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IDENTIFICATION

PRODUCT CODE: AC-9402D-MC

PRODUCT NAME: CZTMCDO TM11 DATA RELIAB

PROGRAM DATE: MAY 1980

MAINTAINER: DIAGNOSTIC GROUP

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 '' '')

4.3 PROGRAM AND/OR OPERATOR ACTION

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

4.3.1 TAPE UNIT SELECTION

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

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

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

4.3.1.1 TAPE UNIT SELECTION EXAMPLES

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

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

SELECT UNITS
SELECT UNITS

A CARRIAGE RETURN WAS TYPED WITH NO UNITS SELECTED.

SELECT UNITS 1,9?,1,2

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

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

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

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

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

```
                                                          01
                                                          01
                                                          01
                                                          ETC




                  6 (ODD,EVEN) ALL 1'S                    77
                                                          77
                                                          ETC

                  7 (EVEN) RANDON (NO ALL 0'S)            ?

                  7 (ODD)  RANDOM (INCLUDING ALL 0'S)     ?

          4.3.2.3 PARITY

                  PARITY SELECTION IS EITHER EVEN OR ODD.

                  PAR     DESCRIPTION
                   0      EVEN PARITY.

                   1      ODD PARITY

          4.3.2.4 DENSITY

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

                  DEN     DESCRIPTION

                   2      200 BITS PER INCH.

                   5      556 BITS PER INCH.

                   8      800 BITS PER INCH.

                   C      800 BPI CORE DUMP.





          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       VARING LENGTH RECORDS, MINIMUM TO MAXIMUM (1ST RECORD=
                          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

```
                    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:

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

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

5.1 OPERATIONAL SWITCH SETTINGS

THE OPERATIONAL SWITCH SETTINGS ARE USED TO:

A. ALTER ERROR RECOVERY PROCEDURES

B. DELETE ERROR PRINTOUTS

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

5.1.1 SWITCHES TO ALTER ERROR RECOVERY

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

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

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

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)

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.

