TM11/TU10

DATA RELIABILITY (9 TRACK)

MD-11-DZTMB-D

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Made in U.S.A.

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IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZTMB-D-D

PRODUCT NAME: TM11 DATA RELIABILITY (9 TRACK)

PROGRAM DATE: 21 MARCH 1976

MAINTAINER: DIAGNOSTIC ENGINEERING

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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, 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 (9 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 (CR DOWN).
***IF SOFTWARE SWITCH REGISTER IS USED THE PROGRAM WILL ALLOW MODIFICATION OF THE SOFTWARE SWITCH REGISTER IMMEDIATELY AFTER THE START OF PROGRAM. THE PROGRAM WILL TYPE THE FOLLOWING*
SWR=XXXXXX NEW= (REFER TO SECTION 5.1 FOR OPERATOR OPTIONS.)

4.2 STARTING ADDRESS

200 - BASIC TEST (AUTOMATIC PARAMETER AND UNIT SELECTION)

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

103 210 - " " " " " 9K " "

4.3 PROGRAM AND/OR OPERATOR ACTION

LOAD PROGRAM INTO MEMORY
SET DESIRED TU10 TAPE UNITS ON-LINE AND WRITE ENABLED
LOAD STARTING ADDRESS 200 (204 OR 210 TO SELECT PARAMETERS AND UNITS)
START PROGRAM-PROGRAM WILL BEGIN TESTING FOR LOAD ADDRESS OF 200 OTHERWI
SELECT TAPE UNITS (REFERENCE 4.3.1)
SELECT PARAMETERS (REFERENCE 4.3.2)
TYPE CARRIAGE RETURN AND PROGRAM WILL BEGIN TESTING.
***THE PROGRAM WILL ALLOW THE LOADING OF SOFTWARE SWITCH REGISTER
AFTER PROGRAM HAS BEEN STARTED BY TYPING OUT THE FOLLOWING
SWR=XXXXXX NEW= (REFER TO SECT 5.1 FOR OPERATOR ACTION).

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 THE 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.

```
155
156
157                    4.3.1.2 AUTOMATIC UNIT SELECTION
158
159                            STARTING AT 200 WILL RESULT IN AUTOMATIC SELECTION OF UNITS TO
160                            BE TESTED. A UNIT WILL BE SELECTED FOR TESTING IF IT MEETS THE
161                            FOLLOWING CRITERIA:
162                                    1. IT IS ON-LINE
163                                    2. IT IS NINE(9) TRACK
164                                    3. IT IS WRITE ENABLED
165
166                            IF THE ABOVE CRITERIA IS NOT MEET BY A LEAST ONE(1) UNIT
167                            OPERATOR SELECTION WILL BE REQUIRED (REFERENCE 4.3.1).
168
169                    4.3.2   PARAMETER SELECTION
170
171                            STARTING THE PROGRAM AT 200 WILL RESULT IN AN AUTOMATIC
172                            SELECTION OF TEST PARAMETERS (REFERENCE 4.3.2.8) OTHERWISE
173                            STARTING AT ADDRESS 204 OR 210 WILL ALLOW OPERATOR TO SELECT
174                            PARAMETERS.THERE ARE FIVE TYPES OF PARAMETERS TO BE CONTROLLED BY THE
175                            OPERATOR.  THEY INCLUDE: TEST NUMBER, PATTERN, RECORD LENGTH,
176                            WRITE MODE, AND READ MODE.  THE PROGRAM WILL PRINT:
177
178                                    "TST PAT RLS WMO RMO"
179
180                            TST=TEST NUMBER
181                            PAT=PATTERN
182                            RLS=RECORD LENGTH SEQUENCE
183                            WMO=WRITE START/STOP MODE
184                            RMO=READ START/STOP MODE
185
186
187
188                    4.3.2.1 TEST NUMBER
189
190                            THERE ARE 6 TESTS AVAILABLE FOR SELECTION (0 THRU 5).
191
192                            TEST            DESCRIPTION
193
194                            0       WRITE 1 RECORD, REPEAT ON ALL UNITS, CONTINUE TO END
195                                    OF TAPE.
196
197                            1       WRITE 256 RECORDS, REPEAT FOR ALL UNITS, CONTINUE TO END
198                                    OF TAPE.
199
200                            2       WRITE 256 RECORDS, REPEAT FOR ALL UNITS, BACKSPACE 256
201                                    RECORDS, REPEAT FOR ALL UNITS, READ 256 RECORDS, REPEAT
202                                    FOR ALL UNITS , CONTINUE TO END OF TAPE.
203
204                            3       WRITE 1 RECORD, REPEAT FOR ALL UNITS, BACKSPACE, REPEAT
205                                    FOR ALL UNITS, READ 1 RECORD, REPEAT FOR ALL UNITS,
206                                    CONTINUE TO END OF TAPE.
207
208                            4       WRITE 1 RECORD, REPEAT FOR ALL UNITS, REPEAT FOR 256
209                                    RECORDS, BACKSPACE 256 RECORDS, REPEAT FOR ALL UNITS,
210                                    READ 1 RECORD, REPEAT FOR ALL UNITS, REPEAT FOR 256
```

```
211                                     RECORDS, CONTINUE TO END OF TAPE.
212
213                             5       READ 1 RECORD, REPEAT FOR ALL UNITS, CONTINUE TO END
214                                     OF TAPE.
215
```

4.3.2.2 PATTERN

THERE ARE 8 DATA PATTERNS AVAILABLE FOR SELECTION (0 THRU 7)

PATTERN	DESCRIPTION	DATA	CHANNELS
0	HALF FREQUENCY, OUTSIDE SKEW	010	001
		004	400
		010	001
		004	400
		ETC.	ETC.
1	SLIDING "1"	000	040
		200	004
		100	010
		040	020
		020	100
		010	001
		004	400
		002	002
		001	200
		ETC.	ETC
2	HIGH FREQUENCY, ALTERNATING CHANNELS	274	525
		274	525
		ETC.	ETC.

PATTERN	DESCRIPTION	DATA	CHANNELS
3	THREE 0'S, THRU 1'S, THRU 0'S	037	703
		037	703
		037	703
		300	054
		300	054
		300	054
		076	523
		076	523
		076	523
		201	244
		201	244
		201	244
		174	531
		174	531
		174	531
		003	242
		003	242
		003	242
		370	135
		370	135
		370	135
		007	602
		007	602
		007	602
		360	174
		360	174
		360	174

272 ETC. ETC.

```
4       INCREMENTING PATTERN          000     040
                                      001     200
                                      002     002
                                      003     202
                                       .       .
                                       .       .
                                       .       .
                                      377     777
                                      ETC.    ETC.

5       EACH CHANNEL 3 BITS           000     040
                                      000     040
                                      000     040
                                      200     004
                                      200     004
                                      200     004
                                      100     010
                                      100     010
                                      100     010
                                      040     020
                                      040     020
                                      040     020
                                      020     100
                                      020     100

PATTERN DESCRIPTION                   DATA    CHANNELS

                                      020     100
                                      010     001
                                      010     001
                                      010     001
                                      004     400
                                      004     400
                                      004     400
                                      002     002
                                      002     002
                                      002     002
                                      001     200
                                      001     200
                                      001     200
                                      ETC.    ETC.

6       HIGH FREQUENCY ALL CHANNELS   377     777
                                      377     777
                                      ETC.    ETC.

7       RANDOM                        ?       ?
```

4.3.2.3 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= 1048 BYTES, EACH SUCCESSIVE RECORD IS 4 BYTES SHORTER UNTIL 256TH RECORD=4 BYTES)

4.3.2.4 WRITE START/STOP MODE

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

WM0	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)

4.3.2.5 READ START/STOP MODE

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

RM0	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)

4.3.2.6 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.

4.3.2.7 TEST SELECTION EXAMPLES

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

TWO PARAMETERS SETS WERE SELECTED BY THE ABOVE SEQUENCE

TEST3, PATTERN 2, MAXIMUM RECORD LENGTH, WRITE NONSTOP, AND READ NONSTOP.
TEST 0, PATTERN 1, 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 BEGINNING OF THE PARAMETER SELECTION AND THE PROGRAM WOULD START TESTING.

4.3.2.8 AUTOMATIC PARAMETER SELECTION

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

```
TST PAT RLS WMO RMO
 3   6   1   1   1
 4   0   2   2   2
 2   7   2   2   2
```

5.0 OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

IF THE DIAGNOSTIC IS RUN ON A CPU WITHOUT A SWITCH REGISTER THEN A SOFTWARE SWITCH REGISTER IS USED WHICH ALLOWS THE USER THE SAME SWITCH OPTIONS AS THE HARDWARE SWITCH REGISTER. IF THE HARDWARE SWITCH REGISTER DOES NOT EXIST OR IF ONE DOES AND IT CONTAINS ALL ONES (177777) THEN THE SOFTWARE SWITCH REGISTER (LOC. 176) IS USED.

CONTROL:

THIS PROGRAM ALSO SUPPORTS THE DYNAMIC LOADING OF THE SOFTWARE SWITCH REGISTER (LOC. 176) FROM THE TTY. THIS CAN BE ACCOMPLISHED BY DOING THE FOLLOWING:

1) TYPE CONTROL G (↑G); THIS WILL ALLOW THE TTY TO ENTER DATA INTO LOC. 176 AT SELECTED POINTS WITHIN THE PROGRAM.

2) THE MACHINE WILL THEN TYPE: SWR=XXXXXXNEW= (XXXXXX IS THE OCTAL CONTENTS OF THE SOFTWARE SWITCH REGISTER.)

3) AFTER THE ''NEW='' HAS BEEN TYPED THEN THE OPERATOR. CAN DO ONE OF THE FOLLOWING AT THE TTY:

   A) TYPE A NUMBER TO BE LOADED INTO LOC. 176 FOLLOWED BY A (CR). (ONLY NUMBERS BETWEEN 0-7 WILL BE ACCEPTED AND ONLY 6 NUMBERS WILL BE ALLOWED)
   IF A (CR) IS THE FIRST KEY DEPRESSED THE SOFTWARE SWITCH REGISTER CONTENTS WILL NOT BE CHANGED.

   B) IF A CONTROL U (↑U) IS DEPRESSED THEN THE PROGRAM WILL SEND YOU BACK TO STEP 2.

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

SW	FUNCTION	PURPOSE
3	PRINT AFTER	USE OF THIS SWITCH WILL CAUSE

(U00010)PARITY ERRORS		THE DATA READ TO BE COMPARED WITH THE DATA WRITTEN AFTER A PARITY ERROR HAS OCCURRED NOTE: THE PARITY ERROR BIT SETTING IN THE STATUS REGISTER IS CAUSED BY THE LOGICAL 'OR' OF BOTH LATERAL (CHARACTER) AND LONGITUDINAL (CHANNEL) PARITY ERRORS.
4 (000020)	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 (000040)	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 (0001000)	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 APPROXIMATELY 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 (020000)	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 (000400)	PRINT ERROR STATISTICS	AFTER COMPLETION OF EVERY RECORD LENGTH SEQUENCE INSTEAD OF AFTER END OF TAPE AS IS NORMAL.

5.1.3 SWITCH TO ALTER TEST PARAMETERS

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

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

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	RLS	WMO	RMO
3	2	0	0	0
4	6	0	0	0

WITH SW0=1

TEST 3 WILL BE EXECUTED 5 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  MODE  RECORD  LENGTH
 0    7   SSTP   1276     MAX

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

DRV = UNIT NUMBER
PAT = PATTERN NUMBER
MODE = WRITE START/STOP MODE
RECORD = NUMBER OF RECORDS
LENGTH = LENGTH OF RECORDS

