ADVANCE COPY

THIS DESCRIPTION IS PRELIMINARY AND SUBJECT TO CHANGE WITHOUT NOTICE.

IDENTIFICATION

Product Code:	MAINDEC-08-D3EA-D (D)
Product Name:	TCØ1 Extended Memory Exerciser
Date Created:	August 15, 1967
Maintainer:	Diagnostic Group
Author:	Edward P. Steinberger

ADVANCE COPY

THIS DESCRIPTION IS PRELIMINARY AND SUBJECT TO CHANGE WITHOUT NOTICE.

1. ABSTRACT

TCØ1 EXTENDED MEMORY EXERCISER is a test program for the PDP-8 Computer which tests the transfer of data between the TCØ1 DECtape Control and extended memory fields (more than 4K). It does this by storing a data pattern in an extended memory field, transferring the data onto DECtape and then reading the data back into the field and checking it for correct transfer.

2. REQUIREMENTS

2.1 Equipment

Standard PDP-8 Computer
TCØ1 DECtape Control with at least 1 Transport (TU55)
183 Memory Extension Control with at least 1 Memory Module (184)

2.2 Storage

The program occupies the first 6 pages of Bank Ø and uses 2ØØØ to 5777 of each memory bank for data storage. All of memory not occupied by the program in Bank Ø with the exception of the last page is filled with "HLT".

2.3 Preliminary Programs

DECtape Basic Exerciser
DECtape Random Exerciser

3. LOADING PROCEDURE

3.1 Method

This test is loaded by the standard Binary Loader (SA = 7777).

4. STARTING PROCEDURE

4.1 Control Switch Settings

The following is a table of control switch settings and their action on the program.

SR	Set As	Action
Ø, 1, 2		Unit Select bits for DECtape transport
6, 7, 8		Number of ADDITIONAL memory fields (must be non-zero)

SR	Set As	Action
9	1	Halt on Error
	Ø	Don't Halt on Error
1Ø	1	Don't Print Errors
	Ø	Print Errors
11	1	Don't Ring Bell on Error
	Ø	Ring Bell on Error

4.2 Starting Address

The starting address of the program is ØØ2ØØ.

4.3 Program and/or Operator Action

4.3.1 Load program into Memory Bank Ø per 3.1.

4.3.2 Set SR to ØØ2ØØ, depress "Load Address".

4.3.3 Set SR 9 to 11 per 4.1.

4.3.4 Depress "Start".

5. OPERATING PROCEDURE

5.1 Operational Switch Settings

See 4.1

5.2 Subroutine Abstracts

None

5.3 Operating Procedure

After starting the program per 4.3 the computer will halt at location ØØ223 if no error occurred after performing static tests on the TCØ1 "Field" register.

5.3.1 Set SR Ø to 2 to unit select bits of transport to be exercised.

5.3.2 Place a standard PDP-8 certified DECtape on the transport to be exercised, place transport "On Line" with "Write" enabled.

5.3.3 Set SR 6 to 8 to the number of extra memory fields (non-zero).

5.3.4 Depress "Continue".

5.3.5 To run the dynamic tests only:

5.3.5.1 Set SR to Ø224, depress "Load Address".

5.3.5.2 Set unit select bit, extra field bits, error option bits in SR (see 4.1).

5.3.5.3 Assure selected transport is ready.

5.3.5.4 Depress "Start".

6. ERRORS

6.1 Error Halts and Description

The following is a table of error halts and the reason for each

Location	Reason
Ø227	No extended memory indicated by SR 6 to 8
Ø35Ø (HALT 2)	"B" register not properly set
Ø527 (HALT 3)	Data Error
Ø735 (HALT 1)	DECtape Error
Outside of Program	Extended Memory Control Error (either non-existent or defective memory)

6.2 Error Recovery

6.2.1 Reset SR if necessary.

6.2.2 Depress "Continue" for any error except "Outside of program".

6.3 Error Typeouts

6.3.1 "B" Register Error.

MEMORY FIELD ERROR

RIGHT WRONG
ØØ7Ø ØØ3Ø

The above example shows that an attempt was made to set the "B" register to ØØ7Ø, however the most significant bit (ØØ4Ø) did not set.

6.3.2 Data Error

```
DATA ERROR
FIELD ØØØ3
FIRST BLOCK ØØ4Ø
LOC. DATA
2ØØØ  74Ø2
2ØØ1  74Ø2
```

The above example shows that a data error occurred in Memory Bank 3, the transfer started at block ØØ4Ø, location 2ØØØ contains 74Ø2 (should contain 2ØØØ).

6.3.3 DECtape Error

```
THE FOLLOWING UNEXPECTED ERRORS OCCURRED:
MARK TRACK
END ZONE
SELECT
PARITY
TIMING
```

The above typeout (with at least one error indicated) will be typed out if there is a DECtape control error.

