TM11

TM11 DATA RELIABILITY 9 TRACK AH-9399E-MC

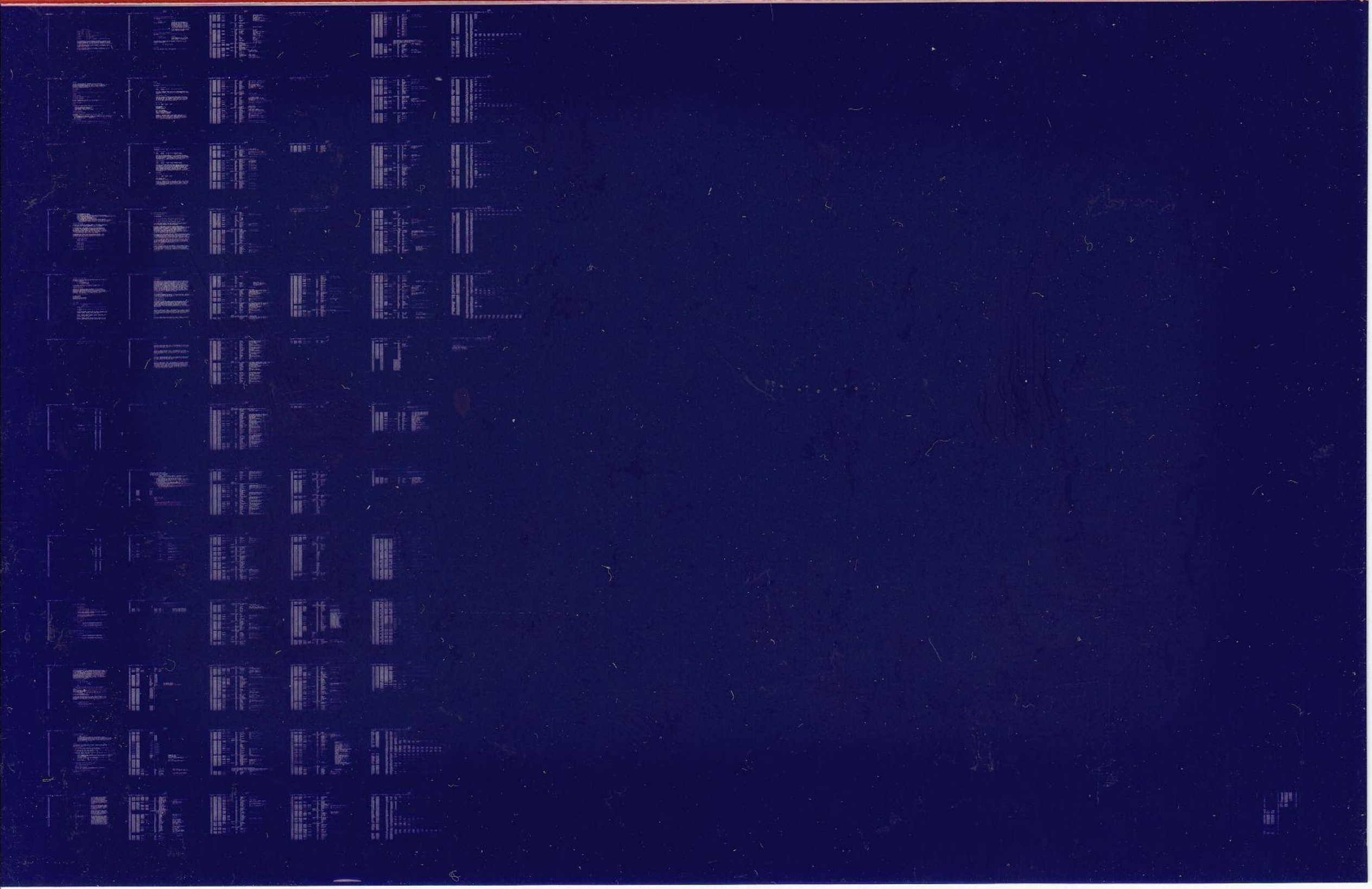
CZTMBE0

FICHE 1 OF 1

MAR 1978

digital

MADE IN USA



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IDENTIFICATION

PRODUCT CODE: AC-9398E-MC

PRODUCT NAME: CZTMBE0 TM 11 DATA RELIAB 9TRK

PROGRAM DATE: FEB 1978

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: JOHN RODENHISER

REVISED: JIM LACEY/B. BURGESS/S. CARPENTER/CLEM WALSH

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)

103 210 - " " " " (" 8K " ")

4.3 PROGRAM AND/OR OPERATOR ACTION

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

4.3.1 TAPE UNIT SELECTION

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

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

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

4.3.1.1 TAPE UNIT SELECTION EXAMPLES

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

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

```
SELECT UNITS
SELECT UNITS
```

A CARRIAGE RETURN WAS TYPED WITH NO UNITS SELECTED.

```
SELECT UNITS 1,9?,1,2
```

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

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.THEPE 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

```
                                        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

272 ETC. ETC.

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

4.3.2.3 RECORD LENGTH SEQUENCE

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

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

4.3.2.4 WRITE START/STOP MODE

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

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 SE REACHES END OF TAPE. TO TERMINATE PARAMETER SELECTION A SECOND CARRIAGE RETURN MUST BE TYPED AFTER SELECTING A SET OF PARAMETERS.

4.3.2.7 TEST SELECTION EXAMPLES

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

TWO PARAMETERS SETS WERE SELECTED BY THE ABOVE SEQUENCE

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

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

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

4.3.2.8 AUTOMATIC PARAMETER SELECTION

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

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

5.0 OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

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

CONTROL:

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

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

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

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

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

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

THE OPERATIONAL SWITCH SETTINGS ARE USED TO:

A. ALTER ERROR RECOVERY PROCEDURES

B. DELETE ERROR PRINTOUTS

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

5.1.1 SWITCHES TO ALTER ERROR RECOVERY

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

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

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

                                6       WRITE STATISTICAL       USE OF THIS SWITCH WILL CAUSE
                                (001000)RECOVERY                A BACKSPACE 2 RECORDS, SPACE
                                     .                          FORWARD 1 RECORD, REWRITE RECORD
                                     .                          SEQUENCE TO BE USED INSTEAD
                                                                OF WRITE XIRG SO THAT THE RECORD
                                                                WILL BE REWRITTEN ON APPROXI-
                                                                MATELY THE SAME AREA OF TAPE
                                                                WHERE THE WRITE ERROR OCCURRED.
                                                                THIS METHOD KEEPS THE INTER-
                                                                RECORD GAP FROM GETTING LARGER.
                                                                DATA IS WRITTEN OVER THE SAME
                                                                SPOT ON TAPE TO TRY AND FIND BAD TAPE.
```

5.1.2 SWITCHES TO CONTROL ERROR PRINTOUTS

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

SW	FUNCTION	PURPOSE
13 (020000)	SUPPRESS ERROR PRINTOUT	THE STATISTICS CONCERNING THE NUMBER AND TYPES OF ERRORS WILL BE PRINTED WHEN THE TAPE UNIT REACHES END OF TAPE. FOR LONG PERIODS OF TESTING (OVERNIGHT, ETC) IT MAY BE SUFFICIENT TO RECEIVE THIS INFORMATION AND NOT HAVE A TYPEOUT EACH TIME AN ERROR OCCURRED.
8 (000400)	PRINT ERROR STATISTICS	AFTER COMPLETION OF EVERY RECORD LENGTH SEQUENCE INSTEAD OF AFTER END OF TAPE AS IS NORMAL.

5.1.3 SWITCH TO ALTER TEST PARAMETERS

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

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

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

EXAMPLE:

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

WITH SWO=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 S 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.

671
672
673 6.3 ERROR RECOVERY PROCEDURES
674
675 6.3.1 WRITE ERROR RECOVERY
676
677 THE PROCEDURE TO RECOVER FROM A WRITE ERROR IS DETERMINED BY
678 THE FOLLOWING:
679
680 A. IS IT A "WRITE ONLY" TEST OR WILL THE DATA BE READ?
681
682 B. IS "WRITE STATISTICAL RECOVERY" SELECTED (SW 6=1)?
683
684 C. IS "DELETE WRITE WITH XIRG" SELECTED (SW 5=1)?
685
686 6.3.1.1 IF IT IS A "WRITE ONLY" TEST AND "WRITE STATISTICAL RECOVERY"
687 IS NOT SELECTED (SW 6=0) THE WRITE ERROR IS SIMPLY COUNTED
688 AND THE PROGRAM PROCEEDS TO THE NEXT RECORD.
689
690 6.3.1.2 IF IT IS A "WRITE ONLY" TEST AND "WRITE STATISTICAL
691 RECOVERY" IS SELECTED (SW 6=1), A WRITE ERROR IS COUNTED AND THEN
692 A RECOVERY SEQUENCE (BACKSPACE 2 RECORDS, SPACE FORWARD 1 RECORD,
693 REWRITE RECORD) IS ENTERED. THIS RECOVERY SEQUENCE WILL BE
694 REPEATED UP TO 7 TIMES IF THE WRITE ERROR PERSISTS. IF A
695 WRITE ERROR IS NOT ELIMINATED AFTER THE 8TH ATTEMPT IT IS
696 COUNTED AS A PERMANENT BAD SPOT ON TAPE. STATISTICS ARE SAVED
697 TO INDICATE HOW MANY TIMES THE REWRITE SEQUENCE HAD TO BE RE-
698 PEATED TO RECOVER FROM EACH WRITE ERROR.
699
700 6.3.1.3 IF IT IS A "WRITE AND READ" TEST AND "WRITE STATISTICAL RECOVERY"
701 IS SELECTED (SW 6=1) AND "WRITE WITH XIRG" IS NOT DELETED (SW 5=0)
702 THE PROGRAM WILL FIRST ATTEMPT TO DO A "WRITE STATISTICAL RECOVERY".
703 IF A PERMANENT BAD SPOT IS ENCOUNTERED THE PROGRAM WILL THEN
704 ATTEMPT TO RECOVER WITH A "WRITE WITH XIRG". FAILURE TO RECOVER
705 AT THIS POINT SHOULD RESULT IN A READ ERROR DURING THE READ PASS.
706
707 6.3.1.4 IF IT IS A "WRITE AND READ" TEST AND "WRITE STATISTICAL RECOVERY"
708 IS NOT SELECTED (SW 6=0) AND "WRITE WITH XIRG" IS NOT DELETED
709 (SW 5=0) THE PROGRAM WILL TRY TO RECOVER ONLY BY REWRITING THE
710 RECORD WITH EXTENDED INTERRECORD GAP. FAILURE TO RECOVER SHOULD
711 RESULT IN A READ ERROR DURING READ PASS.
712
713 6.3.2 READ ERROR RECOVERY
714
715 A READ ERROR CAN OCCUR FOR TWO REASONS: STATUS ERROR OR DATA
716 ERROR. A PROPER COUNT IS TAKEN FOR EACH TYPE OF ERROR. RECOVERY
717 OF A READ ERROR WILL CONSIST OF TRYING TO RE-READ THE RECORD UP
718 TO TWO MORE TIMES (UNLESS SW 4=1 TO DELETE READ RE-TRYS FOR
719 SCOPING PURPOSES). IF THE ERROR PERSISTS IT IS CONSIDERED "NON-
720 RECOVERABLE" AND THE PROGRAM WILL CONTINUE WITH THE NEXT RECORD.
721
722 7. RESTRICTIONS
723
724 NONE
725

8. MISCELLANEOUS

8.1 TAPE LENGTH

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

8.2 MEMORY AVAILABLE

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

9. PROGRAM DESCRIPTION

9.1 GENERAL DESCRIPTION

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

9.2 TEST 0

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

9.3 TEST 1

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

9.4 TEST 2

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

9.5 TEST 3

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

9.6 TEST 4

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

9.7 TEST 5

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

```
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                          TRAP34

                                        ;*****************************************************************************
                                        ;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
                                ;       --
                                
                000036                          $SVPC=.         ;SAVE PC
                000040                          .=40
000040          000             DRIVE:  .BYTE   0               ;DRIVE # FOR XXDP LOAD MEDIUM
                                                                ;ASSEMBLE AS A 0
                
                000041                          .=41
000041          000             MEDIUM: .BYTE   0               ;XXDP LOAD MEDIUM
                                                                ;ASSEMBLE AS A 0
                
                000042                          .=42
000042  000000                  .WORD   0       ;AUTO/MAN MODE INDICATOR
                                                ;ASSEMBLE AS A 0
                
                000046                          .=46
000046  003246                  .WORD   $ENDAD  ;SET TO $ENDAD IN .$EOP
                
                000052                          .=52
000052  000000                  .WORD   0       ;CHARACTERISTICS OF PROGRAM
                                                ;SET TO 0
                
                000036                          .=$SVPC         ;RESTORE PC
                
                                ;       ********************************************************************
```

```
                                ;       ********************************************************************
                                ;                       MODIFIED DEC 16 1977
                                ;
                                ;       ++
                                ;               ACT11 AND XXDP MODE INDICATORS
                                ;       --

000036  000000                          AUTOM:  .WORD   0               ;AUTOMATIC MODE INDICATOR
000040     000                          ACT11M: .BYTE   0               ;ACT11 AUTO MODE INDICATOR
000041     000                          XXDPM:  .BYTE   0               ;XXDP AUTO MODE INDICATOR
000042     000                          ADUMPM: .BYTE   0               ;ACT11 DUMP MODE INDICATOR
000043     000                          XDUMPM: .BYTE   0               ;XXDP DUMP MODE INDICATOR

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

```
                        000176                          .=176
000176  000000         SWREG:  .WORD 0                 ;SOFTWARE SWITCH REGISTER
                        000200                          .=200
000200  000137  001354         JMP     AUTOST
000204  000137  002066         JMP     MEM4K
000210  000137  002112         JMP     MEM6K

                        000500  STACK=500
                        000500                          .=500
000500  172520          MTS:    172520
000502  172522          MTC:    172522
000504  172524          BC:     172524
000506  172526          CA:     172526
000510  177776          CC:     177776
000512  177570          SWR:    177570
000514  177560          TKS:    177560
000516  177562          TKB:    177562
000520  177564          TPS:    177564
000522  177566          TPB:    177566
000524  002000          MAXLEN: 1024.           ;MAX RECORD LENGTH
000526  000004          MINLEN: 4.              ;MIN RECORD LENGTH
000530  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
```

```
  973  000626  000000                  WRTLEN: 0
  974  000630  000000                  READLN: 0
  975  000632  000000                  MODES:  0
  976
  977  000634  000654                  DRVADR: D0TAB
  978  000636  000720                          D1TAB
  979  000640  000764                          D2TAB
  980  000642  001030                          D3TAB
  981  000644  001074                          D4TAB
  982  000646  001140                          D5TAB
  983  000650  001204                          D6TAB
  984  000652  001250                          D7TAB
  985
  986  000654  000000                  D0TAB:  0
  987          000720                          .=D0TAB+44
  988  000720  000000                  D1TAB:  0
  989          000764                          .=D1TAB+44
  990  000764  000000                  D2TAB:  0
  991          001030                          .=D2TAB+44
  992  001030  000000                  D3TAB:  0
  993          001074                          .=D3TAB+44
  994  001074  000000                  D4TAB:  0
  995          001140                          .=D4TAB+44
  996  001140  000000                  D5TAB:  0
  997          001204                          .=D5TAB+44
  998  001204  000000                  D6TAB:  0
  999          001250                          .=D6TAB+44
 1000  001250  000000                  D7TAB:  0
 1001          001314                          .=D7TAB+44
 1002  001314  000000                  CHARIN: 0                       ;CHARACTER JUST INPUT
 1003  001316  000000                  NUMTST: 0                       ;NUMBER OF TEST
 1004  001320  000000                  PARAM:  0                       ;TEST PARAMETERS
 1005  001322  000000                  TSTEX:  0                       ;POINTS TO TEST PARAMETERS TO BE EXECUTED
 1006  001324  000000                  TEST:   0                       ;CONTAINS CURRENT TEST NUMBER
 1007
 1008  001326  000000                  TSTTBL: 0                       ;TEST TABLE
 1009  001330  000000                          0                       ;UP TO 10 TESTS CAN BE SELECTED TO
 1010  001332  000000                          0                       ;BE RUN IN CONSECUTIVE ORDER
 1011  001334  000000                          0
 1012  001336  000000                          0
 1013  001340  000000                          0
 1014  001342  000000                          0
 1015  001344  000000                          0
 1016  001346  000000                          0
 1017  001350  000000                          0
 1018  001352  000000                          0
 1019
 1020  001354  012706  000500          AUTOST: MOV     #STACK,SP               ;SETUP THE SP
 1021  001360  104432                  SUSWR                                   ;CHECK FOR HARDWARE SWICH REG
 1022  001362  004737  012404                  JSR     PC,CKMODE               ;CHECK FOR MODE OF OPERATION ++ C.W
 1023  001366  022737  000176  000512          CMP     #SWREG,SWR
 1024  001374  001004                          BNE     1$
 1025  001376  004737  012024                  JSR     PC,CNTLU                ;ALLOW SWREG TO BE CHANGED
 1026  001402  004737  012404                  JSR     PC,CKMODE               ;CHECK FOR MODE OF OPERATION
 1027  001406  012737  177777  000536  1$:     MOV     #-1,ATST
 1028  001414  012737  036025  001326          MOV     #36025,TSTTBL           ;SETUP TEST PARAMETERS
```