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

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

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

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

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

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

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

9.4 TEST 2

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

9.5 TEST 3

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

9.6 TEST 4

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

9.7 TEST 5

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

10. LISTING

STATUS AND COMMAND REGISTER BIT ASSIGNMENTS

COMMAND REGISTER

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

```
                                5       ADDRESS BIT 17
                                4       ADDRESS BIT 16
                                3       FUNCTION BIT 2  000 = OFF LINE          100 = SPACE FORWARD
                                                        001 = READ              101 = SPACE REVERSE
                                2       FUNCTION BIT 1  010 = WRITE             110 = WRITE XIRG
                                1       FUNCTION BIT 0  011 = WRITE EOF         111 = REWIND
                                0       GO

                                                        STATUS REGISTER

                                15      ILLEGAL COMMAND (ILC)

                                14      END OF FILE (EOF)
                                13      CYCLICAL REDUNDANCY ERROR (CRE)
                                12      PARITY ERROR (PAE)

                                11      BUS GRANT LATE (BGL)
                                10      END OF TAPE (EOT)
                                9       RECORD LENGTH ERROR (RLE)

                                8       BAD TAPE ERROR (BTE)
                                7       NON EXISTENT MEMORY (NXM)
                                6       SELECT REMOTE (SELR)

                                5       BEGINNING OF TAPE (BOT)
                                4       7 CHANNEL (7CH)
                                3       SETTLE DOWN (SDWN)

                                2       WRITE LOCK (WRL)
                                1       REWIND STATUS (RWS)
                                0       TAPE UNIT READY (TUR)
                                !

                                .TITLE  CZTMCDO TM11 DATA RELIAB
                                ;COPYRIGHT 1970,1980 DIGITAL EQUIPMENT CORP., MAYNARD, MASS. 01754
                                ;REVISED SEPT 1971, J.RODENHISER
                                ;REVISED AUGUST 1972, JIM LACEY
                                ;REVISED FEB 1976,RON PLATUKIS
                                ;REVISED MAY 1980, LEN LORANGER
                                        ; CHGD1 - INSERTED SUSW AFTER AUTOST FOR SWITCHLESS PROC.
                                        ; CHGD2 - INSERTED END OF PASS STATEMENT.


                                ;*****************************************************************

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

                                ;*****************************************************************

        000000                  R0=%0
        000001                  R1=%1
        000002                  R2=%2
```

```
                000003                  R3=%3
                000004                  R4=%4
                000005                  R5=%5
                000006                  SP=%6
                000007                  PC=%7

                                        ;TRAP CATCHER IN UNUSED LOCATIONS 0-476

                                                .ENABL  ABS
                000000                          .=0
                000034                          .=34
000034  012426                                  TRAP34
                000046                          .=46
000046  003310                                  ENDADR
                000052                          .=52
000052  040000                                  40000

                                        ;**********************************
                                        ;SOFTWARE SWITCH REGISTER LOCATION
                                        ;**********************************
                000174                          .=174
000174  000000                          DISPREG:0
000176  000000                          SWREG:  0

                000200                          .=200
000200  000167  001162                          JMP     AUTOST
000204  000167  001612                          JMP     MEM4K
000210  000167  001632                          JMP     MEM8K

                000500                          .=500
000500  172520                  MTS:    172520
000502  172522                  MTC:    172522
000504  172524                  BC:     172524
000506  172526                  CA:     172526
000510  177776                  CC:     177776
000512  177570                  SWR:    177570
000514  177570                  DISPLAY:177570
000516  177560                  TKS:    177560
000520  177562                  TKB:    177562
000522  177564                  TPS:    177564
000524  177566                  TPB:    177566
000526  002000                  MAXLEN: 1024.           ;MAX RECORD LENGTH
000530  000004                  MINLEN: 4.              ;MIN RECORD LENGTH
000532  014004                  WBUF:   BUFFER          ;STARTING ADDRESS OF WRITE BUFFER
000534  016004                  RBUF:   BUFFER+1024.    ;STARTING ADDRESS OF READ BUFFER
000536  000224                  MTV:    224
                000500          STACK=500

                                        ;TEMPORARY STORAGE AREAS
000540  000000                  TIB:    0
000542  000000                  TEMPST: 0
000544  000000                  COUNT:  0
000546  000000                  RDSW:   0
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
```

```
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                      ;HAS ALL DRIVES BEEN TESTED FOR EXISTENCE?
1122  001656  001345                    BNE     NXT.TU                  ;BR IF NO
1123
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                      ;SET R0 TO DRIVE 0
1141  001734  012702  000200                  MOV     #200,R2                 ;SET R2 TO DRIVE 0
1142
1143                                  ;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     $ZERO$                  ;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          $ZERO$: CLC                             ;POSITION DRIVE BIT
1152  001770  006002                    ROR     R2
1153  001772  005200                    INC     R0                      ;UPDATE DRIVE NUMBER
1154  001774  020027  000007                  CMP     R0,#7                   ;LAST
1155  002000  003762                    BLE     LOOPER                  ;BR IF NO
1156  002002  105011                    CLRB    (R1)                    ;SET EOM
1157  002004  112741  000100                  MOVB    #'@,-(R1)               ;CR & LF
1158  002010  012702  014004                  MOV     #BUFFER,R2              ;TYPE THE DRIVE/S SELECTED
1159  002014  104404                    TOP
1160  002016  000167  001074                  JMP     EXECUT                  ;GO START TESTING
1161                                  ;MODIFY RECORD LENGTHS AND BUFFER AREAS FOR 4K.
1162  002022  012767  000004  176500  MEM4K:  MOV     #4.,MINLEN
1163  002030  012767  002000  176470          MOV     #1024.,MAXLEN
```

```
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                     ;PRINT 'SELECT DRIVES'
1177  002124  005067  176430                  CLR     MSBITS          ;CLEAR SELECTED DRIVE INDICATOR
1178  002130  104400          SELDRV: WAITKY
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,R0         ;INITIALIZE BIT POSITION FOR DRIVE 0
1198  002236  105267  177064          VAL1:   INCB    CHARIN          ;+1 TO DRIVE SELECT
1199  002242  001402                          BEQ     VAL2            ;HAVE DRIVE OF EQUAL TO ZERO
1200  002244  006200                          ASR     R0              ;MOVE BIT POSITION TO NEXT DRIVE
1201  002246  000773                          BR      VAL1            ;TRY AGAIN
1202  002250  130067  176304          VAL2:   BITB    R0,MSBITS       ;COMPARE DRIVE SELECT WITH PREVIOUS SELECTED
1203  002254  001003                          BNE     VAL3
1204  002256  150067  176276                  BISB    R0,MSBITS       ;DRIVE WASN'T PREVIOUSLY SET, SO SET IT NOW.
1205  002262  000402                          BR      VAL4
1206  002264  140067  176270          VAL3:   BICB    R0,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                     ;PRINT'SELECT TESTS'
1216  002314  005067  177010                  CLR     NUMTST          ;CLEAR TEST NUMBERS SELECTED
1217  002320  012700  001340                  MOV     #TSTTBL,R0      ;INITIALIZE TEST TABLE POINTER
1218  002324  104400          SELT1:          WAITKY
1219  002326  122767  000015  176772          CMPB    #15,CHARIN      ;WAS CHARACTER A CARRIAGE RETURN?
```

```
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             ;TYPE 3 SPACES
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  000060  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
```

```
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)+
```

```
 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                        CNTI
 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                          GENPAT          ;GENERATE PATTERN