ON UNIT 0, USING PATTERN 7, WRITE MODE START/STOP, 1276
RECORDS OF MAXIMUM (1024 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   XXXXXX  XXXXXX
```

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. ALSO PRINTED OUT IF SW(03) IS SET TO A 1 (SEE SECTION 5.1.1) ARE THE EXPECTED AND ACTUAL DATA VALUES FOR A READ STATUS ERROR CAUSED BY A PARITY ERROR

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  MODE  RECORD  LENGTH
 3    4   NSTP   1276   M-MAX

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

ON UNIT 3, USING PATTERN 4, 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 THE 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 NEXT UNIT. READ MODE (RMO) HAS NO EFFECT ON THIS TEST.

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
                                                %
                                        .TITLE  TM-11 DATA RELIABILITY  9 TRACK
                                        ;COPYRIGHT 1970, 1971, 1972, 1973, 1976 DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754
                                        ;REVISED SEPT 1971, J.RODENHISER
                                        ;REVISED AUGUST 1972, J. LACEY
                                        ;REVISED TO REV.B SEPT., 1973 BY BRUCE BURGESS - DIAGNOSTIC ENGINEERING
                                        ;               THE FOLLOWING ADDITIONS AND/OR CORRECTIONS MAKE
                                        ;               UP REV.B :
                                        ;       (A) CODE TO COVER ACT-11 AND MAGTAPE DDP OPTIONS
                                        ;       (B) SECTION TO PRINT OUT GOOD AND BAD DATA (EXPECTED AND ACTUAL)
                                        ;           ON READ STATUS ERRORS CAUSED BY PARITY ERRORS.  THIS SECTION
                                        ;           IS ENABLED BY SETTING SW<03> TO A '1'.  SEE SECTION 5.1.1
                                        ;           OF THE DOCUMENT.
                                        ;REVISED TO REV. D MAR.,1976 BY SAM CARPENTER-DIAGNOSTIC ENGINEERING
                                        ;       (A) MODIFIED TO SUPPORT SOFTWARE SWITCH REGISTER
                                        ;       (B) ALSO SUPPORTS THE DYNAMIC LOADING OF THE SOFTWARE SWITCH REGISTER FROM TTY
                                        ;           BY PRESSING A CNTL G
                                        ;       (C) PROGRAM WILL ALLOW THE LOADING OF THE SOFTWARE SWITCH REGISTER AT START
                                        ;           IF NO HARDWARE SWITCH REGISTER IS AVAILABLE OR IF THE
                                        ;           HARDWARE SWITCH REGISTER CONTAINS ALL 1'S.
                                        ;

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

                                                .ENABL  ABS, AMA
                000000                          .=0
                                        ;TRAP CATCHER IN UNUSED LOCATIONS 0-476
                000034                          .=34
000034  012264                                  TRAP34
                000046                          .=46
000046  003224                                  ENDADR
                000052                          .=52
000052  040000                                  40000
                                                ;*************************************************************************
                                                ;SOFTWARE SWITCH REGISTER IS LOCATED AT LOC. 176

                                                ;BEFOR STARTING REFER TO SECTION 5.1 OF DOCUMENT

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

                000176                          .=176
000176  000000                          SWREG:  .WORD 0                 ;SOFTWARE SWITCH REGISTER
                000200                          .=200
000200  000137  001354                          JMP     AUTOST
000204  000137  002050                          JMP     MEM4K
```

```
  873  000210  000137  002074                    JMP     MEMEX
  874
  875          000500                 STACK=500
  876          000500                         .=500
  877  000500  172520                 MTS:    172520
  878  000502  172522                 MTC:    172522
  879  000504  172524                 BC:     172524
  880  000506  172526                 CA:     172526
  881  000510  177776                 CC:     177776
  882  000512  177570                 SWR:    177570
  883  000514  177560                 TKS:    177560
  884  000516  177562                 TKB:    177562
  885  000520  177564                 TPS:    177564
  886  000522  177566                 TPB:    177566
  887  000524  002000                 MAXLEN: 1024.           ;MAX RECORD LENGTH
  888  000526  000004                 MINLEN: 4.              ;MIN RECORD LENGTH
  889  000530  013616                 WBUF:   BUFFER          ;STARTING ADDRESS OF WRITE BUFFER
  890  000532  015616                 RBUF:   BUFFER+1024.    ;STARTING ADDRESS OF READ BUFFER
  891  000534  000224                 MTV:    224
  892
  893                                 ;TEMPORARY STORAGE AREAS
  894  000536  000000                 ATST:   0
  895  000540  000000                 DRVSEL: 0
  896  000542  000000                 STRLEN: 0
  897  000544  000000                 LENGTH: 0
  898  000546  000000                 MSBITS: 0
  899  000550  000000                 SVRECR: 0
  900  000552  000000                 COMAND: 0
  901  000554  000000                 CDRVBT: 0
  902  000556  000000                 CDRIVE: 0
  903  000560  000000                 RDPASS: 0
  904  000562  000000                 WRPASS: 0
  905  000564  000000                 BLKINC: 0
  906  000566  000000                 STATRD: 0
  907  000570  000000                 WRCHEK: 0
  908  000572  000000                         0
  909  000574  000000                         0
  910  000576  000000                         0
  911  000600  000000                         0
  912  000602  000000                         0
  913  000604  000000                         0
  914  000606  000000                         0
  915
  916  000610  000000                 PERMBS: 0
  917  000612  000000                 RECORD: 0
  918  000614  000000                 WRRECR: 0
  919  000616  000000                 LASRCR: 0
  920  000620  000000                 RDERRS: 0
  921  000622  000000                 DAERRS: 0
  922  000624  000000                 NRREAD: 0
  923  000626  000000                 WRTLEN: 0
  924  000630  000000                 READLN: 0
  925  000632  000000                 MODES:  0
  926
  927  000634  000654                 DRVADR: D0TAB
  928  000636  000720                         D1TAB
```

```
  929  000640  000764                          D2TAB
  930  000642  001030                          D3TAB
  931  000644  001074                          D4TAB
  932  000646  001140                          D5TAB
  933  000650  001204                          D6TAB
  934  000652  001250                          D7TAB
  935
  936  000654  000000                DOTAB:    0
  937          000720                          .=DOTAB+44
  938  000720  000000                D1TAB:    0
  939          000764                          .=D1TAB+44
  940  000764  000000                D2TAB:    0
  941          001030                          .=D2TAB+44
  942  001030  000000                D3TAB:    0
  943          001074                          .=D3TAB+44
  944  001074  000000                D4TAB:    0
  945          001140                          .=D4TAB+44
  946  001140  000000                D5TAB:    0
  947          001204                          .=D5TAB+44
  948  001204  000000                D6TAB:    0
  949          001250                          .=D6TAB+44
  950  001250  000000                D7TAB:    0
  951          001314                          .=D7TAB+44
  952  001314  000000                CHARIN:   0                    ;CHARACTER JUST INPUT
  953  001316  000000                NUMTST:   0                    ;NUMBER OF TEST
  954  001320  000000                PARAM:    0                    ;TEST PARAMETERS
  955  001322  000000                TSTEX:    0                    ;POINTS TO TEST PARAMETERS TO BE EXECUTED
  956  001324  000000                TEST:     0                    ;CONTAINS CURRENT TEST NUMBER
  957
  958  001326  000000                TSTTBL:   0                    ;TEST TABLE
  959  001330  000000                          0                    ;UP TO 10 TESTS CAN BE SELECTED TO
  960  001332  000000                          0                    ;BE RUN IN CONSECUTIVE ORDER
  961  001334  000000                          0
  962  001336  000000                          0
  963  001340  000000                          0
  964  001342  000000                          0
  965  001344  000000                          0
  966  001346  000000                          0
  967  001350  000000                          0
  968  001352  000000                          0
  969
  970  001354  012706  000500        AUTOST:   MOV     #STACK,SP            ;SETUP THE SP
  971  001360  104432                          SUSWR                        ;CHECK FOR HARDWARE SWICH REG
  972  001362  022737  000176  000512          CMP     #SWREG,SWR
  973  001370  001002                          BNE     1$
  974  001372  004737  011762                  JSR     PC,CNTLU                  ;ALLOW SWREG TO BE CHANGED
  975  001376  012737  177777  000536  1$:     MOV     #-1,ATST
  976  001404  012737  036025  001326          MOV     #36025,TSTTBL        ;SETUP TEST PARAMETERS
  977  001412  012737  040052  001330          MOV     #40052,TSTTBL+2
  978  001420  012737  027052  001332          MOV     #27052,TSTTBL+4
  979  001426  012737  000003  001316          MOV     #3,NUMTST
  980  001434  012737  123456  007332          MOV     #123456,LONUM        ;PRIME RANDOM NUMBER GENERATER
  981  001442  012737  176543  007334          MOV     #176543,HINUM
  982                          ;DETERMINE THE SIZE OF THE WRITE AND READ BUFFERS.
  983  001450  012737  001464  000004          MOV     #NXMRET,@#4          ;SETUP NXM VECTOR
  984  001456  005737  023616                  TST     BUFFER+4096.         ;OVER 4K OF MEMORY?
```

```
  985  001462  000413                          BR      OVER4K                  ;BR IF YES
  986  001464  022626                  NXMRET: CMP     (SP)+,(SP)+             ;POP THE STACK
  987  001466  012737  000004  000526          MOV     #4,MINLEN
  988  001474  012737  002000  000524          MOV     #1024.,MAXLEN
  989  001502  012737  015616  000532          MOV     #BUFFER+1024.,RBUF
  990  001510  000411                          BR      TU.SEL                  ;GO SELCT DRIVES
  991  001512  012737  000010  000526  OVER4K: MOV     #8.,MINLEN
  992  001520  012737  004000  000524          MOV     #2048.,MAXLEN
  993  001526  012737  017616  000532          MOV     #BUFFER+2048.,RBUF
  994                                  ;DETERMINE DRIVES TO BE TESTED.
  995                                  ;A DRIVE WILL BE TESTED IF:
  996                                  ;       1. IT CAN BE SELECTED
  997                                  ;       2. IT IS 9 TRACK
  998                                  ;       3. IT IS WRITE ENABLED
  999  001534  012737  000006  000004  TU.SEL: MOV     #6,@#4                  ;SET TRAP CATCHER
 1000  001542  012777  010000  176732          MOV     #10000,@MTC             ;PWR CLR
 1001  001550  005037  000540                  CLR     DRVSEL                  ;CLEAR DRIVE TABLE
 1002  001554  005037  000546                  CLR     MSBITS
 1003  001560  012700  000200                  MOV     #200,R0                 ;R0=DRIVE 0
 1004  001564  105777  176712                  TSTB    @MTC
 1005  001570  100036                          BPL     IDSELF                  ;BR IF NO CU RDY
 1006  001572  123737  000041  000004          CMPB    @#41,4                  ;DDP ON MAGTAPE?
 1007  001600  001426                          BEQ     NO.SEL                  ;IF YES - SKIP DRIVE 0
 1008  001602  013777  000540  176672  NXT.TU: MOV     DRVSEL,@MTC             ;SELECT A DRIVE
 1009  001610  012702  000024                  MOV     #20.,R2                 ;SETUP R2 FOR WAIT LOOP
 1010  001614  032777  000100  176656  USSTST: BIT     #100,@MTS               ;DOES DRIVE EXIST?
 1011  001622  001003                          BNE     USS.OK                  ;BR IF YES
 1012  001624  005302                          DEC     R2                      ;KILL SOME TIME
 1013  001626  003372                          BGT     USSTST
 1014  001630  000412                          BR      NO.SEL                  ;DRIVE IS NON-EXISTENCE
 1015  001632  032777  000020  176640  USS.OK: BIT     #20,@MTS                ;IS THIS DRIVE 7 OR 9 CHN?
 1016  001640  001006                          BNE     NO.SEL                  ;BR IF 7 CHN.
 1017  001642  032777  000004  176630          BIT     #4,@MTS                 ;IS WRITE LOCK ON?
 1018  001650  001002                          BNE     NO.SEL                  ;BR IF YES
 1019  001652  050037  000546                  BIS     R0,MSBITS               ;PUT DRIVE INTO TABLE
 1020  001656  105237  000541          NO.SEL: INCB    DRVSEL+1                ;INC. THE DRIVE NUMBER
 1021  001662  006200                          ASR     R0                      ;HAS ALL DRIVES BEEN TESTED FOR EXISTENCE?
 1022  001664  001346                          BNE     NXT.TU                  ;BR IF NO
 1023
 1024                                  ;TYPE-OUT NAME OF PROGRAM AND MIN. AND MAX. RECORD LENGTHS.
 1025  001666  012702  012731          IDSELF: MOV     #MSG10A,R2
 1026  001672  104404                          TOP
 1027  001674  013702  000526                  MOV     MINLEN,R2
 1028  001700  104426                          DECPRT                          ;PRINT MIN. LENGTH
 1029  001702  013702  000524                  MOV     MAXLEN,R2
 1030  001706  104426                          DECPRT                          ;PRINT MAX. LENGTH
 1031  001710  005737  000546                  TST     MSBITS                  ;WAS ANY DRIVES SELECTED?
 1032  001714  001012                          BNE     2$                      ;BR IF YES
 1033  001716  013701  000042                  MOV     @#42,R1                 ;IS THERE A MONITOR?
 1034  001722  001405                          BEQ     1$                      ;BRANCH IF NO
 1035  001724  012702  013051                  MOV     #MSG10C,R2              ;INDICATE THAT NO DRIVES ARE
 1036  001730  104404                          TOP                             ;AVAILABLE!!
 1037  001732  000137  003224                  JMP     @#ENDADR                ;RETURN TO THE MONITOR
 1038  001736  000137  002122          1$:     JMP     START1                  ;NO--GO HAVE OPERATOR SELECT DRIVES
 1039
 1040                                  ;TYPE-OUT THE DRIVE/S TO BE TESTED
```

```
 1041  001742  012702  013026          2$:     MOV     #MSG10B,R2
 1042  001746  104404                          TOP
 1043  001750  105037  013616                  CLRB    BUFFER
 1044  001754  012701  013616                  MOV     #BUFFER,R1
 1045  001760  005000                          CLR     R0                      ;SET R0 TO DRIVE 0
 1046  001762  012702  000200                  MOV     #200,R2                 ;SET R2 TO DRIVE 0
 1047
 1048                                  ;FORM AND SAVE DRIVE NUMBER FOR TYPE-OUT
 1049  001766  105021                          CLRB    (R1)+                   ;SET EOM
 1050  001770  112721  000040                  MOVB    #' ,(R1)+               ;SPACE
 1051  001774  030237  000546          LOOPER: BIT     R2,MSBITS               ;DID THIS DRIVE NUMBER EXIST?
 1052  002000  001405                          BEQ     $ZERO$                  ;BR IF NO
 1053  002002  110011                          MOVB    R0,(R1)                 ;YES--SAVE THE NUMBER
 1054  002004  152721  000060                  BISB    #'0,(R1)+               ;MAKE IT ASCII
 1055  002010  112721  000054                  MOVB    #',,(R1)+               ;COMMA
 1056  002014  000241                  $ZERO$: CLC                             ;POSITION DRIVE BIT
 1057  002016  006002                          ROR     R2
 1058  002020  005200                          INC     R0                      ;UPDATE DRIVE NUMBER
 1059  002022  020027  000007                  CMP     R0,#7                   ;LAST
 1060  002026  003762                          BLE     LOOPER                  ;BR IF NO
 1061  002030  105011                          CLRB    (R1)                    ;SET EOM
 1062  002032  112741  000100                  MOVB    #'@,-(R1)               ;CR & LF
 1063  002036  012702  013616                  MOV     #BUFFER,R2              ;TYPE THE DRIVE/S SELECTED
 1064  002042  104404                          TOP
 1065  002044  000137  003040                  JMP     EXECUT                  ;GO START TESTING
 1066                                  ;MODIFY RECORD LENGTHS AND BUFFER AREAS FOR 4K OF MEMORY
 1067  002050  012737  000004  000526  MEM4K:  MOV     #4.,MINLEN
 1068  002056  012737  002000  000524          MOV     #1024.,MAXLEN
 1069  002064  012737  015616  000532          MOV     #BUFFER+1024.,RBUF
 1070  002072  000411                          BR      START
 1071                                  ;MODIFY RECORD LENGTHS AND BUFFER AREAS FOR 8K OF MEMORY
 1072  002074  012737  000010  000526  MEM8K:  MOV     #8.,MINLEN
 1073  002102  012737  004000  000524          MOV     #2048.,MAXLEN
 1074  002110  012737  017616  000532          MOV     #BUFFER+2048.,RBUF
 1075  002116  005037  000536          START:  CLR     ATST                    ;NOT AUTO START
 1076  002122  012706  000500          START1: MOV     #STACK,SP               ;INITIALIZE STACK
 1077  002126  104432                          SUSWR                           ;CHECK FOR HARDWARE SWITCH REGISTER
 1078  002130  022737  000176  000512          CMP     #SWREG,SWR
 1079  002136  001002                          BNE     1$
 1080  002140  004737  011762                  JSR     PC,CNTLU
 1081  002144  012737  123456  007332  1$:     MOV     #123456,LONUM           ;PRIME RANDOM
 1082  002152  012737  176543  007334          MOV     #176543,HINUM           ;NUMBER GENERATOR
 1083  002160  012702  012347                  MOV     #MSG1,R2
 1084  002164  104404                          TOP                             ;PRINT 'SELECT DRIVES'
 1085  002166  005037  000546                  CLR     MSBITS                  ;CLEAR SELECTED DRIVE INDICATOR
 1086  002172  104400                  SELDRV: WAITKY
 1087  002174  122737  000015  001314          CMPB    #15,CHARIN              ;WAS CHARACTER A CARRIAGE RETURN?
 1088  002202  001010                          BNE     SELD1                   ;NO
 1089  002204  005737  000546                  TST     MSBITS                  ;YES, WERE ANY DRIVES SELECTED
 1090  002210  001744                          BEQ     START1                  ;NO
 1091  002212  005737  000536                  TST     ATST                    ;YES--IS AUTO SWITCH SET?
 1092  002216  001454                          BEQ     SELTST                  ;NO--GO SELECT TESTS
 1093  002220  000137  003040                  JMP     EXECUT                  ;YES--GO START TESTING
 1094  002224  122737  000070  001314  SELD1:  CMPB    #70,CHARIN              ;IS CHARACTER A VALID NUMBER 0-7?
 1095  002232  003404                          BLE     SELD2                   ;NO, PRINT "?"
 1096  002234  122737  000060  001314          CMPB    #60,CHARIN              ;IS CHARACTER A VALID NUMBER 0-7?
```

```
1097  002242  003407                          BLE     VALID           ;YES
1098  002244  105777  176250          SELD2:  TSTB    @TPS
1099  002250  100375                          BPL     .-4
1100  002252  012777  000077  176242        MOV     #'?,@TPB        ;PRINT '?'
1101  002260  000424                          BR      VAL4
1102                                  ;HAVE VALID DRIVE NUMBER
1103  002262  142737  000270  001314  VALID:  BICB    #270,CHARIN     ;MASK OUT NUMBER
1104  002270  105137  001314                  COMB    CHARIN
1105  002274  012700  000200                  MOV     #200,R0         ;INITIALIZE BIT POSITION FOR DRIVE 0
1106
1107
1108  002300  105237  001314          VAL1:   INCB    CHARIN          ;+1 TO DRIVE SELECT
1109  002304  001402                          BEQ     VAL2            ;HAVE DRIVE OF EQUAL TO ZERO
1110  002306  006200                          ASR     R0              ;MOVE BIT POSITION TO NEXT DRIVE
1111  002310  000773                          BR      VAL1            ;TRY AGAIN
1112  002312  130037  000546          VAL2:   BITB    R0,MSBITS       ;COMPARE DRIVE SELECT WITH PREVIOUS SELECTED
1113  002316  001003                          BNE     VAL3
1114  002320  150037  000546                  BISB    R0,MSBITS       ;DRIVE WASN'T PREVIOUSLY SET, SO SET IT NOW.
1115  002324  000402                          BR      VAL4
1116  002326  140037  000546          VAL3:   BICB    R0,MSBITS       ;DRIVE WAS SET, CLEAR IT.
1117  002332  105777  176162          VAL4:   TSTB    @TPS
1118  002336  100375                          BPL     .-4
1119  002340  012777  000054  176154        MOV     #',,@TPB        ;PRINT COMMA
1120  002346  000711                          BR      SELDRV          ;RETURN TO WAIT FOR NEXT KEY
1121                                  ;HAVE DRIVES SELECTED-NOW GET TEST SELECTION
1122  002350  012702  012370          SELTST: MOV     #MSG2,R2
1123  002354  104404                          TOP                     ;PRINT'SELECT TESTS'
1124  002356  005037  001316                  CLR     NUMTST          ;CLEAR TEST NUMBERS SELECTED
1125  002362  012700  001326                  MOV     #TSTTBL,R0      ;INITIALIZE TEST TABLE POINTER
1126  002366  104400                  SELT1:          WAITKY
1127  002370  122737  000015  001314          CMPB    #15,CHARIN      ;WAS CHARACTER A CARRIAGE RETURN?
1128  002376  001005                          BNE     SELT2
1129  002400  005737  001316                  TST     NUMTST          ;WERE ANY TESTS SELECTED?
1130  002404  001412                          BEQ     SELT3           ;NO
1131  002406  000137  003040                  JMP     EXECUT          ;YES, EXECUTE TESTS
1132  002412  122737  000066  001314  SE_T2:  CMPB    #66,CHARIN      ;IS CHARACTER A VALID NUMBER 0-5
1133  002420  003404                          BLE     SELT3           ;NO
1134  002422  122737  000060  001314          CMPB    #60,CHARIN      ;IS CHARACTER A VALID NUMBER 0-5
1135  002430  003404                          BLE     SELPAT          ;YES
1136  002432  012702  012342          SELT3:  MOV     #MSG0,R2
1137  002436  104404                          TOP
1138  002440  000752                          BR      SELT1           ;RETURN TO WAIT FOR TEST SELECT
1139  002442  013704  001314          SELPAT: MOV     CHARIN,R4
1140  002446  000304                          SWAB    R4              ;ROTATE TEST NUMBER INTO POSITION
1141  002450  006104                          ROL     R4
1142  002452  006104                          ROL     R4
1143  002454  006104                          ROL     R4
1144  002456  006104                          ROL     R4
1145  002460  042704  107777                  BIC     #107777,R4
1146  002464  104430                          SP3                     ;TYPE 3 SPACES
1147                                  ;HAVE VALID TEST SELECTED, NOW GET SELECTED PATTERN
1148  002466  104400                          WAITKY
1149  002470  122737  000070  001314          CMPB    #70,CHARIN      ;IS CHARACTER A VALID NUMBER 0-7
1150  002476  003755                          BLE     SELT3           ;NO
1151  002500  122737  000057  001314          CMPB    #57,CHARIN      ;IS CHARACTER A VALID NUMBER 0-7
1152  002506  002351                          BGE     SELT3           ;NO
```

```
 1153  002510  000337  001314                  SWAB    CHARIN          ;MOVE PATTERN SELECT INTO POSITION
 1154  002514  006137  001314                  ROL     CHARIN
 1155  002520  042737  170777  001314          BIC     #170777,CHARIN
 1156  002526  053704  001314                  BIS     CHARIN,R4       ;COMBINE PATTERN WITH TEST
 1157  002532  104430                          SP3
 1158
 1159                                  ;WAIT FOR RECORD LENGTH SEQUENCES SELECTION
 1160  002534  104400                  SELRLS: WAITKY
 1161  002536  122737  000060  001314          CMPB    #60,CHARIN      ;IS CHARACTER=0
 1162  002544  001424                          BEQ     SELR3           ;YES, RLS=MIN
 1163  002546  122737  000061  001314          CMPB    #61,CHARIN      ;IS CHARACTER=1
 1164  002554  001003                          BNE     SELR1
 1165  002556  052704  000020                  BIS     #20,R4          ;SET RLS=MAX
 1166  002562  000415                          BR      SELR3
 1167  002564  122737  000062  001314  SELR1:  CMPB    #62,CHARIN      ;IS CHARACTER=2
 1168  002572  001003                          BNE     SELR2
 1169  002574  052704  000040                  BIS     #40,R4          ;SET RLS=MIN-MAX
 1170  002600  000406                          BR      SELR3
 1171  002602  122737  000063  001314  SELR2:  CMPB    #63,CHARIN      ;IS CHARACTER=3
 1172  002610  001310                          BNE     SELT3
 1173  002612  052704  000060                  BIS     #60,R4          ;SET RLS=MAX-MIN
 1174  002616  104430                  SELR3:  SP3
 1175                                  ;WAIT FOR WRITE MODE SELECTION
 1176  002620  104400                          WAITKY
 1177  002622  122737  000060  001314          CMPB    #60,CHARIN
 1178  002630  001415                          BEQ     SELW2           ;SET WM0=NONSTOP
 1179  002632  122737  000061  001314          CMPB    #61,CHARIN
 1180  002640  001003                          BNE     SELW1
 1181  002642  052704  000004                  BIS     #4,R4           ;SET WM0=START-STOP
 1182  002646  000406                          BR      SELW2
 1183  002650  122737  000062  001314  SELW1:  CMPB    #62,CHARIN
 1184  002656  001265                          BNE     SELT3
 1185  002660  052704  000010                  BIS     #10,R4          ;SET WM0=RANDOM
 1186  002664  104430                  SELW2:  SP3
 1187                                  ;WAIT FOR READ MODE SELECTION
 1188  002666  104400                          WAITKY
 1189  002670  122737  000060  001314          CMPB    #60,CHARIN
 1190  002676  001415                          BEQ     SELRM2          ;SET RM0=NONSTOP
 1191  002700  122737  000061  001314          CMPB    #61,CHARIN
 1192  002706  001003                          BNE     SELRM1
 1193  002710  052704  000001                  BIS     #1,R4           ;SET RM0=START-STOP
 1194  002714  000406                          BR      SELRM2
 1195  002716  122737  000062  001314  SELRM1: CMPB    #62,CHARIN
 1196  002724  001242                          BNE     SELT3
 1197  002726  052704  000002                  BIS     #2,R4           ;SET RM0=RANDOM
 1198  002732  104430                  SELRM2: SP3
 1199
 1200                                  ;HAVE ALL PARAMETERS
 1201  002734  012702  012445                  MOV     #MSG6,R2
 1202  002740  104404                          TOP                     ;PRINT "OK"
 1203  002742  104400                          WAITKY                  ;WAIT FOR CARRIAGE RETURN
 1204  002744  122737  000015  001314          CMPB    #15,CHARIN
 1205  002752  001402                          BEQ     .+6
 1206  002754  000137  002432                  JMP     SELT3
 1207  002760  105777  175534                  TSTB    @TPS
 1208  002764  100375                          BPL     .-4
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 1209  003066  012777  000012  175526          MOV     #12,@TPB
 1210  003074  105777  175520                  TSTB    @TPS
 1211  003100  100375                          BPL     .-4
 1212  003102  012777  000040  175512          MOV     #40,@TPB
 1213  003110  010420                          MOV     R4,(0)+
 1214  003112  005237  001316                  INC     NUMTST          ;+1 TO TEST COUNT
 1215  003116  022737  000012  001316          CMP     #10.,NUMTST     ;EQUAL TO TEN YET
 1216  003124  001402                          BEQ     SELOK1          ;YES
 1217  003126  000137  002366                  JMP     SELT1           ;NO, ACCEPT NEXT SET
 1218  003132  012702  012420          SELOK1: MOV     #MSGS,R2
 1219  003136  104404                          TOP
 1220
 1221                                  ;EXECUTE SELECTED TEST
 1222  003140  005037  000632          EXECUT: CLR     MODES           ;INITIALIZE MODES
 1223  003144  012737  001326  001322          MOV     #TSTTBL,TSTEX
 1224  003152  017737  176244  001320  EXEC:   MOV     @TSTEX,PARAM    ;GET TEST PARAMETERS
 1225  003160  013700  001320          EXEC1:  MOV     PARAM,R0
 1226  003164  042700  007777                  BIC     #7777,R0
 1227  003170  010037  001324                  MOV     R0,TEST
 1228  003174  001463                          BEQ     TEST0
 1229  003176  022700  010000                  CMP     #10000,R0
 1230  003202  001504                          BEQ     TEST1
 1231  003204  022700  020000                  CMP     #20000,R0
 1232  003210  001525                          BEQ     TEST2
 1233  003212  022700  030000                  CMP     #30000,R0
 1234  003216  001571                          BEQ     TEST3
 1235  003220  022700  040000                  CMP     #40000,R0
 1236  003224  001402                          BEQ     .+6
 1237  003226  000137  004142                  JMP     TEST5
 1238  003232  000137  003620                  JMP     TEST4
 1239                                  ;RETURN HERE AFTER COMPLETION OF TEST
 1240  003236  104434                  DONE:   CKSWR                   ;CHECK FOR CNTL G
 1241  003240  012702  013560                  MOV     #MSG26,R2
 1242  003244  104404                          TOP
 1243  003246  032777  000001  175336          BIT     #1,@SWR         ;IS SW 0=1 TO REPEAT TEST WITH ALL PATTERNS
 1244  003254  001413                          BEQ     DONE1           ;NO
 1245  003256  013700  001320                  MOV     PARAM,R0
 1246  003262  042700  170777                  BIC     #170777,R0
 1247  003266  022700  007000                  CMP     #7000,R0        ;REACHED PATTERN 7?
 1248  003272  001404                          BEQ     DONE1           ;YES
 1249  003274  062737  001000  001320          ADD     #1000,PARAM     ;NO, +1 TO PATTERN
 1250  003302  000726                          BR      EXEC1           ;REPEAT TEST
 1251  003304  005337  001316          DONE1:  DEC     NUMTST
 1252  003310  001011                          BNE     DOAGN
 1253  003312  013701  000042                  MOV     @#42,R1
 1254  003316  001002                          BNE     ENDADR
 1255  003320  000000                          HALT                    ;FINISHED ALL TESTS
 1256  003322  104434                          CKSWR
 1257  003324  004711                  ENDADR: JSR     PC,(1)
 1258  003326  000240                          NOP
 1259  003330  000240                          NOP
 1260  003332  000240                          NOP
 1261  003334  062737  000002  001322  DOAGN:  ADD     #2,TSTEX
 1262  003342  000703                          BR      EXEC            ;DO NEXT TEST
 1263
 1264                                  ;TEST0
```

