TM11 DATA RELIAB 9TRK
CZTMB60
TMB11

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FEB 1985
digital
Made In USA

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IDENTIFICATION

PRODUCT CODE: AC-9398G-MC

PRODUCT NAME: CZTMBGO TM 11 DATA RELIAB 9TRK

PROGRAM DATE: 16 JUNE 1984

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: JEREMY HITT

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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).
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                        4.      STARTING PROCEDURE

                        4.1     CONTROL SWITCH SETTINGS

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

                                210 -    "          "          "      "   ( "   8K   "       "     )
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105
106
107
108                          4.3     PROGRAM AND/OR OPERATOR ACTION
109                                  LOAD PROGRAM INTO MEMORY
110                                  SET DESIRED TU10 TAPE UNITS ON-LINE AND WRITE ENABLED
111                                  LOAD STARTING ADDRESS 200 (204 OR 210  TO SELECT PARAMETERS AND UNITS)
112                                  START PROGRAM-PROGRAM WILL BEGIN TESTING FOR LOAD ADDRESS OF 200 OTHERWISE
113                                  SELECT TAPE UNITS (REFERENCE 4.3.1)
114                                  SELECT PARAMETERS (REFERENCE 4.3.2)
115                                  TYPE CARRIAGE RETURN AND PROGRAM WILL BEGIN TESTING.
116                                  ***THE PROGRAM WILL ALLOW THE LOADING OF SOFTWARE SWITCH REGISTER
117                                     AFTER PROGRAM HAS BEEN STARTED BY TYPING OUT THE FOLLOWING
118                                     SWR=XXXXXX NEW= (REFER TO SECT 5.1 FOR OPERATOR ACTION).
119
120                          4.3.1   TAPE UNIT SELECTION
121
122                                  STARTING THE PROGRAM AT 200 WILL RESULT IN AUTOMATIC SELECTION
123                                  OF THE UNITS TO BE TESTED (REFERENCE 4.3.1.2) OTHERWISE STARTING
124                                  AT 204 OR 210 WILL ALLOW OPERATOR TO SELECT THE UNITS.
125
126                                  THE PROGRAM WILL TYPE "SELECT UNITS". ANY CONFIGURATION OF
127                                  1 TO 8 UNITS MAY BE SELECTED BY TYPING THE UNIT NUMBERS ON
128                                  THE TELETYPE.  ANY SEQUENCE OF NUMBERS MAY BE TYPED.  AFTER
129                                  EACH NUMBER IS TYPED A COMMA (,) WILL BE PRINTED.  TYPING THE
130                                  SAME UNIT NUMBER TWICE WILL CAUSE THAT UNIT NUMBER TO BE DELETED.
131                                  TYPING ANY KEY OTHER THAN 0 THRU 7 WILL CAUSE A QUESTION MARK
132                                  (?) TO BE PRINTED AND THAT KEY WILL BE IGNORED.
133
134                                  TO TERMINATE UNIT SELECTION TYPE A CARRIAGE RETURN.  WHEN
135                                  CARRIAGE RETURN IS TYPED THE PROGRAM WILL CONTINUE TO THE
136                                  "PARAMETER SELECTION" UNLESS NO UNITS WERE SELECTED AND IN
137                                  THAT EVENT WILL RETURN TO THE BEGINNING OF "SELECT UNITS".
138
139                        4.3.1.1 TAPE UNIT SELECTION EXAMPLES
140
141                                          SELECT UNITS 3,4,5
142                                          SELECT UNITS 5,3,4
143
144                                  IN EITHER CASE, UNITS 3,4,5 ARE SELECTED.
145
146                                          SELECT UNITS
147                                          SELECT UNITS
148
149                                  A CARRIAGE RETURN WAS TYPED WITH NO UNITS SELECTED.
150
151                                          SELECT UNITS 1,9?,1,2
152
153                                  ONLY UNIT 2 SELECTED, UNIT 1 WAS DELETED (TYPED TWICE)
154                                  AND THE 9 WAS IGNORED.
155
```

```
157
158
159                          4.3.1.2 AUTOMATIC UNIT SELECTION
160
161                                  STARTING AT 200 WILL RESULT IN AUTOMATIC SELECTION OF UNITS TO
162                                  BE TESTED. A UNIT WILL BE SELECTED FOR TESTING IF IT MEETS THE
163                                  FOLLOWING CRITERIA:
164                                          1. IT IS ON-LINE
165                                          2. IT IS NINE(9) TRACK
166                                          3. IT IS WRITE ENABLED
167
168                                  IF THE ABOVE CRITERIA IS NOT MEET BY A LEAST ONE(1) UNIT
169                                  OPERATOR SELECTION WILL BE REQUIRED (REFERENCE 4.3.1).
170
171                          4.3.2   PARAMETER SELECTION
172
173                                  STARTING THE PROGRAM AT 200 WILL RESULT IN AN AUTOMATIC
174                                  SELECTION OF TEST PARAMETERS (REFERENCE 4.3.2.8) OTHERWISE
175                                  STARTING AT ADDRESS 204 OR 210 WILL ALLOW OPERATOR TO SELECT
176                                  PARAMETERS.THERE ARE FIVE TYPES OF PARAMETERS TO BE CONTROLLED BY THE
177                                  OPERATOR.  THEY INCLUDE: TEST NUMBER, PATTERN, RECORD LENGTH,
178                                  WRITE MODE, AND READ MODE.  THE PROGRAM WILL PRINT:
179
180                                          "TST PAT RLS WMO RMO"
181
182                                  TST=TEST NUMBER
183                                  PAT=PATTERN
184                                  RLS=RECORD LENGTH SEQUENCE
185                                  WMO=WRITE START/STOP MODE
186                                  RMO=READ START/STOP MODE
```

```
188
189
190                         4.3.2.1 TEST NUMBER
191
192                                 THERE ARE 6 TESTS AVAILABLE FOR SELECTION (0 THRU 5).
193
194                                 TEST            DESCRIPTION
195
196                                 0       WRITE 1 RECORD, REPEAT ON ALL UNITS, CONTINUE TO END
197                                         OF TAPE.
198
199                                 1       WRITE 256 RECORDS, REPEAT FOR ALL UNITS, CONTINUE TO END
200                                         OF TAPE.
201
202                                 2       WRITE 256 RECORDS, REPEAT FOR ALL UNITS, BACKSPACE 256
203                                         RECORDS, REPEAT FOR ALL UNITS, READ 256 RECORDS, REPEAT
204                                         FOR ALL UNITS , CONTINUE TO END OF TAPE.
205
206                                 3       WRITE 1 RECORD, REPEAT FOR ALL UNITS, BACKSPACE, REPEAT
207                                         FOR ALL UNITS, READ 1 RECORD, REPEAT FOR ALL UNITS,
208                                         CONTINUE TO END OF TAPE.
209
210                                 4       WRITE 1 RECORD, REPEAT FOR ALL UNITS, REPEAT FOR 256
211                                         RECORDS, BACKSPACE 256 RECORDS, REPEAT FOR ALL UNITS,
212                                         READ 1 RECORD, REPEAT FOR ALL UNITS, REPEAT FOR 256
213                                         RECORDS, CONTINUE TO END OF TAPE.
214
215                                 5       READ 1 RECORD, REPEAT FOR ALL UNITS, CONTINUE TO END
216                                         OF TAPE.
217
```

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
		ETC.	ETC.

PATTERN	DESCRIPTION	DATA	CHANNELS
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
		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	?	?

```
331
332
333                         4.3.2.3 RECORD LENGTH SEQUENCE
334
335                                 THERE ARE 4 TYPES OF RECORD LENGTH SEQUENCES FOR SELECTION (0 THRU 3)
336
337                                 RLS     DESCRIPTION
338
339                                 0       MINIMUM LENGTH RECORDS (4 BYTES)
340
341                                 1       MAXIMUM LENGTH RECORDS (1024 BYTES)
342
343                                 2       VARING LENGTH RECORDS, MINIMUM TO MAXIMUM (1ST RECORD=
344                                         4 BYTES, EACH SUCCESSIVE RECORD IS 4 BYTES LONGER
345                                         UNTIL 256TH RECORD=1024 BYTES)
346
347                                 3       VARYING LENGTH RECORDS, MAXIMUM TO MINIMUM (1ST RECORD=
348                                         1048 BYTES, EACH SUCCESSIVE RECORD IS 4 BYTES SHORTER
349                                         UNTIL 256TH RECORD=4 BYTES)
350
351                         4.3.2.4 WRITE START/STOP MODE
352
353                                 THERE ARE 3 TYPES OF WRITE MODES FOR SELECTION (0 THRU 2)
354
355                                 WMO     DESCRIPTION
356
357                                 0       NONSTOP - NO WAITING BETWEEN WRITE OPERATIONS.  NEW
358                                                 COMMAND IS ISSUED WHEN CU READY SETS.
359
360                                 1       START/STOP - FULL STOP BETWEEN WRITE OPERATIONS.  NEW
361                                                 COMMAND IS ISSUED WHEN TU READY SETS.
362
363                                 2       RANDOM - FULL STOP WITH RANDOM DELAY (1-256 MILLISECONDS)
364
365
366
367                         4.3.2.5 READ START/STOP MODE
368
369                                 THERE ARE 3 TYPES OF MODES FOR SELECTION (0 THRU 2)
370
371                                 RMO     DESCRIPTION
372
373                                 0       NONSTOP - NO WAITING BETWEEN READ OPERATIONS.  NEW
374                                                 COMMAND IS ISSUED WHEN CU READY SETS.
375
376                                 1       START/STOP - FULL STOP BETWEEN READ OPERATIONS.  NEW
377                                                 COMMAND IS ISSUED WHEN TU READY SETS.
378
379                                 2       RANDOM - FULL STOP WITH RANDOM DELAY (1-256 MILLISECONDS)
380
```

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

SW	FUNCTION	PURPOSE
3 (000010)	PRINT AFTER PARITY ERRORS	USE OF THIS SWITCH WILL CAUSE 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       DELETE READ RE-TRYS     USE OF THIS SWITCH WILL CAUSE
                        (000020)                        DELETION OF THE NORMAL SEQUENCE
                                                        OF TRYING TO RE-READ A RECORD
                                                        AFTER A READ ERROR.  THIS WOULD
                                                        BE USEFUL FOR SCOPING READ
                                                        OPERATIONS.

                        5       DELETE WRITE XIRG       USE OF THIS SWITCH WILL CAUSE
                        (000040)                        RECORDS WITH WRITE ERRORS TO
                                                        BE LEFT ON TAPE.  THE READ PASS
                                                        WITH DATA TYPEOUTS SELECTED
                                                        WOULD BE USEFUL FOR DETERMINING
                                                        WRITE ERROR ORIGINS.

                        6       WRITE STATISTICAL       USE OF THIS SWITCH WILL CAUSE
                        (0001000)RECOVERY               A BACKSPACE 2 RECORDS, SPACE
                                                        FORWARD 1 RECORD, REWRITE RECORD
                                                        SEQUENCE TO BE USED INSTEAD
                                                        OF WRITE XIRG SO THAT THE RECORD
                                                        WILL BE REWRITTEN ON APPROXI-
                                                        MATELY THE SAME AREA OF TAPE
                                                        WHERE THE WRITE ERROR OCCURRED.
                                                        THIS METHOD KEEPS THE INTER-
                                                        RECORD GAP FROM GETTING LARGER.
                                                        DATA IS WRITTEN OVER THE SAME
                                                        SPOT ON TAPE TO TRY AND FIND BAD TAPE.
```

5.1.2 SWITCHES TO CONTROL ERROR PRINTOUTS

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

SW	FUNCTION	PURPOSE
13 (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	WMD	RMD
3	2	0	0	0
4	6	0	0	0

WITH SW0=1

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

6. ERRORS

6.1 WRITE ERRORS

THE FOLLOWING ERROR TYPEOUTS ARE POSSIBLE DURING A WRITE OPERATION.

A. WRITE STATUS ERROR

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

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

B. XIRG WRITTEN 4 TIMES

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

C. END OF TAPE

```
DRV  PAT  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.

```
684
685
686                         6.3     ERROR RECOVERY PROCEDURES
687
688                         6.3.1   WRITE ERROR RECOVERY
689
690                                 THE PROCEDURE TO RECOVER FROM A WRITE ERROR IS DETERMINED BY
691                                 THE FOLLOWING:
692
693                                 A.  IS IT A "WRITE ONLY" TEST OR WILL THE DATA BE READ?
694
695                                 B.  IS "WRITE STATISTICAL RECOVERY" SELECTED (SW 6=1)?
696
697                                 C.  IS "DELETE WRITE WITH XIRG" SELECTED (SW 5=1)?
698
699                         6.3.1.1 IF IT IS A "WRITE ONLY" TEST AND "WRITE STATISTICAL RECOVERY"
700                                 IS NOT SELECTED (SW 6=0) THE WRITE ERROR IS SIMPLY COUNTED
701                                 AND THE PROGRAM PROCEEDS TO THE NEXT RECORD.
702
703                         6.3.1.2 IF IT IS A "WRITE ONLY" TEST AND "WRITE STATISTICAL
704                                 RECOVERY" IS SELECTED (SW 6=1), A WRITE ERROR IS COUNTED AND THEN
705                                 A RECOVERY SEQUENCE (BACKSPACE 2 RECORDS, SPACE FORWARD 1 RECORD,
706                                 REWRITE RECORD) IS ENTERED.  THIS RECOVERY SEQUENCE WILL BE
707                                 REPEATED UP TO 7 TIMES IF THE WRITE ERROR PERSISTS.  IF A
708                                 WRITE ERROR IS NOT ELIMINATED AFTER THE 8TH ATTEMPT IT IS
709                                 COUNTED AS A PERMANENT BAD SPOT ON TAPE.  STATISTICS ARE SAVED
710                                 TO INDICATE HOW MANY TIMES THE REWRITE SEQUENCE HAD TO BE RE-
711                                 PEATED TO RECOVER FROM EACH WRITE ERROR.
712
713                         6.3.1.3 IF IT IS A "WRITE AND READ" TEST AND "WRITE STATISTICAL RECOVERY"
714                                 IS SELECTED (SW 6=1) AND "WRITE WITH XIRG" IS NOT DELETED (SW 5=0)
715                                 THE PROGRAM WILL FIRST ATTEMPT TO DO A "WRITE STATISTICAL RECOVERY".
716                                 IF A PERMANENT BAD SPOT IS ENCOUNTERED THE PROGRAM WILL THEN
717                                 ATTEMPT TO RECOVER WITH A "WRITE WITH XIRG".  FAILURE TO RECOVER
718                                 AT THIS POINT SHOULD RESULT IN A READ ERROR DURING THE READ PASS.
719
720                         6.3.1.4 IF IT IS A "WRITE AND READ" TEST AND "WRITE STATISTICAL RECOVERY"
721                                 IS NOT SELECTED (SW 6=0) AND "WRITE WITH XIRG" IS NOT DELETED
722                                 (SW 5=0) THE PROGRAM WILL TRY TO RECOVER ONLY BY REWRITING THE
723                                 RECORD WITH EXTENDED INTERRECORD GAP.  FAILURE TO RECOVER SHOULD
724                                 RESULT IN A READ ERROR DURING READ PASS.
725
726                         6.3.2   READ ERROR RECOVERY
727
728                                 A READ ERROR CAN OCCUR FOR TWO REASONS:  STATUS ERROR OR DATA
729                                 ERROR.  A PROPER COUNT IS TAKEN FOR EACH TYPE OF ERROR.  RECOVERY
730                                 OF A READ ERROR WILL CONSIST OF TRYING TO RE-READ THE RECORD UP
731                                 TO TWO MORE TIMES (UNLESS SW 4=1 TO DELETE READ RE-TRYS FOR
732                                 SCOPING PURPOSES).  IF THE ERROR PERSISTS IT IS CONSIDERED "NON-
733                                 RECOVERABLE" AND THE PROGRAM WILL CONTINUE WITH THE NEXT RECORD.
734
735                         7.      RESTRICTIONS
736
737                                 NONE
738
```

```
740
741
742                         8.      MISCELLANEOUS
743
744                         8.1     TAPE LENGTH
745
746                                 SINCE EACH OF THE TESTS DEPEND ON REACHING THE "EOT" REFLECTOR
747                                 FOR TERMINATING IT COULD BE ADVANTAGEOUS TO USE A "SHORT" TAPE.
748                                 THIS WOULD ALLOW FOR LESS TIME TO RUN A SERIES OF TESTS WHILE
749                                 VARYING THE TEST PARAMETERS (REFERENCE 5.1.3).  HOWEVER, THIS
750                                 IS NOT INTENDED TO IMPLY THAT CONSTANTLY CHANGING THE TEST
751                                 PARAMETERS CONSTITUTES A MORE DIFFICULT TEST OF DATA RELIABILITY.
752                                 THE LENGTH OF TIME UNDER TEST IS MORE LIKELY TO SUPPLY THAT.
753                                 IN ANY EVENT, IF A "SHORT" TAPE IS DESIRED, JUST PLACE AN "EOT"
754                                 REFLECTIVE STRIP APPROXIMATELY 50 FEET DOWN TAPE FROM THE "BOT"
755                                 MARKER.  SO THAT THE TAPE IS STILL USEFUL AS A "LONG" TAPE
756                                 ANOTHER "BOT" MARKER COULD BE PLACED A SHORT DISTANCE (APPROX-
757                                 IMATELY 10 FEET) FARTHER DOWN ON TAPE.  THIS WOULD EFFECTIVELY
758                                 GIVE YOU TWO TAPES.  CARE MUST BE EXERCISED WHEN MOUNTING THE TAPE
759                                 TO POSITION IT AT THE PROPER "BOT" MARKER.
760
761                         8.2     MEMORY AVAILABLE
762
763                                 THE PROGRAM REQUIRES 4K OF MEMORY.  IF 8K IS AVAILABLE, STARTING
764                                 THE PROGRAM AT ADDRESS 200 OR 210 WILL EXPAND THE WRITE AND READ BUFFERS
765                                 SO THAT THE MINIMUM LENGTH RECORDS WILL BE 8 BYTES AND MAXIMUM
766                                 LENGTH RECORDS WILL BE 2048 BYTES.
767
768                         9.      PROGRAM DESCRIPTION
769
770                         9.1     GENERAL DESCRIPTION
771
772                                 THE PROGRAM IS DESIGNED AROUND TWO MAIN SUBROUTINES "WRITE" AND
773                                 "READ" AND A SERIES OF MINOR SUBROUTINES FOR MANIPULATING UNIT
774                                 SELECTION, HANDLING ERROR STATISTICS, AND RECORD POSITIONING.
775                                 IF MORE THAN ONE UNIT IS SELECTED THE UNIT WITH THE LOWEST
776                                 NUMBER IS SELECTED FIRST AND WHEN THE SEQUENCE IS COMPLETED
777                                 THEN THE NEXT LOWEST UNIT NUMBER IS SELECTED UNTIL ALL UNITS HAVE
778                                 BEEN SELECTED.  THIS PROCESS IS REPEATED UNTIL ALL UNITS REACH
779                                 END OF TAPE.
780
781                         9.2     TEST 0
782
783                                 THIS IS A "WRITE ONLY" TEST.  THE PROCEDURE IS TO WRITE 1 RECORD,
784                                 REPEAT FOR ALL UNITS, CONTINUE UNTIL EOT.  WRITE MODE OF NONSTOP
785                                 (WMO=0) WILL NOT BE AN EFFECTIVE SELECTION FOR THIS TEST BECAUSE
786                                 THE WRITE ROUTINE IS EXITED AFTER EACH RECORD TO DETERMINE IF
787                                 ANY OTHER UNITS ARE SELECTED.  READ MODE (RMO) HAS NO EFFECT ON
788                                 THIS TEST.
789
790                         9.3     TEST 1
791
792                                 THIS IS A "WRITE ONLY" TEST SIMILAR TO TEST 0 EXCEPT A SEQUENCE
793                                 OF 256 RECORDS IS WRITTEN ON EACH UNIT BEFORE CHANGING TO THE
794                                 NEXT UNIT.  READ MODE (RMO) HAS NO EFFECT ON THIS TEST.
795
```

```
797
798
799
800                             9.4     TEST 2
801
802                                     THIS IS A "WRITE AND READ" TEST.  THE PROCEDURE IS TO WRITE 256
803                                     RECORDS ON EACH UNIT, THEN BACKSPACE 256 RECORDS ON EACH UNIT,
804                                     THEN READ 256 RECORDS ON EACH UNIT, AND THEN REPEAT THE SEQUENCE
805                                     UNTIL ALL UNITS ARE AT EOT.
806
807                             9.5     TEST 3
808
809                                     THIS IS A "WRITE AND READ" TEST.  THE PROCEDURE IS TO WRITE 1
810                                     RECORD, BACKSPACE, READ 1 RECORD AND REPEAT FOR EACH UNIT, THEN
811                                     REPEAT THE SEQUENCE UNTIL ALL UNITS ARE AT EOT.  WRITE MODE OR
812                                     READ MODE OF NONSTOP (WMO=0 OR RMO=0) WILL NOT BE EFFECTIVE
813                                     FOR THIS TEST.
814
815                             9.6     TEST 4
816
817                                     THIS IS A "WRITE AND READ" TEST.  IT IS SIMILAR TO TEST 2 EXCEPT
818                                     UNITS ARE CHANGED BETWEEN EACH RECORD DURING WRITE, BACKSPACE,
819                                     AND READ.  WRITE MODE OR READ MODE OF NONSTOP (WMO=0 OR RMO=0)
820                                     WILL NOT BE EFFECTIVE FOR THIS TEST.
821
822                             9.7     TEST 5
823
824                                     THIS IS A "READ ONLY" TEST.  THE PROCEDURE IS TO READ 1 RECORD,
825                                     REPEAT FOR ALL UNITS, AND CONTINUE UNTIL ALL UNITS ARE AT EOT.
826                                     THE MAIN PURPOSE OF THIS TEST IS TO PROVE COMPATIBILITY AMONG
827                                     TAPE UNITS.  A TAPE THAT IS WRITTEN ON ONE UNIT SHOULD BE ABLE
828                                     TO BE READ ON ANY OTHER UNIT.  TEST PARAMETERS THAT SELECT
829                                     PATTERN AND RECORD LENGTH SEQUENCE MUST BE THE SAME AS THOSE USED
830                                     TO WRITE THE DATA ON TAPE.  ANY OF THE OTHER TESTS (0 THRU 4)
831                                     CAN BE USED TO GENERATE THE DATA.
832
833
834
835                             10.     LISTING
836
837                             $
```

```
                        .TITLE TM 11 DATA RELIAB 9TRK


                        ;               REVISION HISTORY
                        ;
                        ;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.
                        ;
                        ;REVISED DECEMBER 1977, CLEM WALSH
                        ;
                        ;REVISED JUNE 1984, JEREMY MITT
                        ;       CZTMBG - ADDED XON/XOFF FUNCTIONALITY TO SUPPORT REMOTE DIAGNOSIS.
                        ;
```

```
872
873             000000          R0=%0
874             000001          R1=%1
875             000002          R2=%2
876             000003          R3=%3
877             000004          R4=%4
878             000005          R5=%5
879             000006          SP=%6
880             000007          PC=%7
881
882 000000                              .ENABL  ABS, AMA
883             000000                  .=0
884                             ;TRAP CATCHER IN UNUSED LOCATIONS 0-476
892             000034                  .=34
893 000034  012306                      TRAP34
894
895                             ;*****************************************************************************
896                             ;SOFTWARE SWITCH REGISTER IS LOCATED AT LOC. 176
897
898                             ;BEFORE STARTING REFER TO SECTION 5.1 OF DOCUMENT
899
900                             ;*****************************************************************************
```

J2


