

TM11

TM11 DATA RELIABILITY 9 TRACK
CZTMBE0

AH-9399E-MC
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TM 11 DATA RELIAB 9TRK MACY11 30A(1052) 17-JAN-78

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IDENTIFICATION

PRODUCT CODE: AC-9398E-MC
PRODUCT NAME: CZTMBE0 TM 11 DATA RELIAB 9TRK
PROGRAM DATE: FEB 1978
MAINTAINER: DIAGNOSTIC ENGINEERING
AUTHOR: JOHN RODENHISER
REVISED: JIM LACEY/B. BURGESS/S. CARPENTER/CLEM WALSH

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1. ABSTRACT

THE TM11 DATA RELIABILITY PROGRAM COLLECTS STATISTICAL INFORMATION PERTAINING TO THE DATA RELIABILITY OF THE TM11, 7.110 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 TUID TAPE UNITS ON-LINE AND WRITE ENABLED
 LOAD STARTING ADDRESS 200 (204 OR 210 TO SELECT PARAMETERS AND UNITS)
 START PROGRAM-PROGRAM WILL BEGIN TESTING FOR LOAD ADDRESS OF 200 OTHERWI
 SELECT TAPE UNITS (REFERENCE 4.3.1)
 SELECT PARAMETERS (REFERENCE 4.3.2)
 TYPE CARRIAGE RETURN AND PROGRAM WILL BEGIN TESTING.
 ***THE PROGRAM WILL ALLOW THE LOADING OF SOFTWARE SWITCH REGISTER
 AFTER PROGRAM HAS BEEN STARTED BY TYPING OUT THE FOLLOWING
 SWR=XXXXXX NEW= (REFER TO SECT 5.1 FOR OPERATOR ACTION).

4.3.1 TAPE UNIT SELECTION

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

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

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

4.3.1.1 TAPE UNIT SELECTION EXAMPLES

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

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

SELECT UNITS
 SELECT UNITS

A CARRIAGE RETURN WAS TYPED WITH NO UNITS SELECTED.

SELECT UNITS 1,9?,1,2

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

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4.3.1.2 AUTOMATIC UNIT SELECTION

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

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

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

4.3.2 PARAMETER SELECTION

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

"TST PAT RLS WMO RMO"

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

4.3.2.1 TEST NUMBER

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

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

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RECORDS, CONTINUE TO END OF TAPE.

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

4.3.2.2 PATTERN

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

PATTERN	DESCRIPTION	DATA	CHANNELS
0	HALF FREQUENCY, OUTSIDE SKEW	010	001
		004	400
		010	001
		004	400
		ETC.	ETC.
1	SLIDING "1"	000	040
		200	004
		100	010
		040	020
		020	100
		010	001
		004	400
		002	002
		001	200
		ETC.	ETC.
2	HIGH FREQUENCY, ALTERNATING CHANNELS	274	525
		274	525
		ETC.	ETC.

PATTERN	DESCRIPTION	DATA	CHANNELS
3	THREE 0'S, THRU 1'S, THRU 0'S	037	703
		037	703
		037	703
		300	054
		300	054
		300	054
		076	523
		076	523
		076	523
		201	244
		201	244
		201	244
		174	531
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		003	242
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ETC. ETC.

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4	INCREMENTING PATTERN	000 001 002 003 . . 377 ETC.	040 200 002 202 . . 777 ETC.
5	EACH CHANNEL 3 BITS	000 000 000 200 200 200 100 100 100 100 040 040 040 020 020	040 040 040 004 004 004 010 010 010 010 020 020 020 100 100
	PATTERN DESCRIPTION	DATA	CHANNELS
		020 010 010 010 004 004 004 002 002 002 001 001 001 ETC.	100 001 001 001 400 400 400 002 002 002 200 200 200 ETC.
6	HIGH FREQUENCY ALL CHANNELS	377 377 ETC.	777 777 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 SE REACHES END OF TAPE. TO TERMINATE PARAMETER SELECTION A SECOND CARRIAGE RETURN MUST BE TYPED AFTER SELECTING A SET OF PARAMETERS.

4.3.2.7 TEST SELECTION EXAMPLES

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

(CR)

TWO PARAMETERS SETS WERE SELECTED BY THE ABOVE SEQUENCE

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

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

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

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

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

4.3.2.8 AUTOMATIC PARAMETER SELECTION

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

TST	PAT	RLS	WMO	RMO
3	6	1	1	1
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 SEQUENCE TO BE REPEATED WITH A VARIATION THE PATTERN, RECORD LENGTH SEQUENCE, WRITE MODE, OR READ MODE

5.1.1 SWITCHES TO ALTER ERROR RECOVERY

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

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

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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
(000100)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

726
727
728 8. MISCELLANEOUS
729
730 8.1 TAPE LENGTH
731
732 SINCE EACH OF THE TESTS DEPEND ON REACHING THE "EOT" REFLECTOR
733 FOR TERMINATING IT COULD BE ADVANTAGEOUS TO USE A "SHORT" TAPE.
734 THIS WOULD ALLOW FOR LESS TIME TO RUN A SERIES OF TESTS WHILE
735 VARYING THE TEST PARAMETERS (REFERENCE 5.1.3). HOWEVER, THIS
736 IS NOT INTENDED TO IMPLY THAT CONSTANTLY CHANGING THE TEST
737 PARAMETERS CONSTITUTES A MORE DIFFICULT TEST OF DATA RELIABILITY.
738 THE LENGTH OF TIME UNDER TEST IS MORE LIKELY TO SUPPLY THAT.
739 IN ANY EVENT, IF A "SHORT" TAPE IS DESIRED, JUST PLACE AN "EOT"
740 REFLECTIVE STRIP APPROXIMATELY 50 FEET DOWN TAPE FROM THE "BOT"
741 MARKER. SO THAT THE TAPE IS STILL USEFUL AS A "LONG" TAPE
742 ANOTHER "BOT" MARKER COULD BE PLACED A SHORT DISTANCE (APPROX-
743 IMATELY 10 FEET) FARTHER DOWN ON TAPE. THIS WOULD EFFECTIVELY
744 GIVE YOU TWO TAPES. CARE MUST BE EXERCISED WHEN MOUNTING THE TAPE
745 TO POSITION IT AT THE PROPER "BOT" MARKER.
746
747 8.2 MEMORY AVAILABLE
748
749 THE PROGRAM REQUIRES 4K OF MEMORY. IF 8K IS AVAILABLE, STARTING
750 THE PROGRAM AT ADDRESS 200 OR 210 WILL EXPAND THE WRITE AND READ BUFFERS
751 SO THAT THE MINIMUM LENGTH RECORDS WILL BE 8 BYTES AND MAXIMUM
752 LENGTH RECORDS WILL BE 2048 BYTES.
753
754 9. PROGRAM DESCRIPTION
755
756 9.1 GENERAL DESCRIPTION
757
758 THE PROGRAM IS DESIGNED AROUND TWO MAIN SUBROUTINES "WRITE" AND
759 "READ" AND A SERIES OF MINOR SUBROUTINES FOR MANIPULATING UNIT
760 SELECTION, HANDLING ERROR STATISTICS, AND RECORD POSITIONING.
761 IF MORE THAN ONE UNIT IS SELECTED THE UNIT WITH THE LOWEST
762 NUMBER IS SELECTED FIRST AND WHEN THE SEQUENCE IS COMPLETED
763 THEN THE NEXT LOWEST UNIT NUMBER IS SELECTED UNTIL ALL UNITS HAVE
764 BEEN SELECTED. THIS PROCESS IS REPEATED UNTIL ALL UNITS REACH
765 END OF TAPE.
766
767 9.2 TEST 0
768
769 THIS IS A "WRITE ONLY" TEST. THE PROCEDURE IS TO WRITE 1 RECORD,
770 REPEAT FOR ALL UNITS, CONTINUE UNTIL EOT. WRITE MODE OF NONSTOP
771 (WMO=0) WILL NOT BE AN EFFECTIVE SELECTION FOR THIS TEST BECAUSE
772 THE WRITE ROUTINE IS EXITED AFTER EACH RECORD TO DETERMINE IF
773 ANY OTHER UNITS ARE SELECTED. READ MODE (RMO) HAS NO EFFECT ON
774 THIS TEST.
775
776 9.3 TEST 1
777
778 THIS IS A "WRITE ONLY" TEST SIMILAR TO TEST 0 EXCEPT A SEQUENCE
779 OF 256 RECORDS IS WRITTEN ON EACH UNIT BEFORE CHANGING TO THE
780 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

R0=%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
TRAP34

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

000034 012326

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000036
000040
000041
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000046
000052
000036

```

*****
MODIFIED DEC 16 1977

++
--
ACT11 AND XXDP HOOKS

$SVPC=. ;SAVE PC
.=40
DRIVE: .BYTE 0 ;DRIVE # FOR XXDP LOAD MEDIUM
;ASSEMBLE AS A 0

.=41
MEDIUM: .BYTE 0 ;XXDP LOAD MEDIUM
;ASSEMBLE AS A 0

.=42
.WORD 0 ;AUTO/MAN MODE INDICATOR
;ASSEMBLE AS A 0

.=46
.WORD $ENDAD ;SET TO $ENDAD IN .SEOP

.=52
.WORD 0 ;CHARACTERISTICS OF PROGRAM
;SET TO 0

.= $SVPC ;RESTORE PC
*****

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901
902
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904
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907
908
909 000036 000000
910 000040 000
911 000041 000
912 000042 000
913 000043 000
914
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916

```

; *****
;                               MODIFIED DEC 16 1977
;
; ++
;                               ACT11 AND XXDP MODE INDICATORS
; --
;
; AUTOM: .WORD 0 ; AUTOMATIC MODE INDICATOR
; ACT11M: .BYTE 0 ; ACT11 AUTO MODE INDICATOR
; XXDPM: .BYTE 0 ; XXDP AUTO MODE INDICATOR
; ADUMPM: .BYTE 0 ; ACT11 DUMP MODE INDICATOR
; XDUMPM: .BYTE 0 ; XXDP DUMP MODE INDICATOR
; *****

```


917					
918		000176		.=176	
919	000176	000000		SWREG: .WORD 0	;SOFTWARE SWITCH REGISTER
920		000200		.=200	
921	000200	000137	001354	JMP	AUTOST
922	000204	000137	002066	JMP	MEM4K
923	000210	000137	002112	JMP	MEM6K

924					
925		000500		STACK=500	
926		000500		.=500	
927	000500	172520		MTS: 172520	
928	000502	172522		MTC: 172522	
929	000504	172524		BC: 172524	
930	000506	172526		CA: 172526	
931	000510	177776		CC: 177776	
932	000512	177570		SWR: 177570	
933	000514	177560		TKS: 177560	
934	000516	177562		TKB: 177562	
935	000520	177564		TPS: 177564	
936	000522	177566		TPB: 177566	
937	000524	002000		MAXLEN: 1024.	;MAX RECORD LENGTH
938	000526	000004		MINLEN: 4.	;MIN RECORD LENGTH
939	000530	014074		WBUF: BUFFER	;STARTING ADDRESS OF WRITE BUFFER
940	000532	016074		RBUF: BUFFER+1024.	;STARTING ADDRESS OF READ BUFFER
941	000534	000224		MTV: 224	

942					
943					
944	000536	000000		;TEMPORARY STORAGE AREAS	
945	000540	000000		ATST: 0	
946	000542	000000		DRVSEL: 0	
947	000544	000000		STRLEN: 0	
948	007546	000000		LENGTH: 0	
949	000550	000000		MSBITS: 0	
950	000552	000000		SVRECR: 0	
951	000554	000000		COMAND: 0	
952	000556	000000		CDRVBT: 0	
953	000560	000000		CDRIVE: 0	
954	000562	000000		RDPASS: 0	
955	000564	000000		WRPASS: 0	
956	000566	000000		BLKINC: 0	
957	000570	000000		STATRD: 0	
958	000572	000000		WRCHK: 0	
959	000574	000000			
960	000576	000000			
961	007600	000000			
962	000602	000000			
963	000604	000000			
964	000606	000000			
965					
966	000610	000000		PERMBS: 0	
967	000612	000000		RECORD: 0	
968	000614	000000		WRRECR: 0	
969	000616	000000		LASRCR: 0	
970	000620	000000		RDERRS: 0	
971	000622	000000		DAERRS: 0	
972	000624	000000		NRREAD: 0	

```

973 000626 000000
974 000630 000000
975 000632 000000
976
977 000634 000654
978 000636 000720
979 000640 000764
980 000642 001030
981 000644 001074
982 000646 001140
983 000650 001204
984 000652 001250
985
986 000654 000000
987 000720 000000
988 000720 000000
989 000764 000764
990 000764 000000
991 001030 001030
992 001030 000000
993 001074 001074
994 001074 000000
995 001140 001140
996 001140 000000
997 001204 001204
998 001204 000000
999 001250 001250
1000 001250 000000
1001 001314 001314
1002 001314 000000
1003 001316 000000
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1005 001322 000000
1006 001324 000000
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1008 001326 000000
1009 001330 000000
1010 001332 000000
1011 001334 000000
1012 001336 000000
1013 001340 000000
1014 001342 000000
1015 001344 000000
1016 001346 000000
1017 001350 000000
1018 001352 000000
1019
1020 001354 012706 000500
1021 001360 104432
1022 001362 004737 012404
1023 001366 022737 000176 000512
1024 001374 001004
1025 001376 004737 012024
1026 001402 004737 012404
1027 001406 012737 177777 000536
1028 001414 012737 036025 001326

```

```

WRTLEN: 0
READLN: 0
MODES: 0
DRVADR: DOTAB
          D1TAB
          D2TAB
          D3TAB
          D4TAB
          D5TAB
          D6TAB
          D7TAB

```

```

DOTAB: 0
          =DOTAB+44
D1TAB: 0
          =D1TAB+44
D2TAB: 0
          =D2TAB+44
D3TAB: 0
          =D3TAB+44
D4TAB: 0
          =D4TAB+44
D5TAB: 0
          =D5TAB+44
D6TAB: 0
          =D6TAB+44
D7TAB: 0
          =D7TAB+44

```