1389  003342  104410                  T0:     RSFDRV          ;RESET DRIVE SELECTION TO LOWEST NUMBER
1390  003344  104414                  T0A:    MVCTRS          ;RESTORE DRIVE COUNTERS
1391  003346  032767  000040  175270          BIT     #40,MODES       ;IS THIS DRIVE AT EOT?
1392  003354  001002                          BNE     T0B             ;YES, SKIP WRITE
1393  003356  104402                          WRITIT          ;WRITE
1394  003360  104406                          SVCTRS          ;SAVE DRIVE COUNTERS
1395
1396  003362  104422                  T0B:    CHGDRV          ;ANY MORE DRIVES SELECTED?
1397  003364  000767                          BR      T0A             ;YES
1398  003366  004767  001452                  JSR     PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
1399  003372  000763                          BR      T0              ;NO
1400  003374  000167  177616                  JMP     DONE            ;YES, EXIT
1401                                  ;TEST1
1402                                  ;WRITE RECORD LENGTH SEQUENCE, GO TO NEXT DRIVE, CONTINUE TO EOT ON ALL DRIVES.
1403  003400  052767  000001  175236  TEST1:  BIS     #1,MODES        ;EXIT WRITE AFTER RLS, NO READ PASS
1404  003406  104420                          CLRALL          ;CLEAR ERROR COUNTERS AND REWIND
1405  003410  104416                          GENPAT          ;GENERATE PATTERN
1406  003412  104410                  T1:     RSFDRV          ;RESET DRIVE SELECTION TO LOWEST NUMBER
1407  003414  104414                  T1A:    MVCTRS          ;RESTORE DRIVE COUNTERS
1408  003416  032767  000040  175220          BIT     #40,MODES       ;IS THIS DRIVE AT EOT?
1409  003424  001002                          BNE     T1B             ;YES, SKIP WRITE
1410  003426  104402                          WRITIT          ;WRITE
1411  003430  104406                          SVCTRS          ;SAVE DRIVE COUNTERS
1412  003432  104422                  T1B:    CHGDRV          ;ANY MORE DRIVE SELECTED?
1413  003434  000767                          BR      T1A             ;YES
1414  003436  004767  001402                  JSR     PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
1415  003442  000763                          BR      T1              ;NO
1416  003444  000167  177546                  JMP     DONE            ;YES EXIT
1417
1418                                  ;TEST2
1419                                  ;WRITE A RECORD LENGTH SEQUENCE , CHANGE DRIVES
1420                                  ;BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES.  CONTINUE TO EOT ON ALL DRIVES
1421  003450  052767  000005  175166  TEST2:  BIS     #5,MODES        ;EXIT WRITE AFTER RLS, DO READ PASS
1422  003456  104420                          CLRALL          ;CLEAR ERROR COUNTERS AND REWIND
1423  003460  104416                          GENPAT          ;GENERATE PATTERN
1424  003462  104410                  T2:     RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1425  003464  104414                  T2A:    MVCTRS          ;RESTORE DRIVE COUNTERS
1426  003466  032767  000040  175150          BIT     #40,MODES       ;IS THIS DRIVE AT EOT?
1427  003474  001002                          BNE     T2B             ;YES, SKIP WRITE
1428  003476  104402                          WRITIT          ;WRITE
1429  003500  104406                          SVCTRS          ;SAVE DRIVE COUNTERS
1430  003502  104422                  T2B:    CHGDRV          ;ANYMORE DRIVERS SELECTED?
1431  003504  000767                          BR      T2A             ;YES
1432  003506  104414                  T2C:    MVCTRS          ;RESTORE DRIVE COUNTERS
1433  003510  032767  000020  175126          BIT     #20,MODES       ;IS THIS READ AT EOT?
1434  003516  001003                          BNE     T2D             ;YES, SKIP BACKSPACE
1435  003520  004767  005206                  JSR     PC,GOBKWD       ;BACKSPACE
1436  003524  104406                          SVCTRS          ;SAVE DRIVE COUNTERS
1437  003526  104422                  T2D:    CHGDRV          ;ANY MORE DRIVES SELECTED?
1438  003530  000766                          BR      T2C             ;YES
1439  003532  104414                  T2E:    MVCTRS          ;RESTORE DRIVE COUNTERS
1440  003534  032767  000020  175102          BIT     #20,MODES       ;IS THIS READ AT EOT
1441  003542  001001                          BNE     T2F             ;YES, SKIP READ
1442  003544  104424                          READIT          ;READ
1443  003546  104406                  T2F:    SVCTRS          ;SAVE DRIVE COUNTERS
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1444  003550  104422                          CHGDRV          ;ANYMORE DRIVES SELECTED?
1445  003552  000767                    BR    T2E             ;YES
1446  003554  004767  001264              JSR   PC,ALLEOT       ;ARE ALL DRIVES AT EOT?
1447  003560  000740                    BR    T2              ;NO
1448  003562  000167  177430              JMP   DONE            ;YES EXIT
1449
1450                                ;TEST3
1451                                ;WRITE ONE RECORD, CHANGE DRIVES, BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES
1452  003566  052767  000006  175050  TEST3:  BIS   #6,MODES      ;EXIT WRITE EVERY RECORD, DO READ PASS
1453  003574  104420                          CLRALL          ;CLEAR ERROR COUNTERS AND REWIND
1454  003576  104416                          GENPAT          ;GENERATE PATTERN
1455  003600  104410              T3:         RSFDRV          ;SET DRIVE SELECTION TO LOWEST NUMBER
1456  003602  104414              T3A:        MVCTRS          ;RESTORE DRIVE COUNTERS
1457  003604  032767  000040  175032          BIT   #40,MODES     ;IS THIS DRIVE AT EOT?
1458  003612  001002                    BNE   T3B             ;YES, SKIP WRITE
1459  003614  104402                          WRITIT          ;WRITE
1460  003616  104406                          SVCTRS          ;SAVE DRIVE COUNTERS
1461  003620  104422              T3B:        CHGDRV          ;ANY MORE DRIVES SELECTED
1462  003622  000767                    BR    T3A             ;YES
1463
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,@TSTEX
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
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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                                  ;TEST5
1552                                  ;READ ONLY
1553                                  ;RANDOM PATTERN INVALID EXCEPT FOR SPECIFIC CASES
1554  004226  052767  000002  174410  TEST5:  BIS     #2,MODES
1555  004234  104420                          CLRALL          ;CLEAR ERROR COUNTERS AND REWIND
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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,R0
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:          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     #WRCHEK,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                                  ;WRITE RECORD SECTION
1727  005254  005767  173344          WRITI:  TST     RECORD          ;IS THIS THE FIRST RECORD
1728  005260  001031                        BNE     NOINCR          ;NO, SKIP SET UP OF RECORD LENGTH AND BLOCK INCREMENT
1729  005262  016767  173240  173264        MOV     MAXLEN,STRLEN
1730  005270  012767  177774  173300        MOV     #-4.,BLKINC
1731  005276  032767  000020  174026        BIT     #20,PARAM
1732  005304  001006                        BNE     W1
1733  005306  016767  173216  173240        MOV     MINLEN,STRLEN
1734  005314  012767  000004  173254        MOV     #4.,BLKINC
1735  005322  016767  173226  173310  W1:   MOV     STRLEN,WRTLEN
1736  005330  032767  000040  173774        BIT     #40,PARAM       ;DOES RECORD LENGTH CHANGE?
1737  005336  001002                        BNE     NOINCR          ;YES
1738  005340  005067  173232                CLR     BLKINC          ;NO
1739  005344  016767  173254  173254  NOINCR: MOV   RECORD,WRRECR
1740  005352  005767  177130                TST     T5FLAG
1741  005356  001401                        BEQ     .+4
1742  005360  000207                        RTS     PC              ;EXIT WRITE ROUTINE IF TEST 5
1743  005362  005067  173206                CLR     WRPASS
1744  005366  016777  173172  173106  STRTOP: MOV   COMAND,@MTC     ;SELECT UNIT
1745  005374  105777  173102                TSTB    @MTC
1746  005400  100375                        BPL     .-4             ;WAIT FOR CU READY
1747  005402  006077  173072                ROR     @MTS            ;WAIT FOR TU READY
1748  005406  103375                        BCC     .-4
1749  005410  016777  173224  173066  NONSTP: MOV   WRTLEN,@BC      ;SET BYTE COUNT
1750  005416  005477  173062                NEG     @BC
1751  005422  016777  173104  173056        MOV     WBUF,@CA        ;SET CURRENT ADDRESS
1752  005430  052777  000004  173044        BIS     #4,@MTC         ;WRITE
1753  005436  004767  177540                JSR     PC,GOWAIT       ;INTERRUPT ENABLE, GO, WAIT FOR DONE
1754                                  ;RETURN HERE AFTER INTERRUPT
1755  005442  017767  173032  173130        MOV     @MTS,STATRD     ;SAVE STATUS
1756  005450  005777  173026                TST     @MTC
1757  005454  100542                        BMI     ERROR           ;HAVE ERROR FLAG, CHECK FOR EOT
1758  005456  005767  173112                TST     WRPASS          ;WAS THIS A RECOVERY PASS
1759  005462  001410                        BEQ     TSTSTP          ;NO
1760  005464  016700  173104                MOV     WRPASS,R0       ;YES
1761  005470  006300                        ASL     R0
1762  005472  062700  000602                ADD     #WRCHEK,R0
