TM11/TU10

DATA RELIABILITY (7 TRACK)

MD-11-DZTMC-C

EP-DZTMC-C-DL-A

FICHE 1 OF 1

OCT 1976

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Made in U.S.A.

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IDENTIFICATION

PRODUCT CODE:	MAINDEC-11-DZTMC-C-D
PRODUCT NAME:	TM11 DATA RELIABILITY (7 TRACK)
PROGRAM DATE:	MARCH 1976
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	JOHN RODENHISER/JIM LACEY/RON PLATUKIS

1. ABSTRACT

THE TM11 DATA RELIABILITY PROGRAM COLLECTS STATISTICAL INFORMATION PERTAINING TO THE DATA RELIABILITY OF THE TM11, TU10 WHEN RUN FOR EXTENDED PERIODS OF TIME. IT USES A NUMBER OF DIFFERENT PARAMETERS CONTROLLING DATA PATTERNS, PARITY, DENSITY RECORD LENGTHS, WRITING AND READING SEQUENCES AND STOPPING MODES (NONSTOP, START-STOP, RANDOM STALL DELAY).

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11 WITH TM11 AND 1 TO 8 TU10 TAPE UNITS (7 CHANNEL ONLY)

2.2 STORAGE

2.2.1 PROGRAM STORAGE

THE ROUTINE REQUIRES 4K OF MEMORY.

2.3 PRELIMINARY PROGRAMS

THE TM11 INSTRUCTION TEST AND TM11 DRIVE FUNCTION TIMER MUST RUN PROPERLY BEFORE ATTEMPTING TO USE THIS PROGRAM.

3. LOADING PROCEDURE

3.1 METHOD

PROCEDURE FOR NORMAL BINARY TAPES SHOULD BE FOLLOWED:

1. ABSOLUTE LOADER MUST BE IN MEMORY.
2. PLACE BINARY TAPE IN READER.
3. LOAD ADDRESS #7500 (# DETERMINED BY LOCATION OF LOADER)
4. PRESS "START" (PROGRAM WILL LOAD).

4. STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

FOR INITIAL OPERATION OF PROGRAM ALL SWITCHES SHOULD BE = 0 (OR DOWN).

4.2 STARTING ADDRESS

200 - BASIC TEST (AUTOMATIC PARAMETER AND UNIT SELECTION)

204 - OPERATOR CONTROLLED PARAMETER TEST(WITH 4K MEMORY AVAILABLE)

210 - " " " " (" 8K " ")

4.3 PROGRAM AND/OR OPERATOR ACTION

LOAD PROGRAM INTO MEMORY
SET DESIRED TU10 TAPE UNITS ON-LINE
LOAD STARTING ADDRESS 200 (204 OR 210 TO SELECT PARAMETERS AND UNITS)
PRESS START-PROGRAM WILL BEGIN TESTING FOR LOAD ADDRESS OF 200 OTHERWISE
SELECT TAPE UNITS (REFERENCE 4.3.1.1)
SELECT PARAMETERS (REFERENCE 4.3.2)
TYPE CARRIAGE RETURN AND PROGRAM WILL BEGIN TESTING.

4.3.1 TAPE UNIT SELECTION

STARTING THE PROGRAM AT 200 WILL RESULT IN AUTOMATIC SELECTION
OF THE UNITS TO BE TESTED (REFERENCE 4.3.1.2) OTHERWISE STARTING
AT 204 OR 210 WILL ALLOW OPERATOR TO SELECT UNITS.

THE PROGRAM WILL TYPE "SELECT UNITS". ANY CONFIGURATION OF
1 TO 8 UNITS MAY BE SELECTED BY TYPING THE UNIT NUMBERS ON
THE TELETYPE. ANY SEQUENCE OF NUMBERS MAY BE TYPED. AFTER
EACH NUMBER IS TYPED A COMMA (,) WILL BE PRINTED. TYPING THE
SAME UNIT NUMBER TWICE WILL CAUSE THAT UNIT NUMBER TO BE DELETED.
TYPING ANY KEY OTHER THAN 0 THRU 7 WILL CAUSE A QUESTION MARK
(?) TO BE PRINTED AND THAT KEY WILL BE IGNORED.

TO TERMINATE UNIT SELECTION TYPE A CARRIAGE RETURN. WHEN
CARRIAGE RETURN IS TYPED THE PROGRAM WILL CONTINUE TO THE
"PARAMETER SELECTION" UNLESS NO UNITS WERE SELECTED AND IN
THAT EVENT WILL RETURN TO THE BEGINNING OF "SELECT UNITS".

4.3.1.1 TAPE UNIT SELECTION EXAMPLES

SELECT UNITS 3,4,5
SELECT UNITS 5,3,4

IN EITHER CASE, UNITS 3,4,5 ARE SELECTED.

SELECT UNITS
SELECT UNITS

A CARRIAGE RETURN WAS TYPED WITH NO UNITS SELECTED.

SELECT UNITS 1,9?,1,2

ONLY UNIT 2 SELECTED, UNIT 1 WAS DELETED (TYPED TWICE)
AND THE 9 WAS IGNORED.

4.3.1.2 STARTING AT 200 WILL RESULT IN AUTOMATIC SELECTION OF UNITS TO
BE TESTED. A UNIT WILL BE SELECTED FOR TESTING IF IT MEETS THE
FOLLOWING CRITERIA:

1. IT IS ON-LINE
2. IT IS SEVEN(7) TRACK
3. IT IS WRITE ENABLED

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158
159
160
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IF THE ABOVE CRITERIA IS NOT MEET BY AT LEAST ONE(1) UNIT
OPERATOR SELECTION WILL BE REQUIRED (REFERENCE 4.3.1).

4.3.2 PARAMETER SELECTION

STARTING THE PROGRAM AT 200 WILL RESULT IN AN AUTOMATIC SELECTION OF TEST PARAMETERS (REFERENCE 4.3.2.10) OTHERWISE STARTING AT ADDRESS 204 OR 210 WILL ALLOW OPERATOR TO SELECT PARAMETERS. THERE ARE SEVEN TYPES OF PARAMETERS TO BE CONTROLLED BY THE OPERATOR. THEY INCLUDE: TEST NUMBER, PATTERN, PARITY, DENSITY RECORD LENGTH, WRITE MODE, AND READ MODE. THE PROGRAM WILL PRINT:

"TST PAT PAR DEN RLS WMO RMO"

TST=TEST NUMBER
PAT=PATTERN
PAR=PARITY
DEN=DENSITY
RLS=RECORD LENGTH SEQUENCE
WMO=WRITE START/STOP MODE
RMO=READ START/STOP MODE

4.3.2.1 TEST NUMBER

THERE ARE 6 TESTS AVAILABLE FOR SELECTION (0 THRU 5).

TEST	DESCRIPTION
0	WRITE 1 RECORD, REPEAT ON ALL UNITS, CONTINUE TO END OF TAPE.
1	WRITE 256 RECORDS, REPEAT FOR ALL UNITS, CONTINUE TO END OF TAPE.
2	WRITE 256 RECORDS, REPEAT FOR ALL UNITS, BACKSPACE 256 RECORDS, REPEAT FOR ALL UNITS, READ 256 RECORDS, REPEAT FOR ALL UNITS , CONTINUE TO END OF TAPE.
3	WRITE 1 RECORD, REPEAT FOR ALL UNITS, BACKSPACE, REPEAT FOR ALL UNITS, READ 1 RECORD, REPEAT FOR ALL UNITS, CONTINUE TO END OF TAPE.
4	WRITE 1 RECORD, REPEAT FOR ALL UNITS, REPEAT FOR 256 RECORDS, BACKSPACE 256 RECORDS, REPEAT FOR ALL UNITS, READ 1 RECORD, REPEAT FOR ALL UNITS, REPEAT FOR 256 RECORDS, CONTINUE TO END OF TAPE.
5	READ 1 RECORD, REPEAT FOR ALL UNITS, CONTINUE TO END OF TAPE.

4.3.2.2 PATTERN

THERE ARE 8 DATA PATTERNS AVAILABLE FOR SELECTION (0 THRU 7) WITH EACH PARITY.

PATTERN	DESCRIPTION	DATA
0 (EVEN)	HIGH FREQUENCY OUTSIDE SKEW	01 01 ETC
0 (ODD)	HALF FREQUENCY OUTSIDE SKEW	01 00 01 00 ETC
1 (EVEN)	SLIDING "0"	37 57 67 73 75 76 ETC
1 (ODD)	SLIDING "1"	40 20 10 4 2 1 ETC
2 (EVEN) TRACKS	HIGH FREQUENCY ALTERNATING	25 25 ETC
2 (ODD) TRACKS	HIGH FREQUENCY ALTERNATING	52 52 ETC
3 (EVEN)	HALF FREQUENCY OUTSIDE TRACK HIGH FREQUENCY INSIDE TRACKS	77 76 77 76 ETC
3 (ODD)	HIGH FREQUENCY OUTSIDE TRACK HALF FREQUENCY INSIDE TRACKS	01 77 01 77 ETC

PATTERN	DESCRIPTION	DATA
4 (EVEN)	INCREMENTING PATTERN (NO ALL 0'S)	01 02 03 . . 77
4 (ODD)	INCREMENTING PATTERN (INCLUDING ALL 0'S)	00 01 02 . . 77
5 (EVEN)	THREE 0'S EACH TRACK EVERY 6TH WORD	37 37 37 57 57 57 67 67 67 73 73 73 75 75 75 76 76 76 ETC
5 (ODD)	THREE 1'S EACH TRACK EVERY 6TH WORD	40 40 40 20 20 20 10 10 10 04 04 04 02 02 02

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320                                                    01
321                                                    01
322                                                    01
323                                                    ETC
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                        6 (ODD,EVEN) ALL 1'S                    77
                                                                77
                                                                ETC

                        7 (EVEN) RANDON (NO ALL 0'S)            ?

                        7 (ODD)  RANDOM (INCLUDING ALL 0'S)     ?

4.3.2.3 PARITY

        PARITY SELECTION IS EITHER EVEN OR ODD.

        PAR     DESCRIPTION
         0      EVEN PARITY.

         1      ODD PARITY

4.3.2.4 DENSITY

        THERE ARE 4 TYPES OF DENSITIES FOR SELECTION (2,5,8,C)

        DEN     DESCRIPTION

         2      200 BITS PER INCH.

         5      556 BITS PER INCH.

         8      800 BITS PER INCH.

         C      800 BPI CORE DUMP.
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4.3.2.5 RECORD LENGTH SEQUENCE

THERE ARE 4 TYPES OF RECORD LENGTH SEQUENCES FOR SELECTION (0 THRU 3)

RLS	DESCRIPTION
0	MINIMUM LENGTH RECORDS (4 BYTES)
1	MAXIMUM LENGTH RECORDS (1024 BYTES)
2	VARING LENGTH RECORDS, MINIMUM TO MAXIMUM (1ST RECORD= 4 BYTES, EACH SUCCESSIVE RECORD IS 4 BYTES LONGER UNTIL 256TH RECORD=1024 BYTES)
3	VARYING LENGTH RECORDS, MAXIMUM TO MINIMUM (1ST RECORD= 1024 BYTES, EACH SUCCESSIVE RECORD IS 4 BYTES SHORTER UNTIL 256TH RECORD=4 BYTES)

4.3.2.6 WRITE START/STOP MODE

THERE ARE 3 TYPES OF WRITE MODES FOR SELECTION (0 THRU 2)

WMO	DESCRIPTION
0	NONSTOP - NO WAITING BETWEEN WRITE OPERATIONS. NEW COMMAND IS ISSUED WHEN CU READY SETS.
1	START/STOP - FULL STOP BETWEEN WRITE OPERATIONS. NEW COMMAND IS ISSUED WHEN TU READY SETS.
2	RANDOM - FULL STOP WITH RANDOM DELAY (1-256 MILLISECONDS)

4.3.2.7 READ START/STOP MODE

THERE ARE 3 TYPES OF MODES FOR SELECTION (0 THRU 2)

RMO	DESCRIPTION
0	NONSTOP - NO WAITING BETWEEN READ OPERATIONS. NEW COMMAND IS ISSUED WHEN CU READY SETS.
1	START/STOP - FULL STOP BETWEEN READ OPERATIONS. NEW COMMAND IS ISSUED WHEN TU READY SETS.
2	RANDOM - FULL STOP WITH RANDOM DELAY (1-256 MILLISECONDS)

4.3.2.8 FINAL TEST SELECT APPROVAL

AFTER SELECTING RMO, IF ALL PARAMETERS SELECTED ARE LEGAL, "OK" WILL BE PRINTED. IF THE PARAMETERS SELECTED STILL CORRESPOND TO THE OPERATORS INTENTIONS HE MUST TYPE A CARRIAGE RETURN TO SAVE THE PARAMETERS. TYPING ANY OTHER KEY NOW, OR IN FACT AT ANY TIME DURING PARAMETER SELECTION TYPING AN ILLEGAL KEY WILL CAUSE THE PRESENT PARAMETERS TO BE DELETED AND A NEW PARAMETER SELECTION TO BE INITIATED. UP TO TEN SETS OF PARAMETER SELECTIONS CAN BE MADE. EACH SET WILL BE EXECUTED AFTER THE PREVIOUS SET REACHES END OF TAPE. TO TERMINATE PARAMETER SELECTION A SECOND CARRIAGE RETURN MUST BE TYPED AFTER SELECTING A SET OF PARAMETERS.

4.3.2.9 TEST SELECTION EXAMPLES

TST	PAT	PAR	DEN	RLS	WMO	RMO	
3	2	0	2	1	0	0	OK (CR)
3	K?						
0	0	1	8	2	2	2	OKX?
0	1	1	8	2	1	0	OK (CR)
(CR)							

TWO PARAMETERS SETS WERE SELECTED BY THE ABOVE SEQUENCE

TEST3, PATTERN 2, EVEN PARITY, 200 BPI, MAXIMUM RECORD LENGTH, WRITE NONSTOP, AND READ NONSTOP.
TEST 0, PATTERN 1, ODD PARITY, 800 BPI, VARYING RECORD LENGTH (MIN TO MAX), WRITE START/STOP, READ NONSTOP.
(NOTE: EVEN THOUGH TEST 0 IS A WRITE ONLY TEST, ALL PARAMETERS MUST BE SATISFIED.) (IN THIS CASE RMO HAS NO EFFECT)

IN THE SECOND PARAMETER SET A "K" WAS TYPED WHICH WAS ILLEGAL AND THE SET WAS REINITIALIZED.

IN THE THIRD PARAMETER SET AN "X" WAS TYPED INSTEAD OF A CARRIAGE RETURN AND THE PARAMETERS WERE IGNORED. AFTER AT LEAST ONE GOOD SET WAS SELECTED A CARRIAGE RETURN WAS TYPED AT THE

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    450
    451
```

BEGINNING OF THE PARAMETER SELECTION AND THE PROGRAM WOULD START TESTING.

4.3.2.10 AUTOMATIC PARAMETER SELECTION

STARTING AT 200 WILL CAUSE THE FOLLOWING TEST PARAMETERS
TO BE SELECTED AUTOMATICALLY :

TST	PAT	PAR	DEN	RLS	WMO	RMO
3	6	0	8	1	1	1
4	0	1	C	2	2	2
2	7	1	C	2	2	2

5.0 OPERATING PROCEDURE

THIS PROGRAM HAS BEEN MODIFIED TO RUN ON A PROCESSOR WITH OR WITHOUT
A HARDWARE SWITCH REGISTER. WHEN FIRST EXECUTED THE PROGRAM TESTS
THE EXISTENCE OF A HARDWARE SWITCH REGISTER. IF NOT FOUND A
SOFTWARE SWITCH REGISTER LOCATION (SWREG=LOC. 176) IS DEFAULTED TO.
IF THIS IS THE CASE, UPON EXECUTION THE CONTENTS OF THE SWREG ARE
DUMPED IN OCTAL ON THE CONSOLE TTY AND ANY CHANGES ARE REQUESTED

(IE) SWR=XXXXXX NEW=

POSSIBLE RESPONSES ARE:

1.	<CR>	IF NO CHANGES ARE TO BE MADE
2.	6 DIGITS 0-7	TO REPRESENT IN OCTAL THE NEW SWITCH REGISTER VALUE ;LAST DIGIT FOLLOWED BY <CR>.
3.	↑U	TO ALLOW REENTERING VALUE IF ERROR IS COMMITTED KEYING IN SWREG VALUE.
4.	<LF>	ONLY VALID FOR ACT-11 SYSTEMS-DO NOT USE

BUILT INTO THE PROGRAM IS THE ABILITY TO DYNAMICALLY CHANGE THE
CONTENTS OF SWREG DURING PROGRAM EXECUTION. BY STRIKING ↑G
(CNTL G) ON CONSOLE TTY THE OPERATOR SETS A REQUEST FLAG TO CHANGE
THE CONTENTS OF SWREG, WHICH IS PROCESSED IN KEY AREAS OF THE PROGRAM
CODE (IE) ERROR ROUTINES, AFTER HALTS END OF PASS, AND OTHER
APPLICABLE AREAS.

5.1 OPERATIONAL SWITCH SETTINGS

THE OPERATIONAL SWITCH SETTINGS ARE USED TO:

A. ALTER ERROR RECOVERY PROCEDURES

B. DELETE ERROR PRINTOUTS

C. CAUSE A TEST SEQUENCE TO BE REPEATED WITH A VARIATION THE PATTERN, RECORD LENGTH SEQUENCE, WRITE MODE, OR READ MODE

5.1.1 SWITCHES TO ALTER ERROR RECOVERY

THE FUNCTION PERFORMED IS WITH THE SWITCH IN THE "1" (OR UP) POSITION.

SW	FUNCTION	PURPOSE
4	DELETE READ RE-TRYS	USE OF THIS SWITCH WILL CAUSE DELETION OF THE NORMAL SEQUENCE OF TRYING TO RE-READ A RECORD AFTER A READ ERROR. THIS WOULD BE USEFUL FOR SCOPING READ OPERATIONS.
5	DELETE WRITE XIRG	USE OF THIS SWITCH WILL CAUSE RECORDS WITH WRITE ERRORS TO BE LEFT ON TAPE. THE READ PASS WITH DATA TYPEOUTS SELECTED WOULD BE USEFUL FOR DETERMINING WRITE ERROR ORIGINS.
6	WRITE STATISTICAL RECOVERY	USE OF THIS SWITCH WILL CAUSE A BACKSPACE 2 RECORDS, SPACE FORWARD 1 RECORD, REWRITE RECORD SEQUENCE TO BE USED INSTEAD OF WRITE XIRG SO THAT THE RECORD WILL BE REWRITTEN ON APPROXI-MATELY THE SAME AREA OF TAPE WHERE THE WRITE ERROR OCCURRED. THIS METHOD KEEPS THE INTER-RECORD GAP FROM GETTING LARGER. DATA IS WRITTEN OVER THE SAME SPOT ON TAPE TO TRY AND FIND BAD TAPE.

5.1.2 SWITCHES TO CONTROL ERROR PRINTOUTS

THE FUNCTION PERFORMED IS WITH THE SWITCH IN THE "1" (OR UP) POSITION.

SW	FUNCTION	PURPOSE
13	SUPPRESS ERROR PRINTOUT	THE STATISTICS CONCERNING THE NUMBER AND TYPES OF ERRORS WILL BE PRINTED WHEN THE TAPE UNIT REACHES END OF TAPE. FOR LONG PERIODS OF TESTING (OVERNIGHT, ETC) IT MAY BE SUFFICIENT TO RECEIVE THIS INFORMATION AND NOT HAVE A TYPEOUT EACH TIME AN ERROR OCCURRED.
8	PRINT ERROR STATISTICS	AFTER COMPLETION OF EVERY RECORD LENGTH SEQUENCE INSTEAD OF AFTER END OF TAPE AS IS NORMAL.

5.1.3 TO ALTER TEST PATTERNS

SW	FUNCTION	PURPOSE
0	CHANGE PATTERN	AFTER COMPLETION OF A TEST SEQUENCE REPEAT WITH NEXT PATTERN. UNTIL PATTERN 7 IS COMPLETED.

THIS FEATURE IS USEFUL FOR TESTING MANY COMBINATIONS OF TEST PATTERNS WITHOUT REQUIRING THE OPERATOR TO TYPE IN A LARGE NUMBER OF PARAMETERS.

EXAMPLE:

TST	PAT	PAR	DEN	RLS	WMO	RMO
3	2	0	2	1	0	0
4	6	0	2	0	0	0

WITH SW0=1
TEST 3 WILL BE EXECUTED 6 TIMES (PATTERNS 2-7)
AND THEN TEST 4 WILL BE EXECUTED 2 TIMES (PATTERNS 6,7)

6. ERRORS

6.1 WRITE ERRORS

THE FOLLOWING ERROR TYPEOUTS ARE POSSIBLE DURING A WRITE OPERATION.

A. WRITE STATUS ERROR

```
COMD     STATUS   RECORD   LENGTH EXPECTED ACTUAL
XXXXXX   XXXXXX
```

THIS WILL OCCUR IF ERROR (BIT 15 OF COMMAND REGISTER) SETS ON A WRITE COMMAND. THE CONTENTS OF THE COMMAND AND STATUS REGISTERS IS PRINTED ALONG WITH THE RECORD NUMBER AND RECORD LENGTH.

B. XIRG WRITTEN 4 TIMES

THIS WILL OCCUR IF A WRITE STATUS ERROR CANNOT BE ELIMINATED IN 4 ATTEMPTS AT RE-WRITING THE RECORD WITH EXTENDED INTERRECORD GAP. NOT POSSIBLE DURING TEST 0 OR 1 AS THESE ARE "WRITE ONLY" TESTS AND IT IS NOT ABSOLUTELY NECESSARY FOR THE RECORDS TO BE WRITTEN PROPERLY. SETTING SWITCH 5 TO A "1" WILL DELETE "WRITE WITH XIRG".

C. END OF TAPE

```
DRV  PAT  PAR  DEN  MODE  RECORD  LENGTH
 0    7    0  800  SSTP   1276     MAX

WRITE ERRORS = 5
RECOVERED AT 1 = 3
RECOVERED AT 3 = 1
PERMANENT BADSPOT = 1

DRV = UNIT NUMBER
PAT = PATTERN NUMBER
PAR = PARITY
DEN = DENSITY
MODE = WRITE START/STOP MODE
RECORD = NUMBER OF RECORDS
LENGTH = LENGTH OF RECORDS
```

ON UNIT 0, USING PATTERN 7, EVEN PARITY, 800 BPI, WRITE MODE START/STOP, 1276 RECORDS OF MAXIMUM (1048 BYTES) LENGTH WERE WRITTEN. DURING THAT TIME 5 WRITE STATUS ERRORS OCCURRED, 3 WERE RECOVERED ON THE 1ST RE-WRITE, 1 RECOVERED ON THE 3RD RE-WRITE. THE REMAINING ERROR NOT RECOVERED IS CONSIDERED TO BE CAUSED BY A PERMANENT BAD SPOT ON TAPE.

6.2 READ ERRORS

THE FOLLOWING ERROR TYPEOUTS ARE POSSIBLE DURING A READ OPERATION:

A. READ STATUS ERROR

```
COMD     STATUS   RECORD LENGTH EXPECTED ACTUAL
XXXXXX   XXXXXX       47       4
```

THIS WILL OCCUR WHEN ERROR (BIT 15 OF COMMAND REGISTER) SETS DURING A READ OPERATION. THE CONTENTS OF THE COMMAND AND STATUS REGISTERS IS PRINTED ALONG WITH THE RECORD NUMBER AND RECORD LENGTH.

B. READ DATA ERROR