```

CHARIN: 0
NUMTST: 0
PARAM: 0
TSTEX: 0
TEST: 0
TSTTBL: 0
          0
          0
          0
          0
          0
          0
          0
          0
          0
          0
          0
          0

```

```

AUTOST: MOV #STACK, SP
          SUSWR
          JSR PC, CKMODE
          CMP #SWREG, SWR
          BNE 1$
          JSR PC, CNTLU
          JSR PC, CKMODE
1$: MOV #-1, ATST
      MOV #36025, TSTTBL

```

```

; CHARACTER JUST INPUT
; NUMBER OF TEST
; TEST PARAMETERS
; POINTS TO TEST PARAMETERS TO BE EXECUTED
; CONTAINS CURRENT TEST NUMBER

; TEST TABLE
; UP TO 10 TESTS CAN BE SELECTED TO
; BE R/LN IN CONSECUTIVE ORDER

```

```

; SETUP THE SP
; CHECK FOR HARDWARE SWICH REG
; CHECK FOR MODE OF OPERATION ++ C.W

; ALLOW SWREG TO BE CHANGED
; CHECK FOR MODE OF OPERATION

; SETUP TEST PARAMETERS

```

```

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

```

1085 001724 104426
1086 001726 005737 000546
1087 001732 001012
1088 001734 013701 000042
1089 001740 001405
1090 001742 012702 013311
1091 001746 104404
1092 001750 000137 003246
1093 001754 000137 002140
1094
1095
1096 001760 012702 013266
1097 001764 104404
1098 001766 105037 014074
1099 001772 012701 014074
1100 001776 005000
1101 002000 012702 000200
1102
1103
1104 002004 105021
1105 002006 112721 000040
1106 002012 030237 000546
1107 002016 001405
1108 002020 110011
1109 002022 152721 000060
1110 002026 112721 000054
1111 002032 000241
1112 002034 006002
1113 002036 005200
1114 002040 020027 000007
1115 002044 003762
1116 002046 105011
1117 002050 112721 000100
1118 002054 012702 014074
1119 002060 104404
1120 002062 000137 003056
1121
1122 002066 012737 000004 000526
1123 002074 012737 002000 000524
1124 002102 012737 016074 000532
1125 002110 000411
1126
1127 002112 012737 000010 000526
1128 002120 012737 004000 000524
1129 002126 012737 020074 000532
1130 002134 005037 000536
1131 002140 012706 000500
1132 002144 104432
1133 002146 022737 000176 000512
1134 002154 001002
1135 002156 004737 012024
1136 002162 012737 123456 007374
1137 002170 012737 176543 007376
1138 002176 012702 012615
1139 002202 104404
1140 002204 005037 000546

