DataGeneral

TECHNICAL STATEMENT

TEXT LISTING

068-000174-15

PROGRAM

MAGNETIC TAPE RELIABILITY

TEXT TAPE

097-000174-15

ABSTRACT

THE TAPE CONTROL RELIABILITY IS A MAINTENANCE PROGRAM INTENDED FOR RIGOROUS TESTING OF A SYSTEM THAT HAS SUCCESSFULLY RUN THE DIAGNOSTIC TEST AND THE TIMING TEST.

```
 0001 .MAIN    MACRO REV 06.30          09:58:41 03/19/79
01
02
03
04
05
06
07              ;*****************************************************************
08              ;
09              ; NAME: MTR.TX                              PART NUMBER: 097-000174
10              ;
11              ;
12              ; DESCRIPTION: MAG TAPE RELIABILITY
13              ;                TEXT FILE
14              ;
15              ;
16              ; REVISION HISTORY:
17              ;
18              ;       REV.            DATE
19              ;
20              ;       00              09/15/70
21              ;       01              01/15/71
22              ;       02              03/12/71
23              ;       03              05/26/72
24              ;       04              11/16/72
25              ;       05              11/15/74
26              ;       06              XX/XX/XX
27              ;       07              XX/XX/XX
28              ;       08              XX/XX/XX
29              ;       09              XX/XX/XX
30              ;       10              12/05/75
31              ;       11              04/09/76
32              ;       12              08/06/76
33              ;       13              04/15/77
34              ;       14              12/02/77
35              ;       15              03/16/79
36              ;
37              ;
38              ; COPYRIGHT (C) DATA GENERAL CORPORATION, 1970,1971,1972,1974
39              ; 1975,1976,1977,1979
40              ; ALL RIGHTS RESERVED.
41              ; LICENSED MATERIAL-PROPERTY OF DATA GENERAL CORPARATION.
42              ;*****************************************************************
```

```
10002 .MAIN
01              ;1      PROGRAM NAME
02              ;
03              ;       MTR.SR, NRZI MAGNETIC TAPE RELIABILITY
04              ;
05              ;2      REVISION HISTORY
06              ;
07              ;       15.     INSERT DLIB STANDARD SUBROUTINES, AND
08              ;               MODIFIY ERROR REPORTING PRINTOUTS.
09              ;
10              ;3      MACHINE REQUREMENTS
11              ;
12              ;       3.1     NOVA OR ECLIPSE FAMILY CPU'S
13              ;
14              ;       3.2     MINIMUM OF 16K MEMORY
15              ;
16              ;       3.3     4030 CONTROLLER BOARD
17              ;
18              ;       3.4     TELETYPE OR CRT AND CONTROLLER
19              ;
20              ;       3.5     6020 SERIES TAPE DRIVE
21              ;
22              ;4      TEST REQUIREMENTS
23              ;
24              ;       N/A
25              ;
26              ;5      SUMMARY
27              ;
28              ;       THE TAPE RELIABILITY PROGRAM IS A MAINTENANCE
29              ;       PROGRAM INTENDED TO VERIFY THE MAGNETIC TAPE
30              ;       SUB-SYTEM OPERATION. THE VERIFICATION IS PER-
31              ;       FORMED BY RIGOROUSILY TESTING THE SUB-SYSTEM
32              ;       AND ACCUMULATING THE ERRORS.
33              ;
34              ;       STARTING ADDRESS(SA) 500 FOR RANDOM RELIABILITY
35              ;
36              ;       SA 501 AND 502 FOR INTERCHANGE TESTS
37              ;
38              ;       SA 503 FOR COMMAND STRING INTERPRETER
39              ;
40              ;6      RESTRICTIONS
41              ;
42              ;       BEFORE ATTEMPTING THIS TEST, THE DIAGNOSTIC
43              ;       AND TIMING TESTS MUST HAVE BEEN SUCCESSFULLY
44              ;       RUN.
45              ;
46              ;       ONLY THOSE TAPE DRIVES TO BE TESTED ARE TO
47              ;       BE ONLINE.
48              ;
49              ;       ALL ONLINE DRIVES MUST BE WRITE ENABLED.
```

```
01              ;7      PROGRAM DESCRIPTION/THEORY OF OPERATION
02              ;
03              ;       7.1     RANDOM RELIABILITY (SA 500)
04              ;
05              ;               THE RANDOM RELIABILITY TEST WRITES RANDOM
06              ;               LENGTH FILES. EACH FILE CONSISTS OF FROM
07              ;               1 TO 7 RANDOM LENGTH, RANDOM PATTERN REC-
08              ;               ORDS. THE RANDOM FILES ARE WRITTEN AND
09              ;               READ THE FULL LENGTH OF THE MEDIA. IF
10              ;               MORE THAN ONE(1) TAPE DRIVE IS AVAILABLE,
11              ;               A UNIQUE RANDOM FILE WILL BE WRITE ON EACH
12              ;               UNIT SEQUENTIALILY. WHEN EACH UNIT'S EOT
13              ;               SENSOR IS DETECTED, ITS ACCUMULATED
14              ;               HISTORY IS PRINTED AND THE UNIT IS COM-
15              ;               MANDED TO REWIND. ALL WRITE ENABLED,
16              ;               READY TAPE UNITS WILL BE TESTED. A UNIT
17              ;               CAN BE MADE READY AND WILL BE TESTED AFTER
18              ;               THE TEST HAS BEEN INITIATED. IF A UNIT
19              ;               BECOMES NOT READY DURING THE TEST, ITS
20              ;               HISTORY WILL BE PRINTED AND THE UNIT
21              ;               WILL BE REMOVED FROM THE AVAILABLE UNITS
22              ;               LIST. THE TEST WILL CONTINUE UNTIL STOPPED
23              ;               BY THE OPERATOR.
24              ;
25              ;       7.2     INTERCHANGE TEST, WRITE/READ (SA 501)
26              ;
27              ;               THE INTERCHANGE TEST IS USED TO VERIFY THE
28              ;               INTERCHANGABLITY OF THE TAPE UNITS. THIS
29              ;               TEST GENERATES 200, 2000 WORD RECORDS OF
30              ;               SKEW PATTERNS FOLLOWED BY 200, 2000 WORD
31              ;               RECORDS OF RANDOM DATA. AFTER ALL THE
32              ;               ONLINE, WRITE ENABLED UNITS HAVE BEEN
33              ;               WRITTEN, THEY ARE ALL READ TO INSURE
34              ;               PROPER WRITTING. THE OPERATOR THEN INTER-
35              ;               CHANGES THE TAPES AND PERFORMS ANOTHER
36              ;               READ VERIFICATION. THIS PROCEDURE IS CON-
37              ;               TINUED UNTIL EACH TAPE HAS BEEN READ BY
38              ;               ALL THE UNITS. AFTER EACH READ, A SUMMARY
39              ;               OF THE ACCUMULATED STATISTICS FOR EACH
40              ;               UNIT IS PRINTED. AFTER ALL THE UNITS HAVE
41              ;               BEEN READ, A TEST COMPLETE MESSAGE IS
42              ;               PRINTED. IF THE OPERATOR WISHES TO CON-
43              ;               TINUE THE TEST, TYPING A 'P' CHARACTER
44              ;               WILL REPEAT THE ENTIRE TEST.
45              ;
46              ;       7.3     INTERCHANGE, READ ONLY (SA 502)
47              ;
48              ;               THE READ ONLY INTERCHANGE TEST PROVIDES
49              ;               A MEANS OF TESTING TAPE UNITS WITH PRE-
50              ;               RECORDED TAPES. THE TAPES MUST BE RECORDED
51              ;               IN THE FORMAT DESCRIBIED BY SECTION 7.2.
52              ;               THE READ OPERATION IS IDENTICAL TO
53              ;               SECTION 7.2.
```



```
01              ;       7.4     COMMAND STRING INTERPRETER (SA 504)
02              ;
03              ;               THE COMMAND STRING INTERPRETER PROVIDES
04              ;               A TROUBLE SHOOTING AID TO ISOLATE A
05              ;               FAULT. THE OPERATOR CAN SELECT ALL POS-
06              ;               IBLE OPERATING MODES BY RESPONDING TO
07              ;               CONSOLE REQUESTS. ALL NUMBERS MUST BE
08              ;               ENTERED IN OCTAL.
09              ;
10              ;               7.4.1   UNIT
11              ;
12              ;                       UNIT NUMBER AND/OR CARRIAGE
13              ;                       RETURN TO USE PREVIOUS COMMAND
14              ;                       STRING. IF ONLY A CARRIAGE
15              ;                       RETURN IS TYPED, NO OTHER RE-
16              ;                       QUESTS WILL BE MADE AND THE LAST
17              ;                       ENTERED COMMAND STRING WILL BE
18              ;                       RUN. THE ENTRY IS IN THE RANGE
19              ;                       OF 0 TO 7. THE DEFAULT UNIT NUM-
20              ;                       BER IS 0.
21              ;
22              ;               7.4.2   WC (WORD COUNT)
23              ;
24              ;                       TYPE AN OCTAL NUMBER TO SELECT
25              ;                       THE DATA BLOCK SIZE AND/OR A
26              ;                       CARRIAGE RETURN TO USE THE PRE-
27              ;                       VIOUS ENTRY. THE DEFAULT VALUE
28              ;                       IS THE MAXIMUM BLOCK SIZE. THE
29              ;                       ENTRY IS IN THE RANGE OF 2 TO
30              ;                       THE MAXIMUM BLOCK SIZE.
31              ;
32              ;               7.4.3   DATA
33              ;
34              ;                       SELECT ONE OF THE FOLLOWING DATA
35              ;                       PATTERNS AND/OR A CARRIAGE RETURN
36              ;                       TO USE THE PREVIOUS ENTRY. THE
37              ;                       DEFAULT PATTERN IS RANDOM.
38              ;
39              ;                       RAND - RANDOM
40              ;                       ALL1 - ALL ONE'S
41              ;                       ALL0 - ALL ZERO'S
42              ;                       ALT0 - ALTERNATING ZERO/ONE (000377)
43              ;                       ALT1 - ALTERNATING ONE/ZERO (177400)
44              ;                       FLT0 - FLOATING ZERO
45              ;                       FLT1 - FLOATING ONE
46              ;                       SKEW - SKEW
47              ;                       VARIABLE - THE VARIABLE PATTERN IS
48              ;                                  ENTERED BY THE OPERATOR
49              ;                                  AS OCTAL CHARACTER STRINGS.
50              ;                                  UP TO 8, 16 BIT OCTAL NUMBERS
51              ;                                  CAN BE ENTERED. THE DATA
52              ;                                  BUFFER IS BUILT BY REPEATING
53              ;                                  THE ENTERED CHARACTER STRINGS.
```

