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IDENTIFICATION

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

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DATA RELIABILITY 7 TRACK

## 1. ABSTRACT

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

## 2. REQUIREMENTS

## 2.1 EQUIPMENT

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

## 2.2 STORAGE

## 2.2.1 PROGRAM STORAGE

THE ROUTINE REQUIRES 4K OF MEMORY.

## 2.3 PRELIMINARY PROGRAMS

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

## 3. LOADING PROCEDURE

## 3.1 METHOD

PROCEDURE FOR NORMAL BINARY TAPES SHOULD BE FOLLOWED:

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

## 4. STARTING PROCEDURE

## 4.1 CONTROL SWITCH SETTINGS

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

## 4.2 STARTING ADDRESS

200 - BASIC TEST (AUTOMATIC PARAMETER AND UNIT SELECTION)

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

210 - " " " " ( " BK " " )

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4.3 PROGRAM AND/OR OPERATOR ACTION

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

4.3.1 TAPE UNIT SELECTION

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

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

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

4.3.1.1 TAPE UNIT SELECTION EXAMPLES

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

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

SELECT UNITS  
SELECT UNITS

A CARRIAGE RETURN WAS TYPED WITH NO UNITS SELECTED.

SELECT UNITS 1,9?,1,2

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

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

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

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

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4.3.2 PARAMETER SELECTION

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

"TST PAT PAR DEN RLS WMO RMO"

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

4.3.2.1 TEST NUMBER

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

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

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4.3.2.2 PATTERN

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

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

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

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6 (ODD,EVEN) ALL 1'S	77
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	ETC
7 (EVEN) RANDON (NO ALL 0'S)	?
7 (ODD) RANDOM (INCLUDING ALL 0'S)	?

4.3.2.3 PARITY

PARITY SELECTION IS EITHER EVEN OR ODD.

PAR	DESCRIPTION
0	EVEN PARITY.
1	ODD PARITY

4.3.2.4 DENSITY

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

DEN	DESCRIPTION
2	200 BITS PER INCH.
5	556 BITS PER INCH.
8	800 BITS PER INCH.
C	800 BPI CORE DUMP.

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4.3.2.5 RECORD LENGTH SEQUENCE

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

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

4.3.2.6 WRITE START/STOP MODE

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

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

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4.3.2.7 READ START/STOP MODE

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

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

4.3.2.8 FINAL TEST SELECT APPROVAL

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

4.3.2.9 TEST SELECTION EXAMPLES

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

TWO PARAMETERS SETS WERE SELECTED BY THE ABOVE SEQUENCE

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

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

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

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

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#### 4.3.2.10 AUTOMATIC PARAMETER SELECTION

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

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

#### 5.0 OPERATING PROCEDURE

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

(IE) SWR=XXXXXX NEW=

POSSIBLE RESPONSES ARE:

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

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

#### 5.1 OPERATIONAL SWITCH SETTINGS

THE OPERATIONAL SWITCH SETTINGS ARE USED TO:

- A. ALTER ERROR RECOVERY PROCEDURES
- B. DELETE ERROR PRINTOUTS

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

5.1.1 SWITCHES TO ALTER ERROR RECOVERY

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

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

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5.1.2 SWITCHES TO CONTROL ERROR PRINTOUTS

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

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

5.1.3 TO ALTER TEST PATTERNS

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

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

EXAMPLE:

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

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

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6. ERRORS

6.1 WRITE ERRORS

THE FOLLOWING ERROR TYPEOUTS ARE POSSIBLE DURING A WRITE OPERATION.

A. WRITE STATUS ERROR

COMD	STATUS	RECORD	LENGTH	EXPECTED	ACTUAL
XXXXXX	XXXXXX				

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

B. XIRG WRITTEN 4 TIMES

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

C. END OF TAPE

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

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

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

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

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6.2 READ ERRORS

THE FOLLOWING ERROR TYPEOUTS ARE POSSIBLE DURING A READ OPERATION:

A. READ STATUS ERROR

COMD	STATUS	RECORD	LENGTH	EXPECTED	ACTUAL
XXXXXX	XXXXXX	47	4		

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

B. READ DATA ERROR

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

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

C. READ PASS

END OF TAPE

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

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

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

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## 6.3 ERROR RECOVERY PROCEDURES

## 6.3.1 WRITE ERROR RECOVERY

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

- A. IS IT A "WRITE ONLY" TEST OR WILL THE DATA BE READ?
- B. IS "WRITE STATISTICAL RECOVERY" SELECTED (SW 6=1)?
- C. IS "DELETE WRITE WITH XIRG" SELECTED (SW 5=1)?

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

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

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

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

## 6.3.2 READ ERROR RECOVERY

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

## 7. RESTRICTIONS

NONE

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## 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 (APPROXIMATELY 10 FEET) FARTHER DOWN ON TAPE. THIS WOULD EFFECTIVELY GIVE YOU TWO TAPES. CARE MUST BE EXERCISED WHEN MOUNTING THE TAPE TO POSITION IT AT THE PROPER "BOT" MARKER.

## 8.2 MEMORY AVAILABLE

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

## 9. PROGRAM DESCRIPTION

## 9.1 GENERAL DESCRIPTION

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

## 9.2 TEST 0

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

## 9.3 TEST 1

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

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

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9.4 TEST 2

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

9.5 TEST 3

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

9.6 TEST 4

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

9.7 TEST 5

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

10. LISTING

STATUS AND COMMAND REGISTER BIT ASSIGNMENTS

COMMAND REGISTER

15	ERROR		
14	DEN 8	00 = 200 BPI 7 TRACK	10 = 800 BPI 7 TRACK
13	DEN 5	01 = 556 BPI 7 TRACK	11 = 800 BPI 9 TRACK
12	POWER CLEAR		
11	PARITY	0 = ODD	1 = EVEN
10	UNIT SEL. BIT 2		
9	UNIT SEL. BIT 1		
8	UNIT SEL. BIT 0		
7	CONTROL UNIT READY		
6	INTERRUPT ENABLE		
5	ADDRESS BIT 17		
4	ADDRESS BIT 16		
3	FUNCTION BIT 2	000 = OFF LINE	100 = SPACE FORWARD
		001 = READ	101 = SPACE REVERSE
2	FUNCTION BIT 1	010 = WRITE	110 = WRITE XIRG
1	FUNCTION BIT 0	011 = WRITE EOF	111 = REWIND
0	GO		

STATUS REGISTER

15	ILLEGAL COMMAND (ILC)
14	END OF FILE (EOF)
13	CYCLICAL REDUNDANCY ERROR (CRE)
12	PARITY ERROR (PAE)
11	BUS GRANT LATE (BGL)
10	END OF TAPE (EOT)
9	RECORD LENGTH ERROR (RLE)
8	BAD TAPE ERROR (BTE)
7	NON EXISTENT MEMORY (NXM)
6	SELECT REMOTE (SELR)
5	BEGINNING OF TAPE (BOT)
4	7 CHANNEL (7CH)
3	SETTLE DOWN (SDWN)
2	WRITE LOCK (WRL)
1	REWIND STATUS (RWS)
0	TAPE UNIT READY (TUR)

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918      000000
919      000001
920      000002
921      000003
922      000004
923      000005
924      000006
925      000007
926
927
928
929
930      000000
931      000034
932  000034  012416
933      000046
934  000046  003300
935      000052
936  000052  040000
937
938
939
940
941
942      000174
943  000174  000000
944  000176  000000
945
946      000200
947  000200  000167  001162
948  000204  000167  001610
949  000210  000167  001630
950
951
952      000500
953  000500  172520
954  000502  172522
955  000504  172524
956  000506  172526
957  000510  177776

```

```

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

```

```

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

```

```

R0=%0
R1=%1
R2=%2
R3=%3
R4=%4
R5=%5
SP=%6
PC=%7

```

;TRAP CATCHER IN UNUSED LOCATIONS 0-476

```

.ENABL  ABS
.=0
.=34
TRAP34
.=46
ENDADR
.=52
40000

```

```

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

```

```

.=200
JMP    AUTOST
JMP    MEM4K
JMP    MEM8K

```

```

.MTS:  172520
.MTC:  172522
.BC:   172524
.CA:   172526
.CC:   177776

```

958 000512 177570  
 959 000514 177570  
 960 000516 177560  
 961 000520 177562  
 962 000522 177564  
 963 000524 177566  
 964 000526 002000  
 965 000530 000004  
 966 000532 013750  
 967 000534 015750  
 968 000536 000224  
 969 000500

SWR: 177570  
 DISPLAY: 177570  
 TKS: 177560  
 TKB: 177562  
 TPS: 177564  
 TPB: 177566  
 MAXLEN: 1024.  
 MINLEN: 4.  
 WBUF: BUFFER  
 RBUF: BUFFER+1024.  
 MTV: 224  
 STACK=500

;MAX RECORD LENGTH  
 ;MIN RECORD LENGTH  
 ;STARTING ADDRESS OF WRITE BUFFER  
 ;STARTING ADDRESS OF READ BUFFER

970  
 971  
 972 000540 000000  
 973 000542 000000  
 974 000544 000000  
 975 000546 000000  
 976 000550 000000  
 977 000552 000000  
 978 000554 000000  
 979 000556 000000  
 980 000560 000000  
 981 000562 000000  
 982 000564 000000  
 983 000566 000000  
 984 000570 000000  
 985 000572 000000  
 986 000574 000000  
 987 000576 000000  
 988 000600 000000  
 989 000602 000000  
 990 000604 000000  
 991 000606 000000  
 992 000610 000000  
 993 000612 000000  
 994 000614 000000  
 995 000616 000000  
 996 000620 000000

: TEMPORARY STORAGE AREAS

TIB: 0  
 TEMPST: 0  
 COUNT: 0  
 RDSW: 0  
 ATST: 0  
 DRVSEL: 0  
 STRLEN: 0  
 LENGTH: 0  
 MSBITS: 0  
 SVRECR: 0  
 COMAND: 0  
 CDRVBT: 0  
 CDRIVE: 0  
 RDPASS: 0  
 WRPASS: 0  
 BLKINC: 0  
 STATRD: 0  
 WRCHEK: 0

997  
 998 000622 000000  
 999 000624 000000  
 1000 000626 000000  
 1001 000630 000000  
 1002 000632 000000  
 1003 000634 000000  
 1004 000636 000000  
 1005 000640 000000  
 1006 000642 000000  
 1007 000644 000000

PERMBS: 0  
 RECORD: 0  
 WRRECR: 0  
 LASRCR: 0  
 RDERRS: 0  
 DAERRS: 0  
 NRREAD: 0  
 WRTLEN: 0  
 READLN: 0  
 MODES: 0

1008  
 1009  
 1010 000646 000666  
 1011 000650 000732  
 1012 000652 000776  
 1013 000654 001042

DRVADR: D0TAB  
 D1TAB  
 D2TAB  
 D3TAB