```

```

DECPRT
3$: TST MSBITS ;PRINT MAX. LENGTH
    BNE 2$ ;WAS ANY DRIVES SELECTED?
    MOV 2#42,R1 ;BR IF YES
    BEQ 1$ ;IS THERE A MONITOR?
    MOV #MSG10C,R2 ;BRANCH IF NO
    TOP ;INDICATE THAT NO DRIVES ARE
    JMP 2#SENDAD ;AVAILABLE!!
1$: JMP START1 ;RETURN TO THE MONITOR
    ;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)+
    MOVB #'',(R1)+ ;SET EOM
    BIT R2,MSBITS ;SPACE
    BEQ $ZEROS ;DID THIS DRIVE NUMBER EXIST?
    MOVB R0,(R1) ;BR IF NO
    BISB #'0,(R1)+ ;YES--SAVE THE NUMBER
    MOVB #'',(R1)+ ;MAKE IT ASCII
    CLC ;COMMA
    ROR R2 ;POSITION DRIVE BIT
    INC R0 ;UPDATE DRIVE NUMBER
    CMP R0,#7 ;LAST
    BLE LOOPER ;BR IF NO
    CLRB (R1) ;SET EOM
    MOVB #'2,-(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 ;PRINT 'SELECT DRIVES'
    CLR MSBITS ;CLEAR SELECTED DRIVE INDICATOR

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1141 002210 104400 SELDRV: WAITKY
1142 002212 122737 000015 001314 CMPB #15,CHARIN ;WAS CHARACTER A CARRIAGE RETURN?
1143 002220 001010 BNE SELD1 ;NO
1144 002222 005737 000546 TST MSBITS ;YES, WERE ANY DRIVES SELECTED
1145 002226 001744 BEQ START1 ;NO
1146 002230 005737 000536 TST ATST ;YES--IS AUTO SWITCH SET?
1147 002234 001454 BEQ SELTST ;NO--GO SELECT TESTS
1148 002236 000137 003056 JMP EXECUT ;YES--GO START TESTING
1149 002242 122737 000070 001314 SELD1: CMPB #70,CHARIN ;IS CHARACTER A VALID NUMBER 0-7?
1150 002250 003404 BLE SELD2 ;NO, PRINT "?"
1151 002252 122737 000060 001314 CMPB #60,CHARIN ;IS CHARACTER A VALID NUMBER 0-7?
1152 002260 003407 BLE VAL1D ;YES
1153 002262 105777 176232 SELD2: TSTB #TPS
1154 002266 100375 BPL #-4
1155 002270 012777 000077 176224 MOV #'?,#TPB ;PRINT '?'
1156 002276 000424 BR VAL4
1157 ;HAVE VALID DRIVE NUMBER
1158 002300 142737 000270 001314 VALID: BICB #270,CHARIN ;MASK OUT NUMBER
1159 002306 105137 001314 COMB CHARIN
1160 002312 012700 000200 MOV #200,R0 ;INITIALIZE BIT POSITION FOR DRIVE 0
1161
1162
1163 002316 105237 001314 VAL1: INCB CHARIN ;+1 TO DRIVE SELECT
1164 002322 001402 BEQ VAL2 ;HAVE DRIVE OF EQUAL TO ZERO
1165 002324 006200 RO ;MOVE BIT POSITION TO NEXT DRIVE
1166 002326 000773 BR VAL1 ;TRY AGAIN
1167 002330 130037 000546 VAL2: BITB RO,MSBITS ;COMPARE DRIVE SELECT WITH PREVIOUS SELECTED
1168 002334 001003 BNE VAL3 ;DRIVE WASN'T PREVIOUSLY SET, SO SET IT NOW.
1169 002336 150037 000546 BISB RO,MSBITS
1170 002342 000402 BR VAL4 ;DRIVE WAS SET, CLEAR IT.
1171 002344 140037 000546 VAL3: BICB RO,MSBITS
1172 002350 105777 176144 VAL4: TSTB #TPS
1173 002354 100375 BPL #-4
1174 002356 012777 000054 176136 MOV #'?,#TPB ;PRINT COMMA
1175 002364 000711 BR SELDRV ;RETURN TO WAIT FOR NEXT KEY
1176 ;HAVE DRIVES SELECTED-NOW GET TEST SELECTION
1177 002366 012702 012636 SELTST: MOV #MSG2,R2
1178 002372 104404 TOP ;PRINT 'SELECT TESTS'
1179 002374 005037 001316 CLR NUMTST ;CLEAR TEST NUMBERS SELECTED
1180 002400 012700 001326 MOV #TSTTAB,R0 ;INITIALIZE TEST TABLE POINTER
1181 002404 104400 SELT1: WAITKY
1182 002406 122737 000015 001314 CMPB #15,CHARIN ;WAS CHARACTER A CARRIAGE RETURN?
1183 002414 001005 BNE SELT2 ;WERE ANY TESTS SELECTED?
1184 002416 005737 001316 TST NUMTST ;NO
1185 002422 001412 BEQ SELT3 ;YES, EXECUTE TESTS
1186 002424 000137 003056 JMP EXECUT ;IS CHARACTER A VALID NUMBER 0-5
1187 002430 122737 000066 001314 SELT2: CMPB #66,CHARIN ;NO
1188 002436 003404 BLE SELT3 ;IS CHARACTER A VALID NUMBER 0-5
1189 002440 122737 000060 001314 CMPB #60,CHARIN ;YES
1190 002446 003404 BLE SELPAT
1191 002450 012702 012610 SELT3: MOV #MSG0,R2
1192 002454 104404 TOP ;RETURN TO WAIT FOR TEST SELECT
1193 002456 000752 BR SELT1
1194 002460 013704 001314 SELPAT: MOV CHARIN,R4 ;ROTATE TEST NUMBER INTO POSITION
1195 002464 000304 R4
1196 002466 006104 ROL R4

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1197 002470 006104 ROL R4
1198 002472 006104 ROL R4
1199 002474 006104 ROL R4
1200 002476 042704 107777 BIC #107777,R4
1201 002502 104430 SP3
1202 ;TYPE 3 SPACES
1203 ;HAVE VALID TEST SELECTED, NOW GET SELECTED PATTERN
1204 002504 104400 WAITKY
1205 002506 122737 000070 001314 CMPB #70,CHARIN ;IS CHARACTER A VALID NUMBER 0-7
1206 002514 003755 BLE SELT3 ;NO
1207 002516 122737 000057 001314 CMPB #57,CHARIN ;IS CHARACTER A VALID NUMBER 0-7
1208 002524 002351 BGE SELT3 ;NO
1209 002526 000337 001314 SWAB CHARIN ;MOVE PATTERN SELECT INTO POSITION
1210 002532 006137 001314 ROL CHARIN
1211 002536 042737 170777 001314 BIC #170777,CHARIN
1212 002544 053704 001314 BIS CHARIN,R4 ;COMBINE PATTERN WITH TEST
1213 SP3
1214 ;WAIT FOR RECORD LENGTH SEQUENCES SELECTION
1215 002552 104400 SELRLS: WAITKY
1216 002554 122737 000060 001314 CMPB #60,CHARIN ;IS CHARACTER=0
1217 002562 001424 BEQ SELR3 ;YES, RLS=MIN
1218 002564 122737 000061 001314 CMPB #61,CHARIN ;IS CHARACTER=1
1219 002572 001003 BNE SELR1
1220 002574 052704 000020 BIS #20,R4 ;SET RLS=MAX
1221 002600 000415 BR SELR3
1222 002602 122737 000062 001314 SELR1: CMPB #62,CHARIN ;IS CHARACTER=2
1223 002610 001003 BNE SELR2
1224 002612 052704 000040 BIS #40,R4 ;SET RLS=MIN-MAX
1225 002616 000406 BR SELR3
1226 002620 122737 000063 001314 SELR2: CMPB #63,CHARIN ;IS CHARACTER=3
1227 002626 001310 BNE SELT3
1228 002630 052704 000060 BIS #60,R4 ;SET RLS=MAX-MIN
1229 002634 104430 SELR3: SP3
1230 ;WAIT FOR WRITE MODE SELECTION
1231 002636 104400 WAITKY
1232 002640 122737 000060 001314 CMPB #60,CHARIN
1233 002646 001415 BEQ SELW2 ;SET WMO=NONSTOP
1234 002650 122737 000061 001314 CMPB #61,CHARIN
1235 002656 001003 BNE SELW1
1236 002660 052704 000004 BIS #4,R4 ;SET WMO=START-STOP
1237 002664 000406 BR SELW2
1238 002666 122737 000062 001314 SELW1: CMPB #62,CHARIN
1239 002674 001265 BNE SELT3
1240 002676 052704 000010 BIS #10,R4 ;SET WMO=RANDOM
1241 002702 104430 SELW2: SP3
1242 ;WAIT FOR READ MODE SELECTION
1243 002704 104400 WAITKY
1244 002706 122737 000060 001314 CMPB #60,CHARIN
1245 002714 001415 BEQ SELRM2 ;SET RMO=NONSTOP
1246 002716 122737 000061 001314 CMPB #61,CHARIN
1247 002724 001003 BNE SELRM1
1248 002726 052704 000001 BIS #1,R4 ;SET RMO=START-STOP
1249 002732 000406 BR SELRM2
1250 002734 122737 000062 001314 SELRM1: CMPB #62,CHARIN
1251 002742 001242 BNE SELT3
1252 002744 052704 000002 BIS #2,R4 ;SET RMO=RANDOM

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1253 C02750 104430 SELRM2: SP3
1254
1255 ;HAVE ALL PARAMETERS
1256 002752 012702 012713 MOV #MSG6,R2
1257 002756 104404 TOP ;PRINT "OK"
1258 002760 104400 WAITKY ;WAIT FOR CARRIAGE RETURN
1259 002762 122737 000015 001314 CMPB #15,CHARIN
1260 002770 001402 BFB .+6
1261 002772 000137 002450 JMP SELT3
1262 002776 105777 175516 TSTB @TPS
1263 003002 100375 BPL .-4
1264 003004 012777 000012 175510 MOV #12,@TPB
1265 003012 105777 175502 TSTB @TPS
1266 003016 100375 BPL .-4
1267 003020 012777 000040 175474 MOV #40,@TPB
1268 003026 010420 MOV R4,(0)+
1269 003030 005237 001316 INC NUMTST ;+1 TO TEST COUNT
1270 003034 022737 000012 001316 CMP #10,NUMTST ;EQUAL TO TEN YET
1271 003042 001402 BEQ SELOK1 ;YES
1272 003044 000137 002404 JMP SELT1 ;NO, ACCEPT NEXT SET
1273 003050 012702 012666 SELOK1: MOV #MSG5,R2
1274 003054 104404 TOP
1275
1276 ;EXECUTE SELECTED TEST
1277 003056 005037 000632 EXECUT: CLR MODES ;INITIALIZE MODES
1278 003062 012737 001326 001322 MOV #TSTTBL,TSTEX
1279 003070 017737 176226 001320 EXEC: MOV @TSTEX,PARAM ;GET TEST PARAMETERS
1280 003076 013700 001320 EXEC1: MOV PARAM,R0
1281 003102 042700 007777 BIC #7777,R0
1282 003106 010037 001324 MOV R0,TEST
1283 003112 001475 BEQ TEST0
1284 003114 022700 010000 CMP #10000,R0
1285 003120 001516 BEQ TEST1
1286 003122 022700 020000 CMP #20000,R0
1287 003126 001537 BEQ TEST2
1288 003130 022700 030000 CMP #30000,R0
1289 003134 001002 BNE IS
1290 003136 000137 003544 JMP TEST3
1291 003142 022700 040000 IS: CMP #40000,R0
1292 003146 001402 BEQ .+6
1293 003150 000137 004204 JMP TEST5
1294 003154 000137 003662 JMP TEST4
1295
1296 ;RETURN HERE AFTER COMPLETION OF TEST
1297 003162 012702 014020 DONE: CKSWR ;CHECK FOR CNTL G
1298 003166 104404 MOV #MSG26,R2
1299 003170 032777 000001 175314 TOP ;IS SW 0=1 TO REPEAT TEST WITH ALL PATTERNS
1300 003176 001413 BEQ DONE1 ;NO
1301 003200 013700 001320 MOV PARAM,R0
1302 003204 042700 170777 BIC #170777,R0
1303 003210 022700 007000 CMP #7000,R0 ;REACHED PATTERN ?
1304 003214 001404 BEQ DONE1 ;YES
1305 003216 062737 001000 001320 ADD #1000,PARAM ;NO +1 TO PATTERN
1306 003224 000724 BR EXEC1 ;REPEAT TEST
1307 003226 005337 001316 DONE1: DEC NUMTST
1308 003232 001021 BNE DOAGN

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1309 003234 013701 000042      MOV      J#42,R1
1310 003240 001002      BNE      SENDAD
1311 003242 000000      HALT
1312 003244 104434      CKSWR
1313 003246 004711      SENDAD: JSR      PC,(R1)
1314 003250 000240      NOP
1315 003252 000240      NOP
1316 003254 000240      NOP
1317 003256 105737 000040      TSTB
1318 003262 001405      BEQ      DOAGN
1319 003264 012702 014025      MOV      #MSG27,R2
1320 003270 104404      TOP
1321 003272 000137 001354      JMP      AUTOST
1322 003276 062737 000002 001322 DOAGN: ADD      #2,TSTEX
1323 003304 000671      BR       EXEC
1324
1325
1326
1327 003306 052737 000002 000632      ;TEST0
1328 003314 104420      ;WRITE ONE RECORD, CHANGE DRIVES, GO TO EOT
1329 003316 104416      ;TEST0: BIS      #2,MODES
1330 003320 104410      ;CLRAL
1331 003322 104414      ;GENPAT
1332 003324 032737 000040 000632      TO:      RSFDRV
1333 003332 001002      TOA:     MVCTRS
1334 003334 104402      ;BIT
1335 003336 104406      ;BNE
1336
1337 003340 104422      ;TOB:
1338 003342 000767      ;CHGDRV
1339 003344 004737 004776      ;BR
1340 003350 000763      ;JSR
1341 003352 000137 003160      ;PC,ALLEOT
1342
1343
1344 003356 052737 000001 000632      ;TEST1
1345 003364 104420      ;WRITE RECORD LENGTH SEQUENCE, GO TO NEXT DRIVE, CONTINUE TO EOT ON ALL DRIVES.
1346 003366 104416      ;TEST1: BIS      #1,MODES
1347 003370 104410      ;CLRAL
1348 003372 104414      ;GENPAT
1349 003374 032737 000040 000632      T1:      RSFDRV
1350 003402 001002      T1A:    MVCTRS
1351 003404 104402      ;BIT
1352 003406 104406      ;BNE
1353 003410 104422      ;T1B:
1354 003412 000767      ;CHGDRV
1355 003414 004737 004776      ;BR
1356 003420 000763      ;JSR
1357 003422 000137 003160      ;PC,ALLEOT
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1362 003426 052737 000005 000632      ;TEST2
1363 003434 104420      ;WRITE A RECORD LENGTH SEQUENCE, CHANGE DRIVES, CHANGE DRIVES, CONTINUE TO EOT ON ALL DRIVES
1364 003436 104416      ;BACKSPACE, CHANGE DRIVES, READ,
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1365	003440	104410			T2:	RSFDRV		; SET DRIVE SELECTION TO LOWEST NUMBER
1366	003442	104414			T2A:	MVCTRS		; RESTORE DRIVE COUNTERS
1367	003444	032737	000040	000632		#40, MODES		; IS THIS DRIVE AT EOT?
1368	003452	001002				T2B		; YES, SKIP WRITE
1369	003454	104402				WRITIT		; WRITE
1370	003456	104406				SVCTRS		; SAVE DRIVE COUNTERS
1371	003460	104422			T2B:	CHGDRV		; ANYMORE DRIVES SELECTED?
1372	003462	000767				T2A		; YES
1373	003464	104414			T2C:	MVCTRS		; RESTORE DRIVE COUNTERS
1374	003466	032737	000020	000632		#20, MODES		; IS THIS READ AT EOT?
1375	003474	001003				T2D		; YES, SKIP BACKSPACE
1376	003476	004737	011072			JSR		; BACKSPACE
1377	003502	104406				SVCTRS		; SAVE DRIVE COUNTERS
1378	003504	104422			T2D:	CHGDRV		; ANY MORE DRIVES SELECTED?
1379	003506	000766				T2C		; YES
1380	003510	104414			T2E:	MVCTRS		; RESTORE DRIVE COUNTERS
1381	003512	032737	000020	000632		#20, MODES		; IS THIS READ AT EOT
1382	003520	001001				T2F		; YES, SKIP READ
1383	003522	104424				READIT		; READ
1384	003524	104406			T2F:	SVCTRS		; SAVE DRIVE COUNTERS
1385	003526	104422				CHGDRV		; ANYMORE DRIVES SELECTED?
1386	003530	000767				T2E		; YES
1387	003532	004737	004776			JSR		; ARE ALL DRIVES AT EOT?
1388	003536	000740				T2		; NO
1389	003540	000137	003160			JMP		; DONE
1390								; YES EXIT
1391								
1392								
1393	003544	052737	000006	000632				; TEST3
1394	003552	104420				WRITE		; ONE RECORD, CHANGE DRIVES, BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES
1395	003554	104416			TEST3:	BIS		; #6, MODES
1396	003556	104410				CLRALL		; EXIT WRITE EVERY RECORD, DO READ PASS
1397	003560	104414				GENPAT		; CLEAR ERROR COUNTERS AND REWIND
1398	003562	032737	000040	000632		RSFDRV		; GENERATE PATTERN
1399	003570	001002			T3:	MVCTRS		; SET DRIVE SELECTION TO LOWEST NUMBER
1400	003572	104402			T3A:	#40, MODES		; RESTORE DRIVE COUNTERS
1401	003574	104406				T3B		; IS THIS DRIVE AT EOT?
1402	003576	104422				WRITIT		; YES, SKIP WRITE
1403	003600	000767				SVCTRS		; WRITE
1404					T3B:	CHGDRV		; SAVE DRIVE COUNTERS
1405	003602	104414				T3A		; ANY MORE DRIVES SELECTED
1406	003604	032737	000020	000632		T3C		; YES
1407	003612	001002				MVCTRS		; RESTORE DRIVE COUNTERS
1408	003614	004737	011072			#20, MODES		; IS THIS DRIVE AT EOT
1409	003620	104406				T3D		; YES, SKIP BACKSPACE
1410	003622	104422				JSR		; BACKSPACE
1411	003624	000766			T3D:	SVCTRS		; SAVE DRIVE COUNTERS
1412	003626	104414				CHGDRV		; ANY MORE DRIVES SELECTED?
1413	003630	032737	000020	000632		T3E:		; GO
1414	003636	001001				MVCTRS		; RESTORE DRIVE COUNTERS
1415	003640	104424				#20, MODES		; IS THIS DRIVE AT EOT?
1416	003642	104406				T3F		; YES, SKIP READ
1417	003644	104422				READIT		; READ
1418	003646	000767			T3F:	SVCTRS		; SAVE DRIVE COUNTERS
1419	003650	004737	004776			CHGDRV		; ANY MORE DRIVES SELECTED
1420	003654	000740				T3E		; YES
						JSR		; ARE ALL DRIVES AT EOT?
						T3		; NO

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1421 003656 000137 003160          JMP      DONE          ;YES, EXIT
1422
1423
1424          ;TEST4
1425          ;WRITE RECORD, CHANGE DRIVES, REPEAT FOR RECORD LENGTH SEQUENCE
1426          ;READ RECORD, CHANGE DRIVES, REPEAT FOR RLS
1427 003662 052737 000006 000632 TEST4: BIS      #6,MODES      ;EXIT WRITE EVERY RECORD, DO READ PASS
1428 003670 104416          GENFAT      ;GENERATE PATTERN
1429 003672 032777 000014 175422          BIT      #14,@TSTEX
1430 003700 001006          T4
1431 003702 042737 000007 000632          BNE
1432 003710 052737 000005 000632          BIC      #7,MODES
1433 003716 104420          BIS      #5,MODES      ;EXIT WRITE AFTER RLS, DO READ PASS
1434 003720 104410          T4:         CLEAR      ;CLEAR ERROR COUNTERS AND REWIND
1435 003722 104414          T4A:        RSFDRV      ;SET DRIVE SELECTION TO LOWEST NUMBER
1436 003724 013737 000612 000614          T4B:        MVCTRS      ;RESTORE DRIVE COUNTERS
1437 003732 104406          MOV      RECORD,WRRECR ;SAVE RECORD
1438 003734 104422          SVCTRS      ;SAVE DRIVE COUNTERS
1439 003736 000771          CHGDRV      ;ANYMORE DRIVES SELECTED?
1440 003740 042737 000010 000632          BR      T4B          YES
1441 003746 104410          T4C:        BIC      #10,MODES ;CLEAR RLS END
1442 003752 032737 000040 000632          RSFDRV      ;SET DRIVE SELECTION TO LOWEST NUMBER
1443 003760 001010          T4D:        MVCTRS      ;RESTORE DRIVE COUNTERS
1444 003762 013737 000614 000550          BIT      #40,MODES ;IS DRIVE AT EOT
1445 003770 104402          BNE      T4E          YES SKIP WRITE
1446 003772 013737 000550 000614          MOV      WRRECR,SVRECR ;SAVE START OF RLS
1447 004000 104406          WRITIT      WRITE
1448 004002 104422          T4E:        SVRECR,WRRECR ;RESTORE START OF RLS
1449 004004 000761          CHGDRV      ;SAVE DRIVE COUNTERS
1450 004006 032737 000010 000632          BR      T4D          ;ANYMORE DRIVES SELECTED?
1451 004014 001007          BIT      T4D          YES
1452 004016 104414          T4F:        #10,MODES ;ARE WE AT END OF RLS
1453 004020 032737 000040 000632          BNE      T4G          YES
1454 004026 001747          MVCTRS      ;RESTORE DRIVE COUNTERS
1455 004030 104422          BEQ      T4C          ;ARE WE AT EOT?
1456 004032 000771          CHGDRV      NO
1457 004034 104410          BR      T4C          ;ANYMORE DRIVES SELECTED?
1458 004036 104414          T4G:        T4F          YES
1459 004040 032737 000020 000632          RSFDRV      ;SET DRIVE SELECTION TO LOWEST NUMBER
1460 004046 001002          T4H:        MVCTRS      ;RESTORE DRIVE COUNTERS
1461 004050 004737 011072          BIT      #20,MODES ;IS THIS DRIVE AT EOT?
1462 004054 104406          BNE      T4J          YES, SKIP BACKSPACE
1463 004056 104422          JSR      PC,GOBKWD ;BACKSPACE
1464 004060 000766          T4J:        SVCTRS      ;SAVE DRIVE COUNTERS
1465 004062 104410          CHGDRV      ;ANY MORE DRIVES SELECTED?
1466 004064 104414          BR      T4H          YES
1467 004066 032737 000020 000632          T4K:        RSFDRV      ;SET DRIVE SELECTION TO LOWEST NUMBER
1468 004074 001025          T4L:        MVCTRS      ;RESTORE DRIVE COUNTERS
1469 004076 023737 000616 000612          BIT      #20,MODES ;IS THIS READ AT EOT?
1470 004104 001421          BNE      T4N          YES SKIP READ
1471 004106 013737 000616 000550          CMP      LASRCR,RECORD ;HAVE WE READ LAST RECORD WRITTEN?
1472 004114 032737 000003 001320          BEQ      T4N          YES
1473 004122 001405          MOV      LASRCR,SVRECR ;SAVE LAST RECORD
1474 004124 013737 000612 000616          BIT      #3,PARAM ;IS READ MODE NONSTOP?
1475 004132 005237 000616          BEQ      T4M          YES
1476 004136 104424          MOV      RECORD,LASRCR ;+1 TO LAST RECORD WRITTEN
1477          INC      LASRCR ;READ
1478          T4M:        READIT

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1477	004140	013737	000550	000616		MOV	SVRECR,LASRCR	: RESTORE LAST RECORD WRITTEN
1478	004146	104406					SVCTRS	: SAVE DRIVE COUNTERS
1479	004150	104422			T4N:		CHGDRV	: ANYMORE DRIVES SELECTED?
1480	004152	000744				BR	T4L	: YES
1481	004154	104414			T4P:		MVCTRS	: RESTORE DRIVE COUNTERS
1482	004156	023737	000616	000612		CMP	LASRCR,RECORD	: ARE WE AT END OF RLS?
1483	004164	001336				BNE	T4K	: NO
1484	004166	104422					CHGDRV	: ANYMORE DRIVES SELECTED?
1485	004170	000771				BR	T4P	: YES
1486	004172	004737	004776			JSR	PC,ALLEOT	: ARE ALL DRIVES AT EOT?
1487	004176	000650				BR	T4A	: NO
1488	004200	000137	003160			JMP	DONE	: YES,EXIT
1489								
1490								
1491								
1492								
1493	004204	052737	000002	000632				
1494	004212	104420						
1495	004214	104416						
1496	004216	012737	177777	004464	T5:	MOV	#-1,TSFLAG	: CLEAR ERROR COUNTERS AND REWIND
1497	004224	104402					WRITIT	: GENERATE PATTERN
1498	004226	032737	000010	000632		BIT	#10,MODES	: ENABLE EXIT FROM WRITE ROUTINE
1499	004234	001402				BEQ	T5A	: ENTER WRITE ONLY TO INITIALIZE RECORD SEQUENCE
1500	004236	004737	005616			JSR	PC,TESINC	: ARE WE AT END OF RLS?
1501	004242	013737	000612	004466	T5A:	MOV	RECORD,TSINC	: YES
1502	004250	005037	000612			CLR	RECORD	: SEE IF RECORD LENGTH SHOULD BE CHANGED
1503	004254	052737	000010	000632	T5B:	BIS	#10,MODES	
1504	004262	104410					RSFDRV	: INDICATE AT START OF RLS
1505	004264	104414			T5C:		MVCTRS	: SET DRIVE SELECTION TO LOWEST DRIVE NUMBER
1506	004266	032737	000020	000632		BIT	#20,MODES	: RESTORE DRIVE COUNTERS
1507	004274	001007				BNE	T5D	: IS THIS DRIVE AT EOT?
1508	004276	013737	000612	000616		MOV	RECORD,LASRCR	: YES
1509	004304	063737	004466	000616		ADD	TSINC,LASRCR	: CURRENT RECORD + SEQUENCE LENGTH
1510	004312	104406					SVCTRS	: SAVE DRIVE COUNTERS
1511	004314	104422			T5D:		CHGDRV	: ANYMORE DRIVES?
1512	004316	000762				BR	T5C	: YES
1513	004320	104410					RSFDRV	: SET DRIVE SELECTION TO LOWEST NUMBER
1514	004322	104414			T5E:		MVCTRS	: RESTORE DRIVE COUNTERS
1515	004324	032737	000020	000632		BIT	#20,MODES	: IS THIS DRIVE AT EOT?
1516	004332	001021				BNE	T5G	: YES
1517	004334	013737	000616	000550		MOV	LASRCR,SVRECR	: SAVE END OF RLS RECORDS
1518	004342	032737	000003	001320		BIT	#3,PARAM	: IS READ MODE NONSTOP
1519	004350	001405				BEQ	T5F	: YES GO TO END RLS
1520	004352	013737	000612	000616		MOV	RECORD,LASRCR	: NEXT TO BE READ
1521	004360	005237	000616			INC	LASRCR	: +1 EXIT READ AFTER ONE RECORD
1522	004364	104424			T5F:		READIT	: READ
1523	004366	013737	000550	000616		MOV	SVRECR,LASRCR	: RESTORE END RECORD
1524	004374	104406					SVCTRS	: SAVE DRIVE COUNTERS
1525	004376	104422			T5G:		CHGDRV	: ANY MORE DRIVES?
1526	004400	000750				BR	T5E	: YES
1527	004402	004737	004776			JSR	PC,ALLEOT	: ALL AT EOT?
1528	004406	000402				BR	T5H	: NO
1529	004410	000137	003160			JMP	DONE	: YES EXIT
1530	004414	104410			T5H:		RSFDRV	: SET DRIVE SELECTION TO LOWEST NUMBER
1531	004416	104414			T5J:		MVCTRS	: RESTORE DRIVE COUNTERS
1532	004420	023737	000612	000616		CMP	RECORD,LASRCR	: ARE WE AT END OF RLS?

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1533 004426 001003          BNE      TSK          ;NO
1534 004430 042737 000010 000632  BIC      #10,MODES    ;YES
1535 004436 104422          TSK:     CHGDRV        ;ANYMORE DRIVES SELECTED?
1536 004440 000766          BR       TSJ          ;YES
1537 004442 032737 000010 000632  BIT      #10,MODES    ;AT END OF RLS?
1538 004450 001324          BNE      TSE          ;NO
1539 004452 004737 004776      JSR      PC,ALLEOT    ;ALL DRIVES AT EOT?
1540 004456 000657          BR       TS          ;NO
1541 004460 000137 003160      JMP      DONE         ;YES, EXIT
1542 004464 000000          TSFLAG: 0
1543 004466 000000          TSINC:  0

;SAVE DRIVE RECORD AND ERROR COUNTERS
1545
1546 004470 004737 004524      SVCTR:  JSR      PC,CTRDEX
1547 004474 012021          SVC1:   MOV      (0)+(1)+
1548 004476 022700 000634      CMP      #DRVADR,RO
1549 004502 001374          BNE      SVC1
1550 004504 000207          RTS      PC

;RESET DRIVE COUNTERS BACK INTO PROGRAM
1551
1552 004506 004737 004524      MVCTR:  JSR      PC,CTRDEX
1553 004512 012120          MV1:   MOV      (1)+(0)+
1554 004514 022700 000634      CMP      #DRVADR,RO
1555 004520 001374          BNE      MV1
1556 004522 000207          RTS      PC

;SET UP POINTERS FOR MOVE AND SAVE COUNTERS
1557
1558 004524 012700 000570      CTRDEX: MOV      #WRCHK,RO
1559 004530 012701 000634      MOV      #DRVADR,R1
1560 004534 063701 000556      ADD      CDRIVE,R1
1561 004540 063701 000556      ADD      CDRIVE,R1
1562 004544 011101          MOV      @R1,R1
1563 004546 000207          RTS      PC

;CLEAR ALL DRIVE COUNTERS
1564
1565 004550 104410          CLRAL:  RSFDRV
1566 004552 004737 004740      CLR1:  JSR      PC,REWIND
1567 004556 004737 005104      JSR      PC,CLRTBL
1568 004562 104406          SVCTR:  SVCTRS
1569 004564 104422          CHGDRV
1570 004566 000771          CLR1
1571 004570 052737 000010 000632  BR       #10,MODES    ;AT END OF RLS
1572 004576 005037 004464      CLR      TSFLAG
1573 004602 000207          RTS      PC

;RESET DRIVE SELECTION TO LOWEST NUMBER
1574
1575 004604 005037 000556      RSFDR:  CLR      CDRIVE ;START WITH DRIVE 0
1576 004610 012737 000200 000554      MOV      #200,CDRVBT ;BIT FOR DRIVE 0
1577 004616 033737 000546 000554      RSF1:  BIT      MSBITS,CDRVBT ;IS DRIVE SELECTED?
1578 004624 001006          BNE      RSF2        ;YES
1579 004626 005237 000556          INC      CDRIVE      ;NO + 1 TO DRIVE
1580 004632 000241          CLC
1581 004634 006037 000554      ROR      CDRVBT      ;ROTATE DRIVE BIT
1582 004640 000766          BR       RSF1        ;REPEAT
1583 004642 013737 000556 000552      RSF2:  MOV      CDRIVE,COMAND
1584 004650 000337 000552          SWAB    COMAND
1585 004654 052737 060000 000552      BIS      #6000,COMAND ;800 BPI, 9 TRACK
1586 004662 032777 001000 173622      BIT      #1000,ASWR  ;TEST PARITY SELECTED
1587 004670 001403          BEQ     .+10         ;ODD
1588 004672 052737 004000 000552      BIS      #4000,COMAND ;EVEN
  
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1589 004700 000207          RTS      PC
1590
1591          ;SELECT NEXT DRIVE IN SEQUENCE
1592          ;+1 WORD TO EXIT ADDRESS IF LAST DRIVE TESTED
1593 004702 005237 000556  CHGDR:  INC      CDRIVE      ;+1 TO DRIVE NUMBER
1594 004706 000241          CLC
1595 004710 006037 000554  ROR      CDRVBT      ;MOVE MASK BIT OVER 1 PLACE
1596 004714 001004          BNE      CHG1        ;BRANCH IF MORE DRIVES SELECTED
1597 004716 104410          RSFDRV      ;RESET DRIVE SELECT TO LOWEST NUMBER
1598 004720 062716 000002          ADD      #2, @SP      ;+ 2 TO SKIP OVER FIRST EXIT
1599 004724 000207          RTS      PC
1600 004726 033737 000554 000546  CHG1:  BIT      CDRVBT,MSBITS
1601 004734 001762          BEQ      CHGDR
1602 004736 000741          BR       RSF2
1603
1604          ;REWIND DRIVE TO BOT
1605 004740 105777 173536  REWIND: TSTB     @MTC
1606 004744 100375          BPL      -4          ;WAIT FOR CONTROL UNIT
1607 004746 013777 000552 173526  MOV      COMAND,@MTC ;SELECT DRIVE
1608 004754 006077 173520  ROR      @MTC
1609 004760 103375          BCC      -4          ;WAIT FOR TU READY
1610 004762 052777 000016 173512  BIS      #16,@MTC    ;REWIND
1611 004770 004737 005130  JSR      PC,GOWAIT
1612 004774 000207          RTS      PC          ;EXIT
1613
1614          ;ARE ALL DRIVES AT END OF TAPE
1615 004776 104410  ALLEOT:  RSFDRV
1616 005000 104414  ALL1:   MVCTRS
1617 005002 032737 000060 000632  BIT      #60,MODES  ;AT EOT?
1618 005010 001403          BEQ      ALLEOS     ;NO
1619 005012 104422          BR       CHGDRV     ;DONE ALL DRIVES?
1620 005014 000771          BR       ALL1       ;NO
1621 005016 000427          BR       ALL3
1622 005020 032777 000400 173464  ALLEOS: BIT      #400,@SWR ;TEST SWITCH 8 TO EXIT AT END OF SEQUENCE
1623 005026 001425          BEQ      ALL2       ;NO, GO TO EOT
1624 005030 032737 000010 000632  BIT      #10,MODES  ;AT END OF SEQUENCE
1625 005036 001421          BEQ      ALL2       ;NO, EXIT, DON'T DUMP ERROR COUNTERS
1626          ;DUMP ERROR COUNTERS ON ALL DRIVES
1627 005040 104410  CTRDMP: RSFDRV
1628 005042 104414          MVCTRS
1629 005044 005737 004464          TST      TSFLAG
1630 005050 001006          BNE      CTRD1      ;DUMP READ ONLY
1631 005052 004737 006154          JSR      PC,ENDT1
1632 005056 032737 000004 000632  BIT      #4,MODES   ;READ PASS SELECTED?
1633 005064 001402          BEQ      CDMEND     ;NO
1634 005066 004737 010326  CTRD1:  JSR      PC,RNDTP1
1635 005072 104422  CDMEND: CHGDRV      ;DONE ALL DRIVES
1636 005074 000762          BR       CTRDMP+2   ;NO
1637 005076 062716 000002          ALL3:   ADD      #2,(6) ;INCREMENT RETURN POINT
1638 005102 000207          ALL2:   RTS      PC
1639
1640          ;CLEAR READ AND WRITE TABLES
1641 005104 012700 000570  CLRTBL: MOV      #WRCHK,RO
1642 005110 005020  CLRT1:  CLR      (0)+
1643 005112 020027 000632          CMP      RO,#MODES
1644 005116 001374          BNE      CLRT1
1644 005120 042737 000070 000632  BIC      #70,MODES
    
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1645 005126 000207          RTS      PC
1646          :INTERRUPT ENABLE, GO, WAIT FOR INTERRUPT
1647 005130 012777 000200 173352 GOWAIT: MOV    #200, @CC      ;SET PRIORITY LEVEL-4
1648 005136 012777 005172 173370      MOV    #GW1, @MTV      ;SET INTERRUPT RETURN
1649 005144 012737 000001 005160      MOV    #1, WAIT1
1650 005152 052777 000101 173322      BIS    #101, @MTC
1651 005160 000001          WAIT1: WAIT
1652 005162 012777 000340 173320      MOV    #340, @CC      ;INTERRUPT ENABLE, GO
1653 005170 000207          RTS      PC              ;WAIT FOR INTERRUPT
1654 005172 012737 000001 005160 GOW1: MOV    #1, WAIT1      ;RESTORE PRIORITY LEVEL 7
1655 005200 000002          RTI              ;EXIT
1656
1657          ;WRITE RECORD SECTION
1658 005202 005737 000612 WRIT1: TST    RECORD      ;IS THIS THE FIRST RECORD
1659 005206 001031          BNE    NOINCR          ;NO, SKIP SET UP OF RECORD LENGTH AND BLOCK INCREMENT
1660 005210 013737 000524 000542      MOV    MAXLEN, STRLEN
1661 005216 012737 177774 000564      MOV    #-4, BLKINC
1662 005224 032737 000020 001320      BIT    #20, PARAM
1663 005232 001006          BNE    W1
1664 005234 013737 000526 000542      MOV    MINLEN, STRLEN
1665 005242 012737 000004 000564      MOV    #4, BLKINC
1666 005250 013737 000542 000626 W1:    MOV    STRLEN, WRTLEN
1667 005256 032737 000040 001320      BIT    #40, PARAM      ;DOES RECORD LENGTH CHANGE?
1668 005264 001002          BNE    NOINCR          ;YES
1669 005266 005037 000564          CLR    BLKINC          ;NO
1670 005272 013737 000612 000614 NOINCR: MOV    RECORD, WRRECR
1671 005300 005737 004464          TST    TSFLAG
1672 005304 001401          BEQ    .+4
1673 005306 000207          RTS      PC      ;EXIT WRITE ROUTINE IF TEST 5
1674 005310 005037 000562          CLR    WRPASS
1675 005314 013777 000552 173160 STRTOP: MOV    COMAND, @MTC      ;SELECT UNIT
1676 005322 105777 173154          TSTB   @MTC
1677 005326 100375          BPL    .-4      ;WAIT FOR CU READY
1678 005330 006077 173144          ROR    @MTC      ;WAIT FOR TU READY
1679 005334 103375          BCC    .-4
1680 005336 013777 000626 173140 NONSTP: MOV    WRTLEN, @BC      ;SET BYTE COUNT
1681 005344 005477 173134          NEG    @BC
1682 005350 013777 000530 173130      MOV    WBUF, @CA      ;SET CURRENT ADDRESS
1683 005356 052777 000004 173116      BIS    #4, @MTC      ;WRITE
1684 005364 004737 005130          JSR    PC, GOWAIT      ;INTERRUPT ENABLE, GO, WAIT FOR DONE
1685
1686 005370 017737 173104 000566 ;RETURN HERE AFTER INTERRUPT
1687 005376 005777 173100          MOV    @MTC, STATRD      ;SAVE STATUS
1688 005402 100542          TST    @MTC
1689 005404 005737 000562          BMI    ERROR          ;HAVE ERROR FLAG, CHECK FOR EOT
1690 005410 001410          TST    WRPASS          ;WAS THIS A RECOVERY PASS
1691 005412 013700 000562          BEQ    TSTSTP          ;NO
1692 005416 006300          MOV    WRPASS, RO      ;YES
1693 005420 062700 000570          ASL    RO
1694 005424 005210          ADD    #WRCKEK, RO
1695 005426 005037 000562          INC    @RO      ;+1 TO APPROPRIATE RECOVERY PASS COUNTER
1696 005432 032737 000014 001320 TSTSTP: CLR    WRPASS
1697 005440 001023          BIT    #14, PARAM      ;IS WRITE MODE NONSTOP?
1698 005442 005737 000562          BNE    STOPOP          ;NO
1699 005446 001333          TST    WRPASS          ;YES
1700 005450 004737 005616          BNE    NONSTP
          JSR    PC, TESINC      ;CHANGE RECORD LENGTH

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

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

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TM 11 DATA RELIAB 9TRK MACY11 30A(1052) 17-JAN-78 11:23 PAGE 40
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SEQ 0040

1805 006234 000337 011356

SWAB CHAR

C04

YM 11 DATA RELIAB 9TRK MACY11 30A(1052) 17-JAN-78 11:23 PAGE 41
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SEQ 0041

1806 006240 006037 011356

ROR CHAR

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

E04

TM 11 DATA RELIAB 9TRK MACY11 30A(1052) 17-JAN-78 11:23 PAGE 43
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SEQ 0043

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

1818	006330	012702	013427		MOV	#MSG13,R2	
1819	006334	104404			TOP		;PRINT WRITE MODE
1820	006336	013702	000612		MOV	RECORD,R2	
1821	006342	104426			DECPRT		;PRINT RECORD NUMBER
1822	006344	013737	001320	011356	MOV	PARAM,CHAR	
1823	006352	042737	177717	011356	BIC	#177717,CHAR	
1824	006360	012702	013471		MOV	#MSG17,R2	
1825	006364	022737	000020	011356	CMP	#20,CHAR	
1826	006372	001002			BNE	.+6	
1827	006374	012702	013500		MOV	#MSG18,R2	
1828	006400	022737	000040	011356	CMP	#40,CHAR	
1829	006406	001002			BNE	.+6	
1830	006410	012702	013453		MOV	#MSG15,R2	
1831	006414	022737	000060	011356	CMP	#60,CHAR	
1832	006422	001002			BNE	.+6	
1833	006424	012702	013462		MOV	#MSG16,R2	
1834	006430	104404			TOP		;PRINT RECORD LENGTH SEQUENCE
1835	006432	012702	013507		MOV	#MSG19,R2	
1836	006436	104404			TOP		
1837	006440	013702	000570		MOV	WRCKEK,R2	
1838	006444	104426			DECPRT		;PRINT "WRITE ERRORS="
1839	006446	012700	000572		MOV	#WRCKEK+2,R0	
1840	006452	112737	000060	013550	MOV	#60,MSG20+17	
1841	006460	105237	013550	WRTO1:	INCB	MSG20+17	;PRINT STATISTICAL RECOVERY
1842	006464	005710			TST	R0	
1843	006466	001405			BEQ	WRTO2	
1844	006470	012702	013531		MOV	#MSG20,R2	
1845	006474	104404			TOP		
1846	006476	011002			MOV	(0),R2	
1847	006500	104426			DECPRT		;RECOVERED AT X
1848	006502	005720			(0)+		;JUST INCREMENTING
1849	006504	020027	000610	WRTO2:	TST	R0,#WRCKEK+20	
1850	006510	001363			CMP	WRTO1	
1851	006512	005737	000610		BNE	PERMBS	
1852	006516	001001			TST	PERMBS	
1853	006520	000207			BNE	.+4	;SKIP PRINT IF = 0
1854					RTS	PC	
1855							
1856	006522	012702	013553		MOV	#MSG20A,R2	
1857	006526	104404			TOP		
1858	006530	013702	000610		MOV	PERMBS,R2	;PRINT "PERMANENT BADSPOT"
1859	006534	104426			DECPRT		
1860	006536	000207			RTS	PC	
1861							;GENERATE DATA PATTERN
1862	006540	013702	000530	GENPA:	MOV	WBUF,R2	;INITIALIZE BUFFER
1863	006544	013737	001320	006652	MOV	PARAM,GP1	;CHECK PARAMETERS FOR PATTERN SELECTED
1864	006552	042737	170777	006652	BIC	#170777,GP1	
1865	006560	001435			BEQ	PAT0	
1866	006562	022737	001000	006652	CMP	#1000,GP1	
1867	006570	001437			BEQ	PAT1	
1868	006572	022737	002000	006652	CMP	#2000,GP1	
1869	006600	001457			BEQ	PAT2	
1870	006602	022737	003000	006652	CMP	#3000,GP1	

G04

TM 11 DATA RELIAB 9TRK MACY11 30A(1052) 17-JAN-78 11:23 PAGE 45
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SEQ 0045

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

H04

TM 11 DATA RELIAB 9TRK MACY11 30A(1052) 17-JAN-78 11:23 PAGE 46
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SEQ 0046

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

1878 006642 000137 007202
 1879 006646 000137 007166
 1880 006652 000000
 1881
 1882
 1883 006654 012722 002010
 1884 006660 023702 000532
 1885 006664 001373
 1886 006666 000207
 1887
 1888
 1889 006670 012700 006716
 1890 006674 012022
 1891 006676 023702 000532
 1892 006702 001001
 1893 006704 000207
 1894 006706 022700 006740
 1895 006712 001370
 1896 006714 000765
 1897 006716 100000
 1898 006720 020100
 1899 006722 004020
 1900 006724 001004
 1901 006726 000001
 1902 006730 040200
 1903 006732 010040
 1904 006734 002010
 1905 006736 000402
 1906
 1907
 1908
 1909 006740 012722 136274
 1910 006744 023702 000532
 1911 006750 001373
 1912 006752 000207
 1913
 1914
 1915 006754 012700 007002
 1916 006760 012022
 1917 006762 023702 000532
 1918 006766 001001
 1919 006770 000207
 1920 006772 022700 007024
 1921 006776 001370
 1922 007000 000765
 1923 007002 140037
 1924 007004 100476
 1925 007006 001574
 1926 007010 003770
 1927 007012 017760
 1928 007014 037300
 1929 007016 076201
 1930 007020 174003
 1931 007022 170007
 1932
 1933

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      JMP      PAT7
      JMP      PAT6
GP1:  0
;PATTERN 0
;HALF FREQUENCY OUTSIDE SKEW
PATO: MOV      #2010,(2)+      ;(010)(004)
      CMP      RBUF,R2
      BNE      PATO
      RTS      PC
;PATTERN 1
;SLIDING 1 BIT (ISOLATED BIT)
PAT1: MOV      #P1T,R0
PAT1A:MOV      (0)+,(2)+
      CMP      RBUF,R2
      BNE      .+4
      RTS      PC
      CMP      #PAT2,R0
      BNE      PAT1A
      BR       PAT1
P1T:  100000
      20100
      4020
      1004
      1
      40200
      10040
      2010
      402
;PATTERN 2
;HIGH FREQUENCY EVERY OTHER TRACK
PAT2: MOV      #136274,(2)+    ;(274)(274)
      CMP      RBUF,R2
      BNE      PAT2
      RTS      PC
;PATTERN 3
;THREE 0'S, THREE 1'S, THREE 0'S.
PAT3: MOV      #P3T,R0
PAT3A:MOV      (0)+,(2)+
      CMP      RBUF,R2
      BNE      .+4
      RTS      PC
      CMP      #PAT4,R0
      BNE      PAT3A
      BR       PAT3
P3T:  140037
      100476
      1574
      3770
      17760
      37300
      76201
      174003
      170007
;PATTERN 4
;INCREMENTING PATTERN (0-377)

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1934 007024 105037 007050
 1935 007030 113722 007050
 1936 007034 105237 007050
 1937 007040 023702 000532
 1938 007044 001371
 1939 007046 000207
 1940 007050 000000
 1941
 1942
 1943
 1944 007052 012700 007100
 1945 007056 012022
 1946 007060 023702 000532
 1947 007064 001001
 1948 007066 000207
 1949 007070 022700 007166
 1950 007074 001370
 1951 007076 000765
 1952 007100 000000
 1953 007102 100000
 1954 007104 100200
 1955 007106 040100
 1956 007110 020100
 1957 007112 020040
 1958 007114 010020
 1959 007116 004020
 1960 007120 004010
 1961 007122 002004
 1962 007124 001004
 1963 007126 001002
 1964 007130 000401
 1965 007132 000001
 1966 007134 000000
 1967 007136 100200
 1968 007140 040200
 1969 007142 040100
 1970 007144 020040
 1971 007146 010040
 1972 007150 010020
 1973 007152 004010
 1974 007154 002010
 1975 007156 002004
 1976 007160 001002
 1977 007162 000402
 1978 007164 000401
 1979
 1980
 1981 007166 012722 177777
 1982 007172 023702 000532
 1983 007176 001373
 1984 007200 000207
 1985
 1986
 1987
 1988
 1989 007202 004737 007222

PAT4: CLRB P4A
 P4: MOVB P4A,(2)+
 INCB P4A
 CMP RBUF,R2
 BNE P4
 RTS PC
 P4A: 0

 ;PATTERN 5
 ;EACH TRACK 3 BITS
 PAT5: NOV #PST,R0
 PAT5A: MOV (0)+,(2)+
 CMP RBUF,R2
 BNE +4
 RTS PC
 CMP #PAT6,R0
 BNE PAT5A
 BR PAT5
 PST: 0
 100000
 100200
 40100
 20100
 20040
 10020
 4020
 4010
 2004
 1004
 1002
 401
 1
 0
 100200
 40200
 40100
 20040
 10040
 10020
 4010
 2010
 2004
 1002
 402
 401

 ;PATTERN 6
 ;HIGH FREQUENCY ALL TRACKS
 PAT6: MOV #-1,(2)+
 CMP RBUF,R2
 BNE PAT6
 RTS PC

 ;PATTERN 7
 ;RANDOM
 PAT7: JSR PC,RANGEN

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1990 007206 013722 007372      MOV      RANDOM,(2)+
1991 007212 023702 000532      CMP      RBUF,R2
1992 007216 001371          BNE      PAT7
1993 007220 000207          RTS      PC
1994          ;RANDOM NUMBER GENERATOR
1995          ;EXIT WITH RANDOM NUMBER IN LOCATION NAMED "RANDOM"
1996 007222 010037 007400      RANGEN:  MOV      RO,SVO          ;SAVE REGISTERS
1997 007226 010137 007402      MOV      R1,SV1
1998 007232 010237 007404      MOV      R2,SV2
1999 007236 010337 007406      MOV      R3,SV3
2000 007242 013700 007374      MOV      LONUM,RO          ;SET UP LOW DIGIT
2001 007246 013701 007376      MOV      HINUM,R1          ;SET UP HIGH DIGIT
2002 007252 012703 000007      MOV      #7,R3            ;SET UP SHIFT COUNT
2003 007256 005002          CLR      R2
2004 007260 006300      RANG1:  ASL      RO          ;SHIFT RO LEFT AND
2005 007262 006101      ROL      R1          ;ROTATE CARRY INTO LSB OF R1 AND
2006 007264 006102      ROL      R2          ;ROTATE CARRY OUT OF R1 INTO R2
2007 007266 005303      DEC      R3            ;DECREMENT R3
2008 007270 001373          BNE      RANG1          ;CONTINUE SHIFT LOOP
2009 007272 063700 007374      ADD      LONUM,RO          ;ADD NUMBER TO MAKE X 129
2010 007276 005501          ADC      R1            ;PROPAGATE CARRY
2011 007300 063701 007376      ADD      HINUM,R1          ;ADD NUMBER TO MAKE X 129
2012 007304 005502          ADC      R2            ;PROPAGATE CARRY
2013 007306 062700 001057      ADD      #1057,RO          ;ADD LOW CONSTANT
2014 007312 005501          ADC      R1            ;PROPAGATE CARRY
2015 007314 005502          ADC      R2            ;PROPAGATE CARRY
2016 007316 062701 047401      ADD      #47401,R1          ;ADD HIGH CONSTANT
2017 007322 005502          ADC      R2            ;PROPAGATE CARRY
2018 007324 062702 000006      ADD      #6,R2            ;ADD HIGH CONSTANT
2019 007330 060200          ADD      R2,RO          ;RE-PRIME RO WITH HIGH DIGIT
2020 007332 005501          ADC      R1            ;PROPAGATE CARRY
2021 007334 010037 007372      MOV      RO,RANDOM          ;SAVE RANDOM NUMBER
2022 007340 010037 007374      MOV      RO,LONUM          ;PUT RO BACK IN LONUM
2023 007344 010137 007376      MOV      R1,HINUM          ;PUT R1 BACK IN HINUM
2024 007350 013700 007400      MOV      SVO,RO            ;RESTORE REGISTERS
2025 007354 013701 007402      MOV      SV1,R1
2026 007360 013702 007404      MOV      SV2,R2
2027 007364 013703 007406      MOV      SV3,R3
2028 007370 000207          RTS      PC
2029 007372 000000          ;EXIT
2030 007374 000000
2031 007376 000000
2032 007400 000000
2033 007402 000000
2034 007404 000000
2035 007406 000000
2036
2037
2038          ;READ RECORD SECTION
2039 007410 005737 000612      READ1:  TST      RECORD          ;FIRST RECORD?
2040 007414 001003          BNE      $R1            ;NO
2041 007416 013737 000542 000630      MOV      STRLEN,READLN      ;SET INITIAL READ LENGTH
2042 007424 012737 177775 000560      $R1:    MOV      #-3,ROPASS    ;INITIALIZE READ PASS COUNTER
2043 007432 013777 000552 171042      ROSTPD: MOV      COMAND,AMTC
2044 007440 105777 171036      TSTB    AMTC
2045 007444 100375          BPL      .-4            ;WAIT FOR CONTROL UNIT READY

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2046 007446 006077 171026 ROR 2MTS
2047 007452 103375 BCC .-4 ;WAIT FOR TAPE UNIT READY
2048 007454 013700 000532 READGO: MOV RBUF, R0
2049 007460 013701 000630 MOV READLN, R1
2050 007464 105020 RG1: CLRB (0)+ ;CLEAR READ BUFFER
2051 007466 005301 DEC R1
2052 007470 001375 BNE RG1
2053 007472 013777 000630 171004 MOV READLN, 2BC ;SET BYTE COUNT
2054 007500 005477 171000 NEG 2BC
2055 007504 013777 000532 170774 MOV RBUF, 2CA ;SET CURRENT ADDRESS
2056 007512 013777 000552 170762 MOV COMAND, 2MTC
2057 007520 052777 000002 170754 BIS #2, 2MTC
2058 007526 004737 005130 JSR PC, GOWAIT
2059 ;RETURN HERE AFTER INTERRUPT
2060 007532 017737 170742 000566 MOV 2MTS, STATRD
2061 007540 005777 170736 TST 2MTC ;ANY STATUS ERRORS
2062 007544 100504 BMI RDERR0 ;YES
2063 ;CHECK FOR DATA ERRORS
2064 007546 013700 000532 MOV RBUF, R0
2065 007552 013701 000530 MOV WBUF, R1
2066 007556 013702 000630 MOV READLN, R2
2067 007562 022021 SR5: CMP (0)+(1)+ ;CHECK FOR PROPER DATA TRANSFER
2068 007564 001045 BNE DATERR ;HAVE DATA ERROR
2069 007566 162702 000002 SUB #2, R2 ;CHECKED ALL TRANSFERS?
2070 007572 001373 BNE SR5 ;NO
2071 007574 032737 000003 001320 RTSSTP: BIT #3, PARAM
2072 007602 001007 BNE RDSTPC
2073 007604 004737 010200 JSR PC, RDINCR ;INCREMENT FOR NEXT BLOCK
2074 007610 023737 000612 000616 CMP RECORD, LASRCR
2075 007616 001316 BNE READGO
2076 007620 000207 RTS PC ;EXIT READIT
2077 007622 032737 000002 001320 RDSTPC: BIT #2, PARAM ;IS READ MODE RANDOM?
2078 007630 001414 BEQ RDSTP ;NO
2079 007632 004737 007222 RNRDSD: JSR PC, RANGEN
2080 007636 052737 177400 007372 BIS #177400, RANDOM
2081 007644 012704 177470 RNDS1: MOV #-200., R4 ;DELAY 1 MILLISECOND
2082 007650 005204 INC R4
2083 007652 001376 BNE .-2
2084 007654 005237 007372 INC RANDOM
2085 007660 001371 BNE RNDS1
2086 007662 004737 010200 RDSTP: JSR PC, RDINCR
2087 007666 023737 000612 000616 CMP RECORD, LASRCR ;DONE LAST RECORD?
2088 007674 001256 BNE RDSTPD ;NO
2089 007676 000207 RTS PC ;YES EXIT
2090 ;HAVE DATA ERROR
2091 007700 032777 020000 170604 DATERR: BIT #20000, 2SWR ;TYPE ALL READ ERRORS?
2092 007706 001014 BNE DATERR1 ;NO
2093 007710 012702 013070 MOV #MSG9A, R2
2094 007714 104404 TOP
2095 007716 013737 000630 000544 MOV READLN, LENGTH
2096 007724 004737 011202 JSR PC, PRS
2097 007730 014102 MOV -(1), R2 ;PRINT EXPECTED DATA
2098 007732 104412 OCTPAT
2099 007734 014002 MOV -(0), R2
2100 007736 104412 OCTPAT ;PRINT ACTUAL DATA
2101 007740 022737 177775 000560 DATERR1: CMP #-3, RDPASS

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2102	007746	001002			BNE	+6		
2103	007750	005237	000622		INC	RDERRS		;+1 TO DATA ERRORS
2104	007754	000464			BR	RTSR1		
2105								:STATUS INDICATES AN ERROR, CHECK FOR EOT
2106	007756	104434			RDERR0:	CKSWR		;CHECK FOR CNTL G
2107	007760	032737	175600	000566	BIT	#175600,STATRD		;IS ERROR LEGITIMATE OR EOT?
2108	007766	001552			BEQ	RNOTAP		;HAVE EOT
2109	007770	032777	020000	170514	BIT	#20000,ASWR		;TYPE ALL READ ERRORS?
2110	007776	001044			BNE	RTSREC		;NO
2111	010000	012702	013043		MOV	MSG9,R2		
2112	010004	104404				TOP		;PRINT ERROR
2113	010006	013737	000630	000544	MOV	READLN,LENGTH		
2114	010014	004737	011202		JSR	PC,PRTS		
2115	010020	032777	010000	170452	BIT	#10000,AMTS		;STATUS ERROR DUE TO PARITY
2116								;ERROR?
2117	010026	001430			BEQ	RTSREC		;BRANCH IF NOT
2118	010030	032777	000010	170454	BIT	#10,ASWR		;SEE IF USER WANTS DATA COMPARE!
2119	010036	001424			BEQ	RTSREC		;BRANCH IF NOT
2120	010040	013700	000530		MOV	WBUF,R0		;PICK UP STARTING ADDRESS OF
2121								;WRITE BUFFER
2122	010044	013701	000532		MOV	RBUF,R1		;PICK UP STARTING ADDRESS OF
2123								;READ BUFFER
2124	010050	013702	000630		MOV	READLN,R2		;PICK UP RECORD LENGTH IN BYTES
2125	010054	022021			1\$:	CMP	(R0)+,(R1)+	;COMPARE WHAT SHOULD HAVE BEEN
2126								;WRITTEN WITH WHAT WAS!!
2127	010056	001004			BNE	2\$;BRANCH IF NOT THE SAME
2128	010060	162702	000002		SUB	#2,R2		;DROP OFF A WORD FROM RECORD
2129								;LENGTH
2130	010064	001406			BEQ	3\$;BRANCH IF ALL OF RECORD DATA
2131								;CHECKS
2132	010066	000772			BR	1\$;GO TO COMPARE NEXT BYTE
2133	010070	014002			2\$:	MOV	-(R0),R2	;PICK UP THE DATA VALUE THAT
2134								;SHOULD HAVE BEEN WRITTEN
2135	010072	104412			OCTPRT			;PRINT EXPECTED VALUE OF
2136								;WRITTEN DATA
2137	010074	014102			MOV	-(R1),R2		;PICK UP THE DATA VALUE THAT
2138								;WAS WRITTEN
2139	010076	104412			OCTPRT			;PRINT ACTUAL VALUE OF THE
2140								;DATA READ
2141	010100	000403			BR	RTSREC		;CONTINUE WITH TESTING
2142	010102	012702	013337		3\$:	MOV	MSG100,R2	;INDICATE RECORD DATA COMPARES
2143								;DESPITE THE PARITY ERROR
2144								;CAUSING THE READ STATUS ERROR
2145	010106	104404				TOP		
2146						RDERRS		;+ 1 TO
2147	010110	104434			RTSREC:	CKSWR		;CHECK FOR CNTL G
2148	010112	022737	177775	000560	CMP	#-3,RDPASS		
2149	010120	001002			BNE	+6		
2150	010122	005237	000620		INC	RDERRS		;+1 TO STATUS ERRORS
2151	010126	032777	000020	170356	RTSR1:	BIT	#20,ASWR	;DELETE READ RETRYS (SW 4)?
2152	010134	001011			BNE	RPASS3		;YES
2153	010136	005237	000560		INC	RDPASS		;DONE ALL RE-READS?
2154	010142	001404			BEQ	RPASS1		;YES
2155	010144	004737	010250		JSR	PC,BACK1		;NO, BACKSPACE TAPE
2156	010150	000137	007432		JMP	RDSTPD		;GO AGAIN
2157	010154	005237	000624		RPASS1:	INC	NRREAD	;+1 TO NONRECOVERABLE READ

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2158 010160 012737 177775 000560 RPASS3: MOV #3, RDPASS
2159 010166 032737 002000 000566 BIT #2000, STATRD ;A1 EOT?
2160 010174 001054 BNE RNDTP1 ;YES, TYPE "EOT"
2161 010176 000631 BR RDSTP
2162
2163 ;SET UP POINTERS FOR NEXT RECORD
2164 010200 005237 000612 RDINCR: INC RECGRD
2165 010204 005737 000564 TST BLKINC
2166 010210 001416 BEQ RESTR1
2167 ;RECORD LENGTH IS CHANGING, COUNT IT
2168 010212 063737 000564 000630 ADD BLKINC, READLN
2169 010220 023737 000630 000526 CMP READLN, MINLEN ;IS LENGTH LESS THAN MINIMUM
2170 010226 007404 BLT RESTR1 ;NO
2171 010230 00737 000630 000524 CMP READLN, MAXLEN ;IS LENGTH GREATER THAN MAXIMUM?
2172 010236 0003 BLE RESTR1 ;NO
2173 010240 00737 000542 000630 RESTRL: MOV STRLEN, READLN ;RESET INITIAL LENGTH
2174 010246 000207 RESTR1: RTS PC
2175 ;BACKSPACE ONE RECORD
2176 010250 006077 170224 BACK1: ROR #MTS
2177 010254 103375 BCC .-4 ;WAIT FOR TAPE UNIT READY
2178 010256 012777 177777 170220 MOV #-1, JBC ;COUNT 1 RECORD
2179 010264 013777 000552 170210 MOV COMAND, JMTC ;SELECT DRIVE
2180 010272 052777 000012 170202 BIS #12, JMTC ;ISSUE BACKSPACE
2181 010300 004737 005130 JSR PC, GOWAIT
2182 010304 042777 000016 170170 BIC #16, JMTC
2183 010312 000207 RTS PC
2184 ;DRIVE HAS REACHED EOT IN READ MODE
2185 010314 004737 010200 RNDTAP: JSR PC, RDINCR
2186 010320 052737 000020 000632 BIS #20, MODES ;INDICATE AT EOT
2187 010326 012702 013754 RNDTP1: MOV #MSG25, R2
2188 010332 104404 TOP
2189 010334 012702 012746 MOV #MSG8, R2
2190 010340 104404 TOP
2191 ;DUMP ERROR COUNTERS
2192 010342 104434 READMP: CKSWR ;CHECK FOR CNTL G
2193 010344 013737 000552 011356 MOV COMAND, CHAR
2194 010352 000337 011356 SWAB CHAR
2195 010356 142737 000170 011356 BICB #170, CHAR
2196 010364 052737 000260 011356 BIS #260, CHAR
2197 010372 004737 011360 JSR PC, OCTP ;PRINT DRIVE NUMBER
2198 010376 104430 SP3
2199 010400 013737 001320 011356 MOV PARAM, CHAR
2200 010406 000337 011356 SWAB CHAR
2201 010412 006037 011356 ROR CHAR
2202 010416 042737 000170 011356 BIC #170, CHAR
2203 010424 052737 000260 011356 BIS #260, CHAR
2204 010432 004737 011360 JSR PC, OCTP ;PRINT PATTERN NUMBER
2205
2206 010436 013737 001320 011356 MOV PARAM, CHAR
2207 010444 042737 177774 011356 BIC #177774, CHAR
2208 010452 012702 013441 MOV #MSG14, R2
2209 010456 022737 000001 011356 CMP #1, CHAR
2210 010464 001002 BNE .+6
2211 010466 012702 013415 MOV #MSG12, R2
2212 010472 022737 000002 011356 CMP #2, CHAR
2213 010500 001002 BNE .+6
    
```