7.4.4 PARITY

TYPE 'EVEN' OR 'ODD' AND/OR CARRIAGE RETURN TO SELECT THE PARITY OR USE THE PREVIOUS ENTRY. THE DEFAULT PARITY IS ODD.

7.4.5 COMMAND STRING

THE OPERATOR CAN SELECT THE SUB-SYSTEM OPERATION BY TYPING THE DESIRED COMMANDS AND/OR CARRIAGE RETURN. ALL N(NUMBER) ENTRIES MUST BE IN OCTAL. IF THE COMMAND STRING EXCEEDS THE LINE LENGTH, TYPE A LINEFEED TO CONTINUE ON THE NEXT LINE. THE FOLLOWING IS A LIST OF AVAILABLE SUB-SYSTEM COMMANDS.

RD N	READ N RECORDS
RW	REWIND
RU	REWIND AND UNLOAD
SB N	SPACE BACK N RECORDS
SF N	SPACE FORWARD N RECORDS
WT N	WRITE N RECORDS
WE	WRITE END OF FILE MARK
ER	ERASE 3" OF TAPE
RE	READ END OF FILE MARK
LOOP	LOOP BACK TO FIRST COMMAND
*	LOOP TO HERE
LOOP *	LOOP TO *

NOTE: THE REWIND AND UNLOAD COMMAND ONLY PERFORMS A REWIND OF THE SELECTED UNIT. THIS MODEL TAPE UNIT DOES NOT HAVE AN UNLOAD CAPABILITY.

SAMPLE COMMAND STRINGS

```
RW WT 10 SB 10 RD 10 LOOP
```

THE ABOVE COMMAND STRING WILL REWIND, WRITE 8 RECORDS, SPACE BACK 8 RECORDS, AND READ 8 RECORDS. THIS TEST WILL CONTINUE UNTIL STOPPED BY THE OPERATOR.

```
RW,WT 10,WE * RW,SF,10,SB,10,RD,10,RE,
LOOP *
```

THE ABOVE COMMAND STRING WILL REWIND, WRITE 8 RECORDS, WRITE AN EOF MARK, AND THEN LOOP ON REWIND, SPACE FORWARD 8 RECORDS, SPACE BACK 8 RECORDS, READ 8 RECORDS AND READ EOF MARK.