```
902
903                                     ;*****************************************************************
904                                     ;               MODIFIED DEC 16 1977
905                                     ;
906                                     ;       ++
907                                     ;       ACT11 AND XXDP HOOKS
908                                     ;       --
909                                     ;*****************************************************************
910
911             000036                          $SVPC=.         ;SAVE PC
912             000040                          .=40
913 000040      000000          DRIVE:  .BYTE   0               ;DRIVE # FOR XXDP LOAD MEDIUM
914                                                             ;ASSEMBLE AS A 0
915
916             000041                          .=41
917 000041      000000          MEDIUM: .BYTE   0               ;XXDP LOAD MEDIUM
918                                                             ;ASSEMBLE AS A 0
919
920             000042                          .=42
921 000042      000000                          .WORD   0       ;AUTO/MAN MODE INDICATOR
922                                                             ;ASSEMBLE AS A 0
923
924             000046                          .=46
925 000046      003240                          .WORD   $ENDAD  ;SET TO $ENDAD IN .$EOP
926
927             000052                          .=52
928 000052      000000                          .WORD   0       ;CHARACTERISTICS OF PROGRAM
929                                                             ;SET TO 0
930
931             000036                                  .=$SVPC         ;RESTORE PC
932
933                                     ;       *****************************************************************
934
```

```



              000400                                       .=400

                                                  ;        ************************************************************************
                                                  ;                                 MODIFIED DEC 16 1977

                                                  ;        ++
                                                  ;                 ACT11 AND XXDP MODE INDICATORS
                                                  ;        --

       000400 000000                                       AUTOM:   .WORD    0                      ;AUTOMATIC MODE INDICATOR
       000402    000                                       ACT11M:  .BYTE    0                      ;ACT11 AUTO MODE INDICATOR
       000403    000                                       XXDPM:   .BYTE    0                      ;XXDP AUTO MODE INDICATOR
       000404    000                                       ADUMPM:  .BYTE    0                      ;ACT11 DUMP MODE INDICATOR
       000405    000                                       XDUMPM:  .BYTE    0                      ;XXDP DUMP MODE INDICATOR

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

```

```

        000176                      .=176
000176  000000                      SWREG:  .WORD 0                 ;SOFTWARE SWITCH REGISTER
        000200                      .=200
000200  000137  001356              JMP     AUTOST
000204  000137  002070              JMP     MEM4K
000210  000137  002114              JMP     MEM8K

        000500              STACK=500
        000500                      .=500
000500  172520              MTS:    172520
000502  172522              MTC:    172522
000504  172524              BC:     172524
000506  172526              CA:     172526
000510  177776              CC:     177776
000512  177570              SWR:    177570
000514  177560              TKS:    177560
000516  177562              TKB:    177562
000520  177564              TPS:    177564
000522  177566              TPB:    177566
000524  002000              MAXLEN: 1024.           ;MAX RECORD LENGTH
000526  000004              MINLEN: 4.              ;MIN RECORD LENGTH
000530  014142              WBUF:   BUFFER          ;STARTING ADDRESS OF WRITE BUFFER
000532  016142              RBUF:   BUFFER+1024.    ;STARTING ADDRESS OF READ BUFFER
000534  000224              MTV:    224

                            ;TEMPORARY STORAGE AREAS
000536  000000              $CTRLS: 0               ;JH>> XON/XOFF FLAG
000540  000000              ATST:   0
000542  000000              DRVSEL: 0
000544  000000              STRLEN: 0
000546  000000              LENGTH: 0
000550  000000              MSBITS: 0
000552  000000              SVRECR: 0
000554  000000              COMAND: 0
000556  000000              CDRVBT: 0
000560  000000              CDRIVE: 0
000562  000000              RDPASS: 0
000564  000000              WRPASS: 0
000566  000000              BLKINC: 0
000570  000000              STATRD: 0
000572  000000              WRCHEK: 0
000574  000000                      0
000576  000000                      0
000600  000000                      0
000602  000000                      0
000604  000000                      0
000606  000000                      0
000610  000000                      0

000612  000000              PERMBS: 0
000614  000000              RECORD: 0
000616  000000              WRRECR: 0
000620  000000              LASRCR: 0
000622  000000              RDERRS: 0
000624  000000              DAERRS: 0
000626  000000              NRREAD: 0
```

M2


```
1014 000630  000000                    WRTLEN: 0
1015 000632  000000                    READLN: 0
1016 000634  000000                    MODES:  0
1017
1018 000636  000656                    DRVADR: D0TAB
1019 000640  000722                            D1TAB
1020 000642  000766                            D2TAB
1021 000644  001032                            D3TAB
1022 000646  001076                            D4TAB
1023 000650  001142                            D5TAB
1024 000652  001206                            D6TAB
1025 000654  001252                            D7TAB
1026
1027 000656  000000                    D0TAB:  0
1028         000722                            .=D0TAB+44
1029 000722  000000                    D1TAB:  0
1030         000766                            .=D1TAB+44
1031 000766  000000                    D2TAB:  0
1032         001032                            .=D2TAB+44
1033 001032  000000                    D3TAB:  0
1034         001076                            .=D3TAB+44
1035 001076  000000                    D4TAB:  0
1036         001142                            .=D4TAB+44
1037 001142  000000                    D5TAB:  0
1038         001206                            .=D5TAB+44
1039 001206  000000                    D6TAB:  0
1040         001252                            .=D6TAB+44
1041 001252  000000                    D7TAB:  0
1042         001316                            .=D7TAB+44
1043 001316  000000                    CHARIN: 0                       ;CHARACTER JUST INPUT
1044 001320  000000                    NUMTST: 0                       ;NUMBER OF TEST
1045 001322  000000                    PARAM:  0                       ;TEST PARAMETERS
1046 001324  000000                    TSTEX:  0                       ;POINTS TO TEST PARAMETERS TO BE EXECUTED
1047 001326  000000                    TEST:   0                       ;CONTAINS CURRENT TEST NUMBER
1048
1049 001330  000000                    TSTTBL: 0                       ;TEST TABLE
1050 001332  000000                            0                       ;UP TO 10 TESTS CAN BE SELECTED TO
1051 001334  000000                            0                       ;BE RUN IN CONSECUTIVE ORDER
1052 001336  000000                            0
1053 001340  000000                            0
1054 001342  000000                            0
1055 001344  000000                            0
1056 001346  000000                            0
1057 001350  000000                            0
1058 001352  000000                            0
1059 001354  000000                            0
1060
1061 001356  012706  000500               AUTOST: MOV     #STACK,SP               ;SETUP THE SP
1062 001362  104432                             SUSWR                           ;CHECK FOR HARDWARE SWICH REG
1063 001364  004737  012364                     JSR     PC,CKMODE               ;CHECK FOR MODE OF OPERATION ++ C.W
1064 001370  022737  000176  000512             CMP     #SWREG,SWR
1065 001376  001004                             BNE     1$
1066 001400  004737  012004                     JSR     PC,CNTLU                ;ALLOW SWREG TO BE CHANGED
1067 001404  004737  012364                     JSR     PC,CKMODE               ;CHECK FOR MODE OF OPERATION
1068 001410  012737  177777  000540     1$:     MOV     #-1,ATST
1069 001416  012737  036025  001330             MOV     #36025,TSTTBL           ;SETUP TEST PARAMETERS
1070 001424  012737  040052  001332             MOV     #40052,TSTTBL+2
```

```
1071 001432  012737  027052  001334          MOV     #27052,TSTTBL+4
1072 001440  012737  000003  001320          MOV     #3,NUMTST
1073 001446  012737  123456  007366          MOV     #123456,LONUM           ;PRIME RANDOM NUMBER GENERATER
1074 001454  012737  176543  007370          MOV     #176543,HINUM
1075                                 ;DETERMINE THE SIZE OF THE WRITE AND READ BUFFERS.
1076 001462  012737  001476  000004          MOV     #NXMRET,@#4             ;SETUP NXM VECTOR
1077 001470  005737  024142                  TST     BUFFER+4096.            ;OVER 4K OF MEMORY?
1078 001474  000413                          BR      OVER4K                  ;BR IF YES
1079 001476  022626                  NXMRET: CMP     (SP)+,(SP)+             ;POP THE STACK
1080 001500  012737  000004  000526          MOV     #4,MINLEN
1081 001506  012737  002000  000524          MOV     #1024.,MAXLEN
1082 001514  012737  016142  000532          MOV     #BUFFER+1024.,RBUF
1083 001522  000411                          BR      TU.SEL                  ;GO SELCT DRIVES
1084 001524  012737  000010  000526  OVER4K: MOV     #8.,MINLEN
1085 001532  012737  004000  000524          MOV     #2048.,MAXLEN
1086 001540  012737  020142  000532          MOV     #BUFFER+2048.,RBUF
1087                                 ;DETERMINE DRIVES TO BE TESTED.
1088                                 ;A DRIVE WILL BE TESTED IF:
1089                                 ;       1. IT CAN BE SELECTED
1090                                 ;       2. IT IS 9 TRACK
1091                                 ;       3. IT IS WRITE ENABLED
1092 001546  012737  000006  000004  TU.SEL: MOV     #6,@#4                  ;SET TRAP CATCHER
1093 001554  012777  010000  176720          MOV     #10000,@MTC             ;PWR CLR
1094 001562  005037  000542                  CLR     DRVSEL                  ;CLEAR DRIVE TABLE
1095 001566  005037  000550                  CLR     MSBITS
1096 001572  012700  000200                  MOV     #200,R0                 ;R0=DRIVE 0
1097 001576  105777  176700                  TSTB    @MTC
1098 001602  100036                          BPL     IDSELF                  ;BR IF NO CU RDY
1099 001604  123737  000041  000004          CMPB    @#41,4                  ;DDP ON MAGTAPE?
1100 001612  001426                          BEQ     NO.SEL                  ;IF YES - SKIP DRIVE 0
1101 001614  013777  000542  176660  NXT.TU: MOV     DRVSEL,@MTC             ;SELECT A DRIVE
1102 001622  012702  000024                  MOV     #20.,R2                 ;SETUP R2 FOR WAIT LOOP
1103 001626  032777  000100  176644  USSTST: BIT     #100,@MTS               ;DOES DRIVE EXIST?
1104 001634  001003                          BNE     USS.OK                  ;BR IF YES
1105 001636  005302                          DEC     R2                      ;KILL SOME TIME
1106 001640  003372                          BGT     USSTST
1107 001642  000412                          BR      NO.SEL                  ;DRIVE IS NON-EXISTENCE
1108 001644  032777  000020  176626  USS.OK: BIT     #20,@MTS                ;IS THIS DRIVE 7 OR 9 CHN?
1109 001652  001006                          BNE     NO.SEL                  ;BR IF 7 CHN.
1110 001654  032777  000004  176616          BIT     #4,@MTS                 ;IS WRITE LOCK ON?
1111 001662  001002                          BNE     NO.SEL                  ;BR IF YES
1112 001664  050037  000550                  BIS     R0,MSBITS               ;PUT DRIVE INTO TABLE
1113 001670  105237  000543          NO.SEL: INCB    DRVSEL+1                ;INC. THE DRIVE NUMBER
1114 001674  006200                          ASR     R0                      ;HAS ALL DRIVES BEEN TESTED FOR EXISTENCE?
1115 001676  001346                          BNE     NXT.TU                  ;BR IF NO
1116
1117                                 ;TYPE-OUT NAME OF PROGRAM AND MIN. AND MAX. RECORD LENGTHS.
1118
1119 001700  105737  000402          IDSELF: TSTB    ACT11M                          ;ACT11 MODE?
1120 001704  001011                          BNE     3$                              ;BRANCH - IF YES
1121 001706  012702  013253                  MOV     #MSG10A,R2
1122 001712  104404                          TOP
1123 001714  013702  000526                  MOV     MINLEN,R2
1124 001720  104426                          DECPRT                          ;PRINT MIN. LENGTH
1125 001722  013702  000524                  MOV     MAXLEN,R2
1126 001726  104426                          DECPRT                          ;PRINT MAX. LENGTH
1127 001730  005737  000550          3$:     TST     MSBITS                  ;WAS ANY DRIVES SELECTED?
```

```
1128 001734  001012                    BNE     2$                      ;BR IF YES
1129 001736  013701  000042            MOV     @042,R1                 ;IS THERE A MONITOR?
1130 001742  001405                    BEQ     1$                      ;BRANCH IF NO
1131 001744  012702  013360            MOV     #MSG10C,R2              ;INDICATE THAT NO DRIVES ARE
1132 001750  104404                    TOP                             ;AVAILABLE!!
1133 001752  000137  003240            JMP     @#ENDAD                 ;RETURN TO THE MONITOR
1134 001756  000137  002142  1$:       JMP     START1                  ;NO--GO HAVE OPERATOR SELECT DRIVES
1135
1136                          ;TYPE-OUT THE DRIVE/S TO BE TESTED
1137 001762  012702  013335  2$:       MOV     #MSG10B,R2
1138 001766  104404                    TOP
1139 001770  105037  014142            CLRB    BUFFER
1140 001774  012701  014142            MOV     #BUFFER,R1
1141 002000  005000                    CLR     R0                      ;SET R0 TO DRIVE 0
1142 002002  012702  000200            MOV     #200,R2                 ;SET R2 TO DRIVE 0
1143
1144                          ;FORM AND SAVE DRIVE NUMBER FOR TYPE-OUT
1145 002006  105021                    CLRB    (R1)+                   ;SET EOM
1146 002010  112721  000040            MOVB    #' ,(R1)+               ;SPACE
1147 002014  030237  000550  LOOPER:   BIT     R2,MSBITS               ;DID THIS DRIVE NUMBER EXIST?
1148 002020  001405                    BEQ     $ZERO$                  ;BR IF NO
1149 002022  110011                    MOVB    R0,(R1)                 ;YES--SAVE THE NUMBER
1150 002024  152721  000060            BISB    #'0,(R1)+               ;MAKE IT ASCII
1151 002030  112721  000054            MOVB    #',,(R1)+               ;COMMA
1152 002034  000241  $ZERO$:  CLC                                      ;POSITION DRIVE BIT
1153 002036  006002                    ROR     R2
1154 002040  005200                    INC     R0                      ;UPDATE DRIVE NUMBER
1155 002042  020027  000007            CMP     R0,#7                   ;LAST
1156 002046  003762                    BLE     LOOPER                  ;BR IF NO
1157 002050  105011                    CLRB    (R1)                    ;SET EOM
1158 002052  112741  000100            MOVB    #'@,-(R1)               ;CR & LF
1159 002056  012702  014142            MOV     #BUFFER,R2              ;TYPE THE DRIVE/S SELECTED
1160 002062  104404                    TOP
1161 002064  000137  003050            JMP     EXECUT                  ;GO START TESTING
1162                          ;MODIFY RECORD LENGTHS AND BUFFER AREAS FOR 4K OF MEMORY
1163 002070  012737  000004  000526  MEM4K:  MOV     #4.,MINLEN
1164 002076  012737  002000  000524          MOV     #1024.,MAXLEN
1165 002104  012737  016142  000532          MOV     #@BUFFER+1024.,RBUF
1166 002112  000411                    BR      START
1167                          ;MODIFY RECORD LENGTHS AND BUFFER AREAS FOR 8K OF MEMORY
1168 002114  012737  000010  000526  MEM8K:  MOV     #8.,MINLEN
1169 002122  012737  004000  000524          MOV     #2048.,MAXLEN
1170 002130  012737  020142  000532          MOV     #@BUFFER+2048.,RBUF
1171 002136  005037  000540  START:  CLR     ATST                    ;NOT AUTO START
1172 002142  012706  000500  START1: MOV     #STACK,SP               ;INITIALIZE STACK
1173 002146  104432                    SUSMR                           ;CHECK FOR HARDWARE SWITCH REGISTER
1174 002150  022737  000176  000512    CMP     #SWREG,SWR
1175 002156  001002                    BNE     1$
1176 002160  004737  012004            JSR     PC,CNTLU
1177 002164  012737  123456  007366  1$:       MOV     #123456,LONUM   ;PRIME RANDOM
1178 002172  012737  176543  007370            MOV     #176543,MINUM   ;NUMBER GENERATOR
1179 002200  012702  012671                    MOV     #MSG1,R2
1180 002204  104404                            TOP                     ;PRINT 'SELECT DRIVES'
1181 002206  005037  000550                    CLR     MSBITS          ;CLEAR SELECTED DRIVE INDICATOR
1182 002212  104400  SELDRV: WAITKY
1183 002214  122737  000015  001316            CMPB    #15,CHARIN      ;WAS CHARACTER A CARRIAGE RETURN?
1184 002222  001010                            BNE     SELD1           ;NO
```

```
1185 002224  005737  000550                    TST     MSBITS          ;YES, WERE ANY DRIVES SELECTED
1186 002230  001744                            BEQ     START1          ;NO
1187 002232  005737  000540                    TST     ATST            ;YES--IS AUTO SWITCH SET?
1188 002236  001452                            BEQ     SELTST          ;NO--GO SELECT TESTS
1189 002240  000137  003050                    JMP     EXECUT          ;YES--GO START TESTING
1190 002244  122737  000070  001316  SELD1:    CMPB    #70,CHARIN      ;IS CHARACTER A VALID NUMBER 0-7?
1191 002252  003404                            BLE     SELD2           ;NO, PRINT "?"
1192 002254  122737  000060  001316            CMPB    #60,CHARIN      ;IS CHARACTER A VALID NUMBER 0-7?
1193 002262  003406                            BLE     VALID           ;YES
1194 002264  004737  012546          SELD2:    JSR     PC,READY        ;JH>> WAIT UNTIL READY TO OUTPUT CHARACTER
1195 002270  012777  000077  176224            MOV     #'?,@TPB        ;PRINT '?'
1196 002276  000424                            BR      VAL4
1197                        ;HAVE VALID DRIVE NUMBER
1198 002300  142737  000270  001316  VALID:    BICB    #270,CHARIN     ;MASK OUT NUMBER
1199 002306  105137  001316                    COMB    CHARIN
1200 002312  012700  000200                    MOV     #200,R0         ;INITIALIZE BIT POSITION FOR DRIVE 0
1201
1202
1203 002316  105237  001316          VAL1:     INCB    CHARIN          ;+1 TO DRIVE SELECT
1204 002322  001402                            BEQ     VAL2            ;HAVE DRIVE OF EQUAL TO ZERO
1205 002324  006200                            ASR     R0              ;MOVE BIT POSITION TO NEXT DRIVE
1206 002326  000773                            BR      VAL1            ;TRY AGAIN
1207 002330  130037  000550          VAL2:     BITB    R0,MSBITS       ;COMPARE DRIVE SELECT WITH PREVIOUS SELECTED
1208 002334  001003                            BNE     VAL3
1209 002336  150037  000550                    BISB    R0,MSBITS       ;DRIVE WASN'T PREVIOUSLY SET, SO SET IT NOW.
1210 002342  000402                            BR      VAL4
1211 002344  140037  000550          VAL3:     BICB    R0,MSBITS       ;DRIVE WAS SET, CLEAR IT.
1212 002350  004737  012546          VAL4:     JSR     PC,READY        ;JH>> WAIT UNTIL READY TO OUTPUT CHARACTER
1213 002354  012777  000054  176140            MOV     #',,@TPB        ;PRINT COMMA
1214 002362  000713                            BR      SELDRV          ;RETURN TO WAIT FOR NEXT KEY
1215                        ;HAVE DRIVES SELECTED-NOW GET TEST SELECTION
1216 002364  012702  012712          SELTST:   MOV     #MSG2,R2
1217 002370  104404                            TOP                     ;PRINT'SELECT TESTS'
1218 002372  005037  001320                    CLR     NUMTST          ;CLEAR TEST NUMBERS SELECTED
1219 002376  012700  001330                    MOV     #TSTTBL,R0      ;INITIALIZE TEST TABLE POINTER
1220 002402  104400                  SELT1:    WAITKY
1221 002404  122737  000015  001316            CMPB    #15,CHARIN      ;WAS CHARACTER A CARRIAGE RETURN?
1222 002412  001005                            BNE     SELT2
1223 002414  005737  001320                    TST     NUMTST          ;WERE ANY TESTS SELECTED?
1224 002420  001412                            BEQ     SELT3           ;NO
1225 002422  000137  003050                    JMP     EXECUT          ;YES, EXECUTE TESTS
1226 002426  122737  000066  001316  SELT2:    CMPB    #66,CHARIN      ;IS CHARACTER A VALID NUMBER 0-5
1227 002434  003404                            BLE     SELT3           ;NO
1228 002436  122737  000060  001316            CMPB    #60,CHARIN      ;IS CHARACTER A VALID NUMBER 0-5
1229 002444  003404                            BLE     SELPAT          ;YES
1230 002446  012702  012664          SELT3:    MOV     #MSG0,R2
1231 002452  104404                            TOP
1232 002454  000752                            BR      SELT1           ;RETURN TO WAIT FOR TEST SELECT
1233 002456  013704  001316          SELPAT:   MOV     CHARIN,R4
1234 002462  000304                            SWAB    R4              ;ROTATE TEST NUMBER INTO POSITION
1235 002464  006104                            ROL     R4
1236 002466  006104                            ROL     R4
1237 002470  006104                            ROL     R4
1238 002472  006104                            ROL     R4
1239 002474  042704  107777                    BIC     #107777,R4
1240 002500  104430                            SP3                     ;TYPE 3 SPACES
1241                        ;HAVE VALID TEST SELECTED, NOW GET SELECTED PATTERN
```

