TS03,TU10 TM A B 11 INSTR TST AH 9395I MC
CZTMAIO FICHE 1 OF 1

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IDENTIFICATION

PRODUCT CODE: AC-9393I-MC

PRODUCT TITLE: CZTMAI0 TM,A,B-11 INSTR TST

PROGRAM DATE: SEPTEMBER 1979

MAINTAINER: DIAGNOSTIC ENGINEERING

AUTHOR: JOHN RODENHISER

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40
41                              1.      ABSTRACT
42
43                                      THE TM,A,,B-11 INSTRUCTION TEST CONTAINS A SERIES OF BASIC TESTS
44                                      THAT CHECK  REGISTERS FOR PROPER OPERATION WHILE NOT INVOLVING
45                                      TAPE MOTION, ALL TAPE MOTION FUNCTIONS, DATA TRANSFERS, EXTENDED
46                                      MEMORY, AND MANUAL INTERVENTION TESTS OF THE TU10 OR TS03 TRANSPORTS.
47                                      ***MANUAL INTERVENTION TESTS ARE SKIPPED IN CHAIN MODE***
48
49                              2.      REQUIREMENTS
50
51                              2.1     EQUIPMENT
52
53                                      PDP-11 WITH TM,A.B-11 CONTROL UNIT AND 1 TS03,TU10,N,W TAPE UNIT.
54
55                              2.2     STORAGE
56
57                              2.2.1   PROGRAM STORAGE
58
59                                      THE ROUTINE REQUIRES 4K OF MEMORY.
60
61                              3.      LOADING PROCEDURE
62
63                              3.1     METHOD
64
65                                      A. PROCEDURE FOR NORMAL BINARY TAPES SHOULD BE FOLLOWED.
66
67                                      B. PROGRAM IS LOADABLE AND CHAINABLE IN 8K OF MEMORY.
68
69                              4.      STARTING PROCEDURE
70
71                              4.1     CONTROL SWITCH SETTINGS
72
73                                      STARTING AT LOC. 200 ALL SWITCHES SHOULD BE DOWN OR ZERO.
74                                      ***SOFTWARE SWITCH REGISTER IS LOCATED AT LOC. 176 IF NEEDED.***
75
76                              4.2     STARTING ADDRESS
77
78                                      200
79
80                              4.3     PROGRAM AND/OR OPERATOR ACTION
81
82                                      1. LOAD PROGRAM INTO MEMORY.
83                                      2. PLACE ONE TAPE UNIT, ON-LINE, AT LOAD POINT (BOT),WRITE ENABLED, UNIT 0 SELEC
84                                      3. LOAD STARTING ADDRESS
85                                      4. START PROGRAM
86                                      PROGRAM WILL TYPE "SET SW0=1 IF 7 CHANNEL".(IF NOT CHAIN MODE)
87                                      CHAIN MODE DEFAULT IS DRIVE 0 9TRK ONLY.
88                                      IF APPROPRIATE SET SW0  AND THEN PRESS CONTINUE OR
89                                      ***IF SOFTWARE SWITCH REGISTER IS USED TYPE CNTL G AND THEN CONTINUE
90                                         -THIS WILL ALLOW THE MODIFICATION OF THE SOFTWARE SWITCH REGISTER (REFER TO S
91                                      THE PROGRAM WILL BEGIN TESTING.
```

5. OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

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

CONTROL:

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

1) TYPE CONTROL G <^G>; THIS WILL ALLOW THE TTY TO ENTER DATA INTO LOC. 176 AT SELECTED POINTS WITHIN THE PROGRAM.

2) THE MACHINE WILL THEN TYPE: SWR=XXXXXXNEW= (XXXXXX IS THE OCTAL CONTENTS OF THE SOFTWARE SWITCH REGISTER.)

3) AFTER THE ''NEW='' HAS BEEN TYPED THEN THE OPERATOR CAN DO ONE OF THE FOLLOWING AT THE TTY:

A) TYPE A NUMBER TO BE LOADED INTO LOC. 176 FOLLOWED BY A <CR>. (ONLY NUMBERS BETWEEN 0-7 WILL BE ACCEPTED AND ONLY 6 NUMBERS WILL BE ALLOWED)
IF A <CR> IS THE FIRST KEY DEPRESSED THE SOFTWARE SWITCH REGISTER CONTENTS WILL NOT BE CHANGED.

B) IF A CONTROL U <^U> IS DEPRESSED THEN THE PROGRAM WILL SEND YOU BACK TO STEP 2.

```
129
130                         5.1.1   WITH ALL SWITCHES DOWN THE PROGRAM WILL PRINT OUT ON ERRORS AND
131                                 CONTINUE IN TEST.  (END OF PASS WILL PRINT ON EACH PASS)
132
133                         5.1.2   SWITCH SETTINGS ARE:
134
135                                 SW15 (100000) = 1 OR UP ... HALT ON ERROR
136                                 SW14 (040000) = 1 OR UP ... SCOPE LOOP
137                                 SW13 (020000) = 1 OR UP ... INHIBIT PRINTOUT.
138                                 SW12 (010000) = 1 OR UP ... INHIBIT SUB-TEST INTERATION.
139                                 SW11 (004000) = 1 OR UP ... SINGLE PASS
140                                 SW10 (002000) = 1 OR UP ... INHIBIT MANUAL INTERVENTION TEST
141                                 SW9  (001000) = 1 OR UP ... FOR TS03 TAPE DRIVES
142                                 SW0  (000001) = 1 OR UP ... TEST 7 CHANNEL TAPE UNIT.
143
144                         5.1.3   MANUAL INTERVENTION TEST
145
146                                 THIS TEST WILL REQUIRE THE OPERATOR TO PERFORM CERTAIN OPERATIONS
147                                 WITH THE TRANSPORT AS DIRECTED BY MESSAGES PRINTED ON THE
148                                 TELETYPE.
149
150                         5.2     SUBROUTINE ABSTRACTS
151
152                         5.2.1   SCOPE
153
154                                 THIS SUBROUTINE CALL IS PLACED BETWEEN EACH SUB-TEST IN THE INSTRUCTION
155                                 SECTION.  IT RECORDS THE STARTING ADDRESS OF EACH SUB-TEST AS IT IS
156                                 BEING ENTERED.  IF A SCOPE LOOP IS REQUESTED, IT WILL JUMP TO THE
157                                 START OF THE SUB-TEST THAT THE SCOPE LOOP IS REQUESTING.
158                                 ***CNTL G WILL BE RECOGNIZED IN THIS ROUTINE (REFER TO SECT 5.1)
159
160                         5.2.2   HLT
161
162                                 THIS SUBROUTINE CALL PRINTS THE ADDRESS THAT TAGS THE FAILING
163                                 SUBTEST AND THE CONTENTS OF ALL THE TM,A,B-11 REGISTERS.
164                                 ***THIS ROUTINE RECOGNIZES CNTL G  FUNCTION (REFER TO SECT. 5.1)
```

F 1

6.0 ERRORS

6.1 ERROR PRINTOUT FORMAT

WITH SW13=0 (OR DOWN) THE FOLLOWING PRINTOUT WILL APPEAR ON AN ERROR:

```
  PC    STATUS  COMAND  BYTE   CA     DATA B  READ L  TEMP   CRC CAL
XXXXXX  XXXXXX  XXXXXX XXXXXX XXXXXX  XXXXXX  XXXXXX  XXXXXX XXXXXX
```

```
PC       =      ADDRESS OF TEST WHERE ERROR OCCURED
STATUS   =      CONTENTS OF STATUS REGISTER AT TIME OF ERROR
COMAND   =      CONTENTS OF COMMAND REGISTER AT TIME OF ERROR
BYTE     =      CONTENTS OF BYTE COUNTER AT TIME OF ERROR
CA       =      CONTENTS OF CURRENT MEMORY ADDRESS AT TIME OF ERROR
DATA B   =      CONTENTS OF DATA BUFFER AT TIME OF ERROR
READ L   =      CONTENTS OF READ LINES AT TIME OF ERROR
TEMP     =      CONTENTS OF ADDRESS "TEMP" USED BY SOME TESTS
CRC CAL  =      CRC CHARACTER CALCULATED (USEFUL ONLY FOR CRC TEST)
```

NOTE THAT NOT ALL OF THE INFORMATION PRINTED IS INTENDED TO BE USEFUL FOR EVERY TYPE OF ERROR. THIS IS SIMPLY A STANDARD ERROR REPORT FOR ALL ERRORS. THE OPERATOR MUST REFER TO THE PROGRAM LISTING AT THE ADDRESS OF THE ERROR FOR A DESCRIPTION OF THE CAUSE OF THE ERROR. IT IS THEN UP TO HIM TO DETERMINE WHICH OF THE INFORMATION IS USEFUL.

6.2 ERROR RECOVERY

WITH SW15=1 OR UP THE PROGRAM WILL HALT ON AN ERROR. DEPRESS CONTINUE SWITCH TO RESTART TEST.

```
198
199
200
201                             7.      RESTRICTIONS
202
203                             7.1     STARTING RESTRICTION
204
205                                     BEFORE STARTING PROGRAM THE OPERATOR MUST MAKE CERTAIN THAT THE
206                                     TRANSPORT HAS DRIVE 0 SELECTED ''ON-LINE''.
207
208                             7.2     OPERATIONAL RESTRICTIONS
209
210                                     MANUAL INTERVENTION TEST MUST BE PERFORMED ON EACH PASS THRU
211                                     THE PROGRAM UNLESS INHIBITED WITH SW10=1 (OR UP).
212                                     IF UNIT IS A TS03 SW9 MUST BE 1 (OR UP).
213
214                             8.0     MISCELLANEOUS
215
216                             8.1     EXECUTION TIME
217
218                                     WITH MANUAL INTERVENTION TEST INHIBITED IT TAKES 1 MINUTE
219                                     FOR ONE PASS THRU PROGRAM.  MANUAL INTERVENTION TEST IS
220                                     OPERATOR DEPENDENT BUT SHOULD TAKE APPROXIMATELY 2 MINUTES.
221                                     NOTE: A PDP11/10 TAKES ABOUT 3.5 MINUTES INSTEAD OF 1 MIN.
222
223                             9.0     PROGRAM DESCRIPTION
224
225                             10.0    LISTING
226                             %
227
228
229
230
231
232                     .TITLE CZTMAI0 TM,A,B-11 INSTR TST
233                     ;COPYRIGHT 1971,1979 DIGITAL EQUIPMENT CORP., MAYNARD, MASS.  01754
234                     ;JOHN RODENHISER
235                     ;REVISED AUGUST 1972, JIM LACEY
236                     ;REVISED MARCH 1973, JIM KAPADIA
237                     ;REVISED JANUARY 1975, KEN LIND
238                     ;REVISED AUG 1975, R. B. BARNES
239                     ;REVISED MAR 1976, S. K. CARPENTER - SUPPORT SOFTWARE SWITCH REGISTER
240                     ;REVISED AUG 1976, R. SOLER - INCLUDE TU10W,N
241                     ;       (A) MODIFIED TO SUPPORT SOFTWARE SWITCH REGISTER
242                     ;       (B) ALSO SUPPORTS THE DYNAMIC LOADING OF THE SOFTWARE SWITCH REGISTER FROM TTY
243                     ;               BY PRESSING A CNTL G
244                     ;       (C) PROGRAM WILL ALLOW THE LOADING OF THE SOFTWARE SWITCH REGISTER AT START
245                     ;               IF NO HARDWARE SWITCH REGISTER IS AVAILABLE OR IF THE
246                     ;               HARDWARE SWITCH REGISTER CONTAINS ALL 1'S.
247                     ;REVISED SEPT 1979, LEN LORANGER
248                     ;       CHGI1 - INSTALLED DEPO PATCH TO CHANGE ERROR BIT
249                     ;               TEST FROM 100 TO 177701.
250                     ;       CHGI2 - INSTALLED DEPO PATCH TO CHANGE NON-EXISTANT
251                     ;               MEMORY ADDRESS FROM 173000 TO 176000.
252                     ;       CHGI3 - DELETED DIRECT MEMORY REFERENCE AND MADE
253                     ;               INDIRECT MEMORY REFERENCE.
```

```
                                        .ENABL  ABS,AMA
            000000                      .=0
000000      000000  000000              .WORD   0,0     ;CATCH IMPROPERLY LOADED VECTORS
                                ;TRAP CATCHER 0-776
            000030                      .=30
000030      014106                      TRAP30
000032      000340                      340
            000034                      .=34
000034      013404                      SCOPEC
000036      000340                      340
            014106                      EMT=TRAP30
            177776                      CC=177776
            000240                      NOP=240
            104400                      SCOPE=TRAP
            000776                      BUFF=776
            000000                      R0=%0
            000001                      R1=%1
            000002                      R2=%2
            000003                      R3=%3
            000004                      R4=%4
            000005                      R5=%5
            000006                      SP=%6
            000007                      PC=%7
```

```
                        ;*****************************************************************************
                        ;THIS PROGRAM SUPPORTS SOFTWARE SWITCH REGISTER WHICH IS LOCATED AT LOC. 176

                                ;BEFORE STARTING REFER TO SECTION 5.1 IN DOCUMENIT



                        ;*****************************************************************************
                        ;
                        .SBTTL  ACT11 HOOKS

                        ;;*****************************************************************
                        ;HOOKS REQUIRED BY ACT11
                                $SVPC=.                 ;SAVE PC
                                .=46
                                $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
                                .=52
                                .WORD   0               ;;2)SET LOC.52 TO ZERO
                                .=$SVPC                 ;; RESTORE PC
                                .=176
                                SWREG:  .WORD   2000    ;SOFTWARE SWITCH REGISTER(9TRK=2000/7TRK=2001)
                                .=200
                                JMP     START
                                .=1000
                        MTV:    224                             ;INTERRUPT VECTOR
                        MTVS:   226                             ;INTERRUPT STATUS
                        MTS:    172520                          ;STATUS REGISTER
                        MTC:    172522                          ;COMMAND REGISTER
                        BC:     172524                          ;BYTE COUNT
                        CA:     172526                          ;CURRENT MEMORY ADDRESS
                        MTD:    172530                          ;DATA BUFFER
                        MTRD:   172532                          ;READ LINES
                        TPB:    177566
                        TPS:    177564
                        SWR:    177570
                        TKS:    177560
                        TKB:    177562
                        TEMP:   0
                        ICOUNT: 0
                        PCNTR:  0               ;PASS COUNTER
```

```
                                        ;PROGRAM START**********
001040  012706  000776          START:  MOV     #BUFF,SP
001044  012737  177570  001024          MOV     #177570,SWR             ;PRESET TO CONSOLE SWITCHES
001052  005037  001036                  CLR     PCNTR                   ;CLEAR PASS COUNTER
001056  122737  000004  000041          CMPB    #4,@#41         ;SEE IF LOAD MEDIUM
001064  001006                          BNE     SUSWR                   ;IF NOT: BR
001066  012702  017117                  MOV     #MSG21,R2
001072  004737  013462                  JSR     PC,TOP                  ;PRINT NO TEST
001076  000137  012672                  JMP     TSTEND                  ;END TEST
001102  013746  000006          SUSWR:  MOV     @#6,-(SP)               ;SAVE VECTORS
001106  013746  000004                  MOV     @#4,-(SP)
001112  012737  001140  000004          MOV     #1$,@#4                 ;SET UP FOR TIMEOUT
001120  022777  177777  177676          CMP     #-1,@SWR                ;REFERENCE HARDWARE SWITCH REGISTER
001126  001405                          BEQ     2$
001130  005737  000042                  TST     @#42
001134  001002                          BNE     2$                      ;IF CHAIN MODE: BR
001136  000404                          BR      3$
001140  022626                  1$:     CMP     (SP)+,(SP)+             ;ADJUST STACK
001142  012737  000176  001024  2$:     MOV     #SWREG,SWR              ;POINT TO SOFTWARE SWITCH REG
001150  012637  000004          3$:     MOV     (SP)+,@#4               ;RESTORE VECTORS
001154  012637  000006                  MOV     (SP)+,@#6
001160  012702  014204                  MOV     #MSG0,R2
001164  004737  013462                  JSR     PC,TOP
001170  005002                          CLR     R2
001172  005302                  4$:     DEC     R2                      ;DELAY
001174  001376                          BNE     4$
001176  005737  000042                  TST     @#42                    ;SEE IF CHAIN MODE
001202  001006                          BNE     BEGIN                   ;IF SO: BR
001204  012702  014242                  MOV     #MSG01,R2
001210  004737  013462                  JSR     PC,TOP                  ;PRINT 7 TRK SELECT
001214  000000                          HALT
001216  104002                          CKSWR                           ;CHECK FOR A CNTL G
001220  012706  000776          BEGIN:  MOV     #BUFF,SP                ;SET UP STACK FOR SCOPE LOOPS
001224  012737  001220  013460          MOV     #BEGIN,RETURN           ;SET UP RESTART OF PROGRAM
001232  005037  013200                  CLR     PRINT1                  ;INITIALIZE ERROR PRINTOUT HEADING
001236  005037  011244                  CLR     CRCWRT                  ;INITIALIZE CRC CALCULATED FOR PRINTOUT
001242  005037  000006                  CLR     6                       ;INITIALIZE ERROR TRAP VECTOR


                                        ;*************************************************************************
                                        ;TEST ALL BITS OF COMMAND REGISTER (EXCEPT CU READY, BIT 7) TO BE CLEARED BY INIT
001246  104400                          SCOPE
001250  000005                          RESET
001252  032777  177577  177526          BIT     #177577,@MTC
001260  001401                          BEQ     .+4
001262  104000                          HLT                     ;ERROR, INIT DIDN'T CLEAR COMMAND REGISTER


                                        ;*************************************************************************
                                        ;TEST BITS 7-13, 15 OF STATUS REGISTER TO BE CLEARED AFTER INIT
001264  104400                          SCOPE
001266  000005                          RESET
001270  032777  137600  177506          BIT     #137600,@MTS
```

```
001276  001401                  BEQ     .+4
001300  104000                  HLT                     ;ERROR, INIT DIDN'T CLEAR PROPER BITS IN STATUS REGISTER


                        ;*************************************************************************
                        ;TEST INIT TO CLEAR BYTE RECORD COUNT
001302  104400                  SCOPE
001304  000005                  RESET
001306  005777  177476          TST     @BC
001312  001401                  BEQ     .+4
001314  104000                  HLT                     ;ERROR, INIT DIDN'T CLEAR BYTE COUNT


                        ;*************************************************************************
                        ;TEST INIT TO CLEAR CURRENT MEMORY ADDRESS REGISTER
001316  104400                  SCOPE
001320  000005                  RESET
001322  005777  177464          TST     @CA
001326  001401                  BEQ     .+4
001330  104000                  HLT                     ;ERROR, INIT DIDN'T CLEAR CURRENT MEMORY ADDRESS REGISTE


                        ;*************************************************************************
                        ;TEST INIT TO CLEAR DATA BUFFER
001332  104400                  SCOPE
001334  000005                  RESET
001336  005777  177452          TST     @MTD
001342  001401                  BEQ     .+4
001344  104000                  HLT                     ;ERROR, INIT DIDN'T CLEAR DATA BUFFER


                        ;*************************************************************************
                        ;TEST CU READY (BIT 7 COMMAND REGISTER) TO BE SET BY INIT.
001346  104400                  SCOPE
001350  000005                  RESET
001352  105777  177430          TSTB    @MTC
001356  100401                  BMI     .+4
001360  104000                  HLT                     ;ERROR, INIT DIDN'T SET CU READY


                        ;*************************************************************************
                        ;TEST BIT 14 OF TU10 READ LINES TO BE CLEARED BY INIT
001362  104400                  SCOPE
001364  000005                  RESET
001366  032777  040000  177422  BIT     #40000,@MTRD
001374  001401                  BEQ     .+4
001376  104000                  HLT                     ;ERROR, INIT FAILED TO CLEAR BIT 14 OF MTRD


                        ;*************************************************************************
                        ;TEST COMMAND REGISTER (EXCEPT CU READY, BIT 7) TO BE CLEARED BY POWER CLEAR (BIT 12)
001400  104400                  SCOPE
001402  052777  010000  177376  BIS     #10000,@MTC             ;POWER CLEAR
001410  032777  177577  177370  BIT     #177577,@MTC
001416  001401                  BEQ     .+4
001420  104000                  HLT                     ;ERROR, POWER CLEAR DIDN'T CLEAR COMMAND REGISTER
```

```
                                ;*****************************************************************************
                                ;TEST BITS 7-13, 15 OF STATUS REGISTER TO BE CLEARED BY POWER CLEAR (BIT12)
001422  104400                          SCOPE
001424  052777  010000  177354          BIS     #10000,@MTC             ;POWER CLEAR
001432  032777  137600  177344          BIT     #137600,@MTS
001440  001401                          BEQ     .+4
001442  104000                          HLT                     ;ERROR, POWER CLEAR DIDN'T CLEAR PROPER BITS IN STATUS

                                ;*****************************************************************************
                                ;TEST POWER CLEAR (BIT 12) TO CLEAR BYTE RECORD COUNT
001444  104400                          SCOPE
001446  052777  010000  177332          BIS     #10000,@MTC             ;POWER CLEAR
001454  005777  177330                  TST     @BC
001460  001401                          BEQ     .+4
001462  104000                          HLT                     ;ERROR, POWER CLEAR DIDN'T CLEAR BYTE COUNT

                                ;*****************************************************************************
                                ;TEST POWER CLEAR (BIT 12) TO CLEAR CURRENT MEMORY ADDRESS REGISTER
001464  104400                          SCOPE
001466  052777  010000  177312          BIS     #10000,@MTC             ;POWER CLEAR
001474  005777  177312                  TST     @CA
001500  001401                          BEQ     .+4
001502  104000                          HLT                     ;ERROR, POWER CLEAR DIDN'T CLEAR CURRENT ADDRESS REGISTE

                                ;*****************************************************************************
                                ;TEST POWER CLEAR (BIT 12) TO CLEAR DATA BUFFER
001504  104400                          SCOPE
001506  052777  010000  177272          BIS     #10000,@MTC             ;POWER CLEAR
001514  005777  177274                  TST     @MTD
001520  001401                          BEQ     .+4
001522  104000                          HLT                     ;ERROR, POWER CLEAR DIDN'T CLEAR DATA BUFFER

