

TMA,B-11

TM11 DATA RELIAB 9TRK
CZTMBFO

AH-9399F-MC

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IDENTIFICATION

PRODUCT CODE: AC-9398F-MC
PRODUCT NAME: CZTMBF0 TM 11 DATA RELIAB 9TRK
PROGRAM DATE: 21 MARCH 1976
MAINTAINER: DIAGNOSTIC ENGINEERING
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1. ABSTRACT

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

2. REQUIREMENTS

2.1 EQUIPMENT

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

2.2 STORAGE

2.2.1 PROGRAM STORAGE

THE ROUTINE REQUIRES 4K OF MEMORY.

2.3 PRELIMINARY PROGRAMS

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

3. LOADING PROCEDURE

3.1 METHOD

PROCEDURE FOR NORMAL BINARY TAPES SHOULD BE FOLLOWED:

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

4. STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

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

***IF SOFTWARE SWITCH REGISTER IS USED THE PROGRAM WILL ALLOW MODIFICATION OF THE SOFTWARE SWITCH REGISTER IMMEDIATELY AFTER THE START OF PROGRAM.

THE PROGRAM WILL TYPE THE FOLLOWING*

SWR=XXXXXX NEW= (REFER TO SECTION 5.1 FOR OPERATOR OPTIONS.)

4.2 STARTING ADDRESS

200 - BASIC TEST (AUTOMATIC PARAMETER AND UNIT SELECTION)

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

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210 - " " " " / " 8k " ")

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

4.3.1 TAPE UNIT SELECTION

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

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

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

4.3.1.1 TAPE UNIT SELECTION EXAMPLES

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

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

SELECT UNITS
SELECT UNITS

A CARRIAGE RETURN WAS TYPED WITH NO UNITS SELECTED.

SELECT UNITS 1,9?,1,2

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

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4.3.1.2 AUTOMATIC UNIT SELECTION

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

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

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

4.3.2 PARAMETER SELECTION

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

'TST PAT RLS WMO RMO''

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

4.3.2.1 TEST NUMBER

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

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

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RECORDS, CONTINUE TO END OF TAPE.

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

4.3.2.2 PATTERN

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

PATTERN	DESCRIPTION	DATA	CHANNELS
0	HALF FREQUENCY, OUTSIDE SKEW	010 004 010 004 ETC.	001 400 001 400 ETC.
1	SLIDING '1'	000 200 100 040 020 010 004 002 001 ETC.	040 004 010 020 100 001 400 002 200 ETC.
2	HIGH FREQUENCY, ALTERNATING CHANNELS	274 274 ETC.	525 525 ETC.
3	THREE 0'S, THRU 1'S, THRU 0'S	037 037 037 300 300 300 076 076 076 201 201 201 174 174 174 003 003 003 370 370 370 007 007 007 360 360 360	703 703 703 054 054 054 523 523 523 244 244 244 531 531 531 242 242 242 135 135 135 602 602 602 174 174 174

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ETC. ETC.

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

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

PATTERN DESCRIPTION DATA CHANNELS
 020 100
 010 001
 010 001
 010 001
 004 400
 004 400
 004 400
 002 002
 002 002
 002 002
 001 200
 001 200
 001 200
 ETC. ETC.

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

7 RANDOM ? ?

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4.3.2.3 RECORD LENGTH SEQUENCE

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

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

4.3.2.4 WRITE START/STOP MODE

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

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

4.3.2.5 READ START/STOP MODE

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

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

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4.3.2.6 FINAL TEST SELECT APPROVAL

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

4.3.2.7 TEST SELECTION EXAMPLES

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

TWO PARAMETERS SETS WERE SELECTED BY THE ABOVE SEQUENCE

TEST3, PATTERN 2, MAXIMUM RECORD LENGTH, WRITE NONSTOP, AND READ NONSTOP.

TEST 0, PATTERN 1, VARYING RECORD LENGTH (MIN TO MAX), WRITE START/STOP, READ NONSTOP.

(NOTE: EVEN THOUGH TEST 0 IS A WRITE ONLY TEST, ALL PARAMETERS MUST BE SATISFIED.) (IN THIS CASE RMO HAS NO EFFECT)

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

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

4.3.2.8 AUTOMATIC PARAMETER SELECTION

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

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

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5.0 OPERATING PROCEDURE
5.1 OPERATIONAL SWITCH SETTINGS

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

CONTROL:

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

- 1) TYPE CONTROL G <^G>; THIS WILL ALLOW THE TTY TO ENTER DATA INTO LOC. 176 AT SELECTED POINTS WITHIN THE PROGRAM.
- 2) THE MACHINE WILL THEN TYPE: SWR=XXXXXXNEW= (XXXXXX IS THE OCTAL CONTENTS OF THE SOFTWARE SWITCH REGISTER.)
- 3) AFTER THE "'NEW='" HAS BEEN TYPED THEN THE OPERATOR. CAN DO ONE OF THE FOLLOWING AT THE TTY:
 - A) TYPE A NUMBER TO BE LOADED INTO LOC. 176 FOLLOWED BY A <CR>. (ONLY NUMBERS BETWEEN 0-7 WILL BE ACCEPTED AND ONLY 6 NUMBERS WILL BE ALLOWED) IF A <CR> IS THE FIRST KEY DEPRESSED THE SOFTWARE SWITCH REGISTER CONTENTS WILL NOT BE CHANGED.
 - B) IF A CONTROL U <^U> IS DEPRESSED THEN THE PROGRAM WILL SEND YOU BACK TO STEP 2.

THE OPERATIONAL SWITCH SETTINGS ARE USED TO:

- A. ALTER ERROR RECOVERY PROCEDURES
- B. DELETE ERROR PRINTOUTS
- C. CAUSE A TEST SEQUFNCE TO BE REPEATED WITH A VARIATION THE PATTERN, RECORD LENGTH SEQUENCE, WHITE MODE, CR READ MODE

5.1.1 SWITCHES TO ALTER ERROR RECOVERY

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

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

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(000010)PARITY ERRORS

THE DATA READ TO BE COMPARED WITH THE DATA WRITTEN AFTER A PARITY ERROR HAS OCCURRED
NOTE: THE PARITY ERROR BIT SETTING IN THE STATUS REGISTER IS CAUSED BY THE LOGICAL 'OR' OF BOTH LATERAL (CHARACTER) AND LONGITUDINAL (CHANNEL) PARITY ERRORS.

4 DELETE READ RE-TRYS
(000020)

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
(000040)

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
(0001000)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 (020000)	SUPPRESS ERROR PRINTOUT	THE STATISTICS CONCERNING THE NUMBER AND TYPES OF ERRORS WILL BE PRINTED WHEN THE TAPE UNIT REACHES END OF TAPE. FOR LONG PERIODS OF TESTING (OVERNIGHT, ETC) IT MAY BE SUFFICIENT TO RECEIVE THIS INFORMATION AND NOT HAVE A TYPEOUT EACH TIME AN ERROR OCCURRED.
8 (000400)	PRINT ERROR STATISTICS	AFTER COMPLETION OF EVERY RECORD LENGTH SEQUENCE INSTEAD OF AFTER END OF TAPE AS IS NORMAL.

5.1.3 SWITCH TO ALTER TEST PARAMETERS

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

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

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

EXAMPLE:

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

WITH SW0=1

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

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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	MODE	RECORD	LENGTH
0	7	SSTP	1276	MAX

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

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

ON UNIT 0, USING PATTERN 7, WRITE MODE START/STOP, 1276 RECORDS OF MAXIMUM (1024 BYTES) LENGTH WERE WRITTEN. DURING THAT TIME 5 WRITE STATUS ERRORS OCCURRED, 3 WERE RECOVERED ON THE 1ST RE-WRITE, 1 RECOVERED ON THE 3RD RE-WRITE. THE REMAINING ERROR NOT RECOVERED IS CONSIDERED TO BE CAUSED BY A PERMANENT BAD SPOT ON TAPE.

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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	XXXXXX	XXXXXX

THIS WILL OCCUR WHEN ERROR (BIT 15 OF COMMAND REGISTER) SETS DURING A READ OPERATION. THE CONTENTS OF THE COMMAND AND STATUS REGISTERS IS PRINTED ALONG WITH THE RECORD NUMBER AND RECORD LENGTH. ALSO PRINTED OUT IF SW<03> IS SET TO A 1 (SEE SECTION 5.1.1) ARE THE EXPECTED AND ACTUAL DATA VALUES FOR A READ STATUS ERROR CAUSED BY A PARITY ERROR

B. READ DATA ERROR

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

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

C. READ PASS

END OF TAPE

DRV	PAT	MODE	RECORD	LENGTH
3	4	NSTP	1276	M-MAX

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

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

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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 REPEATED 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 THE MINIMUM LENGTH RECORDS WILL BE 8 BYTES AND MAXIMUM LENGTH RECORDS WILL BE 2048 BYTES.

9. PROGRAM DESCRIPTION

9.1 GENERAL DESCRIPTION

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

9.2 TEST 0

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

9.3 TEST 1

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

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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.

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10. LISTING

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```
.TITLE TM 11 DATA RELIAB 9TRK  
:COPYRIGHT 1970, 1971, 1972, 1973, 1976 1977 DIGITAL EQUIPMENT CORP., MAYNARD, MASS 017  
:REVISED SEPT 1971, J.RODENHISER  
:REVISED AUGUST 1972, J. LACEY  
:REVISED TO REV.B SEPT., 1973 BY BRUCE BURGESS - DIAGNOSTIC ENGINEERING  
:THE FOLLOWING ADDITIONS AND/OR CORRECTIONS MAKE  
:UP REV.B :  
:(A) CODE TO COVER ACT-11 AND MAGTAPE DDP OPTIONS  
:(B) SECTION TO PRINT OUT GOOD AND BAD DATA (EXPECTED AND ACTUAL)  
:ON READ STATUS ERRORS CAUSED BY PARITY ERRORS. THIS SECTION  
:IS ENABLED BY SETTING SW<03> TO A '1'. SEE SECTION 5.1.1  
:OF THE DOCUMENT.  
:REVISED TO REV. D MAR., 1976 BY SAM CARPENTER-DIAGNOSTIC ENGINEERING  
:(A) MODIFIED TO SUPPORT SOFTWARE SWITCH REGISTER  
:(B) ALSO SUPPORTS THE DYNAMIC LOADING OF THE SOFTWARE SWITCH REGISTER FROM TTY  
:BY PRESSING A CNTL G  
:(C) PROGRAM WILL ALLOW THE LOADING OF THE SOFTWARE SWITCH REGISTER AT START  
:IF NO HARDWARE SWITCH REGISTER IS AVAILABLE OR IF THE  
:HARDWARE SWITCH REGISTER CONTAINS ALL 1'S.  
:REVISED DECEMBER 1977, CLEM WALSH
```

```
000000  
000001  
000002  
000003  
000004  
000005  
000006  
000007
```

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

```
.ENABL ABS, AMA  
.=0  
:TRAP CATCHER IN UNUSED LOCATIONS 0-476  
.-34  
*RAP34
```

```
:*****  
:SOFTWARE SWITCH REGISTER IS LOCATED AT LOC. 176  
:BEFORE STARTING REFER TO SECTION 5.1 OF DOCUMENT  
:*****
```