```
1242 002502  104400                                    WAITKY
1243 002504  122737  000070  001316          CMPB    #70,CHARIN      ;IS CHARACTER A VALID NUMBER 0-7
1244 002512  003755                          BLE     SELT3           ;NO
1245 002514  122737  000057  001316          CMPB    #57,CHARIN      ;IS CHARACTER A VALID NUMBER 0-7
1246 002522  002351                          BGE     SELT3           ;NO
1247 002524  000337  001316                  SWAB    CHARIN          ;MOVE PATTERN SELECT INTO POSITION
1248 002530  006137  001316                  ROL     CHARIN
1249 002534  042737  170777  001316          BIC     #170777,CHARIN
1250 002542  053704  001316                  BIS     CHARIN,R4       ;COMBINE PATTERN WITH TEST
1251 002546  104430                          SP3
1252
1253                                 ;WAIT FOR RECORD LENGTH SEQUENCES SELECTION
1254 002550  104400                 SELRLS: WAITKY
1255 002552  122737  000060  001316          CMPB    #60,CHARIN      ;IS CHARACTER=0
1256 002560  001424                          BEQ     SELR3           ;YES, RLS=MIN
1257 002562  122737  000061  001316          CMPB    #61,CHARIN      ;IS CHARACTER=1
1258 002570  001003                          BNE     SELR1
1259 002572  052704  000020                  BIS     #20,R4          ;SET RLS=MAX
1260 002576  000415                          BR      SELR3
1261 002600  122737  000062  001316  SELR1:  CMPB    #62,CHARIN      ;IS CHARACTER=2
1262 002606  001003                          BNE     SELR2
1263 002610  052704  000040                  BIS     #40,R4          ;SET RLS=MIN-MAX
1264 002614  000406                          BR      SELR3
1265 002616  122737  000063  001316  SELR2:  CMPB    #63,CHARIN      ;IS CHARACTER=3
1266 002624  001310                          BNE     SELT3
1267 002626  052704  000060                  BIS     #60,R4          ;SET RLS=MAX-MIN
1268 002632  104430                 SELR3:  SP3
1269                                 ;WAIT FOR WRITE MODE SELECTION
1270 002634  104400                          WAITKY
1271 002636  122737  000060  001316          CMPB    #60,CHARIN
1272 002644  001415                          BEQ     SELW2           ;SET WMO=NONSTOP
1273 002646  122737  000061  001316          CMPB    #61,CHARIN
1274 002654  001003                          BNE     SELW1
1275 002656  052704  000004                  BIS     #4,R4           ;SET WMO=START-STOP
1276 002662  000406                          BR      SELW2
1277 002664  122737  000062  001316  SELW1:  CMPB    #62,CHARIN
1278 002672  001265                          BNE     SELT3
1279 002674  052704  000010                  BIS     #10,R4          ;SET WMO=RANDOM
1280 002700  104430                 SELW2:  SP3
1281                                 ;WAIT FOR READ MODE SELECTION
1282 002702  104400                          WAITKY
1283 002704  122737  000060  001316          CMPB    #60,CHARIN
1284 002712  001415                          BEQ     SELRM2          ;SET RMO=NONSTOP
1285 002714  122737  000061  001316          CMPB    #61,CHARIN
1286 002722  001003                          BNE     SELRM1
1287 002724  052704  000001                  BIS     #1,R4           ;SET RMO=START-STOP
1288 002730  000406                          BR      SELRM2
1289 002732  122737  000062  001316  SELRM1: CMPB    #62,CHARIN
1290 002740  001242                          BNE     SELT3
1291 002742  052704  000002                  BIS     #2,R4           ;SET RMO=RANDOM
1292 002746  104430                 SELRM2: SP3
1293
1294                                 ;HAVE ALL PARAMETERS
1295 002750  012702  012767                  MOV     #MSG6,R2
1296 002754  104404                          TOP                     ;PRINT "OK"
1297 002756  104400                          WAITKY                  ;WAIT FOR CARRIAGE RETURN
1298 002760  122737  000015  001316          CMPB    #15,CHARIN
```

```
1299 002766  001402                        BEQ     .+6
1300 002770  000137  002446                JMP     SELT3
1301 002774  004737  012546                JSR     PC,READY        ;JH>> WAIT UNTIL READY TO OUTPUT CHARACTER
1302 003000  012777  000012  175514        MOV     #12,@TPB
1303 003006  004737  012546                JSR     PC,READY        ;JH>> WAIT UNTIL READY TO OUTPUT CHARACTER
1304 003012  012777  000040  175502        MOV     #40,@TPB
1305 003020  010420                        MOV     R4,(0)+
1306 003022  005237  001320                INC     NUMTST          ;+1 TO TEST COUNT
1307 003026  022737  000012  001320        CMP     #10.,NUMTST     ;EQUAL TO TEN YET
1308 003034  001402                        BEQ     SELOK1          ;YES
1309 003036  000137  002402                JMP     SELT1           ;NO, ACCEPT NEXT SET
1310 003042  012702  012742        SELOK1: MOV     #MSG5,R2
1311 003046  104404                        TOP
1312
1313                               ;EXECUTE SELECTED TEST
1314 003050  005037  000634        EXECUT: CLR     MODES           ;INITIALIZE MODES
1315 003054  012737  001330  001324        MOV     #TSTTBL,TSTEX
1316 003062  017737  176236  001322  EXEC:   MOV     @TSTEX,PARAM    ;GET TEST PARAMETERS
1317 003070  013700  001322        EXEC1:  MOV     PARAM,R0
1318 003074  042700  007777                BIC     #7777,R0
1319 003100  010037  001326                MOV     R0,TEST
1320 003104  001475                        BEQ     TEST0
1321 003106  022700  010000                CMP     #10000,R0
1322 003112  001516                        BEQ     TEST1
1323 003114  022700  020000                CMP     #20000,R0
1324 003120  001537                        BEQ     TEST2
1325 003122  022700  030000                CMP     #30000,R0
1326 003126  001002                        BNE     1$
1327 003130  000137  003536                JMP     TEST3
1328 003134  022700  040000        1$:     CMP     #40000,R0
1329 003140  001402                        BEQ     .+6
1330 003142  000137  004176                JMP     TEST5
1331 003146  000137  003654                JMP     TEST4
1332                               ;RETURN HERE AFTER COMPLETION OF TEST
1333 003152  104434                DONE:   CKSWR                   ;CHECK FOR CNTL G
1334 003154  012702  014067                MOV     #MSG26,R2
1335 003160  104404                        TOP
1336 003162  032777  000001  175322        BIT     #1,@SWR         ;IS SW 0=1 TO REPEAT TEST WITH ALL PATTERNS
1337 003170  001413                        BEQ     DONE1           ;NO
1338 003172  013700  001322                MOV     PARAM,R0
1339 003176  042700  170777                BIC     #170777,R0
1340 003202  022700  007000                CMP     #7000,R0        ;REACHED PATTERN 7?
1341 003206  001404                        BEQ     DONE1           ;YES
1342 003210  062737  001000  001322        ADD     #1000,PARAM     ;NO, +1 TO PATTERN
1343 003216  000724                        BR      EXEC1           ;REPEAT TEST
1344 003220  005337  001320        DONE1:  DEC     NUMTST
1345 003224  001021                        BNE     DOAGN
1346 003226  013701  000042                MOV     @#42,R1
1347 003232  001002                        BNE     $ENDAD
1348 003234  000000                        HALT                    ;FINISHED ALL TESTS
1349 003236  104434                        CKSWR
1350 003240  004711                $ENDAD: JSR     PC,(R1)
1351 003242  000240                        NOP
1352 003244  000240                        NOP
1353 003246  000240                        NOP
1354 003250  105737  000402                TSTB    ACT11M                  ;ACT11 MODE? ++ C.W
1355 003254  001405                        BEQ     DOAGN                   ;BRANCH - IF NO ++ C.W
```

F3


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1356 003256  012702  014074                    MOV     #MSG27,R2               ;GET END OF PASS MESSAGE
1357 003262  104404                            TOP                             ;TYPE END OF PASS
1358 003264  000137  001356                    JMP     AUTOST                  ;CONTINUE TEST
1359 003270  062737  000002  001324  DOAGN:    ADD     #2,TSTEX
1360 003276  000671                            BR      EXEC            ;DO NEXT TEST
1361
1362                                ;TEST0
1363                                ;WRITE ONE RECORD, CHANGE DRIVES, GO TO EOT
1364 003300  052737  000002  000634  TEST0:    BIS     #2,MODES                ;EXIT WRITE EVERY RECORD, NO READ PASS
1365 003306  104420                            CLRALL                          ;CLEAR ERROR COUNTERS AND REWIND
1366 003310  104416                            GENPAT                          ;GENERATE PATTERN
1367 003312  104410                TO:         RSFDRV                          ;RESET DRIVE SELECTION TO LOWEST NUMBER
1368 003314  104414                TOA:        MVCTRS                          ;RESTORE DRIVE COUNTERS
1369 003316  032737  000040  000634            BIT     #40,MODES               ;IS THIS DRIVE AT EOT?
1370 003324  001002                            BNE     TOB                     ;YES, SKIP WRITE
1371 003326  104402                            WRITIT                          ;WRITE
1372 003330  104406                            SVCTRS                          ;SAVE DRIVE COUNTERS
1373
1374 003332  104422                TOB:        CHGDRV                          ;ANY MORE DRIVES SELECTED?
1375 003334  000767                            BR      TOA                     ;YES
1376 003336  004737  004770                    JSR     PC,ALLEOT               ;ARE ALL DRIVES AT EOT?
1377 003342  000763                            BR      TO                      ;NO
1378 003344  000137  003152                    JMP     DONE                    ;YES, EXIT
1379                                ;TEST1
1380                                ;WRITE RECORD LENGTH SEQUENCE, GO TO NEXT DRIVE, CONTINUE TO EOT ON ALL DRIVES.
1381 003350  052737  000001  000634  TEST1:    BIS     #1,MODES                ;EXIT WRITE AFTER RLS, NO READ PASS
1382 003356  104420                            CLRALL                          ;CLEAR ERROR COUNTERS AND REWIND
1383 003360  104416                            GENPAT                          ;GENERATE PATTERN
1384 003362  104410                T1:         RSFDRV                          ;RESET DRIVE SELECTION TO LOWEST NUMBER
1385 003364  104414                T1A:        MVCTRS                          ;RESTORE DRIVE COUNTERS
1386 003366  032737  000040  000634            BIT     #40,MODES               ;IS THIS DRIVE AT EOT?
1387 003374  001002                            BNE     T1B                     ;YES, SKIP WRITE
1388 003376  104402                            WRITIT                          ;WRITE
1389 003400  104406                            SVCTRS                          ;SAVE DRIVE COUNTERS
1390 003402  104422                T1B:        CHGDRV                          ;ANY MORE DRIVE SELECTED?
1391 003404  000767                            BR      T1A                     ;YES
1392 003406  004737  004770                    JSR     PC,ALLEOT               ;ARE ALL DRIVES AT EOT?
1393 003412  000763                            BR      T1                      ;NO
1394 003414  000137  003152                    JMP     DONE                    ;YES EXIT
1395
1396                                ;TEST2
1397                                ;WRITE A RECORD LENGTH SEQUENCE , CHANGE DRIVES
1398                                ;BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES.  CONTINUE TO EOT ON ALL DRIVES
1399 003420  052737  000005  000634  TEST2:    BIS     #5,MODES                ;EXIT WRITE AFTER RLS, DO READ PASS
1400 003426  104420                            CLRALL                          ;CLEAR ERROR COUNTERS AND REWIND
1401 003430  104416                            GENPAT                          ;GENERATE PATTERN
1402 003432  104410                T2:         RSFDRV                          ;SET DRIVE SELECTION TO LOWEST NUMBER
1403 003434  104414                T2A:        MVCTRS                          ;RESTORE DRIVE COUNTERS
1404 003436  032737  000040  000634            BIT     #40,MODES               ;IS THIS DRIVE AT EOT?
1405 003444  001002                            BNE     T2B                     ;YES, SKIP WRITE
1406 003446  104402                            WRITIT                          ;WRITE
1407 003450  104406                            SVCTRS                          ;SAVE DRIVE COUNTERS
1408 003452  104422                T2B:        CHGDRV                          ;ANYMORE DRIVERS SELECTED?
1409 003454  000767                            BR      T2A                     ;YES
1410 003456  104414                T2C:        MVCTRS                          ;RESTORE DRIVE COUNTERS
1411 003460  032737  000020  000634            BIT     #20,MODES               ;IS THIS READ AT EOT?
1412 003466  001003                            BNE     T2D                     ;YES, SKIP BACKSPACE
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1413 003470  004737  011064                    JSR     PC,GOBKWD       ;BACKSPACE
1414 003474  104406                            SVCTRS                  ;SAVE DRIVE COUNTERS
1415 003476  104422                    T2D:    CHGDRV                  ;ANY MORE DRIVES SELECTED?
1416 003500  000766                            BR      T2C             ;YES
1417 003502  104414                    T2E:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1418 003504  032737  000020  000634            BIT     #20,MODES       ;IS THIS READ AT EOT
1419 003512  001001                            BNE     T2F             ;YES, SKIP READ
1420 003514  104424                            READIT                  ;READ
1421 003516  104406                    T2F:    SVCTRS                  ;SAVE DRIVE COUNTERS
1422 003520  104422                            CHGDRV                  ;ANYMORE DRIVES SELECTED?
1423 003522  000767                            BR      T2E             ;YES
1424 003524  004737  004770                    JSR     PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
1425 003530  000740                            BR      T2              ;NO
1426 003532  000137  003152                    JMP     DONE            ;YES EXIT
1427
1428                                    ;TEST3
1429                                    ;WRITE ONE RECORD, CHANGE DRIVES, BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES
1430 003536  052737  000006  000634    TEST3:  BIS     #6,MODES        ;EXIT WRITE EVERY RECORD, DO READ PASS
1431 003544  104420                            CLRALL                  ;CLEAR ERROR COUNTERS AND REWIND
1432 003546  104416                            GENPAT                  ;GENERATE PATTERN
1433 003550  104410                    T3:     RSFDRV                  ;SET DRIVE SELECTION TO LOWEST NUMBER
1434 003552  104414                    T3A:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1435 003554  032737  000040  000634            BIT     #40,MODES       ;IS THIS DRIVE AT EOT?
1436 003562  001002                            BNE     T3B             ;YES, SKIP WRITE
1437 003564  104402                            WRITIT                  ;WRITE
1438 003566  104406                            SVCTRS                  ;SAVE DRIVE COUNTERS
1439 003570  104422                    T3B:    CHGDRV                  ;ANY MORE DRIVES SELECTED
1440 003572  000767                            BR      T3A             ;YES
1441
1442 003574  104414                    T3C:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1443 003576  032737  000020  000634            BIT     #20,MODES       ;IS THIS DRIVE AT EOT
1444 003604  001002                            BNE     T3D             ;YES, SKIP BACKSPACE
1445 003606  004737  011064                    JSR     PC,GOBKWD       ;BACKSPACE
1446 003612  104406                    T3D:    SVCTRS                  ;SAVE DRIVE COUNTERS
1447 003614  104422                            CHGDRV                  ;ANY MORE DRIVES SELECTED?
1448 003616  000766                            BR      T3C             ;GO
1449 003620  104414                    T3E:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1450 003622  032737  000020  000634            BIT     #20,MODES       ;IS THIS DRIVE AT EOT?
1451 003630  001001                            BNE     T3F             ;YES, SKIP READ
1452 003632  104424                            READIT                  ;READ
1453 003634  104406                    T3F:    SVCTRS                  ;SAVE DRIVE COUNTERS
1454 003636  104422                            CHGDRV                  ;ANY MORE DRIVES SELECTED
1455 003640  000767                            BR      T3E             ;YES
1456 003642  004737  004770                    JSR     PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
1457 003646  000740                            BR      T3              ;NO
1458 003650  000137  003152                    JMP     DONE            ;YES, EXIT
1459
1460                                    ;TEST4
1461                                    ;WRITE RECORD, CHANGE DRIVES, REPEAT FOR RECORD LENGTH SEQUENCE
1462                                    ;READ RECORD, CHANGE DRIVES, REPEAT FOR RLS
1463 003654  052737  000006  000634    TEST4:  BIS     #6,MODES        ;EXIT WRITE EVERY RECORD, DO READ PASS
1464 003662  104416                            GENPAT                  ;GENERATE PATTERN
1465 003664  032777  000014  175432            BIT     #14,@TSTEX
1466 003672  001006                            BNE     T4
1467 003674  042737  000007  000634            BIC     #7,MODES
1468 003702  052737  000005  000634            BIS     #5,MODES        ;EXIT WRITE AFTER RLS, DO READ PASS
1469 003710  104420                    T4:     CLRALL                  ;CLEAR ERROR COUNTERS AND REWIND
```