7. RESTRICTIONS

7.1 Starting Restrictions

None

7.2 Operating Restrictions

SR6 to 8 may be set to less than the number of additional memory fields but not more than that number. (SR6 to 8 must be non-zero), otherwise unpredictable results may occur (attempts to reference non-existent memory).

8. MISCELLANEOUS

8.1 Execution Time

Not Applicable - 1 Pass down tape allows each memory field (other than Ø) to be exercised at least 34 (Dec.) times (takes 8 minutes)

9. PROGRAM DESCRIPTION

9.1 The first portion of the test performs static tests on the memory field portion of the "B Register". The "B Register" is tested to assure that it may be set to all values (Ø to 7). Any error will cause an error typeout and error halt unless these are suppressed by Switch Register settings.

9.2 The second portion of the test performs dynamic tests on the DECtape control, transfers are made to and from DECtape and extended memory.

9.2.1 The program first obtains the maximum field size from SR 6 to 8 and checks to make sure it is non-zero. The program then extracts the unit select bits from SR Ø to 2 for the DECtape drive being exercised.

9.2.2 The program then sets a location so that the first block sought is block Ø ("current block").

9.2.3 The program then sets a location so that field 1 is exercised ("current memory field").

9.2.4 The "current memory field" is then checked to assure that it is not larger than the maximum available field. If it is larger, the program goes to 9.2.3., otherwise the program goes to 9.2.5.

9.2.5 "HLT" is stored in all memory locations in field Ø not occupied by the program or the Binary or Rim Loaders. Also a location in an error typeout routine is initialized to provide error header typeout.

9.2.6 "HLT" is stored in all memory locations in the "current memory field", then data (addresses) are stored in locations 2ØØØ through 5777 of the "current memory field".

9.2.7 The "current block" is then searched for. If a DECtape error occurs, an error typeout occurs and the search process is repeated.

9.2.8 After the "current block" has been found, the data in the "current memory field" is written on DECtape starting at that block. If an error occurs, the program goes back to 9.2.7., otherwise it goes to 9.2.9.

9.2.9 All locations in the "current memory field" are then set to "HLT".

9.2.10 The "current block" is sought again.

9.2.11 The data just written on DECtape is then read back into the "current memory field" at the locations from which it came. A DECtape error at this point returns the program to 9.2.10.

9.2.12 The data in the "current memory field" is then checked to assure correctness of transfer.

9.2.13 All locations in the "current memory field" are set to "HLT".

9.2.14 The "current block" is then incremented by 1Ø and checked to assure that it does not equal 267Ø. If it does, the "current block" is then set back to Ø.