                                ;*****************************************************************************
                                ;TEST CU READY (BIT 7 COMMAND REGISTER) TO BE SET BY POWER CLEAR
001524  104400                          SCOPE
001526  052777  010000  177252          BIS     #10000,@MTC             ;POWER CLEAR
001534  105777  177246                  TSTB    @MTC
001540  100401                          BMI     .+4
001542  104000                          HLT                     ;ERROR, POWER CLEAR DIDN'T SET CU READY

                                ;*****************************************************************************
                                ;TEST BIT 14 OF TU10 READ LINES TO BE CLEARED BY POWER CLEAR (BIT12)
001544  104400                          SCOPE
001546  052777  010000  177232          BIS     #10000,@MTC             ;POWER CLEAR
001554  032777  040000  177234          BIT     #40000,@MTRD
001562  001401                          BEQ     .+4
001564  104000                          HLT                     ;ERROR, POWER CLEAR FAILED TO CLEAR BIT14 OF MTRD
```

```
                                ;*****************************************************************************
                                ;TEST FUNCTION BITS (1,2,3) OF COMMAND REGISTER CAN BE SET
001566  104400                          SCOPE
001570  012777  000016  177210          MOV     #16,@MTC
001576  122777  000216  177202          CMPB    #216,@MTC
001604  001401                          BEQ     .+4
001606  104000                          HLT                     ;ERROR, CU READY AND ALL FUNCTION BITS NOT SET

                                ;*****************************************************************************
                                ;TEST FUNCTION BITS (1,2,3) OF COMMAND REGISTER CAN BE CLEARED
001610  104400                          SCOPE
001612  052777  000016  177166          BIS     #16,@MTC
001620  042777  000016  177160          BIC     #16,@MTC
001626  032777  000016  177152          BIT     #16,@MTC
001634  001401                          BEQ     .+4
001636  104000                          HLT                     ;ERROR, ALL FUNCTION BITS NOT CLEARED

                                ;*****************************************************************************
                                ;TEST FUNCTIONS BITS (1,2,3,) OF COMMAND REGISTER CAN BE SET AND CLEARED INDIVIDUALLY
001640  104400                          SCOPE
001642  012777  000002  177136          MOV     #2,@MTC
001650  122777  000202  177130          CMPB    #202,@MTC
001656  001401                          BEQ     .+4
001660  104000                          HLT                     ;ERROR, FUNCTION NOT =001 (READ)
001662  104400                          SCOPE
001664  012777  000004  177114          MOV     #4,@MTC
001672  122777  000204  177106          CMPB    #204,@MTC
001700  001401                          BEQ     .+4
001702  104000                          HLT                     ;ERROR, FUNCTION NOT =010 (WRITE)
001704  104400                          SCOPE
001706  012777  000006  177072          MOV     #6,@MTC
001714  122777  000206  177064          CMPB    #206,@MTC
001722  001401                          BEQ     .+4
001724  104000                          HLT                     ;ERROR, FUNCTION NOT =011 (WRITE EOF)
001726  104400                          SCOPE
001730  012777  000010  177050          MOV     #10,@MTC
001736  122777  000210  177042          CMPB    #210,@MTC
001744  001401                          BEQ     .+4
001746  104000                          HLT                     ;ERROR, FUNCTION NOT =100 (SPACE FORWARD)
001750  104400                          SCOPE
001752  012777  000012  177026          MOV     #12,@MTC
001760  122777  000212  177020          CMPB    #212,@MTC
001766  001401                          BEQ     .+4
001770  104000                          HLT                     ;ERROR, FUNCTION NOT =101 (SPACE REVERSE)
001772  104400                          SCOPE
001774  012777  000014  177004          MOV     #14,@MTC
002002  122777  000214  176776          CMPB    #214,@MTC
002010  001401                          BEQ     .+4
002012  104000                          HLT                     ;ERROR, FUNCTION NOT =110 (WRITE XIRG)
002014  104400                          SCOPE
002016  012777  000016  176762          MOV     #16,@MTC
002024  122777  000216  176754          CMPB    #216,@MTC
```

```
                        BEQ     .+4             ;ERROR, FUNCTION NOT =111 (REWIND)
002034  104000          HLT


                ;*****************************************************************************
                ;TEST ADDRESS BITS (4,5) OF COMMAND REGISTER CAN BE SET
002036  104400          SCOPE
002040  012777  000060  176740  MOV     #60,@MTC
002046  122777  000260  176732  CMPB    #260,@MTC
002054  001401          BEQ     .+4
002056  104000          HLT                     ;ERROR, CU READY AND ADDRESS BITS NOT SET


                ;*****************************************************************************
                ;TEST ADDRESS BITS (4,5) OF COMMAND REGISTER CAN BE CLEARED
002060  104400          SCOPE
002062  052777  000060  176716  BIS     #60,@MTC
002070  042777  000060  176710  BIC     #60,@MTC
002076  032777  000060  176702  BIT     #60,@MTC
002104  001401          BEQ     .+4
002106  104000          HLT                     ;ERROR, ADDRESS BITS NOT CLEARED


                ;*****************************************************************************
                ;CHECK BYTE LOADING OF COMMAND REGISTER
                ;THIS 1ST SECTION WILL TEST THAT THE FUNCTION BITS CAN BE BYTE LOADED
002110  104400          SCOPE
002112          CHGI3:
002112  012700  000002  CHKBYTE:MOV     #2,R0           ;INITIALIZE R0
002116  005077  176664          CLR     @MTC            ;CLEAR OUT COMMAND REGISTER
002122  110077  176660  1$:     MOVB    R0,@MTC         ;LOAD LOWER BYTE OF COMMAND REGISTER
002126  017701  176654          MOV     @MTC,R1         ;GET THE CONTENTS OF THE COMMAND
                                                        ;REGISTER JUST LOADED
002132  042701  000200          BIC     #200,R1         ;MASK OUT READY BIT FOR COMPARE
002136  020100                  CMP     R1,R0           ;DID IT LOAD PROPERLY?
002140  001416                  BEQ     2$              ;BRANCH IF YES
002142  010037  002336          MOV     R0,@#EXPECTED   ;STORE WHAT SHOULD HAVE APPEARED IN
                                                        ;THE COMMAND REGISTER
002146  062737  000200  002336  ADD     #200,@#EXPECTED ;ADD A READY BIT TO WHAT WAS BYTE LOADED
002154  017737  176626  002340  MOV     @MTC,@#RECEIVED ;STORE WHAT DID APPEAR IN THE
                                                        ;COMMAND REGISTER
002162  012702  016441          MOV     #MSG14,R2       ;INDICATE INCORRECT BYTE LOAD
002166  004737  013462          JSR     PC,TOP
002172  104000                  HLT                     ;PROGRAM PC INDICATOR
                        ;AT THIS POINT LOCATIONS 6$ AND 7$ BELOW WILL CONTAIN THE GOOD
                        ;AND BAD DATA, RESPECTIVELY
002174  000410                  BR      3$              ;GO TO START LOADING THE UPPER BYTE OF
                                                        ;THE COMMAND REGISTER
002176  062700  000002  2$:     ADD     #2,R0           ;STEP UP VALUE TO BE BYTE LOADED
002202  022700  000016          CMP     #16,R0          ;OK TO LOAD IT?
002206  100403                  BMI     3$              ;BRANCH IF NO
002210  005077  176572          CLR     @MTC            ;CLEAR OUT THE COMMAND REGISTER
002214  000742                  BR      1$              ;GO BACK TO LOAD NEW VALUE
                        ;THIS 2ND SECTION WILL TEST THAT ALL UPPER BYTE DATA COMBINATIONS
                        ;CAN BE BYTE LOADED EXCEPT FOR THOSE REQUIRING BIT12 (POWER CLEAR)
```

```
                                        ;TO BE SET
002216  005000                  3$:     CLR     R0              ;INITIALIZE R0
002220  005077  176562                  CLR     @#MTC           ;CLEAR OUT COMMAND REGISTER
002224  010003                  4$:     MOV     R0,R3           ;SAVE INITIAL VALUE TO BE BYTE LOADED
002226  042700  000020                  BIC     #20,R0          ;MASK OUT POWER CLEAR BIT OF BYTE
                                                                ;TO BE LOADED
                                        ;********** CHGI3 **********
002232  013701  001006                  MOV     @#MTC,R1        ;SET UP FOR COM REG UPPER BYTE
002236  110061  000001                  MOVB    R0,1(R1)        ;LOAD UPPER BYTE OF COMMAND REGISTER
                                        ;*******************************
002242  000300                          SWAB    R0              ;MOVE LOWER BYTE INTO UPPER BYTE
                                                                ;POSITION FOR CHECKING
002244  017701  176536                  MOV     @#MTC,R1        ;GET THE CONTENTS OF THE COMMAND
                                                                ;REGISTER JUST LOADED
002250  042701  000200                  BIC     #200,R1         ;MASK OUT READY BIT FOR COMPARE
002254  020100                          CMP     R1,R0           ;DID IT LOAD PROPERLY?
002256  001417                          BEQ     5$              ;BRANCH IF YES
002260  010037  002342                  MOV     R0,@#GOODDATA   ;STORE WHAT SHOULD HAVE APPEARED IN THE
                                                                ;COMMAND REGISTER
002264  062737  000200  002342          ADD     #200,@#GOODDATA ;ADD A READY BIT TO WHAT WAS BYTE LOADED
002272  017737  176510  002344          MOV     @#MTC,@#BADDATA ;STORE WHAT DID APPEAR IN THE COMMAND
                                                                ;REGISTER
002300  012702  016552                  MOV     #MSG15,R2       ;INDICATE INCORRECT BYTE LOAD
002304  004737  013462                  JSR     PC,TOP
002310  104000                          HLT                     ;PROGRAM PC INDICATOR
                                        ;AT THIS POINT LOCATIONS 10$ AND 11$ BELOW WILL CONTAIN THE GOOD
                                        ;AND BAD DATA, RESPECTIVELY
002312  000137  002346                  JMP     @#BYTEOPEND     ;ALL DONE
002316  010300                  5$:     MOV     R3,R0           ;OBTAIN INITIAL VALUE (LESS MASKING OF
                                                                ;POWER CLEAR BIT) THAT WAS TO BE BYTE
                                                                ;LOADED
002320  005200                          INC     R0              ;STEP UP VALUE TO BE BYTE LOADED
002322  022700  000157                  CMP     #157,R0         ;OK TO LOAD IT?
002326  100407                          BMI     BYTEOPEND       ;BRANCH IF NO
002330  005077  176452                  CLR     @#MTC           ;CLEAR OUT THE COMMAND REGISTER
002334  000733                          BR      4$              ;GO BACK TO LOAD NEW VALUE
                                        ;THE FOLLOWING ARE THE GOOD AND BAD DATA HOLDERS FOR THE LOWER
                                        ;AND UPPER BYTE LOAD TESTS PERFORMED ABOVE
002336                          6$:
002336  000000                          EXPECTED:       .WORD   0       ;HOLDS VALUE THAT SHOULD HAVE
                                                                        ;APPEARED IN THE COMMAND REGISTER
                                                                        ;ON LOW BYTE LOADING
002340                          7$:
002340  000000                          RECEIVED:       .WORD   0       ;HOLDS VALUE THAT DID APPEAR IN
                                                                        ;THE COMMAND REGISTER ON LOW
                                                                        ;BYTE LOADING
002342                          10$:
002342  000000                          GOODDATA:       .WORD   0       ;HOLDS VALUE THAT SHOULD HAVE
                                                                        ;APPEARED IN THE COMMAND REGISTER
                                                                        ;ON UPPER BYTE LOADING
002344                          11$:
002344  000000                          BADDATA:        .WORD   0       ;HOLDS VALUE THAT DID APPEAR IN
                                                                        ;THE COMMAND REGISTER ON UPPER
                                                                        ;BYTE LOADING
002346  005077  176434          BYTEOPEND:      CLR     @#MTC           ;CLEAR OUT COMMAND REGISTER BEFORE GOING ON
```

```
                                ;*************************************************************************
                                ;TEST ADDRESS BITS (4,5,6) OF COMMAND REGISTER CAN BE SET AND CLEARED INDIVIDUALLY
002352  104400                          SCOPE
002354  012777  000020  176424          MOV     #20,@MTC
002362  122777  000220  176416          CMPB    #220,@MTC
002370  001401                          BEQ     .+4
002372  104000                          HLT                     ;ERROR ADDRESS BITS NOT =01
002374  104400                          SCOPE
002376  012777  000040  176402          MOV     #40,@MTC
002404  122777  000240  176374          CMPB    #240,@MTC
002412  001401                          BEQ     .+4
002414  104000                          HLT                     ;ERROR, ADDRESS BITS NOT =10
002416  104400                          SCOPE
002420  012777  000060  176360          MOV     #60,@MTC
002426  122777  000260  176352          CMPB    #260,@MTC
002434  001401                          BEQ     .+4
002436  104000                          HLT                     ;ERROR, ADDRESS BITS NOT =11


                                ;*************************************************************************
                                ;TEST UNIT SELECT BITS (8,9,10) OF COMMAND REGISTER CAN BE SET
002440  104400                          SCOPE
002442  012777  003400  176336          MOV     #3400,@MTC
002450  022777  003600  176330          CMP     #3600,@MTC
002456  001401                          BEQ     .+4
002460  104000                          HLT                     ;ERROR, CU READY AND ALL UNIT SELECT BITS NOT SET


                                ;*************************************************************************
                                ;TEST UNIT SELECT BITS (8,9,10) OF COMMAND REGISTER CAN BE CLEARED
002462  104400                          SCOPE
002464  052777  003400  176314          BIS     #3400,@MTC
002472  042777  003400  176306          BIC     #3400,@MTC
002500  032777  003400  176300          BIT     #3400,@MTC
002506  001401                          BEQ     .+4
002510  104000                          HLT                     ;ERROR, UNIT SELECT BITS NOT CLEARED


                                ;*************************************************************************
                                ;TEST UNIT SELECT BITS (8,9,10) OF COMMAND REGISTER CAN BE SET AND CLEARED INDIVIDUALLY
002512  104400                          SCOPE
002514  012777  000400  176264          MOV     #400,@MTC
002522  022777  000600  176256          CMP     #600,@MTC
002530  001401                          BEQ     .+4
002532  104000                          HLT                     ;ERROR, UNIT SELECT NOT =001
002534  104400                          SCOPE
002536  012777  001000  176242          MOV     #1000,@MTC
002544  022777  001200  176234          CMP     #1200,@MTC
002552  001401                          BEQ     .+4
002554  104000                          HLT                     ;ERROR, UNIT SELECT NOT =010
002556  104400                          SCOPE
002560  012777  001400  176220          MOV     #1400,@MTC
002566  022777  001600  176212          CMP     #1600,@MTC
```

```
002574  001401                          BEQ     .+4
002576  104000                          HLT                     ;ERROR, UNIT SELECT NOT =011
002600  104400                          SCOPE
002602  012777  002000  176176          MOV     #2000,@MTC
002610  022777  002200  176170          CMP     #2200,@MTC
002616  001401                          BEQ     .+4
002620  104000                          HLT                     ;ERROR, UNIT SELECT NOT =100

002622  104400                          SCOPE
002624  012777  002400  176154          MOV     #2400,@MTC
002632  022777  002600  176146          CMP     #2600,@MTC
002640  001401                          BEQ     .+4
002642  104000                          HLT                     ;ERROR, UNIT SELECT NOT =101
002644  104400                          SCOPE
002646  012777  003000  176132          MOV     #3000,@MTC
002654  022777  003200  176124          CMP     #3200,@MTC
002662  001401                          BEQ     .+4
002664  104000                          HLT                     ;ERROR, UNIT SELECT NOT =110
002666  104400                          SCOPE
002670  012777  003400  176110          MOV     #3400,@MTC
002676  022777  003600  176102          CMP     #3600,@MTC
002704  001401                          BEQ     .+4
002706  104000                          HLT                     ;ERROR, UNIT SELECT NOT =111


                        ;*******************************************************************************
                        ;TEST PARITY BIT (BIT 11) CAN BE SET
002710  104400                  SCOPE
002712  052777  004000  176066  BIS     #4000,@MTC
002720  032777  004000  176060  BIT     #4000,@MTC
002726  001001                  BNE     .+4
002730  104000                  HLT                     ;ERROR, PARITY NOT SET


                        ;*******************************************************************************
                        ;TEST PARITY BIT (BIT 11) CAN BE CLEARED
002732  104400                  SCOPE
002734  052777  004000  176044  BIS     #4000,@MTC
002742  042777  004000  176036  BIC     #4000,@MTC
002750  032777  004000  176030  BIT     #4000,@MTC
002756  001401                  BEQ     .+4
002760  104000                  HLT                     ;ERROR, PARITY BIT NOT CLEARED


                        ;*******************************************************************************
                        ;TEST DENSITY BITS (13,14) OF COMMAND REGISTER CAN BE SET
002762  104400                  SCOPE
002764  012777  060000  176014  MOV     #60000,@MTC
002772  022777  060200  176006  CMP     #60200,@MTC
003000  001401                  BEQ     .+4
003002  104000                  HLT                     ;ERROR, CU READY AND DENSITY BITS NOT SET
```

```
                        ;*****************************************************************************
                        ;TEST DENSITY BITS (13,14) OF COMMAND REGISTER CAN BE CLEARED
003004  104400                  SCOPE
003006  052777  060000  175772  BIS     #60000,@MTC
003014  042777  060000  175764  BIC     #60000,@MTC
003022  032777  060000  175756  BIT     #60000,@MTC
003030  001401                  BEQ     .+4
003032  104000                  HLT


                        ;*****************************************************************************
                        ;TEST DENSITY BITS (13,14) OF COMMAND REGISTER CAN BE SET AND CLEARED INDIVIDUALLY
003034  104400                  SCOPE
003036  012777  020000  175742  MOV     #20000,@MTC
003044  022777  020200  175734  CMP     #20200,@MTC
003052  001401                  BEQ     .+4
003054  104000                  HLT                     ;ERROR, DENSITY NOT =01
003056  104400                  SCOPE
003060  012777  040000  175720  MOV     #40000,@MTC
003066  022777  040200  175712  CMP     #40200,@MTC
003074  001401                  BEQ     .+4
003076  104000                  HLT                     ;ERROR, DENSITY NOT =10
003100  104400                  SCOPE
003102  012777  060000  175676  MOV     #60000,@MTC
003110  022777  060200  175670  CMP     #60200,@MTC
003116  001401                  BEQ     .+4
003120  104000                  HLT                     ;ERROR DENSITY NOT =11


                        ;*****************************************************************************
                        ;TEST ALL BITS OF BYTE COUNT TO ACCEPT COUNT PATTERN
003122  104400                  SCOPE
003124  005037  001034          CLR     ICOUNT
003130  005037  001032          CLR     TEMP
003134  013777  001032  175646  TBC:    MOV     TEMP,@BC
003142  023777  001032  175640          CMP     TEMP,@BC
003150  001401                  BEQ     .+4
003152  104000                  HLT                     ;ERROR, BYTE COUNT NOT =TEMP
003154  005237  001032          INC     TEMP
003160  001365                  BNE     TBC