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1470 003712  104410                    T4A:        RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1471 003714  104414                    T4B:        MVCTRS          ;RESTORE DRIVE COUNTERS
1472 003716  013737  000614  000616          MOV   RECORD,WRRECR   ;SAVE RECORD
1473 003724  104406                              SVCTRS          ;SAVE DRIVE COUNTERS
1474 003726  104422                              CHGDRV          ;ANYMORE DRIVES SELCTED?
1475 003730  000771                        BR    T4B             ;YES
1476 003732  042737  000010  000634          BIC   #10,MODES       ;CLEAR RLS END
1477 003740  104410                    T4C:        RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1478 003742  104414                    T4D:        MVCTRS          ;RESTORE DRIVE COUNTERS
1479 003744  032737  000040  000634          BIT   #40,MODES       ;IS DRIVE AT EOT
1480 003752  001010                        BNE   T4E             ;YES, SKIP WRITE
1481 003754  013737  000616  000552          MOV   WRRECR,SVRECR   ;SAVE START OF RLS
1482 003762  104402                              WRITIT          ;WRITE
1483 003764  013737  000552  000616          MOV   SVRECR,WRRECR   ;RESTORE START OF RLS
1484 003772  104406                              SVCTRS          ;SAVE DRIVE COUNTERS
1485 003774  104422                    T4E:        CHGDRV          ;ANYMORE DRIVES SELECTED?
1486 003776  000761                        BR    T4D             ;YES
1487 004000  032737  000010  000634          BIT   #10,MODES       ;ARE WE AT END OF RLS
1488 004006  001007                        BNE   T4G             ;YES
1489 004010  104414                    T4F:        MVCTRS          ;RESTORE DRIVE COUNTERS
1490 004012  032737  000040  000634          BIT   #40,MODES       ;ARE WE AT EOT?
1491 004020  001747                        BEQ   T4C             ;NO
1492 004022  104422                              CHGDRV          ;ANYMORE DRIVES SELECTED?
1493 004024  000771                        BR    T4F             ;YES
1494 004026  104410                    T4G:  RSFDRV                        ;SET DRIVE SELECTION TO LOWEST NUMBER
1495 004030  104414                    T4H:        MVCTRS          ;RESTORE DRIVE COUNTERS
1496 004032  032737  000020  000634          BIT   #20,MODES       ;IS THIS DRIVE AT EOT?
1497 004040  001002                        BNE   T4J             ;YES, SKIP BACKSPACE
1498 004042  004737  011064                JSR   PC,GOBKWD       ;BACKSPACE
1499 004046  104406                    T4J:        SVCTRS          ;SAVE DRIVE COUNTERS
1500 004050  104422                              CHGDRV          ;ANY MORE DRIVES SELECTED?
1501 004052  000766                        BR    T4H             ;YES
1502 004054  104410                    T4K:        RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1503 004056  104414                    T4L:        MVCTRS          ;RESTORE DRIVE COUNTERS
1504 004060  032737  000020  000634          BIT   #20,MODES       ;IS THIS READ AT EOT?
1505 004066  001025                        BNE   T4N             ;YES, SKIP READ
1506 004070  023737  000620  000614          CMP   LASRCR,RECORD   ;HAVE WE READ LAST RECORD WRITTEN?
1507 004076  001421                        BEQ   T4N             ;YES
1508 004100  013737  000620  000552          MOV   LASRCR,SVRECR   ;SAVE LAST RECORD
1509 004106  032737  000003  001322          BIT   #3,PARAM        ;IS READ MODE NONSTOP?
1510 004114  001405                        BEQ   T4M             ;YES
1511 004116  013737  000614  000620          MOV   RECORD,LASRCR
1512 004124  005237  000620                INC   LASRCR                ;+1 TO LAST RECORD WRITTEN
1513 004130  104424                    T4M:        READIT          ;READ
1514 004132  013737  000552  000620          MOV   SVRECR,LASRCR   ;RESTORE LAST RECORD WRITTEN
1515 004140  104406                              SVCTRS          ;SAVE DRIVE COUNTERS
1516 004142  104422                    T4N:        CHGDRV          ;ANYMORE DRIVES SELECTED?
1517 004144  000744                        BR    T4L             ;YES
1518 004146  104414                    T4P:        MVCTRS          ;RESTORE DRIVE COUNTERS
1519 004150  023737  000620  000614          CMP   LASRCR,RECORD   ;ARE WE AT END OF RLS?
1520 004156  001336                        BNE   T4K             ;NO
1521 004160  104422                              CHGDRV          ;ANYMORE DRIVES SELECTED?
1522 004162  000771                        BR    T4P             ;YES
1523 004164  004737  004770                JSR   PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
1524 004170  000650                        BR    T4A             ;NO
1525 004172  000137  003152                JMP   DONE            ;YES,EXIT
1526
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1527                                    ;TEST5
1528                                    ;READ ONLY
1529                                    ;RANDOM PATTERN INVALID EXCEPT FOR SPECIFIC CASES
1530 004176  052737  000002  000634  TEST5:  BIS     #2,MODES
1531 004204  104420                           CLRALL          ;CLEAR ERROR COUNTERS AND REWIND
1532 004206  104416                           GENPAT          ;GENERATE PATTERN
1533 004210  012737  177777  004456  T5:     MOV     #-1,T5FLAG      ;ENABLE EXIT FROM WRITE ROUTINE
1534 004216  104402                           WRITIT          ;ENTER WRITE ONLY TO INITIALIZE RECORD SEQUENCE
1535 004220  032737  000010  000634          BIT     #10,MODES       ;ARE WE AT END OF RLS?
1536 004226  001402                          BEQ     T5A             ;YES
1537 004230  004737  005610                  JSR     PC,TESINC       ;SEE IF RECORD LENGTH SHOULD BE CHANGED
1538 004234  013737  000614  004460  T5A:    MOV     RECORD,T5INC
1539 004242  005037  000614                  CLR     RECORD
1540 004246  052737  000010  000634  T5B:    BIS     #10,MODES       ;INDICATE AT START OF RLS
1541 004254  104410                           RSFDRV          ;SET DRIVE SELECTION TO LOWEST DRIVE NUMBER
1542 004256  104414                  T5C:     MVCTRS          ;RESTORE DRIVE COUNTERS
1543 004260  032737  000020  000634          BIT     #20,MODES       ;IS THIS DRIVE AT EOT
1544 004266  001007                          BNE     T5D             ;YES
1545 004270  013737  000614  000620          MOV     RECORD,LASRCR
1546 004276  063737  004460  000620          ADD     T5INC,LASRCR    ;CURRENT RECORD + SEQUENCE LENGTH
1547 004304  104406                           SVCTRS          ;SAVE DRIVE COUNTERS
1548 004306  104422                  T5D:     CHGDRV          ;ANYMORE DRIVES?
1549 004310  000762                          BR      T5C             ;YES
1550 004312  104410                           RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1551 004314  104414                  T5E:     MVCTRS          ;RESTORE DRIVE COUNTERS
1552 004316  032737  000020  000634          BIT     #20,MODES       ;IS THIS DRIVE AT EOT?
1553 004324  001021                          BNE     T5G             ;YES
1554 004326  013737  000620  000552          MOV     LASRCR,SVRECR   ;SAVE END OF RLS RECORDS
1555 004334  032737  000003  001322          BIT     #3,PARAM        ;IS READ MODE NONSTOP
1556 004342  001405                          BEQ     T5F             ;YES GO TO END RLS
1557 004344  013737  000614  000620          MOV     RECORD,LASRCR   ;NEXT TO BE READ
1558 004352  005237  000620                  INC     LASRCR          ;+1 EXIT READ AFTER ONE RECORD
1559 004356  104424                  T5F:     READIT          ;READ
1560 004360  013737  000552  000620          MOV     SVRECR,LASRCR   ;RESTORE END RECORD
1561 004366  104406                           SVCTRS          ;SAVE DRIVE COUNTERS
1562 004370  104422                  T5G:     CHGDRV          ;ANY MORE DRIVES?
1563 004372  000750                          BR      T5E             ;YES
1564 004374  004737  004770                  JSR     PC,ALLEOT       ;ALL AT EOT?
1565 004400  000402                          BR      T5H             ;NO
1566 004402  000137  003152                  JMP     DONE            ;YES EXIT
1567 004406  104410                  T5H:     RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1568 004410  104414                  T5J:     MVCTRS          ;RESTORE DRIVE COUNTERS
1569 004412  023737  000614  000620          CMP     RECORD,LASRCR   ;ARE WE AT END OF RLS?
1570 004420  001003                          BNE     T5K             ;NO
1571 004422  042737  000010  000634          BIC     #10,MODES       ;YES,
1572 004430  104422                  T5K:     CHGDRV          ;ANYMORE DRIVES SELECTED?
1573 004432  000766                          BR      T5J             ;YES
1574 004434  032737  000010  000634          BIT     #10,MODES       ;AT END OF RLS?
1575 004442  001324                          BNE     T5E             ;NO
1576 004444  004737  004770                  JSR     PC,ALLEOT       ;ALL DRIVES AT EOT?
1577 004450  000657                          BR      T5              ;NO
1578 004452  000137  003152                  JMP     DONE            ;YES, EXIT
1579 004456  000000          T5FLAG: 0
1580 004460  000000          T5INC:  0
1581
1582                                    ;SAVE DRIVE RECORD AND ERROR COUNTERS
1583 004462  004737  004516  SVCTR:  JSR     PC,CTRDEX
```

J3


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1584 004466  012021                    SVC1:   MOV     (0)+,(1)+
1585 004470  022700  000636                    CMP     #DRVADR,R0
1586 004474  001374                            BNE     SVC1
1587 004476  000207                            RTS     PC
1588                                 ;RESET DRIVE COUNTERS BACK INTO PROGRAM
1589 004500  004737  004516          MVCTR:  JSR     PC,CTRDEX
1590 004504  012120                  MV1:    MOV     (1)+,(0)+
1591 004506  022700  000636                    CMP     #DRVADR,R0
1592 004512  001374                            BNE     MV1
1593 004514  000207                            RTS     PC
1594                                 ;SET UP POINTERS FOR MOVE AND SAVE COUNTERS
1595 004516  012700  000572          CTRDEX: MOV     #WRCHEK,R0
1596 004522  012701  000636                    MOV     #DRVADR,R1
1597 004526  063701  000560                    ADD     CDRIVE,R1
1598 004532  063701  000560                    ADD     CDRIVE,R1
1599 004536  011101                            MOV     @R1,R1
1600 004540  000207                            RTS     PC
1601                                 ;CLEAR ALL DRIVE COUNTERS
1602 004542  104410                  CLRAL:                  RSFDRV
1603 004544  004737  004732          CLR1:   JSR     PC,REWIND
1604 004550  004737  005076                    JSR     PC,CLRTBL
1605 004554  104406                                    SVCTRS
1606 004556  104422                                    CHGDRV
1607 004560  000771                            BR      CLR1
1608 004562  052737  000010  000634                    BIS     #10,MODES       ;AT END OF RLS
1609 004570  005037  004456                    CLR     T5FLAG
1610 004574  000207                            RTS     PC
1611                                 ;RESET DRIVE SELECTION TO LOWEST NUMBER
1612 004576  005037  000560          RSFDR:  CLR     CDRIVE          ;START WITH DRIVE 0
1613 004602  012737  000200  000556          MOV     #200,CDRVBT     ;BIT FOR DRIVE 0
1614 004610  033737  000550  000556  RSF1:   BIT     MSBITS,CDRVBT   ;IS DRIVE SELECTED?
1615 004616  001006                            BNE     RSF2            ;YES
1616 004620  005237  000560                    INC     CDRIVE          ;NO + 1 TO DRIVE
1617 004624  000241                            CLC
1618 004626  006037  000556                    ROR     CDRVBT          ;ROTATE DRIVE BIT
1619 004632  000766                            BR      RSF1            ;REPEAT
1620 004634  013737  000560  000554  RSF2:   MOV     CDRIVE,COMAND
1621 004642  000337  000554                    SWAB    COMAND
1622 004646  052737  060000  000554          BIS     #60000,COMAND   ;800 BPI, 9 TRACK
1623 004654  032777  001000  173630          BIT     #1000,@SWR      ;TEST PARITY SELECTED
1624 004662  001403                            BEQ     .+10            ;ODD
1625 004664  052737  004000  000554          BIS     #4000,COMAND    ;EVEN
1626 004672  000207                            RTS     PC
1627
1628                                 ;SELECT NEXT DRIVE IN SEQUENCE
1629                                 ;+1 WORD TO EXIT ADDRESS IF LAST DRIVE TESTED
1630 004674  005237  000560          CHGDR:  INC     CDRIVE          ;+1 TO DRIVE NUMBER
1631 004700  000241                            CLC
1632 004702  006037  000556                    ROR     CDRVBT          ;MOVE MASK BIT OVER 1 PLACE
1633 004706  001004                            BNE     CHG1            ;BRANCH IF MORE DRIVES SELECTED
1634 004710  104410                                    RSFDRV          ;RESET DRIVE SELECT TO LOWEST NUMBER
1635 004712  062716  000002                    ADD     #2,@SP          ;+ 2 TO SKIP OVER FIRST EXIT
1636 004716  000207                            RTS     PC
1637 004720  033737  000556  000550  CHG1:   BIT     CDRVBT,MSBITS
1638 004726  001762                            BEQ     CHGDR
1639 004730  000741                            BR      RSF2
1640
```

```
1641
1642 004732  105777  173544          ;REWIND DRIVE TO BOT
                      REWIND: TSTB    @MTC
1643 004736  100375             BPL     .-4             ;WAIT FOR CONTROL UNIT
1644 004740  013777  000554  173534 MOV     COMAND,@MTC     ;SELECT DRIVE
1645 004746  006077  173526         ROR     @MTS
1646 004752  103375             BCC     .-4             ;WAIT FOR TU READY
1647 004754  052777  000016  173520 BIS     #16,@MTC        ;REWIND
1648 004762  004737  005122         JSR     PC,GOWAIT
1649 004766  000207             RTS     PC              ;EXIT
1650                            ;ARE ALL DRIVES AT END OF TAPE
1651 004770  104410             ALLEOT: RSFDRV
1652 004772  104414             ALL1:   MVCTRS
1653 004774  032737  000060  000634 BIT     #60,MODES       ;AT EOT?
1654 005002  001403             BEQ     ALLEOS          ;NO
1655 005004  104422             CHGDRV                  ;DONE ALL DRIVES?
1656 005006  000771             BR      ALL1            ;NO
1657 005010  000427             BR      ALL3
1658 005012  032777  000400  173472 ALLEOS: BIT     #400,@SWR       ;TEST SWITCH 8 TO EXIT AT END OF SEQUENCE
1659 005020  001425             BEQ     ALL2            ;NO, GO TO EOT
1660 005022  032737  000010  000634 BIT     #10,MODES       ;AT END OF SEQUENCE
1661 005030  001421             BEQ     ALL2            ;NO, EXIT, DON'T DUMP ERROR COUNTERS
1662                            ;DUMP ERROR COUNTERS ON ALL DRIVES
1663 005032  104410             CTRDMP: RSFDRV
1664 005034  104414             MVCTRS
1665 005036  005737  004456         TST     TSFLAG
1666 005042  001006             BNE     CTRD1           ;DUMP READ ONLY
1667 005044  004737  006146         JSR     PC,ENDT1
1668 005050  032737  000004  000634 BIT     #4,MODES        ;READ PASS SELECTED?
1669 005056  001402             BEQ     CDMEND          ;NO
1670 005060  004737  010320         CTRD1:  JSR     PC,RNDTP1
1671 005064  104422             CDMEND: CHGDRV          ;DONE ALL DRIVES
1672 005066  000762             BR      CTRDMP+2        ;NO
1673 005070  062716  000002         ALL3:   ADD     #2,(6)          ;INCREMENT RETURN POINT
1674 005074  000207             ALL2:   RTS     PC
1675
1676                            ;CLEAR READ AND WRITE TABLES
1677 005076  012700  000572         CLRTBL: MOV     #WRCHEK,R0
1678 005102  005020             CLRT1:  CLR     (0)+
1679 005104  020027  000634         CMP     R0,#MODES
1680 005110  001374             BNE     CLRT1
1681 005112  042737  000070  000634 BIC     #70,MODES
1682 005120  000207             RTS     PC
1683                            ;INTERRUPT ENABLE, GO, WAIT FOR INTERRUPT
1684 005122  012777  000200  173360 GOWAIT: MOV     #200,@CC        ;SET PRIORITY LEVEL 4
1685 005130  012777  005164  173376 MOV     #GW1,@MTV       ;SET INTERRUPT RETURN
1686 005136  012737  000001  005152 MOV     #1,WAIT1
1687 005144  052777  000101  173330 BIS     #101,@MTC       ;INTERRUPT ENABLE, GO
1688 005152  000001             WAIT1:  WAIT            ;WAIT FOR INTERRUPT
1689 005154  012777  000340  173326 MOV     #340,@CC        ;RESTORE PRIORITY LEVEL 7
1690 005162  000207             RTS     PC              ;EXIT
1691 005164  012737  000001  005152 GW1:    MOV     #1,WAIT1
1692 005172  000002             RTI                     ;RETURN FROM INTERRUPT
1693
1694                            ;WRITE RECORD SECTION
1695 005174  005737  000614         WRITI:  TST     RECORD          ;IS THIS THE FIRST RECORD
1696 005200  001031             BNE     NOINCR          ;NO, SKIP SET UP OF RECORD LENGTH AND BLOCK INCREMENT
1697 005202  013737  000524  000544 MOV     MAXLEN,STRLEN
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1698 005210 012737 177774 000566          MOV    #-4.,BLKINC
1699 005216 032737 000020 001322          BIT    #20,PARAM
1700 005224 001006                        BNE    W1
1701 005226 013737 000526 000544          MOV    MINLEN,STRLEN
1702 005234 012737 000004 000566          MOV    #4.,BLKINC
1703 005242 013737 000544 000630 W1:      MOV    STRLEN,WRTLEN
1704 005250 032737 000040 001322          BIT    #40,PARAM       ;DOES RECORD LENGTH CHANGE?
1705 005256 001002                        BNE    NOINCR          ;YES
1706 005260 005037 000566                 CLR    BLKINC          ;NO
1707 005264 013737 000614 000616 NOINCR:  MOV    RECORD,WRRECR
1708 005272 005737 004456                 TST    TSFLAG
1709 005276 001401                        BEQ    .+4
1710 005300 000207                        RTS    PC              ;EXIT WRITE ROUTINE IF TEST 5
1711 005302 005037 000564                 CLR    WRPASS
1712 005306 013777 000554 173166 STRTOP:  MOV    COMAND,@MTC     ;SELECT UNIT
1713 005314 105777 173162                 TSTB   @MTC
1714 005320 100375                        BPL    .-4             ;WAIT FOR CU READY
1715 005322 006077 173152                 ROR    @MTS            ;WAIT FOR TU READY
1716 005326 103375                        BCC    .-4
1717 005330 013777 000630 173146 NONSTP:  MOV    WRTLEN,@BC      ;SET BYTE COUNT
1718 005336 005477 173142                 NEG    @BC
1719 005342 013777 000530 173136          MOV    WBUF,@CA        ;SET CURRENT ADDRESS
1720 005350 052777 000004 173124          BIS    #4,@MTC         ;WRITE
1721 005356 004737 005122                 JSR    PC,GOWAIT       ;INTERRUPT ENABLE, GO, WAIT FOR DONE
1722                              ;RETURN HERE AFTER INTERRUPT
1723 005362 017737 173112 000570          MOV    @MTS,STATRD     ;SAVE STATUS
1724 005370 005777 173106                 TST    @MTC
1725 005374 100542                        BMI    ERROR           ;HAVE ERROR FLAG, CHECK FOR EOT
1726 005376 005737 000564                 TST    WRPASS          ;WAS THIS A RECOVERY PASS
1727 005402 001410                        BEQ    TSTSTP          ;NO
1728 005404 013700 000564                 MOV    WRPASS,R0       ;YES
1729 005410 006300                        ASL    R0
1730 005412 062700 000572                 ADD    #WRCHEK,R0
1731 005416 005210                        INC    @R0             ;+1 TO APPROPRIATE RECOVERY PASS COUNTER
1732 005420 005037 000564                 CLR    WRPASS
1733 005424 032737 000014 001322 TSTSTP:  BIT    #14,PARAM       ;IS WRITE MODE NONSTOP?
1734 005432 001023                        BNE    STOPOP          ;NO
1735 005434 005737 000564                 TST    WRPASS          ;YES
1736 005440 001333                        BNE    NONSTP
1737 005442 004737 005610                 JSR    PC,TESINC       ;CHANGE RECORD LENGTH
1738 005446 032737 000001 000634          BIT    #1,MODES        ;EXIT AFTER RLS?
1739 005454 001405                        BEQ    W10             ;NO
1740 005456 032737 000010 000634          BIT    #10,MODES       ;YES, ARE WE AT END OF RLS?
1741 005464 001721                        BEQ    NONSTP          ;NO
1742 005466 000207                        RTS    PC              ;YES
1743 005470 032737 000002 000634 W10:     BIT    #2,MODES        ;EXIT EVERY RECORD?
1744 005476 001714                        BEQ    NONSTP          ;NO
1745 005500 000207                        RTS    PC              ;YES
1746 005502 032737 000010 001322 STOPOP:  BIT    #10,PARAM       ;IS WRITE MODE RANDOM?
1747 005510 001414                        BEQ    W11             ;NO
1748                              ;RANDOM STALL DELAY
1749 005512 004737 007214 RANSTP:         JSR    PC,RANGEN
1750 005516 052737 177400 007364          BIS    #177400,RANDOM
1751 005524 012704 177470 RAN1:           MOV    #-200.,R4       ;DELAY 1 MILLISECOND
1752 005530 005204                        INC    R4
1753 005532 001376                        BNE    .-2
1754 005534 005237 007364                 INC    RANDOM
```

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1755 005540 001371                          BNE     RAN1
1756 005542 005737 000564          W11:     TST     WRPASS
1757 005546 001257                          BNE     STRTOP
1758 005550 004737 005610                   JSR     PC,TESINC
1759 005554 032737 000001 000634            BIT     #1,MODES        ;EXIT AFTER RLS?
1760 005562 001405                          BEQ     W12             ;NO
1761 005564 032737 000010 000634            BIT     #10,MODES       ;YES, ARE WE AT END OF RLS?
1762 005572 001645                          BEQ     STRTOP          ;NO
1763 005574 000207                          RTS     PC              ;YES
1764 005576 032737 000002 000634 W12:       BIT     #2,MODES        ;EXIT EVERY RECORD?
1765 005604 001640                          BEQ     STRTOP          ;NO
1766 005606 000207                          RTS     PC              ;YES
1767                               ;SEE IF RECORD LENGTH SHOULD BE CHANGED
1768 005610 005237 000614          TESINC:  INC     RECORD          ;+1 TO RECORD COUNT
1769 005614 042737 000010 000634            BIC     #10,MODES       ;NOT END OF RLS UNLESS SET BELOW
1770 005622 005737 000566                   TST     BLKINC
1771 005626 001416                          BEQ     TSINC2
1772 005630 063737 000566 000630            ADD     BLKINC,WRTLEN
1773 005636 023737 000630 000526            CMP     WRTLEN,MINLEN   ;RECORD LENGTH TOO SHORT?
1774 005644 002404                          BLT     RESETL          ;YES,RESET
1775 005646 023737 000630 000524            CMP     WRTLEN,MAXLEN   ;RECORD LENGTH TOO LONG?
1776 005654 003403                          BLE     TSINC2          ;NO
1777 005656 013737 000544 000630 RESETL:    MOV     STRLEN,WRTLEN   ;YES, RESET
1778 005664 105737 000614        TSINC2:    TSTB    RECORD          ;IS RECORD A MULTIPLE OF 256
1779 005670 001003                          BNE     TSINC3          ;NO
1780 005672 052737 000010 000634            BIS     #10,MODES       ;INDICATE AT END OF RLS
1781 005700 000207                TSINC3:   RTS     PC
1782
1783
1784                               ;HAVE AN ERROR FLAG DURING WRITE OPERATION
1785                               ;IF ERROR IS CAUSED BY END OF TAPE FLAG DUMP WRITE ERROR COUNTERS
1786                               ;FOR ALL OTHER ERRORS:  PRINT COMMAND AND STATUS REGISTERS AND RECORD NUMBER
1787                               ;IF READ PASS IS SELECTED, TRY TO RECOVER BY WRITING WITH XIRG.
1788 005702 104434                ERROR:    CKSWR                 ;CHECK FOR CNTL G
1789 005704 032737 175600 000570            BIT     #175600,STATRD  ;AT EOT?
1790 005712 001510                          BEQ     ENDTAP          ;YES
1791 005714 005737 000564                   TST     WRPASS
1792 005720 001002                          BNE     ERR1            ;FIRST ERROR?
1793 005722 005237 000572                   INC     WRCHEK          ;YES, + 1 TO WRITE ERROR
1794 005726 032777 020000 172556 ERR1:      BIT     #20000,@SWR     ;TYPE ALL ERRORS?
1795 005734 001010                          BNE     TESREC          ;NO
1796 005736 012702 012774                   MOV     #MSG7,R2
1797 005742 104404                          TOP                     ;PRINT ERROR
1798 005744 013737 000630 000546            MOV     WRTLEN,LENGTH
1799 005752 004737 011174                   JSR     PC,PRTS         ;PRINT STATUS, COMMAND, RECORD, LENGTH
1800 005756 032777 000100 172526 TESREC:    BIT     #100,@SWR       ;RECOVER STATISTICALLY SELECTED?
1801 005764 001410                          BEQ     TESRC1          ;NO
1802 005766 005237 000564                   INC     WRPASS          ;+1 TO WRITE RECOVER
1803 005772 022737 000010 000564            CMP     #8.,WRPASS      ;HAVE WE TRIED TO WRITE RECOVER 8 TIMES?
1804 006000 001020                          BNE     STREC1          ;NO
1805 006002 005237 000612                   INC     PERMBS          ;YES, +1 TO PERMANENT BADSPOT?
1806 006006 032737 000004 000634 TESRC1:    BIT     #4,MODES        ;IS READ PASS SELECTED?
1807 006014 001402                          BEQ     .+6             ;NO
1808 006016 004737 010644                   JSR     PC,XRGREC
1809 006022 005037 000564                   CLR     WRPASS
1810 006026 032737 002000 000570            BIT     #2000,STATRD
1811 006034 001037                          BNE     ENDTAP
```

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1812 006036  000137  005542                    JMP     W11
1813 006042  004737  010242           STREC1:  JSR     PC,BACK1
1814 006046  004737  010242                    JSR     PC,BACK1        ;BACKSPACE 2 RECORDS
1815 006052  032777  000040  172420            BIT     #40,@MTS
1816 006060  001402                            BEQ     .+6
1817 006062  000137  005306                    JMP     STRTOP
1818 006066  012777  177777  172410            MOV     #-1,@BC
1819 006074  013777  000554  172400            MOV     COMAND,@MTC
1820 006102  052777  000010  172372            BIS     #10,@MTC
1821 006110  004737  005122                    JSR     PC,GOWAIT       ;SPACE FORWARD 1 RECORD
1822 006114  042777  000016  172360            BIC     #16,@MTC
1823 006122  052777  000004  172352            BIS     #4,@MTC         ;CHANGE FROM SPACE TO WRITE
1824 006130  000137  005306                    JMP     STRTOP
1825                          ;DRIVE IS AT EOT
1826 006134  005237  000614           ENDTAP:  INC     RECORD
1827 006140  052737  000040  000634            BIS     #40,MODES       ;INDICATE DRIVE AT EOT
1828 006146  012702  013757           ENDT1:   MOV     #MSG24,R2
1829 006152  104404                            TOP
1830 006154  012702  013022                    MOV     #MSG8,R2
1831 006160  104404                            TOP
```

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1833
1834                                    ;DUMP WRITE ERRORS
1835
1836 006162  104434                    WRTDMP: CKSWR                   ;CHECK FOR CNTL G
1837 006164  013737  000554  011350            MOV     COMAND,CHAR
1838 006172  000337  011350                    SWAB    CHAR
1839 006176  142737  000170  011350            BICB    #170,CHAR
1840
1841 006204  052737  000260  011350            BIS     #260,CHAR
1842 006212  004737  011352                    JSR     PC,OCTP         ;PRINT DRIVE NUMBER
1843 006216  104430                            SP3
1844 006220  013737  001322  011350            MOV     PARAM,CHAR
1845 006226  000337  011350                    SWAB    CHAR
1846 006232  006037  011350                    ROR     CHAR
1847 006236  042737  000170  011350            BIC     #170,CHAR
1848 006244  052737  000260  011350            BIS     #260,CHAR
1849 006252  004737  011352                    JSR     PC,OCTP         ;PRINT PATTERN NUMBER
1850 006256  013737  001322  011350            MOV     PARAM,CHAR
1851 006264  042737  177763  011350            BIC     #177763,CHAR
1852 006272  012702  013510                    MOV     #MSG14,R2
1853 006276  022737  000004  011350            CMP     #4,CHAR
1854 006304  001002                            BNE     .+6
1855 006306  012702  013464                    MOV     #MSG12,R2
1856 006312  022737  000010  011350            CMP     #10,CHAR
1857 006320  001002                            BNE     .+6
1858 006322  012702  013476                    MOV     #MSG13,R2
1859 006326  104404                            TOP             ;PRINT WRITE MODE
1860 006330  013702  000614                    MOV     RECORD,R2
1861 006334  104426                            DECPRT          ;PRINT RECORD NUMBER
1862 006336  013737  001322  011350            MOV     PARAM,CHAR
1863 006344  042737  177717  011350            BIC     #177717,CHAR
1864 006352  012702  013540                    MOV     #MSG17,R2
1865 006356  022737  000020  011350            CMP     #20,CHAR
1866 006364  001002                            BNE     .+6
1867 006366  012702  013547                    MOV     #MSG18,R2
1868 006372  022737  000040  011350            CMP     #40,CHAR
1869 006400  001002                            BNE     .+6
1870 006402  012702  013522                    MOV     #MSG15,R2
1871 006406  022737  000060  011350            CMP     #60,CHAR
1872 006414  001002                            BNE     .+6
1873 006416  012702  013531                    MOV     #MSG16,R2
1874 006422  104404                            TOP             ;PRINT RECORD LENGTH SEQUENCE
1875 006424  012702  013556                    MOV     #MSG19,R2
1876 006430  104404                            TOP
1877 006432  013702  000572                    MOV     WRCHEK,R2
1878 006436  104426                            DECPRT          ;PRINT "WRITE ERRORS="
1879 006440  012700  000574                    MOV     #WRCHEK+2,R0
1880 006444  112737  000060  013617            MOVB    #60,MSG20+17
1881 006452  105237  013617            WRTD1:  INCB    MSG20+17        ;PRINT STATISTICAL RECOVERY
1882 006456  005710                            TST     @R0
1883 006460  001405                            BEQ     WRTD2
1884 006462  012702  013600                    MOV     #MSG20,R2
1885 006466  104404                            TOP
1886 006470  011002                            MOV     (0),R2
1887 006472  104426                            DECPRT          ;RECOVERED AT X
1888 006474  005720                    WRTD2:  TST     (0)+            ;JUST INCREMENTING
1889 006476  020027  000612                    CMP     R0,#WRCHEK+20
```

