TMA,B-11

TM11 DATA RELIAB 9TRK
CZTMBF0

AH-9399F-MC

FICHE 1 OF 1

SEP 1979
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IDENTIFICATION

PRODUCT CODE: AC-9398F-MC

PRODUCT NAME: CZTMBF0 TM 11 DATA RELIAB 9TRK

PROGRAM DATE: 21 MARCH 1976

MAINTAINER: DIAGNOSTIC ENGINEERING

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                                1.      ABSTRACT

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

                                2.      REQUIREMENTS

                                2.1     EQUIPMENT

                                        PDP-11 WITH TM11 AND 1 TO 8 TU10 TAPE UNITS (9 CHANNEL ONLY)

                                2.2     STORAGE

                                2.2.1   PROGRAM STORAGE

                                        THE ROUTINE REQUIRES 4K OF MEMORY.

                                2.3     PRELIMINARY PROGRAMS

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

                                3.      LOADING PROCEDURE

                                3.1     METHOD

                                        PROCEDURE FOR NORMAL BINARY TAPES SHOULD BE FOLLOWED:

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

                                4.      STARTING PROCEDURE

                                4.1     CONTROL SWITCH SETTINGS

                                        FOR INITIAL OPERATION OF PROGRAM ALL SWITCHES SHOULD BE = 0
                                        (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)
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   103                                    210 -    ''       ''       ''       ''    ,  ''   8K   ''       ''       )
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104
105
106
107                                 4.3     PROGRAM AND/OR OPERATOR ACTION
108                                             LOAD PROGRAM INTO MEMORY
109                                             SET DESIRED TUi0 TAPE UNITS ON-LINE AND WRITE ENABLED
110                                             LOAD STARTING ADDRESS 200 (204 OR 210  TO SELECT PARAMETERS AND UNITS)
111                                             START PROGRAM-PROGRAM WILL BEGIN TESTING FOR LOAD ADDRESS OF 200 OTHERWI
112                                             SELECT TAPE UNITS (REFERENCE 4.3.1)
113                                             SELECT PARAMETERS (REFERENCE 4.3.2)
114                                             TYPE CARRIAGE RETURN AND PROGRAM WILL BEGIN TESTING.
115                                             ***THE PROGRAM WILL ALLOW THE LOADING OF SOFTWARE SWITCH REGISTER
116                                                AFTER PROGRAM HAS BEEN STARTED BY TYPING OUT THE FOLLOWING
117                                                SWR=XXXXXX NEW= (REFER TO SECT 5.1 FOR OPERATOR ACTION).
118
119                                 4.3.1   TAPE UNIT SELECTION
120
121                                             STARTING THE PROGRAM AT 200 WILL RESULT IN AUTOMATIC SELECTION
122                                             OF THE UNITS TO BE TESTED (REFERENCE 4.3.1.2) OTHERWISE STARTING
123                                             AT 204 OR 210 WILL ALLOW OPERATOR TO SELECT THE UNITS.
124
125                                             THE PROGRAM WILL TYPE ''SELECT UNITS''. ANY CONFIGURATION OF
126                                             1 TO 8 UNITS MAY BE SELECTED BY TYPING THE UNIT NUMBERS ON
127                                             THE TELETYPE.  ANY SEQUENCE OF NUMBERS MAY BE TYPED.  AFTER
128                                             EACH NUMBER IS TYPED A COMMA (,) WILL BE PRINTED.  TYPING THE
129                                             SAME UNIT NUMBER TWICE WILL CAUSE THAT UNIT NUMBER TO BE DELETED.
130                                             TYPING ANY KEY OTHER THAN 0 THRU 7 WILL CAUSE A QUESTION MARK
131                                             (?) TO BE PRINTED AND THAT KEY WILL BE IGNORED.
132
133                                             TO TERMINATE UNIT SELECTION TYPE A CARRIAGE RETURN.  WHEN
134                                             CARRIAGE RETURN IS TYPED THE PROGRAM WILL CONTINUE TO THE
135                                             ''PARAMETER SELECTION'' UNLESS NO UNITS WERE SELECTED AND IN
136                                             THAT EVENT WILL RETURN TO THE BEGINNING OF ''SELECT UNITS''.
137
138                                 4.3.1.1 TAPE UNIT SELECTION EXAMPLES
139
140                                                     SELECT UNITS 3,4,5
141                                                     SELECT UNITS 5,3,4
142
143                                             IN EITHER CASE, UNITS 3,4,5 ARE SELECTED.
144
145                                                     SELECT UNITS
146                                                     SELECT UNITS
147
148                                             A CARRIAGE RETURN WAS TYPED WITH NO UNITS SELECTED.
149
150                                                     SELECT UNITS 1,9?,1,2
151
152                                             ONLY UNIT 2 SELECTED, UNIT 1 WAS DELETED (TYPED TWICE)
153                                             AND THE 9 WAS IGNORED.
154
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4.3.1.2 AUTOMATIC UNIT SELECTION

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

1. IT IS ON-LINE
2. IT IS NINE(9) TRACK
3. IT IS WRITE ENABLED

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

4.3.2 PARAMETER SELECTION

STARTING THE PROGRAM AT 200 WILL RESULT IN AN AUTOMATIC SELECTION OF TEST PARAMETERS (REFERENCE 4.3.2.8) OTHERWISE STARTING AT ADDRESS 204 OR 210 WILL ALLOW OPERATOR TO SELECT PARAMETERS.THERE ARE FIVE TYPES OF PARAMETERS TO BE CONTROLLED BY THE OPERATOR. THEY INCLUDE: TEST NUMBER, PATTERN, RECORD LENGTH, WRITE MODE, AND READ MODE. THE PROGRAM WILL PRINT:

''TST PAT RLS WMO RMO''

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

4.3.2.1 TEST NUMBER

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

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

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                                        RECORDS, CONTINUE TO END OF TAPE.
                                
                                5       READ 1 RECORD, REPEAT FOR ALL UNITS, CONTINUE TO END
                                        OF TAPE.
```

4.3.2.2 PATTERN

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

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

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ETC. ETC.

	4	INCREMENTING PATTERN	000	040
			001	200
			002	002
			003	202
			.	.
			.	.
			.	.
			377	777
			ETC.	ETC.
	5	EACH CHANNEL 3 BITS	000	040
			000	040
			000	040
			200	004
			200	004
			200	004
			100	010
			100	010
			100	010
			040	020
			040	020
			040	020
			020	100
			020	100
	PATTERN	DESCRIPTION	DATA	CHANNELS
			020	100
			010	001
			010	001
			010	001
			004	400
			004	400
			004	400
			002	002
			002	002
			002	002
			001	200
			001	200
			001	200
			ETC.	ETC.
	6	HIGH FREQUENCY ALL CHANNELS	377	777
			377	777
			ETC.	ETC.
	7	RANDOM	?	?

4.3.2.3 RECORD LENGTH SEQUENCE

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

RLS	DESCRIPTION
0	MINIMUM LENGTH RECORDS (4 BYTES)
1	MAXIMUM LENGTH RECORDS (1024 BYTES)
2	VARING LENGTH RECORDS, MINIMUM TO MAXIMUM (1ST RECORD= 4 BYTES, EACH SUCCESSIVE RECORD IS 4 BYTES LONGER UNTIL 256TH RECORD=1024 BYTES)
3	VARYING LENGTH RECORDS, MAXIMUM TO MINIMUM (1ST RECORD- 1048 BYTES, EACH SUCCESSIVE RECORD IS 4 BYTES SHORTER UNTIL 256TH RECORD=4 BYTES)

4.3.2.4 WRITE START/STOP MODE

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

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

4.3.2.5 READ START/STOP MODE

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

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

4.3.2.6 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 CAR-
RIAGE 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 SEQUFNCE TO BE REPEATED WITH A VARIATION THE PATTERN, RECORD LENGTH SEQUENCE, WRITE MODE, CR 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	PRINT AFTER	USE OF THIS SWITCH WILL CAUSE

(000010)	PARITY ERRORS	THE DATA READ TO BE COMPARED WITH THE DATA WRITTEN AFTER A PARITY ERROR HAS OCCURRED NOTE: THE PARITY ERROR BIT SETTING IN THE STATUS REGISTER IS CAUSED BY THE LOGICAL 'OR' OF BOTH LATERAL (CHARACTER) AND LONGITUDINAL (CHANNEL) PARITY ERRORS.
4 (000020)	DELETE READ RE-TRYS	USE OF THIS SWITCH WILL CAUSE DELETION OF THE NORMAL SEQUENCE OF TRYING TO RE-READ A RECORD AFTER A READ ERROR. THIS WOULD BE USEFUL FOR SCOPING READ OPERATIONS.
5 (000040)	DELETE WRITE XIRG	USE OF THIS SWITCH WILL CAUSE RECORDS WITH WRITE ERRORS TO BE LEFT ON TAPE. THE READ PASS WITH DATA TYPEOUTS SELECTED WOULD BE USEFUL FOR DETERMINING WRITE ERROR ORIGINS.
6 (0001000)	WRITE STATISTICAL RECOVERY	USE OF THIS SWITCH WILL CAUSE A BACKSPACE 2 RECORDS, SPACE FORWARD 1 RECORD, REWRITE RECORD SEQUENCE TO BE USED INSTEAD OF WRITE XIRG SO THAT THE RECORD WILL BE REWRITTEN ON 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	WMO	RMO
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.

6.3 ERROR RECOVERY PROCEDURES

6.3.1 WRITE ERROR RECOVERY

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

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

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

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

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

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

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

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

6.3.2 READ ERROR RECOVERY

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

7. RESTRICTIONS

NONE

8. MISCELLANEOUS

8.1 TAPE LENGTH

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

8.2 MEMORY AVAILABLE

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

9. PROGRAM DESCRIPTION

9.1 GENERAL DESCRIPTION

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

9.2 TEST 0

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

9.3 TEST 1

THIS IS A ''WRITE ONLY'' TEST SIMILAR TO TEST 0 EXCEPT A SEQUENCE OF 256 RECORDS IS WRITTEN ON EACH UNIT BEFORE CHANGING TO THE NEXT UNIT. READ MODE (RMO) HAS NO EFFECT ON THIS TEST.

9.4 TEST 2

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

9.5 TEST 3

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

9.6 TEST 4

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

9.7 TEST 5

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

```
817
818
819
820                                     10.     LISTING
821
822                                     %
823
```

```
                                .TITLE TM 11 DATA RELIAB 9TRK
                                ;COPYRIGHT 1970, 1971, 1972, 1973, 1976 1977 DIGITAL EQUIPMENT CORP., MAYNARD, MASS  017
                                ;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

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

                                        .ENABL  ABS, AMA
000000                          .=0
                                ;TRAP CATCHER IN UNUSED LOCATIONS 0-476
000034                          .-34
000034  012326                  'RAP34

                                ;*****************************************************************************
                                ;SOFTWARE SWITCH REGISTER IS LOCATED AT LOC. 176

                                ;BEFORE STARTING REFER TO SECTION 5.1 OF DOCUMENT

                                ;*****************************************************************************
```

```
                        ;       ********************************************************************************
                        ;                       MODIFIED DEC 16 1977
                        ;       ++
                        ;               ACT11 AND XXDP HOOKS
                        ;       --
                                $SVPC=.                 ;SAVE PC
                                .=40
000040  000000 DRIVE:   .BYTE   0                       ;DRIVE # FOR XXDP LOAD MEDIUM
                                                        ;ASSEMBLE AS A 0
                                .-41
000041  000000 MEDIUM:  .BYTE   0                       ;XXDP LOAD MEDIUM
                                                        ;ASSEMBLE AS A 0
                                .=42
000042  000000         .WORD   0                       ;AUTO/MAN MODE INDICATOR
                                                        ;ASSEMBLE AS A 0
                                .-46
000046  003246         .WORD   $ENDAD                  ;SET TO $ENDAD IN .$EOP
                                .-52
000052  000000         .WORD   0                       ;CHARACTERISTICS OF PROGRAM
                                                        ;SET TO 0
                                .-$SVPC                 ;RESTORE PC
                        ;       ********************************************************************************
```

```
                                        .-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

                                ;       ********************************************************************************
```

```
                                                .=176
000176  000000                                  SWREG:  .WORD 0                 ;SOFTWARE SWITCH REGISTER
                                                .=200
000200  000137  001354                          JMP     AUTOST
000204  000137  002066                          JMP     MEM4K
000210  000137  002112                          JMP     MEM8K

                        STACK=500
                                                .=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  014074                          WBUF:   BUFFER          ;STARTING ADDRESS OF WRITE BUFFER
000532  016074                          RBUF:   BUFFER+1024.    ;STARTING ADDRESS OF READ BUFFER
000534  000224                          MTV:    224

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

000610  000000                          PERMBS: 0
000612  000000                          RECORD: 0
000614  000000                          WRRECR: 0
000616  000000                          LASRCR: 0
000620  000000                          RDERRS: 0
000622  000000                          DAERRS: 0
000624  000000                          NRREAD: 0
```

```
  977  000626  000000                    WRTLEN: 0
  978  000630  000000                    READLN: 0
  979  000632  000000                    MODES:  0
  980
  981  000634  000654                    DRVADR: D0TAB
  982  000636  000720                            D1TAB
  983  000640  000764                            D2TAB
  984  000642  001030                            D3TAB
  985  000644  001074                            D4TAB
  986  000646  001140                            D5TAB
  987  000650  001204                            D6TAB
  988  000652  001250                            D7TAB
  989
  990  000654  000000                    D0TAB:  0
  991          000720                            .=D0TAB+44
  992  000720  000000                    D1TAB:  0
  993          000764                            .=D1TAB+44
  994  000764  000000                    D2TAB:  0
  995          001030                            .=D2TAB+44
  996  001030  000000                    D3TAB:  0
  997          001074                            .=D3TAB+44
  998  001074  000000                    D4TAB:  0
  999          001140                            .=D4TAB+44
 1000  001140  000000                    D5TAB:  0
 1001          001204                            .=D5TAB+44
 1002  001204  000000                    D6TAB:  0
 1003          001250                            .=D6TAB+44
 1004  001250  000000                    D7TAB:  0
 1005          001314                            .=D7TAB+44
 1006  001314  000000                    CHARIN: 0                       ;CHARACTER JUST INPUT
 1007  001316  000000                    NUMTST: 0                       ;NUMBER OF TEST
 1008  001320  000000                    PARAM:  0                       ;TEST PARAMETERS
 1009  001322  000000                    TSTEX:  0                       ;POINTS TO TEST PARAMETERS TO BE EXECUTED
 1010  001324  000000                    TEST:   0                       ;CONTAINS CURRENT TEST NUMBER
 1011
 1012  001326  000000                    TSTTBL: 0                       ;TEST TABLE
 1013  001330  000000                            0                       ;UP TO 10 TESTS CAN BE SELECTED TO
 1014  001332  000000                            0                       ;BE RUN IN CONSECUTIVE ORDER
 1015  001334  000000                            0
 1016  001336  000000                            0
 1017  001340  000000                            0
 1018  001342  000000                            0
 1019  001344  000000                            0
 1020  001346  000000                            0
 1021  001350  000000                            0
 1022  001352  000000                            0
 1023
 1024  001354  012706  000500            AUTOST: MOV     #STACK,SP               ;SETUP THE SP
 1025  001360  104432                            SUSWR                           ;CHECK FOR HARDWARE SWICH REG
 1026  001362  004737  012404                    JSR     PC,.KMODE               ;CHECK FOR MODE OF OPERATION ++ C.W
 1027  001366  022737  000176  000512            CMP     #SWREG,SWR
 1028  001374  001004                            BNE     1$
 1029  001376  004737  012024                    JSR     PC,CNTLU                ;ALLOW SWREG TO BE CHANGED
 1030  001402  004737  012404                    JSR     PC,CKMODE               ;CHECK FOR MODE OF OPERATION
 1031  001406  012737  177777  000536    1$:     MOV     #-1,ATST
 1032  001414  012737  036025  001326            MOV     #36025,TSTTBL           ;SETUP TEST PARAMETERS
```

```
                                                                                    N 2
 1033  001422  012737  040052  001330          MOV     #40052,TSTTBL+2
 1034  001430  012737  027052  001332          MOV     #27052,TSTTBL+4
 1035  001436  012737  000003  001316          MOV     #3,NUMTST
 1036  001444  012737  123456  007374          MOV     #123456,LONUM           ;PRIME RANDOM NUMBER GENERATER
 1037  001452  012737  176543  007376          MOV     #176543,HINUM
 1038                                  ;DETERMINE THE SIZE OF THE WRITE AND READ BUFFERS.
 1039  001460  012737  001474  000004          MOV     #NXMRET,@#4             ;SETUP NXM VECTOR
 1040  001466  005737  024074                  TST     BUFFER+4096.            ;OVER 4K OF MEMORY?
 1041  001472  000413                          BR      OVER4K                  ;BR IF YES
 1042  001474  022626                  NXMRET: CMP     (SP)+,(SP)+             ;POP THE STACK
 1043  001476  012737  000004  000526          MOV     #4,MINLEN
 1044  001504  012737  002000  000524          MOV     #1024.,MAXLEN
 1045  001512  012737  016074  000532          MOV     #BUFFER+1024.,RBUF
 1046  001520  000411                          BR      TU.SEL                  ;GO SELCT DRIVES
 1047  001522  012737  000010  000526  OVER4K: MOV     #8.,MINLEN
 1048  001530  012737  004000  000524          MOV     #2048.,MAXLEN
 1049  001536  012737  020074  000532          MOV     #BUFFER+2048.,RBUF
 1050                                  ;DETERMINE DRIVES TO BE TESTED.
 1051                                  ;A DRIVE WILL BE TESTED IF:
 1052                                  ;       1. IT CAN BE SELECTED
 1053                                  ;       2. IT IS 9 TRACK
 1054                                  ;       3. IT IS WRITE ENABLED
 1055  001544  012737  000006  000004  TU.SEL: MOV     #6,@#4                  ;SET TRAP CATCHER
 1056  001552  012777  010000  176722          MOV     #10000,@MTC             ;PWR CLR
 1057  001560  005037  000540                  CLR     DRVSEL                  ;CLEAR DRIVE TABLE
 1058  001564  005037  000546                  CLR     MSBITS
 1059  001570  012700  000200                  MOV     #200,R0                 ;R0=DRIVE 0
 1060  001574  105777  176702                  TSTB    @MTC
 1061  001600  100036                          BPL     IDSELF                  ;BR IF NO CU RDY
 1062  001602  123737  000041  000004          CMPB    @#41,4                  ;DDP ON MAGTAPE?
 1063  001610  001426                          BEQ     NO.SEL                  ;IF YES - SKIP DRIVE 0
 1064  001612  013777  000540  176662  NXT.TU: MOV     DRVSEL,@MTC             ;SELECT A DRIVE
 1065  001620  012702  000024                  MOV     #20.,R2                 ;SETUP R2 FOR WAIT LOOP
 1066  001624  032777  000100  176646  USSTST: BIT     #100,@MTS               ;DOES DRIVE EXIST?
 1067  001632  001003                          BNE     USS.OK                  ;BR IF YES
 1068  001634  005302                          DEC     R2                      ;KILL SOME TIME
 1069  001636  003372                          BGT     USSTST
 1070  001640  000412                          BR      NO.SEL                  ;DRIVE IS NON-EXISTENCE
 1071  001642  032777  000020  176630  USS.OK: BIT     #20,@MTS                ;IS THIS DRIVE 7 OR 9 CHN?
 1072  001650  001006                          BNE     NO.SEL                  ;BR IF 7 CHN.
 1073  001652  032777  000004  176620          BIT     #4,@MTS                 ;IS WRITE LOCK ON?
 1074  001660  001002                          BNE     NO.SEL                  ;BR IF YES
 1075  001662  050037  000546                  BIS     R0,MSBITS               ;PUT DRIVE INTO TABLE
 1076  001666  105237  000541          NO.SEL: INCB    DRVSEL+1                ;INC. THE DRIVE NUMBER
 1077  001672  006200                          ASR     R0                      ;HAS ALL DRIVES BEEN TESTED FOR EXISTENCE?
 1078  001674  001346                          BNE     NXT.TU                  ;BR IF NO
 1079
 1080                                  ;TYPE-OUT NAME OF PROGRAM AND MIN. AND MAX. RECORD LENGTHS.
 1081
 1082  001676  105737  000402          IDSELF: TSTB    ACT11M                          ;ACT11 MODE?
 1083  001702  001011                          BNE     3$                              ;BRANCH - IF YES
 1084  001704  012702  013177                  MOV     #MSG10A,R2
 1085  001710  104404                          TOP
 1086  001712  013702  000526                  MOV     MINLEN,R2
 1087  001716  104426                          DECPRT                          ;PRINT MIN. LENGTH
 1088  001720  013702  000524                  MOV     MAXLEN,R2
```