                        ;*****************************************************************************
                        ;TEST ALL BITS OF CURRENT MEMORY ADDRESS REGISTER TO ACCEPT COUNT PATTERN
003162  104400                  SCOPE
003164  005037  001034          CLR     ICOUNT
003170  005037  001032          CLR     TEMP
003174  013777  001032  175610  TMA:    MOV     TEMP,@CA
003202  023777  001032  175602          CMP     TEMP,@CA
003210  001401                  BEQ     .+4
003212  104000                  HLT                     ;ERROR, CA NOT = TEMP
003214  005237  001032          INC     TEMP
003220  001365                  BNE     TMA
```

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                        ;*****************************************************************************
                        ;TEST BITS 0-7 OF DATA BUFFER TO ACCEPT COUNT PATTERN
003222  104400                  SCOPE
003224  005037  001034          CLR     ICOUNT
003230  005037  001032          CLR     TEMP
003234  113777  001032  175552  TDB:    MOVB    TEMP,@MTD
003242  123777  001032  175544          CMPB    TEMP,@MTD
003250  001401                  BEQ     .+4
003252  104000                  HLT                     ;ERROR, DATA BUFFER NOT=TEMP
003254  105237  001032          INCB    TEMP
003260  001365                  BNE     TDB


                        ;*****************************************************************************
                        ;TEST BIT 14 OF MTRD CAN BE SET AND CLEARED
003262  104400                  SCOPE
003264  052777  040000  175524          BIS     #40000,@MTRD
003272  032777  040000  175516          BIT     #40000,@MTRD
003300  001001                  BNE     .+4
003302  104000                  HLT                     ;ERROR, BIT 14 OF MTRD NOT=1
003304  042777  040000  175504          BIC     #40000,@MTRD
003312  032777  040000  175476          BIT     #40000,@MTRD
003320  001401                  BEQ     .+4
003322  104000                  HLT                     ;ERROR, BIT 14 OF MTRD NOT=0


                        ;*****************************************************************************
                        ;TEST FOR TAPE UNIT READY (BIT 0) SET
003324  104400                  SCOPE
003326  042777  003400  175452          BIC     #3400,@MTC      ;SELECT DRIVE 0
003334  032777  000001  175442          BIT     #1,@MTS
003342  001001                  BNE     .+4
003344  104000                  HLT                     ;ERROR TU READY NOT SET


                        ;*****************************************************************************
                        ;TEST FOR REWIND STATUS (BIT 1) CLEARED
003346  104400                  SCOPE
003350  032777  000002  175426          BIT     #2,@MTS
003356  001401                  BEQ     .+4
003360  104000                  HLT                     ;ERROR, REWIND STATUS IS SET


                        ;*****************************************************************************
                        ;TEST FOR WRITE LOCK (BIT 2) CLEARED
003362  104400                  SCOPE
003364  032777  000004  175412          BIT     #4,@MTS
003372  001401                  BEQ     .+4
003374  104000                  HLT                     ;ERROR, WRITE LOCK IS SET


                        ;*****************************************************************************
                        ;TEST FOR SETTLEDOWN (BIT 3) CLEARED
```

```
003376  104400                          SCOPE
003400  032777  000010  175376          BIT     #10,@MTS
003406  001401                          BEQ     .+4
003410  104000                          HLT                     ;ERROR, SETTLEDOWN IS SET

                        ;*****************************************************************************
                        ;TEST FOR 7 CHANNEL (BIT 4) CLEARED IF 9 CHANNEL SELECTED
003412  132777  000001  175404          BITB    #1,@SWR         ;IS SW0=1
003420  001007                          BNE     T7CH            ;YES SKIP 9 CHANNEL TEST
003422  104400                          SCOPE
003424  032777  000020  175352          BIT     #20,@MTS
003432  001401                          BEQ     .+4
003434  104000                          HLT                     ;ERROR, 7 CHANNEL SET WITH 9 TRACK DOWN SELECTED
003436  000417                          BR      TSR             ;SKIP 7 CHANNEL TEST

                        ;*****************************************************************************
                        ;TEST FOR 7 CHANNEL (BIT 4) SET IF 7 CHANNEL SELECTED
003440  104400          T7CH:   SCOPE
003442  032777  000020  175334          BIT     #20,@MTS
003450  001001                          BNE     .+4
003452  104000                          HLT                     ;ERROR, 7 CHANNEL NOT SET

                        ;*****************************************************************************
                        ;TEST FOR BEGINNING OF TAPE (BIT 5) SET
003454  104400                  SCOPE
003456  042777  003400  175322          BIC     #3400,@MTC      ;SELECT DRIVE 0
003464  032777  000040  175312          BIT     #40,@MTS
003472  001001                          BNE     .+4
003474  104000                          HLT                     ;ERROR, BOT NOT SET (DRIVE SHOULD BE AT BOT)

                        ;*****************************************************************************
                        ;TEST FOR SELECT/REMOTE (BIT 6) SET
003476  104400          TSR:    SCOPE
003500  032777  000100  175276          BIT     #100,@MTS
003506  001001                          BNE     .+4
003510  104000                          HLT                     ;ERROR, SELECT/REMOTE NOT SET

                        ;*****************************************************************************
                        ;WRITE 1 BYTE RECORD FROM BOT
                        ;BOT (BIT 5) SHOULD CLEAR, CU READY SHOULD SET, BYTE COUNT AND
                        ;CURRENT ADDRESS SHOULD INCREMENT

003512  104400                          SCOPE
003514  005077  175266                  CLR     @MTC            ;SELECT UNIT 0
003520  105777  175262                  TSTB    @MTC
003524  100375                          BPL     .-4             ;WAIT FOR CU READY
003526  006077  175252                  ROR     @MTS
003532  103375                          BCC     .-4             ;WAIT FOR TU READY
003534  032777  000040  175242          BIT     #40,@MTS        ;SEE IF AT BOT
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 938  003542  001014                          BNE     3$              ;IF SO: BR
 939  003544  005737  000042                  TST     @#42            ;SEE IF CHAIN MODE
 940  003550  001410                          BEQ     2$              ;IF NOT: BR
 941  003552  012777  060017  175226          MOV     #60017,@MTC     ;START REWIND
 942  003560  032777  000001  175216  1$:     BIT     #1,@MTS         ;SEE IF TUR
 943  003566  001774                          BEQ     1$              ;IF NOT:AWAIT TUR
 944  003570  000401                          BR      3$
 945  003572  104000                  2$:     HLT                     ;ERROR, DRIVE 0 NOT AT BOT
 946  003574  012777  177777  175206  3$:     MOV     #-1,@BC         ;SET BYTE COUNT=-1
 947  003602  012777  017202  175202          MOV     #WBUF,@CA       ;INIT CURRENT MEMORY ADDRESS
 948  003610  005000                          CLR     R0              ;INIT DELAY COUNTER
 949  003612  012701  000020                  MOV     #20,R1
 950  003616  012777  060005  175162          MOV     #60005,@MTC     ;WRITE, 800 BPI, GO
 951  003624  005200                          INC     R0
 952  003626  001376                          BNE     .-2             ;DELAY LONG ENOUGH TO MOVE OFF BOT
 953  003630  005301                          DEC     R1
 954  003632  001374                          BNE     .-6
 955  003634  032777  000040  175142          BIT     #40,@MTS        ;TEST FOR BOT
 956  003642  001401                          BEQ     .+4
 957  003644  104000                          HLT                     ;ERROR, BOT (BIT 5) NOT CLEARED
 958  003646  105777  175134                  TSTB    @MTC            ;TEST FOR CU READY
 959  003652  100401                          BMI     .+4
 960  003654  104000                          HLT                     ;ERROR, CU READY NOT SET AFTER WRITE FINISHED
 961  003656  005777  175126                  TST     @BC             ;TEST BYTE COUNT TO = 0
 962  003662  001401                          BEQ     .+4
 963  003664  104000                          HLT                     ;ERROR, BYTE COUNT DIDN'T INCREMENT
 964  003666  022777  017203  175116          CMP     #WBUF+1,@CA     ;TEST CURRENT MEMORY ADDRESS TO COUNT
 965  003674  001401                          BEQ     .+4
 966  003676  104000                          HLT                     ;ERROR, CURRENT MEMORY ADDRESS DIDN'T INCREMENT TO 0
 967
 968
 969                                  ;*************************************************************************
 970                                  ;TEST WRITE A 3 BYTE RECORD
 971  003700  104400                          SCOPE
 972  003702  012777  177775  175100          MOV     #-3,@BC         ;SET BYTE COUNT = -3
 973  003710  012777  017202  175074          MOV     #WBUF,@CA       ;INIT CURRENT MEMORY ADDRESS
 974  003716  005000                          CLR     R0              ;INIT DELAY COUNTER
 975  003720  005077  175062                  CLR     @MTC            ;SELECT UNIT 0
 976  003724  105777  175056                  TSTB    @MTC
 977  003730  100375                          BPL     .-4             ;WAIT FOR CU READY
 978  003732  006077  175046                  ROR     @MTS
 979  003736  103375                          BCC     .-4             ;WAIT FOR TU READY
 980  003740  005000                          CLR     R0
 981  003742  012777  060005  175036          MOV     #60005,@MTC     ;WRITE, 800BPI, GO
 982  003750  105777  175032                  TSTB    @MTC
 983  003754  100403                          BMI     .+10
 984  003756  005200                          INC     R0
 985  003760  001373                          BNE     .-10
 986  003762  104000                          HLT                     ;ERROR, CU READY DIDN'T SET AFTER 3 BYTE RECORD
 987
 988
 989  003764  022777  017205  175020          CMP     #WBUF+3,@CA
 990  003772  001401                          BEQ     .+4
 991  003774  104000                          HLT                     ;ERROR, CURRENT MEMORY ADDRESS DIDN'T INCREMENT
 992  003776  005777  175006                  TST     @BC
 993  004002  001401                          BEQ     .+4
```

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                004004  104000                  HLT                     ;ERROR, BYTE COUNT DIDN'T INCREMENT TO 0
                004006  005777  174774          TST     @MTC
                004012  100001                  BPL     .+4
                004014  104000                  HLT                     ;ERROR, BIT 15 SET IN COMMAND REGISTER


                        ;*************************************************************************
                        ;TEST REWIND FUNCTION
                004016  104400                  SCOPE
                004020  012777  177775  174762  MOV     #-3,@BC         ;WRITE SHORT RECORD TO BE CERTAIN THAT BOT NOT SE
                004026  012777  017202  174756  MOV     #WBUF,@CA
                004034  105777  174746          TSTB    @MTC
                004040  100375                  BPL     .-4
                004042  012777  060005  174736  MOV     #60005,@MTC     ;WRITE, 800 BPI, GO
                004050  105777  174732          TSTB    @MTC
                004054  100375                  BPL     .-4             ;WAIT FOR CU READY
                004056  006077  174722          ROR     @MTS
                004062  103375                  BCC     .-4             ;WAIT FOR TU READY
                004064  012777  060017  174714  MOV     #60017,@MTC     ;REWIND, GO
                004072  105777  174710          TSTB    @MTC
                004076  100375                  BPL     .-4
                004100  032777  000002  174676  BIT     #2,@MTS
                004106  001001                  BNE     .+4
                004110  104000                  HLT                     ;ERROR, REWIND STATUS (BIT 1) NOT = 1 DURING REWIND
                004112  006077  174666          ROR     @MTS
                004116  103001                  BCC     .+4
                004120  104000                  HLT                     ;ERROR, TU READY NOT = 0
                004122  032777  000002  174654  BIT     #2,@MTS
                004130  001374                  BNE     .-6             ;WAIT FOR RWS TO CLEAR
                004132  032777  000010  174644  BIT     #10,@MTS
                004140  001774                  BEQ     .-6             ;WAIT FOR SETTLEDOWN TO SET
                004142  032777  000040  174634  BIT     #40,@MTS
                004150  001001                  BNE     .+4
                004152  104000                  HLT                     ;ERROR, BOT (BIT 5) NOT = 1 WHEN SDWN (BIT 3) SET ON REW
                004154  032777  000010  174622  BIT     #10,@MTS
                004162  001374                  BNE     .-6
                004164  006077  174614          ROR     @MTS
                004170  103401                  BCS     .+4
                004172  104000                  HLT                     ;ERROR, TU READY NOT SET AFTER SDWN CLEARED ON REWIND


                        ;*************************************************************************
                        ;READ 1 BYTE RECORD FROM BOT
                        ;BOT (BIT 5) SHOULD CLEAR, CU READY SHOULD SET, BYTE COUNT AND
                        ;CURRENT ADDRESS SHOULD INCREMENT

                004174  104400                  SCOPE
                004176  005077  174604          CLR     @MTC            ;SELECT UNIT 0
                004202  105777  174600          TSTB    @MTC
                004206  100375                  BPL     .-4             ;WAIT FOR CU READY
                004210  006077  174570          ROR     @MTS
                004214  103375                  BCC     .-4             ;WAIT FOR TU READY
                004216  032777  000040  174560  BIT     #40,@MTS
                004224  001001                  BNE     .+4
```

```
1050  004226  104000                        HLT                     ;ERROR, DRIVE 0 NOT AT BOT
1051  004230  012777  177777  174552        MOV     #-1,@BC         ;SET BYTE COUNT=-1
1052  004236  012777  017202  174546        MOV     #WBUF,@CA       ;INIT CURRENT MEMORY ADDRESS
1053  004244  005000                        CLR     R0              ;INIT DELAY COUNTER
1054  004246  012701  000020                MOV     #20,R1
1055  004252  012777  060003  174526        MOV     #60003,@MTC     ;READ, 800 BPI, GO
1056  004260  005200                        INC     R0
1057  004262  001376                        BNE     .-2             ;DELAY LONG ENOUGH TO MOVE OFF BOT
1058  004264  005301                        DEC     R1
1059  004266  001374                        BNE     .-6
1060  004270  032777  000040  174506        BIT     #40,@MTS        ;TEST FOR BOT
1061  004276  001401                        BEQ     .+4
1062  004300  104000                        HLT                     ;ERROR, BOT (BIT 5) NOT CLEARED
1063  004302  105777  174500                TSTB    @MTC            ;TEST FOR CU READY
1064  004306  100401                        BMI     .+4
1065  004310  104000                        HLT                     ;ERROR, CU READY NOT SET AFTER WRITE FINISHED
1066  004312  005777  174472                TST     @BC             ;TEST BYTE COUNT TO = 0
1067  004316  001401                        BEQ     .+4
1068  004320  104000                        HLT                     ;ERROR, BYTE COUNT DIDN'T INCREMENT
1069  004322  022777  017203  174462        CMP     #WBUF+1,@CA     ;TEST CURRENT MEMORY ADDRESS TO COUNT
1070  004330  001401                        BEQ     .+4
1071  004332  104000                        HLT                     ;ERROR, CURRENT MEMORY ADDRESS DIDN'T INCREMENT TO 0
1072
1073
1074                          ;*************************************************************************
1075                          ;TEST READ A 3 BYTE RECORD
1076  004334  104400                        SCOPE
1077  004336  012777  177775  174444        MOV     #-3,@BC         ;SET BYTE COUNT = -3
1078  004344  012777  017202  174440        MOV     #WBUF,@CA       ;INIT CURRENT MEMORY ADDRESS
1079  004352  005000                        CLR     R0              ;INIT DELAY COUNTER
1080  004354  005077  174426                CLR     @MTC            ;SELECT UNIT 0
1081  004360  105777  174422                TSTB    @MTC
1082  004364  100375                        BPL     .-4             ;WAIT FOR CU READY
1083  004366  006077  174412                ROR     @MTS
1084  004372  103375                        BCC     .-4             ;WAIT FOR TU READY
1085  004374  005000                        CLR     R0
1086  004376  012777  060003  174402        MOV     #60003,@MTC     ;READ, 800BPI, GO
1087  004404  105777  174376                TSTB    @MTC
1088  004410  100403                        BMI     .+10
1089  004412  005200                        INC     R0
1090  004414  001373                        BNE     .-10
1091  004416  104000                        HLT                     ;ERROR, CU READY DIDN'T SET AFTER 3 BYTE RECORD
1092  004420  022777  017205  174364        CMP     #WBUF+3,@CA
1093  004426  001401                        BEQ     .+4
1094  004430  104000                        HLT                     ;ERROR, CURRENT MEMORY ADDRESS DIDN'T INCREMENT
1095
1096  004432  005777  174352                TST     @BC
1097  004436  001401                        BEQ     .+4
1098  004440  104000                        HLT                     ;ERROR, BYTE COUNT DIDN'T INCREMENT TO 0
1099  004442  005777  174340                TST     @MTC
1100  004446  100001                        BPL     .+4
1101  004450  104000                        HLT                     ;ERROR, BIT 15 SET IN COMMAND REGISTER
1102
1103
1104                          ;*************************************************************************
1105                          ;TEST WRITE EOF
```

```
1106  004452  104400                          SCOPE
1107  004454  105777  174326                  TSTB    @MTC
1108  004460  100375                          BPL     .-4
1109  004462  012777  060017  174316          MOV     #60017,@MTC     ;REWIND UNIT TO BOT
1110  004470  105777  174312                  TSTB    @MTC
1111  004474  100375                          BPL     .-4
1112  004476  012777  177777  174304          MOV     #-1,@BC
1113  004504  012777  017202  174300          MOV     #WBUF,@CA
1114  004512  012777  060007  174266          MOV     #60007,@MTC     ;WRITE EOF
1115  004520  105777  174262                  TSTB    @MTC
1116  004524  100375                          BPL     .-4
1117  004526  005777  174256                  TST     @BC
1118  004532  001001                          BNE     .+4
1119  004534  104000                          HLT                     ;ERROR, BYTE COUNT SHOULD NOT INCREMENT ON WRITE EOF
1120  004536  022777  017202  174246          CMP     #WBUF,@CA
1121  004544  001401                          BEQ     .+4
1122  004546  104000                          HLT                     ;ERROR, CURRENT ADDRESS SHOULD NOT INCREMENT ON WRITE EO
1123
1124
1125                                  ;*************************************************************************
1126                                  ;TEST SPACE FORWARD TO STOP ON FIRST EOF
1127  004550  012777  060017  174230          MOV     #60017,@MTC     ;REWIND
1128  004556  105777  174224                  TSTB    @MTC
1129  004562  100375                          BPL     .-4
1130  004564  012777  177776  174216          MOV     #-2,@BC
1131  004572  012777  060011  174206          MOV     #60011,@MTC     ;SPACE FORWARD 2 RECORDS
1132  004600  105777  174202                  TSTB    @MTC
1133  004604  100375                          BPL     .-4
1134  004606  032777  040000  174170          BIT     #40000,@MTS
1135  004614  001001                          BNE     .+4
1136  004616  104000                          HLT                     ;ERROR, EOF (BIT 14) NOT =1
1137  004620  005777  174162                  TST     @MTC
1138  004624  100401                          BMI     .+4
1139  004626  104000                          HLT                     ;ERROR, (BIT 15) OF COMMAND REGISTER NOT=1 WITH EOF=1
1140  004630  022777  177777  174152          CMP     #-1, @BC
1141  004636  001401                          BEQ     .+4
1142  004640  104000                          HLT                     ;ERROR, BYTE COUNT SHOULD HAVE INCREMENTED FROM -2 TO -1
1143  004642  022777  017202  174142          CMP     #WBUF,@CA
1144  004650  001401                          BEQ     .+4
1145  004652  104000                          HLT                     ;ERROR, CURRENT ADDRESS REGISTER SHOULD NOT INCREMENT.
1146  004654  052777  010000  174124          BIS     #10000,@MTC     ;PWR CLEAR
1147  004662  032777  040000  174114          BIT     #40000,@MTS
1148  004670  001401                          BEQ     .+4
1149  004672  104000                          HLT                     ;ERROR, PWR CLEAR DIDN'T CLEAR EOF (BIT 14)
1150
1151
1152
1153
1154                                  ;*************************************************************************
1155                                  ;TEST SPACE REVERSE TO STOP IN FIRST EOF
1156  004674  012777  177776  174106          MOV     #-2, @BC
1157  004702  012777  017202  174102          MOV     #WBUF,@CA
1158  004710  012777  060013  174070          MOV     #60013,@MTC     ;SPACE REVERSE 2 RECORDS
1159  004716  105777  174064                  TSTB    @MTC
1160  004722  100375                          BPL     .-4
1161  004724  032777  040000  174052          BIT     #40000,@MTS
```

```
1162  004732  001001                        BNE     .+4
1163  004734  104000                        HLT                     ;ERROR, EOF (BIT 14) NOT =1
1164  004736  032777  000040  174040        BIT     #40,@MTS
1165  004744  001401                        BEQ     .+4
1166  004746  104000                        HLT                     ; ERROR, BOT=1, SHOULD NOT HAVE REACHED BOT
1167  004750  022777  177777  174032        CMP     #-1,@BC
1168  004756  001401                        BEQ     .+4
1169  004760  104000                        HLT                     ;ERROR, BYTE COUNT SHOULD HAVE INCREMENTED FROM -2 TO-1
1170  004762  022777  017202  174022        CMP     #WBUF,@CA
1171  004770  001401                        BEQ     .+4
1172  004772  104000                        HLT                     ;ERROR, CURRENT ADDRESS REGISTER SHOULD NOT INCREMENT
1173
1174
1175                          ;*************************************************************************
1176                          ;TEST SPACE FORWARD
1177                          ;FIRST WRITE 2 RECORDS FOLLOWED BY EOF
1178                          ; SPACE FORWARD 2 RECORDS, SHOULD NOT REACH EOF
1179  004774  104400                        SCOPE
1180  004776  105777  174004                TSTB    @MTC
1181  005002  100375                        BPL     .-4
1182  005004  012777  060017  173774        MOV     #60017,@MTC     ;REWIND TO BOT
1183  005012  105777  173770                TSTB    @MTC
1184  005016  100375                        BPL     .-4
1185  005020  012777  177775  173762        MOV     #-3,@BC
1186  005026  012777  017202  173756        MOV     #WBUF,@CA
1187  005034  012777  060005  173744        MOV     #60005,@MTC     ; WRITE 1ST RECORD
1188  005042  105777  173740                TSTB    @MTC
1189  005046  100375                        BPL     .-4
1190  005050  012777  177775  173732        MOV     #-3,@BC
1191  005056  012777  017202  173726        MOV     #WBUF,@CA
1192  005064  012777  060005  173714        MOV     #60005,@MTC     ; WRITE 2ND RECORD
1193  005072  105777  173710                TSTB    @MTC
1194  005076  100375                        BPL     .-4
1195  005100  012777  060007  173700        MOV     #60007,@MTC     ; WRITE EOF
1196  005106  105777  173674                TSTB    @MTC
1197  005112  100375                        BPL     .-4
1198  005114  012777  060017  173664        MOV     #60017,@MTC     ; REWIND
1199  005122  105777  173660                TSTB    @MTC
1200  005126  100375                        BPL     .-4
1201  005130  012777  177776  173652        MOV     #-2,@BC
1202  005136  012777  060011  173642        MOV     #60011,@MTC     ; SPACE FORWARD 2 RECORDS
1203  005144  105777  173636                TSTB    @MTC
1204  005150  100375                        BPL     .-4
1205  005152  032777  040000  173624        BIT     #40000,@MTS
1206  005160  001401                        BEQ     .+4
1207  005162  104000                        HLT                     ;ERROR, EOF (BIT 14)=1, SHOULDN'T SPACE THIS FAR
1208
1209                          ;NOW SPACE FORWARD TO EOF
1210  005164  012777  060011  173614        MOV     #60011,@MTC     ;SPACE FORWARD TO EOF WITH BYTE COUNT=0
1211  005172  105777  173610                TSTB    @MTC
1212  005176  100375                        BPL     .-4
1213  005200  032777  040000  173576        BIT     #40000,@MTS
1214  005206  001001                        BNE     .+4
1215  005210  104000                        HLT                     ;ERROR, EOF NOT =1
1216  005212  022777  000001  173570        CMP     #1,@BC
1217  005220  001401                        BEQ     .+4
```