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 1265                                        ;WRITE ONE RECORD, CHANGE DRIVES, GO TO EOT
 1266  003244  052737  000002  000632  TEST0: BIS     #2,MODES        ;EXIT WRITE EVERY RECORD, NO READ PASS
 1267  003252  104420                         CLRALL                 ;CLEAR ERROR COUNTERS AND REWIND
 1268  003254  104416                         GENPAT                 ;GENERATE PATTERN
 1269  003256  104410                  T0:    RSFDRV                 ;RESET DRIVE SELECTION TO LOWEST NUMBER
 1270  003260  104414                  T0A:   MVCTRS                 ;RESTORE DRIVE COUNTERS
 1271  003262  032737  000040  000632         BIT     #40,MODES      ;IS THIS DRIVE AT EOT?
 1272  003270  001002                         BNE     T0B            ;YES, SKIP WRITE
 1273  003272  104402                         WRITIT                 ;WRITE
 1274  003274  104406                         SVCTRS                 ;SAVE DRIVE COUNTERS
 1275
 1276  003276  104422                  T0B:   CHGDRV                 ;ANY MORE DRIVES SELECTED?
 1277  003300  000767                         BR      T0A            ;YES
 1278  003302  004737  004734                 JSR     PC,ALLEOT      ;ARE ALL DRIVES AT EOT?
 1279  003306  000763                         BR      T0             ;NO
 1280  003310  000137  003136                 JMP     DONE           ;YES, EXIT
 1281                                  ;TEST1
 1282                                  ;WRITE RECORD LENGTH SEQUENCE, GO TO NEXT DRIVE, CONTINUE TO EOT ON ALL DRIVES.
 1283  003314  052737  000001  000632  TEST1: BIS     #1,MODES       ;EXIT WRITE AFTER RLS, NO READ PASS
 1284  003322  104420                         CLRALL                 ;CLEAR ERROR COUNTERS AND REWIND
 1285  003324  104416                         GENPAT                 ;GENERATE PATTERN
 1286  003326  104410                  T1:    RSFDRV                 ;RESET DRIVE SELECTION TO LOWEST NUMBER
 1287  003330  104414                  T1A:   MVCTRS                 ;RESTORE DRIVE COUNTERS
 1288  003332  032737  000040  000632         BIT     #40,MODES      ;IS THIS DRIVE AT EOT?
 1289  003340  001002                         BNE     T1B            ;YES, SKIP WRITE
 1290  003342  104402                         WRITIT                 ;WRITE
 1291  003344  104406                         SVCTRS                 ;SAVE DRIVE COUNTERS
 1292  003346  104422                  T1B:   CHGDRV                 ;ANY MORE DRIVE SELECTED?
 1293  003350  000767                         BR      T1A            ;YES
 1294  003352  004737  004734                 JSR     PC,ALLEOT      ;ARE ALL DRIVES AT EOT?
 1295  003356  000763                         BR      T1             ;NO
 1296  003360  000137  003136                 JMP     DONE           ;YES EXIT
 1297
 1298                                  ;TEST2
 1299                                  ;WRITE A RECORD LENGTH SEQUENCE , CHANGE DRIVES
 1300                                  ;BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES.  CONTINUE TO EOT ON ALL DRIVES
 1301  003364  052737  000005  000632  TEST2: BIS     #5,MODES       ;EXIT WRITE AFTER RLS, DO READ PASS
 1302  003372  104420                         CLRALL                 ;CLEAR ERROR COUNTERS AND REWIND
 1303  003374  104416                         GENPAT                 ;GENERATE PATTERN
 1304  003376  104410                  T2:    RSFDRV                 ;SET DRIVE SELECTION TO LOWEST NUMBER
 1305  003400  104414                  T2A:   MVCTRS                 ;RESTORE DRIVE COUNTERS
 1306  003402  032737  000040  000632         BIT     #40,MODES      ;IS THIS DRIVE AT EOT?
 1307  003410  001002                         BNE     T2B            ;YES, SKIP WRITE
 1308  003412  104402                         WRITIT                 ;WRITE
 1309  003414  104406                         SVCTRS                 ;SAVE DRIVE COUNTERS
 1310  003416  104422                  T2B:   CHGDRV                 ;ANYMORE DRIVERS SELECTED?
 1311  003420  000767                         BR      T2A            ;YES
 1312  003422  104414                  T2C:   MVCTRS                 ;RESTORE DRIVE COUNTERS
 1313  003424  032737  000020  000632         BIT     #20,MODES      ;IS THIS READ AT EOT?
 1314  003432  001003                         BNE     T2D            ;YES, SKIP BACKSPACE
 1315  003434  004737  011030                 JSR     PC,GOBKWD      ;BACKSPACE
 1316  003440  104406                         SVCTRS                 ;SAVE DRIVE COUNTERS
 1317  003442  104422                  T2D:   CHGDRV                 ;ANY MORE DRIVES SELECTED?
 1318  003444  000766                         BR      T2C            ;YES
 1319  003446  104414                  T2E:   MVCTRS                 ;RESTORE DRIVE COUNTERS
 1320  003450  032737  000020  000632         BIT     #20,MODES      ;IS THIS READ AT EOT
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 1321  003456  001001                        BNE     T2F             ;YES  SKIP READ
 1322  003460  104424                        READIT                  ;READ
 1323  003462  104406                T2F:    SVCTRS                  ;SAVE DRIVE COUNTERS
 1324  003464  104422                        CHGDRV                  ;ANYMORE DRIVES SELECTED?
 1325  003466  000767                        BR      T2E             ;YES
 1326  003470  004737  004734              JSR     PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
 1327  003474  000740                        BR      T2              ;NO
 1328  003476  000137  003136              JMP     DONE            ;YES EXIT
 1329
 1330                                  ;TEST3
 1331                                  ;WRITE ONE RECORD, CHANGE DRIVES, BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES
 1332  003502  052737  000006  000632  TEST3:  BIS     #6,MODES        ;EXIT WRITE EVERY RECORD, DO READ PASS
 1333  003510  104420                        CLRALL                  ;CLEAR ERROR COUNTERS AND REWIND
 1334  003512  104416                        GENPAT                  ;GENERATE PATTERN
 1335  003514  104410                T3:     RSFDRV                  ;SET DRIVE SELECTION TO LOWEST NUMBER
 1336  003516  104414                T3A:    MVCTRS                  ;RESTORE DRIVE COUNTERS
 1337  003520  032737  000040  000632        BIT     #40,MODES       ;IS THIS DRIVE AT EOT?
 1338  003526  001002                        BNE     T3B             ;YES, SKIP WRITE
 1339  003530  104402                        WRITIT                  ;WRITE
 1340  003532  104406                        SVCTRS                  ;SAVE DRIVE COUNTERS
 1341  003534  104422                T3B:    CHGDRV                  ;ANY MORE DRIVES SELECTED
 1342  003536  000767                        BR      T3A             ;YES
 1343
 1344  003540  104414                T3C:    MVCTRS                  ;RESTORE DRIVE COUNTERS
 1345  003542  032737  000020  000632        BIT     #20,MODES       ;IS THIS DRIVE AT EOT
 1346  003550  001002                        BNE     T3D             ;YES, SKIP BACKSPACE
 1347  003552  004737  011030              JSR     PC,GOBKWD       ;BACKSPACE
 1348  003556  104406                T3D:    SVCTRS                  ;SAVE DRIVE COUNTERS
 1349  003560  104422                        CHGDRV                  ;ANY MORE DRIVES SELECTED?
 1350  003562  000766                        BR      T3C             ;GO
 1351  003564  104414                T3E:    MVCTRS                  ;RESTORE DRIVE COUNTERS
 1352  003566  032737  000020  000632        BIT     #20,MODES       ;IS THIS DRIVE AT EOT?
 1353  003574  001001                        BNE     T3F             ;YES, SKIP READ
 1354  003576  104424                        READIT                  ;READ
 1355  003600  104406                T3F:    SVCTRS                  ;SAVE DRIVE COUNTERS
 1356  003602  104422                        CHGDRV                  ;ANY MORE DRIVES SELECTED
 1357  003604  000767                        BR      T3E             ;YES
 1358  003606  004737  004734              JSR     PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
 1359  003612  000740                        BR      T3              ;NO
 1360  003614  000137  003136              JMP     DONE            ;YES, EXIT
 1361
 1362                                  ;TEST4
 1363                                  ;WRITE RECORD, CHANGE DRIVES, REPEAT FOR RECORD LENGTH SEQUENCE
 1364                                  ;READ RECORD, CHANGE DRIVES, REPEAT FOR RLS
 1365  003620  052737  000006  000632  TEST4:  BIS     #6,MODES        ;EXIT WRITE EVERY RECORD, DO READ PASS
 1366  003626  104416                        GENPAT                  ;GENERATE PATTERN
 1367  003630  032777  000014  175464        BIT     #14,@TSTEX
 1368  003636  001006                        BNE     T4
 1369  003640  042737  000007  000632        BIC     #7,MODES
 1370  003646  052737  000005  000632        BIS     #5,MODES        ;EXIT WRITE AFTER RLS, DO READ PASS
 1371  003654  104420                T4:     CLRALL                  ;CLEAR ERROR COUNTERS AND REWIND
 1372  003656  104410                T4A:    RSFDRV                  ;SET DRIVE SELECTION TO LOWEST NUMBER
 1373  003660  104414                T4B:    MVCTRS                  ;RESTORE DRIVE COUNTERS
 1374  003662  013737  000612  000614        MOV     RECORD,WRRECR   ;SAVE RECORD
 1375  003670  104406                        SVCTRS                  ;SAVE DRIVE COUNTERS
 1376  003672  104422                        CHGDRV                  ;ANYMORE DRIVES SELCTED?
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1377  003674  000771                          BR      T4B             ;YES
1378  003676  042737  000010  000632          BIC     #10,MODES       ;CLEAR RLS END
1379  003704  104410                  T4C:    RSFDRV                  ;SET DRIVE SELECTION TO LOWEST NUMBER
1380  003706  104414                  T4D:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1381  003710  032737  000040  000632          BIT     #40,MODES       ;IS DRIVE AT EOT
1382  003716  001010                          BNE     T4E             ;YES, SKIP WRITE
1383  003720  013737  000614  000550          MOV     WRRECR,SVRECR   ;SAVE START OF RLS
1384  003726  104402                          WRITIT                  ;WRITE
1385  003730  013737  000550  000614          MOV     SVRECR,WRRECR   ;RESTORE START OF RLS
1386  003736  104406                          SVCTRS                  ;SAVE DRIVE COUNTERS
1387  003740  104422                  T4E:    CHGDRV                  ;ANYMORE DRIVES SELECTED?
1388  003742  000761                          BR      T4D             ;YES
1389  003744  032737  000010  000632          BIT     #10,MODES       ;ARE WE AT END OF RLS
1390  003752  001007                          BNE     T4G             ;YES
1391  003754  104414                  T4F:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1392  003756  032737  000040  000632          BIT     #40,MODES       ;ARE WE AT EOT?
1393  003764  001747                          BEQ     T4C             ;NO
1394  003766  104422                          CHGDRV                  ;ANYMORE DRIVES SELECTED?
1395  003770  000771                          BR      T4F             ;YES
1396  003772  104410                  T4G:    RSFDRV                  ;SET DRIVE SELECTION TO LOWEST NUMBER
1397  003774  104414                  T4H:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1398  003776  032737  000020  000632          BIT     #20,MODES       ;IS THIS DRIVE AT EOT?
1399  004004  001002                          BNE     T4J             ;YES, SKIP BACKSPACE
1400  004006  004737  011030                  JSR     PC,GOBKWD       ;BACKSPACE
1401  004012  104406                  T4J:    SVCTRS                  ;SAVE DRIVE COUNTERS
1402  004014  104422                          CHGDRV                  ;ANY MORE DRIVES SELECTED?
1403  004016  000766                          BR      T4H             ;YES
1404  004020  104410                  T4K:    RSFDRV                  ;SET DRIVE SELECTION TO LOWEST NUMBER
1405  004022  104414                  T4L:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1406  004024  032737  000020  000632          BIT     #20,MODES       ;IS THIS READ AT EOT?
1407  004032  001025                          BNE     T4N             ;YES, SKIP READ
1408  004034  023737  000616  000612          CMP     LASRCR,RECORD   ;HAVE WE READ LAST RECORD WRITTEN?
1409  004042  001421                          BEQ     T4N             ;YES
1410  004044  013737  000616  000550          MOV     LASRCR,SVRECR   ;SAVE LAST RECORD
1411  004052  032737  000003  001320          BIT     #3,PARAM        ;IS READ MODE NONSTOP?
1412  004060  001405                          BEQ     T4M             ;YES
1413  004062  013737  000612  000616          MOV     RECORD,LASRCR
1414  004070  005237  000616                  INC     LASRCR          ;+1 TO LAST RECORD WRITTEN
1415  004074  104424                  T4M:    READIT                  ;READ
1416  004076  013737  000550  000616          MOV     SVRECR,LASRCR   ;RESTORE LAST RECORD WRITTEN
1417  004104  104406                          SVCTRS                  ;SAVE DRIVE COUNTERS
1418  004106  104422                  T4N:    CHGDRV                  ;ANYMORE DRIVES SELECTED?
1419  004110  000744                          BR      T4L             ;YES
1420  004112  104414                  T4P:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1421  004114  023737  000616  000612          CMP     LASRCR,RECORD   ;ARE WE AT END OF RLS?
1422  004122  001336                          BNE     T4K             ;NO
1423  004124  104422                          CHGDRV                  ;ANYMORE DRIVES SELECTED?
1424  004126  000771                          BR      T4P             ;YES
1425  004130  004737  004734                  JSR     PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
1426  004134  000650                          BR      T4A             ;NO
1427  004136  000137  003136                  JMP     DONE            ;YES,EXIT
1428
1429                                  ;TEST5
1430                                  ;READ ONLY
1431                                  ;RANDOM PATTERN INVALID EXCEPT FOR SPECIFIC CASES
1432  004142  052737  000002  000632  TEST5:  BIS     #2,MODES
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1433  004150  104420                                    CLRALL          ;CLEAR ERROR COUNTERS AND REWIND
1434  004152  104416                                    GENPAT          ;GENERATE PATTERN
1435  004154  012737  177777  004422  T5:       MOV     #-1,T5FLAG      ;ENABLE EXIT FROM WRITE ROUTINE
1436  004162  104402                                    WRITIT          ;ENTER WRITE ONLY TO INITIALIZE RECORD SEQUENCE
1437  004164  032737  000010  000632            BIT     #10,MODES       ;ARE WE AT END OF RLS?
1438  004172  001402                            BEQ     T5A             ;YES
1439  004174  004737  005554                    JSR     PC,TESINC       ;SEE IF RECORD LENGTH SHOULD BE CHANGED
1440  004200  013737  000612  004424  T5A:      MOV     RECORD,T5INC
1441  004206  005037  000612                    CLR     RECORD
1442  004212  052737  000010  000632  T5B:      BIS     #10,MODES       ;INDICATE AT START OF RLS
1443  004220  104410                                    RSFDRV          ;SET DRIVE SELECTION TO LOWEST DRIVE NUMBER
1444  004222  104414                            T5C:    MVCTRS          ;RESTORE DRIVE COUNTERS
1445  004224  032737  000020  000632            BIT     #20,MODES       ;IS THIS DRIVE AT EOT
1446  004232  001007                            BNE     T5D             ;YES
1447  004234  013737  000612  000616            MOV     RECORD,LASRCR
1448  004242  063737  004424  000616            ADD     T5INC,LASRCR    ;CURRENT RECORD + SEQUENCE LENGTH
1449  004250  104406                                    SVCTRS          ;SAVE DRIVE COUNTERS
1450  004252  104422                            T5D:    CHGDRV          ;ANYMORE DRIVES?
1451  004254  000762                            BR      T5C             ;YES
1452  004256  104410                                    RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1453  004260  104414                            T5E:    MVCTRS          ;RESTORE DRIVE COUNTERS
1454  004262  032737  000020  000632            BIT     #20,MODES       ;IS THIS DRIVE AT EOT?
1455  004270  001021                            BNE     T5G             ;YES
1456  004272  013737  000616  000550            MOV     LASRCR,SVRECR   ;SAVE END OF RLS RECORDS
1457  004300  032737  000003  001320            BIT     #3,PARAM        ;IS READ MODE NONSTOP
1458  004306  001405                            BEQ     T5F             ;YES GO TO END RLS
1459  004310  013737  000612  000616            MOV     RECORD,LASRCR   ;NEXT TO BE READ
1460  004316  005237  000616                    INC     LASRCR          ;+1 EXIT READ AFTER ONE RECORD
1461  004322  104424                            T5F:    READIT          ;READ
1462  004324  013737  000550  000616            MOV     SVRECR,LASRCR   ;RESTORE END RECORD
1463  004332  104406                                    SVCTRS          ;SAVE DRIVE COUNTERS
1464  004334  104422                            T5G:    CHGDRV          ;ANY MORE DRIVES?
1465  004336  000750                            BR      T5E             ;YES
1466  004340  004737  004734                    JSR     PC,ALLEOT       ;ALL AT EOT?
1467  004344  000402                            BR      T5H             ;NO
1468  004346  000137  003136                    JMP     DONE            ;YES EXIT
1469  004352  104410                            T5H:    RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1470  004354  104414                            T5J:    MVCTRS          ;RESTORE DRIVE COUNTERS
1471  004356  023737  000612  000616            CMP     RECORD,LASRCR   ;ARE WE AT END OF RLS?
1472  004364  001003                            BNE     T5K             ;NO
1473  004366  042737  000010  000632            BIC     #10,MODES       ;YES,
1474  004374  104422                            T5K:    CHGDRV          ;ANYMORE DRIVES SELECTED?
1475  004376  000766                            BR      T5J             ;YES
1476  004400  032737  000010  000632            BIT     #10,MODES       ;AT END OF RLS?
1477  004406  001324                            BNE     T5E             ;NO
1478  004410  004737  004734                    JSR     PC,ALLEOT       ;ALL DRIVES AT EOT?
1479  004414  000657                            BR      T5              ;NO
1480  004416  000137  003136                    JMP     DONE            ;YES, EXIT
1481  004422  000000                    T5FLAG: 0
1482  004424  000000                    T5INC:  0
1483
1484                                      ;SAVE DRIVE RECORD AND ERROR COUNTERS
1485  004426  004737  004462            SVCTR:  JSR     PC,CTRDEX
1486  004432  012021                    SVC1:   MOV     (0)+,(1)+
1487  004434  022700  000634                    CMP     #DRVADR,R0
1488  004440  001374                            BNE     SVC1
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1489  004442  000207                          RTS     PC
1490                                  ;RESET DRIVE COUNTERS BACK INTO PROGRAM
1491  004444  004737  004462          MVCTR:  JSR     PC,CTRDEX
1492  004450  012120                  MV1:    MOV     (1)+,(0)+
1493  004452  022700  000634                  CMP     #DRVADR,R0
1494  004456  001374                          BNE     MV1
1495  004460  000207                          RTS     PC
1496                                  ;SET UP POINTERS FOR MOVE AND SAVE COUNTERS
1497  004462  012700  000570          CTRDEX: MOV     #WRCHEK,R0
1498  004466  012701  000634                  MOV     #DRVADR,R1
1499  004472  063701  000556                  ADD     CDRIVE,R1
1500  004476  063701  000556                  ADD     CDRIVE,R1
1501  004502  011101                          MOV     @R1,R1
1502  004504  000207                          RTS     PC
1503                                  ;CLEAR ALL DRIVE COUNTERS
1504  004506  104410                  CLRAL:          RSFDRV
1505  004510  004737  004676          CLR1:   JSR     PC,REWIND
1506  004514  004737  005042                  JSR     PC,CLRTBL
1507  004520  104406                          SVCTRS
1508  004522  104422                          CHGDRV
1509  004524  000771                          BR      CLR1
1510  004526  052737  000010  000632          BIS     #10,MODES       ;AT END OF RLS
1511  004534  005037  004422                  CLR     TSFLAG
1512  004540  000207                          RTS     PC
1513                                  ;RESET DRIVE SELECTION TO LOWEST NUMBER
1514  004542  005037  000556          RSFDR:  CLR     CDRIVE          ;START WITH DRIVE 0
1515  004546  012737  000200  000554          MOV     #200,CDRVBT     ;BIT FOR DRIVE 0
1516  004554  033737  000546  000554  RSF1:   BIT     MSBITS,CDRVBT   ;IS DRIVE SELECTED?
1517  004562  001006                          BNE     RSF2            ;YES
1518  004564  005237  000556                  INC     CDRIVE          ;NO + 1 TO DRIVE
1519  004570  000241                          CLC
1520  004572  006037  000554                  ROR     CDRVBT          ;ROTATE DRIVE BIT
1521  004576  000766                          BR      RSF1            ;REPEAT
1522  004600  013737  000556  000552  RSF2:   MOV     CDRIVE,COMAND
1523  004606  000337  000552                  SWAB    COMAND
1524  004612  052737  060000  000552          BIS     #60000,COMAND   ;800 BPI, 9 TRACK
1525  004620  032777  001000  173664          BIT     #1000,@SWR      ;TEST PARITY SELECTED
1526  004626  001403                          BEQ     .+10            ;ODD
1527  004630  052737  004000  000552          BIS     #4000,COMAND    ;EVEN
1528  004636  000207                          RTS     PC
1529
1530                                  ;SELECT NEXT DRIVE IN SEQUENCE
1531                                  ;+1 WORD TO EXIT ADDRESS IF LAST DRIVE TESTED
1532  004640  005237  000556          CHGDR:  INC     CDRIVE          ;+1 TO DRIVE NUMBER
1533  004644  000241                          CLC
1534  004646  006037  000554                  ROR     CDRVBT          ;MOVE MASK BIT OVER 1 PLACE
1535  004652  001004                          BNE     CHG1            ;BRANCH IF MORE DRIVES SELECTED
1536  004654  104410                          RSFDRV                  ;RESET DRIVE SELECT TO LOWEST NUMBER
1537  004656  062716  000002                  ADD     #2,@SP          ;+ 2 TO SKIP OVER FIRST EXIT
1538  004662  000207                          RTS     PC
1539  004664  033737  000554  000546  CHG1:   BIT     CDRVBT,MSBITS
1540  004672  001762                          BEQ     CHGDR
1541  004674  000741                          BR      RSF2
1542
1543                                  ;REWIND DRIVE TO BOT
1544  004676  105777  173600          REWIND: TSTB    @MTC
```

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1545  004702  100375                  BPL     .-4             ;WAIT FOR CONTROL UNIT
1546  004704  013777  000552  173570  MOV     COMAND,@MTC     ;SELECT DRIVE
1547  004712  006077  173562          ROR     @MTS
1548  004716  103375                  BCC     .-4             ;WAIT FOR TU READY
1549  004720  052777  000016  173554  BIS     #16,@MTC        ;REWIND
1550  004726  004737  005066          JSR     PC,GOWAIT
1551  004732  000207                  RTS     PC              ;EXIT
1552                          ;ARE ALL DRIVES AT END OF TAPE
1553  004734  104410          ALLEOT: RSFDRV
1554  004736  104414          ALL1:   MVCTRS
1555  004740  032737  000060  000632  BIT     #60,MODES       ;AT EOT?
1556  004746  001403                  BEQ     ALLEOS          ;NO
1557  004750  104422                  CHGDRV                  ;DONE ALL DRIVES?
1558  004752  000771                  BR      ALL1            ;NO
1559  004754  000427                  BR      ALL3
1560  004756  032777  000400  173526  ALLEOS: BIT     #400,@SWR       ;TEST SWITCH 8 TO EXIT AT END OF SEQUENCE
1561  004764  001425                  BEQ     ALL2            ;NO, GO TO EOT
1562  004766  032737  000010  000632  BIT     #10,MODES       ;AT END OF SEQUENCE
1563  004774  001421                  BEQ     ALL2            ;NO, EXIT, DON'T DUMP ERROR COUNTERS
1564                          ;DUMP ERROR COUNTERS ON ALL DRIVES
1565  004776  104410          CTRDMP: RSFDRV
1566  005000  104414                  MVCTRS
1567  005002  005737  004422          TST     TSFLAG
1568  005006  001006                  BNE     CTRD1           ;DUMP READ ONLY
1569  005010  004737  006112          JSR     PC,ENDT1
1570  005014  032737  000004  000632  BIT     #4,MODES        ;READ PASS SELECTED?
1571  005022  001402                  BEQ     CDMEND          ;NO
1572  005024  004737  010264  CTRD1:  JSR     PC,RNDTP1
1573  005030  104422          CDMEND: CHGDRV                  ;DONE ALL DRIVES
1574  005032  000762                  BR      CTRDMP+2        ;NO
1575  005034  062716  000002  ALL3:   ADD     #2,(6)          ;INCREMENT RETURN POINT
1576  005040  000207          ALL2:   RTS     PC
1577
1578                          ;CLEAR READ AND WRITE TABLES
1579  005042  012700  000570  CLRTBL: MOV     #WRCHEK,R0
1580  005046  005020          CLRT1:  CLR     (0)+
1581  005050  020027  000632          CMP     R0,#MODES
1582  005054  001374                  BNE     CLRT1
1583  005056  042737  000070  000632  BIC     #70,MODES
1584  005064  000207                  RTS     PC
1585                          ;INTERRUPT ENABLE, GO, WAIT FOR INTERRUPT
1586  005066  012777  000200  173414  GOWAIT: MOV     #200,@CC        ;SET PRIORITY LEVEL 4
1587  005074  012777  005130  173432          MOV     #GW1,@MTV       ;SET INTERRUPT RETURN
1588  005102  012737  000001  005116          MOV     #1,WAIT1
1589  005110  052777  000101  173364          BIS     #101,@MTC       ;INTERRUPT ENABLE, GO
1590  005116  000001          WAIT1:  WAIT                    ;WAIT FOR INTERRUPT
1591  005120  012777  000340  173362          MOV     #340,@CC        ;RESTORE PRIORITY LEVEL 7
1592  005126  000207                  RTS     PC              ;EXIT
1593  005130  012737  000001  005116  GW1:    MOV     #1,WAIT1
1594  005136  000002                  RTI                     ;RETURN FROM INTERRUPT
1595
1596                          ;WRITE RECORD SECTION
1597  005140  005737  000612  WRITI:  TST     RECORD          ;IS THIS THE FIRST RECORD
1598  005144  001031                  BNE     NOINCR          ;NO, SKIP SET UP OF RECORD LENGTH AND BLOCK INCREMENT
1599  005146  013737  000524  000542          MOV     MAXLEN,STRLEN
1600  005154  012737  177774  000564          MOV     #-4.,BLKINC
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 1601  005162  032737  000020  001320          BIT     #20,PARAM
 1602  005170  001006                          BNE     W1
 1603  005172  013737  000526  000542          MOV     MINLEN,STRLEN
 1604  005200  012737  000004  000564          MOV     #4.,BLKINC
 1605  005206  013737  000542  000626  W1:     MOV     STRLEN,WRTLEN
 1606  005214  032737  000040  001320          BIT     #40,PARAM       ;DOES RECORD LENGTH CHANGE
 1607  005222  001002                          BNE     NOINCR          ;YES
 1608  005224  005037  000564                  CLR     BLKINC          ;NO
 1609  005230  013737  000612  000614  NOINCR: MOV     RECORD,WRRECR
 1610  005236  005737  004422                  TST     T5FLAG
 1611  005242  001401                          BEQ     .+4
 1612  005244  000207                          RTS     PC              ;EXIT WRITE ROUTINE IF TEST 5
 1613  005246  005037  000562                  CLR     WRPASS
 1614  005252  013777  000552  173222  STRTOP: MOV     COMAND,@MTC     ;SELECT UNIT
 1615  005260  105777  173216                  TSTB    @MTC
 1616  005264  100375                          BPL     .-4             ;WAIT FOR CU READY
 1617  005266  006077  173206                  ROR     @MTS            ;WAIT FOR TU READY
 1618  005272  103375                          BCC     .-4
 1619  005274  013777  000626  173202  NONSTP: MOV     WRTLEN,@BC      ;SET BYTE COUNT
 1620  005302  005477  173176                  NEG     @BC
 1621  005306  013777  000530  173172          MOV     WBUF,@CA        ;SET CURRENT ADDRESS
 1622  005314  052777  000004  173160          BIS     #4,@MTC         ;WRITE
 1623  005322  004737  005066                  JSR     PC,GOWAIT       ;INTERRUPT ENABLE, GO, WAIT FOR DONE
 1624                                  ;RETURN HERE AFTER INTERRUPT
 1625  005326  017737  173146  000566          MOV     @MTS,STATRD     ;SAVE STATUS
 1626  005334  005777  173142                  TST     @MTC
 1627  005340  100542                          BMI     ERROR           ;HAVE ERROR FLAG, CHECK FOR EOT
 1628  005342  005737  000562                  TST     WRPASS          ;WAS THIS A RECOVERY PASS
 1629  005346  001410                          BEQ     TSTSTP          ;NO
 1630  005350  013700  000562                  MOV     WRPASS,R0       ;YES
 1631  005354  006300                          ASL     R0
 1632  005356  062700  000570                  ADD     #WRCHEK,R0
 1633  005362  005210                          INC     @R0             ;+1 TO APPROPRIATE RECOVERY PASS COUNTER
 1634  005364  005037  000562                  CLR     WRPASS
 1635  005370  032737  000014  001320  TSTSTP: BIT     #14,PARAM       ;IS WRITE MODE NONSTOP?
 1636  005376  001023                          BNE     STOPOP          ;NO
 1637  005400  005737  000562                  TST     WRPASS          ;YES
 1638  005404  001333                          BNE     NONSTP
 1639  005406  004737  005554                  JSR     PC,TESINC       ;CHANGE RECORD LENGTH
 1640  005412  032737  000001  000632          BIT     #1,MODES        ;EXIT AFTER RLS?
 1641  005420  001405                          BEQ     W10             ;NO
 1642  005422  032737  000010  000632          BIT     #10,MODES       ;YES, ARE WE AT END OF RLS?
 1643  005430  001721                          BEQ     NONSTP          ;NO
 1644  005432  000207                          RTS     PC              ;YES
 1645  005434  032737  000002  000632  W10:    BIT     #2,MODES        ;EXIT EVERY RECORD?
 1646  005442  001714                          BEQ     NONSTP          ;NO
 1647  005444  000207                          RTS     PC              ;YES
 1648  005446  032737  000010  001320  STOPOP: BIT     #10,PARAM       ;IS WRITE MODE RANDOM?
 1649  005454  001414                          BEQ     W11             ;NO
 1650                                  ;RANDOM STALL DELAY
 1651  005456  004737  007160          RANSTP: JSR     PC,RANGEN
 1652  005462  052737  177400  007330          BIS     #177400,RANDOM
 1653  005470  012704  177470          RAN1:   MOV     #-200.,R4       ;DELAY 1 MILLISECOND
 1654  005474  005204                          INC     R4
 1655  005476  001376                          BNE     .-2
 1656  005500  005237  007330                  INC     RANDOM
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 1657  005504  001371                          BNE     RAN1
 1658  005506  005737  000562          W11:    TST     WRPASS
 1659  005512  001257                          BNE     STRTOP
 1660  005514  004737  005554                  JSR     PC,TESINC
 1661  005520  032737  000001  000632          BIT     #1,MODES        ;EXIT AFTER RLS?
 1662  005526  001405                          BEQ     W12             ;NO
 1663  005530  032737  000010  000632          BIT     #10,MODES       ;YES, ARE WE AT END OF RLS?
 1664  005536  001645                          BEQ     STRTOP          ;NO
 1665  005540  000207                          RTS     PC              ;YES
 1666  005542  032737  000002  000632  W12:    BIT     #2,MODES        ;EXIT EVERY RECORD?
 1667  005550  001640                          BEQ     STRTOP          ;NO
 1668  005552  000207                          RTS     PC              ;YES
 1669                                  ;SEE IF RECORD LENGTH SHOULD BE CHANGED
 1670  005554  005237  000612          TESINC: INC     RECORD          ;+1 TO RECORD COUNT
 1671  005560  042737  000010  000632          BIC     #10,MODES       ;NOT END OF RLS UNLESS SET BELOW
 1672  005566  005737  000564                  TST     BLKINC
 1673  005572  001416                          BEQ     TSINC2
 1674  005574  063737  000564  000626          ADD     BLKINC,WRTLEN
 1675  005602  023737  000626  000526          CMP     WRTLEN,MINLEN   ;RECORD LENGTH TOO SHORT?
 1676  005610  002404                          BLT     RESETL          ;YES,RESET
 1677  005612  023737  000626  000524          CMP     WRTLEN,MAXLEN   ;RECORD LENGTH TOO LONG?
 1678  005620  003403                          BLE     TSINC2          ;NO
 1679  005622  013737  000542  000626  RESETL: MOV     STRLEN,WRTLEN   ;YES, RESET
 1680  005630  105737  000612          TSINC2: TSTB    RECORD          ;IS RECORD A MULTIPLE OF 256
 1681  005634  001003                          BNE     TSINC3          ;NO
 1682  005636  052737  000010  000632          BIS     #10,MODES       ;INDICATE AT END OF RLS
 1683  005644  000207                  TSINC3: RTS     PC
 1684
 1685
 1686                                  ;HAVE AN ERROR FLAG DURING WRITE OPERATION
 1687                                  ;IF ERROR IS CAUSED BY END OF TAPE FLAG DUMP WRITE ERROR COUNTERS
 1688                                  ;FOR ALL OTHER ERRORS:  PRINT COMMAND AND STATUS REGISTERS AND RECORD NUMBER
 1689                                  ;IF READ PASS IS SELECTED, TRY TO RECOVER BY WRITING WITH XIRG.
 1690  005646  104434                  ERROR:  CKSWR                   ;CHECK FOR CNTL G
 1691  005650  032737  175600  000566          BIT     #175600,STATRD  ;AT EOT?
 1692  005656  001510                          BEQ     ENDTAP          ;YES
 1693  005660  005737  000562                  TST     WRPASS
 1694  005664  001002                          BNE     ERR1            ;FIRST ERROR?
 1695  005666  005237  000570                  INC     WRCHEK          ;YES, + 1 TO WRITE ERROR
 1696  005672  032777  020000  172612  ERR1:   BIT     #20000,@SWR     ;TYPE ALL ERRORS?
 1697  005700  001010                          BNE     TESREC          ;NO
 1698  005702  012702  012452                  MOV     #MSG7,R2
 1699  005706  104404                          TOP                     ;PRINT ERROR
 1700  005710  013737  000626  000544          MOV     WRTLEN,LENGTH
 1701  005716  004737  011140                  JSR     PC,PRTS         ;PRINT STATUS, COMMAND, RECORD, LENGTH
 1702  005722  032777  000100  172562  TESREC: BIT     #100,@SWR       ;RECOVER STATISTICALLY SELECTED?
 1703  005730  001410                          BEQ     TESRC1          ;NO
 1704  005732  005237  000562                  INC     WRPASS          ;+1 TO WRITE RECOVER
 1705  005736  022737  000010  000562          CMP     #8.,WRPASS      ;HAVE WE TRIED TO WRITE RECOVER 8 TIMES?
 1706  005744  001020                          BNE     STREC1          ;NO
 1707  005746  005237  000610                  INC     PERMBS          ;YES,[illegible] TO PERMANENT BADSPOT?
 1708  005752  032737  000004  000632  TESRC1: BIT     #4,MODES        ;IS READ PASS SELECTED?
 1709  005760  001402                          BEQ     .+6             ;NO
 1710  005762  004737  010610                  JSR     PC,XRGREC
 1711  005766  005037  000562                  CLR     WRPASS
 1712  005772  032737  002000  000566          BIT     #2000,STATRD
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 1713  006000  001037                        BNE     ENDTAP
 1714  006002  000137  005506                JMP     W11
 1715  006006  004737  010206        STREC1: JSR     PC,BACK1
 1716  006012  004737  010206                JSR     PC,BACK1        ;BACKSPACE 2 RECORDS
 1717  006016  032777  000040  172454        BIT     #40,@MTS
 1718  006024  001402                        BEQ     .+6
 1719  006026  000137  005252                JMP     STRTOP
 1720  006032  012777  177777  172444        MOV     #-1,@BC
 1721  006040  013777  000552  172434        MOV     COMAND,@MTC
 1722  006046  052777  000010  172426        BIS     #10,@MTC
 1723  006054  004737  005066                JSR     PC,GOWAIT       ;SPACE FORWARD 1 RECORD
 1724  006060  042777  000016  172414        BIC     #16,@MTC
 1725  006066  052777  000004  172406        BIS     #4,@MTC         ;CHANGE FROM SPACE TO WRITE
 1726  006074  000137  005252                JMP     STRTOP
 1727                                ;DRIVE IS AT EOT
 1728  006100  005237  000612        ENDTAP: INC     RECORD
 1729  006104  052737  000040  000632        BIS     #40,MODES       ;INDICATE DRIVE AT EOT
 1730  006112  012702  013450        ENDT1:  MOV     #MSG24,R2
 1731  006116  104404                        TOP
 1732  006120  012702  012500                MOV     #MSG8,R2
 1733  006124  104404                        TOP
 1734                                ;DUMP WRITE ERRORS
 1735  006126  104434                WRTDMP: CKSWR                   ;CHECK FOR CNTL G
 1736  006130  013737  000552  011314        MOV     COMAND,CHAR
 1737  006136  000337  011314                SWAB    CHAR
 1738  006142  142737  000170  011314        BICB    #170,CHAR
 1739
 1740  006150  052737  000260  011314        BIS     #260,CHAR
 1741  006156  004737  011316                JSR     PC,OCTP         ;PRINT DRIVE NUMBER
 1742  006162  104430                        SP3
 1743  006164  013737  001320  011314        MOV     PARAM,CHAR
 1744  006172  000337  011314                SWAB    CHAR
 1745  006176  006037  011314                ROR     CHAR
 1746  006202  042737  000170  011314        BIC     #170,CHAR
 1747  006210  052737  000260  011314        BIS     #260,CHAR
 1748  006216  004737  011316                JSR     PC,OCTP         ;PRINT PATTERN NUMBER
 1749  006222  013737  001320  011314        MOV     PARAM,CHAR
 1750  006230  042737  177763  011314        BIC     #177763,CHAR
 1751  006236  012702  013201                MOV     #MSG14,R2
 1752  006242  022737  000004  011314        CMP     #4,CHAR
 1753  006250  001002                        BNE     .+6
 1754  006252  012702  013155                MOV     #MSG12,R2
 1755  006256  022737  000010  011314        CMP     #10,CHAR
 1756  006264  001002                        BNE     .+6
 1757  006266  012702  013167                MOV     #MSG13,R2
 1758  006272  104404                        TOP                     ;PRINT WRITE MODE
 1759  006274  013702  000612                MOV     RECORD,R2
 1760  006300  104426                        DECPRT                  ;PRINT RECORD NUMBER
 1761  006302  013737  001320  011314        MOV     PARAM,CHAR
 1762  006310  042737  177717  011314        BIC     #177717,CHAR
 1763  006316  012702  013231                MOV     #MSG17,R2
 1764  006322  022737  000020  011314        CMP     #20,CHAR
 1765  006330  001002                        BNE     .+6
 1766  006332  012702  013240                MOV     #MSG18,R2
 1767  006336  022737  000040  011314        CMP     #40,CHAR
 1768  006344  001002                        BNE     .+6
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 1769  006346  012702  013213                  MOV     #MSG15,R2
 1770  006352  022737  000060  011314          CMP     #60,CHAR
 1771  006360  001002                          BNE     .+6
 1772  006362  012702  013222                  MOV     #MSG16,R2
 1773  006366  104404                          TOP                     ;PRINT RECORD LENGTH SEQUENCE
 1774  006370  012702  013247                  MOV     #MSG19,R2
 1775  006374  104404                          TOP
 1776  006376  013702  000570                  MOV     WRCHEK,R2
 1777  006402  104426                          DECPRT                  ;PRINT "WRITE ERRORS="
 1778  006404  012700  000572                  MOV     #WRCHEK+2,R0
 1779  006410  112737  000060  013310          MOVB    #60,MSG20+17
 1780  006416  105237  013310          WRTD1:  INCB    MSG20+17        ;PRINT STATISTICAL RECOVERY
 1781  006422  005710                          TST     @R0
 1782  006424  001405                          BEQ     WRTD2
 1783  006426  012702  013271                  MOV     #MSG20,R2
 1784  006432  104404                          TOP
 1785  006434  011002                          MOV     (0),R2
 1786  006436  104426                          DECPRT                  ;RECOVERED AT X
 1787  006440  005720                  WRTD2:  TST     (0)+            ;JUST INCREMENTING
 1788  006442  020027  000610                  CMP     R0,#WRCHEK+20
 1789  006446  001363                          BNE     WRTD1
 1790  006450  005737  000610                  TST     PERMBS
 1791  006454  001001                          BNE     .+4             ;SKIP PRINT IF = 0
 1792  006456  000207                          RTS     PC
 1793
 1794
 1795  006460  012702  013313                  MOV     #MSG20A,R2
 1796  006464  104404                          TOP
 1797  006466  013702  000610                  MOV     PERMBS,R2       ;PRINT "PERMANENT BADSPOT"
 1798  006472  104426                          DECPRT
 1799  006474  000207                          RTS     PC
 1800                          ;GENERATE DATA PATTERN
 1801  006476  013702  000530          GENPA:  MOV     WBUF,R2 ;INITIALIZE BUFFER
 1802  006502  013737  001320  006610          MOV     PARAM,GP1       ;CHECK PARAMETERS FOR PATTERN SELECTED
 1803  006510  042737  170777  006610          BIC     #170777,GP1
 1804  006516  001435                          BEQ     PAT0
 1805  006520  022737  001000  006610          CMP     #1000,GP1
 1806  006526  001437                          BEQ     PAT1
 1807  006530  022737  002000  006610          CMP     #2000,GP1
 1808  006536  001457                          BEQ     PAT2
 1809  006540  022737  003000  006610          CMP     #3000,GP1
 1810  006546  001461                          BEQ     PAT3
 1811  006550  022737  004000  006610          CMP     #4000,GP1
 1812  006556  001501                          BEQ     PAT4
 1813  006560  022737  005000  006610          CMP     #5000,GP1
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 1814  006566  001510                BEQ     PAT5
 1815  006570  022737  006000  006610  CMP     #6000,GP1
 1816  006576  001402                BEQ     .+6
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 1817  006600  000137  007140          JMP     PAT7
 1818  006604  000137  007124          JMP     PAT6
 1819  006610  000000          GP1:    0
 1820                          ;PATTERN 0
 1821                          ;HALF FREQUENCY OUTSIDE SKEW
 1822  006612  012722  002010  PAT0:   MOV     #2010,(2)+      ;(010)(004)
 1823  006616  023702  000532          CMP     RBUF,R2
 1824  006622  001373          BNE     PAT0
 1825  006624  000207          RTS     PC
 1826                          ;PATTERN 1
 1827                          ;SLIDING 1 BIT (ISOLATED BIT)
 1828  006626  012700  006654  PAT1:   MOV     #P1T,R0
 1829  006632  012022  PAT1A:  MOV     (0)+,(2)+
 1830  006634  023702  000532          CMP     RBUF,R2
 1831  006640  001001          BNE     .+4
 1832  006642  000207          RTS     PC
 1833  006644  022700  006676          CMP     #PAT2,R0
 1834  006650  001370          BNE     PAT1A
 1835  006652  000765          BR      PAT1
 1836  006654  100000  P1T:    100000
 1837  006656  020100          20100
 1838  006660  004020          4020
 1839  006662  001004          1004
 1840  006664  000001          1
 1841  006666  040200          40200
 1842  006670  010040          10040
 1843  006672  002010          2010
 1844  006674  000402          402
 1845
 1846                          ;PATTERN 2
 1847                          ;HIGH FREQUENCY EVERY OTHER TRACK
 1848  006676  012722  136274  PAT2:   MOV     #136274,(2)+    ;(274)(274)
 1849  006702  023702  000532          CMP     RBUF,R2
 1850  006706  001373          BNE     PAT2
 1851  006710  000207          RTS     PC
 1852                          ;PATTERN 3
 1853                          ;THREE 0'S, THREE 1'S, THREE 0'S.
 1854  006712  012700  006740  PAT3:   MOV     #P3T,R0
 1855  006716  012022  PAT3A:  MOV     (0)+,(2)+
 1856  006720  023702  000532          CMP     RBUF,R2
 1857  006724  001001          BNE     .+4
 1858  006726  000207          RTS     PC
 1859  006730  022700  006762          CMP     #PAT4,R0
 1860  006734  001370          BNE     PAT3A
 1861  006736  000765          BR      PAT3
 1862  006740  140037  P3T:    140037
 1863  006742  100476          100476
 1864  006744  001574          1574
 1865  006746  003770          3770
 1866  006750  017760          17760
 1867  006752  037300          37300
 1868  006754  076201          76201
 1869  006756  174003          174003
 1870  006760  170007          170007
 1871                          ;PATTERN 4
 1872                          ;INCREMENTING PATTERN (0-377)
```

```
 1873  007762  105037  007006  PAT4:   CLRB    P4A
 1874  007766  113722  007006  P4:     MOVB    P4A,(2)+
 1875  007772  105237  007006          INCB    P4A
 1876  007776  023702  000532          CMP     RBUF,R2
 1877  010002  001371                  BNE     P4
 1878  010004  000207                  RTS     PC
 1879  010006  000000          P4A:    0
 1880
 1881                                  ;PATTERN 5
 1882                                  ;EACH TRACK 3 BITS
 1883  010010  012700  007036  PAT5:   MOV     #P5T,R0
 1884  010014  012022          PAT5A:  MOV     (0)+,(2)+
 1885  010016  023702  000532          CMP     RBUF,R2
 1886  010022  001001                  BNE     .+4
 1887  010024  000207                  RTS     PC
 1888  010026  022700  007124          CMP     #PAT6,R0
 1889  010032  001370                  BNE     PAT5A
 1890  010034  000765                  BR      PAT5
 1891  010036  000000          P5T:    0
 1892  010040  100000                  100000
 1893  010042  100200                  100200
 1894  010044  040100                  40100
 1895  010046  020100                  20100
 1896  010050  020040                  20040
 1897  010052  010020                  10020
 1898  010054  004020                  4020
 1899  010056  004010                  4010
 1900  010060  002004                  2004
 1901  010062  001004                  1004
 1902  010064  001002                  1002
 1903  010066  000401                  401
 1904  010070  000001                  1
 1905  010072  000000                  0
 1906  010074  100200                  100200
 1907  010076  040200                  40200
 1908  010100  040100                  40100
 1909  010102  020040                  20040
 1910  010104  010040                  10040
 1911  010106  010020                  10020
 1912  010110  004010                  4010
 1913  010112  002010                  2010
 1914  010114  002004                  2004
 1915  010116  001002                  1002
 1916  010120  000402                  402
 1917  010122  000401                  401
 1918                                  ;PATTERN 6
 1919                                  ;HIGH FREQUENCY ALL TRACKS
 1920  010124  012722  177777  PAT6:   MOV     #-1,(2)+
 1921  010130  023702  000532          CMP     RBUF,R2
 1922  010134  001373                  BNE     PAT6
 1923  010136  000207                  RTS     PC
 1924
 1925
 1926                                  ;PATTERN 7
 1927                                  ;RANDOM
 1928  010140  004737  010160  PAT7:   JSR     PC,RANGEN
```

```
 1929  007144  013722  007330                  MOV     RANDOM,(2 +
 1930  007150  023702  000532                  CMP     RBUF,R2
 1931  007154  001371                          BNE     PAT7
 1932  007156  000207                          RTS     PC
 1933                                  ;RANDOM NUMBER GENERATOR
 1934                                  ;EXIT WITH RANDOM NUMBER IN LOCATION NAMED "RANDOM"
 1935  007160  010037  007336          RANGEN: MOV     R0,SV0          ;SAVE REGISTERS
 1936  007164  010137  007340                  MOV     R1,SV1
 1937  007170  010237  007342                  MOV     R2,SV2
 1938  007174  010337  007344                  MOV     R3,SV3
 1939  007200  013700  007332                  MOV     LONUM,R0        ;SET UP LOW DIGIT
 1940  007204  013701  007334                  MOV     HINUM,R1        ;SET UP HIGH DIGIT
 1941  007210  012703  000007                  MOV     #7,R3           ;SET UP SHIFT COUNT
 1942  007214  005002                          CLR     R2
 1943  007216  006300                  RANG1:  ASL     R0              ;SHIFT R0 LEFT AND
 1944  007220  006101                          ROL     R1              ;ROTATE CARRY INTO LSB OF R1 AND
 1945  007222  006102                          ROL     R2              ;ROTATE CARRY OUT OF R1 INTO R2
 1946  007224  005303                          DEC     R3              ;DECREMENT R3
 1947  007226  001373                          BNE     RANG1           ;CONTINUE SHIFT LOOP
 1948  007230  063700  007332                  ADD     LONUM,R0        ;ADD NUMBER TO MAKE X 129
 1949  007234  005501                          ADC     R1              ;PROPAGATE CARRY
 1950  007236  063701  007334                  ADD     HINUM,R1        ;ADD NUMBER TO MAKE X 129
 1951  007242  005502                          ADC     R2              ;PROPAGATE CARRY
 1952  007244  062700  001057                  ADD     #1057,R0        ;ADD LOW CONSTANT
 1953  007250  005501                          ADC     R1              ;PROPAGATE CARRY
 1954  007252  005502                          ADC     R2              ;PROPAGATE CARRY
 1955  007254  062701  047401                  ADD     #47401,R1       ;ADD HIGH CONSTANT
 1956  007260  005502                          ADC     R2              ;PROPAGATE CARRY
 1957  007262  062702  000006                  ADD     #6,R2           ;ADD HIGH CONSTANT
 1958  007266  060200                          ADD     R2,R0           ;RE-PRIME R0 WITH HIGH DIGIT
 1959  007270  005501                          ADC     R1              ;PROPAGATE CARRY
 1960  007272  010037  007330                  MOV     R0,RANDOM       ;SAVE RANDOM NUMBER
 1961  007276  010037  007332                  MOV     R0,LONUM        ;PUT R0 BACK IN LONUM
 1962  007302  010137  007334                  MOV     R1,HINUM        ;PUT R1 BACK IN HINUM
 1963  007306  013700  007336                  MOV     SV0,R0          ;RESTORE REGISTERS
 1964  007312  013701  007340                  MOV     SV1,R1
 1965  007316  013702  007342                  MOV     SV2,R2
 1966  007322  013703  007344                  MOV     SV3,R3
 1967  007326  000207                          RTS     PC              ;EXIT
 1968  007330  000000          RANDOM: 0
 1969  007332  000000          LONUM:  0
 1970  007334  000000          HINUM:  0
 1971  007336  000000          SV0:    0
 1972  007340  000000          SV1:    0
 1973  007342  000000          SV2:    0
 1974  007344  000000          SV3:    0
 1975
 1976
 1977                                  ;READ RECORD SECTION
 1978  007346  005737  000612          READI:  TST     RECORD          ;FIRST RECORD?
 1979  007352  001003                          BNE     $R1             ;NO
 1980  007354  013737  000542  000630          MOV     STRLEN,READLN   ;SET INITIAL READ LENGTH
 1981  007362  012737  177775  000560  $R1:    MOV     #-3,RDPASS      ;INITIALIZE READ PASS COUNTER
 1982  007370  013777  000552  171104  RDSTPD: MOV     COMAND,@MTC
 1983  007376  105777  171100                  TSTB    @MTC
 1984  007402  100375                          BPL     .-4             ;WAIT FOR CONTROL UNIT READY
```

```
 1985  007404  006077  171070                 ROR     @MTS
 1986  007410  103375                         BCC     .-4             ;WAIT FOR TAPE UNIT READY
 1987  007412  013700  000532         READGO: MOV     RBUF,R0
 1988  007416  013701  000630                 MOV     READLN,R1
 1989  007422  105020                 RG1:    CLRB    (0)+            ;CLEAR READ BUFFER
 1990  007424  005301                         DEC     R1
 1991  007426  001375                         BNE     RG1
 1992  007430  013777  000630  171046         MOV     READLN,@BC      ;SET BYTE COUNT
 1993  007436  005477  171042                 NEG     @BC
 1994  007442  013777  000532  171036         MOV     RBUF,@CA        ;SET CURRENT ADDRESS
 1995  007450  013777  000552  171024         MOV     COMAND,@MTC
 1996  007456  052777  000002  171016         BIS     #2,@MTC
 1997  007464  004737  005066                 JSR     PC,GOWAIT
 1998                          ;RETURN HERE AFTER INTERRUPT
 1999  007470  017737  171004  000566         MOV     @MTS,STATRD
 2000  007476  005777  171000                 TST     @MTC            ;ANY STATUS ERRORS
 2001  007502  100504                         BMI     RDERR0          ;YES
 2002                          ;CHECK FOR DATA ERRORS
 2003  007504  013700  000532                 MOV     RBUF,R0
 2004  007510  013701  000530                 MOV     WBUF,R1
 2005  007514  013702  000630                 MOV     READLN,R2
 2006  007520  022021                 $R5:    CMP     (0)+,(1)+       ;CHECK FOR PROPER DATA TRANSFER
 2007  007522  001045                         BNE     DATERR          ;HAVE DATA ERROR
 2008  007524  162702  000002                 SUB     #2,R2           ;CHECKED ALL TRANSFERS?
 2009  007530  001373                         BNE     $R5             ;NO
 2010  007532  032737  000003  001320 RTSSTP: BIT     #3,PARAM
 2011  007540  001007                         BNE     RDSTPC
 2012  007542  004737  010136                 JSR     PC,RDINCR       ;INCREMENT FOR NEXT BLOCK
 2013  007546  023737  000612  000616         CMP     RECORD,LASRCR
 2014  007554  001316                         BNE     READGO
 2015  007556  000207                         RTS     PC              ;EXIT READIT
 2016  007560  032737  000002  001320 RDSTPC: BIT     #2,PARAM        ;IS READ MODE RANDOM?
 2017  007566  001414                         BEQ     RDSTP           ;NO
 2018  007570  004737  007160         RNDRDS: JSR     PC,RANGEN
 2019  007574  052737  177400  007330         BIS     #177400,RANDOM
 2020  007602  012704  177470         RNDS1:  MOV     #-200.,R4       ;DELAY 1 MILLISECOND
 2021  007606  005204                         INC     R4
 2022  007610  001376                         BNE     .-2
 2023  007612  005237  007330                 INC     RANDOM
 2024  007616  001371                         BNE     RNDS1
 2025  007620  004737  010136         RDSTP:  JSR     PC,RDINCR
 2026  007624  023737  000612  000616         CMP     RECORD,LASRCR   ;DONE LAST RECORD?
 2027  007632  001256                         BNE     RDSTPD          ;NO
 2028  007634  000207                         RTS     PC              ;YES EXIT
 2029                          ;HAVE DATA ERROR
 2030  007636  032777  020000  170646 DATERR: BIT     #20000,@SWR     ;TYPE ALL READ ERRORS?
 2031  007644  001014                         BNE     DATER1          ;NO
 2032  007646  012702  012622                 MOV     #MSG9A,R2
 2033  007652  104404                         TOP
 2034  007654  013737  000630  000544         MOV     READLN,LENGTH
 2035  007662  004737  011140                 JSR     PC,PRTS
 2036  007666  014102                         MOV     -(1),R2         ;PRINT EXPECTED DATA
 2037  007670  104412                         OCTPRT
 2038  007672  014002                         MOV     -(0),R2
 2039  007674  104412                         OCTPRT                  ;PRINT ACTUAL DATA
 2040  007676  022737  177775  000560 DATER1: CMP     #-3,RDPASS
```

```
2041  007704  001002                          BNE     .+6
2042  007706  005237  000622                  INC     @AERRS          ;+1 TO DATA ERRORS
2043  007712  000464                          BR      RTSR1
2044                                  ;STATUS INDICATES AN ERROR, CHECK FOR EOT
2045  007714  104434                  RDERR0: CKSWR                   ;CHECK FOR CNTL G
2046  007716  032737  175600  000566          BIT     #175600,STATRD  ;IS ERROR LEGITIMATE OR EOT?
2047  007724  001552                          BEQ     RNDTAP          ;HAVE EOT
2048  007726  032777  020000  170556          BIT     #20000,@SWR     ;TYPE ALL READ ERRORS?
2049  007734  001044                          BNE     RTSREC          ;NO
2050  007736  012702  012575                  MOV     #MSG9,R2
2051  007742  104404                          TOP                     ;PRINT ERROR
2052  007744  013737  000630  000544          MOV     READLN,LENGTH
2053  007752  004737  011140                  JSR     PC,PRTS
2054  007756  032777  010000  170514          BIT     #10000,@MTS             ;STATUS ERROR DUE TO PARITY
2055                                                                          ;ERROR?
2056  007764  001430                          BEQ     RTSREC                  ;BRANCH IF NOT
2057  007766  032777  000010  170516          BIT     #10,@SWR                        ;SEE IF USER WANTS DATA COMPARE!
2058  007774  001424                          BEQ     RTSREC                  ;BRANCH IF NOT
2059  007776  013700  000530                  MOV     WBUF,R0                 ;PICK UP STARTING ADDRESS OF
2060                                                                          ;WRITE BUFFER
2061  010002  013701  000532                  MOV     RBUF,R1                 ;PICK UP STARTING ADDRESS OF
2062                                                                          ;READ BUFFER
2063  010006  013702  000630                  MOV     @#READLN,R2             ;PICK UP RECORD LENGTH IN BYTES
2064  010012  022021                  1$:     CMP     (R0)+,(R1)+             ;COMPARE WHAT SHOULD HAVE BEEN
2065                                                                          ;WRITTEN WITH WHAT WAS!!
2066  010014  001004                          BNE     2$                      ;BRANCH IF NOT THE SAME
2067  010016  162702  000002                  SUB     #2,R2                   ;DROP OFF A WORD FROM RECORD
2068                                                                          ;LENGTH
2069  010022  001406                          BEQ     3$                      ;BRANCH IF ALL OF RECORD DATA
2070                                                                          ;CHECKS
2071  010024  000772                          BR      1$                      ;GO TO COMPARE NEXT BYTE
2072  010026  014002                  2$:     MOV     -(R0),R2                ;PICK UP THE DATA VALUE THAT
2073                                                                          ;SHOULD HAVE BEEN WRITTEN
2074  010030  104412                          OCTPRT                          ;PRINT EXPECTED VALUE OF
2075                                                                          ;WRITTEN DATA
2076  010032  014102                          MOV     -(R1),R2                ;PICK UP THE DATA VALUE THAT
2077                                                                          ;WAS WRITTEN
2078  010034  104412                          OCTPRT                          ;PRINT ACTUAL VALUE OF THE
2079                                                                          ;DATA READ
2080  010036  000403                          BR      RTSREC                  ;CONTINUE WITH TESTING
2081  010040  012702  013077          3$:     MOV     #MSG10D,R2              ;INDICATE RECORD DATA COMPARES
2082                                                                          ;DESPITE THE PARITY ERROR
2083                                                                          ;CAUSING THE READ STATUS ERROR
2084  010044  104404                          TOP
2085                                  ;+ 1 TO RDERRS IF FIRST ERROR PASS
2086  010046  104434                  RTSREC: CKSWR                           ;CHECK FOR CNTL G
2087  010050  022737  177775  000560          CMP     #-3,RDPASS
2088  010056  001002                          BNE     .+6
2089  010060  005237  000620                  INC     RDERRS          ;+1 TO STATUS ERRORS
2090  010064  032777  000020  170420  RTSR1:  BIT     #20,@SWR                ;DELETE READ RETRYS (SW 4)?
2091  010072  001011                          BNE     RPASS3          ;YES
2092  010074  005237  000560                  INC     RDPASS          ;DONE ALL RE-READS?
2093  010100  001404                          BEQ     RPASS1          ;YES
2094  010102  004737  010206                  JSR     PC,BACK1        ;NO, BACKSPACE TAPE
2095  010106  000137  007370                  JMP     RDSTPD          ;GO AGAIN
2096  010112  005237  000624          RPASS1: INC     NRREAD          ;+1 TO NONRECOVERABLE READ
```