```
1029  001422  012737  040052  001330          MOV     #40052,TSTTBL+2
1030  001430  012737  027052  001332          MOV     #27052,TSTTBL+4
1031  001436  012737  000003  001316          MOV     #3,NUMTST
1032  001444  012737  123456  007374          MOV     #123456,LONUM           ;PRIME RANDOM NUMBER GENERATER
1033  001452  012737  176543  007376          MOV     #176543,HINUM
1034                          ;DETERMINE THE SIZE OF THE WRITE AND READ BUFFERS.
1035  001460  012737  001474  000004          MOV     #NXMRET,@#4             ;SETUP NXM VECTOR
1036  001466  005737  024074                  TST     BUFFER+4096.            ;OVER 4K OF MEMORY?
1037  001472  000413                          BR      OVER4K                  ;BR IF YES
1038  001474  022626                  NXMRET: CMP     (SP)+,(SP)+             ;POP THE STACK
1039  001476  012737  000004  000526          MOV     #4,MINLEN
1040  001504  012737  002000  000524          MOV     #1024.,MAXLEN
1041  001512  012737  016074  000532          MOV     #BUFFER+1024.,RBUF
1042  001520  000411                          BR      TU.SEL                  ;GO SELCT DRIVES
1043  001522  012737  000010  000526  OVER4K: MOV     #8.,MINLEN
1044  001530  012737  004000  000524          MOV     #2048.,MAXLEN
1045  001536  012737  020074  000532          MOV     #BUFFER+2048.,RBUF
1046                          ;DETERMINE DRIVES TO BE TESTED.
1047                          ;A DRIVE WILL BE TESTED IF:
1048                          ;       1. IT CAN BE SELECTED
1049                          ;       2. IT IS 9 TRACK
1050                          ;       3. IT IS WRITE ENABLED
1051  001544  012737  000006  000004  TU.SEL: MOV     #6,@#4                  ;SET TRAP CATCHER
1052  001552  012777  010000  176722          MOV     #10000,@MTC             ;PWR CLR
1053  001560  005037  000540                  CLR     DRVSEL                  ;CLEAR DRIVE TABLE
1054  001564  005037  000546                  CLR     MSBITS
1055  001570  012700  000200                  MOV     #200,R0                 ;R0=DRIVE 0
1056  001574  105777  176702                  TSTB    @MTC
1057  001600  100036                          BPL     IDSELF                  ;BR IF NO CU RDY
1058  001602  123737  000041  000004          CMPB    @#41,4                  ;DDP ON MAGTAPE?
1059  001610  001426                          BEQ     NO.SEL                  ;IF YES - SKIP DRIVE 0
1060  001612  013777  000540  176662  NXT.TU: MOV     DRVSEL,@MTC             ;SELECT A DRIVE
1061  001620  012702  000024                  MOV     #20.,R2                 ;SETUP R2 FOR WAIT LOOP
1062  001624  032777  000100  176646  USSTST: BIT     #100,@MTS               ;DOES DRIVE EXIST?
1063  001632  001003                          BNE     USS.OK                  ;BR IF YES
1064  001634  005302                          DEC     R2                      ;KILL SOME TIME
1065  001636  003372                          BGT     USSTST
1066  001640  000412                          BR      NO.SEL                  ;DRIVE IS NON-EXISTENCE
1067  001642  032777  000020  176630  USS.OK: BIT     #20,@MTS                ;IS THIS DRIVE 7 OR 9 CHN?
1068  001650  001006                          BNE     NO.SEL                  ;BR IF 7 CHN.
1069  001652  032777  000004  176620          BIT     #4,@MTS                 ;IS WRITE LOCK ON?
1070  001660  001002                          BNE     NO.SEL                  ;BR IF YES
1071  001662  050037  000546                  BIS     R0,MSBITS               ;PUT DRIVE INTO TABLE
1072  001666  105237  000541          NO.SEL: INCB    DRVSEL+1                ;INC. THE DRIVE NUMBER
1073  001672  006200                          ASR     R0                      ;HAS ALL DRIVES BEEN TESTED FOR EXISTENCE?
1074  001674  001346                          BNE     NXT.TU                  ;BR IF NO
1075
1076                          ;TYPE-OUT NAME OF PROGRAM AND MIN. AND MAX. RECORD LENGTHS.
1077
1078  001676  105737  000040          IDSELF: TSTB    ACT11M                          ;ACT11 MODE?
1079  001702  001011                          BNE     3$                              ;BRANCH - IF YES
1080  001704  012702  013177                  MOV     #MSG10A,R2
1081  001710  104404                          TOP
1082  001712  013702  000526                  MOV     MINLEN,R2
1083  001716  104426                          DECPRT                          ;PRINT MIN. LENGTH
1084  001720  013702  000524                  MOV     MAXLEN,R2
```

```
1085  001724  104426                        DECPRT                          ;PRINT MAX. LENGTH
1086  001726  005737  000546          3$:   TST     MSBITS                  ;WAS ANY DRIVES SELECTED?
1087  001732  001012                        BNE     2$                      ;BR IF YES
1088  001734  013701  000042                MOV     @#42,R1                 ;IS THERE A MONITOR?
1089  001740  001405                        BEQ     1$                      ;BRANCH IF NO
1090  001742  012702  013311                MOV     #MSG10C,R2              ;INDICATE THAT NO DRIVES ARE
1091  001746  104404                        TOP                             ;AVAILABLE!!
1092  001750  000137  003246                JMP     @#$ENDAD                ;RETURN TO THE MONITOR
1093  001754  000137  002140          1$:   JMP     START1                  ;NO--GO HAVE OPERATOR SELECT DRIVES
1094
1095                                  ;TYPE-OUT THE DRIVE/S TO BE TESTED
1096  001760  012702  013266          2$:   MOV     #MSG10B,R2
1097  001764  104404                        TOP
1098  001766  105037  014074                CLRB    BUFFER
1099  001772  012701  014074                MOV     #BUFFER,R1
1100  001776  005000                        CLR     R0                      ;SET R0 TO DRIVE 0
1101  002000  012702  000200                MOV     #200,R2                 ;SET R2 TO DRIVE 0
1102
1103                                  ;FORM AND SAVE DRIVE NUMBER FOR TYPE-OUT
1104  002004  105021                        CLRB    (R1)+                   ;SET EOM
1105  002006  112721  000040                MOVB    #' ,(R1)+               ;SPACE
1106  002012  030237  000546          LOOPER: BIT   R2,MSBITS               ;DID THIS DRIVE NUMBER EXIST?
1107  002016  001405                        BEQ     $ZERO$                  ;BR IF NO
1108  002020  110011                        MOVB    R0,(R1)                 ;YES--SAVE THE NUMBER
1109  002022  152721  000060                BISB    #'0,(R1)+               ;MAKE IT ASCII
1110  002026  112721  000054                MOVB    #',,(R1)+               ;COMMA
1111  002032  000241          $ZERO$: CLC                                   ;POSITION DRIVE BIT
1112  002034  006002                        ROR     R2
1113  002036  005200                        INC     R0                      ;UPDATE DRIVE NUMBER
1114  002040  020027  000007                CMP     R0,#7                   ;LAST
1115  002044  003762                        BLE     LOOPER                  ;BR IF NO
1116  002046  105011                        CLRB    (R1)                    ;SET EOM
1117  002050  112701  000100                MOVB    #'@,-(R1)               ;CR & LF
1118  002054  012702  014074                MOV     #BUFFER,R2              ;TYPE THE DRIVE/S SELECTED
1119  002060  104404                        TOP
1120  002062  000137  003056                JMP     EXECUT                  ;GO START TESTING
1121                                  ;MODIFY RECORD LENGTHS AND BUFFER AREAS FOR 4K OF MEMORY
1122  002066  012737  000004  000526  MEM4K:  MOV     #4.,MINLEN
1123  002074  012737  002000  000524          MOV     #1024.,MAXLEN
1124  002102  012737  016074  000532          MOV     #BUFFER+1024.,RBUF
1125  002110  000411                        BR      START
1126                                  ;MODIFY RECORD LENGTHS AND BUFFER AREAS FOR 8K OF MEMORY
1127  002112  012737  000010  000526  MEM8K:  MOV     #8.,MINLEN
1128  002120  012737  004000  000524          MOV     #2048.,MAXLEN
1129  002126  012737  020074  000532          MOV     #BUFFER+2048.,RBUF
1130  002134  005037  000536          START:  CLR     ATST                    ;NOT AUTO START
1131  002140  012706  000500          START1: MOV     #STACK,SP               ;INITIALIZE STACK
1132  002144  104432                        SUSWR                           ;CHECK FOR HARDWARE SWITCH REGISTER
1133  002146  022737  000176  000512          CMP     #SWREG,SWR
1134  002154  001002                        BNE     1$
1135  002156  004737  012024                JSR     PC,CNTLU
1136  002162  012737  123456  007374  1$:   MOV     #123456,LONUM           ;PRIME RANDOM
1137  002170  012737  176543  007376          MOV     #176543,HINUM           ;NUMBER GENERATOR
1138  002176  012702  012615                MOV     #MSG1,R2
1139  002202  104404                        TOP                             ;PRINT 'SELECT DRIVES'
1140  002204  005037  000546                CLR     MSBITS                  ;CLEAR SELECTED DRIVE INDICATOR
```

```
1141  002210  104400                  SELDRV: WAITKY
1142  002212  122737  000015  001314          CMPB    #15,CHARIN      ;WAS CHARACTER A CARRIAGE RETURN?
1143  002220  001010                          BNE     SELD1           ;NO
1144  002222  005737  000546                  TST     MSBITS          ;YES, WERE ANY DRIVES SELECTED
1145  002226  001744                          BEQ     START1          ;NO
1146  002230  005737  000536                  TST     ATST            ;YES--IS AUTO SWITCH SET?
1147  002234  001454                          BEQ     SELTST          ;NO--GO SELECT TESTS
1148  002236  000137  003056                  JMP     EXECUT          ;YES--GO START TESTING
1149  002242  122737  000070  001314  SELD1:  CMPB    #70,CHARIN      ;IS CHARACTER A VALID NUMBER 0-7?
1150  002250  003404                          BLE     SELD2           ;NO, PRINT "?"
1151  002252  122737  000060  001314          CMPB    #60,CHARIN      ;IS CHARACTER A VALID NUMBER 0-7?
1152  002260  003407                          BLE     VALID           ;YES
1153  002262  105777  176232          SELD2:  TSTB    @TPS
1154  002266  100375                          BPL     .-4
1155  002270  012777  000077  176224          MOV     #'?,@TPB        ;PRINT '?'
1156  002276  000424                          BR      VAL4
1157                                  ;HAVE VALID DRIVE NUMBER
1158  002300  142737  000270  001314  VALID:  BICB    #270,CHARIN     ;MASK OUT NUMBER
1159  002306  105137  001314                  COMB    CHARIN
1160  002312  012700  000200                  MOV     #200,R0         ;INITIALIZE BIT POSITION FOR DRIVE 0
1161
1162
1163  002316  105237  001314          VAL1:   INCB    CHARIN          ;+1 TO DRIVE SELECT
1164  002322  001402                          BEQ     VAL2            ;HAVE DRIVE OF EQUAL TO ZERO
1165  002324  006200                          ASR     R0              ;MOVE BIT POSITION TO NEXT DRIVE
1166  002326  000773                          BR      VAL1            ;TRY AGAIN
1167  002330  130037  000546          VAL2:   BITB    R0,MSBITS       ;COMPARE DRIVE SELECT WITH PREVIOUS SELECTED
1168  002334  001003                          BNE     VAL3
1169  002336  150037  000546                  BISB    R0,MSBITS       ;DRIVE WASN'T PREVIOUSLY SET, SO SET IT NOW.
1170  002342  000402                          BR      VAL4
1171  002344  140037  000546          VAL3:   BICB    R0,MSBITS       ;DRIVE WAS SET, CLEAR IT.
1172  002350  105777  176144          VAL4:   TSTB    @TPS
1173  002354  100375                          BPL     .-4
1174  002356  012777  000054  176136          MOV     #',,@TPB        ;PRINT COMMA
1175  002364  000711                          BR      SELDRV          ;RETURN TO WAIT FOR NEXT KEY
1176                                  ;HAVE DRIVES SELECTED-NOW GET TEST SELECTION
1177  002366  012702  012636          SELTST: MOV     #MSG2,R2
1178  002372  104404                          TOP                     ;PRINT'SELECT TESTS'
1179  002374  005037  001316                  CLR     NUMTST          ;CLEAR TEST NUMBERS SELECTED
1180  002400  012700  001326                  MOV     #TSTTBL,R0      ;INITIALIZE TEST TABLE POINTER
1181  002404  104400                  SELT1:  WAITKY
1182  002406  122737  000015  001314          CMPB    #15,CHARIN      ;WAS CHARACTER A CARRIAGE RETURN?
1183  002414  001005                          BNE     SELT2
1184  002416  005737  001316                  TST     NUMTST          ;WERE ANY TESTS SELECTED?
1185  002422  001412                          BEQ     SELT3           ;NO
1186  002424  000137  003056                  JMP     EXECUT          ;YES, EXECUTE TESTS
1187  002430  122737  000066  001314  SELT2:  CMPB    #66,CHARIN      ;IS CHARACTER A VALID NUMBER 0-5
1188  002436  003404                          BLE     SELT3           ;NO
1189  002440  122737  000060  001314          CMPB    #60,CHARIN      ;IS CHARACTER A VALID NUMBER 0-5
1190  002446  003404                          BLE     SELPAT          ;YES
1191  002450  012702  012610          SELT3:  MOV     #MSG0,R2
1192  002454  104404                          TOP
1193  002456  000752                          BR      SELT1           ;RETURN TO WAIT FOR TEST SELECT
1194  002460  013704  001314          SELPAT: MOV     CHARIN,R4
1195  002464  000304                          SWAB    R4              ;ROTATE TEST NUMBER INTO POSITION
1196  002466  006104                          ROL     R4
```

```
1197  002470  006104                          ROL     R4
1198  002472  006104                          ROL     R4
1199  002474  006104                          ROL     R4
1200  002476  042704  107777                  BIC     #107777,R4
1201  002502  104430                          SP3                     ;TYPE 3 SPACES
1202                                  ;HAVE VALID TEST SELECTED, NOW GET SELECTED PATTERN
1203  002504  104400                          WAITKY
1204  002506  122737  000070  001314          CMPB    #70,CHARIN      ;IS CHARACTER A VALID NUMBER 0-7
1205  002514  003755                          BLE     SEL?3           ;NO
1206  002516  122737  000057  001314          CMPB    #57,CHARIN      ;IS CHARACTER A VALID NUMBER 0-7
1207  002524  002351                          BGE     SEL?3           ;NO
1208  002526  000337  001314                  SWAB    CHARIN          ;MOVE PATTERN SELECT INTO POSITION
1209  002532  006137  001314                  ROL     CHARIN
1210  002536  042737  170777  001314          BIC     #170777,CHARIN
1211  002544  053704  001314                  BIS     CHARIN,R4       ;COMBINE PATTERN WITH TEST
1212  002550  104430                          SP3
1213
1214                                  ;WAIT FOR RECORD LENGTH SEQUENCES SELECTION
1215  002552  104400                  SELRLS: WAITKY
1216  002554  122737  000060  001314          CMPB    #60,CHARIN      ;IS CHARACTER=0
1217  002562  001424                          BEQ     SELR3           ;YES, RLS=MIN
1218  002564  122737  000061  001314          CMPB    #61,CHARIN      ;IS CHARACTER=1
1219  002572  001003                          BNE     SELR1
1220  002574  052704  000020                  BIS     #20,R4          ;SET RLS=MAX
1221  002600  000415                          BR      SELR3
1222  002602  122737  000062  001314  SELR1:  CMPB    #62,CHARIN      ;IS CHARACTER=2
1223  002610  001003                          BNE     SELR2
1224  002612  052704  000040                  BIS     #40,R4          ;SET RLS=MIN-MAX
1225  002616  000406                          BR      SELR3
1226  002620  122737  000063  001314  SELR2:  CMPB    #63,CHARIN      ;IS CHARACTER=3
1227  002626  001310                          BNE     SEL?3
1228  002630  052704  000060                  BIS     #60,R4          ;SET RLS=MAX-MIN
1229  002634  104430                  SELR3:  SP3
1230                                  ;WAIT FOR WRITE MODE SELECTION
1231  002636  104400                          WAITKY
1232  002640  122737  000060  001314          CMPB    #60,CHARIN
1233  002646  001415                          BEQ     SELW2           ;SET WMO=NONSTOP
1234  002650  122737  000061  001314          CMPB    #61,CHARIN
1235  002656  001003                          BNE     SELW1
1236  002660  052704  000004                  BIS     #4,R4           ;SET WMO=START-STOP
1237  002664  000406                          BR      SELW2
1238  002666  122737  000062  001314  SELW1:  CMPB    #62,CHARIN
1239  002674  001265                          BNE     SEL?3
1240  002676  052704  000010                  BIS     #10,R4          ;SET WMO=RANDOM
1241  002702  104430                  SELW2:  SP3
1242                                  ;WAIT FOR READ MODE SELECTION
1243  002704  104400                          WAITKY
1344  002706  122737  000060  001314          CMPB    #60,CHARIN
1245  002714  001415                          BEQ     SELRM2          ;SET RMO=NONSTOP
1246  002716  122737  000061  001314          CMPB    #61,CHARIN
1247  002724  001003                          BNE     SELRM1
1248  002726  052704  000001                  BIS     #1,R4           ;SET RMO=START-STOP
1249  002732  000406                          BR      SELRM2
1250  002734  122737  000062  001314  SELRM1: CMPB    #62,CHARIN
1251  002742  001242                          BNE     SEL?3
1252  002744  052704  000002                  BIS     #2,R4           ;SET RMO=RANDOM
```