```
1218  005222  104000                          HLT             ;ERROR BYTE COUNT SHOULD =1
1219                                  ;NOW SPACE REVERSE 2 RECORDS (FIRST MUST BACKSPACE OVER EOF)
1220  005224  012777  177775  173556          MOV     #-3,@BC
1221  005232  012777  017202  173552          MOV     #WBUF,@CA
1222  005240  012777  060013  173540          MOV     #60013,@MTC
1223  005246  105777  173534                  TSTB    @MTC
1224  005252  100375                          BPL     .-4
1225  005254  032777  040000  173522          BIT     #40000,@MTS
1226  005262  001001                          BNE     .+4
1227  005264  104000                          HLT                     ;ERROR, EOF (BIT 14) NOT =1 AFTER BACKSPACE OVER BOT
1228  005266  005277  173514                  INC     @MTC            ;RESUME BACKSPACE
1229  005272  105777  173510                  TSTB    @MTC
1230  005276  100375                          BPL     .-4
1231  005300  100377                          BPL     .
1232  005302  105777  173502                  TSTB    @BC
1233  005306  001401                          BEQ     .+4
1234  005310  104000                          HLT                     ;ERROR, BYTE COUNT NOT=0
1235  005312  001401                          BEQ     .+4
1236  005314  104000                          HLT                     ;ERROR, CURRENT MEMORY ADDRESS SHOULDN'T COUNT ON BACKSP
1237  005316  032777  000040  173460          BIT     #40,@MTS
1238  005324  001401                          BEQ     .+4
1239  005326  104000                          HLT                     ;ERROR, BACKSPACE SHOULD NOT HAVE REACHED BOT
1240
1241
1242                                  ;*************************************************************************
1243                                  ;TEST READ TO FIND EOF
1244  005330  104400                          SCOPE
1245  005332  105777  173450                  TSTB    @MTC
1246  005336  100375                          BPL     .-4
1247  005340  012777  060007  173440          MOV     #60007,@MTC     ;WRITE EOF
1248  005346  105777  173434                  TSTB    @MTC
1249  005352  100375                          BPL     .-4
1250  005354  012777  060013  173424          MOV     #60013,@MTC     ;BACKSPACE OVER EOF
1251  005362  105777  173420                  TSTB    @MTC
1252  005366  100375                          BPL     .-4
1253  005370  005037  017346                  CLR     RBUF
1254  005374  012777  177771  173406          MOV     #-7,@BC
1255  005402  012777  017346  173402          MOV     #RBUF,@CA
1256  005410  012777  060003  173370          MOV     #60003,@MTC     ;READ
1257  005416  105777  173364                  TSTB    @MTC
1258  005422  100375                          BPL     .-4
1259  005424  032777  040000  173354          BIT     #40000,@MTC
1260  005432  001001                          BNE     .+4
1261  005434  104000                          HLT                     ;ERROR, EOF (BIT 14) NOT -1 DURING A READ OPERATION
1262  005436  132777  000001  173360          BITB    #1,@SWR         ;IS 7 CHANNEL SELECTED
1263  005444  001006                          BNE     TREOF           ;YES
1264  005446  022737  011423  017346          CMP     #11423,RBUF
1265  005454  001401                          BEQ     .+4
1266  005456  104000                          HLT                     ;ERROR, EOF (23) NOT TRANSFERRED FOR 2 BYTES DURING READ
1267  005460  000405                          BR      TRLE
1268  005462  022737  000377  017346  TREOF: CMP     #377,RBUF
1269  005470  001401                          BEQ     .+4
1270  005472  104000                          HLT                     ;ERROR, EOF (17-7 CHANNEL) NOT TRANSFERRED DURING READ E
1271
1272
1273
```

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1274
1275                                    ;*************************************************************************
1276                                    ;TEST RECORD LENGTH ERROR
1277  005474  104400                   TRLE:   SCOPE
1278  005476  105777  173304                   TSTB    @MTC
1279  005502  100375                           BPL     .-4
1280  005504  012737  177777  017202         MOV     #-1,WBUF
1281  005512  012737  177777  017204         MOV     #-1,WBUF+2
1282  005520  012777  177774  173262         MOV     #-4,@BC
1283  005526  012777  017202  173256         MOV     #WBUF,@CA
1284  005534  012777  060005  173244         MOV     #60005,@MTC     ;WRITE 4 BYTE RECORD
1285  005542  105777  173240                   TSTB    @MTC
1286  005546  100375                           BPL     .-4
1287  005550  012777  177777  173232         MOV     #-1,@BC
1288  005556  012777  060013  173222         MOV     #60013,@MTC     ;BACKSPACE
1289  005564  105777  173216                   TSTB    @MTC
1290  005570  100375                           BPL     .-4
1291  005572  005037  017346                   CLR     RBUF
1292  005576  005037  017350                   CLR     RBUF+2
1293  005602  012777  177775  173200         MOV     #-3,@BC
1294  005610  012777  017346  173174         MOV     #RBUF,@CA
1295  005616  012777  060003  173162         MOV     #60003,@MTC     ;READ 3 BYTE RECORD
1296  005624  105777  173156                   TSTB    @MTC
1297  005630  100375                           BPL     .-4
1298  005632  032777  001000  173144         BIT     #1000,@MTS
1299  005640  001001                           BNE     .+4
1300  005642  104000                           HLT                     ;ERROR, RECORD LENGTH ERROR (BIT 9) NOT =1
1301  005644  005777  173136                   TST     @MTC
1302  005650  100401                           BMI     .+4
1303  005652  104000                           HLT                     ;ERROR, BIT 15 NOT =1 WHEN RLS (BIT 9) =1
1304  005654  022737  177777  017346         CMP     #-1, RBUF
1305  005662  001401                           BEQ     .+4
1306  005664  104000                           HLT                     ;ERROR, BYTES 1+2 NOT READ PROPERLY
1307  005666  022737  000377  017350         CMP     #377, RBUF+2
1308  005674  001401                           BEQ     .+4
1309  005676  104000                           HLT                     ;ERROR,BYTE 3 READ ERROR OR SOMETHING TRANSFERED TO BYTE
1310  005700  052777  010000  173100         BIS     #10000,@MTC     ;PWR CLEAR
1311  005706  032777  001000  173070         BIT     #1000,@MTS
1312  005714  001401                           BEQ     .+4
1313  005716  104000                           HLT                     ;ERROR PWR CLEAR DIDN'T RLE (BIT 9)
1314
1315
1316
1317
1318                                    ;*************************************************************************
1319                                    ;TEST ILLEGAL COMMAND TO =1 ON A DATO OR DATOB TO MTC WITH CU READY=0
1320  005720  104400                           SCOPE
1321  005722  105777  173060                   TSTB    @MTC
1322  005726  100375                           BPL     .-4
1323  005730  006077  173050                   ROR     @MTS
1324  005734  103375                           BCC     .-4
1325  005736  012777  177775  173044         MOV     #-3,@BC
1326  005744  012777  017202  173040         MOV     #WBUF,@CA
1327  005752  012777  060007  173026         MOV     #60007,@MTC     ;WRITE EOF
1328  005760  105777  173022                   TSTB    @MTC
1329  005764  100775                           BMI     .-4             ;WAIT FOR CU READY TO CLEAR
```