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2097  010116  012737  177775  000560  RPASS3: MOV     #-3,RDPASS
2098  010124  032737  002000  000566          BIT     #2000,STATRD    ;AT EOT?
2099  010132  001054                          BNE     RNDTP1          ;YES, TYPE "EOT"
2100  010134  000631                          BR      RDSTP
2101
2102                                  ;SET UP POINTERS FOR NEXT RECORD
2103  010136  005237  000612          RDINCR: INC     RECORD
2104  010142  005737  000564                  TST     BLKINC
2105  010146  001416                          BEQ     RESTR1
2106                                  ;RECORD LENGTH IS CHANGING, COUNT IT
2107  010150  063737  000564  000630          ADD     BLKINC,READLN
2108  010156  023737  000630  000526          CMP     READLN,MINLEN   ;IS LENGTH LESS THAN MINIMUM
2109  010164  002404                          BLT     RESTRL          ;NO
2110  010166  023737  000630  000524          CMP     READLN,MAXLEN   ;IS LENGTH GREATER THAN MAXIMUM?
2111  010174  003403                          BLE     RESTR1          ;NO
2112  010176  013737  000542  000630  RESTRL: MOV     STRLEN,READLN   ;RESET INITIAL LENGTH
2113  010204  000207                  RESTR1: RTS     PC
2114                                  ;BACKSPACE ONE RECORD
2115  010206  006077  170266          BACK1:  ROR     @MTS
2116  010212  103375                          BCC     .-4             ;WAIT FOR TAPE UNIT READY
2117  010214  012777  177777  170262          MOV     #-1,@BC         ;COUNT 1 RECORD
2118  010222  013777  000552  170252          MOV     COMAND,@MTC     ;SELECT DRIVE
2119  010230  052777  000012  170244          BIS     #12,@MTC        ;ISSUE BACKSPACE
2120  010236  004737  005066                  JSR     PC,GOWAIT
2121  010242  042777  000016  170232          BIC     #16,@MTC
2122  010250  000207                          RTS     PC
2123                                  ;DRIVE HAS REACHED EOT IN READ MODE
2124  010252  004737  010136  RNDTAP: JSR     PC,RDINCR
2125  010256  052737  000020  000632          BIS     #20,MODES       ;INDICATE AT EOT
2126  010264  012702  013514  RNDTP1: MOV     #MSG25,R2
2127  010270  104404                          TOP
2128  010272  012702  012500                  MOV     #MSG8,R2
2129  010276  104404                          TOP
2130                                  ;DUMP ERROR COUNTERS
2131  010300  104434  READMP: CKSWR                         ;CHECK FOR CNTL G
2132  010302  013737  000552  011314          MOV     COMAND,CHAR
2133  010310  000337  011314                  SWAB    CHAR
2134  010314  142737  000170  011314          BICB    #170,CHAR
2135  010322  052737  000260  011314          BIS     #260,CHAR
2136  010330  004737  011316                  JSR     PC,OCTP         ;PRINT DRIVE NUMBER
2137  010334  104430                          SP3
2138  010336  013737  001320  011314          MOV     PARAM,CHAR
2139  010344  000337  011314                  SWAB    CHAR
2140  010350  006037  011314                  ROR     CHAR
2141  010354  042737  000170  011314          BIC     #170,CHAR
2142  010362  052737  000260  011314          BIS     #260,CHAR
2143  010370  004737  011316                  JSR     PC,OCTP         ;PRINT PATTERN NUMBER
2144
2145  010374  013737  001320  011314          MOV     PARAM,CHAR
2146  010402  042737  177774  011314          BIC     #177774,CHAR
2147  010410  012702  013201                  MOV     #MSG14,R2
2148  010414  022737  000001  011314          CMP     #1,CHAR
2149  010422  001002                          BNE     .+6
2150  010424  012702  013155                  MOV     #MSG12,R2
2151  010430  022737  000002  011314          CMP     #2,CHAR
2152  010436  001002                          BNE     .+6
```