NOTE: EITHER A SPACE OR COMMA CAN BE USED AS AN ARGUEMENT DELIMITER. IF AN INCORRECT CHARACTER OR CHARACTERS ARE TYPED, TYPE A RUB-OUT CHARACTER TO DELETE THE PREVIOUSLY TYPED CHARACTER. THE DELETED CHARACTER WILL BE PRINTED.

WHILE THE COMMAND STRING IS BEING EXECUTED, TYPE A 'R' CHARACTER TO CAUSE THE PROGRAM TO RETURN TO THE UNIT PROMPT. THE ESCAPE KEY WILL CAUSE THE PROGRAM TO RETURN TO THE COMMAND STRING ENTRY POINT.

7.5 HISTORY RECOVERY (SA 504)

IF THE PROGRAM HAS STOPPED DURING AN OPERATION, THE ACCUMULATED ERROR AND PASS HISTORY CAN BE RECOVERED BY THIS PROGRAM. THIS PROGRAM MUST BE RUN BEFORE ANY OTHER PROGRAM IS RESTARTED.

TO RETRIEVE THE ACCUMULATED ERROR AND PASS HISTORY WHILE THE RELIABILITY TEST IS RUNNING, TYPE A ^(CONTROL)H. THIS WILL CAUSE THE ACCUMULATED HISTORIES OF ALL TESTED UNITS TO BE PRINTED.

```
10007 .MAIN
01              ;8      SOFT SWITCH REGISTER SETTINGS
02              ;
03              ;       8.1     SWITCH SETTINGS
04              ;
05              ;               LOCATION "SWREG" IS USED TO SELECT THE PROGRAM
06              ;               OPTIONS (NOT SYSTEM CONFIGURATION). WHILE RUN-
07              ;               NING UNDER DTOS, THIS LOCATION WILL BE LOADED
08              ;               BY THE MONITOR. HOWEVER; UNDER STAND ALONE AND
09              ;               PROGRAM LOAD MODES, THIS LOCATION WILL BE SET
10              ;               ACCORDING TO THE RESPONSES SUPPLIED BY THE
11              ;               OPERATOR. IN ANY CASE, THE OPTIONS CAN BE CHANG-
12              ;               ED OF VERIFIED BY USING ONE OF THE COMMANDS
13              ;               GIVEN IN SECTION 8.3.
14              ;
15              ;       8.2     SWITCH OPTIONS
16              ;
17              ;               DIFFERENT SWITCH BITS AND THEIR INTERPRETATION
18              ;               AT LOCATION "SWREG" ARE AS FOLLOWS:
19              ;
20              ;               BIT     OCTAL   BINARY  INTERPRETATION
21              ;                       VALUE   VALUE
22              ;
23              ;               2       20000   0       ENABLE PRINT ON CONSOLE
24              ;                               1       INHIBIT PRINT ON CONSOLE
25              ;
26              ;               5       02000   0       INHIBIT LINEPRINTER
27              ;                               1       ENABLE LINEPRINTER
28              ;
29              ;               7       00400   0       ENABLE PRINT PARITY ERRORS
30              ;                               1       INHIBIT PRINT PARITY ERRORS
```

```
10008 .MAIN
01              ;       8.3     SWITCH SETTING COMMANDS
02              ;
03              ;               THE STATE OF ANY OF THE SWITCH BITS CAN BE
04              ;               CHANGED BY HITTING KEYS 1-9, A-F. THE PROGRAM
05              ;               WILL CONTINUE RUNNING AFTER UPDATING THE OPTION.
06              ;               EACH KEY WILL COMPLEMENT THE STATE OF THE BIT
07              ;               AFFILATED WITH IT. BIT 4 CAN BE ALTERED BY HIT-
08              ;               TING KEY 4, BIT 15 CAN BE ALTERED BY HITTING
09              ;               KEY F. THE SETTING OF ANY BIT WILL SET BIT 0.
10              ;               THE DEFAULT MODE IS DETERMINED BY THE PROGRAM.
11              ;
12              ;       8.4     CONSOLE CONTROL COMMANDS
13              ;
14              ;               THE FOLLOWING COMMANDS, WHEN TYPED AT THE CON-
15              ;               SOLE, WILL INITIATE THE DESCRIBED OPERATION.
16              ;
17              ;               ^D      THIS COMMAND GIVEN AT ANY TIME WILL RE-
18              ;                       SET THE SOFT SWITCH REGISTER TO THE DE-
19              ;                       FAULT CONDITION AND RESTART THE PROGRAM.
20              ;
21              ;               ^R      THIS COMMAND GIVEN AT ANY TIME WILL
22              ;                       RESTART THE PROGRAM WITHOUT RESETTING
23              ;                       THE SOFT SWITCH REGISTER TO THE DEFAULT
24              ;                       CONDITION.
25              ;
26              ;               ^O      THIS COMMAND GIVEN AT ANY TIME WILL
27              ;                       CAUSE THE PROGRAM CONTROL TO ENTER
28              ;                       THE OCTAL DEBUGGER (ODT) PROGRAM.
29              ;
30              ;               ^H      THIS COMMAND GIVEN AT ANY TIME WILL
31              ;                       PRINT THE HISTORY OF ALL ACCUMULATED
32              ;                       ERRORS AND COUNTERS.
33              ;
34              ;               R       THIS COMMAND GIVEN WHILE RUNNING THE
35              ;                       ENTERED COMMAND STRING WILL CAUSE THE
36              ;                       PROGRAM TO RESTART AT THE UNIT PROMPT.
37              ;
38              ;               "ESC"   THIS COMMAND GIVEN WHILE RUNNING THE
39              ;                       ENTERED COMMAND STRING WILL CAUSE THE
40              ;                       PROGRAM TO RESTART AT THE COMMAND STRING
41              ;                       ENTER PROMPT.
42              ;
43              ;               M       THIS COMMAND GIVEN AT ANY TIME WILL
44              ;                       PRINT THE CURRENT CONDITION OF THE SOFT
45              ;                       SWITCH REGISTER.
46              ;
47              ;               0       THIS COMMAND GIVEN AT ANY TIME WILL LOCK
48              ;                       THE PROGRAM IN THE SOFT SWITCH REGISTER
49              ;                       MODIFICATION MODE WHERE MORE THAN ONE(1)
50              ;                       BIT CAN BE CHANGED.
51              ;
52              ;               "CR"    A CARIAGE RETURN WILL RETURN PROGRAM
53              ;                       CONTROL TO THE OPERATING PROGRAM AFTER
54              ;                       BEING LOCKED IN THE MODIFICATION MODE.
55              ;
56              ;               NOTE:   THE "^" CHARACTER INDICATES THE CONTROL
57              ;                       KEY.
```

```
!0009 .MAIN
01              ;9      OPERATING PROCEDURES/OPERATOR INPUT
02              ;
03              ;       9.1     PROGRAM LOAD
04              ;
05              ;               LOAD THE PROGRAM BY USING THE BINARY LOADER
06              ;               OR THE DTOS LOADER.
07              ;
08              ;       9.2     STARTING ADDRESSES
09              ;
10              ;               SA      PROGRAM FUNCTION
11              ;
12              ;               4       DIRECT ENTRY TO OCTAL DEBUGGER (ODT)