```
1089  001724  104426                          DECPRT                          ;PRINT MAX. LENGTH
1090  001726  005737  000546          3$:     TST     MSBITS                  ;WAS ANY DRIVES SELECTED?
1091  001732  001012                          BNE     2$                      ;BR IF YES
1092  001734  013701  000042                  MOV     @#42,R1                 ;IS THERE A MONITOR?
1093  001740  001405                          BEQ     1$                      ;BRANCH IF NO
1094  001742  012702  013311                  MOV     #MSG10C,R2              ;INDICATE THAT NO DRIVES ARE
1095  001746  104404                          TOP                             ;AVAILABLE!!
1096  001750  000137  003246                  JMP     @#$ENDAD                ;RETURN TO THE MONITOR
1097  001754  000137  002140          1$:     JMP     START1                  ;NO--GO HAVE OPERATOR SELECT DRIVES
1098
1099                                  ;TYPE-OUT THE DRIVE/S TO BE TESTED
1100  001760  012702  013266          2$:     MOV     #MSG10B,R2
1101  001764  104404                          TOP
1102  001766  105037  014074                  CLRB    BUFFER
1103  001772  012701  014074                  MOV     #BUFFER,R1
1104  001776  005000                          CLR     R0                      ;SET R0 TO DRIVE 0
1105  002000  012702  000200                  MOV     #200,R2                 ;SET R2 TO DRIVE 0
1106
1107                                  ;FORM AND SAVE DRIVE NUMBER FOR TYPE-OUT
1108  002004  105021                          CLRB    (R1)+                   ;SET EOM
1109  002006  112721  000040                  MOVB    #' ,(R1)+               ;SPACE
1110  002012  030237  000546          LOOPER: BIT     R2,MSBITS               ;DID THIS DRIVE NUMBER EXIST?
1111  002016  001405                          BEQ     $ZERO$                  ;BR IF NO
1112  002020  110011                          MOVB    R0,(R1)                 ;YES--SAVE THE NUMBER
1113  002022  152721  000060                  BISB    #'0,(R1)+               ;MAKE IT ASCII
1114  002026  112721  000054                  MOVB    #',,(R1)+               ;COMMA
1115  002032  000241          $ZERO$. CLC                                     ;POSITION DRIVE BIT
1116  002034  006002                          ROR     R2
1117  002036  005200                          INC     R0                      ;UPDATE DRIVE NUMBER
1118  002040  020027  000007                  CMP     R0,#7                   ;LAST
1119  002044  003762                          BLE     LOOPER                  ;BR IF NO
1120  002046  105011                          CLRB    (R1)                    ;SET EOM
1121  002050  112741  000100                  MOVB    #'@,-(R1)               ;CR & LF
1122  002054  012702  014074                  MOV     #BUFFER,R2              ;TYPE THE DRIVE/S SELECTED
1123  002060  104404                          TOP
1124  002062  000137  003056                  JMP     EXECUT                  ;GO START TESTING
1125                                  ;MODIFY RECORD LENGTHS AND BUFFER AREAS FOR 4K OF MEMORY
1126  002066  012737  000004  000526  MEM4K:  MOV     #4.,MINLEN
1127  002074  012737  002000  000524          MOV     #1024.,MAXLEN
1128  002102  012737  016074  000532          MOV     #BUFFER+1024.,RBUF
1129  002110  000411                          BR      START
1130                                  ;MODIFY RECORD LENGTHS AND BUFFER AREAS FOR 8K OF MEMORY
1131  002112  012737  000010  000526  MEM8K:  MOV     #8.,MINLEN
1132  002120  012737  004000  000524          MOV     #2048.,MAXLEN
1133  002126  012737  020074  000532          MOV     #BUFFER+2048.,RBUF
1134  002134  005037  000536          START:  CLR     ATST                    ;NOT AUTO START
1135  002140  012706  000500          START1: MOV     #STACK,SP               ;INITIALIZE STACK
1136  002144  104432                          SUSWR                           ;CHECK FOR HARDWARE SWITCH REGISTER
1137  002146  022737  000176  000512          CMP     #SWREG,SWR
1138  002154  001002                          BNE     1$
1139  002156  004737  012024                  JSR     PC,CNTLU
1140  002162  012737  123456  007374  1$:     MOV     #123456,LONUM           ;PRIME RANDOM
1141  002170  012737  176543  007376          MOV     #176543,HINUM           ;NUMBER GENERATOR
1142  002176  012702  012615                  MOV     #MSG1,R2
1143  002202  104404                          TOP                             ;PRINT 'SELECT DRIVES'
1144  002204  005037  000546                  CLR     MSBITS                  ;CLEAR SELECTED DRIVE INDICATOR
```

```
1145  002210  104400                    SELDRV: WAITKY
1146  002212  122737  000015  001314            CMPB    #15,CHARIN      ;WAS CHARACTER A CARRIAGE RETURN?
1147  002220  001010                            BNE     SELD1           ;NO
1148  002222  005737  000546                    TST     MSBITS          ;YES, WERE ANY DRIVES SELECTED
1149  002226  001744                            BEQ     START1          ;NO
1150  002230  005737  000536                    TST     ATST            ;YES--IS AUTO SWITCH SET?
1151  002234  001454                            BEQ     SELTST          ;NO--GO SELECT TESTS
1152  002236  000137  003056                    JMP     EXECUT          ;YES--GO START TESTING
1153  002242  122737  000070  001314  SELD1:   CMPB    #70,CHARIN      ;IS CHARACTER A VALID NUMBER 0-7?
1154  002250  003404                            BLE     SELD2           ;NO, PRINT "?"
1155  002252  122737  000060  001314            CMPB    #60,CHARIN      ;IS CHARACTER A VALID NUMBER 0-7?
1156  002260  003407                            BLE     VALID           ;YES
1157  002262  105777  176232          SELD2:   TSTB    @TPS
1158  002266  100375                            BPL     .-4
1159  002270  012777  000077  176224            MOV     #'?,@TPB        ;PRINT '?'
1160  002276  000424                            BR      VAL4
1161                                  ;HAVE VALID DRIVE NUMBER
1162  002300  142737  000270  001314  VALID:   BICB    #270,CHARIN     ;MASK OUT NUMBER
1163  002306  105137  001314                    COMB    CHARIN
1164  002312  012700  000200                    MOV     #200,R0         ;INITIALIZE BIT POSITION FOR DRIVE 0
1165
1166
1167  002316  105237  001314          VAL1:    INCB    CHARIN          ;+1 TO DRIVE SELECT
1168  002322  001402                            BEQ     VAL2            ;HAVE DRIVE OF EQUAL TO ZERO
1169  002324  006200                            ASR     R0              ;MOVE BIT POSITION TO NEXT DRIVE
1170  002326  000773                            BR      VAL1            ;TRY AGAIN
1171  002330  130037  000546          VAL2:    BITB    R0,MSBITS       ;COMPARE DRIVE SELECT WITH PREVIOUS SELECTED
1172  002334  001003                            BNE     VAL3
1173  002336  150037  000546                    BISB    R0,MSBITS       ;DRIVE WASN'T PREVIOUSLY SET, SO SET IT NOW.
1174  002342  000402                            BR      VAL4
1175  002344  140037  000546          VAL3:    BICB    R0,MSBITS       ;DRIVE WAS SET, CLEAR IT.
1176  002350  105777  176144          VAL4:    TSTB    @TPS
1177  002354  100375                            BPL     .-4
1178  002356  012777  000054  176136            MOV     #',,@TPB        ;PRINT COMMA
1179  002364  000711                            BR      SELDRV          ;RETURN TO WAIT FOR NEXT KEY
1180                                  ;HAVE DRIVES SELECTED-NOW GET TEST SELECTION
1181  002366  012702  012636          SELTST:  MOV     #MSG2,R2
1182  002372  104404                            TOP                     ;PRINT'SELECT TESTS'
1183  002374  005037  001316                    CLR     NUMTST          ;CLEAR TEST NUMBERS SELECTED
1184  002400  012700  001326                    MOV     #TSTTBL,R0      ;INITIALIZE TEST TABLE POINTER
1185  002404  104400                  SELT1:    WAITKY
1186  002406  122737  000015  001314            CMPB    #15,CHARIN      ;WAS CHARACTER A CARRIAGE RETURN?
1187  002414  001005                            BNE     SELT2
1188  002416  005737  001316                    TST     NUMTST          ;WERE ANY TESTS SELECTED?
1189  002422  001412                            BEQ     SELT3           ;NO
1190  002424  000137  003056                    JMP     EXECUT          ;YES, EXECUTE TESTS
1191  002430  122737  000066  001314  SELT2:   CMPB    #66,CHARIN      ;IS CHARACTER A VALID NUMBER 0-5
1192  002436  003404                            BLE     SELT3           ;NO
1193  002440  122737  000060  001314            CMPB    #60,CHARIN      ;IS CHARACTER A VALID NUMBER 0-5
1194  002446  003404                            BLE     SELPAT          ;YES
1195  002450  012702  012610          SELT3:   MOV     #MSG0,R2
1196  002454  104404                            TOP
1197  002456  000752                            BR      SELT1           ;RETURN TO WAIT FOR TEST SELECT
1198  002460  013704  001314          SELPAT:  MOV     CHARIN,R4
1199  002464  000304                            SWAB    R4              ;ROTATE TEST NUMBER INTO POSITION
1200  002466  006104                            ROL     R4
```

```
1201  002470  006104                          ROL     R4
1202  002472  006104                          ROL     R4
1203  002474  006104                          ROL     R4
1204  002476  042704  107777                  BIC     #107777,R4
1205  002502  104430                          SP3                     ;TYPE 3 SPACES
1206                                  ;HAVE VALID TEST SELECTED, NOW GET SELECTED PATTERN
1207  002504  104400                          WAITKY
1208  002506  122737  000070  001314          CMPB    #70,CHARIN      ;IS CHARACTER A VALID NUMBER 0-7
1209  002514  003755                          BLE     SELT3           ;NO
1210  002516  122737  000057  001314          CMPB    #57,CHARIN      ;IS CHARACTER A VALID NUMBER 0-7
1211  002524  002351                          BGE     SELT3           ;NO
1212  002526  000337  001314                  SWAB    CHARIN          ;MOVE PATTERN SELECT INTO POSITION
1213  002532  006137  001314                  ROL     CHARIN
1214  002536  042737  170777  001314          BIC     #170777,CHARIN
1215  002544  053704  001314                  BIS     CHARIN,R4       ;COMBINE PATTERN WITH TEST
1216  002550  104430                          SP3
1217
1218                                  ;WAIT FOR RECORD LENGTH SEQUENCES SELECTION
1219  002552  104400                  SELRLS: WAITKY
1220  002554  122737  000060  001314          CMPB    #60,CHARIN      ;IS CHARACTER=0
1221  002562  001424                          BEQ     SELR3           ;YES, RLS=MIN
1222  002564  122737  000061  001314          CMPB    #61,CHARIN      ;IS CHARACTER=1
1223  002572  001003                          BNE     SELR1
1224  002574  052704  000020                  BIS     #20,R4          ;SET RLS=MAX
1225  002600  000415                          BR      SELR3
1226  002602  122737  000062  001314  SELR1:  CMPB    #62,CHARIN      ;IS CHARACTER=2
1227  002610  001003                          BNE     SELR2
1228  002612  052704  000040                  BIS     #40,R4          ;SET RLS=MIN-MAX
1229  002616  000406                          BR      SELR3
1230  002620  122737  000063  001314  SELR2:  CMPB    #63,CHARIN      ;IS CHARACTER=3
1231  002626  001310                          BNE     SELT3
1232  002630  052704  000060                  BIS     #60,R4          ;SET RLS=MAX-MIN
1233  002634  104430                  SELR3:  SP3
1234                                  ;WAIT FOR WRITE MODE SELECTION
1235  002636  104400                          WAITKY
1236  002640  122737  000060  001314          CMPB    #60,CHARIN
1237  002646  001415                          BEQ     SELW2           ;SET WMO=NONSTOP
1238  002650  122737  000061  001314          CMPB    #61,CHARIN
1239  002656  001003                          BNE     SELW1
1240  002660  052704  000004                  BIS     #4,R4           ;SET WMO=START-STOP
1241  002664  000406                          BR      SELW2
1242  002666  122737  000062  001314  SELW1:  CMPB    #62,CHARIN
1243  002674  001265                          BNE     SELT3
1244  002676  052704  000010                  BIS     #10,R4          ;SET WMO=RANDOM
1245  002702  104430                  SELW2:  SP3
1246                                  ;WAIT FOR READ MODE SELECTION
1247  002704  104400                          WAITKY
1248  002706  122737  000060  001314          CMPB    #60,CHARIN
1249  002714  001415                          BEQ     SELRM2          ;SET RMO=NONSTOP
1250  002716  122737  000061  001314          CMPB    #61,CHARIN
1251  002724  001003                          BNE     SELRM1
1252  002726  052704  000001                  BIS     #1,R4           ;SET RMO=START-STOP
1253  002732  000406                          BR      SELRM2
1254  002734  122737  000062  001314  SELRM1: CMPB    #62,CHARIN
1255  002742  001242                          BNE     SELT3
1256  002744  052704  000002                  BIS     #2,R4           ;SET RMO=RANDOM
```

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1257  002750  104430                  SELRM2: SP3
1258
1259                                  ;HAVE ALL PARAMETERS
1260  002752  012702  012713                  MOV     #MSG6,R2
1261  002756  104404                          TOP                     ;PRINT 'OK''
1262  002760  104400                          WAITKY                  ;WAIT FOR CARRIAGE RETURN
1263  002762  122737  000015  001314          CMPB    #15,CHARIN
1264  002770  001402                          BEQ     .+6
1265  002772  000137  002450                  JMP     SELT3
1266  002776  105777  175516                  TSTB    @TPS
1267  003002  100375                          BPL     .-4
1268  003004  012777  000012  175510          MOV     #12,@TPB
1269  003012  105777  175502                  TSTB    @TPS
1270  003016  100375                          BPL     .-4
1271  003020  012777  000040  175474          MOV     #40,@TPB
1272  003026  010420                          MOV     R4,(0)+
1273  003030  005237  001316                  INC     NUMTST          ;+1 TO TEST COUNT
1274  003034  022737  000012  001316          CMP     #10.,NUMTST     ;EQUAL TO TEN YET
1275  003042  001402                          BEQ     SELOK1          ;YES
1276  003044  000137  002404                  JMP     SELT1           ;NO, ACCEPT NEXT SET
1277  003050  012702  012666          SELOK1: MOV     #MSG5,R2
1278  003054  104404                          TOP
1279
1280                                  ;EXECUTE SELECTED TEST
1281  003056  005037  000632          EXECUT: CLR     MODES           ;INITIALIZE MODES
1282  003062  012737  001326  001322          MOV     #TSTTBL,TSTEX
1283  003070  017737  176226  001320  EXEC:   MOV     @TSTEX,PARAM    ;GET TEST PARAMETERS
1284  003076  013700  001320          EXEC1:  MOV     PARAM,R0
1285  003102  042700  007777                  BIC     #7777,R0
1286  003106  010037  001324                  MOV     R0,TEST
1287  003112  001475                          BEQ     TEST0
1288  003114  022700  010000                  CMP     #10000,R0
1289  003120  001516                          BEQ     TEST1
1290  003122  022700  020000                  CMP     #20000,R0
1291  003126  001537                          BEQ     TEST2
1292  003130  022700  030000                  CMP     #30000,R0
1293  003134  001002                          BNE     1$
1294  003136  000137  003544                  JMP     TEST3
1295  003142  022700  040000          1$:     CMP     #40000,R0
1296  003146  001402                          BEQ     .+6
1297  003150  000137  004204                  JMP     TEST5
1298  003154  000137  003662                  JMP     TEST4
1299                                  ;RETURN HERE AFTER COMPLETION OF TEST
1300  003160  104434                  DONE:   CKSWR                   ;CHECK FOR CNTL G
1301  003162  012702  014020                  MOV     #MSG26,R2
1302  003166  104404                          TOP
1303  003170  032777  000001  175314          BIT     #1,@SWR         ;IS SW 0=1 TO REPEAT TEST WITH ALL PATTERNS
1304  003176  001413                          BEQ     DONE1           ;NO
1305  003200  013700  001320                  MOV     PARAM,R0
1306  003204  042700  170777                  BIC     #170777,R0
1307  003210  022700  007000                  CMP     #7000,R0        ;REACHED PATTERN 7?
1308  003214  001404                          BEQ     DONE1           ;YES
1309  003216  062737  001000  001320          ADD     #1000,PAPAM     ;NO, +1 TO PATTERN
1310  003224  000724                          BR      EXEC1           ;REPEAT TEST
1311  003226  005337  001316          DONE1:  DEC     NUMTST
1312  003232  001021                          BNE     DOAGN
```