```
1890 006502  001363                    BNE     WRTD1
1891 006504  005737  000612             TST     PERMBS
1892 006510  001001                    BNE     .+4             ;SKIP PRINT IF = 0
1893 006512  000207                    RTS     PC
1894
1895
1896 006514  012702  013622             MOV     #MSG20A,R2
1897 006520  104404                    TOP
1898 006522  013702  000612             MOV     PERMBS,R2       ;PRINT "PERMANENT BADSPOT"
1899 006526  104426                    DECPRT
1900 006530  000207                    RTS     PC
1901                            ;GENERATE DATA PATTERN
1902 006532  013702  000530       GENPA: MOV     WBUF,R2 ;INITIALIZE BUFFER
1903 006536  013737  001322  006644     MOV     PARAM,GP1       ;CHECK PARAMETERS FOR PATTERN SELECTED
1904 006544  042737  170777  006644     BIC     #170777,GP1
1905 006552  001435                    BEQ     PAT0
1906 006554  022737  001000  006644     CMP     #1000,GP1
1907 006562  001437                    BEQ     PAT1
1908 006564  022737  002000  006644     CMP     #2000,GP1
1909 006572  001457                    BEQ     PAT2
1910 006574  022737  003000  006644     CMP     #3000,GP1
1911 006602  001461                    BEQ     PAT3
1912 006604  022737  004000  006644     CMP     #4000,GP1
1913 006612  001501                    BEQ     PAT4
1914 006614  022737  005000  006644     CMP     #5000,GP1
1915 006622  001510                    BEQ     PAT5
1916 006624  022737  006000  006644     CMP     #6000,GP1
1917 006632  001402                    BEQ     .+6
1918 006634  000137  007174             JMP     PAT7
1919 006640  000137  007160             JMP     PAT6
```

```
1921
1922 006644  000000                    GP1:    0
1923                                   ;PATTERN 0
1924                                   ;HALF FREQUENCY OUTSIDE SKEW
1925 006646  012722  002010            PAT0:   MOV     #2010,(2)+      ;(010)(004)
1926 006652  023702  000532                    CMP     RBUF,R2
1927 006656  001373                            BNE     PAT0
1928 006660  000207                            RTS     PC
1929                                   ;PATTERN 1
1930                                   ;SLIDING 1 BIT (ISOLATED BIT)
1931 006662  012700  006710            PAT1:   MOV     #P1T,R0
1932 006666  012022                    PAT1A:  MOV     (0)+,(2)+
1933 006670  023702  000532                    CMP     RBUF,R2
1934 006674  001001                            BNE     .+4
1935 006676  000207                            RTS     PC
1936 006700  022700  006732                    CMP     #PAT2,R0
1937 006704  001370                            BNE     PAT1A
1938 006706  000765                            BR      PAT1
1939 006710  100000                    P1T:    100000
1940 006712  020100                            20100
1941 006714  004020                            4020
1942 006716  001004                            1004
1943 006720  000001                            1
1944 006722  040200                            40200
1945 006724  010040                            10040
1946 006726  002010                            2010
1947 006730  000402                            402
1948
1949                                   ;PATTERN 2
1950                                   ;HIGH FREQUENCY EVERY OTHER TRACK
1951 006732  012722  136274            PAT2:   MOV     #136274,(2)+    ;(274)(274)
1952 006736  023702  000532                    CMP     RBUF,R2
1953 006742  001373                            BNE     PAT2
1954 006744  000207                            RTS     PC
1955                                   ;PATTERN 3
1956                                   ;THREE 0'S, THREE 1'S, THREE 0'S.
1957 006746  012700  006774            PAT3:   MOV     #P3T,R0
1958 006752  012022                    PAT3A:  MOV     (0)+,(2)+
1959 006754  023702  000532                    CMP     RBUF,R2
1960 006760  001001                            BNE     .+4
1961 006762  000207                            RTS     PC
1962 006764  022700  007016                    CMP     #PAT4,R0
1963 006770  001370                            BNE     PAT3A
1964 006772  000765                            BR      PAT3
1965 006774  140037                    P3T:    140037
1966 006776  100476                            100476
1967 007000  001574                            1574
1968 007002  003770                            3770
1969 007004  017760                            17760
1970 007006  037300                            37300
1971 007010  076201                            76201
1972 007012  174003                            174003
1973 007014  170007                            170007
1974                                   ;PATTERN 4
1975                                   ;INCREMENTING PATTEPN (0-377)
1976 007016  105037  007042            PAT4:   CLRB    P4A
1977 007022  113722  007042            P4:     MOVB    P4A,(2)+
```

```
1978 007026  105237  007042                    INCB    P4A
1979 007032  023702  000532                    CMP     RBUF,R2
1980 007036  001371                            BNE     P4
1981 007040  000207                            RTS     PC
1982 007042  000000                P4A:        0
1983
1984                                           ;PATTERN 5
1985                                           ;EACH TRACK 3 BITS
1986 007044  012700  007072        PAT5:       MOV     #P5T,R0
1987 007050  012022                PAT5A:      MOV     (0)+,(2)+
1988 007052  023702  000532                    CMP     RBUF,R2
1989 007056  001001                            BNE     .+4
1990 007060  000207                            RTS     PC
1991 007062  022700  007160                    CMP     #PAT6,R0
1992 007066  001370                            BNE     PAT5A
1993 007070  000765                            BR      PAT5
1994 007072  000000                P5T:        0
1995 007074  100000                            100000
1996 007076  100200                            100200
1997 007100  040100                            40100
1998 007102  020100                            20100
1999 007104  020040                            20040
2000 007106  010020                            10020
2001 007110  004020                            4020
2002 007112  004010                            4010
2003 007114  002004                            2004
2004 007116  001004                            1004
2005 007120  001002                            1002
2006 007122  000401                            401
2007 007124  000001                            1
2008 007126  000000                            0
2009 007130  100200                            100200
2010 007132  040200                            40200
2011 007134  040100                            40100
2012 007136  020040                            20040
2013 007140  010040                            10040
2014 007142  010020                            10020
2015 007144  004010                            4010
2016 007146  002010                            2010
2017 007150  002004                            2004
2018 007152  001002                            1002
2019 007154  000402                            402
2020 007156  000401                            401
2021                                           ;PATTERN 6
2022                                           ;HIGH FREQUENCY ALL TRACKS
2023 007160  012722  177777        PAT6:       MOV     #-1,(2)+
2024 007164  023702  000532                    CMP     RBUF,R2
2025 007170  001373                            BNE     PAT6
2026 007172  000207                            RTS     PC
2027
2028
2029                                           ;PATTERN 7
2030                                           ;RANDOM
2031 007174  004737  007214        PAT7:       JSR     PC,RANGEN
2032 007200  013722  007364                    MOV     RANDOM,(2)+
2033 007204  023702  000532                    CMP     RBUF,R2
2034 007210  001371                            BNE     PAT7
```

```
                                        RTS     PC
                                ;RANDOM NUMBER GENERATOR
                                ;EXIT WITH RANDOM NUMBER IN LOCATION NAMED "RANDOM"
007214  010037  007372          RANGEN: MOV     R0,SV0          ;SAVE REGISTERS
007220  010137  007374                  MOV     R1,SV1
007224  010237  007376                  MOV     R2,SV2
007230  010337  007400                  MOV     R3,SV3
007234  013700  007366                  MOV     LONUM,R0        ;SET UP LOW DIGIT
007240  013701  007370                  MOV     HINUM,R1        ;SET UP HIGH DIGIT
007244  012703  000007                  MOV     #7,R3           ;SET UP SHIFT COUNT
007250  005002                          CLR     R2
007252  006300                  RANG1:  ASL     R0              ;SHIFT R0 LEFT AND
007254  006101                          ROL     R1              ;ROTATE CARRY INTO LSB OF R1 AND
007256  006102                          ROL     R2              ;ROTATE CARRY OUT OF R1 INTO R2
007260  005303                          DEC     R3              ;DECREMENT R3
007262  001373                          BNE     RANG1           ;CONTINUE SHIFT LOOP
007264  063700  007366                  ADD     LONUM,R0        ;ADD NUMBER TO MAKE X 129
007270  005501                          ADC     R1              ;PROPAGATE CARRY
007272  063701  007370                  ADD     HINUM,R1        ;ADD NUMBER TO MAKE X 129
007276  005502                          ADC     R2              ;PROPAGATE CARRY
007300  062700  001057                  ADD     #1057,R0        ;ADD LOW CONSTANT
007304  005501                          ADC     R1              ;PROPAGATE CARRY
007306  005502                          ADC     R2              ;PROPAGATE CARRY
007310  062701  047401                  ADD     #47401,R1       ;ADD HIGH CONSTANT
007314  005502                          ADC     R2              ;PROPAGATE CARRY
007316  062702  000006                  ADD     #6,R2           ;ADD HIGH CONSTANT
007322  060200                          ADD     R2,R0           ;RE-PRIME R0 WITH HIGH DIGIT
007324  005501                          ADC     R1              ;PROPAGATE CARRY
007326  010037  007364                  MOV     R0,RANDOM       ;SAVE RANDOM NUMBER
007332  010037  007366                  MOV     R0,LONUM        ;PUT R0 BACK IN LONUM
007336  010137  007370                  MOV     R1,HINUM        ;PUT R1 BACK IN HINUM
007342  013700  007372                  MOV     SV0,R0          ;RESTORE REGISTERS
007346  013701  007374                  MOV     SV1,R1
007352  013702  007376                  MOV     SV2,R2
007356  013703  007400                  MOV     SV3,R3
007362  000207                          RTS     PC              ;EXIT
007364  000000          RANDOM: 0
007366  000000          LONUM:  0
007370  000000          HINUM:  0
007372  000000          SV0:    0
007374  000000          SV1:    0
007376  000000          SV2:    0
007400  000000          SV3:    0

                                ;READ RECORD SECTION
007402  005737  000614  000000  READI:  TST     RECORD          ;FIRST RECORD?
007406  001003                          BNE     $R1             ;NO
007410  013737  000544  000632          MOV     STRLEN,READLN   ;SET INITIAL READ LENGTH
007416  012737  177775  000562  $R1:    MOV     #-3,RDPASS      ;INITIALIZE READ PASS COUNTER
007424  013777  000554  171050  RDSTPD: MOV     COMAND,@MTC
007432  105777  171044                  TSTB    @MTC
007436  100375                          BPL     .-4             ;WAIT FOR CONTROL UNIT READY
007440  006077  171034                  ROR     @MTS
007444  103375                          BCC     .-4             ;WAIT FOR TAPE UNIT READY
007446  013700  000532          READGO: MOV     RBUF,R0
007452  013701  000632                  MOV     READLN,R1
```

```
2092 007456  105020                    RG1:    CLRB    (0)+            ;CLEAR READ BUFFER
2093 007460  005301                            DEC     R1
2094 007462  001375                            BNE     RG1
2095 007464  013777  000632  171012            MOV     READLN,@BC      ;SET BYTE COUNT
2096 007472  005477  171006                    NEG     @BC
2097 007476  013777  000532  171002            MOV     RBUF,@CA        ;SET CURRENT ADDRESS
2098 007504  013777  000554  170770            MOV     COMAND,@MTC
2099 007512  052777  000002  170762            BIS     #2,@MTC
2100 007520  004737  005122                    JSR     PC,GOWAIT
2101                                    ;RETURN HERE AFTER INTERRUPT
2102 007524  017737  170750  000570            MOV     @MTS,STATRD
2103 007532  005777  170744                    TST     @MTC            ;ANY STATUS ERRORS
2104 007536  100504                            BMI     RDERRO          ;YES
2105                                    ;CHECK FOR DATA ERRORS
2106 007540  013700  000532                    MOV     RBUF,R0
2107 007544  013701  000530                    MOV     WBUF,R1
2108 007550  013702  000632                    MOV     READLN,R2
2109 007554  022021                    $R5:    CMP     (0)+,(1)+       ;CHECK FOR PROPER DATA TRANSFER
2110 007556  001045                            BNE     DATERR          ;HAVE DATA ERROR
2111 007560  162702  000002                    SUB     #2,R2           ;CHECKED ALL TRANSFERS?
2112 007564  001373                            BNE     $R5             ;NO
2113 007566  032737  000003  001322  RTSSTP: BIT     #3,PARAM
2114 007574  001007                            BNE     RDSTPC
2115 007576  004737  010172                    JSR     PC,RDINCR       ;INCREMENT FOR NEXT BLOCK
2116 007602  023737  000614  000620            CMP     RECORD,LASRCR
2117 007610  001316                            BNE     READGO
2118 007612  000207                            RTS     PC              ;EXIT READIT
2119 007614  032737  000002  001322  RDSTPC: BIT     #2,PARAM        ;IS READ MODE RANDOM?
2120 007622  001414                            BEQ     RDSTP           ;NO
2121 007624  004737  007214            RNDRDS: JSR     PC,RANGEN
2122 007630  052737  177400  007364            BIS     #177400,RANDOM
2123 007636  012704  177470            RNDS1:  MOV     #-200.,R4       ;DELAY 1 MILLISECOND
2124 007642  005204                            INC     R4
2125 007644  001376                            BNE     .-2
2126 007646  005237  007364                    INC     RANDOM
2127 007652  001371                            BNE     RNDS1
2128 007654  004737  010172            RDSTP:  JSR     PC,RDINCR
2129 007660  023737  000614  000620            CMP     RECORD,LASRCR   ;DONE LAST RECORD?
2130 007666  001256                            BNE     RDSTPD          ;NO
2131 007670  000207                            RTS     PC              ;YES EXIT
2132                                    ;HAVE DATA ERROR
2133 007672  032777  020000  170612  DATERR: BIT     #20000,@SWR     ;TYPE ALL READ ERRORS?
2134 007700  001014                            BNE     DATER1          ;NO
2135 007702  012702  013144                    MOV     #MSG9A,R2
2136 007706  104404                            TOP
2137 007710  013737  000632  000546            MOV     READLN,LENGTH
2138 007716  004737  011174                    JSR     PC,PRTS
2139 007722  014102                            MOV     -(1),R2         ;PRINT EXPECTED DATA
2140 007724  104412                            OCTPRT
2141 007726  014002                    MOV     -(0),R2
2142 007730  104412                            OCTPRT                  ;PRINT ACTUAL DATA
2143 007732  022737  177775  000562  DATER1: CMP     #-3,RDPASS
2144 007740  001002                            BNE     .+6
2145 007742  005237  000624                    INC     DAERRS          ;+1 TO DATA ERRORS
2146 007746  000464                            BR      RTSR1
2147                                    ;STATUS INDICATES AN ERROR, CHECK FOR EOT
2148 007750  104434                    RDERRO: CKSWR                   ;CHECK FOR CNTL G
```

```
2149 007752  032737  175600  000570          BIT     #175600,STATRD  ;IS ERROR LEGITIMATE OR EOT?
2150 007760  001552                          BEQ     RNDTAP          ;HAVE EOT
2151 007762  032777  020000  170522          BIT     #20000,@SWR     ;TYPE ALL READ ERRORS?
2152 007770  001044                          BNE     RTSREC          ;NO
2153 007772  012702  013117                  MOV     #MSG9,R2
2154 007776  104404                          TOP                     ;PRINT ERROR
2155 010000  013737  000632  000546          MOV     READLN,LENGTH
2156 010006  004737  011174                  JSR     PC,PRTS
2157 010012  032777  010000  170460          BIT     #10000,@MTS             ;STATUS ERROR DUE TO PARITY
2158                                                                         ;ERROR?
2159 010020  001430                          BEQ     RTSREC                  ;BRANCH IF NOT
2160 010022  032777  000010  170462          BIT     #10,@SWR                        ;SEE IF USER WANTS DATA COMPARE!
2161 010030  001424                          BEQ     RTSREC          ;BRANCH IF NOT
2162 010032  013700  000530                  MOV     WBUF,R0         ;PICK UP STARTING ADDRESS OF
2163                                                                 ;WRITE BUFFER
2164 010036  013701  000532                  MOV     RBUF,R1         ;PICK UP STARTING ADDRESS OF
2165                                                                 ;READ BUFFER
2166 010042  013702  000632                  MOV     @#READLN,R2     ;PICK UP RECORD LENGTH IN BYTES
2167 010046  022021                  1$:     CMP     (R0)+,(R1)+     ;COMPARE WHAT SHOULD HAVE BEEN
2168                                                                 ;WRITTEN WITH WHAT WAS!!
2169 010050  001004                          BNE     2$              ;BRANCH IF NOT THE SAME
2170 010052  162702  000002                  SUB     #2,R2           ;DROP OFF A WORD FROM RECORD
2171                                                                 ;LENGTH
2172 010056  001406                          BEQ     3$              ;BRANCH IF ALL OF RECORD DATA
2173                                                                 ;CHECKS
2174 010060  000772                          BR      1$              ;GO TO COMPARE NEXT BYTE
2175 010062  014002                  2$:     MOV     -(R0),R2        ;PICK UP THE DATA VALUE THAT
2176                                                                 ;SHOULD HAVE BEEN WRITTEN
2177 010064  104412                          OCTPRT                  ;PRINT EXPECTED VALUE OF
2178                                                                 ;WRITTEN DATA
2179 010066  014102                          MOV     -(R1),R2        ;PICK UP THE DATA VALUE THAT
2180                                                                 ;WAS WRITTEN
2181 010070  104412                          OCTPRT                  ;PRINT ACTUAL VALUE OF THE
2182                                                                 ;DATA READ
2183 010072  000403                          BR      RTSREC          ;CONTINUE WITH TESTING
2184 010074  012702  013406          3$:     MOV     #MSG10D,R2      ;INDICATE RECORD DATA COMPARES
2185                                                                 ;DESPITE THE PARITY ERROR
2186                                                                 ;CAUSING THE READ STATUS ERROR
2187 010100  104404                          TOP
2188                                 ;+ 1 TO RDERRS IF FIRST ERROR PASS
2189 010102  104434                  RTSREC: CKSWR                   ;CHECK FOR CNTL G
2190 010104  022737  177775  000562          CMP     #-3,RDPASS
2191 010112  001002                          BNE     .+6
2192 010114  005237  000622                  INC     RDERRS          ;+1 TO STATUS ERRORS
2193 010120  032777  000020  170364  RTSR1:  BIT     #20,@SWR                ;DELETE READ RETRYS (SW 4)?
2194 010126  001011                          BNE     RPASS3          ;YES
2195 010130  005237  000562                  INC     RDPASS          ;DONE ALL RE-READS?
2196 010134  001404                          BEQ     RPASS1          ;YES
2197 010136  004737  010242                  JSR     PC,BACK1        ;NO, BACKSPACE TAPE
2198 010142  000137  007424                  JMP     RDSTPD          ;GO AGAIN
2199 010146  005237  000626          RPASS1: INC     NRREAD          ;+1 TO NONRECOVERABLE READ
2200 010152  012737  177775  000562  RPASS3: MOV     #-3,RDPASS
2201 010160  032737  002000  000570          BIT     #2000,STATRD    ;AT EOT?
2202 010166  001054                          BNE     RNDTP1          ;YES, TYPE "EOT"
2203 010170  000631                          BR      RDSTP
2204
2205                                 ;SET UP POINTERS FOR NEXT RECORD
```

```
2206 010172  005237  000614          RDINCR: INC     RECORD
2207 010176  005737  000566                  TST     BLKINC
2208 010202  001416                          BEQ     RESTR1
2209                                ;RECORD LENGTH IS CHANGING, COUNT IT
2210 010204  063737  000566  000632          ADD     BLKINC,READLN
2211 010212  023737  000632  000526          CMP     READLN,MINLEN   ;IS LENGTH LESS THAN MINIMUM
2212 010220  002404                          BLT     RESTRL          ;NO
2213 010222  023737  000632  000524          CMP     READLN,MAXLEN   ;IS LENGTH GREATER THAN MAXIMUM?
2214 010230  003403                          BLE     RESTR1          ;NO
2215 010232  013737  000544  000632  RESTRL: MOV     STRLEN,READLN   ;RESET INITIAL LENGTH
2216 010240  000207                  RESTR1: RTS     PC
2217                                ;BACKSPACE ONE RECORD
2218 010242  006077  170232          BACK1:  ROR     @MTS
2219 010246  103375                          BCC     .-4             ;WAIT FOR TAPE UNIT READY
2220 010250  012777  177777  170226          MOV     #-1,@BC         ;COUNT 1 RECORD
2221 010256  013777  000554  170216          MOV     COMAND,@MTC     ;SELECT DRIVE
2222 010264  052777  000012  170210          BIS     #12,@MTC        ;ISSUE BACKSPACE
2223 010272  004737  005122                  JSR     PC,GOWAIT
2224 010276  042777  000016  170176          BIC     #16,@MTC
2225 010304  000207                          RTS     PC
2226                                ;DRIVE HAS REACHED EOT IN READ MODE
2227 010306  004737  010172          RNDTAP: JSR     PC,RDINCR
2228 010312  052737  000020  000634          BIS     #20,MODES       ;INDICATE AT EOT
2229 010320  012702  014023          RNDTP1: MOV     #MSG25,R2
2230 010324  104404                          TOP
2231 010326  012702  013022                  MOV     #MSG8,R2
2232 010332  104404                          TOP
2233                                ;DUMP ERROR COUNTERS
2234 010334  104434          READMP: CKSWR                   ;CHECK FOR CNTL G
2235 010336  013737  000554  011350          MOV     COMAND,CHAR
2236 010344  000337  011350                  SWAB    CHAR
2237 010350  142737  000170  011350          BICB    #170,CHAR
2238 010356  052737  000260  011350          BIS     #260,CHAR
2239 010364  004737  011352                  JSR     PC,OCTP         ;PRINT DRIVE NUMBER
2240 010370  104430                          SP3
2241 010372  013737  001322  011350          MOV     PARAM,CHAR
2242 010400  000337  011350                  SWAB    CHAR
2243 010404  006037  011350                  ROR     CHAR
2244 010410  042737  000170  011350          BIC     #170,CHAR
2245 010416  052737  000260  011350          BIS     #260,CHAR
2246 010424  004737  011352                  JSR     PC,OCTP         ;PRINT PATTERN NUMBER
2247
2248 010430  013737  001322  011350          MOV     PARAM,CHAR
2249 010436  042737  177774  011350          BIC     #177774,CHAR
2250 010444  012702  013510                  MOV     #MSG14,R2
2251 010450  022737  000001  011350          CMP     #1,CHAR
2252 010456  001002                          BNE     .+6
2253 010460  012702  013464                  MOV     #MSG12,R2
2254 010464  022737  000002  011350          CMP     #2,CHAR
2255 010472  001002                          BNE     .+6
2256 010474  012702  013476                  MOV     #MSG13,R2
2257 010500  104404                          TOP             ;PRINT READ MODE
2258 010502  013702  000614                  MOV     RECORD,R2
2259 010506  104426                          DECPRT          ;PRINT RECORD NUMBER
2260 010510  013737  001322  011350          MOV     PARAM,CHAR
2261 010516  042737  177717  011350          BIC     #177717,CHAR
2262 010524  012702  013540                  MOV     #MSG17,R2
```

J4


