IDENTIFICATION

Product Code: MAINDEC-08-D8SC-D

Product Name: DM01 Exerciser

Date Created: March 26, 1971

Maintainer: Diagnostic Group

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1. **ABSTRACT**

The DM01 Exerciser is a program written to exercise the DM01 Data Break Multiplexer to assure that it can properly interlace data breaks from several peripheral devices to the PDP-8 computer. It does this by exercising several data break devices simultaneously.

2. **REQUIREMENTS**

2.1 **Equipment**

Family-of-8 Computer and

DM01 Data Break Multiplexer, plus at least one of the following

TC01 DECtape and/or

TC58 MAGtape and/or

338 Display and/or

Extended Memory and/or

RM08 Drum or

DF32 Disk or

RF08 Disk

2.2 **Storage**

The program occupies all of the lowest 4K of the computer's memory and uses some of this area and areas in other memory banks (if available) for data storage.

2.3 **Preliminary Programs**

The appropriate diagnostic programs for the data break devices.

3. **LOADING PROCEDURE**

3.1 **Method**

The program is loaded, using the "standard binary loader" technique, into memory bank 0.

4. STARTING PROCEDURE

4.1 Control Switch Settings

The following is a table of AC Switch settings and their action on the program.

AC Switch	Set As	Action on Program
0	1	Don't halt on hardware errors
	0	Halt on hardware errors
1	1	Don't halt on data errors
	0	Halt on data errors
2	1	Don't print hardware errors
	0	Print hardware errors
3	1	Don't print data errors
	0	Print data errors
4	1	Look at ACS5 for disk/drum transfer direction
	0	Ignore ACS5
5	1	Write
	0	Read
6	1	Suppress DECtape exercising
	0	None
7	1	Suppress MAGtape exercising
	0	None
8	1	Suppress disk/drum exercising
	0	None
9	1	
	0	
10	1	
	0	
11	1	Freeze memory field
	0	None

4.2   Starting Addresses

There are two starting addresses for the program.

a.   Start at location 00200 when the program is initially read into memory, to allow the program to interrogate the operator.

b.   Restart at location 00201 to avoid re-interrogating the operator about computer configuration.

4.3   Starting Procedure

Start the program using the following starting procedure, and ignoring those steps not applicable to computer configuration.

a.   Load program into memory bank 0 using the "standard binary loader."

b.   Mount onto a DECtape transport a reel of DECtape which has the standard mark and timing track format (2702 blocks, 201 words each). Set the transport selector to 8, set switch to WRITE ENABLE, set switch to REMOTE.

c.   Mount onto a MAGtape transport a reel of MAGtape which is certified to operate at 800 bpi with the "write-lock" ring in (able to write). Set the transport selector to 0 and ON LINE.

d.   Set up the DF32, disk 0, so that the upper 16K may be written on (not write-lock).

e.   Set up RF08, disk 0, so that uppermost locations may be written on (not write-lock) (256K).

f.   Set up RM08 drum so that track 77, sectors 50 to 77 may be written on (not write-lock).

g.   Set up 338 Display so that it can be operated by the 8.

h.   Set ACS to 00200.

i.   Depress LOAD ADDRESS.

j.   Set ACS per Section 4.1 (normal setting is 0000).

k.   Depress START.

l.   Answer questions asked by program with "Y" for Yes, "N" for No, and number of extra memory banks (between 1 and 7) (if applicable).

m.   After interrogation is complete, program will start exercising the devices whose answers are "Yes" and the DM01.

5.   OPERATING PROCEDURE

5.1   Operational Switch Settings

See Section 4.1

3

5.2   Subroutine Abstracts

None

5.3   Program and/or Operator Action

After setting up the I/O devices and answering the questions asked by the program, the operator need perform no other action unless an error occurs. If a particular device consistently has errors, it may be "turned off" by setting to 1 its ACS (see Section 4.1, ACS 6-8).

6.   ERRORS

6.1   Error Typeouts

Since all error typeouts occur with the program interrupt facility off, a DECtape timing error will generally occur if any non-DECtape error has been typed out. Normally, the DECtape timing error can be ignored under these circumstances.

6.1.1   Hardware Errors

Hardware errors cause an error status typeout for the device in error. Shown below are the error status bits for the various devices.

6.1.1.1   DECtape Error Status (TC01) –
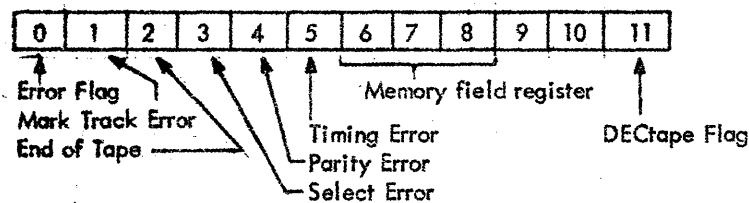
6.1.1.2   MAGtape Error Status (TC-58) –

4
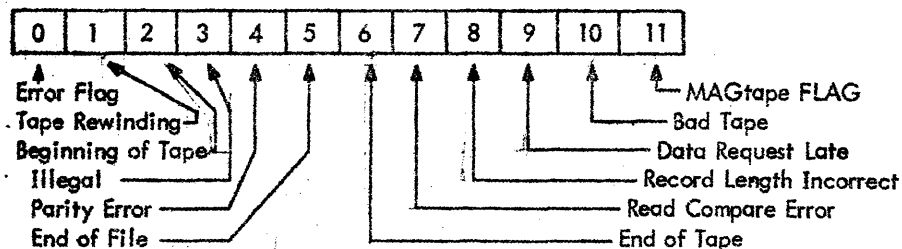
6.1.1.3 Drum Error Status (RM08) -

0	1	2	3	4	5	6	7	8	9	10	11

Parity Error
Data Timing Error
Drum Sector Counter
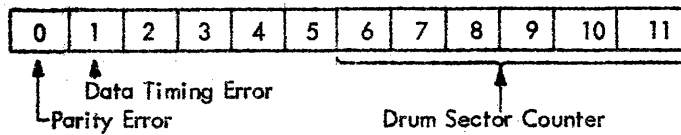
6.1.1.4 Disk Error Status (DF32) -

0	1	2	3	4	5	6	7	8	9	10	11

Photo-Sync Mark
Disk Extended Address
Computer Extended Address
Parity Error
Non-existent Disk/ write-lock on
Data Request Late
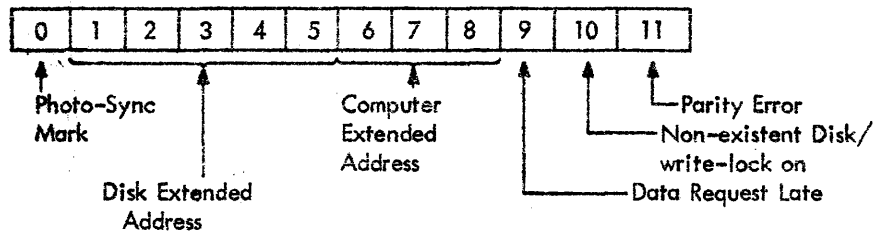
6.1.1.5 Disk Error Status (RF08) -

0	1	2	3	4	5	6	7	8	9	10	11

Photo-sync Mark
Data RQ Enable
Write Lock-on
Interrupt Enable Buffer
Computer Extended Memory
Parity Error
Non-existent Disk
Data Request Late
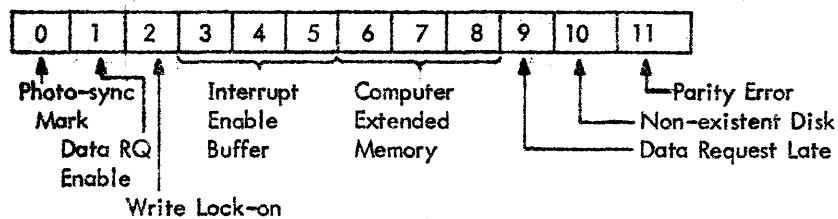
6.1.2 Data Errors

Data error typeouts present the following information:

a. Offending Device (DECtape, MAGtape, DISK/DRUM

b. Memory Field in which error occurred

c. Address of "Good" Data ("GADD")

d. Good Data ("GDAT")

e. Address of "Bad" Data ("BADD")

f. Bad Data ("BDAT")

6.2 Error Halts

Each error, which has an error typeout, also has an error halt.

6.3 Error Recovery

To recover from an error halt, depress CONTINUE. If it was a data error, the program will continue until another data error is found for the device, or until all the data has been checked. If it was a hardware error, the program will attempt to perform the function again, except a non-existent disk error which is not recoverable.

7. RESTRICTIONS

7.1 Starting Restrictions

None

7.2 Operating Restrictions

None

8. MISCELLANEOUS

8.1 Execution Time

Not applicable. Since this is an exerciser program, it does not stop on its own accord, except for errors.