2214	010502	012702	013427		MOV	#MSG13,R2	
2215	010506	104404			TOP		;PRINT READ MODE
2216	010510	013702	000612		MOV	RECORD,R2	
2217	010514	104426			DECPRT		;PRINT RECORD NUMBER
2218	010516	013737	001320	011356	MOV	PARAM,CHAR	
2219	010524	042737	177717	011356	BIC	#177717,CHAR	
2220	010532	012702	013471		MOV	#MSG17,R2	
2221	010536	022737	000020	011356	CMP	#20,CHAR	
2222	010544	001002			BNE	.+6	
2223	010546	012702	013500		MOV	#MSG18,R2	
2224	010552	022737	000040	011356	CMP	#40,CHAR	
2225	010560	001002			BNE	.+6	
2226	010563	012702	013453		MOV	#MSG15,R2	
2227	010566	022737	000060	011356	CMP	#60,CHAR	
2228	010574	001002			BNE	.+6	
2229	010576	012702	013462		MOV	#MSG16,R2	
2230	010602	104404			TOP		;PRINT RECORD LENGTH SEQUENCE
2231	010604	012702	013603		MOV	#MSG21,R2	
2232	010610	104404			TOP		
2233	010612	013702	000620		MOV	RDERRS,R2	
2234	010616	104426			DECPRT		
2235	010620	012702	013633		MOV	#MSG22,R2	
2236	010624	104404			TOP		
2237	010626	013702	000622		MOV	DAERRS,R2	
2238	010632	104426			DECPRT		
2239	010634	012702	013654		MOV	#MSG23,R2	
2240	010640	104404			TOP		
2241	010642	013702	000624		MOV	NRREAD,R2	
2242	010646	104426			DECPRT		
2243	010650	000207			RTS	PC	
2244							
2245							
2246							
2247							
2248							
2249							
2250							
2251	010652	104434					
2252	010654	012737	177774	000562	XRGREC: CKSWR		;WRITE RECOVERY UTILIZING EXTENDED INTERRECORD GAP
2253	010662	032777	000040	167622	MOV	#-4,WRPASS	;USED AFTER EVERY 7 REWRITES OR AFTER
2254	010670	001036			BIT	#40,JSWR	;EACH WRITE ERROR IF STATISTICAL RECOVERY NOT SELECTED
2255	010672	004737	010250		BNE	XRGACD	;USED ONLY IF READ PASS SELECTED
2256	010676	105777	167600		JSR	PC,BACK1	
2257	010702	100375			TSTB	@MTC	
2258	010704	013777	000552	167570	BPL	.-4	
2259	010712	052777	000014	167562	MOV	COMAND,@MTC	
2260	010720	013777	000626	167556	BIS	#14,@MTC	;WRITE XIRG
2261	010726	005477	167552		MOV	WRTLEN,@BC	;SET BYTE COUNT
2262	010732	013777	000530	167546	NEG	@BC	
2263	010740	006077	167534		MOV	WBUF,@CA	;SET CURRENT ADDRESS
2264	010744	103375			ROR	@MTC	;WAIT FOR TU READY
2265	010746	004737	005130		BCC	.-4	
2266					JSR	PC,GOWAIT	
2267							
2268	010752	017737	167522	000566	;RETURN HERE AFTER INTERRUPT		
2269	010760	005777	167516		MOV	@MTC,STATRD	;SAVE STATUS
					TST	@MTC	