1763  005476  005210                        INC     @R0             ;+1 TO APPROPRIATE RECOVERY PASS COUNTER
1764  005500  005067  173070                CLR     WRPASS
1765  005504  032767  000014  173620  TSTSTP: BIT   #14,PARAM       ;IS WRITE MODE NONSTOP?
1766  005512  001023                        BNE     STOPOP          ;NO
1767  005514  005767  173054                TST     WRPASS          ;YES
1768  005520  001333                        BNE     NONSTP
1769  005522  004767  000142                JSR     PC,TESINC       ;CHANGE RECORD LENGTH
1770  005526  032767  000001  173110        BIT     #1,MODES        ;EXIT AFTER RLS?
1771  005534  001405                        BEQ     W10             ;NO
1772  005536  032767  000010  173100        BIT     #10,MODES       ;YES, ARE WE AT END OF RLS?
1773  005544  001721                        BEQ     NONSTP          ;NO
1774  005546  000207                        RTS     PC              ;YES
1775  005550  032767  000002  173066  W10:  BIT     #2,MODES        ;EXIT EVERY RECORD?
1776  005556  001714                        BEQ     NONSTP          ;NO
1777  005560  000207                        RTS     PC              ;YES
1778  005562  032767  000010  173542  STOPOP: BIT   #10,PARAM       ;IS WRITE MODE RANDOM?
1779  005570  001414                        BEQ     W11             ;NO
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1780                                    ;RANDOM STALL DELAY
1781  005572  004767  001450            RANSTP: JSR     PC,RANGEN
1782  005576  052767  177400  001612            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  00621'  005267  172404          ENDTAP: INC     RECORD
1859  00622U  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  004753    MOVB    #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                              ;GENERATE DATA PETTERN
1925                              ;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                    PAT07
1949                                ;PATTERN 0
1950                                ;HIGH FREQUENCY OUTSIDE SKEW
1951  006614  012703  140701          PATE0:  MOV     #140701,R3      ;401
1952  006620  000533                          BR      PFIL1
1953                                ;HALF FREQUENCY OUTSIDE SKEW
1954
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                                    ;PATTERN 5
2005                                    ;THREE 0'S EACH TRACK EVERY 6TH WORD
2006  006754  012703  006762            PATE5:  MOV     #PE5,R3
2007  006760  000475                            BR      PFIL9
2008  006762  157437                    PE5:    157437                  ;17437
2009  006764  167737                            167737                  ;27437
2010  006766  167757                            167757                  ;27457
2011  006770  173767                            173767                  ;33467
2012  006772  171767                            171767                  ;31467
2013  006774  171773                            171773                  ;31473
2014  006776  176775                            176775                  ;37075
2015  007000  177376                            177376                  ;37076
2016
2017
2018                                    ;THREE 1'S EACH TRACK EVERY 6TH WORD
2019  007002  012703  007010            PAT05:  MOV     #P05,R3
2020  007006  000462                            BR      PFIL9
2021  007010  160340                    P05:    160340                  ;20040
2022  007012  150340                            150340                  ;10040
2023  007014  150320                            150320                  ;10020
2024  007016  144310                            144310                  ;4010
2025  007020  142310                            142310                  ;2010
2026  007022  142304                            142304                  ;2004
2027  007024  141302                            141302                  ;1002
2028  007026  140702                            140702                  ;402
2029  007030  140701                            140701                  ;401
2030                                    ;PATTERN 6
2031                                    ;ALL 1'S ALL TRACKS
2032  007032  012703  177777            PAT6:   MOV     #-1,R3
2033  007036  000424                            BR      PFIL1
2034                                    ;PATTERN 7
2035                                    ;RANDOM (NONE ALL 0'S)
2036  007040  004767  000202            PATE7:  JSR     PC,RANGEN
2037  007044  132767  000077  000344            BITB    #77,RANDOM
2038  007052  001772                            BEQ     PATE7
2039  007054  116722  000336                    MOVB    RANDOM,(2)+
2040  007060  026702  171450                    CMP     RBUF,R2
2041  007064  001365                            BNE     PATE7
2042  007066  000447                            BR      PATEND
2043                                    ;RANDOM (WITH ALL 0'S)
2044  007070  004767  000152            PAT07:  JSR     PC,RANGEN
2045  007074  016722  000316                    MOV     RANDOM,(2)+
2046  007100  026702  171430                    CMP     RBUF,R2
2047  007104  001371                            BNE     PAT07
2048  007106  000437                            BR      PATEND
2049                                    ;FILL WRITE BUFFER WITH CONSTANT PATTERN
2050  007110  010322                    PFIL1:  MOV     R3,(2)+
2051  007112  026702  171416                    CMP     RBUF,R2
2052  007116  001374                            BNE     PFIL1
2053  007120  000432                            BR      PATEND
2054                                    ;FILL WRITE BUFFER WITH 3 WORD PATTERN
2055  007122  010304                    PFIL3:  MOV     R3,R4
2056  007124  062704  000006                    ADD     #6,R4
2057  007130  012322                    PFIL3A: MOV     (3)+,(2)+
2058  007132  026702  171376                    CMP     RBUF,R2
2059  007136  001001                            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                                  ;FINISHED PATTERN GENERATION
2078                                  ;IF CORE DUMP NOT SELECTED CLEAR BITS 15,14,7,6 IN ALL WORDS OF WRITE DATA BUFFER
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     @MTS
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                                  ;RETURN HERE AFTER INTERRUPT
2155  007556  017767  170716  171014          MOV     @MTS,STATRD
2156  007564  005777  170712                  TST     @MTC            ;ANY STATUS ERRORS
2157  007570  100504                          BMI     RDERRO          ;YES
2158                                  ;CHECK FOR DATA ERRORS
2159  007572  016700  170736                  MOV     RBUF,R0
2160  007576  016701  170730                  MOV     WBUF,R1
2161  007602  016702  171034                  MOV     READLN,R2
2162  007606  022021                  $R5:    CMP     (0)+,(1)+       ;CHECK FOR PROPER DATA TRANSFER
2163  007610  001045                          BNE     DATERR          ;HAVE DATA ERROR
2164  007612  162702  000002                  SUB     #2,R2           ;CHECKED ALL TRANSFERS?
2165  007616  001373                          BNE     $R5             ;NO
2166  007620  032767  000003  171504  RTSSTP: BIT     #3,PARAM
2167  007626  001007                          BNE     RDSTPC
2168  007630  004767  000274                  JSR     PC,RDINCR       ;INCREMENT FOR NEXT BLOCK
2169  007634  026767  170764  170766          CMP     RECORD,LASRCR
2170  007642  001316                          BNE     READGO
2171  007644  000207                          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                  RNDRDS: JSR     PC,RANGEN
 2175  007662  052767  177400  177526                  BIS     #177400,RANDOM
 2176  007670  012704  177470                  RNDS1:  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     RNDS1
 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
 2195  007762  104412                          OCTPRT          ;PRINT ACTUAL DATA
 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 RETRYS (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            CMP     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
```

```
 2284  010452  016702  170154                  MOV     RDERRS,R2
 2285  010456  104426                          DECPRT
 2286
 2287
 2288  010460  012702  013500                  MOV     #MSG22,R2
 2289  010464  104404                          TOP
 2290  010466  016702  170142                  MOV     DAERRS,R2
 2291  010472  104426                          DECPRT
 2292  010474  012702  013521                  MOV     #MSG23,R2
 2293  010500  104404                          TOP
 2294  010502  016702  170130                  MOV     NRREAD,R2
 2295  010506  104426                          DECPRT
 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     @MTS            ;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     @MTS,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                     ;PRINT WRITE STATUS ERROR
 2333  010660  016767  167754  167670          MOV     WRTLEN,LENGTH
 2334  010666  004767  000150                  JSR     PC,PRTS         ;PRINT STATUS, COMMAND, RECORD, LENGTH
 2335  010672  012702  013242                  MOV     #MSG11,R2
 2336  010676  104404                          TOP                     ;PRINT 'XIRG WRITTEN 4 TIMES''
 2337  010700  032767  002000  167672          BIT     #2000,STATRD
 2338  010706  001702                          BEQ     XRGREC
 2339  010710  042777  000016  167564          BIC     #16,@MTC
```