9. PROGRAM DESCRIPTION

9.1 Interrogation

The first function that is performed by the program is interrogation. The operator is questioned by the program to determine what peripherals are to be exercised.

9.2 Initialization

Next, initialization takes place. Random memory fields (if applicable) are selected for the devices being tested. The DECtape is initialized by causing it to move to the end zone at the beginning of tape. The MAGtape is initialized by causing it to rewind to the beginning of tape; tests are also made at this time to assure that the tape control is ready and that the tape transport is also ready (and exists). A two word transfer is made to disk or one sector to the drum to initialize it. The 338 Display is set up to execute a display program.

9.3 DECtape Exercising

The exercising of DECtape follows this procedure:

a. Six hundred (octal) words are obtained from a random number generator and are stored in an output buffer in memory (some memory bank). This is done with PI off.

b. The block to be sought for writing is incremented by 3. It is initially 0.

c. The data is written on DECtape into the selected block (and the two following). While this is taking place, the PI facility is turned on to allow interrupts from any I/O devices in use.

d. After the data is written, the information is read back from the selected block (S) into an input buffer in the same memory bank data was written from. This takes place with PI on.

e. The data written is compared with the data read to see if any errors occurred. This is done with the PI on. Any discrepancies will be reported on the teletype (unless suppressed) and will cause error halts (unless suppressed).

f. A new data field is selected for data transfer for DECtape. The program then returns to Step a (above).

9.4 MAGtape Exercising

The exercising of MAGtape follows this procedure:

a. Six hundred (octal) words are obtained from a random number generator and are stored in an output buffer in memory (some memory bank). This is done with the PI on.

b. The data is written on MAGtape in an area not previously written on by this program. While this is taking place, the PI facility is turned on to allow interrupts from any I/O devices in use.

c. After the data is written, the information is read back into an input buffer in the same memory bank data was written from. This is accomplished by rewinding the MAGtape to "BOT," spacing forward as many records as necessary to get to the data, then reading it into memory. This is done with the PI on.

d. The data written is compared with the data read to see if any errors occurred. This is done with the PI on. Any discrepancies will be reported on the Teletype and will cause error halts.

e. The data on MAGtape is then "Read Compared" against the data in memory. This is done with the PI on. Any discrepancies will result in the hardware error "Read Compare Error".

f. A new data field is selected for data transfer for MAGtape. The program then returns to Step a (above).

9.5 Disk/Drum Exercising

The exercising of disk/drum follows this procedure:

a. Six hundred (octal) words are obtained from a random number generator and are stored in an output buffer in memory (some memory bank). This is done with PI on.

b. The data is written on the disk/drum into the highest 601 (octal) locations (on disk/drum 0) (265K). While this is taking place, the PI facility is on.

7

c. After the data is written, the information is read back into an input buffer in the same memory bank data was written from. This takes place with the PI on.

d. The data written is compared with the data read to see if any errors occurred. This is done with PI on. Any discrepancies will be reported on the Teletype and will cause error halts.

e. A new data field is selected for data transfer for disk/drum. The program then returns to Step a (above).

If a hardware error occurs during any function of a peripheral, that function will usually be attempted repeatedly until it is successful, or the operator intervenes.

9.6   Data Buffers Memory Map

The following locations in each memory bank being used for data transfer are used as buffer areas.

DECtape Output Buffer	3200 - 3777
MAGtape Output Buffer	4000 - 4577
Disk/Drum Output Buffer	4600 - 5377
DECtape Input Buffer	5400 - 6177
MAGtape Input Buffer	6200 - 6777
Disk/Drum Input Buffer	7000 - 7577

9.7   Display Exercising

The exercising of the display is handled quite simply. The 338 is initialized by clearing the "initial conditions", and the break field is set to 0. The display address register is then set to the starting address of the display program. The display program, which is written in 338 display instructions, causes a square, with corners at 100,100; 100,1700, 1700, 1700, 1700. 100; to be displayed in vector mode. Diagnosis of display errors is visual.

```
                    /DM01 EXERCISER - TAPE 1
                    /IOT DEFINITIONS
                    /DRUM
    6603            DRCR=6603
    6605            DRCW=6605
    6611            DRCF=6611
    6612            DREF=6612
    6615            DRTS=6615
    6621            DRSE=6621
    6622            DRSC=6622
    6624            DRCN=6624
    6612            DRES=6612
    6624            DRFS=6624
                    /DISC
    6601            DCMA=6601
    6603            DMAR=6603
    6605            DMAW=6605
    6611            DCEA=6611
    6612            DSAC=6612
    6615            DEAL=6615
    6616            DEAC=6616
    6621            DFSE=6621
    6622            DFSC=6622
    6626            DMAC=6626
    6611            DCIM=6611
    6615            DIML=6615
    6616            DIMA=6616
    6643            DXAL=6643

                    /TC01
    6761            DTRA=6761
    6762            DTCA=6762
    6764            DTXA=6764
    6766            DTLA=6766
    6771            DTSF=6771
    6772            DTRB=6772
    6774            DTLB=6774

                    /TC58
    6701            MTSF=6701
    6711            MTCR=6711
    6721            MTTR=6721
    6712            MTAF=6712
    6714            MTCM=6714
    6716            MTLC=6716
    6706            MTRS=6706
    6722            MTGO=6722

                    /EXTENDED MEMORY
    6201            CDF=6201
    6202            CIF=6202
    6214            RDF=6214
    6224            RIF=6224
    6234            RIB=6234
```

```
              4244    RMF=6244


                      /DISPATCH TO PI SCAN FLAG ROUTINE
              0001    *1
      0001    5402            JMP I .+1
      0002    2600            SCAN
                      /POINTERS, GOBS OF POINTERS
      0003    2321    PNTR1,  MESAGE
      0004    2254    PNTR2,  INPUT
      0005    2400    PNTR3,  RANGEN
      0006    2554    PNTR4,  GET
      0007    2726    PNTR5,  DDDATA+6

              0020    *20
      0020    0000    DTFELD, 0         /DECTAPE EXTENDED MEMORY FIELD
      0021    0000    MTFELD, 0         /MAGTAPE EXTENDED MEMORY FIELD
      0022    0000    DDFELD, 0         /DISC OR DRUM EXTENDED MEMORY FIELD
      0023    2630    PNTR6,  EXIT
      0024    2654    PNTR7,  RAND3
      0025    2720    PNTR8,  DDDATA
      0026    1501    PNTR9,  RF08WR
      0027    1461    PNTR10, RF08RD
      0030    1416    PNTR11, RM08WR
      0031    1400    PNTR12, RM08RD
      0032    2643    PNTR13, DDFLAG
      0033    0735    PNTR14, DF32WR
      0034    0755    PNTR15, DF32RD
      0035    2637    PNTR16, DTFLAG
      0036    2112    PNTR17, SPCFWD
      0037    2641    PNTR18, MTFLAG
      0040    1240    PNTR19, REWIND
      0041    1255    PNTR20, MTERR
      0042    2444    PNTR21, RAND1
      0043    1067    PNTR22, DTRITE
      0044    1047    PNTR23, DTREAD
      0045    2277    PNTR24, PRINT
      0046    2645    PNTR25, TYPE
      0047    1266    PNTR32, MTWAIT
      0050    2363    PNTR33, CRLF
      0051    0600    PNTR34, DECTAP
      0052    0610    PNTR35, MAGTAP
      0053    0627    PNTR36, RM08
      0054    0644    PNTR38, DF32
      0055    0662    PNTR39, RF08
      0056    2634    PNTR40, MEMORY
      0057    1331    PNTR41, DTSAVE
      0060    1343    PNTR42, DTREST
      0061    0345    PNTR48, NODISC
      0062    0365    PNTR49, DIS338


      0063    3000    PMESS1, MESS01
      0064    1565    PMESS2, MESS02
      0065    2171    PMESS3, MESS03
```

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0066   2371    PMESS4,  MESS04
0067   1770    PMESS6,  MESS06
0070   2565    PMESS7,  MESS07
0071   3040    PMESS8,  MESS08
0072   3046    PMESS9,  MESS09
0073   3055    PMES10,  MESS10
0074   3132    PMES15,  MESS15


0075   7750    K7750,   7750      /WC - DISC
0076   7751    K7751,   7751      /CA - DISC
0077   7752    K7752,   7752      /WC - TC58
0100   7753    K7753,   7753      /CA - TC58
0101   7754    K7754,   7754      /WC - TC01
0102   7755    K7755,   7755      /CA - TC01