9.2.15 The "current memory field" is then incremented by 1Ø (effectively 1) and the program goes back to 9.2.4.

```
                    /PROGRAM TO EXERCISE THE TC01 AND EXTENDED MEMORY
     0020           *20

                    /CONSTANTS AND VARIABLES
0020 0000           BLOCK,  0               /CURRENT BLOCK
0021 0000           CNTR,   0
0022 0000           ERROR,  0               /ERROR STATUS
0023 0000           FIELD,  0               /CURRENT FIELD
0024 0002           K0002,  2
0025 0003           K0003,  3
0026 0004           K0004,  4
0027 0007           K0007,  7
0030 0010           K0010,  10
0031 0070           K0070,  70
0032 0130           K0130,  130
0033 0150           K0150,  150
0034 0200           K0200,  200
0035 0201           K0201,  201             /MINUS 7577
0036 0207           K0207,  207             /BELL
0037 0212           K0212,  212             /LF
0040 0215           K0215,  215             /CR
0041 0240           K0240,  240             /SPACE
0042 0260           K0260,  260             /DIGIT CODE
0043 0400           K0400,  400             /FWD-REV
0044 0600           K0600,  600             /GO-REV
0045 0610           K0610,  610             /GO REV SEARCH
0046 1777           K1777,  1777    /FIRST ADDRESS-1 OF DATA
0047 2670           K2670,  2670
0050 4000           K4000,  4000    /NUMBER OF DATA WORDS
0051 7000           K7000,  7000
0052 7401           K7401,  7401            /MINUS RUBOUT
0053 7754           K7754,  7754            /WC
0054 7755           K7755,  7755            /CA
0055 7774           K7774,  7774            /MINUS 4
0056 0000           MAX,    0               /HIGHEST FIELD AVAILABLE
0057 1000           PMESS1, MESS1           /DECTAPE ERROR HEADER
0060 1056           PMESS2, MESS2           /MARK TRACK
0061 1073           PMESS3, MESS3           /END ZONE
0062 1106           PMESS4, MESS4           /SELECT
0063 1117           PMESS5, MESS5           /PARITY
0064 1130           PMESS6, MESS6           /TIMING
0065 1141           PMESS7, MESS7           /"B" REGISTER ERROR HEADER
0066 1205           PMESS8, MESS8           /DATA ERROR HEADER
0067 1232           PMESS9, MESS9           /MORE DATA ERROR HEADER
0070 1251           PMES10, MESS10          /END OF DATA ERROR HEADER
0071 0000           PNTR1,  0               /MSPRNT POINTER
0072 0000           PNTR2,  0               /DATERR POINTER
0073 7410           SKIP,   SKP
0074 7402           STOP,   HLT
0075 0000           TEMP,   0
0076 0000           UNIT,   0               /UNIT BEING OPERATED UPON
0077 0400           Z1,     SET
0100 0416           Z2,     STORE
```

```
0101  0437          Z3,     CHECK
0102  0466          Z4,     DATERR+4
0103  0600          Z5,     SEARCH
0104  0651          Z6,     WAIT
0105  1266          Z7,     END
```

```
                        /MESSAGE PRINT SUBROUTINE

0106  0000              MSPRNT, 0
0107  3071                      DCA PNTR1
0110  1471                      TAD I PNTR1
0111  4117                      JMS TYPE
0112  1052                      TAD K7401
0113  7650                      SNA CLA
0114  5506                      JMP I MSPRNT
0115  2071                      ISZ PNTR1
0116  5110                      JMP MSPRNT+2

0117  0000              TYPE,   0
0120  6046                      TLS
0121  6041                      TSF
0122  5121                      JMP .-1
0123  5517                      JMP I TYPE

0124  0000              CRLF,   0
0125  7200                      CLA
0126  1040                      TAD K0215
0127  4117                      JMS TYPE
0130  7200                      CLA
0131  1037                      TAD K0212
0132  4117                      JMS TYPE
0133  7200                      CLA
0134  5524                      JMP I CRLF

                        /PRINT SUBROUTINE

0135  0000              PRINT,  0
0136  7604                      LAS
0137  7012                      RTR
0140  7630                      SZL CLA
0141  5535                      JMP I PRINT
0142  2135                      ISZ PRINT
0143  5535                      JMP I PRINT

                        /BELL SUBROUTINE

0144  0000              BELL,   0
0145  7604                      LAS
0146  7010                      RAR
0147  7630                      SZL CLA
0150  5544                      JMP I BELL
0151  1036                      TAD K0207
0152  4117                      JMS TYPE
0153  5544                      JMP I BELL
```

```
                        /TYPE OUT THE NUMBER IN THE AC

0154  0000            NUMBER, 0
0155  3075                    DCA TEMP
0156  1055                    TAD K7774
0157  3021                    DCA CNTR
0160  1075                    TAD TEMP
0161  7104                    RAL CLL
0162  7004                    RAL
0163  7006                    RTL
0164  3075                    DCA TEMP
0165  1075                    TAD TEMP
0166  0027                    AND K0007
0167  1042                    TAD K0260
0170  4117                    JMS TYPE
0171  7200                    CLA
0172  1075                    TAD TEMP
0173  2021                    ISZ CNTR
0174  5162                    JMP .-12
0175  7200                    CLA
0176  5554                    JMP I NUMBER

      6761              DTRA=6761
      6762              DTCA=6762
      6764              DTXA=6764
      6766              DTLA=6766
      6771              DTSF=6771
      6772              DTRB=6772
      6774              DTLB=6774
      6201              CDF=6201
```

```
0200                    *200

                        /STATIC - SET "B" TESTS AND READ BACK

0200  7300  BEGIN,      CLA CLL
0201  3023              DCA FIELD               /CLEAR FIELD
0202  6774              DTLB                /LOAD "B"