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1330  005766  012777  060017  173012          MOV     #60017,@MTC     ;DATO TO MTC WITH CU READY =0
1331  005774  105777  173006                  TSTB    @MTC
1332  006000  100375                          BPL     .-4
1333  006002  005777  172776                  TST     @MTS
1334  006006  100401                          BMI     .+4
1335  006010  104000                          HLT                     ;ERROR, ILLEGAL COMMAND (BIT 15) NOT =1
1336  006012  105777  172770                  TSTB    @MTC
1337  006016  100401                          BMI     .+4
1338  006020  104000                          HLT                     ;ERROR, (BIT 15) NOT =1 WITH ILLEGAL COMMAND
1339  006022  105777  172760                  TSTB    @MTC
1340  006026  100375                          BPL     .-4
1341  006030  006077  172750                  ROR     @MTS
1342  006034  103375                          BCC     .-4
1343
1344
1345                                  ;*************************************************************************
1346                                  ;TEST ILLEGAL COMMAND BY ISSUING A COMMAND TO TYPE A UNIT WITH SELECT REMOTE =0
1347  006036  104400                          SCOPE
1348  006040  012777  003400  172740          MOV     #3400,@MTC      ;SELECT UNIT 7, SELECT REMOTE SHOULD =0
1349  006046  105777  172734                  TSTB    @MTC
1350  006052  100375                          BPL     .-4
1351  006054  032777  000100  172722          BIT     #100,@MTS
1352  006062  001401                          BEQ     .+4
1353  006064  104000                          HLT                     ;ERROR, SELECT REMOTE (BIT 6) NOT =0 WITH  NONEXISTENT U
1354  006066  052777  000017  172712          BIS     #17,@MTC        ;ISSUE REWIND
1355  006074  105777  172706                  TSTB    @MTC
1356  006100  100375                          BPL     .-4
1357  006102  005777  172676                  TST     @MTS
1358  006106  100401                          BMI     .+4
1359  006110  104000                          HLT                     ;ERROR, ILLEGAL COMMAND (BIT 15) NOT =1
1360  006112  052777  010000  172666          BIS     #10000,@MTC     ;PWR CLEAR
1361  006120  005777  172660                  TST     @MTS
1362  006124  100001                          BPL     .+4
1363  006126  104000                          HLT                     ;ERROR, POWER CLEAR DIDN'T CLEAR ILC (BIT 15)
1364
1365
1366
1367
1368                                  ;*************************************************************************
1369                                  ;TEST BACKSPACE WHILE AT BOT TO BE IGNORED
1370  006130  104400                          SCOPE
1371  006132  032777  000040  172646          BIT     #40,@MTC        ;AT BOT ?
1372  006140  001003                          BNE     .+10            ;YES
1373  006142  012777  060017  172636          MOV     #60017,@MTC     ;NO, REWIND
1374  006150  105777  172632                  TSTB    @MTC
1375  006154  100375                          BPL     .-4
1376  006156  006077  172622                  ROR     @MTS
1377  006162  103375                          BCC     .-4
1378  006164  012777  177777  172616          MOV     #-1,@BC
1379  006172  012777  000013  172606          MOV     #13,@MTC        ;BACKSPACE
1380  006200  105777  172602                  TSTB    @MTC
1381  006204  100375                          BPL     .-4
1382  006206  005777  172572                  TST     @MTS
1383  006212  100001                          BPL     .+4
1384  006214  104000                          HLT                     ;ERROR, ILC (BIT 15) =1 AFTER BACKSPACE WHILE AT BOT
1385  006216  032777  000040  172560          BIT     #40,@MTS
```

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1386  006224  001001                        BNE     .+4
1387  006226  104000                        HLT                     ;ERROR, NOT AT BOT AFTER BACKSPACE
1388
1389
1390                                  ;*************************************************************************
1391                                  ;TEST REWIND WHILE AT BOT TO BE IGNORED
1392  006230  104400                        SCOPE
1393  006232  032777  000040  172544        BIT     #40,@MTS        ;AT BOT?
1394  006240  001003                        BNE     .+10            ;YES
1395  006242  012777  060017  172536        MOV     #60017,@MTC     ;NO, REWIND
1396  006250  105777  172532                TSTB    @MTC
1397  006254  100375                        BPL     .-4
1398  006256  006077  172522                ROR     @MTS
1399  006262  103375                        BCC     .-4
1400  006264  012777  060017  172514        MOV     #60017,@MTC     ;REWIND WHILE AT BOT
1401  006272  105777  172510                TSTB    @MTC
1402  006276  100375                        BPL     .-4
1403  006300  005777  172500                TST     @MTS
1404  006304  100001                        BPL     .+4
1405  006306  104000                        HLT                     ;ERROR, ILC(BIT15)=1 AFTER REWIND WHILE AT BOT
1406  006310  032777  000040  172466        BIT     #40,@MTS
1407  006316  001001                        BNE     .+4
1408  006320  104000                        HLT                     ;ERROR, NOT BOT AFTER REWIND
1409
1410
1411
1412                                  ;*************************************************************************
1413                                  ;TEST BAD TAPE ERROR (BIT 8) TO =1
1414                                  ;USE MAINTENANCE BIT 13 OF MTRD TO SET PREMATURE CU READY TO CAUSE BAD TAPE
1415  006322  104400                        SCOPE
1416  006324  012777  177774  172456        MOV     #-4,@BC
1417  006332  012777  017202  172452        MOV     #WBUF,@CA
1418  006340  105777  172442                TSTB    @MTC
1419  006344  100375                        BPL     .-4
1420  006346  012777  060005  172432        MOV     #60005,@MTC     ;WRITE, 800 BPI, GO
1421  006354  005777  172430                TST     @BC
1422  006360  001375                        BNE     .-4
1423  006362  052777  020000  172426        BIS     #20000,@MTRD    ;SET PREMATURE CU READY
1424  006370  006077  172410                ROR     @MTS
1425  006374  103375                        BCC     .-4
1426  006376  032777  000400  172400        BIT     #400,@MTS
1427  006404  001001                        BNE     .+4
1428  006406  104000                        HLT                     ;ERROR, BAD TAPE ERROR (BIT 8) NOT =1
1429  006410  005777  172372                TST     @MTC
1430  006414  100401                        BMI     .+4
1431  006416  104000                        HLT                     ;ERROR, BIT 15 NOT =1 WITH BTE=1
1432  006420  052777  010000  172360        BIS     #10000,@MTC
1433  006426  032777  000400  172350        BIT     #400,@MTS
1434  006434  001401                        BEQ     .+4
```

```
1435  006436  104000                          HLT                     ;ERROR, POWER CLEAR DIDN'T CLEAR BTE (BIT 8)
1436
1437
1438
1439                                  ;*************************************************************************
1440                                  ;TEST NON-EXISTENT MEMORY (BIT 7) AND ERROR (BIT 15) TO =1.
1441  006440  104400                          SCOPE
1442  006442  012777  177777  172340          MOV     #-1,@BC         ;INIT BYTE COUNTER
1443                                          ;**********************
1444  006450  012777  176000  172334  CHGI2:  MOV     #176000,@CA     ;INIT CURRENT MEMORY ADDRESS FOR NON EXISTENT MEMORY
1445                                          ;**********************
1446  006456  105777  172324                  TSTB    @MTC
1447  006462  100375                          BPL     .-4
1448  006464  012777  060063  172314          MOV     #60063,@MTC     ;READ, EA=3, 800 BPI, GO
1449  006472  105777  172310                  TSTB    @MTC
1450  006476  100375                          BPL     .-4
1451  006500  032777  000200  172276          BIT     #200,@MTS
1452  006506  001001                          BNE     .+4
1453  006510  104000                          HLT                     ;ERROR, NON-EXISTENT MEMORY (BIT 7) NOT =1
1454  006512  005777  172270                  TST     @MTC
1455  006516  100401                          BMI     .+4
1456  006520  104000                          HLT                     ;ERROR, (BIT 15) NOT =1 WITH NXM (BIT 7) =1
1457  006522  052777  010000  172256          BIS     #10000,@MTC     ;PWR CLEAR
1458  006530  032777  000600  172246          BIT     #600,@MTS
1459  006536  001401                          BEQ     .+4
1460  006540  104000                          HLT                     ;ERROR, POWER CLEAR DIDN'T CLEAR BTE (BIT 8) OR NXM (BIT
1461
1462
1463
1464
1465                                  ;*************************************************************************
1466                                  ;TEST INTERRUPTS
1467                                  ;INTERRUPT TO 224 WITH PROCESSOR PRIORITY LEVEL 4, BY SETTING INT EN (BIT6)=1
1468  006542  104400                          SCOPE
1469  006544  012737  000200  177776          MOV     #200,CC         ;SET PRIORITY LEVEL 4
1470  006552  005077  172224                  CLR     @MTVS           ;CLEAR INTERRUPT VECTOR CC
1471  006556  012777  006606  172214          MOV     #IR1,@MTV       ;INIT INTERRUPT RETURN
1472  006564  005000                          CLR     R0              ;INIT DELAY COUNT
1473  006566  012777  000100  172212          MOV     #100,@MTC       ;SET INT ENABLE
1474  006574  005200                          INC     R0              ;WAIT FOR INTERRUPT
1475  006576  001376                          BNE     .-2
1476  006600  005077  172202                  CLR     @MTC            ;WAITED TOO LONG WITHOUT INTERRUPT, CLEAR INT ENABLE
1477  006604  104000                          HLT                     ;ERROR, INTERRUPT ENABLE FAILED TO CAUSE INT.
1478
1479
1480                                  ;*************************************************************************
1481                                  ;TEST FOR PROCESSOR PRIORITY LEVEL 5 TO SUPPRESS INTERRUPT
1482  006606  012737  000240  177776  IR1:    MOV     #240,CC         ;SET PROCESSOR PRIORITY LEVEL 5
1483  006614  012777  006640  172156          MOV     #IR2,@MTV       ;INIT INTERRUPT RETURN
1484  006622  005000                          CLR     R0              ;INIT DELAY COUNT
1485  006624  012777  000100  172154          MOV     #100,@MTC       ;SET INIT ENABLE
1486  006632  005200                          INC     R0
1487  006634  001376                          BNE     .-2             ;WAIT FOR INTERRUPT
1488  006636  000401                          BR      .+4
1489  006640  104000                  IR2:    HLT                     ;ERROR, SHOULDN'T HAVE INTERRUPT WITH PROCESSOR PRIORITY
1490
```

```
1491
1492                                    ;*************************************************************************
1493                                    ;TEST CU READY TO CAUSE INTERRUPT WITH INT ENABLE =1
1494                                    ;INT ENABLE (BIT 6) AND GO (BIT 0) SET AT SAME TIME SHOULDN'T CAUSE INTERRUPT
1495  006642  104400                            SCOPE
1496  006644  012737  000200  177776            MOV     #200,CC         ;PROCESSOR PRIORITY LEVEL 4
1497  006652  012777  006710  172120            MOV     #IR3,@MTV
1498  006660  012737  000001  006706            MOV     #1,WAIT1
1499  006666  005077  172114                    CLR     @MTC
1500  006672  105777  172110                    TSTB    @MTC
1501  006676  100375                            BPL     .-4
1502  006700  012777  060107  172100            MOV     #60107,@MTC     ;WRITE EOF, INT ENABLE, GO
1503  006706  000001                    WAIT1:  WAIT
1504  006710  012737  000240  006706    IR3:    MOV     #240,WAIT1
1505  006716  105777  172064                    TSTB    @MTC
1506  006722  100401                            BMI     .+4
1507  006724  104000                            HLT                     ;ERROR, INTERRUPT NOT CAUSED BY CU READY
1508
1509                                    ;*************************************************************************
1510                                    ;TEST REWIND TO CAUSE TWO INTERRUPTS
1511                                    ;1ST AFTER CU READY AND 2ND AFTER REWIND COMPLETE
1512  006726  104400                            SCOPE
1513  006730  012737  000200  177776            MOV     #200,CC         ;PROCESSOR PRIORITY LEVEL 4
1514  006736  012777  007020  172034            MOV     #IR4,@MTV
1515  006744  012737  000001  007016            MOV     #1,WAIT2
1516  006752  005077  172030                    CLR     @MTC
1517  006756  105777  172024                    TSTB    @MTC
1518  006762  100375                            BPL     .-4
1519  006764  032777  000040  172012            BIT     #40,@MTS        ;AT BOT?
1520  006772  001403                            BEQ     .+10            ;NO
1521  006774  012777  000003  172004            MOV     #3,@MTC         ;WRITE EOF TO MOVE OFF BOT
1522  007002  105777  172000                    TSTB    @MTC
1523  007006  100375                            BPL     .-4
1524  007010  012777  000117  171770            MOV     #117,@MTC       ;INT ENABLE, REWIND, GO
1525  007016  000001                    WAIT2:  WAIT
1526  007020  012737  000240  007016    IR4:    MOV     #240,WAIT2
1527  007026  105777  171754                    TSTB    @MTC
1528  007032  100401                            BMI     .+4
1529  007034  104000                            HLT                     ;ERROR, INTERRUPT NOT CAUSED BY CU READY
1530
1531
1532  007036  032777  000040  171740            BIT     #40,@MTS
1533  007044  100001                            BPL     .+4
1534  007046  104000                            HLT                     ;ERROR, SHOULDN'T BE AT BOT SO SOON AFTER 1ST INTERRUPT
1535  007050  012737  000001  007064            MOV     #1,WAIT3
1536  007056  012777  007066  171714            MOV     #IR5,@MTV
1537  007064  000001                    WAIT3:  WAIT
1538  007066  012737  000240  007064    IR5:    MOV     #240,WAIT3
1539  007074  032777  000040  171702            BIT     #40,@MTS
1540  007102  001001                            BNE     .+4
1541  007104  104000                            HLT                     ;ERROR; 2ND INTERRUPT NOT CAUSED BY REWIND COMPLETE
1542
1543
1544                                    ;*************************************************************************
1545                                    ;DATA TRANSFER TEST
1546
```

```
1547                                    ;WRITE RECORD, BACKSPACE, READ RECORD
1548                                    ;REPEAT FOR ALL BYTE PATTERNS FROM 0 THRU DATA PATTERN
1549  007106  005037  001032                    CLR     TEMP                ;INITALIZE DATA PATTERN
1550  007112  012700  017202              WBR:  MOV     #WBUF,R0
1551  007116  013720  001032                    MOV     TEMP, (R0)+         ;SET UP WRITE BUFFER
1552  007122  022700  017226                    CMP     #WBUF+24,R0
1553  007126  001373                            BNE     WBR+4
1554  007130  012777  177754  171652            MOV     #-20.,@BC           ;INIT BYTE COUNT
1555  007136  012777  017202  171646            MOV     #WBUF,@CA           ;INIT CURRENT MEMORY ADDRESS
1556  007144  105777  171636                    TSTB    @MTC
1557  007150  100375                            BPL     .-4
1558  007152  012777  060005  171626            MOV     #60005,@MTC         ;WRITE, 800 BPI, GO
1559  007160  105777  171622                    TSTB    @MTC
1560  007164  100375                            BPL     .-4
1561                                    ;AFTER WRITE, CHECK WRITE BUFFER TO MAKE CERTAIN IT WASN'T MODIFIED
1562  007166  012700  017202                    MOV     #WBUF,R0
1563  007172  023720  001032              WBR1: CMP     TEMP, (R0)+
1564  007176  001401                            BEQ     .+4
1565  007200  104000                            HLT                         ;ERROR, DATA BUFFER MODIFIED DURING WRITE
1566  007202  022700  017226                    CMP     #WBUF+24,R0
1567  007206  001371                            BNE     WBR1
1568                                    ;BACKSPACE 1 RECORD
1569  007210  012777  177777  171572            MOV     #-1,@BC
1570
1571  007216  012777  060013  171562            MOV     #60013,@MTC
1572  007224  105777  171556                    TSTB    @MTC
1573  007230  100375                            BPL     .-4
1574  007232  012700  017346                    MOV     #RBUF,R0
1575  007236  005020                      WBR2: CLR     (R0)+               ;CLEAR READ BUFFER
1576  007240  022700  017372                    CMP     #RBUF+24,R0
1577  007244  001374                            BNE     WBR2
1578                                    ;;READ RECORD
1579  007246  012777  177754  171534            MOV     #-20.,@BC           ;UNIT BYTE COUNT
1580  007254  012777  017346  171530            MOV     #RBUF,@CA           ;UNIT CURRENT MEMORY ADDRESS
1581  007262  012777  060003  171516            MOV     #60003,@MTC         ;READ,800 BPI, GO
1582  007270  105777  171512                    TSTB    @MTC
1583  007274  100375                            BPL     .-4
1584  007276  005777  171504                    TST     @MTC
1585  007302  100001                            BPL     .+4
1586  007304  104000                            HLT                         ;ERROR, ERROR (BIT 15) =1 AFTER READ
1587  007306  012700  017346                    MOV     #RBUF,R0
1588
1589
1590  007312  023720  001032              WBR3: CMP     TEMP,(R0)+
1591  007316  001401                            BEQ     .+4
1592  007320  104000                            HLT                         ;ERROR, DATA READ NOT EQUAL DATA WRITTEN
1593  007322  022700  017372                    CMP     #RBUF+24,R0
1594  007326  001371                            BNE     WBR3
1595  007330  105237  001032                    INCB    TEMP                ;DONE FOR ALL DATA PATTERNS?
1596  007334  001405                            BEQ     WBR4                ;YES, EXIT
1597  007336  113737  001032  001033            MOVB    TEMP, TEMP+1        ;NO
1598  007344  000137  007112                    JMP     WBR                 ;REPEAT
1599                                    ;WRITE AND READ A LONG RECORD
1600                                    ;USES MEMORY OCCUPIED BY THE PROGRAM AS A WRITE BUFFER
1601  007350  012777  177160  171432  WBR4:     MOV     #-400.,@BC
1602  007356  012777  002000  171426            MOV     #2000,@CA
```

```
1603  007364  105777  171416                  TSTB    @MTC
1604  007370  100375                          BPL     .-4
1605  007372  012777  060005  171406          MOV     #60005,@MTC     ;WRITE, 800 BPI, GO
1606  007400  105777  171402                  TSTB    @MTC
1607  007404  100375                          BPL     .-4
1608  007406  012777  177777  171374          MOV     #-1,@BC
1609  007414  012777  060013  171364          MOV     #60013,@MTC     ;BACKSPACE 1 RECORD
1610  007422  105777  171360                  TSTB    @MTC
1611  007426  100375                          BPL     .-4
1612  007430  012777  177160  171352          MOV     #-400.,@BC
1613  007436  012777  017346  171346          MOV     #RBUF,@CA
1614  007444  012777  060003  171334          MOV     #60003,@MTC     ;READ, 800 BPI, GO
1615  007452  105777  171330                  TSTB    @MTC
1616  007456  100375                          BPL     .-4
1617  007460  012700  002000                  MOV     #2000,R0
1618  007464  012701  017346                  MOV     #RBUF,R1
1619  007470  022021                  WBR5:   CMP     (R0)+,(R1)+     ;DO A DATA COMPARISON
1620  007472  001401                          BEQ     .+4
1621  007474  104000                          HLT                     ;ERROR, DATA READ NOT EQUAL DATA WRITTEN
1622  007476  022701  020166                  CMP     #RBUF+400.,R1   ;CHECKED WHOLE BUFFER
1623  007502  001372                          BNE     WBR5            ;NO
1624
1625
1626
1627
1628                                  ;*************************************************************************
1629                                  ;TEST PARITY
1630                                  ;WRITE 3 BYTE RECORD ODD PARITY, READ EVEN PARITY
1631                                  ;BIT 14 OF MTRD =1 SHOULD CAUSE LPC TO BE LOADED IN DATA BUFFER AFTER READ
1632  007504  104400                  PAR:    SCOPE
1633  007506  012737  177777  017202          MOV     #-1,WBUF
1634  007514  012737  177777  017204          MOV     #-1,WBUF+2
1635  007522  012777  177775  171260          MOV     #-3,@BC
1636  007530  012777  017202  171254          MOV     #WBUF,@CA
1637  007536  105777  171244                  TSTB    @MTC
1638  007542  100375                          BPL     .-4
1639  007544  012777  060004  171234          MOV     #60004,@MTC     ;WRITE, 800 BPI, 9 TRACK
1640  007552  132777  000001  171244          BITB    #1,@SWR
1641  007560  001403                          BEQ     .+10
1642  007562  042777  020000  171216          BIC     #20000,@MTC     ;MAKE COMMAND 7 TRACK
1643  007570  005277  171212                  INC     @MTC            ;GO
1644  007574  105777  171206                  TSTB    @MTC
1645  007600  100375                          BPL     .-4
1646  007602  012777  177777  171200          MOV     #-1,@BC
1647  007610  012777  060012  171170          MOV     #60012,@MTC     ;BACKSPACE, 9 TRACK
1648  007616  132777  000001  171200          BITB    #1,@SWR
1649  007624  001403                          BEQ     .+10
1650  007626  042777  020000  171152          BIC     #20000,@MTC     ;MAKE COMMAND 7 TRACK
1651  007634  005277  171146                  INC     @MTC            ;GO
1652  007640  105777  171142                  TSTB    @MTC
1653  007644  100375                          BPL     .-4
1654  007646  052777  040000  171142          BIS     #40000,@MTRD
1655  007654  012777  177775  171126          MOV     #-3,@BC
1656  007662  012777  017346  171122          MOV     #RBUF,@CA
1657  007670  012777  064002  171110          MOV     #64002,@MTC
1658  007676  132777  000001  171120          BITB    #1,@SWR
```

```
1659  007704  001403                        BEQ     .+10
1660  007706  042777  020000  171072        BIC     #20000,@MTC     ;MAKE COMMAND 7 TRACK
1661  007714  005277  171066                INC     @MTC            ;GO
1662  007720  105777  171062                TSTB    @MTC
1663  007724  100375                        BPL     .-4
1664  007726  032777  010000  171050        BIT     #10000,@MTS
1665  007734  001001                        BNE     .+4
1666  007736  104000                        HLT                     ;ERROR, PARITY ERROR (BIT 12) NOT =1
1667  007740  017700  171050                MOV     @MTD,R0
1668  007744  042700  177000                BIC     #177000,R0
1669  007750  132777  000001  171046        BITB    #1,@SWR
1670  007756  001005                        BNE     PAR1
1671  007760  022700  000744                CMP     #744,R0
1672  007764  001401                        BEQ     .+4
1673  007766  104000                        HLT                     ;ERROR, LPC NOT =744 OR BIT 14 OF MTRD DID'T CAUSE LPC R
1674  007770  000404                        BR      PAR2
1675  007772  022700  000477        PAR1:   CMP     #477,R0
1676  007776  001401                        BEQ     .+4
1677  010000  104000                        HLT                     ;ERROR, LPC NOT =477 (7 CHANNEL) OR LPC NOT READ
1678
1679
1680                                ;WRITE EVEN PARITY, READ ODD PARITY
1681  010002  012777  177775  171000  PAR2:   MOV     #-3,@BC
1682  010010  012777  017202  170774        MOV     #WBUF,@CA
1683  010016  012777  064004  170762        MOV     #64004,@MTC     ;WRITE, 800 BPI, 9 TRACK
1684  010024  132777  000001  170772        BITB    #1,@SWR
1685  010032  001403                        BEQ     .+10
1686  010034  042777  020000  170744        BIC     #20000,@MTC     ;MAKE 7 TRACK
1687  010042  005277  170740                INC     @MTC            ;GO
1688  010046  105777  170734                TSTB    @MTC
1689  010052  100375                        BPL     .-4
1690  010054  012777  177777  170726        MOV     #-1,@BC
1691  010062  012777  060012  170716        MOV     #60012,@MTC     ;BACKSPACE
1692  010070  132777  000001  170726        BITB    #1,@SWR
1693  010076  001403                        BEQ     .+10
1694  010100  042777  020000  170700        BIC     #20000,@MTC     ;MAKE COMMAND 7 TRACK
1695  010106  005277  170674                INC     @MTC            ;GO
1696  010112  105777  170670                TSTB    @MTC
1697  010116  100375                        BPL     .-4
1698  010120  052777  040000  170670        BIS     #40000,@MTRD
1699  010126  012777  177775  170654        MOV     #-3,@BC
1700  010134  012777  017346  170650        MOV     #RBUF,@CA
1701  010142  012777  060002  170636        MOV     #60002,@MTC     ;READ, 800 BPI, 9 TRACK
1702  010150  132777  000001  170646        BITB    #1,@SWR
1703  010156  001403                        BEQ     .+10
1704  010160  042777  020000  170620        BIC     #20000,@MTC     ;MAKE 7 TRACK
1705  010166  005277  170614                INC     @MTC            ;GO
1706  010172  105777  170610                TSTB    @MTC
1707  010176  100375                        BPL     .-4
1708  010200  032777  010000  170576        BIT     #10000,@MTS
1709  010206  001001                        BNE     .+4
1710  010210  104000                        HLT                     ;ERROR, PARITY ERROR (BIT 12) NOT =1
1711  010212  017700  170576                MOV     @MTD,R0
1712  010216  042700  177000                BIC     #177000,R0
1713  010222  132777  000001  170574        BITB    #1,@SWR
1714  010230  001005                        BNE     PAR3
```

```
1715  010232  022700  000004              CMP     #4,R0
1716  010236  001401                      BEQ     .+4
1717  010240  104000                      HLT                     ;ERROR, LPC NOT =004 OR LPC NOT READ PROPERLY
1718  010242  000404                      BR      PAR4
1719  010244  022700  000077      PAR3:   CMP     #77,R0
1720  010250  001401                      BEQ     .+4
1721  010252  104000                      HLT                     ;ERROR, LPC NOT =77 (7 TRACK)
1722  010254  052777  010000  170524  PAR4:   BIS     #10000,@MTC     ;PWR CLEAR
1723  010262  032777  010000  170514          BIT     #10000,@MTS
1724  010270  001401                      BEQ     .+4
1725  010272  104000                      HLT                     ;ERROR, POWER CLEAR DIDN'T CLEAR PARITY ERROR (BIT 11)
1726
1727
1728                          ;*************************************************************************
1729                          ;TEST TIMER (BIT 15) TO BE COMPLIMENTING
1730  010274  104400                      SCOPE
1731  010276  005000                      CLR     R0
1732  010300  005777  170512              TST     @MTRD
1733  010304  001403                      BEQ     .+10
1734  010306  005200                      INC     R0              ;DELAY LONG TIME
1735  010310  001373                      BNE     .-10            ;
1736  010312  104000                      HLT                     ;ERROR, TIMER (BIT 15) NEVER =0
1737  010314  005000                      CLR     R0
1738  010316  005777  170474              TST     @MTRD
1739  010322  001003                      BNE     .+10
1740  010324  005200                      INC     R0
1741  010326  001373                      BNE     .-10
1742  010330  104000                      HLT                     ; ERROR, TIMER (BIT 15) NEVER =1
1743
1744  010332  132777  000001  170464      BITB    #1,@SWR         ;IS SW0=1 TO INDICATE 7 CHANNEL
1745  010340  001402                      BEQ     .+6             ;NO
1746  010342  000137  011454              JMP     MIT             ;YES SKIP CRC TEST
1747
1748
1749                          ;*************************************************************************
1750                          ;TEST CRC GENERATION AND LPC CHARACTER
1751                          ;PROCEDURE USED IS TO WRITE A 4 BYTE RECORD AND READ IT BACK.
1752                          ;THEN THE CRC WRITTEN IS COMPARED WITH CRC CALCULATED.
1753                          ;THEN RECORD IS READ AGAIN AND LPC SHOULD = CRC
1754
1755
1756                          ;*************************************************************************
1757                          ;TEST IS REPEATED FOR ALL DATA COMBINATIONS.
1758  010346  105037  001032  CRCTST: CLRB    TEMP            ;INITIALIZE DATA
1759  010352  004737  011116  CRCT1:  JSR     PC,CRCPAR       ;GENERATE PARITY
1760  010356  013737  001032  011224        MOV     TEMP,CRXOR1     ;SAVE 1ST DATA BYTE (+PARITY)
1761  010364  013700  001032              MOV     TEMP,R0
1762  010370  004737  011156              JSR     PC,CRCROT       ;ROTATE AND COMPLEMENT
1763  010374  010037  011226              MOV     R0,CRROT1       ;SAVE ROTATE
1764  010400  013701  001032              MOV     TEMP,R1
1765  010404  004737  011212              JSR     PC,CRCXOR       ;XOR 2ND BYTE
1766  010410  010137  011230              MOV     R1,CRXOR2
1767  010414  013700  011230              MOV     CRXOR2,R0
1768  010420  004737  011156              JSR     PC,CRCROT
1769  010424  010037  011232              MOV     R0,CRROT2
1770  010430  013701  001032              MOV     TEMP,R1
```

```
1771  010434  004737  011212                  JSR     PC,CRCXOR       ;XOR 3RD BYTE
1772  010440  010137  011234                  MOV     R1,CRXOR3
1773  010444  013700  011234                  MOV     CRXOR3,R0
1774  010450  004737  011156                  JSR     PC,CRCROT
1775  010454  010037  011236                  MOV     R0,CRROT3
1776  010460  013701  001032                  MOV     TEMP,R1
1777  010464  004737  011212                  JSR     PC,CRCXOR       ;XOR 4TH BYTE
1778  010470  010137  011240                  MOV     R1,CRXOR4
1779  010474  013700  011240                  MOV     CRXOR4,R0
1780  010500  004737  011156                  JSR     PC,CRCROT
1781  010504  010037  011242                  MOV     R0,CRROT4
1782  010510  010001                          MOV     R0,R1           ;COMPLEMENT ALL EXCEPT 4,6
1783  010512  042701  000727                  BIC     #727,R1
1784  010516  005100                          COM     R0
1785  010520  042700  000050                  BIC     #50,R0
1786  010524  050100                          BIS     R1,R0
1787  010526  010037  011244                  MOV     R0,CRCWRT
1788  010532  042737  177000  011244          BIC     #177000,CRCWRT  ;SAVE CRC CALCULATED
1789
1790
1791                                  ;WRITE A FOUR BYTE RECORD
1792                                  ;ALL BYTES ARE = THEREFORE LPC SHOULD = CRC
1793  010540  104400                  CWRITE: SCOPE
1794  010542  113737  001032  017202          MOVB    TEMP,WBUF
1795  010550  113737  001032  017203          MOVB    TEMP,WBUF+1
1796  010556  013737  017202  017204          MOV     WBUF,WBUF+2
1797  010564  012777  017202  170220          MOV     #WBUF,@CA
1798  010572  012777  177774  170210          MOV     #-4,@BC
1799  010600  005077  170202                  CLR     @MTC
1800  010604  105777  170176                  TSTB    @MTC
1801  010610  100375                          BPL     .-4
1802  010612  012777  060005  170166          MOV     #60005,@MTC     ;WRITE, 4 BYTE RECORD, GO
1803  010620  105777  170162                  TSTB    @MTC
1804  010624  100375                          BPL     .-4
1805  010626  012777  177777  170154          MOV     #-1,@BC
1806  010634  042777  000016  170144          BIC     #16,@MTC
1807  010642  052777  000013  170136          BIS     #13,@MTC        ;BACKSPACE
1808  010650  105777  170132                  TSTB    @MTC
1809  010654  100375                          BPL     .-4
1810  010656  012777  017346  170126          MOV     #RBUF,@CA
1811  010664  012777  177774  170116          MOV     #-4,@BC
1812  010672  042777  000016  170106          BIC     #16,@MTC
1813  010700  052777  000003  170100          BIS     #3,@MTC         ;READ, 4 BYTE RECORD, GO
1814  010706  105777  170074                  TSTB    @MTC
1815  010712  100375                          BPL     .-4
1816  010714  023737  017202  017346          CMP     WBUF,RBUF       ;WERE 1ST 2 BYTES WRITTEN AND READ OK?
1817  010722  001401                          BEQ     .+4             ;YES
1818  010724  104000                          HLT                     ;ERROR DATA WRITTEN NOT = DATA READ
1819  010726  023737  017204  017350          CMP     WBUF+2,RBUF+2   ;WERE 2ND 2 BYTES WRITTEN AND READ OK?
1820  010734  001401                          BEQ     .+4             ;YES
1821  010736  104000                          HLT                     ;ERROR, DATA WRITTEN NOT = DATA READ
1822  010740  017700  170050                  MOV     @MTD,R0         ;GET CRC
1823  010744  017701  170046                  MOV     @MTRD,R1        ;GET LPC ERROR
1824  010750  042700  177000                  BIC     #177000,R0      ;MASK CRC
1825  010754  042701  177000                  BIC     #177000,R1      ;MASK LPC ERROR
1826  010760  001401                          BEQ     .+4
```

```
1827  010762  104000                        HLT                     ;ERROR, LPC NOT = 0
1828  010764  020037  011244                CMP     R0,CRCWRT
1829  010770  001401                        BEQ     .+4
1830  010772  104000                        HLT                     ;ERROR CRC WRITTEN NOT = CRC CALCULATED
1831  010774  012777  177777  170006        MOV     #-1,@BC
1832  011002  012777  000013  167776        MOV     #13,@MTC        ;BACKSPACE
1833  011010  105777  167772                TSTB    @MTC
1834  011014  100375                        BPL     .-4
1835  011016  012777  177774  167764        MOV     #-4,@BC
1836  011024  012777  017346  167760        MOV     #RBUF,@CA
1837  011032  052777  040000  167756        BIS     #40000,@MTRD    ;ENABLE LPC READ
1838  011040  012777  060003  167740        MOV     #60003,@MTC     ;READ, 4 BYTE RECORD, GO
1839  011046  105777  167734                TSTB    @MTC
1840  011052  100375                        BPL     .-4
1841
1842
1843  011054  017700  167734                MOV     @MTD,R0
1844  011060  042700  177000                BIC     #177000,R0
1845  011064  020037  011244                CMP     R0,CRCWRT
1846  011070  001401                        BEQ     .+4
1847  011072  104000                        HLT                     ;ERROR, LPC NOT=CRC
1848  011074  005037  011244                CLR     CRCWRT
1849  011100  005077  167712                CLR     @MTRD           ;ENABLE CRC READ
1850  011104  105237  001032                INCB    TEMP            ;+1 TO DATA PATTERN
1851  011110  001456                        BEQ     ZEROCRC
1852  011112  000137  010352                JMP     CRCT1
1853                        ;CALCULATE PARITY OF DATA TO BE WRITTEN IN CRC TEST (MAKE PARITY ODD)
1854  011116  112737  000001  001033  CRCPAR: MOVB    #1,TEMP+1       ;INITIALIZE ODD PARITY
1855  011124  113701  001032                MOVB    TEMP,R1
1856  011130  105701                CRCP1:  TSTB    R1              ;IS DATA=0
1857  011132  001001                        BNE     .+4             ;NO
1858  011134  000207                        RTS     PC              ;YES, NOW TEMP+1 CONTAINS PARITY BIT
1859  011136  106301                        ASLB    R1              ;SHIFT DATA BITS LEFT INTO C BIT
1860  011140  103002                        BCC     .+6             ;WAS BIT=0?
1861  011142  105137  001033                COMB    TEMP+1          ;NO, COMPLEMENT PARITY
1862  011146  042737  177000  001032        BIC     #177000,TEMP
1863  011154  000765                        BR      CRCP1           ;DO AGAIN UNTIL DATA=0
1864                        ;SIMULATE CRC ROTATE, IF CR1 GOES TO 1 COMPLEMENT 4,5,6, AND 7.
1865  011156  042700  177000        CRCROT: BIC     #177000,R0
1866  011162  006000                        ROR     R0
1867  011164  103011                        BCC     CRCR1           ;NO EXIT
1868  011166  052700  000400                BIS     #400,R0         ;MAKE BIT1=1
1869  011172  010001                        MOV     R0,R1
1870  011174  042701  000074                BIC     #74,R1
1871  011200  005100                        COM     R0
1872  011202  042700  000703                BIC     #703,R0
1873  011206  050100                        BIS     R1,R0           ;RECOMBINE COMPLEMENTED BITS
1874  011210  000207                CRCR1:  RTS     PC              ;EXIT
1875                        ;XOR R0 WITH R1, SAVE RESULT IN R1
1876  011212  010103                CRCXOR: MOV     R1,R3
1877  011214  040001                        BIC     R0,R1
1878  011216  040300                        BIC     R3,R0
1879  011220  050001                        BIS     R0,R1
1880  011222  000207                        RTS     PC
1881  011224  000000                CRXOR1: 0
1882  011226  000000                CRROT1: 0
```

