

TM11

TM11 DATA RELIAB  
CZTMCD0

AH-S171D-MC  
FICHE 1 OF 1

SEP 1980  
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MADE IN USA



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IDENTIFICATION

PRODUCT CODE: AC-9402D-MC  
PRODUCT NAME: CZTMCD0 TM11 DATA RELIAB  
PROGRAM DATE: MAY 1980  
MAINTAINER: DIAGNOSTIC GROUP

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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, PARITY, DENSITY RECORD LENGTHS, WRITING AND READING SEQUENCES AND STOPPING MODES (NONSTOP, START-STOP, RANDOM STALL DELAY).

2. REQUIREMENTS

2.1 EQUIPMENT

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

2.2 STORAGE

2.2.1 PROGRAM STORAGE

THE ROUTINE REQUIRES 4K OF MEMORY.

2.3 PRELIMINARY PROGRAMS

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

3. LOADING PROCEDURE

3.1 METHOD

PROCEDURE FOR NORMAL BINARY TAPES SHOULD BE FOLLOWED:

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

4. STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

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

4.2 STARTING ADDRESS

200 - BASIC TEST (AUTOMATIC PARAMETER AND UNIT SELECTION)

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

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

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4.3 PROGRAM AND/OR OPERATOR ACTION

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

4.3.1 TAPE UNIT SELECTION

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

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

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

4.3.1.1 TAPE UNIT SELECTION EXAMPLES

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

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

SELECT UNITS  
SELECT UNITS

A CARRIAGE RETURN WAS TYPED WITH NO UNITS SELECTED.

SELECT UNITS 1,9?,1,2

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

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

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

IF THE ABOVE CRITERIA IS NOT MEET BY AT 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 4.3.2.10) OTHERWISE STARTING AT ADDRESS 204 OR 210 WILL ALLOW OPERATOR TO SELECT PARAMETERS. THERE ARE SEVEN TYPES OF PARAMETERS TO BE CONTROLLED BY THE OPERATOR. THEY INCLUDE: TEST NUMBER, PATTERN, PARITY, DENSITY RECORD LENGTH, WRITE MODE, AND READ MODE. THE PROGRAM WILL PRINT:

'TST PAT PAR DEN RLS WMO RMO''

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

#### 4.3.2.1 TEST NUMBER

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

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

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4.3.2.2 PATTERN

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

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

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

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

4.3.2.3 PARITY

PARITY SELECTION IS EITHER EVEN OR ODD.

| PAR | DESCRIPTION  |
|-----|--------------|
| 0   | EVEN PARITY. |
| 1   | ODD PARITY   |

4.3.2.4 DENSITY

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

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

4.3.2.5 RECORD LENGTH SEQUENCE

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

| RLS | DESCRIPTION  |
|-----|--|
| 0   | MINIMUM LENGTH RECORDS (4 BYTES)   |
| 1   | MAXIMUM LENGTH RECORDS (1024 BYTES)  |
| 2   | VARIING LENGTH RECORDS, MINIMUM TO MAXIMUM (1ST RECORD=<br>4 BYTES, EACH SUCCESSIVE RECORD IS 4 BYTES LONGER |



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UNTIL 256TH RECORD=1024 BYTES)

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

#### 4.3.2.6 WRITE START/STOP MODE

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

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

#### 4.3.2.7 READ START/STOP MODE

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

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

#### 4.3.2.8 FINAL TEST SELECT APPROVAL

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

#### 4.3.2.9 TEST SELECTION EXAMPLES

TST PAT PAR DEN RLS WMO RMO

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|---|----|---|---|---|---|---|---------|
| 3 | 2  | 0 | 2 | 1 | 0 | 0 | OK (CR) |
| 3 | K? |   |   |   |   |   |         |
| 0 | 0  | 1 | 8 | 2 | 2 | 2 | OKX?    |
| 0 | 1  | 1 | 8 | 2 | 1 | 0 | OK (CR) |

(CR)

TWO PARAMETERS SETS WERE SELECTED BY THE ABOVE SEQUENCE

TEST3, PATTERN 2, EVEN PARITY, 200 BPI, MAXIMUM RECORD LENGTH, WRITE NONSTOP, AND READ NONSTOP.

TEST 0, PATTERN 1, ODD PARITY, 800 BPI, VARYING RECORD LENGTH (MIN TO MAX), WRITE START/STOP, READ NONSTOP.

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

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

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

#### 4.3.2.10 AUTOMATIC PARAMETER SELECTION

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

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

#### 5.0 OPERATING PROCEDURE

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

(IE) SWR=XXXXXX NEW=

POSSIBLE RESPONSES ARE:

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

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

### 5.1 OPERATIONAL SWITCH SETTINGS

THE OPERATIONAL SWITCH SETTINGS ARE USED TO:

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

#### 5.1.1 SWITCHES TO ALTER ERROR RECOVERY

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

| SW | FUNCTION                   | PURPOSE  |
|----|----------------------------|--|
| 4  | DELETE READ RE-TRYS        | USE OF THIS SWITCH WILL CAUSE DELETION OF THE NORMAL SEQUENCE OF TRYING TO RE-READ A RECORD AFTER A READ ERROR. THIS WOULD BE USEFUL FOR SCOPING READ OPERATIONS.          |
| 5  | DELETE WRITE XIRG          | USE OF THIS SWITCH WILL CAUSE RECORDS WITH WRITE ERRORS TO BE LEFT ON TAPE. THE READ PASS WITH DATA TYPEOUTS SELECTED WOULD BE USEFUL FOR DETERMINING WRITE ERROR ORIGINS. |
| 6  | WRITE STATISTICAL RECOVERY | USE OF THIS SWITCH WILL CAUSE A BACKSPACE 2 RECORDS, SPACE FORWARD 1 RECORD, REWRITE RECORD  |

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SEQUENCE TO BE USED INSTEAD OF WRITE XIRG SO THAT THE RECORD WILL BE REWRITTEN ON APPROXIMATELY THE SAME AREA OF TAPE WHERE THE WRITE ERROR OCCURRED. THIS METHOD KEEPS THE INTER-RECORD GAP FROM GETTING LARGER. DATA IS WRITTEN OVER THE SAME SPOT ON TAPE TO TRY AND FIND BAD TAPE.

5.1.2 SWITCHES TO CONTROL ERROR PRINTOUTS

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

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

5.1.3 TO ALTER TEST PATTERNS

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

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

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

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

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6. ERRORS

6.1 WRITE ERRORS

THE FOLLOWING ERROR TYPEOUTS ARE POSSIBLE DURING A WRITE OPERATION.

A. WRITE STATUS ERROR

| COMD   | STATUS | RECORD | LENGTH | EXPECTED | ACTUAL |
|--------|--------|--------|--------|----------|--------|
| XXXXXX | XXXXXX |        |        |          |        |

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

B. XIRG WRITTEN 4 TIMES

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

C. END OF TAPE

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

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

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

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

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6.2 READ ERRORS

THE FOLLOWING ERROR TYPEOUTS ARE POSSIBLE DURING A READ OPERATION:

A. READ STATUS ERROR

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

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

B. READ DATA ERROR

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

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

C. READ PASS

END OF TAPE

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

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

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

6.3 ERROR RECOVERY PROCEDURES

6.3.1 WRITE ERROR RECOVERY

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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

#### 8. MISCELLANEOUS

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8.1 TAPE LENGTH

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

8.2 MEMORY AVAILABLE

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

9. PROGRAM DESCRIPTION

9.1 GENERAL DESCRIPTION

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

9.2 TEST 0

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

9.3 TEST 1

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



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- 9.4 TEST 2  
THIS IS A 'WRITE AND READ' TEST. THE PROCEDURE IS TO WRITE 256 RECORDS ON EACH UNIT, THEN BACKSPACE 256 RECORDS ON EACH UNIT, THEN READ 256 RECORDS ON EACH UNIT, AND THEN REPEAT THE SEQUENCE UNTIL ALL UNITS ARE AT EOT.
- 9.5 TEST 3  
THIS IS A 'WRITE AND READ' TEST. THE PROCEDURE IS TO WRITE 1 RECORD, BACKSPACE, READ 1 RECORD AND REPEAT FOR EACH UNIT, THEN REPEAT THE SEQUENCE UNTIL ALL UNITS ARE AT EOT. WRITE MODE OR READ MODE OF NONSTOP (WMO=0 OR RMO=0) WILL NOT BE EFFECTIVE FOR THIS TEST.
- 9.6 TEST 4  
THIS IS A 'WRITE AND READ' TEST. IT IS SIMILAR TO TEST 2 EXCEPT UNITS ARE CHANGED BETWEEN EACH RECORD DURING WRITE, BACKSPACE, AND READ. WRITE MODE OR READ MODE OF NONSTOP (WMO=0 OR RMO=0) WILL NOT BE EFFECTIVE FOR THIS TEST.
- 9.7 TEST 5  
THIS IS A 'READ ONLY' TEST. THE PROCEDURE IS TO READ 1 RECORD, REPEAT FOR ALL UNITS, AND CONTINUE UNTIL ALL UNITS ARE AT EOT. THE MAIN PURPOSE OF THIS TEST IS TO PROVE COMPATIBILITY AMONG TAPE UNITS. A TAPE THAT IS WRITTEN ON ONE UNIT SHOULD BE ABLE TO BE READ ON ANY OTHER UNIT. TEST PARAMETERS THAT SELECT PATTERN AND RECORD LENGTH SEQUENCE MUST BE THE SAME AS THOSE USED TO WRITE THE DATA ON TAPE. ANY OF THE OTHER TESTS (0 THRU 4) CAN BE USED TO GENERATE THE DATA.

10. LISTING

STATUS AND COMMAND REGISTER BIT ASSIGNMENTS

COMMAND REGISTER

- 15 ERROR
- 14 DEN 8            00 = 200 BPI 7 TRACK    10 = 800 BPI 7 TRACK
- 13 DEN 5            01 = 556 BPI 7 TRACK    11 = 800 BPI 9 TRACK
- 12 POWER CLEAR
- 11 PARITY            0 = ODD    1 = EVEN
- 10 UNIT SEL. BIT 2
- 9    UNIT SEL. BIT 1
- 8    UNIT SEL. BIT 0
- 7    CONTROL UNIT READY
- 6    INTERRUPT ENABLE

884  
885 5 ADDRESS BIT 17  
886 4 ADDRESS BIT 16  
887 3 FUNCTION BIT 2 000 = OFF LINE 100 = SPACE FORWARD  
888 001 = READ 101 = SPACE REVERSE  
889 2 FUNCTION BIT 1 010 = WRITE 110 = WRITE XIRG  
890 1 FUNCTION BIT 0 011 = WRITE EOF 111 = REWIND  
891 0 GO

STATUS REGISTER

892  
893  
894  
895  
896 15 ILLEGAL COMMAND (ILC)  
897  
898 14 END OF FILE (EOF)  
899 13 CYCLICAL REDUNDANCY ERROR (CRE)  
900 12 PARITY ERROR (PAE)  
901  
902 11 BUS GRANT LATE (BGL)  
903 10 END OF TAPE (EOT)  
904 9 RECORD LENGTH ERROR (RLE)  
905  
906 8 BAD TAPE ERROR (BTE)  
907 7 NON EXISTENT MEMORY (NXM)  
908 6 SELECT REMOTE (SELR)  
909  
910 5 BEGINNING OF TAPE (BOT)  
911 4 7 CHANNEL (7CH)  
912 3 SETTLE DOWN (SDWN)  
913  
914 2 WRITE LOCK (WRL)  
915 1 REWIND STATUS (RWS)  
916 0 TAPE UNIT READY (TUR)  
917 !

918  
919 .TITLE CZTMCD0 TM11 DATA RELIAB  
920 :COPYRIGHT 1970,1980 DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754  
921 :REVISED SEPT 1971, J.RODENHISER  
922 :REVISED AUGUST 1972, JIM LACEY  
923 :REVISED FEB 1976, RON PLATUKIS  
924 :REVISED MAY 1980, LEN LORANGER  
925 : CHGD1 - INSERTED SUSW AFTER AUTOST FOR SWITCHLESS PROC.  
926 : CHGD2 - INSERTED END OF PASS STATEMENT.  
927  
928  
929

930 :\*\*\*\*\*

931  
932 :NOTE: THIS PROGRAM HAS BEEN MODIFIED TO WORK WITH OR WITHOUT  
933 : A HARDWARE SWITCH REGISTER  
934

935 :\*\*\*\*\*

936  
937 000000 R0=%0  
938 000001 R1=%1  
939 000002 R2=%2

```
940          000003          R3=%3
941          000004          R4=%4
942          000005          R5=%5
943          000006          SP=%6
944          000007          PC=%7
945
946          ;TRAP CATCHER IN UNUSED LOCATIONS 0-476
947
948          .ENABL ABS
949          .=0
950          000034          .=34
951 000034 012426          TRAP34
952          000046          .=46
953 000046 003310          ENDADR
954          000052          .=52
955 000052 040000          40000
956
957
958          ;*****
959          ;SOFTWARE SWITCH REGISTER LOCATION
960          ;*****
961          000174          .=174
962 000174 000000          DISPREG:0
963 000176 000000          SWREG: 0
964
965          000200          .=200
966 000200 000167 001162          JMP AUTOST
967 000204 000167 001612          JMP MEM4K
968 000210 000167 001632          JMP MEM8K
969
970
971          000500          .=500
972 000500 172520          MTS: 172520
973 000502 172522          MTC: 172522
974 000504 172524          BC: 172524
975 000506 172526          CA: 172526
976 000510 177776          CC: 177776
977 000512 177570          SWR: 177570
978 000514 177570          DISPLAY:177570
979 000516 177560          TKS: 177560
980 000520 177562          TKB: 177562
981 000522 177564          TPS: 177564
982 000524 177566          TPB: 177566
983 000526 002000          MAXLEN: 1024. ;MAX RECORD LENGTH
984 000530 000004          MINLEN: 4. ;MIN RECORD LENGTH
985 000532 014004          WBUF: BUFFER ;STARTING ADDRESS OF WRITE BUFFER
986 000534 016004          RBUF: BUFFER+1024. ;STARTING ADDRESS OF READ BUFFER
987 000536 000224          MTV: 224
988          000500          STACK=500
989
990          ;TEMPORARY STORAGE AREAS
991 000540 000000          TIB: 0
992 000542 000000          TEMPST: 0
993 000544 000000          COUNT: 0
994 000546 000000          RDSW: 0
995 000550 000000          ATST: 0
```

|      |        |        |         |            |
|------|--------|--------|---------|------------|
| 996  | 000552 | 000000 | DRVSEL: | 0          |
| 997  | 000554 | 000000 | STRLEN: | 0          |
| 998  | 000556 | 000000 | LENGTH: | 0          |
| 999  | 000560 | 000000 | MSBITS: | 0          |
| 1000 | 000562 | 000000 | SVRECR: | 0          |
| 1001 | 000564 | 000000 | COMAND: | 0          |
| 1002 | 000566 | 000000 | CDRVBT: | 0          |
| 1003 | 000570 | 000000 | CDRIVE: | 0          |
| 1004 | 000572 | 000000 | RDPASS: | 0          |
| 1005 | 000574 | 000000 | WRPASS: | 0          |
| 1006 | 000576 | 000000 | BLKINC: | 0          |
| 1007 | 000600 | 000000 | STATRD: | 0          |
| 1008 | 000602 | 000000 | WRCHEK: | 0          |
| 1009 | 000604 | 000000 |         | 0          |
| 1010 | 000606 | 000000 |         | 0          |
| 1011 | 000610 | 000000 |         | 0          |
| 1012 | 000612 | 000000 |         | 0          |
| 1013 | 000614 | 000000 |         | 0          |
| 1014 | 000616 | 000000 |         | 0          |
| 1015 | 000620 | 000000 |         | 0          |
| 1016 |        |        |         |            |
| 1017 | 000622 | 000000 | PERMBS: | 0          |
| 1018 | 000624 | 000000 | RECORD: | 0          |
| 1019 | 000626 | 000000 | WRRECR: | 0          |
| 1020 | 000630 | 000000 | LASRCR: | 0          |
| 1021 | 000632 | 000000 | RDERRS: | 0          |
| 1022 | 000634 | 000000 | DAERRS: | 0          |
| 1023 | 000636 | 000000 | NRREAD: | 0          |
| 1024 | 000640 | 000000 | WRTLEN: | 0          |
| 1025 | 000642 | 000000 | READLN: | 0          |
| 1026 | 000644 | 000000 | MODES:  | 0          |
| 1027 |        |        |         |            |
| 1028 |        |        |         |            |
| 1029 | 000646 | 000666 | DRVADR: | D0TAB      |
| 1030 | 000650 | 000732 |         | D1TAB      |
| 1031 | 000652 | 000776 |         | D2TAB      |
| 1032 | 000654 | 001042 |         | D3TAB      |
| 1033 | 000656 | 001106 |         | D4TAB      |
| 1034 | 000660 | 001152 |         | D5TAB      |
| 1035 | 000662 | 001216 |         | D6TAB      |
| 1036 | 000664 | 001262 |         | D7TAB      |
| 1037 |        |        |         |            |
| 1038 | 000666 | 000000 | D0TAB:  | 0          |
| 1039 |        | 000732 |         | .=D0TAB+44 |
| 1040 | 000732 | 000000 | D1TAB:  | 0          |
| 1041 |        | 000776 |         | .=D1TAB+44 |
| 1042 | 000776 | 000000 | D2TAB:  | 0          |
| 1043 |        | 001042 |         | .=D2TAB+44 |
| 1044 | 001042 | 000000 | D3TAB:  | 0          |
| 1045 |        | 001106 |         | .=D3TAB+44 |
| 1046 | 001106 | 000000 | D4TAB:  | 0          |
| 1047 |        | 001152 |         | .=D4TAB+44 |
| 1048 | 001152 | 000000 | D5TAB:  | 0          |
| 1049 |        | 001216 |         | .=D5TAB+44 |
| 1050 | 001216 | 000000 | D6TAB:  | 0          |
| 1051 |        | 001262 |         | .=D6TAB+44 |