```

1070 001500 012767 015750 177026      MOV      #BUFFER+1024.,RBUF
1071 001506 000411                    BR      TU.SEL      ;GO SELCT DRIVES
1072 001510 012767 000010 177012 OVER4K: MOV      #8.,MINLEN
1073 001516 012767 004000 177002      MOV      #2048.,MAXLEN
1074 001524 012767 017750 177002      MOV      #BUFFER+2048.,RBUF
1075
1076      ; DETERMINE DRIVES TO BE TESTED.
1077      ; A DRIVE WILL BE TESTED IF:
1078      ; 1. IT CAN BE SELECTED
1079      ; 2. IT IS 7 TRACK
1080 001532 012737 000006 000004 TU.SEL: MOV      #6.,R4      ;SET TRAP CATCHER
1081 001540 012777 010000 176734      MOV      #10000.,R2MTC    ;PWR CLR
1082 001546 005067 177000                    CLR      DRVSEL        ;CLEAR DRIVE TABLE
1083 001552 005067 177002                    CLR      MSBITS
1084 001556 012700 000200                    MOV      #200.,R0      ;R0=DRIVE 0
1085 001562 105777 176714                    TSTB     R2MTC
1086 001566 100033                    BPL      IDSELF        ;BR IF NO CU RDY
1087 001570 016777 176756 176704 NXT.TU: MOV      DRVSEL,R2MTC    ;SELECT A DRIVE
1088 001576 012702 000024                    MOV      #20.,R2      ;SETUP R2 FOR WAIT LOOP
1089 001602 032777 000100 176670 USSTST: BIT      #100.,R2MTC ;DOES DRIVE EXIST?
1090 001610 001003                    BNE     USS.OK        ;BR IF YES
1091 001612 005302                    DEC      R2
1092 001614 003372                    BGT     USSTST
1093 001616 000412                    BR      NO.SEL        ;DRIVE IS NON-EXISTENCE
1094 001620 032777 000020 176652 USS.OK: BIT      #20.,R2MTC  ;IS THIS DRIVE 7 OR 9 CHN?
1095 001626 001406                    BEQ     NO.SEL        ;BR IF 9 CHN.
1096 001630 032777 000004 176642 BIT      #4.,R2MTC     ;IS WRITE LOCK ON?
1097 001636 001002                    BNE     NO.SEL        ;BR IF YES
1098 001640 050067 176714                    BIS     R0,MSBITS    ;PUT DRIVE INTO TABLE
1099 001644 105267 176703 NO.SEL: INCB   DRVSEL+1  ;INC. THE DRIVE NUMBER
1100 001650 000241                    CLC
1101 001652 006000                    ROR     R0            ;HAS ALL DRIVES BEEN TESTED FOR EXISTENCE?
1102 001654 001345                    BNE     NXT.TU      ;BR IF NO
1103
1104      ;TYPE-OUT NAME OF PROGRAM AND MIN. AND MAX. RECORD LENGTHS.
1105 001656 012702 013105 IDSELF: MOV      #MSG10A,R2
1106 001662 104404                    TOP
1107 001664 016702 176640                    MOV      MINLEN,R2
1108 001670 104426                    DECPRT                    ;PRINT MIN. LENGTH
1109 001672 016702 176630                    MOV      MAXLEN,R2
1110 001676 104426                    DECPRT                    ;PRINT MAX. LENGTH
1111 001700 005767 176654                    TST     MSBITS        ;WAS ANY DRIVES SELECTED?
1112 001704 001002                    BNE     .+6          ;BR IF YES
1113 001706 000167 000160                    JMP     START1        ;NO--GO HAVE OPERATOR SELECT DRIVES
1114
1115      ;TYPE-OUT THE DRIVE/S TO BE TESTED
1116 001712 012702 013201                    MOV      #MSG10B,R2
1117 001716 104404                    TOP
1118 001720 105067 012024                    CLRB    BUFFER
1119 001724 012701 013750                    MOV      #BUFFER,R1
1120 001730 005000                    CLR     R0            ;SET R0 TO DRIVE 0
1121 001732 012702 000200                    MOV      #200.,R2     ;SET R2 TO DRIVE 0
1122
1123      ;FORM AND SAVE DRIVE NUMBER FOR TYPE-OUT
1124 001736 105021                    CLRB    (R1)+        ;SET EOM
1125 001740 112721 000040                    MOVB   #'',(R1)+    ;SPACE

```

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```

1126 001744 030267 176610          LOOPER: BIT      R2,MSBITS      :DID THIS DRIVE NUMBER EXIST?
1127 001750 001405                      BEQ      $ZEROS          :BR IF NO
1128 001752 110011                      MOV      RO,(R1)        :YES--SAVE THE NUMBER
1129 001754 152721 000060          BISH     #'0,(R1)+      :MAKE IT ASCII
1130 001760 112721 000054          MOV      #'..(R1)+      :COMMA
1131 001764 000241          SZEROS: CLC                      :POSITION DRIVE BIT
1132 001766 006002                      ROR      R2
1133 001770 005200                      INC      RO
1134 001772 020027 000007          CMP      RO,#7          :UPDATE DRIVE NUMBER
1135 001776 003762                      BLE     LOOPER          :LAST
1136 002000 105011                      CLAB    (R1)           :BR IF NO
1137 002002 112741 000100          MOV      #'0-(R1)       :SET EOM
1138 002006 012702 013750          MOV      #BUFFER,R2    :CR & LF
1139 002012 104404                      TOP
1140 002014 000167 001074          JMP      EXECUT         :TYPE THE DRIVE/S SELECTED
1141                                :GO START TESTING
1142 002020 012767 000004 176502  :MODIFY RECORD LENGTHS AND BUFFER AREAS FOR 4K.
MEM4K: MOV      #4,MINLEN
1143 002026 012767 002000 176472  MOV      #1024,MAXLEN
1144 002034 012767 015750 176472  MOV      #BUFFER+1024,RBUF
1145 002042 000411                      BR      START
1146                                :MODIFY RECORD LENGTHS AND BUFFER AREAS FOR 8K.
MEM8K: MOV      #8,MINLEN
1147 002044 012767 000010 176456  MOV      #2048,MAXLEN
1148 002052 012767 004000 176446  MOV      #BUFFER+2048,RBUF
1149 002060 012767 017750 176446  MOV      #BUFFER+2048,RBUF
1150 002066 005067 176456          START: CLR      ATST      :NOT AUTO START
1151 002072 012706 000500          START1: MOV     #STACK,SP  :INITIALIZE STACK
1152 002076 104432                      SUSW
1153 002100 012767 123456 005302  MOV      #123456,LONUM  :PRIME RANDOM
1154 002106 012767 176543 005276  MOV      #176543,HINUM  :NUMBER GENERATOR
1155 002114 012702 012503          MOV      #MSG1,R2
1156 002120 104404                      TOP
1157 002122 005067 176432          SELDRV: CLR      MSBITS    :PRINT 'SELECT DRIVES'
1158 002126 104400                      WAITKY  :CLEAR SELECTED DRIVE INDICATOR
1159 002130 122767 000015 17717C  CMP      #15,CHARIN    :WAS CHARACTER A CARRIAGE RETURN?
1160 002136 001010                      BNE     SELD1          :NO
1161 002140 005767 176414          TST     MSBITS        :YES, WERE ANY DRIVES SELECTED
1162 002144 001752                      BEQ     START1        :NO
1163 002146 005767 176376          TST     ATST
1164 002152 001454                      BEQ     SELTST        :YES NOW SELECT TESTS
1165 002154 000167 000734          JMP      EXECUT
1166 002160 122767 000070 177140  SELD1: CMP      #70,CHARIN :IS CHARACTER A VALID NUMBER 0-7?
1167 002166 003404                      BLE     SELD2          :NO, PRINT "?"
1168 002170 122767 000060 177130  CMP      #60,CHARIN    :IS CHARACTER A VALID NUMBER 0-7?
1169 002176 003407                      BLE     VAL1           :YES
1170 002200 105777 176316          SELD2: TST      #7PS
1171 002204 100375                      BPL     #-4
1172 002206 012777 000077 176310  MOV      #'? ,#TPB     :PRINT '?'
1173 002214 000424                      BR      VAL4
1174                                :HAVE VALID DRIVE NUMBER
1175 002216 142767 000270 177102  VALID: BIC      #270,CHARIN :MASK OUT NUMBER
1176 002224 105167 177076          COMB    CHARIN
1177 002230 012700 000200          MOV     #200,RO
1178 002234 105267 177066          VAL1: INCB   CHARIN
1179 002240 001402                      BEQ     VAL2
1180 002242 006200                      ASR     RO
1181 002244 000773                      BR      VAL1
:MOVE BIT POSITION TO NEXT DRIVE
:TRY AGAIN

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1182 002246 130067 176306 VAL2: B.TS RO,MSBITS ;COMPARE DRIVE SELECT WITH PREVIOUS SELECTED
1183 002252 001003 BNE VAL3
1184 002254 150067 176300 BISS RO,MSBITS ;DRIVE WASN'T PREVIOUSLY SET, SO SET IT NOW.
1185 002260 000402 BR VAL4
1186 002262 140067 176272 VAL3: BICB RO,MSBITS ;DRIVE WAS SET, CLEAR IT.
1187 002266 105777 176230 VAL4: TSTB JTPS
1188 002272 100375 BPL -4
1189 002274 012777 000054 176222 MOV #, JTPB ;PRINT COMMA
1190 002302 000711 BR SELDRV ;RETURN TO WAIT FOR NEXT KEY
1191
1192
1193 ;HAVE DRIVES SELECTED-NOW GET TEST SELECTION
1194 002304 012702 012524 SELTST: MOV #MSG2,R2
1195 002310 104404 TOP ;PRINT 'SELECT TESTS'
1196 002312 005067 177012 CLR NUMTST ;CLEAR TEST NUMBERS SELECTED
1197 002316 012700 001340 MOV #TSTTBL,R0 ;INITIALIZE TEST TABLE POINTER
1198 002322 104400 WAITKY
1199 002324 122767 000015 176774 SELT1: CMPB #15,CHARIN ;WAS CHARACTER A CARRIAGE RETURN?
1200 002332 001005 BNE SELT2
1201 002334 005767 176770 TST NUMTST ;WERE ANY TESTS SELECTED?
1202 002340 001412 BEQ SELT3 ;NO
1203 002342 000167 000546 JMP EXECUT ;YES, EXECUTE TESTS
1204 002346 122767 000066 176752 SELT2: CMPB #66,CHARIN ;IS CHARACTER A VALID NUMBER 0-5
1205 002354 003404 BLE SELT3 ;NO
1206 002356 122767 000060 176742 CMPB #60,CHARIN ;IS CHARACTER A VALID NUMBER 0-5
1207 002364 003404 BLE SELPAT ;YES
1208 002366 012702 012476 SELT3: MOV #MSG0,R2
1209 002372 104404 TOP
1210 002374 000752 BR SELT1 ;RETURN TO WAIT FOR TEST SELECT
1211 002376 016704 176724 SELPAT: MOV CHARIN,R4
1212 002402 000304 SWAB R4 ;ROTATE TEST NUMBER INTO POSITION
1213 002404 005104 RCL R4
1214 002406 006104 ROL R4
1215 002410 006104 ROL R4
1216 002412 006104 ROL R4
1217 002414 042704 107777 BIC #107777,R4
1218 002420 104430 SP3
1219 ;HAVE VALID TEST SELECTED, NOW GET SELECTED PATTERN
1220 002422 104400 WAITKY
1221 002424 122767 000070 176674 CMPB #70,CHARIN ;IS CHARACTER A VALID NUMBER 0-7
1222 002432 003755 BLE SELT3 ;NO
1223 002434 122767 000057 176664 CMPB #57,CHARIN ;IS CHARACTER A VALID NUMBER 0-7
1224 002442 002351 BGE SELT3 ;NO
1225 002444 000367 176656 SWAB CHARIN ;MOVE PATTERN SELECT INTO POSITION
1226 002450 006167 176652 ROL CHARIN
1227 002454 042767 170777 176644 BIC #170777,CHARIN
1228 002462 056704 176640 BIS CHARIN,R4 ;COMBINE PATTERN WITH TEST
1229 002466 104430 SP3
1230 ;WAIT FOR PARITY SELECTION (0=EVEN, 1=ODD)
1231 002470 104400 WAITKY
1232 002472 122767 000060 176626 CMPB #60,CHARIN ;IS CHARACTER=0
1233 002500 001406 BEQ SELPR ;YES, EVEN PARITY
1234 002502 122767 000061 176616 CMPB #61,CHARIN ;IS CHARACTER=1
1235 002510 001326 BNE SELT3 ;NO, HAVE ILLEGAL KEY
1236 002512 052704 000400 BIS #400,R4 ;YES, ODD PARITY
1237 002516 104430 SELPR: SP3

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