```
COMD     STATUS   RECORD LENGTH EXPECTED ACTUAL
XXXXXX   XXXXXX      107     1024  177777  175777
```

THIS WILL OCCUR WHEN THE DATA READ DOES NOT AGREE WITH THE DATA WRITTEN. THE CONTENTS OF THE COMMAND AND STATUS REGISTERS IS PRINTED, ALONG WITH THE RECORD NUMBER AND RECORD LENGTH. ALSO PRINTED IS THE CONTENTS OF THE MEMORY ADDRESS FROM WHICH THE DATA WAS WRITTEN (EXPECTED) AND THE CONTENTS OF THE MEMORY ADDRESS INTO WHICH IT WAS READ (ACTUAL). THIS INDICATES THE FIRST DATA TRANSFER ERROR FOUND FOR THE RECORD. NO ATTEMPT IS MADE TO DETERMINE IF THERE ARE OTHER DATA ERRORS IN THE RECORD.

C. READ PASS

END OF TAPE

```
DRV  PAT  PAR  DEN  MODE  RECORD  LENGTH
 3    4    1   CD   NSTP   1276   M-MAX

READ STATUS ERRORS = 3
DATA ERRORS = 1
NON RECOVERABLE ERRORS = 0
```

ON UNIT 3, USING PATTERN 4, ODD PARITY, CORE DUMP, READ MODE NONSTOP, 1276 RECORDS OF VARYING LENGTH (4 TO 1024) WERE READ. DURING THAT TIME 2 READ STATUS ERRORS AND 1 DATA ERROR OCCURRED. THERE WERE 0 NON-RECOVERABLE ERRORS WHICH INDICATES THAT THE STATUS AND DATA ERRORS WERE ELIMINATED BY RE-READING THE RECORD UP TO THREE TIMES.

6.3 ERROR RECOVERY PROCEDURES

6.3.1 WRITE ERROR RECOVERY

THE PROCEDURE TO RECOVER FROM A WRITE ERROR IS DETERMINED BY THE FOLLOWING:

A. IS IT A "WRITE ONLY" TEST OR WILL THE DATA BE READ?

B. IS "WRITE STATISTICAL RECOVERY" SELECTED (SW 6=1)?

C. IS "DELETE WRITE WITH XIRG" SELECTED (SW 5=1)?

6.3.1.1 IF IT IS A "WRITE ONLY" TEST AND "WRITE STATISTICAL RECOVERY" IS NOT SELECTED (SW 6=0) THE WRITE ERROR IS SIMPLY COUNTED AND THE PROGRAM PROCEEDS TO THE NEXT RECORD.

6.3.1.2 IF IT IS A "WRITE ONLY" TEST AND "WRITE STATISTICAL RECOVERY" IS SELECTED (SW 6=1), A WRITE ERROR IS COUNTED AND THEN A RECOVERY SEQUENCE (BACKSPACE 2 RECORDS, SPACE FORWARD 1 RECORD, REWRITE RECORD) IS ENTERED. THIS RECOVERY SEQUENCE WILL BE REPEATED UP TO 7 TIMES IF THE WRITE ERROR PERSISTS. IF A WRITE ERROR IS NOT ELIMINATED AFTER THE 8TH ATTEMPT IT IS COUNTED AS A PERMANENT BAD SPOT ON TAPE. STATISTICS ARE SAVED TO INDICATE HOW MANY TIMES THE REWRITE SEQUENCE HAD TO BE RE-PEATED TO RECOVER FROM EACH WRITE ERROR.

6.3.1.3 IF IT IS A "WRITE AND READ" TEST AND "WRITE STATISTICAL RECOVERY" IS SELECTED (SW 6=1) AND "WRITE WITH XIRG" IS NOT DELETED (SW 5=0) THE PROGRAM WILL FIRST ATTEMPT TO DO A "WRITE STATISTICAL RECOVERY". IF A PERMANENT BAD SPOT IS ENCOUNTERED THE PROGRAM WILL THEN ATTEMPT TO RECOVER WITH A "WRITE WITH XIRG". FAILURE TO RECOVER AT THIS POINT SHOULD RESULT IN A READ ERROR DURING THE READ PASS.

6.3.1.4 IF IT IS A "WRITE AND READ" TEST AND "WRITE STATISTICAL RECOVERY" IS NOT SELECTED (SW 6=0) AND "WRITE WITH XIRG" IS NOT DELETED (SW 5=0) THE PROGRAM WILL TRY TO RECOVER ONLY BY REWRITING THE RECORD WITH EXTENDED INTERRECORD GAP. FAILURE TO RECOVER SHOULD RESULT IN A READ ERROR DURING READ PASS.

6.3.2 READ ERROR RECOVERY

A READ ERROR CAN OCCUR FOR TWO REASONS: STATUS ERROR OR DATA ERROR. A PROPER COUNT IS TAKEN FOR EACH TYPE OF ERROR. RECOVERY OF A READ ERROR WILL CONSIST OF TRYING TO RE-READ THE RECORD UP TO TWO MORE TIMES (UNLESS SW 4=1 TO DELETE READ RE-TRYS FOR SCOPING PURPOSES). IF THE ERROR PERSISTS IT IS CONSIDERED "NON-RECOVERABLE" AND THE PROGRAM WILL CONTINUE WITH THE NEXT RECORD.

7. RESTRICTIONS

NONE

8. MISCELLANEOUS

8.1 TAPE LENGTH

SINCE EACH OF THE TESTS DEPEND ON REACHING THE "EOT" REFLECTOR FOR TERMINATING IT COULD BE ADVANTAGEOUS TO USE A "SHORT" TAPE. THIS WOULD ALLOW FOR LESS TIME TO RUN A SERIES OF TESTS WHILE VARYING THE TEST PARAMETERS (REFERENCE 5.1.3). HOWEVER, THIS IS NOT INTENDED TO IMPLY THAT CONSTANTLY CHANGING THE TEST PARAMETERS CONSTITUTES A MORE DIFFICULT TEST OF DATA RELIABILITY. THE LENGTH OF TIME UNDER TEST IS MORE LIKELY TO SUPPLY THAT. IN ANY EVENT, IF A "SHORT" TAPE IS DESIRED, JUST PLACE AN "EOT" REFLECTIVE STRIP APPROXIMATELY 50 FEET DOWN TAPE FROM THE "BOT" MARKER. SO THAT THE TAPE IS STILL USEFUL AS A "LONG" TAPE ANOTHER "BOT" MARKER COULD BE PLACED A SHORT DISTANCE (APPROX-IMATELY 10 FEET) FARTHER DOWN ON TAPE. THIS WOULD EFFECTIVELY GIVE YOU TWO TAPES. CARE MUST BE EXERCISED WHEN MOUNTING THE TAPE TO POSITION IT AT THE PROPER "BOT" MARKER.

8.2 MEMORY AVAILABLE

THE PROGRAM REQUIRES 4K OF MEMORY. IF 8K IS AVAILABLE, STARTING THE PROGRAM AT ADDRESS 200 OR 210 WILL EXPAND THE WRITE AND READ BUFFERS SO THAT MINIMUM LENGTH RECORDS WILL BE 8 BYTES AND MAXIMUM LENGTH RECORDS WILL BE 2048 BYTES.

9. PROGRAM DESCRIPTION

9.1 GENERAL DESCRIPTION

THE PROGRAM IS DESIGNED AROUND TWO MAIN SUBROUTINES "WRITE" AND "READ" AND A SERIES OF MINOR SUBROUTINES FOR MANIPULATING UNIT SELECTION, HANDLING ERROR STATISTICS, AND RECORD POSITIONING. IF MORE THAN ONE UNIT IS SELECTED THE UNIT WITH THE LOWEST NUMBER IS SELECTED FIRST AND WHEN THE SEQUENCE IS COMPLETED THEN THE NEXT LOWEST UNIT NUMBER IS SELECTED UNTIL ALL UNITS HAVE BEEN SELECTED. THIS PROCESS IS REPEATED UNTIL ALL UNITS REACH END OF TAPE.

9.2 TEST 0

THIS IS A "WRITE ONLY" TEST. THE PROCEDURE IS TO WRITE 1 RECORD, REPEAT FOR ALL UNITS, CONTINUE UNTIL EOT. WRITE MODE OF NONSTOP (WMO=0) WILL NOT BE AN EFFECTIVE SELECTION FOR THIS TEST BECAUSE THE WRITE ROUTINE IS EXITED AFTER EACH RECORD TO DETERMINE IF ANY OTHER UNITS ARE SELECTED. READ MODE (RMO) HAS NO EFFECT ON THIS TEST.

9.3 TEST 1

THIS IS A "WRITE ONLY" TEST SIMILAR TO TEST 0 EXCEPT A SEQUENCE OF 256 RECORDS IS WRITTEN ON EACH UNIT BEFORE CHANGING TO THE

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   809                    NEXT UNIT.  READ MODE (RMO) HAS NO EFFECT ON THIS TEST.
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                                9.4     TEST 2

                                        THIS IS A "WRITE AND READ" TEST.  THE PROCEDURE IS TO WRITE 256
                                        RECORDS ON EACH UNIT, THEN BACKSPACE 256 RECORDS ON EACH UNIT,
                                        THEN READ 256 RECORDS ON EACH UNIT, AND THEN REPEAT THE SEQUENCE
                                        UNTIL ALL UNITS ARE AT EOT.

                                9.5     TEST 3

                                        THIS IS A "WRITE AND READ" TEST.  THE PROCEDURE IS TO WRITE 1
                                        RECORD, BACKSPACE, READ 1 RECORD AND REPEAT FOR EACH UNIT, THEN
                                        REPEAT THE SEQUENCE UNTIL ALL UNITS ARE AT EOT.  WRITE MODE OR
                                        READ MODE OF NONSTOP (WMO=0 OR RMO=0) WILL NOT BE EFFECTIVE
                                        FOR THIS TEST.

                                9.6     TEST 4

                                        THIS IS A "WRITE AND READ" TEST.  IT IS SIMILAR TO TEST 2 EXCEPT
                                        UNITS ARE CHANGED BETWEEN EACH RECORD DURING WRITE, BACKSPACE,
                                        AND READ.  WRITE MODE OR READ MODE OF NONSTOP (WMO=0 OR RMO=0)
                                        WILL NOT BE EFFECTIVE FOR THIS TEST.

                                9.7     TEST 5

                                        THIS IS A "READ ONLY" TEST.  THE PROCEDURE IS TO READ 1 RECORD,
                                        REPEAT FOR ALL UNITS, AND CONTINUE UNTIL ALL UNITS ARE AT EOT.
                                        THE MAIN PURPOSE OF THIS TEST IS TO PROVE COMPATIBILITY AMONG
                                        TAPE UNITS.  A TAPE THAT IS WRITTEN ON ONE UNIT SHOULD BE ABLE
                                        TO BE READ ON ANY OTHER UNIT.  TEST PARAMETERS THAT SELECT
                                        PATTERN AND RECORD LENGTH SEQUENCE MUST BE THE SAME AS THOSE USED
                                        TO WRITE THE DATA ON TAPE.  ANY OF THE OTHER TESTS (0 THRU 4)
                                        CAN BE USED TO GENERATE THE DATA.

                                10.     LISTING
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                        STATUS AND COMMAND REGISTER BIT ASSIGNMENTS

                                        COMMAND REGISTER

                    15      ERROR

                    14      DEN 8           00 = 200 BPI 7 TRACK    10 = 800 BPI 7 TRACK
                    13      DEN 5           01 = 556 BPI 7 TRACK    11 = 800 BPI 9 TRACK
                    12      POWER CLEAR

                    11      PARITY          0 = ODD    1 = EVEN
                    10      UNIT SEL. BIT 2
                    9       UNIT SEL. BIT 1

                    8       UNIT SEL. BIT 0
                    7       CONTROL UNIT READY
                    6       INTERRUPT ENABLE

                    5       ADDRESS BIT 17
                    4       ADDRESS BIT 16
                    3       FUNCTION BIT 2  000 = OFF LINE          100 = SPACE FORWARD
                                            001 = READ              101 = SPACE REVERSE
                    2       FUNCTION BIT 1  010 = WRITE             110 = WRITE XIRG
                    1       FUNCTION BIT 0  011 = WRITE EOF         111 = REWIND
                    0       GO

                                        STATUS REGISTER

                    15      ILLEGAL COMMAND (ILC)

                    14      END OF FILE (EOF)
                    13      CYCLICAL REDUNDANCY ERROR (CRE)
                    12      PARITY ERROR (PAE)

                    11      BUS GRANT LATE (BGL)
                    10      END OF TAPE (EOT)
                    9       RECORD LENGTH ERROR (RLE)

                    8       BAD TAPE ERROR (BTE)
                    7       NON EXISTENT MEMORY (NXM)
                    6       SELECT REMOTE (SELR)

                    5       BEGINNING OF TAPE (BOT)
                    4       7 CHANNEL (7CH)
                    3       SETTLE DOWN (SDWN)

                    2       WRITE LOCK (WRL)
                    1       REWIND STATUS (RWS)
                    0       TAPE UNIT READY (TUR)
```

```
                                        %
                                .TITLE  TM-11 DATA RELIABILITY 7 TRACK
                                ;COPYRIGHT 1970, 1971, 1972, DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754
                                ;REVISED SEPT 1971, J.RODENHISER
                                ;REVISED AUGUST 1972, JIM LACEY
                                ;REVISED FEB 1976,RON PLATUKIS



                                ;*************************************************************

                                ;NOTE: THIS PROGRAM HAS BEEN MODIFIED TO WORK WITH OR WITHOUT
                                ;       A HARDWARE SWITCH REGISTER

                                ;*************************************************************

            000000              R0=%0
            000001              R1=%1
            000002              R2=%2
            000003              R3=%3
            000004              R4=%4
            000005              R5=%5
            000006              SP=%6
            000007              PC=%7

                                ;TRAP CATCHER IN UNUSED LOCATINOS 0-476

                                        .ENABL  ABS
                    000000              .=0
                    000034              .=34
000034  012416                          TRAP34
                    000046              .=46
000046  003300                          ENDADR
                    000052              .=52
000052  040000                          40000


                                        ;*********************************
                                        ;SOFTWARE SWITCH REGISTER LOCATION
                                        ;*********************************
                    000174              .=174
000174  000000                          DISPREG:0
000176  000000                          SWREG:  0

                    000200              .=200
000200  000167  001162                  JMP     AUTOST
000204  000167  001610                  JMP     MEM4K
000210  000167  001630                  JMP     MEM8K


                    000500              .=500
000500  172520              MTS:        172520
000502  172522              MTC:        172522
000504  172524              BC:         172524
000506  172526              CA:         172526
000510  177776              CC:         177776
```

```
  958  000512  177570                SWR:     177570
  959  000514  177570                DISPLAY: 177570
  960  000516  177560                TKS:     177560
  961  000520  177562                TKB:     177562
  962  000522  177564                TPS:     177564
  963  000524  177566                TPB:     177566
  964  000526  002000                MAXLEN:  1024.          ;MAX RECORD LENGTH
  965  000530  000004                MINLEN:  4.             ;MIN RECORD LENGTH
  966  000532  013750                WBUF:    BUFFER         ;STARTING ADDRESS OF WRITE BUFFER
  967  000534  015750                RBUF:    BUFFER+1024.   ;STARTING ADDRESS OF READ BUFFER
  968  000536  000224                MTV:     224
  969           000500                STACK=500
  970
  971                                ;TEMPORARY STORAGE AREAS
  972  000540  000000                TIB:     0
  973  000542  000000                TEMPST:  0
  974  000544  000000                COUNT:   0
  975  000546  000000                RDSW:    0
  976  000550  000000                ATST:    0
  977  000552  000000                DRVSEL:  0
  978  000554  000000                STRLEN:  0
  979  000556  000000                LENGTH:  0
  980  000560  000000                MSBITS:  0
  981  000562  000000                SVRECR:  0
  982  000564  000000                COMAND:  0
  983  000566  000000                CDRVBT:  0
  984  000570  000000                CDRIVE:  0
  985  000572  000000                RDPASS:  0
  986  000574  000000                WRPASS:  0
  987  000576  000000                BLKINC:  0
  988  000600  000000                STATRD:  0
  989  000602  000000                WRCHEK:  0
  990  000604  000000                         0
  991  000606  000000                         0
  992  000610  000000                         0
  993  000612  000000                         0
  994  000614  000000                         0
  995  000616  000000                         0
  996  000620  000000                         0
  997
  998  000622  000000                PERMBS:  0
  999  000624  000000                RECORD:  0
 1000  000626  000000                WRRECR:  0
 1001  000630  000000                LASRCR:  0
 1002  000632  000000                RDERRS:  0
 1003  000634  000000                DAERRS:  0
 1004  000636  000000                NRREAD:  0
 1005  000640  000000                WRTLEN:  0
 1006  000642  000000                READLN:  0
 1007  000644  000000                MODES:   0
 1008
 1009
 1010  000646  000666                DRVADR:  DOTAB
 1011  000650  000732                         D1TAB
 1012  000652  000776                         D2TAB
 1013  000654  001042                         D3TAB
```

```
1014  000656  001106                    D4TAB
1015  000660  001152                    D5TAB
1016  000662  001216                    D6TAB
1017  000664  001262                    D7TAB
1018
1019  000666  000000          D0TAB:    0
1020          000732                    .=D0TAB+44
1021  000732  000000          D1TAB:    0
1022          000776                    .=D1TAB+44
1023  000776  000000          D2TAB:    0
1024          001042                    .=D2TAB+44
1025  001042  000000          D3TAB:    0
1026          001106                    .=D3TAB+44
1027  001106  000000          D4TAB:    0
1028          001152                    .=D4TAB+44
1029  001152  000000          D5TAB:    0
1030          001216                    .=D5TAB+44
1031  001216  000000          D6TAB:    0
1032          001262                    .=D6TAB+44
1033  001262  000000          D7TAB:    0
1034          001326                    .=D7TAB+44
1035  001326  000000          CHARIN:   0                   ;CHARACTER JUST INPUT
1036  001330  000000          NUMTST:   0                   ;NUMBER OF TEST
1037  001332  000000          PARAM:    0                   ;TEST PARAMETERS
1038  001334  000000          TSTEX:    0                   ;POINTS TO TEST PARAMETERS TO BE EXECUTED
1039  001336  000000          TEST:     0                   ;CONTAINS CURRENT TEST NUMBER
1040
1041  001340  000000          TSTTBL:   0                   ;TEST TABLE
1042  001342  000000                    0                   ;UP TO 10 TESTS CAN BE SELECTED TO
1043  001344  000000                    0                   ;BE RUN IN CONSECUTIVE ORDER
1044  001346  000000                    0
1045  001350  000000                    0
1046  001352  000000                    0
1047  001354  000000                    0
1048  001356  000000                    0
1049  001360  000000                    0
1050  001362  000000                    0
1051  001364  000000                    0
1052
1053
1054  001366  012706  000500            AUTOST:MOV    #STACK,SP
1055  001372  012767  177777  177150            MOV    #-1,ATST
1056  001400  012767  036225  177732            MOV    #36225,TSTTBL
1057  001406  012767  040752  177726            MOV    #40752,TSTTBL+2
1058  001414  012767  027752  177722            MOV    #27752,TSTTBL+4
1059  001422  012767  000003  177700            MOV    #3,NUMTST
1060  001430  012767  123456  005752            MOV    #123456,LONUM          ;PRIME RANDOM NUMBER GENERATER
1061  001436  012767  176543  005746            MOV    #176543,HINUM
1062                    ;DETERMINE THE SIZE OF THE WRITE AND READ BUFFERS.
1063  001444  012737  001462  000004            MOV    #NXMRET,@#4            ;SETUP NXM VECTOR
1064  001452  005767  022272                    TST    BUFFER+4096.           ;OVER 4K OF MEMORY?
1065  001456  000240                            NOP
1066  001460  000413                            BR     OVER4K                 ;BR IF YES
1067  001462  022626                    NXMRET: CMP    (SP)+,(SP)+            ;POP THE STACK
1068  001464  012767  000004  177036            MOV    #4,MINLEN
1069  001472  012767  002000  177026            MOV    #1024.,MAXLEN
```

```
1070  001500  012767  015750  177026          MOV     #BUFFER+1024.,RBUF
1071  001506  000411                          BR      TU.SEL                  ;GO SELCT DRIVES
1072  001510  012767  000010  177012  OVER4K: MOV     #8.,MINLEN
1073  001516  012767  004000  177002          MOV     #2048.,MAXLEN
1074  001524  012767  017750  177002          MOV     #BUFFER+2048.,RBUF
1075                                  ;DETERMINE DRIVES TO BE TESTED.
1076                                  ;A DRIVE WILL BE TESTED IF:
1077                                  ;       1. IT CAN BE SELECTED
1078                                  ;       2. IT IS 7 TRACK
1079                                  ;       3. IT IS WRITE ENABLED
1080  001532  012737  000006  000004  TU.SEL: MOV     #6,@#4                  ;SET TRAP CATCHER
1081  001540  012777  010000  176734          MOV     #10000,@MTC             ;PWR CLR
1082  001546  005067  177000                  CLR     DRVSEL                  ;CLEAR DRIVE TABLE
1083  001552  005067  177002                  CLR     MSBITS
1084  001556  012700  000200                  MOV     #200,R0                 ;R0=DRIVE 0
1085  001562  105777  176714                  TSTB    @MTC
1086  001566  100033                          BPL     IDSELF                  ;BR IF NO CU RDY
1087  001570  016777  176756  176704  NXT.TU: MOV     DRVSEL,@MTC             ;SELECT A DRIVE
1088  001576  012702  000024                  MOV     #20.,R2                 ;SETUP R2 FOR WAIT LOOP
1089  001602  032777  000100  176670  USSTST: BIT     #100,@MTS               ;DOES DRIVE EXIST?
1090  001610  001003                          BNE     USS.OK                  ;BR IF YES
1091  001612  005302                          DEC     R2
1092  001614  003372                          BGT     USSTST
1093  001616  000412                          BR      NO.SEL                  ;DRIVE IS NON-EXISTENCE
1094  001620  032777  000020  176652  USS.OK: BIT     #20,@MTS                ;IS THIS DRIVE 7 OR 9 CHN?
1095  001626  001406                          BEQ     NO.SEL                  ;BR IF 9 CHN.
1096  001630  032777  000004  176642          BIT     #4,@MTS                 ;IS WRITE LOCK ON?
1097  001636  001002                          BNE     NO.SEL                  ;BR IF YES
1098  001640  050067  176714                  BIS     R0,MSBITS               ;PUT DRIVE INTO TABLE
1099  001644  105267  176703          NO.SEL: INCB    DRVSEL+1                ;INC. THE DRIVE NUMBER
1100  001650  000241                          CLC
1101  001652  006000                          ROR     R0                      ;HAS ALL DRIVES BEEN TESTED FOR EXISTENCE?
1102  001654  001345                          BNE     NXT.TU                  ;BR IF NO
1103
1104                                  ;TYPE-OUT NAME OF PROGRAM AND MIN. AND MAX. RECORD LENGTHS.
1105  001656  012702  013105          IDSELF: MOV     #MSG10A,R2
1106  001662  104404                          TOP
1107  001664  016702  176640                  MOV     MINLEN,R2
1108  001670  104426                          DECPRT                          ;PRINT MIN. LENGTH
1109  001672  016702  176630                  MOV     MAXLEN,R2
1110  001676  104426                          DECPRT                          ;PRINT MAX. LENGTH
1111  001700  005767  176654                  TST     MSBITS                  ;WAS ANY DRIVES SELECTED?
1112  001704  001002                          BNE     .+6                     ;BR IF YES
1113  001706  000167  000160                  JMP     START1                  ;NO--GO HAVE OPERATOR SELECT DRIVES
1114
1115                                  ;TYPE-OUT THE DRIVE/S TO BE TESTED
1116  001712  012702  013201                  MOV     #MSG10B,R2
1117  001716  104404                          TOP
1118  001720  105067  012024                  CLRB    BUFFER
1119  001724  012701  013750                  MOV     #BUFFER,R1
1120  001730  005000                          CLR     R0                      ;SET R0 TO DRIVE 0
1121  001732  012702  000200                  MOV     #200,R2                 ;SET R2 TO DRIVE 0
1122
1123                                  ;FORM AND SAVE DRIVE NUMBER FOR TYPE-OUT
1124  001736  105021                          CLRB    (R1)+                   ;SET EOM
1125  001740  112721  000040                  MOVB    #' ,(R1)+               ;SPACE
```

```
1126  001744  030267  176610          LOOPER: BIT     R2,MSBITS               ;DID THIS DRIVE NUMBER EXIST?
1127  001750  001405                          BEQ     $ZERO$                  ;BR IF NO
1128  001752  110011                          MOVB    R0,(R1)                 ;YES--SAVE THE NUMBER
1129  001754  152721  000060                  BISB    #'0,(R1)+               ;MAKE IT ASCII
1130  001760  112721  000054                  MOVB    #',,(R1)+               ;COMMA
1131  001764  000241                  $ZERO$: CLC                             ;POSITION DRIVE BIT
1132  001766  006002                          ROR     R2
1133  001770  005200                          INC     R0                      ;UPDATE DRIVE NUMBER
1134  001772  020027  000007                  CMP     R0,#7                   ;LAST
1135  001776  003762                          BLE     LOOPER                  ;BR IF NO
1136  002000  105011                          CLRB    (R1)                    ;SET EOM
1137  002002  112741  000100                  MOVB    #'@,-(R1)               ;CR & LF
1138  002006  012702  013750                  MOV     #BUFFER,R2              ;TYPE THE DRIVE/S SELECTED
1139  002012  104404                          TOP
1140  002014  000167  001074                  JMP     EXECUT                  ;GO START TESTING
1141                          ;MODIFY RECORD LENGTHS AND BUFFER AREAS FOR 4K.
1142  002020  012767  000004  176502  MEM4K:  MOV     #4.,MINLEN
1143  002026  012767  002000  176472          MOV     #1024.,MAXLEN
1144  002034  012767  015750  176472          MOV     #BUFFER+1024.,RBUF
1145  002042  000411                          BR      START
1146                          ;MODIFY RECORD LENGTHS AND BUFFER AREAS FOR 8K.
1147  002044  012767  000010  176456  MEM8K:  MOV     #8.,MINLEN
1148  002052  012767  004000  176446          MOV     #2048.,MAXLEN
1149  002060  012767  017750  176446          MOV     #BUFFER+2048.,RBUF
1150  002066  005067  176456          START:  CLR     ATST                    ;NOT AUTO START
1151  002072  012706  000500          START1: MOV     #STACK,SP               ;INITIALIZE STACK
1152  002076  104432                          SUSW
1153  002100  012767  123456  005302          MOV     #123456,LONUM           ;PRIME RANDOM
1154  002106  012767  176543  005276          MOV     #176543,HINUM           ;NUMBER GENERATOR
1155  002114  012702  012503                  MOV     #MSG1,R2
1156  002120  104404                          TOP                             ;PRINT 'SELECT DRIVES'
1157  002122  005067  176432                  CLR     MSBITS                  ;CLEAR SELECTED DRIVE INDICATOR
1158  002126  104400          SELDRV: WAITKY
1159  002130  122767  000015  177170          CMPB    #15,CHARIN              ;WAS CHARACTER A CARRIAGE RETURN?
1160  002136  001010                          BNE     SELD1                   ;NO
1161  002140  005767  176414                  TST     MSBITS                  ;YES, WERE ANY DRIVES SELECTED
1162  002144  001752                          BEQ     START1                  ;NO
1163  002146  005767  176376                  TST     ATST
1164  002152  001454                          BEQ     SELTST                  ;YES NOW SELECT TESTS
1165  002154  000167  000734                  JMP     EXECUT
1166  002160  122767  000070  177140  SELD1:  CMPB    #70,CHARIN              ;IS CHARACTER A VALID NUMBER 0-7?
1167  002166  003404                          BLE     SELD2                   ;NO, PRINT "?"
1168  002170  122767  000060  177130          CMPB    #60,CHARIN              ;IS CHARACTER A VALID NUMBER 0-7?
1169  002176  003407                          BLE     VALID                   ;YES
1170  002200  105777  176316          SELD2:  TSTB    @TPS
1171  002204  100375                          BPL     .-4
1172  002206  012777  000077  176310          MOV     #'?,@TPB                ;PRINT '?'
1173  002214  000424                          BR      VAL4
1174                          ;HAVE VALID DRIVE NUMBER
1175  002216  142767  000270  177102  VALID:  BICB    #270,CHARIN             ;MASK OUT NUMBER
1176  002224  105167  177076                  COMB    CHARIN
1177  002230  012700  000200                  MOV     #200,R0                 ;INITIALIZE BIT POSITION FOR DRIVE 0
1178  002234  105267  177066          VAL1:   INCB    CHARIN                  ;+1 TO DRIVE SELECT
1179  002240  001402                          BEQ     VAL2                    ;HAVE DRIVE OF EQUAL TO ZERO
1180  002242  006200                          ASR     R0                      ;MOVE BIT POSITION TO NEXT DRIVE
1181  002244  000773                          BR      VAL1                    ;TRY AGAIN
```