|      |        |        |        |        |             |                     |   |
|------|--------|--------|--------|--------|-------------|---------------------|---|
| 1052 | 001262 | 000000 |        |        | D7TAB: 0    |                     |   |
| 1053 |        | 001326 |        |        |             | =D7TAB+44           |   |
| 1054 | 001326 | 000000 |        |        | CHARIN: 0   |                     | : CHARACTER JUST INPUT                              |
| 1055 | 001330 | 000000 |        |        | NUMTST: 0   |                     | : NUMBER OF TEST                                    |
| 1056 | 001332 | 000000 |        |        | PARAM: 0    |                     | : TEST PARAMETERS                                   |
| 1057 | 001334 | 000000 |        |        | TSTEX: 0    |                     | : POINTS TO TEST PARAMETERS TO BE EXECUTED          |
| 1058 | 001336 | 000000 |        |        | TEST: 0     |                     | : CONTAINS CURRENT TEST NUMBER                      |
| 1059 |        |        |        |        |             |                     |   |
| 1060 | 001340 | 000000 |        |        | TSTTBL: 0   |                     | : TEST TABLE  |
| 1061 | 001342 | 000000 |        |        | 0           |                     | : UP TO 10 TESTS CAN BE SELECTED TO                 |
| 1062 | 001344 | 000000 |        |        | 0           |                     | : BE RUN IN CONSECUTIVE ORDER                       |
| 1063 | 001346 | 000000 |        |        | 0           |                     |   |
| 1064 | 001350 | 000000 |        |        | 0           |                     |   |
| 1065 | 001352 | 000000 |        |        | 0           |                     |   |
| 1066 | 001354 | 000000 |        |        | 0           |                     |   |
| 1067 | 001356 | 000000 |        |        | 0           |                     |   |
| 1068 | 001360 | 000000 |        |        | 0           |                     |   |
| 1069 | 001362 | 000000 |        |        | 0           |                     |   |
| 1070 | 001364 | 000000 |        |        | 0           |                     |   |
| 1071 |        |        |        |        |             |                     |   |
| 1072 |        |        |        |        |             |                     |   |
| 1073 | 001366 | 012706 | 000500 |        | AUTOST: MOV | #STACK, SP          |   |
| 1074 | 001372 | 104432 |        |        | CHGD1: SUSW |                     | : SEE IF SOFT SW REG NECESSARY                      |
| 1075 | 001374 | 012767 | 177777 | 177146 | MOV         | #-1, ATST           |   |
| 1076 | 001402 | 012767 | 036225 | 177730 | MOV         | #36225, TSTTBL      |   |
| 1077 | 001410 | 012767 | 040752 | 177724 | MOV         | #40752, TSTTBL+2    |   |
| 1078 | 001416 | 012767 | 027752 | 177720 | MOV         | #27752, TSTTBL+4    |   |
| 1079 | 001424 | 012767 | 000003 | 177676 | MOV         | #3, NUMTST          |   |
| 1080 | 001432 | 012767 | 123456 | 005760 | MOV         | #123456, LONUM      | : PRIME RANDOM NUMBER GENERATER                     |
| 1081 | 001440 | 012767 | 176543 | 005754 | MOV         | #176543, HINUM      |   |
| 1082 |        |        |        |        |             |                     | : DETERMINE THE SIZE OF THE WRITE AND READ BUFFERS. |
| 1083 | 001446 | 012737 | 001464 | 000004 | MOV         | #NXMRET, @#4        | : SETUP NXM VECTOR                                  |
| 1084 | 001454 | 005767 | 022324 |        | TST         | BUFFER+4096.        | : OVER 4K OF MEMORY?                                |
| 1085 | 001460 | 000240 |        |        | NOP         |                     |   |
| 1086 | 001462 | 000413 |        |        | BR          | OVER4K              | : BR IF YES   |
| 1087 | 001464 | 022626 |        |        | NXMRET: CMP | (SP)+, (SP)+        | : POP THE STACK                                     |
| 1088 | 001466 | 012767 | 000004 | 177034 | MOV         | #4, MINLEN          |   |
| 1089 | 001474 | 012767 | 002000 | 177024 | MOV         | #1024, MAXLEN       |   |
| 1090 | 001502 | 012767 | 016004 | 177024 | MOV         | #BUFFER+1024., RBUF |   |
| 1091 | 001510 | 000411 |        |        | BR          | TU.SEL              | : GO SELCT DRIVES                                   |
| 1092 | 001512 | 012767 | 000010 | 177010 | OVER4K: MOV | #8, MINLEN          |   |
| 1093 | 001520 | 012767 | 004000 | 177000 | MOV         | #2048, MAXLEN       |   |
| 1094 | 001526 | 012767 | 020004 | 177000 | MOV         | #BUFFER+2048., RBUF |   |
| 1095 |        |        |        |        |             |                     | : DETERMINE DRIVES TO BE TESTED.                    |
| 1096 |        |        |        |        |             |                     | : A DRIVE WILL BE TESTED IF:                        |
| 1097 |        |        |        |        |             |                     | : 1. IT CAN BE SELECTED                             |
| 1098 |        |        |        |        |             |                     | : 2. IT IS 7 TRACK                                  |
| 1099 |        |        |        |        |             |                     | : 3. IT IS WRITE ENABLED                            |
| 1100 | 001534 | 012737 | 000006 | 000004 | TU.SEL: MOV | #6, @#4             | : SET TRAP CATCHER                                  |
| 1101 | 001542 | 012777 | 010000 | 176732 | MOV         | #10000, @MTC        | : PWR CLR   |
| 1102 | 001550 | 005067 | 176776 |        | CLR         | DRVSEL              | : CLEAR DRIVE TABLE                                 |
| 1103 | 001554 | 005067 | 177000 |        | CLR         | MSBITS              |   |
| 1104 | 001560 | 012700 | 000200 |        | MOV         | #200, R0            | : R0=DRIVE 0  |
| 1105 | 001564 | 105777 | 176712 |        | TSTB        | @MTC                |   |
| 1106 | 001570 | 100033 |        |        | BPL         | IDSELF              | : BR IF NO CU RDY                                   |
| 1107 | 001572 | 016777 | 176754 | 176702 | NXT.TU: MOV | DRVSEL, @MTC        | : SELECT A DRIVE                                    |

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1108 001600 012702 000024          MOV    #20.,R2          ;SETUP R2 FOR WAIT LOOP
1109 001604 032777 000100 176666  USSTST: BIT    #100,@MTS      ;DOES DRIVE EXIST?
1110 001612 001003          BNE    USS.OK          ;BR IF YES
1111 001614 005302          DEC    R2
1112 001616 003372          BGT    USSTST
1113 001620 000412          BR     NO.SEL          ;DRIVE IS NON-EXISTENCE
1114 001622 032777 000020 176650  USS.OK: BIT    #20,@MTS      ;IS THIS DRIVE 7 OR 9 CHN?
1115 001630 001406          BEQ    NO.SEL          ;BR IF 9 CHN.
1116 001632 032777 000004 176640          BIT    #4,@MTS        ;IS WRITE LOCK ON?
1117 001640 001002          BNE    NO.SEL          ;BR IF YES
1118 001642 050067 176712          BIS    R0,MSBITS      ;PUT DRIVE INTO TABLE
1119 001646 105267 176701          NO.SEL: INCB   DRVSEL+1    ;INC. THE DRIVE NUMBER
1120 001652 000241          CLC
1121 001654 006000          ROR    R0
1122 001656 001345          BNE    NXT.TU          ;HAS ALL DRIVES BEEN TESTED FOR EXISTENCE?
1123                                     ;BR IF NO
1124                                     ;TYPE-OUT NAME OF PROGRAM AND MIN. AND MAX. RECORD LENGTHS.
1125 001660 012702 013115  IDSELF: MOV    #MSG10A,R2
1126 001664 104404          TOP
1127 001666 016702 176636          MOV    MINLEN,R2
1128 001672 104426          DECPRT          ;PRINT MIN. LENGTH
1129 001674 016702 176626          MOV    MAXLEN,R2
1130 001700 104426          DECPRT          ;PRINT MAX. LENGTH
1131 001702 005767 176652          TST    MSBITS         ;WAS ANY DRIVES SELECTED?
1132 001706 001002          BNE    .+6           ;BR IF YES
1133 001710 000167 000160          JMP    START1        ;NO--GO HAVE OPERATOR SELECT DRIVES
1134
1135                                     ;TYPE-OUT THE DRIVE/S TO BE TESTED
1136 001714 012702 013217          MOV    #MSG10B,R2
1137 001720 104404          TOP
1138 001722 105067 012056          CLRB   BUFFER
1139 001726 012701 014004          MOV    #BUFFER,R1
1140 001732 005000          CLR    R0
1141 001734 012702 000200          MOV    #200,R2        ;SET R0 TO DRIVE 0
1142                                     ;SET R2 TO DRIVE 0
1143
1144                                     ;FORM AND SAVE DRIVE NUMBER FOR TYPE-OUT
1144 001740 105021          CLRB   (R1)+         ;SET EOM
1145 001742 112721 000040          MOVB   #' ,(R1)+     ;SPACE
1146 001746 030267 176606  LOOPER: BIT    R2,MSBITS ;DID THIS DRIVE NUMBER EXIST?
1147 001752 001405          BEQ    $ZEROS$       ;BR IF NO
1148 001754 110011          MOVB   R0,(R1)       ;YES--SAVE THE NUMBER
1149 001756 152721 000060          BISB   #'0,(R1)+     ;MAKE IT ASCII
1150 001762 112721 000054          MOVB   #' ,(R1)+     ;COMMA
1151 001766 000241          $ZEROS: CLC          ;POSITION DRIVE BIT
1152 001770 006002          ROR    R2
1153 001772 005200          INC    R0
1154 001774 020027 000007          CMP    R0,#7         ;UPDATE DRIVE NUMBER
1155 002000 003762          BLE    LOOPER        ;LAST
1156 002002 105011          CLRB   (R1)          ;BR IF NO
1157 002004 112741 000100          MOVB   #'@,-(R1)     ;SET EOM
1158 002010 012702 014004          MOV    #BUFFER,R2    ;CR & LF
1159 002014 104404          TOP
1160 002016 000167 001074          JMP    EXECUT        ;TYPE THE DRIVE/S SELECTED
1161                                     ;GO START TESTING
1162 002022 012767 000004 176500  ;MODIFY RECORD LENGTHS AND BUFFER AREAS FOR 4K.
1163 002030 012767 002000 176470  MEM4K: MOV    #4.,MINLEN
1163 002030 012767 002000 176470  MOV    #1024.,MAXLEN
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1164 002036 012767 016004 176470      MOV      #BUFFER+1024.,RBUF
1165 002044 000411                      BR      START
1166                                     ;MODIFY RECORD LENGTHS AND BUFFER AREAS FOR 8K.
1167 002046 012767 000010 176454 MEM8K:  MOV      #8.,MINLEN
1168 002054 012767 004000 176444      MOV      #2048.,MAXLEN
1169 002062 012767 020004 176444      MOV      #BUFFER+2048.,RBUF
1170 002070 005067 176454      START:  CLR      ATST      ;NOT AUTO START
1171 002074 012706 000500      START1: MOV      #STACK,SP  ;INITIALIZE STACK
1172 002100 104432                      SUSW
1173 002102 012767 123456 005310      MOV      #123456,LONUM  ;PRIME RANDOM
1174 002110 012767 176543 005304      MOV      #176543,HINUM  ;NUMBER GENERATOR
1175 002116 012702 012513                      MOV      #MSG1,R2
1176 002122 104404                      TOP
1177 002124 005067 176430      SELDRV: CLR      MSBITS   ;PRINT 'SELECT DRIVES'
1178 002130 104400                      WAITKY  ;CLEAR SELECTED DRIVE INDICATOR
1179 002132 122767 000015 177166      CMPB    #15,CHARIN     ;WAS CHARACTER A CARRIAGE RETURN?
1180 002140 001010                      BNE     SELD1          ;NO
1181 002142 005767 176412                      TST    MSBITS         ;YES, WERE ANY DRIVES SELECTED
1182 002146 001752                      BEQ    START1         ;NO
1183 002150 005767 176374                      TST    ATST
1184 002154 001454                      BEQ    SELTST         ;YES NOW SELECT TESTS
1185 002156 000167 000734                      JMP    EXECUT
1186 002162 122767 000070 177136 SELD1:  CMPB    #70,CHARIN  ;IS CHARACTER A VALID NUMBER 0-7?
1187 002170 003404                      BLE    SELD2          ;NO, PRINT '?'
1188 002172 122767 000060 177126      CMPB    #60,CHARIN     ;IS CHARACTER A VALID NUMBER 0-7?
1189 002200 003407                      BLE    VALID          ;YES
1190 002202 105777 176314      SELD2:  TSTB    @TPS
1191 002206 100375                      BPL    .-4
1192 002210 012777 000077 176306      MOV     #'?',@TPB     ;PRINT '?'
1193 002216 000424                      BR     VAL4
1194                                     ;HAVE VALID DRIVE NUMBER
1195 002220 142767 000270 177100 VALID:  BICB    #270,CHARIN  ;MASK OUT NUMBER
1196 002226 105167 177074                      COMB   CHARIN
1197 002232 012700 000200                      MOV    #200,RO
1198 002236 105267 177064      VAL1:  INCB   CHARIN
1199 002242 001402                      BEQ    VAL2          ;INITIALIZE BIT POSITION FOR DRIVE 0
1200 002244 006200                      ASR    RO            ;+1 TO DRIVE SELECT
1201 002246 000773                      BR     VAL1          ;HAVE DRIVE OF EQUAL TO ZERO
1202 002250 130067 176304      VAL2:  BITB   RO,MSBITS ;MOVE BIT POSITION TO NEXT DRIVE
1203 002254 001003                      BNE    VAL3          ;TRY AGAIN
1204 002256 150067 176276      VAL3:  BISB   RO,MSBITS ;COMPARE DRIVE SELECT WITH PREVIOUS SELECTED
1205 002262 000402                      BR     VAL4          ;DRIVE WASN'T PREVIOUSLY SET, SO SET IT NOW.
1206 002264 140067 176270      VAL3:  BICB   RO,MSBITS ;DRIVE WAS SET, CLEAR IT.
1207 002270 105777 176226      VAL4:  TSTB   @TPS
1208 002274 100375                      BPL    .-4
1209 002276 012777 000054 176220      MOV     #'',@TPB     ;PRINT COMMA
1210 002304 000711                      BR     SELDRV        ;RETURN TO WAIT FOR NEXT KEY
1211
1212
1213                                     ;HAVE DRIVES SELECTED-NOW GET TEST SELECTION
1214 002306 012702 012534      SELTST: MOV     #MSG2,R2
1215 002312 104404                      TOP
1216 002314 005067 177010                      CLR    NUMTST        ;PRINT 'SELECT TESTS'
1217 002320 012700 001340                      MOV    #TSTTBL,RO   ;CLEAR TEST NUMBERS SELECTED
1218 002324 104400                      SELT1: WAITKY        ;INITIALIZE TEST TABLE POINTER
1219 002326 122767 000015 176772      CMPB    #15,CHARIN     ;WAS CHARACTER A CARRIAGE RETURN?

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1220 002334 001005          BNE      SELT2
1221 002336 005767 176766  TST      NUMTST          ;WERE ANY TESTS SELECTED?
1222 002342 001412          BEQ      SELT3          ;NO
1223 002344 000167 000546  JMP      EXECUT          ;YES, EXECUTE TESTS
1224 002350 122767 000066 176750 SELT2:  CMPB     #66,CHARIN ;IS CHARACTER A VALID NUMBER 0-5
1225 002356 003404          BLE      SELT3          ;NO
1226 002360 122767 000060 176740  CMPB     #60,CHARIN ;IS CHARACTER A VALID NUMBER 0-5
1227 002366 003404          BLE      SELPAT          ;YES
1228 002370 012702 012506          SELT3:  MOV      #MSG0,R2
1229 002374 104404          TOP
1230 002376 000752          BR       SELT1          ;RETURN TO WAIT FOR TEST SELECT
1231 002400 016704 176722  SELPAT: MOV      CHARIN,R4
1232 002404 000304          SWAB     R4            ;ROTATE TEST NUMBER INTO POSITION
1233 002406 006104          ROL      R4
1234 002410 006104          ROL      R4
1235 002412 006104          ROL      R4
1236 002414 006104          ROL      R4
1237 002416 042704 107777  BIC      #107777,R4
1238 002422 104430          SP3
1239          ;HAVE VALID TEST SELECTED, NOW GET SELECTED PATTERN
1240 002424 104400          WAITKY
1241 002426 122767 000070 176672  CMPB     #70,CHARIN ;IS CHARACTER A VALID NUMBER 0-7
1242 002434 003755          BLE      SELT3          ;NO
1243 002436 122767 000057 176662  CMPB     #57,CHARIN ;IS CHARACTER A VALID NUMBER 0-7
1244 002444 002351          BGE      SELT3          ;NO
1245 002446 000367 176654  SWAB     CHARIN        ;MOVE PATTERN SELECT INTO POSITION
1246 002452 006167 176650  ROL      CHARIN
1247 002456 042767 170777 176642  BIC      #170777,CHARIN
1248 002464 056704 176636  BIS      CHARIN,R4    ;COMBINE PATTERN WITH TEST
1249 002470 104430          SP3
1250          ;WAIT FOR PARITY SELECTION (0=EVEN, 1=ODD)
1251 002472 104400          WAITKY
1252 002474 122767 000050 176624  CMPB     #60,CHARIN ;IS CHARACTER=0
1253 002502 001406          BEQ      SELPR          ;YES, EVEN PARITY
1254 002504 122767 000061 176614  CMPB     #61,CHARIN ;IS CHARACTER=1
1255 002512 001326          BNE      SELT3          ;NO, HAVE ILLEGAL KEY
1256 002514 052704 000400  BIS      #400,R4      ;YES, ODD PARITY
1257 002520 104430  SELPR:  SP3
1258
1259
1260          ;WAIT FOR DENSITY SELECTION
1261 002522 104400          WAITKY
1262 002524 122767 000062 176574  CMPB     #62,CHARIN ;IS CHARACTER=2
1263 002532 001424          BEQ      SELDN3        ;YES, DENSITY=200BPI
1264 002534 122767 000065 176564  CMPB     #65,CHARIN ;IS CHARACTER=5
1265 002542 001003          BNE      SELDN1        ;NO
1266 002544 052704 000100  BIS      #100,R4      ;SET DENSITY=556 BPI
1267 002550 000415          BR       SELDN3
1268 002552 122767 000070 176546  SELDN1: CMPB     #70,CHARIN ;IS CHARACTER=8
1269 002560 001003          BNE      SELDN2
1270 002562 052704 000200  BIS      #200,R4      ;SET DENSITY=800 BPI
1271 002566 000406          BR       SELDN3
1272 002570 122767 000103 176530  SELDN2: CMPB     #'C,CHARIN ;IS CHARACTER=C
1273 002576 001274          BNE      SELT3          ;NO, HAVE ILLEGAL KEY
1274 002600 052704 000300  BIS      #300,R4      ;SET CORE DUMP MODE
1275 002604 104430  SELDN3: SP3

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1276 ;WAIT FOR RECORD LENGTH SEQUENCES SELECTION
1277 002606 104400 WAITKY
1278 002610 122767 000060 176510 CMPB #60,CHARIN ;IS CHARACTER=0
1279 002616 001424 BEQ SELR3 ;YES, RLS=MIN
1280 002620 122767 000061 176500 CMPB #61,CHARIN ;IS CHARACTER=1
1281 002626 001003 BNE SELR1
1282 002630 052704 000020 BIS #20,R4 ;SET RLS=MAX
1283 002634 000415 BR SELR3
1284 002636 122767 000062 176462 SELR1: CMPB #62,CHARIN ;IS CHARACTER=2
1285 002644 001003 BNE SELR2
1286 002646 052704 000040 BIS #40,R4 ;SET RLS=MIN-MAX
1287 002652 000406 BR SELR3
1288 002654 122767 000063 176444 SELR2: CMPB #63,CHARIN ;IS CHARACTER=3
1289 002662 001242 BNE SELT3
1290 002664 052704 000060 BIS #60,R4 ;SET RLS=MAX-MIN
1291 002670 104430 SELR3: SP3
1292 ;WAIT FOR WRITE MODE SELECTION
1293 002672 104400 WAITKY
1294 002674 122767 000060 176424 CMPB #60,CHARIN
1295 002702 001415 BEQ SELW2 ;SET WMO=NONSTOP
1296 002704 122767 000061 176414 CMPB #61,CHARIN
1297 002712 001003 BNE SELW1
1298 002714 052704 000004 BIS #4,R4 ;SET WMO=START-STOP
1299 002720 000406 BR SELW2
1300 002722 122767 000062 176376 SELW1: CMPB #62,CHARIN
1301 002730 001217 BNE SELT3
1302 002732 052704 000010 BIS #10,R4 ;SET WMO=RANDOM
1303 002736 104430 SELW2: SP3
1304 ;WAIT FOR READ MODE SELECTION
1305 002740 104400 WAITKY
1306 002742 122767 000060 176356 CMPB #60,CHARIN
1307 002750 001417 BEQ SELRM2 ;SET RMO=NONSTOP
1308 002752 122767 000061 176346 CMPB #61,CHARIN
1309 002760 001003 BNE SELRM1
1310 002762 052704 000001 BIS #1,R4 ;SET RMO=START-STOP
1311 002766 000410 BR SELRM2
1312 002770 122767 000062 176330 SELRM1: CMPB #62,CHARIN
1313 002776 001402 BEQ .+6
1314 003000 000167 177364 JMP SELT3
1315 003004 052704 000002 BIS #2,R4 ;SET RMO=RANDOM
1316 003010 104430 SELRM2: SP3
1317
1318 ;HAVE ALL PARAMETERS
1319 003012 012702 012621 MOV #MSG6,R2
1320 003016 104404 TOP ;PRINT 'OK'
1321 003020 104400 WAITKY ;WAIT FOR CARRIAGE RETURN
1322 003022 122767 000015 176276 CMPB #15,CHARIN
1323 003030 001402 BEQ .+6
1324 003032 000167 177332 JMP SELT3
1325 003036 105777 175460 TSTB @TPS
1326 003042 100375 BPL .-4
1327 003044 012777 000012 175452 MOV #12,@TPB
1328 003052 105777 175444 TSTB @TPS
1329 003056 100375 BPL .-4
1330 003060 012777 000040 175436 MOV #40,@TPB
1331 003066 010420 MOV R4,(0)+