```
000034 012326
```

```
869
870      :
871      : *****
872      :                               MODIFIED DEC 16 1977
873      :
874      : ++
875      :                               ACT11 AND XXDP HOOKS
876      : --
877      :                               $SVPC=.      ;SAVE PC
878      :                               .=40
879      :                               DRIVE: .BYTE 0      ;DRIVE # FOR XXDP LOAD MEDIUM
880      :                               ;ASSEMBLE AS A 0
881      :
882      :                               .-41
883      :                               MEDIUM: .BYTE 0      ;XXDP LOAD MEDIUM
884      :                               ;ASSEMBLE AS A 0
885      :
886      :                               .=42
887      :                               .WORD 0      ;AUTO/MAN MODE INDICATOR
888      :                               ;ASSEMBLE AS A 0
889      :
890      :                               .-46
891      :                               .WORD $ENDAD ;SET TO $ENDAD IN .$EOP
892      :
893      :                               .-52
894      :                               .WORD 0      ;CHARACTERISTICS OF PROGRAM
895      :                               ;SET TO 0
896      :
897      :                               .-$SVPC      ;RESTORE PC
898      :
899      : *****
900
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901
902
903
904      000400      .-400
905
906      :      *****
907      :      MODIFIED DEC 16 1977
908
909      :      ++
910      :      ACT11 AND XXDP MODE INDICATORS
911      :      --
912
913 000400 000000      AUTOM: .WORD 0      ;AUTOMATIC MODE INDICATOR
914 000402 000      ACT11M: .BYTE 0      ;ACT11 AUTO MGDE iNDICATOR
915 000403 000      XXDPM: .BYTE 0      ;XXDP AUTO MODE INDICATOR
916 000404 000      ADUMPM: .BYTE 0      ;ACT11 DUMP MODE INDICATOR
917 000405 000      XDUMPM: .BYTE 0      ;XXDP DUMP MODE INDICATOR
918
919      :      *****
920
```

921					
922		000176		.=176	
923	000176	000000		SWREG: .WORD 0	; SOFTWARE SWITCH REGISTER
924		000200		.=200	
925	000200	000137	001354	JMP	AUTOST
926	000204	000137	002066	JMP	MEM4K
927	000210	000137	002112	JMP	MEM8K
928					
929		000500		STACK=500	
930		000500		.=500	
931	000500	172520		MTS: 172520	
932	000502	172522		MTC: 172522	
933	000504	172524		BC: 172524	
934	000506	172526		CA: 172526	
935	000510	177776		CC: 177776	
936	000512	177570		SWR: 177570	
937	000514	177560		TKS: 177560	
938	000516	177562		TKB: 177562	
939	000520	177564		TPS: 177564	
940	000522	177566		TPB: 177566	
941	000524	002000		MAXLEN: 1024.	; MAX RECORD LENGTH
942	000526	000004		MINLEN: 4.	; MIN RECORD LENGTH
943	000530	014074		WBUF: BUFFER	; STARTING ADDRESS OF WRITE BUFFER
944	000532	016074		RBUF: BUFFER+1024.	; STARTING ADDRESS OF READ BUFFER
945	000534	000224		MTV: 224	
946					
947				; TEMPORARY STORAGE AREAS	
948	000536	000000		ATST: 0	
949	000540	000000		DRVSEL: 0	
950	000542	000000		STRLEN: 0	
951	000544	000000		LENGTH: 0	
952	000546	000000		MSBITS: 0	
953	000550	000000		SVRECR: 0	
954	000552	000000		COMAND: 0	
955	000554	000000		CDRVBT: 0	
956	000556	000000		CDRIVE: 0	
957	000560	000000		RDPASS: 0	
958	000562	000000		WRPASS: 0	
959	000564	000000		BLKINC: 0	
960	000566	000000		STATRD: 0	
961	000570	000000		WRCHEK: 0	
962	000572	000000		0	
963	000574	000000		0	
964	000576	000000		0	
965	000600	000000		0	
966	000602	000000		0	
967	000604	000000		0	
968	000606	000000		0	
969					
970	000610	000000		PERMBS: 0	
971	000612	000000		RECORD: 0	
972	000614	000000		WRRRCR: 0	
973	000616	000000		LASRCR: 0	
974	000620	000000		RDERRS: 0	
975	000622	000000		DAERRS: 0	
976	000624	000000		NRREAD: 0	

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

```

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

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1089 001724 104426
1090 001726 005737 000546
1091 001732 001012
1092 001734 013701 000042
1093 001740 001405
1094 001742 012702 013311
1095 001746 104404
1096 001750 000137 003246
1097 001754 000137 002140
1098
1099
1100 001760 012702 013266
1101 001764 104404
1102 001766 105037 014074
1103 001772 012701 014074
1104 001776 005000
1105 002000 012702 000200
1106
1107
1108 002004 105021
1109 002006 112721 000040
1110 002012 030237 000546
1111 002016 001405
1112 002020 110011
1113 002022 152721 000060
1114 002026 112721 000054
1115 002032 000241
1116 002034 006002
1117 002036 005200
1118 002040 020027 000007
1119 002044 003762
1120 002046 105011
1121 002050 112741 000100
1122 002054 012702 014074
1123 002060 104404
1124 002062 000137 003056
1125
1126 002066 012737 000004 000526
1127 002074 012737 002000 000524
1128 002102 012737 016074 000532
1129 002110 000411
1130
1131 002112 012737 000010 000526
1132 002120 012737 004000 000524
1133 002126 012737 020074 000532
1134 002134 005037 000536
1135 002140 012706 000500
1136 002144 104432
1137 002146 022737 000176 000512
1138 002154 001002
1139 002156 004737 012024
1140 002162 012737 123456 007374
1141 002170 012737 176543 007376
1142 002176 012702 012615
1143 002202 104404
1144 002204 005037 000546

3$:  DECPRT ;PRINT MAX. LENGTH
    TST  MSBITS ;WAS ANY DRIVES SELECTED?
    BNE  2$ ;BR IF YES
    MOV  @#42,R1 ;IS THERE A MONITOR?
    BEQ  1$ ;BRANCH IF NO
    MOV  #MSG10C,R2 ;INDICATE THAT NO DRIVES ARE
    TOP  ;AVAILABLE!!
    JMP  @#SENDAL ;RETURN TO THE MONITOR
1$:  JMP  START1 ;NO--GO HAVE OPERATOR SELECT DRIVES

;TYPE-OUT THE DRIVE/S TO BE TESTED
2$:  MOV  #MSG10B,R2
    TOP
    CLRB BUFFER
    MOV  #BUFFER,R1
    CLR  R0 ;SET R0 TO DRIVE 0
    MOV  #200,R2 ;SET R2 TO DRIVE 0

;FORM AND SAVE DRIVE NUMBER FOR TYPE-OUT
    CLRB (R1)+ ;SET EOM
    MOVB #'',(R1)+ ;SPACE
LOOPER: BIT R2,MSBITS ;DID THIS DRIVE NUMBER EXIST?
    BEQ  $ZEROS ;BR IF NO
    MOVB R0,(R1) ;YES--SAVE THE NUMBER
    BISB #'0,(R1)+ ;MAKE IT ASCII
    MOVB #'',(R1)+ ;COMMA
$ZEROS: CLC ;POSITION DRIVE BIT
    ROR  R2
    INC  R0 ;UPDATE DRIVE NUMBER
    CMP  R0,#7 ;LAST
    BLE  LOOPER ;BR IF NO
    CLRB (R1) ;SET EOM
    MOVB #'@,-(R1) ;CR & LF
    MOV  #BUFFER,R2 ;TYPE THE DRIVE/S SELECTED
    TOP
    JMP  EXECUT ;GO START TESTING

;MODIFY RECORD LENGTHS AND BUFFER AREAS FOR 4K OF MEMORY
MEM4K: MOV #4.,MINLEN
    MOV #1024.,MAXLEN
    MOV #BUFFER+1024.,RBUF
    BR  START

;MODIFY RECORD LENGTHS AND BUFFER AREAS FOR 8K OF MEMORY
MEM8K: MOV #8.,MINLEN
    MOV #2048.,MAXLEN
    MOV #BUFFER+2048.,RBUF

START: CLR ATST ;NOT AUTO START
START1: MOV #STACK,SP ;INITIALIZE STACK
    SUSWR ;CHECK FOR HARDWARE SWITCH REGISTER
    CMP  #SWREG,SWR
    BNE  1$
    JSR  PC,CNTLU
1$:  MOV #123456,LONUM ;PRIME RANDOM
    MOV #176543,HINUM ;NUMBER GENERATOR
    MOV #MSG1,R2
    TOP
    CLR  MSBITS ;PRINT 'SELECT DRIVES'
    ;CLEAR SELECTED DRIVE INDICATOR
    