13              ;               200     DTOS PROGRAM START, START RELIABILITY
14              ;               500     START RELIABILITY TEST
15              ;               501     START INTERCHANGE TEST, WRITE/READ
16              ;               502     START INTERCHANGE TEST, READ ONLY
17              ;               503     START COMMAND STRING INTERPRETER
18              ;               504     DIRECT ENTRY FOR ERROR LOG RECOVERY
19              ;
20              ;       9.3     PROGRAM OPERATION
21              ;
22              ;               9.3.1   INITIALIZATION
23              ;
24              ;                       THE CONSOLE I/O SYSTEM IS INITIALIZED
25              ;                       BY TESTING FOR I/O MODULE AND SETTING
26              ;                       UP THE SYSTEM CONSOLE I/O CALLS.
27              ;
28              ;                       ALL ERROR AND PASS COUNTERS ARE CLEARED
29              ;                       AND LOCATION "SWREG" IS SET FOR ITS
30              ;                       DEFAULT VALUE. THE FOLLOWING MESSAGE IS
31              ;                       PRINTED REQUESTING THE SETTING OF THE
32              ;                       SOFT SWITCH REGISTER.
33              ;
34              ;       "SET SWITCH REGISTER TO DESIRED VALUE, TYPE CR TO CONTINUE."
35              ;       M
36              ;       0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
37              ;       1   1   0   0   0   0   0   0   0   0   0   0   0   0   0   0
38              ;
39              ;       0
40              ;
41              ;                       MODIFY THE SWITCH REGISTER SETTING AS
42              ;                       DESCRIBIED IN SECTION 8.3, FOLLOWED BY
43              ;                       A CARRIAGE RETURN. THE FOLLOWING MESSAGES
44              ;                       WILL BE PRINTED.
45              ;
46              ;       "MAGNETIC TAPE RELIABILITY TEST, REV 15"
47              ;       "STARTING ADDRESS = 500"
48              ;
49              ;                       IF  A REAL TIME CLOCK IS NOT PRESENT IN
50              ;                       THE SYSTEM, THE FOLLOWING MESSAGE WILL
51              ;                       BE PRINTED.
52              ;
53              ;       "TTO BAUD RATE = ?"
54              ;
55              ;                       RESPOND TO THE REQUEST BY TYPING THE
56              ;                       CORRECT CONSOLE DEVICE BAUD RATE FOR
57              ;                       I/O TIMING CALIBRATION. IF THE RESPONSE
58              ;                       IS 110, THE FOLLOWING REQUEST MESSAGE
59              ;                       WILL BE PRINTED.
```

```
!0010 .MAIN
01              ;       "(ONLY DASHER AT 110 BAUD = 10 BITS/CHAR"
02              ;       "OTHERWISE = 11 BITS/CHAR.)"
03              ;       "# BITS/CHAR = ?"
04              ;
05              ;                       RESPOND TO THE REQUEST BY TYPING 10 OR
06              ;                       11.
07              ;
08              ;                       A REQUEST TO CHANGE THE DEVICE CODE IS
09              ;                       MADE AS FOLLOWS:
10              ;
11              ;       "DEVICE CODE = 22, CHANGE DEVICE CODE(N OR Y AND CR)?"
12              ;
13              ;                       ANSWER THE REQUEST BY TYPING A "N" OR
14              ;                       "Y" FOLLOWED BY A CARRIAGE RETURN. IF
15              ;                       A "Y" IS TYPED THE FOLLOWING MESSAGE
16              ;                       IS PRINTED.
17              ;
18              ;       "DEVICE CODE = "
19              ;
20              ;                       ANSWER THE REQUEST BY TYPING OCTAL 22
21              ;                       OR 62. IF ANY OTHER DEVICE CODE IS
22              ;                       SELECTED, THE DEVICE CODE ENTRY PROMPT
23              ;                       WILL BE PRINTED AGAIN.
24              ;
25              ;               9.3.2   PROGRAM ENTRY
26              ;
27              ;                       WHEN ENTERING THE RELIABILITY PROGRAM,
28              ;                       THE FOLLOWING MESSAGE WILL BE PRINTED
29              ;
30              ;       "MOUNT SCRATCH TAPE(S), HIT ANY KEY TO CONTINUE."
31              ;
32              ;                       THE OPERATOR SHOULD MAKE READY ALL TAPE
33              ;                       UNITS TO BE TESTED. ANY TAPE UNIT THAT
34              ;                       IS ONLINE WILL BE TESTED. AFTER ALL
35              ;                       UNITS ARE READY, HIT ANY KEY ON THE CON-
36              ;                       SOLE TO CONTINUE.
37              ;
38              ;                       NOTE:   SOME CONSOLE KEYS ARE USED FOR
39              ;                               COMMANDS AND CHANGING LOCATION
40              ;                               "SWREG". THE OPERATOR SHOULD USE
41              ;                               DESCRETION HITTING A KEY.
42              ;
43              ;               9.3.3   INTERCHANGE TEST, WRITE/READ
44              ;
45              ;                       ENTRY TO THE INTERCHANGE TEST IS IDENT-
46              ;                       ICAL TO THE RELIABILITY TEST WITH THE
47              ;                       FOLLOWING EXCEPTION.
48              ;
49              ;       "MAGNETIC TAPE INTERCHANGE TEST(WRITE/READ), REV 15"
50              ;       "STARTING ADDRESS = 501"
51              ;
52              ;                       AFTER THE INITIALIZATION SECTION, THE
53              ;                       FOLLOWING MESSAGE IS PRINTED.
54              ;
55              ;       "MOUNT SCRATCH TAPE(S), HIT ANY KEY TO CONTINUE."
56              ;
57              ;                       MAKE READY ALL TAPE UNITS TO BE TESTED
58              ;                       AND HIT ANY KEY TO CONTINUE.
```

```
!0011 .MAIN
01              ;               9.3.4   INTERCHANGE TEST, READ ONLY
02              ;
03              ;                       ENTRY TO THE INTERCHANGE TEST IS
04              ;                       IDENTICAL TO THE RELIABILITY TEST
05              ;                       WITH THE FOLLOWING EXCEPTION.
06              ;
07              ;       "MAGNETIC TAPE INTERCHANGE TEST(READ ONLY), REV 15"
08              ;       "STARTING ADDRESS = 502"
09              ;
10              ;                       AFTER THE INTIALIZATION SECTION THE
11              ;                       FOLLOWING MESSAGE IS PRINTED.
12              ;
13              ;       "MOUNT PRE-RECORDED TAPE(S), HIT ANY KEY TO CONTINUE."
14              ;
15              ;                       MOUNT PRE-RECORDED TAPES ON ALL TAPE