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

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1350	003262	005367	176042	DCNE1:	DEC	NUMTST	
1351	003266	001010			BNE	DOAGN	
1352	003270	013702	000042		MOV	#42,R2	
1353	003274	001001			BNE	ENDADR	
1354	003276	000000			HALT		;FINISHED ALL TESTS
1355	003300	004712		ENDADR:	JSR	PC,(2)	
1356	003302	000240			NOP		
1357	003304	000240			NOP		
1358	003306	000240			NOP		
1359	003310	062767	000002 176016	DOAGN:	ADD	#2,TSTEX	
1360	003316	000704			BR	EXEC	;DO NEXT TEST
1361							
1362							
1363							
1364	003320	052767	000002 175316				
1365	003326	104420					
1366	003330	104416					
1367	003332	104410		TO:	RSFDRV		
1368	003334	104414		TOA:	MVCTRS		
1369	003336	032767	000040 175300		BIT	#40,MODES	
1370	003344	001002			BNE	TOB	
1371	003346	104402				WRITIT	
1372	003350	104406				SVCTRS	
1373							
1374	003352	104422		TOB:	CHGDRV		
1375	003354	000767			BR	TOA	
1376	003356	004767	001452		JSR	PC,ALLEOT	
1377	003362	000763			BR	TO	
1378	003364	000167	177624		JMP	DONE	
1379							
1380							
1381	003370	052767	000001 175246				
1382	003376	104420					
1383	003400	104416					
1384	003402	104410		T1:	RSFDRV		
1385	003404	104414		T1A:	MVCTRS		
1386	003406	032767	000040 175230		BIT	#40,MODES	
1387	003414	001002			BNE	T1B	
1388	003416	104402				WRITIT	
1389	003420	104406				SVCTRS	
1390	003422	104422		T1B:	CHGDRV		
1391	003424	000767			BR	T1A	
1392	003426	004767	001402		JSR	PC,ALLEOT	
1393	003432	000763			BR	T1	
1394	003434	000167	177554		JMP	DONE	
1395							
1396							
1397							
1398							
1399	003440	052767	000005 175176				
1400	003446	104420					
1401	003450	104416					
1402	003452	104410		T2:	RSFDRV		
1403	003454	104414		T2A:	MVCTRS		
1404	003456	032767	000040 175160		BIT	#40,MODES	
1405	003464	001002			BNE	T2B	

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1406	003466	104402			WRITIT	;WRITE
1407	003470	104406			SVCTRS	;SAVE DRIVE COUNTERS
1408	003472	104422		T2B:	CHGDRV	;ANYMORE DRIVERS SELECTED?
1409	003474	000767			T2A	;YES
1410	003476	104414		T2C:	MVCTRS	;RESTORE DRIVE COUNTERS
1411	003500	032767	000020	175136	#20,MODES	;IS THIS READ AT EOT?
1412	003506	001003			T2D	;YES, SKIP BACKSPACE
1413	003510	004767	005206		PC,GOBKWD	;BACKSPACE
1414	003514	104406			SVCTRS	;SAVE DRIVE COUNTERS
1415	003516	104422		T2D:	CHGDRV	;ANY MORE DRIVES SELECTED?
1416	003520	000766			T2C	;YES
1417	003522	104414		T2E:	MVCTRS	;RESTORE DRIVE COUNTERS
1418	003524	032767	000020	175112	#20,MODES	;IS THIS READ AT EOT?
1419	003532	001001			T2F	;YES, SKIP READ
1420	003534	104424			READIT	;READ
1421	003536	104406		T2F:	SVCTRS	;SAVE DRIVE COUNTERS
1422	003540	104422			CHGDRV	;ANYMORE DRIVES SELECTED?
1423	003542	000767			T2E	;YES
1424	003544	004767	001264		PC,ALLEOT	;ARE ALL DRIVES AT EOT?
1425	003550	000740			T2	;NO
1426	003552	000167	177436		JMP	;YES EXIT
1427						
1428						
1429					;TEST3	
1430	003556	052767	000006	175060	;WRITE ONE RECORD, CHANGE DRIVES, BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES	
1431	003564	104420			TEST3: BIS #6,MODES	;EXIT WRITE EVERY RECORD, DO READ PASS
1432	003566	104416			CLRAL	;CLEAR ERROR COUNTERS AND REWIND
1433	003570	104410			GENPAT	;GENERATE PATTERN
1434	003572	104414		T3:	RSFDRV	;SET DRIVE SELECTION TO LOWEST NUMBER
1435	003574	032767	000040	175042	MVCTRS	;RESTORE DRIVE COUNTERS
1436	003602	001002			#40,MODES	;IS THIS DRIVE AT EOT?
1437	003604	104402			T3B	;YES, SKIP WRITE
1438	003606	104406			WRITIT	;WRITE
1439	003610	104422		T3B:	SVCTRS	;SAVE DRIVE COUNTERS
1440	003612	000767			CHGDRV	;ANY MORE DRIVES SELECTED
1441					T3A	;YES
1442	003614	104414		T3C:	MVCTRS	;RESTORE DRIVE COUNTERS
1443	003616	032767	000020	175020	#20,MODES	;IS THIS DRIVE AT EOT?
1444	003624	001002			T3D	;YES, SKIP BACKSPACE
1445	003626	004767	005070		PC,GOBKWD	;BACKSPACE
1446	003632	104406		T3D:	SVCTRS	;SAVE DRIVE COUNTERS
1447	003634	104422			CHGDRV	;ANY MORE DRIVES SELECTED?
1448	003636	000766			T3C	;GO
1449	003640	104414		T3E:	MVCTRS	;RESTORE DRIVE COUNTERS
1450	003642	032767	000020	174774	#20,MODES	;IS THIS DRIVE AT EOT?
1451	003650	001001			T3F	;YES, SKIP READ
1452	003652	104424			READIT	;READ
1453	003654	104406		T3F:	SVCTRS	;SAVE DRIVE COUNTERS
1454	003656	104422			CHGDRV	;ANY MORE DRIVES SELECTED
1455	003660	000767			T3E	;YES
1456	003662	004767	001146		PC,ALLEOT	;ARE ALL DRIVES AT EOT?
1457	003666	000740			T3	;NO
1458	003670	000167	177320		JMP	;YES, EXIT
1459						
1460						
1461						

;TEST4  
;WRITE RECORD, CHANGE DRIVES, REPEAT FOR RECORD LENGTH SEQUENCE

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1462						: READ RECORD, CHANGE DRIVES, REPEAT FOR RLS
1463	003674	052767	000006	174742	TEST4:	BIS #6, MODES ; EXIT WRITE EVERY RECORD, DO READ PASS
1464	003702	104416				GENPAT ; GENERATE PATTERN
1465	003704	032777	000014	175422		BIT #14, 2STEX
1466	003712	001006				BNE T4
1467	003714	042767	000007	174722		BIC #7, MODES
1468	003722	052767	000005	174714		BIS #5, MODES ; EXIT WRITE AFTER RLS, DO READ PASS
1469	003730	104420			T4:	CLRALL ; CLEAR ERROR COUNTERS AND REWIND
1470	003732	104410			T4A:	RSFDRV ; SET DRIVE SELECTION TO LOWEST NUMBER
1471	003734	104414			T4B:	MVCTRS ; RESTORE DRIVE COUNTERS
1472	003736	016767	174662	174662		MOV RECORD, WRRECR ; SAVE RECORD
1473	003744	104406				SVCTRS ; SAVE DRIVE COUNTERS
1474	003746	104422				CHGDRV ; ANYMORE DRIVES SELECTED?
1475	003750	000771				BR T4B ; YES
1476	003752	042767	000010	174664		BIC #10, MODES ; INDICATE RLS END
1477	003760	104410			T4C:	RSFDRV ; SET DRIVE SELECTION TO LOWEST NUMBER
1478	003762	104414			T4D:	MVCTRS ; RESTORE DRIVE COUNTERS
1479	003764	032767	000040	174652		BIT #40, MODES ; IS DRIVE AT EOT
1480	003772	001010				BNE T4E ; YES, SKIP WRITE
1481	003774	016767	174626	174560		MOV WRRECR, SVRECR ; SAVE START OF RLS
1482	004002	104402				WRITIT ; WRITE
1483	004004	016767	174552	174614		MOV SVRECR, WRRECR ; RESTORE START OF RLS
1484	004012	104406				SVCTRS ; SAVE DRIVE COUNTERS
1485	004014	104422			T4E:	CHGDRV ; ANYMORE DRIVES SELECTED?
1486	004016	000761				BR T4D ; YES
1487	004020	032767	000010	174616		BIT #10, MODES ; ARE WE AT END OF RLS
1488	004026	001007				BNE T4G ; YES
1489	004030	104414			T4F:	MVCTRS ; RESTORE DRIVE COUNTERS
1490	004032	032767	000040	174604		BIT #40, MODES ; ARE WE AT EOT?
1491	004040	001747				BEQ T4C ; NO
1492	004042	104422				CHGDRV ; ANYMORE DRIVES SELECTED?
1493	004044	000771				BR T4F ; YES
1494						
1495						
1496	004046	104410			T4G:	RSFDRV ; SET DRIVE SELECTION TO LOWEST NUMBER
1497	004050	104414			T4H:	MVCTRS ; RESTORE DRIVE COUNTERS
1498	004052	032767	000020	174564		BIT #20, MODES ; IS THIS DRIVE AT EOT?
1499	004060	001002				BNE T4J ; YES, SKIP BACKSPACE
1500	004062	004767	004634			JSR PC, GOBKWD ; BACKSPACE
1501	004066	104406			T4J:	SVCTRS ; SAVE DRIVE COUNTERS
1502	004070	104422				CHGDRV ; ANY MORE DRIVES SELECTED?
1503	004072	000766				BR T4H ; YES
1504	004074	104410			T4K:	RSFDRV ; SET DRIVE SELECTION TO LOWEST NUMBER
1505	004076	104414			T4L:	MVCTRS ; RESTORE DRIVE COUNTERS
1506	004100	032767	000020	174536		BIT #20, MODES ; IS THIS READ AT EOT?
1507	004106	001025				BNE T4N ; YES, SKIP READ
1508	004110	026767	174514	174506		CMP LASRCR, RECORD ; HAVE WE READ LAST RECORD WRITTEN?
1509	004116	001421				BEQ T4N ; YES
1510	004120	016767	174504	174434		MOV LASRCR, SVRECR ; SAVE LAST RECORD
1511	004126	032767	000003	175176		BIT #3, PARAM ; IS READ MODE NONSTOP?
1512	004134	001405				BEQ T4M ; YES
1513	004136	016767	174462	174464		MOV RECORD, LASRCR
1514	004144	005267	174460			INC LASRCR ; +1 TO LAST RECORD WRITTEN
1515	004150	104424			T4M:	READIT ; READ
1516	004152	016767	174404	174450		MOV SVRECR, LASRCR ; RESTORE LAST RECORD WRITTEN
1517	004160	104406				SVCTRS ; SAVE DRIVE COUNTERS



1574	004450	104422			TSK:	CHGDRV		: ANYMORE DRIVES SELECTED?
1575	004452	000766				BR	TSJ	: YES
1576	004454	032767	000010	174162		BIT	#10, MODES	: AT END OF RLS?
1577	004462	001324				BNE	TSE	: NO
1578	004464	004767	000344			JSR	PC, ALLEOT	: ALL DRIVES AT EOT?
1579	004470	000657				BR	TS	: NO
1580	004472	000167	176516			JMP	DONE	: YES, EXIT
1581	004476	000000			TSFLAG:	0		
1582	004500	000000			TSINC:	0		
1583								
1584								: SAVE DRIVE RECORD AND ERROR COUNTERS
1585	004502	004767	000030		SVCTR:	JSR	PC, CTRDEX	
1586	004506	012021			SVC1:	MOV	(0)+, (1)+	
1587	004510	022700	000646			CMP	#DRVADR, RO	
1588	004514	001374				BNE	SVC1	
1589	004516	000207				RTS	PC	
1590								: RESET DRIVE COUNTERS BACK INTO PROGRAM
1591	004520	004767	000012		MVCTR:	JSR	PC, CTRDEX	
1592	004524	012120			MV1:	MOV	(1)+, (0)+	
1593	004526	022700	000646			CMP	#DRVADR, RO	
1594	004532	001374				BNE	MV1	
1595	004534	000207				RTS	PC	
1596								: SET UP POINTERS FOR MOVE AND SAVE COUNTERS
1597	004536	012700	000602		CTRDEX:	MOV	#WRCHK, RO	
1598	004542	012701	000646			MOV	#DRVADR, R1	
1599	004546	066701	174016			ADD	CDRIVE, R1	
1600	004552	066701	174012			ADD	CDRIVE, R1	
1601	004556	011101				MOV	R1, R1	
1602	004560	000207				RTS	PC	
1603								: CLEAR ALL DRIVE COUNTERS
1604	004562	104410			CLRAL:		RSFDRV	
1605	004564	004767	000206		CLR1:	JSR	PC, REWIND	
1606	004570	004767	000352			JSR	PC, CLRTBL	
1607	004574	104406					SVCTR	
1608	004576	104422					CHGDRV	
1609	004600	000771				BR	CLR1	
1610	004602	052767	000010	174034		BIS	#10, MODES	: AT END OF RLS
1611	004610	005067	177662			CLR	TSFLAG	
1612	004614	000207				RTS	PC	
1613								: RESET DRIVE SELECTION TO LOWEST NUMBER
1614	004616	005067	173746		RSFDR:	CLR	CDRIVE	: START WITH DRIVE 0
1615	004622	012767	000200	173736		MOV	#200, CDRVBT	: BIT FOR DRIVE 0
1616	004630	036767	173724	173730	RSF1:	BIT	MSBITS, CDRVBT	: IS DRIVE SELECTED?
1617	004636	001006				BNE	RSF2	: YES
1618	004640	005267	173724			INC	CDRIVE	: NO + 1 TO DRIVE
1619	004644	000241				CLC		
1620	004646	006067	173714			ROR	CDRVBT	: ROTATE DRIVE BIT
1621	004652	000766				BR	RSF1	: REPEAT
1622	004654	016767	173710	173702	RSF2:	MOV	CDRIVE, COMAND	
1623	004662	000367	173676			SWAB	COMAND	
1624	004666	105767	174440			TSTB	PARAM	: SET PROPER DENSITY BITS
1625	004672	100003				BPL	.+10	
1626	004674	052767	040000	173662		BIS	#40000, COMAND	
1627	004702	032767	000100	174422		BIT	#100, PARAM	
1628	004710	001403				BEQ	.+10	
1629	004712	052767	020000	173644		BIS	#20000, COMAND	

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1630	004720	032767	000400	174404	BIT	#400,PARAM	;TEST PARITY SELECTED