0103   0400    K0400,   400       /REVERSE DIRECTION (DECTAPE)
0104   0200    K0200,   200       /GO STOP (DECTAPE)
0105   7200    K7200,   7200      /MAX SIZE OF DATA TRANSFERS
0106   3177    BUFF1,   3177      /(DECTAPE OUTPUT BUFFER)-1
0107   3377    BUFF4,   3377      /(DECTAPE INPUT BUFFER)-1
0110   0014    K0014,   14        /REWIND ENABLE (MAGTAPE)
0111   0177    BUFF5,   0177      /(MAGTAPE INPUT BUFFER)-1
0112   3777    BUFF2,   3777      /(MAGTAPE OUTPUT BUFFER)-1
0113   0777    BUFF6,   0777      /(DISC OR DRUM INPUT BUFFER)-1
0114   4577    BUFF3,   4577      /(DISC OR DRUM OUTPUT BUFFER)-1
0115   7775    M0003,   7775      /MINUS 3
0116   7462    M0316,   7462      /MINUS N
0117   7447    M0331,   7447      /MINUS Y
0120   5300    M2700,   5300      /HIGHEST DECTAPE BLOCK TO BE USED
0121   7774    M0004,   7774
0122   3000    K3000,   3000      /24 9-00 DRUM SECTORS
0123   0070    K0070,   70        /MASK FOR MEMORY FIELD BITS
0124   0040    K0040,   40        /MASK FOR DECTAPE SUPPRESSION
0125   0240    K0240,   240       /SPACE
0126   0215    K0215,   215       /CR
0127   0212    K0212,   212       /LF
0130   0007    K0007,   7
0131   0040    K0040,
0132   0000    K0000,   0
0133   1610    S1610,            /GET DISC BUTTON
0134   0020    K0020,   20       /MASK FOR MAGTAPE SUPPRESSION
0135   0010    K0010,   10       /MASK FOR DISC OR DRUM SUPPRESSION
0136   1000    K1000,   1000     /MASK FOR TC58 BIT


0137   7077    DISCEA,  7077     /DISC EXTENDED ADDRESS (DF 32)
0140   7777    DISCAD,  7777     /DISC ADDRESS
0141   7777    DRUMAD,  7777     /DRUM ADDRESS (5-00)
0142   7077    DISCEA,  7077     /DISC EXTENDED ADDRESS (RF08)
0143   0500    DISCA,   500      /INTERRUPT ENABLE (RF08)
0144   0000    DISC,    0
0145   0000    LINK,    0        /LINK PT
0146   0000    DTSTAT,  0        /DECTAPE STATUS
0147   0000    MTSTAT,  0        /MAGTAPE STATUS
```

```
0150  0000      RECORD, 0           /NUMBER OF RECORDS WRITTEN ON MAG TAPE
0151  0000      DDSTAT, 0           /DRUM OR DISC STATUS
0152  0000      DRMSEC, 0           /DRUM SECTOR COUNTER
0153  0000      CHAR,   0           /CHARACTER FROM KEYBOARD
0154  5451      JMPDEC, JMP I PNTR34      /JUMP TO DECTAPE STARTER
0155  5452      JMPMAG, JMP I PNTR35      /JUMP TO MAGTAPE STARTER
0156  5453      JMPRM8, JMP I PNTR36      /JUMP TO RM08 STARTER
0157  5454      JMPD32, JMP I PNTR38      /JUMP TO DF32 STARTER
0160  5455      JMPR08, JMP I PNTR39      /JUMP TO RF08 STARTER
0161  5462      JMP338, JMP I PNTR49
0162  0000      FELD,   0           /NUMBER OF EXTENDED MEMORY FIELDS
0163  1600      DTPNTR, DTEXER      /POINTER TO DECTAPE EXERCISOR
0164  2000      MTPNTR, MTEXER      /POINTER TO MAGTAPE EXERCISER
0165  0510      RM08PR, RM08EX      /POINTER TO RM08 DRUM EXERCISER
0166  0526      DF32PR, DF32EX      /POINTER TO DF32 DISC EXERCISE
0167  0517      RF08PR, RF08EX      /POINTER TO RF08 DISC EXERCISER
0170  0000      DTCNTR, 0           /DECTAPE LOOP COUNTER
0171  0000      TEMP,   0           /TEMP STORAGE
0172  0000      TEMP1,  0
0173  0000      MTCNTR, 0           /MAGTAPE LOOP COUNTER
0174  0000      DDCNTR, 0           /DISC OR DRUM COUNTER
0175  0000      LOOK,   0           /BLOCK LOOKED FOR


      0200      *200
0200  5207      START,  JMP     INTERR          /INTERROGATE OPERATOR
0201  0000              0                       /(DECTAPE) THESE AND'S MAY BE REPLACED
0202  0000              0                       /(MAGTAPE) BY JUMPS
0203  0000              0                       /(DISC OR DRUM) IF THESE DEVICES ARE AVAILABLE
0204  0000              0                       /(338 DISPLAY)
0205  6001              ION                     /TURN ON PI
0206  5206              JMP     .               /IDLE HERE WHEN THERE IS NOTHING BETTER TO DO

              /INTERROGATE THE OPERATOR ABOUT MACHINE CONFIGURATION
0207  7200      INTERR, CLA                     /INITIALIZE STARTER JUMPS TO AND 0
0210  3201              DCA START+1
0211  3202              DCA START+2
0212  3203              DCA START+3
0213  3204              DCA START+4
0214  1063              TAD PMESS1
0215  4403              JMS I PNTR1             /TYPE OUT HEADER
0216  1064      ASK1,   TAD PMESS2
0217  4403              JMS I PNTR1        /ASK OPERATOR ABOUT DECTAPE
0220  4327              JMS TEST
0221  5225              JMP ASK2
0222  5216              JMP ASK1
0223  1154              TAD JMPDEC
0224  3201              DCA START+1
0225  1066      ASK2,   TAD PMESS4
0226  4403              JMS I PNTR1        /ASK OPERATOR ABOUT MAGTAPE
0227  4327              JMS TEST
0230  5234              JMP ASK3
0231  5225              JMP ASK2
0232  1155              TAD JMPMAG
0233  3202              DCA START+2
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```
        0234  1065    ASK3,   TAD PMESS3
        0235  4403            JMS I PNTR1         /ASK OPERATOR ABOUT 338 DISPLAY
        0236  4327            JMS TEST
        0237  5243            JMP ASK4
        0240  5234            JMP ASK3
        0241  1161            TAD JMP338
        0242  3204            DCA START+4


        0243  1067    ASK4,   TAD PMESS6
        0244  4403            JMS I PNTR1         /ASK OPERATOR ABOUT RM08
        0245  4327            JMS TEST
        0246  5253            JMP ASK5
        0247  5243            JMP ASK4
        0250  1156            TAD JMPRM8
        0251  3203            DCA START+3
        0252  5272            JMP ASK7
        0253  1070    ASK5,   TAD PMESS7
        0254  4403            JMS I PNTR1         /ASK OPERATOR ABOUT DF32
        0255  4327            JMS TEST
        0256  5263            JMP ASK6
        0257  5253            JMP ASK5
        0260  1157            TAD JMPD32
        0261  3203            DCA START+3
        0262  5272            JMP ASK7
        0263  1071    ASK6,   TAD PMESS8
        0264  4403            JMS I PNTR1         /ASK OPERATOR ABOUT RF08
        0265  4327            JMS TEST
        0266  5272            JMP ASK7
        0267  5263            JMP ASK6
        0270  1160            TAD JMPR08
        0271  3203            DCA START+3
        0272  1072    ASK7,   TAD PMESS9
        0273  4403            JMS I PNTR1         /ASK OPERATOR ABOUT EXTENDED MENORY
        0274  4327            JMS TEST
        0275  5303            JMP .+6
        0276  5272            JMP ASK7
        0277  1073            TAD PMES10
        0300  4403            JMS I PNTR1         /ASK HOW MUCH
        0301  4404            JMS I PNTR2
        0302  5277            JMP .-3
        0303  7104            RAL CLL             /POSITION BITS
        0304  7006            RTL
        0305  3162            DCA FELD                /STORE NUMBER OF EXTRA MEMORY BANKS
        0306  4450            JMS I PNTR33            /CR-LF


                        /LOAD EXTENDED MEMORY FIELDS FOR
                        /DECTAPE, MAGTAPE, AND DISC/DRUM
        0307  1134            TAD K0020
        0310  3000            DCA 0
        0311  1115            TAD M0003
        0312  3010            DCA 10
        0313  4405            JMS I PNTR3
        0314  0123            AND K0070
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0315  3400            DCA I 0
0316  1162            TAD FELD
0317  7041            CIA
0320  1400            TAD I 0
0321  7740            SMA SZA CLA
0322  5313            JMP .-7
0323  2000            ISZ 0
0324  2010            ISZ 10
0325  5313            JMP .-12
0326  5201            JMP START+1
0327  0000    TEST,   0
0330  6032            KCC
0331  4406            JMS I PNTR4
0332  3153            DCA CHAR
0333  1153            TAD CHAR
0334  1116            TAD M0316
0335  7650            SNA CLA          /N-N0?
0336  5727            JMP I TEST       /YES
0337  2327            ISZ TEST         /NO, INCREMENT
0340  1153            TAD CHAR
0341  1117            TAD M0331
0342  7650            SNA CLA          /Y-YES?
0343  2327            ISZ TEST                 /YES, INCREMENT
0344  5727            JMP I TEST       /THEN EXIT