0203  7200              CLA
0204  6772              DTRB                /READ "B"
0205  0031              AND K0070
0206  3056              DCA MAX             /AND SAVE
0207  1056              TAD MAX
0210  7041              CIA
0211  1023              TAD FIELD
0212  7640              SZA CLA             /SAME AS NUMBER SET?
0213  4327              JMS BERROR          /NO, ERROR
0214  1023              TAD FIELD
0215  1030              TAD K0010               /INCREMENT FIELD SETTING
0216  0031              AND K0070
0217  3023              DCA FIELD
0220  1023              TAD FIELD
0221  7440              SZA                 /DONE ALL FIELDS?
0222  5202              JMP BEGIN+2         /NO
0223  7402              HLT

                        /DYNAMIC TESTS

0224  7604  START,      LAS
0225  0031              AND K0070               /GET MAXIMUM FIELD SIZE
0226  7450              SNA                 /NON-ZERO?
0227  7402              HLT                 /NO
0230  3056              DCA MAX             /YES, STORE
0231  7604              LAS
0232  0051              AND K7000               /GET UNIT NUMBER
0233  3076              DCA UNIT                /AND SAVE
0234  3020              DCA BLOCK               /CLEAR BLOCK
0235  1030              TAD K0010               /SET TO OPERATE
0236  3023              DCA FIELD               /ON FIELD 1
0237  1023              TAD FIELD               /COMPARE CURRENT
0240  7041              CIA                 /FIELD AGAINST
0241  1056              TAD MAX             /MAXIMUM FIELD
0242  7710              SPA CLA             /IS CURRENT FIELD TOO LARGE?
0243  5235              JMP .-6             /YES, RESET TO FIELD 1
0244  4352              JMS HALTS           /STORE HALT IN MEMORY FIELD 0

0245  1073              TAD SKIP
0246  3502              DCA I Z4
0247  1023              TAD FIELD           /STORE HALT IN
0250  4477              JMS I Z1            /MEMORY FIELD "N"
0251  1023              TAD FIELD               /SET INTO FIELD "N"
0252  4500              JMS I Z2                /DATA (ADDRESSES) TO BE WRITTEN ON TAPE
                                          /SET UP DECTAPE TO
0253  4503              JMS I Z5                /ATTACK BLOCK IN FORWARD DIRECTION
0254  4365              JMS ERR             /CHECK FOR ERROR
0255  5253              JMP .-2             /REPEAT SEARCH
```

```
0256  1023                    TAD FIELD               /RETURN HERE WHEN BLOCK IS FOUND AND NO ERRORS
0257  6774                    DTLB            /LOAD MEMORY FIELD REGISTER
0260  1033                    TAD K0150
0261  6764                    DTXA            /CHANGE FROM SEARCH TO WRITE DATA CONT.
0262  1046                    TAD K1777
0263  3454                    DCA I K7755     /SET UP CA
0264  1050                    TAD K4000
0265  3453                    DCA I K7754     /AND WC
0266  4504                    JMS I Z6                /WAIT FOR DECTAPE FLAG AND NO ERRORS
0267  4365                    JMS ERR
0270  5253                    JMP .-15
0271  1023                    TAD FIELD               /SET THE CURRENT MEMORY FIELD TO HLT
0272  4477                    JMS I Z1
0273  4503                    JMS I Z5                /FIND BLOCK AGAIN
0274  4365                    JMS ERR
0275  5273                    JMP .-2
0276  1023                    TAD FIELD               /SET MEMORY FIELD REGISTER
0277  6774                    DTLB
0300  1032                    TAD K0130               /SEARCH TO READ DATA CONT
0301  6764                    DTXA
0302  1046                    TAD K1777
0303  3454                    DCA I K7755     /SET UP CA
0304  1050                    TAD K4000
0305  3453                    DCA I K7754     /AND WC
0306  4504                    JMS I Z6                /WAIT FOR DECTAPE FLAG AND NO ERRORS
0307  4365                    JMS ERR
0310  5273                    JMP .-15
0311  1023                    TAD FIELD               /CHECK FOR CURRENT DATA
0312  4501                    JMS I Z3
0313  1023                    TAD FIELD               /SET IT TO HALT AGAIN
0314  4477                    JMS I Z1
0315  1020                    TAD BLOCK               /INCREMENT BLOCK
0316  1030                    TAD K0010               /BY 10
0317  3020                    DCA BLOCK
0320  1020                    TAD BLOCK
0321  7041                    CIA
0322  1047                    TAD K2670
0323  7750                    SPA SNA CLA     /END OF TAPE?
0324  3020                    DCA BLOCK               /YES, ZERO BLOCK
0325  1023                    TAD FIELD
0326  5235                    JMP START+11    /RETURN TO TEST NEXT MEMORY FIELD

                      /"B" REGISTER ERROR SUBROUTINE
0327  0000              BERROR, 0

0330  4144                    JMS BELL
0331  4135                    JMS PRINT
0332  5345                    JMP HALT2-3
0333  1065                    TAD PMESS7
0334  4106                    JMS MSPRNT
0335  1023                    TAD FIELD
0336  4154                    JMS NUMBER
0337  1041                    TAD K0240
0340  4117                    JMS TYPE
0341  4117                    JMS TYPE
```

```
0342  1056                    TAD MAX
0343  4154                    JMS NUMBER
0344  4124                    JMS CRLF
0345  7604                    LAS
0346  0026                    AND K0004
0347  7640                    SZA CLA
0350  7402            HALT2,  HLT
0351  5727                    JMP I BERROR
```

```
                        /SUBROUTINE TO STORE HALTS IN MEMORY BANK Ø

0352  0000        HALTS,  Ø
0353  6201                CDF
0354  1105                TAD Ž7
0355  3011                DCA 11
0356  1074                TAD STOP
0357  3411                DCA I 11
0360  1011                TAD 11