```

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1145 002210 104400 SELDRV: WAITKY
1146 002212 122737 000015 001314 CMPB #15,CHARIN ;WAS CHARACTER A CARRIAGE RETURN?
1147 002220 001010 BNE SELD1 ;NO
1148 002222 005737 000546 TST MSBITS ;YES, WERE ANY DRIVES SELECTED
1149 002226 001744 BEQ START1 ;NO
1150 002230 005737 000536 TST ATST ;YES--IS AUTO SWITCH SET?
1151 002234 001454 BEQ SELTST ;NO--GO SELECT TESTS
1152 002236 000137 003056 JMP EXECUT ;YES--GO START TESTING
1153 002242 122737 000070 001314 SELD1: CMPB #70,CHARIN ;IS CHARACTER A VALID NUMBER 0-7?
1154 002250 003404 BLE SELD2 ;NO, PRINT '?'
1155 002252 122737 000060 001314 CMPB #60,CHARIN ;IS CHARACTER A VALID NUMBER 0-7?
1156 002260 003407 BLE VALID ;YES
1157 002262 105777 176232 SELD2: TSTB @TPS
1158 002266 100375 BPL -4
1159 002270 012777 000077 176224 MOV #'?',@TPB ;PRINT '?'
1160 002276 000424 BR VAL4
1161 ;HAVE VALID DRIVE NUMBER
1162 002300 142737 000270 001314 VALID: BICB #270,CHARIN ;MASK OUT NUMBER
1163 002306 105137 001314 COMB CHARIN
1164 002312 012700 000200 MOV #200,R0 ;INITIALIZE BIT POSITION FOR DRIVE 0
1165
1166
1167 002316 105237 001314 VAL1: INCB CHARIN ;+1 TO DRIVE SELECT
1168 002322 001402 BEQ VAL2 ;HAVE DRIVE OF EQUAL TO ZERO
1169 002324 006200 ASR R0 ;MOVE BIT POSITION TO NEXT DRIVE
1170 002326 000773 BR VAL1 ;TRY AGAIN
1171 002330 130037 000546 VAL2: BITB R0,MSBITS ;COMPARE DRIVE SELECT WITH PREVIOUS SELECTED
1172 002334 001003 BNE VAL3
1173 002336 150037 000546 BISB R0,MSBITS ;DRIVE WASN'T PREVIOUSLY SET, SO SET IT NOW.
1174 002342 000402 BR VAL4
1175 002344 140037 000546 VAL3: BICB R0,MSBITS ;DRIVE WAS SET, CLEAR IT.
1176 002350 105777 176144 VAL4: TSTB @TPS
1177 002354 100375 BPL -4
1178 002356 012777 000054 176136 MOV #'',@TPB ;PRINT COMMA
1179 002364 000711 BR SELDRV ;RETURN TO WAIT FOR NEXT KEY
1180 ;HAVE DRIVES SELECTED-NOW GET TEST SELECTION
1181 002366 012702 012636 SELTST: MOV #MSG2,R2
1182 002372 104404 TOP ;PRINT 'SELECT TESTS'
1183 002374 005037 001316 CLR NUMTST ;CLEAR TEST NUMBERS SELECTED
1184 002400 012700 001326 MOV #TSTTBL,R0 ;INITIALIZE TEST TABLE POINTER
1185 002404 104400 SELT1: WAITKY
1186 002406 122737 000015 001314 CMPB #15,CHARIN ;WAS CHARACTER A CARRIAGE RETURN?
1187 002414 001005 BNE SELT2
1188 002416 005737 001316 TST NUMTST ;WERE ANY TESTS SELECTED?
1189 002422 001412 BEQ SELT3 ;NO
1190 002424 000137 003056 JMP EXECUT ;YES, EXECUTE TESTS
1191 002430 122737 000066 001314 SELT2: CMPB #66,CHARIN ;IS CHARACTER A VALID NUMBER 0-5
1192 002436 003404 BLE SELT3 ;NO
1193 002440 122737 000060 001314 CMPB #60,CHARIN ;IS CHARACTER A VALID NUMBER 0-5
1194 002446 003404 BLE SELPAT ;YES
1195 002450 012702 012610 SELT3: MOV #MSG0,R2
1196 002454 104404 TOP
1197 002456 000752 BR SELT1 ;RETURN TO WAIT FOR TEST SELECT
1198 002460 013704 001314 SELPAT: MOV CHARIN,R4
1199 002464 000304 R4 ;ROTATE TEST NUMBER INTO POSITION
1200 002466 006104 ROL R4
    
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1201	002470	006104			ROL	R4	
1202	002472	006104			ROL	R4	
1203	002474	006104			ROL	R4	
1204	002476	042704	107777		BIC	#107777,R4	
1205	002502	104430			SP3		:TYPE 3 SPACES
1206							:HAVE VALID TEST SELECTED, NOW GET SELECTED PATTERN
1207	002504	104400			WAITKY		
1208	002506	122737	000070	001314	CMPB	#70,CHARIN	:IS CHARACTER A VALID NUMBER 0-7
1209	002514	003755			BLE	SEL3	:NO
1210	002516	122737	000057	001314	CMPB	#57,CHARIN	:IS CHARACTER A VALID NUMBER 0-7
1211	002524	002351			BGE	SEL3	:NO
1212	002526	000337	001314		SWAB	CHARIN	:MOVE PATTERN SELECT INTO POSITION
1213	002532	006137	001314		ROL	CHARIN	
1214	002536	042737	170777	001314	BIC	#170777,CHARIN	
1215	002544	053704	001314		BIS	CHARIN,R4	:COMBINE PATTERN WITH TEST
1216	002550	104430			SP3		
1217							
1218							:WAIT FOR RECORD LENGTH SEQUENCES SELECTION
1219	002552	104400			SELRLS:	WAITKY	
1220	002554	122737	000060	001314	CMPB	#60,CHARIN	:IS CHARACTER=0
1221	002562	001424			BEQ	SEL3	:YES, RLS=MIN
1222	002564	122737	000061	001314	CMPB	#61,CHARIN	:IS CHARACTER=1
1223	002572	001003			BNE	SEL1	
1224	002574	052704	000020		BIS	#20,R4	:SET RLS=MAX
1225	002600	000415			BR	SEL3	
1226	002602	122737	000062	001314	SELR1: CMPB	#62,CHARIN	:IS CHARACTER=2
1227	002610	001003			BNE	SEL2	
1228	002612	052704	000040		BIS	#40,R4	:SET RLS=MIN-MAX
1229	002616	000406			BR	SEL3	
1230	002620	122737	000063	001314	SELR2: CMPB	#63,CHARIN	:IS CHARACTER=3
1231	002626	001310			BNE	SEL3	
1232	002630	052704	000060		BIS	#60,R4	:SET RLS=MAX-MIN
1233	002634	104430			SELR3: SP3		
1234							:WAIT FOR WRITE MODE SELECTION
1235	002636	104400			WAITKY		
1236	002640	122737	000060	001314	CMPB	#60,CHARIN	
1237	002646	001415			BEQ	SELW2	:SET WMO=NONSTOP
1238	002650	122737	000061	001314	CMPB	#61,CHARIN	
1239	002656	001003			BNE	SELW1	
1240	002660	052704	000004		BIS	#4,R4	:SET WMO=START-STOP
1241	002664	000406			BR	SELW2	
1242	002666	122737	000062	001314	SELW1: CMPB	#62,CHARIN	
1243	002674	001265			BNE	SEL3	
1244	002676	052704	000010		BIS	#10,R4	:SET WMO=RANDOM
1245	002702	104430			SELW2: SP3		
1246							:WAIT FOR READ MODE SELECTION
1247	002704	104400			WAITKY		
1248	002706	122737	000060	001314	CMPB	#60,CHARIN	
1249	002714	001415			BEQ	SELRM2	:SET RMO=NONSTOP
1250	002716	122737	000061	001314	CMPB	#61,CHARIN	
1251	002724	001003			BNE	SELRM1	
1252	002726	052704	000001		BIS	#1,R4	:SET RMO=START-STOP
1253	002732	000406			BR	SELRM2	
1254	002734	122737	000062	001314	SELRM1: CMPB	#62,CHARIN	
1255	002742	001242			BNE	SEL3	
1256	002744	052704	000002		BIS	#2,R4	:SET RMO=RANDOM

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1257 002750 104430 SELRM2: SP3
1258
1259 ;HAVE ALL PARAMETERS
1260 002752 012702 012713 MOV #MSG6,R2
1261 002756 104404 TOP ;PRINT 'OK'
1262 002760 104400 WAITKY ;WAIT FOR CARRIAGE RETURN
1263 002762 122737 000015 001314 CMPB #15,CHARIN
1264 002770 001402 BEQ .+6
1265 002772 000137 002450 JMP SELT3
1266 002776 105777 175516 TSTB @TPS
1267 003002 100375 BPL .-4
1268 003004 012777 000012 175510 MOV #12,@TPB
1269 003012 105777 175502 TSTB @TPS
1270 003016 100375 BPL .-4
1271 003020 012777 000040 175474 MOV #40,@TPB
1272 003026 010420 MOV R4,(0)+
1273 003030 005237 001316 INC NUMTST ;+1 TO TEST COUNT
1274 003034 022737 000012 001316 CMP #10,NUMTST ;EQUAL TO TEN YET
1275 003042 001402 BEQ SELOK1 ;YES
1276 003044 000137 002404 JMP SELT1 ;NO, ACCEPT NEXT SET
1277 003050 012702 012666 SELOK1: MOV #MSG5,R2
1278 003054 104404 TOP
1279
1280 ;EXECUTE SELECTED TEST
1281 003056 005037 000632 EXECUT: CLR MODES ;INITIALIZE MODES
1282 003062 012737 001326 001322 MOV #TSTTBL,TSTEX
1283 003070 017737 176226 001320 EXEC: MOV @TSTEX,PARAM ;GET TEST PARAMETERS
1284 003076 013700 001320 EXEC1: MOV PARAM,R0
1285 003102 042700 007777 BIC #7777,R0
1286 003106 010037 001324 MOV R0,TEST
1287 003112 001475 BEQ TEST0
1288 003114 022700 010000 CMP #10000,R0
1289 003120 001516 BEQ TEST1
1290 003122 022700 020000 CMP #20000,R0
1291 003126 001537 BEQ TEST2
1292 003130 022700 030000 CMP #30000,R0
1293 003134 001002 BNE 1$
1294 003136 000137 003544 JMP TEST3
1295 003142 022700 040000 1$: CMP #40000,R0
1296 003146 001402 BEQ .+6
1297 003150 000137 004204 JMP TEST5
1298 003154 000137 003662 JMP TEST4
1299 ;RETURN HERE AFTER COMPLETION OF TEST
1300 003160 104434 DONE: CKSWR ;CHECK FOR CNTL G
1301 003162 012702 014020 MOV #MSG26,R2
1302 003166 104404 TOP
1303 003170 032777 000001 175314 BIT #1,@SWR ;IS SW 0=1 TO REPEAT TEST WITH ALL PATTERNS
1304 003176 001413 BEQ DONE1 ;NO
1305 003200 013700 001320 MOV PARAM,R0
1306 003204 042700 170777 BIC #170777,R0
1307 003210 022700 007000 CMP #7000,R0 ;REACHED PATTERN ??
1308 003214 001404 BEQ DONE1 ;YES
1309 003216 062737 001000 001320 ADD #1000,PAPAM ;NO, +1 TO PATTERN
1310 003224 000724 BR EXEC1 ;REPEAT TEST
1311 003226 005337 001316 DONE1: DEC NUMTST
1312 003232 001021 BNE DOAGN
  
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1313 003234 013701 000042      MOV      @#42,R1
1314 003240 001002      BNE      $ENDAD
1315 003242 000000      HALT
1316 003244 104434      CKSWR
1317 003246 004711      $ENDAD: JSR      PC,(R1)
1318 003250 000240      NOP
1319 003252 000240      NOP
1320 003254 000240      NOP
1321 003256 105737 000402      TSTB     ACT11M      ;ACT11 MODE? ++ C.W
1322 003262 001405      BEQ      DOAGN      ;BRANCH - IF NO ++ C.W
1323 003264 012702 014025      MOV      #MSG27,R2  ;GET END OF PASS MESSAGE
1324 003270 104404      TOP
1325 003272 000137 001354      JMP      AUTOST     ;TYPE END OF PASS
1326 003276 062737 000002 001322 DOAGN: ADD      #2,TSTEX   ;CONTINUE TEST
1327 003304 000671      BR       EXEC
1328
1329      ;TEST0
1330      ;WRITE ONE RECORD, CHANGE DRIVES, GO TO EOT
1331 003306 052737 000002 000632 TEST0: BIS      #2,MODES ;EXIT WRITE EVERY RECORD, NO READ PASS
1332 003314 104420      CLRALL   ;CLEAR ERROR COUNTERS AND REWIND
1333 003316 104416      GENPAT   ;GENERATE PATTERN
1334 003320 104410      TO:      RSFDRV   ;RESET DRIVE SELECTION TO LOWEST NUMBER
1335 003322 104414      TOA:     MVCTRS  ;RESTORE DRIVE COUNTERS
1336 003324 032737 000040 000632      BIT      #40,MODES ;IS THIS DRIVE AT EOT?
1337 003332 001002      BNE      TOB
1338 003334 104402      WRITIT  ;WRITE
1339 003336 104406      SVCTRS  ;SAVE DRIVE COUNTERS
1340
1341 003340 104422      TOB:     CHGDRV   ;ANY MORE DRIVES SELECTED?
1342 003342 000767      BR       TOA
1343 003344 004737 004776      JSR      FC,ALLEOT ;YES
1344 003350 000763      BR       TO
1345 003352 000137 003160      JMP      DONE     ;ARE ALL DRIVES AT EOT?
1346      ;TEST1
1347      ;WRITE RECORD LENGTH SEQUENCE, GO TO NEXT DRIVE, CONTINUE TO EOT ON ALL DRIVES.
1348 003356 052737 000001 000632 TEST1: BIS      #1,MODES ;EXIT WRITE AFTER RLS, NO READ PASS
1349 003364 104420      CLRALL   ;CLEAR ERROR COUNTERS AND REWIND
1350 003366 104416      GENPAT   ;GENERATE PATTERN
1351 003370 104410      T1:      RSFDRV   ;RESET DRIVE SELECTION TO LOWEST NUMBER
1352 003372 104414      T1A:     MVCTRS  ;RESTORE DRIVE COUNTERS
1353 003374 032737 000040 000632      BIT      #40,MODES ;IS THIS DRIVE AT EOT?
1354 003402 001002      BNE      T1B
1355 003404 104402      WRITIT  ;WRITE
1356 003406 104406      SVCTRS  ;SAVE DRIVE COUNTERS
1357 003410 104422      T1B:     CHGDRV   ;ANY MORE DRIVE SELECTED?
1358 003412 000767      BR       T1A
1359 003414 004737 004776      JSR      PC,ALLEOT ;YES
1360 003420 000763      BR       T1
1361 003422 000137 003160      JMP      DONE     ;ARE ALL DRIVES AT EOT?
1362      ;TEST2
1363      ;WRITE A RECORD LENGTH SEQUENCE, CHANGE DRIVES
1364      ;BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES. CONTINUE TO EOT ON ALL DRIVES
1365      ;TEST2: BIS      #5,MODES ;EXIT WRITE AFTER RLS, DO READ PASS
1366 003426 052737 000005 000632      CLRALL   ;CLEAR ERROR COUNTERS AND REWIND
1367 003434 104420      GENPAT   ;GENERATE PATTERN
1368 003436 104416
    
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1369	003440	104410			T2:	RSFDRV	:SET DRIVE SELECTION TO LOWEST NUMBER
1370	003442	104414			T2A:	MVCTRS	:RESTORE DRIVE COUNTERS
1371	003444	032737	000040	000632		BIT	#40,MODES
1372	003452	001002				BNE	T2B
1373	003454	104402					:IS THIS DRIVE AT EOT?
1374	003456	104406					:YES, SKIP WRITE
1375	003460	104422			T2B:	WRITIT	:WRITE
1376	003462	000767				SVCTRS	:SAVE DRIVE COUNTERS
1377	003464	104414				CHGDRV	:ANYMORE DRIVES SELECTED?
1378	003466	032737	000020	000632		T2A	:YES
1379	003474	001003			T2C:	MVCTRS	:RESTORE DRIVE COUNTERS
1380	003476	004737	011072			#20,MODES	:IS THIS READ AT EOT?
1381	003502	104406				T2D	:YES, SKIP BACKSPACE
1382	003504	104422				JSR	:BACKSPACE
1383	003506	000766			T2D:	PC,GOBKWD	:SAVE DRIVE COUNTERS