              /PROCESS POTENTIAL NON-EXISTANT DISC ERROR
0345  7200    NODISC, CLA
0346  6616            DEAC             /READ DISC STATUS
0347  7000            NOP
0350  3151            DCA DDSTAT
0351  1151            TAD DDSTAT
0352  7012            RTR
0353  7620            SNL CLA          /NON-EXISTANT DISC ERROR?
0354  5423            JMP I PNTR6              /NO,EXIT
0355  1364            TAD PME11A              /YES, TYPE OUT HEADER
0356  4403            JMS I PNTR1
0357  1151            TAD DDSTAT
0360  4445            JMS I PNTR24             /TYPE OUT STATUS WORD
0361  4450            JMS I PNTR33             /CR-LF
0362  7402            HLT              /STOP
0363  5362            JMP .-1          /NON-RECOVERABLE ERROR-RESTART
0364  3062    PME11A, MESS11
              /338 DISPLAY STARTER ROUTINE
0365  7200    DIS338, CLA
0366  6145            6145             /SET DISPLAY INITIAL CONDIITIONS TO 0
0367  7330            CLA CLL CML RAR  /SET AC TO 4000
0370  6155            6155             /CLEAR BREAK FIELD REGISTER
0371  7200            CLA
0372  1376            TAD .+4          /GET STARTING ADDRESS OF 338 PROGRAM
0373  6165            6165             /LOAD DAC
0374  7200            CLA
0375  5205            JMP START+5
0376  3161            PRO338
```

```
                   Ø4ØØ      =4ØE
                             /DISC OR DRUM EXERCISER

        Ø4ØØ   72ØØ    DDEXER, CLA
        Ø4Ø1   66Ø1          66Ø1            /CLEAR EF AND DONE
        Ø4Ø2   1133          TAD SKIP
        Ø4Ø3   34Ø7          DCA I PNTR5
        Ø4Ø4   76Ø4          LAS
        Ø4Ø5   Ø135          AND KØØ1Ø
        Ø4Ø6   764Ø          SZA CLA         /SUPPRESS DISK OR DRUM?
        Ø4Ø7   5423          JMP I PNTR6     /YES, EXIT
        Ø41Ø   76Ø4          LAS
        Ø411   Ø1Ø4          AND KØ2ØØ
        Ø412   764Ø          SZA CLA         /BIT 4 SET?
        Ø413   5365          JMP DDLOOP      /YES
        Ø414   4335          JMS DDSAVE      /SAVE PI STUFF
        Ø415   6ØØ1          ION
        Ø416   11Ø5          TAD K72ØØ
        Ø417   3Ø15          DCA 15
        Ø42Ø   1114          TAD BUFF3
        Ø421   3Ø14          DCA 14
        Ø422   123Ø          TAD .+6
        Ø423   1Ø22          TAD DDFELD
        Ø424   3226          DCA .+2
        Ø425   4424          JMS I PNTR7
        Ø426   62Ø1          CDF
        Ø427   3414          DCA I 14                 /STORE DATA IN OUTPUT BUFFER
        Ø43Ø   62Ø1          CDF
        Ø431   2Ø15          ISZ 15          /DONE
        Ø432   5225          JMP .-5         /NO
        Ø433   6ØØ2          IOF
        Ø434   4347          JMS DDREST               /RESTORE PI STUFF


        Ø435   5235    DDRITE, JMP .             /WRITE DATA ONTO DISC OR DRUM
        Ø436   66Ø1          66Ø1            /CLEAR FLAGS
        Ø437   76Ø4          LAS
        Ø44Ø   Ø135          AND KØØ1Ø
        Ø441   764Ø          SZA CLA         /SUPPRESS DISC OR DRUM?
        Ø442   5423          JMP I PNTR6     /YES, EXIT
        Ø443   5243    DDREAD, JMP .         /READ DATA FROM DISC OR DRUM
        Ø444   66Ø1          66Ø1            /CLEAR FLAGS
        Ø445   4335          JMS DDSAVE      /SAVE PI STUFF
        Ø446   6ØØ1          ION             /TURN ON INTERRUPT
        Ø447   1114          TAD BUFF3       /OUTPUT BUFFER
        Ø45Ø   3Ø14          DCA 14
        Ø451   1113          TAD BUFF6       /INPUT BUFFER
        Ø452   3Ø15          DCA 15
        Ø453   11Ø5          TAD K72ØØ       /COUNT
        Ø454   3174          DCA DDCNTR
        Ø455   1264          TAD .+7
        Ø456   1Ø22          TAD DDFELD
        Ø457   326Ø          DCA .+1
        Ø46Ø   62Ø1          CDF
        Ø461   1414          TAD I 14        /COMPARE DATA OUT WITH DATA IN
```

```
             0462  7041          CIA
             0463  1415          TAD I 15
             0464  6201          COF
             0465  7440          SZA              /GOOD?
             0466  4425          JMS I PNTR8      /NO, DATA ERROR
             0467  2174          ISZ DDCNTR       /DONE?
             0470  5260          JMP .-10         /NO
             0471  7604          LAS
             0472  7010          RAR
             0473  7630          SZL CLA          /CHANGE MEMORY FIELD?


             0474  5305          JMP .+11         /NO
             0475  4424          JMS I PNTR7      /YES
             0476  0123          AND K0070
             0477  3022          DCA DDFELD
             0500  1162          TAD FELD
             0501  7041          CIA
             0502  1022          TAD DDFELD
             0503  7740          SMA SZA CLA
             0504  5275          JMP .-7
             0505  6002          IOF
             0506  4347          JMS DDREST       /RESTORE PI STUFF
             0507  5200          JMP DDEXER



                        /RM08 DRUM EXERCISER SETUP ROUTINE

             0510  1315   RM08EX, TAD RM08RI
             0511  3235          DCA DDRITE
             0512  1316          TAD RM08RE
             0513  3243          DCA DDREAD
             0514  5200          JMP DDEXER
             0515  4430   RM08RI, JMS I PNTR11
             0516  4431   RM08RE, JMS I PNTR12
                        /RF08 DISC EXERCISER SETUP ROUTINE
             0517  1324   RF08EX, TAD RF08RI
             0520  3235          DCA DDRITE
             0521  1325          TAD RF08RE
             0522  3243          DCA DDREAD
             0523  5200          JMP DDEXER
             0524  4426   RF08RI, JMS I PNTR9
             0525  4427   RF08RE, JMS I PNTR10


                        /DF32 DISC EXERCISER SETUP ROUTINE

             0526  1333   DF32EX, TAD DF32RI
             0527  3235          DCA DDRITE
             0530  1334          TAD DF32RE
             0531  3243          DCA DDREAD
             0532  5200          JMP DDEXER
             0533  4433   DF32RI, JMS I PNTR14
             0534  4434   DF32RE, JMS I PNTR15
```

```
                          /DISC-DRUM SAVE SUBROUTINE
     0535  0000          DDSAVE, 0
     0536  1144                  TAD AC          /SAVE AC
     0537  3361                  DCA DDAC
     0540  1145                  TAD LINK        /LINK
     0541  3362                  DCA DDLINK
     0542  1456                  TAD I PNTR40    /MEMORY FIELD
     0543  3363                  DCA DDIB
     0544  1000                  TAD 0           /AND LOC 0
     0545  3364                  DCA DDPC
     0546  5735                  JMP I DDSAVE

                          /DISC-DRUM RESTORE SUBROUTINE
     0547  0000          DDREST, 0
     0550  1361                  TAD DDAC        /RESTORE SAVED AC
     0551  3144                  DCA AC
     0552  1362                  TAD DDLINK      /LINK
     0553  3145                  DCA LINK
     0554  1363                  TAD DDIB        /MEMORY FIELD
     0555  3456                  DCA I PNTR40
     0556  1364                  TAD DDPC        /AND LOC 0
     0557  3000                  DCA 0
     0560  5747                  JMP I DDREST

     0561  0000          DDAC,     0
     0562  0000          DDLINK,   0
     0563  0000          DDIB,     0
     0564  0000          DDPC,     0

                          /DISC-DRUM LOOP ROUTINE
     0565  7604          DDLOOP, LAS
     0566  0132                  AND K0100
     0567  7640                  SZA CLA         /LOOP ON READ?
     0570  5373                  JMP .+3         /NO, WRITE
     0571  1243                  TAD DDREAD      /YES, READ
     0572  7410                  SKP
     0573  1235                  TAD DDRITE
     0574  3375                  DCA .+1
     0575  7402                  HLT             /JMS INSTRUCTION IS STORED HERE
     0576  5200                  JMP DDEXER