16              ;                       UNITS TO BE TESTED AND HIT ANY KEY.
17              ;
18              ;       9.4     COMMAND STRING INTERPRETER
19              ;
20              ;               9.4.1   INITIALIZATION
21              ;
22              ;                       ALL ERROR AND PASS COUNTERS ARE CLEARED
23              ;                       AND THE FOLLOWING REQUEST MESSAGE IS
24              ;                       PRINTED.
25              ;
26              ;       "SET SWITCH REGISTER TO DESIRED VALUE, TYPE CR TO CONTINUE"
27              ;       M
28              ;       0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
29              ;       X   X   X   X   X   X   X   X   X   X   X   X   X   X   X   X
30              ;
31              ;       0
32              ;
33              ;                       NOTE:   THE "X" VALUE INDICATE THE UN-
34              ;                               KNOWN STATE OF THE COMMAND BITS.
35              ;
36              ;                       RESPOND TO THE REQUEST BY SETTING THE
37              ;                       "SWREG" LOCATION AS DESCRIBED BY SECTION
38              ;                       8.3, FOLLOWED BY A CARRIAGE RETURN.
39              ;
40              ;                       THE MEMORY IS SIZED NEXT AND THE TIME
41              ;                       BASE IS CALIBRATED. IF A REAL TIME CLOCK
42              ;                       IS NOT PRESENT IN THE SYSTEM, THE FOL-
43              ;                       LOWING REQUEST IS PRINTED.
44              ;
45              ;       "TTO BAUD RATE = ?"
46              ;
47              ;                       RESPOND TO THE REQUEST BY TYPING THE
48              ;                       CORRECT CONSOLE DEVICE BAUD RATE. IF THE
49              ;                       RESPONSE IS 110, THE FOLLOWING REQUEST
50              ;                       MESSAGE WILL BE PRINTED.
51              ;
52              ;       "(ONLY DASHER AT 110 BAUD = 10 BITS/CHAR"
53              ;       "OTHERWISE = 11 BITS/CHAR.)"
54              ;       "# BITS/CHAR = ?"
55              ;
56              ;                       RESPOND TO THE REQUEST BY TYPING 10 OR
57              ;                       11
```

```
!0012 .MAIN
01              ;               9.4.2   PROGRAM ENTRY
02              ;
03              ;                       THE FOLLOWING MESSAGES ARE PRINTED
04              ;                       INDICATING THE ENTRY TO THE COMMAND
05              ;                       STRING INTERPRETER.
06              ;
07              ;       "COMMAND STRING INTERPRETER"
08              ;       "MAXIMUM WORD COUNT = XXXX"
09              ;
10              ;                       NOTE:   THE MAXIMUM WORD COUNT VALUE
11              ;                               INDICATES THE LARGEST DATA
12              ;                               BUFFER AVAILABLE.
13              ;
14              ;                       THE SUB-SYSTEM DEFAULT VALUES ARE SET
15              ;                       AS FOLLOWS:
16              ;
17              ;                       UNIT    0
18              ;                       WC      SET TO MAXIMUM WORD COUNT
19              ;                       DATA    RANDOM PATTERN
20              ;                       PARITY  ODD
21              ;
22              ;                       WHEN THE "UNIT" PROMPT IS TYPED, REFER
23              ;                       TO SECTION 7.4, FOR PROGRAM OPERATION.
```

```
!0013 .MAIN
01              ;10     PROGRAM OUTPUT/ERROR DESCRIPTION
02              ;
03              ;       ALL ERRORS ARE IDENTIFIED, COUNTED AND PRINTED ON
04              ;       THE BASIS OF THE SETTTING OF LOCATION "SWREG".
05              ;
06              ;       IF A UNIT GOES NOT READY, AN APPROPRIATE ERROR
07              ;       MESSAGE AND ITS ACCUMULATED STATISTICAL HISTORY
08              ;       IS PRINTED. IF ONLY ONE(1) UNIT IS BEING TESTED,
09              ;       AN APPROPRIATE MEESAGE WILL BE PRINTED AND THE
10              ;       PROGRAM WILL WAIT FOR OPERATOR INTERVENTION. IF
11              ;       MORE THAN ONE UNIT IS AVAILABLE, THE TEST PROCESS
12              ;       WILL CONTINUE.
13              ;
14              ;       ALL ERRORS ARE SOFT UNLESS SPECIFIED AS HARD OR
15              ;       FATAL.
16              ;
17              ;       10.1    WRITE ERRORS
18              ;
19              ;               FOLLOWING "DONE" ON A WRITE, ERRORS ARE
20              ;               CHECKED IN THE SEQUENCE SHOWN BELOW. THE
21              ;               ERROR RECOVERY SEQUENCE IS OUTLINED FOR
22              ;               EACH CASE.
23              ;
24              ;                       10.1.1  PRELIMINARY CHECKS
25              ;
26              ;                               THE STATUS AND MEMORY ADDRESS
27              ;                               REGISTERS ARE TEST PRIOR TO THE
28              ;                               STARTING OF THE WRITE. IF ANY FAIL,
29              ;                               THIS CONSITUTES A FATAL ERROR AND
30              ;                               THE OPERATION IS TERMINATED. THE
31              ;                               FOLLOWING IS LIST OF THE ERROR
32              ;                               MESSAGES.
33              ;
34              ;       "DIA STATUS = XXXXXX"
35              ;       "WRITE ENABLE MISSING, UNIT WRITE LOCKOUT, FATAL ERROR,/
36              ;       UNIT X"
37              ;
38              ;       "DIA STATUS = XXXXXX"
39              ;       "STATUS ERROR AFTER A CLEAR COMMAND, FATAL ERROR,/
40              ;       UNIT X"
41              ;
42              ;       "MEMORY ADDRESS REGISTER LOADING ERROR"
43              ;       "DOB ADDRESS = XXXXXX, DIB ADDRESS = YYYYYY, FATAL ERROR,/
44              ;       UNIT X"
45              ;
46              ;               10.1.2  WRITTING ERRORS
47              ;
48              ;                       AFTER THE COMPLETION OF THE WRITE,
49              ;                       THE INTERRUPT AND STATUS REGISTER
50              ;                       ARE TESTED FOR ERRORS. IF ANY ERRORS
51              ;                       ARE DETECTED ONE OF THE FOLLOWING
52              ;                       MESSAGES WILL BE PRINTED.
53              ;
54              ;       "DIA STATUS = XXXXXX"
55              ;       "WRITE TIMEOUT ERROR, FATAL ERROR, UNIT X"
56              ;
57              ;       "INTERRUPT AFTER MASK BIT SET, UNIT X"
58              ;
59              ;       "NO INTERRUPT DURING A WRITE, UNIT X
```