```
 2153  010440  012702  013167          MOV     #MSG13,R2
 2154  010444  104404                  TOP                     ;PRINT READ MODE
 2155  010446  013702  000612          MOV     RECORD,R2
 2156  010452  104426                  DECPRT                  ;PRINT RECORD NUMBER
 2157  010454  013737  001320  011314  MOV     PARAM,CHAR
 2158  010462  042737  177717  011314  BIC     #177717,CHAR
 2159  010470  012702  013231          MOV     #MSG17,R2
 2160  010474  022737  000020  011314  CMP     #20,CHAR
 2161  010502  001002                  BNE     .+6
 2162  010504  012702  013240          MOV     #MSG18,R2
 2163  010510  022737  000040  011314  CMP     #40,CHAR
 2164  010516  001002                  BNE     .+6
 2165  010520  012702  013213          MOV     #MSG15,R2
 2166  010524  022737  000060  011314  CMP     #60,CHAR
 2167  010532  001002                  BNE     .+6
 2168  010534  012702  013222          MOV     #MSG16,R2
 2169  010540  104404                  TOP                     ;PRINT RECORD LENGTH SEQUENCE
 2170  010542  012702  013343          MOV     #MSG21,R2
 2171  010546  104404                  TOP
 2172  010550  013702  000620          MOV     RDERRS,R2
 2173  010554  104426                  DECPRT
 2174  010556  012702  013373          MOV     #MSG22,R2
 2175  010562  104404                  TOP
 2176  010564  013702  000622          MOV     DAERRS,R2
 2177  010570  104426                  DECPRT
 2178  010572  012702  013414          MOV     #MSG23,R2
 2179  010576  104404                  TOP
 2180  010600  013702  000624          MOV     NRREAD,R2
 2181  010604  104426                  DECPRT
 2182  010606  000207                  RTS     PC
 2183
 2184
 2185
 2186                                  ;WRITE RECOVERY UTILIZING EXTENDED INTERRECORD GAP
 2187                                  ;USED AFTER EVERY 7 REWRITES OR AFTER
 2188                                  ;EACH WRITE ERROR IF STATISTICAL RECOVERY NOT SELECTED
 2189                                  ;USED ONLY IF READ PASS SELECTED
 2190  010610  104434                  XRGREC: CKSWR                   ;CHECK FOR CNTL G
 2191  010612  012737  177774  000562          MOV     #-4,WRPASS      ;COUNT 4 REWRITES
 2192  010620  032777  000040  167664  XRGO:   BIT     #40,@SWR                ;DELETE WRITE XIRG (SW 5)
 2193  010626  001036                  BNE     XRGRCD          ;YES
 2194  010630  004737  010206          JSR     PC,BACK1
 2195  010634  105777  167642          TSTB    @MTC
 2196  010640  100375                  BPL     .-4
 2197  010642  013777  000552  167632  MOV     COMAND,@MTC
 2198  010650  052777  000014  167624  BIS     #14,@MTC        ;WRITE XIRG
 2199  010656  013777  000626  167620  MOV     WRTLEN,@BC      ;SET BYTE COUNT
 2200  010664  005477  167614          NEG     @BC
 2201  010670  013777  000530  167610  MOV     WBUF,@CA        ;SET CURRENT ADDRESS
 2202  010676  006077  167576          ROR     @MTS            ;WAIT FOR TU READY
 2203  010702  103375                  BCC     .-4
 2204  010704  004737  005066          JSR     PC,GOWAIT
 2205
 2206                                  ;RETURN HERE AFTER INTERRUPT
 2207  010710  017737  167564  000566  MOV     @MTS,STATRD     ;SAVE STATUS
 2208  010716  005777  167560          TST     @MTC
```