2270	010764	100403			BMI	XRG5			;HAVE ERROR FLAG, CHECK FOR EOT
2271	010766	005037	000562		XRGRCD: CLR	WRPASS			
2272	010772	000207			RTS	PC			;EXIT WRITE XIRG
2273	010774	032737	175600	000566	XRG5: BIT	#175600, STATRD			
2274	011002	001771			BEQ	XRGRCD			;ONLY EOT, EXIT
2275	011004	005237	000562		INC	WRPASS			;DONE 4 XIRG
2276	011010	001324			BNE	XRG5			
2277									;PRINT STATUS AFTER 4 XIRG ERRORS
2278	011012	012702	012720		MOV	#MSG7, R2			
2279	011016	104404				TOP			;PRINT WRITE STATUS ERROR
2280	011020	013727	000626	000544	MOV	WRTLEN, LENGTH			
2281	011026	004737	011202		JSR	PC, PRTS			;PRINT STATUS, COMMAND, RECORD, LENGTH
2282	011032	012702	013367		MOV	#MSG11, R2			
2283	011036	104404				TOP			;PRINT "XIRG WRITTEN 4 TIMES"
2284	011040	032737	002600	000566	BIT	#2000, STATRD			
2285	011046	001701			BEQ	XRGREC			
2286	011050	042777	000016	167424	BIC	#16, @MTC			
2287	011056	052777	000006	167416	BIS	#6, @MTC			;WRITE AN EOF
2288	011064	004737	005130		JSR	PC, GOWAIT			
2289	011070	000207			RTS	PC			
2290									
2291									;GO BACKWARD ON TAPE X RECORDS
2292	011072	013737	000612	000616	GOBKWD: MOV	RECORD, LASRCR			
2293	011100	013737	000614	000612	MOV	WRRECR, RECORD			
2294	011106	001003			BNE	GOB1			;IS NEW RECORD=0
2295	011110	004737	004740		JSR	PC, REWIND			;YES REWIND
2296	011114	000207			RTS	PC			;EXIT
2297	011116	013777	000616	167360	GOB1: MOV	LASRCR, @BC			;SET BYTE COUNT TO DIFFERENCE
2298	011124	163777	000614	167352	SUB	WRRECR, @BC			;BETWEEN LASRCR AND WRRECK
2299	011132	005477	167346		NEG	@BC			
2300	011136	013777	000552	167336	MOV	COMAND, @MTC			
2301	011144	105777	167332		TSTB	@MTC			;WAIT FOR CU READY
2302	011150	100375			BPL	-4			
2303	011152	006077	167322		ROR	@MTC			;WAIT FOR TU READY
2304	011156	103375			BCC	-4			
2305	011160	042777	000016	167314	BIC	#16, @MTC			
2306	011166	052777	000012	167306	BIS	#12, @MTC			
2307	011174	004737	005130		JSR	PC, GOWAIT			
2308	011200	000207			RTS	PC			
2309									
2310									
2311									
2312									;PRINT COMMAND, STATUS, RECORD NUMBER, LENGTH
2313	011202	012702	013113		PRTS: MOV	#MSG9B, R2			
2314	011206	104404				TOP			
2315	011210	017702	167266		MOV	@MTC, R2			
2316	011214	104412			OCTPRT				
2317	011216	013702	000566		MOV	STATRD, R2			
2318	011222	104412			OCTPRT				
2319	011224	013702	000612		MOV	RECORD, R2			
2320	011230	005202			INC	R2			
2321	011232	104426			DECPRT				
2322	011234	013702	000544		MOV	LENGTH, R2			
2323	011240	104426			DECPRT				
2324	011242	000207			RTS	PC			
2325	011244	104434			CKSWR				;CHECK FOR CNTL G