           0600          *600
                          /DECTAPE STARTER ROUTINE

     0600  7200          DECTAP, CLA
     0601  3175                  DCA LOOK                /ZERO BLOCK SPECIFIER
     0602  1376                  TAD K0604
     0603  6766                  DTLA            /LOAD "A" WITH "GO,REVERSE,MOVE,ENABLE,CLEAR"
     0604  1163                  TAD DTPNTR
     0605  3435                  DCA I PNTR16    /SET UP RETURN FROM P.I.
     0606  5607                  JMP I .+1
     0607  0202                  START+2
```

/MAGTAPE STARTER ROUTINE

```
0610  7200   MAGTAP, CLA
0611  3150          DCA RECORD       /CLEAR RECORD COUNT
0612  1110          TAD K0014
0613  6711          MTCR             /SKIP IF MAG TAPE CONTROL READY
0614  7402   MTHLT1, HLT
0615  6716          MTLC             /LOAD COMMAND REGISTER WITH "REWIND, ENABLE"
0616  6721          MTTR             /SKIP IF MAG TAPE UNIT READY
0617  7402   MTHLT2, HLT
0620  7200          CLA
0621  6722          MTGO             /GO
0622  1164          TAD MTPNTR
0623  3437          DCA I PNTR18
0624  5625          JMP I .+1
0625  0203          START+3
```

/RM08 DRUM STARTER ROUTINE

```
0626  0204          START+4
0627  7201   RM08,  CLA IAC
0630  6624          DRFS             /LOAD SECTOR COUNTER TO 1
0631  1114          TAD BUFF3
0632  6605          DRCW             /LOAD CORE ADDRESS, WRITE
0633  1141          TAD DRUMAD
0634  6615          DRTS             /LOAD DRUM ADDRESS, INITIATE XFER
0635  1165          TAD RM08PR
0636  3432          DCA I PNTR13
0637  1105          TAD K7200
0640  3704          DCA I PNTR46
0641  1705          TAD I PNTR47
0642  3703          DCA I PNTR45
0643  5626          JMP I RM08-1
```

/DF32 DISC STARTER ROUTINE

```
0644  7244   DF32,  CLA CMA RAL
0645  3475          DCA I K7750      /SET UP W.C.
0646  1114          TAD BUFF3
0647  3476          DCA I K7751      /SET UP C.A.
0650  1137          TAD DISCEA
0651  6615          DEAL             /LOAD CONTROL WITH DISC EXTENDED ADDRESS
0652  7200          CLA
0653  1140          TAD DISCAD
0654  6605          DMAW             /LOAD DISC ADDRESS AND WRITE
0655  1166          TAD DF32PR
0656  3432          DCA I PNTR13
0657  1306          TAD JMPCON
0660  3704          DCA I PNTR46
0661  5241          JMP RM08+12
```

                     /RF08   DISC STARTER ROUTINE

     0662 7244   RF08,   CLA CMA RAL
     0663 3475   DCA I K7750   /SET UP WC
     0664 1114   TAD BUFF3
     0665 3476   DCA I K7751   /SET UP CA
     0666 1143   TAD INTERN
     0667 6615   DIML   /SET UP INTERRUPT ENABLES
     0670 1142   TAD TRACK
     0671 6643   DXAL   /LOAD DISC EXTENDED ADDRESS
     0672 1140   TAD DISCAD   /LOAD DISC ADDRESS AND WRITE
     0673 6605   DMAW
     0674 1167   TAD RF08PR
     0675 3432   DCA I PNTR13
     0676 1133   TAD SKIP   /SET UP SKIP CHAIN
     0677 3703   DCA I PNTR45
     0700 1705   TAD I PNTR47
     0701 3704   DCA I PNTR46
     0702 5626   JMP I RM08-1   /RETURN TO START+4
     0703 2626   PNTR45, EXIT-2
     0704 2627   PNTR46, EXIT-1
     0705 2624   PNTR47, EXIT-4

     0706 5461   JMPCON, JMP I PNTR48

                     /DF32 DISC WAIT FOR FLAG AND NO ERRORS SUBROUTINE

     0707 0000   DF32WT, 0
     0710 4432   JMS I PNTR13   /WAIT FOR DISC FLAG
     0711 6621   DFSE   /ANY ERRORS?
     0712 7410   SKP   /YES
     0713 5707   JMP I DF32WT   /NO
     0714 7604   LAS
     0715 7006   RTL
     0716 7510   SPA   /PRINT ERRORS?
     0717 5331   JMP HALT4-2   /NO
     0720 7200   CLA
     0721 6616   DEAC   /READ STATUS
     0722 7000   NOP
     0723 3151   DCA DDSTAT
     0724 1375   TAD PMES11
     0725 4403   JMS I PNTR1   /TYPE OUT HEADER
     0726 1151   TAD DDSTAT
     0727 4445   JMS I PNTR24   /TYPE OUT STATUS WORD
     0730 4450   JMS I PNTR33   /CRLF
     0731 7604   LAS
     0732 7700   SMA CLA   /HALT ON ERROR?
     0733 7402   HALT4,   HLT   /YES
     0734 5707   JMP I DF32WT   /EXIT

                     /DF32 DISC WRITE SUBROUTINE

     0735 0000   DF32WR, 0

```
8736  7200              CLA
8737  1105              TAD K7200
8740  3475              DCA I K7750      /SET UP W. C
8741  1114              TAD BUFF3
8742  3476              DCA I K7751      /SET UP C.A
8743  1022              TAD DDFELD       /COMBINE DISC CORE MEMORY FIELD
8744  1137              TAD DISCEA       /AND DISC EXTENDED ADDRESS
8745  6615              DEAL             /AND TRANSFER TO DISC CONTROL
8746  7200              CLA
8747  1140              TAD DISCAD
8750  6605              DMAW             /LOAD DISC ADDRESS AND WRITE
8751  4307              JMS DF32WT       /WAIT FOR DISC FLAG
8752  6621              DFSE             /ANY ERRORS
8753  5336              JMP DF32WR+1     /YES, REPEAT FUNCTION
8754  5735              JMP I DF32WR     /EXIT
                /DF32 DISC READ SUBROUTINE

8755  0000      DF32RD. 0
8756  7200              CLA
8757  1105              TAD K7200
8760  3475              DCA I K7750      /SET UP WC
8761  1113              TAD BUFF6
8762  3476              DCA I K7751      /SET UP CA
8763  1022              TAD DDFELD       /COMBINE DISC CORE MEMORY FIELD
8764  1137              TAD DISCEA       /AND DISC EXTENDED ADDRESS
8765  6615              DEAL             /AND XFER TO DISC CONTROL
8766  7200              CLA
8767  1140              TAD DISCAD
8770  6603              DMAR             /LOAD DISC ADDRESS AND READ
8771  4307              JMS DF32WT       /WAIT FOR DISC FLAG
8772  6621              DFSE             /ANY ERRORS?
8773  5356              JMP DF32RD+1     /YES, REPEAT FUNCTION
8774  5755              JMP I DF32RD     /EXIT
8775  3062      PMES11. MESS11
8776  0604      K0604.  0604             /OR. REVERSE  MOVE, ENABLE


                /OM01 - TAPE2
      1000      *1000
                /DECTAPE SEARCH ROUTINE

1000  0000      SEARCH. 0
1001  1346              TAD FOUND+1
1002  3502              DCA I K7755      /SET UP BLOCK NUMBER TO GO TO FOUND
1003  1355              TAD K0614        / SEARCH, NORM. REV, ENABLE
1004  6766              DTLA             /LOAD /
1005  6774              DTLB             /CLEAR M
1006  4435              JMS I PNTR16     /WAIT FOR DECTAPE FLAG
1007  6772              DTRB             /READ B
1010  7006              RTL
1011  7700              SMA CLA          /SKIP ZERO
1012  5216              JMP .+4
1013  1354              TAD 3H-R8        /GET TURN
1014  6 64              CTR              /AROUND
1015  9206              JMP SEARCH+6
```