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 1313  003234  013701  000042                MOV     @#42,R1
 1314  003240  001002                        BNE     $ENDAD
 1315  003242  000000                        HALT                    ;FINISHED ALL TESTS
 1316  003244  104434                        CKSWR
 1317  003246  004711              $ENDAD:   JSR     PC,(R1)
 1318  003250  000240                        NOP
 1319  003252  000240                        NOP
 1320  003254  000240                        NOP
 1321  003256  105737  000402                TSTB    ACT11M                  ;ACT11 MODE? ++ C.W
 1322  003262  001405                        BEQ     DOAGN                   ;BRANCH - IF NO ++ C.W
 1323  003264  012702  014025                MOV     #MSG27,R2               ;GET END OF PASS MESSAGE
 1324  003270  104404                        TOP                             ;TYPE END OF PASS
 1325  003272  000137  001354                JMP     AUTOST                  ;CONTINUE TEST
 1326  003276  062737  000002  001322  DOAGN:  ADD     #2,TSTEX
 1327  003304  000671                        BR      EXEC            ;DO NEXT TFST
 1328
 1329                                  ;TEST0
 1330                                  ;WRITE ONE RECORD, CHANGE DRIVES, GO TO EOT
 1331  003306  052737  000002  000632  TEST0:  BIS     #2,MODES        ;EXIT WRITE EVERY RECORD, NO READ PASS
 1332  003314  104420                        CLRALL                  ;CLEAR ERROR COUNTERS AND REWIND
 1333  003316  104416                        GENPAT                  ;GENERATE PATTERN
 1334  003320  104410              T0:       RSFDRV                  ;RESET DRIVE SELECTION TO LOWEST NUMBER
 1335  003322  104414              T0A:      MVCTRS                  ;RESTORE DRIVE COUNTERS
 1336  003324  032737  000040  000632        BIT     #40,MODES       ;IS THIS DRIVE AT EOT?
 1337  003332  001002                        BNE     T0B             ;YES, SKIP WRITE
 1338  003334  104402                        WRITIT                  ;WRITE
 1339  003336  104406                        SVCTRS                  ;SAVE DRIVE COUNTERS
 1340
 1341  003340  104422              T0B:      CHGDRV                  ;ANY MORE DRIVES SELECTED?
 1342  003342  000767                        BR      T0A             ;YES
 1343  003344  004737  004776                JSR     PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
 1344  003350  000763                        BR      T0              ;NC
 1345  003352  000137  003160                JMP     DONE            ;YES, EXIT
 1346                                  ;TEST1
 1347                                  ;WRITE RECORD LENGTH SEQUENCE, GO TO NEXT DRIVE, CONTINUE TO EOT ON ALL DRIVES.
 1348  003356  052737  000001  000632  TEST1:  BIS     #1,MODES        ;EXIT WRITE AFTER RLS, NO READ PASS
 1349  003364  104420                        CLRALL                  ;CLEAR ERROR COUNTERS AND REWIND
 1350  003366  104416                        GENPAT                  ;GENERATE PATTERN
 1351  003370  104410              T1:       RSFDRV                  ;RESET DRIVE SELECTION TO LOWEST NUMBER
 1352  003372  104414              T1A:      MVCTRS                  ;RESTORE DRIVE COUNTERS
 1353  003374  032737  000040  000632        BIT     #40,MODES       ;IS THIS DRIVE AT EOT?
 1354  003402  001002                        BNE     T1B             ;YES, SKIP WRITE
 1355  003404  104402                        WRITIT                  ;WRITE
 1356  003406  104406                        SVCTRS                  ;SAVE DRIVE COUNTERS
 1357  003410  104422              T1B:      CHGDRV                  ;ANY MORE DFIVE SELECTED?
 1358  003412  000767                        BR      T1A             ;YES
 1359  003414  004737  004776                JSR     PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
 1360  003420  000763                        BR      T1              ;NO
 1361  003422  000137  003160                JMP     DONE            ;YES EXIT
 1362
 1363                                  ;TEST2
 1364                                  ;WRITE A RECORD LENGTH SEQUENCE , CHANGE DRIVES
 1365                                  ;BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES.  CONTINUE TO EOT ON ALL DRIVES
 1366  003426  052737  000005  000632  TEST2:  BIS     #5,MODES        ;EXIT WRITE AFTER RLS, DO READ PASS
 1367  003434  104420                        CLRALL                  ;CLEAR ERROR COUNTERS AND REWIND
 1368  003436  104416                        GENPAT                  ;GENERATE PATTERN
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1369  003440  104410                    T2:             RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1370  003442  104414                    T2A:            MVCTRS          ;RESTORE DRIVE COUNTERS
1371  003444  032737  000040  000632            BIT     #40,MODES       ;IS THIS DRIVE AT EOT?
1372  003452  001002                            BNE     T2B             ;YES, SKIP WRITE
1373  003454  104402                            WRITIT                  ;WRITE
1374  003456  104406                            SVCTRS                  ;SAVE DRIVE COUNTERS
1375  003460  104422                    T2B:            CHGDRV          ;ANYMORE DRIVERS SELECTED?
1376  003462  000767                            BR      T2A             ;YES
1377  003464  104414                    T2C:            MVCTRS          ;RESTORE DRIVE COUNTERS
1378  003466  032737  000020  000632            BIT     #20,MODES       ;IS THIS READ AT EOT?
1379  003474  001003                            BNE     T2D             ;YES, SKIP BACKSPACE
1380  003476  004737  011072                    JSR     PC,GOBKWD       ;BACKSPACE
1381  003502  104406                            SVCTRS                  ;SAVE DRIVE COUNTERS
1382  003504  104422                    T2D:            CHGDRV          ;ANY MORE DRIVES SELECTED?
1383  003506  000766                            BR      T2C             ;YES
1384  003510  104414                    T2E:            MVCTRS          ;RESTORE DRIVE COUNTERS
1385  003512  032737  000020  000632            BIT     #20,MODES       ;IS THIS READ AT EOT
1386  003520  001001                            BNE     T2F             ;YES, SKIP READ
1387  003522  104424                            READIT                  ;READ
1388  003524  104406                    T2F:            SVCTRS          ;SAVE DRIVE COUNTERS
1389  003526  104422                            CHGDRV                  ;ANYMORE DRIVES SELECTED?
1390  003530  000767                            BR      T2E             ;YES
1391  003532  004737  004776                    JSR     PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
1392  003536  000740                            BR      T2              ;NO
1393  003540  000137  003160                    JMP     DONE            ;YES EXIT
1394
1395                                    ;TEST3
1396                                    ;WRITE ONE RECORD, CHANGE DRIVES, BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES
1397  003544  052737  000006  000632    TEST3:  BIS     #6,MODES        ;EXIT WRITE EVERY RECORD, DO READ PASS
1398  003552  104420                            CLRALL                  ;CLEAR ERROR COUNTERS AND REWIND
1399  003554  104416                            GENPAT                  ;GENERATE PATTERN
1400  003556  104410                    T3:             RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1401  003560  104414                    T3A.            MVCTRS          ;RESTORE DRIVE COUNTERS
1402  003562  032737  000040  000632            BIT     #40,MODES       ;IS THIS DRIVE AT EOT?
1403  003570  001002                            BNE     T3B             ;YES, SKIP WRITE
1404  003572  104402                            WRITIT                  ;WRITE
1405  003574  104406                            SVCTRS                  ;SAVE DRIVE COUNTERS
1406  003576  104422                    T3B:            CHGDRV          ;ANY MORE DRIVES SELECTED
1407  003600  000767                            BR      T3A             ;YES
1408
1409  003602  104414                    T3C:            MVCTRS          ;RESTORE DRIVE COUNTERS
1410  003604  032737  000020  000632            BIT     #20,MODES       ;IS THIS DRIVE AT EOT
1411  003612  001002                            BNE     T3D             ;YES, SKIP BACKSPACE
1412  003614  004737  011072                    JSR     PC,GOBKWD       ;BACKSPACE
1413  003620  104406                    T3D:            SVCTRS          ;SAVE DRIVE COUNTERS
1414  003622  104422                            CHGDRV                  ;ANY MORE DRIVES SELECTED?
1415  003624  000766                            BR      T3C             ;GO
1416  003626  104414                    T3E:            MVCTRS          ;RESTORE DRIVE COUNTERS
1417  003630  032737  000020  000632            BIT     #20,MODES       ;IS THIS DRIVE AT EOT?
1418  003636  001001                            BNE     T3F             ;YES, SKIP READ
1419  003640  104424                            READIT                  ;READ
1420  003642  104406                    T3F:            SVCTRS          ;SAVE DRIVE COUNTERS
1421  003644  104422                            CHGDRV                  ;ANY MORE DRIVES SELECTED
1422  003646  000767                            BR      T3E             ;YES
1423  003650  004737  004776                    JSR     PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
1424  003654  000740                            BR      T3              ;NO
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1425  003656  000137  003160                    JMP     DONE            ;YES, EXIT
1426
1427                                    ;TEST4
1428                                    ;WRITE RECORD, CHANGE DRIVES, REPEAT FOR RECORD LENGTH SEQUENCE
1429                                    ;READ RECORD, CHANGE DRIVES, REPEAT FOR RLS
1430  003662  052737  000006  000632    TEST4:  BIS     #6,MODES        ;EXIT WRITE EVERY RECORD, DO READ PASS
1431  003670  104416                            GENPAT                  ;GENERATE PATTERN
1432  003672  032777  000014  175422            BIT     #14,@TSTEX
1433  003700  001006                            BNE     T4
1434  003702  042737  000007  000632            BIC     #7,MODES
1435  003710  052737  000005  000632            BIS     #5,MODES        ;EXIT WRITE AFTER RLS, DO READ PASS
1436  003716  104420                    T4:             CLRALL          ;CLEAR ERROR COUNTERS AND REWIND
1437  003720  104410                    T4A:            RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1438  003722  104414                    T4B:            MVCTRS          ;RESTORE DRIVE COUNTERS
1439  003724  013737  000612  000614            MOV     RECORD,WRRECR   ;SAVE RECORD
1440  003732  104406                            SVCTRS                  ;SAVE DRIVE COUNTERS
1441  003734  104422                            CHGDRV                  ;ANYMORE DRIVES SELCTED?
1442  003736  000771                            BR      T4B             ;YES
1443  003740  042737  000010  000632            BIC     #10,MODES       ;CLEAR RLS END
1444  003746  104410                    T4C:            RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1445  003750  104414                    T4D:            MVCTRS          ;RESTORE DRIVE COUNTERS
1446  003752  032737  000040  000632            BIT     #40,MODES       ;IS DRIVE AT EOT
1447  003760  001010                            BNE     T4E             ;YES, SKIP WRITE
1448  003762  013737  000614  000550            MOV     WRRECR,SVRECR   ;SAVE START OF RLS
1449  003770  104402                            WRITIT                  ;WRITE
1450  003772  013737  000550  000614            MOV     SVRECR,WRRECR   ;RESTORE START OF RLS
1451  004000  104406                            SVCTRS                  ;SAVE DRIVE COUNTERS
1452  004002  104422                    T4E:            CHGDRV          ;ANYMORE DRIVES SELECTED?
1453  004004  000761                            BR      T4D             ;YES
1454  004006  032737  000010  000632            BIT     #10,MODES       ;ARE WE AT END OF RLS
1455  004014  001007                            BNE     T4G             ;YES
1456  004016  104414                    T4F:            MVCTRS          ;RESTORE DRIVE COUNTERS
1457  004020  032737  000040  000632            BIT     #40,MODES       ;ARE WE AT EOT?
1458  004026  001747                            BEQ     T4C             ;NO
1459  004030  104422                            CHGDRV                  ;ANYMORE DRIVES SELECTED?
1460  004032  000771                            BR      T4F             ;YES
1461  004034  104410                    T4G:    RSFDRV                          ;SET DRIVE SELECTION TO LOWEST NUMBER
1462  004036  104414                    T4H:            MVCTRS          ;RESTORE DRIVE COUNTERS
1463  004040  032737  000020  000632            BIT     #20,MODES       ;IS THIS DRIVE AT EOT?
1464  004046  001002                            BNE     T4J             ;YES, SKIP BACKSPACE
1465  004050  004737  011072                    JSR     PC,GOBKWD       ;BACKSPACE
1466  004054  104406                    T4J:            SVCTRS          ;SAVE DRIVE COUNTERS
1467  004056  104422                            CHGDRV                  ;ANY MORE DRIVES SELECTED?
1468  004060  000766                            BR      T4H             ;YES
1469  004062  104410                    T4K:            RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBFR
1470  004064  104414                    T4L:            MVCTRS          ;RESTORE DRIVE COUNTERS
1471  004066  032737  000020  000632            BIT     #20,MODES       ;IS THIS READ AT EOT?
1472  004074  001025                            BNE     T4N             ;YES, SKIP READ
1473  004076  023737  000616  000612            CMP     LASRCR,RECORD   ;HAVE WE READ LAST RECORD WRITTEN?
1474  004104  001421                            BEQ     T4N             ;YES
1475  004106  013737  000616  000550            MOV     LASRCR,SVRECR   ;SAVE LAST RECORD
1476  004114  032737  000003  001320            BIT     #3,PARAM        ;IS READ MODE NONSTOP?
1477  004122  001405                            BEQ     T4M             ;YES
1478  004124  013737  000612  000616            MOV     RECORD,LASRCR
1479  004132  005237  000616                    INC     LASRCR          ;+1 TO LAST RECORD WRITTEN
1480  004136  104424                    T4M:            READIT          ;READ
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 1481  004140  013737  000550  000616          MOV     SVRECR,LASRCR   ;RESTORE LAST RECORD WRITTEN
 1482  004146  104406                          SVCTRS                  ;SAVE DRIVE COUNTERS
 1483  004150  104422                  T4N:    CHGDRV                  ;ANYMORE DRIVES SELECTED?
 1484  004152  000744                          BR      T4L             ;YES
 1485  004154  104414                  T4P:    MVCTRS                  ;RESTORE DRIVE COUNTERS
 1486  004156  023737  000616  000612          CMP     LASRCR,RECORD   ;ARE WE AT END OF RLS?
 1487  004164  001336                          BNE     T4K             ;NO
 1488  004166  104422                          CHGDRV                  ;ANYMORE DRIVES SELECTED?
 1489  004170  000771                          BR      T4P             ;YES
 1490  004172  004737  004776                  JSR     PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
 1491  004176  000650                          BR      T4A             ;NO
 1492  004200  000137  003160                  JMP     DONE            ;YES,EXIT
 1493
 1494                                  ;TEST5
 1495                                  ;READ ONLY
 1496                                  ;RANDOM PATTERN INVALID EXCEPT FOR SPECIFIC CASES
 1497  004204  052737  000002  000632  TEST5.  BIS     #2,MODES
 1498  004212  104420                          CLRALL                  ;CLEAR ERROR COUNTERS AND REWIND
 1499  004214  104416                          GENPAT                  ;GENERATE PATTERN
 1500  004216  012737  177777  004464  T5:     MOV     #-1,T5FLAG      ;ENABLE EXIT FROM WRITE ROUTINE
 1501  004224  104402                          WRITIT                  ;ENTER WRITE ONLY TO INITIALIZE RECORD SEQUENCE
 1502  004226  032737  000010  000632          BIT     #10,MODES       ;ARE WE AT END OF RLS?
 1503  004234  001402                          BEQ     T5A             ;YES
 1504  004236  004737  005616                  JSR     PC,TESINC       ;SEE IF RECORD LENGTH SHOULD BE CHANGED
 1505  004242  013737  000612  004466  T5A:    MOV     RECORD,T5INC
 1506  004250  005037  000612                  CLR     RECORD
 1507  004254  052737  000010  000632  T5B:    BIS     #10,MODES       ;INDICATE AT START OF RLS
 1508  004262  104410                          RSFDRV                  ;SET DRIVE SELECTION TO LOWEST DRIVE NUMBER
 1509  004264  104414                  T5C:    MVCTRS                  ;RESTORE DRIVE COUNTERS
 1510  004266  032737  000020  000632          BIT     #20,MODES       ;IS THIS DRIVE AT EOT
 1511  004274  001007                          BNE     T5D             ;YES
 1512  004276  013737  000612  000616          MOV     RECORD,LASRCR
 1513  004304  063737  004466  000616          ADD     T5INC,LASRCR    ;CURRENT RECORD + SEQUENCE LENGTH
 1514  004312  104406                          SVCTRS                  ;SAVE DRIVE COUNTERS
 1515  004314  104422                  T5D:    CHGDRV                  ;ANYMORE DRIVES?
 1516  004316  000762                          BR      T5C             ;YES
 1517  004320  104410                          RSFDRV                  ;SET DRIVE SELECTION TO LOWEST NUMBER
 1518  004322  104414                  T5E:    MVCTRS                  ;RESTORE DRIVE COUNTERS
 1519  004324  032737  000020  000632          BIT     #20,MODES       ;IS THIS DRIVE AT EOT?
 1520  004332  001021                          BNE     T5G             ;YES
 1521  004334  013737  000616  000550          MOV     LASRCR,SVRECR   ;SAVE END OF RLS RECORDS
 1522  004342  032737  000003  001320          BIT     #3,PARAM        ;IS READ MODE NONSTOP
 1523  004350  001405                          BEQ     T5F             ;YES GO TO END RLS
 1524  004352  013737  000612  000616          MOV     RECORD,LASRCR   ;NEXT TO BE READ
 1525  004360  005237  000616                  INC     LASRCR          ;+1 EXIT READ AFTER ONE RECORD
 1526  004364  104424                  T5F:    READIT                  ;READ
 1527  004366  013737  000550  000616          MOV     SVRECR,LASRCR   ;RESTORE END RECORD
 1528  004374  104406                          SVCTRS                  ;SAVE DRIVE COUNTERS
 1529  004376  104422                  T5G:    CHGDRV                  ;ANY MORE DRIVES?
 1530  004400  000750                          BR      T5E             ;YES
 1531  004402  004737  004776                  JSR     PC,ALLEOT       ;ALL AT EOT?
 1532  004406  000402                          BR      T5H             ;NO
 1533  004410  000137  003160                  JMP     DONE            ;YES EXIT
 1534  004414  104410                  T5H:    RSFDRV                  ;SET DRIVE SELECTION TO LOWEST NUMBER
 1535  004416  104414                  T5J:    MVCTRS                  ;RESTORE DRIVE COUNTERS
 1536  004420  023737  000612  000616          CMP     RECORD,LASRCR   ;ARE WE AT END OF RLS?
```

```
1537  004426  001003                          BNE     T5K             ;NO
1538  004430  042737  000010  000632          BIC     #10,MODES       ;YES,
1539  004436  104422                  T5K:            CHGDRV          ;ANYMORE DRIVES SELECTED?
1540  004440  000766                          BR      T5J             ;YES
1541  004442  032737  000010  000632          BIT     #10,MODES       ;AT END OF RLS?
1542  004450  001324                          BNE     T5E             ;NO
1543  004452  004737  004776                  JSR     PC,ALLEOT       ;ALL DRIVES AT EOT?
1544  004456  000657                          BR      T5              ;NO
1545  004460  000137  003160                  JMP     DONE            ;YES, EXIT
1546  004464  000000                  T5FLAG: 0
1547  004466  000000                  T5INC:  0
1548
1549                                  ;SAVE DRIVE RECORD AND ERROR COUNTERS
1550  004470  004737  004524          SVCTR:  JSR     PC,CTRDEX
1551  004474  012021                  SVC1:   MOV     (0)+,(1)+
1552  004476  022700  000634                  CMP     #DRVADR,R0
1553  004502  001374                          BNE     SVC1
1554  004504  000207                          RTS     PC
1555                                  ;RESET DRIVE COUNTERS BACK INTO PROGRAM
1556  004506  004737  004524          MVCTR:  JSR     PC,CTRDEX
1557  004512  012120                  MV1:    MOV     (1)+,(0)+
1558  004514  022700  000634                  CMP     #DRVADR,R0
1559  004520  001374                          BNE     MV1
1560  004522  000207                          RTS     PC
1561                                  ;SET UP POINTERS FOR MOVE AND SAVE COUNTERS
1562  004524  012700  000570          CTRDEX: MOV     #WRCHEK,R0
1563  004530  012701  000634                  MOV     #DRVADR,R1
1564  004534  063701  000556                  ADD     CDRIVE,R1
1565  004540  063701  000556                  ADD     CDRIVE,R1
1566  004544  011101                          MOV     @R1,R1
1567  004546  000207                          RTS     PC
1568                                  ;CLEAR ALL DRIVE COUNTERS
1569  004550  104410                  CLRAL:          RSFDRV
1570  004552  004737  004740          CLR1:   JSR     PC,REWIND
1571  004556  004737  005104                  JSR     PC,CLRTBL
1572  004562  104406                                  SVCTRS
1573  004564  104422                                  CHGDRV
1574  004566  000771                          BR      CLR1
1575  004570  052737  000010  000632          BIS     #10,MODES       ;AT END OF RLS
1576  004576  005037  004464                  CLR     T5FLAG
1577  004602  000207                          RTS     PC
1578                                  ;RESET DRIVE SELECTION TO LOWEST NUMBER
1579  004604  005037  000556          RSFDR:  CLR     CDRIVE          ;START WITH DRIVE 0
1580  004610  012737  000200  000554          MOV     #200,CDRVBT     ;BIT FOR DRIVE 0
1581  004616  033737  000546  000554  RSF1:   BIT     MSBITS,CDRVBT   ;IS DRIVE SELECTED?
1582  004624  001006                          BNE     RSF2            ;YES
1583  004626  005237  000556                  INC     CDRIVE          ;NO + 1 TO DRIVE
1584  004632  000241                          CLC
1585  004634  006037  000554                  ROR     CDRVBT          ;ROTATE DRIVE BIT
1586  004640  000766                          BR      RSF1            ;REPEAT
1587  004642  013737  000556  000552  RSF2:   MOV     CDRIVE,COMAND
1588  004650  000337  000552                  SWAB    COMAND
1589  004654  052737  060000  000552          BIS     #60000,COMAND   ;800 BPI, 9 TRACK
1590  004662  032777  001000  173622          BIT     #1000,@SWR      ;TEST PARITY SELECTED
1591  004670  001403                          BEQ     .+10            ;ODD
1592  004672  052737  004000  000552          BIS     #4000,COMAND    ;EVEN
```

