DISK ADDRESS - INCREMENT THE MISC ERROR COUNTER, PRINT THE ERROR MESSAGE, SET THE FATAL FLAG, AND GO TO 6.

6. NO FURTHER CHECKS
6.1 FATAL SWITCH ON - DO A ERROR RETURN.
6.2 OTHERWISE - DO A NORMAL RETURN.

READ - FOLLOWING "DONE" ON A READ, ERRORS ARE CHECKED IN THE SEQUENCE SHOWN BELOW. ERROR RECOVERY PROCEDURE IS OUTLINED FOR EACH CASE. IF THE ERROR IS NOT PRESENT THE NEXT CHECK IS MADE.

1. READ/WRITE DONE STATUS - IF NONE, INCREMENT THE MISC ERROR COUNT, PRINT ILLEGAL STATUS MESSAGE AND DO AN ERROR RETURN.

2. MISC STATUS BITS - (ANY SEEK DONE, ANY SEEKING BIT, SEEK ERROR, END CYLINDER, OR DATA LATE). IF ANY ERROR INCREMENT THE MISC ERROR COUNT, PRINT THE ILLEGAL STATUS, AND DO AN ERROR RETURN.

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3. ADDRESS ERROR
3.1 FIRST TIME - INCREMENT ADDRESS ERROR COUNT
AND REPEAT THE HEAD.
3.2 SECOND SUCCESSIVE FAILURE - INCREMENT
PERMANENT ADDRESS ERROR COUNT AND DO A
ERROR RETURN.

4. CHECK WORD ERROR
4.1 FIRST TIME - INCREMENT THE CHECK WORD
ERROR COUNT AND SET THE RETRY FLAG. PRINT
"CHECK WORD ERROR" AND GO TO 5.
4.2 SECOND SUCCESSIVE ERROR - INCREMENT THE
PERMANENT CHECK WORD ERROR COUNTER AND SET
THE FATAL FLAG. PRINT "CHECK WORD ERROR"
AND GO TO 5.

5. DATA ERROR
5.1 FIRST TIME - SET THE RETRY FLAG AND PRINT
ERROR REPORT.
5.1.1 CHECK WORD ERROR - DECREMENT THE
CHECK WORD ERROR COUNTER AND INCREMENT
THE CHECK WORD & DATA ERROR COUNTER.
GO TO 6.
5.1.2 NO CHECK WORD ERROR - INCREMENT
THE DATA ERROR COUNTER AND GO TO 6.
5.2 SECOND SUCCESSIVE ERROR - SET THE FATAL
FLAG AND PRINT THE ERROR REPORT.
5.2.1 CHECK WORD ERROR - DECREMENT
THE PERMANENT CHECK WORD ERROR COUNTER
AND INCREMENT THE PERMANENT CHECK WORD
& DATA ERROR COUNTER. GO TO 6.
5.2.2 NO CHECK WORD ERROR - INCREMENT
THE PERMANENT DATA ERROR COUNTER.
GO TO 6.

6. ENDING MEMORY ADDRESS - INCREMENT THE MISC ERROR
COUNTER, PRINT THE ERROR MESSAGE, SET THE FATAL FLAG,
AND GO TO 7.

7. ENDING DISK ADDRESS - INCREMENT THE MISC ERROR
COUNTER, PRINT THE ERROR MESSAGE, SET THE FATAL FLAG,
AND GO TO 8.

8. NO FURTHER CHECKS
8.1 RETRY SWITCH ON - PRINT "TRY AGAIN"
AND REPEAT THE TEST.
8.2 FATAL SWITCH ON - DO A ERROR RETURN.
8.3 NO SWITCHES ON - DO A NORMAL RETURN.

.EOT
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