```
2209  010722  100403                          BMI     XRGS            ;HAVE ERROR FLAG, CHECK FOR EOT
2210  010724  005037  000562          XRGRCD: CLR     WRPASS
2211  010730  000207                          RTS     PC              ;EXIT WRITE XIRG
2212  010732  032737  175600  000566  XRGS:   BIT     #175600,STATRD
2213  010740  001771                          BEQ     XRGRCD          ;ONLY EOT, EXIT
2214  010742  005237  000562                  INC     WRPASS          ;DONE 4 XIRG
2215  010746  001324                          BNE     XRGO
2216                                  ;PRINT STATUS AFTER 4 XIRG ERRORS
2217  010750  012702  012452                  MOV     #MSG7,R2
2218  010754  104404                          TOP                     ;PRINT WRITE STATUS ERROR
2219  010756  013737  000626  000544          MOV     WRTLEN,LENGTH
2220  010764  004737  011140                  JSR     PC,PRTS         ;PRINT STATUS, COMMAND, RECORD, LENGTH
2221  010770  012702  013127                  MOV     #MSG11,R2
2222  010774  104404                          TOP                     ;PRINT "XIRG WRITTEN 4 TIMES"
2223  010776  032737  002000  000566          BIT     #2000,STATRD
2224  011004  001701                          BEQ     XRGREC
2225  011006  042777  000016  167466          BIC     #16,@MTC
2226  011014  052777  000006  167460          BIS     #6,@MTC         ;WRITE AN EOF
2227  011022  004737  005066                  JSR     PC,GOWAIT
2228  011026  000207                          RTS     PC
2229
2230                                  ;GO BACKWARD ON TAPE X RECORDS
2231  011030  013737  000612  000616  GOBKWD: MOV     RECORD,LASRCR
2232  011036  013737  000614  000612          MOV     WRRECR,RECORD
2233  011044  001003                          BNE     GOB1            ;IS NEW RECORD=0
2234  011046  004737  004676                  JSR     PC,REWIND       ;YES,REWIND
2235  011052  000207                          RTS     PC              ;EXIT
2236  011054  013777  000616  167422  GOB1:   MOV     LASRCR,@BC      ;SET BYTE COUNT TO DIFFERENCE
2237  011062  163777  000614  167414          SUB     WRRECR,@BC      ;BETWEEN LASRCR AND WRRECK
2238  011070  005477  167410                  NEG     @BC
2239  011074  013777  000552  167400          MOV     COMAND,@MTC
2240  011102  105777  167374                  TSTB    @MTC            ;WAIT FOR CU READY
2241  011106  100375                          BPL     .-4
2242  011110  006077  167364                  ROR     @MTS            ;WAIT FOR TU READY
2243  011114  103375                          BCC     .-4
2244  011116  042777  000016  167356          BIC     #16,@MTC
2245  011124  052777  000012  167350          BIS     #12,@MTC
2246  011132  004737  005066                  JSR     PC,GOWAIT
2247  011136  000207                          RTS     PC
2248
2249
2250
2251                                  ;PRINT COMMAND, STATUS, RECORD NUMBER, LENGTH
2252  011140  012702  012645          PRTS:   MOV     #MSG9B,R2
2253  011144  104404                          TOP
2254  011146  017702  167330                  MOV     @MTC,R2
2255  011152  104412                          OCTPRT
2256  011154  013702  000566                  MOV     STATRD,R2
2257  011160  104412                          OCTPRT
2258  011162  013702  000612                  MOV     RECORD,R2
2259  011166  005202                          INC     R2
2260  011170  104426                          DECPRT
2261  011172  013702  000544                  MOV     LENGTH,R2
2262  011176  104426                          DECPRT
2263  011200  000207                          RTS     PC
2264  011202  104434                          CKSWR                   ;CHECK FOR CNT_ G
```

```
2265                                        ;PRINT OCTAL VALUE IN REGISTER 2
2266  011204  012737  000060  011314  OCTPR:  MOV     #'0,CHAR        ;INITIALIZE 1ST NUMBER AS 0
2267  011212  005702                          TST     R2              ;IS VALUE POSITIVE
2268  011214  100003                          BPL     OCT1            ;YES PRINT 0
2269  011216  012737  000061  011314          MOV     #'1,CHAR        ;NO PRINT 1
2270  011224  004737  011316          OCT1:   JSR     PC,OCTP
2271  011230  006102                          ROL     R2
2272  011232  006102                          ROL     R2
2273  011234  012737  177773  011312          MOV     #-5,OCT         ;COUNT 5 DIGITS
2274  011242  006102                  OCT2:   ROL     R2
2275  011244  006102                          ROL     R2
2276  011246  006102                          ROL     R2
2277  011250  010237  011314                  MOV     R2,CHAR         ;SAVE DIGIT
2278  011254  042737  177770  011314          BIC     #177770,CHAR    ;CLEAR OTHER BITS
2279  011262  052737  000060  011314          BIS     #60,CHAR        ;MAKE ASCII DIGIT
2280  011270  006002                          ROR     R2
2281  011272  004737  011316                  JSR     PC,OCTP         ;PRINT
2282  011276  006102                          ROL     R2
2283  011300  005237  011312                  INC     OCT             ;+1 TO DIGIT COUNT
2284  011304  001356                          BNE     OCT2            ;NOT DONE
2285  011306  104430                          SP3
2286  011310  000207                          RTS     PC              ;EXIT
2287  011312  000000                  OCT:    0
2288  011314  000000                  CHAR:   0
2289  011316  105777  167176          OCTP:   TSTB    @TPS
2290  011322  100375                          BPL     .-4             ;WAIT FOR READY
2291  011324  013777  011314  167170          MOV     CHAR,@TPB       ;PRINT
2292  011332  000207                          RTS     PC
2293                                      ;PRINT DECIMAL VALUE IN REGISTER 2
2294  011334  012737  177773  011512  DECPR:  MOV     #-5,DIGCNT
2295  011342  012737  011520  011516          MOV     #DECPNT+2,DECPNT
2296  011350  012737  000040  011514          MOV     #40,ZERO
2297  011356  012737  177777  011510  TYPT1:  MOV     #-1,DIGIT
2298  011364  005237  011510          TYPT2:  INC     DIGIT
2299  011370  167702  000122                  SUB     @DECPNT,R2
2300  011374  100373                          BPL     TYPT2
2301  011376  067702  000114                  ADD     @DECPNT,R2
2302  011402  004737  011430                  JSR     PC,DECOUT
2303  011406  005237  011512                  INC     DIGCNT
2304  011412  001002                          BNE     TYPT3
2305  011414  104430                          SP3
2306  011416  000207                          RTS     PC
2307  011420  062737  000002  011516  TYPT3:  ADD     #2,DECPNT
2308  011426  000753                          BR      TYPT1
2309  011430  005737  011510          DECOUT: TST     DIGIT
2310  011434  001010                          BNE     DEC1
2311  011436  022737  177777  011512          CMP     #-1,DIGCNT
2312  011444  001404                          BEQ     DEC1
2313  011446  013737  011514  011510          MOV     ZERO,DIGIT
2314  011454  000406                          BR      DEC2
2315  011456  012737  000060  011514  DEC1:   MOV     #60,ZERO
2316  011464  052737  000060  011510          BIS     #60,DIGIT
2317
2318  011472  105777  167022          DEC2:   TSTB    @TPS
2319  011476  100375                          BPL     .-4
2320  011500  013777  011510  167014          MOV     DIGIT,@TPB
```