```
 1593  004700  000207                          RTS     PC
 1594
 1595                                  ;SELECT NEXT DRIVE IN SEQUENCE
 1596                                  ;+1 WORD TO EXIT ADDRESS IF LAST DRIVE TESTED
 1597  004702  005237  000556          CHGDR:  INC     CDRIVE          ;+1 TO DRIVE NUMBER
 1598  004706  000241                          CLC
 1599  004710  006037  000554                  ROR     CDRVBT          ;MOVE MASK BIT OVER 1 PLACE
 1600  004714  001004                          BNE     CHG1            ;BRANCH IF MORE DRIVES SELECTED
 1601  004716  104410                          RSFDRV                  ;RESET DRIVE SELECT TO LOWEST NUMBER
 1602  004720  062716  000002                  ADD     #2,@SP          ;+ 2 TO SKIP OVER FIRST EXIT
 1603  004724  000207                          RTS     PC
 1604  004726  033737  000554  000546  CHG1:   BIT     CDRVBT,MSBITS
 1605  004734  001762                          BEQ     CHGDR
 1606  004736  000741                          BR      RSF2
 1607
 1608                                  ;REWIND DRIVE TO BOT
 1609  004740  105777  173536          REWIND: TSTB    @MTC
 1610  004744  100375                          BPL     .-4             ;WAIT FOR CONTROL UNIT
 1611  004746  013777  000552  173526          MOV     COMAND,@MTC     ;SELECT DRIVE
 1612  004754  006077  173520                  ROR     @MTS
 1613  004760  103375                          BCC     .-4             ;WAIT FOR TU READY
 1614  004762  052777  000016  173512          BIS     #16,@MTC        ;REWIND
 1615  004770  004737  005130                  JSR     PC,GOWAIT
 1616  004774  000207                          RTS     PC              ;EXIT
 1617                                  ;ARE ALL DRIVES AT END OF TAPE
 1618  004776  104410                  ALLEOT:         RSFDRV
 1619  005000  104414                  ALL1:           MVCTRS
 1620  005002  032737  000060  000632                  BIT     #60,MODES       ;AT EOT?
 1621  005010  001403                          BEQ     ALLEOS          ;NO
 1622  005012  104422                          CHGDRV                  ;DONE ALL DRIVES?
 1623  005014  000771                          BR      ALL1            ;NO
 1624  005016  000427                          BR      ALL3
 1625  005020  032777  000400  173464  ALLEOS: BIT     #400,@SWR       ;TEST SWITCH 8 TO EXIT AT END OF SEQUENCE
 1626  005026  001425                          BEQ     ALL2            ;NO, GO TO EOT
 1627  005030  032737  000010  000632          BIT     #10,MODES       ;AT END OF SEQUENCE
 1628  005036  001421                          BEQ     ALL2            ;NO, EXIT, DON'T DUMP ERROR COUNTERS
 1629                                  ;DUMP ERROR COUNTERS ON ALL DRIVES
 1630  005040  104410                  CTRDMP: RSFDRV
 1631  005042  104414                          MVCTRS
 1632  005044  005737  004464                  TST     T5FLAG
 1633  005050  001006                          BNE     CTRD1           ;DUMP READ ONLY
 1634  005052  004737  006154                  JSR     PC,ENDT1
 1635  005056  032737  000004  000632          BIT     #4,MODES        ;READ PASS SELECTED?
 1636  005064  001402                          BEQ     CDMEND          ;NO
 1637  005066  004737  010326          CTRD1:  JSR     PC,RNDTP1
 1638  005072  104422                  CDMEND: CHGDRV                  ;DONE ALL DRIVES
 1639  005074  000762                          BR      CTRDMP+2        ;NO
 1640  005076  062716  000002          ALL3:   ADD     #2,(6)          ;INCREMENT RETURN POINT
 1641  005102  000207                  ALL2:   RTS     PC
 1642
 1643                                  ;CLEAR READ AND WRITE TABLES
 1644  005104  012700  000570          CLRTBL: MOV     #WRCHEK,R0
 1645  005110  005020                  CLRT1:  CLR     (0)+
 1646  005112  020027  000632                  CMP     R0,#MODES
 1647  005116  001374                          BNE     CLRT1
 1648  005120  042737  000070  000632          BIC     #70,MODES
```

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1649  005126  000207                          RTS     PC
1650                                  ;INTERRUPT ENABLE, GO, WAIT FOR INTERRUPT
1651  005130  012777  000200  173352  GOWAIT: MOV     #200,@CC        ;SET PRIORITY LEVEL 4
1652  005136  012777  005172  173370          MOV     #GW1,@MTV       ;SET INTERRUPT RETURN
1653  005144  012737  000001  005160          MOV     #1,WAIT1
1654  005152  052777  000101  173322          BIS     #101,@MTC       ;INTERRUPT ENABLE, GO
1655  005160  000001                  WAIT1:  WAIT                    ;WAIT FOR INTERRUPT
1656  005162  012777  000340  173320          MOV     #340,@CC        ;RESTORE PRIORITY LEVEL 7
1657  005170  000207                          RTS     PC              ;EXIT
1658  005172  012737  000001  005160  GW1:    MOV     #1,WAIT1
1659  005200  000002                          RTI                     ;RETURN FROM INTERRUPT
1660
1661                                  ;WRITE RECORD SECTION
1662  005202  005737  000612          WRITI:  TST     RECORD          ;IS THIS THE FIRST RECORD
1663  005206  001031                          BNE     NOINCR          ;NO, SKIP SET UP OF RECORD LENGTH AND BLOCK INCREMENT
1664  005210  013737  000524  000542          MOV     MAXLEN,STRLEN
1665  005216  012737  177774  000564          MOV     #-4.,BLKINC
1666  005224  032737  000020  001320          BIT     #20,PARAM
1667  005232  001006                          BNE     W1
1668  005234  013737  000526  000542          MOV     MINLEN,STRLEN
1669  005242  012737  000004  000564          MOV     #4.,BLKINC
1670  005250  013737  000542  000626  W1:     MOV     STRLEN,WRTLEN
1671  005256  032737  000040  001320          BIT     #40,PARAM       ;DOES RECORD LENGTH CHANGE?
1672  005264  001002                          BNE     NOINCR          ;YES
1673  005266  005037  000564                  CLR     BLKINC          ;NO
1674  005272  013737  000612  000614  NOINCR: MOV     RECORD,WRRECR
1675  005300  005737  004464                  TST     T5FLAG
1676  005304  001401                          BEQ     .+4
1677  005306  000207                          RTS     PC              ;EXIT WRITE ROUTINE IF TEST 5
1678  005310  005037  000562                  CLR     WRPASS
1679  005314  013777  000552  173160  STRTOP: MOV     COMAND,@MTC     ;SELECT UNIT
1680  005322  105777  173154                  TSTB    @MTC
1681  005326  100375                          BPL     .-4             ;WAIT FOR CU READY
1682  005330  006077  173144                  ROR     @MTS            ;WAIT FOR TU READY
1683  005334  103375                          BCC     .-4
1684  005336  013777  000626  173140  NONSTP: MOV     WRTLEN,@BC      ;SET BYTE COUNT
1685  005344  005477  173134                  NEG     @BC
1686  005350  013777  000530  173130          MOV     WBUF,@CA        ;SET CURRENT ADDRESS
1687  005356  052777  000004  173116          BIS     #4,@MTC         ;WRITE
1688  005364  004737  005130                  JSR     PC,GOWAIT       ;INTERRUPT ENABLE, GO, WAIT FOR DONE
1689                                  ;RETURN HERE AFTER INTERRUPT
1690  005370  017737  173104  000566          MOV     @MTS,STATRD     ;SAVE STATUS
1691  005376  005777  173100                  TST     @MTC
1692  005402  100542                          BMI     ERROR           ;HAVE ERROR FLAG, CHECK FOR EOT
1693  005404  005737  000562                  TST     WRPASS          ;WAS THIS A RECOVERY PASS
1694  005410  001410                          BEQ     TSTSTP          ;NO
1695  005412  013700  000562                  MOV     WRPASS,R0       ;YES
1696  005416  006300                          ASL     R0
1697  005420  062700  000570                  ADD     #WRCHEK,R0
1698  005424  005210                          INC     @R0             ;+1 TO APPROPRIATE RECOVERY PASS COUNTER
1699  005426  005037  000562                  CLR     WRPASS
1700  005432  032737  000014  001320  TSTSTP: BIT     #14,PARAM       ;IS WRITE MODE NONSTOP?
1701  005440  001023                          BNE     STOPOP          ;NO
1702  005442  005737  000562                  TST     WRPASS          ;YES
1703  005446  001333                          BNE     NONSTP
1704  005450  004737  005616                  JSR     PC,TESINC       ;CHANGE RECORD LENGTH
```

```
1705  005454  032737  000001  000632          BIT     #1,MODES        ;EXIT AFTER RLS?
1706  005462  001405                          BEQ     W10             ;NO
1707  005464  032737  000010  000632          BIT     #10,MODES       ;YES, ARE WE AT END OF RLS?
1708  005472  001721                          BEQ     NONSTP          ;NO
1709  005474  000207                          RTS     PC              ;YES
1710  005476  032737  000002  000632  W10:    BIT     #2,MODES        ;EXIT EVERY RECORD?
1711  005504  001714                          BEQ     NONSTP          ;NO
1712  005506  000207                          RTS     PC              ;YES
1713  005510  032737  000010  001320  STOPOP: BIT     #10,PARAM       ;IS WRITE MODE RANDOM?
1714  005516  001414                          BEQ     W11             ;NO
1715                                  ;RANDOM STALL DELAY
1716  005520  004737  007222          RANSTP: JSR     PC,RANGEN
1717  005524  052737  177400  007372          BIS     #177400,RANDOM
1718  005532  012704  177470          RAN1:   MOV     #-200.,R4       ;DELAY 1 MILLISECOND
1719  005536  005204                          INC     R4
1720  005540  001376                          BNE     .-2
1721  005542  005237  007372                  INC     RANDOM
1722  005546  001371                          BNE     RAN1
1723  005550  005737  000562          W11:    TST     WRPASS
1724  005554  001257                          BNE     STRTOP
1725  005556  004737  005616                  JSR     PC,TESINC
1726  005562  032737  000001  000632          BIT     #1,MODES        ;EXIT AFTER RLS?
1727  005570  001405                          BEQ     W12             ;NO
1728  005572  032737  000010  000632          BIT     #10,MODES       ;YES, ARE WE AT END OF RLS?
1729  005600  001645                          BEQ     STRTOP          ;NO
1730  005602  000207                          RTS     PC              ;YES
1731  005604  032737  000002  000632  W12:    BIT     #2,MODES        ;EXIT EVERY RECORD?
1732  005612  001640                          BEQ     STRTOP          ;NO
1733  005614  000207                          RTS     PC              ;YES
1734                                  ;SEE IF RECORD LENGTH SHOULD BE CHANGED
1735  005616  005237  000612          TESINC: INC     RECORD          ;+1 TO RECORD COUNT
1736  005622  042737  000010  000632          BIC     #10,MODES       ;NOT END OF RLS UNLESS SET BELOW
1737  005630  005737  000564                  TST     BLKINC
1738  005634  001416                          BEQ     TSINC2
1739  005636  063737  000564  000626          ADD     BLKINC,WRTLEN
1740  005644  023737  000626  000526          CMP     WRTLEN,MINLEN   ;RECORD LENGTH TOO SHORT?
1741  005652  002404                          BLT     RESETL          ;YES,RESET
1742  005654  023737  000626  000524          CMP     WRTLEN,MAXLEN   ;RECORD LENGTH TOO LONG?
1743  005662  003403                          BLE     TSINC2          ;NO
1744  005664  013737  000542  000626  RESETL: MOV     STRLEN,WRTLEN   ;YES, RESET
1745  005672  105737  000612          TSINC2: TSTB    RECORD          ;IS RECORD A MULTIPLE OF 256
1746  005676  001003                          BNE     TSINC3          ;NO
1747  005700  052737  000010  000632          BIS     #10,MODES       ;INDICATE AT END OF RLS
1748  005706  000207                  TSINC3: RTS     PC
1749
1750
1751                                  ;HAVE AN ERROR FLAG DURING WRITE OPERATION
1752                                  ;IF ERROR IS CAUSED BY END OF TAPE FLAG DUMP WRITE ERROR COUNTERS
1753                                  ;FOR ALL OTHER ERRORS:  PRINT COMMAND AND STATUS REGISTERS AND RECORD NUMBER
1754                                  ;IF READ PASS IS SELECTED, TRY TO RECOVER BY WRITING WITH XIRG.
1755  005710  104434                  ERROR:  CKSWR                   ;CHECK FOR CNTL G
1756  005712  032737  175600  000566          BIT     #175600,STATRD  ;AT EOT?
1757  005720  001510                          BEQ     ENDTAP          ;YES
1758  005722  005737  000562                  TST     WRPASS
1759  005726  001002                          BNE     ERR1            ;FIRST ERROR?
1760  005730  005237  000570                  INC     WRCHEK          ;YES, + 1 TO WRITE ERROR
```

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1761  005734  032777  020000  172550  ERR1:   BIT     #20000,@SWR     ;TYPE ALL ERRORS?
1762  005742  001010                          BNE     TESREC          ;NO
1763  005744  012702  012720                  MOV     #MSG7,R2
1764  005750  104404                          TOP                     ;PRINT ERROR
1765  005752  013737  000626  000544          MOV     WRTLEN,LENGTH
1766  005760  004737  011202                  JSR     PC,PRTS         ;PRINT STATUS, COMMAND, RECORD, LENGTH
1767  005764  032777  000100  172520  TESREC: BIT     #100,@SWR       ;RECOVER STATISTICALLY SELECTED?
1768  005772  001410                          BEQ     TESRC1          ;NO
1769  005774  005237  000562                  INC     WRPASS          ;+1 TO WRITE RECOVER
1770  006000  022737  000010  000562          CMP     #8.,WRPASS      ;HAVE WE TRIED TO WRITE RECOVER 8 TIMES?
1771  006006  001020                          BNE     STREC1          ;NO
1772  006010  005237  000610                  INC     PERMBS          ;YES, +1 TO PERMANENT BADSPOT?
1773  006014  032737  000004  000632  TESRC1: BIT     #4,MODES        ;IS READ PASS SELECTED?
1774  006022  001402                          BEQ     .+6             ;NO
1775  006024  004737  010652                  JSR     PC,XRGREC
1776  006030  005037  000562                  CLR     WRPASS
1777  006034  032737  002000  000566          BIT     #2000,STATRD
1778  006042  001037                          BNE     ENDTAP
1779  006044  000137  005550                  JMP     W11
1780  006050  004737  010250          STREC1: JSR     PC,BACK1
1781  006054  004737  010250                  JSR     PC,BACK1        ;BACKSPACE 2 RECORDS
1782  006060  032777  000040  172412          BIT     #40,@MTS
1783  006066  001402                          BEQ     .+6
1784  006070  000137  005314                  JMP     STRTOP
1785  006074  012777  177777  172402          MOV     #-1,@BC
1786  006102  013777  000552  172372          MOV     COMAND,@MTC
1787  006110  052777  000010  172364          BIS     #10,@MTC
1788  006116  004737  005130                  JSR     PC,GOWAIT       ;SPACE FORWARD 1 RECORD
1789  006122  042777  000016  172352          BIC     #16,@MTC
1790  006130  052777  000004  172344          BIS     #4,@MTC         ;CHANGE FROM SPACE TO WRITE
1791  006136  000137  005314                  JMP     STRTOP
1792                          ;DRIVE IS AT EOT
1793  006142  005237  000612          ENDTAP: INC     RECORD
1794  006146  052737  000040  000632          BIS     #40,MODES       ;INDICATE DRIVE AT EOT
1795  006154  012702  013710          ENDT1:  MOV     #MSG24,R2
1796  006160  104404                          TOP
1797  006162  012702  012746                  MOV     #MSG8,R2
1798  006166  104404                          TOP
1799                          ;DUMP WRITE ERRORS
1800  006170  104434          WRTDMP: CKSWR                           ;CHECK FOR CNTL G
1801  006172  013737  000552  011356          MOV     COMAND,CHAR
1802  006200  000337  011356                  SWAB    CHAR
1803  006204  142737  000170  011356          BICB    #170,CHAR
1804
1805  006212  052737  000260  011356          BIS     #260,CHAR
1806  006220  004737  011360                  JSR     PC,OCTP         ;PRINT DRIVE NUMBER
1807  006224  104430                          SP3
1808  006226  013737  001320  011356          MOV     PARAM,CHAR
```

B 4

1809 006234 000337 011356 SWAB CHAR

C 4

1810 006240 006037 011356 ROR CHAR