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!0014 .MAIN
01              ;       "DIA = XXXXXX"
02              ;       "STATUS AFTER A WRITE, FATAL ERROR, UNIT X"
03              ;
04              ;       "MEMORY ADDRESS REGISTER COUNTING ERROR"
05              ;       "EXPECTED ADDRESS = XXXXXX, DIB ADDRESS YYYYYY
06              ;       "WORD COUNT = AAAA, MEMORY ADDRESS = BBBBBB, FATAL/
07              ;       ERROR, UNIT X"
08              ;
09              ;       "DIA = XXXXXX"
10              ;       "STATUS ERROR AFTER WRITE"
11              ;       "DESCRIPTIVE STATUS ERROR", UNIT X, RECORD # N/
12              ;       RETRIES = X/HARD ERROR"
13              ;
14              ;                       NOTE:   IF AFTER THE STATUS ERROR
15              ;                               MESSAGE A RETRY MESSAGE IS
16              ;                               PRINTED, THE ERROR IS SOFT
17              ;                               AND THE OPERATION WAS COMPLETED
18              ;                               AFTER THE PRINTED NUMBER OF
19              ;                               ATTEMPTS. IF A HARD ERROR MES-
20              ;                               SAGE IS PRINTED, THE RECORD WILL
21              ;                               BE ERASED BY BACKSPACING OVER
22              ;                               THE RECORD AND ERASING IT. THE
23              ;                               RECORD WILL THEN BE WRITTEN
24              ;                               AFTER THE ERASED AREA.
25              ;
26              ;       10.2    READ ERRORS
27              ;
28              ;               ALL READ ERORS WITH THE EXCEPTION OF THE DATA
29              ;               RELATED AND HARD ERRORS ARE HANDLED THE SAME
30              ;               AS DESCRIBED FOR WRITE.
31              ;
32              ;               10.2.1  HARD READ ERRORS
33              ;
34              ;                       IF A HARD READ ERROR OCCURES THIS
35              ;                       CONSISTUTES A SUB-SYSTEM FAILURE.
36              ;                       THE WRITE OPERATION VERIFIES THAT
37              ;                       THE RECORD IS WRITTEN PROPERILY.
38              ;
39              ;               10.2.2  DATA ERRORS
40              ;
41              ;                       THE READ DATA IS VERIFIED BY PER-
42              ;                       FORMING A WORD FOR WORD COMPARISION
43              ;                       AND THE GENERATION OF A SOFT CRC
44              ;                       CHECK WORD WHICH IS COMPARED WITH
45              ;                       THE CALCULATED CRC WORD. IF ANY
46              ;                       ERRORS ARE DETECTED ONE OF THE
47              ;                       FOLLOWING MESSAGES WILL BE PRINTED.
48              ;
49              ;       "DATA COMPARE ERROR, RECORD # NNN, UNIT X"
50              ;       "ADDR    GOOD    BAD     WORD"
51              ;       "XXXXXX  XXXXXX  XXXXXX  XX"
52              ;       "XXXXXX  XXXXXX  XXXXXX  XX"
53              ;       "XXXXXX  XXXXXX  XXXXXX  XX"
54              ;
55              ;       "ERROR IN CHECK CHARACTER, RECORD # NNN, UNIT X"
56              ;       "GOOD XXXXXX"
57              ;       "BAD  YYYYYY"
```