```
1253  002750  104430                  SELRM2: SP3
1254
1255                                  ;HAVE ALL PARAMETERS
1256  002752  012702  012713                  MOV     #MSG6,R2
1257  002756  104404                          TOP                     ;PRINT "OK"
1258  002760  104400                          WAITKY                  ;WAIT FOR CARRIAGE RETURN
1259  002762  122737  000015  001314          CMPB    #15,CHARIN
1260  002770  001402                          BEQ     .+6
1261  002772  000137  002450                  JMP     SELT3
1262  002776  105777  175516                  TSTB    @TPS
1263  003002  100375                          BPL     .-4
1264  003004  012777  000012  175510          MOV     #12,@TPB
1265  003012  105777  175502                  TSTB    @TPS
1266  003016  100375                          BPL     .-4
1267  003020  012777  000040  175474          MOV     #40,@TPB
1268  003026  010420                          MOV     R4,(0)+
1269  003030  005237  001316                  INC     NUMTST          ;+1 TO TEST COUNT
1270  003034  022737  000012  001316          CMP     #10.,NUMTST     ;EQUAL TO TEN YET
1271  003042  001402                          BEQ     SELOK1          ;YES
1272  003044  000137  002404                  JMP     SELT1           ;NO, ACCEPT NEXT SET
1273  003050  012702  012666          SELOK1: MOV     #MSG5,R2
1274  003054  104404                          TOP
1275
1276                                  ;EXECUTE SELECTED TEST
1277  003056  005037  000632          EXECUT: CLR     MODES           ;INITIALIZE MODES
1278  003062  012737  001326  001322          MOV     #TSTTBL,TSTEX
1279  003070  017737  176226  001320  EXEC:   MOV     @TSTEX,PARAM    ;GET TEST PARAMETERS
1280  003076  013700  001320          EXEC1:  MOV     PARAM,R0
1281  003102  042700  007777                  BIC     #7777,R0
1282  003106  010037  001324                  MOV     R0,TEST
1283  003112  001475                          BEQ     TEST0
1284  003114  022700  010000                  CMP     #10000,R0
1285  003120  001516                          BEQ     TEST1
1286  003122  022700  020000                  CMP     #20000,R0
1287  003126  001537                          BEQ     TEST2
1288  003130  022700  030000                  CMP     #30000,R0
1289  003134  001002                          BNE     1$
1290  003136  000137  003544                  JMP     TEST3
1291  003142  022700  040000          1$:     CMP     #40000,R0
1292  003146  001402                          BEQ     .+6
1293  003150  000137  004204                  JMP     TEST5
1294  003154  000137  003662                  JMP     TEST4
1295                                  ;RETURN HERE AFTER COMPLETION OF TEST
1296  003160  104434          DONE:   CKSWR                           ;CHECK FOR CNTL G
1297  003162  012702  014020                  MOV     #MSG26,R2
1298  003166  104404                          TOP
1299  003170  032777  000001  175314          BIT     #1,@SWR         ;IS SW 0=1 TO REPEAT TEST WITH ALL PATTERNS
1300  003176  001413                          BEQ     DONE1           ;NO
1301  003200  013700  001320                  MOV     PARAM,R0
1302  003204  042700  170777                  BIC     #170777,R0
1303  003210  022700  007000                  CMP     #7000,R0        ;REACHED PATTERN 7?
1304  003214  001404                          BEQ     DONE1           ;YES
1305  003216  062737  001000  001320          ADD     #1000,PARAM     ;NO, +1 TO PATTERN
1306  003224  000724                          BR      EXEC1           ;REPEAT TEST
1307  003226  005337  001316          DONE1:  DEC     NUMTST
1308  003232  001021                          BNE     DOAGN
```

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1309  003234  013701  000042                  MOV     @#42,R1
1310  003240  001002                          BNE     $ENDAD
1311  003242  000000                          HALT                    ;FINISHED ALL TESTS
1312  003244  104434                          CKSWR
1313  003246  004711                $ENDAD:   JSR     PC,(R1)
1314  003250  000240                          NOP
1315  003252  000240                          NOP
1316  003254  000240                          NOP
1317  003256  105737  000040                  TSTB    ACT11M                  ;ACT11 MODE? ++ C.W
1318  003262  001405                          BEQ     DOAGN                   ;BRANCH - IF NO ++ C.W
1319  003264  012702  014025                  MOV     #MSG27,R2               ;GET END OF PASS MESSAGE
1320  003270  104404                          TOP                             ;TYPE END OF PASS
1321  003272  000137  001354                  JMP     AUTOST                  ;CONTINUE TEST
1322  003276  062737  000002  001322  DOAGN:  ADD     #2,TSTEX
1323  003304  000671                          BR      EXEC            ;DO NEXT TEST
1324
1325                                  ;TEST0
1326                                  ;WRITE ONE RECORD, CHANGE DRIVES, GO TO EOT
1327  003306  052737  000002  000632  TEST0:  BIS     #2,MODES                ;EXIT WRITE EVERY RECORD, NO READ PASS
1328  003314  104420                          CLRALL                          ;CLEAR ERROR COUNTERS AND REWIND
1329  003316  104416                          GENPAT                          ;GENERATE PATTERN
1330  003320  104410                T0:       RSFDRV                          ;RESET DRIVE SELECTION TO LOWEST NUMBER
1331  003322  104414                T0A:      MVCTRS                          ;RESTORE DRIVE COUNTERS
1332  003324  032737  000040  000632          BIT     #40,MODES               ;IS THIS DRIVE AT EOT?
1333  003332  001002                          BNE     T0B                     ;YES, SKIP WRITE
1334  003334  104402                          WRITIT                          ;WRITE
1335  003336  104406                          SVCTRS                          ;SAVE DRIVE COUNTERS
1336
1337  003340  104422                T0B:      CHGDRV                          ;ANY MORE DRIVES SELECTED?
1338  003342  000767                          BR      T0A                     ;YES
1339  003344  004737  004776                  JSR     PC,ALLEOT               ;ARE ALL DRIVES AT EOT?
1340  003350  000763                          BR      T0                      ;NO
1341  003352  000137  003160                  JMP     DONE                    ;YES, EXIT
1342                                  ;TEST1
1343                                  ;WRITE RECORD LENGTH SEQUENCE, GO TO NEXT DRIVE, CONTINUE TO EOT ON ALL DRIVES.
1344  003356  052737  000001  000632  TEST1:  BIS     #1,MODES                ;EXIT WRITE AFTER RLS, NO READ PASS
1345  003364  104420                          CLRALL                          ;CLEAR ERROR COUNTERS AND REWIND
1346  003366  104416                          GENPAT                          ;GENERATE PATTERN
1347  003370  104410                T1:       RSFDRV                          ;RESET DRIVE SELECTION TO LOWEST NUMBER
1348  003372  104414                T1A:      MVCTRS                          ;RESTORE DRIVE COUNTERS
1349  003374  032737  000040  000632          BIT     #40,MODES               ;IS THIS DRIVE AT EOT?
1350  003402  001002                          BNE     T1B                     ;YES, SKIP WRITE
1351  003404  104402                          WRITIT                          ;WRITE
1352  003406  104406                          SVCTRS                          ;SAVE DRIVE COUNTERS
1353  003410  104422                T1B:      CHGDRV                          ;ANY MORE DRIVE SELECTED?
1354  003412  000767                          BR      T1A                     ;YES
1355  003414  004737  004776                  JSR     PC,ALLEOT               ;ARE ALL DRIVES AT EOT?
1356  003420  000763                          BR      T1                      ;NO
1357  003422  000137  003160                  JMP     DONE                    ;YES EXIT
1358
1359                                  ;TEST2
1360                                  ;WRITE A RECORD LENGTH SEQUENCE , CHANGE DRIVES
1361                                  ;BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES.  CONTINUE TO EOT ON ALL DRIVES
1362  003426  052737  000005  000632  TEST2:  BIS     #5,MODES                ;EXIT WRITE AFTER RLS, DO READ PASS
1363  003434  104420                          CLRALL                          ;CLEAR ERROR COUNTERS AND REWIND
1364  003436  104416                          GENPAT                          ;GENERATE PATTERN
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1365  003440  104410                          T2:         RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1366  003442  104414                          T2A:        MVCTRS          ;RESTORE DRIVE COUNTERS
1367  003444  032737  000040  000632                BIT   #40,MODES        ;IS THIS DRIVE AT EOT?
1368  003452  001002                          BNE   T2B                     ;YES, SKIP WRITE
1369  003454  104402                                WRITIT                  ;WRITE
1370  003456  104406                                SVCTRS                  ;SAVE DRIVE COUNTERS
1371  003460  104422                          T2B:        CHGDRV          ;ANYMORE DRIVERS SELECTED?
1372  003462  000767                          BR    T2A                     ;YES
1373  003464  104414                          T2C:        MVCTRS          ;RESTORE DRIVE COUNTERS
1374  003466  032737  000020  000632                BIT   #20,MODES        ;IS THIS READ AT EOT?
1375  003474  001003                          BNE   T2D                     ;YES, SKIP BACKSPACE
1376  003476  004737  011072                          JSR   PC,GOBKWD       ;BACKSPACE
1377  003502  104406                                SVCTRS                  ;SAVE DRIVE COUNTERS
1378  003504  104422                          T2D:        CHGDRV          ;ANY MORE DRIVES SELECTED?
1379  003506  000766                          BR    T2C                     ;YES
1380  003510  104414                          T2E:        MVCTRS          ;RESTORE DRIVE COUNTERS
1381  003512  032737  000020  000632                BIT   #20,MODES        ;IS THIS READ AT EOT
1382  003520  001001                          BNE   T2F                     ;YES, SKIP READ
1383  003522  104424                                READIT                  ;READ
1384  003524  104406                          T2F:        SVCTRS          ;SAVE DRIVE COUNTERS
1385  003526  104422                                CHGDRV                  ;ANYMORE DRIVES SELECTED?
1386  003530  000767                          BR    T2E                     ;YES
1387  003532  004737  004776                          JSR   PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
1388  003536  000740                          BR    T2                      ;NO
1389  003540  000137  003160                          JMP   DONE            ;YES EXIT
1390
1391                                          ;TEST3
1392                                          ;WRITE ONE RECORD, CHANGE DRIVES, BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES
1393  003544  052737  000006  000632          TEST3:  BIS   #6,MODES        ;EXIT WRITE EVERY RECORD, DO READ PASS
1394  003552  104420                                CLRALL                  ;CLEAR ERROR COUNTERS AND REWIND
1395  003554  104416                                GENPAT                  ;GENERATE PATTERN
1396  003556  104410                          T3:         RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1397  003560  104414                          T3A:        MVCTRS          ;RESTORE DRIVE COUNTERS
1398  003562  032737  000040  000632                BIT   #40,MODES        ;IS THIS DRIVE AT EOT?
1399  003570  001002                          BNE   T3B                     ;YES, SKIP WRITE
1400  003572  104402                                WRITIT                  ;WRITE
1401  003574  104406                                SVCTRS                  ;SAVE DRIVE COUNTERS
1402  003576  104422                          T3B:        CHGDRV          ;ANY MORE DRIVES SELECTED
1403  003600  000767                          BR    T3A                     ;YES
1404
1405  003602  104414                          T3C:        MVCTRS          ;RESTORE DRIVE COUNTERS
1406  003604  032737  000020  000632                BIT   #20,MODES        ;IS THIS DRIVE AT EOT
1407  003612  001002                          BNE   T3D                     ;YES, SKIP BACKSPACE
1408  003614  004737  011072                          JSR   PC,GOBKWD       ;BACKSPACE
1409  003620  104406                          T3D:        SVCTRS          ;SAVE DRIVE COUNTERS
1410  003622  104422                                CHGDRV                  ;ANY MORE DRIVES SELECTED?
1411  003624  000766                          BR    T3C                     ;GO
1412  003626  104414                          T3E:        MVCTRS          ;RESTORE DRIVE COUNTERS
1413  003630  032737  000020  000632                BIT   #20,MODES        ;IS THIS DRIVE AT EOT?
1414  003636  001001                          BNE   T3F                     ;YES, SKIP READ
1415  003640  104424                                READIT                  ;READ
1416  003642  104406                          T3F:        SVCTRS          ;SAVE DRIVE COUNTERS
1417  003644  104422                                CHGDRV                  ;ANY MORE DRIVES SELECTED
1418  003646  000767                          BR    T3E                     ;YES
1419  003650  004737  004776                          JSR   PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
1420  003654  000740                          BR    T3                      ;NO
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1421  003656  000137  003160                    JMP     DONE            ;YES, EXIT
1422
1423                                    ;TEST4
1424                                    ;WRITE RECORD, CHANGE DRIVES, REPEAT FOR RECORD LENGTH SEQUENCE
1425                                    ;READ RECORD, CHANGE DRIVES, REPEAT FOR RLS
1426  003662  052737  000006  000632   TEST4:  BIS     #6,MODES        ;EXIT WRITE EVERY RECORD, DO READ PASS
1427  003670  104416                            GENPAT                  ;GENERATE PATTERN
1428  003672  032777  000014  175422           BIT     #14,@TSTEX
1429  003700  001006                           BNE     T4
1430  003702  042737  000007  000632           BIC     #7,MODES
1431  003710  052737  000005  000632           BIS     #5,MODES        ;EXIT WRITE AFTER RLS, DO READ PASS
1432  003716  104420                    T4:             CLRALL          ;CLEAR ERROR COUNTERS AND REWIND
1433  003720  104410                    T4A:            RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1434  003722  104414                    T4B:            MVCTRS          ;RESTORE DRIVE COUNTERS
1435  003724  013737  000612  000614           MOV     RECORD,WRRECR   ;SAVE RECORD
1436  003732  104406                            SVCTRS                  ;SAVE DRIVE COUNTERS
1437  003734  104422                            CHGDRV                  ;ANYMORE DRIVES SELCTED?
1438  003736  000771                           BR      T4B             ;YES
1439  003740  042737  000010  000632           BIC     #10,MODES       ;CLEAR RLS END
1440  003746  104410                    T4C:            RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1441  003750  104414                    T4D:            MVCTRS          ;RESTORE DRIVE COUNTERS
1442  003752  032737  000040  000632           BIT     #40,MODES       ;IS DRIVE AT EOT
1443  003760  001010                           BNE     T4E             ;YES, SKIP WRITE
1444  003762  013737  000614  000550           MOV     WRRECR,SVRECR   ;SAVE START OF RLS
1445  003770  104402                            WRITIT                  ;WRITE
1446  003772  013737  000550  000614           MOV     SVRECR,WRRECR   ;RESTORE START OF RLS
1447  004000  104406                            SVCTRS                  ;SAVE DRIVE COUNTERS
1448  004002  104422                    T4E:            CHGDRV          ;ANYMORE DRIVES SELECTED?
1449  004004  000761                           BR      T4D             ;YES
1450  004006  032737  000010  000632           BIT     #10,MODES       ;ARE WE AT END OF RLS
1451  004014  001007                           BNE     T4G             ;YES
1452  004016  104414                    T4F:            MVCTRS          ;RESTORE DRIVE COUNTERS
1453  004020  032737  000040  000632           BIT     #40,MODES       ;ARE WE AT EOT?
1454  004026  001747                           BEQ     T4C             ;NO
1455  004030  104422                            CHGDRV                  ;ANYMORE DRIVES SELECTED?
1456  004032  000771                           BR      T4F             ;YES
1457  004034  104410                    T4G:    RSFDRV                          ;SET DRIVE SELECTION TO LOWEST NUMBER
1458  004036  104414                    T4H:            MVCTRS          ;RESTORE DRIVE COUNTERS
1459  004040  032737  000020  000632           BIT     #20,MODES       ;IS THIS DRIVE AT EOT?
1460  004046  001002                           BNE     T4J             ;YES, SKIP BACKSPACE
1461  004050  004737  011072                    JSR     PC,GOBKWD       ;BACKSPACE
1462  004054  104406                    T4J:            SVCTRS          ;SAVE DRIVE COUNTERS
1463  004056  104422                            CHGDRV                  ;ANY MORE DRIVES SELECTED?
1464  004060  000766                           BR      T4H             ;YES
1465  004062  104410                    T4K:    RSFDRV                  ;SET DRIVE SELECTION TO LOWEST NUMBER
1466  004064  104414                    T4L:            MVCTRS          ;RESTORE DRIVE COUNTERS
1467  004066  032737  000020  000632           BIT     #20,MODES       ;IS THIS READ AT EOT?
1468  004074  001025                           BNE     T4N             ;YES, SKIP READ
1469  004076  023737  000616  000612           CMP     LASRCR,RECORD   ;HAVE WE READ LAST RECORD WRITTEN?
1470  004104  001421                           BEQ     T4N             ;YES
1471  004106  013737  000616  000550           MOV     LASRCR,SVRECR   ;SAVE LAST RECORD
1472  004114  032737  000003  001320           BIT     #3,PARAM        ;IS READ MODE NONSTOP?
1473  004122  001405                           BEQ     T4M             ;YES
1474  004124  013737  000612  000616           MOV     RECORD,LASRCR
1475  004132  005237  000616                    INC     LASRCR          ;+1 TO LAST RECORD WRITTEN
1476  004136  104424                    T4M:            READIT          ;READ
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1477  004140  013737  000550  000616          MOV     SVRECR,LASRCR   ;RESTORE LAST RECORD WRITTEN
1478  004146  104406                          SVCTRS                  ;SAVE DRIVE COUNTERS
1479  004150  104422                  T4N:    CHGDRV                  ;ANYMORE DRIVES SELECTED?
1480  004152  000744                          BR      T4L             ;YES
1481  004154  104414                  T4P:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1482  004156  023737  000616  000612          CMP     LASRCR,RECORD   ;ARE WE AT END OF RLS?
1483  004164  001336                          BNE     T4K             ;NO
1484  004166  104422                          CHGDRV                  ;ANYMORE DRIVES SELECTED?
1485  004170  000771                          BR      T4P             ;YES
1486  004172  004737  004776                  JSR     PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
1487  004176  000650                          BR      T4A             ;NO
1488  004200  000137  003160                  JMP     DONE            ;YES,EXIT
1489
1490                                  ;TEST5
1491                                  ;READ ONLY
1492                                  ;RANDOM PATTERN INVALID EXCEPT FOR SPECIFIC CASES
1493  004204  052737  000002  000632  TEST5:  BIS     #2,MODES
1494  004212  104420                          CLRALL                  ;CLEAR ERROR COUNTERS AND REWIND
1495  004214  104416                          GENPAT                  ;GENERATE PATTERN
1496  004216  012737  177777  004464  T5:     MOV     #-1,T5FLAG      ;ENABLE EXIT FROM WRITE ROUTINE
1497  004224  104402                          WRITIT                  ;ENTER WRITE ONLY TO INITIALIZE RECORD SEQUENCE
1498  004226  032737  000010  000632          BIT     #10,MODES       ;ARE WE AT END OF RLS?
1499  004234  001402                          BEQ     T5A             ;YES
1500  004236  004737  005616                  JSR     PC,TESINC       ;SEE IF RECORD LENGTH SHOULD BE CHANGED
1501  004242  013737  000612  004466  T5A:    MOV     RECORD,T5INC
1502  004250  005037  000612                  CLR     RECORD
1503  004254  052737  000010  000632  T5B:    BIS     #10,MODES       ;INDICATE AT START OF RLS
1504  004262  104410                          RSFDRV                  ;SET DRIVE SELECTION TO LOWEST DRIVE NUMBER
1505  004264  104414                  T5C:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1506  004266  032737  000020  000632          BIT     #20,MODES       ;IS THIS DRIVE AT EOT
1507  004274  001007                          BNE     T5D             ;YES
1508  004276  013737  000612  000616          MOV     RECORD,LASRCR
1509  004304  063737  004466  000616          ADD     T5INC,LASRCR    ;CURRENT RECORD + SEQUENCE LENGTH
1510  004312  104406                          SVCTRS                  ;SAVE DRIVE COUNTERS
1511  004314  104422                  T5D:    CHGDRV                  ;ANYMORE DRIVES?
1512  004316  000762                          BR      T5C             ;YES
1513  004320  104410                          RSFDRV                  ;SET DRIVE SELECTION TO LOWEST NUMBER
1514  004322  104414                  T5E:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1515  004324  032737  000020  000632          BIT     #20,MODES       ;IS THIS DRIVE AT EOT?
1516  004332  001021                          BNE     T5G             ;YES
1517  004334  013737  000616  000550          MOV     LASRCR,SVRECR   ;SAVE END OF RLS RECORDS
1518  004342  032737  000003  001320          BIT     #3,PARAM        ;IS READ MODE NONSTOP
1519  004350  001405                          BEQ     T5F             ;YES GO TO END RLS
1520  004352  013737  000612  000616          MOV     RECORD,LASRCR   ;NEXT TO BE READ
1521  004360  005237  000616                  INC     LASRCR          ;+1 EXIT READ AFTER ONE RECORD
1522  004364  104424                  T5F:    READIT                  ;READ
1523  004366  013737  000550  000616          MOV     SVRECR,LASRCR   ;RESTORE END RECORD
1524  004374  104406                          SVCTRS                  ;SAVE DRIVE COUNTERS
1525  004376  104422                  T5G:    CHGDRV                  ;ANY MORE DRIVES?
1526  004400  000750                          BR      T5E             ;YES
1527  004402  004737  004776                  JSR     PC,ALLEOT       ;ALL AT EOT?
1528  004406  000402                          BR      T5H             ;NO
1529  004410  000137  003160                  JMP     DONE            ;YES EXIT
1530  004414  104410                  T5H:    RSFDRV                  ;SET DRIVE SELECTION TO LOWEST NUMBER
1531  004416  104414                  T5J:    MVCTRS                  ;RESTORE DRIVE COUNTERS
1532  004420  023737  000612  000616          CMP     RECORD,LASRCR   ;ARE WE AT END OF RLS?
```

```
1533  004426  001003                        BNE     TSK             ;NO
1534  004430  042737  000010  000632        BIC     #10,MODES       ;YES,
1535  004436  104422                TSK:    CHGDRV                  ;ANYMORE DRIVES SELECTED?
1536  004440  000766                        BR      TSJ             ;YES
1537  004442  032737  000010  000632        BIT     #10,MODES       ;AT END OF RLS?
1538  004450  001324                        BNE     TSE             ;NO
1539  004452  004737  004776                JSR     PC,ALLEOT       ;ALL DRIVES AT EOT?
1540  004456  000657                        BR      TS              ;NO
1541  004460  000137  003160                JMP     DONE            ;YES, EXIT
1542  004464  000000            TSFLAG: 0
1543  004466  000000            TSINC:  0
1544
1545                              ;SAVE DRIVE RECORD AND ERROR COUNTERS
1546  004470  004737  004524    SVCTR:  JSR     PC,CTRDEX
1547  004474  012021    SVC1:   MOV     (0)+,(1)+
1548  004476  022700  000634            CMP     #DRVADR,R0
1549  004502  001374                    BNE     SVC1
1550  004504  000207                    RTS     PC
1551                              ;RESET DRIVE COUNTERS BACK INTO PROGRAM
1552  004506  004737  004524    MVCTR:  JSR     PC,CTRDEX
1553  004512  012120    MV1:    MOV     (1)+,(0)+
1554  004514  022700  000634            CMP     #DRVADR,R0
1555  004520  001374                    BNE     MV1
1556  004522  000207                    RTS     PC
1557                              ;SET UP POINTERS FOR MOVE AND SAVE COUNTERS
1558  004524  012700  000570    CTRDEX: MOV     #WRCHEK,R0
1559  004530  012701  000634            MOV     #DRVADR,R1
1560  004534  063701  000556            ADD     CDRIVE,R1
1561  004540  063701  000556            ADD     CDRIVE,R1
1562  004544  011101                    MOV     @R1,R1
1563  004546  000207                    RTS     PC
1564                              ;CLEAR ALL DRIVE COUNTERS
1565  004550  104410    CLRAL:          RSFDRV
1566  004552  004737  004740    CLR1:   JSR     PC,REWIND
1567  004556  004737  005104            JSR     PC,CLRTBL
1568  004562  104406                    SVCTRS
1569  004564  104422                    CHGDRV
1570  004566  000771                BR      CLR1
1571  004570  052737  000010  000632    BIS     #10,MODES       ;AT END OF RLS
1572  004576  005037  004464            CLR     TSFLAG
1573  004602  000207                    RTS     PC
1574                              ;RESET DRIVE SELECTION TO LOWEST NUMBER
1575  004604  005037  000556    RSFDR:  CLR     CDRIVE          ;START WITH DRIVE 0
1576  004610  012737  000200  000554    MOV     #200,CDRVBT     ;BIT FOR DRIVE 0
1577  004616  033737  000546  000554 RSF1:   BIT     MSBITS,CDRVBT   ;IS DRIVE SELECTED?
1578  004624  001006                    BNE     RSF2            ;YES
1579  004626  005237  000556            INC     CDRIVE          ;NO + 1 TO DRIVE
1580  004632  000241                    CLC
1581  004634  006037  000554            ROR     CDRVBT          ;ROTATE DRIVE BIT
1582  004640  000766                    BR      RSF1            ;REPEAT
1583  004642  013737  000556  000552 RSF2:   MOV     CDRIVE,COMAND
1584  004650  000337  000552            SWAB    COMAND
1585  004654  052737  060000  000552    BIS     #60000,COMAND   ;800 BPI, 9 TRACK
1586  004662  032777  001000  173622    BIT     #1000,@SWR      ;TEST PARITY SELECTED
1587  004670  001403                    BEQ     .+10            ;ODD
1588  004672  052737  004000  000552    BIS     #4000,COMAND    ;EVEN
```

