

TMA11  
TMB11

TM11 DATA RELIAB 9TRK  
CZTMBGO

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AH-9399G-MC  
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Made In USA

The image displays a grid of 15 columns and 15 rows of small data tables. Each table contains various numerical and text-based information, likely representing data points or system parameters. The tables are arranged in a regular grid pattern, with each cell containing a small table of its own. The data is too small to read individually but appears to be organized into a structured format. The tables are arranged in a regular grid pattern, with each cell containing a small table of its own. The data is too small to read individually but appears to be organized into a structured format.

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IDENTIFICATION

PRODUCT CODE: AC-9398G-MC  
PRODUCT NAME: CZTMBGO TM 11 DATA RELIAB 9TRK  
PROGRAM DATE: 16 JUNE 1984  
MAINTAINER: DIAGNOSTIC ENGINEERING  
AUTHOR: JEREMY MITT

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1. ABSTRACT

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

2. REQUIREMENTS

2.1 EQUIPMENT

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

2.2 STORAGE

2.2.1 PROGRAM STORAGE

THE ROUTINE REQUIRES 4K OF MEMORY.

2.3 PRELIMINARY PROGRAMS

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

3. LOADING PROCEDURE

3.1 METHOD

PROCEDURE FOR NORMAL BINARY TAPES SHOULD BE FOLLOWED:

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

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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)

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

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

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## 4.3.2.1 TEST NUMBER

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

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

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4.3.2.2 PATTERN

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

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.



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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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		370	135
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		360	174
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		ETC.	ETC.

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4 INCREMENTING PATTERN

000 040  
001 200  
002 002  
003 202  
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377 777  
ETC. ETC.

5 EACH CHANNEL 3 BITS

000 040  
000 040  
000 040  
200 004  
200 004  
200 004  
100 010  
100 010  
100 010  
040 020  
040 020  
040 020  
020 100  
020 100

PATTERN DESCRIPTION

DATA CHANNELS

020 100  
010 001  
010 001  
010 001  
004 400  
004 400  
004 400  
002 002  
002 002  
002 002  
001 200  
001 200  
001 200  
ETC. ETC.

6 HIGH FREQUENCY ALL CHANNELS

377 777  
377 777  
ETC. ETC.

7 RANDOM

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4.3.2.3 RECORD LENGTH SEQUENCE

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

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

4.3.2.4 WRITE START/STOP MODE

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

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

4.3.2.5 READ START/STOP MODE

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

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

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#### 4.3.2.6 FINAL TEST SELECT APPROVAL

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

#### 4.3.2.7 TEST SELECTION EXAMPLES

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

TWO PARAMETER SETS WERE SELECTED BY THE ABOVE SEQUENCE

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

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

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

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

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

#### 4.3.2.8 AUTOMATIC PARAMETER SELECTION

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

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

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5.0 OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

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

CONTROL:

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

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

THE OPERATIONAL SWITCH SETTINGS ARE USED TO:

- A. ALTER ERROR RECOVERY PROCEDURES
- B. DELETE ERROR PRINTOUTS
- C. CAUSE A TEST 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 (000010)PARITY ERRORS	USE OF THIS SWITCH WILL CAUSE THE DATA READ TO BE COMPARED

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4 DELETE READ RE-TRYS  
(000020)

5 DELETE WRITE XIRG  
(000040)

6 WRITE STATISTICAL  
(0001000)RECOVERY

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.

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.

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.

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

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5.1.2 SWITCHES TO CONTROL ERROR PRINTOUTS

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

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

5.1.3 SWITCH TO ALTER TEST PARAMETERS

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

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

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

EXAMPLE:

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

WITH SW0=1

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

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6. ERRORS

6.1 WRITE ERRORS

THE FOLLOWING ERROR TYPEOUTS ARE POSSIBLE DURING A WRITE OPERATION.

A. WRITE STATUS ERROR

COMD	STATUS	RECORD	LENGTH	EXPECTED	ACTUAL
XXXXXX	XXXXXX				

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

B. XIRG WRITTEN 4 TIMES

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

C. END OF TAPE

DRV	PAT	MODE	RECORD	LENGTH
0	7	SSTP	1276	MAX

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

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

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



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6.2 READ ERRORS

THE FOLLOWING ERROR TYPEOUTS ARE POSSIBLE DURING A READ OPERATION:

A. READ STATUS ERROR

COMD	STATUS	RECORD LENGTH	EXPECTED	ACTUAL
XXXXXX	XXXXXX	47	4	XXXXXX XXXXXX

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

B. READ DATA ERROR

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

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

C. READ PASS

END OF TAPE

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

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

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

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## 6.3 ERROR RECOVERY PROCEDURES

### 6.3.1 WRITE ERROR RECOVERY

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

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

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

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

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

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

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

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

### 6.3.2 READ ERROR RECOVERY

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

## 7. RESTRICTIONS

NONE

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8. MISCELLANEOUS

8.1 TAPE LENGTH

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

8.2 MEMORY AVAILABLE

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

9. PROGRAM DESCRIPTION

9.1 GENERAL DESCRIPTION

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

9.2 TEST 0

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

9.3 TEST 1

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

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9.4 TEST 2

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

9.5 TEST 3

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

9.6 TEST 4

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

9.7 TEST 5

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

10. LISTING

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.TITLE TM 11 DATA RELIAB 9TRK

REVISION HISTORY

:  
: REVISD SEPT 1971. J.RODENHISER

: REVISD AUGUST 1972. J. LACEY

: REVISD 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.

: REVISD 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.

: REVISD DECEMBER 1977. CLEM WALSH

: REVISD JUNE 1984. JEREMY HITT

: CZTMBG - ALYDED XON/XOFF FUNCTIONALITY TO SUPPORT REMOTE DIAGNOSIS.

872  
873 000000  
874 000001  
875 000002  
876 000003  
877 000004  
878 000005  
879 000006  
880 000007  
881  
882 000000  
883 000000  
884  
892 000034  
893 000034 012306  
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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  
;\*\*\*\*\*

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000046 003240  
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000052 000000  
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*****
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 .#EOP
      .-52
      .WORD 0        ;CHARACTERISTICS OF PROGRAM
                        ;SET TO 0
      .-#SVPC        ;RESTORE PC
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MODIFIED DEC 16 1977

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ACT11 AND XXDF MODE INDICATORS

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AUTOM:	.WORD	0	;	AUTOMATIC MODE INDICATOR
ACT11M:	.BYTE	0	;	ACT11 AUTO MODE INDICATOR
XXDPH:	.BYTE	0	;	XXDP AUTO MODE INDICATOR
ADUMPH:	.BYTE	0	;	ACT11 DUMP MODE INDICATOR
XDUMPH:	.BYTE	0	;	XXDP DUMP MODE INDICATOR

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957
958          000176          .-176
959 000176  000000          SWREG: .WORD 0          ;SOFTWARE SWITCH REGISTER
960          000200          .-200
961 000200  000137  001356          JMP          AUTOST
962 000204  000137  002070          JMP          MEMAK
963 000210  000137  002114          JMP          MEMBK
964
965          000500          STACK=500
966          000500          .-500
967 000500  172520          MTS:      172520
968 000502  172522          MTC:      172522
969 000504  172524          BC:       172524
970 000506  172526          CA:       172526
971 000510  177776          CC:       177776
972 000512  177570          SMR:      177570
973 000514  177560          TKS:      177560
974 000516  177562          TKB:      177562
975 000520  177564          TPS:      177564
976 000522  177566          TPB:      177566
977 000524  002000          MAXLEN: 1024.          ;MAX RECORD LENGTH
978 000526  000004          MINLEN: 4.            ;MIN RECORD LENGTH
979 000530  014142          MBUF:  BUFFER          ;STARTING ADDRESS OF WRITE BUFFER
980 000532  016142          RBUF:  BUFFER+1024.    ;STARTING ADDRESS OF READ BUFFER
981 000534  000224          MTV:      224
982
983          ;TEMPORARY STORAGE AREAS
984 000536  000000          #CTRLS: 0          ;JM>> XON/XOFF FLAG
985 000540  000000          ATST:  0
986 000542  000000          DRVSEL: 0
987 000544  000000          STRLEN: 0
988 000546  000000          LENGTH: 0
989 000550  000000          MSBITS: 0
990 000552  000000          SVRECR: 0
991 000554  000000          COMAND: 0
992 000556  000000          CDRVBT: 0
993 000560  000000          CDRIVE: 0
994 000562  000000          RDPASS: 0
995 000564  000000          WRPASS: 0
996 000566  000000          BLKINC: 0
997 000570  000000          STATRD: 0
998 000572  000000          WRCHEK: 0
999 000574  000000          0
1000 000576  000000          0
1001 000600  000000          0
1002 000602  000000          0
1003 000604  000000          0
1004 000606  000000          0
1005 000610  000000          0
1006
1007 000612  000000          PERMBS: 0
1008 000614  000000          RECORD: 0
1009 000616  000000          WPRECR: 0
1010 000620  000000          LASRCR: 0
1011 000622  000000          RDERRS: 0
1012 000624  000000          DAERRS: 0
1013 000626  000000          NRREAD: 0

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1014 000630 000000          WRTLEN: 0
1015 000632 000000          READLN: 0
1016 000634 000000          MODES: 0
1017
1018 000636 000656          DRVADR: DOTAB
1019 000640 000722          D1TAB
1020 000642 000766          D2TAB
1021 000644 001032          D3TAB
1022 000646 001076          D4TAB
1023 000650 001142          D5TAB
1024 000652 001206          D6TAB
1025 000654 001252          D7TAB
1026
1027 000656 000000          DOTAB: 0
1028 000722 000722          .-DOTAB+44
1029 000722 000000          D1TAB: 0
1030 000766 000766          .-D1TAB+44
1031 000766 000000          D2TAB: 0
1032 001032 001032          .-D2TAB+44
1033 001032 000000          D3TAB: 0
1034 001076 001076          .-D3TAB+44
1035 001076 000000          D4TAB: 0
1036 001142 001142          .-D4TAB+44
1037 001142 000000          D5TAB: 0
1038 001206 001206          .-D5TAB+44
1039 001206 000000          D6TAB: 0
1040 001252 001252          .-D6TAB+44
1041 001252 000000          D7TAB: 0
1042 001316 001316          .-D7TAB+44
1043 001316 000000          CHARIN: 0
1044 001320 000000          NUMTST: 0
1045 001322 000000          PARAM: 0
1046 001324 000000          TSTEX: 0
1047 001326 000000          TEST: 0
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1049 001330 000000          TSTTBL: 0
1050 001332 000000          0
1051 001334 000000          0
1052 001336 000000          0
1053 001340 000000          0
1054 001342 000000          0
1055 001344 000000          0
1056 001346 000000          0
1057 001350 000000          0
1058 001352 000000          0
1059 001354 000000          0
1060
1061 001356 012706 000500          AUTOST: MOV    #STACK, SP
1062 001362 104432          SUSWR
1063 001364 004737 012364          JSR    PC, CKMODE
1064 001370 022737 000176 000512          CMP    #SWREG, SWR
1065 001376 001004          BNE    11
1066 001400 004737 012004          JSR    PC, CNTLU
1067 001404 004737 012364          JSR    PC, CKMODE
1068 001410 012737 177777 000540 11:  MOV    #-1, ATST
1069 001416 012737 036025 001330          MOV    #36025, TSTTBL
1070 001424 012737 040052 001332          MOV    #40052, TSTTBL+2

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

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; TEST TABLE
; UP TO 10 TESTS CAN BE SELECTED TO
; BE RUN IN CONSECUTIVE ORDER