0361  1035                TAD KØ201
0362  7640                SŽA CLA
0363  5356                JMP .-5
0364  5752                JMP I HALTS

                        /DECTAPE ERROR REPEAT TEST SUBROUTINE
0365  0000        ERR,    Ø
0366  7200                CLA
0367  6772                DTRB
0370  7700                SMA CLA
0371  2365                ISŽ ERR
0372  5765                JMP I ERR
```

```
0400                    *400

                        /SUBROUTINE TO STORE HALTS IN MEMORY BANK "N" (N-NONZERO), IN AC(6-8)

0400  0000              SET,    0
0401  7450                      SNA
0402  5600                      JMP I SET
0403  1214                      TAD .+11
0404  3206                      DCA .+2
0405  3010                      DCA 10
0406  6201                      CDF
0407  1074                      TAD STOP
0410  3410                      DCA I 10
0411  1010                      TAD 10
0412  7640                      SZA CLA
0413  5207                      JMP .-4
0414  6201                      CDF
0415  5600                      JMP I SET
                        /SUBROUTINE TO STORE ADDRESSES IN MEMORY BANK "N" (N-NONZERO, IN AC6-8)

0416  0000              STORE,  0
0417  7450                      SNA
0420  5616                      JMP I STORE
0421  1235                      TAD .+14
0422  3227                      DCA .+5
0423  1046                      TAD K1777
0424  3010                      DCA 10
0425  1050                      TAD K4000
0426  3012                      DCA 12
0427  6201                      CDF
0430  1010                      TAD 10
0431  7001                      IAC
0432  3410                      DCA I 10
0433  2012                      ISZ 12
0434  5230                      JMP .-4
0435  6201                      CDF
0436  5616                      JMP I STORE

                        /SUBROUTINE TO CHECK MEMORY BANK "N" TO ASSURE PROPER DATA STORED

0437  0000              CHECK,  0
0440  7450                      SNA
0441  5637                      JMP I CHECK
0442  1260                      TAD .+16
0443  3252                      DCA .+7
0444  1046                      TAD K1777
0445  3010                      DCA 10
0446  1050                      TAD K4000
0447  3012                      DCA 12
0450  1010                      TAD 10
0451  7040                      CMA
0452  6201                      CDF
0453  1410                      TAD I 10
0454  7640                      SZA CLA
```

```
0455  4262        JMS DATERR      /DATA ERROR
0456  2012        ISZ 12
0457  5250        JMP .-7
0460  6201        CDF
0461  5637        JMP I CHECK
```

```
                    /DATA ERROR SUBROUTINE

0462  0000        DATERR, 0
0463  4144                JMS BELL
0464  4135                JMS PRINT
0465  5324                JMP HALT3-3
0466  7410                SKP             /PRINT MESSAGE HEADER?
0467  5312                JMP .+23                /NO
0470  6201                CDF
0471  1066                TAD PMESS8      /YES, TYPE FIRST PART
0472  4106                JMS MSPRNT
0473  1023                TAD FIELD
0474  7112                CLL RTR
0475  7010                RAR
0476  4154                JMS NUMBER      /TYPE OUT FIELD
0477  1067                TAD PMESS9
0500  4106                JMS MSPRNT      /MORE HEADER
0501  1020                TAD BLOCK
0502  4154                JMS NUMBER      /FIRST BLOCK NUMBER
0503  1070                TAD PMES10
0504  4106                JMS MSPRNT      /REST OF HEADER
0505  1051                TAD K7000
0506  3266                DCA DATERR+4
0507  1252                TAD CHECK+13    /FORM "CDF"
0510  3311                DCA .+1
0511  6201                CDF             /CHANGE FIELD
0512  1010                TAD 10
0513  3072                DCA PNTR2
0514  1072                TAD PNTR2
0515  4154                JMS NUMBER              /TYPE OUT LOCATION
0516  1041                TAD K0240
0517  4117                JMS TYPE                /1 SPACE
0520  7200                CLA
0521  1472                TAD I PNTR2
0522  4154                JMS NUMBER              /TYPE OUT DATA
0523  4124                JMS CRLF                /CRLF
0524  7604                LAS
0525  0026                AND K0004
0526  7640                SZA CLA         /HALT?
0527  7402        HALT3,  HLT             /YES
0530  5662                JMP I DATERR
```

```
      0600              *600

                        /SEARCH SUBROUTINE

0600  0000              SEARCH, 0
0601  7200                      CLA
0602  3454                      DCA I K7755     /BLOCK# TO LOC 0
0603  1076                      TAD UNIT                /COMBINE UNIT
0604  1045                      TAD K0610               /AND SEARCH, NORM, REV
0605  6766                      DTLA            /LOAD A
0606  6774                      DTLB            /CLEAR B
0607  6771                      DTSF            /WAIT FOR
0610  5207                      JMP .-1         /SOME FLAG
0611  6772                      DTRB            /READ B
0612  7006                      RTL
0613  7700                      SMA CLA         /END ZONE?
0614  5220                      JMP .+4         /NO
0615  1044                      TAD K0600               /YES, TURN
0616  6764                      DTXA            /AROUND
0617  5207                      JMP SEARCH+7
0620  6772                      DTRB            /READ STATUS B
0621  7700                      SMA CLA         /DECTAPE ERROR?
0622  5225                      JMP .+3         /NO
0623  4251                      JMS WAIT                /YES, STOP TRANSPORT, ETC.
0624  5201                      JMP SEARCH+1    /TRY SEARCHING AGAIN
0625  6761                      DTRA            /READ A