```
 2321  011506  000207                          RTS     PC
 2322  011510  000000                  DIGIT:  0
 2323  011512  000000                  DIGCNT: 0
 2324  011514  000040                  ZERO:   40
 2325  011516  011520                  DECPNT: .+2
 2326  011520  023420                          10000.
 2327  011522  001750                          1000.
 2328  011524  000144                          100.
 2329  011526  000012                          10.
 2330  011530  000001                          1.
 2331                                  ;KEYBOARD INPUT
 2332  011532  105777  166756          WAITK:  TSTB    @TKS            ;WAIT FOR KEY
 2333  011536  100375                          BPL     .-4
 2334  011540  105777  166754                  TSTB    @TPS            ;WAIT FOR TELEPRINTER READY
 2335  011544  100375                          BPL     .-4
 2336  011546  117777  166744  166746          MOVB    @TKB,@TPB       ;ECHO CHARACTER
 2337  011554  117737  166736  001314          MOVB    @TKB, CHARIN    ;SAVE IT
 2338  011562  042737  000200  001314          BIC     #200,CHARIN
 2339  011570  000207                          RTS     PC              ;EXIT
 2340                                  ;TYPE 3 SPACES
 2341  011572  012702  011602          SP3X:   MOV     #SP3A,R2
 2342  011576  104404                          TOP
 2343  011600  000207                          RTS     PC
 2344  011602  020057  020040      057 SP3A:   .ASCII  ;/   /;
 2345          011610                          .EVEN
 2346                                  ;TELETYPE OUTPUT PACKAGE
 2347  011610  142777  000177  166702  TO:     BICB    #177,@TPS       ;CLEAR TELETYPE FLAGS
 2348  011616  112237  011710                  MOVB    (2)+,EOMK       ;SAVE MESSAGE DELIMETER
 2349  011622  121237  011710          TOP1:   CMPB    @R2,EOMK        ;IS CHARACTER THE SECOND MESSAGE DELIMITER?
 2350  011626  001001                          BNE     .+4             ;NO
 2351  011630  000207                          RTS     PC              ;YES, EXIT
 2352  011632  121227  000100                  CMPB    @R2,#'@         ;IS CHARACTER AN @ WHICH INDICATES A CARRIAGE RET.
 2353  011636  001406                          BEQ     TOP2            ;YES
 2354  011640  105777  166654                  TSTB    @TPS            ;NO, WAIT FOR TELETYPE READY
 2355  011644  100375                          BPL     .-4
 2356  011646  112277  166650                  MOVB    (2)+,@TPB       ;PRINT CHARACTER
 2357  011652  000763                          BR      TOP1
 2358  011654  105777  166640          TOP2:   TSTB    @TPS
 2359  011660  100375                          BPL     .-4
 2360  011662  112777  000215  166632          MOVB    #215,@TPB       ;CR
 2361  011670  105777  166624                  TSTB    @TPS
 2362  011674  100375                          BPL     .-4
 2363  011676  112777  000212  166616          MOVB    #212,@TPB       ;LF
 2364  011704  005202                          INC     R2
 2365  011706  000745                          BR      TOP1
 2366  011710  000000                  EOMK:   0
 2367  011712  022737  000176  000512  CKSWRR: CMP     #SWREG,SWR              ;SOFTWARE SWITCH REG PRESENT
 2368  011720  001035                          BNE     OUT                     ;NO, GET OUT
 2369  011722  105777  166566                  TSTB    @TKS                    ;YES,WAIT FOR
 2370  011726  100032                          BPL     OUT                     ;READY, GET CHARACTER
 2371  011730  017737  166562  001314          MOV     @TKB,CHARIN             ;AND STRIP OFF
 2372  011736  042737  177600  001314          BIC     #177600,CHARIN          ;THE GARBAGE
 2373  011744  022737  000007  001314          CMP     #7,CHARIN               ;IS IT A <^G>
 2374  011752  001020                          BNE     OUT
 2375  011754  012702  013565                  MOV     #$CNTG,R2
 2376  011760  104404                          TOP
```

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 2377  011762  012702  013573          CNTLU:  MOV     #$MSWR,R2
 2378  011766  104404                          TOP
 2379  011770  017702  166516                  MOV     @SWR,R2
 2380  011774  104412                          OCTPRT
 2381  011776  012702  013603                  MOV     #$MNEW,R2
 2382  012002  104404                          TOP
 2383  012004  005037  012206                  CLR     @#TEMPST
 2384  012010  004737  012016                  JSR     PC,$READ                ;GO READ A LINE
 2385  012014  000207                  OUT:    RTS     PC                      ;RETURN TO MAIN BODY OF PROGRAM
 2386
 2387  012016  005037  012206          $READ:  CLR     TEMPST
 2388  012022  012737  000007  012210          MOV     #7,COUNT
 2389  012030  104400                  1$:     WAITKY
 2390  012032  042737  177600  001314          BIC     #177600,CHARIN  ;STRIP OFF GARBAGE
 2391  012040  122737  000025  001314          CMPB    #25,CHARIN              ;IS IT A ↑U?
 2392  012046  001002                          BNE     2$              ;BRANCH IF NOT
 2393  012050  005726                  3$:     TST     (SP)+           ;POP THE STACK
 2394  012052  000743                          BR CNTLU                ;START OVER
 2395  012054  122737  000015  001314  2$:     CMPB    #15,CHARIN              ;IS IT A <CR>?
 2396  012062  001011                          BNE     4$              ;BRANCH IF NOT
 2397  012064  012702  013613                  MOV     #$MCRLF,R2      ;DO CRLF
 2398  012070  104404                          TOP
 2399  012072  022737  000007  012210          CMP     #7,COUNT        ;WAS IT FIRST CHARACTER
 2400  012100  001036                          BNE     7$              ;CHANGE SWR IF NOT FIRST ONE
 2401  012102  005726                  8$:     TST     (SP)+           ;POP THE STACK
 2402  012104  000743                          BR      OUT             ;GET OUT
 2403  012106  122737  000060  001314  4$:     CMPB    #60,CHARIN
 2404  012114  003004                          BGT     5$
 2405  012116  122737  000067  001314          CMPB    #67,CHARIN
 2406  012124  002004                          BGE     6$
 2407  012126  012702  012342          5$:     MOV     #MSGO,R2
 2408  012132  104404                          TOP
 2409  012134  000745                          BR      3$              ;START OVER IF NOT LEGAL CHARACTER
 2410  012136  006337  012206          6$:     ASL     TEMPST
 2411  012142  006337  012206                  ASL     TEMPST
 2412  012146  006337  012206                  ASL     TEMPST
 2413  012152  142737  000060  001314          BICB    #60,CHARIN              ;GET NITTY-GRITTY
 2414  012160  153737  001314  012206          BISB    CHARIN,TEMPST
 2415  012166  005337  012210                  DEC     COUNT           ;ONLY WANT 6   DIGITS
 2416  012172  001755                          BEQ     5$
 2417  012174  000715                          BR      1$
 2418  012176  013777  012206  166306  7$:     MOV     TEMPST,@SWR     ;CHANGE SWITCH REGISTER CONTENTS
 2419  012204  000736                          BR      8$
 2420
 2421  012206  000000                  TEMPST: 0
 2422  012210  000000                  COUNT:  0
 2423
 2424  012212  013746  000006          SUSWRR: MOV     @#6,-(SP)               ;SAVE VECTORS
 2425  012216  013746  000004                  MOV     @#4,-(SP)
 2426  012222  012737  012242  000004          MOV     #1$,@#4                 ;SET UP FOR TIMEOUT
 2427  012230  022777  177777  166254          CMP     #-1,@SWR                ;REFERENCE HARDWARE SWITCH REGISTER
 2428  012236  001402                          BEQ     2$
 2429  012240  000404                          BR      3$
 2430  012242  022626                  1$:     CMP     (SP)+,(SP)+             ;ADJUST STACK
 2431  012244  012737  000176  000512  2$:     MOV     #SWREG,SWR              ;POINT TO SOFTWARE SWITCH REG
 2432  012252  012637  000004          3$:     MOV     (SP)+,@#4               ;RESTORE VECTORS
```

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  2433  012256  012637  000006            MOV     (SP)+,@#6
  2434  012262  000207                    RTS     PC
  2435
  2436                                  ;TRAP HANDLER
  2437  012264  011666  000002  TRAP34:  MOV     @SP,2(6)
  2438  012270  162716  000002            SUB     #2,@SP
  2439  012274  013646                    MOV     @(6)+,-(6)
  2440  012276  062716  105704            ADD     #TABLE-104400,@SP
  2441  012302  013607                    MOV     @(6)+,PC
  2442  012304  011532  TABLE:  WAITK
  2443  012306  005140          WRITI
  2444  012310  011610          TO
  2445  012312  004426          SVCTR
  2446  012314  004542          RSFDR
  2447  012316  011204          OCTPR
  2448  012320  004444          MVCTR
  2449  012322  006476          GENPA
  2450  012324  004506          CLRAL
  2451  012326  004640          CHGDR
  2452  012330  007346          READI
  2453  012332  011334          DECPR
  2454  012334  011572          SP3X
  2455  012336  012212          SUSWRR
  2456  012340  011712          CKSWRR
  2457          104400  WAITKY=104400
  2458          104402  WRITIT=104402
  2459          104404  TOP=104404
  2460          104406  SVCTRS=104406
  2461          104410  RSFDRV=104410
  2462          104412  OCTPRT=104412
  2463          104414  MVCTRS=104414
  2464          104416  GENPAT=104416
  2465          104420  CLRALL=104420
  2466          104422  CHGDRV=104422
  2467          104424  READIT=104424
  2468          104426  DECPRT=104426
  2469          104430  SP3=104430
  2470          104432  SUSWR=104432
  2471          104434  CKSWR=104434
  2472                                  ;TEXT MESSAGES
  2473  012342  037457  020100     057  MSG0:   .ASCII          ;/?@ /;
  2474  012347     057  051500  046105  MSG1:   .ASCII          ;/@SELECT UNITS  /;
  2475  012354  041505  020124  047125
  2476  012362  052111  020123  027440
  2477  012370  040057  051524  020124  MSG2:   .ASCII          ;/@TST PAT RLS WMO RMO@ /;
  2478  012376  040520  020124  046122
  2479  012404  020123  046527  020117
  2480  012412  046522  040117  027440
  2481  012420  046457  054101  052040  MSG5:   .ASCII          ;/MAX TESTS SELECTED@/;
  2482  012426  051505  051524  051440
  2483  012434  046105  041505  042524
  2484  012442  040104     057
  2485  012445     057  047440  027513  MSG6:   .ASCII          ;/ OK/;
  2486  012452  040057  051127  052111  MSG7:   .ASCII          ;/@WRITE STATUS ERROR@/;
  2487  012460  020105  052123  052101
  2488  012466  051525  042440  051122
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 2489  012474  051117  027500
 2490  012500  042457  042116  047440  MSG8:   .ASCII                ;/END OF TAPE**********@;
 2491  012506  020106  040524  042520
 2492  012514  025052  025052  025052
 2493  012522  025052  025052  025052
 2494  012530  025052  025052  025052
 2495  012536  025052     100
 2496  012541     104  053122  050040          .ASCII                ;DRV PAT MODE RECORD LENGTH@/;
 2497  012546  052101  046440  042117
 2498  012554  020105  042522  047503
 2499  012562  042122  046040  047105
 2500  012570  052107  040110     057
 2501  012575     057  051100  040505  MSG9:   .ASCII                ;/@READ STATUS ERROR@/;
 2502  012602  020104  052123  052101
 2503  012610  051525  042440  051122
 2504  012616  051117  027500
 2505  012622  040057  042522  042101  MSG9A:  .ASCII                ;/@READ DATA ERROR@/;
 2506  012630  042040  052101  020101
 2507  012636  051105  047522  040122
 2508  012644     057
 2509  012645     057  047503  042115  MSG9B:  .ASCII                ;/COMD     STATUS   RECORD   LENGTH EXPECTED ACTUAL@/;
 2510  012652  020040  020040  051440
 2511  012660  040524  052524  020123
 2512  012666  020040  042522  047503
 2513  012674  042122  020040  046040
 2514  012702  047105  052107  020110
 2515  012710  054105  042520  052103
 2516  012716  042105  040440  052103
 2517  012724  040525  040114     057
 2518  012731     057  046500  044501  MSG10A: .ASCII  ;/@MAINDEC-11-DZTMB-D@RECORD LIMITS IN BYTES@;
 2519  012736  042116  041505  030455
 2520  012744  026461  055104  046524
 2521  012752  026502  040104  042522
 2522  012760  047503  042122  046040
 2523  012766  046511  052111  020123
 2524  012774  047111  041040  052131
 2525  013002  051505     100
 2526  013005     115  047111  042514          .ASCII  ;MINLEN  MAXLEN@ /;
 2527  013012  020116  046440  054101
 2528  013020  042514  040116  027440
 2529  013026  040054  054105  051105  MSG10B: .ASCII  /,@EXERCISING UNITS,/
 2530  013034  044503  044523  043516
 2531  013042  052440  044516  051524
 2532  013050     054
 2533  013051     054  047100  020117  MSG10C: .ASCII  /,@NO DRIVES AVAILABLE,/
 2534  013056  051104  053111  051505
 2535  013064  040440  040526  046111
 2536  013072  041101  042514     054
 2537  013077     057  020040  042522  MSG10D: .ASCII  ;/  RECORD DATA COMPARES/;
 2538  013104  047503  042122  042040
 2539  013112  052101  020101  047503
 2540  013120  050115  051101  051505
 2541  013126     057
 2542  013127     057  044530  043522  MSG11:  .ASCII                ;/XIRG WRITTEN 4 TIMES/;
 2543  013134  053440  044522  052124
 2544  013142  047105  032040  052040
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2545  013150  046511  051505     057
2546  013155     057  020040  051440  MSG12:  .ASCII                  ;/   SSTP /;
2547  013162  052123  020120     057
2548  013167     057  020040  051040  MSG13:  .ASCII                  ;/   RNDM /;
2549  013174  042116  020115     057
2550  013201     057  020040  047040  MSG14:  .ASCII                  ;/   NSTP /;
2551  013206  052123  020120     057
2552  013213     057  026515  040515  MSG15:  .ASCII                  ;/M-MAX/;
2553  013220  027530
2554  013222  046457  046455  047111  MSG16:  .ASCII          ;/M-MIN/;
2555  013230     057
2556  013231     057  044515  020116  MSG17:          .ASCII          ;/MIN  /;
2557  013236  027440
2558  013240  046457  054101  020040  MSG18:          .ASCII          ;/MAX  /;
2559  013246     057
2560  013247     057  053500  044522  MSG19:  .ASCII          ;/@WRITE ERRORS = /;
2561  013254  042524  042440  051122
2562  013262  051117  020123  020075
2563  013270     057
2564  013271     057  051100  041505  MSG20:          .ASCII          ;/@RECOVERED AT 0 /;
2565  013276  053117  051105  042105
2566  013304  040440  020124  020060
2567  013312     057
2568  013313     057  050100  051105  MSG20A:         .ASCII          ;/@PERMANENT BADSPOTS = /;
2569  013320  040515  042516  052116
2570  013326  041040  042101  050123
2571  013334  052117  020123  020075
2572  013342     057
2573  013343     057  051100  040505  MSG21:          .ASCII          ;/@READ STATUS ERRORS = /;
2574  013350  020104  052123  052101
2575  013356  051525  042440  051122
2576  013364  051117  020123  020075
2577  013372     057
2578  013373     057  042100  052101  MSG22:          .ASCII          ;/@DATA ERRORS = /;
2579  013400  020101  051105  047522
2580  013406  051522  036440  027440
2581  013414  040057  047516  026516  MSG23:          .ASCII          ;/@NON-RECOVERABLE ERRORS = /;
2582  013422  042522  047503  042526
2583  013430  040522  046102  020105
2584  013436  051105  047522  051522
2585  013444  036440  027440
2586  013450  040057  025052  025052  MSG24:          .ASCII          ;/@**********WRITE PASS   /;
2587  013456  025052  025052  025052
2588  013464  025052  025052  025052
2589  013472  025052  025052  051127
2590  013500  052111  020105  040520
2591  013506  051523  020040  027440
2592  013514  040057  025052  025052  MSG25:          .ASCII          ;/@**********READ PASS    /;
2593  013522  025052  025052  025052
2594  013530  025052  025052  025052
2595  013536  025052  025052  042522
2596  013544  042101  050040  051501
2597  013552  020123  020040  027440
2598  013560  040057  040100     057  MSG26:          .ASCII          ;/@@@/;
2599  013565     057  057100  040107  $CNTG:  .ASCII  ;/@1G@/;
2600  013572     057
```

```
2601  013573     057  051500  051127  $MSWR:  .ASCII  ;/@SWR= /;
2602  013600  020075     057
2603  013603     057  047040  053505  $MNEW:  .ASCII  ;/ NEW= /;
2604  013610  020075     057
2605  013613     057  027500          $MCRLF: .ASCII  : @/;
2606                                          .EVEN
2607
2608  013616  013616                  BUFFER:.                        ;WRITE BUFFER BEGINS HERE
2609
2610          000000:                                 .END
```

```
ALLEOS  004756          1556    1560#
ALLEOT  004734          1278    1294    1326    1358    1425    1466    1478    1553#
ALLI    004736          1554#   1558
ALL2    005040          1561    1563    1576#
ALL3    005034          1559    1575#
ATST    000536           994#    975*   1075*   1091
AUTOST  001354           871     970#
BACK1   010206          1715    1716    2094    2115#   2194
BC      000504           879#   1619*   1620*   1720*   1992*   1993*   2117*   2199*   2200*   2236*   2237*   2238*
BCKINC  000564           905#   1600*   1604*   1608*   1672    1674    2104    2107
BUFFER  013616           889     890     984     989     993    1043*   1044    1063    1069    1074    2608#
CA      000506           880#   1621*   1994*   2201*
CC      000510           881#   1586*   1591*
CDMEMP  005030          1571    1573#
CDRIVE  000556           902#   1499    1500    1514*   1518*   1522    1532*
CDRVBT  000554           901#   1515*   1516    1520*   1534*   1539
CHAR    011314          1736*   1737*   1738*   1740*   1743*   1744*   1745*   1746*   1747*   1749*   1750*   1752    1755
                        1761*   1762*   1764    1767    1770    2132*   2133*   2134*   2135*   2138*   2139*   2140*   2141*
                        2142*   2145*   2146*   2148    2151    2157*   2158*   2160    2163    2166    2266*   2269*   2277*
                        2278*   2279*   2288#   2291
CHARIN  001314           952#   1087    1094    1096    1103*   1104*   1108*   1127    1132    1134    1139    1149    1151
                        1153*   1154*   1155*   1156    1161    1163    1167    1171    1177    1179    1183    1189    1191
                        1195    1204    2337*   2338*   2371*   2372*   2373    2390*   2391    2395    2403    2405    2413#
                        2414
CHGDR   004640          1532#   1540    2451
CHGDRV= 104422          1276    1292    1310    1317    1324    1341    1349    1356    1376    1387    1394    1402    1418
                        1423    1450    1464    1474    1508    1557    1573    2466#
CHG1    004664          1535    1539#
CKSWR = 104434          1240    1256    1690    1735    2045    2086    2131    2190    2264    2471#
CKSWRR  011712          2367#   2456
CLRAL   004506          1504#   2450
CLRALL= 104420          1267    1284    1302    1333    1371    1433    2465#
CLRTBL  005042          1506    1579#
CLRT1   005046          1580#   1582
CLR1    004510          1505#   1509
CNTLU   011762           974    1080    2377#   2394
COMAND  000552           900#   1522*   1523*   1524*   1527*   1546    1614    1721    1736    1992    1995    2118    2132
                        2197    2239
COUNT   012210          2388*   2399    2415*   2422#
CTRDEX  004462          1485    1491    1497#
CTRDMP  004776          1565#   1574
CTRD1   005024          1568    1572#
DAERRS  000622           921#   2042*   2176
DATERR  007636          2007    2030#
DATER1  007676          2031    2040#
DECOUT  011430          2302    2309#
DECPNT  011516          2295*   2299    2301    2307*   2325#
DECPR   011334          2294#   2453
DECPRT= 104426          1028    1030    1760    1777    1786    1798    2156    2173    2177    2181    2260    2262    2468#
DEC1    011456          2310    2312    2315#
DEC2    011472          2314    2318#
DIGCNT  011512          2294*   2303*   2311    2323#
DIGIT   011510          2297*   2298*   2309    2313*   2316*   2320    2322#
DOAGN   003234          1252    1261#
DONE    003136          1240#   1280    1296    1328    1360    1427    1468    1480
DONE1   003204          1244    1248    1251#
```