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; 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

```

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1071 001432 012737 027052 001334      MOV      #27052,TSTTBL+4
1072 001440 012737 000003 001320      MOV      #3,MUMTST
1073 001446 012737 123456 007366      MOV      #123456,LONUM      ;PRIME RANDOM NUMBER GENERATER
1074 001454 012737 176543 007370      MOV      #176543,HINUM
1075                                ;DETERMINE THE SIZE OF THE WRITE AND READ BUFFERS.
1076 001462 012737 001476 000004      MOV      #NXMRET,#04      ;SETUP NXM VECTOR
1077 001470 005737 024142      TST      BUFFER+4096.      ;OVER 4K OF MEMORY?
1078 001474 000413      BR      OVER4K      ;BR IF YES
1079 001476 022626      NXMRET: CMP      (SP), (SP)      ;POP THE STACK
1080 001500 012737 000004 000526      MOV      #4,MINLEN
1081 001506 012737 002000 000524      MOV      #1024.,MAXLEN
1082 001514 012737 016142 000532      MOV      #BUFFER+1024.,RBUF
1083 001522 000411      BR      TU.SEL      ;GO SELCT DRIVES
1084 001524 012737 000010 000526      OVER4K: MOV      #8.,MINLEN
1085 001532 012737 004000 000524      MOV      #2048.,MAXLEN
1086 001540 012737 020142 000532      MOV      #BUFFER+2048.,RBUF
1087                                ;DETERMINE DRIVES TO BE TESTED.
1088                                ;A DRIVE WILL BE TESTED IF:
1089                                ; 1. IT CAN BE SELECTED
1090                                ; 2. IT IS 9 TRACK
1091                                ; 3. IT IS WRITE ENABLED
1092 001546 012737 000006 000004      TU.SEL: MOV      #6,#04      ;SET TRAP CATCHER
1093 001554 012777 010000 176720      MOV      #10000,#MTC      ;PWR CLR
1094 001562 005037 000542      CLR      DRVSEL      ;CLEAR DRIVE TABLE
1095 001566 005037 000550      CLR      MSBITS
1096 001572 012700 000200      MOV      #200,R0      ;R0=DRIVE 0
1097 001576 105777 176700      TSTB     #MTC
1098 001602 100036      BPL      IDSELF      ;BR IF NO CU RDY
1099 001604 123737 000041 000004      CMPB     #41,4      ;DDP ON MAGTAPE?
1100 001612 001426      BEQ      NO.SEL      ;IF YES - SKIP DRIVE 0
1101 001614 013777 000542 176660      NXT.TU: MOV      DRVSEL,#MTC      ;SELECT A DRIVE
1102 001622 012702 000024      MOV      #20.,R2      ;SETUP R2 FOR WAIT LOOP
1103 001626 032777 000100 176644      USSTST: BIT      #100,#MTC      ;DOES DRIVE EXIST?
1104 001634 001003      BNE      USS.OK      ;BR IF YES
1105 001636 005302      DEC      R2      ;KILL SOME TIME
1106 001640 003372      BGT      USSTST
1107 001642 000412      BR      NO.SEL      ;DRIVE IS NON-EXISTENCE
1108 001644 032777 000020 176626      USS.OK: BIT      #20,#MTC      ;IS THIS DRIVE 7 OR 9 CHN?
1109 001652 001006      BNE      NO.SEL      ;BR IF 7 CHN.
1110 001654 032777 000004 176616      BIT      #4,#MTC      ;IS WRITE LOCK ON?
1111 001662 001002      BNE      NO.SEL      ;BR IF YES
1112 001664 050037 000550      BIS      R0,MSBITS      ;PUT DRIVE INTO TABLE
1113 001670 105237 000543      NO.SEL: INCB     DRVSEL+1      ;INC. THE DRIVE NUMBER
1114 001674 006200      ASR      R0      ;HAS ALL DRIVES BEEN TESTED FOR EXISTENCE?
1115 001676 001346      BNE      NXT.TU      ;BR IF NO
1116
1117                                ;TYPE-OUT NAME OF PROGRAM AND MIN. AND MAX. RECORD LENGTHS.
1118
1119 001700 105737 000402      IDSELF: TSTB     ACT11M      ;ACT11 MODE?
1120 001704 001011      BNE      3#      ;BRANCH - IF YES
1121 001706 012702 013253      MOV      #MSG10A,R2
1122 001712 104404      TOP
1123 001714 013702 000526      MOV      MINLEN,R2
1124 001720 104426      DECPRT      ;PRINT MIN. LENGTH
1125 001722 013702 000524      MOV      MAXLEN,R2
1126 001726 104426      DECPRT      ;PRINT MAX. LENGTH
1127 001730 005737 000550      3#:      TST      MSBITS      ;WAS ANY DRIVES SELECTED?

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1128 001734 001012          BNE      21          ;BR IF YES
1129 001736 013701 000042    MOV      @042,R1    ;IS THERE A MONITOR?
1130 001742 001405          BEQ      11         ;BRANCH IF NO
1131 001744 012702 013360    MOV      @MSG10C,R2 ;INDICATE THAT NO DRIVES ARE
1132 001750 104404          TOP                     ;AVAILABLE!!
1133 001752 000137 003240    JMP      @@IENDAD   ;RETURN TO THE MONITOR
1134 001756 000137 002142    11:     JMP      START1  ;NO--GO HAVE OPERATOR SELECT DRIVES
1135
1136          ;TYPE-OUT THE DRIVE/S TO BE TESTED
1137 001762 012702 013355    21:     MOV      @MSG10B,R2
1138 001766 104404          TOP
1139 001770 105037 014142    CLRB    BUFFER
1140 001774 012701 014142    MOV      @BUFFER,R1
1141 002000 005000          CLR      R0          ;SET R0 TO DRIVE 0
1142 002002 012702 000200    MOV      @200,R2     ;SET R2 TO DRIVE 0
1143
1144          ;FORM AND SAVE DRIVE NUMBER FOR TYPE-OUT
1145 002006 105021          CLRB    (R1).        ;SET EOM
1146 002010 112721 000040    MOVSB   @',(R1).     ;SPACE
1147 002014 030237 000550    LOOPER: BIT   R2,MSBITS ;DID THIS DRIVE NUMBER EXIST?
1148 002020 001405          BEQ      @ZERO0     ;BR IF NO
1149 002022 110011          MOVSB   R0,(R1)     ;YES--SAVE THE NUMBER
1150 002024 152721 000060    BISB   @'0,(R1).    ;MAKE IT ASCII
1151 002030 112721 000054    MOVSB   @'..(R1).   ;COMMA
1152 002034 000241          @ZERO0: CLC          ;POSITION DRIVE BIT
1153 002036 006002          ROR     R2
1154 002040 003200          INC     R0          ;UPDATE DRIVE NUMBER
1155 002042 020027 000007    CMP     R0,@7       ;LAST
1156 002046 003762          BLE    LOOPER       ;BR IF NO
1157 002050 105011          CLRB    (R1)        ;SET EOM
1158 002052 112741 000100    MOVSB   @'@,-(R1)   ;CR & LF
1159 002056 012702 014142    MOV     @BUFFER,R2  ;TYPE THE DRIVE/S SELECTED
1160 002062 174404          TOP
1161 002064 000137 003050    JMP     EXECUT       ;GO START TESTING
1162          ;MODIFY RECORD LENGTHS AND BUFFER AREAS FOR 4K OF MEMORY
1163 002070 012737 000004 000526 MEM4K: MOV     @4.,MINLEN
1164 002076 012737 002000 000524    MOV     @1024.,MAXLEN
1165 002104 012737 016142 000532    MOV     @BUFFER+1024.,RBUF
1166 002112 000411          BR      START
1167          ;MODIFY RECORD LENGTHS AND BUFFER AREAS FOR 8K OF MEMORY
1168 002114 012737 000010 000526 MEM8K: MOV     @8.,MINLEN
1169 002122 012737 004000 000524    MOV     @2048.,MAXLEN
1170 002130 012737 020142 000532    MOV     @BUFFER+2048.,RBUF
1171 002136 005037 000540    START: CLR     ATST  ;NOT AUTO START
1172 002142 012706 000500    START1: MOV    @STACK,SP ;INITIALIZE STACK
1173 002146 104432          SUSMR          ;CHECK FOR HARDWARE SWITCH REGISTER
1174 002150 022737 000176 000512    CMP     @SMREG,SMR
1175 002156 001002          BNE     11
1176 002160 004737 012004          JSR     PC,CNTLU
1177 002164 012737 123456 007366    11:     MOV     @123456,LONUM ;PRIME RANDOM
1178 002172 012737 176543 007370    MOV     @176543,MINUM ;NUMBER GENERATOR
1179 002200 012702 012671          MOV     @MSG1,R2
1180 002204 104404          TOP
1181 002206 005037 000550          CLR     MSBITS     ;PRINT 'SELECT DRIVES'
1182 002212 104400          SELDRV: WAITKY    ;CLEAR SELECTED DRIVE INDICATOR
1183 002214 122737 000015 001316    CMPB   @15,CHARIN  ;WAS CHARACTER A CARRIAGE RETURN?
1184 002222 001010          BNE     SELD1      ;NO

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1185 002224 005737 060550          TST      MSBITS          ;YES, WERE ANY DRIVES SELECTED
1186 002230 001744          BEQ      START1         ;NO
1187 002232 005737 000540          TST      ATST           ;YES--IS AUTO SWITCH SET?
1188 002236 001452          BEQ      SELTST         ;NO--GO SELECT TESTS
1189 002240 000137 003050          JMP      EXECUT         ;YES--GO START TESTING
1190 002244 122737 000070 001316 SELD1:  CMPB     @70,CHARIN   ;IS CHARACTER A VALID NUMBER 0-7?
1191 002252 003404          BLE     SELD2           ;NO, PRINT "?"
1192 002254 122737 000060 001316    CMPB     @60,CHARIN   ;IS CHARACTER A VALID NUMBER 0-7?
1193 002262 003406          BLE     VALID           ;YES
1194 002264 004737 012546          SELD2:  JSR      PC,READY ;JH>> WAIT UNTIL READY TO OUTPUT CHARACTER
1195 002270 012777 000077 176224    MOV      @',@TPB      ;PRINT '?'
1196 002276 000424          BR      VAL4
1197          ;HAVE VALID DRIVE NUMBER
1198 002300 142737 000270 001316 VALID:  BICB     @270,CHARIN ;MASK OUT NUMBER
1199 002306 105137 001316          COMB     CHARIN
1200 002312 012700 000200          MOV      @200,R0      ;INITIALIZE BIT POSITION FOR DRIVE 0
1201
1202
1203 002316 105237 001316          VAL1:   INCB     CHARIN   ;+1 TO DRIVE SELECT
1204 002322 001402          BEQ     VAL2           ;HAVE DRIVE OF EQUAL TO ZERO
1205 002324 006200          ASR     R0             ;MOVE BIT POSITION TO NEXT DRIVE
1206 002326 000773          BR      VAL1           ;TRY AGAIN
1207 002330 130037 000550          VAL2:   BITB     R0,MSBITS ;COMPARE DRIVE SELECT WITH PREVIOUS SELECTED
1208 002334 001003          BNE     VAL3           ;DRIVE WASN'T PREVIOUSLY SET, SO SET IT NOW.
1209 002336 150037 000550          BISB     R0,MSBITS
1210 002342 000402          BR      VAL4
1211 002344 140037 000550          VAL3:   BICB     R0,MSBITS ;DRIVE WAS SET, CLEAR IT.
1212 002350 004737 012546          VAL4:   JSR      PC,READY ;JH>> WAIT UNTIL READY TO OUTPUT CHARACTER
1213 002354 012777 000054 176140    MOV      @',@TPB      ;PRINT COMMA
1214 002362 000713          BR      SELDRV        ;RETURN TO WAIT FOR NEXT KEY
1215          ;HAVE DRIVES SELECTED-NOW GET TEST SELECTION
1216 002364 012702 012712          SELTST: MOV      @MSG2,R2
1217 002370 104404          TOP
1218 002372 005037 001320          CLR     NMTST         ;PRINT 'SELECT TESTS'
1219 002376 012700 001330          MOV     @TSTBL,R0     ;CLEAR TEST NUMBERS SELECTED
1220 002402 104400          SELT1:  WAITKY        ;INITIALIZE TEST TABLE POINTER
1221 002404 122737 000015 001316    CMPB     @15,CHARIN   ;WAS CHARACTER A CARRIAGE RETURN?
1222 002412 001005          BNE     SELT2
1223 002414 005737 001320          TST     NMTST         ;WERE ANY TESTS SELECTED?
1224 002420 001412          BEQ     SELT3         ;NO
1225 002422 000137 003050          JMP     EXECUT         ;YES, EXECUTE TESTS
1226 002426 122737 000066 001316 SELT2:  CMPB     @66,CHARIN   ;IS CHARACTER A VALID NUMBER 0-5
1227 002434 003404          BLE     SELT3         ;NO
1228 002436 122737 000060 001316    CMPB     @60,CHARIN   ;IS CHARACTER A VALID NUMBER 0-5
1229 002444 003404          BLE     SELPAT        ;YES
1230 002446 012702 012664          SELT3:  MOV      @MSG0,R2
1231 002452 104404          TOP
1232 002454 000752          BR      SELT1         ;RETURN TO WAIT FOR TEST SELECT
1233 002456 013704 001316          SELPAT: MOV      CHARIN,R4 ;ROTATE TEST NUMBER INTO POSITION
1234 002462 000304          SHAB    R4
1235 002464 006104          ROL     R4
1236 002466 006104          ROL     R4
1237 002470 006104          ROL     R4
1238 002472 006104          ROL     R4
1239 002474 042704 107777          BIC     @107777,R4
1240 002500 104430          SP3
1241          ;HAVE VALID TEST SELECTED, NOW GET SELECTED PATTERN
;TYPE 3 SPACES

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1242 002502 104400          WAITKY
1243 002504 122737 000070 001316      CMPB  #70,CHARIN      ;IS CHARACTER A VALID NUMBER 0-7
1244 002512 003755          BLE   SELT3          ;NO
1245 002514 122737 000057 001316      CMPB  #57,CHARIN      ;IS CHARACTER A VALID NUMBER 0-7
1246 002522 002351          RGE   SELT3          ;NO
1247 002524 000337 001316          SWAB  CHARIN         ;MOVE PATTERN SELECT INTO POSITION
1248 002530 006137 001316          ROL   CHARIN
1249 002534 042737 170777 001316      BIC   #170777,CHARIN
1250 002542 053704 001316          BIS   CHARIN,R4      ;COMBINE PATTERN WITH TEST
1251 002546 104430          SP3
1252
1253          ;WAIT FOR RECORD LENGTH SEQUENCES SELECTION
1254 002550 104400          SELRLS: WAITKY
1255 002552 122737 000060 001316      CMPB  #60,CHARIN      ;IS CHARACTER=0
1256 002560 001424          BEQ   SELR3          ;YES, RLS=MIN
1257 002562 122737 000061 001316      CMPB  #61,CHARIN      ;IS CHARACTER=1
1258 002570 001003          BNE   SELR1
1259 002572 052704 000020          BIS   #20,R4         ;SET RLS=MAX
1260 002576 000415          BR    SELR3
1261 002600 122737 000062 001316      SELR1: CMPB  #62,CHARIN      ;IS CHARACTER=2
1262 002606 001003          BNE   SELR2
1263 002610 052704 000040          BIS   #40,R4         ;SET RLS=MIN-MAX
1264 002614 000406          BR    SELR3
1265 002616 122737 000063 001316      SELR2: CMPB  #63,CHARIN      ;IS CHARACTER=3
1266 002624 001310          BNE   SELT3
1267 002626 052704 000060          BIS   #60,R4         ;SET RLS=MAX-MIN
1268 002632 104430          SELR3: SP3
1269          ;WAIT FOR WRITE MODE SELECTION
1270 002634 104400          WAITKY
1271 002636 122737 000060 001316      CMPB  #60,CHARIN
1272 002644 001415          BEQ   SELM2          ;SET WMO=NONSTOP
1273 002646 122737 000061 001316      CMPB  #61,CHARIN
1274 002654 001003          BNE   SELM1
1275 002656 052704 000004          BIS   #4,R4         ;SET WMO=START-STOP
1276 002662 000406          BR    SELM2
1277 002664 122737 000062 001316      SELM1: CMPB  #62,CHARIN
1278 002672 001265          BNE   SELT3
1279 002674 052704 000010          BIS   #10,R4        ;SET WMO=RANDOM
1280 002700 104430          SELM2: SP3
1281          ;WAIT FOR READ MODE SELECTION
1282 002702 104400          WAITKY
1283 002704 122737 000060 001316      CMPB  #60,CHARIN
1284 002712 001415          BEQ   SELRM2        ;SET RMO=NONSTOP
1285 002714 122737 000061 001316      CMPB  #61,CHARIN
1286 002722 001003          BNE   SELRM1
1287 002724 052704 000001          BIS   #1,R4         ;SET RMO=START-STOP
1288 002730 000406          BR    SELRM2
1289 002732 122737 000062 001316      SELRM1: CMPB  #62,CHARIN
1290 002740 001242          BNE   SELT3
1291 002742 052704 000002          BIS   #2,R4         ;SET RMO=RANDOM
1292 002746 104430          SELRM2: SP3
1293
1294          ;HAVE ALL PARAMETERS
1295 002750 012702 012767          MOV   #MSG6,R2
1296 002754 104404          TOP
1297 002756 104400          WAITKY
1298 002760 122737 000015 001316      CMPB  #15,CHARIN      ;PRINT "OK"
;WAIT FOR CARRIAGE RETURN

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1299 002766 001402          BEQ      .+6
1300 002770 000137 002446    JMP      SELT3
1301 002774 004737 012546    JSR      PC,READY      ;JM>> WAIT UNTIL READY TO OUTPUT CHARACTER
1302 003000 012777 000012 175514  MOV      @12,BTPB
1303 003006 004737 012546    JSR      PC,READY      ;JM>> WAIT UNTIL READY TO OUTPUT CHARACTER
1304 003012 012777 000040 175502  MOV      @40,BTPB
1305 003020 010420          MOV      R4,(0)+
1306 003022 005237 001320          INC      NUMTST      ;+1 TO TEST COUNT
1307 003026 022737 000012 001320  CMP      @10,NUMTST  ;EQUAL TO TEN YET
1308 003034 001402          BEQ      SELOK1      ;YES
1309 003036 000137 002402          JMP      SELT1      ;NO, ACCEPT NEXT SET
1310 003042 012702 012742          SELOK1: MOV      @MSG5,R2
1311 003046 104404          TOP
1312
1313          ;EXECUTE SELECTED TEST
1314 003050 005037 000634          EXECUT: CLR      MODES      ;INITIALIZE MODES
1315 003054 012737 001330 001324  MOV      @TSTTBL,TSTEX
1316 003062 017737 176236 001322  EXEC:  MOV      @TSTEX,PARAM  ;GET TEST PARAMETERS
1317 003070 013700 001322          EXEC1: MOV      PARAM,R0
1318 003074 042700 007777          BIC      @7777,R0
1319 003100 010037 001326          MOV      R0,TEST
1320 003104 001475          BEQ      TEST0
1321 003106 022700 010000          CMP      @10000,R0
1322 003112 001516          BEQ      TEST1
1323 003114 022700 020000          CMP      @20000,R0
1324 003120 001537          BEQ      TEST2
1325 003122 022700 030000          CMP      @30000,R0
1326 003126 001002          BNE     14
1327 003130 000137 003536          JMP      TEST3
1328 003134 022700 040000          14:  CMP      @40000,R0
1329 003140 001402          BEQ      .+6
1330 003142 000137 004176          JMP      TEST5
1331 003146 000137 003654          JMP      TEST4
1332          ;RETURN HERE AFTER COMPLETION OF TEST
1333 003152 104434          DONE:  CKSWR      ;CHECK FOR CNTL G
1334 003154 012702 014067          MOV      @MSG26,R2
1335 003160 104404          TOP
1336 003162 032777 000001 175322  BIT      @1,BSWR      ;IS SW 0=1 TO REPEAT TEST WITH ALL PATTERNS
1337 003170 001413          BEQ      DONE1      ;NO
1338 003172 013700 001322          MOV      PARAM,R0
1339 003176 042700 170777          BIC      @170777,R0
1340 003202 022700 007000          CMP      @7000,R0      ;REACHED PATTERN ??
1341 003206 001404          BEQ      DONE1      ;YES
1342 003210 062737 001000 001322  ADD      @1000,PARAM  ;NO, +1 TO PATTERN
1343 003216 000724          BR      EXEC1      ;REPEAT TEST
1344 003220 005337 001320          DONE1: DEC      NUMTST
1345 003224 001021          BNE     DOAGN
1346 003226 013701 000042          MOV      @M42,R1
1347 003232 001002          BNE     $ENDAD
1348 003234 000000          HALT
1349 003236 104434          CKSWR
1350 003240 004711          $ENDAD: JSR      PC,(R1)      ;FINISHED ALL TESTS
1351 003242 000240          NOP
1352 003244 000240          NOP
1353 003246 000240          NOP
1354 003250 105737 000402          TSTB     ACT11M      ;ACT11 MODE? ** C W
1355 003254 001405          BEQ      DOAGN      ;BRANCH - IF NO ** C.W

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1356 003256 012702 014074      MOV      #MSG27,R2      ;GET END OF PASS MESSAGE
1357 003262 104404                TOP      ;TYPE END OF PASS
1358 003264 000137 001356      JMP      AUTOST        ;CONTINUE TEST
1359 003270 062737 000002 001324 DOAGN:  ADD      #2,TSTEX
1360 003276 000671                BR       EXEC          ;DO NEXT TEST
1361
1362                ;TEST0
1363                ;WRITE ONE RECORD, CHANGE DRIVES, GO TO EOT
1364 003300 052737 000002 000634 TEST0:  BIS      #2,MODES      ;EXIT WRITE EVERY RECORD, NO READ PASS
1365 003306 104420                CLRALL   ;CLEAR ERROR COUNTERS AND REWIND
1366 003310 104416                GENPAT   ;GENERATE PATTERN
1367 003312 104410                TO:      RSFDRV        ;RESET DRIVE SELECTION TO LOWEST NUMBER
1368 003314 104414                TOA:     MVCTRS        ;RESTORE DRIVE COUNTERS
1369 003316 032737 000040 000634      BIT      #40,MODES     ;IS THIS DRIVE AT EOT?
1370 003324 001002                BNE     TOB           ;YES, SKIP WRITE
1371 003326 104402                WRITIT   ;WRITE
1372 003330 104406                SVCTRS   ;SAVE DRIVE COUNTERS
1373
1374 003332 104422                TOB:     CHGDRV        ;ANY MORE DRIVES SELECTED?
1375 003334 000767                BR       TOA          ;YES
1376 003336 004737 004770      JSR      PC,ALLEOT    ;ARE ALL DRIVES AT EOT?
1377 003342 000763                BR       TO           ;NO
1378 003344 000137 003152      JMP      DONE         ;YES, EXIT
1379
1380                ;TEST1
1381 003350 052737 000001 000634 TEST1:  BIS      #1,MODES     ;EXIT WRITE AFTER RLS, NO READ PASS
1382 003356 104420                CLRALL   ;CLEAR ERROR COUNTERS AND REWIND
1383 003360 104416                GENPAT   ;GENERATE PATTERN
1384 003362 104410                T1:      RSFDRV        ;RESET DRIVE SELECTION TO LOWEST NUMBER
1385 003364 104414                T1A:     MVCTRS        ;RESTORE DRIVE COUNTERS
1386 003366 032737 000040 000634      BIT      #40,MODES     ;IS THIS DRIVE AT EOT?
1387 003374 001002                BNE     T1B          ;YES, SKIP WRITE
1388 003376 104402                WRITIT   ;WRITE
1389 003400 104406                SVCTRS   ;SAVE DRIVE COUNTERS
1390 003402 104422                T1B:     CHGDRV        ;ANY MORE DRIVE SELECTED?
1391 003404 000767                BR       T1A          ;YES
1392 003406 004737 004770      JSR      PC,ALLEOT    ;ARE ALL DRIVES AT EOT?
1393 003412 000763                BR       T1           ;NO
1394 003414 000137 003152      JMP      DONE         ;YES EXIT
1395
1396                ;TEST2
1397                ;WRITE A RECORD LENGTH SEQUENCE, CHANGE DRIVES
1398                ;BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES, CONTINUE TO EOT ON ALL DRIVES
1399 003420 052737 000005 000634 TEST2:  BIS      #5,MODES     ;EXIT WRITE AFTER RLS, DO READ PASS
1400 003426 104420                CLRALL   ;CLEAR ERROR COUNTERS AND REWIND
1401 003430 104416                GENPAT   ;GENERATE PATTERN
1402 003432 104410                T2:      RSFDRV        ;SET DRIVE SELECTION TO LOWEST NUMBER
1403 003434 104414                T2A:     MVCTRS        ;RESTORE DRIVE COUNTERS
1404 003436 032737 000040 000634      BIT      #40,MODES     ;IS THIS DRIVE AT EOT?
1405 003444 001002                BNE     T2B          ;YES, SKIP WRITE
1406 003446 104402                WRITIT   ;WRITE
1407 003450 104406                SVCTRS   ;SAVE DRIVE COUNTERS
1408 003452 104422                T2B:     CHGDRV        ;ANYMORE DRIVERS SELECTED?
1409 003454 000767                BR       T2A          ;YES
1410 003456 104414                T2C:     MVCTRS        ;RESTORE DRIVE COUNTERS
1411 003460 032737 000020 000634      BIT      #20,MODES     ;IS THIS READ AT EOT?
1412 003466 001003                BNE     T2D          ;YES, SKIP BACKSPACE

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1413 003470 004737 011064          JSR    PC,GOBKWD      ;BACKSPACE
1414 003474 104406                   SVCTRS                ;SAVE DRIVE COUNTERS
1415 003476 104422                   CHGDRV                ;ANY MORE DRIVES SELECTED?
1416 003500 000766                   T2C                   ;YES
1417 003502 104414                   MVCTRS                ;RESTORE DRIVE COUNTERS
1418 003504 032737 000020 000634   BIT    #20,MODES      ;IS THIS READ AT EOT
1419 003512 001001                   BNE    T2F            ;YES, SKIP READ
1420 003514 104424                   READIT                ;READ
1421 003516 104406                   T2F:                 SVCTRS                ;SAVE DRIVE COUNTERS
1422 003520 104422                   CHGDRV                ;ANYMORE DRIVES SELECTED?
1423 003522 000767                   BR     T2E            ;YES
1424 003524 004737 004770          JSR    PC,ALLEOT      ;ARE ALL DRIVES AT EOT?
1425 003530 000740                   BR     T2              ;NO
1426 003532 000137 003152          JMP    DONE            ;YES EXIT
1427
1428
1429                                ;TEST3
1430 003536 052737 000006 000634   ;WRITE ONE RECORD, CHANGE DRIVES, BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES
1431 003544 104420                   TEST3: BIS    #6,MODES ;EXIT WRITE EVERY RECORD, DO READ PASS
1432 003546 104416                   CLRALL                ;CLEAR ERROR COUNTERS AND REWIND
1433 003550 104410                   T3:                   GENPAT                ;GENERATE PATTERN
1434 003552 104414                   T3A:                 RSFDRV                ;SET DRIVE SELECTION TO LOWEST NUMBER
1435 003554 032737 000040 000634   BIT    #40,MODES      ;RESTORE DRIVE COUNTERS
1436 003562 001002                   BNE    T3B            ;IS THIS DRIVE AT EOT?
1437 003564 104402                   WRITIT                ;YES, SKIP WRITE
1438 003566 104406                   SVCTRS                ;WRITE
1439 003570 104422                   T3B:                 CHGDRV                ;SAVE DRIVE COUNTERS
1440 003572 000767                   BR     T3A            ;ANY MORE DRIVES SELECTED
1441
1442 003574 104414                   T3C:                 MVCTRS                ;RESTORE DRIVE COUNTERS
1443 003576 032737 000020 000634   BIT    #20,MODES      ;IS THIS DRIVE AT EOT
1444 003604 001002                   BNE    T3D            ;YES, SKIP BACKSPACE
1445 003606 004737 011064          JSR    PC,GOBKWD      ;BACKSPACE
1446 003612 104406                   T3D:                 SVCTRS                ;SAVE DRIVE COUNTERS
1447 003614 104422                   CHGDRV                ;ANY MORE DRIVES SELECTED?
1448 003616 000766                   BR     T3C            ;GO
1449 003620 104414                   T3E:                 MVCTRS                ;RESTORE DRIVE COUNTERS
1450 003622 032737 000020 000634   BIT    #20,MODES      ;IS THIS DRIVE AT EOT?
1451 003630 001001                   BNE    T3F            ;YES, SKIP READ
1452 003632 104424                   READIT                ;READ
1453 003634 104406                   T3F:                 SVCTRS                ;SAVE DRIVE COUNTERS
1454 003636 104422                   CHGDRV                ;ANY MORE DRIVES SELECTED
1455 003640 000767                   BR     T3E            ;YES
1456 003642 004737 004770          JSR    PC,ALLEOT      ;ARE ALL DRIVES AT EOT?
1457 003646 000740                   BR     T3              ;NO
1458 003650 000137 003152          JMP    DONE            ;YES, EXIT
1459
1460                                ;TEST4
1461                                ;WRITE RECORD, CHANGE DRIVES, REPEAT FOR RECORD LENGTH SEQUENCE
1462                                ;READ RECORD, CHANGE DRIVES, REPEAT FOR RLS
1463 003654 052737 000006 000634   TEST4: BIS    #6,MODES ;EXIT WRITE EVERY RECORD, DO READ PASS
1464 003662 104416                   GENPAT                ;GENERATE PATTERN
1465 003664 032777 000014 175432   BIT    #14,BTSTEX
1466 003672 001006                   BNE    T4
1467 003674 042737 000007 000634   BIC    #7,MODES
1468 003702 052737 000005 000634   BIS    #5,MODES      ;EXIT WRITE AFTER RLS, DO READ PASS
1469 003710 104420                   T4:                   CLRALL                ;CLEAR ERROR COUNTERS AND REWIND

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1470	003712	104410			T4A:	RSFDRV	;SET DRIVE SELECTION TO LOWEST NUMBER
1471	003714	104414			T4B:	MVCTRS	;RESTORE DRIVE COUNTERS
1472	003716	013737	000614	000616		MOV	RECORD,WRRECR
1473	003724	104406					;SAVE RECORD
1474	003726	104422					;SAVE DRIVE COUNTERS
1475	003730	000771					;ANYMORE DRIVES SELCTED?
1476	003732	042737	000010	000634		BR	;YES
1477	003740	104410			T4C:	T4B	;CLEAR RLS END
1478	003742	104414			T4D:	#10,MODES	;SET DRIVE SELECTION TO LOWEST NUMBER
1479	003744	032737	000040	000634		RSFDRV	;RESTORE DRIVE COUNTERS
1480	003752	001010				MVCTRS	;IS DRIVE AT EOT
1481	003754	013737	000616	000552		#40,MODES	;YES, SKIP WRITE
1482	003762	104402				T4E:	;SAVE START OF RLS
1483	003764	013737	000552	000616		MOV	;WRITE
1484	003772	104406				SVRECR,WRRECR	;RESTORE START OF RLS
1485	003774	104422				SVCTRS	;SAVE DRIVE COUNTERS
1486	003776	000761				CHGDRV	;ANYMORE DRIVES SELECTED?
1487	004000	032737	000010	000634		BR	;YES
1488	004006	001007				T4F:	;ARE WE AT END OF RLS
1489	004010	104414				BIT	;YES
1490	004012	032737	000040	000634		#10,MODES	;RESTORE DRIVE COUNTERS
1491	004020	001747				T4G:	;ARE WE AT EOT?
1492	004022	104422				BEQ	;NO
1493	004024	000771				T4H:	;ANYMORE DRIVES SELECTED?
1494	004026	104410				BR	;YES
1495	004030	104414				RSFDRV	;SET DRIVE SELECTION TO LOWEST NUMBER
1496	004032	032737	000020	000634		MVCTRS	;RESTORE DRIVE COUNTERS
1497	004040	001002				#20,MODES	;IS THIS DRIVE AT EOT?
1498	004042	004737	011064			T4J:	;YES, SKIP BACKSPACE
1499	004046	104406				JSR	;BACKSPACE
1500	004050	104422				PC,GOBKWD	;SAVE DRIVE COUNTERS
1501	004052	000766				SVCTRS	;ANY MORE DRIVES SELECTED?
1502	004054	104410				CHGDRV	;YES
1503	004056	104414				T4K:	;SET DRIVE SELECTION TO LOWEST NUMBER
1504	004060	032737	000020	000634		RSFDRV	;RESTORE DRIVE COUNTERS
1505	004066	001025				MVCTRS	;IS THIS READ AT EOT?
1506	004070	023737	000620	000614		#20,MODES	;YES, SKIP READ
1507	004076	001421				T4L:	;HAVE WE READ LAST RECORD WRITTEN?
1508	004100	013737	000620	000552		BIT	;YES
1509	004106	032737	000003	001322		MOV	;SAVE LAST RECORD
1510	004114	001405				LASRCR,SVRECR	;IS READ MODE NONSTOP?
1511	004116	013737	000614	000620		BIT	;YES
1512	004124	005237	000620			BEQ	
1513	004130	104424				MOV	;+1 TO LAST RECORD WRITTEN
1514	004132	013737	000552	000620		REC,LASRCR	;READ
1515	004140	104406			T4M:	LASRCR	;RESTORE LAST RECORD WRITTEN
1516	004142	104422				READIT	;SAVE DRIVE COUNTERS
1517	004144	000744				SVCTRS	;ANYMORE DRIVES SELECTED?
1518	004146	104414				CHGDRV	;YES
1519	004150	023737	000620	000614		T4N:	;RESTORE DRIVE COUNTERS
1520	004156	001336				BR	;ARE WE AT END OF RLS?
1521	004160	104422				T4P:	;NO
1522	004162	000771				LMP	;ANYMORE DRIVES SELECTED?
1523	004164	004737	004770			BNE	;YES
1524	004170	000650				T4Q:	;ARE ALL DRIVES AT EOT?
1525	004172	000137	003152			JSR	;NO
1526						BR	;YES,EXIT
						JMP	
						DONE	

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1527          ;TEST5
1528          ;READ ONLY
1529          ;RANDOM PATTERN INVALID EXCEPT FOR SPECIFIC CASES
1530 004176 052737 000002 000634 TEST5: BIS      @2,MODES
1531 004204 104420          CLRALL          ;CLEAR ERROR COUNTERS AND REWIND
1532 004206 104416          GENPAT          ;GENERATE PATTERN
1533 004210 012737 177777 004456 T5:   MOV      @-1,TSFLAG ;ENABLE EXIT FROM WRITE ROUTINE
1534 004216 104402          WRITIT          ;ENTER WRITE ONLY TO INITIALIZE RECORD SEQUENCE
1535 004220 032737 000010 000634          BIT      @10,MODES ;ARE WE AT END OF RLS?
1536 004226 001402          BEQ      TSA          ;YES
1537 004230 004737 005610          JSR      PC,TESINC ;SEE IF RECORD LENGTH SHOULD BE CHANGED
1538 004234 013737 000614 004460 TSA:  MOV      RECORD,TSINC
1539 004242 005037 000614          CLR      RECORD
1540 004246 052737 000010 000634 T5B:  BIS      @10,MODES ;INDICATE AT START OF RLS
1541 004254 104410          RSFDRV          ;SET DRIVE SELECTION TO LOWEST DRIVE NUMBER
1542 004256 104414          MVCTRS          ;RESTORE DRIVE COUNTERS
1543 004260 032737 000020 000634          BIT      @20,MODES ;IS THIS DRIVE AT EOT
1544 004266 001007          BNE      T5D          ;YES
1545 004270 013737 000614 000620          MOV      RECORD,LASRCR
1546 004276 063737 004460 000620          ADD      TSINC,LASRCR ;CURRENT RECORD + SEQUENCE LENGTH
1547 004304 104406          SVCTRS          ;SAVE DRIVE COUNTERS
1548 004306 104422          CHGDRV          ;ANYMORE DRIVES?
1549 004310 000762          BR       T5C          ;YES
1550 004312 104410          RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1551 004314 104414          MVCTRS          ;RESTORE DRIVE COUNTERS
1552 004316 032737 000020 000634          BIT      @20,MODES ;IS THIS DRIVE AT EOT?
1553 004324 001021          BNE      T5G          ;YES
1554 004326 013737 000620 000552          MOV      LASRCR,SVRECR ;SAVE END OF RLS RECORDS
1555 004334 032737 000005 001322          BIT      @3,PARAM    ;IS READ MODE NONSTOP
1556 004342 001405          BEQ      TSF          ;YES GO TO END RLS
1557 004344 013737 000614 000620          MOV      RECORD,LASRCR ;NEXT TO BE READ
1558 004352 005237 000620          INC      LASRCR      ;+1 EXIT READ AFTER ONE RECORD
1559 004356 104424          READIT          ;READ
1560 004360 013737 000552 000620 T5F:  MOV      SVRECR,LASRCR ;RESTORE END RECORD
1561 004366 104406          SVCTRS          ;SAVE DRIVE COUNTERS
1562 004370 104422          CHGDRV          ;ANY MORE DRIVES?
1563 004372 000750          BR       T5E          ;YES
1564 004374 004737 004770          JSR      PC,ALLEOT  ;ALL AT EOT?
1565 004400 000402          BR       T5H          ;NO
1566 004402 000137 003152          JMP      DONE        ;YES EXIT
1567 004406 104410          RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1568 004410 104414          MVCTRS          ;RESTORE DRIVE COUNTERS
1569 004412 023737 000614 000620          CMP      RECORD,LASRCR ;ARE WE AT END OF RLS?
1570 004420 001003          BNE      T5K          ;NO
1571 004422 042737 000010 000634          BIC      @10,MODES   ;YES,
1572 004430 104422          CHGDRV          ;ANYMORE DRIVES SELECTED?
1573 004432 000766          BR       T5J          ;YES
1574 004434 032737 000010 000634          BIT      @10,MODES   ;AT END OF RLS?
1575 004442 001324          BNE      T5E          ;NO
1576 004444 004737 004770          JSR      PC,ALLEOT  ;ALL DRIVES AT EOT?
1577 004450 000657          BR       T5          ;NO
1578 004452 000137 003152          JMP      DONE        ;YES, EXIT
1579 004456 000000          TSFLAG: 0
1580 004460 000000          TSINC:  0
1581
1582          ;SAVE DRIVE RECORD AND ERROR COUNTERS
1583 004462 004737 004516          SVCTR:  JSR      PC,CTRDEX

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1584 004466 012021          SVC1:  MOV    (0), (1)
1585 004470 022700 000636    CMP    @DRVADR, R0
1586 004474 001374          BNE    SVC1
1587 004476 000207          RTS    PC
1588          ;RESET DRIVE COUNTERS BACK INTO PROGRAM
1589 004500 004737 004516    MVCTR: JSR    PC, CTRDEX
1590 004504 012120          MV1:   MOV    (1), (0)
1591 004506 022700 000636    CMP    @DRVADR, R0
1592 004512 001374          BNE    MV1
1593 004514 000207          RTS    PC
1594          ;SET UP POINTERS FOR MOVE AND SAVE COUNTERS
1595 004516 012700 000572    CTRDEX: MOV   @ARCHEK, R0
1596 004522 012701 000636    MOV   @DRVADR, R1
1597 004526 063701 000560    ADD   CDRIVE, R1
1598 004532 063701 000560    ADD   CDRIVE, R1
1599 004536 011101          MOV   @R1, R1
1600 004540 000207          RTS    PC
1601          ;CLEAR ALL DRIVE COUNTERS
1602 004542 104410          CLRAL: RSFDRV
1603 004544 004737 004732    CLR1:  JSR    PC, REMIND
1604 004550 004737 005076    JSR    PC, CLRTBL
1605 004554 104406          SVCTRS
1606 004556 104422          CHGDRV
1607 004560 000771          BR    CLR1
1608 004562 004737 000010 000634    BIS   @10, MODES ;AT END OF RLS
1609 004570 005037 004456    CLR   TSFLAG
1610 004574 000207          RTS    PC
1611          ;RESET DRIVE SELECTION TO LOWEST NUMBER
1612 004576 005037 000560    RSFDR: CLR   JDRIVE ;START WITH DRIVE 0
1613 004602 012737 000200 000556    MOV   @200, CDRVBT ;BIT FOR DRIVE 0
1614 004610 033737 000550 000556    RSF1: BIT   MSBITS, CDRVBT ;IS DRIVE SELECTED?
1615 004616 001006          BNE    RSF2 ;YES
1616 004620 005237 000560          INC   CDRIVE ;NO + 1 TO DRIVE
1617 004624 000241          CLC
1618 004626 006037 000556          ROR   CDRVBT ;ROTATE DRIVE BIT
1619 004632 000766          BR    RSF1 ;REPEAT
1620 004634 013737 000560 000554    RSF2: MOV   CDRIVE, COMAND
1621 004642 000337 000554          SWAB COMAND
1622 004646 052737 000000 000554    BIS   @60000, COMAND ;800 BPI, 9 TRACK
1623 004654 032777 001000 173630    BIT   @1000, BSWR ;TEST PARITY SELECTED
1624 004662 001403          BEQ   .+10 ;ODD
1625 004664 052737 004000 000554    BIS   @4000, COMAND ;EVEN
1626 004672 000207          RTS    PC
1627
1628          ;SELECT NEXT DRIVE IN SEQUENCE
1629          ;+1 WORD TO EXIT ADDRESS IF LAST DRIVE TESTED
1630 004674 005237 000560    CHGDR: INC   CDRIVE ;+1 TO DRIVE NUMBER
1631 004700 000241          CLC
1632 004702 006037 000556          ROR   CDRVBT ;MOVE MASK BIT OVER 1 PLACE
1633 004706 001004          BNE    CHG1 ;BRANCH IF MORE DRIVES SELECTED
1634 004710 104410          RSFDRV ;RESET DRIVE SELECT TO LOWEST NUMBER
1635 004712 062716 000002          ADD   @2, BSP ;+ 2 TO SKIP OVER FIRST EXIT
1636 004716 000207          RTS    PC
1637 004720 033737 000556 000550    CHG1: BIT   CDRVBT, MSBITS
1638 004726 001762          BEQ   CHGDR
1639 004730 000741          BR    RSF2
1640

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1641 ;REWIND DRIVE TO BOT
1642 004732 105777 173544 REWIND: TSTB @MTC
1643 004736 100375 BPL .-4 ;WAIT FOR CONTROL UNIT
1644 004740 013777 000554 173534 MOV COMAND,@MTC ;SELECT DRIVE
1645 004746 006077 173526 ROR @MTC
1646 004752 103375 BCC .-4 ;WAIT FOR TU READY
1647 004754 052777 000016 173520 BIS @16,@MTC ;REWIND
1648 004762 004737 005122 JSR PC,GOWAIT
1649 004766 000207 RTS PC ;EXIT
1650 ;ARE ALL DRIVES AT END OF TAPE
1651 004770 104410 ALLEOT: RSFDRV
1652 004772 104414 ALL1: MVCTRS
1653 004774 032737 000060 000634 BIT @60,MODES ;AT EOT?
1654 005002 001403 BEQ ALLEOS ;NO
1655 005004 104422 CHGDRV ;DONE ALL DRIVES?
1656 005006 000771 BR ALL1 ;NO
1657 005010 000427 BR ALL3
1658 005012 032777 000400 173472 ALLEOS: BIT @400,BSWR ;TEST SWITCH 8 TO EXIT AT END OF SEQUENCE
1659 005020 001425 BEQ ALL2 ;NO, GO TO EOT
1660 005022 032737 000010 000634 BIT @10,MODES ;AT END OF SEQUENCE
1661 005030 001421 BEQ ALL2 ;NO, EXIT, DON'T DUMP ERROR COUNTERS
1662 ;DUMP ERROR COUNTERS ON ALL DRIVES
1663 005032 104410 CTRDMP: RSFDRV
1664 005034 104414 MVCTRS
1665 005036 005737 004456 TST TSFLAG
1666 005042 001006 BNE CTRD1 ;DUMP READ ONLY
1667 005044 004737 006146 JSR PC,ENDT1
1668 005050 032737 000004 000634 BIT @4,MODES ;READ PASS SELECTED?
1669 005056 001402 BEQ CDMEND ;NO
1670 005060 004737 010320 CTRD1: JSR PC,RNDTP1
1671 005064 104422 CDMEND: CHGDRV ;DONE ALL DRIVES
1672 005066 000762 BR CTRDMP+2 ;NO
1673 005070 062716 000002 ALL3: ADD @2,(6) ;INCREMENT RETURN POINT
1674 005074 000207 ALL2: RTS PC
1675
1676 ;CLEAR READ AND WRITE TABLES
1677 005076 012700 000572 CLRTBL: MOV @MRCHEK,RO
1678 005102 005020 CLRT1: CLR (0)+
1679 005104 020027 000634 CMP RO,@MODES
1680 005110 001374 BNE CLRT1
1681 005112 042737 000070 000634 BIC @70,MODES
1682 005120 000207 RTS PC
1683 ;INTERRUPT ENABLE, GO, WAIT FOR INTERRUPT
1684 005122 012777 000200 173360 GOWAIT: MOV @200,BCC ;SET PRIORITY LEVEL 4
1685 005130 012777 005164 173376 MOV @GW1,@MTV ;SET INTERRUPT RETURN
1686 005136 012737 000001 005152 MOV @1,WAIT1
1687 005144 052777 000101 173330 BIS @101,@MTC ;INTERRUPT ENABLE, GO
1688 005152 000001 WAIT1: WAIT ;WAIT FOR INTERRUPT
1689 005154 012777 000340 173326 MOV @340,BCC ;RESTORE PRIORITY LEVEL 7
1690 005162 000207 RTS PC ;EXIT
1691 005164 012737 000001 005152 GW1: MOV @1,WAIT1
1692 005172 000002 RTI ;RETURN FROM INTERRUPT
1693
1694 ;WRITE RECORD SECTION
1695 005174 005737 000614 WRITI: TST RECORD ;IS THIS THE FIRST RECORD
1696 005200 001031 BNE NOINCR ;NO, SKIP SET UP OF RECORD LENGTH AND BLOCK INCREMENT
1697 005202 013737 000524 000544 MOV MAXLEN,STRLEN

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1698 005210 012737 177774 000566      MOV      @-4.,BLKINC
1699 005216 032737 000020 001322      BIT      @20,PARAM
1700 005224 001006                BNE      W1
1701 005226 013737 000526 000544      MOV      MINLEN,STRLEN
1702 005234 012737 000004 000566      MOV      @4.,BLKINC
1703 005242 013737 000544 000630  W1:      MOV      STRLEN,WRLEN
1704 005250 032737 000040 001322      BIT      @40,PARAM      ;DOES RECORD LENGTH CHANGE?
1705 005256 001002                BNE      NOINCR      ;YES
1706 005260 005037 000566                CLR      BLKINC      ;NO
1707 005264 013737 000614 000616  NOINCR: MOV      RECORD,WRRECR
1708 005272 005737 004456                TST      TSFLAG
1709 005276 001401                BEQ      .+4
1710 005300 000207                RTS      PC      ;EXIT WRITE ROUTINE IF TEST 5
1711 005302 005037 000564                CLR      WRPASS
1712 005306 013777 000554 173166  STRTOP: MOV      COMAND,BMTC      ;SELECT UNIT
1713 005314 105777 173162                TSTB     BMTC
1714 005320 100375                BPL      .-4      ;WAIT FOR CU READY
1715 005322 006077 173152                ROR      BMS      ;WAIT FOR TU READY
1716 005326 103375                BCC      .-4
1717 005330 013777 000630 173146  NONSTP: MOV      WRLEN,BBC      ;SET BYTE COUNT
1718 005336 005477 173142                NEG      BBC
1719 005342 013777 000530 173136      MOV      WBUF,BCA      ;SET CURRENT ADDRESS
1720 005350 052777 000004 173124      BIS      @4,BMTC      ;WRITE
1721 005356 004737 005122                JSR      PC,GOWAIT      ;INTERRUPT ENABLE, GO, WAIT FOR DONE
1722                ;RETURN HERE AFTER INTERRUPT
1723 005362 017737 173112 000570      MOV      BMS,STATRD      ;SAVE STATUS
1724 005370 005777 173106                TST      BMTC
1725 005374 100542                BHI      ERROR      ;HAVE ERROR FLAG, CHECK FOR EOT
1726 005376 005737 000564                TST      WRPASS      ;WAS THIS A RECOVERY PASS
1727 005402 001410                BEQ      TSTSTP      ;NO
1728 005404 013700 000564                MOV      WRPASS,RO      ;YES
1729 005410 006300                ASL      RO
1730 005412 062700 000572                ADD      @WRCHK,RO
1731 005416 005210                INC      BRO      ;+1 TO APPROPRIATE RECOVERY PASS COUNTER
1732 005420 005037 000564                CLR      WRPASS
1733 005424 032737 000014 001322  TSTSTP: BIT      @14,PARAM      ;IS WRITE MODE NONSTOP?
1734 005432 001023                BNE      STOPOP      ;NO
1735 005434 005737 000564                TST      WRPASS      ;YES
1736 005440 001333                BNE      NONSTP
1737 005442 004737 005610                JSR      PC,TESINC      ;CHANGE RECORD LENGTH
1738 005446 032737 000001 000634      BIT      @1,MODES      ;EXIT AFTER RLS?
1739 005454 001405                BEQ      W10      ;NO
1740 005456 032737 000010 000634      BIT      @10,MODES      ;YES, ARE WE AT END OF RLS?
1741 005464 001721                BEQ      NONSTP      ;NO
1742 005466 000207                RTS      PC      ;YES
1743 005470 032737 000002 000634  W10:      BIT      @2,MODES      ;EXIT EVERY RECORD?
1744 005476 001714                BEQ      NONSTP      ;NO
1745 005500 000207                RTS      PC      ;YES
1746 005502 032737 000010 001322  STOPOP: BIT      @10,PARAM      ;IS WRITE MODE RANDOM?
1747 005510 001414                BEQ      W11      ;NO
1748                ;RANDOM STALL DELAY
1749 005512 004737 007214                JSR      PC,RANGEN
1750 005516 052737 177400 007364      BIS      @177400,RANDOM
1751 005524 012704 177470                MOV      @-200.,R4      ;DELAY 1 MILLISECOND
1752 005530 005204                INC      R4
1753 005532 001376                BNE      .-2
1754 005534 005237 007364                INC      RANDOM

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1755 005540 001371      BNE      RAN1
1756 005542 005737 000564  W11:  TST      WRPASS
1757 005546 001257      BNE      STRTOP
1758 005550 004737 005610  JSR      PC, TESINC
1759 005554 032737 000001 000634  BIT      @1, MODES      ;EXIT AFTER RLS?
1760 005562 001405      BEQ      W12            ;NO
1761 005564 032737 000010 000634  BIT      @10, MODES     ;YES, ARE WE AT END OF RLS?
1762 005572 001645      BEQ      STRTOP        ;NO
1763 005574 000207      RTS      PC            ;YES
1764 005576 032737 000002 000634  W12:  BIT      @2, MODES     ;EXIT EVERY RECORD?
1765 005604 001640      BEQ      STRTOP        ;NO
1766 005606 000207      RTS      PC            ;YES
1767      ;SEE IF RECORD LENGTH SHOULD BE CHANGED
1768 005610 005237 000614  TESINC: INC      RECORD    ;+1 TO RECORD COUNT
1769 005614 042737 000010 000634  BIC      @10, MODES     ;NOT END OF RLS UNLESS SET BELOW
1770 005622 005737 000566      TST      BLKINC
1771 005626 001416      BEQ      TSINC2
1772 005630 063737 000566 000630  ADD      BLKINC, WRTLEN
1773 005636 023737 000630 000526  CMP      WRTLEN, MINLEN ;RECORD LENGTH TOO SHORT?
1774 005644 002404      BLT      RESETL        ;YES, RESET
1775 005646 023737 000630 000524  CMP      WRTLEN, MAXLEN ;RECORD LENGTH TOO LONG?
1776 005654 003403      BLE      TSINC2        ;NO
1777 005656 013737 000544 000630  RESETL: MOV     STRLEN, WRTLEN ;YES, RESET
1778 005664 105737 000614  TSINC2: TSTB     RECORD    ;IS RECORD A MULTIPLE OF 256
1779 005670 001003      BNE      TSINC3        ;NO
1780 005672 052737 000010 000634  BIS      @10, MODES     ;INDICATE AT END OF RLS
1781 005700 000207      TSINC3: RTS      PC
1782
1783
1784      ;HAVE AN ERROR FLAG DURING WRITE OPERATION
1785      ;IF ERROR IS CAUSED BY END OF TAPE FLAG DUMP WRITE ERROR COUNTERS
1786      ;FOR ALL OTHER ERRORS; PRINT COMMAND AND STATUS REGISTERS AND RECORD NUMBER
1787      ;IF READ PASS IS SELECTED, TRY TO RECOVER BY WRITING WITH XIRG.
1788 005702 104434      ERRGR: CKSMR          ;CHECK FOR CNTL G
1789 005704 032737 175600 000570  BIT      @175600, STATRD ;AT EOT?
1790 005712 001510      BEQ      ENDTAP        ;YES
1791 005714 005737 000564      TST      WRPASS
1792 005720 001002      BNE      ERR1          ;FIRST ERROR?
1793 005722 005237 000572      INC      WRCHEK        ;YES, + 1 TO WRITE ERROR
1794 005726 032777 020000 172556  ERR1:  BIT      @20000, BSMR ;TYPE ALL ERRORS?
1795 005734 001010      BNE      TESREC        ;NO
1796 005736 012702 012774      MOV      @MSG7, R2
1797 005742 104404      TOP
1798 005744 013737 000630 000546  MOV      WRTLEN, LENGTH ;PRINT ERROR
1799 005752 004737 011174      JSR      PC, PRS
1800 005756 032777 000100 172526  TESREC: BIT      @100, BSMR ;PRINT STATUS, COMMAND, RECORD, LENGTH
1801 005764 001410      BEQ      TESRC1        ;RECOVER STATISTICALLY SELECTED?
1802 005766 005237 000564      INC      WRPASS        ;NO
1803 005772 022737 000010 000564  CMP      @8, WRPASS     ;+1 TO WRITE RECOVER
1804 006000 001020      BNE      STREC1        ;HAVE WE TRIED TO WRITE RECOVER 8 TIMES?
1805 006002 005237 000612      INC      PERMBS        ;NO
1806 006006 032737 000004 000634  TESRC1: BIT      @4, MODES ;YES, +1 TO PERMANENT BADSPOT?
1807 006014 001402      BEQ      .+6           ;IS READ PASS SELECTED?
1808 006016 004737 010644      JSR      PC, XRGREC    ;NO
1809 006022 005037 000564      CLR      WRPASS
1810 006026 032737 002000 000570  BIT      @2000, STATRD
1811 006034 001037      BNE      ENDTAP