1631	004726	001003			BNE	.+10	;ODD
1632	004730	052767	004000	173626	BIS	#4000,COMAND	;EVEN
1633	004736	000207			RTS	PC	
1634							
1635							
1636							
1637	004740	005267	173624				
1638	004744	000241					
1639	004746	006067	173614				
1640	004752	001004					
1641	004754	104410					
1642	004756	062716	000002				
1643	004762	000207					
1644	004764	036767	173576	173566	CHG1:	BIT	CDRVBT,MSBITS
1645	004772	001762					
1646	004774	000727					
1647							
1648							
1649	004776	105777	173500				
1650	005002	100375					
1651	005004	016777	173554	173470			
1652	005012	006077	173462				
1653	005016	103375					
1654	005020	052777	000016	173454			
1655	005026	004767	000140				
1656	005032	000207					
1657							
1658	005034	104410					
1659	005036	104414					
1660	005040	032767	000060	173576			
1661	005046	001403					
1662	005050	104422					
1663	005052	000771					
1664	005054	000431					
1665	005056	104436					
1666	005060	032777	000400	173424			
1667	005066	001426					
1668	005070	032767	000010	173546			
1669	005076	001422					
1670							
1671	005100	104410					
1672	005102	104414					
1673	005104	005767	177366				
1674	005110	001007					
1675	005112	004767	001100				
1676	005116	104436					
1677	005120	032767	000004	173516			
1678	005126	001402					
1679	005130	004767	003112				
1680	005134	104422					
1681	005136	000761					
1682	005140	062716	000002				
1683	005144	000207					
1684							
1685							

1686											
1687	005146	012700	000602								
1688	005152	005020									
1689	005154	020027	000644								
1690	005160	001374									
1691	005162	042767	000070	173454							
1692	005170	000207									
1693											
1694	005172	012777	000200	173310							
1695	005200	012767	000001	000014							
1696	005206	012777	005234	173322							
1697	005214	052777	000101	173260							
1698	005222	000001									
1699	005224	012777	000340	173256							
1700	005232	000207									
1701	005234	012767	000240	177760							
1702	005242	000002									
1703											
1704											
1705	005244	005767	173354								
1706	005250	001031									
1707	005252	016767	173250	173274							
1708	005260	012767	177774	173310							
1709	005266	032767	000020	174036							
1710	005274	001006									
1711	005276	016767	173226	173250							
1712	005304	012767	000004	173264							
1713	005312	016767	173236	173320							
1714	005320	032767	000040	174004							
1715	005326	001002									
1716	005330	005067	173242								
1717	005334	016767	173264	173264							
1718	005342	005767	177130								
1719	005346	001401									
1720	005350	000207									
1721	005352	005067	173216								
1722	005356	016777	173202	173116							
1723	005364	105777	173112								
1724	005370	100375									
1725	005372	006077	173102								
1726	005376	103375									
1727	005400	016777	173234	173076							
1728	005406	005477	173072								
1729	005412	016777	173114	173066							
1730	005420	052777	000004	173054							
1731	005426	004767	177540								
1732											
1733	005432	017767	173042	173140							
1734	005440	005777	173036								
1735	005444	100542									
1736	005446	005767	173122								
1737	005452	001410									
1738	005454	016700	173114								
1739	005460	006300									
1740	005462	062700	000602								
1741	005466	005210									

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;CLEAR READ AND WRITE TABLES
CLRTBL: MOV #WRCHK,RO
CLRT1: CLR (0)+
        CMP RO,#MODES
        BNE CLRT1
        BIC #70,MODES
        RTS PC
; INTERRUPT ENABLE, GO, WAIT FOR INTERRUPT
GOWAIT: MOV #200,ACC ;SET PRIORITY LEVEL 4
        MOV #1,$WAIT ;#1=WAIT INSTR
        MOV #GW1,AMTV ;SET INTERRUPT RETURN
        BIS #101,AMTC ;INTERRUPT ENABLE, GO
$WAIT: WAIT ;WAIT FOR INTERRUPT
        MOV #340,ACC ;RESTORE PRIORITY LEVEL 7
        RTS PC ;EXIT
GW1: MOV #240,$WAIT ;NOP IT JUST IN CASE 11/34
      RTI ;RETURN FROM INTERRUPT

;WRITE RECORD SECTION
WRITI: TST RECORD ;IS THIS THE FIRST RECORD
        BNE NOINCR ;NO, SKIP SET UP OF RECORD LENGTH AND BLOCK INCREMENT
        MOV MAXLEN,STLEN
        MOV #-4,BLKINC
        BIT #20,PARAM
        BNE W1
        MOV MINLEN,STLEN
        MOV #4,BLKINC
W1: MOV STRLEN,WRTLEN
     BIT #40,PARAM ;DOES RECORD LENGTH CHANGE?
     BNE NOINCR ;YES
     CLR BLKINC ;NO
NOINCR: MOV RECORD,WRRECR
        TST T5FLAG
        BEQ .+4
        RTS PC ;EXIT WRITE ROUTINE IF TEST 5
        CLR WRPASS
STRTOP: MOV COMAND,AMTC ;SELECT UNIT
        TSTB AMTC
        BPL .-4 ;WAIT FOR CU READY
        ROR AMTS ;WAIT FOR TU READY
        BCC .-4
NONSTP: MOV WRTLEN,ABC ;SET BYTE COUNT
        NEG ABC
        MOV WBUF,ACA ;SET CURRENT ADDRESS
        BIS #4,AMTC ;WRITE
        JSR PC,GOWAIT ;INTERRUPT ENABLE, GO, WAIT FOR DONE
;RETURN HERE AFTER INTERRUPT
        MOV AMTS,STATRD ;SAVE STATUS
        TST AMTC
        BMI ERROR ;HAVE ERROR FLAG, CHECK FOR EOT
        TST WRPASS ;WAS THIS A RECOVERY PASS
        BEQ TSTSTP ;NO
        MOV WRPASS,RO ;YES
        ASL RO
        ADD #WRCHK,RO
        INC JRO ;+1 TO APPROPRIATE RECOVERY PASS COUNTER
    
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1742 005470 005067 173100
1743 005474 032767 000014 173630 TSTSTP: CLR WRPASS
1744 005502 001023 BNE #14,PARAM ;IS WRITE MODE NONSTOP?
1745 005504 005767 173064 TST STOPOP ;NO
1746 005510 001333 BNE WRPASS ;YES
1747 005512 004767 000142 JSR PC, TESINC ;CHANGE RECORD LENGTH
1748 005516 032767 000001 173120 BIT #1, MODES ;EXIT AFTER RLS?
1749 005524 001405 BEQ W10 ;NO
1750 005526 032767 000010 173110 BIT #10, MODES ;YES, ARE WE AT END OF RLS?
1751 005534 001721 BEQ NONSTP ;NO
1752 005536 000207 RTS PC ;YES
1753 005540 032767 000002 173076 W10: BIT #2, MODES ;EXIT EVERY RECORD?
1754 005546 0017 4 BEQ NONSTP ;NO
1755 005550 000207 RTS PC ;YES
1756 005552 032767 000010 173552 STOPOP: BIT #10,PARAM ;IS WRITE MODE RANDOM?
1757 005560 001414 BEQ W11 ;NO
1758 ;RANDOM STALL DELAY
1759 005562 004767 001450 RANSTP: JSR PC, RANGEN
1760 005566 052767 177400 001612 BIS #177400, RANDOM
1761 005574 012704 177470 RAN1: MOV #-200., R4 ;DELAY 1 MILLISECOND
1762 005600 005204 INC R4
1763 005602 001376 BNE -2
1764 005604 005267 001576 INC RANDOM
1765 005610 001371 BNE RAN1
1766 005612 005767 172756 W11: TST WRPASS
1767 005616 001257 BNE STRTOP
1768 005620 004767 000034 JSR PC, TESINC
1769 005624 032767 000001 173012 BIT #1, MODES ;EXIT AFTER RLS?
1770 005632 001405 BEQ W12 ;NO
1771 005634 032767 000010 173002 BIT #10, MODES ;YES, ARE WE AT END OF RLS?
1772 005642 001645 BEQ STRTOP ;NO
1773 005644 000207 RTS PC ;YES
1774 005646 032767 000002 172770 W12: BIT #2, MODES ;EXIT EVERY RECORD?
1775 005654 001640 BEQ STRTOP ;NO
1776 005656 000207 RTS PC ;YES
1777 ;SEE IF RECORD LENGTH SHOULD BE CHANGED
1778 005660 005267 172740 TESINC: INC RECORD ;+1 TO RECORD COUNT
1779 005664 042767 000010 172752 BIC #10, MODES ;NOT END OF RLS UNLESS SET BELOW
1780 005672 005767 172700 TST BLKINC
1781 005676 001416 BEQ TSINC2
1782 005700 066767 172672 172732 ADD BLKINC, WRTLEN
1783 005706 026767 172726 172614 CMP WRTLEN, MINLEN ;RECORD LENGTH TOO SHORT?
1784 005714 002404 BLT RESETL ;YES, RESET
1785 005716 026767 172716 172602 CMP WRTLEN, MAXLEN ;RECORD LENGTH TOO LONG?
1786 005724 003403 BLE TSINC2 ;NO
1787 005726 016767 172622 172704 RESETL: MOV STRLEN, WRTLEN ;YES, RESET
1788 005734 105767 172664 TSINC2: TSTB RECORD
1789 005740 001003 BNE TSINC3 ;NO
1790 005742 052767 000010 172674 BIS #10, MODES ;INDICATE AT END OF RLS
1791 005750 000207 TSINC3: RTS PC
1792
1793
1794 ;HAVE AN ERROR FLAG DURING WRITE OPERATION
1795 ;IF ERROR IS CAUSED BY END OF TAPE FLAG DUMP WRITE ERROR COUNTERS
1796 ;FOR ALL OTHER ERRORS: PRINT COMMAND AND STATUS REGISTERS AND RECORD NUMBER
1797 ;IF READ PASS IS SELECTED, TRY TO RECOVER BY WRITING WITH XIRG.

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

18954	006306	104404				TOP		:PRINT WRITE MODE
18955	006310	016702	172310			MOV	RECORD,R2	
18956	006314	104426				DECPRT		:PRINT RECORD NUMBER
18957	006316	016767	173010	003103		MOV	PARAM,CHAR	
18958	006324	042767	177717	003074		BIC	#177717,CHAR	
18959	006332	012702	013320			MOV	#MSG17,R2	
18960	006336	022767	000020	003062		CMP	#20,CHAR	
18961	006344	001002				BNE	.+6	
18962	006346	012702	013327			MOV	#MSG18,R2	
18963	006352	022767	000040	003046		CMP	#40,CHAR	
18964	006360	001002				BNE	.+6	
18965	006362	012702	013302			MOV	#MSG15,R2	
18966	006366	022767	000060	003032		CMP	#60,CHAR	
18967	006374	001002				BNE	.+6	
18968	006376	012702	013311			MOV	#MSG17,R2	
18969	006402	104424				TOP		:PRINT RECORD LENGTH SEQUENCE
18970	006404	012702	013336			MOV	#MSG19,R2	
18971	006410	104404				TOP		
18972	006412	016702	172164			MOV	WRCHK,R2	
18973	006416	104426				DECPRT		:PRINT "WRITE ERRORS="
18974	006420	012700	000604			MOV	#WRCHK+2,R0	
18975	006424	112767	000060	004745		MOVB	#60,MSG20+17	
18976	006432	105267	004741		WRTD1:	INCB	MSG20+17	:PRINT STATISTICAL RECOVERY
18977	006436	005710				TST	R0	
18978	006440	001405				BEQ	WRTD2	
18979	006442	012702	013360			MOV	#MSG20,R2	
18980	006446	104404				TOP		
18981	006450	011002				MOV	(0),R2	
18982	006452	104426				DECPRT		:RECOVERED AT X
18983	006454	005720			WRTD2:	TST	(0)+	:JUST INCREMENTING
18984	006456	020027	000622			CMP	R0,#WRCHK+20	
18985	006462	001363				BNE	WRTD1	
18986	006464	005767	172132			TST	PERMBS	
18987	006470	001002				BNE	IS	:SKIP PRINT IF = 0
18988	006472	104436				CKSW		
18989	006474	000207				RTS	PC	
18990								
18991								
18992	006476	012702	013402		IS:	MOV	#MSG20A,R2	
18993	006502	104404				TOP		
18994	006504	016702	172112			MOV	PERMBS,R2	:PRINT "PERMANENT BADSPOT"

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1895	006510	104426
1896	006512	104436
1897	006514	000207

	DECPRT
	CKSW
RTS	PC

1999			
1999			
1900			
1901	006516	016702	172010
1902	006522	016703	172604
1903	006526	000303	
1904	006530	006303	
1905	006532	042703	177741
1906	006536	062703	006544
1907	006542	011307	
1908	006544	006604	
1909	006546	006612	
1910	006550	006620	
1911	006552	006634	
1912	006554	006650	
1913	006556	006656	
1914	006560	006664	
1915	006562	006672	
1916	006564	006700	
1917	006566	006724	
1918	006570	006744	
1919	006572	006772	
1920	006574	007022	
1921	006576	007022	
1922	006600	007030	
1923	006602	007060	
1924			
1925			
1926	006604	012703	140701
1927	006610	000533	
1928			