1384	003510	104414				SVCTRS	:ANY MORE DRIVES SELECTED?
1385	003512	032737	000020	000632		CHGDRV	:YES
1386	003520	001001			T2E:	T2C	:RESTORE DRIVE COUNTERS
1387	003522	104424				MVCTRS	:IS THIS READ AT EOT
1388	003524	104406				#20,MODES	:YES, SKIP READ
1389	003526	104422			T2F:	T2F	:READ
1390	003530	000767				READIT	:SAVE DRIVE COUNTERS
1391	003532	004737	004776			SVCTRS	:ANYMORE DRIVES SELECTED?
1392	003536	000740				CHGDRV	:YES
1393	003540	000137	003160			T2E	:ARE ALL DRIVES AT EOT?
1394						JSR	:NO
1395						BR	:YES EXIT
1396						BR	
1397	003544	052737	000006	000632		JMP	DONE
1398	003552	104420					
1399	003554	104416					
1400	003556	104410					
1401	003560	104414					
1402	003562	032737	000040	000632			
1403	003570	001002					
1404	003572	104402					
1405	003574	104406					
1406	003576	104422					
1407	003600	000767					
1408							
1409	003602	104414					
1410	003604	032737	000020	000632			
1411	003612	001002					
1412	003614	004737	011072				
1413	003620	104406					
1414	003622	104422					
1415	003624	000766					
1416	003626	104414					
1417	003630	032737	000020	000632			
1418	003636	001001					
1419	003640	104424					
1420	003642	104406					
1421	003644	104422					
1422	003646	000767					
1423	003650	004737	004776				
1424	003654	000740					

:TEST3
 :WRITE ONE RECORD, CHANGE DRIVES, BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES
 TEST3: BIS #6,MODES :EXIT WRITE EVERY RECORD, DO READ PASS
 CLRALL :CLEAR ERROR COUNTERS AND REWIND
 GENPAT :GENERATE PATTERN

T3:
 T3A: RSFDRV :SET DRIVE SELECTION TO LOWEST NUMBER
 MVCTRS :RESTORE DRIVE COUNTERS

BIT #40,MODES :IS THIS DRIVE AT EOT?
 BNE T3B :YES, SKIP WRITE
 WRITIT :WRITE
 SVCTRS :SAVE DRIVE COUNTERS
 T3B: CHGDRV :ANY MORE DRIVES SELECTED
 BR T3A :YES

T3C: MVCTRS :RESTORE DRIVE COUNTERS
 BIT #20,MODES :IS THIS DRIVE AT EOT
 BNE T3D :YES, SKIP BACKSPACE
 JSR PC,GOBKWD :BACKSPACE
 T3D: SVCTRS :SAVE DRIVE COUNTERS
 CHGDRV :ANY MORE DRIVES SELECTED?
 BR T3C :GO

T3E: MVCTRS :RESTORE DRIVE COUNTERS
 BIT #20,MODES :IS THIS DRIVE AT EOT?
 BNE T3F :YES, SKIP READ

T3F: READIT :READ
 SVCTRS :SAVE DRIVE COUNTERS
 CHGDRV :ANY MORE DRIVES SELECTED
 BR T3E :YES
 JSR PC,ALLEOT :ARE ALL DRIVES AT EOT?
 BR T3 :NO

1481	004140	013737	000550	000616		MOV	SVRECR,LASRCR	:RESTORE LAST RECORD WRITTEN
1482	004146	104406					SVCTRS	:SAVE DRIVE COUNTERS
1483	004150	104422			T4N:		CHGDRV	:ANymORE DRIVES SELECTED?
1484	004152	000744				BR	T4L	:YES
1485	004154	104414			T4P:		MVCTRS	:RESTORE DRIVE COUNTERS
1486	004156	023737	000616	000612		CMP	LASRCR,RECORD	:ARE WE AT END OF RLS?
1487	004164	001336				BNE	T4K	:NO
1488	004166	104422					CHGDRV	:ANymORE DRIVES SELECTED?
1489	004170	000771				BR	T4P	:YES
1490	004172	004737	004776			JSR	PC,ALLEOT	:ARE ALL DRIVES AT EOT?
1491	004176	000650				BR	T4A	:NO
1492	004200	000137	003160			JMP	DONE	:YES,EXIT
1493								
1494								:TEST5
1495								:READ ONLY
1496								:RANDOM PATTERN INVALID EXCEPT FOR SPECIFIC CASES
1497	004204	052737	000002	000632	TEST5.	BIS	#2,MODES	
1498	004212	104420					CLRALL	:CLEAR ERROR COUNTERS AND REWIND
1499	004214	104416					GENPAT	:GENERATE PATTERN
1500	004216	012737	177777	004464	T5:	MOV	#-1,T5FLAG	:ENABLE EXIT FROM WRITE ROUTINE
1501	004224	104402					WRITIT	:ENTER WRITE ONLY TO INITIALIZE RECORD SEQUENCE
1502	004226	032737	000010	000632		BIT	#10,MODES	:ARE WE AT END OF RLS?
1503	004234	001402				BEQ	T5A	:YES
1504	004236	004737	005616			JSR	PC,TESINC	:SEE IF RECORD LENGTH SHOULD BE CHANGED
1505	004242	013737	000612	004466	T5A:	MOV	RECORD,T5INC	
1506	004250	005037	000612			CLR	RECORD	
1507	004254	052737	000010	000632	T5B:	BIS	#10,MODES	:INDICATE AT START OF RLS
1508	004262	104410					RSFDRV	:SET DRIVE SELECTION TO LOWEST DRIVE NUMBER
1509	004264	104414			T5C:		MVCTRS	:RESTORE DRIVE COUNTERS
1510	004266	032737	000020	000632		BIT	#20,MODES	:IS THIS DRIVE AT EOT
1511	004274	001007				BNE	T5D	:YES
1512	004276	013737	000612	000616		MOV	RECORD,LASRCR	
1513	004304	063737	004466	000616		ADD	T5INC,LASRCR	:CURRENT RECORD + SEQUENCE LENGTH
1514	004312	104406					SVCTRS	:SAVE DRIVE COUNTERS
1515	004314	104422			T5D:		CHGDRV	:ANymORE DRIVES?
1516	004316	000762				BR	T5C	:YES
1517	004320	104410					RSFDRV	:SET DRIVE SELECTION TO LOWEST NUMBER
1518	004322	104414			T5E:		MVCTRS	:RESTORE DRIVE COUNTERS
1519	004324	032737	000020	000632		BIT	#20,MODES	:IS THIS DRIVE AT EOT?
1520	004332	001021				BNE	T5G	:YES
1521	004334	013737	000616	000550		MOV	LASRCR,SVRECR	:SAVE END OF RLS RECORDS
1522	004342	032737	000003	001320		BIT	#3,PARAM	:IS READ MODE NONSTOP
1523	004350	001405				BEQ	T5F	:YES GO TO END RLS
1524	004352	013737	000612	000616		MOV	RECORD,LASRCR	:NEXT TO BE READ
1525	004360	005237	000616			INC	LASRCR	:+1 EXIT READ AFTER ONE RECORD
1526	004364	104424			T5F:		READIT	:READ
1527	004366	013737	000550	000616		MOV	SVRECR,LASRCR	:RESTORE END RECORD
1528	004374	104406					SVCTRS	:SAVE DRIVE COUNTERS
1529	004376	104422			T5G:		CHGDRV	:ANy MORE DRIVES?
1530	004400	000750				BR	T5E	:YES
1531	004402	004737	004776			JSR	PC,ALLEOT	:ALL AT EOT?
1532	004406	000402				BR	T5H	:NO
1533	004410	000137	003160			JMP	DONE	:YES EXIT
1534	004414	104410			T5H:		RSFDRV	:SET DRIVE SELECTION TO LOWEST NUMBER
1535	004416	104414			T5J:		MVCTRS	:RESTORE DRIVE COUNTERS
1536	004420	023737	000612	000616		CMP	RECORD,LASRCR	:ARE WE AT END OF RLS?

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1537 004426 001003          BNE      T5K          ;NO
1538 004430 042737 000010 000632  BIC      #10,MODES   ;YES,
1539 004436 104422          T5K:    CHGDRV       ;ANYMORE DRIVES SELECTED?
1540 004440 000766          BR       T5J          ;YES
1541 004442 032737 000010 000632  BIT      #10,MODES   ;AT END OF RLS?
1542 004450 001324          BNE      T5E          ;NO
1543 004452 004737 004776          JSR     PC,ALLEOT    ;ALL DRIVES AT EOT?
1544 004456 000657          BR       T5           ;NO
1545 004460 000137 003160          JMP     DONE         ;YES, EXIT
1546 004464 000000          T5FLAG: 0
1547 004466 000000          T5INC:  0
1548
1549          ;SAVE DRIVE RECORD AND ERROR COUNTERS
1550 004470 004737 004524          SVCTR:  JSR     PC,CTRDEX
1551 004474 012021          SVC1:   MOV     (0)+,(1)+
1552 004476 022700 000634          CMP     #DRVADR,R0
1553 004502 001374          BNE     SVC1
1554 004504 000207          RTS     PC
1555          ;RESET DRIVE COUNTERS BACK INTO PROGRAM
1556 004506 004737 004524          MVCTR:  JSR     PC,CTRDEX
1557 004512 012120          MV1:    MOV     (1)+,(0)+
1558 004514 022700 000634          CMP     #DRVADR,R0
1559 004520 001374          BNE     MV1
1560 004522 000207          RTS     PC
1561          ;SET UP POINTERS FOR MOVE AND SAVE COUNTERS
1562 004524 012700 000570          CTRDEX: MOV     #WRCHEK,R0
1563 004530 012701 000634          MOV     #DRVADR,R1
1564 004534 063701 000556          ADD     CDRIVE,R1
1565 004540 063701 000556          ADD     CDRIVE,R1
1566 004544 011101          MOV     @R1,R1
1567 004546 000207          RTS     PC
1568          ;CLEAR ALL DRIVE COUNTERS
1569 004550 104410          CLRAL:  RSFDRV
1570 004552 004737 004740          CLR1:  JSR     PC,REWIND
1571 004556 004737 005104          JSR     PC,CLRTBL
1572 004562 104406          SVCTRS
1573 004564 104422          CHGDRV
1574 004566 000771          CLR1
1575 004570 052737 000010 000632  BR       CLR1
1576 004576 005037 004464          BIS     #10,MODES   ;AT END OF RLS
1577 004602 000207          CLR     T5FLAG
1578          RTS     PC
1579          ;RESET DRIVE SELECTION TO LOWEST NUMBER
1579 004604 005037 000556          RSFDR:  CLR     CDRIVE ;START WITH DRIVE 0
1580 004610 012737 000200 000554          MOV     #200,CDRVBT ;BIT FOR DRIVE 0
1581 004616 033737 000546 000554          RSF1:  BIT     MSBITS,CDRVBT ;IS DRIVE SELECTED?
1582 004624 001006          BNE     RSF2         ;YES
1583 004626 005237 000556          INC     CDRIVE      ;NO + 1 TO DRIVE
1584 004632 000241          CLC
1585 004634 006037 000554          ROR     CDRVBT      ;ROTATE DRIVE BIT
1586 004640 000766          BR       RSF1        ;REPEAT
1587 004642 013737 000556 000552          RSF2:  MOV     CDRIVE,COMAND
1588 004650 000337 000552          SWAB   COMAND
1589 004654 052737 060000 000552          BIS     #60000,COMAND ;800 BPI, 9 TRACK
1590 004662 032777 001000 173622          BIT     #1000,@SWR  ;TEST PARITY SELECTED
1591 004670 001403          BEQ    .+10         ;ODD
1592 004672 052737 004000 000552          BIS     #4000,COMAND ;EVEN
    
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1593 004700 000207          RTS      PC
1594
1595          ;SELECT NEXT DRIVE IN SEQUENCE
1596          ;+1 WORD TO EXIT ADDRESS IF LAST DRIVE TESTED
1597 004702 005237 000556    CHGDR:  INC      CDRIVE          ;+1 TO DRIVE NUMBER
1598 004706 000241          CLC
1599 004710 006037 000554    ROR      CDRVBT          ;MOVE MASK BIT OVER 1 PLACE
1600 004714 001004          BNE      CHG1           ;BRANCH IF MORE DRIVES SELECTED
1601 004716 104410          RSFDRV          ;RESET DRIVE SELECT TO LOWEST NUMBER
1602 004720 062716 000002    ADD      #2,@SP        ;+ 2 TO SKIP OVER FIRST EXIT
1603 004724 000207          RTS      PC
1604 004726 033737 000554 000546  CHG1:  BIT      CDRVBT,MSBITS
1605 004734 001762          BEQ      CHGDR
1606 004736 000741          BR       RSF2
1607
1608          ;REWIND DRIVE TO BOT
1609 004740 105777 173536    REWIND:  TSTB     @MTC
1610 004744 100375          BPL     .-4
1611 004746 013777 000552 173526    MOV     COMAND,@MTC    ;WAIT FOR CONTROL UNIT
1612 004754 006077 173520    ROR     @MTC          ;SELECT DRIVE
1613 004760 103375          BCC     .-4
1614 004762 052777 000016 173512    BIS     #16,@MTC      ;WAIT FOR TU READY
1615 004770 004737 005130    JSR     PC,GOWAIT     ;REWIND
1616 004774 000207          RTS      PC          ;EXIT
1617
1618 004776 104410          ;ARE ALL DRIVES AT END OF TAPE
1619 005000 104414          ALLEOT:  RSFDRV
1620 005002 032737 000060 000632    ALL1:  MVCTRS
1621 005010 001403          BIT     #60,MODES    ;AT EOT?
1622 005012 104422          BEQ     ALLEOS        ;NO
1623 005014 000771          BR      CHGDRV        ;DONE ALL DRIVES?
1624 005016 000427          BR      ALL1          ;NO
1625 005020 032777 000400 173464    ALLEOS:  BIT     #400,@SWR    ;TEST SWITCH 8 TO EXIT AT END OF SEQUENCE
1626 005026 001425          BEQ     ALL2          ;NO, GO TO EOT
1627 005030 032737 000010 000632    BIT     #10,MODES    ;AT END OF SEQUENCE
1628 005036 001421          BEQ     ALL2          ;NO, EXIT, DON'T DUMP ERROR COUNTERS
1629          ;DUMP ERROR COUNTERS ON ALL DRIVES
1630 005040 104410          CTRDMP:  RSFDRV
1631 005042 104414          MVCTRS
1632 005044 005737 004464          TST     T5FLAG
1633 005050 001006          BNE     CTRD1          ;DUMP READ ONLY
1634 005052 004737 006154          JSR     PC,ENDT1
1635 005056 032737 000004 000632    BIT     #4,MODES    ;READ PASS SELECTED?
1636 005064 001402          BEQ     CDMEND        ;NO
1637 005066 004737 010326    CTRD1:  JSR     PC,RNDTP1
1638 005072 104422          CDMEND:  CHGDRV        ;DONE ALL DRIVES
1639 005074 000762          BR      CTRDMP+2     ;NO
1640 005076 062716 000002    ALL3:  ADD     #2,(6)    ;INCREMENT RETURN POINT
1641 005102 000207          ALL2:  RTS      PC
1642
1643          ;CLEAR READ AND WRITE TABLES
1644 005104 012700 000570    CLRTBL:  MOV     #WRCHK,R0
1645 005110 005020          CLR11:  CLR     (0)+
1646 005112 020027 000632          CMP     R0,#MODES
1647 005116 001374          BNE     CLR11