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1883  011230  000000                    CRXOR2: 0
1884  011232  000000                    CRROT2: 0
1885  011234  000000                    CRXOR3: 0
1886  011236  000000                    CRROT3: 0
1887  011240  000000                    CRXOR4: 0
1888  011242  000000                    CRROT4: 0
1889  011244  000000                    CRCWRT: 0
1890
1891
1892
1893                                    ;*************************************************************************
1894                                    ;TEST FOR ZERO (0) CRC CHARACTER
1895  011246  104400                    ZEROCRC:        SCOPE
1896  011250  012777  011374  167534            MOV     #WCRCOBUFF,@CA  ;SET CURRENT MEMORY ADDRESS TO BUFFER
1897                                                                    ;CONTAINING '0' CRC PATTERN
1898  011256  012777  177751  167524            MOV     #-27,@BC        ;SET BYTE RECORD COUNTER TO 27(8) BYTES
1899                                                                    ;TO BE WRITTEN
1900  011264  012777  060005  167514            MOV     #60005,@MTC     ;800 BPI,9-CHANNEL,UNIT 1,WRITE,GO
1901  011272  105777  167510                    TSTB    @MTC            ;CONTROL UNIT READY?
1902  011276  100375                            BPL     .-4             ;NO - WAIT
1903  011300  012777  177777  167502            MOV     #-1,@BC         ;SET BYTE RECORD COUNTER FOR A
1904                                                                    ;BACKSPACE OF 1 RECORD
1905  011306  012777  060013  167472            MOV     #60013,@MTC     ;BACKSPACE 1 RECORD!!
1906  011314  105777  167466                    TSTB    @MTC            ;CONTROL UNIT READY?
1907  011320  100375                            BPL     .-4             ;NO - WAIT
1908                                    ;AT THIS POINT WE MUST READ THE DATA JUST WRITTEN IN ORDER TO
1909                                    ;GET THE CRC CHARACTER INTO THE MAGTAPE DATA BUFFER
1910  011322  012777  011424  167462            MOV     #RCRCOBUFF,@CA  ;SET CURRENT MEMORY ADDRESS TO DUMP THE
1911                                                                    ;PATTERN JUST WRITTEN
1912  011330  012777  177751  167452            MOV     #-27,@BC        ;SET BYTE RECORD COUNTER TO 27(8) BYTES
1913                                                                    ;TO BE READ
1914  011336  012777  060003  167442            MOV     #60003,@MTC     ;800 BPI,9-CHANNEL,UNIT 0,READ,GO
1915  011344  105777  167436                    TSTB    @MTC            ;CONTROL UNIT READY?
1916  011350  100375                            BPL     .-4             ;NO - WAIT
1917  011352  017700  167436                    MOV     @MTD,R0         ;GET THE GENERATED CRC CHARACTER
1918  011356  042700  177000                    BIC     #177000,R0      ;MASK UPPER BYTE TO SEGREGATE THE
1919                                                                    ;TOTAL CRC CHARACTER
1920  011362  001401                            BEQ     1$              ;BRANCH IF IT IS 0
1921  011364  104000                            HLT                     ;CRC GENERATED NOT 0!!
1922  011366  104400                    1$:     SCOPE
1923  011370  000137  011454                    JMP     @#MIT           ;GO TO MANUAL INTERVENTION TESTS
1924  011374                            WCRCOBUFF:
1925  011374  020011  041056  052131    20011,41056,52131,4505,20040,41440
1926  011402  004505  020040  041440
1927  011410  026122  043114  046054    26122,43114,46054,26106,6460,00012
1928  011416  026106  006460  000012
1929  011424                            RCRCOBUFF:
1930  011424  000014                            .BLKW 14                ;RESERVE 12 WORDS FOR THE READ BUFFER
1931
1932
1933
1934                                    ;*************************************************************************
1935                                    ;MANUAL INTERVENTION TESTS
1936  011454  012777  060017  167324    MIT:    MOV     #60017,@MTC     ;REWIND
1937  011462  105777  167320                    TSTB    @MTC
1938  011466  100375                            BPL     .-4
```

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1939  011470  032777  002000  167326          BIT     #2000,@SWR
1940  011476  001402                          BEQ     .+6
1941  011500  000137  012672                  JMP     TSTEND
1942  011504  012702  014411                  MOV     #MSG3,R2
1943  011510  004737  013462                  JSR     PC,TOP          ;PRINT INSTRUCTIONS TO SELECT OR INHIBIT TEST
1944  011514  000000                          HALT                    ;WAIT FOR OPERATOR TO CONTINUE
1945  011516  104002                          CKSWR                   ;CHECK FOR A CNTL G
1946  011520  032777  002000  167276          BIT     #2000,@SWR              ;INHIBIT TESTS?
1947  011526  001402                          BEQ     MITA            ;NO
1948  011530  000137  012672                  JMP     TSTEND          ;YES
1949
1950
1951                                  ;*************************************************************************
1952                                  ;MAKE SURE UNIT 0 SELECTED, ONLINE, AT BOT
1953  011534  012702  014627          MITA:   MOV     #MSG3A,R2
1954  011540  004737  013462                  JSR     PC,TOP          ;REQUEST TS03 RESPONSE
1955  011544  000000                          HALT
1956  011546  104400                          SCOPE
1957  011550  005077  167232                  CLR     @MTC            ;SELECT UNIT 0
1958  011554  105777  167226                  TSTB    @MTC
1959  011560  100401                          BMI     .+4
1960  011562  104000                          HLT                     ;ERROR, CU READY NOT SET, IS UNIT 0 SELECTED?
1961  011564  104400                          SCOPE
1962  011566  032777  000040  167210          BIT     #40,@MTS
1963  011574  001001                          BNE     .+4
1964  011576  104000                          HLT                     ;ERROR, BOT AND TUR NOT SET, IS UNIT 0 ON LINE AT BOT?
1965
1966
1967                                  ;*************************************************************************
1968                                  ;TEST UNIT SELECT SWITCH
1969  011600  112737  000061  014722          MOVB    #61,MSG4+16     ;INITIALIZE TYPEOUT FOR UNIT 1
1970  011606  012737  000400  001032          MOV     #400,TEMP       ;INITIALIZE UNIT SELECT #1
1971  011614  012702  014704          USS:    MOV     #MSG4,R2
1972  011620  004737  013462                  JSR     PC,TOP
1973  011624  000000                          HALT
1974  011626  104400                          SCOPE
1975  011630  013777  001032  167150          MOV     TEMP,@MTC       ;SELECT UNIT
1976  011636  005000                          CLR     R0              ;INIT DELAY
1977  011640  032777  000100  167136  USS1:   BIT     #100,@MTS       ;IS SELECT REMOTE SET
1978  011646  001003                          BNE     USS2            ;YES
1979  011650  005200                          INC     R0              ;NO, HAVE WE WAITED LONG ENOUGH?
1980  011652  001372                          BNE     USS1            ;NO, WAIT SOME MORE
1981  011654  104000                          HLT                     ;ERROR, PROPER UNIT NOT SELECTED
1982  011656  105237  014722          USS2:   INCB    MSG4+16         ;INCREMENT UNIT #
1983  011662  062737  000400  001032          ADD     #400,TEMP
1984  011670  032777  001000  167126          BIT     #1000,@SWR      ;SEE IF TS03
1985  011676  001405                          BEQ     USS3            ;IF NOT: BR
1986  011700  022737  001000  001032          CMP     #1000,TEMP      ;SEE IF DONE ALL TS03 UNITS
1987  011706  001342                          BNE     USS             ;IF NOT: BR
1988  011710  000404                          BR      USS4
1989  011712  022737  004000  001032  USS3:   CMP     #4000,TEMP      ;DONE ALL UNITS?
1990  011720  001335                          BNE     USS             ;NO
1991
1992
1993                                  ;*************************************************************************
1994                                  ;TEST ONLINE-OFFLINE SWITCH
```

```
1995  011722  012702  014744          USS4:   MOV     #MSG5,R2
1996  011726  004737  013462                  JSR     PC,TOP
1997  011732  000000                          HALT
1998  011734  104400                          SCOPE
1999  011736  005077  167044                  CLR     @MTC            ;SELECT UNIT 0
2000  011742  032777  000100  167034          BIT     #100,@MTS       ;
2001  011750  001401                          BEQ     .+4
2002  011752  104000                          HLT                     ;ERROR, SELECT REMOTE SET, UNIT NOT OFF-LINE
2003
2004
2005
2006
2007
2008                                  ;*************************************************************************
2009                                  ;TEST WRITE LOCK SWITCH
2010  011754  012702  015016                  MOV     #MSG6,R2
2011  011760  004737  013462                  JSR     PC,TOP
2012  011764  000000                          HALT
2013  011766  104400                          SCOPE
2014  011770  005077  167012                  CLR     @MTC            ;SELECT UNIT 0
2015  011774  032777  000004  167002          BIT     #4,@MTS         ;IS WRITE LOCK SET?
2016  012002  001001                          BNE     .+4             ;YES
2017  012004  104000                          HLT                     ;ERROR, WRL (BIT 2) NOT SET WITH WRITE LOCK RING REMOVED
2018
2019
2020                                  ;*************************************************************************
2021                                  ;TEST WRITE WITH WRITE LOCK RING REMOVED TO CAUSE ILLEGAL COMMAND
2022  012006  104400                          SCOPE
2023  012010  005077  166774                  CLR     @BC
2024  012014  005077  166772                  CLR     @CA
2025  012020  012777  060005  166760          MOV     #60005,@MTC
2026  012026  105777  166754                  TSTB    @MTC
2027  012032  100375                          BPL     .-4
2028  012034  005777  166746                  TST     @MTC
2029  012040  100401                          BMI     .+4
2030  012042  104000                          HLT                     ;ERROR (BIT 15) NOT SET AFTER WRITE WITH WRITE LOCK SET
2031  012044  005777  166734                  TST     @MTS
2032  012050  100401                          BMI     .+4
2033  012052  104000                          HLT                     ;ERROR,ILLEGAL COMMAND (BIT 15) NOT SET AFTER WRITE WITH
2034
2035
2036                                  ;*************************************************************************
2037                                  ;TEST OFFLINE FUNCTION TO SET UNIT OFFLINE AND REWIND TO BOT
2038  012054  104400                          SCOPE
2039  012056  012702  015151                  MOV     #MSG7,R2
2040  012062  004737  013462                  JSR     PC,TOP
2041  012066  032777  001000  166730          BIT     #1000,@SWR      ;SEE IF TS03
2042  012074  001004                          BNE     1$              ;IF SO: BR
2043  012076  012702  015236                  MOV     #MSG7A,R2
2044  012102  004737  013462                  JSR     PC,TOP
2045  012106  012702  015312          1$:     MOV     #MSG7B,R2
2046  012112  004737  013462                  JSR     PC,TOP
2047  012116  000000                          HALT
2048  012120  104002                          CKSWR                   ;CHECK FOR CNTL G
2049  012122  012777  010000  166656          MOV     #10000,@MTC     ;POWER CLEAR
2050  012130  105777  166652                  TSTB    @MTC
```

```
2051  012134  100375                          BPL     .-4
2052                                          ;**********************
2053  012136  032777  177701  166640  CHGI1:  BIT     #177701,@MTS
2054                                          ;**********************
2055  012144  001001                          BNE     .+4
2056  012146  104000                          HLT                     ;ERROR, UNIT 0 NOT ON LINE, OFF BOT
2057  012150  104400                          SCOPE
2058  012152  012777  000001  166626          MOV     #1,@MTC         ;GO OFFLINE
2059  012160  105777  166622                  TSTB    @MTC
2060  012164  100375                          BPL     .-4
2061  012166  032777  000100  166610          BIT     #100,@MTS
2062  012174  001401                          BEQ     .+4
2063  012176  104000                          HLT                     ;ERROR, SELR (BIT 6) NOT CLEARED BY OFFLINE COMMAND
2064                                  ;RE-SET UNIT
2065  012200  012702  015426                  MOV     #MSG8,R2
2066  012204  004737  013462                  JSR     PC,TOP
2067  012210  000000                          HALT
2068  012212  104002                          CKSWR                   ;CHECK FOR CNTL G
2069
2070
2071
2072                                  ;*************************************************************************
2073                                  ;TEST BUS GRANT LATE (BIT 11) TO=1
2074                                  ;HALT PROCESSOR DURING AN NPR SEQUENCE
2075  012214  012702  015507                  MOV     #MSG9,R2
2076  012220  004737  013462                  JSR     PC,TOP
2077  012224  000000                          HALT
2078  012226  104002                          CKSWR                   ;CHECK FOR CNTL G
2079  012230  032777  000002  166566          BIT     #2,@SWR
2080  012236  001047                          BNE     BGL1
2081  012240  012702  015627                  MOV     #MSG10,R2
2082  012244  004737  013462                  JSR     PC,TOP
2083  012250  104400                          SCOPE
2084  012252  005077  166530                  CLR     @MTC
2085  012256  105777  166524                  TSTB    @MTC
2086  012262  100375                          BPL     .-4
2087  012264  012777  177756  166516          MOV     #-18.,@BC
2088  012272  012777  017202  166512          MOV     #WBUF,@CA
2089  012300  012777  060005  166500          MOV     #60005,@MTC     ;WRITE, 800 BPI, GO
2090  012306  022777  017204  166476          CMP     #WBUF+2,@CA
2091  012314  003774                          BLE     .-6             ;WAIT FOR NPR SEQUENCE TO START
2092  012316  000000                          HALT                    ;CAUSE BGL, WAIT FOR CONTINUE
2093  012320  104002                          CKSWR                   ;CHECK FOR CNTL G
2094  012322  032777  004000  166454          BIT     #4000,@MTS
2095  012330  001001                          BNE     .+4
2096  012332  104000                          HLT                     ;ERROR, BGL (BIT 11) NOT=1.
2097  012334  052777  010000  166444          BIS     #10000,@MTC     ;POWER CLEAR
2098  012342  032777  004000  166434          BIT     #4000,@MTS
2099  012350  001401                          BEQ     .+4
2100  012352  104000                          HLT                     ;ERROR, POWER CLEAR DIDN'T CLEAR BGL (BIT 11)
2101  012354  000443                          BR      LASTTEST
2102  012356  012702  015675          BGL1:   MOV     #MSG11,R2
2103  012362  004737  013462                  JSR     PC,TOP
2104  012366  104400                          SCOPE
2105  012370  005077  166412                  CLR     @MTC
2106  012374  105777  166406                  TSTB    @MTC
```

```
2107  012400  100375                    BPL     .-4
2108  012402  012777  177756  166400    MOV     #-18.,@BC
2109  012410  012777  017202  166374    MOV     #WBUF,@CA
2110  012416  000000                    HALT
2111  012420  012777  060005  166360    MOV     #60005,@MTC     ;WRITE, 800 BPI, GO
2112  012426  000240                    NOP
2113  012430  000240                    NOP
2114  012432  032777  004000  166344    BIT     #4000,@MTS
2115  012440  001001                    BNE     .+4
2116  012442  104000                    HLT                     ;ERROR, BGL (BIT 11) NOT= 1
2117  012444  052777  010000  166334    BIS     #10000,@MTC     ;POWER CLEAR
2118  012452  032777  004000  166324    BIT     #4000,@MTS
2119  012460  001401                    BEQ     .+4
2120  012462  104000                    HLT                     ;ERROR, POWER CLEAR DIDN'T CLEAR BGL (BIT 11)
2121
2122
2123                          ;*************************************************************************
2124                          ;TEST FOR ILC ERROR ON DELAYED UNIT CHANGE
2125  012464  104400          LASTTEST:       SCOPE
2126  012466  012702  016163                  MOV     #MSG12,R2       ;FIND OUT IF WE HAVE A 2ND TRANSPORT
2127  012472  004737  013462                  JSR     PC,TOP
2128  012476  000000                          HALT
2129  012500  104002                          CKSWR                   ;CHECK FOR CNTL G
2130  012502  032777  000004  166314          BIT     #4,@SWR         ;DO WE HAVE A 2ND TRANSPORT?
2131  012510  001470                          BEQ     TSTEND          ;BRANCH IF NO
2132  012512  012702  016265                  MOV     #MSG13,R2       ;GET OPERATOR TO SELECT UNIT 1 ON 1ST
2133                                                                  ;TRANSPORT, ON-LINE
2134  012516  004737  013462                  JSR     PC,TOP
2135  012522  032777  001000  166274          BIT     #1000,@SWR      ;SEE IF TS03
2136  012530  001004                          BNE     1$              ;IF SO: BR
2137  012532  012702  016340                  MOV     #MSG13A,R2
2138  012536  004737  013462                  JSR     PC,TOP
2139  012542  012702  016413          1$:     MOV     #MSG13B,R2
2140  012546  004737  013462                  JSR     PC,TOP
2141  012552  000000                          HALT
2142  012554  104002                          CKSWR                   ;CHECK FOR CNTL G
2143  012556  012702  016664                  MOV     #MSG16,R2       ;GET OPERATOR TO SELECT UNIT 0 ON 2ND
2144                                                                  ;TRANSPORT, ON-LINE
2145  012562  004737  013462                  JSR     PC,TOP
2146  012566  000000                          HALT
2147  012570  104002                          CKSWR                   ;CHECK FOR CNTL G
2148  012572  005077  166210                  CLR     @MTC            ;SELECT UNIT 0
2149                                                                  ;IT SHOULD BE POWERED UP AND
2150                                                                  ;ON LINE
2151  012576  012700  007777                  MOV     #7777,R0        ;DELAY BETWEEN CHANGING UNITS
2152  012602  005300                  3$:     DEC     R0
2153  012604  001402                          BEQ     4$              ;BRANCH AFTER DELAY
2154  012606  000137  012602                  JMP     @#3$            ;KEEP DELAYING
2155  012612  012777  060417  166166  4$:     MOV     #60417,@MTC     ;LOAD THE COMMAND REGISTER WITH
2156                                                                  ;800 BPI (7 OR 9-CHANNEL), REWIND, GO
2157                                                                  ;THIS COMMAND WILL CHANGE UNITS AND REWIND
2158  012620  105777  166162                  TSTB    @MTC            ;CONTROL UNIT READY?
2159  012624  100375                          BPL     .-4             ;NO - WAIT
2160  012626  005777  166152                  TST     @MTS            ;ILLEGAL COMMAND ERROR PRESENT?
2161  012632  100401                          BMI     5$              ;BRANCH IF YES
2162  012634  000410                          BR      6$
```

```
2163  012636  104000                  5$:     HLT                     ;ILC BIT SET - SHOULDN'T BE!!
2164  012640  052777  010000  166140          BIS     #10000,@MTC     ;ISSUE A POWER CLEAR!!
2165  012646  005777  166132                  TST     @MTS            ;ILLEGAL COMMAND BIT CLEAR?
2166  012652  100001                          BPL     .+4             ;BRANCH IF YES
2167  012654  104000                          HLT                     ;POWER CLEAR DIDN'T CLEAR ILC BIT
2168  012656  012702  016762          6$:     MOV     #MSG17,R2       ;GET OPERATOR TO RESELECT UNIT 1 TO 0
2169                                                                  ;AND TURN 2ND TRANSPORT OFF-LINE
2170  012662  004737  013462                  JSR     PC,TOP
2171  012666  000000                          HALT
2172  012670  104400                          SCOPE
2173                                  ;END OF PASS MESSAGE
2174  012672  012702  017076          TSTEND: MOV     #MSG20,R2
2175  012676  004737  013462                  JSR     PC,TOP          ;PRINT END OF PASS
2176  012702  013702  001036                  MOV     PCNTR,R2
2177  012706  004737  013202                  JSR     PC,OCTPRT       ;PRINT END OF PASS NUMBER
2178  012712  005237  001036                  INC     PCNTR           ;BUMP PASS COUNTER
2179  012716  105777  166064                  TSTB    @MTC
2180  012722  100375                          BPL     .-4
2181  012724  012777  060017  166054          MOV     #60017,@MTC             ;REWIND UNIT
2182  012732  105777  166050                  TSTB    @MTC
2183  012736  100375                          BPL     .-4
2184  012740  006077  166040                  ROR     @MTS
2185  012744  103375                          BCC     .-4
2186  012746  013702  000042                  MOV     @#42,R2
2187  012752  001405                          BEQ     THERE
2188  012754  000005                          RESET
2189  012756  004712                  $ENDAD: JSR     PC,(R2)
2190  012760  000240                          NOP
2191  012762  000240                          NOP
2192  012764  000240                          NOP
2193  012766  000240                  THERE:  NOP
2194  012770  032777  004000  166026          BIT     #4000,@SWR              ;SEE IF SINGLE PASS
2195  012776  001401                          BEQ     1$                      ;IF NOT: BR
2196  013000  000000                          HALT
2197  013002  000137  001220          1$:     JMP     BEGIN                   ;START OF TEST WITH TRACE OFF
2198
2199                                  ;ENTERED WITH SYSTEM TRAP CALL(HLT)
2200                                  ;PRINT PC, STATUS REGISTER, COMMAND REGISTER, BYTE COUNT, CURRENT ADDRESS, DATA BUFFER
2201  013006  037727  166012  020000  PRINT:  BIT     @SWR,#20000             ;TEST FOR INHIBIT PRINT OUT
2202  013014  001401                          BEQ     .+4                     ;BRANCH TO PRINT
2203  013016  000466                          BR      1$                      ;INHIBIT, RETURN TO MAIN STREAM
2204  013020  012702  014274                  MOV     #MSG1,R2
2205  013024  005737  013200                  TST     PRINT1
2206  013030  001402                          BEQ     .+6
2207  013032  012702  014406                  MOV     #MSG2,R2
2208  013036  004737  013462                  JSR     PC,TOP                  ;PRINT ERROR HEADING
2209  013042  005237  013200                  INC     PRINT1
2210  013046  011602                          MOV     (SP),R2
2211  013050  162702  000002                  SUB     #2,R2
2212  013054  004737  013202                  JSR     PC,OCTPRT               ;PRINT PC
2213  013060  017702  165720                  MOV     @MTS,R2
2214  013064  004737  013202                  JSR     PC,OCTPRT               ;PRINT STATUS REGISTER
2215  013070  017702  165712                  MOV     @MTC,R2
2216  013074  004737  013202                  JSR     PC,OCTPRT               ;PRINT COMMAND REGISTER
2217  013100  017702  165704                  MOV     @BC,R2
2218  013104  004737  013202                  JSR     PC,OCTPRT               ;PRINT BYTE COUNT
```

```
2219  013110  017702  165676                  MOV     @CA,R2
2220  013114  004737  013202                  JSR     PC,OCTPRT               ;PRINT CURRENT ADDRESS
2221  013120  017702  165670                  MOV     @MTD,R2
2222  013124  042702  177000                  BIC     #177000,R2
2223  013130  004737  013202                  JSR     PC,OCTPRT               ;PRINT DATA BUFFER
2224  013134  017702  165656                  MOV     @MTRD,R2
2225  013140  004737  013202                  JSR     PC,OCTPRT               ;PRINT TU10 READ LINES
2226  013144  013702  001032                  MOV     TEMP,R2
2227  013150  004737  013202                  JSR     PC,OCTPRT               ;PRINT TEMP
2228  013154  013702  011244                  MOV     CRCWRT,R2
2229  013160  004737  013202                  JSR     PC,OCTPRT
2230  013164  005777  165634                  TST     @SWR                    ;CHECK @SWR FOR HALT SWITCH
2231  013170  100001                          BPL     1$
2232  013172  000000                          HALT                            ;HALT ON ERROR UP
2233  013174  104002                  1$:     CKSWR                           ;CHECK FOR CNTL G
2234  013176  000207                          RTS     PC                              ;RETURN TO MAINLINE
2235  013200  000000                  PRINT1: 0
2236                                  ;PRINT OCTAL VALUE IN REGISTER2
2237  013202  012737  000060  013314  OCTPRT: MOV     #'0,CHAR                ;INITIALIZE 1ST NUMBER AS 0
2238  013210  005702                          TST     R2                      ;IS VALUE POSITIVE
2239  013212  100003                          BPL     OCT1                    ;YES PRINT 0
2240  013214  012737  000061  013314          MOV     #'1,CHAR                ;NO PRINT 1
2241  013222  004737  013316          OCT1:   JSR     PC,OCTP
2242  013226  006102                          ROL     R2
2243  013230  006102                          ROL     R2
2244  013232  012737  177773  013312          MOV     #-5,OCT                 ;COUNT 5 DIGITS
2245  013240  006102                  OCT2:   ROL     R2
2246  013242  006102                          ROL     R2
2247  013244  006102                          ROL     R2
2248  013246  010237  013314                  MOV     R2,CHAR                 ;SAVE DIGIT
2249  013252  042737  177770  013314          BIC     #177770,CHAR            ;CLEAR OTHER BITS
2250  013260  052737  000060  013314          BIS     #60,CHAR                ;MAKE ASCII DIGIT
2251  013266  006002                          ROR     R2
2252  013270  004737  013316                  JSR     PC,OCTP                 ;PRINT
2253  013274  006102                          ROL     R2
2254  013276  005237  013312                  INC     OCT                     ;+1 TO DIGIT COUNT
2255  013302  001356                          BNE     OCT2                    ;NOT DONE
2256  013304  004737  013334                  JSR     PC,SP3
2257  013310  000207                          RTS     PC                      ;EXIT
2258  013312  000000                  OCT:    0
2259  013314  000000                  CHAR:   0
2260  013316  105777  165500          OCTP:   TSTB    @TPS
2261  013322  100375                          BPL     .-4                     ;WAIT FOR READY
2262  013324  013777  013314  165466          MOV     CHAR,@TPB               ;PRINT
2263  013332  000207                          RTS     PC
2264
2265                                  ;TYPE 3 SPACES
2266  013334  012702  013346          SP3:    MOV     #SP3A,R2
2267  013340  004737  013462                  JSR     PC,TOP
2268  013344  000207                          RTS     PC
2269  013346  020057  027440          SP3A:   .ASCII  ;/  /;
2270                                          .EVEN
2271
2272                                  ;SCOPE LOOP ROUTINE ENTERED BY USER TRAP
2273  013352  104002                  SCOPEA: CKSWR                           ;CHECK FOR CNTL G
2274  013354  032777  040000  165442          BIT     #40000,@SWR
```

```
2275  013362  001003                    BNE     SCOPEB                  ;SCOPE, BIT IS A ONE
2276  013364  011637  013460            MOV     @SP,RETURN              ;NO - SAVE PC FOR NEXT TIME
2277  013370  000002                    RTI                             ;RETURN IN SEQUENCE
2278  013372  022606            SCOPEB: CMP     (SP)+,SP                        ;REPOSITION THE STACK
2279  013374  012637  177776            MOV     (SP)+,CC
2280  013400  000177  000054            JMP     @RETURN                 ;SCOPE RETURN
2281
2282                                    ;SCOPE OR/AND ITERATION LOOP FOR EACH TEST 4000 TIMES
2283  013404  104002            SCOPEC: CKSWR                           ;CHECK FOR CNTL G
2284  013406  032777  040000  165410    BIT     #40000,@SWR             ;TEST SWR FOR SCOPE
2285  013414  001366                    BNE     SCOPEB                  ;YES SCOPE
2286  013416  032777  010000  165400    BIT     #10000,@SWR             ;NO - TEST FOR ITERATION
2287  013424  001007                    BNE     SCOPEG                  ;INHIBIT ITERATION
2288  013426  023737  013456  001034    CMP     SCOPEF,ICOUNT
2289  013434  001403                    BEQ     SCOPEG                  ;EXIT - DONE
2290  013436  005237  013456            INC     SCOPEF                  ;INCREMENT COUNT
2291  013442  000753                    BR      SCOPEB                  ;LOOP SOME MORE
2292  013444  005037  013456    SCOPEG: CLR     SCOPEF                  ;CLEAR COUNT
2293  013450  011637  013460            MOV     @SP,RETURN              ;SAVE SCOPE RETURN POINTER
2294  013454  000002                    RTI                             ;RETURN INLINE-NEXT TEST
2295  013456  000000    SCOPEF: 0                                       ;COUNT LOCATION FOR ITERATION LOOP
2296  013460  001220    RETURN: BEGIN                                   ;ADDRESS OF LAST TEST
2297                                    ;MOV ADDRESS OF MESSAGE TO REGISTER 2
2298                                    ;THEN JSR PC,TOP
2299  013462  142777  000177  165332    TOP:    BICB    #177,@TPS              ;CLR INT FLAG
2300  013470  112237  013562            MOVB    (R2)+,EOMK              ;MOVE IN EOM MARKER
2301  013474  121237  013562    TOP1:   CMPB    @R2,EOMK                ;COMPARE FOR EOM
2302  013500  001001                    BNE     .+4                     ;NO
2303  013502  000207                    RTS     PC                      ;YES, EXIT
2304  013504  121227  000100            CMPB    @R2,#'@
2305  013510  001406                    BEQ     TOP2
2306  013512  105777  165304            TSTB    @TPS                    ;CK TTY
2307  013516  100375                    BPL     .-4                     ;WAIT FOR DONE
2308  013520  112277  165274            MOVB    (R2)+,@TPB              ;MOVE CHARACTER
2309  013524  000763                    BR      TOP1                    ;BRANCH BACK
2310  013526  105777  165270    TOP2:   TSTB    @TPS
2311  013532  100375                    BPL     .-4
2312  013534  112777  000215  165256    MOVB    #215,@TPB               ;SEND CARRIAGE RETURN
2313  013542  105777  165254            TSTB    @TPS
2314  013546  100375                    BPL     .-4
2315  013550  112777  000212  165242    MOVB    #212,@TPB               ;SEND LINE FEED
2316  013556  005202                    INC     R2                      ;INCRMTN R2
2317  013560  000745                    BR      TOP1                    ;NO EOM, SO LOOP
2318  013562     000    EOMK:   .BYTE   0
2319        013564    .EVEN
2320
2321
2322
2323                                    ;*****************************************************************************
2324                                    ;SOFTWARE SWITCH REGISTER CHANGE ROUTINE
2325
2326  013564  022737  000176  001024  CKSWRR: CMP     #SWREG,SWR              ;SOFTWARE SWITCH REG PRESENT
2327  013572  001041                    BNE     OUT                     ;NO, GET OUT
2328
2329  013574  105777  165226            TSTB    @TKS                    ;YES,WAIT FOR
2330  013600  100036                    BPL     OUT                     ;READY, GET CHARACTER
```

```
2331  013602  017737  165222  014104          MOV     @TKB,TIB                ;AND STRIP OFF
2332  013610  042737  177600  014104          BIC     #177600,TIB             ;THE GARBAGE
2333  013616  022737  000007  014104          CMP     #7,TIB          ;IS IT A <^G>
2334  013624  001024                          BNE     OUT
2335  013626  012702  017154                  MOV     #$CNTG,R2
2336  013632  004737  013462                  JSR     PC,TOP
2337  013636  012702  017162          CNTLU:  MOV     #$MSWR,R2
2338  013642  004737  013462                  JSR     PC,TOP
2339  013646  017702  165152                  MOV     @SWR,R2
2340  013652  004737  013202                  JSR     PC,OCTPRT
2341  013656  012702  017171                  MOV     #$MNEW,R2
2342  013662  004737  013462                  JSR     PC,TOP
2343  013666  005037  014102                  CLR     @#TEMPST
2344  013672  004737  013700                  JSR     PC,$READ                ;GO READ A LINE
2345  013676  000207                  OUT:    RTS     PC                      ;RETURN TO MAIN BODY OF PROGRAM
2346
2347  013700  005037  014102          $READ:  CLR     TEMPST
2348  013704  012737  000007  014100          MOV     #7,COUNT
2349  013712  004737  014132          1$:     JSR     PC,TTIN         ;GO  READ A CHARACTER
2350  013716  042737  177600  014104          BIC     #177600,TIB     ;STRIP OFF GARBAGE
2351  013724  122737  000025  014104          CMPB    #25,TIB         ;IS IT A ^U?
2352  013732  001002                          BNE     2$              ;BRANCH IF NOT
2353  013734  005726                  3$:     TST     (SP)+           ;POP THE STACK
2354  013736  000737                          BR CNTLU                ;START OVER
2355  013740  122737  000015  014104  2$:     CMPB    #15,TIB         ;IS IT A <CR>?
2356  013746  001012                          BNE     4$              ;BRANCH IF NOT
2357  013750  012702  014406                  MOV     #MSG2,R2                ;DO A CRLF
2358  013754  004737  013462                  JSR     PC,TOP
2359  013760  022737  000007  014100          CMP     #7,COUNT        ;WAS IT FIRST CHARACTER
2360  013766  001037                          BNE     7$              ;CHANGE SWR IF NOT FIRST CR
2361  013770  005726                  8$:     TST     (SP)+           ;POP THE STACK
2362  013772  000741                          BR      OUT             ;GET OUT
2363  013774  122737  000060  014104  4$:     CMPB    #60,TIB
2364  014002  003004                          BGT     5$
2365  014004  122737  000067  014104          CMPB    #67,TIB
2366  014012  002005                          BGE     6$
2367  014014  012702  017177          5$:     MOV     #$QUEST,R2
2368  014020  004737  013462                  JSR     PC,TOP
2369  014024  000743                          BR      3$              ;START OVER IF NOT LEGAL CHARACTER
2370  014026  006337  014102          6$:     ASL     TEMPST
2371  014032  006337  014102                  ASL     TEMPST
2372  014036  006337  014102                  ASL     TEMPST
2373  014042  142737  000060  014104          BICB    #60,TIB         ;GET NITTY-GRITTY
2374  014050  153737  014104  014102          BISB    TIB,TEMPST
2375  014056  005337  014100                  DEC     COUNT           ;ONLY WANT 6   DIGITS
2376  014062  001754                          BEQ     5$
2377  014064  000712                          BR      1$
2378  014066  013777  014102  164730  7$:     MOV     TEMPST,@SWR     ;CHANGE SWITCH REGISTER CONTENTS
2379  014074  000735                          BR      8$
2380
2381  014076  000000                  RDSW:   0
2382  014100  000000                  COUNT:  0
2383  014102  000000                  TEMPST: 0
2384  014104  000000                  TIB:    0
2385
2386
```

```
                        ;*****************************************************************************
                        ;TRAP HANDLER
014106  011666  000002  TRAP30: MOV     @SP,2(6)
014112  162716  000002         SUB     #2,@SP
014116  013646                 MOV     @(6)+,-(6)
014120  062716  110126         ADD     #TABLE-104000,@SP
014124  013607                 MOV     @(SP)+,PC
014126  013006          TABLE:  PRINT
014130  013564                 CKSWRR
        104000          HLT=    104000
        104002          CKSWR=  104002


                        ;*****************************************************************************
                        ;TTY READ SUBROUTINE

014132  005077  164670  TTIN:   CLR     @TKS
014136  005077  164666         CLR     @TKB
014142  005037  014104         CLR     TIB
014146  005277  164654         INC     @TKS
014152  105777  164650  TTIN1:  TSTB    @TKS
014156  100375                 BPL     TTIN1
014160  017737  164644  014104         MOV     @TKB,TIB
014166  105777  164630  TTIN2:  TSTB    @TPS
014172  100375                 BPL     TTIN2
014174  113777  014104  164616         MOVB    TIB,@TPB
014202  000207                 RTS     PC
```

```
 2415  014204  040057  055103  046524  MSG0:   .ASCII  ;/@CZTMAI0 TM,A,B-11 INSTR TST/;
 2416  014212  044501  020060  046524
 2417  014220  040454  041054  030455
 2418  014226  020061  047111  052123
 2419  014234  020122  051524  027524
 2420  014242  040057  042523  020124  MSG01:  .ASCII  ;/@SET SW0=1 IF 7 CHANNEL@/;
 2421  014250  053523  036460  020061
 2422  014256  043111  033440  041440
 2423  014264  040510  047116  046105
 2424  014272  027500
 2425  014274  040057  020040  041520  MSG1:   .ASCII  ;/@  PC    STATUS  COMAND   BYTE     CA    DATA B  READ L   TEMP  CRC CA
 2426  014302  020040  020040  052123
 2427  014310  052101  051525  020040
 2428  014316  047503  040515  042116
 2429  014324  020040  041040  052131
 2430  014332  020105  020040  020040
 2431  014340  040503  020040  020040
 2432  014346  040504  040524  041040
 2433  014354  020040  042522  042101
 2434  014362  046040  020040  052040
 2435  014370  046505  020120  041440
 2436  014376  041522  041440  046101
 2437  014404  027500
 2438  014406  040057     057          MSG2:   .ASCII  ;/@/;
 2439  014411     057  052100  020117  MSG3:   .ASCII  ;/@TO INHIBIT MANUAL INTERVENTION TEST:  SET SW10=1 AND PRESS CONTINUE;
 2440  014416  047111  044510  044502
 2441  014424  020124  040515  052516
 2442  014432  046101  044440  052116
 2443  014440  051105  042526  052116
 2444  014446  047511  020116  042524
 2445  014454  052123  020072  051440
 2446  014462  052105  051440  030527
 2447  014470  036460  020061  047101
 2448  014476  020104  051120  051505
 2449  014504  020123  047503  052116
 2450  014512  047111  042525
 2451  014516  047500  044124  051105          .ASCII  ;@OTHERWISE SET SW10=0, SELECT UNIT 0, ON LINE, AT BOT AND PRESS CONTINU
 2452  014524  044527  042523  051440
 2453  014532  052105  051440  030527
 2454  014540  036460  026060  051440
 2455  014546  046105  041505  020124
 2456  014554  047125  052111  030040
 2457  014562  020054  047117  046040
 2458  014570  047111  026105  040440
 2459  014576  020124  047502  020124
 2460  014604  047101  020104  051120
 2461  014612  051505  020123  047503
 2462  014620  052116  047111  042525
 2463  014626     057
 2464  014627     057  044500  020106  MSG3A:  .ASCII  ;/@IF UNIT IS TS03, SET SW9=1, PRESS CONTINUE/;
 2465  014634  047125  052111  044440
 2466  014642  020123  051524  031460
 2467  014650  020054  042523  020124
 2468  014656  053523  036471  026061
 2469  014664  050040  042522  051523
 2470  014672  041440  047117  044524
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2471  014700  052516  027505
2472  014704  040057  042523  042514  MSG4:   .ASCII  ;/@SELECT UNIT 1, PRESS CONTINUE/;
2473  014712  052103  052440  044516
2474  014720  020124  026061  050040
2475  014726  042522  051523  041440
2476  014734  047117  044524  052516
2477  014742  027505
2478  014744  040057  042523  042514  MSG5:   .ASCII  ;/@SELECT UNIT 0, OFF-LINE, PRESS CONTINUE/;
2479  014752  052103  052440  044516
2480  014760  020124  026060  047440
2481  014766  043106  046055  047111
2482  014774  026105  050040  042522
2483  015002  051523  041440  047117
2484  015010  044524  052516  027505
2485  015016  040057  044504  046523  MSG6:   .ASCII  ;/@DISMOUNT TAPE, REMOVE WRITE LOCK RING, MOUNT TAPE;
2486  015024  052517  052116  052040
2487  015032  050101  026105  051040
2488  015040  046505  053117  020105
2489  015046  051127  052111  020105
2490  015054  047514  045503  051040
2491  015062  047111  026107  046440
2492  015070  052517  052116  052040
2493  015076  050101     105
2494  015101     100  042523  042514          .ASCII  ;@SELECT UNIT 0, ON LINE, PRESS CONTINUE/;
2495  015106  052103  052440  044516
2496  015114  020124  026060  047440
2497  015122  020116  044514  042516
2498  015130  020054  051120  051505
2499  015136  020123  047503  052116
2500  015144  047111  042525     057
2501  015151     057  042100  051511  MSG7:   .ASCII  ;/@DISMOUNT TAPE, REPLACE WRITE LOCK RING, MOUNT TAPE/;
2502  015156  047515  047125  020124
2503  015164  040524  042520  020054
2504  015172  042522  046120  041501
2505  015200  020105  051127  052111
2506  015206  020105  047514  045503
2507  015214  051040  047111  026107
2508  015222  046440  052517  052116
2509  015230  052040  050101  027505
2510  015236  040057  047515  042526  MSG7A:  .ASCII  ;/@MOVE TAPE SHORT DISTANCE FORWARD FROM BOT/;
2511  015244  052040  050101  020105
2512  015252  044123  051117  020124
2513  015260  044504  052123  047101
2514  015266  042503  043040  051117
2515  015274  040527  042122  043040
2516  015302  047522  020115  047502
2517  015310  027524
2518  015312  040057  042523  042514  MSG7B:  .ASCII  ;/@SELECT UNIT 0, ON LINE, PRESS CONTINUE;
2519  015320  052103  052440  044516
2520  015326  020124  026060  047440
2521  015334  020116  044514  042516
2522  015342  020054  051120  051505
2523  015350  020123  047503  052116
2524  015356  047111  042525
2525  015362  052500  044516  020124          .ASCII  ;@UNIT SHOULD GO OFFLINE AND REWIND@/;
2526  015370  044123  052517  042114
```