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2326          :PRINT OCTAL VALUE IN REGISTER 2
2327 011246 012737 000060 011356 OCTPR: MOV #0,CHAR ;INITIALIZE 1ST NUMBER AS 0
2328 011254 005702          TST R2 ;IS VALUE POSITIVE
2329 011256 100003          BPL OCT1 ;YES PRINT 0
2330 011260 012737 000061 011356 MOV #1,CHAR ;NO PRINT 1
2331 011266 004737 011360 OCT1: JSR PC,OCTP
2332 011272 006102          ROL R2
2333 011274 006102          ROL R2
2334 011276 012737 177773 011354 MOV #-5,OCT ;COUNT 5 DIGITS
2335 011304 006102          OCT2: ROL R2
2336 011306 006102          ROL R2
2337 011310 006102          ROL R2
2338 011312 010237 011356 MOV R2,CHAR ;SAVE DIGIT
2339 011316 042737 177770 011356 BIC #17770,CHAR ;CLEAR OTHER BITS
2340 011324 052737 000060 011356 BIS #60,CHAR ;MAKE ASCII DIGIT
2341 011332 006002          ROR R2
2342 011334 004737 011360 JSR PC,OCTP ;PRINT
2343 011340 006102          ROL R2
2344 011342 005237 011354 INC OCT ;+1 TO DIGIT COUNT
2345 011346 001356          BNE OCT2 ;NOT DONE
2346 011350 104430          SP3
2347 011352 000207          RTS PC ;EXIT
2348 011354 000000          OCT: 0
2349 011356 000000          CHAR: 0
2350 011360 105777 167134          OCTP: TSTB @TPS
2351 011364 100375          BPL .-4 ;WAIT FOR READY
2352 011366 013777 011356 167126 MOV CHAR,@TPB ;PRINT
2353 011374 000207          RTS PC
2354          :PRINT DECIMAL VALUE IN REGISTER 2
2355 011376 012737 177773 011554 DECPR: MOV #-5,DIGCNT
2356 011404 012737 011562 011560 MOV @DECPNT+2,DECPNT
2357 011412 012737 000040 011556 MOV #40,ZERO
2358 011420 012737 177777 011552 TYPT1: MOV #-1,DIGIT
2359 011426 005237 011552 TYPT2: INC DIGIT
2360 011432 167702 000122          SUB @DECPNT,R2
2361 011436 100373          BPL TYPT2
2362 011440 067702 000114          ADD @DECPNT,R2
2363 011444 004737 011472          JSR PC,DECOUT
2364 011450 005237 011554          INC DIGCNT
2365 011454 001002          BNE TYPT3
2366 011456 104430          SP3
2367 011460 000207          RTS PC
2368 011462 062737 000002 011560 TYPT3: ADD #2,DECPNT
2369 011470 000753          BR TYPT1
2370 011472 005737 011552          DECOUT: TST DIGIT
2371 011476 001010          BNE DEC1
2372 011500 022737 177777 011554          CMP #-1,DIGCNT
2373 011506 001404          BEQ DEC1
2374 011510 013737 011556 011552          MOV ZERO,DIGIT
2375 011516 000406          BR DEC2
2376 011520 012737 000060 011556 DEC1: MOV #60,ZERO
2377 011526 052737 000060 011552          BIS #60,DIGIT
2378
2379 011534 105777 166760          DEC2: TSTB @TPS
2380 011540 100375          BPL .-4
2381 011542 013777 011552 166752          MOV DIGIT,@TPB