1648 005120 042737 000070 000632          BIC     #70,MODES
    
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1649 005126 000207          RTS      PC
1650          :INTERRUPT ENABLE, GO, WAIT FOR INTERRUPT
1651 005130 012777 000200 173352 GOWAIT: MOV    #200,@CC      ;SET PRIORITY LEVEL 4
1652 005136 012777 005172 173370      MOV    #GW1,@MTV      ;SET INTERRUPT RETURN
1653 005144 012737 000001 005160      MOV    #1,WAIT1
1654 005152 052777 000101 173322      BIS    #101,@MTC      ;INTERRUPT ENABLE, GO
1655 005160 000001          WAIT1: WAIT           ;WAIT FOR INTERRUPT
1656 005162 012777 000340 173320      MOV    #340,@CC      ;RESTORE PRIORITY LEVEL 7
1657 005170 000207          RTS      PC      ;EXIT
1658 005172 012737 000001 005160 GW1:  MOV    #1,WAIT1
1659 005200 000002          RTI           ;RETURN FROM INTERRUPT
1660
1661          ;WRITE RECORD SECTION
1662 005202 005737 000612          WRITI: TST    RECORD      ;IS THIS THE FIRST RECORD
1663 005206 001031          BNE    NOINCR      ;NO, SKIP SET UP OF RECORD LENGTH AND BLOCK INCREMENT
1664 005210 013737 000524 000542      MOV    MAXLEN,STRLEN
1665 005216 012737 177774 000564      MOV    #-4,BLKINC
1666 005224 032737 000020 001320      BIT    #20,PARAM
1667 005232 001006          BNE    W1
1668 005234 013737 000526 000542      MOV    MINLEN,STRLEN
1669 005242 012737 000004 000564      MOV    #4,BLKINC
1670 005250 013737 000542 000626 W1:  MOV    STRLEN,WRTLEN
1671 005256 032737 000040 001320      BIT    #40,PARAM      ;DOES RECORD LENGTH CHANGE?
1672 005264 001002          BNE    NOINCR      ;YES
1673 005266 005037 000564          CLR    BLKINC      ;NO
1674 005272 013737 000612 000614 NOINCR: MOV    RECORD,WRRECR
1675 005300 005737 004464          TST    TSFLAG
1676 005304 001401          BEQ    .+4
1677 005306 000207          RTS      PC      ;EXIT WRITE ROUTINE IF TEST 5
1678 005310 005037 000562          CLR    WRPASS
1679 005314 013777 000552 173160 STRTOP: MOV    COMAND,@MTC      ;SELECT UNIT
1680 005322 105777 173154          TSTB   @MTC
1681 005326 100375          BPL    .-4      ;WAIT FOR CU READY
1682 005330 006077 173144          ROR    @MTS      ;WAIT FOR TU READY
1683 005334 103375          BCC    .-4
1684 005336 013777 000626 173140 NONSTP: MOV    WRTLEN,@BC      ;SET BYTE COUNT
1685 005344 005477 173134          NEG    @BC
1686 005350 013777 000530 173130      MOV    WBUF,@CA      ;SET CURRENT ADDRESS
1687 005356 052777 000004 173116      BIS    #4,@MTC      ;WRITE
1688 005364 004737 005130          JSR    PC,GOWAIT      ;INTERRUPT ENABLE, GO, WAIT FOR DONE
1689          ;RETURN HERE AFTER INTERRUPT
1690 005370 017737 173104 000566      MOV    @MTS,STATRD      ;SAVE STATUS
1691 005376 005777 173100          TST    @MTC
1692 005402 100542          BMI    ERROR      ;HAVE ERROR FLAG, CHECK FOR EOT
1693 005404 005737 000562          TST    WRPASS      ;WAS THIS A RECOVERY PASS
1694 005410 001410          BEQ    TSTSTP      ;NO
1695 005412 013700 000562          MOV    WRPASS,RO      ;YES
1696 005416 006300          ASL    RO
1697 005420 062700 000570          ADD    #WRCHEK,RO
1698 005424 005210          INC    @RO      ;+1 TO APPROPRIATE RECOVERY PASS COUNTER
1699 005426 005037 000562          CLR    WRPASS
1700 005432 032737 000014 001320 TSTSTP: BIT    #14,PARAM      ;IS WRITE MODE NONSTOP?
1701 005440 001023          BNE    STOPOP      ;NO
1702 005442 005737 000562          TST    WRPASS      ;YES
1703 005446 001333          BNE    NONSTP
1704 005450 004737 005616          JSR    PC,TESINC      ;CHANGE RECORD LENGTH
    
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1705 005454 032737 000001 000632      BIT      #1,MODES      ;EXIT AFTER RLS?
1706 005462 001405      BEQ      W10          ;NO
1707 005464 032737 000010 000632      BIT      #10,MODES    ;YES, ARE WE AT END OF RLS?
1708 005472 001721      BEQ      NONSTP      ;NO
1709 005474 000207      RTS      PC          ;YES
1710 005476 032737 000002 000632 W10:    BIT      #2,MODES    ;EXIT EVERY RECORD?
1711 005504 001714      BEQ      NONSTP      ;NO
1712 005506 000207      RTS      PC          ;YES
1713 005510 032737 000010 001320 STOPOP: BIT      #10,PARAM ;IS WRITE MODE RANDOM?
1714 005516 001414      BEQ      W11          ;NO
1715      ;RANDOM STALL DELAY
1716 005520 004737 007222      RANSTP: JSR      PC,RANGEN
1717 005524 052737 177400 007372      BIS      #177400,RANDOM
1718 005532 012704 177470      RAN1:   MOV      #-200.,R4 ;DELAY 1 MILLISECOND
1719 005536 005204      INC      R4
1720 005540 001376      BNE      -2
1721 005542 005237 007372      INC      RANDOM
1722 005546 001371      BNE      RAN1
1723 005550 005737 000562      W11:    TST      WRPASS
1724 005554 001257      BNE      STRTOP
1725 005556 004737 005616      JSR      PC,TESINC
1726 005562 032737 000001 000632      BIT      #1,MODES    ;EXIT AFTER RLS?
1727 005570 001405      BEQ      W12          ;NO
1728 005572 032737 000010 000632      BIT      #10,MODES   ;YES, ARE WE AT END OF RLS?
1729 005600 001645      BEQ      STRTOP      ;NO
1730 005602 000207      RTS      PC          ;YES
1731 005604 032737 000002 000632 W12:    BIT      #2,MODES    ;EXIT EVERY RECORD?
1732 005612 001640      BEQ      STRTOP      ;NO
1733 005614 000207      RTS      PC          ;YES
1734      ;SEE IF RECORD LENGTH SHOULD BE CHANGED
1735 005616 005237 000612      TESINC: INC      RECORD ;+1 TO RECORD COUNT
1736 005622 042737 000010 000632      BIC      #10,MODES   ;NOT END OF RLS UNLESS SET BELOW
1737 005630 005737 000564      TST      BLKINC
1738 005634 001416      BEQ      TSINC2
1739 005636 063737 000564 000626      ADD      BLKINC,WRTLEN
1740 005644 023737 000626 000526      CMP      WRTLEN,MINLEN ;RECORD LENGTH TOO SHORT?
1741 005652 002404      BLT      RESETL      ;YES, RESET
1742 005654 023737 000626 000524      CMP      WRTLEN,MAXLEN ;RECORD LENGTH TOO LONG?
1743 005662 003403      BLE      TSINC2      ;NO
1744 005664 013737 000542 000626 RESETL: MOV      STRLEN,WRTLEN ;YES, RESET
1745 005672 105737 000612      TSINC2: TSTB      RECORD ;IS RECORD A MULTIPLE OF 256
1746 005676 001003      BNE      TSINC3      ;NO
1747 005700 052737 000010 000632      BIS      #10,MODES   ;INDICATE AT END OF RLS
1748 005706 000207      TSINC3: RTS      PC
1749
1750
1751      ;HAVE AN ERROR FLAG DURING WRITE OPERATION
1752      ;IF ERROR IS CAUSED BY END OF TAPE FLAG DUMP WRITE ERROR COUNTERS
1753      ;FOR ALL OTHER ERRORS: PRINT COMMAND AND STATUS REGISTERS AND RECORD NUMBER
1754      ;IF READ PASS IS SELECTED, TRY TO RECOVER BY WRITING WITH XIRG.
1755 005710 104434      ERROR: CKSWR        ;CHECK FOR CNTL G
1756 005712 032737 175600 000566      BIT      #175600,STATRD ;AT EOT?
1757 005720 001510      BEQ      ENDTAP      ;YES
1758 005722 005737 000562      TST      WRPASS
1759 005726 001002      BNE      ERR1        ;FIRST ERROR?
1760 005730 005237 000570      INC      WRCHK       ;YES, + 1 TO WRITE ERROR
    
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1761 005734 032777 020000 172550 ERR1: BIT #20000,@SWR ;TYPE ALL ERRORS?
1762 005742 001010 BNE TESREC ;NO
1763 005744 012702 012720 MOV #MSG7,R2
1764 005750 104404 TOP ;PRINT ERROR
1765 005752 013737 000626 000544 MOV WRTLEN,LENGTH
1766 005760 004737 011202 JSR PC,PRTS ;PRINT STATUS, COMMAND, RECORD, LENGTH
1767 005764 032777 000100 172520 TESREC: BIT #100,@SWR ;RECOVER STATISTICALLY SELECTED?
1768 005772 001410 BEQ TESRC1 ;NO
1769 005774 005237 000562 INC WRPASS ;+1 TO WRITE RECOVER
1770 006000 022737 000010 000562 CMP #8,WRPASS ;HAVE WE TRIED TO WRITE RECOVER 8 TIMES?
1771 006006 001020 BNE STREC1 ;NO
1772 006010 005237 000610 INC PERMBS ;YES, +1 TO PERMANENT BADSPOT?
1773 006014 032737 000004 000632 TESRC1: BIT #4,MODES ;IS READ PASS SELECTED?
1774 006022 001402 BEQ .+6 ;NO
1775 006024 004737 010652 JSR PC,XRGREC
1776 006030 005037 000562 CLR WRPASS
1777 006034 032737 002000 000566 BIT #2000,STATRD
1778 006042 001037 BNE ENDTAP
1779 006044 000137 005550 JMP W11
1780 006050 004737 010250 STREC1: JSR PC,BACK1
1781 006054 004737 010250 JSR PC,BACK1 ;BACKSPACE 2 RECORDS
1782 006060 032777 000040 172412 BIT #40,@MTS
1783 006066 001402 BEQ .+6
1784 006070 000137 005314 JMP STRTOP
1785 006074 012777 177777 172402 MOV #-1,@BC
1786 006102 013777 000552 172372 MOV COMAND,@MTC
1787 006110 052777 000010 172364 BIS #10,@MTC
1788 006116 004737 005130 JSR PC,GOWAIT ;SPACE FORWARD 1 RECORD
1789 006122 042777 000016 172352 BIC #16,@MTC
1790 006130 052777 000004 172344 BIS #4,@MTC ;CHANGE FROM SPACE TO WRITE
1791 006136 000137 005314 JMP STRTOP
1792 ;DRIVE IS AT EOT
1793 006142 005237 000612 ENDTAP: INC RECORD
1794 006146 052737 000040 000632 BIS #40,MODES ;INDICATE DRIVE AT EOT
1795 006154 012702 013710 ENDT1: MOV #MSG24,R2
1796 006160 104404 TOP
1797 006162 012702 012746 MOV #MSG8,R2
1798 006166 104404 TOP
1799 ;DUMP WRITE ERRORS
1800 006170 104434 WRTDMP: CKSWR ;CHECK FOR CNTL G
1801 006172 013737 000552 011356 MOV COMAND,CHAR
1802 006200 000337 011356 SWAB CHAR
1803 006204 142737 000170 011356 BICB #170,CHAR
1804
1805 006212 052737 000260 011356 BIS #260,CHAR
1806 006220 004737 011360 JSR PC,OCTP ;PRINT DRIVE NUMBER
1807 006224 104430 SP3
1808 006226 013737 001320 011356 MOV PARAM,CHAR

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1809 006234 000337 011356

SWAB CHAR

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TM 11 DATA RELIAB 9TRK MACY11 30A(1052) 04-APR-79 10:39 PAGE 41^{C 4}
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SEQ 0041

1810 006240 006037 011356

ROR CHAR

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

1820	006320	022737	000010	011356	CMP	#10,CHAR
1821	006326	001002			BNE	.+6

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1822 006330 012702 013427      MOV      #MSG13,R2
1823 006334 104404              TOP          ;PRINT WRITE MODE
1824 006336 013702 000612      MOV      RECORD,R2
1825 006342 104426              DECPRT      ;PRINT RECORD NUMBER
1826 006344 013737 001320 011356  MOV      PARAM,CHAR
1827 006352 042737 177717 011356  BIC      #177717,CHAR
1828 006360 012702 013471      MOV      #MSG17,R2
1829 006364 022737 000020 011356  CMP      #20,CHAR
1830 006372 001002              BNE      .+6
1831 006374 012702 013500      MOV      #MSG18,R2
1832 006400 022737 000040 011356  CMP      #40,CHAR
1833 006406 001002              BNE      .+6
1834 006410 012702 013453      MOV      #MSG15,R2
1835 006414 022737 000060 011356  CMP      #60,CHAR
1836 006422 001002              BNE      .+6
1837 006424 012702 013462      MOV      #MSG16,R2
1838 006430 104404              TOP          ;PRINT RECORD LENGTH SEQUENCE
1839 006432 012702 013507      MOV      #MSG19,R2
1840 006436 104404              TOP
1841 006440 013702 000570      MOV      WRCHEK,R2
1842 006444 104426              DECPRT      ;PRINT 'WRITE ERRORS='
1843 006446 012700 000572      MOV      #WRCHEK+2,R0
1844 006452 112737 000060 013550  MOV      #60,MSG20+17
1845 006460 105237 013550      WRTD1: INCB   MSG20+17      ;PRINT STATISTICAL RECOVERY
1846 006464 005710              TST      @R0
1847 006466 001405              BEQ      WRTD2
1848 006470 012702 013531      MOV      #MSG20,R2
1849 006474 104404              TOP
1850 006476 011002              MOV      (0),R2
1851 006500 104426              DECPRT      ;RECOVERED AT X
1852 006502 005720      WRTD2: TST      (0)+      ;JUST INCREMENTING
1853 006504 020027 000610      CMP      R0,#WRCHEK+20
1854 006510 001363              BNE      WRTD1
1855 006512 005737 000610      TST      PERMBS
1856 006516 001001              BNE      .+4      ;SKIP PRINT IF = 0