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1182  002246  130067  176306          VAL2:   BITB    RO,MSBITS       ;COMPARE DRIVE SELECT WITH PREVIOUS SELECTED
1183  002252  001003                          BNE     VAL3
1184  002254  150067  176300                  BISB    RO,MSBITS       ;DRIVE WASN'T PREVIOUSLY SET, SO SET IT NOW.
1185  002260  000402                          BR      VAL4
1186  002262  140067  176272          VAL3:   BICB    RO,MSBITS       ;DRIVE WAS SET, CLEAR IT.
1187  002266  105777  176230          VAL4:   TSTB    @TPS
1188  002272  100375                          BPL     .-4
1189  002274  012777  000054  176222          MOV     #',,@TPB        ;PRINT COMMA
1190  002302  000711                          BR      SELDRV          ;RETURN TO WAIT FOR NEXT KEY
1191
1192
1193                                  ;HAVE DRIVES SELECTED-NOW GET TEST SELECTION
1194  002304  012702  012524          SELTST: MOV     #MSG2,R2
1195  002310  104404                          TOP                     ;PRINT'SELECT TESTS'
1196  002312  005067  177012                  CLR     NUMTST          ;CLEAR TEST NUMBERS SELECTED
1197  002316  012700  001340                  MOV     #TSTTBL,RO      ;INITIALIZE TEST TABLE POINTER
1198  002322  104400                  SELT1:  WAITKY
1199  002324  122767  000015  176774          CMPB    #15,CHARIN      ;WAS CHARACTER A CARRIAGE RETURN?
1200  002332  001005                          BNE     SELT2
1201  002334  005767  176770                  TST     NUMTST          ;WERE ANY TESTS SELECTED?
1202  002340  001412                          BEQ     SELT3           ;NO
1203  002342  000167  000546                  JMP     EXECUT          ;YES, EXECUTE TESTS
1204  002346  122767  000066  176752  SELT2:  CMPB    #66,CHARIN      ;IS CHARACTER A VALID NUMBER 0-5
1205  002354  003404                          BLE     SELT3           ;NO
1206  002356  122767  000060  176742          CMPB    #60,CHARIN      ;IS CHARACTER A VALID NUMBER 0-5
1207  002364  003404                          BLE     SELPAT          ;YES
1208  002366  012702  012476          SELT3:  MOV     #MSG0,R2
1209  002372  104404                          TOP
1210  002374  000752                          BR      SELT1           ;RETURN TO WAIT FOR TEST SELECT
1211  002376  016704  176724          SELPAT: MOV     CHARIN,R4
1212  002402  000304                          SWAB    R4              ;ROTATE TEST NUMBER INTO POSITION
1213  002404  006104                          ROL     R4
1214  002406  006104                          ROL     R4
1215  002410  006104                          ROL     R4
1216  002412  006104                          ROL     R4
1217  002414  042704  107777                  BIC     #107777,R4
1218  002420  104430                          SP3                     ;TYPE 3 SPACES
1219                                  ;HAVE VALID TEST SELECTED, NOW GET SELECTED PATTERN
1220  002422  104400                          WAITKY
1221  002424  122767  000070  176674          CMPB    #70,CHARIN      ;IS CHARACTER A VALID NUMBER 0-7
1222  002432  003755                          BLE     SELT3           ;NO
1223  002434  122767  000057  176664          CMPB    #57,CHARIN      ;IS CHARACTER A VALID NUMBER 0-7
1224  002442  002351                          BGE     SELT3           ;NO
1225  002444  000367  176656                  SWAB    CHARIN          ;MOVE PATTERN SELECT INTO POSITION
1226  002450  006167  176652                  ROL     CHARIN
1227  002454  042767  170777  176644          BIC     #170777,CHARIN
1228  002462  056704  176640                  BIS     CHARIN,R4       ;COMBINE PATTERN WITH TEST
1229  002466  104430                          SP3
1230                                  ;WAIT FOR PARITY SELECTION (0=EVEN, 1=ODD)
1231  002470  104400                          WAITKY
1232  002472  122767  000060  176626          CMPB    #60,CHARIN      ;IS CHARACTER=0
1233  002500  001406                          BEQ     SELPR           ;YES, EVEN PARITY
1234  002502  122767  000061  176616          CMPB    #61,CHARIN      ;IS CHARACTER=1
1235  002510  001326                          BNE     SELT3           ;NO, HAVE ILLEGAL KEY
1236  002512  052704  000400                  BIS     #400,R4         ;YES, ODD PARITY
1237  002516  104430          SELPR:  SP3
```

```
1238
1239
1240                                        ;WAIT FOR DENSITY SELECTION
1241  002520  104400                              WAITKY
1242  002522  122767  000062  176576              CMPB    #62,CHARIN      ;IS CHARACTER=2
1243  002530  001424                              BEQ     SELDN3          ;YES, DENSITY=200BPI
1244  002532  122767  000065  176566              CMPB    #65,CHARIN      ;IS CHARACTER=5
1245  002540  001003                              BNE     SELDN1          ;NO
1246  002542  052704  000100                      BIS     #100,R4         ;SET DENSITY=556 BPI
1247  002546  000415                              BR      SELDN3
1248  002550  122767  000070  176550  SELDN1:     CMPB    #70,CHARIN      ;IS CHARACTER=8
1249  002556  001003                              BNE     SELDN2
1250  002560  052704  000200                      BIS     #200,R4         ;SET DENSITY=800 BPI
1251  002564  000406                              BR      SELDN3
1252  002566  122767  000103  176532  SELDN2:     CMPB    #'C,CHARIN      ;IS CHARACTER=C
1253  002574  001274                              BNE     SELT3           ;NO, HAVE ILLEGAL KEY
1254  002576  052704  000300                      BIS     #300,R4         ;SET CORE DUMP MODE
1255  002602  104430                  SELDN3:     SP3
1256                                        ;WAIT FOR RECORD LENGTH SEQUENCES SELECTION
1257  002604  104400                              WAITKY
1258  002606  122767  000060  176512              CMPB    #60,CHARIN      ;IS CHARACTER=0
1259  002614  001424                              BEQ     SELR3           ;YES, RLS=MIN
1260  002616  122767  000061  176502              CMPB    #61,CHARIN      ;IS CHARACTER=1
1261  002624  001003                              BNE     SELR1
1262  002626  052704  000020                      BIS     #20,R4          ;SET RLS=MAX
1263  002632  000415                              BR      SELR3
1264  002634  122767  000062  176464  SELR1:     CMPB    #62,CHARIN      ;IS CHARACTER=2
1265  002642  001003                              BNE     SELR2
1266  002644  052704  000040                      BIS     #40,R4          ;SET RLS=MIN-MAX
1267  002650  000406                              BR      SELR3
1268  002652  122767  000063  176446  SELR2:     CMPB    #63,CHARIN      ;IS CHARACTER=3
1269  002660  001242                              BNE     SELT3
1270  002662  052704  000060                      BIS     #60,R4          ;SET RLS=MAX-MIN
1271  002666  104430                  SELR3:      SP3
1272                                        ;WAIT FOR WRITE MODE SELECTION
1273  002670  104400                              WAITKY
1274  002672  122767  000060  176426              CMPB    #60,CHARIN
1275  002700  001415                              BEQ     SELW2           ;SET WMO=NONSTOP
1276  002702  122767  000061  176416              CMPB    #61,CHARIN
1277  002710  001003                              BNE     SELW1
1278  002712  052704  000004                      BIS     #4,R4           ;SET WMO=START-STOP
1279  002716  000406                              BR      SELW2
1280  002720  122767  000062  176400  SELW1:     CMPB    #62,CHARIN
1281  002726  001217                              BNE     SELT3
1282  002730  052704  000010                      BIS     #10,R4          ;SET WMO=RANDOM
1283  002734  104430                  SELW2:      SP3
1284                                        ;WAIT FOR READ MODE SELECTION
1285  002736  104400                              WAITKY
1286  002740  122767  000060  176360              CMPB    #60,CHARIN
1287  002746  001417                              BEQ     SELRM2          ;SET RMO=NONSTOP
1288  002750  122767  000061  176350              CMPB    #61,CHARIN
1289  002756  001003                              BNE     SELRM1
1290  002760  052704  000001                      BIS     #1,R4           ;SET RMO=START-STOP
1291  002764  000410                              BR      SELRM2
1292  002766  122767  000062  176332  SELRM1:     CMPB    #62,CHARIN
1293  002774  001402                              BEQ     .+6
```

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1294  002776  000167  177364                  JMP     SELT3
1295  003002  052704  000002                  BIS     #2,R4           ;SET RM0=RANDOM
1296  003006  104430                  SELRM2: SP3
1297
1298                                  ;HAVE ALL PARAMETERS
1299  003010  012702  012611                  MOV     #MSG6,R2
1300  003014  104404                          TOP                     ;PRINT "OK"
1301  003016  104400                          WAITKY                  ;WAIT FOR CARRIAGE RETURN
1302  003020  122767  000015  176300          CMPB    #15,CHARIN
1303  003026  001402                          BEQ     .+6
1304  003030  000167  177332                  JMP     SELT3
1305  003034  105777  175462                  TSTB    @TPS
1306  003040  100375                          BPL     .-4
1307  003042  012777  000012  175454          MOV     #12,@TPB
1308  003050  105777  175440                  TSTB    @TPS
1309  003054  100375                          BPL     .-4
1310  003056  012777  000040  175440          MOV     #40,@TPB
1311  003064  010420                          MOV     R4,(0)+
1312  003066  005267  176236                  INC     NUMTST          ;+1 TO TEST COUNT
1313  003072  022767  000012  176230          CMP     #10.,NUMTST     ;EQUAL TO TEN YET
1314  003100  001402                          BEQ     SELOK1          ;YES
1315  003102  000167  177214                  JMP     SELT1           ;NO, ACCEPT NEXT SET
1316  003106  012702  012564          SELOK1: MOV     #MSG5,R2
1317  003112  104404                          TOP
1318
1319                                  ;EXECUTE SELECTED TEST
1320  003114  005067  175524          EXECUT: CLR     MODES           ;INITIALIZE MODES
1321  003120  104434                          CNTL
1322  003122  012767  001340  176204          MOV     #TSTTBL,TSTEX
1323  003130  017767  176200  176174  EXEC:   MOV     @TSTEX,PARAM    ;GET TEST PARAMS
1324  003136  016700  176170          EXEC1:  MOV     PARAM,R0
1325  003142  042700  007777                  BIC     #7777,R0
1326  003146  010067  176164                  MOV     R0,TEST
1327  003152  001462                          BEQ     TEST0
1328  003154  022700  010000                  CMP     #10000,R0
1329  003160  001503                          BEQ     TEST1
1330  003162  022700  020000                  CMP     #20000,R0
1331  003166  001524                          BEQ     TEST2
1332  003170  022700  030000                  CMP     #30000,R0
1333  003174  001570                          BEQ     TEST3
1334  003176  022700  040000                  CMP     #40000,R0
1335  003202  001402                          BEQ     .+6
1336  003204  000167  001006                  JMP     TEST5
1337  003210  000167  000460                  JMP     TEST4
1338                                  ;RETURN HERE AFTER COMPLETION OF TEST
1339  003214  012702  013705          DONE:   MOV     #MSG30,R2
1340  003220  104404                          TOP
1341  003222  104436                          CKSW
1342  003224  032777  000001  175260          BIT     #1,@SWR         ;IF BIT 0=1 REPEAT ALL PATTERNS
1343  003232  001413                          BEQ     DONE1
1344  003234  016700  176072                  MOV     PARAM,R0
1345  003240  042700  170777                  BIC     #170777,R0
1346  003244  022700  007000                  CMP     #7000,R0        ;REACHED PAT 7
1347  003250  001404                          BEQ     DONE1           ;YES
1348  003252  062767  001000  176052          ADD     #1000,PARAM     ;NO, +1 TO PAT
1349  003260  000726                          BR      EXEC1           ;REPEAT
```