```
1016  4772        DTRB              /READ STATUS B
1017  7700        SMA CLA           /DECTAPE ERROR
1020  5223        JMP .+3           /NO
1021  4307        JMS DTWAIT        /YES, STOP TRANSPORT, ETC
1022  5203        JMP SEARCH+3      /TRY SEARCHING AGAIN
1023  6761        DTRA              /READ A
1024  7006        RTL               /MOVE DIRECTION
1025  7006        RTL               /BIT INTO LINK
1026  7200        CLA
1027  1345        TAD FOUND         /GET BLOCK NUMBER FOUND
1030  7041        CIA
1031  1175        TAD LOOK
1032  7450        SNA               /CURRENT BLOCK?
1033  5243        JMP LOCBED        /YES, CHECK DIRECTION
1034  7041        CIA               /NO, TAKE 2'S COMPLEMENT
1035  7420        SNL               /LINK IS 1 IF BKWD AND NOT AT OR LOWER THAN BLOCK
1036  1352        TAD K0002         /ADD TWO TO ENABLE TURN AROUND
1037  7620        SNL CLA           /TURN AROUND (3 BEYOND)?
1040  1103        TAD K0400         /YES
1041  6764        DTXA              /CLEAR FLAG
1042  5206        JMP SEARCH+6      /WAIT FOR NEXT FLAG
1043  7620  LOCBED, SNL CLA         /FOUND BLOCK FORWARD?
1044  5241        JMP .-3           /NO
1045  6764        DTXA              /YES, CLEAR FLAGS
1046  5600        JMP I SEARCH      /EXIT


                  /DECTAPE READ SUBROUTINE

1047  0000  DTREAD, 0
1050  4200        JMS SEARCH        /SEARCH OUT BLOCK
1051  4337        JMS DTERR
1052  5250        JMP .-2
1053  1020        TAD DTFELD
1054  6774        DTLB              /LOAD MEMORY FIELD REGISTER
1055  1350        TAD K0130
1056  6764        DTXA              /CHANGE FROM SEARCH TO READ DATA CONT
1057  1105        TAD K7200
1060  3501        DCA I K7754       /SET UP WC
1061  1107        TAD BUFF4
1062  3502        DCA I K7755       /SET UP CA
1063  4307        JMS DTWAIT        /WAIT FOR DECTAPE FLAG
1064  4337        JMS DTERR         /ERRORS?
1065  5250        JMP DTREAD+1      /YES, REPEAT FUNCTION
1066  5647        JMP I DTREAD      /EXIT
                  /DECTAPE WRITE SUBROUTINE
1067  0000  DTRITE, 0
1070  4200        JMS SEARCH        /SEARCH OUT BLOCK
1071  4337        JMS DTERR
1072  5270        JMP .-2
1073  1020        TAD DTFELD
1074  6774        DTLB              /LOAD MEMORY FIELD REGISTOR
1075  1351        TAD K0150
1076  6764        DTXA              /CHANGE FROM SEARCH TO WRITE DATA CONT.
1077  1105        TAD K7200
```

```
      1160   2801          DCA I K7754      /SETUP WC
      1161   1.2.          TAD WORDS
        2.   3582          ...  .3759       ... UP ...
        P3   4387          .8  .....        ..... ... DECTAPE FLAG
      ...    4532          ... ...          .PROMPT
      .85    5279          ..  .V(....-.    ... REPORT ..NCTION
      .86.   35AT          ..  ....TE
```

/S....... TO WAIT FOR DECTAPE FLAG AND NO ERRORS
/L.... ..TH TRANSPORT STOPPED

```
      1187   8#88   DTW...          .                  .....................
      ...    ...      ..T I PNTR10       .WAIT FOR #DM1 FLAG
      ...    ...      ...              ...... .......
      ...    ...      ...  ...         ...........
      ...    ...      ...  ....        ...........
      ...    ...      ...             ...........
      ...    ...      ...             ...
      ...    ...      ... CLA          /ERRORS?
      ...    ...      ...  I DTW....    /NO
      ...    ...      ...
      ...    ...      RTL
      ...    ...      SMA CLA          ..... ERRORS?
      ...    ...      ...  WA.....
      ...    ...      DTRS
      ...    ...      DCA DTST.T
      ...    ...      ... ...
      ...    ...      J.. I PNTR.      /.......  HEADER
      ...    ...      ..D DTSTA.
      1181   ....     J.S I PNTR24     /..... OUT STATUS WORD

      1182   ....     J.. I PNTR05     /.....

      ...    ...      ...
      ...    ...      ... CLA          ......  ... .....
      ...    ...      ... ..  RTL      /...
      ...    ...      J.. I .. TW...
```

/DECTAPE ERROR ROUTINES, DON'T SKIP IF ANY ERROR

```
      1137   8#86   DTER..  5
      1188   72..          CLA
      ...    ...           ...
      11.2   77..          SMA CLA
      ...    2337          ISZ DTERR
      ...    5732          JMP I DTERR
      1145   ####   .....   #                  SLOCK ....
      1146   ...            .
      1147   ...     .......   ....
      ...    ....    ......    ...          /...... TO ....  DATA ...........
      ...    ....    ......    ...          /...... TO .... DATA ...........
      1152   ####   ....     ....
      1183   ####   K####,  ....
```

```
          1154  0600  K0600,  0600              /REVERSE, GO
          1155  0614  K0614,  0614              /SEARCH, NORMAL, REVERSE, ENABLE
          1156  2403  MESS16,  2403             /T,C
          1157  6570          6570              /5,8
          1160  4004          4004              /SP,D
          1161  0124          0124              /A,T
          1162  0140          0140              /A,SP
          1163  0522          0522              /E,R
          1164  2217          2217              /R,O
          1165  2240          2240              /R,SP
          1166  1116          1116              /I,N
          1167  4002          4002              /SP,B
          1170  0116          0116              /A,N
          1171  1340          1340              /K,SP
          1172  4000          4000              /SP,END


          1200          *1200
                        /MAGTAPE READ SUBROUTINE

          1200  0000  MTREAD,  0
          1201  4240          JMS REWIND        /REWIND TAPE
          1202  4436          JMS I PNTR17      /SPACE TO BEGINNING OF RECORD
          1203  1356          TAD K0626
          1204  6716          MTLC              /LOAD CM WITH "ODD,7CH,READ,ENABLE,800" AND CLEAR FLAGS
          1205  7200          CLA
          1206  1105          TAD K7200
          1207  3477          DCA I K7752       /SET UP WC
          1210  1111          TAD BUFF3
          1211  3500          DCA I K7753       /SET UP CA
          1212  1021          TAD MTFELD
          1213  6722          MTGO              /LOAD EXTENDED FIELD REGISTER, GO
          1214  4266          JMS MTWAIT        /WAIT FOR MT FLAG AND NO ERRORS
          1215  4255          JMS MTERR         /ERRORS?
          1216  5201          JMP MTREAD+1      /YES, REPEAT FUNCTION
          1217  5600          JMP I MTREAD      /NO, EXIT


                        /MAGTAPE READ-COMPARE SUBROUTINE

          1220  0000  RDCOMP,  0
          1221  4240          JMS REWIND        /REWIND TAPE
          1222  4436          JMS I PNTR17      /SPACE TO BEGINNING OF RECORD
          1223  1355          TAD K0636
          1224  6716          MTLC              /LOAD CM WITH "ODD,7CH,RD COMP,ENABLE800" AND CLEAR FLAGS
          1225  7200          CLA
          1226  1105          TAD K7200
          1227  3477          DCA I K7752       /SET UP WC
          1230  1112          TAD BUFF2
          1231  3500          DCA I K7753       /SET UP CA
          1232  1021          TAD MTFELD
          1233  6722          MTGO              /LOAD EXTENDED FIELD REGISTER, GO
          1234  6266          JMS MTWAIT        /WAIT FOR MT FLAG AND NO ERRORS
          1235  4255          JMS MTERR         /ERRORS?
          1236  5221          JMP RDCOMP+1      /YES,REPEAT FUNCTION
```

```
1237  5620           JMP I RDCOMP     /NO, EXIT


             /MAGTAPE REWIND SUBROUTINE (ACTUALLY SPACE REVERSE)

1240  0000   REWIND,  0
1241  1254           TAD K0676
1242  6716           MTLC             /LOAD CM WITH "ODD,7CH,SPACE REVERSE,ENABLE,800" AND CLEAR FLAGS
1243  7200           CLA
1244  6722           MTGO             /SET GO
1245  3477           DCA I K7752      /SET UP W.C.
1246  4266           JMS MTWAIT       /WAIT FOR MT FLAG
1247  6706           MTRS             /READ STATUS
1250  7006           RTL
1251  7700           SMA CLA          /BOT?
1252  5241           JMP REWIND+1     /NO, TRY AGAIN
1253  5640           JMP I REWIND     /YES, EXIT
1254  0676   K0676,  0676             /ODD,7CH,SPACE REVERSE,ENABLE,800



             /MAG TAPE ERROR ROUTINE
1255  0000   MTERR,   0
1256  6706           MTRS             /READ STATUS
1257  7500           SMA              /ERRORS?
1260  5263           JMP .+3          /NO
1261  0136           AND K1000        /YES
1262  7640           SZA CLA          /BOT?
1263  2255           ISZ MTERR        /YES, NO ERROR
1264  7200           CLA
1265  5655           JMP I MTERR
             /SUBROUTINE TO WAIT FOR MAGTAPE FLAG AND NO ERRORS
             /EXIT WITH TRANSPORT STOPPING