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 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     @MTS            ;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
```

```
2396
2397
2398  011234  016767  170072  000174          MOV     PARAM,CHAR
2399  011242  042767  177477  000166          BIC     #177477,CHAR
2400  011250  012702  013663                  MOV     #MSG26,R2
2401  011254  022767  000100  000154          CMP     #100,CHAR
2402  011262  001002                          BNE     .+6
2403  011264  012702  013673                  MOV     #MSG27,R2
2404  011270  022767  000200  000140          CMP     #200,CHAR
2405  011276  001002                          BNE     .+6
2406  011300  012702  013703                  MOV     #MSG28,R2
2407  011304  022767  000300  000124          CMP     #300,CHAR
2408  011312  001002                          BNE     .+6
2409  011314  012702  013713                  MOV     #MSG29,R2
2410  011320  104404                          TOP
2411  011322  104436                          CKSW
2412  011324  000207                          RTS     PC
2413                          ;PRINT OCTAL VALUE IN REGISTER 2
2414  011326  012767  000060  000102  OCTPR:  MOV     #'0,CHAR        ;INITIALIZE 1ST NUMBER AS 0
2415  011334  005702                  TST     R2              ;IS VALUE POSITIVE
2416  011336  100003                  BPL     OCT1            ;YES PRINT 0
2417  011340  012767  000061  000070          MOV     #'1,CHAR        ;NO PRINT 1
2418  011346  004767  000066          OCT1:   JSR     PC,OCTP
2419  011352  006102                  ROL     R2
2420  011354  006102                  ROL     R2
2421  011356  012767  177773  000050          MOV     #-5,OCT         ;COUNT 5 DIGITS
2422  011364  006102                  OCT2:   ROL     R2
2423  011366  006102                  ROL     R2
2424  011370  006102                  ROL     R2
2425  011372  010267  000040                  MOV     R2,CHAR         ;SAVE DIGIT
2426  011376  042767  177770  000032          BIC     #177770,CHAR    ;CLEAR OTHER BITS
2427  011404  052767  000060  000024          BIS     #60,CHAR        ;MAKE ASCII DIGIT
2428  011412  006002                          ROR     R2
2429  011414  004767  000020                  JSR     PC,OCTP         ;PRINT
2430  011420  006102                          ROL     R2
2431  011422  005267  000006                  INC     OCT             ;+1 TO DIGIT COUNT
2432  011426  001356                          BNE     OCT2            ;NOT DONE
2433  011430  104430                          SP3
2434  011432  000207                          RTS     PC              ;EXIT
2435  011434  000000                  OCT:    0
2436  011436  000000                  CHAR:   0
2437  011440  105777  167056          OCTP:   TSTB    @TPS
2438  011444  100375                          BPL     .-4             ;WAIT FOR READY
2439  011446  016777  177764  167050          MOV     CHAR,@TPB       ;PRINT
2440  011454  000207                          RTS     PC
2441
2442
2443                          ;PRINT DECIMAL VALUE IN REGISTER 2
2444  011456  012767  177773  000150  DECPR:  MOV     #-5,DIGCNT
2445  011464  012767  011642  000146          MOV     #DECPNT+2,DECPNT
2446  011472  012767  000040  000136          MOV     #40,ZERO
2447  011500  012767  177777  000124  TYPT1:  MOV     #-1,DIGIT
2448  011506  005267  000120          TYPT2:  INC     DIGIT
2449  011512  167702  000122                  SUB     @DECPNT,R2
2450  011516  100373                          BPL     TYPT2
2451  011520  067702  000114                  ADD     @DECPNT,R2
```