1857 006520 000207              RTS      PC
1858
1859
1860 006522 012702 013553      MOV      #MSG20A,R2
1861 006526 104404              TOP
1862 006530 013702 000610      MOV      PERMBS,R2      ;PRINT 'PERMANENT BADSPOT'
1863 006534 104426              DECPRT
1864 006536 000207              RTS      PC
1865      ;GENERATE DATA PATTERN
1866 006540 013702 000530      GENPA: MOV      WBUF,R2 ;INITIALIZE BUFFER
1867 006544 013737 001320 006652  MOV      PARAM,GP1      ;CHECK PARAMETERS FOR PATTERN SELECTED
1868 006552 042737 170777 006652  BIC      #170777,GP1
1869 006560 001435              BEQ      PAT0
1870 006562 022737 001000 006652  CMP      #1000,GP1
1871 006570 001437              BEQ      PAT1
1872 006572 022737 002000 006652  CMP      #2000,GP1
1873 006600 001457              BEQ      PAT2
1874 006602 022737 003000 006652  CMP      #3000,GP1
    
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1875	006610	001461			BEQ	PAT3
1876	006612	022737	004000	006652	CMP	#4000.GP1
1877	006620	001501			BEQ	PAT4
1878	006622	022737	005000	006652	CMP	#5000.GP1

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

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

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

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1994 007206 013722 007372      MOV      RANDOM,(2)+
1995 007212 023702 000532      CMP      RBUF,R2
1996 007216 001371              BNE      PAT7
1997 007220 000207              RTS      PC
1998                                ;RANDOM NUMBER GENERATOR
1999                                ;EXIT WITH RANDOM NUMBER IN LOCATION NAMED 'RANDOM'
2000 007222 010037 007400  RANGEN: MOV      R0,SV0      ;SAVE REGISTERS
2001 007226 010137 007402      MOV      R1,SV1
2002 007232 010237 007404      MOV      R2,SV2
2003 007236 010337 007406      MOV      R3,SV3
2004 007242 013700 007374      MOV      LONUM,R0      ;SET UP LOW DIGIT
2005 007246 013701 007376      MOV      HINUM,R1      ;SET UP HIGH DIGIT
2006 007252 012703 000007      MOV      #7,R3      ;SET UP SHIFT COUNT
2007 007256 005002              CLR      R2
2008 007260 006300  RANG1: ASL      R0      ;SHIFT R0 LEFT AND
2009 007262 006101              ROL      R1      ;ROTATE CARRY INTO LSB OF R1 AND
2010 007264 006102              ROL      R2      ;ROTATE CARRY OUT OF R1 INTO R2
2011 007266 005303              DEC      R3      ;DECREMENT R3
2012 007270 001373              BNE      RANG1      ;CONTINUE SHIFT LOOP
2013 007272 063700 007374      ADD      LONUM,R0      ;ADD NUMBER TO MAKE X 129
2014 007276 005501              ADC      R1      ;PROPAGATE CARRY
2015 007300 063701 007376      ADD      HINUM,R1      ;ADD NUMBER TO MAKE X 129
2016 007304 005502              ADC      R2      ;PROPAGATE CARRY
2017 007306 062700 001057      ADD      #1057,R0      ;ADD LOW CONSTANT
2018 007312 005501              ADC      R1      ;PROPAGATE CARRY
2019 007314 005502              ADC      R2      ;PROPAGATE CARRY
2020 007316 062701 047401      ADD      #47401,R1      ;ADD HIGH CONSTANT
2021 007322 005502              ADC      R2      ;PROPAGATE CARRY
2022 007324 062702 000006      ADD      #6,R2      ;ADD HIGH CONSTANT
2023 007330 060200              ADD      R2,R0      ;RE-PRIME R0 WITH HIGH DIGIT
2024 007332 005501              ADC      R1      ;PROPAGATE CARRY
2025 007334 010037 007372      MOV      R0,RANDOM      ;SAVE RANDOM NUMBER
2026 007340 010037 007374      MOV      R0,LONUM      ;PUT R0 BACK IN LONUM
2027 007344 010137 007376      MOV      R1,HINUM      ;PUT R1 BACK IN HINUM
2028 007350 013700 007400      MOV      SV0,R0      ;RESTORE REGISTERS
2029 007354 013701 007402      MOV      SV1,R1
2030 007360 013702 007404      MOV      SV2,R2
2031 007364 013703 007406      MOV      SV3,R3
2032 007370 000207              RTS      PC      ;EXIT
2033 007372 000000  RANDOM: 0
2034 007374 000000  LONUM: 0
2035 007376 000000  HINUM: 0
2036 007400 000000  SV0: 0
2037 007402 000000  SV1: 0
2038 007404 000000  SV2: 0
2039 007406 000000  SV3: 0
2040
2041
2042                                ;READ RECORD SECTION
2043 007410 005737 000612  READI: TST      RECORD      ;FIRST RECORD?
2044 007414 001003              BNE      $R1      ;NO
2045 007416 013737 000542 000630      MOV      STRLEN,READLN      ;SET INITIAL READ LENGTH
2046 007424 012737 177775 000560  $R1:  MOV      #-3,PDPASS      ;INITIALIZE READ PASS COUNTER
2047 007432 013777 000552 171042  RDSTPD: MOV      COMAND,@MTC
2048 007440 105777 171036              1STB    @MTC
2049 007444 100375              BPL     .-4      ;WAIT FOR CONTROL UNIT READY
    
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2050 007446 006077 171026          ROR      @MTS
2051 007452 103375          BCC      .-4          ;WAIT FOR TAPE UNIT READY
2052 007454 013700 000532    READGO: MOV      RBUF,R0
2053 007460 013701 000630          MOV      READLN,R1
2054 007464 105020          RG1:    CLRB     (0)+          ;CLEAR READ BUFFER
2055 007466 005301          DEC      R1
2056 007470 001375          BNE      RG1
2057 007472 013777 000630 171004    MOV      READLN,@BC          ;SET BYTE COUNT
2058 007500 005477 171000          NEG      @BC
2059 007504 013777 000532 170774    MOV      RBUF,@CA          ;SET CURRENT ADDRESS
2060 007512 013777 000552 170762    MOV      COMAND,@MTC
2061 007520 052777 000002 170754    BIS      #2,@MTC
2062 007526 004737 005130          JSR      PC,GOWAIT
2063          ;RETURN HERE AFTER INTERRUPT
2064 007532 017737 170742 000566    MOV      @MTS,STATRD
2065 007540 005777 170736          TST      @MTC          ;ANY STATUS ERRORS
2066 007544 100504          BMI      RDERR          ;YES
2067          ;CHECK FOR DATA ERRORS
2068 007546 013700 000532          MOV      RBUF,R0
2069 007552 013701 000530          MOV      WBUF,R1
2070 007556 013702 000630          MOV      READLN,R2
2071 007562 022021          $R5:    CMP      (0)+,(1)+          ;CHECK FOR PROPER DATA TRANSFER
2072 007564 001045          BNE      DATERR          ;HAVE DATA ERROR
2073 007566 162702 000002          SUB      #2,R2          ;CHECKED ALL TRANSFERS?
2074 007572 001373          BNE      $R5          ;NO
2075 007574 032737 000003 001320    RTSSTP: BIT      #3,PARAM
2076 007602 001007          BNE      RDSTPC
2077 007604 004737 010200          JSR      PC,RDINCR          ;INCREMENT FOR NEXT BLOCK
2078 007610 023737 000612 000616    CMP      RECORD,LASRCR
2079 007616 001316          BNE      READGO
2080 007620 000207          RTS      PC          ;EXIT READIT
2081 007622 032737 000002 001320    RDSTPC: BIT      #2,PARAM          ;IS READ MODE RANDOM?
2082 007630 001414          BEQ      RDSTP          ;NO
2083 007632 004737 007222          RNRDRS: JSR      PC,RANGEN
2084 007636 052737 177400 007372    BIS      #177400,RANDOM
2085 007644 012704 177470          RNDS1:  MOV      #-200.,R4          ;DELAY 1 MILLISECOND
2086 007650 005204          INC      R4
2087 007652 001376          BNE      .-2
2088 007654 005237 007372          INC      RANDOM
2089 007660 001371          BNE      RNDS1
2090 007662 004737 010200          RDSTP:  JSR      PC,RDINCR
2091 007666 023737 000612 000616    CMP      RECORD,LASRCR          ;DONE LAST RECORD?
2092 007674 001256          BNE      RDSTPD          ;NO
2093 007676 000207          RTS      PC          ;YES EXIT
2094          ;HAVE DATA ERROR
2095 007700 032777 020000 170604    DATERR: BIT      #20000,@SWR          ;TYPE ALL READ ERRORS?
2096 007706 001014          BNE      DATERR1          ;NO
2097 007710 012702 013070          MOV      #MSG9A,R2
2098 007714 104404          TOP
2099 007716 013737 000630 000544    MOV      READLN,LENGTH
2100 007724 004737 011202          JSR      PC,PRIS
2101 007730 014102          MOV      -(1),R2          ;PRINT EXPECTED DATA
2102 007732 104412          OCTPRT
2103 007734 014002          MOV      -(0),R2
2104 007736 104412          OCTPRT          ;PRINT ACTUAL DATA
2105 007740 022737 177775 000560    DATERR1: CMP      #-3,RDPASS
    
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2106 007746 001002          BNE      .+6
2107 007750 005237 000622  INC      DAERRS          ;+1 TO DATA ERRORS
2108 007754 000464          BR       RTSR1
2109          ;STATUS INDICATES AN ERROR, CHECK FOR EOT
2110 007756 104434          RDERR0: CKSWR          ;CHECK FOR CNTL G
2111 007760 032737 175600 000566  BIT      #175600,STATRD ;IS ERROR LEGITIMATE OR EOT?
2112 007766 001552          BEQ      RNDTAP          ;HAVE EOT
2113 007770 032777 020000 170514  BIT      #20000,@SWR    ;TYPE ALL READ ERRORS?
2114 007776 001044          BNE      RTSREC          ;NO
2115 010000 012702 013043          MOV      #MSG9,R2
2116 010004 104404          TOP
2117 010006 013737 000630 000544  MOV      READLN,LENGTH ;PRINT ERROR
2118 010014 004737 011202          JSR      PC,PRTS
2119 010020 032777 010000 170452  BIT      #10000,@MTS    ;STATUS ERROR DUE TO PARITY
2120          ;ERROR?
2121 010026 001430          BEQ      RTSREC          ;BRANCH IF NOT
2122 010030 032777 000010 170454  BIT      #10,@SWR        ;SEE IF USER WANTS DATA COMPARE.
2123 010036 001424          BEQ      RTSREC          ;BRANCH IF NOT
2124 010040 013700 000530          MOV      WBUF,R0        ;PICK UP STARTING ADDRESS OF
2125          ;WRITE BUFFER
2126 010044 013701 000532          MOV      RBUF,R1        ;PICK UP STARTING ADDRESS OF
2127          ;READ BUFFER
2128 010050 013702 000630          MOV      @#READLN,R2    ;PICK UP RECORD LENGTH IN BYTES
2129 010054 022021          1$:  CMP      (R0)+,(R1)+  ;COMPARE WHAT SHOULD HAVE BEEN
2130          ;WRITTEN WITH WHAT WAS!!
2131 010056 001004          BNE      2$             ;BRANCH IF NOT THE SAME
2132 010060 162702 000002          SUB      #2,R2          ;DROP OFF A WORD FROM RECORD
2133          ;LENGTH
2134 010064 001406          BEQ      3$             ;BRANCH IF ALL OF RECORD DATA
2135          ;CHECKS
2136 010066 000772          BR       1$             ;GO TO COMPARE NEXT BYTE
2137 010070 014002          2$:  MOV      -(R0),R2    ;PICK UP THE DATA VALUE THAT
2138          ;SHOULD HAVE BEEN WRITTEN
2139 010072 104412          OCTPRT          ;PRINT EXPECTED VALUE OF
2140          ;WRITTEN DATA
2141 010074 014102          MOV      -(R1),R2    ;PICK UP THE DATA VALUE THAT
2142          ;WAS WRITTEN
2143 010076 104412          OCTPRT          ;PRINT ACTUAL VALUE OF THE
2144          ;DATA READ
2145 010100 000403          BR       RTSREC          ;CONTINUE WITH TESTING
2146 010102 012702 013337          3$:  MOV      #MSG10D,R2 ;INDICATE RECORD DATA COMPARES
2147          ;DESPITE THE PARITY ERROR
2148          ;CAUSING THE READ STATUS ERROR
2149 010106 104404          TOP
2150          ;+ 1 TO RDERRS IF FIRST ERROR PASS
2151 010110 104434          RTSREC: CKSWR          ;CHECK FOR CNTL G
2152 010112 022737 177775 000560  CMP      #-3,RDPASS
2153 010120 001002          BNE      .+6
2154 010122 005237 000620          INC      RDERRS          ;+1 TO STATUS ERRORS
2155 010126 032777 000020 170356  RTSR1: BIT      #20,@SWR    ;DELETE READ RETRYS (SW 4)?
2156 010134 001011          BNE      RPASS3          ;YES
2157 010136 005237 000560          INC      RDPASS          ;DONE ALL RE-READS?
2158 010142 001404          BEQ      RPASS1          ;YES
2159 010144 004737 010250          JSR      PC,BACK1       ;NO, BACKSPACE TAPE
2160 010150 000137 007432          JMP      RDSTPD         ;GO AGAIN
2161 010154 005237 000624          RPASS1: INC      NRREAD ;+1 TO NONRECOVERABLE READ
    
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2162 010160 012737 177775 000560 RPASS3: MOV #3,RDPASS