1266  0000   MTWAIT,  0
1267  4437           JMS I PNTR18     /WAIT FOR MAGTAPE FLAG
1270  4255           JMS MTERR        /READ MAGTAPE STATUS
1271  7410           SKP              /ERRORS?
1272  5312           JMP HALT2+2      /NO
1273  7604           LAS
1274  7006           RTL
1275  7710           SPA CLA          /PRINT ERRORS?
1276  5306           JMP HALT2-2      /NO
1277  6706           MTRS
1300  3147           DCA MTSTAT
1301  1326           TAD PMES13
1302  4403           JMS I PNTR1      /TYPE OUT HEADER
1303  1147           TAD MTSTAT
1304  4445           JMS I PNTR24     /TYPE OUT STATUS WORD


1305  4450           JMS I PNTR33     /CRLF
1306  7604           LAS
1307  7700           SMA CLA          /HALT ON ERROR?
1310  7402   HALT2,  HLT              /YES
```

```
1311  5666              JMP I MTWAIT
1312  6712              MTAF               /CLEAR FLAGS
1313  4727              JMS I PNTR43
1314  6001              ION
1315  6721              MTTR               /WAIT FOR
1316  5315              JMP .-1            /TAPE TRANSPORT READY
1317  6002              IOF
1320  4730              JMS I PNTR44
1321  5666              JMP I MTWAIT
1322  0000     DTAC,    0
1323  0000     DTLINK,  0
1324  0000     DTIB,    0
1325  0000     DTPC,    0
1326  3106     PMES13,  MESS13
1327  2132     PNTR43,  MTSAVE
1330  2144     PNTR44,  MTREST


              /DECTAPE SAVE SUBROTINE
1331  0000     DTSAVE,  0
1332  1144              TAD AC             /SAVE AC
1333  3322              DCA DTAC
1334  1145              TAD LINK           /LINK
1335  3323              DCA DTLINK
1336  1456              TAD I PNTR40       /MEMORY FIELD
1337  3324              DCA DTIB
1340  1000              TAD 0              /AND LOC 0
1341  3325              DCA DTPC
1342  5731              JMP I DTSAVE


              /DECTAPE RESTORE SUBROUTINE
1343  0000     DTREST,  0
1344  1322              TAD DTAC           /RESTORE SAVED AC
1345  3144              DCA AC
1346  1323              TAD DTLINK         /LINK
1347  3145              DCA LINK
1350  1324              TAD DTIB           /MEMORY FIELD
1351  3456              DCA I PNTR40
1352  1325              TAD DTPC           /AND LOC 0
1353  3000              DCA 0
1354  5743              JMP I DTREST

1355  0636     K0636,   0636               /ODD, 7CH READ COMPARE, ENABLE, 800
1356  0626     K0626,   0626               /ODD, 7CH, READ, ENABLE, 800
1357  0411     MESS17,  0411               /D,I
1360  2303              2303               /S,C
1361  4017              4017               /SP,O
1362  2240              2240               /R,SP
1363  0422              0422               /D,R
1364  2515              2515               /U,M
1365  4004              4004               /SP,D
1366  0124              0124               /A,T
1367  0140              0140               /A,SP
1370  0522              0522               /E,R
```

```
1371  2217            2217          /R,0
1372  2240            2240          /R,SP
1373  1116            1116          /I,N
1374  4002            4002          /SP,0
1375  0116            0116          /A,N
1376  1340            1340          /K,SP
1377  4000            4000          /SP,END


      1400            *1400
                      /RM08 DRUM READ SUBROUTINE

1400  0000    RM08RD, 0
1401  7200            CLA
1402  1022            TAD DDFELD     /COMBINE MEMORY FIELD
1403  1122            TAD K3000      /AND NUMBER OF SECTORS
1404  6624            DRFS           /TO DRUM CONTROL
1405  7201            CLA IAC
1406  1113            TAD BUFF6
1407  6603            DRCR           /LOAD CORE MEMORY ADDRESS, READ
1410  1141            TAD DRUMAD
1411  6615            DRTS           /LOAD DRUM ADDRESS REGISTER, INITIATE XFER
1412  4234            JMS DRUMWT     /WAIT FOR DONE FLAG AND  NO ERRORS
1413  6621            DRSE           /ERRORS?
1414  5201            JMP RM08RD+1   /YES, REPEAT XFER
1415  5600            JMP I RM08RD   /NO


                      /RM08 DRUM WRITE SUBROUTINE

1416  0000    RM08WR, 0
1417  7200            CLA
1420  1022            TAD DDFELD     /COMBINE MEMORY FIELD
1421  1122            TAD K3000      /AND NUMBER OF SECTORS
1422  6624            DRFS           /TO CONTROL
1423  7201            CLA IAC
1424  1114            TAD BUFF3
1425  6605            DRCW           /LOAD CORE MEMORY ADDRESS, WRITE
1426  1141            TAD DRUMAD
1427  6615            DRTS           /LOAD DRUM ADDRESS REGISTER, INITIATE XFER
1430  4234            JMS DRUMWT     /WAIT FOR DRUM FLAG AND NO ERRORS
1431  6621            DRSE           /ERRORS?
1432  5217            JMP RM08WR+1   /YES, REPEAT XFER
1433  5616            JMP I RM08WR   /NO


                      /DRUM WAIT FOR FLAG AND NO ERRORS SUBROUTINE

1434  0000    DRUMWT, 0
1435  4432            JMS I PNTR13   /WAIT FOR DRUM FLAG
1436  6621            DRSE           /ANY ERRORS
1437  7410            SKP
1440  5634            JMP I DRUMWT   /NO
1441  7604            LAS            /YES, PRINT ERRORS?
1442  7006            RTL
```

```
          1443  7510              SPA               /PRINT ERRORS.
          1444  5255              JMP HALT3-2
          1445  7200              CLA
          1446  6612              CREF              /READ STATUS
          1447  3151              DCA DDSTAT
          1450  1363              TAD PMES14
          1451  4403              JMS I PNTR1       /TYPE OUT HEADER
          1452  1151              TAD DDSTAT


          1453  4445              JMS I PNTR24      /TYPE OUT ERROR STATUS
          1454  4450              JMS I PNTR33      /CRLF
          1455  7604              LAS
          1456  7700              SMA CLA           /HALT ON ERROR?
          1457  7402      HALT3,  HLT               /YES
          1460  5634              JMP I DRUMWT

                          /RF08 DISC READ SUBROUTINE
          1461  0000      RF08RD, 0
          1462  1105              TAD K7200
          1463  3475              DCA I K7750       /SET UP WC
          1464  1113              TAD BUFF6
          1465  3476              DCA I K7751       /SET UP CA
          1466  1022              TAD ODFELD        /COMBINE DISC CORE MEMORY FIELD
          1467  1143              TAD INTERN        /AND INTERRUPT ENABLES
          1470  6615              DIML              /AND TRANSFER TO DISC CONTROL
          1471  1142              TAD TRACK
          1472  6643              DXAL              /LOAD DISC EXTENDED ADDRESS
          1473  1140              TAD DISCAD
          1474  6603              DMAR              /LOAD DISC ADDRESS AND READ
          1475  4321              JMS RF08WT        /WAIT FOR DISC FLAG
          1476  6621              DFSE              /ANY ERRORS?
          1477  5661              JMP I RF08RD      /NO
          1500  5262              JMP RF08RD+1      /YES, REPEAT FUNCTION

                          /RF08 DISC WRITE SUBROUTINE
          1501  0000      RF08WR, 0
          1502  1105              TAD K7200
          1503  3475              DCA I K7750       /SET UP WC
          1504  1114              TAD BUFF3
          1505  3476              DCA I K7751       /SET UP CA
          1506  1022              TAD ODFELD        /COMBINE DISC CORE MEMORY FIELD
          1507  1143              TAD INTERN        /AND INTERRUPT ENABLES
          1510  6615              DIML              /AND TRANSFER TO DISC CONTROL
          1511  1142              TAD TRACK
          1512  6643              DXAL              /LOAD DISC EXTENDED ADDRESS
          1513  1140              TAD DISCAD
          1514  6605              DMAW              /LOAD DISC ADDRESS AND WRITE
          1515  4321              JMS RF08WT        /WAIT FOR DISC FLAG
          1516  6621              DFSE              /ANY ERRORS
          1517  5701              JMP I RF08WR      /NO
          1520  5302              JMP RF08WR+1      /YES

                          /RF08 DISC WAIT FOR FLAG AND NO ERRORS SUBROUTINE
                          /(TRANSFERS CONTROL TO "DF32WT" IF ANY ERRORS)
```