```
2263 010530  022737  000020  011350          CMP     #20,CHAR
2264 010536  001002                          BNE     .+6
2265 010540  012702  013547                  MOV     #MSG18,R2
2266 010544  022737  000040  011350          CMP     #40,CHAR
2267 010552  001002                          BNE     .+6
2268 010554  012702  013522                  MOV     #MSG15,R2
2269 010560  022737  000060  011350          CMP     #60,CHAR
2270 010566  001002                          BNE     .+6
2271 010570  012702  013531                  MOV     #MSG16,R2
2272 010574  104404                          TOP                     ;PRINT RECORD LENGTH SEQUENCE
2273 010576  012702  013652                  MOV     #MSG21,R2
2274 010602  104404                          TOP
2275 010604  013702  000622                  MOV     RDERRS,R2
2276 010610  104426                          DECPRT
2277 010612  012702  013702                  MOV     #MSG22,R2
2278 010616  104404                          TOP
2279 010620  013702  000624                  MOV     DAERRS,R2
2280 010624  104426                          DECPRT
2281 010626  012702  013723                  MOV     #MSG23,R2
2282 010632  104404                          TOP
2283 010634  013702  000626                  MOV     NRREAD,R2
2284 010640  104426                          DECPRT
2285 010642  000207                          RTS     PC
2286
2287
2288
2289                                ;WRITE RECOVERY UTILIZING EXTENDED INTERRECORD GAP
2290                                ;USED AFTER EVERY 7 REWRITES OR AFTER
2291                                ;EACH WRITE ERROR IF STATISTICAL RECOVERY NOT SELECTED
2292                                ;USED ONLY IF READ PASS SELECTED
2293 010644  104434                XRGREC: CKSWR                   ;CHECK FOR CNTL G
2294 010646  012737  177774  000564          MOV     #-4,WRPASS      ;COUNT 4 REWRITES
2295 010654  032777  000040  167630  XRG0:   BIT     #40,@SWR                ;DELETE WRITE XIRG (SW 5)
2296 010662  001036                          BNE     XRGRCD          ;YES
2297 010664  004737  010242                  JSR     PC,BACK1
2298 010670  105777  167606                  TSTB    @MTC
2299 010674  100375                          BPL     .-4
2300 010676  013777  000554  167576          MOV     COMAND,@MTC
2301 010704  052777  000014  167570          BIS     #14,@MTC        ;WRITE XIRG
2302 010712  013777  000630  167564          MOV     WRTLEN,@BC      ;SET BYTE COUNT
2303 010720  005477  167560                  NEG     @BC
2304 010724  013777  000530  167554          MOV     WBUF,@CA        ;SET CURRENT ADDRESS
2305 010732  006077  167542                  ROR     @MTS            ;WAIT FOR TU READY
2306 010736  103375                          BCC     .-4
2307 010740  004737  005122                  JSR     PC,GOWAIT
2308
2309                                ;RETURN HERE AFTER INTERRUPT
2310 010744  017737  167530  000570          MOV     @MTS,STATRD     ;SAVE STATUS
2311 010752  005777  167524                  TST     @MTC
2312 010756  100403                          BMI     XRG5            ;HAVE ERROR FLAG, CHECK FOR EOT
2313 010760  005037  000564  XRGRCD: CLR     WRPASS
2314 010764  000207                          RTS     PC              ;EXIT WRITE XIRG
2315 010766  032737  175600  000570  XRG5:   BIT     #175600,STATRD
2316 010774  001771                          BEQ     XRGRCD          ;ONLY EOT, EXIT
2317 010776  005237  000564                  INC     WRPASS          ;DONE 4 XIRG
2318 011002  001324                          BNE     XRG0
2319                                ;PRINT STATUS AFTER 4 XIRG ERRORS
```

```
2320 011004  012702  012774          MOV     #MSG7,R2
2321 011010  104404                  TOP                     ;PRINT WRITE STATUS ERROR
2322 011012  013737  000630  000546  MOV     WRTLEN,LENGTH
2323 011020  004737  011174          JSR     PC,PRTS         ;PRINT STATUS, COMMAND, RECORD, LENGTH
2324 011024  012702  013436          MOV     #MSG11,R2
2325 011030  104404                  TOP                     ;PRINT "XIRG WRITTEN 4 TIMES"
2326 011032  032737  002000  000570  BIT     #2000,STATRD
2327 011040  001701                  BEQ     XRGREC
2328 011042  042777  000016  167432  BIC     #16,@MTC
2329 011050  052777  000006  167424  BIS     #6,@MTC         ;WRITE AN EOF
2330 011056  004737  005122          JSR     PC,GOWAIT
2331 011062  000207                  RTS     PC
2332
2333                                 ;GO BACKWARD ON TAPE X RECORDS
2334 011064  013737  000614  000620  GOBKWD: MOV     RECORD,LASRCR
2335 011072  013737  000616  000614          MOV     WRRECR,RECORD
2336 011100  001003                  BNE     GOB1            ;IS NEW RECORD=0
2337 011102  004737  004732          JSR     PC,REWIND       ;YES,REWIND
2338 011106  000207                  RTS     PC              ;EXIT
2339 011110  013777  000620  167366  GOB1:   MOV     LASRCR,@BC      ;SET BYTE COUNT TO DIFFERENCE
2340 011116  163777  000616  167360          SUB     WRRECR,@BC      ;BETWEEN LASRCR AND WRRECK
2341 011124  005477  167354          NEG     @BC
2342 011130  013777  000554  167344  MOV     COMAND,@MTC
2343 011136  105777  167340          TSTB    @MTC            ;WAIT FOR CU READY
2344 011142  100375                  BPL     .-4
2345 011144  006077  167330          ROR     @MTS            ;WAIT FOR TU READY
2346 011150  103375                  BCC     .-4
2347 011152  042777  000016  167322  BIC     #16,@MTC
2348 011160  052777  000012  167314  BIS     #12,@MTC
2349 011166  004737  005122          JSR     PC,GOWAIT
2350 011172  000207                  RTS     PC
2351
2352
2353
2354                                 ;PRINT COMMAND, STATUS, RECORD NUMBER, LENGTH
2355 011174  012702  013167  PRTS:   MOV     #MSG98,R2
2356 011200  104404                  TOP
2357 011202  017702  167274          MOV     @MTC,R2
2358 011206  104412                  OCTPRT
2359 011210  013702  000570          MOV     STATRD,R2
2360 011214  104412                  OCTPRT
2361 011216  013702  000614          MOV     RECORD,R2
2362 011222  005202                  INC     R2
2363 011224  104426                  DECPRT
2364 011226  013702  000546          MOV     LENGTH,R2
2365 011232  104426                  DECPRT
2366 011234  000207                  RTS     PC
2367 011236  104434                  CKSWR                   ;CHECK FOR CNTL G
2368                                 ;PRINT OCTAL VALUE IN REGISTER 2
2369 011240  012737  000060  011350  OCTPR:  MOV     #'0,CHAR        ;INITIALIZE 1ST NUMBER AS 0
2370 011246  005702                  TST     R2              ;IS VALUE POSITIVE
2371 011250  100003                  BPL     OCT1            ;YES PRINT 0
2372 011252  012737  000061  011350          MOV     #'1,CHAR        ;NO PRINT 1
2373 011260  004737  011352  OCT1:   JSR     PC,OCTP
2374 011264  006102                  ROL     R2
2375 011266  006102                  ROL     R2
2376 011270  012737  177773  011346          MOV     #-5,OCT         ;COUNT 5 DIGITS
```

```
2377 011276  006102                    OCT2:   ROL     R2
2378 011300  006102                            ROL     R2
2379 011302  006102                            ROL     R2
2380 011304  010237  011350                    MOV     R2,CHAR         ;SAVE DIGIT
2381 011310  042737  177770  011350            BIC     #177770,CHAR    ;CLEAR OTHER BITS
2382 011316  052737  000060  011350            BIS     #60,CHAR        ;MAKE ASCII DIGIT
2383 011324  006002                            ROR     R2
2384 011326  004737  011352                    JSR     PC,OCTP         ;PRINT
2385 011332  006102                            ROL     R2
2386 011334  005237  011346                    INC     OCT             ;+1 TO DIGIT COUNT
2387 011340  001356                            BNE     OCT2            ;NOT DONE
2388 011342  104430                            SP3
2389 011344  000207                            RTS     PC              ;EXIT
2390
2391 011346  000000                    OCT:    0
2392 011350  000000                    CHAR:   0
2393 011352  004737  012546            OCTP:   JSR     PC,READY        ;JH>> WAIT UNTIL READY TO OUTPUT CHARACTER
2394 011356  013777  011350  167136            MOV     CHAR,@TPB       ;PRINT IT
2395 011364  000207                            RTS     PC
2396
2397                                    ;PRINT DECIMAL VALUE IN REGISTER 2
2398 011366  012737  177773  011542    DECPR:  MOV     #-5,DIGCNT
2399 011374  012737  011550  011546            MOV     #DECPNT+2,DECPNT
2400 011402  012737  000040  011544            MOV     #40,ZERO
2401 011410  012737  177777  011540    TYPT1:  MOV     #-1,DIGIT
2402 011416  005237  011540            TYPT2:  INC     DIGIT
2403 011422  167702  000120                    SUB     @DECPNT,R2
2404 011426  100373                            BPL     TYPT2
2405 011430  067702  000112                    ADD     @DECPNT,R2
2406 011434  004737  011462                    JSR     PC,DECOUT
2407 011440  005237  011542                    INC     DIGCNT
2408 011444  001002                            BNE     TYPT3
2409 011446  104430                            SP3
2410 011450  000207                            RTS     PC
2411 011452  062737  000002  011546    TYPT3:  ADD     #2,DECPNT
2412 011460  000753                            BR      TYPT1
2413 011462  005737  011540            DECOUT: TST     DIGIT
2414 011466  001010                            BNE     DEC1
2415 011470  022737  177777  011542            CMP     #-1,DIGCNT
2416 011476  001404                            BEQ     DEC1
2417 011500  013737  011544  011540            MOV     ZERO,DIGIT
2418 011506  000406                            BR      DEC2
2419 011510  012737  000060  011544    DEC1:   MOV     #60,ZERO
2420 011516  052737  000060  011540            BIS     #60,DIGIT
2421
2422 011524  004737  012546            DEC2:   JSR     PC,READY        ;JH>> WAIT UNITL READY TO OUTPUT CHARACTER
2423 011530  013777  011540  166764            MOV     DIGIT,@TPB
2424 011536  000207                            RTS     PC
2425 011540  000000                    DIGIT:  0
2426 011542  000000                    DIGCNT: 0
2427 011544  000040                    ZERO:   40
2428 011546  011550                    DECPNT: .+2
2429 011550  023420                            10000.
2430 011552  001750                            1000.
2431 011554  000144                            100.
2432 011556  000012                            10.
2433 011560  000001                            1.
```

```
2434
2435 011562  105777  166726          ;KEYBOARD INPUT
2436 011566  100375          WAITK:  TSTB    @TKS            ;WAIT FOR KEY
2437 011570  117737  166722  001316          BPL     WAITK
2438 011576  142737  000200  001316          MOVB    @TKB,CHARIN     ;GET CHARACTER
2439 011604  105777  166710          WAITK1: BICB    #200,CHARIN     ;CLEAR PARITY
2440 011610  100375                  TSTB    @TPS            ;WAIT FOR TELEPRINTER READY
2441 011612  113777  001316  166702          BPL     WAITK1
2442 011620  000207                  MOVB    CHARIN,@TPB     ;ECHO CHARACTER
2443                                  RTS     PC              ;EXIT
2444 011622  012702  011632          ;TYPE 3 SPACES
2445 011626  104404          SP3X:   MOV     #SP3A,R2
2446 011630  000207                  TOP
2447 011632    057     040     040          RTS     PC
     011635    040     057          SP3A:   .ASCII  :/   /:
2448                                  .EVEN
2449                                  ;TELETYPE OUTPUT PACKAGE
2450 011640  142777  000177  166652  TO:     BICB    #177,@TPS       ;CLEAR TELETYPE FLAGS
2451 011646  112237  011732          MOVB    (2)+,EOMK       ;SAVE MESSAGE DELIMETER
2452 011652  121237  011732          TOP1:   CMPB    @R2,EOMK        ;IS CHARACTER THE SECOND MESSAGE DELIMITER?
2453 011656  001001                  BNE     .+4             ;NO
2454 011660  000207                  RTS     PC              ;YES, EXIT
2455 011662  121227  000100          CMPB    @R2,#'@         ;IS CHARACTER AN @ WHICH INDICATES A CARRIAGE RET.
2456 011666  001405                  BEQ     TOP2            ;YES
2457 011670  004737  012546          JSR     PC,READY        ;JH>> WAIT UNTIL READY TO OUTPUT CHARACTER
2458 011674  112277  166622          MOVB    (2)+,@TPB       ;PRINT CHARACTER
2459 011700  000764                  BR      TOP1
2460 011702  004737  012546          TOP2:   JSR     PC,READY        ;JH>> WAIT UNTIL READY TO OUTPUT CHARACTER
2461 011706  112777  000215  166606          MOVB    #215,@TPB       ;CR
2462 011714  004737  012546          JSR     PC,READY        ;JH>> WAIT UNTIL READY TO OUTPUT CHARACTER
2463 011720  112777  000212  166574          MOVB    #212,@TPB       ;LF
2464 011726  005202                  INC     R2
2465 011730  000750                  BR      TOP1
2466 011732  000000          EOMK:   0
2467 011734  022737  000176  000512  CKSWRR: CMP     #SWREG,SWR              ;SOFTWARE SWITCH REG PRESENT
2468 011742  001035                  BNE     OUT             ;NO, GET OUT
2469 011744  105777  166544          TSTB    @TKS            ;YES,WAIT FOR
2470 011750  100032                  BPL     OUT             ;READY, GET CHARACTER
2471 011752  017737  166540  001316          MOV     @TKB,CHARIN     ;AND STRIP OFF
2472 011760  042737  177600  001316          BIC     #177600,CHARIN  ;THE GARBAGE
2473 011766  022737  000007  001316          CMP     #7,CHARIN       ;IS IT A <^G>
2474 011774  001020                  BNE     OUT
2475 011776  012702  014111          MOV     #$CNTG,R2
2476 012002  104404                  TOP
2477 012004  012702  014117  CNTLU:  MOV     #$MSWR,R2
2478 012010  104404                  TOP
2479 012012  017702  166474          MOV     @SWR,R2
2480 012016  104412                  OCTPRT
2481 012020  012702  014127          MOV     #$MNEW,R2
2482 012024  104404                  TOP
2483 012026  005037  012230          CLR     @#TEMPST
2484 012032  004737  012040          JSR     PC,$READ                ;GO READ A LINE
2485 012036  000207          OUT:    RTS     PC              ;RETURN TO MAIN BODY OF PROGRAM
2486
2487 012040  005037  012230  $READ:  CLR     TEMPST
2488 012044  012737  000007  012232  MOV     #7,COUNT
2489 012052  104400          1$:     WAITKY
```

```
2490 012054 042737 177600 001316        BIC     #177600,CHARIN  ;STRIP OFF GARBAGE
2491 012062 122737 000025 001316        CMPB    #25,CHARIN              ;IS IT A ↑U?
2492 012070 001002                      BNE     2$              ;BRANCH IF NOT
2493 012072 005726                3$:   TST     (SP)+           ;POP THE STACK
2494 012074 000743                      BR CNTLU                ;START OVER
2495 012076 122737 000015 001316  2$:   CMPB    #15,CHARIN              ;IS IT A <CR>?
2496 012104 001011                      BNE     4$              ;BRANCH IF NOT
2497 012106 012702 014137               MOV     #$MCRLF,R2      ;DO CRLF
2498 012112 104404                      TOP
2499 012114 022737 000007 012232        CMP     #7,COUNT        ;WAS IT FIRST CHARACTER
2500 012122 001036                      BNE     7$              ;CHANGE SWR IF NOT FIRST ONE
2501 012124 005726                8$:   TST     (SP)+           ;POP THE STACK
2502 012126 000743                      BR      OUT             ;GET OUT
2503 012130 122737 000060 001316  4$:   CMPB    #60,CHARIN
2504 012136 003004                      BGT     5$
2505 012140 122737 000067 001316        CMPB    #67,CHARIN
2506 012146 002004                      BGE     6$
2507 012150 012702 012664         5$:   MOV     #MSG0,R2
2508 012154 104404                      TOP
2509 012156 000745                      BR      3$              ;START OVER IF NOT LEGAL CHARACTER
2510 012160 006337 012230         6$:   ASL     TEMPST
2511 012164 006337 012230               ASL     TEMPST
2512 012170 006337 012230               ASL     TEMPST
2513 012174 142737 000060 001316        BICB    #60,CHARIN              ;GET NITTY-GRITTY
2514 012202 153737 001316 012230        BISB    CHARIN,TEMPST
2515 012210 005337 012232               DEC     COUNT           ;ONLY WANT 6   DIGITS
2516 012214 001755                      BEQ     5$
2517 012216 000715                      BR      1$
2518 012220 013777 012230 166264  7$:   MOV     TEMPST,@SWR     ;CHANGE SWITCH REGISTER CONTENTS
2519 012226 000736                      BR      8$
2520
2521 012230 000000                TEMPST: 0
2522 012232 000000                COUNT:  0
2523
2524 012234 013746 000006         SUSWRR: MOV     @06,-(SP)               ;SAVE VECTORS
2525 012240 013746 000004                 MOV     @04,-(SP)
2526 012244 012737 012264 000004          MOV     #1$,@04                 ;SET UP FOR TIMEOUT
2527 012252 022777 177777 166232          CMP     #-1,@SWR                ;REFERENCE HARDWARE SWITCH REGISTER
2528 012260 001402                        BEQ     2$
2529 012262 000404                        BR      3$
2530 012264 022626                1$:     CMP     (SP)+,(SP)+             ;ADJUST STACK
2531 012266 012737 000176 000512  2$:     MOV     #SWREG,SWR              ;POINT TO SOFTWARE SWITCH REG
2532 012274 012637 000004         3$:     MOV     (SP)+,@04               ;RESTORE VECTORS
2533 012300 012637 000006                 MOV     (SP)+,@06
2534 012304 000207                        RTS     PC
2535
2536                              ;TRAP HANDLER
2537 012306 011666 000002         TRAP34: MOV     @SP,2(6)
2538 012312 162716 000002                 SUB     #2,@SP
2539 012316 013646                        MOV     @(6)+,-(6)
2540 012320 062716 105726                 ADD     #TABLE-104400,@SP
2541 012324 013607                        MOV     @(6)+,PC
2542 012326 011562                TABLE:  WAITK
2543 012330 005174                        WRITI
2544 012332 011640                        TO
2545 012334 004462                        SVCTR
2546 012336 004576                        RSFDR
```

```
2547 012340  011240                    OCTPR
2548 012342  004500                    MVCTR
2549 012344  006532                    GENPA
2550 012346  004542                    CLRAL
2551 012350  004674                    CHGDR
2552 012352  007402                    READI
2553 012354  011366                    DECPR
2554 012356  011622                    SP3X
2555 012360  012234                    SUSWRR
2556 012362  011734                    CKSWRR
2557         104400          WAITKY=104400
2558         104402          WRITIT=104402
2559         104404          TOP=104404
2560         104406          SVCTRS=104406
2561         104410          RSFDRV=104410
2562         104412          OCTPRT=104412
2563         104414          MVCTRS=104414
2564         104416          GENPAT=104416
2565         104420          CLRALL=104420
2566         104422          CHGDRV=104422
2567         104424          READIT=104424
2568         104426          DECPRT=104426
2569         104430          SP3=104430
2570         104432          SUSWR=104432
2571         104434          CKSWR=104434
2572
```

```
2574
2575                            ;       **********************************************************************
2576                            ;                       MODIFIED DEC 16 1977
2577
2578                            ;       ..
2579                            ;               CHECK FOR DUMP MODE OR AUTOMATIC/ACT11-XXDP MODE
2580                            ;       --
2581
2582 012364  005037  000400            CKMODE: CLR     AUTOM           ;INIT AUTOMATIC MODE INDICATOR
2583 012370  105037  000402                    CLRB    ACT11M          ;INIT ACT11 AUTO MODE INDICATOR
2584 012374  105037  000403                    CLRB    XXDPM           ;INIT XXDP AUTO MODE INDICATOR
2585 012400  105037  000404                    CLRB    ADUMPM          ;INIT  ACT11 DUMP MODE INDICATOR
2586 012404  105037  000405                    CLRB    XDUMPM          ;INIT XXDP DUMP MODE INDICATOR
2587 012410  005737  000042                    TST     @#42            ;AUTO MODE?
2588 012414  001425                           BEQ     2$              ;BRANCH - IF NO
2589 012416  005237  000400                    INC     AUTOM           ;SET AUTO MODE INDICATOR
2590 012422  032737  020000  000052            BIT     #20000,@#52     ;MANUAL INTERVENTION?
2591 012430  001402                           BEQ     6$              ;BRANCH - IF NO
2592 012432  000137  012512                    JMP     ABORT           ;ABORT THE PROGRAM
2593 012436  023737  000042  000046    6$:     CMP     @#42,@#46       ;ACT11 MODE?
2594 012444  001403                           BEQ     1$              ;BRANCH - IF YES
2595 012446  105237  000403                    INCB    XXDPM           ;INDICATE XXDP AUTO MODE
2596 012452  000416                           BR      5$              ;AND EXIT
2597 012454  105237  000402            1$:     INCB    ACT11M          ;INDICATE ACT11 AUTO MODE
2598 012460  012777  020111  166024            MOV     #20111,@#SWR    ;SET SWITCH REGISTER
2599 012466  000410                           BR      5$              ;AND EXIT
2600 012470  105737  000041            2$:     TSTB    @#41            ;MAN/MODE VIA ACT11/PAPER TAPE?
2601 012474  001003                           BNE     3$              ;BRANCH - IF NOT
2602 012476  105237  000404                    INCB    ADUMPM          ;INDICATE MAN/MODE VIA ACT11/PAPER TAPE
2603 012502  000402                           BR      5$              ;AND EXIT
2604 012504  105237  000405            3$:     INCB    XDUMPM          ;INDICATE MANUAL MODE VIA XXDP
2605 012510  000207                    5$:     RTS     PC              ;RETURN
2606
2607                            ;       **********************************************************************
2608
```

```
2610
2611                            ;       **********************************************************************
2612                            ;                               MODIFIED DEC 16 1977
2613
2614                            ;       ++
2615                            ;               DISCONTINUE TESTING FOR ILLEGAL CONDITIONS
2616                            ;       --
2617
2618 012512  000005            ABORT:  RESET                   ;CLEAR THE WORLD
2619 012514  012702  012642            MOV     @#MSG00,R2      ;GET ABORT MESSAGE
2620 012520  004737  104404            JSR     PC,TOP          ;PRINT ABORT MESSAGE
2621 012524  105737  000403            TSTB    XXDP#           ;XXDP AUTO MODE
2622 012530  001405                    BEQ     1$              ;BRANCH - IF NOT
2623 012532  013700  000042            MOV     @#42,R0         ;GET MONITOR EXIT ADDRESS
2624 012536  005037  000042            CLR     @#42            ;USE AS ABORT FLAG
2625 012542  004710                    JSR     PC,(R0)         ;EXIT TO XXDP MONITOR
2626 012544  000777            1$:     BR      .               ;AND HANG
2627
2628                            ;       **********************************************************************
2629
```