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1350  003262  005367  176042          DONE1:  DEC     NUMTST
1351  003266  001010                          BNE     DOAGN
1352  003270  013702  000042                  MOV     @#42,R2
1353  003274  001001                          BNE     ENDADR
1354  003276  000000                          HALT                    ;FINISHED ALL TESTS
1355  003300  004712                  ENDADR: JSR     PC,(2)
1356  003302  000240                          NOP
1357  003304  000240                          NOP
1358  003306  000240                          NOP
1359  003310  062767  000002  176016  DOAGN:  ADD     #2,TSTEX
1360  003316  000704                          BR      EXEC            ;DO NEXT TEST
1361
1362                                  ;TEST0
1363                                  ;WRITE ONE RECORD, CHANGE DRIVES, GO TO EOT
1364  003320  052767  000002  175316  TEST0:  BIS     #2,MODES        ;EXIT WRITE EVERY RECORD, NO READ PASS
1365  003326  104420                          CLRALL                  ;CLEAR ERROR COUNTERS AND REWIND
1366  003330  104416                          GENPAT                  ;GENERATE PATTERN
1367  003332  104410                  T0:     RSFDRV                  ;RESET DRIVE SELECTION TO LOWEST NUMBER
1368  003334  104414                  T0A:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1369  003336  032767  000040  175300          BIT     #40,MODES       ;IS THIS DRIVE AT EOT?
1370  003344  001002                          BNE     T0B             ;YES, SKIP WRITE
1371  003346  104402                          WRITIT                  ;WRITE
1372  003350  104406                          SVCTRS                  ;SAVE DRIVE COUNTERS
1373
1374  003352  104422                  T0B:    CHGDRV                  ;ANY MORE DRIVES SELECTED?
1375  003354  000767                          BR      T0A             ;YES
1376  003356  004767  001452                  JSR     PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
1377  003362  000763                          BR      T0              ;NO
1378  003364  000167  177624                  JMP     DONE            ;YES, EXIT
1379                                  ;TEST1
1380                                  ;WRITE RECORD LENGTH SEQUENCE, GO TO NEXT DRIVE, CONTINUE TO EOT ON ALL DRIVES.
1381  003370  052767  000001  175246  TEST1:  BIS     #1,MODES        ;EXIT WRITE AFTER RLS, NO READ PASS
1382  003376  104420                          CLRALL                  ;CLEAR ERROR COUNTERS AND REWIND
1383  003400  104416                          GENPAT                  ;GENERATE PATTERN
1384  003402  104410                  T1:     RSFDRV                  ;RESET DRIVE SELECTION TO LOWEST NUMBER
1385  003404  104414                  T1A:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1386  003406  032767  000040  175230          BIT     #40,MODES       ;IS THIS DRIVE AT EOT?
1387  003414  001002                          BNE     T1B             ;YES, SKIP WRITE
1388  003416  104402                          WRITIT                  ;WRITE
1389  003420  104406                          SVCTRS                  ;SAVE DRIVE COUNTERS
1390  003422  104422                  T1B:    CHGDRV                  ;ANY MORE DRIVE SELECTED?
1391  003424  000767                          BR      T1A             ;YES
1392  003426  004767  001402                  JSR     PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
1393  003432  000763                          BR      T1              ;NO
1394  003434  000167  177554                  JMP     DONE            ;YES EXIT
1395
1396                                  ;TEST2
1397                                  ;WRITE A RECORD LENGTH SEQUENCE , CHANGE DRIVES
1398                                  ;BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES,  CONTINUE TO EOT ON ALL DRIVES
1399  003440  052767  000005  175176  TEST2:  BIS     #5,MODES        ;EXIT WRITE AFTER RLS, DO READ PASS
1400  003446  104420                          CLRALL                  ;CLEAR ERROR COUNTERS AND REWIND
1401  003450  104416                          GENPAT                  ;GENERATE PATTERN
1402  003452  104410                  T2:     RSFDRV                  ;SET DRIVE SELECTION TO LOWEST NUMBER
1403  003454  104414                  T2A:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1404  003456  032767  000040  175160          BIT     #40,MODES       ;IS THIS DRIVE AT EOT?
1405  003464  001002                          BNE     T2B             ;YES, SKIP WRITE
```

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1406  003466  104402                          WRITIT          ;WRITE
1407  003470  104406                          SVCTRS          ;SAVE DRIVE COUNTERS
1408  003472  104422                  T2B:    CHGDRV          ;ANYMORE DRIVERS SELECTED?
1409  003474  000767                  BR      T2A             ;YES
1410  003476  104414                  T2C:    MVCTRS          ;RESTORE DRIVE COUNTERS
1411  003500  032767  000020  175136  BIT     #20,MODES       ;IS THIS READ AT EOT?
1412  003506  001003                  BNE     T2D             ;YES, SKIP BACKSPACE
1413  003510  004767  005206          JSR     PC,GOBKWD       ;BACKSPACE
1414  003514  104406                          SVCTRS          ;SAVE DRIVE COUNTERS
1415  003516  104422                  T2D:    CHGDRV          ;ANY MORE DRIVES SELECTED?
1416  003520  000766                  BR      T2C             ;YES
1417  003522  104414                  T2E:    MVCTRS          ;RESTORE DRIVE COUNTERS
1418  003524  032767  000020  175112  BIT     #20,MODES       ;IS THIS READ AT EOT
1419  003532  001001                  BNE     T2F             ;YES, SKIP READ
1420  003534  104424                  READIT                  ;READ
1421  003536  104406                  T2F:    SVCTRS          ;SAVE DRIVE COUNTERS
1422  003540  104422                          CHGDRV          ;ANYMORE DRIVES SELECTED?
1423  003542  000767                  BR      T2E             ;YES
1424  003544  004767  001264          JSR     PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
1425  003550  000740                  BR      T2              ;NO
1426  003552  000167  177436          JMP     DONE            ;YES EXIT
1427
1428                                  ;TEST3
1429                                  ;WRITE ONE RECORD, CHANGE DRIVES, BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES
1430  003556  052767  000006  175060  TEST3:  BIS     #6,MODES        ;EXIT WRITE EVERY RECORD, DO READ PASS
1431  003564  104420                          CLRALL          ;CLEAR ERROR COUNTERS AND REWIND
1432  003566  104416                          GENPAT          ;GENERATE PATTERN
1433  003570  104410                  T3:     RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1434  003572  104414                  T3A:    MVCTRS          ;RESTORE DRIVE COUNTERS
1435  003574  032767  000040  175042          BIT     #40,MODES       ;IS THIS DRIVE AT EOT?
1436  003602  001002                          BNE     T3B             ;YES, SKIP WRITE
1437  003604  104402                          WRITIT          ;WRITE
1438  003606  104406                          SVCTRS          ;SAVE DRIVE COUNTERS
1439  003610  104422                  T3B:    CHGDRV          ;ANY MORE DRIVES SELECTED
1440  003612  000767                          BR      T3A             ;YES
1441
1442  003614  104414                  T3C:    MVCTRS          ;RESTORE DRIVE COUNTERS
1443  003616  032767  000020  175020          BIT     #20,MODES       ;IS THIS DRIVE AT EOT
1444  003624  001002                          BNE     T3D             ;YES, SKIP BACKSPACE
1445  003626  004767  005070          JSR     PC,GOBKWD       ;BACKSPACE
1446  003632  104406                  T3D:    SVCTRS          ;SAVE DRIVE COUNTERS
1447  003634  104422                          CHGDRV          ;ANY MORE DRIVES SELECTED?
1448  003636  000766                  BR      T3C             ;GO
1449  003640  104414                  T3E:    MVCTRS          ;RESTORE DRIVE COUNTERS
1450  003642  032767  000020  174774          BIT     #20,MODES       ;IS THIS DRIVE AT EOT?
1451  003650  001001                          BNE     T3F             ;YES, SKIP READ
1452  003652  104424                          READIT          ;READ
1453  003654  104406                  T3F:    SVCTRS          ;SAVE DRIVE COUNTERS
1454  003656  104422                          CHGDRV          ;ANY MORE DRIVES SELECTED
1455  003660  000767                          BR      T3E             ;YES
1456  003662  004767  001146          JSR     PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
1457  003666  000740                  BR      T3              ;NO
1458  003670  000167  177320          JMP     DONE            ;YES, EXIT
1459
1460                                  ;TEST4
1461                                  ;WRITE RECORD, CHANGE DRIVES, REPEAT FOR RECORD LENGTH SEQUENCE
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1462                                            ;READ RECORD, CHANGE DRIVES, REPEAT FOR RLS
1463  003674  052767  000006  174742  TEST4:  BIS     #6,MODES        ;EXIT WRITE EVERY RECORD, DO READ PASS
1464  003702  104416                          GENPAT                  ;GENERATE PATTERN
1465  003704  032777  000014  175422          BIT     #14,@TSTEX
1466  003712  001006                          BNE     T4
1467  003714  042767  000007  174722          BIC     #7,MODES
1468  003722  052767  000005  174714          BIS     #5,MODES        ;EXIT WRITE AFTER RLS, DO READ PASS
1469  003730  104420                  T4:     CLRALL                  ;CLEAR ERROR COUNTERS AND REWIND
1470  003732  104410                  T4A:    RSFDRV                  ;SET DRIVE SELECTION TO LOWEST NUMBER
1471  003734  104414                  T4B:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1472  003736  016767  174662  174662          MOV     RECORD,WRRECR   ;SAVE RECORD
1473  003744  104406                          SVCTRS                  ;SAVE DRIVE COUNTERS
1474  003746  104422                          CHGDRV                  ;ANYMORE DRIVES SELCTED?
1475  003750  000771                          BR      T4B             ;YES
1476  003752  042767  000010  174664          BIC     #10,MODES       ;INDICATE RLS END
1477  003760  104410                  T4C:    RSFDRV                  ;SET DRIVE SELECTION TO LOWEST NUMBER
1478  003762  104414                  T4D:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1479  003764  032767  000040  174652          BIT     #40,MODES       ;IS DRIVE AT EOT
1480  003772  001010                          BNE     T4E             ;YES, SKIP WRITE
1481  003774  016767  174626  174560          MOV     WRRECR,SVRECR   ;SAVE START OF RLS
1482  004002  104402                          WRITIT                  ;WRITE
1483  004004  016767  174552  174614          MOV     SVRECR,WRRECR   ;RESTORE START OF RLS
1484  004012  104406                          SVCTRS                  ;SAVE DRIVE COUNTERS
1485  004014  104422                  T4E:    CHGDRV                  ;ANYMORE DRIVES SELECTED?
1486  004016  000761                          BR      T4D             ;YES
1487  004020  032767  000010  174616          BIT     #10,MODES       ;ARE WE AT END OF RLS
1488  004026  001007                          BNE     T4G             ;YES
1489  004030  104414                  T4F:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1490  004032  032767  000040  174604          BIT     #40,MODES       ;ARE WE AT EOT?
1491  004040  001747                          BEQ     T4C             ;NO
1492  004042  104422                          CHGDRV                  ;ANYMORE DRIVES SELECTED?
1493  004044  000771                          BR      T4F             ;YES
1494
1495
1496  004046  104410                  T4G:    RSFDRV                  ;SET DRIVE SELECTION TO LOWEST NUMBER
1497  004050  104414                  T4H:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1498  004052  032767  000020  174564          BIT     #20,MODES       ;IS THIS DRIVE AT EOT?
1499  004060  001002                          BNE     T4J             ;YES, SKIP BACKSPACE
1500  004062  004767  004634                  JSR     PC,GOBKWD       ;BACKSPACE
1501  004066  104406                  T4J:    SVCTRS                  ;SAVE DRIVE COUNTERS
1502  004070  104422                          CHGDRV                  ;ANY MORE DRIVES SELECTED?
1503  004072  000766                          BR      T4H             ;YES
1504  004074  104410                  T4K:    RSFDRV                  ;SET DRIVE SELECTION TO LOWEST NUMBER
1505  004076  104414                  T4L:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1506  004100  032767  000020  174536          BIT     #20,MODES       ;IS THIS READ AT EOT?
1507  004106  001025                          BNE     T4N             ;YES, SKIP READ
1508  004110  026767  174514  174506          CMP     LASRCR,RECORD   ;HAVE WE READ LAST RECORD WRITTEN?
1509  004116  001421                          BEQ     T4N             ;YES
1510  004120  016767  174504  174434          MOV     LASRCR,SVRECR   ;SAVE LAST RECORD
1511  004126  032767  000003  175176          BIT     #3,PARAM        ;IS READ MODE NONSTOP?
1512  004134  001405                          BEQ     T4M             ;YES
1513  004136  016767  174462  174464          MOV     RECORD,LASRCR
1514  004144  005267  174460                  INC     LASRCR          ;+1 TO LAST RECORD WRITTEN
1515  004150  104424                  T4M:    READIT                  ;READ
1516  004152  016767  174404  174450          MOV     SVRECR,LASRCR   ;RESTORE LAST RECORD WRITTEN
1517  004160  104406                          SVCTRS                  ;SAVE DRIVE COUNTERS
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1518  004162  104422                    T4N:        CHGDRV          ;ANYMORE DRIVES SELECTED?
1519  004164  000744                            BR  T4L             ;YES
1520  004166  104414                    T4P:        MVCTRS          ;RESTORE DRIVE COUNTERS
1521  004170  026767  174434  174426        CMP   LASRCR,RECORD    ;ARE WE AT END OF RLS?
1522  004176  001336                        BNE   T4K               ;NO
1523  004200  104422                            CHGDRV          ;ANYMORE DRIVES SELECTED?
1524  004202  000771                        BR    T4P               ;YES
1525  004204  004767  000624              JSR   PC,ALLEOT         ;ARE ALL DRIVES AT EOT?
1526  004210  000650                        BR    T4A               ;NO
1527  004212  000167  176776              JMP   DONE              ;YES,EXIT
1528
1529                                    ;TEST5
1530                                    ;READ ONLY
1531                                    ;RANDOM PATTERN INVALID EXCEPT FOR SPECIFIC CASES
1532  004216  052767  000002  174420  TEST5:  BIS   #2,MODES
1533  004224  104420                            CLRALL          ;CLEAR ERROR COUNTERS AND REWIND
1534  004226  104416                            GENPAT          ;GENERATE PATTERN
1535  004230  012767  177777  000240  T5:      MOV   #-1,T5FLAG        ;ENABLE EXIT FROM WRITE ROUTINE
1536  004236  104402                            WRITIT          ;ENTER WRITE ONLY TO INITIALIZE RECORD SEQUENCE
1537  004240  032767  000010  174376        BIT   #10,MODES         ;ARE WE AT END OF RLS?
1538  004246  001402                        BEQ   T5A               ;YES
1539  004250  004767  001404              JSR   PC,TESINC         ;SEE IF RECORD LENGTH SHOULD BE CHANGED
1540  004254  016767  174344  000216  T5A:     MOV   RECORD,T5INC
1541  004262  005067  174336              CLR   RECORD
1542  004266  052767  000010  174350  T5B:     BIS   #10,MODES         ;INDICATE AT START OF RLS
1543  004274  104410                            RSFDRV          ;SET DRIVE SELECTION TO LOWEST DRIVE NUMBER
1544  004276  104414                    T5C:    MVCTRS          ;RESTORE DRIVE COUNTERS
1545  004300  032767  000020  174336        BIT   #20,MODES         ;IS THIS DRIVE AT EOT
1546  004306  001007                        BNE   T5D               ;YES
1547  004310  016767  174310  174312        MOV   RECORD,LASRCR
1548  004316  066767  000156  174304        ADD   T5INC,LASRCR      ;CURRENT RECORD + SEQUENCE LENGTH
1549  004324  104406                            SVCTRS          ;SAVE DRIVE COUNTERS
1550  004326  104422                    T5D:    CHGDRV          ;ANYMORE DRIVES?
1551  004330  000762                        BR    T5C               ;YES
1552  004332  104410                            RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1553  004334  104414                    T5E:    MVCTRS          ;RESTORE DRIVE COUNTERS
1554  004336  032767  000020  174300        BIT   #20,MODES         ;IS THIS DRIVE AT EOT?
1555  004344  001021                        BNE   T5G               ;YES
1556  004346  016767  174256  174206        MOV   LASRCR,SVRECR     ;SAVE END OF RLS RECORDS
1557  004354  032767  000003  174750        BIT   #3,PARAM          ;IS READ MODE NONSTOP
1558  004362  001405                        BEQ   T5F               ;YES GO TO END RLS
1559  004364  016767  174234  174236        MOV   RECORD,LASRCR     ;NEXT TO BE READ
1560  004372  005267  174232              INC   LASRCR            ;+1 EXIT READ AFTER ONE RECORD
1561  004376  104424                    T5F:    READIT          ;READ
1562  004400  016767  174156  174222        MOV   SVRECR,LASRCR     ;RESTORE END RECORD
1563  004406  104406                            SVCTRS          ;SAVE DRIVE COUNTERS
1564  004410  104422                    T5G:    CHGDRV          ;ANY MORE DRIVES?
1565  004412  000750                        BR    T5E               ;YES
1566  004414  004767  000414              JSR   PC,ALLEOT         ;ALL AT EOT?
1567  004420  000402                        BR    T5H               ;NO
1568  004422  000167  176566              JMP   DONE              ;YES EXIT
1569  004426  104410                    T5H:    RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1570  004430  104414                    T5J:    MVCTRS          ;RESTORE DRIVE COUNTERS
1571  004432  026767  174166  174170        CMP   RECORD,LASRCR     ;ARE WE AT END OF RLS?
1572  004440  001003                        BNE   T5K               ;NO
1573  004442  042767  000010  174174        BIC   #10,MODES         ;YES,
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1574  004450  104422                  T5K:    .       CHGDRV          ;ANYMORE DRIVES SELECTED?
1575  004452  000766                          BR      T5J             ;YES
1576  004454  032767  000010  174162          BIT     #10,MODES       ;AT END OF RLS?
1577  004462  001324                          BNE     T5E             ;NO
1578  004464  004767  000344                  JSR     PC,ALLEOT       ;ALL DRIVES AT EOT?
1579  004470  000657                          BR      T5              ;NO
1580  004472  000167  176516                  JMP     DONE            ;YES, EXIT
1581  004476  000000                  T5FLAG: 0
1582  004500  000000                  T5INC:  0
1583
1584                                  ;SAVE DRIVE RECORD AND ERROR COUNTERS
1585  004502  004767  000030          SVCTR:  JSR     PC,CTRDEX
1586  004506  012021                  SVC1:   MOV     (0)+,(1)+
1587  004510  022700  000646                  CMP     #DRVADR,R0
1588  004514  001374                          BNE     SVC1
1589  004516  000207                          RTS     PC
1590                                  ;RESET DRIVE COUNTERS BACK INTO PROGRAM
1591  004520  004767  000012          MVCTR:  JSR     PC,CTRDEX
1592  004524  012120                  MV1:    MOV     (1)+,(0)+
1593  004526  022700  000646                  CMP     #DRVADR,R0
1594  004532  001374                          BNE     MV1
1595  004534  000207                          RTS     PC
1596                                  ;SET UP POINTERS FOR MOVE AND SAVE COUNTERS
1597  004536  012700  000602          CTRDEX: MOV     #WRCHEK,R0
1598  004542  012701  000646                  MOV     #DRVADR,R1
1599  004546  066701  174016                  ADD     CDRIVE,R1
1600  004552  066701  174012                  ADD     CDRIVE,R1
1601  004556  011101                          MOV     @R1,R1
1602  004560  000207                          RTS     PC
1603                                  ;CLEAR ALL DRIVE COUNTERS
1604  004562  104410                  CLRAL:          RSFDRV
1605  004564  004767  000206          CLR1:   JSR     PC,REWIND
1606  004570  004767  000352                  JSR     PC,CLRTBL
1607  004574  104406                          SVCTRS
1608  004576  104422                          CHGDRV
1609  004600  000771                          BR      CLR1
1610  004602  052767  000010  174034          BIS     #10,MODES       ;AT END OF RLS
1611  004610  005067  177662                  CLR     T5FLAG
1612  004614  000207                          RTS     PC
1613                                  ;RESET DRIVE SELECTION TO LOWEST NUMBER
1614  004616  005067  173746          RSFDR:  CLR     CDRIVE          ;START WITH DRIVE 0
1615  004622  012767  000200  173736          MOV     #200,CDRVBT     ;BIT FOR DRIVE 0
1616  004630  036767  173724  173730  RSF1:   BIT     MSBITS,CDRVBT   ;IS DRIVE SELECTED?
1617  004636  001006                          BNE     RSF2            ;YES
1618  004640  005267  173724                  INC     CDRIVE          ;NO + 1 TO DRIVE
1619  004644  000241                          CLC
1620  004646  006067  173714                  ROR     CDRVBT          ;ROTATE DRIVE BIT
1621  004652  000766                          BR      RSF1            ;REPEAT
1622  004654  016767  173710  173702  RSF2:   MOV     CDRIVE,COMAND
1623  004662  000367  173676                  SWAB    COMAND
1624  004666  105767  174440                  TSTB    PARAM           ;SET PROPER DENSITY BITS
1625  004672  100003                          BPL     .+10
1626  004674  052767  040000  173662          BIS     #40000,COMAND
1627  004702  032767  000100  174422          BIT     #100,PARAM
1628  004710  001403                          BEQ     .+10
1629  004712  052767  020000  173644          BIS     #20000,COMAND
```

```
1630  004720  032767  000400  174404          BIT     #400,PARAM      ;TEST PARITY SELECTED
1631  004726  001003                          BNE     .+10            ;ODD
1632  004730  052767  004000  173626          BIS     #4000,COMAND    ;EVEN
1633  004736  000207                          RTS     PC
1634
1635                                  ;SELECT NEXT DRIVE IN SEQUENCE
1636                                  ;+1 WORD TO EXIT ADDRESS IF LAST DRIVE TESTED
1637  004740  005267  173624          CHGDR:  INC     CDRIVE          ;+1 TO DRIVE NUMBER
1638  004744  000241                          CLC
1639  004746  006067  173614                  ROR     CDRVBT          ;MOVE MASK BIT OVER 1 PLACE
1640  004752  001004                          BNE     CHG1            ;BRANCH IF MORE DRIVES SELECTED
1641  004754  104410                          RSFDRV                  ;RESET DRIVE SELECT TO LOWEST NUMBER
1642  004756  062716  000002                  ADD     #2,@SP          ;+ 2 TO SKIP OVER FIRST EXIT
1643  004762  000207                          RTS     PC
1644  004764  036767  173576  173566  CHG1:   BIT     CDRVBT,MSBITS
1645  004772  001762                          BEQ     CHGDR
1646  004774  000727                          BR      RSF2
1647
1648                                  ;REWIND DRIVE TO BOT
1649  004776  105777  173500          REWIND: TSTB    @MTC
1650  005002  100375                          BPL     .-4             ;WAIT FOR CONTROL UNIT
1651  005004  016777  173554  173470          MOV     COMAND,@MTC     ;SELECT DRIVE
1652  005012  006077  173462                  ROR     @MTS
1653  005016  103375                          BCC     .-4             ;WAIT FOR TU READY
1654  005020  052777  000016  173454          BIS     #16,@MTC        ;REWIND
1655  005026  004767  000140                  JSR     PC,GOWAIT
1656  005032  000207                          RTS     PC              ;EXIT
1657                                  ;ARE ALL DRIVES AT END OF TAPE
1658  005034  104410                  ALLEOT: RSFDRV
1659  005036  104414                  ALL1:   MVCTRS
1660  005040  032767  000060  173576          BIT     #60,MODES       ;AT EOT?
1661  005046  001403                          BEQ     ALLEOS          ;NO
1662  005050  104422                          CHGDRV                  ;DONE ALL DRIVES?
1663  005052  000771                          BR      ALL1            ;NO
1664  005054  000431                          BR      ALL3
1665  005056  104436                  ALLEOS: CKSW
1666  005060  032777  000400  173424          BIT     #400,@SWR       ;TEST SWITCH 8 TO EXIT AT END OF SEQUENCE
1667  005066  001426                          BEQ     ALL2            ;NO, GO TO EOT
1668  005070  032767  000010  173546          BIT     #10,MODES       ;AT END OF SEQUENCE
1669  005076  001422                          BEQ     ALL2            ;NO, EXIT, DON'T DUMP ERROR COUNTERS
1670                                  ;DUMP ERROR COUNTERS ON ALL DRIVES
1671  005100  104410                  CTRDMP: RSFDRV
1672  005102  104414                          MVCTRS
1673  005104  005767  177366                  TST     T5FLAG
1674  005110  001007                          BNE     CTRD1           ;DUMP READ ONLY
1675  005112  004767  001100                  JSR     PC,ENDT1
1676  005116  104436                          CKSW
1677  005120  032767  000004  173516          BIT     #4,MODES        ;READ PASS SELECTED?
1678  005126  001402                          BEQ     CDMEND          ;NO
1679  005130  004767  003112          CTRD1:  JSR     PC,RNDTP1
1680  005134  104422                  CDMEND: CHGDRV                  ;DONE ALL DRIVES
1681  005136  000761                          BR      CTRDMP+2        ;NO
1682  005140  062716  000002          ALL3:   ADD     #2,(6)          ;INCREMENT RETURN POINT
1683  005144  000207                  ALL2:   RTS     PC
1684
1685
```