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1332 003070 005267 176234      INC      NUMTST      ;+1 TO TEST COUNT
1333 003074 022767 000012 176226  CMP      #10.,NUMTST ;EQUAL TO TEN YET
1334 003102 001402      BEQ      SELOK1      ;YES
1335 003104 000167 177214      JMP      SELT1       ;NO, ACCEPT NEXT SET
1336 003110 012702 012574  SELOK1: MOV     #MSG5,R2
1337 003114 104404      TOP
1338
1339      ;EXECUTE SELECTED TEST
1340 003116 005067 175522  EXECUT: CLR     MODES      ;INITIALIZE MODES
1341 003122 104434      CNTL
1342 003124 012767 001340 176202  MOV     #TSTTBL,TSTEX
1343 003132 017767 176176 176172  EXEC:  MOV     @TSTEX,PARAM ;GET TEST PARAMS
1344 003140 016700 176166  EXEC1: MOV     PARAM,R0
1345 003144 042700 007777      BIC     #7777,R0
1346 003150 010067 176162      MOV     R0,TEST
1347 003154 001465      BEQ     TEST0
1348 003156 022700 010000      CMP     #10000,R0
1349 003162 001506      BEQ     TEST1
1350 003164 022700 020000      CMP     #20000,R0
1351 003170 001527      BEQ     TEST2
1352 003172 022700 030000      CMP     #30000,R0
1353 003176 001573      BEQ     TEST3
1354 003200 022700 040000      CMP     #40000,R0
1355 003204 001402      BEQ     .+6
1356 003206 000167 001014      JMP     TEST5
1357 003212 000167 000466      JMP     TEST4
1358      ;RETURN HERE AFTER COMPLETION OF TEST
1359 003216 012702 013723  DONE:  MOV     #MSG30,R2
1360 003222 104404      TOP
1361 003224 104436      CKSW
1362 003226 032777 000001 175256  BIT     #1,@SWR      ;IF BIT 0=1 REPEAT ALL PATTERNS
1363 003234 001413      BEQ     DONE1
1364 003236 016700 176070      MOV     PARAM,R0
1365 003242 042700 170777      BIC     #170777,R0
1366 003246 022700 007000      CMP     #7000,R0      ;REACHED PAT 7
1367 003252 001404      BEQ     DONE1        ;YES
1368 003254 062767 001000 176050  ADD     #1000,PARAM   ;NO, +1 TO PAT
1369 003262 000726      BR      EXEC1        ;REPEAT
1370 003264 005367 176040  DONE1: DEC     NUMTST
1371 003270 001013      BNE     DOAGN
1372 003272 013702 000042      MOV     @#42,R2
1373 003276 001004      BNE     ENDADR
1374 003300 012702 013730  CHGD2: MOV     #MSG31,R2      ;PRINT END OF PASS
1375 003304 104404      TOP
1376 003306 000000      HALT      ;FINISHED ALL TESTS
1377 003310 004712      ENDADR: JSR    PC,(2)
1378 003312 000240      NOP
1379 003314 000240      NOP
1380 003316 000240      NOP
1381 003320 062767 000002 176006  DOAGN: ADD     #2,TSTEX
1382 003326 000701      BR      EXEC        ;DO NEXT TEST
1383
1384      ;TEST0
1385      ;WRITE ONE RECORD, CHANGE DRIVES, GO TO EOT
1386 003330 052767 000002 175306  TEST0: BIS     #2,MODES      ;EXIT WRITE EVERY RECORD, NO READ PASS
1387 003336 104420      CLRALL      ;CLEAR ERROR COUNTERS AND REWIND

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1388 003340 104416
1389 003342 104410
1390 003344 104414
1391 003346 032767 000040 175270
1392 003354 001002
1393 003356 104402
1394 003360 104406
1395
1396 003362 104422
1397 003364 000767
1398 003366 004767 001452
1399 003372 000763
1400 003374 000167 177616
1401
1402
1403 003400 052767 000001 175236
1404 003406 104420
1405 003410 104416
1406 003412 104410
1407 003414 104414
1408 003416 032767 000040 175220
1409 003424 001002
1410 003426 104402
1411 003430 104406
1412 003432 104422
1413 003434 000767
1414 003436 004767 001402
1415 003442 000763
1416 003444 000167 177546
1417
1418
1419
1420
1421 003450 052767 000005 175166
1422 003456 104420
1423 003460 104416
1424 003462 104410
1425 003464 104414
1426 003466 032767 000040 175150
1427 003474 001002
1428 003476 104402
1429 003500 104406
1430 003502 104422
1431 003504 000767
1432 003506 104414
1433 003510 032767 000020 175126
1434 003516 001003
1435 003520 004767 005206
1436 003524 104406
1437 003526 104422
1438 003530 000766
1439 003532 104414
1440 003534 032767 000020 175102
1441 003542 001001
1442 003544 104424
1443 003546 104406

TO: GENPAT ;GENERATE PATTERN
RSFDRV ;RESET DRIVE SELECTION TO LOWEST NUMBER
T0A: MVCTRS ;RESTORE DRIVE COUNTERS
BIT #40,MODES ;IS THIS DRIVE AT EOT?
BNE T0B ;YES, SKIP WRITE
WRITIT ;WRITE
SVCTRS ;SAVE DRIVE COUNTERS

T0B: CHGDRV ;ANY MORE DRIVES SELECTED?
TOA ;YES
JSR PC,ALLEOT ;ARE ALL DRIVES AT EOT?
BR T0 ;NO
JMP DONE ;YES, EXIT

;TEST1
;WRITE RECORD LENGTH SEQUENCE, GO TO NEXT DRIVE, CONTINUE TO EOT ON ALL DRIVES.
TEST1: BIS #1,MODES ;EXIT WRITE AFTER RLS, NO READ PASS
CLRALL ;CLEAR ERROR COUNTERS AND REWIND
GENPAT ;GENERATE PATTERN
RSFDRV ;RESET DRIVE SELECTION TO LOWEST NUMBER
T1A: MVCTRS ;RESTORE DRIVE COUNTERS
BIT #40,MODES ;IS THIS DRIVE AT EOT?
BNE T1B ;YES, SKIP WRITE
WRITIT ;WRITE
SVCTRS ;SAVE DRIVE COUNTERS
T1B: CHGDRV ;ANY MORE DRIVE SELECTED?
BR T1A ;YES
JSR PC,ALLEOT ;ARE ALL DRIVES AT EOT?
BR T1 ;NO
JMP DONE ;YES EXIT

;TEST2
;WRITE A RECORD LENGTH SEQUENCE, CHANGE DRIVES
;BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES. CONTINUE TO EOT ON ALL DRIVES
TEST2: BIS #5,MODES ;EXIT WRITE AFTER RLS, DO READ PASS
CLRALL ;CLEAR ERROR COUNTERS AND REWIND
GENPAT ;GENERATE PATTERN
RSFDRV ;SET DRIVE SELECTION TO LOWEST NUMBER
T2A: MVCTRS ;RESTORE DRIVE COUNTERS
BIT #40,MODES ;IS THIS DRIVE AT EOT?
BNE T2B ;YES, SKIP WRITE
WRITIT ;WRITE
SVCTRS ;SAVE DRIVE COUNTERS
T2B: CHGDRV ;ANYMORE DRIVERS SELECTED?
BR T2A ;YES
MVCTRS ;RESTORE DRIVE COUNTERS
T2C: BIT #20,MODES ;IS THIS READ AT EOT?
BNE T2D ;YES, SKIP BACKSPACE
JSR PC,GOBKWD ;BACKSPACE
SVCTRS ;SAVE DRIVE COUNTERS
T2D: CHGDRV ;ANY MORE DRIVES SELECTED?
BR T2C ;YES
MVCTRS ;RESTORE DRIVE COUNTERS
T2E: BIT #20,MODES ;IS THIS READ AT EOT?
BNE T2F ;YES, SKIP READ
READIT ;READ
SVCTRS ;SAVE DRIVE COUNTERS
T2F:

```

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1444 003550 104422          CHGDRV          ;ANYMORE DRIVES SELECTED?
1445 003552 000767          T2E            ;YES
1446 003554 004767 001264   BR             PC,ALLEOT    ;ARE ALL DRIVES AT EOT?
1447 003560 000740          BR             T2            ;NO
1448 003562 000167 177430   JMP            DONE        ;YES EXIT
1449
1450
1451          ;TEST3
1452 003566 052767 000006 175050 ;WRITE ONE RECORD, CHANGE DRIVES, BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES
1453 003574 104420          TEST3: BIS      #6,MODES    ;EXIT WRITE EVERY RECORD, DO READ PASS
1454 003576 104416          CLRALL         ;CLEAR ERROR COUNTERS AND REWIND
1455 003600 104410          GENPAT         ;GENERATE PATTERN
1456 003602 104414          T3:            RSFDRV         ;SET DRIVE SELECTION TO LOWEST NUMBER
1457 003604 032767 000040 175032 T3A:            MVCTRS         ;RESTORE DRIVE COUNTERS
1458 003612 001002          BIT            #40,MODES   ;IS THIS DRIVE AT EOT?
1459 003614 104402          BNE            T3B         ;YES, SKIP WRITE
1460 003616 104406          WRITIT        ;WRITE
1461 003620 104422          SVCTRS        ;SAVE DRIVE COUNTERS
1462 003622 000767          T3B:            CHGDRV         ;ANY MORE DRIVES SELECTED
1463          BR             T3A         ;YES
1464 003624 104414          T3C:            MVCTRS         ;RESTORE DRIVE COUNTERS
1465 003626 032767 000020 175010 BIT            #20,MODES   ;IS THIS DRIVE AT EOT?
1466 003634 001002          BNE            T3D         ;YES, SKIP BACKSPACE
1467 003636 004767 005070   JSR            PC,GOBKWD   ;BACKSPACE
1468 003642 104406          T3D:            SVCTRS         ;SAVE DRIVE COUNTERS
1469 003644 104422          CHGDRV         ;ANY MORE DRIVES SELECTED?
1470 003646 000766          BR             T3C         ;GO
1471 003650 104414          T3E:            MVCTRS         ;RESTORE DRIVE COUNTERS
1472 003652 032767 000020 174764 BIT            #20,MODES   ;IS THIS DRIVE AT EOT?
1473 003660 001001          BNE            T3F         ;YES, SKIP READ
1474 003662 104424          READIT        ;READ
1475 003664 104406          T3F:            SVCTRS         ;SAVE DRIVE COUNTERS
1476 003666 104422          CHGDRV         ;ANY MORE DRIVES SELECTED
1477 003670 000767          BR             T3E         ;YES
1478 003672 004767 001146   JSR            PC,ALLEOT    ;ARE ALL DRIVES AT EOT?
1479 003676 000740          BR             T3          ;NO
1480 003700 000167 177312   JMP            DONE        ;YES, EXIT
1481
1482          ;TEST4
1483          ;WRITE RECORD, CHANGE DRIVES, REPEAT FOR RECORD LENGTH SEQUENCE
1484          ;READ RECORD, CHANGE DRIVES, REPEAT FOR RLS
1485 003704 052767 000006 174732 TEST4: BIS      #6,MODES    ;EXIT WRITE EVERY RECORD, DO READ PASS
1486 003712 104416          GENPAT         ;GENERATE PATTERN
1487 003714 032777 000014 175412 BIT            #14,@STEX
1488 003722 001006          BNE            T4
1489 003724 042767 000007 174712 BIC            #7,MODES
1490 003732 052767 000005 174704 BIS            #5,MODES    ;EXIT WRITE AFTER RLS, DO READ PASS
1491 003740 104420          T4:            CLRALL         ;CLEAR ERROR COUNTERS AND REWIND
1492 003742 104410          T4A:            RSFDRV         ;SET DRIVE SELECTION TO LOWEST NUMBER
1493 003744 104414          T4B:            MVCTRS         ;RESTORE DRIVE COUNTERS
1494 003746 016767 174652 174652 MOV            RECORD,WRRECR ;SAVE RECORD
1495 003754 104406          SVCTRS        ;SAVE DRIVE COUNTERS
1496 003756 104422          CHGDRV         ;ANYMORE DRIVES SELCTED?
1497 003760 000771          BR             T4B         ;YES
1498 003762 042767 000010 174654 BIC            #10,MODES   ;INDICATE RLS END
1499 003770 104410          T4C:            RSFDRV         ;SET DRIVE SELECTION TO LOWEST NUMBER

```

|      |        |        |        |        |      |     |               |                                       |
|------|--------|--------|--------|--------|------|-----|---------------|---------------------------------------|
| 1500 | 003772 | 104414 |        |        | T4D: |     | MVCTRS        | :RESTORE DRIVE COUNTERS               |
| 1501 | 003774 | 032767 | 000040 | 174642 |      | BIT | #40,MODES     | :IS DRIVE AT EOT                      |
| 1502 | 004002 | 001010 |        |        |      | BNE | T4E           | :YES, SKIP WRITE                      |
| 1503 | 004004 | 016767 | 174616 | 174550 |      | MOV | WRRECR,SVRECR | :SAVE START OF RLS                    |
| 1504 | 004012 | 104402 |        |        |      |     | WRITIT        | :WRITE                                |
| 1505 | 004014 | 016767 | 174542 | 174604 |      | MOV | SVRECR,WRRECR | :RESTORE START OF RLS                 |
| 1506 | 004022 | 104406 |        |        |      |     | SVCTRS        | :SAVE DRIVE COUNTERS                  |
| 1507 | 004024 | 104422 |        |        | T4E: |     | CHGDRV        | :ANymORE DRIVES SELECTED?             |
| 1508 | 004026 | 000761 |        |        |      | BR  | T4D           | :YES                                  |
| 1509 | 004030 | 032767 | 000010 | 174606 |      | BIT | #10,MODES     | :ARE WE AT END OF RLS                 |
| 1510 | 004036 | 001007 |        |        |      | BNE | T4G           | :YES                                  |
| 1511 | 004040 | 104414 |        |        | T4F: |     | MVCTRS        | :RESTORE DRIVE COUNTERS               |
| 1512 | 004042 | 032767 | 000040 | 174574 |      | BIT | #40,MODES     | :ARE WE AT EOT?                       |
| 1513 | 004050 | 001747 |        |        |      | BEQ | T4C           | :NO                                   |
| 1514 | 004052 | 104422 |        |        |      |     | CHGDRV        | :ANymORE DRIVES SELECTED?             |
| 1515 | 004054 | 000771 |        |        |      | BR  | T4F           | :YES                                  |
| 1516 |        |        |        |        |      |     |               |                                       |
| 1517 |        |        |        |        |      |     |               |                                       |
| 1518 | 004056 | 104410 |        |        | T4G: |     | RSFDRV        | :SET DRIVE SELECTION TO LOWEST NUMBER |
| 1519 | 004060 | 104414 |        |        | T4H: |     | MVCTRS        | :RESTORE DRIVE COUNTERS               |
| 1520 | 004062 | 032767 | 000020 | 174554 |      | BIT | #20,MODES     | :IS THIS DRIVE AT EOT?                |
| 1521 | 004070 | 001002 |        |        |      | BNE | T4J           | :YES, SKIP BACKSPACE                  |
| 1522 | 004072 | 004767 | 004634 |        |      | JSR | PC,GOBKWD     | :BACKSPACE                            |
| 1523 | 004076 | 104406 |        |        | T4J: |     | SVCTRS        | :SAVE DRIVE COUNTERS                  |
| 1524 | 004100 | 104422 |        |        |      |     | CHGDRV        | :ANy MORE DRIVES SELECTED?            |
| 1525 | 004102 | 000766 |        |        |      | BR  | T4H           | :YES                                  |
| 1526 | 004104 | 104410 |        |        | T4K: |     | RSFDRV        | :SET DRIVE SELECTION TO LOWEST NUMBER |
| 1527 | 004106 | 104414 |        |        | T4L: |     | MVCTRS        | :RESTORE DRIVE COUNTERS               |
| 1528 | 004110 | 032767 | 000020 | 174526 |      | BIT | #20,MODES     | :IS THIS READ AT EOT?                 |
| 1529 | 004116 | 001025 |        |        |      | BNE | T4N           | :YES, SKIP READ                       |
| 1530 | 004120 | 026767 | 174504 | 174476 |      | CMP | LASRCR,RECORD | :HAVE WE READ LAST RECORD WRITTEN?    |
| 1531 | 004126 | 001421 |        |        |      | BEQ | T4N           | :YES                                  |
| 1532 | 004130 | 016767 | 174474 | 174424 |      | MOV | LASRCR,SVRECR | :SAVE LAST RECORD                     |
| 1533 | 004136 | 032767 | 000003 | 175166 |      | BIT | #3,PARAM      | :IS READ MODE NONSTOP?                |
| 1534 | 004144 | 001405 |        |        |      | BEQ | T4M           | :YES                                  |
| 1535 | 004146 | 016767 | 174452 | 174454 |      | MOV | RECORD,LASRCR |                                       |
| 1536 | 004154 | 005267 | 174450 |        |      | INC | LASRCR        | :+1 TO LAST RECORD WRITTEN            |
| 1537 | 004160 | 104424 |        |        | T4M: |     | READIT        | :READ                                 |
| 1538 | 004162 | 016767 | 174374 | 174440 |      | MOV | SVRECR,LASRCR | :RESTORE LAST RECORD WRITTEN          |
| 1539 | 004170 | 104406 |        |        |      |     | SVCTRS        | :SAVE DRIVE COUNTERS                  |
| 1540 | 004172 | 104422 |        |        | T4N: |     | CHGDRV        | :ANymORE DRIVES SELECTED?             |
| 1541 | 004174 | 000744 |        |        |      | BR  | T4L           | :YES                                  |
| 1542 | 004176 | 104414 |        |        | T4P: |     | MVCTRS        | :RESTORE DRIVE COUNTERS               |
| 1543 | 004200 | 026767 | 174424 | 174416 |      | CMP | LASRCR,RECORD | :ARE WE AT END OF RLS?                |
| 1544 | 004206 | 001336 |        |        |      | BNE | T4K           | :NO                                   |
| 1545 | 004210 | 104422 |        |        |      |     | CHGDRV        | :ANymORE DRIVES SELECTED?             |
| 1546 | 004212 | 000771 |        |        |      | BR  | T4P           | :YES                                  |
| 1547 | 004214 | 004767 | 000624 |        |      | JSR | PC,ALLEOT     | :ARE ALL DRIVES AT EOT?               |
| 1548 | 004220 | 000650 |        |        |      | BR  | T4A           | :NO                                   |
| 1549 | 004222 | 000167 | 176770 |        |      | JMP | DONE          | :YES,EXIT                             |
| 1550 |        |        |        |        |      |     |               |                                       |
| 1551 |        |        |        |        |      |     |               |                                       |
| 1552 |        |        |        |        |      |     |               |                                       |
| 1553 |        |        |        |        |      |     |               |                                       |
| 1554 | 004226 | 052767 | 000002 | 174410 |      |     |               |                                       |
| 1555 | 004234 | 104420 |        |        |      |     |               |                                       |