```

1812	006036	000137	005542		JMP	W11	
1813	006042	004737	010242		STREC1: JSR	PC,BACK1	
1814	006046	004737	010242		JSR	PC,BACK1	;BACKSPACE 2 RECORDS
1815	006052	032777	000040	172420	BIT	@40,BMTS	
1816	006060	001402			BEQ	.+6	
1817	006062	000137	005306		JMP	STRTOP	
1818	006066	012777	177777	172410	MOV	@-1,BBC	
1819	006074	013777	000554	172400	MOV	COMAND,BMTC	
1820	006102	052777	000010	172372	BIS	@10,BMTC	
1821	006110	004737	005122		JSR	PC,GOMAIT	;SPACE FORWARD 1 RECORD
1822	006114	042777	000016	172360	BIC	@16,BMTC	
1823	006122	052777	000004	172352	BIS	@4,BMTC	;CHANGE FROM SPACE TO WRITE
1824	006130	000137	005306		JMP	STRTOP	
1825							;DRIVE IS AT EOT
1826	006134	005237	000614		ENDTAP: INC	RECORD	
1827	006140	052737	000040	000634	BIS	@40,MODES	;INDICATE DRIVE AT EOT
1828	006146	012702	013757		ENDT1: MOV	@MSG24,R2	
1829	006152	104404				TOP	
1830	006154	012702	013022		MOV	@MSG8,R2	
1831	006160	104404				TOP	



```

1833
1834
1835
1836 006162 104434
1837 006164 013737 000554 011350
1838 006172 000337 011350
1839 006176 142737 000170 011350
1840
1841 006204 052737 000260 011350
1842 006212 004737 011352
1843 006216 104430
1844 006220 013737 001322 011350
1845 006226 000337 011350
1846 006232 006037 011350
1847 006236 042737 000170 011350
1848 006244 052737 000260 011350
1849 006252 004737 011352
1850 006256 013737 001322 011350
1851 006264 042737 177763 011350
1852 006272 012702 013510
1853 006276 022737 000004 011350
1854 006304 001002
1855 006306 012702 013464
1856 006312 022737 000010 011350
1857 006320 001002
1858 006322 012702 013476
1859 006326 104404
1860 006330 013702 000614
1861 006334 104426
1862 006336 013737 001322 011350
1863 006344 042737 177717 011350
1864 006352 012702 013540
1865 006356 022737 000020 011350
1866 006364 001002
1867 006366 012702 013547
1868 006372 022737 000040 011350
1869 006400 001002
1870 006402 012702 013522
1871 006406 022737 000060 011350
1872 006414 001002
1873 006416 012702 013531
1874 006422 104404
1875 006424 012702 013556
1876 006430 104404
1877 006432 013702 000572
1878 006436 104426
1879 006440 012700 000574
1880 006444 112737 000060 013617
1881 006452 105237 013617
1882 006456 005710
1883 006460 001405
1884 006462 012702 013600
1885 006466 104404
1886 006470 011002
1887 006472 104426
1888 006474 005720
1889 006476 020027 000612

```

!DUMP WRITE ERRORS

WRTDMP: CKSMR

!CHECK FOR CNTL G

MOV COMAND,CHAR
SWAB CHAR
BICB @170,CHAR

!PRINT DRIVE NUMBER

BIS @260,CHAR
JSR PC,OCTP

!PRINT PATTERN NUMBER

MOV PARAM,CHAR
SWAB CHAR
ROR CHAR
BIC @170,CHAR
BIS @260,CHAR
JSR PC,OCTP

!PRINT WRITE MODE

!PRINT RECORD NUMBER

MOV PARAM,CHAR
BIC @177763,CHAR
MOV @MSG14,R2
CMP @4,CHAR
BNE .+6
MOV @MSG12,R2
CMP @10,CHAR
BNE .+6
MOV @MSG13,R2
TOP

!PRINT RECORD LENGTH SEQUENCE

!PRINT "WRITE ERRORS-"

!PRINT STATISTICAL RECOVERY

MOV RECORD,R2
DECPRT
MOV PARAM,CHAR
BIC @177717,CHAR
MOV @MSG17,R2
CMP @20,CHAR
BNE .+6
MOV @MSG18,R2
CMP @40,CHAR
BNE .+6
MOV @MSG15,R2
CMP @60,CHAR
BNE .+6
MOV @MSG16,R2
TOP
MOV @MSG19,R2
TOP
MOV @RRCHEK,R2

WRTD1:

WRTD2:

MOV @RRCHEK+2,R0
MOV @60,MSG20+17
INCB MSG20+17
TST BR0
BEG WRTD2
MOV @MSG20,R2
TOP
MOV (0),R2
DECPRT
TST (0)+
CMP R0,@RRCHEK+20

!RECOVERED AT X
!JUST INCREMENTING

```

1890 006502 001363          BNE      WRTD1
1891 006504 005737 000612  TST      PERMBS
1892 006510 001001          BNE      .+4          ;SKIP PRINT IF = 0
1893 006512 000207          RTS      PC
1894
1895
1896 006514 012702 013622  MOV      @MSG20A,R2
1897 006520 104404          TOP
1898 006522 013702 000612  MOV      PC,@BS,R2    ;PRINT "PERMANENT BADSPOT"
1899 006526 104426          DECP    PC
1900 006530 000207          RTS      PC
1901          ;GENERATE DATA PATTERN
1902 006532 013702 000530  GENPA:  MOV      MBUF,R2 ;INITIALIZE BUFFER
1903 006536 013737 001322 006644  MOV      PARAM,GP1   ;CHECK PARAMETERS FOR PATTERN SELECTED
1904 006544 042737 170777 006544  BIC      @170777,GP1
1905 006552 001435          BEQ      PAT0
1906 006554 022737 001000 006644  CMP      @1000,GP1
1907 006562 001437          BEQ      PAT1
1908 006564 022737 002000 006644  CMP      @2000,GP1
1909 006572 001457          BEQ      PAT2
1910 006574 022737 003000 006644  CMP      @3000,GP1
1911 006602 001461          BEQ      PAT3
1912 006604 022737 004000 006644  CMP      @4000,GP1
1913 006612 001501          BEQ      PAT4
1914 006614 022737 005000 006644  CMP      @5000,GP1
1915 006622 001510          BEQ      PAT5
1916 006624 022737 006000 006644  CMP      @6000,GP1
1917 006632 001402          BEQ      .+6
1918 006634 000137 007174  JMP      PAT7
1919 006640 000137 007160  JMP      PAT6

```

```

1921
1922 006644 000000
1923
1924
1925 006646 012722 002010
1926 006652 023702 000532
1927 006656 001373
1928 006660 000207
1929
1930
1931 006662 012700 006710
1932 006666 012022
1933 006670 023702 000532
1934 006674 001001
1935 006676 000207
1936 006700 022700 006732
1937 006704 001370
1938 006706 000765
1939 006710 100000
1940 006712 020100
1941 006714 004020
1942 006716 001004
1943 006720 000001
1944 006722 040200
1945 006724 010040
1946 006726 002010
1947 006730 000402
1948
1949
1950
1951 006732 012722 136274
1952 006736 023702 000532
1953 006742 001373
1954 006744 000207
1955
1956
1957 006746 012700 006774
1958 006752 012022
1959 006754 023702 000532
1960 006760 001001
1961 006762 000207
1962 006764 022700 007016
1963 006770 001370
1964 006772 000765
1965 006774 140037
1966 006776 100476
1967 007000 001574
1968 007002 003770
1969 007004 017760
1970 007006 037300
1971 007010 076201
1972 007012 174003
1973 007014 170007
1974
1975
1976 007016 105037 007042
1977 007022 113722 007042

```

```

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 PATTEPN (0-377)
PAT4: CLRB P4A
P4: MOVB P4A,(2)

```

1978	007026	105237	007042	INCB	P4A
1979	007032	023702	000532	CMP	RBUF,R2
1980	007036	001371		BNE	P4
1981	007040	000207		RTS	PC
1982	007042	000000		P4A:	0
1983					
1984				;PATTERN 5	
1985				;EACH TRACK 3 BITS	
1986	007044	012700	007072	PAT5:	MOV @PST,R0
1987	007050	012022		PAT5A:	MOV (0),.(2).
1988	007052	023702	000532	CMP	RBUF,R2
1989	007056	001001		BNE	,+4
1990	007060	000207		RTS	PC
1991	007062	022700	007160	CMP	@PAT6,R0
1992	007064	001370		BNE	PAT5A
1993	007070	000765		BR	PAT5
1994	007072	000000		PST:	0
1995	007074	100000			100000
1996	007076	100200			100200
1997	007100	040100			40100
1998	007102	020100			20100
1999	007104	020040			20040
2000	007106	010020			10020
2001	007110	004020			4020
2002	007112	004010			4010
2003	007114	002004			2004
2004	007116	001004			1004
2005	007120	001002			1002
2006	007122	000401			401
2007	007124	000001			1
2008	007126	000000			0
2009	007130	100200			100200
2010	007132	040200			40200
2011	007134	040100			40100
2012	007136	020040			20040
2013	007140	010040			10040
2014	007142	010020			10020
2015	007144	004010			4010
2016	007146	002010			2010
2017	007150	002004			2004
2018	007152	001002			1002
2019	007154	000402			402
2020	007156	000401			401
2021				;PATTERN 6	
2022				;HIGH FREQUENCY ALL TRACKS	
2023	007160	012722	177777	PAT6:	MOV @-1,(2).
2024	007164	023702	000532	CMP	RBUF,R2
2025	007170	001373		BNE	PAT6
2026	007172	000207		RTS	PC
2027					
2028					
2029				;PATTERN 7	
2030				;RANDOM	
2031	007174	004737	007214	PAT7:	JSR PC,RANGEN
2032	007200	013722	007364	MOV	RANDOM,(2).
2033	007204	023702	000532	CMP	RBUF,R2
2034	007210	001371		BNE	PAT7