```
 1811  006244  042737  000170  011356          BIC     #170,CHAR
 1812  006252  052737  000260  011356          BIS     #260,CHAR
 1813  006260  004737  011360                  JSR     PC,OCTP         ;PRINT PATTERN NUMBER
 1814  006264  013737  001320  011356          MOV     PARAM,CHAR
 1815  006272  042737  177763  011356          BIC     #177763,CHAR
 1816  006300  012702  013441                  MOV     #MSG14,R2
 1817  006304  022737  000004  011356          CMP     #4,CHAR
 1818  006312  001002                          BNE     .+6
 1819  006314  012702  013415                  MOV     #MSG12,R2
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  1820  006320  022737  000010  011356          CMP     #10,CHAR
  1821  006326  001002                          BNE     .+6
```

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1822  006330  012702  013427                    MOV     #MSG13,R2
1823  006334  104404                            TOP
1824  006336  013702  000612                    MOV     RECORD,R2               ;PRINT WRITE MODE
1825  006342  104426                            DECPRT                          ;PRINT RECORD NUMBER
1826  006344  013737  001320  011356            MOV     PARAM,CHAR
1827  006352  042737  177717  011356            BIC     #177717,CHAR
1828  006360  012702  013471                    MOV     #MSG17,R2
1829  006364  022737  000020  011356            CMP     #20,CHAR
1830  006372  001002                            BNE     .+6
1831  006374  012702  013500                    MOV     #MSG18,R2
1832  006400  022737  000040  011356            CMP     #40,CHAR
1833  006406  001002                            BNE     .+6
1834  006410  012702  013453                    MOV     #MSG15,R2
1835  006414  022737  000060  011356            CMP     #60,CHAR
1836  006422  001002                            BNE     .+6
1837  006424  012702  013467                    MOV     #MSG16,R2
1838  006430  104404                            TOP                             ;PRINT RECORD LENGTH SEQUENCE
1839  006432  012702  013507                    MOV     #MSG19,R2
1840  006436  104404                            TOP
1841  006440  013702  000570                    MOV     WRCHEK,R2
1842  006444  104426                            DECPRT                          ;PRINT 'WRITE ERRORS=''
1843  006446  012700  000572                    MOV     #WRCHEK+2,R0
1844  006452  112737  000060  013550            MOVB    #60,MSG20+17
1845  006460  105237  013550          WRTD1:    INCB    MSG20+17                ;PRINT STATISTICAL RECOVERY
1846  006464  005710                            TST     @R0
1847  006466  001405                            BEQ     WRTD2
1848  006470  012702  013531                    MOV     #MSG20,R2
1849  006474  104404                            TOP
1850  006476  011002                            MOV     (0),R2
1851  006500  104426                            DECPRT                          ;RECOVERED AT X
1852  006502  005720                    WRTD2:  TST     (0)+                    ;JUST INCREMENTING
1853  006504  020027  000610                    CMP     R0,#WRCHEK+20
1854  006510  001363                            BNE     WRTD1
1855  006512  005737  000610                    TST     PERMBS
1856  006516  001001                            BNE     .+4                     ;SKIP PRINT IF = 0
1857  006520  000207                            RTS     PC
1858
1859
1860  006522  012702  013553                    MOV     #MSG20A,R2
1861  006526  104404                            TOP
1862  006530  013702  000610                    MOV     PERMBS,R2               ;PRINT 'PERMANENT BADSPOT''
1863  006534  104426                            DECPRT
1864  006536  000207                            RTS     PC
1865                                    ;GENERATE DATA PATTERN
1866  006540  013702  000530            GENPA:  MOV     WBUF,R2 ;INITIALIZE BUFFER
1867  006544  013737  001320  006652            MOV     PARAM,GP1               ;CHECK PARAMETERS FOR PATTERN SELECTED
1868  006552  042737  170777  006652            BIC     #170777,GP1
1869  006560  001435                            BEQ     PAT0
1870  006562  022737  001000  006652            CMP     #1000,GP1
1871  006570  001437                            BEQ     PAT1
1872  006572  022737  002000  006652            CMP     #2000,GP1
1873  006600  001457                            BEQ     PAT2
1874  006602  022737  003000  006652            CMP     #3000,GP1
```

```
 1875  006610  001461                          BEQ     PAT3
 1876  006612  022737  004000  006652          CMP     #4000,GP1
 1877  006620  001501                          BEQ     PAT4
 1878  006622  022737  005000  006652          CMP     #5000,GP1
```

```
 1879  006630  001510                          BEQ     PAT5
 1880  006632  022737  006000  006652          CMP     #6000,GP1
 1881  006640  001402                          BEQ     .+6
```

```
1882  006642  000137  007202                  JMP     PAT7
1883  006646  000137  007166                  JMP     PAT6
1884  006652  000000                  GP1:    0
1885                                  ;PATTERN 0
1886                                  ;HALF FREQUENCY OUTSIDE SKEW
1887  006654  012722  002010          PAT0:   MOV     #2010,(2)+      ;(010)(004)
1888  006660  023702  000532                  CMP     RBUF,R2
1889  006664  001373                          BNE     PAT0
1890  006666  000207                          RTS     PC
1891                                  ;PATTERN 1
1892                                  ;SLIDING 1 BIT (ISOLATED BIT)
1893  006670  012700  006716          PAT1:   MOV     #P1T,R0
1894  006674  012022                  PAT1A:  MOV     (0)+,(2)+
1895  006676  023702  000532                  CMP     RBUF,R2
1896  006702  001001                          BNE     .+4
1897  006704  000207                          RTS     PC
1898  006706  022700  006740                  CMP     #PAT2,R0
1899  006712  001370                          BNE     PAT1A
1900  006714  000765                          BR      PAT1
1901  006716  100000                  P1T:    100000
1902  006720  020100                          20100
1903  006722  004020                          4020
1904  006724  001004                          1004
1905  006726  000001                          1
1906  006730  040200                          40200
1907  006732  010040                          10040
1908  006734  002010                          2010
1909  006736  000402                          402
1910
1911                                  ;PATTERN 2
1912                                  ;HIGH FREQUENCY EVERY OTHER TRACK
1913  006740  012722  136274          PAT2:   MOV     #136274,(2)+    ;(274)(274)
1914  006744  023702  000532                  CMP     RBUF,R2
1915  006750  001373                          BNE     PAT2
1916  006752  000207                          RTS     PC
1917                                  ;PATTERN 3
1918                                  ;THREE 0'S, THREE 1'S, THREE 0'S.
1919  006754  012700  007002          PAT3:   MOV     #P3T,R0
1920  006760  012022                  PAT3A:  MOV     (0)+,(2)+
1921  006762  023702  000532                  CMP     RBUF,R2
1922  006766  001001                          BNE     .+4
1923  006770  000207                          RTS     PC
1924  006772  022700  007024                  CMP     #PAT4,R0
1925  006776  001370                          BNE     PAT3A
1926  007000  000765                          BR      PAT3
1927  007002  140037                  P3T:    140037
1928  007004  100476                          100476
1929  007006  001574                          1574
1930  007010  003770                          3770
1931  007012  017760                          17760
1932  007014  037300                          37300
1933  007016  076201                          76201
1934  007020  174003                          174003
1935  007022  170007                          170007
1936                                  ;PATTERN 4
1937                                  ;INCREMENTING PATTERN (0-377)
```

```
 1938  007024  105037  007050          PAT4:   CLRB    P4A
 1939  007030  113722  007050          P4:     MOVB    P4A,(2)+
 1940  007034  105237  007050                  INCB    P4A
 1941  007040  023702  000532                  CMP     RBUF,R2
 1942  007044  001371                          BNE     P4
 1943  007046  000207                          RTS     PC
 1944  007050  000000          P4A:    0
 1945
 1946                          ;PATTERN 5
 1947                          ;EACH TRACK 3 BITS
 1948  007052  012700  007100  PAT5:   MOV     #P5T,R0
 1949  007056  012022          PAT5A:  MOV     (0)+,(2)+
 1950  007060  023702  000532          CMP     RBUF,R2
 1951  007064  001001                  BNE     .+4
 1952  007066  000207                  RTS     PC
 1953  007070  022700  007166          CMP     #PAT6,R0
 1954  007074  001370                  BNE     PAT5A
 1955  007076  000765                  BR      PAT5
 1956  007100  000000          P5T:    0
 1957  007102  100000                  100000
 1958  007104  100200                  100200
 1959  007106  040100                  40100
 1960  007110  020100                  20100
 1961  007112  020040                  20040
 1962  007114  010020                  10020
 1963  007116  004020                  4020
 1964  007120  004010                  4010
 1965  007122  002004                  2004
 1966  007124  001004                  1004
 1967  007126  001002                  1002
 1968  007130  000401                  401
 1969  007132  000001                  1
 1970  007134  000000                  0
 1971  007136  100200                  100200
 1972  007140  040200                  40200
 1973  007142  040100                  40100
 1974  007144  020040                  20040
 1975  007146  010040                  10040
 1976  007150  010020                  10020
 1977  007152  004010                  4010
 1978  007154  002010                  2010
 1979  007156  002004                  2004
 1980  007160  001002                  1002
 1981  007162  000402                  402
 1982  007164  000401                  401
 1983                          ;PATTERN 6
 1984                          ;HIGH FREQUENCY ALL TRACKS
 1985  007166  012722  177777  PAT6:   MOV     #-1,(2)+
 1986  007172  023702  000532          CMP     RBUF,R2
 1987  007176  001373                  BNE     PAT6
 1988  007200  000207                  RTS     PC
 1989
 1990
 1991                          ;PATTERN 7
 1992                          ;RANDOM
 1993  007202  004737  007222  PAT7:   JSR     PC,RANGEN
```

```
1994  007206  013722  007372                  MOV     RANDOM,(2)+
1995  007212  023702  000532                  CMP     RBUF,R2
1996  007216  001371                          BNE     PAT7
1997  007220  000207                          RTS     PC
1998                                  ;RANDOM NUMBER GENERATOR
1999                                  ;EXIT WITH RANDOM NUMBER IN LOCATION NAMED 'RANDOM'
2000  007222  010037  007400          RANGEN: MOV     R0,SV0          ;SAVE REGISTERS
2001  007226  010137  007402                  MOV     R1,SV1
2002  007232  010237  007404                  MOV     R2,SV2
2003  007236  010337  007406                  MOV     R3,SV3
2004  007242  013700  007374                  MOV     LONUM,R0        ;SET UP LOW DIGIT
2005  007246  013701  007376                  MOV     HINUM,R1        ;SET UP HIGH DIGIT
2006  007252  012703  000007                  MOV     #7,R3           ;SET UP SHIFT COUNT
2007  007256  005002                          CLR     R2
2008  007260  006300          RANG1:  ASL     R0              ;SHIFT R0 LEFT AND
2009  007262  006101                          ROL     R1              ;ROTATE CARRY INTO LSB OF R1 AND
2010  007264  006102                          ROL     R2              ;ROTATE CARRY OUT OF R1 INTO R2
2011  007266  005303                          DEC     R3              ;DECREMENT R3
2012  007270  001373                          BNE     RANG1           ;CONTINUE SHIFT LOOP
2013  007272  063700  007374                  ADD     LONUM,R0        ;ADD NUMBER TO MAKE X 129
2014  007276  005501                          ADC     R1              ;PROPAGATE CARRY
2015  007300  063701  007376                  ADD     HINUM,R1        ;ADD NUMBER TO MAKE X 129
2016  007304  005502                          ADC     R2              ;PROPAGATE CARRY
2017  007306  062700  001057                  ADD     #1057,R0        ;ADD LOW CONSTANT
2018  007312  005501                          ADC     R1              ;PROPAGATE CARRY
2019  007314  005502                          ADC     R2              ;PROPAGATE CARRY
2020  007316  062701  047401                  ADD     #47401,R1       ;ADD HIGH CONSTANT
2021  007322  005502                          ADC     R2              ;PROPAGATE CARRY
2022  007324  062702  000006                  ADD     #6,R2           ;ADD HIGH CONSTANT
2023  007330  060200                          ADD     R2,R0           ;RE-PRIME R0 WITH HIGH DIGIT
2024  007332  005501                          ADC     R1              ;PROPAGATE CARRY
2025  007334  010037  007372                  MOV     R0,RANDOM       ;SAVE RANDOM NUMBER
2026  007340  010037  007374                  MOV     R0,LONUM        ;PUT R0 BACK IN LONUM
2027  007344  010137  007376                  MOV     R1,HINUM        ;PUT R1 BACK IN HINUM
2028  007350  013700  007400                  MOV     SV0,R0          ;RESTORE REGISTERS
2029  007354  013701  007402                  MOV     SV1,R1
2030  007360  013702  007404                  MOV     SV2,R2
2031  007364  013703  007406                  MOV     SV3,R3
2032  007370  000207                          RTS     PC              ;EXIT
2033  007372  000000          RANDOM: 0
2034  007374  000000          LONUM:  0
2035  007376  000000          HINUM:  0
2036  007400  000000          SV0:    0
2037  007402  000000          SV1:    0
2038  007404  000000          SV2:    0
2039  007406  000000          SV3:    0
2040
2041
2042                                  ;READ RECORD SECTION
2043  007410  005737  000612          READI:  TST     RECORD          ;FIRST RECORD?
2044  007414  001003                          BNE     $R1             ;NO
2045  007416  013737  000542  000630          MOV     STRLEN,READLN   ;SET INITIAL READ LENGTH
2046  007424  012737  177775  000560  $R1:    MOV     #-3,RDPASS      ;INITIALIZE READ PASS COUNTER
2047  007432  013777  000552  171042  RDSTPD: MOV     COMAND,@MTC
2048  007440  105777  171036                  TSTB    @MTC
2049  007444  100375                          BPL     .-4             ;WAIT FOR CONTROL UNIT READY
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 2050  007446  006077  171026                  ROR     @MTS
 2051  007452  103375                          BCC     .-4             ;WAIT FOR TAPE UNIT READY
 2052  007454  013700  000532          READGO: MOV     RBUF,R0
 2053  007460  013701  000630                  MOV     READLN,R1
 2054  007464  105020                  RG1:    CLRB    (0)+            ;CLEAR READ BUFFER
 2055  007466  005301                          DEC     R1
 2056  007470  001375                          BNE     RG1
 2057  007472  013777  000630  171004          MOV     READLN,@BC      ;SET BYTE COUNT
 2058  007500  005477  171000                  NEG     @BC
 2059  007504  013777  000532  170774          MOV     RBUF,@CA        ;SET CURRENT ADDRESS
 2060  007512  013777  000552  170762          MOV     COMAND,@MTC
 2061  007520  052777  000002  170754          BIS     #2,@MTC
 2062  007526  004737  005130                  JSR     PC,GOWAIT
 2063                          ;RETURN HERE AFTER INTERRUPT
 2064  007532  017737  170742  000566          MOV     @MTS,STATRD
 2065  007540  005777  170736                  TST     @MTC            ;ANY STATUS ERRORS
 2066  007544  100504                          BMI     RDERRO          ;YES
 2067                          ;CHECK FOR DATA ERRORS
 2068  007546  013700  000532                  MOV     RBUF,R0
 2069  007552  013701  000530                  MOV     WBUF,R1
 2070  007556  013702  000630                  MOV     READLN,R2
 2071  007562  022021                  $R5:    CMP     (0)+,(1)+       ;CHECK FOR PROPER DATA TRANSFER
 2072  007564  001045                          BNE     DATERR          ;HAVE DATA ERROR
 2073  007566  162702  000002                  SUB     #2,R2           ;CHECKED ALL TRANSFERS?
 2074  007572  001373                          BNE     $R5             ;NO
 2075  007574  032737  000003  001320  RTSSTP: BIT     #3,PARAM
 2076  007602  001007                          BNE     RDSTPC
 2077  007604  004737  010200                  JSR     PC,RDINCR       ;INCREMENT FOR NEXT BLOCK
 2078  007610  023737  000612  000616          CMP     RECORD,LASRCR
 2079  007616  001316                          BNE     READGO
 2080  007620  000207                          RTS     PC              ;EXIT READIT
 2081  007622  032737  000002  001320  RDSTPC: BIT     #2,PARAM        ;IS READ MODE RANDOM?
 2082  007630  001414                          BEQ     RDSTP           ;NO
 2083  007632  004737  007222          RNDRDS: JSR     PC,RANGEN
 2084  007636  052737  177400  007372          BIS     #177400,RANDOM
 2085  007644  012704  177470          RNDS1:  MOV     #-200.,R4       ;DELAY 1 MILLISECOND
 2086  007650  005204                          INC     R4
 2087  007652  001376                          BNE     .-2
 2088  007654  005237  007372                  INC     RANDOM
 2089  007660  001371                          BNE     RNDS1
 2090  007662  004737  010200          RDSTP:  JSR     PC,RDINCR
 2091  007666  023737  000612  000616          CMP     RECORD,LASRCR   ;DONE LAST RECORD?
 2092  007674  001256                          BNE     RDSTPD          ;NO
 2093  007676  000207                          RTS     PC              ;YES EXIT
 2094                          ;HAVE DATA ERROR
 2095  007700  032777  020000  170604  DATERR: BIT     #20000,@SWR     ;TYPE ALL READ ERRORS?
 2096  007706  001014                          BNE     DATER1          ;NO
 2097  007710  012702  013070                  MOV     #MSG9A,R2
 2098  007714  104404                          TOP
 2099  007716  013737  000630  000544          MOV     READLN,LENGTH
 2100  007724  004737  011202                  JSR     PC,PRTS
 2101  007730  014102                          MOV     -(1),R2         ;PRINT EXPECTED DATA
 2102  007732  104412                          OCTPRT
 2103  007734  014002                          MOV     -(0),R2
 2104  007736  104412                          OCTPRT                  ;PRINT ACTUAL DATA
 2105  007740  022737  177775  000560  DATER1: CMP     #-3,RDPASS
```

```
2106  007746  001002                          BNE     .+6
2107  007750  005237  000622                  INC     DAERRS          ;+1 TO DATA ERRORS
2108  007754  000464                          BR      RTSR1
2109                                  ;STATUS INDICATES AN ERROR, CHECK FOR EOT
2110  007756  104434                  RDERRO: CKSWR                   ;CHECK FOR CNTL G
2111  007760  032737  175600  000566          BIT     #175600,STATRD  ;IS ERROR LEGITIMATE OR EOT?
2112  007766  001552                          BEQ     RNDTAP          ;HAVE EOT
2113  007770  032777  020000  170514          BIT     #20000,@SWR     ;TYPE ALL READ ERRORS?
2114  007776  001044                          BNE     RTSREC          ;NO
2115  010000  012702  013043                  MOV     #MSG9,R2
2116  010004  104404                          TOP                     ;PRINT ERROR
2117  010006  013737  000630  000544          MOV     READLN,LENGTH
2118  010014  004737  011202                  JSR     PC,PRTS
2119  010020  032777  010000  170452          BIT     #10000,@MTS             ;STATUS ERROR DUE TO PARITY
2120                                                                          ;ERROR?
2121  010026  001430                          BEQ     RTSREC                  ;BRANCH IF NOT
2122  010030  032777  000010  170454          BIT     #10,@SWR                        ;SEE IF USER WANTS DATA COMPARE.
2123  010036  001424                          BEQ     RTSREC                  ;BRANCH IF NOT
2124  010040  013700  000530                  MOV     WBUF,R0                 ;PICK UP STARTING ADDRESS OF
2125                                                                          ;WRITE BUFFER
2126  010044  013701  000532                  MOV     RBUF,R1                 ;PICK UP STARTING ADDRESS OF
2127                                                                          ;READ BUFFER
2128  010050  013702  000630                  MOV     @#READLN,R2             ;PICK UP RECORD LENGTH IN BYTES
2129  010054  022021                  1$:     CMP     (R0)+,(R1)+             ;COMPARE WHAT SHOULD HAVE BEEN
2130                                                                          ;WRITTEN WITH WHAT WAS!!
2131  010056  001004                          BNE     2$                      ;BRANCH IF NOT THE SAME
2132  010060  162702  000002                  SUB     #2,R2                   ;DROP OFF A WORD FROM RECORD
2133                                                                          ;LENGTH
2134  010064  001406                          BEQ     3$                      ;BRANCH IF ALL OF RECORD DATA
2135                                                                          ;CHECKS
2136  010066  000772                          BR      1$                      ;GO TO COMPARE NEXT BYTE
2137  010070  014002                  2$:     MOV     -(R0),R2                ;PICK UP THE DATA VALUE THAT
2138                                                                          ;SHOULD HAVE BEEN WRITTEN
2139  010072  104412                          OCTPRT                          ;PRINT EXPECTED VALUE OF
2140                                                                          ;WRITTEN DATA
2141  010074  014102                          MOV     -(R1),R2                ;PICK UP THE DATA VALUE THAT
2142                                                                          ;WAS WRITTEN
2143  010076  104412                          OCTPRT                          ;PRINT ACTUAL VALUE OF THE
2144                                                                          ;DATA READ
2145  010100  000403                          BR      RTSREC                  ;CONTINUE WITH TESTING
2146  010102  012702  013337          3$:     MOV     #MSG10D,R2              ;INDICATE RECORD DATA COMPARES
2147                                                                          ;DESPITE THE PARITY ERROR
2148                                                                          ;CAUSING THE READ STATUS ERROR
2149  010106  104404                          TOP
2150                                  ;+ 1 TO RDERRS IF FIRST ERROR PASS
2151  010110  104434                  RTSREC: CKSWR                           ;CHECK FOR CNTL G
2152  010112  022737  177775  000560          CMP     #-3,RDPASS
2153  010120  001002                          BNE     .+6
2154  010122  005237  000620                  INC     RDERRS          ;+1 TO STATUS ERRORS
2155  010126  032777  000020  170356  RTSR1:  BIT     #20,@SWR                ;DELETE READ RETRYS (SW 4)?
2156  010134  001011                          BNE     RPASS3          ;YES
2157  010136  005237  000560                  INC     RDPASS          ;DONE ALL RE-READS?
2158  010142  001404                          BEQ     RPASS1          ;YES
2159  010144  004737  010250                  JSR     PC,BACK1        ;NO, BACKSPACE TAPE
2160  010150  000137  007432                  JMP     RDSTPD          ;GO AGAIN
2161  010154  005237  000624          RPASS1: INC     NRREAD          ;+1 TO NONRECOVERABLE READ
```

```
 2162  010160  012737  177775  000560  RPASS3: MOV     #-3,RDPASS
 2163  010166  032737  002000  000566          BIT     #2000,STATRD    ;AT EOT?
 2164  010174  001054                          BNE     RNDTP1          ;YES, TYPE 'EOT'
 2165  010176  000631                          BR      RDSTP
 2166
 2167                                  ;SET UP POINTERS FOR NEXT RECORD
 2168  010200  005237  000612          RDINCR: INC     RECORD
 2169  010204  005737  000564                  TST     BLKINC
 2170  010210  001416                          BEQ     RESTR1
 2171                                  ;RECORD LENGTH IS CHANGING, COUNT IT
 2172  010212  063737  000564  000630          ADD     BLKINC,READLN
 2173  010220  023737  000630  000526          CMP     READLN,MINLEN   ;IS LENGTH LESS THAN MINIMUM
 2174  010226  002404                          BLT     RESTRL          ;NO
 2175  010230  023737  000630  000524          CMP     READLN,MAXLEN   ;IS LENGTH GREATER THAN MAXIMUM?
 2176  010236  003403                          BLE     RESTR1          ;NO
 2177  010240  013737  000542  000630  RESTRL: MOV     STRLEN,READLN   ;RESET INITIAL LENGTH
 2178  010246  000207                  RESTR1: RTS     PC
 2179                                  ;BACKSPACE ONE RECORD
 2180  010250  006077  170224          BACK1:  ROR     @MTS
 2181  010254  103375                          BCC     .-4             ;WAIT FOR TAPE UNIT READY
 2182  010256  012777  177777  170220          MOV     #-1,@BC         ;COUNT 1 RECORD
 2183  010264  013777  000552  170210          MOV     COMAND,@MTC     ;SELECT DRIVE
 2184  010272  052777  000012  170202          BIS     #12,@MTC        ;ISSUE BACKSPACE
 2185  010300  004737  005130                  JSR     PC,GOWAIT
 2186  010304  042777  000016  170170          BIC     #16,@MTC
 2187  010312  000207                          RTS     PC
 2188                                  ;DRIVE HAS REACHED EOT IN READ MODE
 2189  010314  004737  010200          RNDTAP: JSR     PC,RDINCR
 2190  010320  052737  000020  000632          BIS     #20,MODES       ;INDICATE AT EOT
 2191  010326  012702  013754          RNDTP1: MOV     #MSG25,R2
 2192  010332  104404                          TOP
 2193  010334  012702  012746                  MOV     #MSG8,R2
 2194  010340  104404                          TOP
 2195                                  ;DUMP ERROR COUNTERS
 2196  010342  104434                  READMP: CKSWR                   ;CHECK FOR CNTL G
 2197  010344  013737  000552  011356          MOV     COMAND,CHAR
 2198  010352  000337  011356                  SWAB    CHAR
 2199  010356  142737  000170  011356          BICB    #170,CHAR
 2200  010364  052737  000260  011356          BIS     #260,CHAR
 2201  010372  004737  011360                  JSR     PC,OCTP         ;PRINT DRIVE NUMBER
 2202  010376  104430                          SP3
 2203  010400  013737  001320  011356          MOV     PARAM,CHAR
 2204  010406  000337  011356                  SWAB    CHAR
 2205  010412  006037  011356                  ROR     CHAR
 2206  010416  042737  000170  011356          BIC     #170,CHAR
 2207  010424  052737  000260  011356          BIS     #260,CHAR
 2208  010432  004737  011360                  JSR     PC,OCTP         ;PRINT PATTERN NUMBER
 2209
 2210  010436  013737  001320  011356          MOV     PARAM,CHAR
 2211  010444  042737  177774  011356          BIC     #177774,CHAR
 2212  010452  012702  013441                  MOV     #MSG14,R2
 2213  010456  022737  000001  011356          CMP     #1,CHAR
 2214  010464  001002                          BNE     .+6
 2215  010466  012702  013415                  MOV     #MSG12,R2
 2216  010472  022737  000002  011356          CMP     #2,CHAR
 2217  010500  001002                          BNE     .+6
```

```
2218  010502  012702  013427                MOV     #MSG13,R2
2219  010506  104404                       TOP
2220  010510  013702  000612                MOV     RECORD,R2
2221  010514  104426                       DECPRT
2222  010516  013737  001320  011356        MOV     PARAM,CHAR
2223  010524  042737  177717  011356        BIC     #177717,CHAR
2224  010532  012702  013471                MOV     #MSG17,R2
2225  010536  022737  000020  011356        CMP     #20,CHAR
2226  010544  001002                       BNE     .+6
2227  010546  012702  013500                MOV     #MSG18,R2
2228  010552  022737  000040  011356        CMP     #40,CHAR
2229  010560  001002                       BNE     .+6
2230  010562  012702  013453                MOV     #MSG15,R2
2231  010566  022737  000060  011356        CMP     #60,CHAR
2232  010574  001002                       BNE     .+6
2233  010576  012702  013462                MOV     #MSG16,R2
2234  010602  104404                       TOP
2235  010604  012702  013603                MOV     #MSG21,R2
2236  010610  104404                       TOP
2237  010612  013702  000620                MOV     RDERRS,R2
2238  010616  104426                       DECPRT
2239  010620  012702  013633                MOV     #MSG22,R2
2240  010624  104404                       TOP
2241  010626  013702  000622                MOV     DAERRS,R2
2242  010632  104426                       DECPRT
2243  010634  012702  013654                MOV     #MSG23,R2
2244  010640  104404                       TOP
2245  010642  013702  000624                MOV     NRREAD,R2
2246  010646  104426                       DECPRT
2247  010650  000207                       RTS     PC
2248
2249
2250
2251                                  ;WRITE RECOVERY UTILIZING EXTENDED INTERRECORD GAP
2252                                  ;USED AFTER EVERY 7 REWRITES OR AFTER
2253                                  ;EACH WRITE ERROR IF STATISTICAL RECOVERY NOT SELECTED
2254                                  ;USED ONLY IF READ PASS SELECTED
2255  010652  104434                  XRGREC: CKSWR                   ;CHECK FOR CNTL G
2256  010654  012737  177774  000562          MOV     #-4,WRPASS      ;COUNT 4 REWRITES
2257  010662  032777  000040  167622  XRGO:   BIT     #40,@SWR                ;DELETE WRITE XIRG (SW 5)
2258  010670  001036                       BNE     XRGRCD          ;YES
2259  010672  004737  010250                JSR     PC,BACK1
2260  010676  105777  167600                TSTB    @MTC
2261  010702  100375                       BPL     .-4
2262  010704  013777  000552  167570        MOV     COMAND,@MTC
2263  010712  052777  000014  167562        BIS     #14,@MTC        ;WRITE XIRG
2264  010720  013777  000626  167556        MOV     WRTLEN,@BC      ;SET BYTE COUNT
2265  010726  005477  167552                NEG     @BC
2266  010732  013777  000530  167546        MOV     WBUF,@CA        ;SET CURRENT ADDRESS
2267  010740  006077  167534                ROR     @MTS            ;WAIT FOR TU READY
2268  010744  103375                       BCC     .-4
2269  010746  004737  005130                JSR     PC,GOWAIT
2270
2271                                  ;RETURN HERE AFTER INTERRUPT
2272  010752  017737  167522  000566        MOV     @MTS,STATRD     ;SAVE STATUS
2273  010760  005777  167516                TST     @MTC
```

```
2274  010764  100403                          BMI     XRG5            ;HAVE ERROR FLAG, CHECK FOR EOT
2275  010766  005037  000562          XRGRCD: CLR     WRPASS
2276  010772  000207                          RTS     PC              ;EXIT WRITE XIRG
2277  010774  032737  175600  000566  XRG5:   BIT     #175600,STATRD
2278  011002  001771                          BEQ     XRGRCD          ;ONLY EOT, EXIT
2279  011004  005237  000562                  INC     WRPASS          ;DONE 4 XIRG
2280  011010  001324                          BNE     XRG0
2281                                ;PRINT STATUS AFTER 4 XIRG ERRORS
2282  011012  012702  012720                  MOV     #MSG7,R2
2283  011016  104404                          TOP                     ;PRINT WRITE STATUS ERROR
2284  011020  013737  000626  000544          MOV     WRTLEN,LENGTH
2285  011026  004737  011202                  JSR     PC,PRTS         ;PRINT STATUS, COMMAND, RECORD, LENGTH
2286  011032  012702  013367                  MOV     #MSG11,R2
2287  011036  104404                          TOP                     ;PRINT 'XIRG WRITTEN 4 TIMES''
2288  011040  032737  002000  000566          BIT     #2000,STATRD
2289  011046  001701                          BEQ     XRGREC
2290  011050  042777  000016  167424          BIC     #16,@MTC
2291  011056  052777  000006  167416          BIS     #6,@MTC         ;WRITE AN EOF
2292  011064  004737  005130                  JSR     PC,GOWAIT
2293  011070  000207                          RTS     PC
2294
2295                                ;GO BACKWARD ON TAPE X RECORDS
2296  011072  013737  000612  000616  GOBKWD: MOV     RECORD,LASRCR
2297  011100  013737  000614  000612          MOV     WRRECR,RECORD
2298  011106  001003                          BNE     GOB1            ;IS NEW RECORD 0
2299  011110  004737  004740                  JSR     PC,REWIND       ;YES,REWIND
2300  011114  000207                          RTS     PC              ;EXIT
2301  011116  013777  000616  167360  GOB1:   MOV     LASRCR,@BC      ;SET BYTE COUNT TO DIFFERENCE
2302  011124  163777  000614  167352          SUB     WRRECR,@BC      ;BETWEEN LASRCR AND WRRECK
2303  011132  005477  167346                  NEG     @BC
2304  011136  013777  000552  167336          MOV     COMAND,@MTC
2305  011144  105777  167332                  TSTB    @MTC            ;WAIT FOR CU READY
2306  011150  100375                          BPL     .-4
2307  011152  006077  167322                  ROR     @MTS            ;WAIT FOR TU READY
2308  011156  103375                          BCC     .-4
2309  011160  042777  000016  167314          BIC     #16,@MTC
2310  011166  052777  000012  167306          BIS     #12,@MTC
2311  011174  004737  005130                  JSR     PC,GOWAIT
2312  011200  000207                          RTS     PC
2313
2314
2315
2316                                ;PRINT COMMAND, STATUS, RECORD NUMBER, LENGTH
2317  011202  012702  013113          PRTS:   MOV     #MSG9B,R2
2318  011206  104404                          TOP
2319  011210  017702  167266                  MOV     @MTC,R2
2320  011214  104412                          OCTPRT
2321  011216  013702  000566                  MOV     STATRD,R2
2322  011222  104412                          OCTPRT
2323  011224  013702  000612                  MOV     RECORD,R2
2324  011230  005202                          INC     R2
2325  011232  104426                          DECPRT
2326  011234  013702  000544                  MOV     LENGTH,R2
2327  011240  104426                          DECPRT
2328  011242  000207                          RTS     PC
2329  011244  104434                          CKSWR                   ;CHECK FOR CNTL G
```

```
2330                                        ;PRINT OCTAL VALUE IN REGISTER 2
2331  011246  012737  000060  011356  OCTPR:  MOV     #'0,CHAR          ;INITIALIZE 1ST NUMBER AS 0
2332  011254  005702                          TST     R2                ;IS VALUE POSITIVE
2333  011256  100003                          BPL     OCT1              ;YES PRINT 0
2334  011260  012737  000061  011356          MOV     #'1,CHAR          ;NO PRINT 1
2335  011266  004737  011360          OCT1:   JSR     PC,OCTP
2336  011272  006102                          ROL     R2
2337  011274  006102                          ROL     R2
2338  011276  012737  177773  011354          MOV     #-5,OCT           ;COUNT 5 DIGITS
2339  011304  006102                  OCT2:   ROL     R2
2340  011306  006102                          ROL     R2
2341  011310  006102                          ROL     R2
2342  011312  010237  011356                  MOV     R2,CHAR           ;SAVE DIGIT
2343  011316  042737  177770  011356          BIC     #177770,CHAR      ;CLEAR OTHER BITS
2344  011324  052737  000060  011356          BIS     #60,CHAR          ;MAKE ASCII DIGIT
2345  011332  006002                          ROR     R2
2346  011334  004737  011360                  JSR     PC,OCTP           ;PRINT
2347  011340  006102                          ROL     R2
2348  011342  005237  011354                  INC     OCT               ;+1 TO DIGIT COUNT
2349  011346  001356                          BNE     OCT2              ;NOT DONE
2350  011350  104430                          SP3
2351  011352  000207                          RTS     PC                ;EXIT
2352  011354  000000          OCT:    0
2353  011356  000000          CHAR:   0
2354  011360  105777  167134  OCTP:   TSTB    @TPS
2355  011364  100375                  BPL     .-4               ;WAIT FOR READY
2356  011366  013777  011356  167126          MOV     CHAR,@TPB         ;PRINT
2357  011374  000207                          RTS     PC
2358                                        ;PRINT DECIMAL VALUE IN REGISTER 2
2359  011376  012737  177773  011554  DECPR:  MOV     #-5,DIGCNT
2360  011404  012737  011562  011560          MOV     #DECPNT+2,DECPNT
2361  011412  012737  000040  011556          MOV     #40,ZERO
2362  011420  012737  177777  011552  TYPT1:  MOV     #-1,DIGIT
2363  011426  005237  011552          TYPT2:  INC     DIGIT
2364  011432  167702  000122                  SUB     @DECPNT,R2
2365  011436  100373                          BPL     TYPT2
2366  011440  067702  000114                  ADD     @DECPNT,R2
2367  011444  004737  011472                  JSR     PC,DECOUT
2368  011450  005237  011554                  INC     DIGCNT
2369  011454  001002                          BNE     TYPT3
2370  011456  104430                          SP3
2371  011460  000207                          RTS     PC
2372  011462  062737  000002  011560  TYPT3:  ADD     #2,DECPNT
2373  011470  000753                  BR      TYPT1
2374  011472  005737  011552          DECOUT: TST     DIGIT
2375  011476  001010                  BNE     DEC1
2376  011500  022737  177777  011554          CMP     #-1,DIGCNT
2377  011506  001404                  BEQ     DEC1
2378  011510  013737  011556  011552          MOV     ZERO,DIGIT
2379  011516  000406                  BR      DEC2
2380  011520  012737  000060  011556  DEC1:   MOV     #60,ZERO
2381  011526  052737  000060  011552          BIS     #60,DIGIT
2382
2383  011534  105777  166760          DEC2:   TSTB    @TPS
2384  011540  100375                  BPL     .-4
2385  011542  013777  011552  166752          MOV     DIGIT,@TPB
```

```
 2386  011550  000207                          RTS     PC
 2387  011552  000000                  DIGIT:  0
 2388  011554  000000                  DIGCNT: 0
 2389  011556  000040                  ZERO:   40
 2390  011560  011562                  DECPNT: .+2
 2391  011562  023420                          10000.
 2392  011564  001750                          1000.
 2393  011566  000144                          100.
 2394  011570  000012                          10.
 2395  011572  000001                          1.
 2396                                  ;KEYBOARD INPUT
 2397  011574  105777  166714          WAITK:  TSTB    @TKS            ;WAIT FOR KEY
 2398  011600  100375                          BPL     .-4
 2399  011602  105777  166712                  TSTB    @TPS            ;WAIT FOR TELEPRINTER READY
 2400  011606  100375                          BPL     .-4
 2401  011610  117777  166702  166704          MOVB    @TKB,@TPB       ;ECHO CHARACTER
 2402  011616  117737  166674  001314          MOVB    @TKB, CHARIN    ;SAVE IT
 2403  011624  042737  000200  001314          BIC     #200,CHARIN
 2404  011632  000207                          RTS     PC              ;EXIT
 2405                                  ;TYPE 3 SPACES
 2406  011634  012702  011644          SP3X:   MOV     #SP3A,R2
 2407  011640  104404                          TOP
 2408  011642  000207                          RTS     PC
 2409  011644  020057  020040      057 SP3A:   .ASCII  ;/   /;
 2410          011652                          .EVEN
 2411                                  ;TELETYPE OUTPUT PACKAGE
 2412  011652  142777  000177  166640  TO:     BICB    #177,@TPS       ;CLEAR TELETYPE FLAGS
 2413  011660  112237  011752                  MOVB    (2)+,EOMK       ;SAVE MESSAGE DELIMETER
 2414  011664  121237  011752          TOP1:   CMPB    @R2,EOMK        ;IS CHARACTER THE SECOND MESSAGE DELIMITER?
 2415  011670  001001                          BNE     .+4             ;NO
 2416  011672  000207                          RTS     PC              ;YES, EXIT
 2417  011674  121227  000100                  CMPB    @R2,#'@         ;IS CHARACTER AN @ WHICH INDICATES A CARRIAGE RET.
 2418  011700  001406                          BEQ     TOP2            ;YES
 2419  011702  105777  166612                  TSTB    @TPS            ;NO, WAIT FOR TELETYPE READY
 2420  011706  100375                          BPL     .-4
 2421  011710  112277  166606                  MOVB    (2)+,@TPB       ;PRINT CHARACTER
 2422  011714  000763                          BR      TOP1
 2423  011716  105777  166576          TOP2:   TSTB    @TPS
 2424  011722  100375                          BPL     .-4
 2425  011724  112777  000215  166570          MOVB    #215,@TPB       ;CR
 2426  011732  105777  166562                  TSTB    @TPS
 2427  011736  100375                          BPL     .-4
 2428  011740  112777  000212  166554          MOVB    #212,@TPB       ;LF
 2429  011746  005202                          INC     R2
 2430  011750  000745                          BR      TOP1
 2431  011752  000000                  EOMK:   0
 2432  011754  022737  000176  000512  CKSWRR: CMP     #SWREG,SWR              ;SOFTWARE SWITCH REG PRESENT
 2433  011762  001035                          BNE     OUT                     ;NO, GET OUT
 2434  011764  105777  166524                  TSTB    @TKS                    ;YES,WAIT FOR
 2435  011770  100032                          BPL     OUT                     ;READY, GET CHARACTER
 2436  011772  017737  166520  001314          MOV     @TKB,CHARIN             ;AND STRIP OFF
 2437  012000  042737  177600  001314          BIC     #177600,CHARIN          ;THE GARBAGE
 2438  012006  022737  000007  001314          CMP     #7,CHARIN               ;IS IT A <^G>
 2439  012014  001020                          BNE     OUT
 2440  012016  012702  014042                  MOV     #$CNTG,R2
 2441  012022  104404                          TOP
```

```
 2442  012024  012702  014050          CNTLU:  MOV     #$MSWR,R2
 2443  012030  104404                          TOP
 2444  012032  017702  166454                  MOV     @SWR,R2
 2445  012036  104412                          OCTPRT
 2446  012040  012702  014060                  MOV     #$MNEW,R2
 2447  012044  104404                          TOP
 2448  012046  005037  012250                  CLR     @#TEMPST
 2449  012052  004737  012060                  JSR     PC,$READ                ;GO READ A LINE
 2450  012056  000207                  OUT:    RTS     PC                      ;RETURN TO MAIN BODY OF PROGRAM
 2451
 2452  012060  005037  012250          $READ:  CLR     TEMPST
 2453  012064  012737  000007  012252          MOV     #7,COUNT
 2454  012072  104400                  1$:     WAITKY
 2455  012074  042737  177600  001314          BIC     #177600,CHARIN  ;STRIP OFF GARBAGE
 2456  012102  122737  000025  001314          CMPB    #25,CHARIN              ;IS IT A ^U?
 2457  012110  001002                          BNE     2$              ;BRANCH IF NOT
 2458  012112  005726                  3$:     TST     (SP)+           ;POP THE STACK
 2459  012114  000743                          BR CNTLU                ;START OVER
 2460  012116  122737  000015  001314  2$:     CMPB    #15,CHARIN              ;IS IT A <CR>?
 2461  012124  001011                          BNE     4$              ;BRANCH IF NOT
 2462  012126  012702  014070                  MOV     #$MCRLF,R2      ;DO CRLF
 2463  012132  104404                          TOP
 2464  012134  022737  000007  012252          CMP     #7,COUNT        ;WAS IT FIRST CHARACTER
 2465  012142  001036                          BNE     7$              ;CHANGE SWR IF NOT FIRST ONE
 2466  012144  005726                  8$:     TST     (SP)+           ;POP THE STACK
 2467  012146  000743                          BR      OUT             ;GET OUT
 2468  012150  122737  000060  001314  4$:     CMPB    #60,CHARIN
 2469  012156  003004                          BGT     5$
 2470  012160  122737  000067  001314          CMPB    #67,CHARIN
 2471  012166  002004                          BGE     6$
 2472  012170  012702  012610          5$:     MOV     #MSGO,R2
 2473  012174  104404                          TOP
 2474  012176  000745                          BR      3$              ;START OVER IF NOT LEGAL CHARACTER
 2475  012200  006337  012250          6$:     ASL     TEMPST
 2476  012204  006337  012250                  ASL     TEMPST
 2477  012210  006337  012250                  ASL     TEMPST
 2478  012214  142737  000060  001314          BICB    #60,CHARIN              ;GET NITTY-GRITTY
 2479  012222  153737  001314  012250          BISB    CHARIN,TEMPST
 2480  012230  005337  012252                  DEC     COUNT           ;ONLY WANT 6   DIGITS
 2481  012234  001755                          BEQ     5$
 2482  012236  000715                          BR      1$
 2483  012240  013777  012250  166244  7$:     MOV     TEMPST,@SWR     ;CHANGE SWITCH REGISTER CONTENTS
 2484  012246  000736                          BR      8$
 2485
 2486  012250  000000          TEMPST: 0
 2487  012252  000000          COUNT:  0
 2488
 2489  012254  013746  000006          SUSWRR: MOV     @#6,-(SP)               ;SAVE VECTORS
 2490  012260  013746  000004                  MOV     @#4,-(SP)
 2491  012264  012737  012304  000004          MOV     #1$,@#4                 ;SET UP FOR TIMEOUT
 2492  012272  022777  177777  166212          CMP     #-1,@SWR                ;REFERENCE HARDWARE SWITCH REGISTER
 2493  012300  001402                          BEQ     2$
 2494  012302  000404                          BR      3$
 2495  012304  022626                  1$:     CMP     (SP)+,(SP)+             ;ADJUST STACK
 2496  012306  012737  000176  000512  2$:     MOV     #SWREG,SWR              ;POINT TO SOFTWARE SWITCH REG
 2497  012314  012637  000004          3$:     MOV     (SP)+,@#4               ;RESTORE VECTORS
```

```
 2498  012320  012637  000006                  MOV     (SP)+,@#6
 2499  012324  000207                          RTS     PC
 2500
 2501                                  ;TRAP HANDLER
 2502  012326  011666  000002          TRAP34: MOV     @SP,2(6)
 2503  012332  162716  000002                  SUB     #2,@SP
 2504  012336  013646                          MOV     @(6)+,-(6)
 2505  012340  062716  105746                  ADD     #TABLE-104400,@SP
 2506  012344  013607                          MOV     @(6)+,PC
 2507  012346  011574                  TABLE:  WAITK
 2508  012350  005202                          WRITI
 2509  012352  011652                          TO
 2510  012354  004470                          SVCTR
 2511  012356  004604                          RSFDR
 2512  012360  011246                          OCTPR
 2513  012362  004506                          MVCTR
 2514  012364  006540                          GENPA
 2515  012366  004550                          CLRAL
 2516  012370  004702                          CHGDR
 2517  012372  007410                          READI
 2518  012374  011376                          DECPR
 2519  012376  011634                          SP3X
 2520  012400  012254                          SUSWRR
 2521  012402  011754                          CKSWRR
 2522          104400                  WAITKY=104400
 2523          104402                  WRITIT=104402
 2524          104404                  TOP=104404
 2525          104406                  SVCTRS=104406
 2526          104410                  RSFDRV=104410
 2527          104412                  OCTPRT=104412
 2528          104414                  MVCTRS=104414
 2529          104416                  GENPAT=104416
 2530          104420                  CLRALL=104420
 2531          104422                  CHGDRV=104422
 2532          104424                  READIT=104424
 2533          104426                  DECPRT=104426
 2534          104430                  SP3=104430
 2535          104432                  SUSWR=104432
 2536          104434                  CKSWR=104434
 2537
```