```
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                                  ;KEYBOARD INPUT
2481  011654  105777  166636          WAITK:  TSTB    @TKS            ;WAIT FOR KEY
2482  011660  100375                      BPL     .-4
2483  011662  105777  166634              TSTB    @TPS            ;WAIT FOR TELEPRINTER READY
2484  011666  100375                      BPL     .-4
2485  011670  117777  166624  166626          MOVB    @TKB,@TPB               ;ECHO CHARACTER
2486  011676  117767  166616  167422          MOVB    @TKB, CHARIN    ;SAVE IT
2487  011704  042767  000200  167414          BIC     #200,CHARIN
2488  011712  000207                      RTS     PC              ;EXIT
2489                                  ;TYPE 3 SPACES
2490  011714  012702  011724          SP3X:   MOV     #SP3A,R2
2491  011720  104404                          TOP
2492  011722  000207                      RTS     PC
2493  011724  020057  020040     057  SP3A:   .ASCII  ;/   /;
2494          011732                      .EVEN
2495
2496
2497                                  ;TELETYPE OUTPUT PACKAGE
2498  011732  142777  000177  166562  TO:     BICB    #177,@TPS       ;CLEAR TELETYPE FLAGS
2499  011740  112267  000100              MOVB    (2)+,EOMK       ;SAVE MESSAGE DELIMETER
2500  011744  121267  000074          TOP1:   CMPB    @R2,EOMK        ;IS CHARACTER THE SECOND MESSAGE DELIMITER?
2501  011750  001003                      BNE     .+10            ;NO
2502  011752  005067  166570          TOP3:   CLR     RDSW
2503  011756  000207                      RTS     PC              ;YES, EXIT
2504  011760  121227  000100              CMPB    @R2,#'@         ;IS CHARACTER AN @ WHICH INDICATES A CARRIAGE RET.
2505  011764  001406                      BEQ     TOP2            ;YES
2506  011766  105777  166530              TSTB    @TPS            ;NO, WAIT FOR TELETYPE READY
2507  011772  100375                      BPL     .-4
```

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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$,@#4                 ;SET UP FOR TIMEOUT
2528  012064  022777  177777  166420     CMP     #-1,@SWR                ;REFERENCE HARDWARE SWITCH REGISTER
2529  012072  001402                     BEQ     2$
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$:    MOV     (SP)+,@#4               ;RESTORE VECTORS
2535  012120  012637  000006             MOV     (SP)+,@#6
2536  012124  000207                     RTS     PC
2537
2538
2539
2540  012126  022767  000176  166356  CKSWR:  CMP     #SWREG,SWR              ;SOFTWARE SWITCH REG PRESENT
2541  012134  001035                     BNE     OUT                     ;NO, GET OUT
2542  012136  105777  166354             TSTB    @TKS                    ;YES,WAIT FOR
2543  012142  100032                     BPL     OUT                     ;READY, GET CHARACTER
2544  012144  017767  166350  166366     MOV     @TKB,TIB                ;AND STRIP OFF
2545  012152  042767  177600  166360     BIC     #177600,TIB             ;THE GARBAGE
2546  012160  022767  000007  166352     CMP     #7,TIB          ;IS IT A <^G>
2547  012166  001020                     BNE     OUT
2548  012170  012702  013747             MOV     #$CNTG,R2
2549  012174  104404                     TOP
2550  012176  012702  013754      CNTLU:  MOV     #$MSWR,R2
2551  012202  104404                     TOP
2552  012204  017702  166302             MOV     @SWR,R2
2553  012210  104412                     OCTPRT
2554  012212  012702  013765             MOV     #$MNEW,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                  3$:     TST     (SP)+           ;POP THE STACK
2567  012266  000743                          BR CNTLU                ;START OVER
2568  012270  122767  000015  167030  2$:     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         ;ECHO IT WITH <LF>
2572  012312  022767  000007  166224          CMP     #7,COUNT        ;WAS IT FIRST CHARACTER
2573  012320  001036                          BNE     7$              ;CHANGE SWR IF NOT FIRST ONE
2574  012322  005726                  8$:     TST     (SP)+           ;POP THE STACK
2575  012324  000741                          BR      OUT             ;GET OUT
2576  012326  122767  000060  166772  4$:     CMPB    #60,CHARIN
2577  012334  003004                          BGT     5$
2578  012336  122767  000067  166762          CMPB    #67,CHARIN
2579  012344  002004                          BGE     6$
2580  012346  012702  013776          5$:     MOV     #$QUEST,R2
2581  012352  104404                          TOP
2582  012354  000743                          BR      3$              ;START OVER IF NOT LEGAL CHARACTER
2583  012356  006367  166160          6$:     ASL     TEMPST
2584  012362  006367  166154                  ASL     TEMPST
2585  012366  006367  166150                  ASL     TEMPST
2586  012372  142767  000060  166726          BICB    #60,CHARIN              ;GET NITTY-GRITTY
2587  012400  156767  166722  166134          BISB    CHARIN,TEMPST
2588  012406  005367  166132                  DEC     COUNT           ;ONLY WANT 6   DIGITS
2589  012412  001755                          BEQ     5$
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          104400                  WAITKY=104400
2616          104402                  WRITIT=104402
2617          104404                  TOP=104404
2618          104406                  SVCTRS=104406
2619          104410                  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                ;/CMD     STATUS   RECORD   LENGTH EXPECTED ACTUAL@/;
2673  013036  020040  020040  051440
2674  013044  040524  052524  020123
2675  013052  020040  042522  047503
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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  ;/@CZTMCDO 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#
 TST    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#
```

```
DISPLA  000514   978#  2533*
DISPRE  000174   962#  2533
DOAGN   003320  1371   1381#
DONE    003216  1359#  1400   1416   1448   1480   1549   1590   1602
DONE1   003264  1363   1367   1370#
DRVADR  000646  1029#  1609   1615   1620
DRVSEL  000552   996#  1102*  1107   1119*
DOTAB   000666  1029   1038#  1039
D1TAB   000732  1030   1040#  1041
D2TAB   000776  1031   1042#  1043
D3TAB   001042  1032   1044#  1045
D4TAB   001106  1033   1046#  1047
D5TAB   001152  1034   1048#  1049
D6TAB   001216  1035   1050#  1051
D7TAB   001262  1036   1052#  1053
ENDADR  003310   953   1373   1377#
ENDTAP  006214  1821   1843   1858#
ENDT1   006226  1697   1860#
EOMK    012044  2499*  2500   2521#
ERROR   005762  1757   1820#
ERR1    006004  1823   1825#
EXEC    003132  1343#  1382
EXECUT  003116  1160   1185   1223   1340#
EXEC1   003140  1344#  1369
GENPA   006526  1926#  2606
GENPAT= 104416  1388   1405   1423   1454   1486   1556   2622#
GOBKWD  010732  1435   1467   1522   2345#
GOB1    010756  2347   2350#