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1686
1687  005146  012700  000602          ;CLEAR READ AND WRITE TABLES
1688  005152  005020          CLRTBL: MOV     #WRCHEK,R0
1689  005154  020027  000644  CLRT1:  CLR     (0)+
1690  005160  001374                  CMP     R0,#MODES
1691  005162  042767  000070  173454  BNE     CLRT1
1692  005170  000207                  BIC     #70,MODES
1693                                  RTS     PC
1694  005172  012777  000200  173310  ;INTERRUPT ENABLE, GO, WAIT FOR INTERRUPT
1695  005200  012767  000001  000014  GOWAIT: MOV     #200,@CC        ;SET PRIORITY LEVEL 4
1696  005206  012777  005234  173322          MOV     #1,$WAIT        ;#1=WAIT INSTR
1697  005214  052777  000101  173260          MOV     #GW1,@MTV       ;SET INTERRUPT RETURN
1698  005222  000001                  $WAIT:  BIS     #101,@MTC       ;INTERRUPT ENABLE, GO
1699  005224  012777  000340  173256          WAIT                    ;WAIT FOR INTERRUPT
1700  005232  000207                          MOV     #340,@CC        ;RESTORE PRIORITY LEVEL 7
1701  005234  012767  000240  177760  GW1:    RTS     PC              ;EXIT
1702  005242  000002                          MOV     #240,$WAIT      ;NOP IT JUST IN CASE 11/34
1703                                  GW1:    RTI                     ;RETURN FROM INTERRUPT
1704
1705  005244  005767  173354          ;WRITE RECORD SECTION
1706  005250  001031          WRITI:  TST     RECORD          ;IS THIS THE FIRST _CORD
1707  005252  016767  173250  173274          BNE     NOINCR          ;NO, SKIP SET UP OF RECORD LENGTH AND BLOCK INCREMENT
1708  005260  012767  177774  173310          MOV     MAXLEN,STRLEN
1709  005266  032767  000020  174036          MOV     #-4.,BLKINC
1710  005274  001006                          BIT     #20,PARAM
1711  005276  016767  173226  173250          BNE     W1
1712  005304  012767  000004  173264          MOV     MINLEN,STRLEN
1713  005312  016767  173236  173320  W1:     MOV     #4.,BLKINC
1714  005320  032767  000040  174004          MOV     STRLEN,WRTLEN
1715  005326  001002                          BIT     #40,PARAM       ;DOES RECORD LENGTH CHANGE?
1716  005330  005067  173242                  BNE     NOINCR          ;YES
1717  005334  016767  173264  173264  NOINCR: CLR     BLKINC          ;NO
1718  005342  005767  177130                  MOV     RECORD,WRREC
1719  005346  001401                          TST     TSFLAG
1720  005350  000207                          BEQ     .+4
1721  005352  005067  173216                  RTS     PC              ;EXIT WRITE ROUTINE IF TEST 5
1722  005356  016777  173202  173116  STRTOP: CLR     WRPASS
1723  005364  105777  173112                  MOV     COMAND,@MTC     ;SELECT UNIT
1724  005370  100375                  TSTB    @MTC
1725  005372  006077  173102                  BPL     .-4             ;WAIT FOR CU READY
1726  005376  103375                  ROR     @MTS            ;WAIT FOR TU READY
1727  005400  016777  173234  173076  NONSTP: BCC     .-4
1728  005406  005477  173072                  MOV     WRTLEN,@BC      ;SET BYTE COUNT
1729  005412  016777  173114  173066          NEG     @BC
1730  005420  052777  000004  173054          MOV     WBUF,@CA        ;SET CURRENT ADDRESS
1731  005426  004767  177540                  BIS     #4,@MTC         ;WRITE
1732                                  ;RETURN HERE AFTER INTERRUPT
1733  005432  017767  173042  173140          JSR     PC,GOWAIT       ;INTERRUPT ENABLE, GO, WAIT FOR DONE
1734  005440  005777  173036          MOV     @MTS,STATRD     ;SAVE STATUS
1735  005444  100542                  TST     @MTC
1736  005446  005767  173122                  BMI     ERROR           ;HAVE ERROR FLAG, CHECK FOR EOT
1737  005452  001410                  TST     WRPASS          ;WAS THIS A RECOVERY PASS
1738  005454  016700  173114                  BEQ     TSTSTP          ;NO
1739  005460  006300                  MOV     WRPASS,R0       ;YES
1740  005462  062700  000602                  ASL     R0
1741  005466  005210                  ADD     #WRCHEK,R0
                                        INC     @R0             ;+1 TO APPROPRIATE RECOVERY PASS COUNTER
```

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1742  005470  005067  173100                          CLR     WRPASS
1743  005474  032767  000014  173630  TSTSTP:         BIT     #14,PARAM       ;IS WRITE MODE NONSTOP?
1744  005502  001023                                  BNE     STOPOP          ;NO
1745  005504  005767  173064                          TST     WRPASS          ;YES
1746  005510  001333                                  BNE     NONSTP
1747  005512  004767  000142                          JSR     PC,TESINC       ;CHANGE RECORD LENGTH
1748  005516  032767  000001  173120                  BIT     #1,MODES        ;EXIT AFTER RLS?
1749  005524  001405                                  BEQ     W10             ;NO
1750  005526  032767  000010  173110                  BIT     #10,MODES       ;YES, ARE WE AT END OF RLS?
1751  005534  001721                                  BEQ     NONSTP          ;NO
1752  005536  000207                                  RTS     PC              ;YES
1753  005540  032767  000002  173076  W10:            BIT     #2,MODES        ;EXIT EVERY RECORD?
1754  005546  001714                                  BEQ     NONSTP          ;NO
1755  005550  000207                                  RTS     PC              ;YES
1756  005552  032767  000010  173552  STOPOP:         BIT     #10,PARAM       ;IS WRITE MODE RANDOM?
1757  005560  001414                                  BEQ     W11             ;NO
1758                                    ;RANDOM STALL DELAY
1759  005562  004767  001450                  RANSTP: JSR     PC,RANGEN
1760  005566  052767  177400  001612                  BIS     #177400,RANDOM
1761  005574  012704  177470                  RAN1:   MOV     #-200.,R4       ;DELAY 1 MILLISECOND
1762  005600  005204                                  INC     R4
1763  005602  001376                                  BNE     .-2
1764  005604  005267  001576                          INC     RANDOM
1765  005610  001371                                  BNE     RAN1
1766  005612  005767  172756          W11:            TST     WRPASS
1767  005616  001257                                  BNE     STRTOP
1768  005620  004767  000034                          JSR     PC,TESINC
1769  005624  032767  000001  173012                  BIT     #1,MODES        ;EXIT AFTER RLS?
1770  005632  001405                                  BEQ     W12             ;NO
1771  005634  032767  000010  173002                  BIT     #10,MODES       ;YES, ARE WE AT END OF RLS?
1772  005642  001645                                  BEQ     STRTOP          ;NO
1773  005644  000207                                  RTS     PC              ;YES
1774  005646  032767  000002  172770  W12:            BIT     #2,MODES        ;EXIT EVERY RECORD?
1775  005654  001640                                  BEQ     STRTOP          ;NO
1776  005656  000207                                  RTS     PC              ;YES
1777                                    ;SEE IF RECORD LENGTH SHOULD BE CHANGED
1778  005660  005267  172740                  TESINC: INC     RECORD          ;+1 TO RECORD COUNT
1779  005664  042767  000010  172752                  BIC     #10,MODES       ;NOT END OF RLS UNLESS SET BELOW
1780  005672  005767  172700                          TST     BLKINC
1781  005676  001416                                  BEQ     TSINC2
1782  005700  066767  172672  172732                  ADD     BLKINC,WRTLEN
1783  005706  026767  172726  172614                  CMP     WRTLEN,MINLEN   ;RECORD LENGTH TOO SHORT?
1784  005714  002404                                  BLT     RESETL          ;YES,RESET
1785  005716  026767  172716  172602                  CMP     WRTLEN,MAXLEN   ;RECORD LENGTH TOO LONG?
1786  005724  003403                                  BLE     TSINC2          ;NO
1787  005726  016767  172622  172704  RESETL: MOV     STRLEN,WRTLEN   ;YES, RESET
1788  005734  105767  172664          TSINC2: TSTB    RECORD
1789  005740  001003                                  BNE     TSINC3          ;NO
1790  005742  052767  000010  172674                  BIS     #10,MODES       ;INDICATE AT END OF RLS
1791  005750  000207                          TSINC3: RTS     PC
1792
1793
1794                                    ;HAVE AN ERROR FLAG DURING WRITE OPERATION
1795                                    ;IF ERROR IS CAUSED BY END OF TAPE FLAG DUMP WRITE ERROR COUNTERS
1796                                    ;FOR ALL OTHER ERRORS:  PRINT COMMAND AND STATUS REGISTERS AND RECORD NUMBER
1797                                    ;IF READ PASS IS SELECTED, TRY TO RECOVER BY WRITING WITH XIRG.
```

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1798  005752  032767  175600  172620  ERROR:  BIT     #175600,STATRD  ;AT EOT?
1799  005760  001511                  BEQ     ENDTAP          ;YES
1800  005762  005767  172606          TST     WRPASS
1801  005766  001002                  BNE     ERR1            ;FIRST ERROR?
1802  005770  005267  172606          INC     WRCHEK          ;YES, + 1 TO WRITE ERROR
1803  005774  032777  020000  172510  ERR1:   BIT     #20000,@SWR     ;TYPE ALL ERRORS?
1804  006002  001011                  BNE     TESREC          ;NO
1805  006004  012702  012616          MOV     #MSG7,R2
1806  006010  104404                  TOP                     ;PRINT ERROR
1807  006012  016767  172622  172536  MOV     WRTLEN,LENGTH
1808  006020  004767  003006          JSR     PC,PRTS         ;PRINT STATUS, COMMAND, RECORD, LENGTH
1809  006024  104436                  CKSW
1810  006026  032777  000100  172456  TESREC: BIT     #100,@SWR       ;RECOVER STATISTICALLY SELECTED?
1811  006034  001410                  BEQ     TESRC1          ;NO
1812  006036  005267  172532          INC     WRPASS          ;+1 TO WRITE RECOVER
1813  006042  022767  000010  172524  CMP     #8.,WRPASS      ;HAVE WE TRIED TO WRITE RECOVER 8 TIMES?
1814  006050  001020                  BNE     STREC1          ;NO
1815  006052  005267  172544          INC     PERMBS          ;YES, +1 TO PERMANENT BADSPOT?
1816  006056  032767  000004  172560  TESRC1: BIT     #4,MODES        ;IS READ PASS SELECTED?
1817  006064  001402                  BEQ     .+6             ;NO
1818  006066  004767  002412          JSR     PC,XRGREC
1819  006072  005067  172476          CLR     WRPASS
1820  006076  032767  002000  172474  BIT     #2000,STATRD
1821  006104  001037                  BNE     ENDTAP
1822  006106  000167  177500          JMP     W11
1823  006112  004767  002052  STREC1: JSR     PC,BACK1
1824  006116  004767  002046          JSR     PC,BACK1        ;BACKSPACE 2 RECORDS
1825  006122  032777  000040  172350  BIT     #40,@MTS
1826  006130  001402                  BEQ     .+6
1827  006132  000167  177220          JMP     STRTOP
1828  006136  012777  177777  172340  MOV     #-1,@BC
1829  006144  016777  172414  172330  MOV     COMAND,@MTC
1830  006152  052777  000010  172322  BIS     #10,@MTC
1831  006160  004767  177006          JSR     PC,GOWAIT       ;SPACE FORWARD 1 RECORD
1832  006164  042777  000016  172310  BIC     #16,@MTC
1833  006172  052777  000004  172302  BIS     #4,@MTC         ;CHANGE FROM SPACE TO WRITE
1834  006200  000167  177152          JMP     STRTOP
1835                          ;DRIVE IS AT EOT
1836  006204  005267  172414  ENDTAP: INC     RECORD
1837  006210  052767  000040  172426  BIS     #40,MODES       ;INDICATE DRIVE AT EOT
1838  006216  012702  013537  ENDT1:  MOV     #MSG24,R2
1839  006222  104404                  TOP
1840  006224  012702  012644          MOV     #MSG8,R2
1841  006230  104404                  TOP
1842                          ;DUMP WRITE ERRORS
1843  006232  004767  002640  WRTDMP: JSR     PC,PRTD         ;PRINT DRIVE, PATTERN, PARITY, DENSITY
1844
1845  006236  016767  173070  003162  MOV     PARAM,CHAR
1846  006244  042767  177763  003154  BIC     #177763,CHAR
1847  006252  012702  013272          MOV     #MSG14,R2
1848  006256  022767  000004  003142  CMP     #4,CHAR
1849  006264  001002                  BNE     .+6
1850  006266  012702  013252          MOV     #MSG12,R2
1851  006272  022767  000010  003126  CMP     #10,CHAR
1852  006300  001002                  BNE     .+6
1853  006302  012702  013262          MOV     #MSG13,R2
```

```
1854  006306  104404                          TOP             ;PRINT WRITE MODE
1855  006310  016702  172310                  MOV     RECORD,R2
1856  006314  104426                          DECPRT          ;PRINT RECORD NUMBER
1857  006316  016767  173010  003102          MOV     PARAM,CHAR
1858  006324  042767  177717  003074          BIC     #177717,CHAR
1859  006332  012702  013320                  MOV     #MSG17,R2
1860  006336  022767  000020  003062          CMP     #20,CHAR
1861  006344  001002                          BNE     .+6
1862  006346  012702  013327                  MOV     #MSG18,R2
1863  006352  022767  000040  003046          CMP     #40,CHAR
1864  006360  001002                          BNE     .+6
1865  006362  012702  013302                  MOV     #MSG15,R2
1866  006366  022767  000060  003032          CMP     #60,CHAR
1867  006374  001002                          BNE     .+6
1868  006376  012702  013311                  MOV     #MSG16,R2
1869  006402  104404                          TOP             ;PRINT RECORD LENGTH SEQUENCE
1870  006404  012702  013336                  MOV     #MSG19,R2
1871  006410  104404                          TOP
1872  006412  016702  172164                  MOV     WRCHEK,R2
1873  006416  104426                          DECPRT          ;PRINT "WRITE ERRORS="
1874  006420  012700  000604                  MOV     #WRCHEK+2,R0
1875  006424  112767  000060  004745          MOVB    #60,MSG20+17
1876  006432  105267  004741          WRTD1:  INCB    MSG20+17        ;PRINT STATISTICAL RECOVERY
1877  006436  005710                          TST     @R0
1878  006440  001405                          BEQ     WRTD2
1879  006442  012702  013360                  MOV     #MSG20,R2
1880  006446  104404                          TOP
1881  006450  011002                          MOV     (0),R2
1882  006452  104426                          DECPRT          ;RECOVERED AT X
1883  006454  005720                  WRTD2:  TST     (0)+            ;JUST INCREMENTING
1884  006456  020027  000622                  CMP     R0,#WRCHEK+20
1885  006462  001363                          BNE     WRTD1
1886  006464  005767  172132                  TST     PERMBS
1887  006470  001002                          BNE     1$              ;SKIP PRINT IF = 0
1888  006472  104436                          CKSW
1889  006474  000207                          RTS     PC
1890
1891
1892  006476  012702  013402          1$:     MOV     #MSG20A,R2
1893  006502  104404                          TOP
1894  006504  016702  172112                  MOV     PERMBS,R2       ;PRINT "PERMANENT BADSPOT"
```

```
1895  006510  104426                    DECPRT
1896  006512  104436                    CKSW
1897  006514  000207              RTS   PC
```

```
1898
1899                                    ;GENERATE DATA PETTERN
1900                                    ;ALL PATTERNS HAVE BITS 15,14,7,6 SET IN CASE CORE DUMP SELECTED
1901  006516  016702  172010    GENPA:  MOV     WBUF,R2
1902  006522  016703  172604            MOV     PARAM,R3
1903  006526  000303                    SWAB    R3
1904  006530  006303                    ASL     R3
1905  006532  042703  177741            BIC     #177741,R3
1906  006536  062703  006544            ADD     #PATPNT,R3
1907  006542  011307                    MOV     @R3,PC
1908  006544  006604            PATPNT: PATE0
1909  006546  006612                    PAT00
1910  006550  006620                    PATE1
1911  006552  006634                    PAT01
1912  006554  006650                    PATE2
1913  006556  006656                    PAT02
1914  006560  006664                    PATE3
1915  006562  006672                    PAT03
1916  006564  006700                    PATE4
1917  006566  006724                    PAT04
1918  006570  006744                    PATE5
1919  006572  006772                    PAT05
1920  006574  007022                    PAT6
1921  006576  007022                    PAT6
1922  006600  007030                    PATE7
1923  006602  007060                    PAT07
1924                                    ;PATTERN 0
1925                                    ;HIGH FREQUENCY OUTSIDE SKEW
1926  006604  012703  140701    PATE0:  MOV     #140701,R3      ;401
1927  006610  000533                    BR      PFIL1
1928                                    ;HALF FREQUENCY OUTSIDE SKEW
```

```
 1929  006612  012703  140301          PAT00:  MOV     #140301,R3      ;1
 1930  006616  000530                          BR      PFIL1
 1931                                  ;PATTERN 1
 1932                                  ;SLIDING 0
 1933  006620  012703  006626          PATE1:  MOV     #PE1,R3
 1934  006624  000532                          BR      PFIL3
 1935  006626  167737                  PE1:    167737                  ;27437
 1936  006630  175767                          175767                  ;35467
 1937  006632  177375                          177375                  ;37075
 1938                                  ;SLIDING 1
 1939  006634  012703  006642          PAT01:  MOV     #P01,R3
 1940  006640  000524                          BR      PFIL3
 1941  006642  150340                  P01:    150340                  ;10040
 1942  006644  142310                          142310                  ;2010
 1943  006646  140702                          140702                  ;402
 1944
 1945                                  ;PATTERN 2
 1946                                  ;HIGH FREQUENCY EVERY OTHER TRACK
 1947  006650  012703  152725          PATE2:  MOV     #152725,R3      ;12425
 1948  006654  000511                          BR      PFIL1
 1949
 1950                                  ;HIGH FREQUENCY EVERY OTHER TRACK
 1951  006656  012703  165352          PAT02:  MOV     #165352,R3      ;25052
 1952  006662  000506                          BR      PFIL1
 1953                                  ;PATTERN 3
 1954                                  ;HALF FREQUENCY OUTSIDE TRACK, HIGH FREQUENCY INSIDE TRACKS
 1955  006664  012703  177377          PATE3:  MOV     #177377,R3      ;37077
 1956  006670  000503                          BR      PFIL1
 1957                                  ;HIGH FREQUENCY OUTSIDE TRACK, HALF FREQUENCY INSIDE TRACKS
 1958  006672  012703  177701          PAT03:  MOV     #177701,R3      ;37401
 1959  006676  000500                          BR      PFIL1
 1960                                  ;PATTERN 4
 1961                                  ;INCREMENTING PATTERN (NO ALL 0'S)
 1962  006700  012703  000301          PATE4:  MOV     #301,R3
 1963  006704  110322                          MOVB    R3,(2)+
 1964  006706  026702  171622                  CMP     RBUF,R2
 1965  006712  001001                          BNE     .+4
 1966  006714  000530                          BR      PATEND
 1967  006716  105203                          INCB    R3
 1968  006720  001767                          BEQ     PATE4
 1969  006722  000770                          BR      PATE4+4
 1970                                  ;INCREMENTING PATTERN (INCLUDING ALL 0'S)
 1971  006724  005003                  PAT04:  CLR     R3
 1972  006726  110322                          MOVB    R3,(2)+
 1973  006730  026702  171600                  CMP     RBUF,R2
 1974  006734  001001                          BNE     .+4
 1975  006736  000517                          BR      PATEND
 1976  006740  005203                          INC     R3
 1977  006742  000771                          BR      PAT04+2
 1978                                  ;PATTERN 5
 1979                                  ;THREE 0'S EACH TRACK EVERY 6TH WORD
 1980  006744  012703  006752          PATE5:  MOV     #PE5,R3
 1981  006750  000475                          BR      PFIL9
 1982  006752  157437                  PE5:    157437                  ;17437
 1983  006754  167737                          167737                  ;27437
 1984  006756  167757                          167757                  ;27457
```

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 1985  006760  173767                          173767                  ;33467
 1986  006762  171767                          171767                  ;31467
 1987  006764  171773                          171773                  ;31473
 1988  006766  176775                          176775                  ;37075
 1989  006770  177376                          177376                  ;37076
 1990
 1991
 1992                                  ;THREE 1'S EACH TRACK EVERY 6TH WORD
 1993  006772  012703  007000          PAT05:  MOV     #P05,R3
 1994  006776  000462                          BR      PFIL9
 1995  007000  160340                  P05:    160340                  ;20040
 1996  007002  150340                          150340                  ;10040
 1997  007004  150320                          150320                  ;10020
 1998  007006  144310                          144310                  ;4010
 1999  007010  142310                          142310                  ;2010
 2000  007012  142304                          142304                  ;2004
 2001  007014  141302                          141302                  ;1002
 2002  007016  140702                          140702                  ;402
 2003  007020  140701                          140701                  ;401
 2004                                  ;PATTERN 6
 2005                                  ;ALL 1'S ALL TRACKS
 2006  007022  012703  177777          PAT6:   MOV     #-1,R3
 2007  007026  000424                          BR      PFIL1
 2008                                  ;PATTERN 7
 2009                                  ;RANDOM (NONE ALL 0'S)
 2010  007030  004767  000202          PAT7:   JSR     PC,RANGEN
 2011  007034  132767  000077  000344          BITB    #77,RANDOM
 2012  007042  001772                          BEQ     PAT7
 2013  007044  116722  000336                  MOVB    RANDOM,(2)+
 2014  007050  026702  171460                  CMP     RBUF,R2
 2015  007054  001365                          BNE     PAT7
 2016  007056  000447                          BR      PATEND
 2017                                  ;RANDOM (WITH ALL 0'S)
 2018  007060  004767  000152          PAT07:  JSR     PC,RANGEN
 2019  007064  016722  000316                  MOV     RANDOM,(2)+
 2020  007070  026702  171440                  CMP     RBUF,R2
 2021  007074  001371                          BNE     PAT07
 2022  007076  000437                          BR      PATEND
 2023                                  ;FILL WRITE BUFFER WITH CONSTANT PATTERN
 2024  007100  010322                  PFIL1:  MOV     R3,(2)+
 2025  007102  026702  171426                  CMP     RBUF,R2
 2026  007106  001374                          BNE     PFIL1
 2027  007110  000432                          BR      PATEND
 2028                                  ;FILL WRITE BUFFER WITH 3 WORD PATTERN
 2029  007112  010304                  PFIL3:  MOV     R3,R4
 2030  007114  062704  000006                  ADD     #6,R4
 2031  007120  012322                  PFIL3A: MOV     (3)+,(2)+
 2032  007122  026702  171406                  CMP     RBUF,R2
 2033  007126  001001                          BNE     .+4
 2034  007130  000422                          BR      PATEND
 2035  007132  020304                          CMP     R3,R4
 2036  007134  001002                          BNE     .+6
 2037  007136  162703  000006                  SUB     #6,R3
 2038  007142  000766                          BR      PFIL3A
 2039
 2040                                  ;FILL WRITE BUFFER WITH 9 WORD PATTERN
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2041  007144  010304                  PFIL9:  MOV     R3,R4
2042  007146  062704  000022                  ADD     #22,R4
2043  007152  012322                  PFIL9A: MOV     (3)+,(2)+
2044  007154  026702  171354                  CMP     RBUF,R2
2045  007160  001001                          BNE     .+4
2046  007162  000405                          BR      PATEND
2047  007164  020304                          CMP     R3,R4
2048  007166  001002                          BNE     .+6
2049  007170  162703  000022                  SUB     #22,R3
2050  007174  000766                          BR      PFIL9A
2051                                  ;FINISHED PATTERN GENERATION
2052                                  ;IF CORE DUMP NOT SELECTED CLEAR BITS 15,14,7,6 IN ALL WORDS OF WRITE DATA BUFFER
2053  007176  032767  000100  172126  PATEND: BIT     #100,PARAM      ;IS CORE DUMP SET?
2054  007204  001404                          BEQ     PATEN           ;NO
2055  007206  032767  000200  172116          BIT     #200,PARAM      ;MAYBE, IS CORE DUMP SET?
2056  007214  001007                          BNE     PATEN2          ;YES
2057  007216  016702  171310          PATEN:  MOV     WBUF,R2         ;NO
2058  007222  042722  140300          PATEN1: BIC     #140300,(2)+    ;CLEAR BITS 15,14,7,6
2059  007226  026702  171302                  CMP     RBUF,R2         ;DONE ALL?
2060  007232  001373                          BNE     PATEN1          ;NO
2061  007234  000207                  PATEN2: RTS     PC
2062
2063                                  ;RANDOM NUMBER GENERATOR
2064                                  ;EXIT WITH RANDOM NUMBER IN LOCATION NAMED "RANDOM"
2065  007236  010067  000152          RANGEN: MOV     R0,SV0          ;SAVE REGISTERS
2066  007242  010167  000150                  MOV     R1,SV1
2067  007246  010267  000146                  MOV     R2,SV2
2068  007252  010367  000144                  MOV     R3,SV3
2069  007256  016700  000126                  MOV     LONUM,R0        ;SET UP LOW DIGIT
2070  007262  016701  000124                  MOV     HINUM,R1        ;SET UP HIGH DIGIT
2071  007266  012703  000007                  MOV     #7,R3           ;SET UP SHIFT COUNT
2072  007272  005002                          CLR     R2
2073  007274  006300          RANG1:  ASL     R0              ;SHIFT R0 LEFT AND
2074  007276  006101                  ROL     R1              ;ROTATE CARRY INTO LSB OF R1 AND
2075  007300  006102                  ROL     R2              ;ROTATE CARRY OUT OF R1 INTO R2
2076  007302  005303                  DEC     R3              ;DECREMENT R3
2077  007304  001373                  BNE     RANG1           ;CONTINUE SHIFT LOOP
2078  007306  066700  000076          ADD     LONUM,R0        ;ADD NUMBER TO MAKE X 129
2079  007312  005501                  ADC     R1              ;PROPAGATE CARRY
2080  007314  066701  000072          ADD     HINUM,R1        ;ADD NUMBER TO MAKE X 129
2081  007320  005502                  ADC     R2              ;PROPAGATE CARRY
2082  007322  062700  001057          ADD     #1057,R0        ;ADD LOW CONSTANT
2083  007326  005501                  ADC     R1              ;PROPAGATE CARRY
2084  007330  005502                  ADC     R2              ;PROPAGATE CARRY
2085  007332  062701  047401          ADD     #47401,R1       ;ADD HIGH CONSTANT
2086  007336  005502                  ADC     R2              ;PROPAGATE CARRY
2087  007340  062702  000006          ADD     #6,R2           ;ADD HIGH CONSTANT
2088  007344  060200                  ADD     R2,R0           ;RE-PRIME R0 WITH HIGH DIGIT
2089  007346  005501                  ADC     R1              ;PROPAGATE CARRY
2090  007350  010067  000032          MOV     R0,RANDOM       ;SAVE RANDOM NUMBER
2091  007354  010067  000030          MOV     R0,LONUM        ;PUT R0 BACK IN LONUM
2092  007360  010167  000026          MOV     R1,HINUM        ;PUT R1 BACK IN HINUM
2093  007364  016700  000024          MOV     SV0,R0          ;RESTORE REGISTERS
2094  007370  016701  000022          MOV     SV1,R1
2095  007374  016702  000020          MOV     SV2,R2
2096  007400  016703  000016          MOV     SV3,R3
```