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1589  004700  000207                          RTS     PC
1590
1591                                  ;SELECT NEXT DRIVE IN SEQUENCE
1592                                  ;+1 WORD TO EXIT ADDRESS IF LAST DRIVE TESTED
1593  004702  005237  000556          CHGDR:  INC     CDRIVE          ;+1 TO DRIVE NUMBER
1594  004706  000241                          CLC
1595  004710  006037  000554                  ROR     CDRVBT          ;MOVE MASK BIT OVER 1 PLACE
1596  004714  001004                          BNE     CHG1            ;BRANCH IF MORE DRIVES SELECTED
1597  004716  104410                          RSFDRV                  ;RESET DRIVE SELECT TO LOWEST NUMBER
1598  004720  062716  000002                  ADD     #2,@SP          ;+ 2 TO SKIP OVER FIRST EXIT
1599  004724  000207                          RTS     PC
1600  004726  033737  000554  000546  CHG1:   BIT     CDRVBT,MSBITS
1601  004734  001762                          BEQ     CHGDR
1602  004736  000741                          BR      RSF2
1603
1604                                  ;REWIND DRIVE TO BOT
1605  004740  105777  173536          REWIND: TSTB    @MTC
1606  004744  100375                          BPL     .-4             ;WAIT FOR CONTROL UNIT
1607  004746  013777  000552  173526          MOV     COMAND,@MTC     ;SELECT DRIVE
1608  004754  006077  173520                  ROR     @MTS
1609  004760  103375                          BCC     .-4             ;WAIT FOR TU READY
1610  004762  052777  000016  173512          BIS     #16,@MTC        ;REWIND
1611  004770  004737  005130                  JSR     PC,GOWAIT
1612  004774  000207                          RTS     PC              ;EXIT
1613                                  ;ARE ALL DRIVES AT END OF TAPE
1614  004776  104410                  ALLEOT:         RSFDRV
1615  005000  104414                  ALL1:           MVCTRS
1616  005002  032737  000060  000632          BIT     #60,MODES       ;AT EOT?
1617  005010  001403                          BEQ     ALLEOS          ;NO
1618  005012  104422                          CHGDRV                  ;DONE ALL DRIVES?
1619  005014  000771                          BR      ALL1            ;NO
1620  005016  000427                          BR      ALL3
1621  005020  032777  000400  173464  ALLEOS: BIT     #400,@SWR       ;TEST SWITCH 8 TO EXIT AT END OF SEQUENCE
1622  005026  001425                          BEQ     ALL2            ;NO, GO TO EOT
1623  005030  032737  000010  000632          BIT     #10,MODES       ;AT END OF SEQUENCE
1624  005036  001421                          BEQ     ALL2            ;NO, EXIT, DON'T DUMP ERROR COUNTERS
1625                                  ;DUMP ERROR COUNTERS ON ALL DRIVES
1626  005040  104410                  CTRDMP: RSFDRV
1627  005042  104414                          MVCTRS
1628  005044  005737  004464                  TST     TSFLAG
1629  005050  001006                          BNE     CTRD1           ;DUMP READ ONLY
1630  005052  004737  006154                  JSR     PC,ENDT1
1631  005056  032737  000004  000632          BIT     #4,MODES        ;READ PASS SELECTED?
1632  005064  001402                          BEQ     CDMEND          ;NO
1633  005066  004737  010326          CTRD1:  JSR     PC,RNDTP1
1634  005072  104422                  CDMEND: CHGDRV                  ;DONE ALL DRIVES
1635  005074  000762                          BR      CTRDMP+2        ;NO
1636  005076  062716  000002          ALL3:   ADD     #2,(6)          ;INCREMENT RETURN POINT
1637  005102  000207                  ALL2:   RTS     PC
1638
1639                                  ;CLEAR READ AND WRITE TABLES
1640  005104  012700  000570          CLRTBL: MOV     #WRCHEK,R0
1641  005110  005020                  CLRT1:  CLR     (0)+
1642  005112  020027  000632                  CMP     R0,#MODES
1643  005116  001374                          BNE     CLRT1
1644  005120  042737  000070  000632          BIC     #70,MODES
```

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1645  005126  000207                                  RTS     PC
1646                                  ;INTERRUPT ENABLE, GO, WAIT FOR INTERRUPT
1647  005130  012777  000200  173352  GOWAIT: MOV     #200,@CC        ;SET PRIORITY LEVEL-4
1648  005136  012777  005172  173370          MOV     #GW1,@MTV       ;SET INTERRUPT RETURN
1649  005144  012737  000001  005160          MOV     #1,WAIT1
1650  005152  052777  000101  173322          BIS     #101,@MTC       ;INTERRUPT ENABLE, GO
1651  005160  000001                  WAIT1:  WAIT                    ;WAIT FOR INTERRUPT
1652  005162  012777  000340  173320          MOV     #340,@CC        ;RESTORE PRIORITY LEVEL 7
1653  005170  000207                          RTS     PC              ;EXIT
1654  005172  012737  000001  005160  GW1:    MOV     #1,WAIT1
1655  005200  000002                          RTI                     ;RETURN FROM INTERRUPT
1656
1657                                  ;WRITE RECORD SECTION
1658  005202  005737  000612          WRITI:  TST     RECORD          ;IS THIS THE FIRST RECORD
1659  005206  001031                          BNE     NOINCR          ;NO, SKIP SET UP OF RECORD LENGTH AND BLOCK INCREMENT
1660  005210  013737  000524  000542          MOV     MAXLEN,STRLEN
1661  005216  012737  177774  000564          MOV     #-4.,BLKINC
1662  005224  032737  000020  001320          BIT     #20,PARAM
1663  005232  001006                          BNE     W1
1664  005234  013737  000526  000542          MOV     MINLEN,STRLEN
1665  005242  012737  000004  000564          MOV     #4.,BLKINC
1666  005250  013737  000542  000626  W1:     MOV     STRLEN,WRTLEN
1667  005256  032737  000040  001320          BIT     #40,PARAM       ;DOES RECORD LENGTH CHANGE?
1668  005264  001002                          BNE     NOINCR          ;YES
1669  005266  005037  000564                  CLR     BLKINC          ;NO
1670  005272  013737  000612  000614  NOINCR: MOV     RECORD,WRRECR
1671  005300  005737  004464                  TST     TSFLAG
1672  005304  001401                          BEQ     .+4
1673  005306  000207                          RTS     PC              ;EXIT WRITE ROUTINE IF TEST 5
1674  005310  005037  000562                  CLR     WRPASS
1675  005314  013777  000552  173160  STRTOP: MOV     COMAND,@MTC     ;SELECT UNIT
1676  005322  105777  173154                  TSTB    @MTC
1677  005326  100375                          BPL     .-4             ;WAIT FOR CU READY
1678  005330  006077  173144                  ROR     @MTS            ;WAIT FOR TU READY
1679  005334  103375                          BCC     .-4
1680  005336  013777  000626  173140  NONSTP: MOV     WRTLEN,@BC      ;SET BYTE COUNT
1681  005344  005477  173134                  NEG     @BC
1682  005350  013777  000530  173130          MOV     WBUF,@CA        ;SET CURRENT ADDRESS
1683  005356  052777  000004  173116          BIS     #4,@MTC         ;WRITE
1684  005364  004737  005130                  JSR     PC,GOWAIT       ;INTERRUPT ENABLE, GO, WAIT FOR DONE
1685                                  ;RETURN HERE AFTER INTERRUPT
1686  005370  017737  173104  000566          MOV     @MTS,STATRD     ;SAVE STATUS
1687  005376  005777  173100                  TST     @MTC
1688  005402  100542                          BMI     ERROR           ;HAVE ERROR FLAG, CHECK FOR EOT
1689  005404  005737  000562                  TST     WRPASS          ;WAS THIS A RECOVERY PASS
1690  005410  001410                          BEQ     TSTSTP          ;NO
1691  005412  013700  000562                  MOV     WRPASS,R0       ;YES
1692  005416  006300                          ASL     R0
1693  005420  062700  000570                  ADD     #WRCHEK,R0
1694  005424  005210                          INC     @R0             ;+1 TO APPROPRIATE RECOVERY PASS COUNTER
1695  005426  005037  000562                  CLR     WRPASS
1696  005432  032737  000014  001320  TSTSTP: BIT     #14,PARAM       ;IS WRITE MODE NONSTOP?
1697  005440  001023                          BNE     STOPOP          ;NO
1698  005442  005737  000562                  TST     WRPASS          ;YES
1699  005446  001333                          BNE     NONSTP
1700  005450  004737  005616                  JSR     PC,TESINC       ;CHANGE RECORD LENGTH
```

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 1701  005454  032737  000001  000632          BIT     #1,MODES        ;EXIT AFTER RLS?
 1702  005462  001405                          BEQ     W10             ;NO
 1703  005464  032737  000010  000632          BIT     #10,MODES       ;YES, ARE WE AT END OF RLS?
 1704  005472  001721                          BEQ     NONSTP          ;NO
 1705  005474  000207                          RTS     PC              ;YES
 1706  005476  032737  000002  000632  W10:    BIT     #2,MODES        ;EXIT EVERY RECORD?
 1707  005504  001714                          BEQ     NONSTP          ;NO
 1708  005506  000207                          RTS     PC              ;YES
 1709  005510  032737  000010  001320  STOPOP: BIT     #10,PARAM       ;IS WRITE MODE RANDOM?
 1710  005516  001414                          BEQ     W11             ;NO
 1711                                  ;RANDOM STALL DELAY
 1712  005520  004737  007222          RANSTP: JSR     PC,RANGEN
 1713  005524  052737  177400  007372          BIS     #177400,RANDOM
 1714  005532  012704  177470          RAN1:   MOV     #-200.,R4       ;DELAY 1 MILLISECOND
 1715  005536  005204                          INC     R4
 1716  005540  001376                          BNE     .-2
 1717  005542  005237  007372                  INC     RANDOM
 1718  005546  001371                          BNE     RAN1
 1719  005550  005737  000562          W11:    TST     WRPASS
 1720  005554  001257                          BNE     STRTOP
 1721  005556  004737  005616                  JSR     PC,TESINC
 1722  005562  032737  000001  000632          BIT     #1,MODES        ;EXIT AFTER RLS?
 1723  005570  001405                          BEQ     W12             ;NO
 1724  005572  032737  000010  000632          BIT     #10,MODES       ;YES, ARE WE AT END OF RLS?
 1725  005600  001645                          BEQ     STRTOP          ;NO
 1726  005602  000207                          RTS     PC              ;YES
 1727  005604  032737  000002  000632  W12:    BIT     #2,MODES        ;EXIT EVERY RECORD?
 1728  005612  001640                          BEQ     STRTOP          ;NO
 1729  005614  000207                          RTS     PC              ;YES
 1730                                  ;SEE IF RECORD LENGTH SHOULD BE CHANGED
 1731  005616  005237  000612          TESINC: INC     RECORD          ;+1 TO RECORD COUNT
 1732  005622  042737  000010  000632          BIC     #10,MODES       ;NOT END OF RLS UNLESS SET BELOW
 1733  005630  005737  000564                  TST     BLKINC
 1734  005634  001416                          BEQ     TSINC2
 1735  005636  063737  000564  000626          ADD     BLKINC,WRTLEN
 1736  005644  023737  000626  000526          CMP     WRTLEN,MINLEN   ;RECORD LENGTH TOO SHORT?
 1737  005652  002404                          BLT     RESETL          ;YES,RESET
 1738  005654  023737  000626  000524          CMP     WRTLEN,MAXLEN   ;RECORD LENGTH TOO LONG?
 1739  005662  003403                          BLE     TSINC2          ;NO
 1740  005664  013737  000542  000626  RESETL: MOV     STRLEN,WRTLEN   ;YES, RESET
 1741  005672  105737  000612          TSINC2: TSTB    RECORD          ;IS RECORD A MULTIPLE OF 256
 1742  005676  001003                          BNE     TSINC3          ;NO
 1743  005700  052737  000010  000632          BIS     #10,MODES       ;INDICATE AT END OF RLS
 1744  005706  000207                  TSINC3: RTS     PC
 1745
 1746
 1747                                  ;HAVE AN ERROR FLAG DURING WRITE OPERATION
 1748                                  ;IF ERROR IS CAUSED BY END OF TAPE FLAG DUMP WRITE ERROR COUNTERS
 1749                                  ;FOR ALL OTHER ERRORS:  PRINT COMMAND AND STATUS REGISTERS AND RECORD NUMBER
 1750                                  ;IF READ PASS IS SELECTED, TRY TO RECOVER BY WRITING WITH XIRG.
 1751  005710  104434                  ERROR:  CKSWR                   ;CHECK FOR CNTL G
 1752  005712  032737  175600  000566          BIT     #175600,STATRD  ;AT EOT?
 1753  005720  001510                          BEQ     ENDTAP          ;YES
 1754  005722  005737  000562                  TST     WRPASS
 1755  005726  001002                          BNE     ERR1            ;FIRST ERROR?
 1756  005730  005237  000570                  INC     WRCHEK          ;YES, + 1 TO WRITE ERROR
```

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1757  005734  032777  020000  172550  ERR1:   BIT     #20000,@SWR     ;TYPE ALL ERRORS?
1758  005742  001010                          BNE     TESREC          ;NO
1759  005744  012702  012720                  MOV     #MSG7,R2
1760  005750  104404                          TOP                     ;PRINT ERROR
1761  005752  013737  000626  000544          MOV     WRTLEN,LENGTH
1762  005760  004737  011202                  JSR     PC,PRTS         ;PRINT STATUS, COMMAND, RECORD, LENGTH
1763  005764  032777  000100  172520  TESREC: BIT     #100,@SWR       ;RECOVER STATISTICALLY SELECTED?
1764  005772  001410                          BEQ     TESRC1          ;NO
1765  005774  005237  000562                  INC     WRPASS          ;+1 TO WRITE RECOVER
1766  006000  022737  000010  000562          CMP     #8.,WRPASS      ;HAVE WE TRIED TO WRITE RECOVER 8 TIMES?
1767  006006  001020                          BNE     STREC1          ;NO
1768  006010  005237  000610                  INC     PERMBS          ;YES, +1 TO PERMANENT BADSPOT?
1769  006014  032737  000004  000632  TESRC1: BIT     #4,MODES        ;IS READ PASS SELECTED?
1770  006022  001402                          BEQ     .+6             ;NO
1771  006024  004737  010652                  JSR     PC,XRGREC
1772  006030  005037  000562                  CLR     WRPASS
1773  006034  032737  002000  000566          BIT     #2000,STATRD
1774  006042  001037                          BNE     ENDTAP
1775  006044  000137  005550                  JMP     W11
1776  006050  004737  010250          STREC1: JSR     PC,BACK1
1777  006054  004737  010250                  JSR     PC,BACK1        ;BACKSPACE 2 RECORDS
1778  006060  032777  000040  172412          BIT     #40,@MTS
1779  006066  001402                          BEQ     .+6
1780  006070  000137  005314                  JMP     STRTOP
1781  006074  012777  177777  172402          MOV     #-1,@BC
1782  006102  013777  000552  172372          MOV     COMAND,@MTC
1783  006110  052777  000010  172364          BIS     #10,@MTC
1784  006116  004737  005130                  JSR     PC,GOWAIT       ;SPACE FORWARD 1 RECORD
1785  006122  042777  000016  172352          BIC     #16,@MTC
1786  006130  052777  000004  172344          BIS     #4,@MTC         ;CHANGE FROM SPACE TO WRITE
1787  006136  000137  005314                  JMP     STRTOP
1788                                  ;DRIVE IS AT EOT
1789  006142  005237  000612          ENDTAP: INC     RECORD
1790  006146  052737  000040  000632          BIS     #40,MODES       ;INDICATE DRIVE AT EOT
1791  006154  012702  013710          ENDT1:  MOV     #MSG24,R2
1792  006160  104404                          TOP
1793  006162  012702  012746                  MOV     #MSG8,R2
1794  006166  104404                          TOP
1795                                  ;DUMP WRITE ERRORS
1796  006170  104434                  WRTDMP: CKSWR                   ;CHECK FOR CNTL G
1797  006172  013737  000552  011356          MOV     COMAND,CHAR
1798  006200  000337  011356                  SWAB    CHAR
1799  006204  142737  000170  011356          BICB    #170,CHAR
1800
1801  006212  052737  000260  011356          BIS     #260,CHAR
1802  006220  004737  011360                  JSR     PC,OCTP         ;PRINT DRIVE NUMBER
1803  006224  104430                          SP3
1804  006226  013737  001320  011356          MOV     PARAM,CHAR
```

1805 006234 000337 011356 SWAB CHAR

1806 006240 006037 011356 ROR CHAR

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  1807  006244  042737  000170  011356          BIC     #170,CHAR
  1808  006252  052737  000260  011356          BIS     #260,CHAR
  1809  006260  004737  011360                  JSR     PC,OCTP         ;PRINT PATTERN NUMBER
  1810  006264  013737  001320  011356          MOV     PARAM,CHAR
  1811  006272  042737  177763  011356          BIC     #177763,CHAR
  1812  006300  012702  013441                  MOV     #MSG14,R2
  1813  006304  022737  000004  011356          CMP     #4,CHAR
  1814  006312  001002                          BNE     .+6
  1815  006314  012702  013415                  MOV     #MSG12,R2
```

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  1816  006320  022737  000010  011356          CMP     #10,CHAR
  1817  006326  001002                          BNE     .+6
```