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2538
2539                                    ;       ****************************************************************
2540                                    ;                       MODIFIED DEC 16 1977
2541
2542                                    ;       ++
2543                                    ;               CHECK FOR DUMP MODE OR AUTOMATIC/ACT11-XXDP MODE
2544                                    ;       --
2545
2546  012404  005037  000400           CKMODE: CLR     AUTOM           ;INIT AUTOMATIC MODE INDICATOR
2547  012410  105037  000402                   CLRB    ACT11M          ;INIT ACT11 AUTO MODE INDICATOR
2548  012414  105037  000403                   CLRB    XXDPM           ;INIT XXDP AUTO MODE INDICATOR
2549  012420  105037  000404                   CLRB    ADUMPM          ;INIT  ACT11 DUMP MODE INDICATOR
2550  012424  105037  000405                   CLRB    XDUMPM          ;INIT XXDP DUMP MODE INDICATOR
2551  012430  005737  000042                   TST     @#42            ;AUTO MODE?
2552  012434  001425                           BEQ     2$              ;BRANCH - IF NO
2553  012436  005237  000400                   INC     AUTOM           ;SET AUTO MODE INDICATOR
2554  012442  032737  020000  000052           BIT     #20000,@#52     ;MANUAL INTERVENTION?
2555  012450  001402                           BEQ     6$              ;BRANCH - IF NO
2556  012452  000137  012532                   JMP     ABORT           ;ABORT THE PROGRAM
2557  012456  023737  000042  000046   6$:     CMP     @#42,@#46       ;ACT11 MODE?
2558  012464  001403                           BEQ     1$              ;BRANCH - IF YES
2559  012466  105237  000403                   INCB    XXDPM           ;INDICATE XXDP AUTO MODE
2560  012472  000416                           BR      5$              ;AND EXIT
2561  012474  105237  000402           1$:     INCB    ACT11M          ;INDICATE ACT11 AUTO MODE
2562  012500  012777  020111  166004           MOV     #20111,@SWR     ;SET SWITCH REGISTER
2563  012506  000410                           BR      5$              ;AND EXIT
2564  012510  105737  000041           2$:     TSTB    @#41            ;MAN/MODE VIA ACT11/PAPER TAPE?
2565  012514  001003                           BNE     3$              ;BRANCH - IF NOT
2566  012516  105237  000404                   INCB    ADUMPM          ;INDICATE MAN/MODE VIA ACT11/PAPER TAPE
2567  012522  000402                           BR      5$              ;AND EXIT
2568  012524  105237  000405           3$:     INCB    XDUMPM          ;INDICATE MANUAL MODE VIA XXDP
2569  012530  000207                   5$:     RTS     PC              ;RETURN
2570
2571                                    ;       ****************************************************************
2572
```