```
DRVADR  000634            927#  1487  1493  1498
DRVSEL  000540            895#  1001* 1008  1020*
DOTAB   000654            927   936#  937
D1TAB   000720            928   939#  939
D2TAB   000764            929   940#  941
D3TAB   001030            930   942#  943
D4TAB   001074            931   944#  945
D5TAB   001140            932   946#  947
D6TAB   001204            933   948#  949
D7TAB   001250            934   950#  951
ENDADR  003224            858   1037  1254  1257#
ENDTAP  006100           1692   1713  1728#
ENDT1   006112           1569   1730#
EOMK    011710           2348*  2349  2366#
ERROR   005646           1627   1690#
ERR1    005672           1694   1696#
EXEC    003052           1224#  1262
EXECUT  003040           1065   1093  1131  1222#
EXEC1   003060           1225#  1250
GENPA   006476           1801#  2449
GENPAT= 104416           1268   1285  1303  1334  1366  1434  2464#
GOBKWD  011030           1315   1347  1400  2231#
GOBI    011054           2233   2236#
GOWAIT  005066           1550   1586#  1623  1723  1997  2120  2204  2227  2246
GP1     006610           1802*  1803*  1805  1807  1809  1811  1813  1815  1819#
GW1     005130           1587   1593#
HINUM   007334            981*  1082*  1940  1950  1962*  1970#
IDSELF  001666           1005   1025#
LASRCR  000616            919#  1408  1410  1413*  1414*  1416*  1421  1447*  1448*  1456  1459*  1460*  1462*
                         1471   2013  2026  2231*  2236
LENGTH  000544            897#  1700*  2034*  2052*  2219*  2261
LONUM   007332            980*  1081*  1939  1948  1961*  1969#
LOOPER  001774           1051#  1060
MAXLEN  000524            887#   988*   992*  1029  1068*  1073*  1599  1677  2110
MEM4K   002050            872   1067#
MEM8K   002074            873   1072#
MINLEN  000526            888#   987*   991*  1027  1067*  1072*  1603  1675  2108
MODES   000632            925#  1222*  1266*  1271  1283*  1288  1301*  1306  1313  1320  1332*  1337  1345
                         1352   1365*  1369*  1370*  1378*  1381  1389  1392  1398  1406  1432*  1437  1442*
                         1445   1454  1473*  1476  1510*  1555  1562  1570  1581  1583*  1640  1642  1645
                         1661   1663  1666  1671*  1682*  1708  1729*  2125*
MSBITS  000546            898#  1002*  1019*  1031  1051  1085*  1089  1112  1114*  1116*  1516  1539
MSG0    012342           1136   2407  2473#
MSG1    012347           1083   2474#
MSG10A  012731           1025   2518#
MSG10B  013026           1041   2529#
MSG10C  013051           1035   2533#
MSG10D  013077           2081   2537#
MSG11   013127           2221   2542#
MSG12   013155           1754   2150  2546#
MSG13   013167           1757   2153  2548#
MSG14   013201           1751   2147  2550#
MSG15   013213           1769   2165  2552#
MSG16   013222           1772   2168  2554#
MSG17   013231           1763   2159  2556#
MSG18   013240           1766   2162  2558#
```

```
MSG19   013247          1774    2560#
MSG2    012370          1122    2477#
MSG20   013271          1779*   1780*   1783    2564#
MSG20A  013313          1795    2568#
MSG21   013343          2170    2573#
MSG22   013373          2174    2578#
MSG23   013414          2178    2581#
MSG24   013450          1730    2586#
MSG25   013514          2126    2592#
MSG26   013560          1241    2598#
MSG5    012420          1218    2481#
MSG6    012445          1201    2485#
MSG7    012452          1698    2217    2486#
MSG8    012500          1732    2128    2490#
MSG9    012575          2050    2501#
MSG9A   012622          2032    2505#
MSG9B   012645          2252    2509#
MTC     000502           878#   1000*   1004    1008*   1544    1546*   1549*   1589*   1614*   1615    1622*   1626    1721*
                        1722*   1724*   1725*   1982*   1983    1995*   1996*   2000    2118*   2119*   2121*   2195    2197*
                        2198*   2208    2225*   2226*   2239*   2240    2244*   2245*   2254
MTS     000500           877#   1010    1015    1017    1547*   1617*   1625    1717    1985*   1999    2054    2115*   2202*
                        2207    2242#
MTV     000534           891#   1587*
MVCTR   004444          1491#   2448
MVCTRS= 104414          1270    1287    1305    1312    1319    1336    1344    1351    1373    1380    1391    1397    1405
                        1420    1444    1453    1470    1554    1566    2463#
MV1     004450          1492#   1494
NOINCR  005230          1598    1607    1609#
NONSTP  005274          1619#   1638    1643    1646
NO.SEL  001656          1007    1014    1016    1018    1020#
NPREAD  000624           922#   2096*   2180
NUMTST  001316           953#    979*   1124*   1129    1214*   1215    1251*
NXMRET  001464           983     986#
NXT.TU  001602          1008#   1022
OCT     011312          2273*   2283*   2287#
OCTP    011316          1741    1748    2136    2143    2270    2281    2289#
OCTPR   011204          2266#   2447
OCTPRT= 104412          2037    2039    2074    2078    2255    2257    2380    2462#
OCT1    011224          2268    2270#
OCT2    011242          2274#   2284
OUT     012014          2368    2370    2374    2385#   2402
OVER4K  001512           985     991#
PARAM   001320           954#   1224*   1225    1245    1249*   1411    1457    1601    1606    1635    1648    1743    1749
                        1761    1802    2010    2016    2138    2145    2157
PAT0    006612          1804    1822#   1824
PAT1    006626          1806    1828#   1835
PAT1A   006632          1829#   1834
PAT2    006676          1808    1833    1848#   1850
PAT3    006712          1810    1854#   1861
PAT3A   006716          1855#   1860
PAT4    006762          1812    1859    1873#
PAT5    007010          1814    1883#   1890
PAT5A   007014          1884#   1889
PAT6    007124          1818    1888    1920#   1922
PAT7    007140          1817    1928#   1931
PC     =%000007          850#    974*   1080*   1257*   1278*   1294*   1315*   1326*   1347*   1358*   1400*   1425*   1439*
```

```
                    1497* 1579* 1581  1630* 1631* 1632* 1633* 1778* 1781  1788  1828* 1833  1854*
                    1859  1883* 1888  1935  1939* 1943* 1948* 1952* 1958* 1960  1961  1963* 1987*
                    2003* 2059* 2064  2072
R1      =%000001     844* 1033* 1044* 1049* 1050* 1053* 1054* 1055* 1061* 1062* 1253* 1498* 1499*
                    1500* 1501* 1936  1940* 1944* 1949* 1950* 1953* 1955* 1959* 1962  1964* 1988*
                    1990* 2004* 2061* 2064  2076
R2      =%000002     845* 1009* 1012* 1025* 1027* 1029* 1035* 1041* 1046* 1051  1057* 1063* 1083*
                    1122* 1136* 1201* 1218* 1241* 1698* 1730* 1732* 1751* 1754* 1757* 1759* 1763*
                    1766* 1769* 1772* 1774* 1776* 1783* 1785* 1795* 1797* 1801* 1823  1830  1849
                    1856  1876  1885  1921  1930  1937  1942* 1945* 1951* 1954* 1956* 1957* 1958
                    1965* 2005* 2008* 2032* 2036* 2038* 2050* 2063* 2067* 2072* 2076* 2081* 2126*
                    2128* 2147* 2150* 2153* 2155* 2159* 2162* 2165* 2168* 2170* 2172* 2174* 2176*
                    2178* 2180* 2217* 2221* 2252* 2254* 2256* 2258* 2259* 2261* 2267  2271* 2272*
                    2274* 2275* 2276* 2277  2280* 2282* 2299* 2301* 2341* 2349  2352  2364* 2375*
                    2377* 2379* 2381* 2397* 2407*
R3      =%000003     846* 1938  1941* 1946* 1966*
R4      =%000004     847* 1139* 1140* 1141* 1142* 1143* 1144* 1145* 1156* 1165* 1169* 1173* 1181*
                    1185* 1193* 1197* 1213  1653* 1654* 2020* 2021*
R5      =%000005     848*
SELDRV  002172      1086* 1120
SELD1   002224      1088  1094*
SELD2   002244      1095  1098*
SELOK1  003032      1216  1218*
SELPAT  002442      1135  1139*
SELRLS  002534      1160*
SELRM1  002716      1192  1195*
SELRM2  002732      1190  1194  1198*
SELR1   002564      1164  1167*
SELR2   002602      1168  1171*
SELR3   002616      1162  1166  1170  1174*
SELTST  002350      1092  1122*
SELT1   002366      1126* 1138  1217
SELT2   002412      1128  1132*
SELT3   002432      1130  1133  1136* 1150  1152  1172  1184  1196  1206
SELW1   002650      1180  1183*
SELW2   002664      1178  1182  1186*
SP      =%000006     849*  970*  986  1076* 1537* 2393  2401  2424* 2425* 2430  2432  2433  2437
                    2438* 2440*
SP3     = 104430    1146  1157  1174  1186  1198  1742  2137  2285  2305  2469*
SP3A      011602    2341  2344*
SP3X      011572    2341* 2454
STACK   = 000500     875*  970  1076
START     002116    1070  1075*
START1    002122    1038  1076* 1090
STATRD    000566     906* 1625* 1691  1712  1999* 2046  2098  2207* 2212  2223  2256
STOPOP    005446    1636  1648*
STREC1    006006    1706  1715*
STRLEN    000542     896* 1599* 1603* 1605  1679  1980  2112
STRTOP    005252    1614* 1659  1664  1667  1719  1726
SUSWR   = 104432     971  1077  2470*
SUSWRR    012212    2424* 2455
SVCTR     004426    1485* 2445
SVCTRS= 104406      1274  1291  1309  1316  1323  1340  1348  1355  1375  1386  1401  1417  1449
                    1463  1507  2460*
SVC1      004432    1486* 1488
SVRECR    000550     899* 1383* 1385  1410* 1416  1456* 1462
```

```
SV0     007336          1935*   1963    1971#
SV1     007340          1936*   1964    1972#
SV2     007342          1937*   1965    1973#
SV3     007344          1938*   1966    1974#
SWR     000512           882#    972    1078    1243    1525    1560    1696    1702    2030    2048    2057    2090    2192
                        2367    2379    2418*   2427    2431*
SWREG   000176           869#    972    1078    2367    2431
TABLE   012304          2440    2442#
TEMPST  012206          2383*   2387*   2410*   2411*   2412*   2414*   2418    2421#
TESINC  005554          1439    1639    1660    1670#
TESRC1  005752          1703    1708#
TESREC  005722          1697    1702#
TEST    001324           956#   1227*
TESTO   003244          1228    1256#
TESTI   003314          1230    1283#
TEST2   003364          1232    1301#
TEST3   003502          1234    1332#
TEST4   003620          1238    1365#
TEST5   004142          1237    1432#
TKB     000516           884#   2336    2337    2371
TKS     000514           883#   2332    2369
TO      011610          2347#   2444
TOP   = 104404          1026    1036    1042    1064    1084    1123    1137    1202    1219    1242    1699    1731    1733
                        1758    1773    1775    1784    1796    2033    2051    2084    2127    2129    2154    2169    2171
                        2175    2179    2218    2222    2253    2342    2376    2378    2382    2398    2408    2459*
TOP1    011622          2349*   2357    2365
TOP2    011654          2353    2358#
TPB     000522           886#   1100*   1119*   1209*   1212*   2291*   2320*   2336*   2356*   2360*   2363*
TPS     000520           895#   1098    1117    1207    1210    2289    2318    2334    2347*   2354    2359    2361
TRAP34  012264           856    2437#
TSINC2  005630          1673    1678    1680#
TSINC3  005644          1681    1683#
TSTEX   001322           955#   1223*   1224    1261*   1367
TSTSTP  005370          1629    1635#
TSTTBL  001326           958#    976*    977*    978*   1125    1223
TU.SEL  001534           990     999#
TYPT1   011356          2297#   2308
TYPT2   011364          2298#   2300
TYPT3   011420          2304    2307#
TO      003256          1269#   1279
TOA     003260          1270#   1277
TOB     003276          1272    1276#
T1      003326          1286#   1295
T1A     003330          1287#   1293
T1B     003346          1289    1292#
T2      003376          1304#   1327
T2A     003400          1305#   1311
T2B     003416          1307    1310#
T2C     003422          1312#   1318
T2D     003442          1314    1317#
T2E     003446          1319#   1325
T2F     003462          1321    1323#
T3      003514          1335#   1359
T3A     003516          1336#   1342
T3B     003534          1338    1341#
T3C     003540          1344#   1350
```

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T3D     003556          1346    1348#
T3E     003564          1351#   1357
T3F     003600          1353    1355#
T4      003654          1368    1371#
T4A     003656          1372#   1426
T4B     003660          1373#   1377
T4C     003704          1379#   1393
T4D     003706          1380#   1388
T4E     003740          1382    1387#
T4F     003754          1391#   1395
T4G     003772          1390    1396#
T4H     003774          1397#   1403
T4J     004012          1399    1401#
T4K     004020          1404#   1422
T4L     004022          1405#   1419
T4M     004074          1412    1415#
T4N     004106          1407    1409    1418#
T4P     004112          1420#   1424
T5      004154          1435#   1479
T5A     004200          1438    1440#
T5B     004212          1442#
T5C     004222          1444#   1451
T5D     004252          1446    1450#
T5E     004260          1453#   1465    1477
T5F     004322          1458    1461#
T5FLAG  004422          1435*   1481#   1511*   1567    1610
T5G     004334          1455    1464#
T5H     004352          1467    1469#
T5INC   004424          1440*   1448    1482#
T5J     004354          1470#   1475
T5K     004374          1472    1474#
USSTST  001614          1010#   1013
USS.OK  001632          1011    1015#
VALID   002262          1097    1103#
VAL1    002300          1108#   1111
VAL2    002312          1109    1112#
VAL3    002326          1113    1116#
VAL4    002332          1101    1115    1117#
WAITK   011532          2332#   2442
WAITKY= 104400          1086    1126    1148    1160    1176    1188    1203    2389    2457#
WAIT1   005116          1588#   1590#   1593*
WBUF    000530           889#   1621    1801    2004    2059    2201
WRCHEK  000570           907#   1497    1579    1632    1695*   1776    1778    1788
WRITI   005140          1597#   2443
WRITIT= 104402          1273    1290    1308    1339    1384    1436    2458#
WRPASS  000562           904#   1613*   1628    1630    1634*   1637    1658    1693    1704*   1705    1711*   2191*   2210*
                        2214*
WRRECR  000614           918#   1374*   1383    1385*   1609*   2232    2237
WRTDMP  006126          1735#
WRTD1   006416          1780#   1789
WRTD2   006440          1782    1787#
WRTLEN  000626           923#   1605*   1619    1674*   1675    1677    1679*   1700    2199    2219
W1      005206          1602    1605#
W10     005434          1641    1645#
W11     005506          1649    1658#   1714
W12     005542          1662    1666#
```

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XRGRCD  010724          2193    2210*   2213
XRGREC  010610          1710    2190*   2224
XRGO    010620          2192*   2215
XRGS    010732          2209    2212*
ZERO    011E14          2296*   2313    2315*   2324*
$CNTG   013565          2375    2599*
$MCRLF  013613          2397    2605*
$MNEW   013603          2381    2603*
$MSWR   013573          2377    2601*
$READ   012016          2384    2387*
$R1     007362          1979    1981*
$RS     007520          2006*   2009
$ZERO$  002014          1052    1056*
.     = 013620           853*    855*    857*    859*    868*    870*    876*    937*    939*    941*    943*    945*    947*
                         949*    951*   1099    1118    1205    1208    1211    1236    1526    1545    1548    1611    1616
                        1618    1655    1709    1718    1753    1756    1765    1768    1771    1791    1816    1831    1857
                        1886    1984    1986    2022    2041    2088    2116    2149    2152    2161    2164    2167    2196
                        2203    2241    2243    2290    2319    2325    2333    2335    2345*   2350    2355    2359    2362
                        2608
```

DZTMBD.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

```
HALT     855  1255
INC     1058  1214  1414  1460  1518  1532  1633  1654  1656  1670  1695  1704  1707  1728  2021
        2023  2042  2089  2092  2096  2103  2214  2259  2283  2298  2303  2364
INCB    1020  1108  1780  1875
JMP      871   872   873  1037  1038  1065  1093  1131  1206  1217  1237  1238  1280  1296  1328
        1360  1427  1468  1480  1714  1719  1726  1817  1818  2095
JSR      974  1080  1257  1278  1294  1315  1326  1347  1358  1400  1425  1439  1466  1478  1485
        1491  1505  1506  1550  1569  1572  1623  1639  1651  1660  1701  1710  1715  1716  1723
        1741  1748  1928  1997  2012  2018  2025  2035  2053  2094  2120  2124  2136  2143  2194
        2204  2220  2227  2234  2246  2270  2281  2302  2384
MOV      970   975   976   977   978   979   980   981   983   987   988   989   991   992   993
         999  1000  1003  1008  1009  1025  1027  1029  1033  1035  1041  1044  1046  1063  1067
        1068  1069  1072  1073  1074  1076  1081  1082  1083  1100  1105  1119  1122  1125  1136
        1139  1201  1209  1212  1213  1218  1223  1224  1225  1227  1241  1245  1253  1374  1383
        1385  1410  1413  1416  1435  1440  1447  1456  1459  1462  1486  1492  1497  1498  1501
        1515  1522  1546  1579  1586  1587  1588  1591  1593  1599  1600  1603  1604  1605  1609
        1614  1619  1621  1625  1630  1653  1679  1698  1700  1720  1721  1730  1732  1736  1743
        1749  1751  1754  1757  1759  1761  1763  1766  1769  1772  1774  1776  1778  1783  1785
        1795  1797  1801  1802  1822  1828  1829  1848  1854  1855  1883  1894  1920  1929  1935
        1936  1937  1938  1939  1940  1941  1960  1961  1962  1963  1964  1965  1966  1980  1981
        1982  1987  1988  1992  1994  1995  1999  2003  2004  2005  2020  2032  2034  2036  2038
        2050  2052  2059  2061  2063  2072  2076  2081  2097  2112  2117  2118  2126  2128  2132
        2138  2145  2147  2150  2153  2155  2157  2159  2162  2165  2168  2170  2172  2174  2176
        2178  2190  2191  2197  2199  2201  2207  2217  2219  2221  2231  2232  2236  2239  2252
        2254  2256  2258  2261  2266  2269  2273  2277  2291  2294  2295  2296  2297  2313  2315
        2320  2341  2371  2375  2377  2379  2381  2388  2397  2407  2418  2424  2425  2426  2431
        2432  2433  2437  2439  2441
MOVB    1050  1053  1055  1062  1779  1874  2336  2337  2348  2356  2360  2363
NEG     1620  1993  2200  2238
NOP     1258  1259  1260
ROL     1141  1142  1143  1144  1154  1944  1945  2271  2272  2274  2275  2276  2282
ROR     1057  1520  1534  1547  1617  1745  1985  2115  2140  2202  2242  2280
RTI     1594
RTS     1489  1495  1502  1512  1528  1538  1551  1576  1584  1592  1612  1644  1647  1665  1668
        1683  1792  1799  1825  1832  1851  1858  1878  1887  1923  1932  1967  2015  2028  2113
        2122  2182  2211  2228  2235  2247  2263  2286  2292  2306  2321  2339  2343  2351  2385
        2434
SUB     2008  2067  2237  2299  2438
SWAB    1140  1153  1523  1737  1744  2133  2139
TST      984  1031  1089  1091  1129  1567  1597  1610  1626  1628  1637  1658  1672  1693  1781
        1787  1790  1978  2000  2104  2208  2267  2309  2393  2401
TSTB    1004  1098  1117  1207  1210  1544  1615  1680  1983  2195  2240  2289  2318  2332  2334
        2354  2358  2361  2369
WAIT    1590
.ASCII  2344  2473  2474  2477  2481  2485  2486  2490  2496  2501  2505  2509  2518  2526  2529
        2533  2537  2542  2546  2548  2550  2552  2554  2556  2558  2560  2564  2568  2573  2578
        2581  2586  2592  2598  2599  2601  2603  2605
.ENABL   852
.END    2610
.EVEN   2345  2606
.LIST    855
.NLIST   855
.REM       1
.REPT    855
.TITLE   822
.WORD    855   869
```

ERRORS DETECTED: 0
DEFAULT GLOBALS GENERATED: 0

*DZTMBD,DZTMBD.SEQ/SOL/CRF/DS:ERFZ/EN:ABS=DSKM:DZTMBD.P11
RUN-TIME: 7 15 3 SECONDS
RUN-TIME RATIO: 57/27=2.0
CORE USED: 9K (17 PAGES)

NOS

Spooler runtime 9 Seconds, 43 KCS, 246 disk reads, 4 disk writes, 64 pages