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1818  006330  012702  013427                    MOV     #MSG13,R2
1819  006334  104404                            TOP                     ;PRINT WRITE MODE
1820  006336  013702  000612                    MOV     RECORD,R2
1821  006342  104426                            DECPRT                  ;PRINT RECORD NUMBER
1822  006344  013737  001320  011356            MOV     PARAM,CHAR
1823  006352  042737  177717  011356            BIC     #177717,CHAR
1824  006360  012702  013471                    MOV     #MSG17,R2
1825  006364  022737  000020  011356            CMP     #20,CHAR
1826  006372  001002                            BNE     .+6
1827  006374  012702  013500                    MOV     #MSG18,R2
1828  006400  022737  000040  011356            CMP     #40,CHAR
1829  006406  001002                            BNE     .+6
1830  006410  012702  013453                    MOV     #MSG15,R2
1831  006414  022737  000060  011356            CMP     #60,CHAR
1832  006422  001002                            BNE     .+6
1833  006424  012702  013462                    MOV     #MSG16,R2
1834  006430  104404                            TOP                     ;PRINT RECORD LENGTH SEQUENCE
1835  006432  012702  013507                    MOV     #MSG19,R2
1836  006436  104404                            TOP
1837  006440  013702  000570                    MOV     WRCHEK,R2
1838  006444  104426                            DECPRT                  ;PRINT "WRITE ERRORS="
1839  006446  012700  000572                    MOV     #WRCHEK+2,R0
1840  006452  112737  000060  013550            MOVB    #60,MSG20+17
1841  006460  105237  013550          WRTD1:    INCB    MSG20+17        ;PRINT STATISTICAL RECOVERY
1842  006464  005710                            TST     @R0
1843  006466  001405                            BEQ     WRTD2
1844  006470  012702  013531                    MOV     #MSG20,R2
1845  006474  104404                            TOP
1846  006476  011002                            MOV     (0),R2
1847  006500  104426                            DECPRT                  ;RECOVERED AT X
1848  006502  005720                  WRTD2:    TST     (0)+            ;JUST INCREMENTING
1849  006504  020027  000610                    CMP     R0,#WRCHEK+20
1850  006510  001363                            BNE     WRTD1
1851  006512  005737  000610                    TST     PERMBS
1852  006516  001001                            BNE     .+4             ;SKIP PRINT IF = 0
1853  006520  000207                            RTS     PC
1854
1855
1856  006522  012702  013553                    MOV     #MSG20A,R2
1857  006526  104404                            TOP
1858  006530  013702  000610                    MOV     PERMBS,R2       ;PRINT "PERMANENT BADSPOT"
1859  006534  104426                            DECPRT
1860  006536  000207                            RTS     PC
1861                            ;GENERATE DATA PATTERN
1862  006540  013702  000530          GENPA:    MOV     WBUF,R2 ;INITIALIZE BUFFER
1863  006544  013737  001320  006652            MOV     PARAM,GP1       ;CHECK PARAMETERS FOR PATTERN SELECTED
1864  006552  042737  170777  006652            BIC     #170777,GP1
1865  006560  001435                            BEQ     PAT0
1866  006562  022737  001000  006652            CMP     #1000,GP1
1867  006570  001437                            BEQ     PAT1
1868  006572  022737  002000  006652            CMP     #2000,GP1
1869  006600  001457                            BEQ     PAT2
1870  006602  022737  003000  006652            CMP     #3000,GP1
```

```
 1871  006610  001461                        BEQ     PAT3
 1872  006612  022737  004000  006652        CMP     #4000,GP1
 1873  006620  001501                        BEQ     PAT4
 1874  006622  022737  005000  006652        CMP     #5000,GP1
```

```
  1875  006630  001510                          BEQ     PAT5
  1876  006632  022737  006000  006652          CMP     #6000,GP1
  1877  006640  001402                          BEQ     .+6
```

```
1878  006642  000137  007202                JMP     PAT7
1879  006646  000137  007166                JMP     PAT6
1880  006652  000000            GP1:        0
1881                              ;PATTERN 0
1882                              ;HALF FREQUENCY OUTSIDE SKEW
1883  006654  012722  002010    PAT0:       MOV     #2010,(2)+      ;(010)(004)
1884  006660  023702  000532                CMP     RBUF,R2
1885  006664  001373                        BNE     PAT0
1886  006666  000207                        RTS     PC
1887                              ;PATTERN 1
1888                              ;SLIDING 1 BIT (ISOLATED BIT)
1889  006670  012700  006716    PAT1:       MOV     #P1T,R0
1890  006674  012022    PAT1A:   MOV     (0)+,(2)+
1891  006676  023702  000532                CMP     RBUF,R2
1892  006702  001001                        BNE     .+4
1893  006704  000207                        RTS     PC
1894  006706  022700  006740                CMP     #PAT2,R0
1895  006712  001370                        BNE     PAT1A
1896  006714  000765                        BR      PAT1
1897  006716  100000            P1T:        100000
1898  006720  020100                        20100
1899  006722  004020                        4020
1900  006724  001004                        1004
1901  006726  000001                        1
1902  006730  040200                        40200
1903  006732  010040                        10040
1904  006734  002010                        2010
1905  006736  000402                        402
1906
1907                              ;PATTERN 2
1908                              ;HIGH FREQUENCY EVERY OTHER TRACK
1909  006740  012722  136274    PAT2:       MOV     #136274,(2)+    ;(274)(274)
1910  006744  023702  000532                CMP     RBUF,R2
1911  006750  001373                        BNE     PAT2
1912  006752  000207                        RTS     PC
1913                              ;PATTERN 3
1914                              ;THREE 0'S, THREE 1'S, THREE 0'S.
1915  006754  012700  007002    PAT3:       MOV     #P3T,R0
1916  006760  012022    PAT3A:   MOV     (0)+,(2)+
1917  006762  023702  000532                CMP     RBUF,R2
1918  006766  001001                        BNE     .+4
1919  006770  000207                        RTS     PC
1920  006772  022700  007024                CMP     #PAT4,R0
1921  006776  001370                        BNE     PAT3A
1922  007000  000765                        BR      PAT3
1923  007002  140037            P3T:        140037
1924  007004  100476                        100476
1925  007006  001574                        1574
1926  007010  003770                        3770
1927  007012  017760                        17760
1928  007014  037300                        37300
1929  007016  076201                        76201
1930  007020  174003                        174003
1931  007022  170007                        170007
1932                              ;PATTERN 4
1933                              ;INCREMENTING PATTERN (0-377)
```

```
1934  007024  105037  007050          PAT4:   CLRB    P4A
1935  007030  113722  007050          P4:     MOVB    P4A,(2)+
1936  007034  105237  007050                  INCB    P4A
1937  007040  023702  000532                  CMP     RBUF,R2
1938  007044  001371                          BNE     P4
1939  007046  000207                          RTS     PC
1940  007050  000000          P4A:    0
1941
1942                                  ;PATTERN 5
1943                                  ;EACH TRACK 3 BITS
1944  007052  012700  007100          PAT5:   MOV     #P5T,R0
1945  007056  012022                  PAT5A:  MOV     (0)+,(2)+
1946  007060  023702  000532                  CMP     RBUF,R2
1947  007064  001001                          BNE     .+4
1948  007066  000207                          RTS     PC
1949  007070  022700  007166                  CMP     #PAT6,R0
1950  007074  001370                          BNE     PAT5A
1951  007076  000765                          BR      PAT5
1952  007100  000000          P5T:    0
1953  007102  100000                  100000
1954  007104  100200                  100200
1955  007106  040100                  40100
1956  007110  020100                  20100
1957  007112  020040                  20040
1958  007114  010020                  10020
1959  007116  004020                  4020
1960  007120  004010                  4010
1961  007122  002004                  2004
1962  007124  001004                  1004
1963  007126  001002                  1002
1964  007130  000401                  401
1965  007132  000001                  1
1966  007134  000000                  0
1967  007136  100200                  100200
1968  007140  040200                  40200
1969  007142  040100                  40100
1970  007144  020040                  20040
1971  007146  010040                  10040
1972  007150  010020                  10020
1973  007152  004010                  4010
1974  007154  002010                  2010
1975  007156  002004                  2004
1976  007160  001002                  1002
1977  007162  000402                  402
1978  007164  000401                  401
1979                                  ;PATTERN 6
1980                                  ;HIGH FREQUENCY ALL TRACKS
1981  007166  012722  177777          PAT6:   MOV     #-1,(2)+
1982  007172  023702  000532                  CMP     RBUF,R2
1983  007176  001373                          BNE     PAT6
1984  007200  000207                          RTS     PC
1985
1986
1987                                  ;PATTERN 7
1988                                  ;RANDOM
1989  007202  004737  007222          PAT7:   JSR     PC,RANGEN
```

```
1990  007206  013722  007372                  MOV     RANDOM,(2)+
1991  007212  023702  000532                  CMP     RBUF,R2
1992  007216  001371                          BNE     PAT7
1993  007220  000207                          RTS     PC
1994                                  ;RANDOM NUMBER GENERATOR
1995                                  ;EXIT WITH RANDOM NUMBER IN LOCATION NAMED "RANDOM"
1996  007222  010037  007400          RANGEN: MOV     R0,SV0          ;SAVE REGISTERS
1997  007226  010137  007402                  MOV     R1,SV1
1998  007232  010237  007404                  MOV     R2,SV2
1999  007236  010337  007406                  MOV     R3,SV3
2000  007242  013700  007374                  MOV     LONUM,R0        ;SET UP LOW DIGIT
2001  007246  013701  007376                  MOV     HINUM,R1        ;SET UP HIGH DIGIT
2002  007252  012703  000007                  MOV     #7,R3           ;SET UP SHIFT COUNT
2003  007256  005002                          CLR     R2
2004  007260  006300                  RANG1:  ASL     R0              ;SHIFT R0 LEFT AND
2005  007262  006101                          ROL     R1              ;ROTATE CARRY INTO LSB OF R1 AND
2006  007264  006102                          ROL     R2              ;ROTATE CARRY OUT OF R1 INTO R2
2007  007266  005303                          DEC     R3              ;DECREMENT R3
2008  007270  001373                          BNE     RANG1           ;CONTINUE SHIFT LOOP
2009  007272  063700  007374                  ADD     LONUM,R0        ;ADD NUMBER TO MAKE X 129
2010  007276  005501                          ADC     R1              ;PROPAGATE CARRY
2011  007300  063701  007376                  ADD     HINUM,R1        ;ADD NUMBER TO MAKE X 129
2012  007304  005502                          ADC     R2              ;PROPAGATE CARRY
2013  007306  062700  001057                  ADD     #1057,R0        ;ADD LOW CONSTANT
2014  007312  005501                          ADC     R1              ;PROPAGATE CARRY
2015  007314  005502                          ADC     R2              ;PROPAGATE CARRY
2016  007316  062701  047401                  ADD     #47401,R1       ;ADD HIGH CONSTANT
2017  007322  005502                          ADC     R2              ;PROPAGATE CARRY
2018  007324  062702  000006                  ADD     #6,R2           ;ADD HIGH CONSTANT
2019  007330  060200                          ADD     R2,R0           ;RE-PRIME R0 WITH HIGH DIGIT
2020  007332  005501                          ADC     R1              ;PROPAGATE CARRY
2021  007334  010037  007372                  MOV     R0,RANDOM       ;SAVE RANDOM NUMBER
2022  007340  010037  007374                  MOV     R0,LONUM        ;PUT R0 BACK IN LONUM
2023  007344  010137  007376                  MOV     R1,HINUM        ;PUT R1 BACK IN HINUM
2024  007350  013700  007400                  MOV     SV0,R0          ;RESTORE REGISTERS
2025  007354  013701  007402                  MOV     SV1,R1
2026  007360  013702  007404                  MOV     SV2,R2
2027  007364  013703  007406                  MOV     SV3,R3
2028  007370  000207                          RTS     PC              ;EXIT
2029  007372  000000          RANDOM: 0
2030  007374  000000          LONUM:  0
2031  007376  000000          HINUM:  0
2032  007400  000000          SV0:    0
2033  007402  000000          SV1:    0
2034  007404  000000          SV2:    0
2035  007406  000000          SV3:    0
2036
2037
2038                                  ;READ RECORD SECTION
2039  007410  005737  000612          READI:  TST     RECORD          ;FIRST RECORD?
2040  007414  001003                          BNE     $R1             ;NO
2041  007416  013737  000542  000630          MOV     STRLEN,READLN   ;SET INITIAL READ LENGTH
2042  007424  012737  177775  000560  $R1:    MOV     #-3,RDPASS      ;INITIALIZE READ PASS COUNTER
2043  007432  013777  000552  171042  RDSTPD: MOV     COMAND,@MTC
2044  007440  105777  171036                  TSTB    @MTC
2045  007444  100375                          BPL     .-4             ;WAIT FOR CONTROL UNIT READY
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2046  007446  006077  171026                    ROR     @MTS
2047  007452  103375                            BCC     .-4             ;WAIT FOR TAPE UNIT READY
2048  007454  013700  000532          READGO:   MOV     RBUF,R0
2049  007460  013701  000630                    MOV     READLN,R1
2050  007464  105020                  RG1:      CLRB    (0)+            ;CLEAR READ BUFFER
2051  007466  005301                            DEC     R1
2052  007470  001375                            BNE     RG1
2053  007472  013777  000630  171004            MOV     READLN,@BC      ;SET BYTE COUNT
2054  007500  005477  171000                    NEG     @BC
2055  007504  013777  000532  170774            MOV     RBUF,@CA        ;SET CURRENT ADDRESS
2056  007512  013777  000552  170762            MOV     COMAND,@MTC
2057  007520  052777  000002  170754            BIS     #2,@MTC
2058  007526  004737  005130                    JSR     PC,GOWAIT
2059                          ;RETURN HERE AFTER INTERRUPT
2060  007532  017737  170742  000566            MOV     @MTS,STATRD
2061  007540  005777  170736                    TST     @MTC            ;ANY STATUS ERRORS
2062  007544  100504                            BMI     RDERRO          ;YES
2063                          ;CHECK FOR DATA ERRORS
2064  007546  013700  000532                    MOV     RBUF,R0
2065  007552  013701  000530                    MOV     WBUF,R1
2066  007556  013702  000630                    MOV     READLN,R2
2067  007562  022021                  $R5:      CMP     (0)+,(1)+       ;CHECK FOR PROPER DATA TRANSFER
2068  007564  001045                            BNE     DATERR          ;HAVE DATA ERROR
2069  007566  162702  000002                    SUB     #2,R2           ;CHECKED ALL TRANSFERS?
2070  007572  001373                            BNE     $R5             ;NO
2071  007574  032737  000003  001320  RTSSTP:   BIT     #3,PARAM
2072  007602  001007                            BNE     RDSTPC
2073  007604  004737  010200                    JSR     PC,RDINCR       ;INCREMENT FOR NEXT BLOCK
2074  007610  023737  000612  000616            CMP     RECORD,LASRCR
2075  007616  001316                            BNE     READGO
2076  007620  000207                            RTS     PC              ;EXIT READIT
2077  007622  032737  000002  001320  RDSTPC:   BIT     #2,PARAM        ;IS READ MODE RANDOM?
2078  007630  001414                            BEQ     RDSTP           ;NO
2079  007632  004737  007222          RNDRDS:   JSR     PC,RANGEN
2080  007636  052737  177400  007372            BIS     #177400,RANDOM
2081  007644  012704  177470          RNDS1:    MOV     #-200.,R4       ;DELAY 1 MILLISECOND
2082  007650  005204                            INC     R4
2083  007652  001376                            BNE     .-2
2084  007654  005237  007372                    INC     RANDOM
2085  007660  001371                            BNE     RNDS1
2086  007662  004737  010200          RDSTP:    JSR     PC,RDINCR
2087  007666  023737  000612  000616            CMP     RECORD,LASRCR   ;DONE LAST RECORD?
2088  007674  001256                            BNE     RDSTPD          ;NO
2089  007676  000207                            RTS     PC              ;YES EXIT
2090                          ;HAVE DATA ERROR
2091  007700  032777  020000  170604  DATERR:   BIT     #20000,@SWR     ;TYPE ALL READ ERRORS?
2092  007706  001014                            BNE     DATER1          ;NO
2093  007710  012702  013070                    MOV     #MSG9A,R2
2094  007714  104404                            TOP
2095  007716  013737  000630  000544            MOV     READLN,LENGTH
2096  007724  004737  011202                    JSR     PC,PRTS
2097  007730  014102                            MOV     -(1),R2         ;PRINT EXPECTED DATA
2098  007732  104412                            OCTPRT
2099  007734  014002                            MOV     -(0),R2
2100  007736  104412                            OCTPRT                  ;PRINT ACTUAL DATA
2101  007740  022737  177775  000560  DATER1:   CMP     #-3,RDPASS
```

```
2102  007746  001002                        BNE     .+6
2103  007750  005237  000622                INC     DAERRS          ;+1 TO DATA ERRORS
2104  007754  000464                        BR      RTSR1
2105                          ;STATUS INDICATES AN ERROR, CHECK FOR EOT
2106  007756  104434          RDERRO: CKSWR                           ;CHECK FOR CNTL G
2107  007760  032737  175600  000566        BIT     #175600,STATRD  ;IS ERROR LEGITIMATE OR EOT?
2108  007766  001552                        BEQ     RNOTAP          ;HAVE EOT
2109  007770  032777  020000  170514        BIT     #20000,@SWR     ;TYPE ALL READ ERRORS?
2110  007776  001044                        BNE     RTSREC          ;NO
2111  010000  012702  013043                MOV     #MSG9,R2
2112  010004  104404                        TOP                     ;PRINT ERROR
2113  010006  013737  000630  000544        MOV     READLN,LENGTH
2114  010014  004737  011202                JSR     PC,PRTS
2115  010020  032777  010000  170452        BIT     #10000,@MTS             ;STATUS ERROR DUE TO PARITY
2116                                                                        ;ERROR?
2117  010026  001430                        BEQ     RTSREC                  ;BRANCH IF NOT
2118  010030  032777  000010  170454        BIT     #10,@SWR                        ;SEE IF USER WANTS DATA COMPARE!
2119  010036  001424                        BEQ     RTSREC                  ;BRANCH IF NOT
2120  010040  013700  000530                MOV     WBUF,R0                 ;PICK UP STARTING ADDRESS OF
2121                                                                        ;WRITE BUFFER
2122  010044  013701  000532                MOV     RBUF,R1                 ;PICK UP STARTING ADDRESS OF
2123                                                                        ;READ BUFFER
2124  010050  013702  000630                MOV     @#READLN,R2             ;PICK UP RECORD LENGTH IN BYTES
2125  010054  022021          1$:     CMP     (R0)+,(R1)+             ;COMPARE WHAT SHOULD HAVE BEEN
2126                                                                        ;WRITTEN WITH WHAT WAS!!
2127  010056  001004                        BNE     2$                      ;BRANCH IF NOT THE SAME
2128  010060  162702  000002                SUB     #2,R2                   ;DROP OFF A WORD FROM RECORD
2129                                                                        ;LENGTH
2130  010064  001406                        BEQ     3$                      ;BRANCH IF ALL OF RECORD DATA
2131                                                                        ;CHECKS
2132  010066  000772                        BR      1$                      ;GO TO COMPARE NEXT BYTE
2133  010070  014002          2$:     MOV     -(R0),R2                ;PICK UP THE DATA VALUE THAT
2134                                                                        ;SHOULD HAVE BEEN WRITTEN
2135  010072  104412                        OCTPRT                  ;PRINT EXPECTED VALUE OF
2136                                                                        ;WRITTEN DATA
2137  010074  014102                        MOV     -(R1),R2                ;PICK UP THE DATA VALUE THAT
2138                                                                        ;WAS WRITTEN
2139  010076  104412                        OCTPRT                  ;PRINT ACTUAL VALUE OF THE
2140                                                                        ;DATA READ
2141  010100  000403                        BR      RTSREC                  ;CONTINUE WITH TESTING
2142  010102  012702  013337          3$:     MOV     #MSG10D,R2              ;INDICATE RECORD DATA COMPARES
2143                                                                        ;DESPITE THE PARITY ERROR
2144                                                                        ;CAUSING THE READ STATUS ERROR
2145  010106  104404                        TOP
2146                          ;+ 1 TO RDERRS IF FIRST ERROR PASS
2147  010110  104434          RTSREC: CKSWR                           ;CHECK FOR CNTL G
2148  010112  022737  177775  000560        CMP     #-3,RDPASS
2149  010120  001002                        BNE     .+6
2150  010122  005237  000620                INC     RDERRS          ;+1 TO STATUS ERRORS
2151  010126  032777  000020  170356  RTSR1:  BIT     #20,@SWR                ;DELETE READ RETRYS (SW 4)?
2152  010134  001011                        BNE     RPASS3          ;YES
2153  010136  005237  000560                INC     RDPASS          ;DONE ALL RE-READS?
2154  010142  001404                        BEQ     RPASS1          ;YES
2155  010144  004737  010250                JSR     PC,BACK1        ;NO, BACKSPACE TAPE
2156  010150  000137  007432                JMP     RDSTPD          ;GO AGAIN
2157  010154  005237  000624          RPASS1: INC     NRREAD          ;+1 TO NONRECOVERABLE READ
```