:TEST5  
:READ ONLY  
:RANDOM PATTERN INVALID EXCEPT FOR SPECIFIC CASES

TEST5: BIS #2,MODES  
CLRALL :CLEAR ERROR COUNTERS AND REWIND

|      |        |        |        |        |         |     |               |   |
|------|--------|--------|--------|--------|---------|-----|---------------|---|
| 1556 | 004236 | 104416 |        |        |         |     | GENPAT        | :GENERATE PATTERN                               |
| 1557 | 004240 | 012767 | 177777 | 000240 | T5:     | MOV | #-1,T5FLAG    | :ENABLE EXIT FROM WRITE ROUTINE                 |
| 1558 | 004246 | 104402 |        |        |         |     | WRITIT        | :ENTER WRITE ONLY TO INITIALIZE RECORD SEQUENCE |
| 1559 | 004250 | 032767 | 000010 | 174366 |         | BIT | #10,MODES     | :ARE WE AT END OF RLS?                          |
| 1560 | 004256 | 001402 |        |        |         | BEQ | T5A           | :YES  |
| 1561 | 004260 | 004767 | 001404 |        |         | JSR | PC,TESINC     | :SEE IF RECORD LENGTH SHOULD BE CHANGED         |
| 1562 | 004264 | 016767 | 174334 | 000216 | T5A:    | MOV | RECORD,T5INC  |   |
| 1563 | 004272 | 005067 | 174326 |        |         | CLR | RECORD        |   |
| 1564 | 004276 | 052767 | 000010 | 174340 | T5B:    | BIS | #10,MODES     | :INDICATE AT START OF RLS                       |
| 1565 | 004304 | 104410 |        |        |         |     | RSFDRV        | :SET DRIVE SELECTION TO LOWEST DRIVE NUMBER     |
| 1566 | 004306 | 104414 |        |        | T5C:    |     | MVCTRS        | :RESTORE DRIVE COUNTERS                         |
| 1567 | 004310 | 032767 | 000020 | 174326 |         | BIT | #20,MODES     | :IS THIS DRIVE AT EOT                           |
| 1568 | 004316 | 001007 |        |        |         | BNE | T5D           | :YES  |
| 1569 | 004320 | 016767 | 174300 | 174302 |         | MOV | RECORD,LASRCR |   |
| 1570 | 004326 | 066767 | 000156 | 174274 |         | ADD | T5INC,LASRCR  | :CURRENT RECORD + SEQUENCE LENGTH               |
| 1571 | 004334 | 104406 |        |        |         |     | SVCTRS        | :SAVE DRIVE COUNTERS                            |
| 1572 | 004336 | 104422 |        |        | T5D:    |     | CHGDRV        | :ANYMORE DRIVES?                                |
| 1573 | 004340 | 000762 |        |        |         | BR  | T5C           | :YES  |
| 1574 | 004342 | 104410 |        |        |         |     | RSFDRV        | :SET DRIVE SELECTION TO LOWEST NUMBER           |
| 1575 | 004344 | 104414 |        |        | T5E:    |     | MVCTRS        | :RESTORE DRIVE COUNTERS                         |
| 1576 | 004346 | 032767 | 000020 | 174270 |         | BIT | #20,MODES     | :IS THIS DRIVE AT EOT?                          |
| 1577 | 004354 | 001021 |        |        |         | BNE | T5G           | :YES  |
| 1578 | 004356 | 016767 | 174246 | 174176 |         | MOV | LASRCR,SVRECR | :SAVE END OF RLS RECORDS                        |
| 1579 | 004364 | 032767 | 000003 | 174740 |         | BIT | #3,PARAM      | :IS READ MODE NONSTOP                           |
| 1580 | 004372 | 001405 |        |        |         | BEQ | T5F           | :YES GO TO END RLS                              |
| 1581 | 004374 | 016767 | 174224 | 174226 |         | MOV | RECORD,LASRCR | :NEXT TO BE READ                                |
| 1582 | 004402 | 005267 | 174222 |        |         | INC | LASRCR        | :+1 EXIT READ AFTER ONE RECORD                  |
| 1583 | 004406 | 104424 |        |        | T5F:    |     | READIT        | :READ   |
| 1584 | 004410 | 016767 | 174146 | 174212 |         | MOV | SVRECR,LASRCR | :RESTORE END RECORD                             |
| 1585 | 004416 | 104406 |        |        |         |     | SVCTRS        | :SAVE DRIVE COUNTERS                            |
| 1586 | 004420 | 104422 |        |        | T5G:    |     | CHGDRV        | :ANY MORE DRIVES?                               |
| 1587 | 004422 | 000750 |        |        |         | BR  | T5E           | :YES  |
| 1588 | 004424 | 004767 | 000414 |        |         | JSR | PC,ALLEOT     | :ALL AT EOT?                                    |
| 1589 | 004430 | 000402 |        |        |         | BR  | T5H           | :NO   |
| 1590 | 004432 | 000167 | 176560 |        |         | JMP | DONE          | :YES EXIT                                       |
| 1591 | 004436 | 104410 |        |        | T5H:    |     | RSFDRV        | :SET DRIVE SELECTION TO LOWEST NUMBER           |
| 1592 | 004440 | 104414 |        |        | T5J:    |     | MVCTRS        | :RESTORE DRIVE COUNTERS                         |
| 1593 | 004442 | 026767 | 174156 | 174160 |         | CMP | RECORD,LASRCR | :ARE WE AT END OF RLS?                          |
| 1594 | 004450 | 001003 |        |        |         | BNE | T5K           | :NO   |
| 1595 | 004452 | 042767 | 000010 | 174164 |         | BIC | #10,MODES     | :YES,   |
| 1596 | 004460 | 104422 |        |        | T5K:    |     | CHGDRV        | :ANYMORE DRIVES SELECTED?                       |
| 1597 | 004462 | 000766 |        |        |         | BR  | T5J           | :YES  |
| 1598 | 004464 | 032767 | 000010 | 174152 |         | BIT | #10,MODES     | :AT END OF RLS?                                 |
| 1599 | 004472 | 001324 |        |        |         | BNE | T5E           | :NO   |
| 1600 | 004474 | 004767 | 000344 |        |         | JSR | PC,ALLEOT     | :ALL DRIVES AT EOT?                             |
| 1601 | 004500 | 000657 |        |        |         | BR  | T5            | :NO   |
| 1602 | 004502 | 000167 | 176510 |        |         | JMP | DONE          | :YES, EXIT                                      |
| 1603 | 004506 | 000000 |        |        | T5FLAG: | 0   |               |   |
| 1604 | 004510 | 000000 |        |        | T5INC:  | 0   |               |   |
| 1605 |        |        |        |        |         |     |               |   |
| 1606 |        |        |        |        |         |     |               | :SAVE DRIVE RECORD AND ERROR COUNTERS           |
| 1607 | 004512 | 004767 | 000030 |        | SVCTR:  | JSR | PC,CTRDEX     |   |
| 1608 | 004516 | 012021 |        |        | SVC1:   | MOV | (0)+,(1)+     |   |
| 1609 | 004520 | 022700 | 000646 |        |         | CMP | #DRVADR,RO    |   |
| 1610 | 004524 | 001374 |        |        |         | BNE | SVC1          |   |
| 1611 | 004526 | 000207 |        |        |         | RTS | PC            |   |

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1612      ;RESET DRIVE COUNTERS BACK INTO PROGRAM
1613 004530 004767 000012 MVCTR: JSR PC,CTRDEX
1614 004534 012120 MV1: MOV (1)+,(0)+
1615 004536 022700 000646 CMP #DRVADR,R0
1616 004542 001374 BNE MV1
1617 004544 000207 RTS PC
1618      ;SET UP POINTERS FOR MOVE AND SAVE COUNTERS
1619 004546 012700 000602 CTRDEX: MOV #WRCHEK,R0
1620 004552 012701 000646 MOV #DRVADR,R1
1621 004556 066701 174006 ADD CDRIVE,R1
1622 004562 066701 174002 ADD CDRIVE,R1
1623 004566 011101 MOV @R1,R1
1624 004570 000207 RTS PC
1625      ;CLEAR ALL DRIVE COUNTERS
1626 004572 104410 CLRAL: JSR RSFDRV
1627 004574 004767 000206 CLR1: JSR PC,REWIND
1628 004600 004767 000352 JSR PC,CLRTBL
1629 004604 104406 SVCTRS
1630 004606 104422 CHGDRV
1631 004610 000771 BR CLR1
1632 004612 052767 000010 174024 BIS #10,MODES ;AT END OF RLS
1633 004620 005067 177662 CLR T5FLAG
1634 004624 000207 RTS PC
1635      ;RESET DRIVE SELECTION TO LOWEST NUMBER
1636 004626 005067 173736 RSFDR: CLR CDRIVE ;START WITH DRIVE 0
1637 004632 012767 000200 173726 MOV #200,CDRVBT ;BIT FOR DRIVE 0
1638 004640 036767 173714 173720 RSF1: BIT MSBITS,CDRVBT ;IS DRIVE SELECTED?
1639 004646 001006 BNE RSF2 ;YES
1640 004650 005267 173714 INC CDRIVE ;NO + 1 TO DRIVE
1641 004654 000241 CLC
1642 004656 006067 173704 ROR CDRVBT ;ROTATE DRIVE BIT
1643 004662 000766 BR RSF1 ;REPEAT
1644 004664 016767 173700 173672 RSF2: MOV CDRIVE,COMAND
1645 004672 000367 173666 SWAB COMAND
1646 004676 105767 174430 TSTB PARAM ;SET PROPER DENSITY BITS
1647 004702 100003 BPL .+10
1648 004704 052767 040000 173652 BIS #40000,COMAND
1649 004712 032767 000100 174412 BIT #100,PARAM
1650 004720 001403 BEQ .+10
1651 004722 052767 020000 173634 BIS #20000,COMAND
1652 004730 032767 000400 174374 BIT #400,PARAM ;TEST PARITY SELECTED
1653 004736 001003 BNE .+10 ;ODD
1654 004740 052767 004000 173616 BIS #4000,COMAND ;EVEN
1655 004746 000207 RTS PC
1656
1657      ;SELECT NEXT DRIVE IN SEQUENCE
1658      ;+1 WORD TO EXIT ADDRESS IF LAST DRIVE TESTED
1659 004750 005267 173614 CHGDR: INC CDRIVE ;+1 TO DRIVE NUMBER
1660 004754 000241 CLC
1661 004756 006067 173604 ROR CDRVBT ;MOVE MASK BIT OVER 1 PLACE
1662 004762 001004 BNE CHG1 ;BRANCH IF MORE DRIVES SELECTED
1663 004764 104410 RSFDRV ;RESET DRIVE SELECT TO LOWEST NUMBER
1664 004766 062716 000002 ADD #2,@SP ;+ 2 TO SKIP OVER FIRST EXIT
1665 004772 000207 RTS PC
1666 004774 036767 173566 173556 CHG1: BIT CDRVBT,MSBITS
1667 005002 001762 BEQ CHGDR

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1668 005004 000727          BR      RSF2
1669
1670          ;REWIND DRIVE TO BOT
1671 005006 105777 173470  REWIND: TSTB  @MTC
1672 005012 100375          BPL      .-4          ;WAIT FOR CONTROL UNIT
1673 005014 016777 173544 173460  MOV      COMAND,@MTC ;SELECT DRIVE
1674 005022 006077 173452          ROR      @MTS
1675 005026 103375          BCC      .-4          ;WAIT FOR TU READY
1676 005030 052777 000016 173444  BIS      #16,@MTC    ;REWIND
1677 005036 004767 000140          JSR      PC,GOWAIT
1678 005042 000207          RTS      PC          ;EXIT
1679          ;ARE ALL DRIVES AT END OF TAPE
1680 005044 104410  ALLEOT: RSFDRV
1681 005046 104414  ALL1:  MVCTRS
1682 005050 032767 000060 173566  BIT      #60,MODES  ;AT EOT?
1683 005056 001403          BEQ      ALLEOS    ;NO
1684 005060 104422          CHGDRV   ;DONE ALL DRIVES?
1685 005062 000771          BR      ALL1      ;NO
1686 005064 000431          BR      ALL3
1687 005066 104436  ALLEOS: CKSW
1688 005070 032777 000400 173414  BIT      #400,@SWR  ;TEST SWITCH 8 TO EXIT AT END OF SEQUENCE
1689 005076 001426          BEQ      ALL2      ;NO, GO TO EOT
1690 005100 032767 000010 173536  BIT      #10,MODES ;AT END OF SEQUENCE
1691 005106 001422          BEQ      ALL2      ;NO, EXIT, DON'T DUMP ERROR COUNTERS
1692          ;DUMP ERROR COUNTERS ON ALL DRIVES
1693 005110 104410  CTRDMP: RSFDRV
1694 005112 104414  MVCTRS
1695 005114 005767 177366  TST      T5FLAG
1696 005120 001007          BNE      CTRD1    ;DUMP READ ONLY
1697 005122 004767 001100          JSR      PC,ENDT1
1698 005126 104436          CKSW
1699 005130 032767 000004 173506  BIT      #4,MODES  ;READ PASS SELECTED?
1700 005136 001402          BEQ      CDMEND   ;NO
1701 005140 004767 003112  CTRD1: JSR      PC,RNDTP1
1702 005144 104422  CDMEND: CHGDRV   ;DONE ALL DRIVES
1703 005146 000761          BR      CTRDMP+2  ;NO
1704 005150 062716 000002  ALL3:  ADD      #2,(6) ;INCREMENT RETURN POINT
1705 005154 000207  ALL2:  RTS      PC
1706
1707
1708          ;CLEAR READ AND WRITE TABLES
1709 005156 012700 000602  CLRTBL: MOV     #WRCHK,R0
1710 005162 005020  CLRT1: CLR     (0)+
1711 005164 020027 000644          CMP     R0,#MODES
1712 005170 001374          BNE     CLRT1
1713 005172 042767 000070 173444  BIC     #70,MODES
1714 005200 000207          RTS     PC
1715          ;INTERRUPT ENABLE, GO, WAIT FOR INTERRUPT
1716 005202 012777 000200 173300  GOWAIT: MOV     #200,@CC ;SET PRIORITY LEVEL 4
1717 005210 012767 000001 000014  MOV     #1,$WAIT    ;#1=WAIT INSTR
1718 005216 012777 005244 173312  MOV     #GW1,@MTV   ;SET INTERRUPT RETURN
1719 005224 052777 000101 173250  BIS     #101,@MTC   ;INTERRUPT ENABLE, GO
1720 005232 000001  $WAIT: WAIT      ;WAIT FOR INTERRUPT
1721 005234 012777 000340 173246  MOV     #340,@CC    ;RESTORE PRIORITY LEVEL 7
1722 005242 000207          RTS     PC          ;EXIT
1723 005244 012767 000240 177760  GW1:  MOV     #240,$WAIT ;NOP IT JUST IN CASE 11/34

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|      |        |        |        |        |                              |  |   |
|------|--------|--------|--------|--------|------------------------------|--|---|
| 1724 | 005252 | 000002 |        |        | RTI                          |  | ;RETURN FROM INTERRUPT                                |
| 1725 |        |        |        |        |                              |  |   |
| 1726 |        |        |        |        |                              |  |   |
| 1727 | 005254 | 005767 | 173344 |        | ;WRITE RECORD SECTION        |  |   |
| 1728 | 005260 | 001031 |        |        | WRITI: TST RECORD            |  | ;IS THIS THE FIRST RECORD                             |
| 1729 | 005262 | 016767 | 173240 | 173264 | BNE NOINCR                   |  | ;NO, SKIP SET UP OF RECORD LENGTH AND BLOCK INCREMENT |
| 1730 | 005270 | 012767 | 177774 | 173300 | MOV MAXLEN,STRLEN            |  |   |
| 1731 | 005276 | 032767 | 000020 | 174026 | MOV #-4, BLKINC              |  |   |
| 1732 | 005304 | 001006 |        |        | BIT #20,PARAM                |  |   |
| 1733 | 005306 | 016767 | 173216 | 173240 | BNE W1                       |  |   |
| 1734 | 005314 | 012767 | 000004 | 173254 | MOV MINLEN,STRLEN            |  |   |
| 1735 | 005322 | 016767 | 173226 | 173310 | MOV #4, BLKINC               |  |   |
| 1736 | 005330 | 032767 | 000040 | 173774 | W1: MOV STRLEN,WRLEN         |  |   |
| 1737 | 005336 | 001002 |        |        | BIT #40,PARAM                |  | ;DOES RECORD LENGTH CHANGE?                           |
| 1738 | 005340 | 005067 | 173232 |        | BNE NOINCR                   |  | ;YES  |
| 1739 | 005344 | 016767 | 173254 | 173254 | CLR BLKINC                   |  | ;NO   |
| 1740 | 005352 | 005767 | 177130 |        | NOINCR: MOV RECORD,WRRECR    |  |   |
| 1741 | 005356 | 001401 |        |        | TST T5FLAG                   |  |   |
| 1742 | 005360 | 000207 |        |        | BEQ .+4                      |  |   |
| 1743 | 005362 | 005067 | 173206 |        | RTS PC                       |  | ;EXIT WRITE ROUTINE IF TEST 5                         |
| 1744 | 005366 | 016777 | 173172 | 173106 | CLR WRPASS                   |  |   |
| 1745 | 005374 | 105777 | 173102 |        | STRTOP: MOV COMAND,@MTC      |  | ;SELECT UNIT  |
| 1746 | 005400 | 100375 |        |        | TSTB @MTC                    |  |   |
| 1747 | 005402 | 006077 | 173072 |        | BPL .-4                      |  | ;WAIT FOR CU READY                                    |
| 1748 | 005406 | 103375 |        |        | ROR @MTC                     |  | ;WAIT FOR TU READY                                    |
| 1749 | 005410 | 016777 | 173224 | 173066 | BCC .-4                      |  |   |
| 1750 | 005416 | 005477 | 173062 |        | NONSTP: MOV WRLEN,@BC        |  | ;SET BYTE COUNT                                       |
| 1751 | 005422 | 016777 | 173104 | 173056 | NEG @BC                      |  |   |
| 1752 | 005430 | 052777 | 000004 | 173044 | MOV WBUF,@CA                 |  | ;SET CURRENT ADDRESS                                  |
| 1753 | 005436 | 004767 | 177540 |        | BIS #4,@MTC                  |  | ;WRITE  |
| 1754 |        |        |        |        | JSR PC,GOWAIT                |  | ;INTERRUPT ENABLE, GO, WAIT FOR DONE                  |
| 1755 | 005442 | 017767 | 173032 | 173130 | ;RETURN HERE AFTER INTERRUPT |  |   |
| 1756 | 005450 | 005777 | 173026 |        | MOV @MTC,STATRD              |  | ;SAVE STATUS  |
| 1757 | 005454 | 100542 |        |        | TST @MTC                     |  |   |
| 1758 | 005456 | 005767 | 173112 |        | BMI ERROR                    |  | ;HAVE ERROR FLAG, CHECK FOR EOT                       |
| 1759 | 005462 | 001410 |        |        | TST WRPASS                   |  | ;WAS THIS A RECOVERY PASS                             |
| 1760 | 005464 | 016700 | 173104 |        | BEQ TSTSTP                   |  | ;NO   |
| 1761 | 005470 | 006300 |        |        | MOV WRPASS,RO                |  | ;YES  |
| 1762 | 005472 | 062700 | 000602 |        | ASL RO                       |  |   |
| 1763 | 005476 | 005210 |        |        | ADD #WRCHK,RO                |  |   |
| 1764 | 005500 | 005067 | 173070 |        | INC @RO                      |  | ;+1 TO APPROPRIATE RECOVERY PASS COUNTER              |
| 1765 | 005504 | 032767 | 000014 | 173620 | TSTSTP: CLR WRPASS           |  |   |
| 1766 | 005512 | 001023 |        |        | BIT #14,PARAM                |  | ;IS WRITE MODE NONSTOP?                               |
| 1767 | 005514 | 005767 | 173054 |        | BNE STOPOP                   |  | ;NO   |
| 1768 | 005520 | 001333 |        |        | TST WRPASS                   |  | ;YES  |
| 1769 | 005522 | 004767 | 000142 |        | BNE NONSTP                   |  |   |
| 1770 | 005526 | 032767 | 000001 | 173110 | JSR PC,TESINC                |  | ;CHANGE RECORD LENGTH                                 |
| 1771 | 005534 | 001405 |        |        | BIT #1,MODES                 |  | ;EXIT AFTER RLS?                                      |
| 1772 | 005536 | 032767 | 000010 | 173100 | BEQ W10                      |  | ;NO   |
| 1773 | 005544 | 001721 |        |        | BIT #10,MODES                |  | ;YES, ARE WE AT END OF RLS?                           |
| 1774 | 005546 | 000207 |        |        | BEQ NONSTP                   |  | ;NO   |
| 1775 | 005550 | 032767 | 000002 | 173066 | RTS PC                       |  | ;YES  |
| 1776 | 005556 | 001714 |        |        | W10: BIT #2,MODES            |  | ;EXIT EVERY RECORD?                                   |
| 1777 | 005560 | 000207 |        |        | BEQ NONSTP                   |  | ;NO   |
| 1778 | 005562 | 032767 | 000010 | 173542 | RTS PC                       |  | ;YES  |
| 1779 | 005570 | 001414 |        |        | STOPOP: BIT #10,PARAM        |  | ;IS WRITE MODE RANDOM?                                |
|      |        |        |        |        | BEQ W11                      |  | ;NO   |