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2097  007404  000207                          RTS     PC              ;EXIT
2098  007406  000000                  RANDOM: 0
2099  007410  000000                  LONUM:  0
2100  007412  000000                  HINUM:  0
2101  007414  000000                  SV0:    0
2102  007416  000000                  SV1:    0
2103  007420  000000                  SV2:    0
2104  007422  000000                  SV3:    0
2105
2106
2107                                  ;READ RECORD SECTION
2108  007424  005767  171174          READI:  TST     RECORD          ;FIRST RECORD?
2109  007430  001003                          BNE     $R1             ;NO
2110  007432  016767  171116  171202          MOV     STRLEN,READLN   ;SET INITIAL READ LENGTH
2111  007440  012767  177775  171124  $R1:    MOV     #-3,RDPASS      ;INITIALIZE READ PASS COUNTER
2112  007446  016777  171112  171026  RDSTPD: MOV     COMAND,@MTC
2113  007454  105777  171022                  TSTB    @MTC
2114  007460  100375                          BPL     .-4             ;WAIT FOR CONTROL UNIT READY
2115  007462  006077  171012                  ROR     @MTS
2116  007466  103375                          BCC     .-4             ;WAIT FOR TAPE UNIT READY
2117  007470  016700  171040          READGO: MOV     RBUF,R0
2118  007474  016701  171142                  MOV     READLN,R1
2119  007500  105020                  RG1:    CLRB    (0)+            ;CLEAR READ BUFFER
2120  007502  005301                          DEC     R1
2121  007504  001375                          BNE     RG1
2122  007506  016777  171130  170770          MOV     READLN,@BC      ;SET BYTE COUNT
2123  007514  005477  170764                  NEG     @BC
2124  007520  016777  171010  170760          MOV     RBUF,@CA        ;SET CURRENT ADDRESS
2125  007526  016777  171032  170746          MOV     COMAND,@MTC
2126  007534  052777  000002  170740          BIS     #2,@MTC
2127  007542  004767  175424                  JSR     PC,GOWAIT
2128                                  ;RETURN HERE AFTER INTERRUPT
2129  007546  017767  170726  171024          MOV     @MTS,STATRD
2130  007554  005777  170722                  TST     @MTC            ;ANY STATUS ERRORS
2131  007560  100504                          BMI     RDERRO          ;YES
2132                                  ;CHECK FOR DATA ERRORS
2133  007562  016700  170746                  MOV     RBUF,R0
2134  007566  016701  170740                  MOV     WBUF,R1
2135  007572  016702  171044                  MOV     READLN,R2
2136  007576  022021                  $R5:    CMP     (0)+,(1)+       ;CHECK FOR PROPER DATA TRANSFER
2137  007600  001045                          BNE     DATERR          ;HAVE DATA ERROR
2138  007602  162702  000002                  SUB     #2,R2           ;CHECKED ALL TRANSFERS?
2139  007606  001373                          BNE     $R5             ;NO
2140  007610  032767  000003  171514  RTSSTP: BIT     #3,PARAM
2141  007616  001007                          BNE     RDSTPC
2142  007620  004767  000274                  JSR     PC,RDINCR       ;INCREMENT FOR NEXT BLOCK
2143  007624  026767  170774  170776          CMP     RECORD,LASRCR
2144  007632  001316                          BNE     READGO
2145  007634  000207                          RTS     PC              ;EXIT READIT
2146  007636  032767  000002  171466  RDSTPC: BIT     #2,PARAM        ;IS READ MODE RANDOM?
2147  007644  001414                          BEQ     RDSTP           ;NO
2148  007646  004767  177364          RNDRDS: JSR     PC,RANGEN
2149  007652  052767  177400  177526          BIS     #177400,RANDOM
2150  007660  012704  177470          RNDS1:  MOV     #-200.,R4       ;DELAY 1 MILLISECOND
2151  007664  005204                          INC     R4
2152  007666  001376                          BNE     .-2
```

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2153  007670  005267  177512                  INC     RANDOM
2154  007674  001371                          BNE     RNDS1
2155  007676  004767  000216          RDSTP:  JSR     PC,RDINCR
2156  007702  026767  170716  170720          CMP     RECORD,LASRCR   ;DONE LAST RECORD?
2157  007710  001256                          BNE     RDSTPD          ;NO
2158  007712  000207                          RTS     PC              ;YES EXIT
2159                          ;HAVE DATA ERROR
2160  007714  032777  020000  170570  DATERR: BIT     #20000,@SWR     ;TYPE ALL READ ERRORS?
2161  007722  001014                          BNE     DATER1          ;NO
2162  007724  012702  012776                  MOV     #MSG9A,R2
2163  007730  104404                          TOP
2164  007732  016767  170704  170616          MOV     READLN,LENGTH
2165  007740  004767  001066                  JSR     PC,PRTS
2166  007744  014102                          MOV     -(1),R2         ;PRINT EXPECTED DATA
2167  007746  104412                          OCTPRT
2168  007750  014002                          MOV     -(0),R2
2169  007752  104412                          OCTPRT                  ;PRINT ACTUAL DATA
2170  007754  022767  177775  170610  DATER1: CMP     #-3,RDPASS
2171  007762  001002                          BNE     .+6
2172  007764  005267  170644                  INC     DAERRS          ;+1 TO DATA ERRORS
2173  007770  000426                          BR      RTSR1
2174                          ;STATUS INDICATES AN ERROR, CHECK FOR EOT
2175  007772  032767  175600  170600  RDERRO: BIT     #175600,STATRD  ;IS ERROR LEGITIMATE OR EOT?
2176  010000  001515                          BEQ     RNDTAP          ;HAVE EOT
2177  010002  032777  020000  170502          BIT     #20000,@SWR     ;TYPE ALL READ ERRORS?
2178  010010  001010                          BNE     RTSREC          ;NO
2179  010012  012702  012751                  MOV     #MSG9,R2
2180  010016  104404                          TOP                     ;PRINT ERROR
2181  010020  016767  170616  170530          MOV     READLN,LENGTH
2182  010026  004767  001000                  JSR     PC,PRTS
2183                          ;+ 1 TO RDERRS IF FIRST ERROR PASS
2184  010032  022767  177775  170532  RTSREC: CMP     #-3,RDPASS
2185  010040  001002                          BNE     .+6
2186  010042  005267  170564                  INC     RDERRS          ;+1 TO STATUS ERRORS
2187  010046  032777  000020  170436  RTSR1:  BIT     #20,@SWR                ;DELETE READ RETRYS (SW 4)?
2188  010054  001011                          BNE     RPASS3          ;YES
2189  010056  005267  170510                  INC     RDPASS          ;DONE ALL RE-READS?
2190  010062  001404                          BEQ     RPASS1          ;YES
2191  010064  004767  000100                  JSR     PC,BACK1        ;NO, BACKSPACE TAPE
2192  010070  000167  177352                  JMP     RDSTPD          ;GO AGAIN
2193  010074  005267  170536          RPASS1: INC     NRREAD          ;+1 TO NONRECOVERABLE READ
2194  010100  012767  177775  170464  RPASS3: MOV     #-3,RDPASS
2195  010106  032767  002000  170464          BIT     #2000,STATRD    ;AT EOT?
2196  010114  001054                          BNE     RNDTP1          ;YES, TYPE "EOT"
2197  010116  000667                          BR      RDSTP
2198                          ;SET UP POINTERS FOR NEXT RECORD
2199  010120  005267  170500          RDINCR: INC     RECORD
2200  010124  005767  170446                  TST     BLKINC
2201  010130  001416                          BEQ     RESTR1
2202                          ;RECORD LENGTH IS CHANGING, COUNT IT
2203  010132  066767  170440  170502          ADD     BLKINC,READLN
2204  010140  026767  170476  170362          CMP     READLN,MINLEN   ;IS LENGTH LESS THAN MINIMUM
2205  010146  002404                          BLT     RESTRL          ;NO
2206  010150  026767  170466  170350          CMP     READLN,MAXLEN   ;IS LENGTH GREATER THAN MAXIMUM?
2207  010156  003403                          BLE     RESTR1          ;NO
2208  010160  016767  170370  170454  RESTRL: MOV     STRLEN,READLN   ;RESET INITIAL LENGTH
```

```
2209  010166  000207                  RESTR1: RTS     PC
2210
2211
2212                                  ;BACKSPACE ONE RECORD
2213  010170  006077  170304          BACK1:  ROR     @MTS
2214  010174  103375                          BCC     .-4                     ;WAIT FOR TAPE UNIT READY
2215  010176  012777  177777  170300          MOV     #-1,@BC                 ;COUNT 1 RECORD
2216  010204  016777  170354  170270          MOV     COMAND,@MTC             ;SELECT DRIVE
2217  010212  052777  000012  170262          BIS     #12,@MTC                ;ISSUE BACKSPACE
2218  010220  004767  174746                  JSR     PC,GOWAIT
2219  010224  042777  000016  170250          BIC     #16,@MTC
2220  010232  000207                          RTS     PC
2221                                  ;DRIVE HAS REACHED EOT IN READ MODE
2222  010234  004767  177660          RNDTAP: JSR     PC,RDINCR
2223  010240  052767  000020  170376          BIS     #20,MODES               ;INDICATE AT EOT
2224  010246  012702  013602          RNDTP1: MOV     #MSG25,R2
2225  010252  104404                          TOP
2226  010254  012702  012644                  MOV     #MSG8,R2
2227  010260  104404                          TOP
2228                                  ;DUMP ERROR COUNTERS
2229  010262  004767  000610          READMP: JSR     PC,PRTD                 ;PRINT DRIVE, PATTERN, PARITY, DENSITY
2230
2231  010266  016767  171040  001132          MOV     PARAM,CHAR
2232  010274  042767  177774  001124          BIC     #177774,CHAR
2233  010302  012702  013272                  MOV     #MSG14,R2
2234  010306  022767  000001  001112          CMP     #1,CHAR
2235  010314  001002                          BNE     .+6
2236  010316  012702  013252                  MOV     #MSG12,R2
2237  010322  022767  000002  001076          CMP     #2,CHAR
2238  010330  001002                          BNE     .+6
2239  010332  012702  013262                  MOV     #MSG13,R2
2240  010336  104404                          TOP                             ;PRINT READ MODE
2241  010340  016702  170260                  MOV     RECORD,R2
2242  010344  104426                          DECPRT                          ;PRINT RECORD NUMBER
2243  010346  016767  170760  001052          MOV     PARAM,CHAR
2244  010354  042767  177717  001044          BIC     #177717,CHAR
2245  010362  012702  013320                  MOV     #MSG17,R2
2246  010366  022767  000020  001032          CMP     #20,CHAR
2247  010374  001002                          BNE     .+6
2248  010376  012702  013327                  MOV     #MSG18,R2
2249  010402  022767  000040  001016          CMP     #40,CHAR
2250  010410  001002                          BNE     .+6
2251  010412  012702  013302                  MOV     #MSG15,R2
2252  010416  022767  000060  001002          CMP     #60,CHAR
2253  010424  001002                          BNE     .+6
2254  010426  012702  013311                  MOV     #MSG16,R2
2255  010432  104404                          TOP                             ;PRINT RECORD LENGTH SEQUENCE
2256  010434  012702  013432                  MOV     #MSG21,R2
2257  010440  104404                          TOP
2258  010442  016702  170164                  MOV     RDERRS,R2
2259  010446  104426                          DECPRT
2260
2261
2262  010450  012702  013462                  MOV     #MSG22,R2
2263  010454  104404                          TOP
2264  010456  016702  170152                  MOV     DAERRS,R2
```

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2265  010462  104426                  DECPRT
2266  010464  012702  013503          MOV     #MSG23,R2
2267  010470  104404                  TOP
2268  010472  016702  170140          MOV     NRREAD,R2
2269  010476  104426                  DECPRT
2270  010500  104436                  CKSW
2271  010502  000207                  RTS     PC
2272
2273
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2274                                    ;WRITE RECOVERY UTILIZING EXTENDED INTERRECORD GAP
2275                                    ;USED AFTER EVERY 7 REWRITES OR AFTER
2276                                    ;EACH WRITE ERROR IF STATISTICAL RECOVERY NOT SELECTED
2277                                    ;USED ONLY IF READ PASS SELECTED
2278  010504  012767  177774  170062  XRGREC: MOV     #-4,WRPASS      ;COUNT 4 REWRITES
2279  010512  032777  000040  167772  XRGO:   BIT     #40,@SWR                ;DELETE WRITE XIRG (SW 5)
2280  010520  001036                          BNE     XRGRCD          ;YES
2281  010522  004767  177442                  JSR     PC,BACK1
2282  010526  105777  167750                  TSTB    @MTC
2283  010532  100375                          BPL     .-4
2284  010534  016777  170024  167740          MOV     COMAND,@MTC
2285  010542  052777  000014  167732          BIS     #14,@MTC        ;WRITE XIRG
2286  010550  016777  170064  167726          MOV     WRTLEN,@BC      ;SET BYTE COUNT
2287  010556  005477  167722                  NEG     @BC
2288  010562  016777  167744  167716          MOV     WBUF,@CA        ;SET CURRENT ADDRESS
2289  010570  006077  167704                  ROR     @MTS            ;WAIT FOR TU READY
2290  010574  103375                          BCC     .-4
2291  010576  004767  174370                  JSR     PC,GOWAIT
2292
2293                                    ;RETURN HERE AFTER INTERRUPT
2294  010602  017767  167672  167770          MOV     @MTS,STATRD     ;SAVE STATUS
2295  010610  005777  167666                  TST     @MTC
2296  010614  100403                          BMI     XRG5            ;HAVE ERROR FLAG, CHECK FOR EOT
2297  010616  005067  167752          XRGRCD: CLR     WRPASS
2298  010622  000207                          RTS     PC              ;EXIT WRITE XIRG
2299  010624  032767  175600  167746  XRG5:   BIT     #175600,STATRD
2300  010632  001771                          BEQ     XRGRCD          ;ONLY EOT, EXIT
2301  010634  005267  167734                  INC     WRPASS          ;DONE 4 XIRG
2302  010640  001324                          BNE     XRGO
2303                                    ;PRINT STATUS AFTER 4 XIRG ERRORS
2304  010642  012702  012616                  MOV     #MSG7,R2
2305  010646  104404                          TOP                     ;PRINT WRITE STATUS ERROR
2306  010650  016767  167764  167700          MOV     WRTLEN,LENGTH
2307  010656  004767  000150                  JSR     PC,PRTS         ;PRINT STATUS, COMMAND, RECORD, LENGTH
2308  010662  012702  013224                  MOV     #MSG11,R2
2309  010666  104404                          TOP                     ;PRINT "XIRG WRITTEN 4 TIMES"
2310  010670  032767  002000  167702          BIT     #2000,STATRD
2311  010676  001702                          BEQ     XRGREC
2312  010700  042777  000016  167574          BIC     #16,@MTC
2313  010706  052777  000003  167566          BIS     #3,@MTC         ;WRITE AN EOF
2314  010714  004767  174252                  JSR     PC,GOWAIT
2315  010720  000207                          RTS     PC
2316
2317                                    ;GO BACKWARD ON TAPE X RECORDS
2318  010722  016767  167676  167700  GOBKWD: MOV     RECORD,LASRCR
2319  010730  016767  167672  167666          MOV     WRRECR,RECORD
2320  010736  001003                          BNE     GOB1            ;IS NEW RECORD=0
2321  010740  004767  174032                  JSR     PC,REWIND       ;YES,REWIND
2322  010744  000207                          RTS     PC              ;EXIT
2323  010746  016777  167656  167530  GOB1:   MOV     LASRCR,@BC      ;SET BYTE COUNT TO DIFFERENCE
2324  010754  166777  167646  167522          SUB     WRRECR,@BC      ;BETWEEN LASRCR AND WRRECK
2325  010762  005477  167516                  NEG     @BC
2326  010766  016777  167572  167506          MOV     COMAND,@MTC
2327  010774  105777  167502                  TSTB    @MTC            ;WAIT FOR CU READY
2328  011000  100375                          BPL     .-4
2329  011002  006077  167472                  ROR     @MTS            ;WAIT FOR TU READY
```

```
2330  011006  103375                    BCC     .-4
2331  011010  042777  000016  167464    BIC     #16,@MTC
2332  011016  052777  000012  167456    BIS     #12,@MTC
2333  011024  004767  174142            JSR     PC,GOWAIT
2334  011030  000207                    RTS     PC
2335                          ;PRINT COMMAND, STATUS, RECORD NUMBER, LENGTH
2336  011032  012702  013021    PRTS:   MOV     #MSG9B,R2
2337  011036  104404                    TOP
2338  011040  017702  167436            MOV     @MTC,R2
2339  011044  104412                    OCTPRT
2340  011046  016702  167526            MOV     STATRD,R2
2341  011052  104412                    OCTPRT
2342  011054  016702  167544            MOV     RECORD,R2
2343  011060  005202                    INC     R2
2344  011062  104426                    DECPRT
2345  011064  016702  167466            MOV     LENGTH,R2
2346  011070  104426                    DECPRT
2347  011072  104436                    CKSW
2348  011074  000207                    RTS     PC
2349
2350                          ;PRINT DRIVE, PATTERN, PARITY, DENSITY
2351  011076  016767  167462  000322    PRTD:   MOV     COMAND,CHAR
2352  011104  000367  000316            SWAB    CHAR
2353  011110  142767  000170  000310    BICB    #170,CHAR
2354  011116  052767  000260  000302    BIS     #260,CHAR
2355  011124  004767  000300            JSR     PC,OCTP         ;PRINT DRIVE NUMBER
2356  011130  104430                    SP3
2357  011132  016767  170174  000266    MOV     PARAM,CHAR
2358  011140  000367  000262            SWAB    CHAR
2359  011144  006067  000256            ROR     CHAR
2360  011150  042767  000170  000250    BIC     #170,CHAR
2361  011156  052767  000260  000242    BIS     #260,CHAR
2362  011164  004767  000240            JSR     PC,OCTP         ;PRINT PATTERN NUMBER
2363  011170  104430                    SP3
2364  011172  016767  170134  000226    MOV     PARAM,CHAR
2365  011200  000367  000222            SWAB    CHAR
2366  011204  042767  000176  000214    BIC     #176,CHAR
2367  011212  052767  000260  000206    BIS     #260,CHAR
2368  011220  004767  000204            JSR     PC,OCTP         ;PRINT PARITY
2369
2370
2371  011224  016767  170102  000174    MOV     PARAM,CHAR
2372  011232  042767  177477  000166    BIC     #177477,CHAR
2373  011240  012702  013645            MOV     #MSG26,R2
2374  011244  022767  000100  000154    CMP     #100,CHAR
2375  011252  001002                    BNE     .+6
2376  011254  012702  013655            MOV     #MSG27,R2
2377  011260  022767  000200  000140    CMP     #200,CHAR
2378  011266  001002                    BNE     .+6
2379  011270  012702  013665            MOV     #MSG28,R2
2380  011274  022767  000300  000124    CMP     #300,CHAR
2381  011302  001002                    BNE     .+6
2382  011304  012702  013675            MOV     #MSG29,R2
2383  011310  104404                    TOP
2384  011312  104436                    CKSW
2385  011314  000207                    RTS     PC
```

```
2386                                            ;PRINT OCTAL VALUE IN REGISTER 2
2387  011316  012767  000060  000102  OCTPR:  MOV     #'0,CHAR        ;INITIALIZE 1ST NUMBER AS 0
2388  011324  005702                          TST     R2              ;IS VALUE POSITIVE
2389  011326  100003                          BPL     OCT1            ;YES PRINT 0
2390  011330  012767  000061  000070          MOV     #'1,CHAR        ;NO PRINT 1
2391  011336  004767  000066          OCT1:   JSR     PC,OCTP
2392  011342  006102                          ROL     R2
2393  011344  006102                          ROL     R2
2394  011346  012767  177773  000050          MOV     #-5,OCT         ;COUNT 5 DIGITS
2395  011354  006102                  OCT2:   ROL     R2
2396  011356  006102                          ROL     R2
2397  011360  006102                          ROL     R2
2398  011362  010267  000040                  MOV     R2,CHAR         ;SAVE DIGIT
2399  011366  042767  177770  000032          BIC     #177770,CHAR    ;CLEAR OTHER BITS
2400  011374  052767  000060  000024          BIS     #60,CHAR        ;MAKE ASCII DIGIT
2401  011402  006002                          ROR     R2
2402  011404  004767  000020                  JSR     PC,OCTP         ;PRINT
2403  011410  006102                          ROL     R2
2404  011412  005267  000006                  INC     OCT             ;+1 TO DIGIT COUNT
2405  011416  001356                          BNE     OCT2            ;NOT DONE
2406  011420  104430                          SP3
2407  011422  000207                          RTS     PC              ;EXIT
2408  011424  000000          OCT:    0
2409  011426  000000          CHAR:   0
2410  011430  105777  167066          OCTP:   TSTB    @TPS
2411  011434  100375                          BPL     .-4             ;WAIT FOR READY
2412  011436  016777  177764  167060          MOV     CHAR,@TPB       ;PRINT
2413  011444  000207                          RTS     PC
2414
2415
2416                                            ;PRINT DECIMAL VALUE IN REGISTER 2
2417  011446  012767  177773  000150  DECPR:  MOV     #-5,DIGCNT
2418  011454  012767  011632  000146          MOV     #DECPNT+2,DECPNT
2419  011462  012767  000040  000136          MOV     #40,ZERO
2420  011470  012767  177777  000124  TYPT1:  MOV     #-1,DIGIT
2421  011476  005267  000120          TYPT2:  INC     DIGIT
2422  011502  167702  000122                  SUB     @DECPNT,R2
2423  011506  100373                          BPL     TYPT2
2424  011510  067702  000114                  ADD     @DECPNT,R2
2425  011514  004767  000022                  JSR     PC,DECOUT
2426  011520  005267  000100                  INC     DIGCNT
2427  011524  001002                          BNE     TYPT3
2428  011526  104430                          SP3
2429  011530  000207                          RTS     PC
2430  011532  062767  000002  000070  TYPT3:  ADD     #2,DECPNT
2431  011540  000753                          BR      TYPT1
2432  011542  005767  000054          DECOUT: TST     DIGIT
2433  011546  001010                          BNE     DEC1
2434  011550  022767  177777  000046          CMP     #-1,DIGCNT
2435  011556  001404                          BEQ     DEC1
2436  011560  016767  000042  000034          MOV     ZERO,DIGIT
2437  011566  000406                          BR      DEC2
2438  011570  012767  000060  000030  DEC1:   MOV     #60,ZERO
2439  011576  052767  000060  000016          BIS     #60,DIGIT
2440  011604  105777  166712          DEC2:   TSTB    @TPS
2441  011610  100375                          BPL     .-4
```