2163 010166 032737 002000 000566 BIT #2000,STATRD ;AT EOT?
2164 010174 001054 BNE RNDTP1 ;YES, TYPE 'EOT'
2165 010176 000631 BR RDSTP
2166
2167 ;SET UP POINTERS FOR NEXT RECORD
2168 010200 005237 000612 RDINCR: INC RECORD
2169 010204 005737 000564 TST BLKINC
2170 010210 001416 BEQ RESTR1
2171 ;RECORD LENGTH IS CHANGING, COUNT IT
2172 010212 063737 000564 000630 ADD BLKINC,READLN
2173 010220 023737 000630 000526 CMP READLN,MINLEN ;IS LENGTH LESS THAN MINIMUM
2174 010226 002404 BLT RESTR1 ;NO
2175 010230 023737 000630 000524 CMP READLN,MAXLEN ;IS LENGTH GREATER THAN MAXIMUM?
2176 010236 003403 BLE RESTR1 ;NO
2177 010240 013737 000542 000630 RESTR1: MOV STRLEN,READLN ;PESET INITIAL LENGTH
2178 010246 000207 RESTR1: RTS PC
2179 ;BACKSPACE ONE RECORD
2180 010250 006077 170224 BACK1: ROR @MTC
2181 010254 103375 BCC #-4 ;WAIT FOR TAPE UNIT READY
2182 010256 012777 177777 170220 MOV #-1,@BC ;COUNT 1 RECORD
2183 010264 013777 000552 170210 MOV COMAND,@MTC ;SELECT DRIVE
2184 010272 052777 000012 170202 BIC #12,@MTC ;ISSUE BACKSPACE
2185 010300 004737 005130 JSR PC,GOWAIT
2186 010304 042777 000016 170170 BIC #16,@MTC
2187 010312 000207 RTS PC
2188 ;DRIVE HAS REACHED EOT IN READ MODE
2189 010314 004737 010200 RNDTAP: JSR PC,RDINCR
2190 010320 052737 000020 000632 BIS #20,MODES ;INDICATE AT EOT
2191 010326 012702 013754 RNDTP1: MOV #MSG25,R2
2192 010332 104404 TOP
2193 010334 012702 012746 MOV #MSG8,R2
2194 010340 104404 TOP
2195 ;DUMP ERROR COUNTERS
2196 010342 104434 READMP: CKSWR ;CHECK FOR CNTL G
2197 010344 013737 000552 011356 MOV COMAND,CHAR
2198 010352 000337 011356 SWAB CHAR
2199 010356 142737 000170 011356 BICB #170,CHAR
2200 010364 052737 000260 011356 BIS #260,CHAR
2201 010372 004737 011360 JSR PC,OCTP ;PRINT DRIVE NUMBER
2202 010376 104430 SP3
2203 010400 013737 001320 011356 MOV PARAM,CHAR
2204 010406 000337 011356 SWAB CHAR
2205 010412 006037 011356 ROR CHAR
2206 010416 042737 000170 011356 BIC #170,CHAR
2207 010424 052737 000260 011356 BIS #260,CHAR
2208 010432 004737 011360 JSR PC,OCTP ;PRINT PATTERN NUMBER
2209
2210 010436 013737 001320 011356 MOV PARAM,CHAR
2211 010444 042737 177774 011356 BIC #177774,CHAR
2212 010452 012702 013441 MOV #MSG14,R2
2213 010456 022737 000001 011356 CMP #1,CHAR
2214 010464 001002 BNE .+6
2215 010466 012702 013415 MOV #MSG12,R2
2216 010472 022737 000002 011356 CMP #2,CHAR
2217 010500 001002 BNE .+6
    
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2330 ;PRINT OCTAL VALUE IN REGISTER 2
2331 011246 012737 000060 011356 OCTPR: MOV #'0,CHAR ;INITIALIZE 1ST NUMBER AS 0
2332 011254 005702 TST R2 ;IS VALUE POSITIVE
2333 011256 100003 BPL OCT1 ;YES PRINT 0
2334 011260 012737 000061 011356 MOV #'1,CHAR ;NO PRINT 1
2335 011266 004737 011360 OCT1: JSR PC,OCTP
2336 011272 006102 ROL R2
2337 011274 006102 ROL R2
2338 011276 012737 177773 011354 MOV #-5,OCT ;COUNT 5 DIGITS
2339 011304 006102 OCT2: ROL R2
2340 011306 006102 ROL R2
2341 011310 006102 ROL R2
2342 011312 010237 011356 MOV R2,CHAR ;SAVE DIGIT
2343 011316 042737 177770 011356 BIC #177770,CHAR ;CLEAR OTHER BITS
2344 011324 052737 000060 011356 BIS #60,CHAR ;MAKE ASCII DIGIT
2345 011332 006002 ROR R2
2346 011334 004737 011360 JSR PC,OCTP ;PRINT
2347 011340 006102 ROL R2
2348 011342 005237 011354 INC OCT ;+1 TO DIGIT COUNT
2349 011346 001356 BNE OCT2 ;NOT DONE
2350 011350 104430 SP3
2351 011352 000207 RTS PC ;EXIT
2352 011354 000000 OCT: 0
2353 011356 000000 CHAR: 0
2354 011360 105777 167134 OCTP: TSTB @TPS
2355 011364 100375 BPL -4 ;WAIT FOR READY
2356 011366 013777 011356 167126 MOV CHAR,@TPB ;PRINT
2357 011374 000207 RTS PC
2358 ;PRINT DECIMAL VALUE IN REGISTER 2
2359 011376 012737 177773 011554 DECPR: MOV #-5,DIGCNT
2360 011404 012737 011562 011560 MOV #DECPNT+2,DECPNT
2361 011412 012737 000040 011556 MOV #40,ZERO
2362 011420 012737 177777 011552 TYPT1: MOV #-1,DIGIT
2363 011426 005237 011552 TYPT2: INC DIGIT
2364 011432 167702 000122 SUB @DECPNT,R2
2365 011436 100373 BPL TYPT2
2366 011440 067702 000114 ADD @DECPNT,R2
2367 011444 004737 011472 JSR PC,DECOUT
2368 011450 005237 011554 INC DIGCNT
2369 011454 001002 BNE TYPT3
2370 011456 104430 SP3
2371 011460 000207 RTS PC
2372 011462 062737 000002 011560 TYPT3: ADD #2,DECPNT
2373 011470 000753 BR TYPT1
2374 011472 005737 011552 DECOUT: TST DIGIT
2375 011476 001010 BNE DEC1
2376 011500 022737 177777 011554 CMP #-1,DIGCNT
2377 011506 001404 BEQ DEC1
2378 011510 013737 011556 011552 MOV ZERO,DIGIT
2379 011516 000406 BR DEC2
2380 011520 012737 000060 011556 DEC1: MOV #60,ZERO
2381 011526 052737 000060 011552 BIS #60,DIGIT
2382
2383 011534 105777 166760 DEC2: TSTB @TPS
2384 011540 100375 BPL -4
2385 011542 013777 011552 166752 MOV DIGIT,@TPB
  
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2386 011550 000207          RTS      PC
2387 011552 000000          DIGIT:  0
2388 011554 000000          DIGCNT: 0
2389 011556 000040          ZERO:   40
2390 011560 011562          DECPNT: .+2
2391 011562 023420          10000.
2392 011564 001750          1000.
2393 011566 000144          100.
2394 011570 000012          10.
2395 011572 000001          1.
2396
2397 011574 105777 166714      ;KEYBOARD INPUT
2397 011574 105777 166714      WAITK:  TSTB   @TKS           ;WAIT FOR KEY
2398 011600 100375          BPL     .-4
2399 011602 105777 166712      TSTB   @TPS           ;WAIT FOR TELEPRINTER READY
2400 011606 100375          BPL     .-4
2401 011610 117777 166702 166704      MOVB   @TKB,@TPB       ;ECHO CHARACTER
2402 011616 117737 166674 001314      MOVB   @TKB,CHARIN     ;SAVE IT
2403 011624 042737 000200 001314      BIC    #200,CHARIN
2404 011632 000207          RTS      PC           ;EXIT
2405
2406 011634 012702 011644      ;TYPE 3 SPACES
2407 011640 104404          SP3X:  MOV     #SP3A,R2
2408 011642 000207          TOP
2409 011644 020057 020040 057      RTS      PC
2410 011652          SP3A:  .ASCII  :/  /;
2411          .EVEN
2412 011652 142777 000177 166640      ;TELETYPE OUTPUT PACKAGE
2412 011652 142777 000177 166640      TO:    BICB   #177,@TPS   ;CLEAR TELETYPE FLAGS
2413 011660 112237 011752          MOVB   (2)+,EOMK       ;SAVE MESSAGE DELIMITER
2414 011664 121237 011752      TOP1:  CMPB   @R2,EOMK     ;IS CHARACTER THE SECOND MESSAGE DELIMITER?
2415 011670 001001          BNE    .+4            ;NO
2416 011672 000207          RTS      PC           ;YES, EXIT
2417 011674 121227 000100      CMPB   @R2,#'a        ;IS CHARACTER AN @ WHICH INDICATES A CARRIAGE RET.
2418 011700 001406          BEQ    TOP2           ;YES
2419 011702 105777 166612      TSTB   @TPS           ;NO, WAIT FOR TELETYPE READY
2420 011706 100375          BPL     .-4
2421 011710 112277 166606      MOVB   (2)+,@TPB     ;PRINT CHARACTER
2422 011714 000763          BR     TOP1
2423 011716 105777 166576      TOP2:  TSTB   @TPS
2424 011722 100375          BPL     .-4
2425 011724 112777 000215 166570      MOVB   #215,@TPB     ;CR
2426 011732 105777 166562      TSTB   @TPS
2427 011736 100375          BPL     .-4
2428 011740 112777 000212 166554      MOVB   #212,@TPB     ;LF
2429 011746 005202          INC    R2
2430 011750 000745          BR     TOP1
2431 011752 000000          EOMK:  0
2432 011754 022737 000176 000512      CKSWRR: CMP    #SWREG,SWR   ;SOFTWARE SWITCH REG PRESENT
2433 011762 001035          BNE    OUT           ;NO, GET OUT
2434 011764 105777 166524      TSTB   @TKS           ;YES, WAIT FOR
2435 011770 100032          BPL     OUT           ;READY, GET CHARACTER
2436 011772 017737 166520 001314      MOV    @TKB,CHARIN   ;AND STRIP OFF
2437 012000 042737 177600 001314      BIC    #177600,CHARIN ;THE GARBAGE
2438 012006 022737 000007 001314      CMP    #7,CHARIN     ;IS IT A <^G>
2439 012014 001020          BNE    OUT
2440 012016 012702 014042      MOV    #SCNTG,R2
2441 012022 104404          TOP
  
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2498	012320	012637	000006	MOV	(SP)+,@#6
2499	012324	000207		RTS	PC
2500					
2501				:TRAP HANDLER	
2502	012326	011666	000002	TRAP34: MOV	@SP,2(6)
2503	012332	162716	000002	SUB	#2,@SP
2504	012336	013646		MOV	@(6)+,-(6)
2505	012340	062716	105746	ADD	#TABLE-104400,@SP
2506	012344	013607		MOV	@(6)+,PC
2507	012346	011574		TABLE: WAITK	
2508	012350	005202		WRITI	
2509	012352	011652		TO	
2510	012354	004470		SVCTR	
2511	012356	004604		RSFDR	
2512	012360	011246		OCTPR	
2513	012362	004506		MVCTR	
2514	012364	006540		GENPA	
2515	012366	004550		CLRAL	
2516	012370	004702		CHGDR	
2517	012372	007410		READI	
2518	012374	011376		DECPR	
2519	012376	011634		SP3X	
2520	012400	012254		SUSWRR	
2521	012402	011754		CKSWRR	
2522		104400		WAITKY=104400	
2523		104402		WRITIT=104402	
2524		104404		TOP=104404	
2525		104406		SVCTRS=104406	
2526		104410		RSFDRV=104410	
2527		104412		OCTPRT=104412	
2528		104414		MVCTRS=104414	
2529		104416		GENPAT=104416	
2530		104420		CLRALL=104420	
2531		104422		CHGDRV=104422	
2532		104424		READIT=104424	
2533		104426		DECPRT=104426	
2534		104430		SP3=104430	
2535		104432		SUSWR=104432	
2536		104434		CKSWR=104434	
2537					

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2538  
2539 : *****  
2540 : MODIFIED DEC 16 1977  
2541 :  
2542 : **  
2543 : CHECK FOR DUMP MODE OR AUTOMATIC/ACT11-XXDP MODE  
2544 :  
2545 : --  
2546 012404 005037 000400 CKMODE: CLR AUTOM :INIT AUTOMATIC MODE INDICATOR  
2547 012410 105037 000402 CLRB ACT11M :INIT ACT11 AUTO MODE INDICATOR  
2548 012414 105037 000403 CLRB XXDPM :INIT XXDP AUTO MODE INDICATOR  
2549 012420 105037 000404 CLRB ADUMPM :INIT ACT11 DUMP MODE INDICATOR  
2550 012424 105037 000405 CLRB XDUMPM :INIT XXDP DUMP MODE INDICATOR  
2551 012430 005737 000042 TST @#42 :AUTO MODE?  
2552 012434 001425 BEQ 2$ :BRANCH - IF NO  
2553 012436 005237 000400 INC AUTOM :SET AUTO MODE INDICATOR  
2554 012442 032737 020000 000052 BIT #20000,@#52 :MANUAL INTERVENTION?  
2555 012450 001402 BEQ 6$ :BRANCH - IF NO  
2556 012452 000137 012532 JMP ABORT :ABORT THE PROGRAM  
2557 012456 023737 000042 000046 6$: CMP @#42,@#46 :ACT11 MODE?  
2558 012464 001403 BEQ 1$ :BRANCH - IF YES  
2559 012466 105237 000403 INCB XXDPM :INDICATE XXDP AUTO MODE  
2560 012472 000416 BR 5$ :AND EXIT  
2561 012474 105237 000402 1$: INCB ACT11M :INDICATE ACT11 AUTO MODE  
2562 012500 012777 020111 166004 MOV #20111,@SWR :SET SWITCH REGISTER  
2563 012506 000410 BR 5$ :AND EXIT  
2564 012510 105737 000041 2$: TSTB @#41 :MAN/MODE VIA ACT11/PAPER TAPE?  
2565 012514 001003 BNE 3$ :BRANCH - IF NOT  
2566 012516 105237 000404 INCB ADUMPM :INDICATE MAN/MODE VIA ACT11/PAPER TAPE  
2567 012522 000402 BR 5$ :AND EXIT  
2568 012524 105237 000405 3$: INCB XDUMPM :INDICATE MANUAL MODE VIA XXDP  
2569 012530 000207 5$: RTS PC :RETURN  
2570  
2571 : *****  
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: *****  
:                                     MODIFIED DEC 16 1977  
:                                     *****  
:                                     ++  
:                                     DISCONTINUE TESTING FOR ILLEGAL CONDITIONS  
:                                     --  
ABORT: RESET                               ;CLEAR THE WORLD  
MOV      #MSG00,R2                         ;GET ABORT MESSAGE  
JSR      PC, TOP                           ;PRINT ABORT MESSAGE  
TSTB    XXDPM                              ;XXDP AUTO MODE  
BEQ     1$                                  ;BRANCH - IF NOT  
MOV     @#42,R0                             ;GET MONITOR EXIT ADDRESS  
CLR     @#42                               ;USE AS ABORT FLAG  
JSR     PC,(R0)                             ;EXIT TO XXDP MONITOR  
1$:     OR      .                            ;AND HANG  
: *****
```