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1780 ;RANDOM STALL DELAY
1781 005572 004767 001450 RANSTP: JSR PC,RANGEN
1782 005576 052767 177400 001612 RAN1: BIS #177400,RANDOM
1783 005604 012704 177470 RAN1: MOV #-200.,R4 ;DELAY 1 MILLISECOND
1784 005610 005204 INC R4
1785 005612 001376 BNE .-2
1786 005614 005267 001576 INC RANDOM
1787 005620 001371 BNE RAN1
1788 005622 005767 172746 W11: TST WRPASS
1789 005626 001257 BNE STRTOP
1790 005630 004767 000034 JSR PC,TESINC
1791 005634 032767 000001 173002 BIT #1,MODES ;EXIT AFTER RLS?
1792 005642 001405 BEQ W12 ;NO
1793 005644 032767 000010 172772 BIT #10,MODES ;YES, ARE WE AT END OF RLS?
1794 005652 001645 BEQ STRTOP ;NO
1795 005654 000207 RTS PC ;YES
1796 005656 032767 000002 172760 W12: BIT #2,MODES ;EXIT EVERY RECORD?
1797 005664 001640 BEQ STRTOP ;NO
1798 005666 000207 RTS PC ;YES
1799 ;SEE IF RECORD LENGTH SHOULD BE CHANGED
1800 005670 005267 172730 TESINC: INC RECORD ;+1 TO RECORD COUNT
1801 005674 042767 000010 172742 BIC #10,MODES ;NOT END OF RLS UNLESS SET BELOW
1802 005702 005767 172670 TST BLKINC
1803 005706 001416 BEQ TSINC2
1804 005710 066767 172662 172722 ADD BLKINC,WRTLEN
1805 005716 026767 172716 172604 CMP WRTLEN,MINLEN ;RECORD LENGTH TOO SHORT?
1806 005724 002404 BLT RESETL ;YES,RESET
1807 005726 026767 172706 172572 CMP WRTLEN,MAXLEN ;RECORD LENGTH TOO LONG?
1808 005734 003403 BLE TSINC2 ;NO
1809 005736 016767 172612 172674 RESETL: MOV STRLEN,WRTLEN ;YES, RESET
1810 005744 105767 172654 TSINC2: TSTB RECORD
1811 005750 001003 BNE TSINC3 ;NO
1812 005752 052767 000010 172664 BIS #10,MODES ;INDICATE AT END OF RLS
1813 005760 000207 TSINC3: RTS PC
1814
1815
1816 ;HAVE AN ERROR FLAG DURING WRITE OPERATION
1817 ;IF ERROR IS CAUSED BY END OF TAPE FLAG DUMP WRITE ERROR COUNTERS
1818 ;FOR ALL OTHER ERRORS: PRINT COMMAND AND STATUS REGISTERS AND RECORD NUMBER
1819 ;IF READ PASS IS SELECTED, TRY TO RECOVER BY WRITING WITH XIRG.
1820 005762 032767 175600 172610 ERROR: BIT #175600,STATRD ;AT EOT?
1821 005770 001511 BEQ ENDTAP ;YES
1822 005772 005767 172576 TST WRPASS
1823 005776 001002 BNE ERR1 ;FIRST ERROR?
1824 006000 005267 172576 INC WRCHEK ;YES, + 1 TO WRITE ERROR
1825 006004 032777 020000 172500 ERR1: BIT #20000,@SWR ;TYPE ALL ERRORS?
1826 006012 001011 BNE TESREC ;NO
1827 006014 012702 012626 MOV #MSG7,R2
1828 006020 104404 TOP ;PRINT ERROR
1829 006022 016767 172612 172526 MOV WRTLEN,LENGTH
1830 006030 004767 003006 JSR PC,PRTS ;PRINT STATUS, COMMAND, RECORD, LENGTH
1831 006034 104436 CKSW
1832 006036 032777 000100 172446 TESREC: BIT #100,@SWR ;RECOVER STATISTICALLY SELECTED?
1833 006044 001410 BEQ TESRC1 ;NO
1834 006046 005267 172522 INC WRPASS ;+1 TO WRITE RECOVER
1835 006052 022767 000010 172514 CMP #8.,WRPASS ;HAVE WE TRIED TO WRITE RECOVER 8 TIMES?

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|      |        |        |        |        |             |              |  |  |
|------|--------|--------|--------|--------|-------------|--------------|--|--|
| 1836 | 006060 | 001020 |        |        | BNE         | STREC1       |  | :NO                                    |
| 1837 | 006062 | 005267 | 172534 |        | INC         | PERMBS       |  | :YES, +1 TO PERMANENT BADSPOT?         |
| 1838 | 006066 | 032767 | 000004 | 172550 | TESRC1: BIT | #4,MODES     |  | :IS READ PASS SELECTED?                |
| 1839 | 006074 | 001402 |        |        | BEQ         | .+6          |  | :NO                                    |
| 1840 | 006076 | 004767 | 002412 |        | JSR         | PC,XRGREC    |  |  |
| 1841 | 006102 | 005067 | 172466 |        | CLR         | WRPASS       |  |  |
| 1842 | 006106 | 032767 | 002000 | 172464 | BIT         | #2000,STATRD |  |  |
| 1843 | 006114 | 001037 |        |        | BNE         | ENDTAP       |  |  |
| 1844 | 006116 | 000167 | 177500 |        | JMP         | W11          |  |  |
| 1845 | 006122 | 004767 | 002052 |        | STREC1: JSR | PC,BACK1     |  |  |
| 1846 | 006126 | 004767 | 002046 |        | JSR         | PC,BACK1     |  | :BACKSPACE 2 RECORDS                   |
| 1847 | 006132 | 032777 | 000040 | 172340 | BIT         | #40,@MTS     |  |  |
| 1848 | 006140 | 001402 |        |        | BEQ         | .+6          |  |  |
| 1849 | 006142 | 000167 | 177220 |        | JMP         | STRTOP       |  |  |
| 1850 | 006146 | 012777 | 177777 | 172330 | MOV         | #-1,@BC      |  |  |
| 1851 | 006154 | 016777 | 172404 | 172320 | MOV         | COMAND,@MTC  |  |  |
| 1852 | 006162 | 052777 | 000010 | 172312 | BIS         | #10,@MTC     |  |  |
| 1853 | 006170 | 004767 | 177006 |        | JSR         | PC,GOWAIT    |  | :SPACE FORWARD 1 RECORD                |
| 1854 | 006174 | 042777 | 000016 | 172300 | BIC         | #16,@MTC     |  |  |
| 1855 | 006202 | 052777 | 000004 | 172272 | BIS         | #4,@MTC      |  | :CHANGE FROM SPACE TO WRITE            |
| 1856 | 006210 | 000167 | 177152 |        | JMP         | STRTOP       |  |  |
| 1857 |        |        |        |        |             |              |  | :DRIVE IS AT EOT                       |
| 1858 | 006214 | 005267 | 172404 |        | ENDTAP: INC | RECORD       |  |  |
| 1859 | 006220 | 052767 | 000040 | 172416 | BIS         | #40,MODES    |  | :INDICATE DRIVE AT EOT                 |
| 1860 | 006226 | 012702 | 013555 |        | ENDT1: MOV  | #MSG24,R2    |  |  |
| 1861 | 006232 | 104404 |        |        |             | TOP          |  |  |
| 1862 | 006234 | 012702 | 012654 |        | MOV         | #MSG8,R2     |  |  |
| 1863 | 006240 | 104404 |        |        |             | TOP          |  |  |
| 1864 |        |        |        |        |             |              |  | :DUMP WRITE ERRORS                     |
| 1865 | 006242 | 004767 | 002640 |        | WRTDMP: JSR | PC,PRTD      |  | :PRINT DRIVE, PATTERN, PARITY, DENSITY |
| 1866 |        |        |        |        |             |              |  |  |
| 1867 | 006246 | 016767 | 173060 | 003162 | MOV         | PARAM,CHAR   |  |  |
| 1868 | 006254 | 042767 | 177763 | 003154 | BIC         | #177763,CHAR |  |  |
| 1869 | 006262 | 012702 | 013310 |        | MOV         | #MSG14,R2    |  |  |
| 1870 | 006266 | 022767 | 000004 | 003142 | CMP         | #4,CHAR      |  |  |
| 1871 | 006274 | 001002 |        |        | BNE         | .+6          |  |  |
| 1872 | 006276 | 012702 | 013270 |        | MOV         | #MSG12,R2    |  |  |
| 1873 | 006302 | 022767 | 000010 | 003126 | CMP         | #10,CHAR     |  |  |
| 1874 | 006310 | 001002 |        |        | BNE         | .+6          |  |  |
| 1875 | 006312 | 012702 | 013300 |        | MOV         | #MSG13,R2    |  |  |
| 1876 | 006316 | 104404 |        |        |             | TOP          |  | :PRINT WRITE MODE                      |
| 1877 | 006320 | 016702 | 172300 |        | MOV         | RECORD,R2    |  |  |
| 1878 | 006324 | 104426 |        |        |             | DECPRT       |  | :PRINT RECORD NUMBER                   |
| 1879 | 006326 | 016767 | 173000 | 003102 | MOV         | PARAM,CHAR   |  |  |
| 1880 | 006334 | 042767 | 177717 | 003074 | BIC         | #177717,CHAR |  |  |
| 1881 | 006342 | 012702 | 013336 |        | MOV         | #MSG17,R2    |  |  |
| 1882 | 006346 | 022767 | 000020 | 003062 | CMP         | #20,CHAR     |  |  |
| 1883 | 006354 | 001002 |        |        | BNE         | .+6          |  |  |
| 1884 | 006356 | 012702 | 013345 |        | MOV         | #MSG18,R2    |  |  |
| 1885 | 006362 | 022767 | 000040 | 003046 | CMP         | #40,CHAR     |  |  |
| 1886 | 006370 | 001002 |        |        | BNE         | .+6          |  |  |
| 1887 | 006372 | 012702 | 013320 |        | MOV         | #MSG15,R2    |  |  |
| 1888 | 006376 | 022767 | 000060 | 003032 | CMP         | #60,CHAR     |  |  |
| 1889 | 006404 | 001002 |        |        | BNE         | .+6          |  |  |
| 1890 | 006406 | 012702 | 013327 |        | MOV         | #MSG16,R2    |  |  |
| 1891 | 006412 | 104404 |        |        |             | TOP          |  | :PRINT RECORD LENGTH SEQUENCE          |

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1892 006414 012702 013354          MOV    #MSG19,R2
1893 006420 104404                    TOP
1894 006422 016702 172154          MOV    WRCHEK,R2
1895 006426 104426                    DECPRT ;PRINT 'WRITE ERRORS='
1896 006430 012700 000604          MOV    #WRCHEK+2,R0
1897 006434 112767 000060          MOV    #60,MSG20+17
1898 006442 105267 004747          WRTD1: INCB  MSG20+17 ;PRINT STATISTICAL RECOVERY
1899 006446 005710                    TST    @R0
1900 006450 001405                    BEQ    WRTD2
1901 006452 012702 013376          MOV    #MSG20,R2
1902 006456 104404                    TOP
1903 006460 011002                    MOV    (0),R2
1904 006462 104426                    DECPRT ;RECOVERED AT X
1905 006464 005720                    WRTD2: TST    (0)+ ;JUST INCREMENTING
1906 006466 020027 000622          CMP    R0,#WRCHEK+20
1907 006472 001363                    BNE    WRTD1
1908 006474 005767 172122          TST    PERMBS
1909 006500 001002                    BNE    1$ ;SKIP PRINT IF = 0
1910 006502 104436                    CKSW
1911 006504 000207                    RTS    PC
1912
1913
1914 006506 012702 013420          1$:   MOV    #MSG20A,R2
1915 006512 104404                    TOP
1916 006514 016702 172102          MOV    PERMBS,R2 ;PRINT 'PERMANENT BADSPOT'
1917
1918 006520 104426                    DECPRT
1919 006522 104436                    CKSW
1920 006524 000207                    RTS    PC
1921
1922
1923
1924
1925 ;GENERATE DATA PATTERN
;ALL PATTERNS HAVE BITS 15,14,7,6 SET IN CASE CORE DUMP SELECTED
1926 006526 016702 172000          GENPA: MOV    WBUF,R2
1927 006532 016703 172574          MOV    PARAM,R3
1928 006536 000303                    SWAB   R3
1929 006540 006303                    ASL    R3
1930 006542 042703 177741          BIC    #177741,R3
1931 006546 062703 006554          ADD    #PATPNT,R3
1932 006552 011307                    MOV    @R3,PC
1933 006554 006614          PATPNT: PATE0
1934 006556 006622          PAT00
1935 006560 006630          PATE1
1936 006562 006644          PAT01
1937 006564 006660          PATE2
1938 006566 006666          PAT02
1939 006570 006674          PATE3
1940 006572 006702          PAT03
1941 006574 006710          PATE4
1942 006576 006734          PAT04
1943 006600 006754          PATE5
1944 006602 007002          PAT05
1945 006604 C^7032          PAT6
1946 006606 007032          PAT6
1947 006610 007040          PATE7
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|      |        |        |        |   |  |
|------|--------|--------|--------|---|--|
| 1948 | 006612 | 007070 |        |   |  |
| 1949 |        |        |        | PAT07   |  |
| 1950 |        |        |        | :PATTERN 0  |  |
| 1951 | 006614 | 012703 | 140701 | :HIGH FREQUENCY OUTSIDE SKEW                                |  |
| 1952 | 006620 | 000533 |        | PATE0: MOV #140701,R3 ;401                                  |  |
| 1953 |        |        |        | BR PFIL1  |  |
| 1954 |        |        |        | :HALF FREQUENCY OUTSIDE SKEW                                |  |
| 1955 | 006622 | 012703 | 140301 | PAT00: MOV #140301,R3 ;1                                    |  |
| 1956 | 006626 | 000530 |        | BR PFIL1  |  |
| 1957 |        |        |        | :PATTERN 1  |  |
| 1958 |        |        |        | :SLIDING 0  |  |
| 1959 | 006630 | 012703 | 006636 | PATE1: MOV #PE1,R3  |  |
| 1960 | 006634 | 000532 |        | BR PFIL3  |  |
| 1961 | 006636 | 167737 |        | PE1: 167737 ;27437  |  |
| 1962 | 006640 | 175767 |        | 175767 ;35467   |  |
| 1963 | 006642 | 177375 |        | 177375 ;37075   |  |
| 1964 |        |        |        | :SLIDING 1  |  |
| 1965 | 006644 | 012703 | 006652 | PAT01: MOV #P01,R3  |  |
| 1966 | 006650 | 000524 |        | BR PFIL3  |  |
| 1967 | 006652 | 150340 |        | P01: 150340 ;10040  |  |
| 1968 | 006654 | 142310 |        | 142310 ;2010  |  |
| 1969 | 006656 | 140702 |        | 140702 ;402   |  |
| 1970 |        |        |        |   |  |
| 1971 |        |        |        | :PATTERN 2  |  |
| 1972 |        |        |        | :HIGH FREQUENCY EVERY OTHER TRACK                           |  |
| 1973 | 006660 | 012703 | 152725 | PATE2: MOV #152725,R3 ;12425                                |  |
| 1974 | 006664 | 000511 |        | BR PFIL1  |  |
| 1975 |        |        |        |   |  |
| 1976 |        |        |        | :HIGH FREQUENCY EVERY OTHER TRACK                           |  |
| 1977 | 006666 | 012703 | 165352 | PAT02: MOV #165352,R3 ;25052                                |  |
| 1978 | 006672 | 000506 |        | BR PFIL1  |  |
| 1979 |        |        |        | :PATTERN 3  |  |
| 1980 |        |        |        | :HALF FREQUENCY OUTSIDE TRACK, HIGH FREQUENCY INSIDE TRACKS |  |
| 1981 | 006674 | 012703 | 177377 | PATE3: MOV #177377,R3 ;37077                                |  |
| 1982 | 006700 | 000503 |        | BR PFIL1  |  |
| 1983 |        |        |        | :HIGH FREQUENCY OUTSIDE TRACK, HALF FREQUENCY INSIDE TRACKS |  |
| 1984 | 006702 | 012703 | 177701 | PAT03: MOV #177701,R3 ;37401                                |  |
| 1985 | 006706 | 000500 |        | BR PFIL1  |  |
| 1986 |        |        |        | :PATTERN 4  |  |
| 1987 |        |        |        | :INCREMENTING PATTERN (NO ALL 0'S)                          |  |
| 1988 | 006710 | 012703 | 000301 | PATE4: MOV #301,R3  |  |
| 1989 | 006714 | 110322 |        | MOVB R3,(2)+  |  |
| 1990 | 006716 | 026702 | 171612 | CMP RBUF,R2   |  |
| 1991 | 006722 | 001001 |        | BNE .+4   |  |
| 1992 | 006724 | 000530 |        | BR PATEND   |  |
| 1993 | 006726 | 105203 |        | INCB R3   |  |
| 1994 | 006730 | 001767 |        | BEQ PATE4   |  |
| 1995 | 006732 | 000770 |        | BR PATE4+4  |  |
| 1996 |        |        |        | :INCREMENTING PATTERN (INCLUDING ALL 0'S)                   |  |
| 1997 | 006734 | 005003 |        | PAT04: CLR R3   |  |
| 1998 | 006736 | 110322 |        | MOVB R3,(2)+  |  |
| 1999 | 006740 | 026702 | 171570 | CMP RBUF,R2   |  |
| 2000 | 006744 | 001001 |        | BNE .+4   |  |
| 2001 | 006746 | 000517 |        | BR PATEND   |  |
| 2002 | 006750 | 005203 |        | INC R3  |  |
| 2003 | 006752 | 000771 |        | BR PAT04+2  |  |

2004  
2005  
2006 006754 012703 006762  
2007 006760 000475  
2008 006762 157437  
2009 006764 167737  
2010 006766 167757  
2011 006770 173767  
2012 006772 171767  
2013 006774 171773  
2014 006776 176775  
2015 007000 177376  
2016  
2017  
2018  
2019 007002 012703 007010  
2020 007006 000462  
2021 007010 160340  
2022 007012 150340  
2023 007014 150320  
2024 007016 144310  
2025 007020 142310  
2026 007022 142304  
2027 007024 141302  
2028 007026 140702  
2029 007030 140701  
2030  
2031  
2032 007032 012703 177777  
2033 007036 000424  
2034  
2035  
2036 007040 004767 000202  
2037 007044 132767 000077 000344  
2038 007052 001772  
2039 007054 116722 000336  
2040 007060 026702 171450  
2041 007064 001365  
2042 007066 000447  
2043  
2044 007070 004767 000152  
2045 007074 016722 000316  
2046 007100 026702 171430  
2047 007104 001371  
2048 007106 000437  
2049  
2050 007110 010322  
2051 007112 026702 171416  
2052 007116 001374  
2053 007120 000432  
2054  
2055 007122 010304  
2056 007124 062704 000006  
2057 007130 012322  
2058 007132 026702 171376  
2059 007136 001001

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:PATTERN 5  
:THREE 0'S EACH TRACK EVERY 6TH WORD  
PATE5: MOV #PE5,R3  
BR PFIL9  
PE5: 157437 :17437  
167737 :27437  
167757 :27457  
173767 :33467  
171767 :31467  
171773 :31473  
176775 :37075  
177376 :37076
```

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

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

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

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

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

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