```

:GENERATE DATA PATTERN
:ALL PATTERNS HAVE BITS 15,14,7,6 SET IN CASE CORE DUMP SELECTED
GENPA:  MOV      WBUF,R2
        MOV      PARAM,R3
        SWAB     R3
        ASL      R3
        BIC      #177741,R3
        ADD      #PATPNT,R3
        MOV      R3,PC
PATPNT: PATE0
        PAT00
        PATE1
        PAT01
        PATE2
        PAT02
        PATE3
        PAT03
        PATE4
        PAT04
        PATE5
        PAT05
        PAT6
        PATE7
        PAT07
:PATTERN 0
:HIGH FREQUENCY OUTSIDE SKEW
PATE0:  MOV      #140701,R3      ;401
        BR       PFIL1
:HALF FREQUENCY OUTSIDE SKEW

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

1985	006760	173767		173767		:33467
1986	006762	171767		171767		:31467
1987	006764	171773		171773		:31473
1988	006766	176775		176775		:37075
1989	006770	177376		177376		:37076
1990						
1991						
1992						
1993	006772	012703	007000			
1994	006776	000462				
1995	007000	160340				
1996	007002	150340				
1997	007004	150320				
1998	007006	144310				
1999	007010	142310				
2000	007012	142304				
2001	007014	141302				
2002	007016	140702				
2003	007020	140701				
2004						
2005						
2006	007022	012703	177777			
2007	007026	000424				
2008						
2009						
2010	007030	004767	000202			
2011	007034	132767	000077	000344		
2012	007042	001772				
2013	007044	116722	000336			
2014	007050	026702	171460			
2015	007054	001365				
2016	007056	000447				
2017						
2018	007060	004767	000152			
2019	007064	016722	000316			
2020	007070	026702	171440			
2021	007074	001371				
2022	007076	000437				
2023						
2024	007100	010322				
2025	007102	026702	171426			
2026	007106	001374				
2027	007110	000432				
2028						
2029	007112	010304				
2030	007114	062704	000006			
2031	007120	012322				
2032	007122	026702	171406			
2033	007126	001001				
2034	007130	000422				
2035	007132	020304				
2036	007134	001002				
2037	007136	162703	000006			
2038	007142	000766				
2039						
2040						

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:THREE 1'S EACH TRACK EVERY 6TH WORD
PAT05: MOV #P05,R3
        BR PFIL9
P05: 160340 ;20040
      150340 ;10040
      150320 ;10020
      144310 ;4010
      142310 ;2010
      142304 ;2004
      141302 ;1002
      140702 ;402
      140701 ;401

:PATTERN 6
:ALL 1'S ALL TRACKS
PAT6: MOV #-1,R3
      BR PFIL1

:PATTERN 7
:RANDOM (NONE ALL 0'S)
PATE7: JSR PC,RANGEN
      BITB #77,RANDOM
      BEQ PATE7
      MOVB RANDOM,(2)+
      CMP RBUF,R2
      BNE PATE7
      BR PATEND

:RANDOM (WITH ALL 0'S)
PAT07: JSR PC,RANGEN
      MOV RANDOM,(2)+
      CMP RBUF,R2
      BNE PAT07
      BR PATEND

:FILL WRITE BUFFER WITH CONSTANT PATTERN
PFIL1: MOV R3,(2)+
      CMP RBUF,R2
      BNE PFIL1
      BR PATEND

:FILL WRITE BUFFER WITH 3 WORD PATTERN
PFIL3: MOV R3,R4
      ADD #6,R4
PFIL3A: MOV (3)+,(2)+
      CMP RBUF,R2
      BNE .+4
      BR PATEND
      CMP R3,R4
      BNE .+6
      SUB #6,R3
      BR PFIL3A

:FILL WRITE BUFFER WITH 9 WORD PATTERN

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2041	007144	010304			PFIL9:	MOV	R3,R4	
2042	007146	062704	000022			ADD	#22,R4	
2043	007152	012322			PFIL9A:	MOV	(3)+,(2)+	
2044	007154	026702	171354			CMP	RBUF,R2	
2045	007160	001001				BNE	+4	
2046	007162	000405				BR	PATEND	
2047	007164	020304				CMP	R3,R4	
2048	007166	001002				BNE	+6	
2049	007170	162703	000022			SUB	#22,R3	
2050	007174	000766				BR	PFIL9A	
2051						:FINISHED PATTERN GENERATION		
2052						:IF CORE DUMP NOT SELECTED CLEAR BITS 15,14,7,6 IN ALL WORDS OF WRITE DATA BUFFER		
2053	007176	032767	000100	172126	PATEND:	BIT	#100,PARAM	:IS CORE DUMP SET?
2054	007204	001404				BEG	PATEN	:NO
2055	007206	032767	000200	172116		BIT	#200,PARAM	:MAYBE, IS CORE DUMP SET?
2056	007214	001007				BNE	PATEN2	:YES
2057	007216	016702	171310		PATEN:	MOV	WBUF,R2	:NO
2058	007222	042722	140300		PATEN1:	BIC	#140300,(2)+	:CLEAR BITS 15,14,7,6
2059	007226	026702	171302			CMP	RBUF,R2	:DONE ALL?
2060	007232	001373				BNE	PATEN1	:NO
2061	007234	000207			PATEN2:	RTS	PC	
2062						:RANDOM NUMBER GENERATOR		
2063						:EXIT WITH RANDOM NUMBER IN LOCATION NAMED "RANDOM"		
2064					RANGEN:	MOV	RO,SV0	:SAVE REGISTERS
2065	007236	010067	000152			MOV	R1,SV1	
2066	007242	010167	000150			MOV	R2,SV2	
2067	007246	010267	000146			MOV	R3,SV3	
2068	007252	010367	000144			MOV	LONUM,RO	:SET UP LOW DIGIT
2069	007256	016700	000126			MOV	HINUM,R1	:SET UP HIGH DIGIT
2070	007262	016701	000124			MOV	#7,R3	:SET UP SHIFT COUNT
2071	007266	012703	000007			CLR	R2	
2072	007272	005002						
2073	007274	006300			RANG1:	ASL	RO	:SHIFT RO LEFT AND
2074	007276	006101				ROL	R1	:ROTATE CARRY INTO LSB OF R1 AND
2075	007300	006102				ROL	R2	:ROTATE CARRY OUT OF R1 INTO R2
2076	007302	005303				DEC	R3	:DECREMENT R3
2077	007304	001373				BNE	RANG1	:CONTINUE SHIFT LOOP
2078	007306	066700	000076			ADD	LONUM,RO	:ADD NUMBER TO MAKE X 129
2079	007312	005501				ADC	R1	:PROPAGATE CARRY
2080	007314	066701	000072			ADD	HINUM,R1	:ADD NUMBER TO MAKE X 129
2081	007320	005502				ADC	R2	:PROPAGATE CARRY
2082	007322	062700	001057			ADD	#1057,RO	:ADD LOW CONSTANT
2083	007326	005501				ADC	R1	:PROPAGATE CARRY
2084	007330	005502				ADC	R2	:PROPAGATE CARRY
2085	007332	062701	047401			ADD	#47401,R1	:ADD HIGH CONSTANT
2086	007336	005502				ADC	R2	:PROPAGATE CARRY
2087	007340	062702	000006			ADD	#6,R2	:ADD HIGH CONSTANT
2088	007344	060200				ADD	R2,RO	:RE-PRIME RO WITH HIGH DIGIT
2089	007346	005501				ADC	R1	:PROPAGATE CARRY
2090	007350	010067	000032			MOV	RO,RANDOM	:SAVE RANDOM NUMBER
2091	007354	010067	000030			MOV	RO,LONUM	:PUT RO BACK IN LONUM
2092	007360	010167	000026			MOV	R1,HINUM	:PUT R1 BACK IN HINUM
2093	007364	016700	000024			MOV	SV0,RO	:RESTORE REGISTERS
2094	007370	016701	000022			MOV	SV1,R1	
2095	007374	016702	000020			MOV	SV2,R2	
2096	007400	016703	000016			MOV	SV3,R3	