```
2158  010160  012737  177775  000560  RPASS3: MOV     #-3,RDPASS
2159  010166  032737  002000  000566          BIT     #2000,STATRD    ;AT EOT?
2160  010174  001054                          BNE     RNDTP1          ;YES, TYPE "EOT"
2161  010176  000631                          BR      RDSTP
2162
2163                                  ;SET UP POINTERS FOR NEXT RECORD
2164  010200  005237  000612          RDINCR: INC     RECORD
2165  010204  005737  000564                  TST     BLKINC
2166  010210  001416                          BEQ     RESTR1
2167                                  ;RECORD LENGTH IS CHANGING, COUNT IT
2168  010212  063737  000564  000630          ADD     BLKINC,READLN
2169  010220  023737  000630  000526          CMP     READLN,MINLEN   ;IS LENGTH LESS THAN MINIMUM
2170  010226  00?404                          BLT     RESTRL          ;NO
2171  010230  0?  37  000630  000524          CMP     READLN,MAXLEN   ;IS LENGTH GREATER THAN MAXIMUM?
2172  010236  0   03                          BLE     RESTR1          ;NO
2173  010240  0 ,37  000542  000630  RESTRL: MOV     STRLEN,READLN   ;RESET INITIAL LENGTH
2174  010246  000207          RESTR1: RTS     PC
2175                                  ;BACKSPACE ONE RECORD
2176  010250  006077  170224          BACK1:  ROR     @MTS
2177  010254  103375                          BCC     .-4             ;WAIT FOR TAPE UNIT READY
2178  010256  012777  177777  170220          MOV     #-1,@BC         ;COUNT 1 RECORD
2179  010264  013777  000552  170210          MOV     COMAND,@MTC     ;SELECT DRIVE
2180  010272  052777  000012  170202          BIS     #12,@MTC        ;ISSUE BACKSPACE
2181  010300  004737  005130                  JSR     PC,GOWAIT
2182  010304  042777  000016  170170          BIC     #16,@MTC
2183  010312  000207                          RTS     PC
2184                                  ;DRIVE HAS REACHED EOT IN READ MODE
2185  010314  004737  010200          RNDTAP: JSR     PC,RDINCR
2186  010320  052737  000020  000632          BIS     #20,MODES       ;INDICATE AT EOT
2187  010326  012702  013754          RNDTP1: MOV     #MSG25,R2
2188  010332  104404                          TOP
2189  010334  012702  012746                  MOV     #MSG8,R2
2190  010340  104404                          TOP
2191                                  ;DUMP ERROR COUNTERS
2192  010342  104434          READMP: CKSWR                   ;CHECK FOR CNTL G
2193  010344  013737  000552  011356          MOV     COMAND,CHAR
2194  010352  000337  011356                  SWAB    CHAR
2195  010356  142737  000170  011356          BICB    #170,CHAR
2196  010364  052737  000260  011356          BIS     #260,CHAR
2197  010372  004737  011360                  JSR     PC,OCTP         ;PRINT DRIVE NUMBER
2198  010376  104430                          SP3
2199  010400  013737  001320  011356          MOV     PARAM,CHAR
2200  010406  000337  011356                  SWAB    CHAR
2201  010412  006037  011356                  ROR     CHAR
2202  010416  042737  000170  011356          BIC     #170,CHAR
2203  010424  052737  000260  011356          BIS     #260,CHAR
2204  010432  004737  011360                  JSR     PC,OCTP         ;PRINT PATTERN NUMBER
2205
2206  010436  013737  001320  011356          MOV     PARAM,CHAR
2207  010444  042737  177774  011356          BIC     #177774,CHAR
2208  010452  012702  013441                  MOV     #MSG14,R2
2209  010456  022737  000001  011356          CMP     #1,CHAR
2210  010464  001002                          BNE     .+6
2211  010466  012702  013415                  MOV     #MSG12,R2
2212  010472  022737  000002  011356          CMP     #2,CHAR
2213  010500  001002                          BNE     .+6
```

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2214  010502  012702  013427                MOV     #MSG13,R2
2215  010506  104404                        TOP                     ;PRINT READ MODE
2216  010510  013702  000612                MOV     RECORD,R2
2217  010514  104426                        DECPRT                  ;PRINT RECORD NUMBER
2218  010516  013737  001320  011356        MOV     PARAM,CHAR
2219  010524  042737  177717  011356        BIC     #177717,CHAR
2220  010532  012702  013471                MOV     #MSG17,R2
2221  010536  022737  000020  011356        CMP     #20,CHAR
2222  010544  001002                        BNE     .+6
2223  010546  012702  013500                MOV     #MSG18,R2
2224  010552  022737  000040  011356        CMP     #40,CHAR
2225  010560  001002                        BNE     .+6
2226  010562  012702  013453                MOV     #MSG15,R2
2227  010566  022737  000060  011356        CMP     #60,CHAR
2228  010574  001002                        BNE     .+6
2229  010576  012702  013462                MOV     #MSG16,R2
2230  010602  104404                        TOP                     ;PRINT RECORD LENGTH SEQUENCE
2231  010604  012702  013603                MOV     #MSG21,R2
2232  010610  104404                        TOP
2233  010612  013702  000620                MOV     RDERRS,R2
2234  010616  104426                        DECPRT
2235  010620  012702  013633                MOV     #MSG22,R2
2236  010624  104404                        TOP
2237  010626  013702  000622                MOV     DAERRS,R2
2238  010632  104426                        DECPRT
2239  010634  012702  013654                MOV     #MSG23,R2
2240  010640  104404                        TOP
2241  010642  013702  000624                MOV     NRREAD,R2
2242  010646  104426                        DECPRT
2243  010650  000207                        RTS     PC
2244
2245
2246
2247                                  ;WRITE RECOVERY UTILIZING EXTENDED INTERRECORD GAP
2248                                  ;USED AFTER EVERY 7 REWRITES OR AFTER
2249                                  ;EACH WRITE ERROR IF STATISTICAL RECOVERY NOT SELECTED
2250                                  ;USED ONLY IF READ PASS SELECTED
2251  010652  104434                  XRGREC: CKSWR                   ;CHECK FOR CNTL G
2252  010654  012737  177774  000562          MOV     #-4,WRPASS      ;COUNT 4 REWRITES
2253  010662  032777  000040  167622  XRGO:   BIT     #40,@SWR                ;DELETE WRITE XIRG (SW 5)
2254  010670  001036                        BNE     XRGRCD          ;YES
2255  010672  004737  010250                JSR     PC,BACK1
2256  010676  105777  167600                TSTB    @MTC
2257  010702  100375                        BPL     .-4
2258  010704  013777  000552  167570        MOV     COMAND,@MTC
2259  010712  052777  000014  167562        BIS     #14,@MTC        ;WRITE XIRG
2260  010720  013777  000626  167556        MOV     WRTLEN,@BC      ;SET BYTE COUNT
2261  010726  005477  167552                NEG     @BC
2262  010732  013777  000530  167546        MOV     WBUF,@CA        ;SET CURRENT ADDRESS
2263  010740  006077  167534                ROR     @MTS            ;WAIT FOR TU READY
2264  010744  103375                        BCC     .-4
2265  010746  004737  005130                JSR     PC,GOWAIT
2266
2267                                  ;RETURN HERE AFTER INTERRUPT
2268  010752  017737  167522  000566        MOV     @MTS,STATRD     ;SAVE STATUS
2269  010760  005777  167516                TST     @MTC
```

```
2270  010764  100403                          BMI     XRGS            ;HAVE ERROR FLAG, CHECK FOR EOT
2271  010766  005037  000562          XRGRCD: CLR     WRPASS
2272  010772  000207                          RTS     PC              ;EXIT WRITE XIRG
2273  010774  032737  175600  000566  XRGS:   BIT     #175600,STATRD
2274  011002  001771                          BEQ     XRGRCD          ;ONLY EOT, EXIT
2275  011004  005237  000562                  INC     WPPASS          ;DONE 4 XIRG
2276  011010  001324                          BNE     XRGO
2277                                ;PRINT STATUS AFTER 4 XIRG ERRORS
2278  011012  012702  012720                  MOV     #MSG7,R2
2279  011016  104404                          TOP                     ;PRINT WRITE STATUS ERROR
2280  011020  013737  000626  000544          MOV     WRTLEN,LENGTH
2281  011026  004737  011202                  JSR     PC,PRTS         ;PRINT STATUS, COMMAND, RECORD, LENGTH
2282  011032  012702  013367                  MOV     #MSG11,R2
2283  011036  104404                          TOP                     ;PRINT "XIRG WRITTEN 4 TIMES"
2284  011040  032737  002000  000566          BIT     #2000,STATRD
2285  011046  001701                          BEQ     XRGREC
2286  011050  042777  000016  167424          BIC     #16,@MTC
2287  011056  052777  000006  167416          BIS     #6,@MTC         ;WRITE AN EOF
2288  011064  004737  005130                  JSR     PC,GOWAIT
2289  011070  000207                          RTS     PC
2290
2291                                ;GO BACKWARD ON TAPE X RECORDS
2292  011072  013737  000612  000616  GOBKWD: MOV     RECORD,LASRCR
2293  011100  013737  000614  000612          MOV     WRRECR,RECORD
2294  011106  001003                          BNE     GOB1            ;IS NEW RECORD=0
2295  011110  004737  004740                  JSR     PC,REWIND       ;YES,REWIND
2296  011114  000207                          RTS     PC              ;EXIT
2297  011116  013777  000616  167360  GOB1:   MOV     LASRCR,@BC      ;SET BYTE COUNT TO DIFFERENCE
2298  011124  163777  000614  167352          SUB     WRRECR,@BC      ;BETWEEN LASRCR AND WRRECK
2299  011132  005477  167346                  NEG     @BC
2300  011136  013777  000552  167336          MOV     COMAND,@MTC
2301  011144  105777  167332                  TSTB    @MTC            ;WAIT FOR CU READY
2302  011150  100375                          BPL     .-4
2303  011152  006077  167322                  ROR     @MTS            ;WAIT FOR TU READY
2304  011156  103375                          BCC     .-4
2305  011160  042777  000016  167314          BIC     #16,@MTC
2306  011166  052777  000012  167306          BIS     #12,@MTC
2307  011174  004737  005130                  JSR     PC,GOWAIT
2308  011200  000207                          RTS     PC
2309
2310
2311
2312                                ;PRINT COMMAND, STATUS, RECORD NUMBER, LENGTH
2313  011202  012702  013113          PRTS:   MOV     #MSG9B,R2
2314  011206  104404                          TOP
2315  011210  017702  167266                  MOV     @MTC,R2
2316  011214  104412                          OCTPRT
2317  011216  013702  000566                  MOV     STATRD,R2
2318  011222  104412                          OCTPRT
2319  011224  013702  000612                  MOV     RECORD,R2
2320  011230  005202                          INC     R2
2321  011232  104426                          DECPRT
2322  011234  013702  000544                  MOV     LENGTH,R2
2323  011240  104426                          DECPRT
2324  011242  000207                          RTS     PC
2325  011244  104434                          CKSWR                   ;CHECK FOR CNTL G
```

```
2326                                    ;PRINT OCTAL VALUE IN REGISTER 2
2327  011246  012737  000060  011356  OCTPR:  MOV     #'0,CHAR        ;INITIALIZE 1ST NUMBER AS 0
2328  011254  005702                          TST     R2              ;IS VALUE POSITIVE
2329  011256  100003                          BPL     OCT1            ;YES PRINT 0
2330  011260  012737  000061  011356          MOV     #'1,CHAR        ;NO PRINT 1
2331  011266  004737  011360          OCT1:   JSR     PC,OCTP
2332  011272  006102                          ROL     R2
2333  011274  006102                          ROL     R2
2334  011276  012737  177773  011354          MOV     #-5,OCT         ;COUNT 5 DIGITS
2335  011304  006102                  OCT2:   ROL     R2
2336  011306  006102                          ROL     R2
2337  011310  006102                          ROL     R2
2338  011312  010237  011356                  MOV     R2,CHAR         ;SAVE DIGIT
2339  011316  042737  177770  011356          BIC     #177770,CHAR    ;CLEAR OTHER BITS
2340  011324  052737  000060  011356          BIS     #60,CHAR        ;MAKE ASCII DIGIT
2341  011332  006002                          ROR     R2
2342  011334  004737  011360                  JSR     PC,OCTP         ;PRINT
2343  011340  006102                          ROL     R2
2344  011342  005237  011354                  INC     OCT             ;+1 TO DIGIT COUNT
2345  011346  001356                          BNE     OCT2            ;NOT DONE
2346  011350  104430                          SP3
2347  011352  000207                          RTS     PC              ;EXIT
2348  011354  000000          OCT:    0
2349  011356  000000          CHAR:   0
2350  011360  105777  167134  OCTP:   TSTB    @TPS
2351  011364  100375                          BPL     .-4             ;WAIT FOR READY
2352  011366  013777  011356  167126          MOV     CHAR,@TPB       ;PRINT
2353  011374  000207                          RTS     PC
2354                                    ;PRINT DECIMAL VALUE IN REGISTER 2
2355  011376  012737  177773  011554  DECPR:  MOV     #-5,DIGCNT
2356  011404  012737  011562  011560          MOV     #DECPNT+2,DECPNT
2357  011412  012737  000040  011556          MOV     #40,ZERO
2358  011420  012737  177777  011552  TYPT1:  MOV     #-1,DIGIT
2359  011426  005237  011552  TYPT2:  INC     DIGIT
2360  011432  167702  000122                  SUB     @DECPNT,R2
2361  011436  100373                          BPL     TYPT2
2362  011440  067702  000114                  ADD     @DECPNT,R2
2363  011444  004737  011472                  JSR     PC,DECOUT
2364  011450  005237  011554                  INC     DIGCNT
2365  011454  001002                          BNE     TYPT3
2366  011456  104430                          SP3
2367  011460  000207                          RTS     PC
2368  011462  062737  000002  011560  TYPT3:  ADD     #2,DECPNT
2369  011470  000753                          BR      TYPT1
2370  011472  005737  011552          DECOUT: TST     DIGIT
2371  011476  001010                          BNE     DEC1
2372  011500  022737  177777  011554          CMP     #-1,DIGCNT
2373  011506  001404                          BEQ     DEC1
2374  011510  013737  011556  011552          MOV     ZERO,DIGIT
2375  011516  000406                          BR      DEC2
2376  011520  012737  000060  011556  DEC1:   MOV     #60,ZERO
2377  011526  052737  000060  011552          BIS     #60,DIGIT
2378
2379  011534  105777  166760          DEC2:   TSTB    @TPS
2380  011540  100375                          BPL     .-4
2381  011542  013777  011552  166752          MOV     DIGIT,@TPB
```

```
2382  011550  000207                          RTS     PC
2383  011552  000000                  DIGIT:  0
2384  011554  000000                  DIGCNT: 0
2385  011556  000040                  ZERO:   40
2386  011560  011562                  DECPNT: .+2
2387  011562  023420                          10000.
2388  011564  001750                          1000.
2389  011566  000144                          100.
2390  011570  000012                          10.
2391  011572  000001                          1.
2392                                  ;KEYBOARD INPUT
2393  011574  105777  166714          WAITK:  TSTB    @TKS            ;WAIT FOR KEY
2394  011600  100375                          BPL     .-4
2395  011602  105777  166712                  TSTB    @TPS            ;WAIT FOR TELEPRINTER READY
2396  011606  100375                          BPL     .-4
2397  011610  117777  166702  166704          MOVB    @TKB,@TPB       ;ECHO CHARACTER
2398  011616  117737  166674  001314          MOVB    @TKB, CHARIN    ;SAVE IT
2399  011624  042737  000200  001314          BIC     #200,CHARIN
2400  011632  000207                          RTS     PC              ;EXIT
2401                                  ;TYPE 3 SPACES
2402  011634  012702  011644          SP3X:   MOV     #SP3A,R2
2403  011640  104404                          TOP
2404  011642  000207                          RTS     PC
2405  011644  020057  020040      057 SP3A:   .ASCII  ;/   /;
2406           011652                         .EVEN
2407                                  ;TELETYPE OUTPUT PACKAGE
2408  011652  142777  000177  166640  TO:     BICB    #177,@TPS       ;CLEAR TELETYPE FLAGS
2409  011660  112237  011752                  MOVB    (2)+,EOMK       ;SAVE MESSAGE DELIMETER
2410  011664  121237  011752          TOP1:   CMPB    @R2,EOMK        ;IS CHARACTER THE SECOND MESSAGE DELIMITER?
2411  011670  001001                          BNE     .+4             ;NO
2412  011672  000207                          RTS     PC              ;YES, EXIT
2413  011674  121227  000100                  CMPB    @R2,#'@         ;IS CHARACTER AN @ WHICH INDICATES A CARRIAGE RET.
2414  011700  001406                          BEQ     TOP2            ;YES
2415  011702  105777  166612                  TSTB    @TPS            ;NO, WAIT FOR TELETYPE READY
2416  011706  100375                          BPL     .-4
2417  011710  112277  166606                  MOVB    (2)+,@TPB       ;PRINT CHARACTER
2418  011714  000763                          BR      TOP1
2419  011716  105777  166576          TOP2:   TSTB    @TPS
2420  011722  100375                          BPL     .-4
2421  011724  112777  000215  166570          MOVB    #215,@TPB       ;CR
2422  011732  105777  166562                  TSTB    @TPS
2423  011736  100375                          BPL     .-4
2424  011740  112777  000212  166554          MOVB    #212,@TPB       ;LF
2425  011746  005202                          INC     R2
2426  011750  000745                          BR      TOP1
2427  011752  000000                  EOMK:   0
2428  011754  022737  000176  000512  CKSWRR: CMP     #SWREG,SWR              ;SOFTWARE SWITCH REG PRESENT
2429  011762  001035                          BNE     OUT                     ;NO, GET OUT
2430  011764  105777  166524                  TSTB    @TKS                    ;YES,WAIT FOR
2431  011770  100032                          BPL     OUT                     ;READY, GET CHARACTER
2432  011772  017737  166520  001314          MOV     @TKB,CHARIN             ;AND STRIP OFF
2433  012000  042737  177600  001314          BIC     #177600,CHARIN          ;THE GARBAGE
2434  012006  022737  000007  001314          CMP     #7,CHARIN               ;IS IT A <^G>
2435  012014  001020                          BNE     OUT
2436  012016  012702  014042                  MOV     #$CNTG,R2
2437  012022  104404                          TOP
```

```
2438  012024  012702  014050          CNTLU:  MOV     #$MSWR,R2
2439  012030  104404                          TOP
2440  012032  017702  166454                  MOV     @SWR,R2
2441  012036  104412                          OCTPRT
2442  012040  012702  014060                  MOV     #$MNEW,R2
2443  012044  104404                          TOP
2444  012046  005037  012250                  CLR     @#TEMPST
2445  012052  004737  012060                  JSR     PC,$READ                ;GO READ A LINE
2446  012056  000207                  OUT:    RTS     PC                      ;RETURN TO MAIN BODY OF PROGRAM
2447
2448  012060  005037  012250          $READ:  CLR     TEMPST
2449  012064  012737  000007  012252          MOV     #7,COUNT
2450  012072  104400                  1$:     WAITKY
2451  012074  042737  177600  001314          BIC     #177600,CHARIN  ;STRIP OFF GARBAGE
2452  012102  122737  000025  001314          CMPB    #25,CHARIN              ;IS IT A ↑U?
2453  012110  001002                          BNE     2$              ;BRANCH IF NOT
2454  012112  005726                  3$:     TST     (SP)+           ;POP THE STACK
2455  012114  000743                          BR CNTLU                ;START OVER
2456  012116  122737  000015  001314  2$:     CMPB    #15,CHARIN              ;IS IT A <CR>?
2457  012124  001011                          BNE     4$              ;BRANCH IF NOT
2458  012126  012702  014070                  MOV     #$MCRLF,R2      ;DO CRLF
2459  012132  104404                          TOP
2460  012134  022737  000007  012252          CMP     #7,COUNT        ;WAS IT FIRST CHARACTER
2461  012142  001036                          BNE     7$              ;CHANGE SWR IF NOT FIRST ONE
2462  012144  005726                  8$:     TST     (SP)+           ;POP THE STACK
2463  012146  000743                          BR      OUT             ;GET OUT
2464  012150  122737  000060  001314  4$:     CMPB    #60,CHARIN
2465  012156  003004                          BGT     5$
2466  012160  122737  000067  001314          CMPB    #67,CHARIN
2467  012166  002004                          BGE     6$
2468  012170  012702  012610          5$:     MOV     #MSGO,R2
2469  012174  104404                          TOP
2470  012176  000745                          BR      3$              ;START OVER IF NOT LEGAL CHARACTER
2471  012200  006337  012250          6$:     ASL     TEMPST
2472  012204  006337  012250                  ASL     TEMPST
2473  012210  006337  012250                  ASL     TEMPST
2474  012214  142737  000060  001314          BICB    #60,CHARIN              ;GET NITTY-GRITTY
2475  012222  153737  001314  012250          BISB    CHARIN,TEMPST
2476  012230  005337  012252                  DEC     COUNT           ;ONLY WANT 6   DIGITS
2477  012234  001755                          BEQ     5$
2478  012236  000715                          BR      1$
2479  012240  013777  012250  166244  7$:     MOV     TEMPST,@SWR     ;CHANGE SWITCH REGISTER CONTENTS
2480  012246  000736                          BR      8$
2481
2482  012250  000000          TEMPST: 0
2483  012252  000000          COUNT:  0
2484
2485  012254  013746  000006          SUSWRR: MOV     @#6,-(SP)               ;SAVE VECTORS
2486  012260  013746  000004                  MOV     @#4,-(SP)
2487  012264  012737  012304  000004          MOV     #1$,@#4                 ;SET UP FOR TIMEOUT
2488  012272  022777  177777  166212          CMP     #-1,@SWR                ;REFERENCE HARDWARE SWITCH REGISTER
2489  012300  001402                          BEQ     2$
2490  012302  000404                          BR      3$
2491  012304  022626                  1$:     CMP     (SP)+,(SP)+             ;ADJUST STACK
2492  012306  012737  000176  000512  2$:     MOV     #SWREG,SWR              ;POINT TO SOFTWARE SWITCH REG
2493  012314  012637  000004          3$:     MOV     (SP)+,@#4               ;RESTORE VECTORS
```

```
2494  012320  012637  000006                  MOV     (SP)+,@#6
2495  012324  000207                          RTS     PC
2496
2497                                  ;TRAP HANDLER
2498  012326  011666  000002          TRAP34: MOV     @SP,2(6)
2499  012332  162716  000002                  SUB     #2,@SP
2500  012336  013646                          MOV     @(6)+,-(6)
2501  012340  062716  105746                  ADD     #TABLE-104400,@SP
2502  012344  013607                          MOV     @(6)+,PC
2503  012346  011574                  TABLE:  WAITK
2504  012350  005202                          WRITI
2505  012352  011652                          TO
2506  012354  004470                          SVCTR
2507  012356  004604                          RSFDR
2508  012360  011246                          OCTPR
2509  012362  004506                          MVCTR
2510  012364  006540                          GENPA
2511  012366  004550                          CLRAL
2512  012370  004702                          CHGDR
2513  012372  007410                          READI
2514  012374  011376                          DECPR
2515  012376  011634                          SP3X
2516  012400  012254                          SUSWRR
2517  012402  011754                          CKSWRR
2518          104400                  WAITKY=104400
2519          104402                  WRITIT=104402
2520          104404                  TOP=104404
2521          104406                  SVCTRS=104406
2522          104410                  RSFDRV=104410
2523          104412                  OCTPRT=104412
2524          104414                  MVCTRS=104414
2525          104416                  GENPAT=104416
2526          104420                  CLRALL=104420
2527          104422                  CHGDRV=104422
2528          104424                  READIT=104424
2529          104426                  DECPRT=104426
2530          104430                  SP3=104430
2531          104432                  SUSWR=104432
2532          104434                  CKSWR=104434
2533
```

```
2534
2535                            ;       ************************************************************************
2536                            ;                               MODIFIED DEC 16 1977
2537
2538                            ;       ++
2539                            ;               CHECK FOR DUMP MODE OR AUTOMATIC/ACT11-XXDP MODE
2540                            ;       --
2541
2542  012404  005037  000036       CKMODE: CLR     AUTOM           ;INIT AUTOMATIC MODE INDICATOR
2543  012410  105037  000040               CLRB    ACT11M          ;INIT ACT11 AUTO MODE INDICATOR
2544  012414  105037  000041               CLRB    XXDPM           ;INIT XXDP AUTO MODE INDICATOR
2545  012420  105037  000042               CLRB    ADUMPM          ;INIT  ACT11 DUMP MODE INDICATOR
2546  012424  105037  000043               CLRB    XDUMPM          ;INIT XXDP DUMP MODE INDICATOR
2547  012430  005737  000042               TST     @#42            ;AUTO MODE?
2548  012434  001425                       BEQ     2$              ;BRANCH - IF NO
2549  012436  005237  000036               INC     AUTOM           ;SET AUTO MODE INDICATOR
2550  012442  032737  020000  000052       BIT     #20000,@#52     ;MANUAL INTERVENTION?
2551  012450  001402                       BEQ     6$              ;BRANCH - IF NO
2552  012452  000137  012532               JMP     ABORT           ;ABORT THE PROGRAM
2553  012456  023737  000042  000046 6$:   CMP     @#42,@#46       ;ACT11 MODE?
2554  012464  001403                       BEQ     1$              ;BRANCH - IF YES
2555  012466  105237  000041               INCB    XXDPM           ;INDICATE XXDP AUTO MODE
2556  012472  000416                       BR      5$              ;AND EXIT
2557  012474  105237  000040       1$:     INCB    ACT11M          ;INDICATE ACT11 AUTO MODE
2558  012500  012777  020111  166004       MOV     #20111,@SWR     ;SET SWITCH REGISTER
2559  012506  000410                       BR      5$              ;AND EXIT
2560  012510  105737  000041       2$:     TSTB    @#41            ;MAN/MODE VIA ACT11/PAPER TAPE?
2561  012514  001003                       BNE     3$              ;BRANCH - IF NOT
2562  012516  105237  000042               INCB    ADUMPM          ;INDICATE MAN/MODE VIA ACT11/PAPER TAPE
2563  012522  000402                       BR      5$              ;AND EXIT
2564  012524  105237  000043       3$:     INCB    XDUMPM          ;INDICATE MANUAL MODE VIA XXDP
2565  012530  000207               5$:     RTS     PC              ;RETURN
2566
2567                            ;       ************************************************************************
2568
```

```
2569
2570                                    ;       ************************************************************************
2571                                    ;                       MODIFIED DEC 16 1977
2572
2573                                    ;       ++
2574                                    ;               DISCONTINUE TESTING FOR ILLEGAL CONDITIONS
2575                                    ;       --
2576
2577  012532  000005                    ABORT:  RESET                   ;CLEAR THE WORLD
2578  012534  012702  012566                    MOV     #MSGOO,R2       ;GET ABORT MESSAGE
2579  012540  004737  104404                    JSR     PC,TOP          ;PRINT ABORT MESSAGE
2580  012544  105737  000041                    TSTB    XXDPM           ;XXDP AUTO MODE
2581  012550  001405                            BEQ     1$              ;BRANCH - IF NOT
2582  012552  013700  000042                    MOV     @#42,R0         ;GET MONITOR EXIT ADDRESS
2583  012556  005037  000042                    CLR     @#42            ;USE AS ABORT FLAG
2584  012562  004710                            JSR     PC,(R0)         ;EXIT TO XXDP MONITOR
2585  012564  000777                    1$:     BR      .               ;AND HANG
2586
2587                                    ;       ************************************************************************
2588
```

```
2589
2590                                        ;TEXT MESSAGES
2591
2592  012566  040057  051120  043517  MSG00:  .ASCII          ;/@PROGRAM ABORTED/;
2593  012574  040522  020115  041101
2594  012602  051117  042524  027504
2595  012610  037457  020100     057  MSG0:   .ASCII          ;/?@ /;
2596  012615     057  051500  046105  MSG1:   .ASCII          ;/@SELECT UNITS  /;
2597  012622  041505  020124  047125
2598  012630  052111  020123  027440
2599  012636  040057  051524  020124  MSG2:   .ASCII          ;/@TST PAT RLS WMO RMO@ /;
2600  012644  040520  020124  046122
2601  012652  020123  046527  020117
2602  012660  046522  040117  027440
2603  012666  046457  054101  052040  MSG5:   .ASCII          ;/MAX TESTS SELECTED@/;
2604  012674  051505  051524  051440
2605  012702  046105  041505  042524
2606  012710  040104     057
2607  012713     057  047440  027513  MSG6:   .ASCII          ;/ OK/;
2608  012720  040057  051127  052111  MSG7:   .ASCII          ;/@WRITE STATUS ERROR@/;
2609  012726  020105  052123  052101
2610  012734  051525  042440  051122
2611  012742  051117  027500
2612  012746  042457  042116  047440  MSG8:   .ASCII          ;/END OF TAPE**********************@;
2613  012754  020106  040524  042520
2614  012762  025052  025052  025052
2615  012770  025052  025052  025052
2616  012776  025052  025052  025052
2617  013004  025052     100
2618  013007     104  053122  050040          .ASCII          ;DRV PAT MODE RECORD LENGTH@/;
2619  013014  052101  046440  042117
2620  013022  020105  042522  047503
2621  013030  042122  046040  047105
2622  013036  052107  040110     057
2623  013043     057  051100  040505  MSG9:   .ASCII          ;/@READ STATUS ERROR@/;
2624  013050  020104  052123  052101
2625  013056  051525  042440  051122
2626  013064  051117  027500
2627  013070  040057  042522  042101  MSG9A:  .ASCII          ;/@READ DATA ERROR@/;
2628  013076  042040  052101  020101
2629  013104  051105  047522  040122
2630  013112     057
2631  013113     057  047503  042115  MSG9B:  .ASCII          ;/COMD     STATUS   RECORD   LENGTH EXPECTED ACTUAL@/;
2632  013120  020040  020040  051440
2633  013126  040524  052524  020123
2634  013134  020040  042522  047503
2635  013142  042122  020040  046040
2636  013150  047105  052107  020110
2637  013156  054105  042520  052103
2638  013164  042105  040440  052103
2639  013172  040525  040114     057
2640  013177     057  055100  020132  MSG10A: .ASCII  ;/@ZZ - CZTMBE0@RECORD LIMITS IN BYTES@;
2641  013204  020055  055103  046524
2642  013212  042502  040060  042522
2643  013220  047503  042122  046040
2644  013226  046511  052111  020123
```