```

2060 007140 000422          BR      PATEND
2061 007142 020304          CMP     R3,R4
2062 007144 001002          BNE    .+6
2063 007146 162703 000006   SUB    #6,R3
2064 007152 000766          BR     PFIL3A
2065
2066          ;FILL WRITE BUFFER WITH 9 WORD PATTERN
2067 007154 010304          PFIL9: MOV    R3,R4
2068 007156 062704 000022   ADD    #22,R4
2069 007162 012322          PFIL9A: MOV   (3)+,(2)+
2070 007164 026702 171344   CMP    RBUF,R2
2071 007170 001001          BNE    .+4
2072 007172 000405          BR     PATEND
2073 007174 020304          CMP    R3,R4
2074 007176 001002          BNE    .+6
2075 007200 162703 000022   SUB    #22,R3
2076 007204 000766          BR     PFIL9A
2077
2078          ;FINISHED PATTERN GENERATION
2079 007206 032767 000100 172116 PATEND: BIT   #100,PARAM ;IS CORE DUMP SET?
2080 007214 001404          BEQ    PATEN ;NO
2081 007216 032767 000200 172106 BIT   #200,PARAM ;MAYBE, IS CORE DUMP SET?
2082 007224 001007          BNE    PATEN2 ;YES
2083 007226 016702 171300          PATEN: MOV   WBUF,R2 ;NO
2084 007232 042722 140300          PATEN1: BIC  #140300,(2)+ ;CLEAR BITS 15,14,7,6
2085 007236 026702 171272          CMP    RBUF,R2 ;DONE ALL?
2086 007242 001373          BNE    PATEN1 ;NO
2087 007244 000207          PATEN2: RTS   PC
2088
2089          ;RANDOM NUMBER GENERATOR
2090          ;EXIT WITH RANDOM NUMBER IN LOCATION NAMED 'RANDOM'
2091 007246 010067 000152          RANGEN: MOV  R0,SV0 ;SAVE REGISTERS
2092 007252 010167 000150          MOV    R1,SV1
2093 007256 010267 000146          MOV    R2,SV2
2094 007262 010367 000144          MOV    R3,SV3
2095 007266 016700 000126          MOV    LONUM,R0 ;SET UP LOW DIGIT
2096 007272 016701 000124          MOV    HINUM,R1 ;SET UP HIGH DIGIT
2097 007276 012703 000007          MOV    #7,R3 ;SET UP SHIFT COUNT
2098 007302 005002          CLR    R2
2099 007304 006300          RANG1: ASL  R0 ;SHIFT R0 LEFT AND
2100 007306 006101          ROL   R1 ;ROTATE CARRY INTO LSB OF R1 AND
2101 007310 006102          ROL   R2 ;ROTATE CARRY OUT OF R1 INTO R2
2102 007312 005303          DEC   R3 ;DECREMENT R3
2103 007314 001373          BNE   RANG1 ;CONTINUE SHIFT LOOP
2104 007316 066700 000076          ADD   LONUM,R0 ;ADD NUMBER TO MAKE X 129
2105 007322 005501          ADC   R1 ;PROPAGATE CARRY
2106 007324 066701 000072          ADD   HINUM,R1 ;ADD NUMBER TO MAKE X 129
2107 007330 005502          ADC   R2 ;PROPAGATE CARRY
2108 007332 062700 001057          ADD   #1057,R0 ;ADD LOW CONSTANT
2109 007336 005501          ADC   R1 ;PROPAGATE CARRY
2110 007340 005502          ADC   R2 ;PROPAGATE CARRY
2111 007342 062701 047401          ADD   #47401,R1 ;ADD HIGH CONSTANT
2112 007346 005502          ADC   R2 ;PROPAGATE CARRY
2113 007350 062702 000006          ADD   #6,R2 ;ADD HIGH CONSTANT
2114 007354 060200          ADD   R2,R0 ;RE-PRIME R0 WITH HIGH DIGIT
2115 007356 005501          ADC   R1 ;PROPAGATE CARRY

```

```

2116 007360 010067 000032      MOV      R0,RANDOM      ;SAVE RANDOM NUMBER
2117 007364 010067 000030      MOV      R0,LONUM      ;PUT R0 BACK IN LONUM
2118 007370 010167 000026      MOV      R1,HINUM      ;PUT R1 BACK IN HINUM
2119 007374 016700 000024      MOV      SV0,R0        ;RESTORE REGISTERS
2120 007400 016701 000022      MOV      SV1,R1
2121 007404 016702 000020      MOV      SV2,R2
2122 007410 016703 000016      MOV      SV3,R3
2123 007414 000207              RTS      PC              ;EXIT
2124 007416 000000              RANDOM: 0
2125 007420 000000              LONUM: 0
2126 007422 000000              HINUM: 0
2127 007424 000000              SV0: 0
2128 007426 000000              SV1: 0
2129 007430 000000              SV2: 0
2130 007432 000000              SV3: 0
2131
2132
2133              ;READ RECORD SECTION
2134 007434 005767 171164      READI:  TST      RECORD      ;FIRST RECORD?
2135 007440 001003              BNE      $R1              ;NO
2136 007442 016767 171106 171172      MOV      STRLEN,READLN      ;SET INITIAL READ LENGTH
2137 007450 012767 177775 171114      $R1:  MOV      #-3,RDPASS      ;INITIALIZE READ PASS COUNTER
2138 007456 016777 171102 171016      RDSTPD: MOV      COMAND,@MTC
2139 007464 105777 171012      TSTB    @MTC
2140 007470 100375              BPL      .-4              ;WAIT FOR CONTROL UNIT READY
2141 007472 006077 171002      ROR     @MTC
2142 007476 103375              BCC     .-4              ;WAIT FOR TAPE UNIT READY
2143 007500 016700 171030      READGO: MOV      RBUF,R0
2144 007504 016701 171132      MOV     READLN,R1
2145 007510 105020      RG1:  CLRB    (0)+        ;CLEAR READ BUFFER
2146 007512 005301              DEC     R1
2147 007514 001375              BNE     RG1
2148 007516 016777 171120 170760      MOV     READLN,@BC        ;SET BYTE COUNT
2149 007524 005477 170754              NEG     @BC
2150 007530 016777 171000 170750      MOV     RBUF,@CA        ;SET CURRENT ADDRESS
2151 007536 016777 171022 170736      MOV     COMAND,@MTC
2152 007544 052777 000002 170730      BIS     #2,@MTC
2153 007552 004767 175424      JSR     PC,GOWAIT
2154
2155 007556 017767 170716 171014      ;RETURN HERE AFTER INTERRUPT
2156 007564 005777 170712      MOV     @MTC,STATRD
2157 007570 100504      TST     @MTC              ;ANY STATUS ERRORS
2158              BMI     RDERRO        ;YES
2159              ;CHECK FOR DATA ERRORS
2160              MOV     RBUF,R0
2161              MOV     WBUF,R1
2162              MOV     READLN,R2
2163      $R5:  CMP     (0)+,(1)+      ;CHECK FOR PROPER DATA TRANSFER
2164              BNE     DATERR      ;HAVE DATA ERROR
2165              SUB     #2,R2        ;CHECKED ALL TRANSFERS?
2166              BNE     $R5        ;NO
2167 007620 032767 000003 171504      RTSSTP: BIT     #3,PARAM
2168              BNE     RDSTPC
2169              JSR     PC,RDINCR    ;INCREMENT FOR NEXT BLOCK
2170              CMP     RECORD,LASRCR
2171 007644 000207      BNE     READGO
              RTS      PC        ;EXIT READIT

```



```

2172 007646 032767 000002 171456 RDSTPC: BIT #2,PARAM ;IS READ MODE RANDOM?
2173 007654 001414 BEQ RDSTP ;NO
2174 007656 004767 177364 RNRDRS: JSR PC,RANGEN
2175 007662 052767 177400 177526 BIS #177400,RANDOM
2176 007670 012704 177470 RND1: MOV #-200.,R4 ;DELAY 1 MILLISECOND
2177 007674 005204 INC R4
2178 007676 001376 BNE .-2
2179 007700 005267 177512 INC RANDOM
2180 007704 001371 BNE RND1
2181 007706 004767 000216 RDSTP: JSR PC,RDINCR
2182 007712 026767 170706 170710 CMP RECORD,LASRCR ;DONE LAST RECORD?
2183 007720 001256 BNE RDSTPD ;NO
2184 007722 000207 RTS PC ;YES EXIT
2185 ;HAVE DATA ERROR
2186 007724 032777 020000 170560 DATERR: BIT #20000,@SWR ;TYPE ALL READ ERRORS?
2187 007732 001014 BNE DATER1 ;NO
2188 007734 012702 013006 MOV #MSG9A,R2
2189 007740 104404 TOP
2190 007742 016767 170674 170606 MOV READLN,LENGTH
2191 007750 004767 001066 JSR PC,PRTS
2192 007754 014102 MOV -(1),R2 ;PRINT EXPECTED DATA
2193 007756 104412 OCTPRT
2194 007760 014002 MOV -(0),R2 ;PRINT ACTUAL DATA
2195 007762 104412 OCTPRT
2196 007764 022767 177775 170600 DATER1: CMP #-3,RDPASS
2197 007772 001002 BNE .+6
2198 007774 005267 170634 INC DAERRS ;+1 TO DATA ERRORS
2199 010000 000426 BR RTSR1
2200 ;STATUS INDICATES AN ERROR, CHECK FOR EOT
2201 010002 032767 175600 170570 RDERRO: BIT #175600,STATRD ;IS ERROR LEGITIMATE OR EOT?
2202 010010 001515 BEQ RNDTAP ;HAVE EOT
2203 010012 032777 020000 170472 BIT #20000,@SWR ;TYPE ALL READ ERRORS?
2204 010020 001010 BNE RTSREC ;NO
2205 010022 012702 012761 MOV #MSG9,R2
2206 010026 104404 TOP ;PRINT ERROR
2207 010030 016767 170606 170520 MOV READLN,LENGTH
2208 010036 004767 001000 JSR PC,PRTS
2209 ;+ 1 TO RDERRS IF FIRST ERROR PASS
2210 010042 022767 177775 170522 RTSREC: CMP #-3,RDPASS
2211 010050 001002 BNE .+6
2212 010052 005267 170554 INC RDERRS ;+1 TO STATUS ERRORS
2213 010056 032777 000020 170426 RTSR1: BIT #20,@SWR ;DELETE READ RETRY (SW 4)?
2214 010064 001011 BNE RPASS3 ;YES
2215 010066 005267 170500 INC RDPASS ;DONE ALL RE-READS?
2216 010072 001404 BEQ RPASS1 ;YES
2217 010074 004767 000100 JSR PC,BACK1 ;NO, BACKSPACE TAPE
2218 010100 000167 177352 JMP RDSTPD ;GO AGAIN
2219 010104 005267 170526 RPASS1: INC NRREAD ;+1 TO NONRECOVERABLE READ
2220 010110 012767 177775 170454 RPASS3: MOV #-3,RDPASS
2221 010116 032767 002000 170454 BIT #2000,STATRD ;AT EOT?
2222 010124 001054 BNE RNDTP1 ;YES, TYPE 'EOT'
2223 010126 000667 BR RDSTP
2224 ;SET UP POINTERS FOR NEXT RECORD
2225 010130 005267 170470 RDINCR: INC RECORD
2226 010134 005767 170436 TST BLKINC
2227 010140 001416 BEQ RESTR1

```

```
2228 ;RECORD LENGTH IS CHANGING, COUNT IT
2229 010142 066767 170430 170472 ADD BLKINC,READLN
2230 010150 026767 170466 170352 C/P READLN,MINLEN ;IS LENGTH LESS THAN MINIMUM
2231 010156 002404 BLT RESTRL ;NO
2232 010160 026767 170456 170340 CMP READLN,MAXLEN ;IS LENGTH GREATER THAN MAXIMUM?
2233 010166 003403 BLE RESTR1 ;NO
2234 010170 016767 170360 170444 RESTRL: MOV STRLEN,READLN ;RESET INITIAL LENGTH
2235 010176 000207 RESTR1: RTS PC
2236
2237
2238 ;BACKSPACE ONE RECORD
2239 010200 006077 170274 BACK1: ROR @MTS
2240 010204 103375 BCC .-4 ;WAIT FOR TAPE UNIT READY
2241 010206 012777 177777 170270 MOV #-1,@BC ;COUNT 1 RECORD
2242 010214 016777 170344 170260 MOV COMAND,@MTC ;SELECT DRIVE
2243 010222 052777 000012 170252 BIS #12,@MTC ;ISSUE BACKSPACE
2244 010230 004767 174746 JSR PC,GOWAIT
2245 010234 042777 000016 170240 BIC #16,@MTC
2246 010242 000207 RTS PC
2247 ;DRIVE HAS REACHED EOT IN READ MODE
2248 010244 004767 177660 RNDTAP: JSR PC,RDINCR
2249 010250 052767 000020 170366 BIS #20,MODES ;INDICATE AT EOT
2250 010256 012702 013620 RNDTP1: MOV #MSG25,R2
2251 010262 104404 TOP
2252 010264 012702 012654 MOV #MSG8,R2
2253 010270 104404 TOP
2254 ;DUMP ERROR COUNTERS
2255 010272 004767 000610 READMP: JSR PC,PRTD ;PRINT DRIVE, PATTERN, PARITY, DENSITY
2256
2257 010276 016767 171030 001132 MOV PARAM,CHAR
2258 010304 042767 177774 001124 BIC #177774,CHAR
2259 010312 012702 013310 MOV #MSG14,R2
2260 010316 022767 000001 001112 CMP #1,CHAR
2261 010324 001002 BNE .+6
2262 010326 012702 013270 MOV #MSG12,R2
2263 010332 022767 000002 001076 CMP #2,CHAR
2264 010340 001002 BNE .+6
2265 010342 012702 013300 MOV #MSG13,R2
2266 010346 104404 TOP ;PRINT READ MODE
2267 010350 016702 170250 MOV RECORD,R2
2268 010354 104426 DECPRT ;PRINT RECORD NUMBER
2269 010356 016767 170750 001052 MOV PARAM,CHAR
2270 010364 042767 177717 001044 BIC #177717,CHAR
2271 010372 012702 013336 MOV #MSG17,R2
2272 010376 022767 000020 001032 CMP #20,CHAR
2273 010404 001002 BNE .+6
2274 010406 012702 013345 MOV #MSG18,R2
2275 010412 022767 000040 001016 CMP #40,CHAR
2276 010420 001002 BNE .+6
2277 010422 012702 013320 MOV #MSG15,R2
2278 010426 022767 000060 001002 CMP #60,CHAR
2279 010434 001002 BNE .+6
2280 010436 012702 013327 MOV #MSG16,R2
2281 010442 104404 TOP ;PRINT RECORD LENGTH SEQUENCE
2282 010444 012702 013450 MOV #MSG21,R2
2283 010450 104404 TOP
```

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2284 010452 016702 170154      MOV      RDERRS,R2
2285 010456 104426      DECPR    T
2286
2287
2288 010460 012702 013500      MOV      #MSG22,R2
2289 010464 104404      TOP
2290 010466 016702 170142      MOV      DAERRS,R2
2291 010472 104426      DECPR    T
2292 010474 012702 013521      MOV      #MSG23,R2
2293 010500 104404      TOP
2294 010502 016702 170130      MOV      NRREAD,R2
2295 010506 104426      DECPR    T
2296 010510 104436      CKSW
2297 010512 000207      RTS      PC
2298
2299
2300
2301      ;WRITE RECOVERY UTILIZING EXTENDED INTERRECORD GAP
2302      ;USED AFTER EVERY 7 REWRITES OR AFTER
2303      ;EACH WRITE ERROR IF STATISTICAL RECOVERY NOT SELECTED
2304      ;USED ONLY IF READ PASS SELECTED
2305 010514 012767 177774 170052  XRGREC: MOV      #-4,WRPASS      ;COUNT 4 REWRITES
2306 010522 032777 000040 167762  XRG0:  BIT      #40,@SWR          ;DELETE WRITE XIRG (SW 5)
2307 010530 001036      BNE      XRGRCD          ;YES
2308 010532 004767 177442      JSR      PC,BACK1
2309 010536 105777 167740      TSTB    @MTC
2310 010542 100375      BPL      #-4
2311 010544 016777 170014 167730      MOV      COMAND,@MTC
2312 010552 052777 000014 167722      BIS      #14,@MTC      ;WRITE XIRG
2313 010560 016777 170054 167716      MOV      WRTLEN,@BC      ;SET BYTE COUNT
2314 010566 005477 167712      NEG      @BC
2315 010572 016777 167734 167706      MOV      WBUF,@CA      ;SET CURRENT ADDRESS
2316 010600 006077 167674      ROR      @MTC          ;WAIT FOR TU READY
2317 010604 103375      BCC      #-4
2318 010606 004767 174370      JSR      PC,GOWAIT
2319
2320      ;RETURN HERE AFTER INTERRUPT
2321 010612 017767 167662 167760      MOV      @MTC,STATRD      ;SAVE STATUS
2322 010620 005777 167656      TST      @MTC
2323 010624 100403      BMI      XRG5          ;HAVE ERROR FLAG, CHECK FOR EOT
2324 010626 005067 167742      XRGRCD: CLR      WRPASS
2325 010632 000207      RTS      PC          ;EXIT WRITE XIRG
2326 010634 032767 175600 167736  XRG5:  BIT      #175600,STATRD
2327 010642 001771      BEQ      XRGRCD      ;ONLY EOT, EXIT
2328 010644 005267 167724      INC      WRPASS      ;DONE 4 XIRG
2329 010650 001324      BNE      XRG0
2330      ;PRINT STATUS AFTER 4 XIRG ERRORS
2331 010652 012702 012626      MOV      #MSG7,R2
2332 010656 104404      TOP
2333 010660 016767 167754 167670      MOV      WRTLEN,LENGTH      ;PRINT WRITE STATUS ERROR
2334 010666 004767 000150      JSR      PC,PRTS      ;PRINT STATUS, COMMAND, RECORD, LENGTH
2335 010672 012702 013242      MOV      #MSG11,R2
2336 010676 104404      TOP
2337 010700 032767 002000 167672      BIT      #2000,STATRD      ;PRINT 'XIRG WRITTEN 4 TIMES'
2338 010706 001702      BEQ      XRGREC
2339 010710 042777 000016 167564      BIC      #16,@MTC