2097	007404	000207				RIS	PC		;EXIT
2098	007406	000000				RANDOM:	0		
2099	007410	000000				LONUM:	0		
2100	007412	000000				HINUM:	0		
2101	007414	000000				SVO:	0		
2102	007416	000000				SV1:	0		
2103	007420	000000				SV2:	0		
2104	007422	000000				SV3:	0		
2105									
2106									
2107									
2108	007424	005767	171174						
2109	007430	001003				READI:	TST	RECORD	;FIRST RECORD?
2110	007432	016767	171116	171202			BNE	\$R1	;NO
2111	007440	012767	177775	171124			MOV	STRLEN,READLN	;SET INITIAL READ LENGTH
2112	007446	016777	171112	171026		\$R1:	MOV	#-3,RDPASS	;INITIALIZE READ PASS COUNTER
2113	007454	105777	171022			RDSTPD:	MOV	COMAND,AMTC	
2114	007460	100375					TSTB	AMTC	
2115	007462	006077	171012				BPL	.-4	;WAIT FOR CONTROL UNIT READY
2116	007466	103375					ROR	AMTS	
2117	007470	016700	171040			READGO:	BCC	.-4	;WAIT FOR TAPE UNIT READY
2118	007474	016701	171142				MOV	RBUF,RO	
2119	007500	105020				RG1:	MOV	READLN,R1	
2120	007502	005301					CLRB	(0)+	;CLEAR READ BUFFER
2121	007504	001375					DEC	R1	
2122	007506	016777	171130	170770			BNE	RG1	
2123	007514	005477	170764				MOV	READLN,ABC	;SET BYTE COUNT
2124	007520	016777	171010	170760			NEG	ABC	
2125	007526	016777	171032	170746			MOV	RBUF,ACA	;SET CURRENT ADDRESS
2126	007534	052777	000002	170740			MOV	COMAND,AMTC	
2127	007542	004767	175424				BIS	#2,AMTC	
2128							JSR	PC,GOWAIT	
2129	007546	017767	170726	171024		;RETURN	HERE	AFTER INTERRUPT	
2130	007554	005777	170722				MOV	AMTS,STATRD	
2131	007560	100504					TST	AMTC	;ANY STATUS ERRORS
2132							BMI	RDERR0	;YES
2133	007562	016700	170746			;CHECK	FOR DATA	ERRORS	
2134	007566	016701	170740				MOV	RBUF,RO	
2135	007572	016702	171044				MOV	WBUF,R1	
2136	007576	022021					MOV	READLN,R2	
2137	007600	001045				\$R5:	CMP	(0)+(1)+	;CHECK FOR PROPER DATA TRANSFER
2138	007602	162702	000002				BNE	DATERR	;HAVE DATA ERROR
2139	007606	001373					SUB	#2,R2	;CHECKED ALL TRANSFERS?
2140	007610	032767	000003	171514		RTSSTP:	BNE	\$R5	;NO
2141	007616	001007					BIT	#3,PARAM	
2142	007620	004767	000274				BNE	RDSTPC	
2143	007624	026767	170774	170776			JSR	PC,RDINCR	;INCREMENT FOR NEXT BLOCK
2144	007632	001316					CMP	RECORD,LASRCR	
2145	007634	000207					BNE	READGO	
2146	007636	032767	000002	171466		RDSTPC:	RTS	PC	;EXIT READIT
2147	007644	001414					BIT	#2,PARAM	;IS READ MODE RANDOM?
2148	007646	004767	177364				BEQ	RDSTP	;NO
2149	007652	052767	177400	177526		RNDRDS:	JSR	PC,RANGEN	
2150	007660	012704	177470				BIS	#177400,RANDOM	
2151	007664	005204				RNDS1:	MOV	#-200.,R4	;DELAY 1 MILLISECOND
2152	007666	001376					INC	R4	
							BNE	.-2	

2153	007670	005267	177512		INC	RANDOM	
2154	007674	001371			BNE	RNDS1	
2155	007676	004767	000216		JSR	PC, RDINCR	
2156	007702	026767	170716	170720	CMP	RECORD, LASRCR	; DONE LAST RECORD?
2157	007710	001256			BNE	RDSTPD	; NO
2158	007712	000207			RTS	PC	; YES EXIT
2159							
2160	007714	032777	020000	170570			
2161	007722	001014			DATER1: BIT	#20000, QSWR	; TYPE ALL READ ERRORS?
2162	007724	012702	012776		BNE	DATER1	; NO
2163	007730	104404			MOV	#MSG9A, R2	
2164	007732	016767	170704	170616	TOP		
2165	007740	004767	001066		MOV	READLN, LENGTH	
2166	007744	014102			JSR	PC, PRS	
2167	007746	104412			MOV	-(1), R2	; PRINT EXPECTED DATA
2168	007750	014002				OCTPR1	
2169	007752	104412			MOV	-(0), R2	; PRINT ACTUAL DATA
2170	007754	022767	177775	170610	DATER1: CMP	#-3, RDPASS	
2171	007762	001002			BNE	.+6	
2172	007764	005267	170644		INC	DAERRS	; +1 TO DATA ERRORS
2173	007770	000426			BR	RTSR1	
2174							
2175	007772	032767	175600	170600			
2176	010000	001515			:STATUS INDICATES AN ERROR, CHECK FOR EOT		
2177	010002	032777	020000	170502	RDERR0: BIT	#175600, STATRD	; IS ERROR LEGITIMATE OR EOT?
2178	010010	001010			BEQ	RNDTAP	; HAVE EOT
2179	010012	012702	012751		BIT	#20000, QSWR	; TYPE ALL READ ERRORS?
2180	010016	104404			BNE	RTSREC	; NO
2181	010020	016767	170616	170530	MOV	#MSG9, R2	
2182	010026	004767	001000		TOP		; PRINT ERROR
2183							
2184	010032	022767	177775	170532	:+ 1 TO RDERRS IF FIRST ERROR PASS		
2185	010040	001002			RTSREC: CMP	#-3, RDPASS	
2186	010042	005267	170564		BNE	.+6	
2187	010046	032777	000020	170436	RTSR1: INC	RDERRS	; +1 TO STATUS ERRORS
2188	010054	001011			BIT	#20, QSWR	; DELETE READ RETRYS (SW 4)?
2189	010056	005267	170510		BNE	RPASS3	; YES
2190	010062	001404			INC	RDPASS	; DONE ALL RE-READS?
2191	010064	004767	000100		BEQ	RPASS1	; YES
2192	010070	000167	177352		JSR	PC, BACK1	; NO, BACKSPACE TAPE
2193	010074	005267	170536		JMP	RDSTPD	; GO AGAIN
2194	010100	012767	177775	170464	RPASS1: INC	NREAD	; +1 TO NONRECOVERABLE READ
2195	010106	032767	002000	170464	RPASS3: MOV	#-3, RDPASS	
2196	010114	001054			BIT	#2000, STATRD	; AT EOT?
2197	010116	000667			BNE	RNDTP1	; YES, TYPE "EOT"
2198					BR	RDSTP	
2199	010120	005267	170500				
2200	010124	005767	170446		:SET UP POINTERS FOR NEXT RECORD		
2201	010130	001416			RDINCR: INC	RECORD	
2202					TST	BLKINC	
2203	010132	066767	170440	170502	BEQ	RESTR1	
2204	010140	026767	170476	170362			
2205	010146	002404			:RECORD LENGTH IS CHANGING, COUNT IT		
2206	010150	026767	170466	170350	ADD	BLKINC, READLN	
2207	010156	003403			CMP	READLN, MINLEN	; IS LENGTH LESS THAN MINIMUM
2208	010160	016767	170370	170454	BLT	RESTR1	; NO
					CMP	READLN, MAXLEN	; IS LENGTH GREATER THAN MAXIMUM?
					BLE	RESTR1	; NO
					RESTR1: MOV	STRLEN, READLN	; RESET INITIAL LENGTH

2209	010166	000207			RESTR1: R1S	PC	
2210							
2211							
2212							
2213	010170	006077	170304		:BACKSPACE ONE RECORD		
2214	010174	103375			BACK1: ROR	AMTS	
2215	010176	012777	177777	170300	BCC	.-4	;WAIT FOR TAPE UNIT READY
2216	010204	016777	170354	170270	MOV	#-1,ABC	;COUNT 1 RECORD
2217	010212	052777	000012	170262	MOV	COMAND,AMTC	;SELECT DRIVE
2218	010220	004767	174746		BIS	#12,AMTC	;ISSUE BACKSPACE
2219	010224	042777	000016	170250	JSR	PC,GOWAIT	
2220	010232	000207			BIC	#16,AMTC	
2221					RTS	PC	
2222	010234	004767	177660		:DRIVE HAS REACHED EOT IN READ MODE		
2223	010240	052767	000020	170376	RNDTAP: JSR	PC,RDINCR	
2224	010246	012702	013602		BIS	#20,MODES	;INDICATE AT EOT
2225	010252	104404			RNDTP1: MOV	#MSG25,R2	
2226	010254	012702	012644			TOP	
2227	010260	104404			MOV	#MSG8,R2	
2228						TOP	
2229	010262	004767	000610		:DUMP ERROR COUNTERS		
2230					READMP: JSR	PC,PRTD	;PRINT DRIVE, PATTERN, PARITY, DENSITY
2231	010266	016767	171040	001132	MOV	PARAM,CHAR	
2232	010274	042767	177774	001124	BIC	#177774,CHAR	
2233	010302	012702	013272		MOV	#MSG14,R2	
2234	010306	022767	000001	001112	CMP	#1,CHAR	
2235	010314	001002			BNE	.+6	
2236	010316	012702	013252		MOV	#MSG12,R2	
2237	010322	022767	000002	001076	CMP	#2,CHAR	
2238	010330	001002			BNE	.+6	
2239	010332	012702	013262		MOV	#MSG13,R2	
2240	010336	104404				TOP	;PRINT READ MODE
2241	010340	016702	170260		MOV	RECORD,R2	
2242	010344	104426			DECPRT		;PRINT RECORD NUMBER
2243	010346	016767	170760	001052	MOV	PARAM,CHAR	
2244	010354	042767	177717	001044	BIC	#177717,CHAR	
2245	010362	012702	013320		MOV	#MSG17,R2	
2246	010366	022767	000020	001032	CMP	#20,CHAR	
2247	010374	001002			BNE	.+6	
2248	010376	012702	013327		MOV	#MSG18,R2	
2249	010402	022767	000040	001016	CMP	#40,CHAR	
2250	010410	001002			BNE	.+6	
2251	010412	012702	013302		MOV	#MSG15,R2	
2252	010416	022767	000060	001002	CMP	#60,CHAR	
2253	010424	001002			BNE	.+6	
2254	010426	012702	013311		MOV	#MSG16,R2	
2255	010432	104404				TOP	;PRINT RECORD LENGTH SEQUENCE
2256	010434	012702	013432		MOV	#MSG21,R2	
2257	010440	104404				TOP	
2258	010442	016702	170164		MOV	RDERRS,R2	
2259	010446	104426			DECPRT		
2260							
2261							
2262	010450	012702	013462		MOV	#MSG22,R2	
2263	010454	104404				TOP	
2264	010456	016702	170152		MOV	DAERRS,R2	

K04

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2265	010462	104426	
2266	010464	012702	013503
2267	010470	104404	
2268	010472	016702	170140
2269	010476	104426	
2270	010500	104436	
2271	010502	000207	
2272			
2273			