0626  7006                      RTL             /MOVE DIRECTION
0627  7006                      RTL             /BIT INTO LINK
0630  7200                      CLA             /CLEAR AC
0631  1000                      TAD 0           /GET CURRENT BLOCK NUMBER
0632  7041                      CIA
0633  1020                      TAD BLOCK
0634  7450                      SNA             /CORRECT BLOCK?
0635  5245                      JMP FOUND               /YES, CHECK DIRECTION
0636  7041                      CIA             /NO, TAKE 2'S COMPLEMENT
0637  7420                      SNL             /LINK IS 1 IF BKWD AND NOT AT OR LOWER THAN BLOCK
0640  1024                      TAD K0002               /ADD TWO TO ENABLE TURN AROUND
0641  7620                      SNL CLA         /TURN AROUND (3 BEYOND)?
0642  1043                      TAD K0400               /YES
0643  6764                      DTXA            /CLEAR FLAG
0644  5207                      JMP SEARCH+7    /WAIT FOR NEXT FLAG
0645  7620              FOUND,  SNL CLA         /FOUND BLOCK FORWARD?
0646  5243                      JMP .-3         /NO
0647  6764                      DTXA            /YES, CLEAR FLAG

0650  5600                      JMP I SEARCH    /EXIT
```

```
                        /SUBROUTINE TO WAIT FOR DECTAPE FLAG AND NO ERROR
                        /EXIT WITH TRANSPORT STOPPED

0651  0000    WAIT,     0
0652  6771              DTSF              /WAIT FOR SOME FLAG
0653  5252              JMP .-1
0654  6761              DTRA              /READ STATUS A
0655  0034              AND K0200
0656  1025              TAD K0003
0657  6764              DTXA              /CLEAR GO
0660  6772              DTRB
0661  7700              SMA CLA
0662  5651              JMP I WAIT
0663  4144              JMS BELL
0664  4135              JMS PRINT
0665  5332              JMP HALT1-3
0666  1057              TAD PMESS1        /TYPE OUT ERROR MESSAGE HEADER
0667  4106              JMS MSPRNT
0670  6772              DTRB
0671  7006              RTL
0672  3022              DCA ERROR
0673  7420              SNL               /MARK TRACK ERROR?
0674  5277              JMP .+3           /NO
0675  1060              TAD PMESS2
0676  4106              JMS MSPRNT
0677  1022              TAD ERROR
0700  7104              RAL CLL
0701  3022              DCA ERROR
0702  7420              SNL               /END ZONE?
0703  5306              JMP .+3           /NO
0704  1061              TAD PMESS3
0705  4106              JMS MSPRNT
0706  1022              TAD ERROR
0707  7104              RAL CLL
0710  3022              DCA ERROR
0711  7420              SNL               /SELECT ERROR?
0712  5315              JMP .+3           /NO
0713  1062              TAD PMESS4
0714  4106              JMS MSPRNT
0715  1022              TAD ERROR
0716  7104              RAL CLL
0717  3022              DCA ERROR
0720  7420              SNL               /PARITY ERROR?
0721  5324              JMP .+3
0722  1063              TAD PMESS5
0723  4106              JMS MSPRNT
0724  1022              TAD ERROR
0725  7104              RAL CLL
0726  7620              SNL CLA           /TIMING ERROR?
0727  5332              JMP .+3
0730  1064              TAD PMESS6
```

```
0731  4106                    JMS MSPRNT
0732  7604                    LAS
0733  0026                    AND KØØØ4
0734  7640                    SZA CLA          /HALT ON ERROR?

0735  7402          HALT1,    HLT
0736  5651                    JMP I WAIT
```

```
      1000              *1000

                        /MESSAGES

1000  0215              MESS1,  215     /CR
1001  0212                      212     /LF
1002  0324                      324     /T
1003  0310                      310     /H
1004  0305                      305     /E
1005  0240                      240     /SP
1006  0306                      306     /F
1007  0317                      317     /O
1010  0314                      314     /L
1011  0314                      314     /L
1012  0317                      317     /O
1013  0327                      327     /W
1014  0311                      311     /I
1015  0316                      316     /N
1016  0307                      307     /G
1017  0240                      240     /SP
1020  0325                      325     /U
1021  0316                      316     /N
1022  0305                      305     /E
1023  0330                      330     /X
1024  0320                      320     /P
1025  0305                      305     /E
1026  0303                      303     /C
1027  0324                      324     /T
1030  0305                      305     /E
1031  0304                      304     /D
1032  0240                      240     /SP
1033  0305                      305     /E
1034  0322                      322     /R
1035  0322                      322     /R
1036  0317                      317     /O
1037  0322                      322     /R
1040  0323                      323     /S
1041  0240                      240     /SP
1042  0317                      317     /O
1043  0303                      303     /C
1044  0303                      303     /C
1045  0325                      325     /U
1046  0322                      322     /R
1047  0322                      322     /R
1050  0305                      305     /E
1051  0304                      304     /D
1052  0272                      272     /:
1053  0215                      215     /CR
1054  0212                      212     /LF
1055  0377                      377     /RO
```

```
1056  0315              MESS2,  315     /M
1057  0301                      301     /A
1060  0322                      322     /R
1061  0313                      313     /K

1062  0240                      240     /SP
