

TEXT LISTING

068-000471-04

PROGRAM

MOVING HEAD DISK FORMATTER

TEXT TAPE

097-000471-04

ABSTRACT

; THE 6060,6061,6067,6122 DISK FORMATTER PROGRAM IS A  
; UTILITY PROGRAM DESIGNED TO FORMAT AND CHECK DISK  
; PACKS TO BE USED ON THE 6060,6061,6067,6122 DISK SYSTEMS.

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10002 .MAIN

0001 .MAIN MACRO REV 06.30 00:04:30 11/09/79

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PROGRAM NAME: MHDZF.LR
6060,6061,6067,6122 MOVING HEAD DISK FORMATTER PROGRAM

REVISION HISTORY:
3. FIX OUTSTANDING DTR'S, CHANGE CSI SA TO 503 (CONSISTANT WITH THE RELIABILITY), AND IMPLEMENT DTOS I/O MODULE LINKS.
4. 6122 ADDITION.

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MACHINE REQUIREMENTS:

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NOVA/ECLIPSE FAMILY CENTRAL PROCESSOR
16K READ/WRITE MEMORY
TELETYPE OR CRT AND 4010 CONTROL
DGC 6060,6061,6067,6122 MOVING HEAD DISK SYSTEM
0-3 DGC 6060,6061,6067,6122-A ADD ON DISK DRIVES

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TEST REQUIREMENTS: N/A

SUMMARY:

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THE 6060,6061,6067,6122 DISK FORMATTER PROGRAM IS A UTILITY PROGRAM DESIGNED TO FORMAT AND CHECK DISK PACKS TO BE USED ON THE 6060,6061,6067,6122 DISK SYSTEMS. THE PROGRAM IS INTI A MAINTENANCE PROGRAM AND ASSUMES THE HARDWARE TO BE IN WORKING ORDER. THE PROGRAM WILL HALT ON ANY NON-DATA RELATED ERRORS. ALTHOUGH PRESSING CONTINUE WILL ALLOW THE PROGRAM TO PROCEED, IT IS NOT RECOMMENDED THAT THE PROGRAM BE RUN UNDER THESE CONDITIONS.

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THE CONTROL CAN BE ANY DEVICE 20-76 OCTAL
THE DEFAULT IS 27 # SEE 9.

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RESTRICTIONS:

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NAME: MHDZF.TX PART NUMBER: 097-000471

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DESCRIPTION: 6060,6061,6067,6122 MOVING HEAD DISK FORMATTER

REVISION HISTORY:

REV.	DATE
00	12/03/76
01	03/11/77
02	04/28/78
03	12/15/78
04	11/06/79

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NOTICE

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10003 \*MAIN

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PROGRAM DESCRIPTION/THEORY OF OPERATION:

A. FORMATTER PROGRAM (STARTING ADDRESS <SA> 500) THE DISK IS FIRST FORMATTED AFTER WHICH A FORMAT DONE MESSAGE IS PRINTED. THEN A 5555 PATTERN IS WRITTEN TO THE ENTIRE PACK AND READ BACK 2 TIMES, A RANDOM SEEK TEST IS PERFORMED, AND PASS IS PRINTED. THE DATA PATTERN IS THEN ROTATED 1 BIT AND THE WRITE/READ/READ/SEEK PROCESS IS REPEATED. AT THE COMPLETION OF THE NUMBER OF PASSES ENTERED BY THE OPERATOR, A LOG IS PRINTED AND THE DRIVES ARE RELEASED.

\*\*\*\*\* IT IS RECOMMENDED THAT AT LEAST 6 PASSES (W/R/R/S) BE ALLOWED (SEE TIMING 13.0) TO INSURE PACK QUALITY. IF TIME PERMITS, LONGER RUNS WILL FURTHER INSURE QUALITY. \*\*\*\*\*

BAD DATA OR ADDRESS ERRORS WILL RESULT IN THE "SOFT DATA" OR "ADDRESS ERROR" ADDRESS ENCOUNTERED TWICE CAUSE THE BAD SECTOR FLAG TO BE SET. ANY OTHER ERROR WILL CAUSE THE PROGRAM TO PRINT THE FAILURE TO THE TTY AND THE PROGRAM WILL HALT. #THIS PROGRAM IS NOT INTENDED TO BE A RELIABILITY PROGRAM FOR THE DISK SYSTEM AND IN GENERAL ASSUMES THE CONTROL AND DRIVE TO BE IN WORKING ORDER.