DECPRT	
MOV	#MSG23,R2
	TOP
MOV	NRREAD,R2
DECPRT	
CKSW	
RTS	PC

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2274 :WRITE RECOVERY UTILIZING EXTENDED INTERRECORD GAP
2275 :USED AFTER EVERY 7 REWRITES OR AFTER
2276 :EACH WRITE ERROR IF STATISTICAL RECOVERY NOT SELECTED
2277 :USED ONLY IF READ PASS SELECTED
2278 010504 012767 177774 170062 XRGREC: MOV #-4,WRPASS ;COUNT 4 REWRITES
2279 010512 032777 000040 167772 XRGO: BIT #40,JSWR ;DELETE WRITE XIRG (SW 5)
2280 010520 001036 BNE XRGRCO ;YES
2281 010522 004767 177442 JSR PC,BACK1
2282 010526 105777 167750 TSTB @MTC
2283 010532 100375 BPL -4
2284 010534 016777 170024 167740 MOV COMAND,@MTC
2285 010542 052777 000014 167732 BIS #14,@MTC ;WRITE XIRG
2286 010550 016777 170064 167726 MOV WRTLEN,@BC ;SET BYTE COUNT
2287 010556 005477 167722 NEG @BC
2288 010562 016777 167744 167716 MOV WBUF,@CA ;SET CURRENT ADDRESS
2289 010570 006077 167704 ROR @MTC ;WAIT FOR TU READY
2290 010574 103J75 BCC -4
2291 010576 004767 174370 JSR PC,GOWAIT
2292
2293 ;RETURN HERE AFTER INTERRUPT
2294 010602 017767 167672 167770 MOV @MTC,STATRD ;SAVE STATUS
2295 010610 005777 167666 TST @MTC
2296 010614 100403 BMI XRG5 ;HAVE ERROR FLAG, CHECK FOR EOT
2297 010616 005067 167752 XRGRCO: CLR WRPASS
2298 010622 000207 RTS PC ;EXIT WRITE XIRG
2299 010624 032767 175600 167746 XRG5: BIT #175600,STATRD
2300 010632 001771 BEQ XRGRCO ;ONLY EOT, EXIT
2301 010634 005267 167734 INC WRPASS ;DONE 4 XIRG
2302 010640 001324 BNE XRGO
2303 ;PRINT STATUS AFTER 4 XIRG ERRORS
2304 010642 012702 012616 MOV #MSG7,R2
2305 010646 104404 TOP ;PRINT WRITE STATUS ERROR
2306 010650 016767 167764 167700 MOV WRTLEN,LENGTH
2307 010656 004767 000150 JSR PC,PRTS ;PRINT STATUS, COMMAND, RECORD, LENGTH
2308 010662 012702 013224 MOV #MSG11,R2
2309 010666 104404 TOP ;PRINT "XIRG WRITTEN 4 TIMES"
2310 010670 032767 002000 167702 BIT #2000,STATRD
2311 010676 001702 BEQ XRGREC
2312 010700 042777 000016 167574 BIC #16,@MTC
2313 010706 052777 000003 167566 BIS #3,@MTC ;WRITE AN EOF
2314 010714 004767 174252 JSR PC,GOWAIT
2315 010720 000207 RTS PC
2316
2317 ;GO BACKWARD ON TAPE X RECORDS
2318 010722 016767 167676 167700 GOBKWD: MOV RECORD,LASRCR
2319 010730 016767 167672 167666 MOV WRECR,RECORD
2320 010736 001003 BNE GOB1 ;IS NEW RECORD=0
2321 010740 004767 174032 JSR PC,REWIND ;YES REWIND
2322 010744 000207 RTS PC ;EXIT
2323 010746 016777 167656 167530 GOB1: MOV LASRCR,@BC ;SET BYTE COUNT TO DIFFERENCE
2324 010754 166777 167646 167522 SUB WRECR,@BC ;BETWEEN LASRCR AND WRECR
2325 010762 005477 167516 NEG @BC
2326 010766 016777 167572 167506 MOV COMAND,@MTC
2327 010774 105777 167502 TSTB @MTC ;WAIT FOR CU READY
2328 011000 100375 BPL -4
2329 011002 006077 167472 ROR @MTC ;WAIT FOR TU READY

```

2330	011006	103375		
2331	011010	042777	000016	167464
2332	011016	052777	000012	167456
2333	011024	004767	174142	
2334	011030	000207		
2335				
2336	011032	012702	013021	
2337	011036	104404		
2338	011040	017702	167436	
2339	011044	104412		
2340	011046	016702	167526	
2341	011052	104412		
2342	011054	016702	167544	
2343	011060	005202		
2344	011062	104426		
2345	011064	016702	167466	
2346	011070	104426		
2347	011072	104436		
2348	011074	000207		
2349				
2350				
2351	011076	016767	167462	000322
2352	011104	000367	000316	
2353	011110	142767	000170	000310
2354	011116	052767	000260	000302
2355	011124	004767	000300	
2356	011130	104430		
2357	011132	016767	170174	000266
2358	011140	000367	000262	
2359	011144	006067	000256	
2360	011150	042767	000170	000250
2361	011156	052767	000260	000242
2362	011164	004767	000240	
2363	011170	104430		
2364	011172	016767	170134	000226
2365	011200	000367	000222	
2366	011204	042767	000176	000214
2367	011212	052767	000260	000206
2368	011220	004767	000204	
2369				
2370				
2371	011224	016767	170102	000174
2372	011232	042767	177477	000166
2373	011240	012702	013645	
2374	011244	022767	000100	000154
2375	011252	001002		
2376	011254	012702	013655	
2377	011260	022767	000200	000140
2378	011266	001002		
2379	011270	012702	013665	
2380	011274	022767	000300	000124
2381	011302	001002		
2382	011304	012702	013675	
2383	011310	104404		
2384	011312	104436		
2385	011314	000207		

```

BCC      .-4
BIC      #16,AMTC
BIS      #12,AMTC
JSR      PC,GOWAIT
RTS      PC
:PRINT COMMAND, STATUS, RECORD NUMBER, LENGTH
PRTS:    MOV      #MSG98,R2
          TOP
          MOV      AMTC,R2
          OCTPRT
          MOV      STATRD,R2
          OCTPRT
          MOV      RECORD,R2
          INC      R2
          DECPRT
          MOV      LENGTH,R2
          DECPRT
          CKSW
          RTS      PC

:PRINT DRIVE, PATTERN, PARITY, DENSITY
PRTD:    MOV      COMAND,CHAR
          SWAB    CHAR
          BICB   #170,CHAR
          BIS    #260,CHAR
          JSR    PC,OCTP      ;PRINT DRIVE NUMBER
          SP3
          MOV    PARAM,CHAR
          SWAB  CHAR
          ROR   CHAR
          BIC  #170,CHAR
          BIS  #260,CHAR
          JSR  PC,OCTP      ;PRINT PATTERN NUMBER
          SP3
          MOV  PARAM,CHAR
          SWAB CHAR
          BIC  #176,CHAR
          BIS  #260,CHAR
          JSR  PC,OCTP      ;PRINT PARITY

MOV      PARAM,CHAR
BIC      #177477,CHAR
MOV      #MSG26,R2
CMP      #100,CHAR
BNE      .+6
MOV      #MSG27,R2
CMP      #200,CHAR
BNE      .+6
MOV      #MSG28,R2
CMP      #300,CHAR
BNE      .+6
MOV      #MSG29,R2
TOP
CKSW
RTS      PC

```

```

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

011612  
011620  
011622  
011624  
011626  
011630  
011632  
011634  
011636  
011640  
011642  
  
011644  
011650  
011652  
011656  
011660  
011666  
011674  
011702  
  
011704  
011710  
011712  
011714  
  
011722  
011730  
011734  
011740  
011742  
011746  
011750  
011754  
011756  
011762  
011764  
011770  
  
011772  
011776  
012000  
012006  
012012  
012014  
012022  
012024  
012030  
012032  
012034

016777 000004 166704  
000207  
000000  
000000  
000040  
011632  
023420  
001750  
000144  
000012  
000001  
  
105777 166646  
100375  
105777 166644  
100375  
117777 166634 166636  
117767 166626 167432  
042767 000200 167424  
000207  
  
012702 011714  
104404  
000207  
020057 020040 057  
011722  
  
142777 000177 166572  
112267 000100  
121267 000074  
001003  
005067 166600  
000207  
121227 000100  
001406  
105777 166540  
100375  
112277 166534  
000761  
  
105777 166524  
100375  
112777 000215 166516  
105777 166510  
100375  
112777 000212 166502  
105202  
105767 166516  
100744  
000740  
000000

MOV DIGIT, @TPB  
RTS PC  
DIGIT: 0  
OIGCNT: 0  
ZERO: 40  
DECPNT: +2  
10000.  
1000.  
100.  
10.  
1.  
:KEYBOARD INPUT  
WAITK: TSTB @TKS  
BPL -4  
TSTB @TPS  
BPL -4  
MOV @TKB, @TPB  
MOV @TKB, CHARIN  
BIC @200, CHARIN  
RTS PC  
:TYPE 3 SPACES  
SP3X: MOV @SP3A, R2  
TOP  
RTS PC  
SP3A: .ASCII  
.EVEN  
  
:TELETYPE OUTPUT PACKAGE  
TO: BICB @177, @TPS  
MOV (2)+, ECMK  
TOP1: CMPB @R2, ECMK  
BNE +10  
TOP3: CLR RDSW  
RTS PC  
CMPB @R2, @2  
BEQ TOP2  
TSTB @TPS  
BPL -4  
MOV (2)+, @TP9  
BR TOP1  
:CARRIAGE RETURN, LINE FEED  
TOP2: TSTB @TFS  
BPL -4  
MOV @215, @TPB  
TSTB @TPS  
BPL -4  
MOV @212, @TPB  
INCB R2  
TSTB RDSW  
BMI TOP3  
BR TOP1  
ECMK: 0

:WAIT FOR KEY  
:WAIT FOR TELEPRINTER READY  
:ECHO CHARACTER  
:SAVE IT  
:EXIT  
:CLEAR TELETYPE FLAGS  
:SAVE MESSAGE DELIMITER  
:IS CHARACTER THE SECOND MESSAGE DELIMITER?  
:NO  
:YES, EXIT  
:IS CHARACTER AN @ WHICH INDICATES A CARRIAGE RET.  
:YES  
:NO, WAIT FOR TELETYPE READY  
:PRINT CHARACTER  
:CR  
:LF

2498	012036	013746	000006		SLSWR:	MOV	#06, -(SP)	:SAVE VECTORS
2499	012042	013746	000004			MOV	#04, -(SP)	
2500	012046	012737	012066	000004		MOV	#15, #04	:SET UP FOR TIMEOUT
2501	012054	022777	177777	166430		CMP	#-1, #SWR	:REFERENCE HARDWARE SWITCH REGISTER
2502	012062	001402				BEQ	2\$	
2503	012064	000407				BR	3\$	
2504	012066	022626			1\$:	CMP	(SP)+, (SP)+	:ADJUST STACK
2505	012070	012767	000176	166414	2\$:	MOV	#SWREG, SWR	:POINT TO SOFTWARE SWITCH REG
2506	012076	012767	000174	166410		MOV	#DISPREG, DISPLAY	:POINT TO SCFT DISPLAY REG
2507	012104	012637	000004		3\$:	MOV	(SP)+, #04	:RESTORE VECTORS
2508	012110	012637	000006			MOV	(SP)+, #06	
2509	012114	000207				RTS	PC	
2510								
2511								
2512								
2513	012116	022767	000176	166356	CKSWR:	CMP	#SWREG, SWR	:SOFTWARE SWITCH REG PRESENT
2514	012124	001035				BNE	OUT	:NO, GET OUT
2515	012126	105777	166364			TSTB	#TKS	:YES, WAIT FOR
2516	012132	100032				BPL	OUT	:READY, GET CHARACTER
2517	012134	017767	166360	166376		MOV	#TKB, TIB	:AND STRIP OFF
2518	012142	042767	177600	166370		BIC	#177600, TIB	:THE GARBAGE
2519	012150	022767	000007	166362		CMP	#7, TIB	: IS IT A <↑G>
2520	012156	001020				BNE	OUT	
2521	012160	012702	013712			MOV	#SCNTG, R2	
2522	012164	104404				TOP		
2523	012166	012702	013717		CNTLU:	MOV	#MSWR, R2	
2524	012172	104404				TOP		
2525	012174	017702	166312			MOV	#SWR, R2	
2526	012200	104412				OCTPRT		
2527	012202	012702	013730			MOV	#MNEW, R2	
2528	012206	104404				TOP		
2529	012210	005037	000542			CLR	#TEMPST	
2530	012214	004767	000002			JSR	PC, \$READ	:GO READ A LINE
2531	012220	000207			OUT:	RTS	PC	:RETURN TO MAIN BODY OF PROGRAM
2532								
2533	012222	005067	166314		\$READ:	CLR	TEMPST	
2534	012226	012767	000007	166310		MOV	#7, COUNT	
2535	012234	104400			1\$:	WAITKY		:GO READ A CHARACTER
2536	012236	042767	177600	167062		BIC	#177600, CHARIN	:STRIP OFF GARBAGE
2537	012244	122767	000025	167054		CMPB	#25, CHARIN	: IS IT A 'U'?
2538	012252	001002				BNE	2\$	:BRANCH IF NOT
2539	012254	005726			3\$:	TST	(SP)+	:POP THE STACK
2540	012256	000743				BR	CNTLU	:START OVER
2541	012260	122767	000015	167040	2\$:	CMPB	#15, CHARIN	: IS IT A <CR>?
2542	012266	001013				BNE	4\$	:BRANCH IF NOT
2543	012270	012767	000200	166250		MOV	#200, RDSW	
2544	012276	004767	177470			JSR	PC, TOP2	:ECHO IT WITH <LF>
2545	012302	022767	000007	166234		CMP	#7, COUNT	:WAS IT FIRST CHARACTER
2546	012310	001036				BNE	7\$	:CHANGE SWR IF NOT FIRST ONE
2547	012312	005726			8\$:	TST	(SP)+	:POP THE STACK
2548	012314	000741				BR	OUT	:GET OUT
2549	012316	122767	000060	167002	4\$:	CMPB	#60, CHARIN	
2550	012324	003004				BGT	5\$	
2551	012326	122767	000067	166772		CMPB	#67, CHARIN	
2552	012334	002004				BGE	6\$	
2553	012336	012702	013741		5\$:	MOV	#SQUEST, R2	