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2645  013234  047111  041040  052131
2646  013242  051505     100
2647  013245     115  047111  042514          .ASCII  ;MINLEN  MAXLEN@ /;
2648  013252  020116  046440  054101
2649  013260  042514  040116  027440
2650  013266  040054  054105  051105  MSG10B: .ASCII  /,@EXERCISING UNITS,/
2651  013274  044503  044523  043516
2652  013302  052440  044516  051524
2653  013310     054
2654  013311     054  047100  020117  MSG10C: .ASCII  /,@NO DRIVES AVAILABLE,/
2655  013316  051104  053111  051505
2656  013324  040440  040526  046111
2657  013332  041101  042514     054
2658  013337     057  020040  042522  MSG10D: .ASCII  ;/  RECORD DATA COMPARES/;
2659  013344  047503  042122  042040
2660  013352  052101  020101  047503
2661  013360  050115  051101  051505
2662  013366     057
2663  013367     057  044530  043522  MSG11:  .ASCII                  ;/XIRG WRITTEN 4 TIMES/;
2664  013374  053440  044522  052124
2665  013402  047105  032040  052040
2666  013410  046511  051505     057
2667  013415     057  020040  051440  MSG12:  .ASCII                  ;/   SSTP /;
2668  013422  052123  020120     057
2669  013427     057  020040  051040  MSG13:  .ASCII                  ;/   RNDM /;
2670  013434  042116  020115     057
2671  013441     057  020040  047040  MSG14:  .ASCII                  ;/   NSTP /;
2672  013446  052123  020120     057
2673  013453     057  026515  040515  MSG15:  .ASCII                  ;/M-MAX/;
2674  013460  027530
2675  013462  046457  046455  047111  MSG16:  .ASCII          ;/M-MIN/;
2676  013470     057
2677  013471     057  044515  020116  MSG17:          .ASCII          ;/MIN  /;
2678  013476  027440
2679  013500  046457  054101  020040  MSG18:          .ASCII          ;/MAX  /;
2680  013506     057
2681  013507     057  053500  044522  MSG19:  .ASCII          ;/@WRITE ERRORS = /;
2682  013514  042524  042440  051122
2683  013522  051117  020123  020075
2684  013530     057
2685  013531     057  051100  041505  MSG20:          .ASCII          ;/@RECOVERED AT 0 /;
2686  013536  053117  051105  042105
2687  013544  040440  020124  020060
2688  013552     057
2689  013553     057  050100  051105  MSG20A:         .ASCII          ;/@PERMANENT BADSPOTS = /;
2690  013560  040515  042516  052116
2691  013566  041040  042101  050123
2692  013574  052117  020123  020075
2693  013602     057
2694  013603     057  051100  040505  MSG21:          .ASCII          ;/@READ STATUS ERRORS = /;
2695  013610  020104  052123  052101
2696  013616  051525  042440  051122
2697  013624  051117  020123  020075
2698  013632     057
2699  013633     057  042100  052101  MSG22:          .ASCII          ;/@DATA ERRORS = /;
2700  013640  020101  051105  047522
```

```
2701  013646  051522  036440  027440
2702  013654  040057  047516  026516  MSG23:          .ASCII          ;/@NON-RECOVERABLE ERRORS = /;
2703  013662  042522  047503  042526
2704  013670  040522  046102  020105
2705  013676  051105  047522  051522
2706  013704  036440  027440
2707  013710  040057  025052  025052  MSG24:          .ASCII          ;/@**********************WRITE PASS    /;
2708  013716  025052  025052  025052
2709  013724  025052  025052  025052
2710  013732  025052  025052  051127
2711  013740  052111  020105  040520
2712  013746  051523  020040  027440
2713  013754  040057  025052  025052  MSG25:          .ASCII          ;/@**********************READ PASS     /;
2714  013762  025052  025052  025052
2715  013770  025052  025052  025052
2716  013776  025052  025052  042522
2717  014004  042101  050040  051501
2718  014012  020123  020040  027440
2719  014020  040057  040100      057 MSG26:          .ASCII          ;/@@@/;
2720  014025      057  047105  020104  MSG27:          .ASCII          ;/END OF PASS/;
2721  014032  043117  050040  051501
2722  014040  027523
2723  014042  040057  043536  027500  $CNTG:  .ASCII  ;/@↑G@/;
2724  014050  040057  053523  036522  $MSWR:  .ASCII  ;/@SWR=' /;
2725  014056  027440
2726  014060  020057  042516  036527  $MNEW:  .ASCII  ;/ NEW= /;
2727  014066  027440
2728  014070  040057      057         $MCRLF: .ASCII  ;/@/;
2729          014074                          .EVEN
2730
2731  014074  014074                  BUFFER:.                        ;WRITE BUFFER BEGINS HERE
2732
2733          000001                          .END
```

CROSS REFERENCE TABLE -- USER SYMBOLS