A HARD ADDRESS ERROR IS DEFINED AS SUCH AFTER TWO ATTEMPTS HAVE BEEN MADE BOTH RESULTING IN AN ADDRESS ERROR. A HARD DATA ERROR IS DEFINED AS SUCH AFTER 2 OR MORE OF 10 WRITE/READ RETRY'S HAVE BEEN UNSUCCESSFUL.

AB. CHECK PROGRAM ONLY (SA 501) SAME AS SA 500 EXCEPT THAT INITIAL PACK FORMAT OPERATION IS BYPASSED.

B. STATISTICS TYPE L FOR 1ST 100. DISK ADDRESSES OF BAD SECTORS, DATA AND ADDRESS ERRORS, PLUS A STATISTIC TABLE OF OVERALL ERRORS. \*\*NOTE\*\* ANY CHARACTER TYPED WHILE EXECUTING THIS LOG WILL END IT AT THE NEXT CHANGE OF DATA TYPE.

BA. LOG RECOVERY (SA 502) USE TO RECOVER LOG IF PROGRAM WAS STOPPED BEFORE LOG PRINTOUT.

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C. COMMAND STRING INTERPRETER (SA 503) AS A TROUBLE SHOOTING AID THE SERVICE ENGINEER MAY TYPE IN HIS OWN TEST LOOP. AFTER STARTING AT 503, THREE ARGUMENTS MUST BE ENTERED IN RESPONSE TO THREE PROGRAM QUESTIONS: "UNIT", "DATA", AND "COMMAND STRING". ALL NUMBERS MUST ENTERED IN OCTAL.

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

II. DATA: RAN-RANDOM  
ALZ-ALL ZEROS  
PAT=110110 PATTERN  
FLZ-FLOATING ZERO PATTERN  
ADR-ALTERNATING CYLINDER AND HEAD, SECTOR WORDS  
VAR-EXISTING WORDS ENTERED PREVIOUSLY AS DESCRIBED BELOW

ALTERNATIVELY ENTER A STRING OF UP TO 7 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.

10005 .MAIN

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      III.  COMMAND STRING:
      OPTIONS 1.  READ HEAD,SECTOR,#SECTORS
      2.  WRITE SAME
      3.  SEEK CYLINDER
      4.  RECALIBRATE
      5.  LOOP (GO TO BEGINNING OR LR)
      6.  DELAY N (N=DELAY IN MS)
      7.  DISABLE (WRITE DISABLE)
      8.  TRESPASS
      9.  STOP DISK
      10.  RELEASE
      11.  OFF (OFFSET FORWARD)
      12.  OFR (OFFSET REVERSE)
      13.  LR (BEGIN LOOP HERE)
      14.  VERIFY (WRITE)
      15.  FORMAT CYL,HD,SECTOR
      16.  BAD (BAD SECTOR) CYL,HD,SECTOR
      17.  TYPE CARRIAGE RETURN 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.

      AN R TYPED WHILE A STRING IS BEING EXECUTED WILL
      CAUSE THE PROGRAM TO RETURN TO COMMAND STRING START.
      THE ESCAPE KEY WILL BYPASS UNIT AND DATA PROMPTS TO
      THE COMMAND STRING PROMPT.

      THE FOLLOWING EXAMPLE WOULD CAUSE UNIT
      1 TO SEEK CYLINDER 50, THEN REPEATEDLY
      WRITE SECTORS 2 AND 3 OF 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 LR WRITE 5,2,2 READ SAME LOOP

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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

      SWITCH OPTIONS
      DIFFERENT BITS AND THEIR INTERPRETATION AT LOCATION
      "SWREG" IS AS FOLLOWS:
      BIT      OCTAL BINARY INTERPRETATION
      VALUE      VALUE
      1          40000 1      LOOP ON ERROR
      2          20000 1      SKIP LOOPING ON ERROR
      5          02000 1      PRINT TO CONSOLE
      11(B)      00020 1      ABORT PRINT OUT TO CONSOLE
      N/A
      0          00020 1      DO NOT PRINT ON THE LINE PRINTER
      1          00020 1      PRINT ON THE LINE PRINTER
      0          00020 1      N/A
      1          00020 1      ENABLE BAD SECTOR PRINTOUT

      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 COMPLETE THE STATE OF THE BIT AFFILIAT-
      ED 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)

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10007 .MAIN

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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 ODT (NOTE: THIS IS AN OPTIONAL COMMAND AND IS AVAILBLE ONLY IF OOTPK 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.