1063  0324                      324     /T
1064  0322                      322     /R
1065  0301                      301     /A
1066  0303                      303     /C
1067  0313                      313     /K
1070  0215                      215     /CR
1071  0212                      212     /LF
1072  0377                      377     /RO

1073  0305              MESS3,  305     /E
1074  0316                      316     /N
1075  0304                      304     /D
1076  0240                      240     /SP
1077  0332                      332     /Z
1100  0317                      317     /O
1101  0316                      316     /N
1102  0305                      305     /E
1103  0215                      215     /CR
1104  0212                      212     /LF
1105  0377                      377     /RO

1106  0323              MESS4,  323     /S
1107  0305                      305     /E
1110  0314                      314     /L
1111  0305                      305     /E
1112  0303                      303     /C
1113  0324                      324     /T
1114  0215                      215     /CR
1115  0212                      212     /LF
1116  0377                      377     /RO

1117  0320              MESS5,  320     /P
1120  0301                      301     /A
1121  0322                      322     /R
1122  0311                      311     /I
1123  0324                      324     /T
1124  0331                      331     /Y
1125  0215                      215     /CR

1126  0212                      212     /LF
1127  0377                      377     /RO
```

```
1130  0324              MESS6,  324     /T
1131  0311                      311     /I
1132  0315                      315     /M
1133  0311                      311     /I
1134  0316                      316     /N
1135  0307                      307     /G
1136  0215                      215     /CR
1137  0212                      212     /LF
1140  0377                      377     /RO

1141  0215              MESS7,  215     /CR
1142  0212                      212     /LF
1143  0315                      315     /M
1144  0305                      305     /E
1145  0315                      315     /M
1146  0317                      317     /O
1147  0322                      322     /R
1150  0331                      331     /Y
1151  0240                      240     /SP
1152  0306                      306     /F
1153  0311                      311     /I
1154  0305                      305     /E
1155  0314                      314     /L
1156  0304                      304     /D
1157  0240                      240     /SP
1160  0305                      305     /E
1161  0322                      322     /R
1162  0322                      322     /R
1163  0317                      317     /O
1164  0322                      322     /R
1165  0215                      215     /CR
1166  0212                      212     /LF
1167  0322                      322     /R
1170  0311                      311     /I
1171  0307                      307     /G
1172  0310                      310     /H
1173  0324                      324     /T
1174  0240                      240     /SP
1175  0327                      327     /W
1176  0322                      322     /R
1177  0317                      317     /O
1200  0316                      316     /N
1201  0307                      307     /G
1202  0215                      215     /CR
1203  0212                      212     /LF
1204  0377                      377     /RO
```

```
1205  0215              MESS8,  215     /CR
1206  0212                      212     /LF
1207  0304                      304     /D
1210  0301                      301     /A

1211  0324                      324     /T
1212  0301                      301     /A
1213  0240                      240     /SP
1214  0305                      305     /E
1215  0322                      322     /R
1216  0322                      322     /R
1217  0317                      317     /O
1220  0322                      322     /R
1221  0215                      215     /CR
1222  0212                      212     /LF
1223  0306                      306     /F
1224  0311                      311     /I
1225  0305                      305     /E
1226  0314                      314     /L
1227  0304                      304     /D
1230  0240                      240     /SP
1231  0377                      377     /RO

1232  0215              MESS9,  215     /CR
1233  0212                      212     /LF
1234  0306                      306     /F
1235  0311                      311     /I
1236  0322                      322     /R
1237  0323                      323     /S
1240  0324                      324     /T
1241  0240                      240     /SP
1242  0302                      302     /B
1243  0314                      314     /L
1244  0317                      317     /O
1245  0303                      303     /C
1246  0313                      313     /K
1247  0240                      240     /SP
1250  0377                      377     /RO
```

```
1251  0215              MESS10, 215     /CR
1252  0212                      212     /LF
1253  0314                      314     /L
1254  0317                      317     /O
1255  0303                      303     /C
1256  0256                      256     /.
1257  0240                      240     /SP
1260  0304                      304     /D
1261  0301                      301     /A
1262  0324                      324     /T
1263  0301                      301     /A
1264  0215                      215     /CR
1265  0212                      212     /LF
1266  0377              END,    377             /RO

$
```