GOWAIT  005202  1677   1716#  1753   1853   2153   2244   2318   2341   2360
GW1     005244  1718   1723#
HINUM   007422  1081*  1174*  2096   2106   2118*  2126#
IDSELF  001660  1106   1125#
LASRCR  000630  1020#  1530   1532   1535*  1536*  1538*  1543   1569*  1570*  1578   1581*  1582*  1584*
                1593   2169   2182   2345*  2350
LENGTH  000556   998#  1829*  2190*  2207*  2333*  2372
LONUM   007420  1080*  1173*  2095   2104   2117*  2125#
LOOPER  001746  1146#  1155
MAXLEN  000526   983#  1089*  1093*  1129   1163*  1168*  1729   1807   2232
MEM4K   002022   967   1162#
MEM8K   002046   968   1167#
MINLEN  000530   984#  1088*  1092*  1127   1162*  1167*  1733   1805   2230
MODES   000644  1026#  1340*  1386*  1391   1403*  1408   1421*  1426   1433   1440   1452*  1457   1465
                1472   1485*  1489*  1490*  1498*  1501   1509   1512   1520   1528   1554*  1559   1564*
                1567   1576   1595*  1598   1632*  1682   1690   1699   1711   1713*  1770   1772   1775
                1791   1793   1796   1801*  1812*  1838   1859*  2249*
MSBITS  000560   999#  1103*  1118*  1131   1146   1177*  1181   1202   1204*  1206*  1638   1666
MSG0    012506  1228   2632#
MSG1    012513  1175   2633#
MSG10A  013115  1125   2681#
MSG10B  013217  1136   2693#
MSG11   013242  2335   2697#
MSG12   013270  1872   2262   2701#
MSG13   013300  1875   2265   2703#
MSG14   013310  1869   2259   2705#
MSG15   013320  1887   2277   2707#
MSG16   013327  1890   2280   2709#
```

```
MSG17   013336  1881  2271  2711#
MSG18   013345  1884  2274  2713#
MSG19   013354  1892  2715#
MSG2    012534  1214  2636#
MSG20   013376  1897* 1898* 1901  2718#
MSG20A  013420  1914  2721#
MSG21   013450  2282  2725#
MSG22   013500  2288  2729#
MSG23   013521  2292  2732#
MSG24   013555  1860  2737#
MSG25   013620  2250  2743#
MSG26   013663  2400  2749#
MSG27   013673  2403  2751#
MSG28   013703  2406  2753#
MSG29   013713  2409  2755#
MSG30   013723  1359  2757#
MSG31   013730  1374  2758#
MSG5    012574  1336  2642#
MSG6    012621  1319  2646#
MSG7    012626  1827  2331  2647#
MSG8    012654  1862  2252  2651#
MSG9    012761  2205  2664#
MSG9A   013006  2188  2668#
MSG9B   013031  2363  2672#
MTC     000502   973# 1101* 1105  1107* 1671  1673* 1676* 1719* 1744* 1745  1752* 1756  1851*
                1852* 1854* 1855* 2138* 2139  2151* 2152* 2156  2242* 2243* 2245* 2309  2311*
                2312* 2322  2339* 2340* 2353* 2354  2358* 2359* 2365
MTS     000500   972# 1109  1114  1116  1674* 1747* 1755  1847  2141* 2155  2239* 2316* 2321
                2356*
MTV     000536   987# 1718*
MVCTR   004530  1613# 2605
MVCTRS= 104414  1390  1407  1425  1432  1439  1456  1464  1471  1493  1500  1511  1519  1527
                1542  1566  1575  1592  1681  1694  2621#
MV1     004534  1614# 1616
NOINCR  005344  1728  1737  1739#
NONSTP  005410  1749# 1768  1773  1776
NO.SEL  001646  1113  1115  1117  1119#
NRREAD  000636  1023# 2219* 2294
NUMTST  001330  1055# 1079* 1216* 1221  1332* 1333  1370*
NXMRET  001464  1083  1087#
NXT.TU  001572  1107# 1122
OCT     011434  2421* 2431* 2435#
OCTP    011440  2382  2389  2395  2418  2429  2437#
OCTPR   011326  2414# 2604
OCTPRT= 104412  2193  2195  2366  2368  2553  2620#
OCT1    011346  2416  2418#
OCT2    011364  2422# 2432
OUT     012230  2541  2543  2547  2558#  2575
OVER4K  001512  1086  1092#
PARAM   001332  1056# 1343* 1344  1364  1368* 1533  1579  1646  1649  1652  1731  1736  1765
                1778  1867  1879  1927  2079  2081  2166  2172  2257  2269  2384  2391  2398
PATEN   007226  2080  2083#
PATEND  007206  1992  2001  2042  2048  2053  2060  2072  2079#
PATEN1  007232  2084# 2086
PATEN2  007244  2082  2087#
PATE0   006614  1933  1951#
```

```
PATE1   006630            1935    1959#
PATE2   006660            1937    1973#
PATE3   006674            1939    1981#
PATE4   006710            1941    1988#   1994    1995
PATE5   006754            1943    2006#
PATE7   007040            1947    2036#   2038    2041
PAT00   006622            1934    1955#
PAT01   006644            1936    1965#
PAT02   006666            1938    1977#
PAT03   006702            1940    1984#
PAT04   006734            1942    1997#   2003
PAT05   007002            1944    2019#
PAT07   007070            1948    2044#   2047
PATPNT  006554            1931    1933#
PAT6    007032            1945    1946    2032#
PERMBS  000622            1017#   1837*   1908    1916
PE1     006636            1959    1961#
PE5     006762            2006    2008#
PFIL1   007110            1952    1956    1974    1978    1982    1985    2033    2050#   2052
PFIL3   007122            1960    1966    2055#
PFIL3A  007130            2057#   2064
PFIL9   007154            2007    2020    2067#
PFIL9A  007162            2069#   2076
PO1     006652            1965    1967#
PO5     007010            2019    2021#
PRTD    011106            1865    2255    2378#
PRTS    011042            1830    2191    2208    2334    2363#
RANDOM  007416            1782*   1786*   2037    2039    2045    2116*   2124#   2175*   2179*
RANGEN  007246            1781    2036    2044    2091#   2174
RANG1   007304            2099#   2103
RANSTP  005572            1781#
RAN1    005604            1783#   1787
RBUF    000534             986#   1090*   1094*   1164*   1169*   1990    1999    2040    2046    2051    2058    2070    2085
                          2143    2150    2159
RDERRO  010002            2157    2201#
RDERRS  000632            1021#   2212*   2284
RDINCR  010130            2168    2181    2225#   2248
RDPASS  000572            1004#   2137*   2196    2210    2215*   2220*
RDSTP   007706            2173    2181#   2223
RDSTPC  007646            2167    2172#
RDSTPD  007456            2138#   2183    2218
RDSW    000546             994#   2502*   2518    2570*
READGO  007500            2143#   2170
READI   007434            2134#   2609
READIT= 104424            1442    1474    1537    1583    2625#
READLN  000642            1025#   2136*   2144    2148    2161    2190    2207    2229*   2230    2232    2234*
READMP  010272            2255#
RECORD  000624            1018#   1494    1530    1535    1543    1562    1563*   1569    1581    1593    1727    1739    1800*
                          1810    1858*   1877    2134    2169    2182    2225*   2267    2345    2346*   2369
RESETL  005736            1806    1809#
RESTRL  010170            2231    2234#
RESTR1  010176            2227    2233    2235#
REWIND  005006            1627    1671#   2348
RG1     007510            2145#   2147
RNDRDS  007656            2174#
RNDS1   007670            2176#   2180
```

```
RNDTAP  010244            2202  2248#
RNDTP1  010256            1701  2222  2250#
RPASS1  010104            2216  2219#
RPASS3  010110            2214  2220#
RSFDR   004626            1636# 2603
RSFDRV= 104410            1389  1406  1424  1455  1492  1499  1518  1526  1565  1574  1591  1626  1663