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

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2438 012024 012702 014050          CNTLU:  MOV    #MSWR,R2
2439 012030 104404                    TOP
2440 012032 017702 166454          MOV    2SWR,R2
2441 012036 104412                    OCTPRT
2442 012040 012702 014060          MOV    #SMNEW,R2
2443 012044 104404                    TOP
2444 012046 005037 012250          CLR    2#TEMPST
2445 012052 004737 012060          JSR    PC,$READ          ;GO READ A LINE
2446 012056 000207                    OUT:   RTS    PC          ;RETURN TO MAIN BODY OF PROGRAM
2447
2448 012060 005037 012250          $READ: CLR    TEMPST
2449 012064 012737 000007 012252  MOV    #7,COUNT
2450 012072 104400                    1$:   WAITKY
2451 012074 042737 177600 001314  BIC    #177600,CHARIN ;STRIP OFF GARBAGE
2452 012102 122737 000025 001314  CMPB   #25,CHARIN    ;IS IT A 'U'?
2453 012110 001002                    BNE    2$           ;BRANCH IF NOT
2454 012112 005726                    3$:   TST    (SP)+    ;POP THE STACK
2455 012114 000743                    BR     CNTLU       ;START OVER
2456 012116 122737 000015 001314  2$:   CMPB   #15,CHARIN ;IS IT A <CR>?
2457 012124 001011                    BNE    4$           ;BRANCH IF NOT
2458 012126 012702 014070          MOV    #SMCRLF,R2    ;DO CRLF
2459 012132 104404                    TOP
2460 012134 022737 000007 012252  CMP    #7,COUNT     ;WAS IT FIRST CHARACTER
2461 012142 001036                    BNE    7$           ;CHANGE SWR IF NOT FIRST ONE
2462 012144 005726                    8$:   TST    (SP)+    ;POP THE STACK
2463 012146 000743                    BR     OUT         ;GET OUT
2464 012150 122737 000060 001314  4$:   CMPB   #60,CHARIN
2465 012156 003004                    BGT    5$
2466 012160 122737 000067 001314  CMPB   #67,CHARIN
2467 012166 002004                    BGE    6$
2468 012170 012702 012610          5$:   MOV    #MSG0,R2
2469 012174 104404                    TOP
2470 012176 000745                    BR     3$           ;START OVER IF NOT LEGAL CHARACTER
2471 012200 006337 012250          6$:   ASL    TEMPST
2472 012204 006337 012250          ASL    TEMPST
2473 012210 006337 012250          ASL    TEMPST
2474 012214 142737 000060 001314  BICB   #60,CHARIN    ;GET NITTY-GRITTY
2475 012222 153737 001314 012250  BISB   CHARIN,TEMPST
2476 012230 005337 012252          DEC    COUNT        ;ONLY WANT 6 DIGITS
2477 012234 001755                    BEQ    5$
2478 012236 000715                    BR     1$
2479 012240 013777 012250 166244  7$:   MOV    TEMPST,2SWR ;CHANGE SWITCH REGISTER CONTENTS
2480 012246 000736                    BR     8$
2481
2482 012250 000000          TEMPST: 0
2483 012252 000000          COUNT:  0
2484
2485 012254 013746 000006          SUSWRR: MOV    2#6,-(SP) ;SAVE VECTORS
2486 012260 013746 000004          MOV    2#4,-(SP)
2487 012264 012737 012304 000004  MOV    #1$,2#4      ;SET UP FOR TIMEOUT
2488 012272 022777 177777 166212  CMP    #-1,2SWR    ;REFERENCE HARDWARE SWITCH REGISTER
2489 012300 001402                    BEQ    2$
2490 012302 000404                    BR     3$
2491 012304 022626                    1$:   CMP    (SP)+,(SP)+ ;ADJUST STACK
2492 012306 012737 000176 000512  2$:   MOV    #SWREG,SWR ;POINT TO SOFTWARE SWITCH REG
2493 012314 012637 000004          3$:   MOV    (SP)+,2#4  ;RESTORE VECTORS
    
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2494	012320	012637	000006	MOV	(SP)+, @#6
2495	012324	000207		RTS	PC
2496					
2497				: TRAP HANDLER	
2498	012326	011666	000002	↑TRAP34: MOV	@SP, 2(6)
2499	012332	162716	000002	SUB	#2, @SP
2500	012336	013646		MOV	@(6), +-(6)
2501	012340	062716	105746	ADD	#TABLE-104400, @SP
2502	012344	013607		MOV	@(6)+, PC
2503	012346	011574		TABLE: WAITK	
2504	012350	005202		WRITI	
2505	012352	011652		TO	
2506	012354	004470		SVCTR	
2507	012356	004604		RSFDR	
2508	012360	011246		OCTPR	
2509	012362	004506		MVCTR	
2510	012364	006540		GENPA	
2511	012366	004550		CLRAL	
2512	012370	004702		CHGDR	
2513	012372	007410		READI	
2514	012374	011376		DECPR	
2515	012376	011634		SP3X	
2516	012400	012254		SUSWR	
2517	012402	011754		CKSWRR	
2518		104400		WAITKY=	104400
2519		104402		WRITIT=	104402
2520		104404		TOP=	104404
2521		104406		SVCTRS=	104406
2522		104410		RSFDRV=	104410
2523		104412		OCTPRT=	104412
2524		104414		MVCTRS=	104414
2525		104416		GENPAT=	104416
2526		104420		CLRALL=	104420
2527		104422		CHGDRV=	104422
2528		104424		READIT=	104424
2529		104426		DECPRT=	104426
2530		104430		SP3=	104430
2531		104432		SUSWR=	104432
2532		104434		CKSWR=	104434
2533					