```
 2442  011612  016777  000004  166704          MOV     DIGIT,@TPB
 2443  011620  000207                          RTS     PC
 2444  011622  000000                  DIGIT:  0
 2445  011624  000000                  DIGCNT: 0
 2446  011626  000040                  ZERO:   40
 2447  011630  011632                  DECPNT: .+2
 2448  011632  023420                          10000.
 2449  011634  001750                          1000.
 2450  011636  000144                          100.
 2451  011640  000012                          10.
 2452  011642  000001                          1.
 2453                                  ;KEYBOARD INPUT
 2454  011644  105777  166646          WAITK:  TSTB    @TKS            ;WAIT FOR KEY
 2455  011650  100375                          BPL     .-4
 2456  011652  105777  166644                  TSTB    @TPS            ;WAIT FOR TELEPRINTER READY
 2457  011656  100375                          BPL     .-4
 2458  011660  117777  166634  166636          MOVB    @TKB,@TPB               ;ECHO CHARACTER
 2459  011666  117767  166626  167432          MOVB    @TKB, CHARIN    ;SAVE IT
 2460  011674  042767  000200  167424          BIC     #200,CHARIN
 2461  011702  000207                          RTS     PC              ;EXIT
 2462                                  ;TYPE 3 SPACES
 2463  011704  012702  011714          SP3X:   MOV     #SP3A,R2
 2464  011710  104404                          TOP
 2465  011712  000207                          RTS     PC
 2466  011714  020057  020040      057 SP3A:   .ASCII  ;/   /;
 2467          011722                          .EVEN
 2468
 2469
 2470                                  ;TELETYPE OUTPUT PACKAGE
 2471  011722  142777  000177  166572  TO:     BICB    #177,@TPS       ;CLEAR TELETYPE FLAGS
 2472  011730  112267  000100                  MOVB    (2)+,EOMK       ;SAVE MESSAGE DELIMETER
 2473  011734  121267  000074          TOP1:   CMPB    @R2,EOMK        ;IS CHARACTER THE SECOND MESSAGE DELIMITER?
 2474  011740  001003                          BNE     .+10            ;NO
 2475  011742  005067  166600          TOP3:   CLR     RDSW
 2476  011746  000207                          RTS     PC              ;YES, EXIT
 2477  011750  121227  000100                  CMPB    @R2,#'@         ;IS CHARACTER AN @ WHICH INDICATES A CARRIAGE RET.
 2478  011754  001406                          BEQ     TOP2            ;YES
 2479  011756  105777  166540                  TSTB    @TPS            ;NO, WAIT FOR TELETYPE READY
 2480  011762  100375                          BPL     .-4
 2481  011764  112277  166534                  MOVB    (2)+,@TPB       ;PRINT CHARACTER
 2482  011770  000761                          BR      TOP1
 2483                                  ;CARRIAGE RETURN, LINE FEED
 2484  011772  105777  166524          TOP2:   TSTB    @TPS
 2485  011776  100375                          BPL     .-4
 2486  012000  112777  000215  166516          MOVB    #215,@TPB       ;CR
 2487  012006  105777  166510                  TSTB    @TPS
 2488  012012  100375                          BPL     .-4
 2489  012014  112777  000212  166502          MOVB    #212,@TPB       ;LF
 2490  012022  105202                          INCB    R2
 2491  012024  105767  166516                  TSTB    RDSW
 2492  012030  100744                          BMI     TOP3
 2493  012032  000740                          BR      TOP1
 2494  012034  000000                  EOMK:   0
 2495
 2496
 2497
```

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2498  012036  013746  000006          SUSWR:  MOV     @#6,-(SP)               ;SAVE VECTORS
2499  012042  013746  000004                  MOV     @#4,-(SP)
2500  012046  012737  012066  000004          MOV     #1$,@#4                 ;SET UP FOR TIMEOUT
2501  012054  022777  177777  166430          CMP     #-1,@SWR                ;REFERENCE HARDWARE SWITCH REGISTER
2502  012062  001402                          BEQ     2$
2503  012064  000407                          BR      3$
2504  012066  022626                  1$:     CMP     (SP)+,(SP)+             ;ADJUST STACK
2505  012070  012767  000176  166414  2$:     MOV     #SWREG,SWR              ;POINT TO SOFTWARE SWITCH REG
2506  012076  012767  000174  166410          MOV     #DISPREG,DISPLAY                ;POINT TO SOFT DISPLAY REG
2507  012104  012637  000004          3$:     MOV     (SP)+,@#4               ;RESTORE VECTORS
2508  012110  012637  000006                  MOV     (SP)+,@#6
2509  012114  000207                          RTS     PC
2510
2511
2512
2513  012116  022767  000176  166366  CKSWR:  CMP     #SWREG,SWR              ;SOFTWARE SWITCH REG PRESENT
2514  012124  001035                          BNE     OUT                     ;NO, GET OUT
2515  012126  105777  166364                  TSTB    @TKS                    ;YES,WAIT FOR
2516  012132  100032                          BPL     OUT                     ;READY, GET CHARACTER
2517  012134  017767  166360  166376          MOV     @TKB,TIB                ;AND STRIP OFF
2518  012142  042767  177600  166370          BIC     #177600,TIB             ;THE GARBAGE
2519  012150  022767  000007  166362          CMP     #7,TIB          ;IS IT A ‹↑G›
2520  012156  001020                          BNE     OUT
2521  012160  012702  013712                  MOV     #$CNTG,R2
2522  012164  104404                          TOP
2523  012166  012702  013717          CNTLU:  MOV     #$MSWR,R2
2524  012172  104404                          TOP
2525  012174  017702  166312                  MOV     @SWR,R2
2526  012200  104412                          OCTPRT
2527  012202  012702  013730                  MOV     #$MNEW,R2
2528  012206  104404                          TOP
2529  012210  005037  000542                  CLR     @#TEMPST
2530  012214  004767  000002                  JSR     PC,$READ                ;GO READ A LINE
2531  012220  000207                  OUT:    RTS     PC                      ;RETURN TO MAIN BODY OF PROGRAM
2532
2533  012222  005067  166314          $READ:  CLR     TEMPST
2534  012226  012767  000007  166310          MOV     #7,COUNT
2535  012234  104400                  1$:     WAITKY                  ;GO READ A CHARACTER
2536  012236  042767  177600  167062          BIC     #177600,CHARIN  ;STRIP OFF GARBAGE
2537  012244  122767  000025  167054          CMPB    #25,CHARIN              ;IS IT A ↑U?
2538  012252  001002                          BNE     2$              ;BRANCH IF NOT
2539  012254  005726                  3$:     TST     (SP)+           ;POP THE STACK
2540  012256  000743                          BR CNTLU                ;START OVER
2541  012260  122767  000015  167040  2$:     CMPB    #15,CHARIN              ;IS IT A ‹CR›?
2542  012266  001013                          BNE     4$              ;BRANCH IF NOT
2543  012270  012767  000200  166250          MOV     #200,RDSW
2544  012276  004767  177470                  JSR     PC,TOP2         ;ECHO IT WITH ‹LF›
2545  012302  022767  000007  166234          CMP     #7,COUNT        ;WAS IT FIRST CHARACTER
2546  012310  001036                          BNE     7$              ;CHANGE SWR IF NOT FIRST ONE
2547  012312  005726                  8$:     TST     (SP)+           ;POP THE STACK
2548  012314  000741                          BR      OUT             ;GET OUT
2549  012316  122767  000060  167002  4$:     CMPB    #60,CHARIN
2550  012324  003004                          BGT     5$
2551  012326  122767  000067  166772          CMPB    #67,CHARIN
2552  012334  002004                          BGE     6$
2553  012336  012702  013741          5$:     MOV     #$QUEST,R2
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2554   012342  104404                          TOP
2555   012344  000743                          BR      3$                      ;START OVER IF NOT LEGAL CHARACTER
2556   012346  006367  166170          6$:     ASL     TEMPST
2557   012352  006367  166164                  ASL     TEMPST
2558   012356  006367  166160                  ASL     TEMPST
2559   012362  142767  000060  166736          BICB    #60,CHARIN              ;GET NITTY-GRITTY
2560   012370  156767  166732  166144          BISB    CHARIN,TEMPST
2561   012376  005367  166142                  DEC     COUNT                   ;ONLY WANT 6   DIGITS
2562   012402  001755                          BEQ     5$
2563   012404  000713                          BR      1$
2564   012406  016777  166130  166076  7$:     MOV     TEMPST,@SWR             ;CHANGE SWITCH REGISTER CONTENTS
2565   012414  000736                          BR      8$
2566                                  ;TRAP HANDLER
2567   012416  011666  000002          TRAP34: MOV     @SP,2(6)
2568   012422  162716  000002                  SUB     #2,@SP
2569   012426  013646                          MOV     @(6)+,-(6)
2570   012430  062716  106036                  ADD     #TABLE-104400,@SP
2571   012434  013607                          MOV     @(6)+,PC
2572   012436  011644                  TABLE:  WAITK
2573   012440  005244                          WRITI
2574   012442  011722                          TO
2575   012444  004502                          SVCTR
2576   012446  004616                          RSFDR
2577   012450  011316                          OCTPR
2578   012452  004520                          MVCTR
2579   012454  006516                          GENPA
2580   012456  004562                          CLRAL
2581   012460  004740                          CHGDR
2582   012462  007424                          READI
2583   012464  011446                          DECPR
2584   012466  011704                          SP3X
2585   012470  012036                          SUSWR
2586   012472  012166                          CNTLU
2587   012474  012116                          CKSWR
2588           104400                  WAITKY=104400
2589           104402                  WRITIT=104402
2590           104404                  TOP=104404
2591           104406                  SVCTRS=104406
2592           104410                  RSFDRV=104410
2593           104412                  OCTPRT=104412
2594           104414                  MVCTRS=104414
2595           104416                  GENPAT=104416
2596           104420                  CLRALL=104420
2597           104422                  CHGDRV=104422
2598           104424                  READIT=104424
2599           104426                  DECPRT=104426
2600           104430                  SP3=104430
2601           104432                  SUSW=104432
2602           104434                  CNTL=104434
2603           104436                  CKSW=104436
2604                                  ;TEXT MESSAGES
2605   012476  037457  020100     057  MSG0:   .ASCII                          ;/?@ /;
2606   012503     057  051500  046105  MSG1:   .ASCII                          ;/@SELECT UNITS  /;
2607   012510  041505  020124  047125
2608   012516  052111  020123  027440
2609   012524  040057  051524  020124  MSG2:   .ASCII                          ;/@TST PAT PAR DEN RLS WMO RMO@ /;
```

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2610  012532  040520  020124  040520
2611  012540  020122  042504  020116
2612  012546  046122  020123  046527
2613  012554  020117  046522  040117
2614  012562  027440
2615  012564  046457  054101  052040  MSG5:   .ASCII                ;/MAX TESTS SELECTED@/;
2616  012572  051505  051524  051440
2617  012600  046105  041505  042524
2618  012606  040104     057
2619  012611     057  047440  027513  MSG6:   .ASCII                ;/ OK/;
2620  012616  040057  051127  052111  MSG7:   .ASCII                ;/@WRITE STATUS ERROR@/;
2621  012624  020105  052123  052101
2622  012632  051525  042440  051122
2623  012640  051117  027500
2624  012644  042457  042116  047440  MSG8:   .ASCII                ;/END OF TAPE**********@;
2625  012652  020106  040524  042520
2626  012660  025052  025052  025052
2627  012666  025052  025052  025052
2628  012674  025052  025052  025052
2629  012702  025052     100
2630  012705     104  053122  050040          .ASCII                ;DRV PAT PAR DEN MODE RECORD LENGTH@/;
2631  012712  052101  050040  051101
2632  012720  042040  047105  046440
2633  012726  042117  020105  042522
2634  012734  047503  042122  046040
2635  012742  047105  052107  040110
2636  012750     057
2637  012751     057  051100  040505  MSG9:   .ASCII                ;/@READ STATUS ERROR@/;
2638  012756  020104  052123  052101
2639  012764  051525  042440  051122
2640  012772  051117  027500
2641  012776  040057  042522  042101  MSG9A:  .ASCII                ;/@READ DATA ERROR@/;
2642  013004  042040  052101  020101
2643  013012  051105  047522  040122
2644  013020     057
2645  013021     057  047503  042115  MSG9B:  .ASCII                ;/COMD     STATUS   RECORD   LENGTH EXPECTED ACTUAL@/;
2646  013026  020040  020040  051440
2647  013034  040524  052524  020123
2648  013042  020040  042522  047503
2649  013050  042122  020040  046040
2650  013056  047105  052107  020110
2651  013064  054105  042520  052103
2652  013072  042105  040440  052103
2653  013100  040525  040114     057
2654  013105     057  046500  044501  MSG10A: .ASCII  ;/@MAINDEC-11-DZTMC-C;
2655  013112  042116  041505  030455
2656  013120  026461  055104  046524
2657  013126  026503     103
2658  013131     100  042522  047503          .ASCII  ;@RECORD LIMITS IN BYTES;
2659  013136  042122  046040  046511
2660  013144  052111  020123  047111
2661  013152  041040  052131  051505
2662  013160  046500  047111  042514          .ASCII  ;@MINLEN  MAXLEN@/;
2663  013166  020116  046440  054101
2664  013174  042514  040116     057
2665  013201     057  042500  042530  MSG10B: .ASCII  ;/@EXERCISING UNITS/;
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 2666  013206  041522  051511  047111
 2667  013214  020107  047125  052111
 2668  013222  027523
 2669  013224  054057  051111  020107  MSG11:  .ASCII          ;/XIRG WRITTEN 4 TIMES/;
 2670  013232  051127  052111  042524
 2671  013240  020116  020064  044524
 2672  013246  042515  027523
 2673  013252  020057  051523  050124  MSG12:  .ASCII          ;/ SSTP /;
 2674  013260  027440
 2675  013262  020057  047122  046504  MSG13:  .ASCII          ;/ RNDM /;
 2676  013270  027440
 2677  013272  020057  051516  050124  MSG14:  .ASCII          ;/ NSTP /;
 2678  013300  027440
 2679  013302  046457  046455  054101  MSG15:  .ASCII          ;/M-MAX/;
 2680  013310     057
 2681  013311     057  026515  044515  MSG16:  .ASCII          ;/M-MIN/;
 2682  013316  027516
 2683  013320  046457  047111  020040  MSG17:  .ASCII          ;/MIN  /;
 2684  013326     057
 2685  013327     057  040515  020130  MSG18:  .ASCII          ;/MAX  /;
 2686  013334  027440
 2687  013336  040057  051127  052111  MSG19:  .ASCII          ;/@WRITE ERRORS = /;
 2688  013344  020105  051105  047522
 2689  013352  051522  036440  027440
 2690  013360  040057  042522  047503  MSG20:  .ASCII          ;/@RECOVERED AT 0 /;
 2691  013366  042526  042522  020104
 2692  013374  052101  030040  027440
 2693  013402  040057  042520  046522  MSG20A: .ASCII          ;/@PERMANENT BADSPOTS = /;
 2694  013410  047101  047105  020124
 2695  013416  040502  051504  047520
 2696  013424  051524  036440  027440
 2697  013432  040057  042522  042101  MSG21:  .ASCII          ;/@READ STATUS ERRORS = /;
 2698  013440  051440  040524  052524
 2699  013446  020123  051105  047522
 2700  013454  051522  036440  027440
 2701  013462  040057  040504  040524  MSG22:  .ASCII          ;/@DATA ERRORS = /;
 2702  013470  042440  051122  051117
 2703  013476  020123  020075     057
 2704  013503     057  047100  047117  MSG23:  .ASCII          ;/@NON RECOVERABLE ERRORS = /;
 2705  013510  051040  041505  053117
 2706  013516  051105  041101  042514
 2707  013524  042440  051122  051117
 2708  013532  020123  020075     057
 2709  013537     057  025100  025052  MSG24:  .ASCII          ;/@**********WRITE PASS  /;
 2710  013544  025052  025052  025052
 2711  013552  025052  025052  025052
 2712  013560  025052  025052  053452
 2713  013566  044522  042524  050040
 2714  013574  051501  020123  027440
 2715  013602  040057  025052  025052  MSG25:  .ASCII          ;/@**********READ PASS   /;
 2716  013610  025052  025052  025052
 2717  013616  025052  025052  025052
 2718  013624  025052  025052  042522
 2719  013632  042101  050040  051501
 2720  013640  020123  020040     057
 2721  013645     057  020040  031040  MSG26:  .ASCII          ;/   200/;
```

```
 2722  013652  030060     057
 2723  013655     057  020040  032440  MSG27:  .ASCII                ;/   556/;
 2724  013662  033065     057
 2725  013665     057  020040  034040  MSG28:  .ASCII                ;/   800/;
 2726  013672  030060     057
 2727  013675     057  020040  041440  MSG29:  .ASCII                ;/   CD /;
 2728  013702  020104     057
 2729  013705     057  040100  027500  MSG30:  .ASCII                ;/@@@/;
 2730
 2731  013712  040057  043536     057  $CNTG:  .ASCII  ;/@↑G/;
 2732  013717     057  040100  053523  $MSWR:  .ASCII  ;/@@SWR= /;
 2733  013724  036522  027440
 2734  013730  020057  047040  053505  $MNEW:  .ASCII  ;/  NEW= /;
 2735  013736  020075     057
 2736  013741     057  037500  040100  $QUEST: .ASCII  ;/@?@@/;
 2737  013746     057
 2738          013750                          .EVEN
 2739
 2740  013750  013750                  BUFFER: .                     ;WRITE BUFFER BEGINS HERE
 2741          000001                          .END
```

```
ALLEOS  005056  1661  1665#
ALLEOT  005034  1376  1392  1424  1456  1525  1566  1578  1658#
ALL1    005036  1659#  1663
ALL2    005144  1667  1669  1683#
ALL3    005140  1664  1682#
ATST    000550  976#  1055*  1150*  1163
AUTOST  001366  947  1054#
BACK1   010170  1823  1824  2191  2213#  2281
BC      000504  955#  1727*  1728*  1828*  2122*  2123*  2215*  2286*  2287*  2323*  2324*  2325*
BLKINC  000576  987#  1708*  1712*  1716*  1780  1782  2200  2203
BUFFER  013750  966  967  1064  1070  1074  1118*  1119  1138  1144  1149  2740#
CA      000506  956#  1729*  2124*  2288*
CC      000510  957#  1694*  1699*
CDMEND  005134  1678  1680#
CDRIVE  000570  984#  1599  1600  1614*  1618*  1622  1637*
CDRVBT  000566  983#  1615*  1616  1620*  1639*  1644
CHAR    011426  1845*  1846*  1848  1851  1857*  1858*  1860  1863  1866  2231*  2232*  2234  2237
                2243*  2244*  2246  2249  2252  2351*  2352*  2353*  2354*  2357*  2358*  2359*  2360*
                2361*  2364*  2365*  2366*  2367*  2371*  2372*  2374  2377  2380  2387*  2390*  2398*
                2399*  2400*  2409#  2412
CHARIN  001326  1035#  1159  1166  1168  1175*  1176*  1178*  1199  1204  1206  1211  1221  1223
                1225*  1226*  1227*  1228  1232  1234  1242  1244  1248  1252  1258  1260  1264
                1268  1274  1276  1280  1286  1288  1292  1302  2459*  2460*  2536*  2537  2541
                2549  2551  2559*  2560
CHGDR   004740  1637#  1645  2581
CHGDRV= 104422  1374  1390  1408  1415  1422  1439  1447  1454  1474  1485  1492  1502  1518
                1523  1550  1564  1574  1608  1662  1680  2597#
CHG1    004764  1640  1644#
CKSW  = 104436  1341  1665  1676  1809  1888  1896  2270  2347  2384  2603#
CKSWR   012116  2513#  2587
CLRAL   004562  1604#  2580
CLRALL= 104420  1365  1382  1400  1431  1469  1533  2596#
CLRTBL  005146  1606  1687#
CLRT1   005152  1688#  1690
CLR1    004564  1605#  1609
CNTL  = 104434  1321  2602#
CNTLU   012166  2523#  2540  2586
COMAND  000564  982#  1622*  1623*  1626*  1629*  1632*  1651  1722  1829  2112  2125  2216  2284
                2326  2351
COUNT   000544  974#  2534*  2545  2561*
CTRDEX  004536  1585  1591  1597#
CTRDMP  005100  1671#  1681
CTRD1   005130  1674  1679#
DAERRS  000634  1003#  2172*  2264
DATERR  007714  2137  2160#
DATER1  007754  2161  2170#
DECOUT  011542  2425  2432#
DECPNT  011630  2418*  2422  2424  2430*  2447#
DECPR   011446  2417#  2583
DECPRT= 104426  1108  1110  1856  1873  1882  1895  2242  2259  2265  2269  2344  2346  2599#
DEC1    011570  2433  2435  2438#
DEC2    011604  2437  2440#
DIGCNT  011624  2417*  2426*  2434  2445#
DIGIT   011622  2420*  2421*  2432  2436*  2439*  2442  2444#
DISPLA  000514  959#  2506*
DISPRE  000174  943#  2506
```

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DOAGN   003310          1351    1359#
DONE    003214          1339#   1378    1394    1426    1458    1527    1568    1580
DONE1   003262          1343    1347    1350#
DRVADR  000646          1010#   1587    1593    1598
DRVSEL  000552           977#   1082*   1087    1099*
DOTAB   000666          1010    1019#   1020
D1TAB   000732          1011    1021#   1022
D2TAB   000776          1012    1023#   1024
D3TAB   001042          1013    1025#   1026
D4TAB   001106          1014    1027#   1028
D5TAB   001152          1015    1029#   1030
D6TAB   001216          1016    1031#   1032
D7TAB   001262          1017    1033#   1034
ENDADR  003300           934    1353    1355#
ENDTAP  006204          1799    1821    1836#
ENDT1   006216          1675    1838#
EOMK    012034          2472*   2473    2494#
ERROR   005752          1735    1798#
ERR1    005774          1801    1803#
EXEC    003130          1323#   1360
EXECUT  003114          1140    1165    1203    1320#
EXEC1   003136          1324#   1349
GENPA   006516          1901#   2579
GENPAT= 104416          1366    1383    1401    1432    1464    1534    2595#
GOBKWD  010722          1413    1445    1500    2318#
GOB1    010746          2320    2323#
GOWAIT  005172          1655    1694#   1731    1831    2127    2218    2291    2314    2333
GW1     005234          1696    1701#
HINUM   007412          1061*   1154*   2070    2080    2092*   2100#
IDSELF  001656          1086    1105#
LASRCR  000630          1001#   1508    1510    1513*   1514*   1516*   1521    1547*   1548*   1556    1559*   1560*   1562*
                        1571    2143    2156    2318*   2323
LENGTH  000556           979#   1807*   2164*   2181*   2306*   2345
LONUM   007410          1060*   1153*   2069    2078    2091*   2099#
LOOPER  001744          1126#   1135
MAXLEN  000526           964#   1069*   1073*   1109    1143*   1148*   1707    1785    2206
MEM4K   002020           948    1142#
MEM8K   002044           949    1147#
MINLEN  000530           965#   1068*   1072*   1107    1142*   1147*   1711    1783    2204
MODES   000644          1007#   1320*   1364*   1369    1381*   1386    1399*   1404    1411    1418    1430*   1435    1443
                        1450    1463*   1467*   1468*   1476*   1479    1487    1490    1498    1506    1532*   1537    1542*
                        1545    1554    1573*   1576    1610*   1660    1668    1677    1689    1691*   1748    1750    1753
                        1769    1771    1774    1779*   1790*   1816    1837*   2223*
MSBITS  000560           980#   1083*   1098*   1111    1126    1157*   1161    1182    1184*   1186*   1616    1644
MSG0    012476          1208    2605#
MSG1    012503          1155    2606#
MSG10A  013105          1105    2654#
MSG10B  013201          1116    2665#
MSG11   013224          2308    2669#
MSG12   013252          1850    2236    2673#
MSG13   013262          1853    2239    2675#
MSG14   013272          1847    2233    2677#
MSG15   013302          1865    2251    2679#
MSG16   013311          1868    2254    2681#
MSG17   013320          1859    2245    2683#
MSG18   013327          1862    2248    2685#
```