```
!0015 .MAIN
01              ;                       NOTE:   ONLY THE FIRST THREE(3) DATA
02              ;                               COMPARE ERRORS ARE PRINTED FOR
03              ;                               EACH RECORD.
04              ;
05              ;       10.3    SPACING ERRORS
06              ;
07              ;               AFTER THE COMPLETION OF THE SPACING OPERATION
08              ;               A CHECK OF THE STATUS AND THE NUMBER OF RECORDS
09              ;               SPACED IS CHECKED. IF AN ERROR OCCURES ONE OF
10              ;               THE FOLLOWING MESSAGES WILL BE PRINTED. IF AN
11              ;               INCORRECT NUMBER OF RECORDS ARE SPACED, THE
12              ;               ERROR IS FATAL.
13              ;
14              ;               10.3.1  TIMEOUT ERROR
15              ;
16              ;       "DIA STATUS = XXXXXX"
17              ;       "SPACING TIMEOUT ERROR, FATAL ERROR, UNIT X"
18              ;
19              ;               10.3.2  STATUS ERROR
20              ;
21              ;       "DIA STATUS = XXXXXX"
22              ;       "STATUS ERROR AFTER A SPACE, UNIT X"
23              ;
24              ;               10.3.3  RECORD SPACING ERROR
25              ;
26              ;       "SPACING ERROR"
27              ;       "COMMAND IS SPACE XX"
28              ;       "RECORDS DETECTED = YY, FATAL ERROR, UNIT X"
29              ;
30              ;       10.4    WRITE EOF MARK ERRORS
31              ;
32              ;               THE WRITE EOF MARK ERRORS ARE HANDLED
33              ;               THE SAME AS DESCRIBED FOR THE WRITE
34              ;               OPERATION.
35              ;
36              ;       10.5    ERASE ERRORS
37              ;
38              ;               THE ERASE ERRORS ARE HANDLED THE SAME AS
39              ;               DESCRIBED FOR THE WRITE OPERATION.
40              ;
41              ;       10.6    STATISTICAL HISTORY PRINTOUT
42              ;
43              ;               THE STATISTICAL HISTORY IS PRINTED FOR
44              ;               EACH UNIT WHEN IT REACHES ITS EOT SENSOR.
45              ;               THE STATISTICAL HISTORY FOR ALL TESTED
46              ;               UNITS CAN BE REQUESTED BY TYPING A
47              ;               "^(CONTROL)O" CHARACTER. A SAMPLE OF THE
48              ;               PRINTOUT IS AS FOLLOWS:
49              ;
50              ;       "UNIT     0         1"
51              ;       "PAR WR   1         0"
52              ;       "PAR RD   1         1"
53              ;       "PERM WR  1         0"
54              ;       "PERM RD  0         0"
55              ;       "WDS RD   30348     1075827"
56              ;       "WDS WR   31345     1075827"
```