                          1680  1693  2619#
RSF1    004640            1638# 1643
RSF2    004664            1639  1644# 1668
RTSREC  010042            2204  2210#
RTSR1   010056            2199  2213#
RTSSTP  007620            2166#
SELDN1  002552            1265  1268#
SELDN2  002570            1269  1272#
SELDN3  002604            1263  1267  1271  1275#
SELDRV  002130            1178# 1210
SELD1   002162            1180  1186#
SELD2   002202            1187  1190#
SELOK1  003110            1334  1336#
SELPAT  002400            1227  1231#
SELPR   002520            1253  1257#
SELRM1  002770            1309  1312#
SELRM2  003010            1307  1311  1316#
SELR1   002636            1281  1284#
SELR2   002654            1285  1288#
SELR3   002670            1279  1283  1287  1291#
SELTST  002306            1184  1214#
SELT1   002324            1218# 1230  1335
SELT2   002350            1220  1224#
SELT3   002370            1222  1225  1228# 1242  1244  1255  1273  1289  1301  1314  1324
SELW1   002722            1297  1300#
SELW2   002736            1295  1299  1303#
SP3   = 104430            1238  1249  1257  1275  1291  1303  1316  2383  2390  2433  2455  2627#
SP3A    011724            2490  2493#
SP3X    011714            2490# 2611
STACK = 000500             988# 1073  1171
START   002070            1165  1170#
START1  002074            1133  1171# 1182
STATRD  000600            1007# 1755* 1820  1842  2155* 2201  2221  2321* 2326  2337  2367
STOPOP  005562            1766  1778#
STREC1  006122            1836  1845#
STRLEN  000554             997# 1729* 1733* 1735  1809  2136  2234
STRTOP  005366            1744# 1789  1794  1797  1849  1856
SUSW  = 104432            1074  1172  2628#
SUSWR   012046            2525# 2612
SVCTR   004512            1607# 2602
SVCTRS= 104406            1394  1411  1429  1436  1443  1460  1468  1475  1495  1506  1523  1539  1571
                          1585  1629  2618#
SVC1    004516            1608# 1610
SVRECR  000562            1000# 1503* 1505  1532* 1538  1578* 1584
SV0     007424            2091* 2119  2127#
SV1     007426            2092* 2120  2128#
SV2     007430            2093* 2121  2129#
SV3     007432            2094* 2122  2130#
SWR     000512             977# 1362  1688  1825  1832  2186  2203  2213  2306  2528  2532* 2540  2552
                          2591*
```

```
SWREG   000176           963#  2532  2540
TABLE   012446          2597   2599#
TEMPST  000542           992#  2556* 2560* 2583* 2584* 2585* 2587* 2591
TESINC  005670          1561   1769  1790  1800#
TESRC1  006066          1833   1838#
TESREC  006036          1826   1832#
TEST    001336          1058#  1346*
TEST0   003330          1347   1386#
TEST1   003400          1349   1403#
TEST2   003450          1351   1421#
TEST3   003566          1353   1452#
TEST4   003704          1357   1485#
TEST5   004226          1356   1554#
TIB     000540           991#  2544* 2545* 2546
TKB     000520           980#  2485  2486  2544
TKS     000516           979#  2481  2542
TO      011732          2498#  2601
TOP   = 104404          1126   1137  1159  1176  1215  1229  1320  1337  1360  1375  1828  1861  1863
                        1876   1891  1893  1902  1915  2189  2206  2251  2253  2266  2281  2283  2289
                        2293   2332  2336  2364  2410  2491  2549  2551  2555  2581  2617#
TOP1    011744          2500#  2509  2520
TOP2    012002          2505   2511# 2571
TOP3    011752          2502#  2519
TPB     000524           982#  1192* 1209* 1327* 1330* 2439* 2469* 2485* 2508* 2513* 2516*
TPS     000522           981#  1190  1207  1325  1328  2437  2467  2483  2498* 2506  2511  2514
TRAP34  012426           951   2594#
TSINC2  005744          1803   1808  1810#
TSINC3  005760          1811   1813#
TSTEX   001334          1057#  1342* 1343  1381* 1487
TSTSTP  005504          1759   1765#
TSTTBL  001340          1060#  1076* 1077* 1078* 1217  1342
TU.SEL  001534          1091   1100#
TYPT1   011500          2447#  2458
TYPT2   011506          2448#  2450
TYPT3   011542          2454   2457#
T0      003342          1389#  1399
T0A     003344          1390#  1397
T0B     003362          1392   1396#
T1      003412          1406#  1415
T1A     003414          1407#  1413
T1B     003432          1409   1412#
T2      003462          1424#  1447
T2A     003464          1425#  1431
T2B     003502          1427   1430#
T2C     003506          1432#  1438
T2D     003526          1434   1437#
T2E     003532          1439#  1445
T2F     003546          1441   1443#
T3      003600          1455#  1479
T3A     003602          1456#  1462
T3B     003620          1458   1461#
T3C     003624          1464#  1470
T3D     003642          1466   1468#
T3E     003650          1471#  1477
T3F     003664          1473   1475#
T4      003740          1488   1491#
```

```
T4A     003742  1492#  1548
T4B     003744  1493#  1497
T4C     003770  1499#  1513
T4D     003772  1500#  1508
T4E     004024  1502   1507#
T4F     004040  1511#  1515
T4G     004056  1510   1518#
T4H     004060  1519#  1525
T4J     004076  1521   1523#
T4K     004104  1526#  1544
T4L     004106  1527#  1541
T4M     004160  1534   1537#
T4N     004172  1529   1531   1540#
T4P     004176  1542#  1546
T5      004240  1557#  1601
T5A     004264  1560   1562#
T5B     004276  1564#
T5C     004306  1566#  1573
T5D     004336  1568   1572#
T5E     004344  1575#  1587   1599
T5F     004406  1580   1583#
T5FLAG  004506  1557*  1603#  1633*  1695  1740
T5G     004420  1577   1586#
T5H     004436  1589   1591#
T5INC   004510  1562*  1570   1604#
T5J     004440  1592#  1597
T5K     004460  1594   1596#
USSTST  001604  1109#  1112
USS.OK  001622  1110   1114#
VALID   002220  1189   1195#
VAL1    002236  1198#  1201
VAL2    002250  1199   1202#
VAL3    002264  1203   1206#
VAL4    002270  1193   1205   1207#
WAITK   011654  2481#  2599
WAITKY= 104400  1178   1218   1240  1251  1261  1277  1293  1305  1321  2562  2615#
WBUF    000532   985#  1751   1926  2083  2160  2315
WRCHEK  000602  1008#  1619   1709  1762  1824*  1894  1896  1906
WRITI   005254  1727#  2600
WRITIT= 104402  1393   1410   1428  1459  1504  1558  2616#
WRPASS  000574  1005#  1743*  1758  1760  1764*  1767  1788  1822  1834*  1835  1841*  2305*  2324*
                2328*
WRRECR  000626  1019#  1494*  1503  1505*  1739*  2346  2351
WRTDMP  006242  1865#
WRTD1   006442  1898#  1907
WRTD2   006464  1900   1905#
WRTLEN  000640  1024#  1735*  1749  1804*  1805  1807  1809*  1829  2313  2333
W1      005322  1732   1735#
W10     005550  1771   1775#
W11     005622  1779   1788#  1844
W12     005656  1792   1796#
XRGRCD  010626  2307   2324#  2327
XRGREC  010514  1840   2305#  2338
XRG0    010522  2306#  2329
XRG5    010634  2323   2326#
ZERO    011636  2446*  2463   2465*  2473#
```

```
$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*
$ZERO$  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)
```