```
2573
2574                            ;       ********************************** **********************************
2575                            ;                       MODIFIED DEC 16 1977
2576
2577                            ;       ++
2578                            ;               DISCONTINUE TESTING FOR ILLEGAL CONDITIONS
2579                            ;       --
2580
2581  012532  000005            ABORT:  RESET                   ;CLEAR THE WORLD
2582  012534  012702  012566            MOV     #MSG00,R2       ;GET ABORT MESSAGE
2583  012540  004737  104404            JSR     PC,TOP          ;PRINT ABORT MESSAGE
2584  012544  105737  000403            TSTB    XXDPM           ;XXDP AUTO MODE
2585  012550  001405                    BEQ     1$              ;BRANCH - IF NOT
2586  012552  013700  000042            MOV     @#42,R0         ;GET MONITOR EXIT ADDRESS
2587  012556  005037  000042            CLR     @#42            ;USE AS ABORT FLAG
2588  012562  004710                    JSR     PC,(R0)         ;EXIT TO XXDP MONITOR
2589  012564  000777            1$:     BR      .               ;AND HANG
2590
2591                            ;       ********************************************************************************
2592
```

```
2593
2594                                    ;TEXT MESSAGES
2595
2596  012566  040057  051120  043517  MSG00:  .ASCII                  ;/@PROGRAM ABORTED/;
2597  012574  040522  020115  041101
2598  012602  051117  042524  027504
2599  012610  037457  020100     057  MSG0:   .ASCII                  ;/?@ /;
2600  012615     057  051500  046105  MSG1:   .ASCII                  ;/@SELECT UNITS  /;
2601  012622  041505  020124  047125
2602  012630  052111  020123  027440
2603  012636  040057  051524  020124  MSG2:   .ASCII                  ./@TST PAT RLS WMO RMO@ /;
2604  012644  040520  020124  046122
2605  012652  020123  046527  020117
2606  012660  046522  040117  027440
2607  012666  046457  054101  052040  MSG5:   .ASCII                  ;/MAX TESTS SELECTED@/;
2608  012674  051505  051524  051440
2609  012702  046105  041505  042524
2610  012710  040104     C57
2611  012713     057  047440  027513  MSG6:   .ASCII                  ;/ OK/;
2612  012720  040057  051127  052111  MSG7:   .ASCII                  ;/@WRITE STATUS ERROR@/;
2613  012726  020105  052123  052101
2614  012734  051525  042440  051122
2615  012742  051117  027500
2616  012746  042457  042116  047440  MSG8:   .ASCII                  ;/END OF TAPE**********************@;
2617  012754  020106  040524  042520
2618  012762  025052  025052  025052
2619  012770  025052  025052  025052
2620  012776  025052  025052  025052
2621  013004  025052     100
2622  013007     104  053122  050040          .ASCII                  ;DRV PAT MODE RECORD LENGTH@/;
2623  013014  052101  046440  042117
2624  013022  020105  042522  047503
2625  013030  042122  046040  047105
2626  013036  052107  040110     057
2627  013043     057  051100  040505  MSG9:   .ASCII                  ;/@READ STATUS ERROR@/;
2628  013050  020104  052123  052101
2629  013056  051525  042440  051122
2630  013064  051117  027500
2631  013070  040057  042522  042101  MSG9A:  .ASCII                  ;/@READ DATA ERROR@/;
2632  013076  042040  052101  020101
2633  013104  051105  047522  040122
2634  013112     057
2635  013113     057  047503  042115  MSG9B:  .ASCII                  ;/COMD     STATUS   RECORD   LENGTH EXPECTED ACTUAL@/;
2636  013120  020040  020040  051440
2637  013126  040524  052524  020123
2638  013134  020040  042522  047503
2639  013142  042122  020040  046040
2640  013150  047105  052107  020110
2641  013156  054105  042520  052103
2642  013164  042105  040440  052103
2643  013172  040525  040114     057
2644  013177     057  055100  020132  MSG10A: .ASCII  ;/@ZZ - CZTMBF0@RECORD LIMITS IN BYTES@;
2645  013204  020055  055103  046524
2646  013212  043102  040060  042522
2647  013220  047503  042122  046040
2648  013226  046511  052111  020123
```

```
 2649  013234  047111  041040  052131
 2650  013242  051505     100
 2651  013245     115  047111  042514          .ASCII  ;MINLEN  MAXLEN@ /;
 2652  013252  020116  046440  054101
 2653  013260  042514  040116  027440
 2654  013266  040054  054105  051105  MSG10B: .ASCII  /,@EXERCISING UNITS,/
 2655  013274  044503  044523  043516
 2656  013302  052440  044516  051524
 2657  013310     054
 2658  013311     054  047100  020117  MSG10C: .ASCII  /,@NO DRIVES AVAILABLE,/
 2659  013316  051104  053111  051505
 2660  013324  040440  040526  046111
 2661  013332  041101  042514     054
 2662  013337     057  020040  042522  MSG10D: .ASCII  ;/  RECORD DATA COMPARES/;
 2663  013344  047503  042122  042040
 2664  013352  052101  020101  047503
 2665  013360  050115  051101  051505
 2666  013366     057
 2667  013367     057  044530  043522  MSG11:  .ASCII                  ;/XIRG WRITTEN 4 TIMES/;
 2668  013374  053440  044522  052124
 2669  013402  047105  032040  052040
 2670  013410  046511  051505     057
 2671  013415     057  020040  051440  MSG12:  .ASCII                  ;/   SSTP /;
 2672  013422  052123  020120     057
 2673  013427     057  020040  051040  MSG13:  .ASCII                  ;/   RNDM /;
 2674  013434  042116  020115     057
 2675  013441     057  020040  047040  MSG14:  .ASCII                  ;/   NSTP /;
 2676  013446  052123  020120     057
 2677  013453     057  026515  040515  MSG15:  .ASCII                  ;/M-MAX/;
 2678  013460  027530
 2679  013462  046457  046455  047111  MSG16:  .ASCII          ;/M-MIN/;
 2680  013470     057
 2681  013471     057  044515  020116  MSG17:          .ASCII          ;/MIN  /;
 2682  013476  027440
 2683  013500  046457  054101  020040  MSG18:          .ASCII          ;/MAX  /;
 2684  013506     057
 2685  013507     057  053500  044522  MSG19:  .ASCII          ;/@WRITE ERRORS - /;
 2686  013514  042524  042440  051122
 2687  013522  051117  020123  020075
 2688  013530     057
 2689  013531     057  051100  041505  MSG20:          .ASCII          ;/@RECOVERED AT 0 /;
 2690  013536  053117  051105  042105
 2691  013544  040440  020124  020060
 2692  013552     057
 2693  013553     057  050100  051105  MSG20A:         .ASCII          ;/@PERMANENT BADSPOTS = /;
 2694  013560  040515  042516  052116
 2695  013566  041040  042101  050123
 2696  013574  052117  020123  020075
 2697  013602     057
 2698  013603     057  051100  040505  MSG21:          .ASCII          ;/@READ STATUS ERRORS - /;
 2699  013610  020104  052123  052101
 2700  013616  051525  042440  051122
 2701  013624  051117  020123  020075
 2702  013632     057
 2703  013633     057  042100  052101  MSG22:          .ASCII          ;/@DATA ERRORS = /;
 2704  013640  020101  051105  047522
```

```
 2705  013646  051522  036440  027440
 2706  013654  040057  047516  026516  MSG23:          .ASCII          ;/@NON-RECOVERABLE ERRORS = /;
 2707  013662  042522  047503  042526
 2708  013670  040522  046102  020105
 2709  013676  051105  047522  051522
 2710  013704  036440  027440
 2711  013710  040057  025052  025052  MSG24:          .ASCII          ;/@**********WRITE PASS   /;
 2712  013716  025052  025052  025052
 2713  013724  025052  025052  025052
 2714  013732  025052  025052  051127
 2715  013740  052111  020105  040520
 2716  013746  051523  020040  027440
 2717  013754  040057  025052  025052  MSG25:          .ASCII          ;/@**********READ PASS    /;
 2718  013762  025052  025052  025052
 2719  013770  025052  025052  025052
 2720  013776  025052  025052  042522
 2721  014004  042101  050040  051501
 2722  014012  020123  020040  027440
 2723  014020  040057  040100     057  MSG26:          .ASCII          ;/@@@/;
 2724  014025     057  047105  020104  MSG27:          .ASCII          ;/END OF PASS/;
 2725  014032  043117  050040  051501
 2726  014040  027523
 2727  014042  040057  043536  027500  $CNTG:  .ASCII  ;/@^G@/;
 2728  014050  040057  053523  036522  $MSWR:  .ASCII  ;/@SWR= /;
 2729  014056  027440
 2730  014060  020057  042516  036527  $MNEW:  .ASCII  ;/ NEW= /;
 2731  014066  027440
 2732  014070  040057     057         $MCRLF: .ASCII  ;/@/;
 2733          014074                         .EVEN
 2734
 2735  014074  014074                 BUFFER:.                        ;WRITE BUFFER BEGINS HERE
 2736
 2737          000001                                 .END
```