```

| Line | Address | Command | Value  | Label  | Code                      | Comment                                       |
|------|---------|---------|--------|--------|---------------------------|---|
| 2340 | 010716  | 052777  | 000003 | 167556 | BIS #3,@MTC               | :WRITE AN EOF                                 |
| 2341 | 010724  | 004767  | 174252 |        | JSR PC,GOWAIT             |   |
| 2342 | 010730  | 000207  |        |        | RTS PC                    |   |
| 2343 |         |         |        |        |                           |   |
| 2344 |         |         |        |        |                           | :GO BACKWARD ON TAPE X RECORDS                |
| 2345 | 010732  | 016767  | 167666 | 167670 | GOBKWD: MOV RECORD,LASRCR |   |
| 2346 | 010740  | 016767  | 167662 | 167656 | MOV WRRECR,RECORD         |   |
| 2347 | 010746  | 001003  |        |        | BNE GOB1                  | :IS NEW RECORD=0                              |
| 2348 | 010750  | 004767  | 174032 |        | JSR PC,REWIND             | :YES,REWIND                                   |
| 2349 | 010754  | 000207  |        |        | RTS PC                    | :EXIT   |
| 2350 | 010756  | 016777  | 167646 | 167520 | GOB1: MOV LASRCR,@BC      | :SET BYTE COUNT TO DIFFERENCE                 |
| 2351 | 010764  | 166777  | 167636 | 167512 | SUB WRRECR,@BC            | :BETWEEN LASRCR AND WRRECK                    |
| 2352 | 010772  | 005477  | 167506 |        | NEG @BC                   |   |
| 2353 | 010776  | 016777  | 167562 | 167476 | MOV COMAND,@MTC           |   |
| 2354 | 011004  | 105777  | 167472 |        | TSTB @MTC                 | :WAIT FOR CU READY                            |
| 2355 | 011010  | 100375  |        |        | BPL -4                    |   |
| 2356 | 011012  | 006077  | 167462 |        | ROR @MTC                  | :WAIT FOR TU READY                            |
| 2357 | 011016  | 103375  |        |        | BCC -4                    |   |
| 2358 | 011020  | 042777  | 000016 | 167454 | BIC #16,@MTC              |   |
| 2359 | 011026  | 052777  | 000012 | 167446 | BIS #12,@MTC              |   |
| 2360 | 011034  | 004767  | 174142 |        | JSR PC,GOWAIT             |   |
| 2361 | 011040  | 000207  |        |        | RTS PC                    |   |
| 2362 |         |         |        |        |                           | :PRINT COMMAND, STATUS, RECORD NUMBER, LENGTH |
| 2363 | 011042  | 012702  | 013031 |        | PRTS: MOV #MSG9B,R2       |   |
| 2364 | 011046  | 104404  |        |        | TOP                       |   |
| 2365 | 011050  | 017702  | 167426 |        | MOV @MTC,R2               |   |
| 2366 | 011054  | 104412  |        |        | OCTPRT                    |   |
| 2367 | 011056  | 016702  | 167516 |        | MOV STATRD,R2             |   |
| 2368 | 011062  | 104412  |        |        | OCTPRT                    |   |
| 2369 | 011064  | 016702  | 167534 |        | MOV RECORD,R2             |   |
| 2370 | 011070  | 005202  |        |        | INC R2                    |   |
| 2371 | 011072  | 104426  |        |        | DECPRT                    |   |
| 2372 | 011074  | 016702  | 167456 |        | MOV LENGTH,R2             |   |
| 2373 | 011100  | 104426  |        |        | DECPRT                    |   |
| 2374 | 011102  | 104436  |        |        | CKSW                      |   |
| 2375 | 011104  | 000207  |        |        | RTS PC                    |   |
| 2376 |         |         |        |        |                           |   |
| 2377 |         |         |        |        |                           | :PRINT DRIVE, PATTERN, PARITY, DENSITY        |
| 2378 | 011106  | 016767  | 167452 | 000322 | PRTD: MOV COMAND,CHAR     |   |
| 2379 | 011114  | 000367  | 000316 |        | SWAB CHAR                 |   |
| 2380 | 011120  | 142767  | 000170 | 000310 | BICB #170,CHAR            |   |
| 2381 | 011126  | 052767  | 000260 | 000302 | BIS #260,CHAR             |   |
| 2382 | 011134  | 004767  | 000300 |        | JSR PC,OCTP               | :PRINT DRIVE NUMBER                           |
| 2383 | 011140  | 104430  |        |        | SP3                       |   |
| 2384 | 011142  | 016767  | 170164 | 000266 | MOV PARAM,CHAR            |   |
| 2385 | 011150  | 000367  | 000262 |        | SWAB CHAR                 |   |
| 2386 | 011154  | 006067  | 000256 |        | ROR CHAR                  |   |
| 2387 | 011160  | 042767  | 000170 | 000250 | BIC #170,CHAR             |   |
| 2388 | 011166  | 052767  | 000260 | 000242 | BIS #260,CHAR             |   |
| 2389 | 011174  | 004767  | 000240 |        | JSR PC,OCTP               | :PRINT PATTERN NUMBER                         |
| 2390 | 011200  | 104430  |        |        | SP3                       |   |
| 2391 | 011202  | 016767  | 170124 | 000226 | MOV PARAM,CHAR            |   |
| 2392 | 011210  | 000367  | 000222 |        | SWAB CHAR                 |   |
| 2393 | 011214  | 042767  | 000176 | 000214 | BIC #176,CHAR             |   |
| 2394 | 011222  | 052767  | 000260 | 000206 | BIS #260,CHAR             |   |
| 2395 | 011230  | 004767  | 000204 |        | JSR PC,OCTP               | :PRINT PARITY                                 |



|      |        |        |        |        |         |        |            |  |  |
|------|--------|--------|--------|--------|---------|--------|------------|--|--|
| 2452 | 011524 | 004767 | 000022 |        |         | JSR    | PC,DECOUT  |  |  |
| 2453 | 011530 | 005267 | 000100 |        |         | INC    | DIGCNT     |  |  |
| 2454 | 011534 | 001002 |        |        |         | BNE    | TYPT3      |  |  |
| 2455 | 011536 | 104430 |        |        |         | SP3    |            |  |  |
| 2456 | 011540 | 000207 |        |        |         | RTS    | PC         |  |  |
| 2457 | 011542 | 062767 | 000002 | 000070 | TYPT3:  | ADD    | #2,DECPNT  |  |  |
| 2458 | 011550 | 000753 |        |        |         | BR     | TYPT1      |  |  |
| 2459 | 011552 | 005767 | 000054 |        | DECOUT: | TST    | DIGIT      |  |  |
| 2460 | 011556 | 001010 |        |        |         | BNE    | DEC1       |  |  |
| 2461 | 011560 | 022767 | 177777 | 000046 |         | CMP    | #-1,DIGCNT |  |  |
| 2462 | 011566 | 001404 |        |        |         | BEQ    | DEC1       |  |  |
| 2463 | 011570 | 016767 | 000042 | 000034 |         | MOV    | ZERO,DIGIT |  |  |
| 2464 | 011576 | 000406 |        |        |         | BR     | DEC2       |  |  |
| 2465 | 011600 | 012767 | 000060 | 000030 | DEC1:   | MOV    | #60,ZERO   |  |  |
| 2466 | 011606 | 052767 | 000060 | 000016 |         | BIS    | #60,DIGIT  |  |  |
| 2467 | 011614 | 105777 | 166702 |        | DEC2:   | TSTB   | @TPS       |  |  |
| 2468 | 011620 | 100375 |        |        |         | BPL    | .-4        |  |  |
| 2469 | 011622 | 016777 | 000004 | 166674 |         | MOV    | DIGIT,@TPB |  |  |
| 2470 | 011630 | 000207 |        |        |         | RTS    | PC         |  |  |
| 2471 | 011632 | 000000 |        |        | DIGIT:  | 0      |            |  |  |
| 2472 | 011634 | 000000 |        |        | DIGCNT: | 0      |            |  |  |
| 2473 | 011636 | 000040 |        |        | ZERO:   | 40     |            |  |  |
| 2474 | 011640 | 011642 |        |        | DECPNT: | .-+2   |            |  |  |
| 2475 | 011642 | 023420 |        |        |         | 10000. |            |  |  |
| 2476 | 011644 | 001750 |        |        |         | 1000.  |            |  |  |
| 2477 | 011646 | 000144 |        |        |         | 100.   |            |  |  |
| 2478 | 011650 | 000012 |        |        |         | 10.    |            |  |  |
| 2479 | 011652 | 000001 |        |        |         | 1.     |            |  |  |
| 2480 |        |        |        |        |         |        |            |  |  |
| 2481 | 011654 | 105777 | 166636 |        |         |        |            |  |  |
| 2482 | 011660 | 100375 |        |        |         |        |            |  |  |
| 2483 | 011662 | 105777 | 166634 |        |         |        |            |  |  |
| 2484 | 011666 | 100375 |        |        |         |        |            |  |  |
| 2485 | 011670 | 117777 | 166624 | 166626 |         |        |            |  |  |
| 2486 | 011676 | 117767 | 166616 | 167422 |         |        |            |  |  |
| 2487 | 011704 | 042767 | 000200 | 167414 |         |        |            |  |  |
| 2488 | 011712 | 000207 |        |        |         |        |            |  |  |
| 2489 |        |        |        |        |         |        |            |  |  |
| 2490 | 011714 | 012702 | 011724 |        |         |        |            |  |  |
| 2491 | 011720 | 104404 |        |        |         |        |            |  |  |
| 2492 | 011722 | 000207 |        |        |         |        |            |  |  |
| 2493 | 011724 | 020057 | 020040 | 057    |         |        |            |  |  |
| 2494 |        | 011732 |        |        |         |        |            |  |  |
| 2495 |        |        |        |        |         |        |            |  |  |
| 2496 |        |        |        |        |         |        |            |  |  |
| 2497 |        |        |        |        |         |        |            |  |  |
| 2498 | 011732 | 142777 | 000177 | 166562 |         |        |            |  |  |
| 2499 | 011740 | 112267 | 000100 |        |         |        |            |  |  |
| 2500 | 011744 | 121267 | 000074 |        |         |        |            |  |  |
| 2501 | 011750 | 001003 |        |        |         |        |            |  |  |
| 2502 | 011752 | 005067 | 166570 |        |         |        |            |  |  |
| 2503 | 011756 | 000207 |        |        |         |        |            |  |  |
| 2504 | 011760 | 121227 | 000100 |        |         |        |            |  |  |
| 2505 | 011764 | 001406 |        |        |         |        |            |  |  |
| 2506 | 011766 | 105777 | 166530 |        |         |        |            |  |  |
| 2507 | 011772 | 100375 |        |        |         |        |            |  |  |

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2508 011774 112277 166524          MOVB (2)+,@TPB          ;PRINT CHARACTER
2509 012000 000761          BR TOP1
2510          ;CARRIAGE RETURN, LINE FEED
2511 012002 105777 166514          TOP2: TSTB @TPS
2512 012006 100375          BPL -4
2513 012010 112777 000215 166506          MOVB #215,@TPB          ;CR
2514 012016 105777 166500          TSTB @TPS
2515 012022 100375          BPL -4
2516 012024 112777 000212 166472          MOVB #212,@TPB          ;LF
2517 012032 105202          INCB R2
2518 012034 105767 166506          TSTB RDSW
2519 012040 100744          BMI TOP3
2520 012042 000740          BR TOP1
2521 012044 000000          EOMK: 0
2522
2523
2524
2525 012046 013746 000006          SUSWR: MOV @#6,-(SP)          ;SAVE VECTORS
2526 012052 013746 000004          MOV @#4,-(SP)
2527 012056 012737 012076 000004          MOV #1$,@#4          ;SET UP FOR TIMFOUT
2528 012064 022777 177777 166420          CMP #-1,@SWR          ;REFERENCE HARDWARE SWITCH REGISTER
2529 012072 001402          BEQ 2$
2530 012074 000407          BR 3$
2531 012076 022626          1$: CMP (SP)+,(SP)+          ;ADJUST STACK
2532 012100 012767 000176 166404          2$: MOV #SWREG,SWR          ;POINT TO SOFTWARE SWITCH REG
2533 012106 012767 000174 166400          MOV #DISPREG,DISPLAY          ;POINT TO SOFT DISPLAY REG
2534 012114 012637 000004          3$: MOV (SP)+,@#4          ;RESTORE VECTORS
2535 012120 012637 000006          MOV (SP)+,@#6
2536 012124 000207          RTS PC
2537
2538
2539
2540 012126 022767 000176 166356          CKSWR: CMP #SWREG,SWR          ;SOFTWARE SWITCH REG PRESENT
2541 012134 001035          BNE OUT          ;NO, GET OUT
2542 012136 105777 166354          TSTB @TKS          ;YES, WAIT FOR
2543 012142 100032          BPL OUT          ;READY, GET CHARACTER
2544 012144 017767 166350 166366          MOV @TKB,TIB          ;AND STRIP OFF
2545 012152 042767 177600 166360          BIC #177600,TIB          ;THE GARBAGE
2546 012160 022767 000007 166352          CMP #7,TIB          ;IS IT A <^G>
2547 012166 001020          BNE OUT
2548 012170 012702 013747          MOV #SCNTG,R2
2549 012174 104404          TOP
2550 012176 012702 013754          CNTLU: MOV #SMSWR,R2
2551 012202 104404          TOP
2552 012204 017702 166302          MOV @SWR,R2
2553 012210 104412          OCTPRT
2554 012212 012702 013765          MOV #SMNEW,R2
2555 012216 104404          TOP
2556 012220 005037 000542          CLR @TEMPST
2557 012224 004767 000002          JSR PC,$READ          ;GO READ A LINE
2558 012230 000207          OUT: RTS PC          ;RETURN TO MAIN BODY OF PROGRAM
2559
2560 012232 005067 166304          $READ: CLR TEMPST
2561 012236 012767 000007 166300          MOV #7,COUNT
2562 012244 104400          1$: WAITKY          ;GO READ A CHARACTER
2563 012246 042767 177600 167052          BIC #177600,CHARIN          ;STRIP OFF GARBAGE

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2564 012254 122767 000025 167044      CMPB    #25,CHARIN      ;IS IT A ^U?
2565 012262 001002                BNE     2$              ;BRANCH IF NOT
2566 012264 005726                TST     (SP)+           ;POP THE STACK
2567 012266 000743                BR CNTLU                ;START OVER
2568 012270 122767 000015 167030 2$:  CMPB    #15,CHARIN      ;IS IT A <CR>?
2569 012276 001013                BNE     4$              ;BRANCH IF NOT
2570 012300 012767 000200 166240      MOV     #200,RDSW
2571 012306 004767 177470      JSR     PC, TOP2
2572 012312 022767 000007 166224      CMP     #7,COUNT
2573 012320 001036                BNE     7$
2574 012322 005726                TST     (SP)+           ;ECHO IT WITH <LF>
2575 012324 000741                BR      OUT             ;WAS IT FIRST CHARACTER
2576 012326 122767 000060 166772 4$:  CMPB    #60,CHARIN      ;CHANGE SWR IF NOT FIRST ONE
2577 012334 003004                BGT     5$              ;POP THE STACK
2578 012336 122767 000067 166762      CMPB    #67,CHARIN      ;GET OUT
2579 012344 002004                BGE     6$
2580 012346 012702 013776      MOV     #SQUEST,R2
2581 012352 104404                TOP
2582 012354 000743                BR      3$              ;START OVER IF NOT LEGAL CHARACTER
2583 012356 006367 166160      ASL     TEMPST
2584 012362 006367 166154      ASL     TEMPST
2585 012366 006367 166150      ASL     TEMPST
2586 012372 142767 000060 166726      BICB    #60,CHARIN      ;GET NITTY-GRITTY
2587 012400 156767 166722 166134      BISB    CHARIN,TEMPST
2588 012406 005367 166132      DEC     COUNT           ;ONLY WANT 6 DIGITS
2589 012412 001755                BEQ     5$
2590 012414 000713                BR      1$
2591 012416 016777 166120 166066 7$:  MOV     TEMPST,@SWR     ;CHANGE SWITCH REGISTER CONTENTS
2592 012424 000736                BR      8$
2593                                ;TRAP HANDLER
2594 012426 011666 000002      TRAP34: MOV    @SP,2(6)
2595 012432 162716 000002                SUB     #2,@SP
2596 012436 013646                MOV     @6)+,-(6)
2597 012440 062716 106046                ADD     #TABLE-104400,@SP
2598 012444 013607                MOV     @6)+,PC
2599 012446 011654      TABLE: WAITK
2600 012450 005254                WRITI
2601 012452 011732                TO
2602 012454 004512                SVCTR
2603 012456 004626                RSFDR
2604 012460 011326                OCTPR
2605 012462 004530                MVCTR
2606 012464 006526                GENPA
2607 012466 004572                CLRAL
2608 012470 004750                CHGDR
2609 012472 007434                READI
2610 012474 011456                DECPR
2611 012476 011714                SP3X
2612 012500 012046                SUSWR
2613 012502 012176                CNTLU
2614 012504 012126                CKSWR
2615                                WAITKY=104400
2616                                WRITIT=104402
2617                                TOP=104404
2618                                SVCTRS=104406
2619                                RSFDRV=104410

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|      |        |        |        |        |               |                |  |  |
|------|--------|--------|--------|--------|---------------|----------------|--|--|
| 2620 |        | 104412 |        |        |               | OCTPRT=104412  |  |  |
| 2621 |        | 104414 |        |        |               | MVCTRS=104414  |  |  |
| 2622 |        | 104416 |        |        |               | GENPAT=104416  |  |  |
| 2623 |        | 104420 |        |        |               | CLRALL=104420  |  |  |
| 2624 |        | 104422 |        |        |               | CHGDRV=104422  |  |  |
| 2625 |        | 104424 |        |        |               | READIT=104424  |  |  |
| 2626 |        | 104426 |        |        |               | DECPRT=104426  |  |  |
| 2627 |        | 104430 |        |        |               | SP3=104430     |  |  |
| 2628 |        | 104432 |        |        |               | SUSW=104432    |  |  |
| 2629 |        | 104434 |        |        |               | CNTL=104434    |  |  |
| 2630 |        | 104436 |        |        |               | CKSW=104436    |  |  |
| 2631 |        |        |        |        |               | :TEXT MESSAGES |  |  |
| 2632 | 012506 | 037457 | 020100 | 057    |               | MSG0: .ASCII   | ;/?@ /;  |  |
| 2633 | 012513 | 057    | 051500 | 046105 |               | MSG1: .ASCII   | ;/@SELECT UNITS /;                             |  |
| 2634 | 012520 | 041505 | 020124 | 047125 |               |                |  |  |
| 2635 | 012526 | 052111 | 020123 | 027440 |               |                |  |  |
| 2636 | 012534 | 040057 | 051524 | 020124 | MSG2: .ASCII  |                | ;/@TST PAT PAR DEN RLS WMO RMO@ /;             |  |
| 2637 | 012542 | 040520 | 020124 | 040520 |               |                |  |  |
| 2638 | 012550 | 020122 | 042504 | 020116 |               |                |  |  |
| 2639 | 012556 | 046122 | 020123 | 046527 |               |                |  |  |
| 2640 | 012564 | 020117 | 046522 | 040117 |               |                |  |  |
| 2641 | 012572 | 027440 |        |        |               |                |  |  |
| 2642 | 012574 | 046457 | 054101 | 052040 | MSG5: .ASCII  |                | ;/MAX TESTS SELECTED@/;                        |  |
| 2643 | 012602 | 051505 | 051524 | 051440 |               |                |  |  |
| 2644 | 012610 | 046105 | 041505 | 042524 |               |                |  |  |
| 2645 | 012616 | 040104 | 057    |        |               |                |  |  |
| 2646 | 012621 | 057    | 047440 | 027513 | MSG6: .ASCII  |                | ;/ OK/;  |  |
| 2647 | 012626 | 040057 | 051127 | 052111 | MSG7: .ASCII  |                | ;/@WRITE STATUS ERROR@/;                       |  |
| 2648 | 012634 | 020105 | 052123 | 052101 |               |                |  |  |
| 2649 | 012642 | 051525 | 042440 | 051122 |               |                |  |  |
| 2650 | 012650 | 051117 | 027500 |        |               |                |  |  |
| 2651 | 012654 | 042457 | 042116 | 047440 | MSG8: .ASCII  |                | ;/END OF TAPE*****@;                           |  |
| 2652 | 012662 | 020106 | 040524 | 042520 |               |                |  |  |
| 2653 | 012670 | 025052 | 025052 | 025052 |               |                |  |  |
| 2654 | 012676 | 025052 | 025052 | 025052 |               |                |  |  |
| 2655 | 012704 | 025052 | 025052 | 025052 |               |                |  |  |
| 2656 | 012712 | 025052 | 100    |        |               |                |  |  |
| 2657 | 012715 | 104    | 053122 | 050040 | .ASCII        |                | ;/DRV PAT PAR DEN MODE RECORD LENGTH@/;        |  |
| 2658 | 012722 | 052101 | 050040 | 051101 |               |                |  |  |
| 2659 | 012730 | 042040 | 047105 | 046440 |               |                |  |  |
| 2660 | 012736 | 042117 | 020105 | 042522 |               |                |  |  |
| 2661 | 012744 | 047503 | 042122 | 046040 |               |                |  |  |
| 2662 | 012752 | 047105 | 052107 | 040110 |               |                |  |  |
| 2663 | 012760 | 057    |        |        |               |                |  |  |
| 2664 | 012761 | 057    | 051100 | 040505 | MSG9: .ASCII  |                | ;/@READ STATUS ERROR@/;                        |  |
| 2665 | 012766 | 020104 | 052123 | 052101 |               |                |  |  |
| 2666 | 012774 | 051525 | 042440 | 051122 |               |                |  |  |
| 2667 | 013002 | 051117 | 027500 |        |               |                |  |  |
| 2668 | 013006 | 040057 | 042522 | 042101 | MSG9A: .ASCII |                | ;/@READ DATA ERROR@/;                          |  |
| 2669 | 013014 | 042040 | 052101 | 020101 |               |                |  |  |
| 2670 | 013022 | 051105 | 047522 | 040122 |               |                |  |  |
| 2671 | 013030 | 057    |        |        |               |                |  |  |
| 2672 | 013031 | 057    | 047503 | 042115 | MSG9B: .ASCII |                | ;/COMD STATUS RECORD LENGTH EXPECTED ACTUAL@/; |  |
| 2673 | 013036 | 020040 | 020040 | 051440 |               |                |  |  |
| 2674 | 013044 | 040524 | 052524 | 020123 |               |                |  |  |
| 2675 | 013052 | 020040 | 042522 | 047503 |               |                |  |  |