```
!0016 .MAIN
01              ;       10.7    STATUS WORD
02              ;
03              ;               BIT     DESCRIPTION
04              ;
05              ;               0       ANY ERROR, SET BY BITS 1,3,5,6,7,8,10,14
06              ;
07              ;               1       DATA LATE
08              ;               2       REWINDING
09              ;               3       ILLEGAL COMMAND
10              ;
11              ;               4       HIGH DENSITY
12              ;               5       PARITY ERROR
13              ;               6       EOT MARK SENSED
14              ;
15              ;               7       EOF MARK SENSED
16              ;               8       BOT MARK SENSED
17              ;               9       9 TRACK TAPE
18              ;
19              ;               10      BAD TAPE
20              ;               11      SEND CLOCK
21              ;               12      FIRST CHARCTER
22              ;
23              ;               13      WRITE LOCKOUT
24              ;               14      CRC ERROR
25              ;               15      UNIT READY
```

```
!0017 .MAIN
01
02              ;11.    OCTAL DEBUG TOOL (ODT)
03              ;
04              ;       THE DIAGNOSTIC IS EQUIPED WITH A BUILT IN ODT WHICH CAN
05              ;       BE ACCESSED BY HITTING CONTROL O (^O) AT ANY TIME DURING
06              ;       THE EXECUTION OF THE PROGRAM (AFTER SETTING THE PARA-
07              ;       METERS).
08              ;       ON ENTERING ODT THE ADDRESS OF THE LOCATION HAVING THE
09              ;       NEXT INSTRUCTION TO BE EXECUTED WILL BE TYPED-OUT.
10              ;
11              ;11.1   CONVENTIONS AND SYMBOLS
12              ;       THE FOLLOWING CONVENTIONS ARE USED BY THE ODT:
13              ;       ?       PRESSING ANY ILLEGAL KEY CAUSES THE ODT TO RES-
14              ;               POND WITH A "?".
15              ;       @       ODT IS READY AND AT YOUR SERVICE.
16              ;
17              ;11.2   COMMAND STRUCTURE
18              ;       AN ODT COMMAND HAS THE FOLLOWING FORMAT:
19              ;               [ARGUMENT][COMMAND]
20              ;       AN ARGUMENT MAY BE ONE OF THE FOLLOWING:
21              ;       "EXP"   AN OCTAL EXPRESSION CONSISTING OF OCTAL NUMBERS
22              ;               SEPARATED BY PLUS (+) OR MINUS (-) SIGNS. LEAD-
23              ;               ING ZEROS NEED NOT BE TYPED.
24              ;       "ADR"   AN ADDRESS IS THE SAME AS AN EXPRESSION EXCEPT
25              ;               THAT BIT 0 IS NEGLECTED.
26              ;       A COMMAND IS A SINGLE TELETYPE CHARACTER
27              ;
28              ;11.3   ODT COMMANDS
29              ;       THE LOCATIONS THAT CAN BE EXAMINED AND MODIFIED BY THE
30              ;       USER ARE CALLED CELLS. THESE CELLS ARE OF TWO TYPES:
31              ;       INTERNAL CPU CELLS AND MEMORY LOCATIONS.
32              ;
33              ;11.3.1 OPENING INTERNAL CELLS
34              ;       THE COMMAND TO OPEN ONE OF THE INTERNAL REGISTERS IS OF
35              ;       THE FORM "NA" WHERE N IS ANY OCTAL EXPRESSION BETWEEN
36              ;       0 AND 7
37              ;       0-3     FOR ACCUMULATORS 0-3
38              ;       4       FOR PC OF THE NEXT INSTRUCTION TO BE EXECUTED IN
39              ;               THE EVENT OF A "P" COMMAND.
40              ;       5       CPU AND TTO STATUS
41              ;               BIT     INTERPRETATION
42              ;               15      STATUS OF TTO DONE FLAG
43              ;               14      STATUS OF INTERRUPTS (ION FLAG)
44              ;               13      STATUS OF CARRY BIT
45              ;       6       ADDRESS OF THE LOCATION HAVING THE BREAK POINT (IF
46              ;               ANY)
47              ;       7       INSTRUCTION AT THE BREAK POINT LOCATION
48
49              ;       OTHER COMMANDS TO OPEN CELLS ARE:
50              ;
51              ;       "ADR"/  OPEN THE CELL AND PRINT ITS CONTENTS
52              ;       ./      OPEN THE CELL CURRENTLY POINTED TO BY THE POINTER
53              ;               AND PRINT ITS CONTENTS.
54              ;       .+"ADR"/        ADD "ADR" TO THE POINTER, OPEN THE CELL
55              ;               AND PRINT ITS CONTENTS.
56              ;       .-"ADR"/        SUBTRACT "ADR" FROM THE POINTER, OPEN
57              ;               THE CELL AND PRINT ITS CONTENTS.
58              ;       "CR"    THE RETURN KEY IS USED TO CLOSE THE OPEN CELL
59              ;               WITH OR WITHOUT MODIFICATION.
60              ;       "LF"    LINE FEED IS USED TO CLOSE THE OPEN CELL WITH OR
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 0018 .MAIN
01              ;               WITHOUT MODIFICATION AND TO OPEN THE SUCCEEDING
02              ;               CELL.
03              ;       ^       CLOSE THE OPEN CELL WITH OR WITHOUT MODIFICATION
04              ;               AND OPEN THE PRECEDING CELL
05              ;       /       CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND
06              ;               OPEN THE CELL POINTED TO BY ITS CONTENTS.
07              ;       +"ADR"/ CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND
08              ;               OPEN THE CELL POINTED TO BY ITS CONTENTS + "ADDR".
09              ;       -"ADR"/ CLOSE THE OPEN CELL WITHOUT MODIFICATION, AND
10              ;               OPEN THE CELL POINTED TO BY ITS CONTENTS - "ADR".
11              ;
12              ;11.3.2 MODIFICATION OF A CELL
13              ;       ONCE A CELL HAS BEEN OPENED ITS CONTENTS CAN BE MODIFIED
14              ;       BY TYPING THE NEW VALUE THE CELL IS TO CONTAIN IN THE
15              ;       FORM OF AN OCTAL EXPRESSION FOLLOWED BY "CR" OR "LF".
16              ;       IF A + OR - IS TYPED AS THE FIRST CHARACTER OF THE EX-
17              ;       PRESSION THEN THE VALUE OF THE EXPRESSION IS ADDED TO OR
18              ;       SUBTRACTED FROM THE OLD CONTENTS OF THE CELL. THE
19              ;       ADDRESS ITSELF OR AN EXPRESION RELATIVE TO THE ADDRESS
20              ;       CAN BE DEPOSITED BY TYPING A "." OR ".+/-OCTAL EXPRESS-
21              ;       ION". A RUBOUT COMMAND GIVEN RIGHT AFTER OPENING A CELL
22              ;       ALLOWS THE MODIFICATION OF ITS CONTENTS AS IF THEY WERE
23              ;       TYPED IN JUST BEFORE THE COMMAND WAS ISSUED.
24              ;
25              ;11.3.3 OTHER ODT COMMANDS
26              ;       RUBOUT  THIS KEY IS USED TO DELETE ERRONEOUSLY TYPED
27              ;               DIGITS. EACH TIME THE KEY IS PRESSED THE RIGHT MOST
28              ;               DIGIT IS DELETED AND ECHOED ON THE TERMINAL. IF
29              ;               THE RUBOUT KEY IS PRESSED RIGHT AFTER OPENING A
30              ;               CELL THEN IT DELETES THE RIGHT MOST DIGIT OF THE CELLS
31              ;               CONTENTS. THIS ALLOWS THE MODIFICATION OF THE CELL
32              ;               AS IF ITS CONTENTS WERE TYPED IN JUST BEFORE THE
33              ;               KEY WAS PRESSED.
34              ;       "ADR"B  INSERT A BREAK POINT AT LOCATION "ADR".
35              ;               ONLY ONE BREAK POINT CAN BE INSERTED AND ANY
36              ;               ENTRY TO ODT AFTER EXECUTING A BREAK POINT WILL
37              ;               CAUSE IT TO BE DELETED.
38              ;       D       DELETE THE BREAK POINT IF ANY.
39              ;       P       RESTART THE EXECUTION OF THE PROGRAM AT LOCATION
40              ;               POINTED BY 4A.
41              ;       "ADR"R  START EXECUTING THE PROGRAM AT "ADR" AFTER AN
42              ;               IO-RESET.
43              ;       K       KILL THE STRING TYPED SO FAR. THE ODT RESPONDS
44              ;               WITH A "?" AND THE OPEN CELL IS CLOSED WITHOUT
45              ;               MODIFICATION.
46              ;       =       PRINT THE OCTAL VALUE OF THE INPUT ONLY.
47              ;               THIS WILL CLOSE ANY OPEN CELLS WITHOUT
48              ;               MODIFICATION AND WILL NOT OPEN A CELL
49              ;
50              ;
51              ;       NOTE:   IN PROGRAMS WHICH RELOCATE THEMSELVES THE
52              ;               THE USER SHOULD PLACE BREAK POINTS ONLY IN THE
53              ;               THE ORIGINAL PROGRAM AREA. IF A BREAK POINT IS
54              ;               PLACED OUTSIDE THIS AREA THE RESULTS WILL
55              ;               BE UNPREDICTABLE.
56              ;
57              ;
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!0019 .MAIN
01              ;12     SPECIAL NOTES
02              ;
03              ;       12.1    MEDIA SELECTION
04              ;
05              ;               IT IS IMPORTANT TO SELECT KNOWN GOOD TAPES
06              ;               WHEN PERFORMING THE RELIABILITY TESTS. USING
07              ;               MARGINAL TAPE MEDIA WILL CAUSE SOFT AND HARD
08              ;               ERRORS TO OCCURE. TO VERIFIY THE SUB-SYSTEM
09              ;               RELIABILITY THE TAPE MEDIA SHOULD NOT INFLUENCE
10              ;               THE PASS OR FAIL CRITERIA.
11              ;
12              ;       12.2    DATA ENTRY
13              ;
14              ;               ALL NUMBER ENTRIES MUST BE ON OCTAL. ANY OTHER
15              ;               ENTRY WILL BE CONSIDERED AS AN ALPHA CHARACTER.
16              ;
17              ;13     RUN TIME
18              ;
19              ;       THE PROGRAM RUN TIME IS DEPENDENT ON THE LENGTH OF THE
20              ;       TAPE MEDIA. TO FULLY TEST THE RELIABILITY OF EACH TAPE
21              ;       UNIT, 2400 FOOT TAPE REELS SHOULD BE USED. FOR A QUICK
22              ;       VERIFICATION OF THE SUB-SYSTEM SHORTER TAPE REELS CAN
23              ;       BE USED.
24              ;
25              ;       THE RUN TIME FOR A 2400 FOOT TAPE REEL IS APPROXIMATELY
26              ;       30 MINUTES/UNIT.
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 0020 .MAIN

**00000 TOTAL ERRORS, 00000 PASS 1 ERRORS
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.0021 .MAIN

0?DTD 001520 MC 17/01