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2035 007212 000207          RTS      PC
2036          ;RANDOM NUMBER GENERATOR
2037          ;EXIT WITH RANDOM NUMBER IN LOCATION NAMED "RANDOM"
2038 007214 010037 007372  RANGEN: MOV    R0,SV0          ;SAVE REGISTERS
2039 007220 010137 007374          MOV    R1,SV1
2040 007224 010237 007376          MOV    R2,SV2
2041 007230 010337 007400          MOV    R3,SV3
2042 007234 013700 007366          MOV    LONUM,R0          ;SET UP LOW DIGIT
2043 007240 013701 007370          MOV    MINUM,R1         ;SET UP HIGH DIGIT
2044 007244 012703 000007          MOV    #7,R3           ;SET UP SHIFT COUNT
2045 007250 005002          CLR    R2
2046 007252 006300  RANG1: ASL    R0           ;SHIFT R0 LEFT AND
2047 007254 006101          ROL    R1           ;ROTATE CARRY INTO LSB OF R1 AND
2048 007256 006102          ROL    R2           ;ROTATE CARRY OUT OF R1 INTO R2
2049 007260 005303          DEC    R3           ;DECREMENT R3
2050 007262 001373          BNE   RANG1        ;CONTINUE SHIFT LOOP
2051 007264 063700 007366          ADD    LONUM,R0       ;ADD NUMBER TO MAKE X 129
2052 007270 005501          ADC    R1           ;PROPAGATE CARRY
2053 007272 063701 007370          ADD    MINUM,R1      ;ADD NUMBER TO MAKE X 129
2054 007276 005502          ADC    R2           ;PROPAGATE CARRY
2055 007300 062700 001057          ADD    #1057,R0      ;ADD LOW CONSTANT
2056 007304 005501          ADC    R1           ;PROPAGATE CARRY
2057 007306 005502          ADC    R2           ;PROPAGATE CARRY
2058 007310 062701 047401          ADD    #47401,R1     ;ADD HIGH CONSTANT
2059 007314 005502          ADC    R2           ;PROPAGATE CARRY
2060 007316 062702 000006          ADD    #6,R2        ;ADD HIGH CONSTANT
2061 007322 060200          ADD    R2,R0        ;RE-PRIME R0 WITH HIGH DIGIT
2062 007324 005501          ADC    R1           ;PROPAGATE CARRY
2063 007326 010037 007364          MOV    R0,RANDOM    ;SAVE RANDOM NUMBER
2064 007332 010037 007366          MOV    R0,LONUM     ;PUT R0 BACK IN LONUM
2065 007336 010137 007370          MOV    R1,MINUM    ;PUT R1 BACK IN MINUM
2066 007342 013700 007372          MOV    SV0,R0       ;RESTORE REGISTERS
2067 007346 013701 007374          MOV    SV1,R1
2068 007352 013702 007376          MOV    SV2,R2
2069 007356 013703 007400          MOV    SV3,R3
2070 007362 000207          RTS      PC          ;EXIT
2071 007364 000000  RANDOM: 0
2072 007366 000000  LONUM: 0
2073 007370 000000  MINUM: 0
2074 007372 000000  SV0: 0
2075 007374 000000  SV1: 0
2076 007376 000000  SV2: 0
2077 007400 000000  SV3: 0
2078
2079
2080          ;READ RECORD SECTION
2081 007402 005737 000614  READI: TST    RECORD          ;FIRST RECORD?
2082 007406 001003          BNE   #R1           ;NO
2083 007410 013737 000544 000632  MOV    STRLEN,READLN ;SET INITIAL READ LENGTH
2084 007416 012737 177775 000562  #R1:  MOV    #-3,RDPASS ;INITIALIZE READ PASS COUNTER
2085 007424 013777 000554 171050  RDSTPD: MOV    COMAND,BMTC
2086 007432 105777 171044          TSTB  BMTC
2087 007436 100375          BPL   .-4           ;WAIT FOR CONTROL UNIT READY
2088 007440 006077 171034          ROR   BMTC
2089 007444 103375          BCC   .-4           ;WAIT FOR TAPE UNIT READY
2090 007446 013700 000532  READGO: MOV    RBUF,R0
2091 007452 013701 000632          MOV    READLN,R1

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2092 007456 105020          RG1:  CLR8   (0)•          ;CLEAR READ BUFFER
2093 007460 005301          DEC    R1
2094 007462 001375          BNE   RG1
2095 007464 013777 000632 171012  MOV   READLN,8BC      ;SET BYTE COUNT
2096 007472 005477 171006          NEG   8BC
2097 007476 013777 000532 171002  MOV   RBUF,8CA        ;SET CURRENT ADDRESS
2098 007504 013777 000554 170770  MOV   COMAND,8MTC
2099 007512 052777 000002 170762  BIS   @2,8MTC
2100 007520 004737 005122          JSR   PC,GOMAIT
2101                                ;RETURN HERE AFTER INTERRUPT
2102 007524 017737 170750 000570  MOV   8MTC,STATRD
2103 007532 005777 170744          TST   8MTC            ;ANY STATUS ERRORS
2104 007536 100504          BMI   RDERR0         ;YES
2105                                ;CHECK FOR DATA ERRORS
2106 007540 013700 000532          MOV   RBUF,R0
2107 007544 013701 000530          MOV   WBUF,R1
2108 007550 013702 000632          MOV   READLN,R2
2109 007554 022021          ;RS:  CMP   (0)•,(1)•    ;CHECK FOR PROPER DATA TRANSFER
2110 007556 001045          BNE   DATERR         ;HAVE DATA ERROR
2111 007560 162702 000002          SUB   @2,R2          ;CHECKED ALL TRANSFERS?
2112 007564 001373          BNE   ;RS            ;NO
2113 007566 032737 000003 001322  RTSSTP: BIT   @3,PARAM
2114 007574 001007          BNE   RDSTPC
2115 007576 004737 010172          JSR   PC,RDINCR     ;INCREMENT FOR NEXT BLOCK
2116 007602 023737 000614 000620  CMP   RECORD,LASRCR
2117 007610 001316          BNE   READGO
2118 007612 000207          RTS   PC
2119 007614 032737 000002 001322  RDSTPC: BIT   @2,PARAM
2120 007622 001414          BEQ   RDSTP         ;EXIT READIT
2121 007624 004737 007214          ;RDRDS: JSR   PC,RANGEN ;IS READ MODE RANDOM?
2122 007630 052737 177400 007364  BIS   @177400,RANDOM ;NO
2123 007636 012704 177470          RND51: MOV   @-200.,R4
2124 007642 005204          INC   R4            ;DELAY 1 MILLISECOND
2125 007644 001376          BNE   .-2
2126 007646 005237 007364          INC   RANDOM
2127 007652 001371          BNE   RND51
2128 007654 004737 010172          RDSTP: JSR   PC,RDINCR
2129 007660 023737 000614 000620  CMP   RECORD,LASRCR ;DONE LAST RECORD?
2130 007666 001256          BNE   RDSTPD        ;NO
2131 007670 000207          RTS   PC            ;YES EXIT
2132                                ;HAVE DATA ERROR
2133 007672 032777 020000 170612  DATERR: BIT   @20000,8SMR ;TYPE ALL READ ERRORS?
2134 007700 001014          BNE   DATER1        ;NO
2135 007702 012702 013144          MOV   @MSG9A,R2
2136 007706 104404          TOP
2137 007710 013737 000632 000546  MOV   READLN,LENGTH
2138 007716 004737 011174          JSR   PC,PRTS
2139 007722 014102          MOV   -(1),R2       ;PRINT EXPECTED DATA
2140 007724 104412          OCTPRT
2141 007726 014002          MOV   -(0),R2
2142 007730 104412          OCTPRT             ;PRINT ACTUAL DATA
2143 007732 022737 177775 000562  DATER1: CMP   @-3,RDPASS
2144 007740 001002          BNE   .+6
2145 007742 005237 000624          INC   DAERRS        ;+1 TO DATA ERRORS
2146 007746 000464          BR    RTSR1
2147                                ;STATUS INDICATES AN ERROR, CHECK FOR EOT
2148 007750 104434          RDERR0: CKSMR      ;CHECK FOR CNTL G

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2206	010172	005237	000614		RDINCR: INC	RECORD	
2207	010176	005737	000566		TST	BLKINC	
2208	010202	001416			BEG	RESTR1	
2209					;RECORD LENGTH IS CHANGING, COUNT IT		
2210	010204	063737	000566	000632	ADD	BLKINC,READLN	
2211	010212	023737	000632	000526	CMP	READLN,MINLEN	;IS LENGTH LESS THAN MINIMUM
2212	010220	002404			BLT	RESTR1	;NO
2213	010222	023737	000632	000524	CMP	READLN,MAXLEN	;IS LENGTH GREATER THAN MAXIMUM?
2214	010230	003403			BLE	RESTR1	;NO
2215	010232	013737	000544	000632	RESTR1: MOV	STRLEN,READLN	;RESET INITIAL LENGTH
2216	010240	000207			RESTR1: RTS	PC	
2217					;BACKSPACE ONE RECORD		
2218	010242	006077	170232		BACK1: ROR	BPTS	
2219	010246	103375			BCC	.-4	;WAIT FOR TAPE UNIT READY
2220	010250	012777	177777	170226	MOV	@-1,BBC	;COUNT 1 RECORD
2221	010256	013777	000554	170216	MOV	COMAND,BMTC	;SELECT DRIVE
2222	010264	052777	000012	170210	BIS	@12,BMTC	;ISSUE BACKSPACE
2223	010272	004737	005122		JSR	PC,GOWAIT	
2224	010276	042777	000016	170176	BIC	@16,BMTC	
2225	010304	000207			RTS	PC	
2226					;DRIVE HAS REACHED EOT IN READ MODE		
2227	010306	004737	010172		RNDTAP: JSR	PC,RDINCR	
2228	010312	052737	000020	000634	BIS	@20,MODES	;INDICATE AT EOT
2229	010320	012702	014023		RNDTP1: MOV	@MSG25,R2	
2230	010324	104404				TOP	
2231	010326	012702	013022		MOV	@MSG8,R2	
2232	010332	104404				TOP	
2233					;DUMP ERROR COUNTERS		
2234	010334	104434			READMP: CKSWR		;CHECK FOR CNTL G
2235	010336	013737	000554	011350	MOV	COMAND,CHAR	
2236	010344	000337	011350		SWAB	CHAR	
2237	010350	142737	000170	011350	BICB	@170,CHAR	
2238	010356	052737	000260	011350	BIS	@260,CHAR	
2239	010364	004737	011352		JSR	PC,OCTP	;PRINT DRIVE NUMBER
2240	010370	104430			SP3		
2241	010372	013737	001322	011350	MOV	PARAM,CHAR	
2242	010400	000337	011350		SWAB	CHAR	
2243	010404	006037	011350		ROR	CHAR	
2244	010410	042737	000170	011350	BIC	@170,CHAR	
2245	010416	052737	000260	011350	BIS	@260,CHAR	
2246	010424	004737	011352		JSR	PC,OCTP	;PRINT PATTERN NUMBER
2247							
2248	010430	013737	001322	011350	MOV	PARAM,CHAR	
2249	010436	042737	177774	011350	BIC	@177774,CHAR	
2250	010444	012702	013510		MOV	@MSG14,R2	
2251	010450	022737	000001	011350	CMP	@1,CHAR	
2252	010456	001002			BNE	.*6	
2253	010460	012702	013464		MOV	@MSG12,R2	
2254	010464	022737	000002	011350	CMP	@2,CHAR	
2255	010472	001002			BNE	.*6	
2256	010474	012702	013476		MOV	@MSG13,R2	
2257	010500	104404				TOP	;PRINT READ MODE
2258	010502	013702	000614		MOV	RECORD,R2	
2259	010506	104426			DECPRT		;PRINT RECORD NUMBER
2260	010510	013737	001322	011350	MOV	PARAM,CHAR	
2261	010516	042737	177717	011350	BIC	@177717,CHAR	
2262	010524	012702	013540		MOV	@MSG17,R2	



```

2263 010530 022737 000020 011350      CMP      #20,CHAR
2264 010536 001002                      BNE      .+6
2265 010540 012702 013547      MOV      @MSG18,R2
2266 010544 022737 000040 011350      CMP      #40,CHAR
2267 010552 001002                      BNE      .+6
2268 010554 012702 013522      MOV      @MSG15,R2
2269 010560 022737 000060 011350      CMP      #60,CHAR
2270 010566 001002                      BNE      .+6
2271 010570 012702 013531      MOV      @MSG16,R2
2272 010574 104404                      TOP      ;PRINT RECORD LENGTH SEQUENCE
2273 010576 012702 013652      MOV      @MSG21,R2
2274 010602 104404                      TOP
2275 010604 013702 000622      MOV      RDERRS,R2
2276 010610 104426                      DECPRT
2277 010612 012702 013702      MOV      @MSG22,R2
2278 010616 104404                      TOP
2279 010620 013702 000624      MOV      DAERRS,R2
2280 010624 104426                      DECPRT
2281 010626 012702 013723      MOV      @MSG23,R2
2282 010632 104404                      TOP
2283 010634 013702 000626      MOV      NRREAD,R2
2284 010640 104426                      DECPRT
2285 010642 000207                      RTS      PC
2286
2287
2288
2289
2290
2291
2292
2293 010644 104434
2294 010646 012737 177774 000564
2295 010654 032777 000040 167630
2296 010662 001036
2297 010664 004737 010242
2298 010670 105777 167606
2299 010674 100375
2300 010676 013777 000554 167576
2301 010704 052777 000014 167570
2302 010712 013777 000630 167564
2303 010720 005477 167560
2304 010724 013777 000530 167554
2305 010732 006077 167542
2306 010736 103375
2307 010740 004737 005122
2308
2309
2310 010744 017737 167530 000570
2311 010752 005777 167524
2312 010756 100403
2313 010760 005037 000564
2314 010764 000207
2315 010766 032737 175600 000570
2316 010774 001771
2317 010776 005237 000564
2318 011002 001324
2319
;WRITE RECOVERY UTILIZING EXTENDED INTERRECORD GAP
;USED AFTER EVERY 7 REWRITES OR AFTER
;EACH WRITE ERROR IF STATISTICAL RECOVERY NOT SELECTED
;USED ONLY IF READ PASS SELECTED
XRGRCD: CKSMR
XRGO:  MOV      #-4,WRPASS      ;CHECK FOR CNTL G
      BIT      #40,BSMR      ;COUNT 4 REWRITES
      BNE      XRGRCD      ;DELETE WRITE XIRG (SW 5)
      JSR      PC,BACK1      ;YES
      TSTB     @MTC
      BPL      .-4
      MOV      @MTC,COMAND
      BIS      #14,@MTC      ;WRITE XIRG
      MOV      @MTC,WRLEN      ;SET BYTE COUNT
      NEG      @MTC
      MOV      @MTC,MBUF      ;SET CURRENT ADDRESS
      ROR      @MTC
      BCC      .-4
      JSR      PC,GOWAIT
      ;WAIT FOR TU READY
;RETURN HERE AFTER INTERRUPT
MOV      @MTC,STATRD      ;SAVE STATUS
TST      @MTC
BMI      XRG5      ;HAVE ERROR FLAG, CHECK FOR EOT
XRGRCD: CLR      WRPASS
RTS      PC      ;EXIT WRITE XIRG
XRG5:  BIT      #175600,STATRD
      BEQ      XRGRCD      ;ONLY EOT, EXIT
      INC      WRPASS
      BNE      XRGO      ;DONE 4 XIRG
;PRINT STATUS AFTER 4 XIRG ERRORS

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```

2320 011004 012702 012774          MOV      #MSG7,R2
2321 011010 104404                    TOP
2322 011012 013737 000630 000546    MOV      WRTLEN,LENGTH ;PRINT WRITE STATUS ERROR
2323 011020 004737 011174          JSR      PC,PRTS      ;PRINT STATUS, COMMAND, RECORD, LENGTH
2324 011024 012702 013436          MOV      #MSG11,R2
2325 011030 104404                    TOP
2326 011032 032737 002000 000570    BIT      #2000,STATRD ;PRINT "XIRG WRITTEN 4 TIMES"
2327 011040 001701                    BEQ      XRGREC
2328 011042 042777 000016 167432    BIC      #16,BMTC
2329 011050 052777 000006 167424    BIS      #6,BMTC      ;WRITE AN EOF
2330 011056 004737 005122          JSR      PC,GOWAIT
2331 011062 000207                    RTS      PC
2332
2333          ;GO BACKWARD ON TAPE X RECORDS
2334 011064 013737 000614 000620    GOBKWD: MOV      RECORD,LASRCR
2335 011072 013737 000616 000614    MOV      WRECR,RECORD
2336 011100 001003                    BNE      GOB1        ;IS NEW RECORD=0
2337 011102 004737 004732          JSR      PC,REWIND   ;YES,REWIND
2338 011106 000207                    RTS      PC         ;EXIT
2339 011110 013777 000620 167366    GOB1:  MOV      LASRCR,BBC ;SET BYTE COUNT TO DIFFERENCE
2340 011116 163777 000616 167360    SUB      WRECR,BBC   ;BETWEEN LASRCR AND WRECR
2341 011124 005477 167354          NEG      BBC
2342 011130 013777 000554 167344    MOV      COMAND,BMTC
2343 011136 105777 167340          TSTB    BMTC        ;WAIT FOR CU READY
2344 011142 100375                    BPL      #-4
2345 011144 006077 167330          ROR      BMTC        ;WAIT FOR TU READY
2346 011150 103375                    BCC      #-4
2347 011152 042777 000016 167322    BIC      #16,BMTC
2348 011160 052777 000012 167314    BIS      #12,BMTC
2349 011166 004737 005122          JSR      PC,GOWAIT
2350 011172 000207                    RTS      PC
2351
2352
2353
2354          ;PRINT COMMAND, STATUS, RECORD NUMBER, LENGTH
2355 011174 012702 013167          PRTS:  MOV      #MSG98,R2
2356 011200 104404                    TOP
2357 011202 017702 167274          MOV      #BMTC,R2
2358 011206 104412                    OCTPRT
2359 011210 013702 000570          MOV      STATRD,R2
2360 011214 104412                    OCTPRT
2361 011216 013702 000614          MOV      RECORD,R2
2362 011222 005202                    INC      R2
2363 011224 104426                    DECPRT
2364 011226 013702 000546          MOV      LENGTH,R2
2365 011232 104426                    DECPRT
2366 011234 000207                    RTS      PC
2367 011236 104434                    CKSWR
2368          ;PRINT OCTAL VALUE IN REGISTER 2 ;CHECK FOR CNTL G
2369 011240 012737 000060 011350    OCTPR: MOV      #'0,CHAR ;INITIALIZE 1ST NUMBER AS 0
2370 011246 005702                    TST     R2           ;IS VALUE POSITIVE
2371 011250 100003                    BPL     OCT1        ;YES PRINT 0
2372 011252 012737 000061 011350    MOV      #'1,CHAR   ;NO PRINT 1
2373 011260 004737 011352          OCT1:  JSR      PC,OCTP
2374 011264 006102                    ROL     R2
2375 011266 006102                    ROL     R2
2376 011270 012737 177773 011346    MOV      #-5,OCT    ;COUNT 5 DIGITS

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2377 011276 006102          OCT2:  ROL  R2
2378 011300 006102          ROL  R2
2379 011302 006102          ROL  R2
2380 011304 010237 011350    MOV  R2,CHAR      ;SAVE DIGIT
2381 011310 042737 177770 011350    BIC  #177770,CHAR ;CLEAR OTHER BITS
2382 011316 052737 000060 011350    BIS  #60,CHAR     ;MAKE ASCII DIGIT
2383 011324 006002          ROR  R2
2384 011326 004737 011352    JSR  PC,OCTP      ;PRINT
2385 011332 006102          ROL  R2
2386 011334 005237 011346    INC  OCT          ;+1 TO DIGIT COUNT
2387 011340 001356          BNE  OCT2         ;NOT DONE
2388 011342 104430          SP3
2389 011344 000207          RTS  PC          ;EXIT
2390
2391 011346 000000          OCT:  0
2392 011350 000000          CHAR: 0
2393 011352 004737 012546          OCTP: JSR  PC,READY ;JH>> WAIT UNTIL READY TO OUTPUT CHARACTER
2394 011356 013777 011350 167136    MOV  CHAR,BTPB   ;PRINT IT
2395 011364 000207          RTS  PC
2396
2397          ;PRINT DECIMAL VALUE IN REGISTER 2
2398 011366 012737 177773 011542    DECPR: MOV #5,DIGCNT
2399 011374 012737 011550 011546    MOV #DECPT+2,DECPT
2400 011402 012737 000040 011544    MOV #40,ZERO
2401 011410 012737 177777 011540    TYPT1: MOV #-1,DIGIT
2402 011422 005237 011540          TYPT2: INC  DIGIT
2403 011426 167702 000120          SUB  #DECPT,R2
2404 011430 100373          BPL  TYPT2
2405 011434 067702 000112          ADD  #DECPT,R2
2406 011438 004737 011462          JSR  PC,DECOUT
2407 011440 005237 011542          INC  DIGCNT
2408 011444 001002          BNE  TYPT3
2409 011446 104430          SP3
2410 011450 000207          RTS  PC
2411 011452 062737 000002 011546    TYPT3: ADD #2,DECPT
2412 011460 000753          BR   TYPT1
2413 011462 005737 011540          DECOUT: TST DIGIT
2414 011466 001010          BNE  DEC1
2415 011470 022737 177777 011542    CMP  #-1,DIGCNT
2416 011476 001404          BEQ  DEC1
2417 011500 013737 011544 011540    MOV  ZERO,DIGIT
2418 011506 000406          BR   DEC2
2419 011510 012737 000060 011544    DEC1: MOV #60,ZERO
2420 011516 052737 000060 011540    BIS  #60,DIGIT
2421
2422 011524 004737 012546          DEC2: JSR  PC,READY ;JH>> WAIT UNTIL READY TO OUTPUT CHARACTER
2423 011530 013777 011540 166764    MOV  DIGIT,BTPB
2424 011536 000207          RTS  PC
2425 011540 000000          DIGIT: 0
2426 011542 000000          DIGCNT: 0
2427 011544 000040          ZERO: 40
2428 011546 011550          DECPT: .+2
2429 011550 023420          .10000.
2430 011552 001750          .1000.
2431 011554 000144          .100.
2432 011556 000012          .10.
2433 011560 000001          .1.

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2434                                     ;KEYBOARD INPUT
2435 011562 105777 166726      WAITK: TSTB  @TKS      ;WAIT FOR KEY
2436 011566 100375              BPL      WAITK
2437 011570 117737 166722 001316  MOVB    @TKB,CHARIN ;GET CHARACTER
2438 011576 142737 000200 001316  BICB    @200,CHARIN ;CLEAR PARITY
2439 011604 105777 166710      WAITK1: TSTB  @TPS      ;WAIT FOR TELEPRINTER READY
2440 011610 100375              BPL      WAITK1
2441 011612 113777 001316 166702  MOVB    CHARIN,@TPB ;ECHO CHARACTER
2442 011620 000207              RTS      PC           ;EXIT
2443                                     ;TYPE 3 SPACES
2444 011622 012702 011632      SP3X:  MOV    @SP3A,R2
2445 011626 104404              TOP
2446 011630 000207              RTS      PC
2447 011632 057 040 040      SP3A:  .ASCII  / /
2448 011635 040 057
2448                                     .EVEN
2449                                     ;TELETYPE OUTPUT PACKAGE
2450 011640 142777 000177 166652  TO:    BICB    @177,@TPS ;CLEAR TELETYPE FLAGS
2451 011646 112237 011732      MOVB    (2)*,EOMK ;SAVE MESSAGE DELIMETER
2452 011652 121237 011732      TOP1:  CMPB    @R2,EOMK ;IS CHARACTER THE SECOND MESSAGE DELIMITER?
2453 011656 001001              BNE     .+4 ;NO
2454 011660 000207              RTS     PC ;YES, EXIT
2455 011662 121227 000100      CMPB    @R2,@'B ;IS CHARACTER AN @ WHICH INDICATES A CARRIAGE RET.
2456 011666 001405              BGE    TOP2 ;YES
2457 011670 004737 012546      JSR    PC,READY ;JM>> WAIT UNTIL READY TO OUTPUT CHARACTER
2458 011674 112277 166622      MOVB    (2)*,@TPB ;PRINT CHARACTER
2459 011700 000764              BR     TOP1
2460 011702 004737 012546      TOP2:  JSR    PC,READY ;JM>> WAIT UNTIL READY TO OUTPUT CHARACTER
2461 011706 112777 000215 166606  MOVB    @215,@TPB ;CR
2462 011714 004737 012546      JSR    PC,READY ;JM>> WAIT UNTIL READY TO OUTPUT CHARACTER
2463 011720 112777 000212 166574  MOVB    @212,@TPB ;LF
2464 011726 005202              INC    R2
2465 011730 000750              BR     TOP1
2466 011732 000000
2467 011734 022737 000176 000512  EOMK:  0
2468 011742 001035              CKSMR: CMP    @SMREG,SMR ;SOFTWARE SWITCH REG PRESENT
2469 011744 105777 166544              BNE    OUT ;NO, GET OUT
2470 011750 100032              TSTB   @TKS ;YES, WAIT FOR
2471 011752 017737 166540 001316  BPL    OUT ;READY, GET CHARACTER
2472 011760 042737 177600 001316  MOV    @TKB,CHARIN ;AND STRIP OFF
2473 011766 022737 000007 001316  BIC    @177600,CHARIN ;THE GARBAGE
2474 011774 001020              CMP    @7,CHARIN ;IS IT A <'G>
2475 011776 012702 014111      BNE    OUT
2476 012002 104404              MOV    @#CNTG,R2
2477 012004 012702 014117      CNTLU: TOP
2478 012010 104404              MOV    @#MSMR,R2
2479 012012 017702 166474      TOP
2480 012016 104412              MOV    @SMR,R2
2481 012020 012702 014127      OCTPRT
2482 012024 104404              MOV    @#MNEW,R2
2483 012026 005037 012230      TOP
2484 012032 004737 012040      CLR    @TEMPST
2485 012036 000207              JSR    PC,@READ ;GO READ A LINE
2486                                     OUT:   RTS     PC ;RETURN TO MAIN BODY OF PROGRAM
2487 012040 005037 012230      @READ: CLR    TEMPST
2488 012044 012737 000007 012232  MOV    @7,COUNT
2489 012052 104400              1@:   WAITKY

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2490 012054 042737 177600 001316      BIC      @177600,CHARIN ;STRIP OFF GARBAGE
2491 012062 122737 000025 001316      CMPB     @25,CHARIN    ;IS IT A 'U'?
2492 012070 001002                BNE      2@           ;BRANCH IF NOT
2493 012072 005726                3@:     TST      (SP)+ ;POP THE STACK
2494 012074 000743                BR      CNTLU        ;START OVER
2495 012076 122737 000015 001316 2@:     CMPB     @15,CHARIN   ;IS IT A <CR>?
2496 012104 001011                BNE      4@           ;BRANCH IF NOT
2497 012106 012702 014137      MOV      @@MCR LF,R2 ;DO CRLF
2498 012112 104404                TOP
2499 012114 022737 000007 012232      CMP      @7,COUNT    ;WAS IT FIRST CHARACTER
2500 012122 001036                BNE      7@           ;CHANGE SHR IF NOT FIRST ONE
2501 012124 005726                8@:     TST      (SP)+ ;POP THE STACK
2502 012126 000743                BR      OUT          ;GET OUT
2503 012130 122737 000060 001316 4@:     CMPB     @60,CHARIN
2504 012136 003004                BGT      5@
2505 012140 122737 000067 001316      CMPB     @67,CHARIN
2506 012146 002004                BGE      6@
2507 012150 012702 012664      5@:     MOV      @MSG0,R2
2508 012154 104404                TOP
2509 012156 000745                BR      3@           ;START OVER IF NOT LEGAL CHARACTER
2510 012160 006337 012230      6@:     ASL      TEMPST
2511 012164 006337 012230      ASL      TEMPST
2512 012170 006337 012230      ASL      TEMPST
2513 012174 142737 000060 001316      BICB     @60,CHARIN   ;GET NITTY-GRITTY
2514 012202 153737 001316 012230      BISB     CHARIN,TEMPST
2515 012210 005337 012232      DEC      COUNT       ;ONLY WANT 6 DIGITS
2516 012214 001755                BEQ      5@
2517 012216 000715                BR      1@
2518 012220 013777 012230 166264 7@:     MOV      TEMPST,@SWR ;CHANGE SWITCH REGISTER CONTENTS
2519 012226 000736                BR      8@
2520
2521 012230 000000      TEMPST: 0
2522 012232 000000      COUNT:  0
2523
2524 012234 013746 000006      SUSWR:  MOV      @@6,-(SP) ;SAVE VECTORS
2525 012240 013746 000004      MOV      @@4,-(SP)
2526 012244 012737 012264 000004      MOV      @1@,@@4      ;SET UP FOR TIMEOUT
2527 012252 022777 177777 166232      CMP      @-1,@SWR    ;REFERENCE HARDWARE SWITCH REGISTER
2528 012260 001402                BEQ      2@
2529 012262 000404                BR      3@
2530 012264 022626                1@:     CMP      (SP)+,(SP)+ ;ADJUST STACK
2531 012266 012737 000176 000512 2@:     MOV      @SWREG,SWR  ;POINT TO SOFTWARE SWITCH REG
2532 012274 012637 000004      3@:     MOV      (SP)+,@@4    ;RESTORE VECTORS
2533 012300 012637 000006      MOV      (SP)+,@@6
2534 012304 000207                RTS      PC
2535
2536                ;TRAP HANDLER
2537 012306 011666 000002      TRAP34: MOV      @SP,2(6)
2538 012312 162716 000002      SUB      @2,@SP
2539 012316 013646                MOV      @6)+,-(6)
2540 012320 062716 105726      ADD      @TABLE-104400,@SP
2541 012324 013607                MOV      @6)+,PC
2542 012326 011562      TABLE: WAITK
2543 012330 005174                WRITI
2544 012332 011640                TO
2545 012334 004462                SVCTR
2546 012336 004576                RSFDR

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2547	012340	011240	OCTPR
2548	012342	004500	MVCTR
2549	012344	006532	GENPA
2550	012346	004542	CLRAL
2551	012350	004674	CHGDR
2552	012352	007402	READI
2553	012354	011366	DECPR
2554	012356	011622	SP3X
2555	012360	012234	SUSMR
2556	012362	011734	CKSMR
2557		104400	WAITKY-104400
2558		104402	WRITIT-104402
2559		104404	TOP-104404
2560		104406	SVCTRS-104406
2561		104410	RSFDRV-104410
2562		104412	OCTPRT-104412
2563		104414	MVCTRS-104414
2564		104416	GENPAT-104416
2565		104420	CLRAL-104420
2566		104422	CHGDRV-104422
2567		104424	READIT-104424
2568		104426	DECPRT-104426
2569		104430	SP3-104430
2570		104432	SUSMR-104432
2571		104434	CKSMR-104434
2572			

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2574
2575      ; .....
2576      ;                               MODIFIED DEC 16 1977
2577
2578      ; **
2579      ;                               CHECK FOR DUMP MODE OR AUTOMATIC/ACT11-XXDP MODE
2580      ; **
2581
2582 012364 005037 000400      CXMODE: CLR      AUTOM      ;INIT AUTOMATIC MODE INDICATOR
2583 012370 105037 000402      CLR      ACT11M     ;INIT ACT11 AUTO MODE INDICATOR
2584 012374 105037 000403      CLR      XXDPH      ;INIT XXDP AUTO MODE INDICATOR
2585 012400 105037 000404      CLR      ADUMPH     ;INIT ACT11 DUMP MODE INDICATOR
2586 012404 105037 000405      CLR      XDUMPH     ;INIT XXDP DUMP MODE INDICATOR
2587 012410 005737 000042      TST      B042       ;AUTO MODE?
2588 012414 001425              BEQ      21         ;BRANCH - IF NO
2589 012416 005237 000400      INC      AUTOM      ;SET AUTO MODE INDICATOR
2590 012422 032737 020000 000052  BIT      020000,B052 ;MANUAL INTERVENTION?
2591 012430 001402              BEQ      61         ;BRANCH - IF NO
2592 012432 000137 012512      JMP      ABORT     ;ABORT THE PROGRAM
2593 012435 023737 000042 000046 61:  CMP      B042,B046 ;ACT11 MODE?
2594 012444 001403              BEQ      11         ;BRANCH - IF YES
2595 012446 105237 000403      INCB    XXDPH      ;INDICATE XXDP AUTO MODE
2596 012452 000416              BR      51         ;AND EXIT
2597 012454 105237 000402 11:  INCB    ACT11M     ;INDICATE ACT11 AUTO MODE
2598 012460 012777 020111 166024  MOV     020111,BSMR ;SET SWITCH REGISTER
2599 012466 000410              BR      51         ;AND EXIT
2600 012470 105737 000041 21:  TSTB   B041       ;MAN/MODE VIA ACT11/PAPER TAPE?
2601 012474 001003              BNE     31         ;BRANCH - IF NOT
2602 012476 105237 000404      INCB    ADUMPH     ;INDICATE MAN/MODE VIA ACT11/PAPER TAPE
2603 012502 000402              BR      51         ;AND EXIT
2604 012504 105237 000405 31:  INCB    XDUMPH     ;INDICATE MANUAL MODE VIA XXDP
2605 012510 000207 51:  RTS     PC         ;RETURN
2606
2607      ; .....
2608