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MSG19   013336          1870    2687#
MSG2    012524          1194    2609#
MSG20   013360          1875*   1876*   1879    2690#
MSG20A  013402          1892    2693#
MSG21   013432          2256    2697#
MSG22   013462          2262    2701#
MSG23   013503          2266    2704#
MSG24   013537          1838    2709#
MSG25   013602          2224    2715#
MSG26   013645          2373    2721#
MSG27   013655          2376    2723#
MSG28   013665          2379    2725#
MSG29   013675          2382    2727#
MSG30   013705          1339    2729#
MSG5    012564          1316    2615#
MSG6    012611          1299    2619#
MSG7    012616          1805    2304    2620#
MSG8    012644          1840    2226    2624#
MSG9    012751          2179    2637#
MSG9A   012776          2162    2641#
MSG9B   013021          2336    2645#
MTC     000502           954#   1081*   1085    1087*   1649    1651*   1654*   1697*   1722*   1723    1730*   1734    1829*
                        1830*   1832*   1833*   2112*   2113    2125*   2126*   2130    2216*   2217*   2219*   2282    2284*
                        2285*   2295    2312*   2313*   2326*   2327    2331*   2332*   2338
MTS     000500           953#   1089    1094    1096    1652*   1725*   1733    1825    2115*   2129    2213*   2289*   2294
                        2329*
MTV     000536           968#   1696*
MVCTR   004520          1591#   2578
MVCTRS= 104414          1368    1385    1403    1410    1417    1434    1442    1449    1471    1478    1489    1497    1505
                        1520    1544    1553    1570    1659    1672    2594#
MV1     004524          1592#   1594
NOINCR  005334          1706    1715    1717#
NONSTP  005400          1727#   1746    1751    1754
NO.SEL  001644          1093    1095    1097    1099#
NRREAD  000636          1004#   2193*   2268
NUMTST  001330          1036#   1059*   1196*   1201    1312*   1313    1350*
NXMRET  001462          1063    1067#
NXT.TU  001570          1087#   1102
OCT     011424          2394*   2404*   2408#
OCTP    011430          2355    2362    2368    2391    2402    2410#
OCTPR   011316          2387#   2577
OCTPRT= 104412          2167    2169    2339    2341    2526    2593#
OCT1    011336          2389    2391#
OCT2    011354          2395#   2405
OUT     012220          2514    2516    2520    2531#   2548
OVER4K  001510          1066    1072#
PARAM   001332          1037#   1323*   1324    1344    1348*   1511    1557    1624    1627    1630    1709    1714    1743
                        1756    1845    1857    1902    2053    2055    2140    2146    2231    2243    2357    2364    2371
PATEN   007216          2054    2057#
PATEND  007176          1966    1975    2016    2022    2027    2034    2046    2053#
PATEN1  007222          2058#   2060
PATEN2  007234          2056    2061#
PATE0   006604          1908    1926#
PATE1   006620          1910    1933#
PATE2   006650          1912    1947#
PATE3   006664          1914    1955#
```

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PATE4   006700          1916    1962#   1968    1969
PATE5   006744          1918    1980#
PATE7   007030          1922    2010#   2012    2015
PAT00   006612          1909    1929#
PAT01   006634          1911    1939#
PAT02   006656          1913    1951#
PAT03   006672          1915    1958#
PAT04   006724          1917    1971#   1977
PAT05   006772          1919    1993#
PAT07   007060          1923    2018#   2021
PATPNT  006544          1906    1908#
PAT6    007022          1920    1921    2006#
PC      =%000007         925#   1355*   1376*   1392*   1413*   1424*   1445*   1456*   1500*   1525*   1539*   1566*   1578*
                        1585*   1589*   1591*   1595*   1602*   1605*   1606*   1612*   1633*   1643*   1655*   1656*   1675*
                        1679*   1683*   1692*   1700*   1720*   1731*   1747*   1752*   1755*   1759*   1768*   1773*   1776*
                        1791*   1808*   1818*   1823*   1824*   1831*   1843*   1889*   1897*   1907*   2010*   2018*   2061*
                        2097*   2127*   2142*   2145*   2148*   2155*   2158*   2165*   2182*   2191*   2209*   2218*   2220*
                        2222*   2229*   2271*   2281*   2291*   2298*   2307*   2314*   2315*   2321*   2322*   2333*   2334*
                        2348*   2355*   2362*   2368*   2385*   2391*   2402*   2407*   2413*   2425*   2429*   2443*   2461*
                        2465*   2476*   2509*   2530*   2531*   2544*   2571*
PERMBS  000622           998#   1815*   1886    1894
PE1     006626          1933    1935#
PE5     006752          1980    1982#
PFIL1   007100          1927    1930    1948    1952    1956    1959    2007    2024#   2026
PFIL3   007112          1934    1940    2029#
PFIL3A  007120          2031#   2038
PFIL9   007144          1981    1994    2041#
PFIL9A  007152          2043#   2050
PO1     006642          1939    1941#
PO5     007000          1993    1995#
PRTD    011076          1843    2229    2351#
PRTS    011032          1808    2165    2182    2307    2336#
RANDOM  007406          1760*   1764*   2011    2013    2019    2090*   2098#   2149*   2153*
RANGEN  007236          1759    2010    2018    2065#   2148
RANG1   007274          2073#   2077
RANSTP  005562          1759#
RAN1    005574          1761#   1765
RBUF    000534           967#   1070*   1074*   1144*   1149*   1964    1973    2014    2020    2025    2032    2044    2059
                        2117    2124    2133
RDERRO  007772          2131    2175#
RDERRS  000632          1002#   2186*   2258
RDINCR  010120          2142    2155    2199#   2222
RDPASS  000572           985#   2111*   2170    2184    2189*   2194*
RDSTP   007676          2147    2155#   2197
RDSTPC  007636          2141    2146#
RDSTPD  007446          2112#   2157    2192
RDSW    000546           975#   2475*   2491    2543*
READGO  007470          2117#   2144
READI   007424          2108#   2582
READIT= 104424          1420    1452    1515    1561    2598#
READLN  000642          1006#   2110*   2118    2122    2135    2164    2181    2203*   2204    2206    2208*
READMP  010262          2229#
RECORD  000624           999#   1472    1508    1513    1521    1540    1541*   1547    1559    1571    1705    1717    1778*
                        1788    1836*   1855    2108    2143    2156    2199*   2241    2318    2319*   2342
RESETL  005726          1784    1787#
RESTRL  010160          2205    2208#
```

DZTMCC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
RESTR1  010166          2201    2207    2209#
REWIND  004776          1605    1649#   2321
RG1     007500          2119#   2121
RNDRDS  007646          2148#
RNDS1   007660          2150#   2154
RNDTAP  010234          2176    2222#
RNDTP1  010246          1679    2196    2224#
RPASS1  010074          2190    2193#
RPASS3  010100          2188    2194#
RSFDR   004616          1614#   2576
RSFDRV= 104410          1367    1384    1402    1433    1470    1477    1496    1504    1543    1552    1569    1604    1641
                        1658    1671    2592#
RSF1    004630          1616#   1621
RSF2    004654          1617    1622#   1646
RTSREC  010032          2178    2184#
RTSR1   010046          2173    2187#
RTSSTP  007610          2140#
R0      =%000000         918#   1084*   1098    1101*   1120*   1128    1133*   1134    1177*   1180*   1182    1184    1186
                        1197*   1324*   1325*   1326    1328    1330    1332    1334    1344*   1345*   1346    1587    1593
                        1597*   1687*   1689    1738*   1739*   1740*   1741*   1874*   1877    1884    2065    2069*   2073*
                        2078*   2082*   2088*   2090    2091    2093*   2117*   2133*
R1      =%000001         919#   1119*   1124*   1125*   1128*   1129*   1130*   1136*   1137*   1598*   1599*   1600*   1601*
                        2066    2070*   2074*   2079*   2080*   2083*   2085*   2089*   2092    2094*   2118*   2120*   2134*
R2      =%000002         920#   1088*   1091*   1105*   1107*   1109*   1116*   1121*   1126    1132*   1138*   1155*   1194*
                        1208*   1299*   1316*   1339*   1352*   1805*   1838*   1840*   1847*   1850*   1853*   1855*   1859*
                        1862*   1865*   1868*   1870*   1872*   1879*   1881*   1892*   1894*   1901*   1964    1973    2014
                        2020    2025    2032    2044    2057*   2059    2067    2072*   2075*   2081*   2084*   2086*   2087*
                        2088    2095*   2135*   2138*   2162*   2166*   2168*   2179*   2224*   2226*   2233*   2236*   2239*
                        2241*   2245*   2248*   2251*   2254*   2256*   2258*   2262*   2264*   2266*   2268*   2304*   2308*
                        2336*   2338*   2340*   2342*   2343*   2345*   2373*   2376*   2379*   2382*   2388    2392*   2393*
                        2395*   2396*   2397*   2398    2401*   2403*   2422*   2424*   2463*   2473    2477    2490*   2521*
                        2523*   2525*   2527*   2553*
R3      =%000003         921#   1902*   1903*   1904*   1905*   1906*   1907    1926*   1929*   1933*   1939*   1947*   1951*
                        1955*   1958*   1962*   1963    1967*   1971*   1972    1976*   1980*   1993*   2006*   2024    2029
                        2035    2037*   2041    2047    2049*   2068    2071*   2076*   2096*
R4      =%000004         922#   1211*   1212*   1213*   1214*   1215*   1216*   1217*   1228*   1236*   1246*   1250*   1254*
                        1262*   1266*   1270*   1278*   1282*   1290*   1295*   1311    1761*   1762*   2029*   2030*   2035
                        2041*   2042*   2047    2150*   2151*
R5      =%000005         923#
SELDN1  002550          1245    1248#
SELDN2  002566          1249    1252#
SELDN3  002602          1243    1247    1251    1255#
SELDRV  002126          1158#   1190
SELD1   002160          1160    1166#
SELD2   002200          1167    1170#
SELOK1  003106          1314    1316#
SELPAT  002376          1207    1211#
SELPR   002516          1233    1237#
SELRM1  002766          1289    1292#
SELRM2  003006          1287    1291    1296#
SELR1   002634          1261    1264#
SELR2   002652          1265    1268#
SELR3   002666          1259    1263    1267    1271#
SELTST  002304          1164    1194#
SELT1   002322          1198#   1210    1315
SELT2   002346          1200    1204#
```

```
SELT3    002366          1202    1205    1208#   1222    1224    1235    1253    1269    1281    1294    1304
SELW1    002720          1277    1280#
SELW2    002734          1275    1279    1283#
SP     =%000006           924#  1054*   1067    1151*   1642*   2498*   2493*   2504    2507    2508    2539    2547    2567
                         2568*   2570*
SP3    = 104430          1218    1229    1237    1255    1271    1283    1296    2356    2363    2406    2428    2600#
SP3A     011714          2463    2466#
SP3X     011704          2463#   2584
STACK  = 000500           969#   1054    1151
START    002066          1145    1150#
START1   002072          1113    1151#   1162
STATRD   000600           988#   1733*   1798    1820    2129*   2175    2195    2294*   2299    2310    2340
STOPOP   005552          1744    1756#
STREC1   006112          1814    1823#
STRLEN   000554           978#   1707*   1711*   1713    1787    2110    2208
STRTOP   005356          1722#   1767    1772    1775    1827    1834
SUSW   = 104432          1152    2601#
SUSWR    012036          2498#   2585
SVCTR    004502          1585#   2575
SVCTRS= 104406           1372    1389    1407    1414    1421    1438    1446    1453    1473    1484    1501    1517    1549
                         1563    1607    2591#
SVC1     004506          1586#   1588
SVRECR   000562           981#   1481*   1483    1510*   1516    1556*   1562
SV0      007414          2065*   2093    2101#
SV1      007416          2066*   2094    2102#
SV2      007420          2067*   2095    2103#
SV3      007422          2068*   2096    2104#
SWR      000512           958#   1342    1666    1803    1810    2160    2177    2187    2279    2501    2505*   2513    2525
                         2564*
SWREG    000176           944#   2505    2513
TABLE    012436          2570    2572#
TEMPST   000542           973#   2529*   2533*   2556*   2557*   2558*   2560*   2564
TESINC   005660          1539    1747    1768    1778#
TESRC1   006056          1811    1816#
TESREC   006026          1804    1810#
TEST     001336          1039#   1326*
TEST0    003320          1327    1364#
TEST1    003370          1329    1381#
TEST2    003440          1331    1399#
TEST3    003556          1333    1430#
TEST4    003674          1337    1463#
TEST5    004216          1336    1532#
TIB      000540           972#   2517*   2518*   2519
TKB      000520           961#   2458    2459    2517
TKS      000516           960#   2454    2515
TO       011722          2471#   2574
TOP    = 104404          1106    1117    1139    1156    1195    1209    1300    1317    1340    1806    1839    1841    1854
                         1869    1871    1880    1893    2163    2180    2225    2227    2240    2255    2257    2263    2267
                         2305    2309    2337    2383    2464    2522    2524    2528    2554    2590#
TOP1     011734          2473#   2482    2493
TOP2     011772          2478    2484#   2544
TOP3     011742          2475#   2492
TPB      000524           963#   1172*   1189*   1307*   1310*   2412*   2442*   2458*   2481*   2486*   2489*
TPS      000522           962#   1170    1187    1305    1308    2410    2440    2456    2471*   2479    2484    2487
TRAP34   012416           932    2567#
TSINC2   005734          1781    1786    1788#
```

```
TSINC3  005750          1789    1791#
TSTEX   001334          1038#   1322*   1323    1359*   1465
TSTSTP  005474          1737    1743#
TSTTBL  001340          1041#   1056*   1057*   1058*   1197    1322
TU.SEL  001532          1071    1080#
TYPT1   011470          2420#   2431
TYPT2   011476          2421#   2423
TYPT3   011532          2427    2430#
T0      003332          1367#   1377
T0A     003334          1368#   1375
T0B     003352          1370    1374#
T1      003402          1384#   1393
T1A     003404          1385#   1391
T1B     003422          1387    1390#
T2      003452          1402#   1425
T2A     003454          1403#   1409
T2B     003472          1405    1408#
T2C     003476          1410#   1416
T2D     003516          1412    1415#
T2E     003522          1417#   1423
T2F     003536          1419    1421#
T3      003570          1433#   1457
T3A     003572          1434#   1440
T3B     003610          1436    1439#
T3C     003614          1442#   1448
T3D     003632          1444    1446#
T3E     003640          1449#   1455
T3F     003654          1451    1453#
T4      003730          1466    1469#
T4A     003732          1470#   1526
T4B     003734          1471#   1475
T4C     003760          1477#   1491
T4D     003762          1478#   1486
T4E     004014          1480    1485#
T4F     004030          1489#   1493
T4G     004046          1488    1496#
T4H     004050          1497#   1503
T4J     004066          1499    1501#
T4K     004074          1504#   1522
T4L     004076          1505#   1519
T4M     004150          1512    1515#
T4N     004162          1507    1509    1518#
T4P     004166          1520#   1524
T5      004230          1535#   1579
T5A     004254          1538    1540#
T5B     004266          1542#
T5C     004276          1544#   1551
T5D     004326          1546    1550#
T5E     004334          1553#   1565    1577
T5F     004376          1558    1561#
T5FLAG  004476          1535*   1581#   1611*   1673    1718
T5G     004410          1555    1564#
T5H     004426          1567    1569#
T5INC   004500          1540*   1548    1582#
T5J     004430          1570#   1575
T5K     004450          1572    1574#
```

DZTMCC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
USSTST  001602          1089#   1092
USS.OK  001620          1090    1094#
VALID   002216          1169    1175#
VAL1    002234          1178#   1181
VAL2    002246          1179    1182#
VAL3    002262          1183    1186#
VAL4    002266          1173    1185    1187#
WAITK   011644          2454#   2572
WAITKY= 104400          1158    1198    1220    1231    1241    1257    1273    1285    1301    2535    2588#
WBUF    000532           966#   1729    1901    2057    2134    2288
WRCHEK  000602           989#   1597    1687    1740    1802*   1872    1874    1884
WRITI   005244          1705#   2573
WRITIT= 104402          1371    1388    1406    1437    1482    1536    2589#
WRPASS  000574           986#   1721*   1736    1738    1742*   1745    1766    1800    1812*   1813    1819*   2278*   2297*
                        2301*
WRRECR  000626          1000#   1472*   1481    1483*   1717*   2319    2324
WRTDMP  006232          1843#
WRTD1   006432          1876#   1885
WRTD2   006454          1878    1883#
WRTLEN  000640          1005#   1713*   1727    1782*   1783    1785    1787*   1807    2286    2306
W1      005312          1710    1713#
W10     005540          1749    1753#
W11     005612          1757    1766#   1822
W12     005646          1770    1774#
XRGRCD  010616          2280    2297#   2300
XRGREC  010504          1818    2278#   2311
XRGO    010512          2279#   2302
XRGS    010624          2296    2299#
ZERO    011626          2419*   2436    2438*   2446#
$CNTG   013712          2521    2731#
$MNEW   013730          2527    2734#
$MSWR   013717          2523    2732#
$QUEST  013741          2553    2736#
$READ   012222          2530    2533#
$R1     007440          2109    2111#
$R5     007576          2136#   2139
$WAIT   005222          1695*   1698#   1701*
$ZEROS  001764          1127    1131#
.       = 013752         930#    931#    933#    935#    942#    946#    952#   1020#   1022#   1024#   1026#   1028#   1030#
                        1032#   1034#   1112    1171    1188    1293    1303    1306    1309    1335    1625    1628    1631
                        1650    1653    1719    1724    1726    1763    1817    1826    1849    1852    1861    1864    1867
                        1965    1974    2033    2036    2045    2048    2114    2116    2152    2171    2185    2214    2235
                        2238    2247    2250    2253    2283    2290    2328    2330    2375    2379    2381    2411    2441
                        2447    2455    2457    2467#   2474    2480    2485    2488    2738#   2740
```

CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

```
DEC     1091  1350  2076  2120  2561
HALT     931  1354
INC     1133  1312  1514  1560  1618  1637  1741  1762  1764  1778  1802  1812  1815  1836  1976
        2151  2153  2172  2186  2189  2193  2199  2301  2343  2404  2421  2426
INCB    1099  1178  1876  1967  2490
JMP      947   948   949  1113  1140  1165  1203  1294  1304  1315  1336  1337  1378  1394  1426
        1458  1527  1568  1580  1822  1827  1834  2192
JSR     1355  1376  1392  1413  1424  1445  1456  1500  1525  1539  1566  1578  1585  1591  1605
        1606  1655  1675  1679  1731  1747  1759  1768  1808  1818  1823  1824  1831  1843  2010
        2018  2127  2142  2148  2155  2165  2182  2191  2218  2222  2229  2281  2291  2307  2314
        2321  2333  2355  2362  2368  2391  2402  2425  2530  2544
MOV     1054  1055  1056  1057  1058  1059  1060  1061  1063  1068  1069  1070  1072  1073  1074
        1080  1081  1084  1087  1088  1105  1107  1109  1116  1119  1121  1138  1142  1143  1144
        1147  1148  1149  1151  1153  1154  1155  1172  1177  1189  1194  1197  1208  1211  1299
        1307  1310  1311  1316  1322  1323  1324  1326  1339  1344  1352  1472  1481  1483  1510
        1513  1516  1535  1540  1547  1556  1559  1562  1586  1592  1597  1598  1601  1615  1622
        1651  1687  1694  1695  1696  1699  1701  1707  1708  1711  1712  1713  1717  1722  1727
        1729  1733  1738  1761  1787  1805  1807  1828  1829  1838  1840  1845  1847  1850  1853
        1855  1857  1859  1862  1865  1868  1870  1872  1874  1879  1881  1892  1894  1901  1902
        1907  1926  1929  1933  1939  1947  1951  1955  1958  1962  1980  1993  2006  2019  2024
        2029  2031  2041  2043  2057  2065  2066  2067  2068  2069  2070  2071  2090  2091  2092
        2093  2094  2095  2096  2110  2111  2112  2117  2118  2122  2124  2125  2129  2133  2134
        2135  2150  2162  2164  2166  2168  2179  2181  2194  2208  2215  2216  2224  2226  2231
        2233  2236  2239  2241  2243  2245  2248  2251  2254  2256  2258  2262  2264  2266  2268
        2278  2284  2286  2288  2294  2304  2306  2308  2318  2319  2323  2326  2336  2338  2340
        2342  2345  2351  2357  2364  2371  2373  2376  2379  2382  2387  2390  2394  2398  2412
        2417  2418  2419  2420  2436  2438  2442  2463  2498  2499  2500  2505  2506  2507  2508
        2517  2521  2523  2525  2527  2534  2543  2553  2564  2567  2569  2571
MOVB    1125  1128  1130  1137  1875  1963  1972  2013  2458  2459  2472  2481  2486  2489
NEG     1728  2123  2287  2325
NOP     1065  1356  1357  1358
ROL     1213  1214  1215  1216  1226  2074  2075  2392  2393  2395  2396  2397  2403
ROR     1101  1132  1620  1639  1652  1725  2115  2213  2289  2329  2359  2401
RTI     1702
RTS     1589  1595  1602  1612  1633  1643  1656  1683  1692  1700  1720  1752  1755  1773  1776
        1791  1889  1897  2061  2097  2145  2158  2209  2220  2271  2298  2315  2322  2334  2348
        2385  2407  2413  2429  2443  2461  2465  2476  2509  2531
SUB     2037  2049  2138  2324  2422  2568
SWAB    1212  1225  1623  1903  2352  2358  2365
TST     1064  1111  1161  1163  1201  1673  1705  1718  1734  1736  1745  1766  1780  1800  1977
        1883  1886  2108  2130  2200  2295  2388  2432  2539  2547
TSTB    1085  1170  1187  1305  1308  1624  1649  1723  1788  2113  2282  2327  2410  2440  2454
        2456  2479  2484  2487  2491  2515
WAIT    1698
.ASCII  2466  2605  2606  2609  2615  2619  2620  2624  2630  2637  2641  2645  2654  2658  2662
        2665  2669  2673  2675  2677  2679  2681  2683  2685  2687  2690  2693  2697  2701  2704
        2709  2715  2721  2723  2725  2727  2729  2731  2732  2734  2736
.ENABL   929
.END    2741
.EVEN   2467  2738
.LIST    931
.NLIST   931
.REM       1
.REPT    931
.TITLE   903
.WORD    931
```

E06


```
ERRORS DETECTED:  0
DEFAULT GLOBALS GENERATED:  0

*DZTMCC,DZTMCC.SEQ/SOL/CRF/DS:ERFZ/EN:ABS=DSKM:DZTMCC.P11
RUN-TIME: 7 16 3 SECONDS
RUN-TIME RATIO: 38/28=1.3
CORE USED:  10K  (19 PAGES)
```

Spooler runtime 9 Seconds, 43 KCS, 253 disk reads, 4 disk writes, 69 pages