10008 .MAIN

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OPERATING PROCEEDURE/OPERATOR INPUT:

A. VERIFY DRIVE (DRIVES) ARE READY ON-LINE

B. LOAD PROGRAM USING BINARY LOADER

C. RESET ,LOAD ONE OF THE STARTING ADDRESSES SHOWN BELOW INTO THE DATA SWITCHES AND HIT START.

STARTING ADDRESS (SA)

4 SET DISK CONTROL ADDRESS TO OTHER THAN 27

11 ODT - DIRECT ENTRY ONLY

200 FORMATTER/CHECK PROGRAM

500 FORMATTER/CHECK PROGRAM

501 CHECK PROGRAM ONLY

502 ERROR LOG RECOVERY (SEE 7.8,8A)

503 COMMAND STRING INTERPRETER

OPERATOR IS REQUESTED TO ENTER A TTY BAUD RATE (IF RTC IS NOT PRESENT) FOR TIMING, MONTH, DAY, YEAR (I.E. 77.0.), HOUR, & MIN (IF ICR) IS GIVEN THIS ROUTINE IS BYPASSED), # PASSES FOR TEST COMPLETION (IF ICR) IS GIVEN THIS ROUTINE IS BYPASSED), UNIT NUMBERS TO BE TESTED(0-3), A DATA CHANNEL BLOCK SIZE (10 OR 20), 50, 96, OR 190 MEGABYTE.

OPERATOR INPUT CONTROLLED PRINTOUTS ARE AS FOLLOWS:

L = FIRST 100. BAD SECTORS, DATA, OR ADDRESSES

PROGRAM OUTPUT/ERROR DESCRIPTION:

1. ERRORS- ERROR STATUS IS PRINTED WHENEVER ENCOUNTERED. WHEN DATA ERRORS ARE FOUND ONLY THREE ARE PRINTED PER ENCOUNTER. (SEE PARAGRAPH 10.3)

2. IF ERRORS ARE ENCOUNTERED MORE THAN ONCE, A COUNT WILL BE RECORDED AND A BAD SECTOR FLAG SET. ALL ADDRESS INFO. WILL BE PRINTED IN OCTAL.

3. ERROR REPORTING AND RECOVERY

ALL ERRORS ARE IDENTIFIED, AND THE PROGRAM IS ROUTED VIA BASE TO A CALL TO CKSW. WITH THE EXCEPTION OF ADDRESS AND DATA ERRORS THE PROGRAM WILL THEN LOOP FOR OPERATOR INTERVENTION, ON THE BASIS OF SWPAK (SEE 6.)

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

SEEK - POSITIONNER FAULT STATUS RESULTS IN STATUS PRINTOUT AND ERROR RETURN.

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10009 *MAIN
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WRITE - FOLLOWING "DONE" ON A WRITE, ERRORS ARE
CHECKED IN THE SEQUENCE SHOWN BELOW.  ERROR
RECOVERY PROCEDURE IS OUTFINED FOR EACH CASE.
IF THE ERROR IS NOT PRESENT THE NEXT CHECK IS MADE.

DRIVE STATUS (DIB) IS CHECKED 1ST FOR BOTH READ AND
WRITE BEFORE ANY DIA CHECKS ARE MADE

4. READ/WRITE TIMEOUTS, DATA LATE, ILLEGAL SECTOR,
ECC(DATA OK), OR ANY DRIVE FAULT- PRINT THE ILLEGAL
STATUS AND DO AN ERROR RETURN.

5. ADDRESS ERROR- REPEAT THE WRITE, IF TEST PASSES
THE SECOND TIME, DO A NORMAL RETURN; OTHERWISE
FLAG AS HARD, SET THE BAD SECTOR FLAG FOR THAT SECTOR
AND DO AN ERROR RETURN.

IF A HARD CYLINDER ADDRESS ERROR OCCURS, A READ
ON AN ADJACENT HEAD WILL BE ATTEMPTED TO DETERMINE
WHETHER THE FAULT SHOULD BE CLASSED AS A SEEK ERROR
OR AN ADDRESS ERROR. THE FIRST 30. HARD ADDRESS
ERRORS WILL HAVE THEIR ADDRESSES LOGGED.