```

2610  
 2611  
 2612  
 2613  
 2614  
 2615  
 2616  
 2617  
 2618 012512 000005  
 2619 012514 012702 012642  
 2620 012520 004737 104404  
 2621 012524 105737 000403  
 2622 012530 001405  
 2623 012532 013700 000042  
 2624 012536 005037 000042  
 2625 012542 004710  
 2626 012544 000777  
 2627  
 2628  
 2629

```

; .....
;                               MODIFIED DEC 16 1977
;
; ..
; DISCONTINUE TESTING FOR ILLEGAL CONDITIONS
; ..
ABORT: RESET                ;CLEAR THE WORLD
        MOV                ;GET ABORT MESSAGE
        JSR                ;PRINT ABORT MESSAGE
        JSR                ;XXDP AUTO MODE
        TSTB               ;BRANCH - IF NOT
        BEQ                ;GET MONITOR EXIT ADDRESS
        MOV                ;USE AS ABORT FLAG
        CLR                ;EXIT TO XXDP MONITOR
        JSR                ;AND HANG
        JSR                ;
        BR                .
; .....

```



2631  
2632  
2633  
2634  
2635  
2636  
2637  
2638  
2639  
2640  
2641  
2642  
2643  
2644  
2645  
2646  
2647  
2648  
2649  
2650  
2651  
2652  
2653  
2654  
2655  
2656  
2657  
2658  
2659  
2660

```

.....
;
; THIS ROUTINE WILL SEE WAIT UNTIL WE CAN OUTPUT A CHARACTER.
; IT WILL CHECK TO SEE IF AN XON (+Q) OR XOFF (+S) HAS BEEN
; TYPED AT THE KEYBOARD.
;
; JUNE 16, 1984
;
.....

```

012546	105777	165742	READY:	TSTB	BTXS	;JH>>	SEE IF CHARACTER TYPED AT KEYBOARD
012552	100024			BPL	RDY2	;JH>>	BRANCH IF NO CHARACTER
012554	117737	165736	000537	MOVB	BTXB,%CTRLS.1	;JH>>	SAVE CHARACTER IN TEMP LOCATION
012562	142737	000200	000537	BICB	%200,%CTRLS.1	;JH>>	STRIP OFF PARITY BIT
012570	122737	000023	000537	CHPB	%23,%CTRLS.1	;JH>>	SEE IF CHARACTER IS AN XOFF
012576	001004			BNE	RDY1	;JH>>	BRANCH IF NOT +S
012600	112737	000377	000536	MOVB	%377,%CTRLS	;JH>>	SET XOFF FLAG
012606	000757			BR	READY	;JH>>	LOOK FOR ANOTHER CHARACTER...
012610	122737	000021	000537	RDY1: CHPB	%21,%CTRLS.1	;JH>>	SEE IF CHARACTER IS AN XON
012616	001002			BNE	RDY2	;JH>>	BRANCH IF NOT +Q
012620	105037	000536		CLRB	%CTRLS	;JH>>	CLEAR XOFF FLAG
012624	105777	165670	RDY2:	TSTB	BTXS	;JH>>	SEE IF PRINTER READY
012630	100346			BPL	READY	;JH>>	BRANCH IF NOT READY
012632	105737	000536		TSTB	%CTRLS	;JH>>	SEE IF XOFF FLAG IS SET
012636	100743			BMI	READY	;JH>>	BRANCH IF FLAG IS SET
012640	000207			RTS	PC	;JH>>	OTHERWISE, FINALLY READY TO PRINT CHARACTER

```

,TEXT MESSAGES
2662
2663
2664 012642 057 100 120 MSG00: .ASCII ;/BPROGRAM ABORTED/;
      012645 122 117 107
      012650 122 101 115
      012653 040 101 102
      012656 117 122 124
      012661 105 104 057
2665 012664 057 077 100 MSG0: .ASCII ;/78 /;
      012667 040 057
2666 012671 057 100 123 MSG1: .ASCII ;/BSELECT UNITS /;
      012674 105 114 105
      012677 103 124 040
      012702 125 116 111
      012705 124 123 040
      012710 040 057
2667 012712 057 100 124 MSG2: .ASCII ;/BTST PAT RLS WMO RMOB /;
      012715 123 124 040
      012720 120 101 124
      012723 040 122 114
      012726 123 040 127
      012731 115 117 040
      012734 122 115 117
      012737 100 040 057
2668 012742 057 115 101 MSG5: .ASCII ;/MAX TESTS SELECTEDB/;
      012745 130 040 124
      012750 105 123 124
      012753 123 040 123
      012756 105 114 105
      012761 103 124 105
      012764 104 100 057
2669 012767 057 040 117 MSG6: .ASCII ;/ OK/;
      012772 113 057
2670 012774 057 100 127 MSG7: .ASCII ;/BWRITE STATUS ERRORB/;
      012777 122 111 124
      013002 105 040 123
      013005 124 101 124
      013010 125 123 040
      013013 105 122 122
      013016 117 122 100
      013021 057
2671 013022 057 105 116 MSG8: .ASCII ;/END OF TAPE*****B;
      013025 104 040 117
      013030 106 040 124
      013033 101 120 105
      013036 052 052 052
      013041 052 052 052
      013044 052 052 052
      013047 052 052 052
      013052 052 052 052
      013055 052 052 052
      013060 052 052 100
2672 013063 104 122 126 .ASCII ;/DRV PAT MODE RECORD LENGTHB/;
      013066 040 120 101
      013071 124 040 115
      013074 117 104 105
      013077 040 122 105

```

	013102	103	117	122		
	013105	104	040	114		
	013110	105	116	107		
	013113	124	110	100		
	013116	057				
2673	013117	057	100	122	MSG9: .ASCII	;/BREAD STATUS ERRORB/;
	013122	105	101	104		
	013125	040	123	124		
	013130	101	124	125		
	013133	123	040	105		
	013136	122	122	117		
	013141	122	100	057		
2674	013144	057	100	122	MSG9A: .ASCII	;/BREAD DATA ERRORB/;
	013147	105	101	104		
	013152	040	104	101		
	013155	124	101	040		
	013160	105	122	122		
	013163	117	122	100		
	013166	057				
2675	013167	057	103	117	MSG9B: .ASCII	;/COND STATUS RECORD LENGTH EXPECTED ACTUALB/;
	013172	115	104	040		
	013175	040	040	040		
	013200	040	123	124		
	013203	101	124	125		
	013206	123	040	040		
	013211	040	122	105		
	013214	103	117	122		
	013217	104	040	040		
	013222	040	114	105		
	013225	116	107	124		
	013230	110	040	105		
	013233	130	120	105		
	013236	103	124	105		
	013241	104	040	101		
	013244	103	124	125		
	013247	101	114	100		
	013252	057				
2676	013253	057	100	103	MSG10A: .ASCII	;/BCZTMBGORECORD LIMITS IN BYTESB/;
	013256	132	124	115		
	013261	102	107	060		
	013264	100	122	105		
	013267	103	117	122		
	013272	104	040	114		
	013275	111	115	111		
	013300	124	123	040		
	013303	111	116	040		
	013306	102	131	124		
	013311	105	123	100		
2677	013314	115	111	116	.ASCII ;MINLEN MAXLENG /;	
	013317	114	105	116		
	013322	040	040	115		
	013325	101	130	114		
	013330	105	116	100		
	013333	040	057			
2678	013335	054	100	105	MSG10B: .ASCII	;/BEXERCISING UNITS,/;
	013340	130	105	122		
	013343	103	111	123		