```
ABORT   012532  2556  2581#
ACT11M  000402   914#  1082  1321  2547*  2561*
ADUMPM  000404   916#  2549* 2566*
ALLEOS  005020  1621  1625#
ALLEOT  004776  1343  1359  1391  1423  1490  1531  1543  1618#
ALL1    005000  1619#  1623
ALL2    005102  1626  1628  1641#
ALL3    005076  1624  1640#
ATST    000536   948#  1031* 1134* 1150
AUTOM   000400   913#  2546* 2553*
AUTOST  001354   925  1024#  1325
BACK1   010250  1780  1781  2159  2180#  2259
BC      000504   933#  1684* 1685* 1785* 2057* 2058* 2182* 2264* 2265* 2301* 2302* 2303*
BLKINC  000564   959#  1665* 1669* 1673* 1737  1739  2169  2172
BUFFER  014074   943   944  1040  1045  1049  1102* 1103  1122  1128  1133  2735#
CA      000506   934#  1686* 2059* 2266*
CC      000510   935#  1651* 1656*
CDMEND  005072  1636  1638#
CDRIVE  000556   956#  1564  1565  1579* 1583* 1587  1597*
CDRVBT  000554   955#  1580* 1581  1585* 1599* 1604
CHAR    011356  1801* 1802* 1803* 1805* 1808* 1809* 1810* 1811* 1812* 1814* 1815* 1817  1820
                1826* 1827* 1829  1832  1835  2197* 2198* 2199* 2200* 2203* 2204* 2205* 2206*
                2207* 2210* 2211* 2213  2216  2222* 2223* 2225  2228  2231  2331* 2334* 2342*
                2343* 2344* 2353# 2356
CHARIN  001314  1006# 1146  1153  1155  1162* 1163* 1167* 1186  1191  1193  1198  1208  1210
                1212* 1213* 1214* 1215  1220  1222  1226  1230  1236  1238  1242  1248  1250
                1254  1263  2402* 2403* 2436* 2437* 2438  2455* 2456  2460  2468  2470  2478*
                2479
CHGDR   004702  1597#  1605  2516
CHGDRV= 104422  1341  1357  1375  1382  1389  1406  1414  1421  1441  1452  1459  1467  1483
                1488  1515  1529  1539  1573  1622  1638  2531#
CHG1    004726  1600  1604#
CKMODE  012404  1026  1030  2546#
CKSWR = 104434  1300  1316  1755  1800  2110  2151  2196  2255  2329  2536#
CKSWRR  011754  2432#  2521
CLRAL   004550  1569#  2515
CLRALL= 104420  1332  1349  1367  1598  1436  1498  2530#
CLRTBL  005104  1571  1644#
CLRT1   005110  1645#  1647
CLR1    004552  1570#  1574
CNTLU   012024  1029  1139  2442#  2459
COMAND  000552   954#  1587* 1588* 1589* 1592* 1611  1679  1786  1801  2047  2060  2183  2197
                2262  2304
COUNT   012252  2453*  2464  2480*  2487#
CTRDEX  004524  1550  1556  1562#
CTRDMP  005040  1630#  1639
CTRD1   005066  1633  1637#
DAERRS  000622   975#  2107* 2241
DATERR  007700  2072  2095#
DATER1  007740  2096  2105#
DECOUT  011472  2367  2374#
DECPNT  011560  2360*  2364  2366  2372*  2390#
DECPR   011376  2359#  2518
DECPRT= 104426  1087  1089  1825  1842  1851  1863  2221  2238  2242  2246  2325  2327  2533#
DEC1    011520  2375  2377  2380#
DEC2    011534  2379  2383#
```

CROSS REFERENCE TABLE -- USER SYMBOLS


```
DIGCNT  011554            2359* 2368* 2376  2388#
DIGIT   011552            2362* 2363* 2374  2378* 2381* 2385  2387#
DOAGN   003276            1312  1322  1326#
DONE    003160            1300# 1345  1361  1393  1425  1492  1533  1545
DONE1   003226            1304  1308  1311#
DRIVE   000040             879#
DRVADR  000634             981#  1552  1558  1563
DRVSEL  000540             949#  1057* 1064  1076*
D0TAB   000654             981   990#  991
D1TAB   000720             982   992#  993
D2TAB   000764             983   994#  995
D3TAB   001030             984   996#  997
D4TAB   001074             985   998#  999
D5TAB   001140             986   1000# 1001
D6TAB   001204             987   1002# 1003
D7TAB   001250             988   1004# 1005
ENDTAP  006142            1757  1778  1793#
ENDT1   006154            1634  1795#
EGMK    011752            2413* 2414  2431#
ERROR   005710            1692  1755#
ERR1    005734            1759  1761#
EXEC    003070            1283# 1327
EXECUT  003056            1124  1152  1190  1281#
EXEC1   003076            1284# 1310
GENPA   006540            1866# 2514
GENPAT= 104416            1333  1350  1368  1399  1431  1499  2529#
GOBKWD  011072            1380  1412  1465  2296#
GOB1    011116            2298  2301#
GOWAIT  005130            1615  1651# 1688  1788  2062  2185  2269  2292  2311
GP1     006652            1867* 1868* 1870  1872  1874  1876  1878  1880  1884#
GW1     005172            1652  1658#
HINUM   007376            1037* 1141* 2005  2015  2027* 2035#
IDSELF  001676            1061  1082#
LASRCR  000616             973# 1473  1475  1478* 1479* 1481* 1486  1512* 1513* 1521  1524* 1525* 1527*
                          1536  2078  2091  2296* 2301
LENGTH  000544             951# 1765* 2099* 2117* 2284* 2326
LONUM   007374            1036* 1140* 2004  2013  2026* 2034#
LOOPER  002012            1110# 1119
MAXLEN  000524             941# 1044* 1048* 1088  1127* 1132* 1664  1742  2175
MEDIUM  000041             883#
MEM4K   002066             926  1126#
MEM8K   002112             927  1131#
MINLEN  000526             942# 1043* 1047* 1086  1126* 1131* 1668  1740  2173
MODES   000632             979# 1281* 1331* 1336  1348* 1353  1366* 1371  1378  1385  1397* 1402  1410
                          1417  1430* 1434* 1435* 1443* 1446  1454  1457  1463  1471  1497* 1502  1507*
                          1510  1519  1538* 1541  1575* 1620  1627  1635  1646  1648* 1705  1707  1710
                          1726  1728  1731  1736* 1747* 1773  1794* 2190*
MSBITS  000546             952# 1058* 1075* 1090  1110  1144* 1148  1171  1173* 1175* 1581  1604
MSG0    012610            1195  2472  2599#
MSG00   012566            2582  2596#
MSG1    012615            1142  2600#
MSG10A  013177            1084  2644#
MSG10B  013266            1100  2654#
MSG10C  013311            1094  2658#
MSG10D  013337            2146  2662#
MSG11   013367            2286  2667#
```

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MSG12   013415          1819    2215    2671#
MSG13   013427          1822    2218    2673#
MSG14   013441          1816    2212    2675#
MSG15   013453          1834    2230    2677#
MSG16   013462          1837    2233    2679#
MSG17   013471          1828    2224    2681#
MSG18   013500          1831    2227    2683#
MSG19   013507          1839    2685#
MSG2    012636          1181    2603#
MSG20   013531          1844*   1845*   1848    2689#
MSG20A  013553          1860    2693#
MSG21   013603          2235    2698#
MSG22   013633          2239    2703#
MSG23   013654          2243    2706#
MSG24   013710          1795    2711#
MSG25   013754          2191    2717#
MSG26   014020          1301    2723#
MSG27   014025          1323    2724#
MSG5    012666          1277    2607#
MSG6    012713          1260    2611#
MSG7    012720          1763    2282    2612#
MSG8    012746          1797    2193    2616#
MSG9    013043          2115    2627#
MSG9A   013070          2097    2631#
MSG9B   013113          2317    2635#
MTC     000502           932#   1056*   1060    1064*   1609    1611*   1614*   1654*   1679*   1680    1687*   1691    1786*
                        1787*   1789*   1790*   2047*   2048    2060*   2061*   2065    2183*   2184*   2186*   2260    2262*
                        2263*   2273    2290*   2291*   2304*   2305    2309*   2310*   2319
MTS     000500           931#   1066    1071    1073    1612*   1682*   1690    1782    2050*   2064    2119    2180*   2267*
                        2272    2307*
MTV     000534           945#   1652*
MVCTR   004506          1556#   2513
MVCTRS- 104414          1335    1352    1370    1377    1384    1401    1409    1416    1438    1445    1456    1462    1470
                        1485    1509    1518    1535    1619    1631    2528#
MV1     004512          1557#   1559
NOINCR  005272          1663    1672    1674#
NONSTP  005336          1684#   1703    1708    1711
NO.SEL  001666          1063    1070    1072    1074    1076#
NRREAD  000624           976#   2161*   2245
NUMTST  001316          1007#   1035*   1183*   1188    1273*   1274    1311*
NXMRET  001474          1039    1042#
NXT.TU  001612          1064#   1078
OCT     011354          2338*   2348*   2352#
OCTP    011360          1806    1813    2201    2208    2335    2346    2354#
OCTPR   011246          2331#   2512
OCTPRT- 104412          2102    2104    2139    2143    2320    2322    2445    2527#
OCT1    011266          2333    2335#
OCT2    011304          2339#   2349
OUT     012056          2433    2435    2439    2450#   2467
OVER4K  001522          1041    1047#
PARAM   001320          1008#   1283*   1284    1305    1309*   1476    1522    1666    1671    1700    1713    1808    1814
                        1826    1867    2075    2081    2203    2210    2222
PAT0    006654          1869    1887#   1889
PAT1    006670          1871    1893#   1900
PAT1A   006674          1894#   1899
PAT2    006740          1873    1898    1913#   1915
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PAT3    006754  1875    1919#   1926
PAT3A   006760  1920#   1925
PAT4    007024  1877    1924    1938#
PAT5    007052  1879    1948#   1955
PAT5A   007056  1949#   1954
PAT6    007166  1883    1953    1985#   1987
PAT7    007202  1882    1993#   1996
PERMBS  000610   970#   1772*   1855    1862
PRTS    011202  1766    2100    2118    2285    2317#
P1T     006716  1893    1901#
P3T     007002  1919    1927#
P4      007030  1939#   1942
P4A     007050  1938*   1939    1940*   1944#
P5T     007100  1948    1956#
RANDOM  007372  1717*   1721*   1994    2025*   2033#   2084*   2088*
RANGEN  007222  1716    1993    2000#   2083
RANG1   007260  2008#   2012
RANSTP  005520  1716#
RAN1    005532  1718#   1722
RBUF    000532   944#   1045*   1049*   1128*   1133*   1888    1895    1914    1921    1941    1950    1986    1995
                2052    2059    2068    2126
RDERRO  007756  2066    2110#
RDERRS  000620   974#   2154*   2237
RDINCR  010200  2077    2090    2168#   2189
RDPASS  000560   957#   2046*   2105    2152    2157*   2162*
RDSTP   007662  2082    2090#   2165
RDSTPC  007622  2076    2081#
RDSTPD  007432  2047#   2092    2160
READGO  007454  2052#   2079
READI   007410  2043#   2517
READIT= 104424  1387    1419    1480    1526    2532#
READLN  000630   978#   2045*   2053    2057    2070    2099    2117    2128    2172*   2173    2175    2177*
READMP  010342  2196#
RECORD  000612   971#   1439    1473    1478    1486    1505    1506*   1512    1524    1536    1662    1674    1735*
                1745    1793*   1824    2043    2078    2091    2168*   2220    2296    2297*   2323
RESETL  005664  1741    1744#
RESTRL  010240  2174    2177#
RESTR1  010246  2170    2176    2178#
REWIND  004740  1570    1609#   2299
RG1     007464  2054#   2056
RNDRDS  007632  2083#
RNDS1   007644  2085#   2089
RNDTAP  010314  2112    2189#
RNDTP1  010326  1637    2164    2191#
RPASS1  010154  2158    2161#
RPASS3  010160  2156    2162#
RSFDR   004604  1579#   2511
RSFDRV= 104410  1334    1351    1369    1400    1437    1444    1461    1469    1508    1517    1534    1569    1601
                1618    1630    2526#
RSF1    004616  1581#   1586
RSF2    004642  1582    1587#   1606
RTSREC  010110  2114    2121    2123    2145    2151#
RTSR1   010126  2108    2155#
RTSSTP  007574  2075#
SELDRV  002210  1145#   1179
SELD1   002242  1147    1153#
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SELD2    002262          1154    1157#
SELOK1   003050          1275    1277#
SELPAT   002460          1194    1198#
SELRLS   002552          1219#
SELRM1   002734          1251    1254#
SELRM2   002750          1249    1253    1257#
SELR1    002602          1223    1226#
SELR2    002620          1227    1230#
SELR3    002634          1221    1225    1229    1233#
SELTST   002366          1151    1181#
SELT1    002404          1185#   1197    1276
SELT2    002430          1187    1191#
SELT3    002450          1189    1192    1195#   1209    1211    1231    1243    1255    1265
SELW1    002666          1239    1242#
SELW2    002702          1237    1241    1245#
SP3    = 104430          1205    1216    1233    1245    1257    1807    2202    2350    2370    2534#
SP3A     011644          2406    2409#
SP3X     011634          2406#   2519
STACK  = 000500           929#   1024    1135
START    002134          1129    1134#
START1   002140          1097    1135#   1149
STATRD   000566           960#   1690*   1756    1777    2064*   2111    2163    2272*   2277    2288    2321
STOPOP   005510          1701    1713#
STREC1   006050          1771    1780#
STRLEN   000542           950#   1664*   1668*   1670    1744    2045    2177
STRTOP   005314          1679#   1724    1729    1732    1784    1791
SUSWR  = 104432          1025    1136    2535#
SUSWRR   012254          2489#   2520
SVCTR    004470          1550#   2510
SVCTRS= 104406           1339    1356    1374    1381    1388    1405    1413    1420    1440    1451    1466    1482    1514
                         1528    1572    2525#
SVC1     004474          1551#   1553
SVRECR   000550           953#   1448*   1450    1475*   1481    1521*   1527
SV0      007400          2000*   2028    2036#
SV1      007402          2001*   2029    2037#
SV2      007404          2002*   2030    2038#
SV3      007406          2003*   2031    2039#
SWR      000512           936#   1027    1137    1303    1590    1625    1761    1767    2095    2113    2122    2155    2257
                         2432    2444    2483*   2492    2496*   2562*
SWREG    000176           923#   1027    1137    2432    2496
TABLE    012346          2505    2507#
TEMPST   012250          2448*   2452*   2475*   2476*   2477*   2479*   2483    2486#
TESINC   005616          1504    1704    1725    1735#
TESRC1   006014          1768    1773#
TESREC   005764          1762    1767#
TEST     001324          1010#   1286*
TEST0    003306          1287    1331#
TEST1    003356          1289    1348#
TEST2    003426          1291    1366#
TEST3    003544          1294    1397#
TEST4    003662          1298    1430#
TEST5    004204          1297    1497#
TKB      000516           938#   2401    2402    2436
TKS      000514           937#   2397    2434
TO       011652          2412#   2509
TOP    = 104404          1085    1095    1101    1123    1143    1182    1196    1261    1278    1302    1324    1764    1796
```

CROSS REFERENCE TABLE -- USER SYMBOLS

		1798	1823	1838	1840	1849	1861	2098	2116	2149	2192	2194	2219	2234
		2236	2240	2244	2283	2287	2318	2407	2441	2443	2447	2463	2473	2524#
		2583												
TOP1	011664	2414#	2422	2430										
TOP2	011716	2418	2423#											
TPB	000522	940#	1159*	1178*	1268*	1271*	2356*	2385*	2401*	2421*	2425*	2428*		
TPS	000520	939#	1157	1176	1266	1269	2354	2383	2399	2412*	2419	2423	2426	
TRAP34	012326	860	2502#											
TSINC2	005672	1738	1743	1745#										
TSINC3	005706	1746	1748#											
TSTEX	001322	1009#	1282*	1283	1326*	1432								
TSTSTP	005432	1694	1700#											
TSTTBL	001326	1012#	1032*	1033*	1034*	1184	1282							
TU.SEL	001544	1046	1055#											
TYPT1	011420	2362#	2373											
TYPT2	011426	2363#	2365											
TYPT3	011462	2369	2372#											
T0	003320	1334#	1344											
T0A	003322	1335#	1342											
T0B	003340	1337	1341#											
T1	003370	1351#	1360											
T1A	003372	1352#	1358											
T1B	003410	1354	1357#											
T2	003440	1369#	1392											
T2A	003442	1370#	1376											
T2B	003460	1372	1375#											
T2C	003464	1377#	1383											
T2D	003504	1379	1382#											
T2E	003510	1384#	1390											
T2F	003524	1386	1388#											
T3	003556	1400#	1424											
T3A	003560	1401#	1407											
T3B	003576	1403	1406#											
T3C	003602	1409#	1415											
T3D	003620	1411	1413#											
T3E	003626	1416#	1422											
T3F	003642	1418	1420#											
T4	003716	1433	1436#											
T4A	003720	1437#	1491											
T4B	003722	1438#	1442											
T4C	003746	1444#	1458											
T4D	003750	1445#	1453											
T4E	004002	1447	1452#											
T4F	004016	1456#	1460											
T4G	004034	1455	1461#											
T4H	004036	1462#	1468											
T4J	004054	1464	1466#											
T4K	004062	1469#	1487											
T4L	004064	1470#	1484											
T4M	004136	1477	1480#											
T4N	004150	1472	1474	1483#										
T4P	004154	1485#	1489											
T5	004216	1500#	1544											
T5A	004242	1503	1505#											
T5B	004254	1507#												
T5C	004264	1509#	1516											

CROSS REFERENCE TABLE -- USER SYMBOLS


```
T5D      004314            1511    1515#
T5E      004322            1518#   1530    1542
T5F      004364            1523    1526#
T5FLAG   004464            1500*   1546#   1576*   1632    1675
T5G      004376            1520    1529#
T5H      004414            1532    1534#
T5INC    004466            1505*   1513    1547#
T5J      004416            1535#   1540
T5K      004436            1537    1539#
USSTST   001624            1066#   1069
USS.OK   001642            1067    1071#
VALID    002300            1156    1162#
VAL1     002316            1167#   1170
VAL2     002330            1168    1171#
VAL3     002344            1172    1175#
VAL4     002350            1160    1174    1176#
WAITK    011574            2397#   2507
WAITKY=  104400            1145    1185    1207    1219    1235    1247    1262    2454    2522#
WAIT1    005160            1653*   1655#   1658*
WBUF     000530             943#   1686    1866    2069    2124    2266
WRCHEK   000570             961#   1562    1644    1697    1760*   1841    1843    1853
WRITI    005202            1662#   2508
WRITIT=  104402            1338    1355    1373    1404    1449    1501    2523#
WRPASS   000562             958#   1678*   1693    1695    1699*   1702    1723    1758    1769*   1770    1776*   2256*   2275*
                           2279*
WRRECR   000614             972#   1439*   1448    1450*   1674*   2297    2302
WRTDMP   006170            1800#
WRTD1    006460            1845#   1854
WRTD2    006502            1847    1852#
WRTLEN   000626             977#   1670*   1684    1739*   1740    1742    1744*   1765    2264    2284
W1       005250            1667    1670#
W10      005476            1706    1710#
W11      005550            1714    1723#   1779
W12      005604            1727    1731#
XDUMPM   000405             917#   2550*   2568*
XRGRCD   010766            2258    2275#   2278
XRGREC   010652            1775    2255#   2289
XRGO     010662            2257#   2280
XRG5     010774            2274    2277#
XXDPM    000403             915#   2548*   2559*   2584
ZERO     011556            2361*   2378    2380*   2389#
$CNTG    014042            2440    2727#
$ENDAD   003246             891    1096    1314    1317#
$MCRLF   014070            2462    2732#
$MNEW    014060            2446    2730#
$MSWR    014050            2442    2728#
$READ    012060            2449    2452#
$R1      007424            2044    2046#
$R5      007562            2071#   2074
$SVPC =  000036             877#    897
$ZERO$   002032            1111    1115#
.      - 014076             857#    859#    877     878#    882#    886#    890#    893#    897#    904#    922#    924#    930#
                            991#    993#    995#    997#    999#   1001#   1003#   1005#   1158    1177    1264    1267    1270
                           1296    1591    1610    1613    1676    1681    1683    1720    1774    1783    1818    1821    1830
                           1833    1836    1856    1881    1896    1922    1951    2049    2051    2087    2106    2153    2181
                           2214    2217    2226    2229    2232    2261    2268    2306    2308    2355    2384    2390    2398
```

2400   2410#   2415   2420   2424   2427   2589   2733#   2735

. ABS. 014076   000

ERRORS DETECTED: 0

DSKZ:CZTMBF,DSKZ:CZTMBF.SEQ/CRF/SOL=CZTMBF.P11
RUN-TIME: 8 16 2 SECONDS
RUN-TIME RATIO: 276/27=10.0
CORE USED: 8K (15 PAGES)