```
ABORT   012532  2552  2577*
ACT11M  000040   910*  1078  1317  2543*  2557*
ADUMPM  000042   912*  2545* 2562*
ALLEOS  005020  1617  1621*
ALLEOT  004776  1339  1355  1387  1419  1486  1527  1539  1614*
ALL1    005000  1615* 1619
ALL2    005102  1622  1624  1637*
ALL3    005076  1620  1636*
ATST    000536   944*  1027* 1130* 1146
AUTOM   000036   909*  2542* 2549*
AUTOST  001354   921   1020* 1321
BACK1   010250  1776  1777  2155  2176*  2255
BC      000504   929*  1680* 1681* 1781* 2053* 2054* 2178* 2260* 2261* 2297* 2298* 2299*
BLKINC  000564   955*  1661* 1665* 1669* 1733  1735  2165  2168
BUFFER  014074   939    940  1036  1041  1045  1098* 1099  1118  1124  1129  2731*
CA      000506   930*  1682* 2055* 2262*
CC      000510   931*  1647* 1652*
CDMEND  005072  1632  1634*
CDRIVE  000556   952*  1560  1561  1575* 1579* 1583  1593*
CDRVBT  000554   951*  1576* 1577  1581* 1595* 1600
CHAR    011356  1797* 1798* 1799* 1801* 1804* 1805* 1806* 1807* 1808* 1810* 1811* 1813  1816
                1822* 1823* 1825  1828  1831  2193* 2194* 2195* 2196* 2199* 2200* 2201* 2202*
                2203* 2206* 2207* 2209  2212  2218* 2219* 2221  2224  2227  2327* 2330* 2338*
                2339* 2340* 2349* 2352
CHARIN  001314  1002* 1142  1149  1151  1158* 1159* 1163* 1182  1187  1189  1194  1204  1206
                1208* 1209* 1210* 1211  1216  1218  1222  1226  1232  1234  1238  1244  1246
                1250  1259  2398* 2399* 2432* 2433* 2434  2451* 2452  2456  2464  2466  2474*
                2475
CHGDR   004702  1593* 1601  2512
CHGDRV= 104422  1337  1353  1371  1378  1385  1402  1410  1417  1437  1448  1455  1463  1479
                1484  1511  1525  1535  1569  1618  1634  2527*
CHG1    004726  1596  1600*
CKMODE  012404  1022  1026  2542*
CKSWR = 104434  1296  1312  1751  1796  2106  2147  2192  2251  2325  2532*
CKSWRR  011754  2428* 2517
CLRAL   004550  1565* 2511
CLRALL= 104420  1328  1345  1363  1394  1432  1494  2526*
CLRTBL  005104  1567  1640*
CLRT1   005110  1641* 1643
CLR1    004552  1566* 1570
CNTLU   012024  1025  1135  2438* 2455
COMAND  000552   950*  1583* 1584* 1585* 1588* 1607  1675  1782  1797  2043  2056  2179  2193
                2258  2300
COUNT   012252  2449* 2460  2476* 2483*
CTRDEX  004524  1546  1552  1558*
CTRDMP  005040  1626* 1635
CTRD1   005066  1629  1633*
DAERRS  000622   971*  2103* 2237
DATERR  007700  2068  2091*
DATER1  007740  2092  2101*
DECOUT  011472  2363  2370*
DECPNT  011560  2356* 2360  2362  2368* 2386*
DECPR   011376  2355* 2514
DECPRT= 104426  1083  1085  1821  1838  1847  1859  2217  2234  2238  2242  2321  2323  2529*
DEC1    011520  2371  2373  2376*
DEC2    011534  2375  2379*
```

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DIGCNT  011554  2355* 2364* 2372  2384#
DIGIT   011552  2358* 2359* 2370  2374* 2377* 2381  2383#
DOAGN   003276  1308  1318  1322#
DONE    003160  1296# 1341  1357  1389  1421  1488  1529  1541
DONE1   003226  1300  1304  1307#
DRIVE   000040   879#
DRVADR  000634   977# 1548  1554  1559
DRVSEL  000540   945# 1053* 1060  1072*
D0TAB   000654   977   986#  987
D1TAB   000720   978   988#  989
D2TAB   000764   979   990#  991
D3TAB   001030   980   992#  993
D4TAB   001074   981   994#  995
D5TAB   001140   982   996#  997
D6TAB   001204   983   998#  999
D7TAB   001250   984  1000#  1001
ENDTAP  006142  1753  1774  1789#
ENDT1   006154  1630  1791#
EOMK    011752  2409* 2410  2427#
ERROR   005710  1688  1751#
ERR1    005734  1755  1757#
EXEC    003070  1279# 1323
EXECUT  003056  1120  1148  1186  1277#
EXEC1   003076  1280# 1306
GENPA   006540  1862# 2510
GENPAT= 104416  1329  1346  1364  1395  1427  1495  2525#
GOBKWD  011072  1376  1408  1461  2292#
GOB1    011116  2294  2297#
GOWAIT  005130  1611  1647# 1684  1784  2058  2181  2265  2288  2307
GP1     006652  1863* 1864* 1866  1868  1870  1872  1874  1876  1880#
GW1     005172  1648  1654#
HINUM   007376  1033* 1137* 2001  2011  2023* 2031#
IDSELF  001676  1057  1078#
LASRCR  000616   969# 1469  1471  1474* 1475* 1477* 1482  1508* 1509* 1517  1520* 1521* 1523*
                1532  2074  2087  2292* 2297
LENGTH  000544   947# 1761* 2095* 2113* 2280* 2322
LONUM   007374  1032* 1136* 2000  2009  2022* 2030#
LOOPER  002012  1106# 1115
MAXLEN  000524   937# 1040* 1044* 1084  1123* 1128* 1660  1738  2171
MEDIUM  000041   883#
MEM4K   002066   922  1122#
MEM8K   002112   923  1127#
MINLEN  000526   938# 1039* 1043* 1082  1122* 1127* 1664  1736  2169
MODES   000632   975# 1277* 1327* 1332  1344* 1349  1362* 1367  1374  1381  1393* 1398  1406
                1413  1426* 1430* 1431* 1439* 1442  1450  1453  1459  1467  1493* 1498  1503*
                1506  1515  1534* 1537  1571* 1616  1623  1631  1642  1644* 1701  1703  1706
                1722  1724  1727  1732* 1743* 1769  1790* 2186*
MSBITS  000546   948# 1054* 1071* 1086  1106  1140* 1144  1167  1169* 1171* 1577  1600
MSGO    012610  1191  2468  2595#
MSGOO   012566  2578  2592#
MSG1    012615  1138  2596#
MSG10A  013177  1080  2640#
MSG10B  013266  1096  2650#
MSG10C  013311  1090  2654#
MSG10D  013337  2142  2658#
MSG11   013367  2282  2663#
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MSG12   013415          1815    2211    2667#
MSG13   013427          1818    2214    2669#
MSG14   013441          1812    2208    2671#
MSG15   013453          1830    2226    2673#
MSG16   013462          1833    2229    2675#
MSG17   013471          1824    2220    2677#
MSG18   013500          1827    2223    2679#
MSG19   013507          1835    2681#
MSG2    012636          1177    2599#
MSG20   013531          1840*   1841*   1844    2685#
MSG20A  013553          1856    2689#
MSG21   013603          2231    2694#
MSG22   013633          2235    2699#
MSG23   013654          2239    2702#
MSG24   013710          1791    2707#
MSG25   013754          2187    2713#
MSG26   014020          1297    2719#
MSG27   014025          1319    2720#
MSG5    012666          1273    2603#
MSG6    012713          1256    2607#
MSG7    012720          1759    2278    2608#
MSG8    012746          1793    2189    2612#
MSG9    013043          2111    2623#
MSG9A   013070          2093    2627#
MSG9B   013113          2313    2631#
MTC     000502           928#   1052*   1056    1060*   1605    1607*   1610*   1650*   1675*   1676    1683*   1687    1782*
                        1783*   1785*   1786*   2043*   2044    2056*   2057*   2061    2179*   2180*   2182*   2256    2258*
                        2259*   2269    2286*   2287*   2300*   2301    2305*   2306*   2315
MTS     000500           927#   1062    1067    1069    1608*   1678*   1686    1778    2046*   2060    2115    2176*   2263*
                        2268    2303*
MTV     000534           941#   1648*
MVCTR   004506          1552#   2509
MVCTRS= 104414          1331    1348    1366    1373    1380    1397    1405    1412    1434    1441    1452    1458    1466
                        1481    1505    1514    1531    1615    1627    2524#
MV1     004512          1553#   1555
NOINCR  005272          1659    1668    1670#
NONSTP  005336          1680#   1699    1704    1707
NO.SEL  001666          1059    1066    1068    1070    1072#
NRREAD  000624           972#   2157*   2241
NUMTST  001316          1003#   1031*   1179*   1184    1269*   1270    1307#
NXMRET  001474          1035    1038#
NXT.TU  001612          1060#   1074
OCT     011354          2334*   2344*   2348#
OCTP    011360          1802    1809    2197    2204    2331    2342    2350#
OCTPR   011246          2327#   2508
OCTPRT= 104412          2098    2100    2135    2139    2316    2318    2441    2523#
OCT1    011266          2329    2331#
OCT2    011304          2335#   2345
OUT     012056          2429    2431    2435    2446#   2463
OVER4K  001522          1037    1043#
PARAM   001320          1004#   1279*   1280    1301    1305*   1472    1518    1662    1667    1696    1709    1804    1810
                        1822    1863    2071    2077    2199    2206    2218
PAT0    006654          1865    1883#   1885
PAT1    006670          1867    1889#   1896
PAT1A   006674          1890#   1895
PAT2    006740          1869    1894    1909#   1911
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PAT3    006754          1871    1915#   1922
PAT3A   006760          1916#   1921
PAT4    007024          1873    1920    1934#
PAT5    007052          1875    1944#   1951
PAT5A   007056          1945#   1950
PAT6    007166          1879    1949    1981#   1983
PAT7    007202          1878    1989#   1992
PERMBS  000610           966#   1768#   1851    1858
PRIS    011202          1762    2096    2114    2281    2313#
P1T     006716          1889    1897#
P3T     007002          1915    1923#
P4      007030          1935#   1938
P4A     007050          1934*   1935    1936*   1940#
PST     007100          1944    1952#
RANDOM  007372          1713*   1717*   1990    2021*   2029#   2080*   2084#
RANGEN  007222          1712    1989    1996#   2079
RANG1   007260          2004#   2008
RANSTP  005520          1712#
RAN1    005532          1714#   1718
RBUF    000532           940#   1041*   1045*   1124*   1129*   1884    1891    1910    1917    1937    1946    1982    1991
                        2048    2055    2064    2122
RDERRO  007756          2062    2106#
RDERRS  000620           970#   2150*   2233
RDINCR  010200          2073    2086    2164#   2185
RDPASS  000560           953#   2042*   2101    2148    2153*   2158*
RDSTP   007662          2078    2086#   2161
RDSTPC  007622          2072    2077#
RDSTPO  007432          2043#   2088    2156
READGO  007454          2048#   2075
READI   007410          2039#   2513
READIT= 104424          1383    1415    1476    1522    2528#
READLN  000630           974#   2041*   2049    2053    2066    2095    2113    2124    2168*   2169    2171    2173*
READMP  010342          2192#
RECORD  000612           967#   1435    1469    1474    1482    1501    1502*   1508    1520    1532    1658    1670    1731*
                        1741    1789*   1820    2039    2074    2087    2164*   2216    2292    2293*   2319
RESETL  005664          1737    1740#
RESTRL  010240          2170    2173#
RESTR1  010246          2166    2172    2174#
REWIND  004740          1566    1605#   2295
RG1     007464          2050#   2052
RNDRDS  007632          2079#
RNDS1   007644          2081#   2085
RNDTAP  010314          2108    2185#
RNDTP1  010326          1633    2160    2187#
RPASS1  010154          2154    2157#
RPASS3  010160          2152    2158#
RSFDR   004604          1575#   2507
RSFDRV= 104410          1330    1347    1365    1396    1433    1440    1457    1465    1504    1513    1530    1565    1597
                        1614    1626    2522#
RSF1    004616          1577#   1582
RSF2    004642          1578    1583#   1602
RTSREC  010110          2110    2117    2119    2141    2147#
RTSR1   010126          2104    2151#
RTSSTP  007574          2071#
SELDRV  002210          1141#   1175
SELD1   002242          1143    1149#
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SELD2   002262          1150    1153#
SELOK1  003050          1271    1273#
SELPAT  002460          1190    1194#
SELRLS  002552          1215#
SELRM1  002734          1247    1250#
SELRM2  002750          1245    1249    1253#
SELR1   002602          1219    1222#
SELR2   002620          1223    1226#
SELR3   002634          1217    1221    1225    1229#
SELTST  002366          1147    1177#
SELT1   002404          1181#   1193    1272
SELT2   002430          1183    1187#
SELT3   002450          1185    1188    1191#   1205    1207    1227    1239    1251    1261
SELW1   002666          1235    1238#
SELW2   002702          1233    1237    1241#
SP3   = 104430          1201    1212    1229    1241    1253    1803    2198    2346    2366    2530#
SP3A    011644          2402    2405#
SP3X    011634          2402#   2515
STACK = 000500           925#   1020    1131
START   002134          1125    1130#
START1  002140          1093    1131#   1145
STATRD  000566           956#   1686#   1752    1773    2060#   2107    2159    2268#   2273    2284    2317
STOPOP  005510          1697    1709#
STREC1  006050          1767    1776#
STRLEN  000542           946#   1660#   1664#   1666    1740    2041    2173
STRTOP  005314          1675#   1720    1725    1728    1780    1787
SUSWR = 104432          1021    1132    2531#
SUSWRR  012254          2485#   2516
SVCTR   004470          1546#   2506
SVCTRS= 104406          1335    1352    1370    1377    1384    1401    1409    1416    1436    1447    1462    1478    1510
                        1524    1568    2521#
SVC1    004474          1547#   1549
SVRECR  000550           949#   1444#   1446    1471#   1477    1517#   1523
SV0     007400          1996#   2024    2032#
SV1     007402          1997#   2025    2033#
SV2     007404          1998#   2026    2034#
SV3     007406          1999#   2027    2035#
SWR     000512           932#   1023    1133    1299    1586    1621    1757    1763    2091    2109    2118    2151    2253
                        2428    2440    2479#   2488    2492#   2558#
SWREG   000176           919#   1023    1133    2428    2492
TABLE   012346          2501    2503#
TEMPST  012250          2444#   2448#   2471#   2472#   2473#   2475#   2479    2482#
TESINC  005616          1500    1700    1721    1731#
TESRC1  006014          1764    1769#
TESREC  005764          1758    1763#
TEST    001324          1006#   1282#
TEST0   003306          1283    1327#
TEST1   003356          1285    1344#
TEST2   003426          1287    1362#
TEST3   003544          1290    1393#
TEST4   003662          1294    1426#
TEST5   004204          1293    1493#
TKB     000516           934#   2397    2398    2432
TKS     000514           933#   2393    2430
TO      011652          2408#   2505
TOP   = 104404          1081    1091    1097    1119    1139    1178    1192    1257    1274    1298    1320    1760    1792
```

CROSS REFERENCE TABLE -- USER SYMBOLS

		1794	1819	1834	1836	1845	1857	2094	2112	2145	2188	2190	2215	2230
		2232	2236	2240	2279	2283	2314	2403	2437	2439	2443	2459	2469	2520*
		2579												
TOP1	011664	2410*	2418	2426										
TOP2	011716	2414	2419*											
TP8	000522	936*	1155*	1174*	1264*	1267*	2352*	2381*	2397*	2417*	2421*	2424*		
TPS	000520	935*	1153	1172	1262	1265	2350	2379	2395	2408*	2415	2419	2422	
TRAP34	012326	860	2498*											
TSINC2	005672	1734	1739	1741*										
TSINC3	005706	1742	1744*											
TSTEX	001322	1005*	1278*	1279	1322*	1428								
TSTSTP	005432	1690	1696*											
TSTTBL	001326	1008*	1028*	1029*	1030*	1180	1278							
TU.SEL	001544	1042	1051*											
TYPT1	011420	2358*	2369											
TYPT2	011426	2359*	2361											
TYPT3	011462	2365	2368*											
T0	003320	1330*	1340											
T0A	003322	1331*	1338											
T0B	003340	1333	1337*											
T1	003370	1347*	1356											
T1A	003372	1348*	1354											
T1B	003410	1350	1353*											
T2	003440	1365*	1388											
T2A	003442	1366*	1372											
T2B	003460	1368	1371*											
T2C	003464	1373*	1379											
T2D	003504	1375	1378*											
T2E	003510	1380*	1386											
T2F	003524	1382	1384*											
T3	003556	1396*	1420											
T3A	003560	1397*	1403											
T3B	003[illegible]	1399	1402*											
T3C	0036[illegible]	1405*	1411											
T3D	003620	1407	1409*											
T3E	003626	1412*	1418											
T3F	003642	1414	1416*											
T4	003716	1429	1432*											
T4A	003720	1433*	1487											
T4B	003722	1434*	1438											
T4C	003746	1440*	1454											
T4D	003750	1441*	1449											
T4E	004002	1443	1448*											
T4F	004016	1452*	1456											
T4G	004034	1451	1457*											
T4H	004036	1458*	1464											
T4J	004054	1460	1462*											
T4K	004062	1465*	1483											
T4L	004064	1466*	1480											
T4M	004136	1473	1476*											
T4N	004150	1468	1470	1479*										
T4P	004154	1481*	1485											
T5	004216	1496*	1540											
T5A	004242	1499	1501*											
T5B	004254	1503*												
T5C	004264	1505*	1512											

CROSS REFERENCE TABLE -- USER SYMBOLS

```
TSD      004314            1507    1511#
TSE      004322             514#   1526    1538
TSF      004364            1519    1522#
TSFLAG   004464            1496*   1542#   1572*   1628    1671
TSG      004376            1516    1525#
TSH      004414            1528    1530#
TSINC    004466            1501*   1509    1543#
TSJ      004416            1531#   1536
TSK      004436            1533    1535#
USSTST   001624            1062#   1065
USS.OK   001642            1063    1067#
VALID    002300            1152    1158#
VAL1     002316            1163#   1166
VAL2     002330            1164    1167#
VAL3     002344            1168    1171#
VAL4     002350            1156    1170    1172#
WAITK    011574            2393#   2503
WAITKY=  104400            1141    1181    1203    1215    1231    1243    1258    2450    2518#
WAIT1    005160            1649*   1651#   1654*
WBUF     000530             939#   1682    1862    2065    2120    2262
WRCHEK   000570             957#   1558    1640    1693    1756*   1837    1839    1849
WRITI    005202            1658#   2504
WRITIT=  104402            1334    1351    1369    1400    1445    1497    2519#
WRPASS   000562             954#   1674*   1689    1691    1695*   1698    1719    1754    1765*   1766    1772*   2252*   2271*
                           2275*
WRRECR   000614             968#   1435*   1444    1446*   1670*   2293    2298
WRTDMP   006170            1796#
WRTD1    006460            1841#   1850
WRTD2    006502            1843    1848#
WRTLEN   000626             973#   1666*   1680    1735*   1736    1738    1740*   1761    2260    2280
W1       005250            1663    1666#
W10      005476            1702    1706#
W11      005550            1710    1719#   1775
W12      005604            1723    1727#
XDUMPM   000043             913#   2546*   2564*
XRGRCD   010766            2254    2271#   2274
XRGREC   010652            1771    2251#   2285
XRGO     010662            2253#   2276
XRGS     010774            2270    2273#
XXDPM    000041             911#   2544*   2555*   2580
ZERO     011556            2357*   2374    2376*   2385#
$CNTG    014042            2436    2723#
$ENDAD   003246             891    1092    1310    1313#
$MCRLF   014070            2458    2728#
$MNEW    014060            2442    2726#
$MSWR    014050            2438    2724#
$READ    012060            2445    2448#
$R1      007424            2040    2042#
$R5      007562            2067#   2070
$SVPC =  000036             877#    897
$ZERO$   002032            1107    1111#
.     =  014076             857#    859#    877     878#    882#    886#    890#    893#    897#    918#    920#    926#    987#
                            989#    991#    993#    995#    997#    999#   1001#   1154    1173    1260    1263    1266    1292
                           1587    1606    1609    1672    1677    1679    1716    1770    1779    1814    1817    1826    1829
                           1832    1852    1877    1892    1918    1947    2045    2047    2083    2102    2149    2177    2210
                           2213    2222    2225    2228    2257    2264    2302    2304    2351    2380    2386    2394    2396
```

CROSS REFERENCE TABLE -- USER SYMBOLS

2406# 2411 2416 2420 2423 2585 2729# 2731

. ABS. 014076 000

ERRORS DETECTED: 0

CZTMBE,CZTMBE.SEQ/CRF/SOL/NL:TOC=CZTMBE.P11
RUN-TIME: 3 6 .9 SECONDS
RUN-TIME RATIO: 173/10=16.3
CORE USED: 8K (15 PAGES)

DOCUMENT PAGES: 71