2554	012342	104404		
2555	012344	000743		
2556	012346	006367	166170	
2557	012352	006367	166164	
2558	012356	006367	166160	
2559	012362	142767	000060	166736
2560	012370	156767	166732	166144
2561	012376	005367	166142	
2562	012402	001755		
2563	012404	000713		
2564	012406	016777	166130	166076
2565	012414	000736		
2566				
2567	012416	011666	000002	
2568	012422	162716	000002	
2569	012426	013646		
2570	012430	062716	106036	
2571	012434	013607		
2572	012436	011644		
2573	012440	005244		
2574	012442	011722		
2575	012444	004502		
2576	012446	004616		
2577	012450	011316		
2578	012452	004520		
2579	012454	006516		
2580	012456	004562		
2581	012460	004740		
2582	012462	007424		
2583	012464	011446		
2584	012466	011704		
2585	012470	012036		
2586	012472	012166		
2587	012474	012116		
2588		104400		
2589		104402		
2590		104404		
2591		104406		
2592		104410		
2593		104412		
2594		104414		
2595		104416		
2596		104420		
2597		104422		
2598		104424		
2599		104426		
2600		104430		
2601		104432		
2602		104434		
2603		104436		
2604				
2605	012476	037457	020100	057
2606	012503	057	051500	046105
2607	012510	041505	020124	047125
2608	012516	052111	020123	027440
2609	012524	040057	051524	020124

```

TOP
BR 3$ ;START OVER IF NOT LEGAL CHARACTER
ASL TEMPST
ASL TEMPST
ASL TEMPST
BICB #60,CHARIN ;GET NITTY-GRIFTY
BISB CHARIN,TEMPST
DEC COUNT ;ONLY WANT 6 DIGITS
BEQ 5$
BR 1$
MOV TEMPST,ASWR ;CHANGE SWITCH REGISTER CONTENTS
BR 8$

:TRAP ANDLER
TRAP34: MOV @SP,2(6)
SUB #2,@SP
MOV @6)+,-(6)
ADD #TABLE-104400,@SP
MOV @6)+,PC
TABLE: WAITK
WRITI
TO
SVCTR
RSFDR
OCTPR
MVCTR
GENPA
CLRAL
CHGDR
READI
DECPR
SP3X
SUSWR
CNTLU
CKSWR
WAITKY=104400
WRITIT=104402
TOP=104404
SVCTRS=104406
RSFDRV=104410
OCTPRT=104412
MVCTRS=104414
GENPAT=104416
CLRALL=104420
CHGDRV=104422
READIT=104424
DECPRT=104426
SP3=104430
SUSW=104432
CNTL=104434
CKSW=104436
:TEXT MESSAGES
MSG0: .ASCII ;/?
MSG1: .ASCII ;/SELECT UNITS
MSG2: .ASCII ;/ATST PAT PAR DEN RLS WMO RMO3

```

E05

TM-11 DATA RELIABILITY 7 TRACK  
DZTMCC.P11

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2610	012532	040520	020124	040520		
2611	012540	020122	042504	020116		
2612	012546	046122	020123	046527		
2613	012554	020117	046522	040117		
2614	012562	027440				
2615	012564	046457	054101	052040	MSG5:	.ASCII ;/MAX TESTS SELECTED/;
2616	012572	051505	051524	051440		
2617	012600	046105	041505	042524		
2618	012606	040104	057			
2619	012611	057	047440	027513	MSG6:	.ASCII ;/OK/;
2620	012616	040057	051127	052111	MSG7:	.ASCII ;/WRITE STATUS ERROR/;
2621	012624	020105	052123	052101		
2622	012632	051525	042440	051122		
2623	012640	051117	027500			
2624	012644	042457	042116	047440	MSG8:	.ASCII ;/END OF TAPE*****/;
2625	012652	020106	040524	042520		
2626	012660	025052	025052	025052		
2627	012666	025052	025052	025052		
2628	012674	025052	025052	025052		
2629	012702	025052	100			
2630	012705	104	053122	050040	.ASCII	;/DRV PAT PAR DEN MODE RECORD LENGTH/;
2631	012712	052101	050040	051101		
2632	012720	042040	047105	046440		
2633	012726	042117	020105	042522		
2634	012734	047503	042122	046040		
2635	012742	047105	052107	040110		
2636	012750	057				
2637	012751	057	051100	040505	MSG9:	.ASCII ;/READ STATUS ERROR/;
2638	012756	020104	052123	052101		
2639	012764	051525	042440	051122		
2640	012772	051117	027500			
2641	012776	040057	042522	042101	MSG9A:	.ASCII ;/READ DATA ERROR/;
2642	013004	042040	052101	020101		
2643	013012	051105	047522	040122		
2644	013020	057				
2645	013021	057	047503	042115	MSG9B:	.ASCII ;/COMD STATUS RECORD LENGTH EXPECTED ACTUAL/;
2646	013026	020040	020040	051440		
2647	013034	040524	052524	020123		
2648	013042	020040	042522	047503		
2649	013050	042122	020040	046040		
2650	013056	047105	052107	020110		
2651	013064	054105	042520	052103		
2652	013072	042105	040440	052103		
2653	013100	040525	040114	057		
2654	013105	057	046500	044501	MSG10A:	.ASCII ;/MAINDEC-11-DZTMC-C/;
2655	013112	042116	041505	030455		
2656	013120	026461	055104	046524		
2657	013126	026503	103			
2658	013131	100	042522	047503	.ASCII	;/RECORD LIMITS IN BYTES/;
2659	013136	042122	046040	046511		
2660	013144	052111	020123	047111		
2661	013152	041040	052131	051505		
2662	013160	046500	047111	042514	.ASCII	;/MINLEN MAXLEN/;
2663	013166	020116	046440	054101		
2664	013174	042514	040116	057		
2665	013201	057	042500	042530	MSG10B:	.ASCII ;/EXERCISING UNITS/;

2666	013206	041522	051511	047111			
2667	013214	020107	047125	052111			
2668	013222	027523					
2669	013224	054057	051111	020107	MSG11:	.ASCII	;/XIRG WRITTEN 4 TIMES/;
2670	013232	051127	052111	042524			
2671	013240	020116	020064	044524			
2672	013246	042515	027523				
2673	013252	020057	051523	050124	MSG12:	.ASCII	;/ SSTP /;
2674	013260	027440					
2675	013262	020057	047122	046504	MSG13:	.ASCII	;/ RNDM /;
2676	013270	027440					
2677	013272	020057	051516	050124	MSG14:	.ASCII	;/ NSTP /;
2678	013300	027440					
2679	013302	046457	046455	054101	MSG15:	.ASCII	;/M-MAX/;
2680	013310	057					
2681	013311	057	026515	044515	MSG16:	.ASCII	;/M-MIN/;
2682	013316	027516					
2683	013320	046457	047111	020040	MSG17:	.ASCII	;/MIN /;
2684	013326	057					
2685	013327	057	040515	020130	MSG18:	.ASCII	;/MAX /;
2686	013334	027440					
2687	013336	040057	051127	052111	MSG19:	.ASCII	;/@WRITE ERRORS = /;
2688	013344	020105	051105	047522			
2689	013352	051522	036440	027440			
2690	013360	040057	042522	047503	MSG20:	.ASCII	;/@RECOVERED AT 0 /;
2691	013366	042526	042522	020104			
2692	013374	052101	030040	027440			
2693	013402	040057	042520	046522	MSG20A:	.ASCII	;/@PERMANENT BADSPOTS = /;
2694	013410	047101	047105	020124			
2695	013416	040502	051504	047520			
2696	013424	051524	036440	027440			
2697	013432	040057	042522	042101	MSG21:	.ASCII	;/@READ STATUS ERRORS = /;
2698	013440	051440	040524	052524			
2699	013446	020123	051105	047522			
2700	013454	051522	036440	027440			
2701	013462	040057	040504	040524	MSG22:	.ASCII	;/@DATA ERRORS = /;
2702	013470	042440	051122	051117			
2703	013476	020123	020075	057			
2704	013503	057	047100	047117	MSG23:	.ASCII	;/@NON RECOVERABLE ERRORS = /;
2705	013510	051040	041505	053117			
2706	013516	051105	041101	042514			
2707	013524	042440	051122	051117			
2708	013532	020123	020075	057			
2709	013537	057	025100	025052	MSG24:	.ASCII	;/@*****WRITE PASS /;
2710	013544	025052	025052	025052			
2711	013552	025052	025052	025052			
2712	013560	025052	025052	053452			
2713	013566	044522	042524	050040			
2714	013574	051501	020123	027440			
2715	013602	040057	025052	025052	MSG25:	.ASCII	;/@*****READ PASS /;
2716	013610	025052	025052	025052			
2717	013616	025052	025052	025052			
2718	013624	025052	025052	042522			
2719	013632	042101	050040	051501			
2720	013640	020123	020040	057			
2721	013645	057	020040	031040	MSG26:	.ASCII	;/ 200/;

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2722	013652	030060	057				
2723	013655	057	020040	032440	MSG27:	.ASCII	;/ 556/;
2724	013662	033065	057				
2725	013665	057	020040	034040	MSG28:	.ASCII	;/ 800/;
2726	013672	030060	057				
2727	013675	057	020040	041440	MSG29:	.ASCII	;/ CD /;
2728	013702	020104	057				
2729	013705	057	040100	027500	MSG30:	.ASCII	;/000/;
2730							
2731	013712	040057	043536	057	SCNTG:	.ASCII	;/01G/;
2732	013717	057	040100	053523	SMSWR:	.ASCII	;/00SWR= /;
2733	013724	036522	027440				
2734	013730	020057	047040	053505	SMNEW:	.ASCII	;/ NEW= /;
2735	013736	020075	057				
2736	013741	057	037500	040100	SQUEST:	.ASCII	;/0?00/;
2737	013746	057					
2738		013750					.EVEN
2739							
2740	013750	013750			BUFFER:		;/WRITE BUFFER BEGINS HERE
2741		000001					.END













TSINC3	005750	1789	1791#				
TSTEX	001334	1038#	1322*	1323	1359*	1465	
TSTSTP	005474	1737	1743#				
TSTTBL	001340	1041#	1056*	1057*	1058*	1197	1322
TU.SEL	001532	1071	1080#				
TYPT1	011470	2420#	2431				
TYPT2	011476	2421#	2423				
TYPT3	011532	2427	2430#				
TO	003332	1367#	1377				
TOA	003334	1368#	1375				
TOB	003352	1370	1374#				
T1	003402	1384#	1393				
T1A	003404	1385#	1391				
T1B	003422	1387	1390#				
T2	003452	1402#	1425				
T2A	003454	1403#	1409				
T2B	003472	1405	1408#				
T2C	003476	1410#	1416				
T2D	003516	1412	1415#				
T2E	003522	1417#	1423				
T2F	003536	1419	1421#				
T3	003570	1433#	1457				
T3A	003572	1434#	1440				
T3B	003610	1436	1439#				
T3C	003614	1442#	1448				
T3D	003632	1444	1446#				
T3E	003640	1449#	1455				
T3F	003654	1451	1453#				
T4	003730	1466	1469#				
T4A	003732	1470#	1526				
T4B	003734	1471#	1475				
T4C	003760	1477#	1491				
T4D	003762	1478#	1486				
T4E	004014	1480	1485#				
T4F	004030	1489#	1493				
T4G	004046	1488	1496#				
T4H	004050	1497#	1503				
T4J	004066	1499	1501#				
T4K	004074	1504#	1522				
T4L	004076	1505#	1519				
T4M	004150	1512	1515#				
T4N	004162	1507	1509	1518#			
T4P	004166	1520#	1524				
T5	004230	1535#	1579				
T5A	004254	1538	1540#				
T5R	004266	1542#					
T5C	004276	1544#	1551				
T5D	004326	1546	1550#				
T5E	004334	1553#	1565	1577			
T5F	004376	1558	1561#				
T5FLAG	004476	1535*	1581#	1611*	1673	1718	
T5G	004410	1555	1564#				
T5H	004426	1567	1569#				
T5INC	004500	1540*	1548	1582#			
T5J	004430	1570#	1575				
T5K	004450	1572	1574#				







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CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

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ERRORS DETECTED: 0  
DEFAULT GLOBALS GENERATED: 0

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