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 2527  015376  043440  020117  043117
 2528  015404  046106  047111  020105
 2529  015412  047101  020104  042522
 2530  015420  044527  042116  027500
 2531  015426  040057  042523  042514  MSG8:   .ASCII  ;/@SELECT UNIT 0, ON LINE, AT BOT, PRESS CONTINUE/;
 2532  015434  052103  052440  044516
 2533  015442  020124  026060  047440
 2534  015450  020116  044514  042516
 2535  015456  020054  052101  041040
 2536  015464  052117  020054  051120
 2537  015472  051505  020123  047503
 2538  015500  052116  047111  042525
 2539  015506     057
 2540  015507     057  044500  020106  MSG9:   .ASCII  ;/@IF PROCESSOR IS A PDP-45, SET SW 1=1;
 2541  015514  051120  041517  051505
 2542  015522  047523  020122  051511
 2543  015530  040440  050040  050104
 2544  015536  032055  026065  051440
 2545  015544  052105  051440  020127
 2546  015552  036461     061
 2547  015555     100  043111  040440          .ASCII  ;@IF ANY OTHER, SET SW 1=0, PRESS CONTINUE/;
 2548  015562  054516  047440  044124
 2549  015570  051105  020054  042523
 2550  015576  020124  053523  030440
 2551  015604  030075  020054  051120
 2552  015612  051505  020123  047503
 2553  015620  052116  047111  042525
 2554  015626     057
 2555  015627     057  050100  047522  MSG10:  .ASCII  ;/@PROCESSOR WILL HALT, PRESS CONTINUE/;
 2556  015634  042503  051523  051117
 2557  015642  053440  046111  020114
 2558  015650  040510  052114  020054
 2559  015656  051120  051505  020123
 2560  015664  047503  052116  047111
 2561  015672  042525     057
 2562  015675     057  050100  047522  MSG11:  .ASCII  ;/@PROCESSOR  WILL HALT, PUT 'ENABLE-HALT' SW ON 'HALT';
 2563  015702  042503  051523  051117
 2564  015710  020040  044527  046114
 2565  015716  044040  046101  026124
 2566  015724  050040  052125  023440
 2567  015732  047105  041101  042514
 2568  015740  044055  046101  023524
 2569  015746  051440  020127  047117
 2570  015754  023440  040510  052114
 2571  015762     047
 2572  015763     100  052520  020124          .ASCII  ;@PUT 'S-INST-S-BUS CYCLE' SW ON 'S-BUS CYCLE';
 2573  015770  051447  044455  051516
 2574  015776  026524  026523  052502
 2575  016004  020123  054503  046103
 2576  016012  023505  051440  020127
 2577  016020  047117  023440  026523
 2578  016026  052502  020123  054503
 2579  016034  046103  023505
 2580  016040  050100  042522  051523          .ASCII  ;@PRESS 'CONTINUE' 6 TIMES;
 2581  016046  023440  047503  052116
 2582  016054  047111  042525  020047
```

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 2583  016062  020066  044524  042515
 2584  016070     123
 2585  016071     100  052520  020124          .ASCII  ;@PUT SW'S  BACK TO 'ENABLE' & 'S-INST', PRESS 'CONTINUE'@/;
 2586  016076  053523  051447  020040
 2587  016104  040502  045503  052040
 2588  016112  020117  042447  040516
 2589  016120  046102  023505  023040
 2590  016126  023440  026523  047111
 2591  016134  052123  026047  050040
 2592  016142  042522  051523  023440
 2593  016150  047503  052116  047111
 2594  016156  042525  040047     057
 2595  016163     057  051500  052105  MSG12:  .ASCII  ;/@SET SW2 = 1 IF A 2ND TRANSPORT IS AVAILABLE;
 2596  016170  051440  031127  036440
 2597  016176  030440  044440  020106
 2598  016204  020101  047062  020104
 2599  016212  051124  047101  050123
 2600  016220  051117  020124  051511
 2601  016226  040440  040526  046111
 2602  016234  041101  042514
 2603  016240  052100  042510  020116          .ASCII  ;@THEN PRESS CONTINUE/;
 2604  016246  051120  051505  020123
 2605  016254  047503  052116  047111
 2606  016262  042525     057
 2607  016265     057  051500  046105  MSG13:  .ASCII  ;/@SELECT UNIT 1, ON-LINE, ON 1ST TRANSPORT/;
 2608  016272  041505  020124  047125
 2609  016300  052111  030440  020054
 2610  016306  047117  046055  047111
 2611  016314  026105  047440  020116
 2612  016322  051461  020124  051124
 2613  016330  047101  050123  051117
 2614  016336  027524
 2615  016340  040057  047101  020104  MSG13A: .ASCII  ;/@AND MOVE UNIT 1 ON 1ST TRANSPORT OFF BOT/;
 2616  016346  047515  042526  052440
 2617  016354  044516  020124  020061
 2618  016362  047117  030440  052123
 2619  016370  052040  040522  051516
 2620  016376  047520  052122  047440
 2621  016404  043106  041040  052117
 2622  016412     057
 2623  016413     057  052100  042510  MSG13B: .ASCII  ;/@THEN PRESS CONTINUE/;
 2624  016420  020116  051120  051505
 2625  016426  020123  047503  052116
 2626  016434  047111  042525     057
 2627  016441     057  046100  053517  MSG14:  .ASCII  ;/@LOW BYTE OF COMMAND REGISTER LOADED INCORRECTLY;
 2628  016446  041040  052131  020105
 2629  016454  043117  041440  046517
 2630  016462  040515  042116  051040
 2631  016470  043505  051511  042524
 2632  016476  020122  047514  042101
 2633  016504  042105  044440  041516
 2634  016512  051117  042522  052103
 2635  016520  054514
 2636  016522  052500  044523  043516          .ASCII  ;@USING BYTE INSTRUCTION/;
 2637  016530  041040  052131  020105
 2638  016536  047111  052123  052522
```