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

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

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

SELD2	002262	1154	1157#															
SELOK1	003050	1275	1277#															
SELPAT	002460	1194	1198#															
SELRLS	002552	1219#																
SELRM1	002734	1251	1254#															
SELRM2	002750	1249	1253	1257#														
SELR1	002602	1223	1226#															
SELR2	002620	1227	1230#															
SELR3	002634	1221	1225	1229	1233#													
SELTST	002366	1151	1181#															
SELT1	002404	1185#	1197	1276														
SELT2	002430	1187	1191#															
SELT3	002450	1189	1192	1195#	1209	1211	1231	1243	1255	1265								
SELW1	002666	1239	1242#															
SELW2	002702	1237	1241	1245#														
SP3 =	104430	1205	1216	1233	1245	1257	1807	2202	2350	2370	2534#							
SP3A	011644	2406	2409#															
SP3X	011634	2406#	2519															
STACK =	000500	929#	1024	1135														
START	002134	1129	1134#															
START1	002140	1097	1135#	1149														
STATRD	000566	960#	1690*	1756	1777	2064*	2111	2163	2272*	2277	2288	2321						
STOPOP	005510	1701	1713#															
STREC1	006050	1771	1780#															
STRLEN	000542	950#	1664*	1668*	1670	1744	2045	2177										
STRTOP	005314	1679#	1724	1729	1732	1784	1791											
SUSWR =	104432	1025	1136	2535#														
SUSWRR	012254	2489#	2520															
SVCTR	004470	1550#	2510															
SVCTRS=	104406	1339	1356	1374	1381	1388	1405	1413	1420	1440	1451	1466	1482	1514				
		1528	1572	2525#														
SVC1	004474	1551#	1553															
SVRECR	000550	953#	1448*	1450	1475*	1481	1521*	1527										
SVO	007400	2000*	2028	2036#														
SV1	007402	2001*	2029	2037#														
SV2	007404	2002*	2030	2038#														
SV3	007406	2003*	2031	2039#														
SWR	000512	936#	1027	1137	1303	1590	1625	1761	1767	2095	2113	2122	2155	2257				
		2432	2444	2483*	2492	2496*	2562*											
SWREG	000176	923#	1027	1137	2432	2496												
TABLE	012346	2505	2507#															
TEMPST	012250	2448*	2452*	2475*	2476*	2477*	2479*	2483	2486#									
TESINC	005616	1504	1704	1725	1735#													
TESRC1	006014	1768	1773#															
TESREC	005764	1762	1767#															
TEST	001324	1010#	1286*															
TEST0	003306	1287	1331#															
TEST1	003356	1289	1348#															
TEST2	003426	1291	1366#															
TEST3	003544	1294	1397#															
TEST4	003662	1298	1430#															
TEST5	004204	1297	1497#															
TKB	000516	938#	2401	2402	2436													
TKS	000514	937#	2397	2434														
TO	011652	2412#	2509															
TOP =	104404	1085	1095	1101	1123	1143	1182	1196	1261	1278	1302	1324	1764	1796				

TSD	004314	1511	1515#																		
TSE	004322	1518#	1530	1542																	
TSF	004364	1523	1526#																		
T5FLAG	004464	1500*	1546#	1576*	1632	1675															
T5G	004376	1520	1529#																		
T5H	004414	1532	1534#																		
T5INC	004466	1505*	1513	1547#																	
T5J	004416	1535#	1540																		
T5K	004436	1537	1539#																		
USSTST	001624	1066#	1069																		
USS.OK	001642	1067	1071#																		
VALID	002300	1156	1162#																		
VAL1	002316	1167#	1170																		
VAL2	002330	1168	1171#																		
VAL3	002344	1172	1175#																		
VAL4	002350	1160	1174	1176#																	
WAITK	011574	2397#	2507																		
WAITKY=	104400	1145	1185	1207	1219	1235	1247	1262	2454	2522#											
WAIT1	005160	1653*	1655#	1658*																	
WBUF	000530	943#	1686	1866	2069	2124	2266														
WRCHK	000570	961#	1562	1644	1697	1760*	1841	1843	1853												
WRIT!	005202	1602#	2508																		
WRITIT=	104402	1338	1355	1373	1404	1449	1501	2523#													
WRPASS	000562	958#	1678*	1693	1695	1699*	1702	1723	1758	1769*	1770	1776*	2256*	2275*							
		2279*																			
WRRECR	000614	972#	1439*	1448	1450*	1674*	2297	2302													
WRDMP	006170	1800#																			
WRD1	006460	1845#	1854																		
WRD2	006502	1847	1852#																		
WRTLEN	000626	977#	1670*	1684	1739*	1740	1742	1744*	1765	2264	2284										
W1	005250	1667	1670#																		
w10	005476	1706	1710#																		
w11	005550	1714	1723#	1779																	
w12	005604	1727	1731#																		
XDUMPM	000405	917#	2550*	2568*																	
XRGRCD	010766	2258	2275#	2278																	
XRGREC	010652	1775	2255#	2289																	
XRG0	010662	2257#	2280																		
XRG5	010774	2274	2277#																		
XXDPM	000403	915#	2548*	2559*	2584																
ZERO	011556	2361*	2378	2380*	2389#																
\$CNTG	014042	2440	2727#																		
\$ENDAD	003246	891	1096	1314	1317#																
\$MCRLF	014070	2462	2732#																		
\$MNEW	014060	2446	2730#																		
\$MSWR	014050	2442	2728#																		
\$READ	012060	2449	2452#																		
\$R1	007424	2044	2046#																		
\$R5	007562	2071#	2074																		
\$SVPC =	000036	877#	897																		
\$ZEROS	002032	1111	1115#																		
.	- 014076	857#	859#	877	878#	882#	886#	890#	893#	897#	904#	922#	924#	930#							
		991#	993#	995#	997#	999#	1001#	1003#	1005#	1158	1177	1264	1267	1270							
		1296	1591	1610	1613	1676	1681	1683	1720	1774	1783	1818	1821	1830							
		1833	1836	1856	1881	1896	1922	1951	2049	2051	2087	2106	2153	2181							
		2214	2217	2226	2229	2232	2261	2268	2306	2308	2355	2384	2390	2398							

TM 11 DATA RELIAB 9TRK MACY11 30A(1052) 04-APP-79 10:39 PAGE 72^{G 6}
CZTMBF.P11 04-APR-79 10:28 CROSS REFERENCE TABLE -- USER SYMBOLS

SEQ 0071

2400 2410# 2415 2420 2424 2427 2589 2733# 2735

. ABS. 014076 000

ERRORS DETECTED: 0

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