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012404 005037 000036
012410 105037 000040
012414 105037 000041
012420 105037 000042
012424 105037 000043
012430 005737 000042
012434 001425
012436 005237 000036
012442 032737 020000 000052
012450 001402
012452 000137 012532
012456 023737 000042 000046 6\$:
012464 001403
012466 105237 000041
012472 000416
012474 105237 000040 1\$:
012500 012777 020111 166004
012506 000410
012510 105737 000041 2\$:
012514 001003
012516 105237 000042
012522 000402
012524 105237 000043 3\$:
012530 000207 5\$:

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*****  
MODIFIED DEC 16 1977  
**  
-- CHECK FOR DUMP MODE OR AUTOMATIC/ACT11-XXDP MODE  
CKMODE: CLR AUTOM ;INIT AUTOMATIC MODE INDICATOR  
CLR ACT11M ;INIT ACT11 AUTO MODE INDICATOR  
CLR XXDPM ;INIT XXDP AUTO MODE INDICATOR  
CLR ADUMPM ;INIT ACT11 DUMP MODE INDICATOR  
CLR XDUMPM ;INIT XXDP DUMP MODE INDICATOR  
TST @#42 ;AUTO MODE?  
BEQ 2$ ;BRANCH - IF NO  
INC AUTOM ;SET AUTO MODE INDICATOR  
BIT @20000,@#52 ;MANUAL INTERVENTION?  
BEQ 6$ ;BRANCH - IF NO  
JMP ABORT ;ABORT THE PROGRAM  
CMP @#42,@#46 ;ACT11 MODE?  
BEQ 1$ ;BRANCH - IF YES  
INCB XXDPM ;INDICATE XXDP AUTO MODE  
BR 5$ ;AND EXIT  
INCB ACT11M ;INDICATE ACT11 AUTO MODE  
MOV @20111,@SWR ;SET SWITCH REGISTER  
BR 5$ ;AND EXIT  
TSTB @#41 ;MAN/MODE VIA ACT11/PAPER TAPE?  
BNE 3$ ;BRANCH - IF NOT  
INCB ADUMPM ;INDICATE MAN/MODE VIA ACT11/PAPER TAPE  
BR 5$ ;AND EXIT  
INCB XDUMPM ;INDICATE MANUAL MODE VIA XXDP  
RTS PC ;RETURN  
*****
```

2569
 2570
 2571
 2572
 2573
 2574
 2575
 2576
 2577 012532 000005
 2578 012534 012702 012566
 2579 012540 004737 104404
 2580 012544 105737 000041
 2581 012550 001405
 2582 012552 013700 000042
 2583 012556 005037 000042
 2584 012562 004710
 2585 012564 000777
 2586
 2587
 2588

```

; *****
;                               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    XXOPM                             ; XXDP AUTO MODE
BEQ      1$                               ; BRANCH - IF NOT
MOV      @#42,RO                          ; GET MONITOR EXIT ADDRESS
CLR      @#42                             ; USE AS ABORT FLAG
JSR      PC,(RO)                          ; EXIT TO XXDP MONITOR
1$:      BR                               ; AND HANG
; *****

```

```

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

```

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

```

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

```


MSG12	013415	1815	2211	2667*																		
MSG13	013427	1818	2214	2669*																		
MSG14	013441	1812	2208	2671*																		
MSG15	013453	1830	2226	2673*																		
MSG16	013462	1833	2229	2675*																		
MSG17	013471	1824	2220	2677*																		
MSG18	013500	1827	2223	2679*																		
MSG19	013507	1835	2681*																			
MSG20	012636	1177	2599*																			
MSG21	013531	1840*	1841*	1844	2685*																	
MSG22	013553	1856	2689*																			
MSG23	013603	2231	2694*																			
MSG24	013633	2235	2699*																			
MSG25	013654	2239	2702*																			
MSG26	013710	1791	2707*																			
MSG27	013754	2187	2713*																			
MSG28	014020	1297	2719*																			
MSG29	014025	1319	2720*																			
MSG30	012666	1273	2603*																			
MSG31	012713	1256	2607*																			
MSG32	012720	1759	2278	2608*																		
MSG33	012746	1793	2189	2612*																		
MSG34	013043	2111	2623*																			
MSG35	013070	2093	2627*																			
MSG36	013113	2313	2631*																			
MSG37	000502	928*	1052*	1056	1060*	1605	1607*	1610*	1650*	1675*	1676	1683*	1687	1782*								
MSG38		1783*	1785*	1786*	2043*	2044	2056*	2057*	2061	2179*	2180*	2182*	2256	2258*								
MSG39		2259*	2269	2286*	2287*	2300*	2301	2305*	2306*	2315												
MSG40		927*	1062	1067	1069	1608*	1678*	1686	1778	2046*	2060	2115	2176*	2263*								
MSG41		2258	2303*																			
MSG42		941*	1648*																			
MSG43	000534	1552*	2509																			
MSG44	004506	1331	1348	1366	1373	1380	1397	1405	1412	1434	1441	1452	1458	1466								
MSG45	104414	1481	1505	1514	1531	1615	1627	2524*														
MSG46		1553*	1555																			
MSG47		1659	1668	1670*																		
MSG48		1680*	1699	1704	1707																	
MSG49		1059	1066	1068	1070	1072*																
MSG50		972*	2157*	2241																		
MSG51		1003*	1031*	1179*	1184	1269*	1270	1307*														
MSG52		1035	1038*																			
MSG53		1060*	1074																			
MSG54		2334*	2344*	2348*																		
MSG55		1802	1809	2197	2204	2331	2342	2350*														
MSG56		2327*	2508																			
MSG57		2098	2100	2135	2139	2316	2318	2441	2523*													
MSG58		2329	2331*																			
MSG59		2335*	2345																			
MSG60		2429	2431	2435	2446*	2463																
MSG61		1037	1043*																			
MSG62		1004*	1279*	1280	1301	1305*	1472	1518	1662	1667	1696	1709	1804	1810								
MSG63		1822	1863	2071	2077	2199	2206	2218														
MSG64		1865	1883*	1885																		
MSG65		1867	1889*	1896																		
MSG66		1890*	1895																			
MSG67		1869	1894	1909*	1911																	
MSG68																						
MSG69																						
MSG70																						
MSG71																						
MSG72																						
MSG73																						
MSG74																						
MSG75																						
MSG76																						
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MSG92																						
MSG93																						
MSG94																						
MSG95																						
MSG96																						
MSG97																						
MSG98																						
MSG99																						
MSG100																						
MTS	000500																					
MTV	000534																					
MVCTR	004506																					
MVCTRS=	104414																					
MV1	004512																					
NOINCR	005272																					
NONSTP	005336																					
NO. SEL	001666																					
NRREAD	000624																					
NUMTST	001316																					
NXMRET	001474																					
NXT. TU	001612																					
OCT	011354																					
OCTP	011360																					
OCTPR	011246																					
OCTPRT=	104412																					
OCT1	011266																					
OCT2	011304																					
OUT	012056																					

SELD2	002262	1150	1153#															
SELOK1	003050	1271	1273#															
SELPA1	002460	1190	1194#															
SELRLS	002552	1215#																
SELRM1	002734	1247	1250#															
SELRM2	002750	1245	1249	1253#														
SELRI	002602	1219	1222#															
SELR2	002620	1223	1226#															
SELR3	002634	1217	1221	1225	1229#													
SELTST	002366	1147	1177#															
SELT1	002404	1181#	1193	1272														
SELT2	002430	1183	1187#															
SELT3	002450	1185	1188	1191#	1205	1207	1227	1239	1251	1261								
SELM1	002666	1235	1238#															
SELM2	002702	1233	1237	1241#														
SP3 =	104430	1201	1212	1229	1241	1253	1803	2198	2346	2366	2530#							
SP3A	011644	2402	2405#															
SP3X	011634	2403#	2515															
STACK =	000500	925#	1020	1131														
START	002134	1125	1130#															
START1	002140	1093	1131#	1145														
STATRO	000566	956#	1686#	1752	1773	2060#	2107	2159	2268#	2273	2284	2317						
STOPOP	005510	1697	1709#															
STREC1	006050	1767	1776#															
STRLEN	000542	946#	1660#	1664#	1666	1740	2041	2173										
STRTOP	005314	1675#	1720	1725	1728	1780	1787											
SUSWR =	104432	1021	1132	2531#														
SUSWR	012254	2485#	2516															
SVCTR	004470	1546#	2506															
SVCTRS =	104406	1335	1352	1370	1377	1384	1401	1409	1416	1436	1447	1462	1478	1510				
		1524	1568	2521#														
SVC1	004474	1547#	1549															
SVRECR	000550	949#	1444#	1446	1471*	1477	1517*	1523										
SVO	007400	1996*	2024	2032#														
SV1	007402	1997*	2025	2033#														
SV2	007404	1998*	2026	2034#														
SV3	007406	1999*	2027	2035#														
SWR	000512	932#	1023	1133	1299	1586	1621	1757	1763	2091	2109	2118	2151	2253				
		2428	2440	2479*	2488	2492*	2558*											
SWREG	000176	919#	1023	1133	2428	2492												
TABLE	012346	2501	2503#															
TEMPST	012250	2444*	2448*	2471*	2472*	2473*	2475*	2479	2482#									
TESINC	005616	1500	1700	1721	1731#													
TESAC1	006014	1764	1769#															
TESREC	005764	1758	1763#															
TEST	001324	1006#	1282*															
TESTO	003306	1283	1327#															
TEST1	003356	1285	1344#															
TEST2	003426	1287	1362#															
TEST3	003544	1290	1393#															
TEST4	003662	1294	1426#															
TEST5	004204	1293	1493#															
TKB	000516	934#	2397	2398	2432													
TKS	000514	933#	2393	2430														
TO	011652	2408#	2505															
TOP =	104404	1081	1091	1097	1119	1139	1178	1192	1257	1274	1298	1320	1760	1792				

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TSD	004314	1507	1511#												
TSE	004322	514#	1526	1538											
TSF	004364	519	1522#												
TSFLAG	004464	1496*	1542#	1572*	1628	1671									
TSG	004376	1516	1525#												
TSH	004414	1528	1530#												
TSINC	004466	1501*	1509	1543#											
TSJ	004416	1531#	1536												
TSK	004436	1533	1535#												
USSTST	001624	1062#	1065												
USS.OK	001642	1063	1067#												
VALID	002300	1152	1158#												
VAL1	002316	1163#	1166												
VAL2	002330	1164	1167#												
VAL3	002344	1168	1171#												
VAL4	002350	1156	1170	1172#											
WAITK	011574	2393#	2503												
WAITKY=	104400	1141	1181	1203	1215	1231	1243	1258	2450	2518#					
WAITI	005160	1649*	1651#	1654*											
WBUF	000530	939#	1682	1862	2065	2120	2262								
WRCHEK	000570	957#	1558	1640	1693	1756*	1837	1839	1849						
WRITI	005202	1658#	2504												
WRITIT=	104402	1334	1351	1369	1400	1445	1497	2519#							
WRPASS	000562	954#	1674*	1689	1691	1695*	1698	1719	1754	1765*	1766	1772*	2252*	2271*	
		2275*													
WRRECR	000614	968#	1435*	1444	1446*	1670*	2293	2298							
WRDMP	006170	1796#													
WRD01	006460	1841#	1850												
WRD02	006502	1843	1848#												
WRTLEN	000626	973#	1666*	1680	1735*	1736	1738	1740*	1761	2260	2280				
W1	005250	1663	1666#												
W10	005476	1702	1706#												
W11	005550	1710	1719#	1775											
W12	005604	1723	1727#												
XDUMPM	000043	913#	2546*	2564*											
XRGROD	010766	2254	2271#	2274											
XRGREC	010652	1771	2251#	2285											
XRG0	010662	2253#	2276												
XRG5	010774	2270	2273#												
XXDPM	000041	911#	2544*	2555*	2580										
ZERO	011556	2357*	2374	2376*	2385#										
\$CNTG	014042	2436	2723#												
\$ENDAD	003246	891	1092	1310	1313#										
\$MCRLF	014070	2458	2728#												
\$MNEW	014060	2442	2726#												
\$MSWR	014050	2438	2724#												
\$READ	012060	2445	2448#												
\$R1	007424	2040	2042#												
\$R5	007562	2067#	2070												
\$SVPC =	000036	877#	897												
\$ZEROS =	002032	1107	1111#												
	014076	857#	859#	877	878#	882#	886#	890#	893#	897#	918#	920#	926#	987#	
		989#	991#	993#	995#	997#	999#	1001#	1154	1173	1260	1263	1266	1292	
		1587	1606	1609	1672	1677	1679	1716	1770	1779	1814	1817	1826	1829	
		1832	1852	1877	1892	1918	1947	2045	2047	2083	2102	2149	2177	2210	
		2213	2222	2225	2228	2257	2264	2302	2304	2351	2380	2386	2394	2396	

G06

TM 11 DATA RELIAB 9TRK MACY11 30A(1052) 17-JAN-78 11:23 PAGE 72
CZTMBE.P11 17-JAN-78 11:22 CROSS REFERENCE TABLE -- USER SYMBOLS

SEQ 0071

2406# 2411 2416 2420 2423 2585 2729# 2731

. ABS. 014076 000

ERRORS DETECTED: 0

CZTMBE, CZTMBE.SEG/CRF/SOL/NL:TOC=CZTMBE.P11

RUN-TIME: 3 6 .9 SECONDS

RUN-TIME RATIO: 173/10=16.3

CORE USED: 8K (15 PAGES)

DOCUMENT PAGES: 71