6. ENDING MEMORY ADDRESS -PRINT THE ERROR MESSAGE,
CHECK FOR A DISK ADDRESS AND DO AN ERROR RETURN.

7. ENDING DISK ADDRESS -PRINT THE ERROR MESSAGE AND
DO AN ERROR RETURN.

READ - ALL READ ERRORS WITH THE EXCEPTION OF DATA RELATED
ERRORS ARE HANDLED THE SAME AS DESCRIBED FOR THE WRITE
OPERATIONS

DATA ERRORS - DATA IS REREAD 9 TIMES.
IF DATA IS BAD ON 2 OR MORE OF
10. TRIES, A HARD ERROR COUNT IS INCREMENTED,
AND AN
THE BAD SECTOR FLAG IS SET IN THAT SECTOR, AND AN
ERROR RETURN IS TAKEN. IF DATA IS GOOD ON ALL RETRIES,
THE ERROR IS CONSIDERED SOFT AND A NORMAL RETURN IS
TAKEN.

THE 1ST 100. DATA ERRORS (HARD OR SOFT) ARE LOGGED.

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DEBUG HELP:
OP20D 11
OCTAL DEBUG TOOL (ODT)

THIS DIAGNOSTIC IS EQUIPPED WITH A BUILT IN ODT WHICH CAN
BE ACCESSED BY HITTING CONTROL 0 ("O") AT ANY TIME DURING
THE EXECUTION OF THE PROGRAM (AFTER SETTING THE PARA-
METERS).
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 RES-
POND 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. LEAD-
ING 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.

11.3.1 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
0-3 FOR ACCUMULATORS 0-3
4 FOR PC OF THE NEXT INSTRUCTION TO BE EXECUTED IN
THE EVENT OF A "P" COMMAND.
5 CPU AND I/O STATUS
BIT 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

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0011 .MAIN
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02 WITH OR WITHOUT MODIFICATION.
03 LINE FEED IS USED TO CLOSE THE OPEN CELL WITH OR
04 WITHOUT MODIFICATION AND TO OPEN THE SUCCEEDING
05 CELL.
06 CLOSE THE OPEN CELL WITH OR WITHOUT MODIFICATION
07 AND OPEN THE PRECEDING CELL
08 CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND
09 OPEN THE CELL POINTED TO BY ITS CONTENTS.
10 ++ADR#/ CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND
11 --ADR#/ OPEN THE CELL POINTED TO BY ITS CONTENTS.
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0012 .MAIN
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SPECIAL NOTES/SPECIAL FEATURES:
1. THE PROGRAM IS INTOTI A MAINTENANCE PROGRAM
AND ASSURES THE HARDWARE TO BE IN WORKING ORDER.
THE PROGRAM WILL HALT ON ANY NON-DATA RELATED
ERRORS. ALTHOUGH PRESSING CONTINUE WILL ALLOW
THE PROGRAM TO PROCEED, IT IS NOT RECOMMENDED
THAT THE PROGRAM BE RUN UNDER THESE CONDITIONS.
2. IT IS RECOMMENDED THAT AT LEAST 6 PASSES (W/R/R/S)
BE ALLOWED (SEE BELOW) TO INSURE PACK QUALITY.
IF TIME PERMITS, LONGER RUNS WILL FURTHER
INSURE QUALITY.

11.3.1 PROGRAM RUNTIME:
PROGRAM RUNTIMES ARE SUBSTANTIALLY REDUCED WITH
MEMORIES OF 24K OR LARGER. RUNTIMES BELOW ARE FOR
A NOVA 800 OR FASTER CPU WITH 32K CORE MEMORY.
RUNTIME IS DEFINED AS TIME FROM
START TO A "PASS" MESSAGE.
INITIAL FORMAT PASS ~
50 MB - 2:00 MINUTES
96 MB - 4:00 "
190MB - 8:00 "
277MB - 8:00 "
SUBSEQUENT WRITE/READ/SEEK PASSES -
50 MB - 9:00 MINUTES
96 MB - 13:00 "
190MB - 25:00 "
277MB - 25:00 " **ECLIPSE S/250 WITH BMC
SIX PASSES AFTER FORMAT ARE RECOMMENDED FOR
SURFACE VERIFICATION.
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).
TYPE 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.

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!0013 .MAIN

\*\*00000 TOTAL ERRORS, 00000 PASS 1 ERRORS

0014 .MAIN

070TD 000520 MC 10/02