```
2631
2632
2633                            ;*************************************************************************
2634                            ;*                                                                       *
2635                            ;*      THIS ROUTINE WILL SEE WAIT UNTIL WE CAN OUTPUT A CHARACTER.      *
2636                            ;*      IT WILL CHECK TO SEE IF AN XON (↑Q) OR XOFF (↑S) HAS BEEN        *
2637                            ;*      TYPED AT THE KEYBOARD.                                           *
2638                            ;*                                                                       *
2639                            ;*      JUNE 16, 1984                                                    *
2640                            ;*                                                                       *
2641                            ;*************************************************************************
2642
2643
2644 012546  105777  165742          READY:  TSTB    @TKS            ;JH>> SEE IF CHARACTER TYPED AT KEYBOARD
2645 012552  100024                  BPL     RDY2                    ;JH>> BRANCH IF NO CHARACTER
2646 012554  117737  165736  000537          MOVB    @TKB,$CTRLS+1   ;JH>> SAVE CHARACTER IN TEMP LOCATION
2647 012562  142737  000200  000537          BICB    #200,$CTRLS+1   ;JH>> STRIP OFF PARITY BIT
2648 012570  122737  000023  000537          CMPB    #23,$CTRLS+1    ;JH>> SEE IF CHARACTER IS AN XOFF
2649 012576  001004                  BNE     RDY1                    ;JH>> BRANCH IF NOT ↑S
2650 012600  112737  000377  000536          MOVB    #377,$CTRLS     ;JH>> SET XOFF FLAG
2651 012606  000757                  BR      READY                   ;JH>> LOOK FOR ANOTHER CHARACTER...
2652 012610  122737  000021  000537  RDY1:   CMPB    #21,$CTRLS+1    ;JH>> SEE IF CHARACTER IS AN XON
2653 012616  001002                  BNE     RDY2                    ;JH>> BRANCH IF NOT ↑Q
2654 012620  105037  000536                  CLRB    $CTRLS          ;JH>> CLEAR XOFF FLAG
2655 012624  105777  165670          RDY2:   TSTB    @TPS            ;JH>> SEE IF PRINTER READY
2656 012630  100346                  BPL     READY                   ;JH>> BRANCH IF NOT READY
2657 012632  105737  000536                  TSTB    $CTRLS          ;JH>> SEE IF XOFF FLAG IS SET
2658 012636  100743                  BMI     READY                   ;JH>> BRANCH IF FLAG IS SET
2659 012640  000207                  RTS     PC                      ;JH>> OTHERWISE, FINALLY READY TO PRINT CHARACTER
2660
```

```
                                        ;TEXT MESSAGES
                                
2664 012642  057  100  120  MSG00:  .ASCII          ;/@PROGRAM ABORTED/;
     012645  122  117  107
     012650  122  101  115
     012653  040  101  102
     012656  117  122  124
     012661  105  104  057
2665 012664  057  077  100  MSG0:   .ASCII          ;/?@ /;
     012667  040  057
2666 012671  057  100  123  MSG1:   .ASCII          ;/@SELECT UNITS  /;
     012674  105  114  105
     012677  103  124  040
     012702  125  116  111
     012705  124  123  040
     012710  040  057
2667 012712  057  100  124  MSG2:   .ASCII          ;/@TST PAT RLS WMO RMO@ /;
     012715  123  124  040
     012720  120  101  124
     012723  040  122  114
     012726  123  040  127
     012731  115  117  040
     012734  122  115  117
     012737  100  040  057
2668 012742  057  115  101  MSG5:   .ASCII          ;/MAX TESTS SELECTED@/;
     012745  130  040  124
     012750  105  123  124
     012753  123  040  123
     012756  105  114  105
     012761  103  124  105
     012764  104  100  057
2669 012767  057  040  117  MSG6:   .ASCII          ;/ OK/;
     012772  113  057
2670 012774  057  100  127  MSG7:   .ASCII          ;/@WRITE STATUS ERROR@/;
     012777  122  111  124
     013002  105  040  123
     013005  124  101  124
     013010  125  123  040
     013013  105  122  122
     013016  117  122  100
     013021  057
2671 013022  057  105  116  MSG8:   .ASCII          ;/END OF TAPE**********@;
     013025  104  040  117
     013030  106  040  124
     013033  101  120  105
     013036  052  052  052
     013041  052  052  052
     013044  052  052  052
     013047  052  052  052
     013052  052  052  052
     013055  052  052  052
     013060  052  052  100
2672 013063  104  122  126            .ASCII       ;DRV PAT MODE RECORD LENGTH@/;
     013066  040  120  101
     013071  124  040  115
     013074  117  104  105
     013077  040  122  105
```

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                013102  103     117     122
                013105  104     040     114
                013110  105     116     107
                013113  124     110     100
                013116  057
2673            013117  057     100     122     MSG9:   .ASCII          ;/@READ STATUS ERROR@/;
                013122  105     101     104
                013125  040     123     124
                013130  101     124     125
                013133  123     040     105
                013136  122     122     117
                013141  122     100     057
2674            013144  057     100     122     MSG9A:  .ASCII          ;/@READ DATA ERROR@/;
                013147  105     101     104
                013152  040     104     101
                013155  124     101     040
                013160  105     122     122
                013163  117     122     100
                013166  057
2675            013167  057     103     117     MSG9B:  .ASCII          ;/COMD     STATUS   RECORD   LENGTH EXPECTED ACTUAL@/;
                013172  115     104     040
                013175  040     040     040
                013200  040     123     124
                013203  101     124     125
                013206  123     040     040
                013211  040     122     105
                013214  103     117     122
                013217  104     040     040
                013222  040     114     105
                013225  116     107     124
                013230  110     040     105
                013233  130     120     105
                013236  103     124     105
                013241  104     040     101
                013244  103     124     125
                013247  101     114     100
                013252  057
2676            013253  057     100     103     MSG10A: .ASCII  ;/@CZTMBG0@RECORD LIMITS IN BYTES@;
                013256  132     124     115
                013261  102     107     060
                013264  100     122     105
                013267  103     117     122
                013272  104     040     114
                013275  111     115     111
                013300  124     123     040
                013303  111     116     040
                013306  102     131     124
                013311  105     123     100
2677            013314  115     111     116             .ASCII  ;MINLEN  MAXLEN@ /;
                013317  114     105     116
                013322  040     040     115
                013325  101     130     114
                013330  105     116     100
                013333  040     057
2678            013335  054     100     105     MSG10B: .ASCII  /,@EXERCISING UNITS./
                013340  130     105     122
                013343  103     111     123
```

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                013346  111     116     107
                013351  040     125     116
                013354  111     124     123
                013357  054
2679            013360  054     100     116     MSG10C: .ASCII  /,@NO DRIVES AVAILABLE,/
                013363  117     040     104
                013366  122     111     126
                013371  105     123     040
                013374  101     126     101
                013377  111     114     101
                013402  102     114     105
                013405  054
2680            013406  057     040     040     MSG10D: .ASCII  ;/  RECORD DATA COMPARES/;
                013411  122     105     103
                013414  117     122     104
                013417  040     104     101
                013422  124     101     040
                013425  103     117     115
                013430  120     101     122
                013433  105     123     057
2681            013435  057     130     111     MSG11:  .ASCII                  ;/XIRG WRITTEN 4 TIMES/;
                013441  122     107     040
                013444  127     122     111
                013447  124     124     105
                013452  116     040     064
                013455  040     124     111
                013460  115     105     123
                013463  057
2682            013464  057     040     040     MSG12:  .ASCII                  ;/   SSTP /;
                013467  040     123     123
                013472  124     120     040
                013475  057
2683            013476  057     040     040     MSG13:  .ASCII                  ;/   RNDM /;
                013501  040     122     116
                013504  104     115     040
                013507  057
2684            013510  057     040     040     MSG14:  .ASCII                  ;/   NSTP /;
                013513  040     116     123
                013516  124     120     040
                013521  057
2685            013522  057     115     055     MSG15:  .ASCII                  ;/M-MAX/;
                013525  115     101     130
                013530  057
2686            013531  057     115     055     MSG16:  .ASCII          ;/M-MIN/;
                013534  115     111     116
                013537  057
2687            013540  057     115     111     MSG17:          .ASCII          ;/MIN  /;
                013543  116     040     040
                013546  057
2688            013547  057     115     101     MSG18:          .ASCII          ;/MAX  /;
                013552  130     040     040
                013555  057
2689            013556  057     100     127     MSG19:  .ASCII          ;/@WRITE ERRORS = /;
                013561  122     111     124
                013564  105     040     105
                013567  122     122     117
                013572  122     123     040
```

```
                013575  075     040     057
2690            013600  057     100     122     MSG20:          .ASCII          ;/@RECOVERED AT 0 /;
                013603  105     103     117
                013606  126     105     122
                013611  105     104     040
                013614  101     124     040
                013617  060     040     057
2691            013622  057     100     120     MSG20A:         .ASCII          ;/@PERMANENT BADSPOTS = /;
                013625  105     122     115
                013630  101     116     105
                013633  116     124     040
                013636  102     101     104
                013641  123     120     117
                013644  124     123     040
                013647  075     040     057
2692            013652  057     100     122     MSG21:          .ASCII          ;/@READ STATUS ERRORS = /;
                013655  105     101     104
                013660  040     123     124
                013663  101     124     125
                013666  123     040     105
                013671  122     122     117
                013674  122     123     040
                013677  075     040     057
2693            013702  057     100     104     MSG22:          .ASCII          ;/@DATA ERRORS = /;
                013705  101     124     101
                013710  040     105     122
                013713  122     117     122
                013716  123     040     075
                013721  040     057
2694            013723  057     100     116     MSG23:          .ASCII          ;/@NON-RECOVERABLE ERRORS = /;
                013726  117     116     055
                013731  122     105     103
                013734  117     126     105
                013737  122     101     102
                013742  114     105     040
                013745  105     122     122
                013750  117     122     123
                013753  040     075     040
                013756  057
2695            013757  057     100     052     MSG24:          .ASCII          ;/@**********WRITE PASS   /;
                013762  052     052     052
                013765  052     052     052
                013770  052     052     052
                013773  052     052     052
                013776  052     052     052
                014001  052     052     052
                014004  052     127     122
                014007  111     124     105
                014012  040     120     101
                014015  123     123     040
                014020  040     040     057
2696            014023  057     100     052     MSG25:          .ASCII          ;/@**********READ PASS    /;
                014026  052     052     052
                014031  052     052     052
                014034  052     052     052
                014037  052     052     052
                014042  052     052     052
```

J5


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                014045      052     052     052
                014050      052     122     105
                014053      101     104     040
                014056      120     101     123
                014061      123     040     040
                014064      040     040     057
2697            014067      057     100     100  MSG26:          .ASCII          ;/@@@/;
                014072      100     057
2698            014074      057     105     116  MSG27:          .ASCII          ;/END OF PASS/;
                014077      104     040     117
                014102      106     040     120
                014105      101     123     123
                014110      057
2699            014111      057     100     136  $CNTG:  .ASCII  ;/@↑G@/;
                014114      107     100     057
2700            014117      057     100     123  $MSWR:  .ASCII  ;/@SWR= /;
                014122      127     122     075
                014125      040     057
2701            014127      057     040     116  $MNEW:  .ASCII  ;/ NEW= /;
                014132      105     127     075
                014135      040     057
2702            014137      057     100     057  $MCRLF: .ASCII  ;/@/;
2703                                                .EVEN
2704
2705            014142  014142                   BUFFER:.                        ;WRITE BUFFER BEGINS HERE
2706
2707                    000001                                  .END
```

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SYMBOL TABLE

ABORT	012512	D1TAB	000722	MSG24	013757	RDERRO	007750	STATRD	000570		
ACT11M	000402	D2TAB	000766	MSG25	014023	RDERRS	000622	STOPOP	005502		
ADUMPM	000404	D3TAB	001032	MSG26	014067	RDINCR	010172	STREC1	006042		
ALLEOS	005012	D4TAB	001076	MSG27	014074	RDPASS	000562	STRLEN	000544		
ALLEOT	004770	D5TAB	001142	MSG5	012742	RDSTP	007654	STRTOP	005306		
ALL1	004772	D6TAB	001206	MSG6	012767	RDSTPC	007614	SUSWR -	104432		
ALL2	005074	D7TAB	001252	MSG7	012774	RDSTPD	007424	SUSWRR	012234		
ALL3	005070	ENDTAP	006134	MSG8	013022	RDY1	012610	SVCTR	004462		
ATST	000540	ENDT1	006146	MSG9	013117	RDY2	012624	SVCTRS-	104406		
AUTOM	000400	EOMK	011732	MSG9A	013144	READGO	007446	SVC1	004466		
AUTOST	001356	ERROR	005702	MSG9B	013167	READI	007402	SVRECR	000552		
BACK1	010242	ERR1	005726	MTC	000502	READIT-	104424	SV0	007372		
BC	000504	EXEC	003062	MTS	000500	READLN	000632	SV1	007374		
BLKINC	000566	EXECUT	003050	MTV	000534	READMP	010334	SV2	007376		
BUFFER	014142	EXEC1	003070	MVCTR	004500	READY	012546	SV3	007400		
CA	000506	GENPA	006532	MVCTRS-	104414	RECORD	000614	SWR	000512		
CC	000510	GENPAT-	104416	MV1	004504	RESETL	005656	SWREG	000176		
CDMEND	005064	GOBKWD	011064	NOINCR	005264	RESTRL	010232	TABLE	012326		
CDRIVE	000560	GOB1	011110	NONSTP	005330	RESTR1	010240	TEMPST	012230		
CDRVBT	000556	GOWAIT	005122	NO.SEL	001670	REWIND	004732	TESINC	005610		
CHAR	011350	GP1	006644	NRREAD	000626	RG1	007456	TESRC1	006006		
CHARIN	001316	GW1	005164	NUMTST	001320	RNDRDS	007624	TESREC	005756		
CHGDR	004674	HINUM	007370	NXMRET	001476	RNDS1	007636	TEST	001326		
CHGDRV-	104422	IDSELF	001700	NXT.TU	001614	RNDTAP	010306	TEST0	003300		
CHG1	004720	LASRCR	000620	OCT	011346	RNDTP1	010320	TEST1	003350		
CKMODE	012364	LENGTH	000546	OCTP	011352	RPASS1	010146	TEST2	003420		
CKSWR -	104434	LONUM	007366	OCTPR	011240	RPASS3	010152	TEST3	003536		
CKSWRR	011734	LOOPER	002014	OCTPRT-	104412	RSFDR	004576	TEST4	003654		
CLRAL	004542	MAXLEN	000524	OCT1	011260	RSFDRV-	104410	TEST5	004176		
CLRALL-	104420	MEDIUM	000041	OCT2	011276	RSF1	004610	TKB	000516		
CLRTBL	005076	MEMAK	002070	OUT	012036	RSF2	004634	TKS	000514		
CLRT1	005102	MEMBK	002114	OVER4K	001524	RTSREC	010102	TO	011640		
CLR1	004544	MINLEN	000526	PARAM	001322	RTSR1	010120	TOP -	104404		
CNTLU	012004	MODES	000634	PAT0	006646	RTSSTP	007566	TOP1	011652		
COMAND	000554	MSBITS	000550	PAT1	006662	SELDRV	002212	TOP2	011702		
COUNT	012232	MSG0	012664	PAT1A	006666	SELD1	002244	TPB	000522		
CTRDEX	004516	MSG00	012642	PAT2	006732	SELD2	002264	TPS	000520		
CTRDMP	005032	MSG1	012671	PAT3	006746	SELOK1	003042	TRAP34	012306		
CTRD1	005060	MSG10A	013253	PAT3A	006752	SELPAT	002456	TSINC2	005664		
DAERRS	000624	MSG10B	013335	PAT4	007016	SELRLS	002350	TSINC3	005700		
DATERR	007672	MSG10C	013360	PAT5	007044	SELRM1	002732	TSTEX	001324		
DATER1	007732	MSG10D	013406	PAT5A	007050	SELRM2	002746	TSTSTP	005424		
DECOUT	011462	MSG11	013436	PAT6	007160	SELR1	002600	TSTTBL	001330		
DECPNT	011546	MSG12	013464	PAT7	007174	SELR2	002616	TU.SEL	001546		
DECPR	011366	MSG13	013476	PERMBS	000612	SELR3	002632	TYPT1	011410		
DECPRT-	104426	MSG14	013510	PRTS	011174	SELTST	002364	TYPT2	011416		
DEC1	011510	MSG15	013522	P1T	006710	SELT1	002402	TYPT3	011452		
DEC2	011524	MSG16	013531	P3T	006774	SELT2	002426	T0	003312		
DIGCNT	011542	MSG17	013540	P4	007022	SELT3	002446	T0A	003314		
DIGIT	011540	MSG18	013547	P4A	007042	SELW1	002664	T0B	003332		
DOAGN	003270	MSG19	013556	P5T	007072	SELW2	002700	T1	003362		
DONE	003152	MSG2	012712	RANDOM	007364	SP3 -	104430	T1A	003364		
DONE1	003220	MSG20	013600	RANGEN	007214	SP3A	011632	T1B	003402		
DRIVE	000040	MSG20A	013622	RANG1	007252	SP3X	011622	T2	003432		
DRVADR	000636	MSG21	013652	RANSTP	005512	STACK -	000500	T2A	003434		
DRVSEL	000542	MSG22	013702	RAN1	005524	START	002136	T2B	003452		
DOTAB	000656	MSG23	013723	RBUF	000532	START1	002142	T2C	003456		

L5

SYMBOL TABLE

```
T2D     003476          T4G     004026          T5G     004370          WBUF    000530          XRGREC  010644
T2E     003502          T4H     004030          T5H     004406          WRCHEK  000572          XRG0    010654
T2F     003516          T4J     004046          T5INC   004460          WRITI   005174          XRG5    010766
T3      003550          T4K     004054          T5J     004410          WRITIT- 104402          XXDPM   000403
T3A     003552          T4L     004056          T5K     004430          WRPASS  000564          ZERO    011544
T3B     003570          T4M     004130          USSTST  001626          WRRECR  000616          $CNTG   014111
T3C     003574          T4N     004142          USS.OK  001644          WRTDMP  006162          $CTRLS  000536
T3D     003612          T4P     004146          VALID   002300          WRTD1   006452          $ENDAD  003240
T3E     003620          T5      004210          VAL1    002316          WRTD2   006474          $MCRLF  014137
T3F     003634          T5A     004234          VAL2    002330          WRTLEN  000630          $MNEW   014127
T4      003710          T5B     004246          VAL3    002344          W1      005242          $MSWR   014117
T4A     003712          T5C     004256          VAL4    002350          W10     005470          $READ   012040
T4B     003714          T5D     004306          WAITK   011562          W11     005542          $R1     007416
T4C     003740          T5E     004314          WAITKY- 104400          W12     005576          $R5     007554
T4D     003742          T5F     004356          WAITK1  011604          XDUMPM  000405          $SVPC -  000036
T4E     003774          T5FLAG  004456          WAIT1   005152          XRGRCD  010760          $ZERO$  002034
T4F     004010
```

```
. ABS.  014144      000
        000000      001
ERRORS DETECTED:  0

VIRTUAL MEMORY USED:  8232 WORDS  ( 33 PAGES)
DYNAMIC MEMORY:  19748 WORDS  ( 75 PAGES)
ELAPSED TIME:  00:00:57
CZTMBG.BIN,CZTMBG/-SP/CR/NL:TOC=CZTMBG.P11
```

M5

SYMBOL	VALUE	REFERENCES
ABORT	012512	26-2592 #27-2618
ACT11M	000402	#22-949 23-1119 23-1354 *26-2583 *26-2597
ADUMPM	000404	#22-951 *26-2585 *26-2602
ALLEOS	005012	23-1654 #23-1658
ALLEOT	004770	23-1376 23-1392 23-1424 23-1456 23-1523 23-1564 23-1576 #23-1651
ALL1	004772	#23-1652 23-1656
ALL2	005074	23-1659 23-1661 #23-1674
ALL3	005070	23-1657 #23-1673
ATST	000540	#23-985 *23-1068 *23-1171 23-1187
AUTOM	000400	#22-948 *26-2582 *26-2589
AUTOST	001356	23-961 #23-1061 23-1358
BACK1	010242	23-1813 23-1814 25-2197 #25-2218 25-2297
BC	000504	#23-969 23-1717 23-1718 23-1818 25-2095 25-2096 25-2220 25-2302 25-2303
		25-2339 25-2340 25-2341
BLKINC	000566	#23-996 *23-1698 *23-1702 *23-1706 23-1770 23-1772 25-2207 25-2210
BUFFER	014142	23-979 23-980 23-1077 23-1082 23-1086 *23-1139 23-1140 23-1159 23-1165
		23-1170 #29-2705
CA	000506	#23-970 23-1719 25-2097 25-2304
CC	000510	#23-971 23-1684 23-1689
CDMEND	005064	23-1669 #23-1671
CDRIVE	000560	#23-993 23-1597 23-1598 *23-1612 *23-1616 23-1620 *23-1630
CDRVBT	000556	#23-992 *23-1613 23-1614 *23-1618 *23-1632 23-1637
CHAR	011350	*24-1837 *24-1838 *24-1839 *24-1841 *24-1844 *24-1845 *24-1846 *24-1847 *24-1848
		*24-1850 *24-1851 24-1853 24-1856 *24-1862 *24-1863 24-1865 24-1868 24-1871
		*25-2235 *25-2236 *25-2237 *25-2238 *25-2241 *25-2242 *25-2243 *25-2244 *25-2245
		*25-2248 *25-2249 25-2251 25-2254 *25-2260 *25-2261 25-2263 25-2266 25-2269
		*25-2369 *25-2372 *25-2380 *25-2381 *25-2382 #25-2392 25-2394
CHARIN	001316	#23-1043 23-1185 23-1190 23-1192 *23-1198 *23-1199 *23-1203 23-1221 23-1226
		23-1228 23-1233 23-1243 23-1245 *23-1247 *23-1248 *23-1249 23-1250 23-1255
		23-1257 23-1261 23-1265 23-1271 23-1273 23-1277 23-1283 23-1285 23-1289
		23-1298 *25-2437 *25-2438 25-2441 *25-2471 *25-2472 25-2473 *25-2490 25-2491
		25-2495 25-2503 25-2505 *25-2513 25-2514
CHGDR	004674	#23-1630 23-1638 25-2551
CHGDRV	= 104422	23-1374 23-1390 23-1408 23-1415 23-1422 23-1439 23-1447 23-1454 23-1474
		23-1485 23-1492 23-1500 23-1516 23-1521 23-1548 23-1562 23-1572 23-1606
		23-1655 23-1671 #25-2566
CHG1	004720	23-1633 #23-1637
CKMODE	012364	23-1063 23-1067 #26-2582
CKSWR	= 104434	23-1333 23-1349 23-1788 24-1836 25-2148 25-2189 25-2234 25-2293 25-2367
		#25-2571
CKSWRR	011734	#25-2467 25-2556
CLRAL	004542	#23-1602 25-2550
CLRALL	= 104420	23-1365 23-1382 23-1400 23-1431 23-1469 23-1531 #25-2565
CLRTBL	005076	23-1604 #23-1677
CLRT1	005102	#23-1678 23-1680
CLR1	004544	#23-1603 23-1607
CNTLU	012004	23-1066 23-1176 #25-2477 25-2494
COMAND	000554	#23-991 *23-1620 *23-1621 *23-1622 *23-1625 23-1644 23-1712 23-1819 24-1837
		25-2085 25-2098 25-2221 25-2235 25-2300 25-2342
COUNT	012232	*25-2488 25-2499 *25-2515 #25-2522
CTRDEX	004516	23-1583 23-1589 #23-1595
CTRDMP	005032	#23-1663 23-1672