|      |        |        |        |        |                |                              |
|------|--------|--------|--------|--------|----------------|------------------------------|
| 2676 | 013060 | 042122 | 020040 | 046040 |                |                              |
| 2677 | 013066 | 047105 | 052107 | 020110 |                |                              |
| 2678 | 013074 | 054105 | 042520 | 052103 |                |                              |
| 2679 | 013102 | 042105 | 040440 | 052103 |                |                              |
| 2680 | 013110 | 040525 | 040114 | 057    |                |                              |
| 2681 | 013115 | 057    | 041500 | 052132 | MSG10A: .ASCII | ;/@CZTMCD0 TM11 DATA RELIAB; |
| 2682 | 013122 | 041515 | 030104 | 052040 |                |                              |
| 2683 | 013130 | 030515 | 020061 | 040504 |                |                              |
| 2684 | 013136 | 040524 | 051040 | 046105 |                |                              |
| 2685 | 013144 | 040511 | 102    |        |                |                              |
| 2686 | 013147 | 100    | 042522 | 047503 | .ASCII         | ;/@RECORD LIMITS IN BYTES;   |
| 2687 | 013154 | 042122 | 046040 | 046511 |                |                              |
| 2688 | 013162 | 052111 | 020123 | 047111 |                |                              |
| 2689 | 013170 | 041040 | 052131 | 051505 |                |                              |
| 2690 | 013176 | 046500 | 047111 | 042514 | .ASCII         | ;/@MINLEN MAXLEN@/;          |
| 2691 | 013204 | 020116 | 046440 | 054101 |                |                              |
| 2692 | 013212 | 042514 | 040116 | 057    |                |                              |
| 2693 | 013217 | 057    | 042500 | 042530 | MSG10B: .ASCII | ;/@EXERCISING UNITS/;        |
| 2694 | 013224 | 041522 | 051511 | 047111 |                |                              |
| 2695 | 013232 | 020107 | 047125 | 052111 |                |                              |
| 2696 | 013240 | 027523 |        |        |                |                              |
| 2697 | 013242 | 054057 | 051111 | 020107 | MSG11: .ASCII  | ;/XIRG WRITTEN 4 TIMES/;     |
| 2698 | 013250 | 051127 | 052111 | 042524 |                |                              |
| 2699 | 013256 | 020116 | 020064 | 044524 |                |                              |
| 2700 | 013264 | 042515 | 027523 |        |                |                              |
| 2701 | 013270 | 020057 | 051523 | 050124 | MSG12: .ASCII  | ;/ SSTP /;                   |
| 2702 | 013276 | 027440 |        |        |                |                              |
| 2703 | 013300 | 020057 | 047122 | 046504 | MSG13: .ASCII  | ;/ RNDM /;                   |
| 2704 | 013306 | 027440 |        |        |                |                              |
| 2705 | 013310 | 020057 | 051516 | 050124 | MSG14: .ASCII  | ;/ NSTP /;                   |
| 2706 | 013316 | 027440 |        |        |                |                              |
| 2707 | 013320 | 046457 | 046455 | 054101 | MSG15: .ASCII  | ;/M-MAX/;                    |
| 2708 | 013326 | 057    |        |        |                |                              |
| 2709 | 013327 | 057    | 026515 | 044515 | MSG16: .ASCII  | ;/M-MIN/;                    |
| 2710 | 013334 | 027516 |        |        |                |                              |
| 2711 | 013336 | 046457 | 047111 | 020040 | MSG17: .ASCII  | ;/MIN /;                     |
| 2712 | 013344 | 057    |        |        |                |                              |
| 2713 | 013345 | 057    | 040515 | 020130 | MSG18: .ASCII  | ;/MAX /;                     |
| 2714 | 013352 | 027440 |        |        |                |                              |
| 2715 | 013354 | 040057 | 051127 | 052111 | MSG19: .ASCII  | ;/@WRITE ERRORS = /;         |
| 2716 | 013362 | 020105 | 051105 | 047522 |                |                              |
| 2717 | 013370 | 051522 | 036440 | 027440 |                |                              |
| 2718 | 013376 | 040057 | 042522 | 047503 | MSG20: .ASCII  | ;/@RECOVERED AT 0 /;         |
| 2719 | 013404 | 042526 | 042522 | 020104 |                |                              |
| 2720 | 013412 | 052101 | 030040 | 027440 |                |                              |
| 2721 | 013420 | 040057 | 042520 | 046522 | MSG20A: .ASCII | ;/@PERMANENT BADSPOTS = /;   |
| 2722 | 013426 | 047101 | 047105 | 020124 |                |                              |
| 2723 | 013434 | 040502 | 051504 | 047520 |                |                              |
| 2724 | 013442 | 051524 | 036440 | 027440 |                |                              |
| 2725 | 013450 | 040057 | 042522 | 042101 | MSG21: .ASCII  | ;/@READ STATUS ERRORS = /;   |
| 2726 | 013456 | 051440 | 040524 | 052524 |                |                              |
| 2727 | 013464 | 020123 | 051105 | 047522 |                |                              |
| 2728 | 013472 | 051522 | 036440 | 027440 |                |                              |
| 2729 | 013500 | 040057 | 040504 | 040524 | MSG22: .ASCII  | ;/@DATA ERRORS = /;          |
| 2730 | 013506 | 042440 | 051122 | 051117 |                |                              |
| 2731 | 013514 | 020123 | 020075 | 057    |                |                              |

|      |        |        |        |        |                 |                                |
|------|--------|--------|--------|--------|-----------------|--------------------------------|
| 2732 | 013521 | 057    | 047100 | 047117 | MSG23: .ASCII   | ;/@NON RECOVERABLE ERRORS = /; |
| 2733 | 013526 | 051040 | 041505 | 053117 |                 |                                |
| 2734 | 013534 | 051105 | 041101 | 042514 |                 |                                |
| 2735 | 013542 | 042440 | 051122 | 051117 |                 |                                |
| 2736 | 013550 | 020123 | 020075 | 057    |                 |                                |
| 2737 | 013555 | 057    | 025100 | 025052 | MSG24: .ASCII   | ;/@*****WRITE PASS /;          |
| 2738 | 013562 | 025052 | 025052 | 025052 |                 |                                |
| 2739 | 013570 | 025052 | 025052 | 025052 |                 |                                |
| 2740 | 013576 | 025052 | 025052 | 053452 |                 |                                |
| 2741 | 013604 | 044522 | 042524 | 050040 |                 |                                |
| 2742 | 013612 | 051501 | 020123 | 027440 |                 |                                |
| 2743 | 013620 | 040057 | 025052 | 025052 | MSG25: .ASCII   | ;/@*****READ PASS /;           |
| 2744 | 013626 | 025052 | 025052 | 025052 |                 |                                |
| 2745 | 013634 | 025052 | 025052 | 025052 |                 |                                |
| 2746 | 013642 | 025052 | 025052 | 042522 |                 |                                |
| 2747 | 013650 | 042101 | 050040 | 051501 |                 |                                |
| 2748 | 013656 | 020123 | 020040 | 057    |                 |                                |
| 2749 | 013663 | 057    | 020040 | 031040 | MSG26: .ASCII   | ;/ 200/;                       |
| 2750 | 013670 | 030060 | 057    |        |                 |                                |
| 2751 | 013673 | 057    | 020040 | 032440 | MSG27: .ASCII   | ;/ 556/;                       |
| 2752 | 013700 | 033065 | 057    |        |                 |                                |
| 2753 | 013703 | 057    | 020040 | 034040 | MSG28: .ASCII   | ;/ 800/;                       |
| 2754 | 013710 | 030060 | 057    |        |                 |                                |
| 2755 | 013713 | 057    | 020040 | 041440 | MSG29: .ASCII   | ;/ CD /;                       |
| 2756 | 013720 | 020104 | 057    |        |                 |                                |
| 2757 | 013723 | 057    | 040100 | 027500 | MSG30: .ASCII   | ;/@@@/;                        |
| 2758 | 013730 | 040057 | 047105 | 020104 | MSG31: .ASCII   | ;/@END OF PASS@/;              |
| 2759 | 013736 | 043117 | 050040 | 051501 |                 |                                |
| 2760 | 013744 | 040123 | 057    |        |                 |                                |
| 2761 |        |        |        |        |                 |                                |
| 2762 | 013747 | 057    | 057100 | 027507 | \$CNTG: .ASCII  | ;/@^G/;                        |
| 2763 | 013754 | 040057 | 051500 | 051127 | \$MSWR: .ASCII  | ;/@@SWR= /;                    |
| 2764 | 013762 | 020075 | 057    |        |                 |                                |
| 2765 | 013765 | 057    | 020040 | 042516 | \$MNEW: .ASCII  | ;/ NEW= /;                     |
| 2766 | 013772 | 036527 | 027440 |        |                 |                                |
| 2767 | 013776 | 040057 | 040077 | 027500 | \$QUEST: .ASCII | ;/@?@@/;                       |
| 2768 |        |        |        |        | .EVEN           |                                |
| 2769 |        |        |        |        |                 |                                |
| 2770 | 014004 | 014004 |        |        | BUFFER: .       | ;/WRITE BUFFER BEGINS HERE     |
| 2771 | 000001 |        |        |        | .END            |                                |

|         |        |       |       |       |       |       |       |       |       |       |       |       |       |       |  |
|---------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--|
| ALLEOS  | 005066 | 1683  | 1687# |       |       |       |       |       |       |       |       |       |       |       |  |
| ALLEOT  | 005044 | 1398  | 1414  | 1446  | 1478  | 1547  | 1588  | 1600  | 1680# |       |       |       |       |       |  |
| ALL1    | 005046 | 1681# | 1685  |       |       |       |       |       |       |       |       |       |       |       |  |
| ALL2    | 005154 | 1689  | 1691  | 1705# |       |       |       |       |       |       |       |       |       |       |  |
| ALL3    | 005150 | 1686  | 1704# |       |       |       |       |       |       |       |       |       |       |       |  |
| ATST    | 000550 | 995#  | 1075* | 1170* | 1183  |       |       |       |       |       |       |       |       |       |  |
| AUTOST  | 001366 | 966   | 1073# |       |       |       |       |       |       |       |       |       |       |       |  |
| BACK1   | 010200 | 1845  | 1846  | 2217  | 2239# | 2308  |       |       |       |       |       |       |       |       |  |
| BC      | 000504 | 974#  | 1749* | 1750* | 1850* | 2148* | 2149* | 2241* | 2313* | 2314* | 2350* | 2351* | 2352* |       |  |
| BLKINC  | 000576 | 1006# | 1730* | 1734* | 1738* | 1802  | 1804  | 2226  | 2229  |       |       |       |       |       |  |
| BUFFER  | 014004 | 985   | 986   | 1084  | 1090  | 1094  | 1138* | 1139  | 1158  | 1164  | 1169  | 2770# |       |       |  |
| CA      | 000506 | 975#  | 1751* | 2150* | 2315* |       |       |       |       |       |       |       |       |       |  |
| CC      | 000510 | 976#  | 1716* | 1721* |       |       |       |       |       |       |       |       |       |       |  |
| CDMEND  | 005144 | 1700  | 1702# |       |       |       |       |       |       |       |       |       |       |       |  |
| CDRIVE  | 000570 | 1003# | 1621  | 1622  | 1636* | 1640* | 1644  | 1659* |       |       |       |       |       |       |  |
| CDRVBT  | 000566 | 1002# | 1637* | 1638  | 1642* | 1661* | 1666  |       |       |       |       |       |       |       |  |
| CHAR    | 011436 | 1867* | 1868* | 1870  | 1873  | 1879* | 1880* | 1882  | 1885  | 1888  | 2257* | 2258* | 2260  | 2263  |  |
|         |        | 2269* | 2270* | 2272  | 2275  | 2278  | 2378* | 2379* | 2380* | 2381* | 2384* | 2385* | 2386* | 2387* |  |
|         |        | 2388* | 2391* | 2392* | 2393* | 2394* | 2398* | 2399* | 2401  | 2404  | 2407  | 2414* | 2417* | 2425* |  |
|         |        | 2426* | 2427* | 2436# | 2439  |       |       |       |       |       |       |       |       |       |  |
| CHARIN  | 001326 | 1054# | 1179  | 1186  | 1188  | 1195* | 1196* | 1198* | 1219  | 1224  | 1226  | 1231  | 1241  | 1243  |  |
|         |        | 1245* | 1246* | 1247* | 1248  | 1252  | 1254  | 1262  | 1264  | 1268  | 1272  | 1278  | 1280  | 1284  |  |
|         |        | 1288  | 1294  | 1296  | 1300  | 1306  | 1308  | 1312  | 1322  | 2486* | 2487* | 2563* | 2564  | 2568  |  |
|         |        | 2576  | 2578  | 2586* | 2587  |       |       |       |       |       |       |       |       |       |  |
| CHGDR   | 004750 | 1659# | 1667  | 2608  |       |       |       |       |       |       |       |       |       |       |  |
| CHGDRV= | 104422 | 1396  | 1412  | 1430  | 1437  | 1444  | 1461  | 1469  | 1476  | 1496  | 1507  | 1514  | 1524  | 1540  |  |
|         |        | 1545  | 1572  | 1586  | 1596  | 1630  | 1684  | 1702  | 2624# |       |       |       |       |       |  |
| CHGD1   | 001372 | 1074# |       |       |       |       |       |       |       |       |       |       |       |       |  |
| CHGD2   | 003300 | 1374# |       |       |       |       |       |       |       |       |       |       |       |       |  |
| CHG1    | 004774 | 1662  | 1666# |       |       |       |       |       |       |       |       |       |       |       |  |
| CKSW =  | 104436 | 1361  | 1687  | 1698  | 1831  | 1910  | 1919  | 2296  | 2374  | 2411  | 2630# |       |       |       |  |
| CKSWR   | 012126 | 2540# | 2614  |       |       |       |       |       |       |       |       |       |       |       |  |
| CLRAL   | 004572 | 1626# | 2607  |       |       |       |       |       |       |       |       |       |       |       |  |
| CLRALL= | 104420 | 1387  | 1404  | 1422  | 1453  | 1491  | 1555  | 2623# |       |       |       |       |       |       |  |
| CLRTBL  | 005156 | 1628  | 1709# |       |       |       |       |       |       |       |       |       |       |       |  |
| CLRT1   | 005162 | 1710# | 1712  |       |       |       |       |       |       |       |       |       |       |       |  |
| CLR1    | 004574 | 1627# | 1631  |       |       |       |       |       |       |       |       |       |       |       |  |
| CNTL =  | 104434 | 1341  | 2629# |       |       |       |       |       |       |       |       |       |       |       |  |
| CNTLU   | 012176 | 2550# | 2567  | 2613  |       |       |       |       |       |       |       |       |       |       |  |
| COMAND  | 000564 | 1001# | 1644* | 1645* | 1648* | 1651* | 1654* | 1673  | 1744  | 1851  | 2138  | 2151  | 2242  | 2311  |  |
|         |        | 2353  | 2378  |       |       |       |       |       |       |       |       |       |       |       |  |
| COUNT   | 000544 | 993#  | 2561* | 2572  | 2588* |       |       |       |       |       |       |       |       |       |  |
| CTRDEX  | 004546 | 1607  | 1613  | 1619# |       |       |       |       |       |       |       |       |       |       |  |
| CTRDMP  | 005110 | 1693# | 1703  |       |       |       |       |       |       |       |       |       |       |       |  |
| CTRD1   | 005140 | 1696  | 1701# |       |       |       |       |       |       |       |       |       |       |       |  |
| DAERRS  | 000634 | 1022# | 2198* | 2290  |       |       |       |       |       |       |       |       |       |       |  |
| DATERR  | 007724 | 2163  | 2186# |       |       |       |       |       |       |       |       |       |       |       |  |
| DATER1  | 007764 | 2187  | 2196# |       |       |       |       |       |       |       |       |       |       |       |  |
| DECOUT  | 011552 | 2452  | 2459# |       |       |       |       |       |       |       |       |       |       |       |  |
| DECPNT  | 011640 | 2445* | 2449  | 2451  | 2457* | 2474# |       |       |       |       |       |       |       |       |  |
| DECPR   | 011456 | 2444# | 2610  |       |       |       |       |       |       |       |       |       |       |       |  |
| DECPRT= | 104426 | 1128  | 1130  | 1878  | 1895  | 1904  | 1918  | 2268  | 2285  | 2291  | 2295  | 2371  | 2373  | 2626# |  |
| DEC1    | 011600 | 2460  | 2462  | 2465# |       |       |       |       |       |       |       |       |       |       |  |
| DEC2    | 011614 | 2464  | 2467# |       |       |       |       |       |       |       |       |       |       |       |  |
| DIGCNT  | 011634 | 2444* | 2453* | 2461  | 2472# |       |       |       |       |       |       |       |       |       |  |
| DIGIT   | 011632 | 2447* | 2448* | 2459  | 2463* | 2466* | 2469  | 2471# |       |       |       |       |       |       |  |















CZTMCD TM11 DATA RELIAB  
 CZTMCD.P11 03-JUN-80 15:26

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 CROSS REFERENCE TABLE -- USER SYMBOLS

SEQ 0058

|         |          |       |       |       |       |      |      |      |       |       |       |       |       |       |  |
|---------|----------|-------|-------|-------|-------|------|------|------|-------|-------|-------|-------|-------|-------|--|
| \$CNTG  | 013747   | 2548  | 2762# |       |       |      |      |      |       |       |       |       |       |       |  |
| \$MNEW  | 013765   | 2554  | 2765# |       |       |      |      |      |       |       |       |       |       |       |  |
| \$MSWR  | 013754   | 2550  | 2763# |       |       |      |      |      |       |       |       |       |       |       |  |
| \$QUEST | 013776   | 2580  | 2767# |       |       |      |      |      |       |       |       |       |       |       |  |
| \$READ  | 012232   | 2557  | 2560# |       |       |      |      |      |       |       |       |       |       |       |  |
| \$R1    | 007450   | 2135  | 2137# |       |       |      |      |      |       |       |       |       |       |       |  |
| \$R5    | 007606   | 2162# | 2165  |       |       |      |      |      |       |       |       |       |       |       |  |
| \$WAIT  | 005232   | 1717* | 1720# | 1723* |       |      |      |      |       |       |       |       |       |       |  |
| \$ZEROS | 001766   | 1147  | 1151# |       |       |      |      |      |       |       |       |       |       |       |  |
| .       | = 014006 | 949#  | 950#  | 952#  | 954#  | 961# | 965# | 971# | 1039# | 1041# | 1043# | 1045# | 1047# | 1049# |  |
|         |          | 1051# | 1053# | 1132  | 1191  | 1208 | 1313 | 1323 | 1326  | 1329  | 1355  | 1647  | 1650  | 1653  |  |
|         |          | 1672  | 1675  | 1741  | 1746  | 1748 | 1785 | 1839 | 1848  | 1871  | 1874  | 1883  | 1886  | 1889  |  |
|         |          | 1991  | 2000  | 2059  | 2062  | 2071 | 2074 | 2140 | 2142  | 2178  | 2197  | 2211  | 2240  | 2261  |  |
|         |          | 2264  | 2273  | 2276  | 2279  | 2310 | 2317 | 2355 | 2357  | 2402  | 2405  | 2408  | 2438  | 2468  |  |
|         |          | 2474  | 2482  | 2484  | 2494# | 2501 | 2507 | 2512 | 2515  | 2770  |       |       |       |       |  |

. ABS. 014006 000

ERRORS DETECTED: 0

CZTMCD.BIN,CZTMCD.LST/CRF/SOL/NL:TOC=CZTMCD.P11  
 RUN-TIME: 8 16 2 SECONDS  
 RUN-TIME RATIO: 65/27=2.3  
 CORE USED: 8K (15 PAGES)