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 2639  016544  052103  047511  027516
 2640  016552  040057  044510  044107  MSG15:  .ASCII  ;/@HIGH BYTE OF COMMAND REGISTER LOADED INCORRECTLY;
 2641  016560  041040  052131  020105
 2642  016566  043117  041440  046517
 2643  016574  040515  042116  051040
 2644  016602  043505  051511  042524
 2645  016610  020122  047514  042101
 2646  016616  042105  044440  041516
 2647  016624  051117  042522  052103
 2648  016632  054514
 2649  016634  052500  044523  043516          .ASCII  ;@USING BYTE INSTRUCTION/;
 2650  016642  041040  052131  020105
 2651  016650  047111  052123  052522
 2652  016656  052103  047511  027516
 2653  016664  040057  042523  042514  MSG16:  .ASCII  ;/@SELECT UNIT 0 ON 2ND TRANSPORT, ON-LINE;
 2654  016672  052103  052440  044516
 2655  016700  020124  020060  047117
 2656  016706  031040  042116  052040
 2657  016714  040522  051516  047520
 2658  016722  052122  020054  047117
 2659  016730  046055  047111     105
 2660  016735     100  044124  047105          .ASCII  ;@THEN PRESS CONTINUE/;
 2661  016742  050040  042522  051523
 2662  016750  041440  047117  044524
 2663  016756  052516  027505
 2664  016762  040057  042522  042523  MSG17:  .ASCII  ;/@RESELECT UNIT 1 TO 0, AND TURN 2ND TRANSPORT OFF-LINE;
 2665  016770  042514  052103  052440
 2666  016776  044516  020124  020061
 2667  017004  047524  030040  020054
 2668  017012  047101  020104  052524
 2669  017020  047122  031040  042116
 2670  017026  052040  040522  051516
 2671  017034  047520  052122  047440
 2672  017042  043106  046055  047111
 2673  017050     105
 2674  017051     100  044124  047105          .ASCII  ;@THEN PRESS CONTINUE/;
 2675  017056  050040  042522  051523
 2676  017064  041440  047117  044524
 2677  017072  052516  027505
 2678  017076  040057  042500  042116  MSG20:  .ASCII  ;/@@END OF PASS: /;
 2679  017104  047440  020106  040520
 2680  017112  051523  020072     057
 2681  017117     057  040100  040503  MSG21:  .ASCII  ;/@@CANNOT TEST LOAD MEDIUM@@/;
 2682  017124  047116  052117  052040
 2683  017132  051505  020124  047514
 2684  017140  042101  046440  042105
 2685  017146  052511  040115  027500
 2686  017154  040057  043536  027500  $CNTG:  .ASCII  ;/@^G@/;
 2687  017162  040057  053523  036522  $MSWR:  .ASCII  ;/@SWR=/;
 2688  017170     057
 2689  017171     057  042516  036527  $MNEW:  .ASCII  ;/NEW=/;
 2690  017176     057
 2691  017177     057  027477          $QUEST: .ASCII  ;/?/;
 2692                                           .EVEN
 2693  017202  000000                  WBUF:   0
 2694          017346                          .=WBUF+100.
```

```
 2695  017346  000000                RBUF:   0
 2696          000001                        .END
```

```
BADDAT  002344   622*  653#
BC      001010   310#  386   450   806*  807   946*  961   972*  992   1004*  1051*  1066  1077*
                 1096  1112* 1117  1130* 1140  1156* 1167  1185* 1190* 1201*  1216   1220* 1232
                 1254* 1282* 1287* 1293* 1325* 1378* 1416* 1421  1442* 1554*  1569*  1579* 1601*
                 1608* 1612* 1635* 1646* 1655* 1681* 1690* 1699* 1798* 1805*  1811*  1831* 1835*
                 1898* 1903* 1912* 2023* 2087* 2108* 2217
BEGIN   001220   351   356#  357   2197  2296
BGL1    012356   2080  2102#
BUFF  = 000776   269#  325   356
BYTEOP  002346   629   635   656#
CA      001012   311#  395   459   819*  820   947*  964   973*  989   1005*  1052*  1069  1078*
                 1092  1113* 1120  1143  1157* 1170  1186* 1191* 1221* 1255*  1283*  1294* 1326*
                 1417* 1444* 1555* 1580* 1602* 1613* 1636* 1656* 1682* 1700*  1797*  1810* 1836*
                 1896* 1910* 2024* 2088* 2090  2109* 2219
CC    = 177776   266#  1469* 1482* 1496* 1514* 2279*
CHAR    013314   2237* 2240* 2248* 2249* 2250* 2259# 2262
CHGI1   012136   2053#
CHGI2   006450   1444#
CHGI3   002112   574#
CHKBYT  002112   575#
CKSWR = 104002   355   1945  2048  2068  2078  2093  2129  2142  2147  2233   2273   2283  2397#
CKSWRR  013564   2326#  2395
CNTLU   013636   2337#  2354
COUNT   014100   2348*  2359  2375*  2382#
CRCPAR  011116   1759   1854#
CRCP1   011130   1856#  1863
CRCROT  011156   1762   1768  1774   1780  1865#
CRCR1   011210   1867   1874#
CRCTST  010346   1758#
CRCT1   010352   1759#  1852
CRCWRT  011244   359*   1787* 1788*  1828  1845  1848*  1889#  2228
CRCXOR  011212   1765   1771  1777   1876#
CRROT1  011226   1763*  1882#
CRROT2  011232   1769*  1884#
CRROT3  011236   1775*  1886#
CRROT4  011242   1781*  1888#
CRXOR1  011224   1760*  1881#
CRXOR2  011230   1766*  1767  1883#
CRXOR3  011234   1772*  1773  1885#
CRXOR4  011240   1778*  1779  1887#
CWRITE  010540   1793#
EMT   = 014106   265#
EOMK    013562   2300*  2301  2318#
EXPECT  002336   583*   585*  641#
GOODDA  002342   619*   621*  649#
HLT   = 104000   370   379   388   397   406   415   424   433   443   452   461   470   479
                 488   497   507   517   522   527   532   537   542   547   556   566   590
                 626   666   671   676   686   696   705   710   715   720   727   732   737
                 747   757   766   777   788   793   798   809   822   835   848   852   861
                 869   877   885   895   904   913   921   945   957   960   963   966   986
                 991   994   997   1018  1021  1028  1033  1050  1062  1065  1068  1071  1091
                 1094  1098  1101  1119  1122  1136  1139  1142  1145  1149  1163  1166  1169
                 1172  1207  1215  1218  1227  1234  1236  1239  1261  1266  1270  1300  1303
                 1306  1309  1313  1335  1338  1353  1359  1363  1384  1387  1405  1408  1428
                 1431  1435  1453  1456  1460  1477  1489  1507  1530  1535  1542  1565  1586
                 1592  1621  1666  1673  1677  1710  1717  1721  1725  1736  1742  1818  1821
```

		1827	1830	1847	1921	1960	1964	1981	2002	2017	2030	2033	2056	2063
		2096	2100	2116	2120	2163	2167	2396#						
ICOUNT	001034	320#	804*	817*	830*	2288								
IR1	006606	1471	1482#											
IR2	006640	1483	1489#											
IR3	006710	1497	1504#											
IR4	007020	1515	1527#											
IR5	007066	1537	1539#											
LASTTE	012464	2101	2125#											
MIT	011454	1746	1923	1936#										
MITA	011534	1947	1953#											
MSG0	014204	345	2415#											
MSG01	014242	352	2420#											
MSG1	014274	2204	2425#											
MSG10	015627	2081	2555#											
MSG11	015675	2102	2562#											
MSG12	016163	2126	2595#											
MSG13	016265	2132	2607#											
MSG13A	016340	2137	2615#											
MSG13B	016413	2139	2623#											
MSG14	016441	588	2627#											
MSG15	016552	624	2640#											
MSG16	016664	2143	2653#											
MSG17	016762	2168	2664#											
MSG2	014406	2207	2357	2438#										
MSG20	017076	2174	2678#											
MSG21	017117	330	2681#											
MSG3	014411	1942	2439#											
MSG3A	014627	1953	2464#											
MSG4	014704	1969*	1971	1982*	2472#									
MSG5	014744	1995	2478#											
MSG6	015016	2010	2485#											
MSG7	015151	2039	2501#											
MSG7A	015236	2043	2510#											
MSG7B	015312	2045	2518#											
MSG8	015426	2065	2531#											
MSG9	015507	2075	2540#											
MTC	001006	309#	368	413	430*	431	440*	449*	458*	467*	476*	477	485*	494*
		495	503*	504*	505	514*	515	519*	520	524*	525	529*	530	534*
		535	539*	540	544*	545	553*	554	562*	563*	564	576*	577*	578
		586	598*	604*	609	614	622	636*	656*	663*	664	668*	669	673*
		674	683*	684	692*	693*	694	702*	703	707*	708	712*	713	717*
		718	724*	725	729*	730	734*	735	744*	745	753*	754*	755	763*
		764	773*	774*	775	785*	786	790*	791	795*	796	858*	910*	932*
		933	941*	950*	958	975*	976	981*	982	995	1006	1008*	1009	1013*
		1014	1043*	1044	1055*	1063	1080*	1081	1086*	1087	1099	1107	1109*	1110
		1114*	1115	1127*	1128	1131*	1132	1137	1146*	1158*	1159	1180	1182*	1183
		1187*	1188	1192*	1193	1195*	1196	1198*	1199	1202*	1203	1210*	1211	1222*
		1223	1228*	1229	1245	1247*	1248	1250*	1251	1256*	1257	1259	1278	1284*
		1285	1288*	1289	1295*	1296	1301	1310*	1321	1327*	1328	1330*	1331	1336
		1339	1348*	1349	1354*	1355	1360*	1371	1373*	1374	1379*	1380	1395*	1396
		1400*	1401	1418	1420*	1429	1432*	1446	1448*	1449	1454	1457*	1473*	1476*
		1485*	1499*	1500	1502*	1505	1517*	1518	1522*	1523	1525*	1528	1556	1558*
		1559	1571*	1572	1581*	1582	1584	1603	1605*	1606	1609*	1610	1614*	1615
		1637	1639*	1642*	1643*	1644	1647*	1650*	1651*	1652	1657*	1660*	1661*	1662
		1683*	1686*	1687*	1688	1691*	1694*	1695*	1696	1701*	1704*	1705*	1706	1722*

		1799*	1800	1802*	1803	1806*	1807*	1808	1812*	1813*	1814	1832*	1833	1838*
		1839	1900*	1901	1905*	1906	1914*	1915	1936*	1937	1957*	1958	1975*	1999*
		2014*	2025*	2026	2028	2049*	2050	2058*	2059	2084*	2085	2089*	2097*	2105*
		2106	2111*	2117*	2148*	2155*	2158	2164*	2179	2181*	2182	2215		
MTD	001014	312#	404	468	832*	833	1667	1711	1822	1843	1917	2221		
MTRD	001016	313#	422	486	845*	846	849*	850	1423*	1654*	1698*	1732	1738	1823
		1837*	1849*	2224										
MTS	001004	308#	377	441	859	867	875	883	893	902	911	919	935*	937
		942	955	978*	1011*	1016	1019*	1022	1024	1026	1029	1031*	1046*	1048
		1060	1083*	1134	1147	1161	1164	1205	1213	1225	1237	1298	1311	1323*
		1333	1341*	1351	1357	1361	1376*	1382	1385	1393	1398*	1403	1406	1424*
		1426	1433	1451	1458	1520	1533	1540	1664	1708	1723	1962	1977	2000
		2015	2031	2053	2061	2094	2098	2114	2118	2160	2165	2184*	2213	
MTV	001000	306#	1471*	1483*	1497*	1515*	1537*							
MTVS	001002	307#	1470*											
NOP =	000240	267#												
OCT	013312	2244*	2254*	2258#										
OCTP	013316	2241	2252	2260#										
OCTPRT	013202	2177	2212	2214	2216	2218	2220	2223	2225	2227	2229	2237#	2340	
OCT1	013222	2239	2241#											
OCT2	013240	2245#	2255											
OUT	013676	2327	2330	2334	2345#	2362								
PAR	007504	1632#												
PAR1	007772	1670	1675#											
PAR2	010002	1674	1681#											
PAR3	010244	1714	1719#											
PAR4	010254	1718	1722#											
PCNTR	001036	321#	327*	2176	2178*									
PRINT	013006	2201#	2394											
PRINT1	013200	358*	2205	2209*	2235#									
RBUF	017346	1253*	1255	1264	1268	1291*	1292*	1294	1304	1307	1574	1576	1580	1587
		1593	1613	1618	1622	1656	1700	1810	1816	1819	1836	2695#		
RCRCOB	011424	1910	1929#											
RDSW	014076	2381#												
RECEIV	002340	586*	645#											
RETURN	013460	357*	2276*	2280	2293*	2296#								
SCOPE =	104400	268#	366	375	384	393	402	411	420	429	439	448	457	466
		475	484	493	502	513	518	523	528	533	538	543	552	561
		573	662	667	672	682	691	701	706	711	716	723	728	733
		743	752	762	772	784	789	794	803	816	829	844	857	866
		874	882	892	901	909	918	931	971	1003	1042	1076	1106	1179
		1244	1277	1320	1347	1370	1392	1415	1441	1468	1495	1513	1632	1730
		1793	1895	1922	1956	1961	1974	1998	2013	2022	2038	2057	2083	2104
		2125	2172											
SCOPEA	013352	2273#												
SCOPEB	013372	2275	2278#	2285	2291									
SCOPEC	013404	263	2283#											
SCOPEF	013456	2288	2290*	2292*	2295#									
SCOPEG	013444	2287	2289	2292#										
SP3	013334	2256	2266#											
SP3A	013346	2266	2269#											
START	001040	304	325#											
SUSWR	001102	329	333#											
SWR	001024	316#	326*	336	342*	890	1262	1640	1648	1658	1669	1684	1692	1702
		1713	1744	1939	1946	1984	2041	2079	2130	2135	2194	2201	2230	2274
		2284	2286	2326	2339	2378*								

```
SWREG   000176   302#   342   2326
TABLE   014126  2392  2394#
TBC     003134   806#   811
TDB     003234   832#   837
TEMP    001032   319#   805*   806   807   810*  818*  819   820   823*  831*  832   833   836*
                1549*  1551  1563  1590  1595* 1597* 1758* 1760  1761  1764  1770  1776  1794
                1795   1850* 1854* 1855  1861* 1862* 1970* 1975  1983* 1986  1989  2226
TEMPST  014102  2343*  2347* 2370* 2371* 2372* 2374* 2378  2383#
THERE   012766  2187   2193#
TIB     014104  2331*  2332* 2333  2350* 2351  2355  2363  2365  2373* 2374  2384# 2405* 2409*
                2412
TKB     001030   318#  2331  2404* 2409
TKS     001026   317#  2329  2403* 2406* 2407
TMA     003174   819#   824
TOP     013462   331    346   353   589   625   1943  1954  1972  1996  2011  2040  2044  2046
                2066   2076  2082  2103  2127  2134  2138  2140  2145  2170  2175  2208  2267
                2299#  2336  2338  2342  2358  2368
TOP1    013474  2301#  2309  2317
TOP2    013526  2305   2310#
TPB     001020   314#  2262* 2308* 2312* 2315* 2412*
TPS     001022   315#  2260  2299* 2306  2310  2313  2410
TRAP30  014106   260    265   2389#
TREOF   005462  1263   1268#
TRLE    005474  1267   1277#
TSR     003476   896    918#
TSTEND  012672   332   1941  1948  2131  2174#
TTIN    014132  2349   2403#
TTIN1   014152  2407#  2408
TTIN2   014166  2410#  2411
T7CH    003440   891    901#
USS     011614  1971#  1987  1990
USS1    011640  1977#  1980
USS2    011656  1978   1982#
USS3    011712  1985   1989#
USS4    011722  1988   1995#
WAIT1   006706  1498*  1503# 1504*
WAIT2   007016  1516*  1526# 1527*
WAIT3   007064  1536*  1538# 1539*
WBR     007112  1550#  1553  1598
WBR1    007172  1563#  1567
WBR2    007236  1575#  1577
WBR3    007312  1590#  1594
WBR4    007350  1596   1601#
WBR5    007470  1619#  1623
WBUF    017202   947    964   973   989   1005  1052  1069  1078  1092  1113  1120  1143  1157
                1170   1186  1191  1221  1280* 1281* 1283  1326  1417  1550  1552  1555  1562
                1566   1633* 1634* 1636  1682  1794* 1795* 1796* 1797  1816  1819  2088  2090
                2109   2693# 2694
WCRCOB  011374  1896   1924#
ZEROCR  011246  1851   1895#
$CNTG   017154  2335   2686#
$ENDAD  012756   297   2189#
$MNEW   017171  2341   2689#
$MSWR   017162  2337   2687#
$QUEST  017177  2367   2691#
$READ   013700  2344   2347#
```

```
$SVPC = 000040
.     = 017350

 295#  300
 256#  258  259#  262#  295  296#  298#  300#  301#  303#  305#  369  378
 387   396  405   414   423  432   442   451   460   469   478   487  496
 506   516  521   526   531  536   541   546   555   565   665   670  675
 685   695  704   709   714  719   726   731   736   746   756   765  776
 787   792  797   808   821  834   847   851   860   868   876   884  894
 903   912  920   934   936  952   954   956   959   962   965   977  979
 983   985  990   993   996  1007  1010  1012  1015  1017  1020  1023 1025
1027  1030 1032  1045  1047 1049  1057  1059  1061  1064  1067  1070 1082
1084  1088 1090  1093  1097 1100  1108  1111  1116  1118  1121  1129 1133
1135  1138 1141  1144  1148 1160  1162  1165  1168  1171  1181  1184 1189
1194  1197 1200  1204  1206 1212  1214  1217  1224  1226  1230  1231 1233
1235  1238 1246  1249  1252 1258  1260  1265  1269  1279  1286  1290 1297
1299  1302 1305  1308  1312 1322  1324  1329  1332  1334  1337  1340 1342
1350  1352 1356  1358  1362 1372  1375  1377  1381  1383  1386  1394 1397
1399  1402 1404  1407  1419 1422  1425  1427  1430  1434  1447  1450 1452
1455  1459 1475  1487  1488 1501  1506  1519  1521  1524  1529  1534 1541
1557  1560 1564  1573  1583 1585  1591  1604  1607  1611  1616  1620 1638
1641  1645 1649  1653  1659 1663  1665  1672  1676  1685  1689  1693 1697
1703  1707 1709  1716  1720 1724  1733  1735  1739  1741  1745  1801 1804
1809  1815 1817  1820  1826 1829  1834  1840  1846  1857  1860  1902 1907
1916  1930# 1938  1940  1959 1963  2001  2016  2027  2029  2032  2051 2055
2060  2062 2086  2091  2095 2099  2107  2115  2119  2159  2166  2180 2183
2185  2202 2206  2261  2302 2307  2311  2314  2319# 2694#
```

```
COMMEN      1#
ENDCOM      1#
ESCAPE      1#
GETPRI      1#
GETSWR      1#
MULT        1#
NAME      278#    279    286    362    371    380    389    398    407    416    425    435    444    453    462
          471     480    489    498    509    548    557    568    658    678    687    697    739    748    758
          768     780    799    812    825    840    853    862    870    878    886    897    905    914    924
          967     999   1035   1072   1102   1123   1152   1173   1240   1273   1316   1343   1366   1388   1410
         1437    1463   1478   1490   1508   1543   1626   1726   1747   1754   1891   1932   1949   1965   1991
         2006    2018   2034   2070   2121   2321   2385   2398
NEWTST      1#
POP         1#
PUSH        1#
PWRCLR    278#    430    440    449    458    467    476    485
REPORT      1#
SETPRI      1#
SETUP       1#
SKIP        1#
SLASH       1#
STARS       1#    293
SWRSU       1#
TYPBIN      1#
TYPDEC      1#
TYPNAM      1#
TYPNUM      1#
TYPOCS      1#
TYPOCT      1#
TYPTXT      1#
$$ESCA      1#
$$NEWT      1#
$$SKIP      1#
.EQUAT      1#
.HEADE      1#
.KT11       1#
.SETUP      1#
.SWRHI      1#
.$ACT1      1#    256#    291
.$APTB      1#
.$APTH      1#
.$APTY      1#
.$ASTA      1#
.$CATC      1#
.$CMTA      1#
.$DB2D      1#
.$DB2O      1#
.$DIV       1#
.$EOP       1#
.$ERRO      1#
.$ERRT      1#
.$MULT      1#
.$POWE      1#
.$RAND      1#
.$RDDE      1#
.$RDOC      1#
```

```
.$READ      1#
.$R2AZ      1#
.$SAVE      1#
.$SB2D      1#
.$SB2O      1#
.$SCOP      1#
.$SIZE      1#
.$SUPR      1#
.$TRAP      1#
.$TYPB      1#
.$TYPD      1#
.$TYPE      1#
.$TYPO      1#
.$40CA      1#
.1170       1#


. ABS.  017350     000


 ERRORS DETECTED:  0

 CZTMAI.BIN,CZTMAI.LST/CRF/SOL/NL:TOC=CZTMAI.SML,CZTMAI.P11
 RUN-TIME: 27 37 2 SECONDS
 RUN-TIME RATIO: 153/67=2.2
 CORE USED:  31K  (61 PAGES)
```