SYMBOL	VALUE	REFERENCES								
CTRD1	005060	23-1666	#23-1670							
DAERRS	000624	#23-1012	*25-2145	25-2279						
DATERR	007672	25-2110	#25-2133							
DATER1	007732	25-2134	#25-2143							
DECOUT	011462	25-2406	#25-2413							
DECPNT	011546	25-2399	*25-2399	25-2403	25-2405	*25-2411	#25-2428			
DECPR	011366	#25-2398	25-2553							
DECPRT	= 104426	23-1124	23-1126	24-1861	24-1878	24-1887	24-1899	25-2259	25-2276	25-2280
		25-2284	25-2363	25-2365	#25-2568					
DEC1	011510	25-2414	25-2416	#25-2419						
DEC2	011524	25-2418	#25-2422							
DIGCNT	011542	*25-2398	*25-2407	25-2415	#25-2426					
DIGIT	011540	*25-2401	*25-2402	25-2413	*25-2417	*25-2420	25-2423	#25-2425		
DOAGN	003270	23-1345	23-1355	#23-1359						
DONE	003152	#23-1333	23-1378	23-1394	23-1426	23-1458	23-1525	23-1566	23-1578	
DONE1	003220	23-1337	23-1341	#23-1344						
DRIVE	000040	#21-913								
DRVADP	000636	#23-1018	23-1585	23-1591	23-1596					
DRVSEL	000542	#23-986	*23-1094	23-1101	*23-1113					
D0TAB	000656	23-1018	#23-1027	23-1028						
D1TAB	000722	23-1019	#23-1029	23-1030						
D2TAB	000766	23-1020	#23-1031	23-1032						
D3TAB	001032	23-1021	#23-1033	23-1034						
D4TAB	001076	23-1022	#23-1035	23-1036						
D5TAB	001142	23-1023	#23-1037	23-1038						
D6TAB	001206	23-1024	#23-1039	23-1040						
D7TAB	001252	23-1025	#23-1041	23-1042						
ENDTAP	006134	23-1790	23-1811	#23-1826						
ENDT1	006146	23-1667	#23-1828							
EOMK	011732	*25-2451	25-2452	#25-2466						
ERROR	005702	23-1725	#23-1788							
ERR1	005726	23-1792	#23-1794							
EXEC	003062	#23-1316	23-1360							
EXECUT	003050	23-1161	23-1189	23-1225	#23-1314					
EXEC1	003070	#23-1317	23-1343							
GENPA	006532	#24-1902	25-2549							
GENPAT	= 104416	23-1366	23-1383	23-1401	23-1432	23-1464	23-1532	#25-2564		
GOBKMD	011064	23-1413	23-1445	23-1498	#25-2334					
GOB1	011110	25-2336	#25-2339							
GOWAIT	005122	23-1648	#23-1684	23-1721	23-1821	25-2100	25-2223	25-2307	25-2330	25-2349
GP1	006644	*24-1903	*24-1904	24-1906	24-1908	24-1910	24-1912	24-1914	24-1916	#25-1922
GW1	005164	23-1685	#23-1691							
HINUM	007370	*23-1074	*23-1178	25-2043	25-2053	*25-2065	#25-2073			
IDSELF	001700	23-1098	#23-1119							
LASRCR	000620	#23-1010	23-1506	23-1508	*23-1511	*23-1512	*23-1514	23-1519	*23-1545	*23-1546
		23-1554	*23-1557	*23-1558	*23-1560	23-1569	25-2116	25-2129	*25-2334	25-2339
LENGTH	000546	#23-988	*23-1798	*25-2137	*25-2155	*25-2322	25-2364			
LONUM	007366	*23-1073	*23-1177	25-2042	25-2051	*25-2064	#25-2072			
LOOPER	002014	#23-1147	23-1156							
MAXLEN	000524	#23-977	*23-1081	*23-1085	23-1125	*23-1164	*23-1169	23-1697	23-1775	25-2213
MEDIUM	000041	#21-917								
MEM4K	002070	23-962	#23-1163							

SYMBOL	VALUE	REFERENCES								
MEMBK	002114	23-963	#23-1168							
MINLEN	000526	#23-978	*23-1080	*23-1084	23-1123	*23-1163	*23-1168	23-1701	23-1773	25-2211
MODES	000634	#23-1016	*23-1314	*23-1364	23-1369	*23-1381	23-1386	*23-1399	23-1404	23-1411
		23-1418	*23-1430	23-1435	23-1443	23-1450	*23-1463	*23-1467	*23-1468	*23-1476
		23-1479	23-1487	23-1490	23-1496	23-1504	*23-1530	23-1535	*23-1540	23-1543
		23-1552	*23-1571	23-1574	*23-1608	23-1653	23-1660	23-1668	23-1679	*23-1681
		23-1738	23-1740	23-1743	23-1759	23-1761	23-1764	*23-1769	*23-1780	23-1806
		*23-1827	*25-2228							
MSBITS	000550	#23-989	*23-1095	*23-1112	23-1127	23-1147	*23-1181	23-1185	23-1207	*23-1209
		*23-1211	23-1614	23-1637						
MSG0	012664	23-1230	25-2507	#29-2665						
MSG00	012642	27-2619	#29-2664							
MSG1	012671	23-1179	#29-2666							
MSG10A	013253	23-1121	#29-2676							
MSG10B	013335	23-1137	#29-2678							
MSG10C	013360	23-1131	#29-2679							
MSG10D	013406	25-2184	#29-2680							
MSG11	013436	25-2324	#29-2681							
MSG12	013464	24-1855	25-2253	#29-2682						
MSG13	013476	24-1858	25-2256	#29-2683						
MSG14	013510	24-1852	25-2250	#29-2684						
MSG15	013522	24-1870	25-2268	#29-2685						
MSG16	013531	24-1873	25-2271	#29-2686						
MSG17	013540	24-1864	25-2262	#29-2687						
MSG18	013547	24-1867	25-2265	#29-2688						
MSG19	013556	24-1875	#29-2689							
MSG2	012712	23-1216	#29-2667							
MSG20	013600	*24-1880	*24-1881	24-1884	#29-2690					
MSG20A	013622	24-1896	#29-2691							
MSG21	013652	25-2273	#29-2692							
MSG22	013702	25-2277	#29-2693							
MSG23	013723	25-2281	#29-2694							
MSG24	013757	23-1828	#29-2695							
MSG25	014023	25-2229	#29-2696							
MSG26	014067	23-1334	#29-2697							
MSG27	014074	23-1356	#29-2698							
MSG5	012742	23-1310	#29-2668							
MSG6	012767	23-1295	#29-2669							
MSG7	012774	23-1796	25-2320	#29-2670						
MSG8	013022	23-1830	25-2231	#29-2671						
MSG9	013117	25-2153	#29-2673							
MSG9A	013144	25-2155	#29-2674							
MSG9B	013167	25-2355	#29-2675							
MTC	000502	#23-968	23-1093	23-1097	23-1101	23-1642	23-1644	23-1647	23-1687	23-1712
		23-1713	23-1720	23-1724	23-1819	23-1820	23-1822	23-1823	25-2085	25-2086
		25-2098	25-2099	25-2103	25-2221	25-2222	25-2224	25-2298	25-2300	25-2301
		25-2311	25-2328	25-2329	25-2342	25-2343	25-2347	25-2348	25-2357	
MTS	000500	#23-967	23-1103	23-1108	23-1110	23-1645	23-1715	23-1723	23-1815	25-2088
		25-2102	25-2157	25-2218	25-2305	25-2310	25-2345			
MTV	000534	#23-981	23-1685							
MVCTR	004500	#23-1589	25-2548							
MVCTRS	= 104414	23-1368	23-1385	23-1403	23-1410	23-1417	23-1434	23-1442	23-1449	23-1471

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SYMBOL	VALUE	REFERENCES								
		23-1478	23-1489	23-1495	23-1503	23-1518	23-1542	23-1551	23-1568	23-1652
		23-1664	#25-2563							
MV1	004504	#23-1590	23-1592							
NOINCR	005264	23-1696	23-1705	#23-1707						
NONSTP	005330	#23-1717	23-1736	23-1741	23-1744					
NO.SEL	001670	23-1100	23-1107	23-1109	23-1111	#23-1113				
NRREAD	000626	#23-1013	#25-2199	25-2283						
NUMTST	001320	#23-1044	#23-1072	#23-1218	23-1223	#23-1306	23-1307	#23-1344		
NXTRET	001476	23-1076	#23-1079							
NXT.TU	001614	#23-1101	23-1115							
OCT	011346	#25-2376	#25-2386	#25-2391						
OCTP	011352	24-1842	24-1849	25-2239	25-2246	25-2373	25-2384	#25-2393		
OCTPR	011240	#25-2369	25-2547							
OCTPRT	104412	25-2140	25-2142	25-2177	25-2181	25-2358	25-2360	25-2480	#25-2562	
OCT1	011260	25-2371	#25-2373							
OCT2	011276	#25-2377	25-2387							
OUT	012036	25-2468	25-2470	25-2474	025-2485	25-2502				
OVER4K	001524	23-1078	#23-1084							
PARAM	001322	#23-1045	#23-1316	23-1317	23-1338	#23-1342	23-1509	23-1555	23-1699	23-1704
		23-1733	23-1746	24-1844	24-1850	24-1862	24-1903	25-2113	25-2119	25-2241
		25-2248	25-2260							
PAT0	006646	24-1905	#25-1925	25-1927						
PAT1	006662	24-1907	#25-1931	25-1938						
PAT1A	006666	#25-1932	25-1937							
PAT2	006732	24-1909	25-1936	#25-1951	25-1953					
PAT3	006746	24-1911	#25-1957	25-1964						
PAT3A	006752	#25-1958	25-1963							
PAT4	007016	24-1913	25-1962	#25-1976						
PAT5	007044	24-1915	#25-1986	25-1993						
PAT5A	007050	#25-1987	25-1992							
PAT6	007160	24-1919	25-1991	#25-2023	25-2025					
PAT7	007174	24-1918	#25-2031	25-2034						
PERMBS	000612	#23-1007	#23-1805	24-1891	24-1898					
PRTS	011174	23-1799	25-2138	25-2156	25-2323	#25-2355				
P1T	006710	25-1931	#25-1939							
P3T	006774	25-1957	#25-1965							
P4	007022	#25-1977	25-1980							
P4A	007042	#25-1976	25-1977	#25-1978	#25-1982					
P5T	007072	25-1986	#25-1994							
RANDOM	007364	#23-1750	#23-1754	25-2032	#25-2063	#25-2071	#25-2122	#25-2126		
RANGEN	007214	23-1749	25-2031	#25-2038	25-2121					
RANG1	007252	#25-2046	25-2050							
RANSTP	005512	#23-1749								
RAN1	005524	#23-1751	23-1755							
RBUF	000532	#23-980	#23-1082	#23-1086	#23-1165	#23-1170	25-1926	25-1933	25-1952	25-1959
		25-1979	25-1988	25-2024	25-2033	25-2090	25-2097	25-2106	25-2164	
RDERRO	007750	25-2104	#25-2148							
RDERRS	000622	#23-1011	#25-2192	25-2275						
RDINCR	010172	25-2115	25-2128	#25-2206	25-2227					
RDPASS	000562	#23-994	#25-2084	25-2143	25-2190	#25-2195	#25-2200			
RDSTP	007654	25-2120	#25-2128	25-2203						
RDSTPC	007614	25-2114	#25-2119							

SYMBOL	VALUE	REFERENCES								
RDSTPD	007424	#25-2085	25-2130	25-2198						
RDY1	012610	28-2649	#28-2652							
RDY2	012624	28-2645	28-2653	#28-2655						
READGO	007446	#25-2090	25-2117							
READI	007402	#25-2081	25-2552							
READIT	= 104424	23-1420	23-1452	23-1513	23-1559	#25-2367				
READLN	000632	#23-1015	*25-2083	25-2091	25-2095	25-2108	25-2137	25-2155	25-2166	*25-2210
		25-2211	25-2213	*25-2215						
READMP	010334	#25-2234								
READY	012546	23-1194	23-1212	23-1301	23-1303	25-2393	25-2422	25-2457	25-2460	25-2462
		#28-2644	28-2651	28-2656	28-2658					
RECORD	000614	#23-1008	23-1472	23-1506	23-1511	23-1519	23-1538	*23-1539	23-1545	23-1557
		23-1569	23-1695	23-1707	*23-1768	23-1778	*23-1826	24-1860	25-2081	25-2116
		25-2129	*25-2206	25-2258	25-2334	*25-2335	25-2361			
RESETL	005656	23-1774	#23-1777							
RESTRL	010232	25-2212	#25-2215							
RESTR1	010240	25-2208	25-2214	#25-2216						
REWIND	004732	23-1603	#23-1642	25-2337						
RG1	007456	#25-2092	25-2094							
RNDRDS	007624	#25-2121								
RNDS1	007636	#25-2123	25-2127							
RNDTAP	010306	25-2150	#25-2227							
RNDTP1	010320	23-1670	25-2202	#25-2229						
RPASS1	010146	25-2196	#25-2199							
RPASS3	010152	25-2194	#25-2200							
RSFDR	004576	#23-1612	25-2546							
RSFDRV	= 104410	23-1367	23-1384	23-1402	23-1433	23-1470	23-1477	23-1494	23-1502	23-1541
		23-1550	23-1567	23-1602	23-1634	23-1651	23-1663	#25-2561		
RSF1	004610	#23-1614	23-1619							
RSF2	004634	23-1615	#23-1620	23-1639						
RTSREC	010102	25-2152	25-2159	25-2161	25-2183	#25-2189				
RTSR1	010120	25-2146	#25-2193							
RTSSTP	007566	#25-2113								
SELDRV	002212	#23-1182	23-1214							
SELD1	002244	23-1184	#23-1190							
SELD2	002264	23-1191	#23-1194							
SELOK1	003042	23-1308	#23-1310							
SELPAT	002456	23-1229	#23-1233							
SELRLS	002550	#23-1254								
SELRM1	002732	23-1286	#23-1289							
SELRM2	002746	23-1284	23-1288	#23-1292						
SELR1	002600	23-1258	#23-1261							
SELR2	002616	23-1262	#23-1265							
SELR3	002632	23-1256	23-1260	23-1264	#23-1268					
SELTST	002364	23-1188	#23-1216							
SELT1	002402	#23-1220	23-1232	23-1309						
SELT2	002426	23-1222	#23-1226							
SELT3	002446	23-1224	23-1227	#23-1230	23-1244	23-1246	23-1266	23-1278	23-1290	23-1300
SELW1	002664	23-1274	#23-1277							
SELW2	002700	23-1272	23-1276	#23-1280						
SP3	= 104430	23-1240	23-1251	23-1268	23-1280	23-1292	24-1843	25-2240	25-2388	25-2409
		#25-2569								

SYMBOL VALUE REFERENCES

SP3A 011632 25-2444 #25-2447
SP3X 011622 #25-2444 25-2554
STACK = 000500 #23-965 23-1061 23-1172
START 002136 23-1166 #23-1171
START1 002142 23-1134 #23-1172 23-1186
STATRD 000570 #23-997 *23-1723 23-1789 23-1810 *25-2102 25-2149 25-2201 *25-2310 25-2315
25-2326 25-2359
STOPOP 005502 23-1734 #23-1746
STREC1 006042 23-1804 #23-1813
STRLEN 000544 #23-987 *23-1697 *23-1701 23-1703 23-1777 25-2083 25-2215
STRTOP 005306 #23-1712 23-1757 23-1762 23-1765 23-1817 23-1824
SUSWR = 104432 23-1062 23-1173 #25-2570
SUSWRR 012234 #25-2524 25-2555
SVCTR 004462 #23-1583 25-2545
SVCTRS = 104406 23-1372 23-1389 23-1407 23-1414 23-1421 23-1438 23-1446 23-1453 23-1473
23-1484 23-1499 23-1515 23-1547 23-1561 23-1605 #25-2560
SVC1 004466 #23-1584 23-1586
SVRECR 000552 #23-990 *23-1481 23-1483 *23-1508 23-1514 *23-1554 23-1560
SV0 007372 *25-2038 25-2066 #25-2074
SV1 007374 *25-2039 25-2067 #25-2075
SV2 007376 *25-2040 25-2068 #25-2076
SV3 007400 *25-2041 25-2069 #25-2077
SWR 000512 #23-972 23-1064 23-1174 23-1336 23-1623 23-1658 23-1794 23-1800 25-2133
25-2151 25-2160 25-2193 25-2295 25-2467 25-2479 25-2518 25-2527 *25-2531
26-2598
SWREG 000176 #23-959 23-1064 23-1174 25-2467 25-2531
TABLE 012326 25-2540 #25-2542
TEMPST 012230 *25-2483 *25-2487 *25-2510 *25-2511 *25-2512 *25-2514 25-2518 #25-2521
TESINC 005610 23-1537 23-1737 23-1758 #23-1768
TESRC1 006006 23-1801 #23-1806
TESREC 005756 23-1795 #23-1800
TEST 001326 #23-1047 *23-1319
TEST0 003300 23-1320 #23-1364
TEST1 003350 23-1322 #23-1381
TEST2 003420 23-1324 #23-1399
TEST3 003536 23-1327 #23-1430
TEST4 003654 23-1331 #23-1463
TEST5 004176 23-1330 #23-1530
TKB 000516 #23-974 25-2437 25-2471 28-2646
TKS 000514 #23-973 25-2435 25-2469 28-2644
TO 011640 #25-2450 25-2544
TOP = 104404 23-1122 23-1132 23-1138 23-1160 23-1180 23-1217 23-1231 23-1296 23-1311
23-1335 23-1357 23-1797 23-1829 23-1831 24-1859 24-1874 24-1876 24-1885
24-1897 25-2136 25-2154 25-2187 25-2230 25-2232 25-2257 25-2272 25-2274
25-2278 25-2282 25-2321 25-2325 25-2356 25-2445 25-2476 25-2478 25-2482
25-2498 25-2508 #25-2559 27-2620
TOP1 011652 #25-2452 25-2459 25-2465
TOP2 011702 25-2456 #25-2460
TPB 000522 #23-976 23-1195 23-1213 23-1302 23-1304 25-2394 25-2423 25-2441 25-2458
25-2461 25-2463
TPS 000520 #23-975 25-2439 25-2450 28-2655
TRAP34 012306 20-893 #25-2537

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SYMBOL	VALUE	REFEPENCES					
TSINC2	005664	23-1771	23-1776	#23-1778			
TSINC3	005700	23-1779	#23-1781				
TSTEX	001324	#23-1046	*23-1315	23-1316	*23-1359	23-1465	
TSTSTP	005424	23-1727	#23-1733				
TSTTBL	001330	#23-1049	*23-1069	*23-1070	*23-1071	23-1219	23-1315
TU.SEL	001546	23-1083	#23-1092				
TYPT1	011410	#25-2401	25-2412				
TYPT2	011416	#25-2402	25-2404				
TYPT3	011452	25-2408	#25-2411				
T0	003312	#23-1367	23-1377				
T0A	003314	#23-1368	23-1375				
T0B	003332	23-1370	#23-1374				
T1	003362	#23-1384	23-1393				
T1A	003364	#23-1385	23-1391				
T1B	003402	23-1387	#23-1390				
T2	003432	#23-1402	23-1425				
T2A	003434	#23-1403	23-1409				
T2B	003452	23-1405	#23-1408				
T2C	003456	#23-1410	23-1416				
T2D	003476	23-1412	#23-1415				
T2E	003502	#23-1417	23-1423				
T2F	003516	23-1419	#23-1421				
T3	003550	#23-1433	23-1457				
T3A	003552	#23-1434	23-1440				
T3B	003570	23-1436	#23-1439				
T3C	003574	#23-1442	23-1448				
T3D	003612	23-1444	#23-1446				
T3E	003620	#23-1449	23-1455				
T3F	003634	23-1451	#23-1453				
T4	003710	23-1466	#23-1469				
T4A	003712	#23-1470	23-1524				
T4B	003714	#23-1471	23-1475				
T4C	003740	#23-1477	23-1491				
T4D	003742	#23-1478	23-1486				
T4E	003774	23-1480	#23-1485				
T4F	004010	#23-1489	23-1493				
T4G	004026	23-1488	#23-1494				
T4H	004030	#23-1495	23-1501				
T4J	004046	23-1497	#23-1499				
T4K	004054	#23-1502	23-1520				
T4L	004056	#23-1503	23-1517				
T4M	004130	23-1510	#23-1513				
T4N	004142	23-1505	23-1507	#23-1516			
T4P	004146	#23-1518	23-1522				
T5	004210	#23-1533	23-1577				
T5A	004234	23-1536	#23-1538				
T5B	004246	#23-1540					
T5C	004256	#23-1542	23-1549				
T5D	004306	23-1544	#23-1548				
T5E	004314	#23-1551	23-1563	23-1575			
T5F	004356	23-1556	#23-1559				
T5FLAG	004456	*23-1533	#23-1579	*23-1609	23-1665	23-1708	

SYMBOL VALUE REFERENCES

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TSG       004370          23-1553   #23-1562
TSH       004406          23-1565   #23-1567
TSINC     004460         *23-1538    23-1546   #23-1580
TSJ       004410         #23-1568    23-1573
TSK       004430          23-1570   #23-1572
USSTST    001626         #23-1103    23-1106
USS.OK    001644          23-1104   #23-1108
VALID     002300          23-1193   #23-1198
VAL1      002316         #23-1203    23-1206
VAL2      002330          23-1204   #23-1207
VAL3      002344          23-1208   #23-1211
VAL4      002350          23-1196    23-1210   #23-1212
WAITK     011562         #25-2435    25-2436    25-2542
WAITKY  = 104400          23-1182    23-1220    23-1242   23-1254   23-1270   23-1282   23-1297   25-2489   #25-2557
WAITK1    011604         #25-2439    25-2440
WAIT1     005152         *23-1686   #23-1688   *23-1691
WBUF      000530         #23-979     23-1719    24-1902   25-2107   25-2162   25-2304
WRCHEK    000572         #23-998     23-1595    23-1677   23-1730  *23-1793   24-1877   24-1879   24-1889
WRITI     005174         #23-1695    25-2543
WRITIT  = 104402          23-1371    23-1388    23-1406   23-1437   23-1482   23-1534   #25-2558
WRPASS    000564         #23-995    *23-1711    23-1726   23-1728  *23-1732   23-1735   23-1756   23-1791  *23-1802
                          23-1803   *23-1809   *23-2294  *25-2313  *25-2317
WRRECR    000616         #23-1009   *23-1472    23-1481  *23-1483  *23-1707   25-2335   25-2340
WRTDMP    006162         #24-1836
WRTD1     006452         #24-1881    24-1890
WRTD2     006474          24-1883   #24-1888
WRTLEN    000630         #23-1014   *23-1703    23-1717  *23-1772   23-1773   23-1775  *23-1777   23-1798   25-2302
                          25-2322
W1        005242          23-1700   #23-1703
W10       005470          23-1739   #23-1743
W11       005542          23-1747   #23-1756    23-1812
W12       005576          23-1760   #23-1764
XDUMPM    000405         #22-952    *26-2586   *26-2604
XRGRCD    010760          25-2296   #25-2313    25-2316
XRGREC    010644          23-1808   #25-2293    25-2327
XRGO      010654         #25-2295    25-2318
XRGS      010766          25-2312   #25-2315
XXDPM     000403         #22-950    *26-2584   *26-2595    27-2621
ZERO      011544         *25-2400    25-2417   *25-2419   #25-2427
$CNTG     014111          25-2475   #29-2699
$CTRLS    000536         #23-984    *28-2646   *28-2647    28-2648  *28-2650   28-2652  *28-2654   28-2657
$ENDAD    003240          21-925     23-1133    23-1347   #23-1350
$MCRLF    014137          25-2497   #29-2702
$MNEW     014127          25-2481   #29-2701
$MSWR     014117          25-2477   #29-2700
$READ     012040          25-2484   #25-2487
$R1       007416          25-2082   #25-2084
$R5       007554         #25-2109    25-2112
$SVPC   = 000036         #21-911     21-931
$ZERO$    002034          23-1148   #23-1152
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