THERE ARE NO ERRORS

SYMBOL TABLE

BEGIN	0200
BELL	0144
BERROR	0327
BLOCK	0020
CDF	6201
CHECK	0437
CNTR	0021
CRLF	0124
DATERR	0462
DTCA	6762
DTLA	6766
DTLB	6774
DTRA	6761
DTRB	6772
DTSF	6771
DTXA	6764
END	1266
ERR	0365
ERROR	0022
FIELD	0023
FOUND	0645
HALTS	0352
HALT1	0735
HALT2	0350
HALT3	0527
K0002	0024
K0003	0025
K0004	0026
K0007	0027
K0010	0030
K0070	0031
K0130	0032
K0150	0033
K0200	0034
K0201	0035
K0207	0036
K0212	0037
K0215	0040
K0240	0041
K0260	0042
K0400	0043
K0600	0044
K0610	0045
K1777	0046
K2670	0047
K4000	0050
K7000	0051
K7401	0052
K7754	0053
K7755	0054
K7774	0055
MAX	0056
MESS1	1000

SYMBOL TABLE

MESS10	1251
MESS2	1056
MESS3	1073
MESS4	1106
MESS5	1117
MESS6	1130
MESS7	1141
MESS8	1205
MESS9	1232
MSPRNT	0106
NUMBER	0154
PMESS1	0057
PMESS2	0060
PMESS3	0061
PMESS4	0062
PMESS5	0063
PMESS6	0064
PMESS7	0065
PMESS8	0066
PMESS9	0067
PMES10	0070
PNTR1	0071
PNTR2	0072
PRINT	0135
SEARCH	0600
SET	0400
SKIP	0073
START	0224
STOP	0074
STORE	0416
TEMP	0075
TYPE	0117
UNIT	0076
WAIT	0651
Z1	0077
Z2	0100
Z3	0101
Z4	0102
Z5	0103
Z6	0104
Z7	0105

SYMBOL TABLE

BLOCK	0020
CNTR	0021
ERROR	0022
FIELD	0023
K0002	0024
K0003	0025
K0004	0026
K0007	0027
K0010	0030
K0070	0031
K0130	0032
K0150	0033
K0200	0034
K0201	0035
K0207	0036
K0212	0037
K0215	0040
K0240	0041
K0260	0042
K0400	0043
K0600	0044
K0610	0045
K1777	0046
K2670	0047
K4000	0050
K7000	0051
K7401	0052
K7754	0053
K7755	0054
K7774	0055
MAX	0056
PMESS1	0057
PMESS2	0060
PMESS3	0061
PMESS4	0062
PMESS5	0063
PMESS6	0064
PMESS7	0065
PMESS8	0066
PMESS9	0067
PMES10	0070
PNTR1	0071
PNTR2	0072
SKIP	0073
STOP	0074
TEMP	0075
UNIT	0076
Z1	0077
Z2	0100
Z3	0101
Z4	0102
Z5	0103
Z6	0104

SYMBOL TABLE

Z7	0105
MSPRNT	0106
TYPE	0117
CRLF	0124
PRINT	0135
BELL	0144
NUMBER	0154
BEGIN	0200
START	0224
BERROR	0327
HALT2	0350
HALTS	0352
ERR	0365
SET	0400
STORE	0416
CHECK	0437
DATERR	0462
HALT3	0527
SEARCH	0600
FOUND	0645
WAIT	0651
HALT1	0735
MESS1	1000
MESS2	1056
MESS3	1073
MESS4	1106
MESS5	1117
MESS6	1130
MESS7	1141
MESS8	1205
MESS9	1232
MESS10	1251
END	1266
CDF	6201
DTRA	6761
DTCA	6762
DTXA	6764
DTLA	6766
DTSF	6771
DTRB	6772
DTLB	6774