	013346	111	116	107	
	013351	040	125	116	
	013354	111	124	123	
	013357	054			
2679	013360	054	100	116	MSG10C: .ASCII /,BNO DRIVES AVAILABLE, /
	013363	117	040	104	
	013366	122	111	126	
	013371	105	123	040	
	013374	101	126	101	
	013377	111	114	101	
	013402	102	114	105	
	013405	054			
2680	013406	057	040	040	MSG10D: .ASCII ;/ RECORD DATA COMPARES/;
	013411	122	105	103	
	013414	117	122	104	
	013417	040	104	101	
	013422	124	101	040	
	013425	103	117	115	
	013430	120	101	122	
	013433	105	123	057	
2681	013435	057	130	111	MSG11: .ASCII ;/XIRG WRITTEN 4 TIMES/;
	013441	122	107	040	
	013444	127	122	111	
	013447	124	124	105	
	013452	116	040	064	
	013455	040	124	111	
	013460	115	105	123	
	013463	057			
2682	013464	057	040	040	MSG12: .ASCII ;/ SSTP /;
	013467	040	123	123	
	013472	124	120	040	
	013475	057			
2683	013476	057	040	040	MSG13: .ASCII ;/ RNDM /;
	013501	040	122	116	
	013504	104	115	040	
	013507	057			
2684	013510	057	040	040	MSG14: .ASCII ;/ NSTP /;
	013513	040	116	123	
	013516	124	120	040	
	013521	057			
2685	013522	057	115	055	MSG15: .ASCII ;/M-MAX/;
	013525	115	101	130	
	013530	057			
2686	013531	057	115	055	MSG16: .ASCII ;/M-MIN/;
	013534	115	111	116	
	013537	057			
2687	013540	057	115	111	MSG17: .ASCII ;/MIN /;
	013543	116	040	040	
	013546	057			
2688	013547	057	115	101	MSG18: .ASCII ;/MAX /;
	013552	130	040	040	
	013555	057			
2689	013556	057	100	127	MSG19: .ASCII ;/BWRITE ERRORS = /;
	013561	122	111	124	
	013564	105	040	105	
	013567	122	122	117	
	013572	122	123	040	

2690	013575	075	040	057			
	013600	057	100	122	MSG20:	.ASCII	;/BRECOVERED AT 0 /;
	013603	105	103	117			
	013606	126	105	122			
	013611	105	104	040			
	013614	101	124	040			
	013617	060	040	057			
2691	013622	057	100	120	MSG20A:	.ASCII	;/BPERMANENT BAUSPOTS = /;
	013625	105	122	115			
	013630	101	116	105			
	013633	116	124	040			
	013636	102	101	104			
	013641	123	120	117			
	013644	124	123	040			
	013647	075	040	057			
2692	013652	057	100	122	MSG21:	.ASCII	;/BREAD STATUS ERRORS = /;
	013655	105	101	104			
	013660	040	123	124			
	013663	101	124	125			
	013666	123	040	105			
	013671	122	122	117			
	013674	122	123	040			
	013677	075	040	057			
2693	013702	057	100	104	MSG22:	.ASCII	;/BDATA ERRORS = /;
	013705	101	124	101			
	013710	040	105	122			
	013713	122	117	122			
	013716	123	040	075			
	013721	040	057				
2694	013723	057	100	116	MSG23:	.ASCII	;/BNON-RECOVERABLE ERRORS = /;
	013726	117	116	055			
	013731	122	105	103			
	013734	117	126	105			
	013737	122	101	102			
	013742	114	105	040			
	013745	105	122	122			
	013750	117	122	123			
	013753	040	075	040			
	013756	057					
2695	013757	057	100	052	MSG24:	.ASCII	;/B*****WRITE PASS /;
	013762	052	052	052			
	013765	052	052	052			
	013770	052	052	052			
	013773	052	052	052			
	013776	052	052	052			
	014001	052	052	052			
	014004	052	127	122			
	014007	111	124	105			
	014012	040	120	101			
	014015	123	123	040			
	014020	040	040	057			
2696	014023	057	100	052	MSG25:	.ASCII	;/B*****READ PASS /;
	014026	052	052	052			
	014031	052	052	052			
	014034	052	052	052			
	014037	052	052	052			
	014042	052	052	052			

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014045 052 052 052
014050 052 122 105
014053 101 104 040
014056 120 101 123
014061 123 040 040
014064 040 040 057
2697 014067 057 100 100 MSG26: .ASCII ;/BBB/;
014072 100 057
2698 014074 057 105 116 MSG27: .ASCII ;/END OF PASS/;
014077 104 040 117
014102 106 040 120
014105 101 123 123
014110 057
2699 014111 057 100 136 #CNTG: .ASCII ;/B*GB/;
014114 107 100 057
2700 014117 057 100 123 #MSMR: .ASCII ;/BSMR= /;
014122 127 122 075
014125 040 057
2701 014127 057 040 116 #MNEW: .ASCII ;/ NEW= /;
014132 105 127 075
014135 040 057
2702 014137 057 100 057 #MCRLF: .ASCII ;/B/;
2703 .EVEN
2704
2705 014142 014142 BUFFER: . ;WRITE BUFFER BEGINS HERE
2706
2707 000001 .END

```

ABORT	012512	D1TAB	000722	MSG24	013757	RDERR0	007750	STATRD	000570
ACT11M	000402	D2TAB	000766	MSG25	014023	RDERRS	000622	STOPOP	005502
ADUMPM	000404	D3TAB	001032	MSG26	014067	RDINCR	010172	STREC1	006042
ALLEOS	005012	D4TAB	001076	MSG27	014074	RDPASS	000562	STRLEN	000544
ALLEOT	004770	D5TAB	001142	MSG5	012742	RDSTP	007654	STRTOP	005306
ALL1	004772	D6TAB	001206	MSG6	012767	RDSTPC	007614	SUSMR	104432
ALL2	005074	D7TAB	001252	MSG7	012774	RDSTPD	007424	SUSMR	012234
ALL3	005070	ENDTAP	006134	MSG8	013022	RDY1	012610	SVCTR	004462
ATST	000540	ENDT1	006146	MSG9	013117	RDY2	012624	SVCTPS-	104406
AUTOM	000400	EOPK	011732	MSG9A	013144	READGO	007446	SVC1	004466
AUTOST	001356	ERROR	005702	MSG9B	013167	READI	007402	SVRECR	000552
BACK1	010242	ERR1	005726	HTC	000502	READIT-	104424	SVO	007372
BC	000504	EXEC	003062	HTS	000500	READLN	000632	SV1	007374
BLKINC	000566	EXECUT	003050	MTV	000534	READMP	010334	SV2	007376
BUFFER	014142	EXEC1	003070	MVCTR	004500	READY	012546	SV3	007400
CP	000506	GENPA	006532	MVCTRS-	104414	RECORD	000614	SMR	000512
CC	000510	GENPAT-	104416	MV1	004504	RESETL	005656	SMREG	000176
CDMEND	005064	GOBKWD	011064	NOINCR	005264	RESTR1	010232	TABLE	012326
CDRIVE	000560	GOB1	011110	NONSTP	005330	RESTR1	010240	TEMPST	012230
CDRYBT	000556	GOMAIT	005122	NO. SEL	001670	REWIND	004732	TESINC	005610
CHAR	011350	GP1	006644	NRREAD	000626	RG1	007456	TESRC1	006006
CHARIN	001316	GW1	005164	NUMTST	001320	RNDRDS	007624	TESREC	005756
CHGOR	004674	HINUM	007370	NUMRET	001476	RNDS1	007636	TEST	001326
CHGDRV-	104422	IDSELF	001700	NXT. TU	001614	RNDTAP	010306	TEST0	003300
CHG1	004720	LASRCR	000620	OCT	011346	RNDTP1	010320	TEST1	003350
CKMODE	012364	LENGTH	000546	OCTP	011352	RPASS1	010146	TEST2	003420
CKSMR	104434	LONUM	007366	OCTPR	011240	RPASS3	010152	TEST3	003536
CKSMR	011734	LOOPER	002014	OCTPRT-	104412	RSFDR	004576	TEST4	003654
CLRAL	004542	MAXLEN	000524	OCT1	011260	RSFDRV-	104410	TEST5	004176
CLRALL-	104420	MEDIUM	000041	OCT2	011276	RSF1	004610	TKB	000516
CLRTBL	005076	MEMAK	002070	OUT	012036	RSF2	004634	TKS	000514
CLRT1	005102	MEMBK	002114	OVER4K	001524	RTSREC	010102	TO	011640
CLR1	004544	MIDLEN	000526	PARAM	001322	RTSR1	010120	TOP	104404
CNTLU	012004	MODES	000634	PAT0	006646	RTSSTP	007566	TOP1	011652
COMMAND	000554	MSBITS	000550	PAT1	006662	SELDRV	002212	TOP2	011702
COUNT	012232	MSG0	012664	PAT1A	006666	SEL01	002244	TPB	000522
CTRDEX	004516	MSG00	012642	PAT2	006732	SEL02	002264	TPS	000520
CTRDMP	005032	MSG1	012671	PAT3	006746	SEL0K1	003042	TRAP34	012306
CTRD1	005060	MSG10A	013253	PAT3A	006752	SELPAT	002456	TSINC2	005664
DAERRS	000624	MSG10B	013335	PAT4	007016	SELRLS	002550	TSINC3	005700
DATERR	007672	MSG10C	013360	PAT5	007044	SELRM1	002732	TSTEX	001324
DATER1	007732	MSG10D	013406	PAT5A	007050	SELRM2	002746	TSTSTP	005424
DECOU	011462	MSG11	013436	PAT6	007160	SELR1	002600	TSTTBL	001330
DECPNT	011546	MSG12	013464	PAT7	007174	SELR2	002616	TU. SEL	001546
DECPR	011366	MSG13	013476	PERMBS	000612	SELR3	002632	TYPT1	011410
DECPRT-	104426	MSG14	013510	PRTS	011174	SELTST	002364	TYPT2	011416
DEC1	011510	MSG15	013522	P1T	006710	SELT1	002402	TYPT3	011452
DEC2	011524	MSG16	013531	P3T	006774	SELT2	002426	TO	003312
DIGONT	011542	MSG17	013540	P4	007022	SELT3	002446	TOA	003314
DIGIT	011540	MSG18	013547	P4A	007042	SELW1	002664	TOB	003332
DOAGN	003270	MSG19	013556	P5T	007072	SELW2	002700	T1	003362
DONE	003152	MSG2	012712	RANDOM	007364	SP3	104430	T1A	003364
DONE1	003220	MSG20	013600	RANGEN	007214	SP3A	011632	T1B	003402
DRIVE	000040	MSG20A	013622	RANG1	007252	SP3X	011622	T2	003432
DRVADR	000636	MSG21	013652	RANSTP	005512	STACK	000500	T2A	003434
DRVSEL	000542	MSG22	013702	RAN1	005524	START	002136	T2B	003452
DOTAB	000656	MSG23	013723	RBUF	000532	START1	002142	T2C	003456

T2D	003476	T4G	004026	T5G	004370	WBUF	000530	XRGREC	010644
T2E	003502	T4H	004030	T5H	004406	WRCHEK	000572	XRGO	010654
T2F	003516	T4J	004046	T5INC	004460	WRITI	005174	XRG5	010766
T3	003550	T4K	004054	T5J	004410	WRITIT-	104402	XXDPM	000403
T3A	003552	T4L	004056	T5K	004430	WRPASS	000564	ZERO	011544
T3B	003570	T4M	004130	USSTST	001626	WRRECR	000616	#CNTG	014111
T3C	003574	T4N	004142	USS.OK	001644	WRTDMP	006162	#CTRLS	000536
T3D	003612	T4P	004146	VALID	002300	WRTD1	006452	#ENDAD	003240
T3E	003620	T5	004210	VAL1	002316	WRTD2	006474	#MCRLF	014137
T3F	003634	T5A	004234	VAL2	002330	WRTLEN	000630	#MNEW	014127
T4	003710	T5B	004246	VAL3	002344	W1	005242	#MSWR	014117
T4A	003712	T5C	004256	VAL4	002350	W10	005470	#READ	012040
T4B	003714	T5D	004306	WAITK	011562	W11	005542	#R1	007416
T4C	003740	T5E	004314	WAITKY-	104400	W12	005576	#R5	007554
T4D	003742	T5F	004356	WAITK1	011604	XDUMPH	000405	#SVPC -	000036
T4E	003774	T5FLAG	004456	WAIT1	005152	XRGRCO	010760	#ZERO#	002034
T4F	004010								

. ABS. 014144 000  
000000 001

ERRORS DETECTED: 0

VIRTUAL MEMORY USED: 8232 WORDS ( 33 PAGES)

DYNAMIC MEMORY: 19748 WORDS ( 75 PAGES)

ELAPSED TIME: 00:00:57

CZTMBG.BIN.CZTMBG/-SP/CR/AL:TOC=CZTMBG.P11



SYMBOL	VALUE	REFERENCES
ABORT	012512	26-2592 027-2618
ACT11M	000402	022-949 23-1119 23-1354 *26-2583 *26-2597
ADUPPM	000404	022-951 *26-2585 *26-2602
ALLEOS	005012	23-1654 023-1658
ALLEOT	004770	23-1376 23-1392 23-1424 23-1456 23-1523 23-1564 23-1576 023-1651
ALL1	004772	023-1652 23-1656
ALL2	005074	23-1659 23-1661 023-1674
ALL3	005070	23-1657 023-1673
ATST	000540	023-985 *23-1068 *23-1171 23-1187
AUTOM	000400	022-948 *26-2582 *26-2589
AUTOST	001356	23-961 023-1061 23-1358
BACK1	010242	23-1813 23-1814 25-2197 025-2218 25-2297
BC	000504	023-969 23-1717 23-1718 23-1818 25-2095 25-2096 25-2220 25-2302 25-2303
		25-2339 25-2340 25-2341
BLKINC	000566	023-996 *23-1698 *23-1702 *23-1706 23-1770 23-1772 25-2207 25-2210
BUFFER	014142	23-979 23-980 23-1077 23-1082 23-1086 *23-1139 23-1140 23-1159 23-1165
		23-1170 029-2705
CA	000506	023-970 23-1719 25-2097 25-2304
CC	000510	023-971 23-1684 23-1689
CDMEND	005064	23-1669 023-1671
CDRIVE	000560	023-993 23-1597 23-1598 *23-1612 *23-1616 23-1620 *23-1630
CDRVBT	000556	023-992 *23-1613 23-1614 *23-1618 *23-1632 23-1637
CHAR	011350	*24-1837 *24-1838 *24-1839 *24-1841 *24-1844 *24-1845 *24-1846 *24-1847 *24-1848
		*24-1850 *24-1851 24-1853 24-1856 *24-1862 *24-1863 24-1865 24-1868 24-1871
		*25-2235 *25-2236 *25-2237 *25-2238 *25-2241 *25-2242 *25-2243 *25-2244 *25-2245
		*25-2248 *25-2249 25-2251 25-2254 *25-2260 *25-2261 25-2263 25-2266 25-2269
		*25-2369 *25-2372 *25-2380 *25-2381 *25-2382 025-2392 25-2394
CHARIN	001316	023-1043 23-1183 23-1190 23-1192 *23-1198 *23-1199 *23-1203 23-1221 23-1226
		23-1228 23-1233 23-1243 23-1245 *23-1247 *23-1248 *23-1249 23-1250 23-1255
		23-1257 23-1261 23-1265 23-1271 23-1273 23-1277 23-1283 23-1285 23-1289
		23-1298 *25-2437 *25-2438 25-2441 *25-2471 *25-2472 25-2473 *25-2490 25-2491
		25-2495 25-2503 25-2505 *25-2513 25-2514
CHGDR	004674	023-1630 23-1638 25-2551
CHGDY	104422	23-1374 23-1390 23-1408 23-1415 23-1422 23-1439 23-1447 23-1454 23-1474
		23-1485 23-1492 23-1500 23-1516 23-1521 23-1548 23-1562 23-1572 23-1606
		23-1655 23-1671 025-2566
CHG1	004720	23-1633 023-1637
CKMODE	012364	23-1063 23-1067 *26-2582
CKSMR	104434	23-1333 23-1349 23-1788 24-1836 25-2148 25-2189 25-2234 25-2293 25-2367
		025-2571
CKSMRR	011734	025-2467 25-2556
CLRAL	004542	023-1602 25-2550
CLRALL	104420	23-1365 23-1382 23-1400 23-1431 23-1469 23-1531 025-2565
CLRTBL	005076	23-1604 023-1677
CLRT1	005102	023-1678 23-1680
CLR1	004544	023-1603 23-1607
CNTLU	012004	23-1066 23-1176 025-2477 25-2494
COMMAND	000554	023-991 *23-1620 *23-1621 *23-1622 *23-1625 23-1644 23-1712 23-1819 24-1837
		25-2085 25-2098 25-2221 25-2235 25-2300 25-2342
COUNT	012232	*25-2488 25-2499 *25-2515 025-2522
CTRDEX	004516	23-1583 23-1589 023-1595
CTRDFP	005032	023-1663 23-1672

SYMBOL	VALUE	REFERENCES
CTRD1	005060	23-1666 023-1670
DAERRS	000624	023-1012 *25-2145 25-2279
DATERR	007672	25-2110 025-2133
DATER1	007732	25-2134 025-2143
DECOUT	011462	25-2406 025-2413
DECPNT	011546	25-2399 *25-2399 25-2403 25-2405 *25-2411 025-2428
DECPR	011366	025-2398 25-2553
DECPRT	- 104426	23-1124 23-1126 24-1861 24-1878 24-1887 24-1899 25-2259 25-2276 25-2280 25-2284 25-2363 25-2365 025-2568 25-2414 25-2416 025-2419
DEC1	011510	25-2418 025-2422
DEC2	011524	*25-2398 *25-2407 25-2415 025-2426
DIGCNT	011542	*25-2401 *25-2402 25-2413 *25-2417 *25-2420 25-2423 025-2425
DIGIT	011540	23-1345 23-1355 023-1359
DOAGN	003270	023-1333 23-1378 23-1394 23-1426 23-1458 23-1525 23-1566 23-1578
DONE	003152	23-1337 23-1341 023-1344
DONE1	003220	021-913
DRIVE	000040	023-1018 23-1585 23-1591 23-1596
DRVADP	000636	023-986 *23-1094 23-1101 *23-1113
DRVSEL	000542	23-1018 023-1027 23-1028
D0TAB	000656	23-1019 023-1029 23-1030
D1TAB	000722	23-1020 023-1031 23-1032
D2TAB	000766	23-1021 023-1033 23-1034
D3TAB	001032	23-1022 023-1035 23-1036
D4TAB	001076	23-1023 023-1037 23-1038
D5TAB	001142	23-1024 023-1039 23-1040
D6TAB	001206	23-1025 023-1041 23-1042
D7TAB	001252	23-1790 23-1811 023-1826
ENDTAP	006134	23-1667 023-1828
ENDT1	006146	*25-2451 25-2452 025-2466
EOMK	011732	23-1725 023-1788
ERROR	005702	23-1792 023-1794
ERR1	005726	023-1316 23-1360
EXEC	003062	23-1161 23-1189 23-1225 023-1314
EXECUT	003050	023-1317 23-1343
EXEC1	003070	024-1902 25-2549
GENPA	006532	23-1366 23-1383 23-1401 23-1432 23-1464 23-1532 025-2564
GENPAT	- 104416	23-1413 23-1445 23-1498 025-2334
GOBKMD	011064	25-2336 025-2339
GOB1	011110	23-1648 023-1684 23-1721 23-1821 25-2100 25-2223 25-2307 25-2330 25-2349
GOMAIT	005122	*24-1903 *24-1904 24-1906 24-1908 24-1910 24-1912 24-1914 24-1916 025-1922
GP1	006644	23-1685 023-1691
GW1	005164	*23-1074 *23-1178 25-2043 25-2053 *25-2065 025-2073
HINUM	007370	23-1098 023-1119
IDSELF	001700	023-1010 23-1506 23-1508 *23-1511 *23-1512 *23-1514 23-1519 *23-1545 *23-1546
LASRCR	000620	23-1554 *23-1557 *23-1558 *23-1560 23-1569 25-2116 25-2129 *25-2334 25-2339
LENGTH	000546	023-988 *23-1798 *25-2137 *25-2155 *25-2322 25-2364
LONUM	007366	*23-1073 *23-1177 25-2042 25-2051 *25-2064 025-2072
LOOPER	002014	023-1147 23-1156
MAXLEN	000524	023-977 *23-1081 *23-1085 23-1125 *23-1164 *23-1169 23-1697 23-1775 25-2213
MEDIUM	000041	021-917
MEMAK	002070	23-962 023-1163

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SYMBOL	VALUE	REFERENCES
MEMBK	002114	23-963 023-1168
MINLEN	000526	023-978 023-1080 023-1084 23-1123 023-1163 023-1168 23-1701 23-1773 23-2211
MODES	000634	023-1016 023-1314 023-1364 23-1369 023-1381 23-1386 023-1399 23-1404 23-1411
		23-1418 023-1430 23-1435 23-1443 23-1450 023-1463 023-1467 023-1468 023-1476
		23-1479 23-1487 23-1490 23-1496 23-1504 023-1530 23-1535 023-1540 23-1543
		23-1552 023-1571 23-1574 023-1608 23-1653 23-1660 23-1668 23-1679 023-1681
		23-1738 23-1740 23-1743 23-1759 23-1761 23-1764 023-1769 023-1780 23-1806
		023-1827 023-2228
MSBITS	000550	023-989 023-1095 023-1112 23-1127 23-1147 023-1181 23-1185 23-1207 023-1209
		023-1211 23-1614 23-1637
MSG0	012664	23-1230 23-2507 029-2665
MSG00	012642	27-2619 029-2664
MSG1	012671	23-1179 029-2666
MSG10A	013253	23-1121 029-2676
MSG10B	013335	23-1137 029-2678
MSG10C	013360	23-1131 029-2679
MSG10D	013406	23-2184 029-2680
MSG11	013436	23-2324 029-2681
MSG12	013464	24-1855 23-2253 029-2682
MSG13	013476	24-1858 23-2256 029-2683
MSG14	013510	24-1852 23-2250 029-2684
MSG15	013522	24-1870 23-2268 029-2685
MSG16	013531	24-1873 23-2271 029-2686
MSG17	013540	24-1864 23-2262 029-2687
MSG18	013547	24-1867 23-2265 029-2688
MSG19	013556	24-1875 029-2689
MSG2	012712	23-1216 029-2667
MSG20	013600	024-1880 024-1881 24-1884 029-2690
MSG20A	013622	24-1896 029-2691
MSG21	013652	23-2273 029-2692
MSG22	013702	23-2277 029-2693
MSG23	013723	23-2281 029-2694
MSG24	013757	23-1828 029-2695
MSG25	014023	23-2229 029-2696
MSG26	014067	23-1334 029-2697
MSG27	014074	23-1356 029-2698
MSG5	012742	23-1310 029-2668
MSG6	012767	23-1295 029-2669
MSG7	012774	23-1796 23-2320 029-2670
MSG8	013022	23-1830 23-2231 029-2671
MSG9	013117	23-2153 029-2673
MSG9A	013144	23-2155 029-2674
MSG9B	013167	23-2355 029-2675
MTC	000502	023-968 23-1093 23-1097 23-1101 23-1642 23-1644 23-1647 23-1687 23-1712
		23-1713 23-1720 23-1724 23-1819 23-1820 23-1822 23-1823 23-2085 23-2086
		23-2098 23-2099 23-2103 23-2221 23-2222 23-2224 23-2298 23-2300 23-2301
		23-2311 23-2328 23-2329 23-2342 23-2343 23-2347 23-2348 23-2357
MTS	000500	023-967 23-1103 23-1108 23-1110 23-1645 23-1715 23-1723 23-1815 23-2088
		23-2102 23-2157 23-2218 23-2305 23-2310 23-2345
MTV	000534	023-981 23-1685
MVCTR	004500	023-1589 23-2548
MVCTAS	104414	23-1368 23-1385 23-1403 23-1410 23-1417 23-1434 23-1442 23-1449 23-1471

SYMBOL	VALUE	REFERENCES
		23-1478 23-1489 23-1495 23-1503 23-1518 23-1542 23-1551 23-1568 23-1652
		23-1664 025-2563
MV1	004504	023-1590 23-1592
NOINCR	005264	23-1696 23-1705 023-1707
NONSTP	005330	023-1717 23-1736 23-1741 23-1744
NOSEL	001670	23-1100 23-1107 23-1109 23-1111 023-1113
NRREAD	000626	023-1013 025-2199 25-2283
NMPTST	001320	023-1044 023-1072 023-1218 23-1223 023-1306 23-1307 023-1344
NDMPRET	001476	23-1076 023-1079
NXT.TU	001614	023-1101 23-1115
OCT	011346	025-2376 025-2386 025-2391
OCTP	011352	24-1842 24-1849 25-2239 25-2246 25-2373 25-2384 025-2393
OCTPR	011240	025-2369 25-2347
OCTPRT	104412	25-2140 25-2142 25-2177 25-2181 25-2358 25-2360 25-2480 025-2562
OCT1	011260	25-2371 025-2373
OCT2	011276	025-2377 25-2387
OUT	012036	25-2468 25-2470 25-2474 025-2485 25-2502
OVER4K	001524	23-1078 023-1084
PARAM	001322	023-1045 023-1316 23-1317 23-1338 023-1342 23-1509 23-1555 23-1699 23-1704
		23-1733 23-1746 24-1844 24-1850 24-1862 24-1903 25-2113 25-2119 25-2241
		25-2248 25-2260
PAT0	006646	24-1905 025-1925 25-1927
PAT1	006662	24-1907 025-1931 25-1938
PAT1A	006666	025-1932 25-1937
PAT2	006732	24-1909 25-1936 025-1951 25-1953
PAT3	006746	24-1911 025-1957 25-1964
PAT3A	006752	025-1958 25-1963
PAT4	007016	24-1913 25-1962 025-1976
PAT5	007044	24-1915 025-1986 25-1993
PAT5A	007050	025-1987 25-1992
PAT6	007160	24-1919 25-1991 025-2023 25-2025
PAT7	007174	24-1918 025-2031 25-2034
PERMBS	000612	023-1007 023-1805 24-1891 24-1898
PRTS	011174	23-1799 25-2138 25-2156 25-2323 025-2355
P1T	006710	25-1931 025-1939
P3T	006774	25-1957 025-1965
P4	007022	025-1977 25-1980
P4A	007042	025-1976 25-1977 025-1978 025-1982
P5T	007072	25-1986 025-1994
RANDOM	007364	023-1750 023-1754 25-2032 025-2063 025-2071 025-2122 025-2126
RANGEN	007214	23-1749 25-2031 025-2038 25-2121
RANG1	007252	025-2046 25-2050
RANSTP	005512	023-1749
RAN1	005524	023-1751 23-1755
RBUF	000532	023-980 023-1082 023-1086 023-1165 023-1170 25-1926 25-1933 25-1952 25-1959
		25-1979 25-1988 25-2024 25-2033 25-2090 25-2097 25-2106 25-2164
RDERR0	007750	25-2104 025-2148
RDERRS	000622	023-1011 025-2192 25-2275
RDINCR	010172	25-2115 25-2128 025-2206 25-2227
RDPASS	000562	023-994 025-2084 25-2143 25-2190 025-2195 025-2200
RDSTP	007654	25-2120 025-2128 25-2203
RDSTPC	007614	25-2114 025-2119

SYMBOL	VALUE	REFERENCES
RDSTPD	007424	025-2085 25-2130 25-2198
RDY1	012610	28-2649 028-2652
RDY2	012624	28-2645 28-2653 028-2655
READGO	007446	025-2090 25-2117
READI	007402	025-2081 25-2552
READIT	- 104424	23-1420 23-1452 23-1513 23-1559 025-2567
READLN	000632	023-1015 025-2083 25-2091 25-2095 25-2108 25-2137 25-2155 25-2166 025-2210
		25-2211 25-2213 025-2215
READMP	010334	025-2234
READY	012546	23-1194 23-1212 23-1301 23-1303 25-2393 25-2422 25-2457 25-2460 25-2462
		028-2644 28-2651 28-2656 28-2658
RECORD	000614	023-1008 23-1472 23-1506 23-1511 23-1519 23-1538 023-1539 23-1545 23-1557
		23-1569 23-1695 23-1707 023-1768 23-1778 023-1826 24-1860 25-2081 25-2116
		25-2129 025-2206 25-2258 25-2334 025-2335 25-2361
RESETL	005656	23-1774 023-1777
RESTR	010232	25-2212 025-2215
RESTR1	010240	25-2208 25-2214 025-2216
REWIND	004732	23-1603 023-1642 25-2337
RG1	007456	025-2092 25-2094
RNDRDS	007624	025-2121
RNDS1	007636	025-2123 25-2127
RNDTAP	010306	25-2150 025-2227
RNDTP1	010320	23-1670 25-2202 025-2229
RPASS1	010146	25-2196 025-2199
RPASS3	010152	25-2194 025-2200
RSFDR	004576	023-1612 25-2546
RSFDRV	- 104410	23-1367 23-1384 23-1402 23-1433 23-1470 23-1477 23-1494 23-1502 23-1541
		23-1550 23-1567 23-1602 23-1634 23-1651 23-1663 025-2561
RSF1	004610	023-1614 23-1619
RSF2	004634	23-1615 023-1620 23-1639
RTSREC	010102	25-2152 25-2159 25-2161 25-2183 025-2189
RTSR1	010120	25-2146 025-2193
RTSSTP	007566	025-2113
SELDRV	002212	023-1182 23-1214
SEL01	002244	23-1184 023-1190
SEL02	002264	23-1191 023-1194
SEL0K1	003042	23-1308 023-1310
SELPAT	002456	23-1229 023-1233
SELRLS	002550	023-1254
SELRM1	002732	23-1286 023-1289
SELRM2	002746	23-1284 23-1288 023-1292
SELR1	002600	23-1258 023-1261
SELR2	002616	23-1262 023-1265
SELR3	002632	23-1256 23-1260 23-1264 023-1268
SELTST	002364	23-1188 023-1216
SELT1	002402	023-1220 23-1232 23-1309
SELT2	002426	23-1222 023-1226
SELT3	002446	23-1224 23-1227 023-1230 23-1244 23-1246 23-1266 23-1278 23-1290 23-1300
SELW1	002664	23-1274 023-1277
SELW2	002700	23-1272 23-1276 023-1280
SP3	- 104430	23-1240 23-1251 23-1268 23-1280 23-1292 24-1843 25-2240 25-2388 25-2409
		025-2569

SYMBOL	VALUE	REFERENCES
SP3A	011632	25-2444 025-2447
SP3X	011622	025-2444 25-2554
STACK	- 000500	023-965 23-1061 23-1172
START	002136	23-1166 023-1171
START1	002142	23-1134 023-1172 23-1186
STATRD	000570	023-997 023-1723 23-1789 23-1810 *25-2102 25-2149 25-2201 *25-2310 25-2315
		25-2326 25-2359
STOPOP	005502	23-1734 023-1746
STREC1	006042	23-1804 023-1813
STRLEN	000544	023-987 *23-1697 *23-1701 23-1703 23-1777 25-2083 25-2215
STRTOP	005306	023-1712 23-1757 23-1762 23-1765 23-1817 23-1824
SUSMR	- 104432	23-1062 23-1173 025-2570
SUSMR1	012234	025-2524 25-2555
SVCTR	004462	023-1583 25-2545
SVCTRS	- 104406	23-1372 23-1389 23-1407 23-1414 23-1421 23-1438 23-1446 23-1453 23-1473
		23-1484 23-1499 23-1515 23-1547 23-1561 23-1605 025-2560
SVC1	004466	023-1584 23-1586
SVRECR	000552	023 990 *23-1481 23-1483 *23-1508 23-1514 *23-1554 23-1560
SVO	007372	*25-2038 25-2066 025-2074
SV1	007374	*25-2039 25-2067 025-2075
SV2	007376	*25-2040 25-2068 2076
SV3	007400	*25-2041 25-2069 025-2077
SMR	000512	023-972 23-1064 23-1174 23-1336 23-1623 23-1658 23-1794 23-1800 25-2133
		25-2151 25-2160 25-2193 25-2295 25-2467 25-2479 25-2518 25-2527 *25-2531
		26-2598
SMREG	000176	023-959 23-1064 23-1174 25-2467 25-2531
TABLE	012326	25-2540 025-2542
TEMPST	012230	*25-2483 *25-2487 *25-2510 *25-2511 *25-2512 *25-2514 25-2518 025-2521
TESINC	005610	23-1537 23-1737 23-1758 023-1768
TESRC1	006006	23-1801 023-1806
TESREC	005756	23-1795 023-1800
TEST	001326	023-1047 *23-1319
TEST0	003300	23-1320 023-1364
TEST1	003350	23-1322 023-1381
TEST2	003420	23-1324 023-1399
TEST3	003536	23-1327 023-1430
TEST4	003654	23-1331 023-1463
TEST5	004176	23-1330 023-1530
TKB	000516	023-974 25-2437 25-2471 28-2646
TKS	000514	023-973 25-2435 25-2469 28-2644
TO	011640	025-2450 25-2544
TOP	- 104404	23-1122 23-1132 23-1138 23-1160 23-1180 23-1217 23-1231 23-1296 23-1311
		23-1335 23-1357 23-1797 23-1829 23-1831 24-1859 24-1874 24-1876 24-1885
		24-1897 25-2136 25-2154 25-2187 25-2230 25-2232 25-2257 25-2272 25-2274
		25-2278 25-2282 25-2321 25-2325 25-2356 25-2445 25-2476 25-2478 25-2482
		25-2498 25-2508 025-2559 27-2620
TOP1	011652	025-2452 25-2459 25-2465
TOP2	011702	25-2456 025-2460
TPB	000522	023-976 23-1195 23-1213 23-1302 23-1304 25-2394 25-2423 25-2441 25-2458
		25-2461 25-2463
TPS	000520	023-975 25-2439 25-2450 28-2655
TRAP34	012306	20-893 025-2537

SYMBOL	VALUE	REFEPENCES
TSINC2	005664	23-1771    23-1776    *23-1778
TSINC3	005700	23-1779    *23-1781
TSTEX	001324	*23-1046    *23-1315    23-1316    *23-1359    23-1465
TSTSTP	005424	23-1727    *23-1733
TSTTBL	001330	*23-1049    *23-1069    *23-1070    *23-1071    23-1219    23-1315
TU_SEL	001546	23-1083    *23-1092
TYPT1	011410	*23-2401    23-2412
TYPT2	011416	*23-2402    23-2404
TYPT3	011452	23-2408    *23-2411
TO	003312	*23-1367    23-1377
TOA	003314	*23-1368    23-1375
TOB	003332	23-1370    *23-1374
T1	003362	*23-1384    23-1393
T1A	003364	*23-1385    23-1391
T1B	003402	23-1387    *23-1390
T2	003432	*23-1402    23-1425
T2A	003434	*23-1403    23-1409
T2B	003452	23-1405    *23-1408
T2C	003456	*23-1410    23-1416
T2D	003476	23-1412    *23-1415
T2E	003502	*23-1417    23-1423
T2F	003516	23-1419    *23-1421
T3	003550	*23-1433    23-1457
T3A	003552	*23-1434    23-1440
T3B	003570	23-1436    *23-1439
T3C	003574	*23-1442    23-1448
T3D	003612	23-1444    *23-1446
T3E	003620	*23-1449    23-1455
T3F	003634	23-1451    *23-1453
T4	003710	23-1466    *23-1469
T4A	003712	*23-1470    23-1524
T4B	003714	*23-1471    23-1475
T4C	003740	*23-1477    23-1491
T4D	003742	*23-1478    23-1486
T4E	003774	23-1480    *23-1485
T4F	004010	*23-1489    23-1493
T4G	004026	23-1488    *23-1494
T4H	004030	*23-1495    23-1501
T4J	004046	23-1497    *23-1499
T4K	004054	*23-1502    23-1520
T4L	004056	*23-1503    23-1517
T4M	004130	23-1510    *23-1513
T4N	004142	23-1505    23-1507    *23-1516
T4P	004146	*23-1518    23-1522
T5	004210	*23-1533    23-1577
T5A	004234	23-1536    *23-1538
T5B	004246	*23-1540
T5C	004256	*23-1542    23-1549
T5D	004306	23-1544    *23-1548
T5E	004314	*23-1551    23-1563    23-1575
T5F	004356	23-1556    *23-1559
T5FLAG	004456	*23-1533    *23-1579    *23-1609    23-1665    23-1708

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SYMBOL	VALUE	REFERENCES
TSG	004370	23-1553 023-1562
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TSINC	004460	*23-1538 23-1546 023-1580
TSJ	004410	023-1568 23-1573
TSK	004430	23-1570 023-1572
USSTST	001626	023-1103 23-1106
USS.OK	001644	23-1104 023-1108
VAL ID	002300	23-1193 023-1198
VAL1	002316	023-1203 23-1206
VAL2	002330	23-1204 023-1207
VAL3	002344	23-1208 023-1211
VAL4	002350	23-1196 23-1210 023-1212
WAITK	011562	025-2435 25-2436 25-2542
WAITKY	= 104400	23-1182 23-1220 23-1242 23-1254 23-1270 23-1282 23-1297 25-2489 025-2557
WAITK1	011604	025-2439 25-2440
WAIT1	005152	*23-1686 023-1688 *23-1691
WBUF	000530	023-979 23-1719 24-1902 25-2107 25-2162 25-2304
WRCHK	000572	023-998 23-1595 23-1677 23-1730 *23-1793 24-1877 24-1879 24-1889
WRITI	005174	023-1695 25-2543
WRITIT	= 104402	23-1371 23-1388 23-1406 23-1437 23-1482 23-1534 025-2558
WRPASS	000564	023-995 *23-1711 23-1726 23-1728 *23-1732 23-1735 23-1756 23-1791 *23-1802
		23-1803 *23-1809 *23-2294 *23-2313 *23-2317
WRRECR	000616	023-1009 *23-1472 23-1481 *23-1483 *23-1707 25-2335 25-2340
WRTDMP	006162	024-1836
WRTD1	006452	024-1881 24-1890
WRTD2	006474	24-1883 024-1888
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W10	005470	23-1739 023-1743
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