```
1521  0000    RF08WT, 0
1522  4432            JMS I PNTR13        /WAIT FOR DISC FLAG
1523  6621            DFSE                /ANY ERRORS?
1524  5721            JMP I RF08WT        /NO
1525  1321            TAD RF08WT          /YES
1526  3731            DCA I .+3           /SAVE "PC"
1527  5730            JMP I .+1           /TRANSFER CONTROL TO
1530  0714            DF32WT +5           /DDF32 ERROR TYPEOUT
1531  0707            DF32WT


              /MAGTAPE WRITE ROUTINE

1532  0000    MTRITE, 0
1533  7200            CLA
1534  1364            TAD K0746
1535  6716            MTLC                /LOAD CM WITH "ODD,7CH,3 IN, GAP,WRITE,800" AND CLEAR FLAGS
1536  7200            CLA
1537  1105            TAD K7200
1540  3477            DCA I K7752         /SET UP WC
1541  1112            TAD BUFF2
1542  3500            DCA I K7753         /SET UP CA
1543  1021            TAD MTFELD
1544  6722            MTGO                /LOAD EXTENDED FIELD REGISTER, GO
1545  4447            JMS I PNTR32        /WAIT FOR MT FLAG AND NO ERRORS
1546  2150            ISZ RECORD          /INCREMENT NUMBER OF RECORDS
1547  5352            JMP .+3
1550  4440            JMS I PNTR19        /4096 RECORDS, REWIND TAPE
1551  5333            JMP MTRITE+1        /START OVER
1552  4441            JMS I PNTR20        /ANY ERRORS
1553  7410            SKP
1554  5732            JMP I MTRITE        /NO, EXIT
1555  4440            JMS I PNTR19        /YES, REWIND TAPE
1556  4436            JMS I PNTR17        /SPACE FORWARD TO BEGINNING OF THIS RECORD
1557  7240            CLA CMA
1560  1150            TAD RECORD          /DECREMENT RECORD COUNT
1561  3150            DCA RECORD
1562  5334            JMP MTRITE+2        /TRY AGAIN
1563  3120    PMES14, MESS14
1564  0746    K0746,  0746                /ODD, 7CH, WRITE, ENABLE, 800
1565  2403    MESS02, 2403                /T,C
1566  6061            6061                /0,1
1567  4004            4004                /SP,D
1570  0503            0503                /E,C
1571  2401            2401                /T,A
1572  2005            2005                /P,E
1573  7700            7700                /?,END


1600          *1600
              /DECTAPE EXERCISER

1600  7200    DTEXER, CLA
1601  6764            DTXA                /CLEAR EF AND DTF
1602  1133            TAD SKIP
```

```
        1603   3320          DCA DTDATA+6
        1604   7604          LAS
        1605   0124          AND K0040
        1606   7640          SZA CLA              /SUPPRESS DECTAPE?
        1607   5423          JMP I PNTR6          /YES, EXIT
        1610   4457          JMS I PNTR41         /SAVE PI STUFF
        1611   6001          ION
        1612   1105          TAD K7200
        1613   3011          DCA 11
        1614   1106          TAD BUFF1
        1615   3010          DCA 10
        1616   1224          TAD .+6
        1617   1020          TAD DTFELD
        1620   3222          DCA .+2
        1621   4442          JMS I PNTR21
        1622   6201          CDF
        1623   3410          DCA I 10             /STORE DATA IN OUTPUT BUFFER
        1624   6201          CDF
        1625   2011          ISZ 11               /DONE
        1626   5221          JMP .-5              /NO
        1627   1175          TAD LOOK
        1630   1311          TAD K0003A           /INCREMENT BLOCK BY 3
        1631   3175          DCA LOOK
        1632   7300          CLA CLL
        1633   1175          TAD LOOK
        1634   1120          TAD M2700
        1635   7630           SEL CLA
        1636   5231          JMP .-5
        1637   6002          IOF
        1640   4460          JMS I PNTR42         /RESTORE PI STUFF
        1641   4443          JMS I PNTR22         /WRITE DATA ONTO DECTAPE
        1642   6764          DTXA                 /CLEAR FLAGS
        1643   4444          JMS I PNTR23         /READ DATA FROM DECTAPE
        1644   1367          TAD K0004            /STOP TAPE, CLEAR ENABLE AND
        1645   6764          DTXA                 /CLEAR FLAGS
        1646   4457          JMS I PNTR41         /SAVE PI STUFF


        1647   6001          ION                  /TURN ON INTERRUPT
        1650   1106          TAD BUFF1            /OUTPUT BUFFER
        1651   3010          DCA 10
        1652   1107          TAD BUFF4            /INPUT BUFFER
        1653   3011          DCA 11
        1654   1105          TAD K7200           /COUNT
        1655   3170          DCA DTCNTR
        1656   1265          TAD .+7
        1657   1020          TAD DTFELD
        1660   3261          DCA .+1
        1661   6201          CDF
        1662   1410          TAD I 10             /COMPARE DATA OUT WITH DATA IN
        1663   7041          CIA
        1664   1411          TAD I 11
        1665   6201          CDF
        1666   7440          SZA                  /GOOD?
        1667   4312          JMS DTDATA           /NO, DATA ERROR
```

```
1670    2170            ISZ DTCNTR          /DONE?
1671    5261            JMP .-10            /NO
1672    6002            IOF                 /YES
1673    4460            JMS I PNTR42        /RESTORE PI STUFF
1674    7604            LAS
1675    7010            RAR
1676    7630            SZL CLA             /CHANGE MEMORY FIELD?
1677    5200            JMP DTEXER          /NO
1700    4442            JMS I PNTR21        /YES
1701    0123            AND K0070
1702    3020            DCA DTFELD
1703    1162            TAD FELD
1704    7041            CIA
1705    1020            TAD DTFELD
1706    7740            SMA SZA CLA
1707    5300            JMP .-7
1710    5200            JMP DTEXER
1711    0003    K0003A, 3


                /DECTAPE DATA ERROR ROUTINE

1712    0000    DTDATA, 0
1713    7604            LAS
1714    0103            AND K0400
1715    7640            SZA CLA
1716    5361            JMP CHNGE1+1
1717    6002            IOF
1720    7610            SKP CLA             /OR CLA
1721    5335            JMP .+14
1722    1366            TAD PMES18
1723    4403            JMS I PNTR1         /TYPE OUT HEADER
1724    1020            TAD DTFELD
1725    7110            RAR CLL
1726    7012            RTR
1727    4445            JMS I PNTR24        /AND DATA FIELD
1730    1074            TAD PMES15
1731    4403            JMS I PNTR1         /TYPE OUT REST OF HEADER
1732    1105            TAD K7200
1733    3320            DCA DTDATA+6
1734    4450            JMS I PNTR33
1735    1020            TAD DTFELD
1736    1360            TAD CHNGE1
1737    3340            DCA .+1
1740    6201            CDF
1741    1010            TAD 10              /PICK UP "GOOD" ADDRESS
1742    4445            JMS I PNTR24
1743    1125            TAD K0240
1744    4446            JMS I PNTR25
1745    1571            TAD I TEMP          /PICK UP "GOOD" DATA
1746    4445            JMS I PNTR24
1747    1125            TAD K0240
1750    4446            JMS I PNTR25
1751    1011            TAD 11              /PICK UP "BAD" ADDRESS
1752    4445            JMS I PNTR24
```

```
        1753  1125              TAD K0240
        1754  4446              JMS I PNTR29
        1755  1571              TAD I TEMP       /PICK UP "BAD" DATA
        1756  4445              JMS I PNTR24
        1757  4450              JMS I PNTR33
        1760  6201    CHNGE1,   CDF
        1761  7604              LAS
        1762  7004              RAL
        1763  7700              SMA CLA          /HALT ON ERROR?
        1764  7402              HLT              /YES
        1765  5712              JMP I DTDATA
        1766  3144    PMES18,   MESS18
        1767  0004    K0004,    4                /ENABLE
        1770  2215    MESS06,   2215             /R.M
        1771  6070              6070             /0.8
        1772  4004              4004             /SP.D
        1773  2225              2225             /R.V
        1774  1577              1577             /M.7
        1775  0000              0                /END


                     /DM01 - TAPE 3
        2000         *2000
                     /MAG TAPE EXERCISER

        2000  7200    MTEXER,   CLA
        2001  6712              MTAF             /CLEAR MTF AND EF
        2002  1133              TAD SKIP
        2003  3762              DCA I PNTR26
        2004  7604              LAS
        2005  0134              AND K0020
        2006  7640              SZA CLA          /SUPPRESS MAGTAPE?
        2007  5423              JMP I PNTR6      /YES, EXIT
        2010  7604              LAS
        2011  0104              AND K0200
        2012  7640              SZA CLA          /BIT 4 SET?
        2013  7000              NOP              /YES
        2014  4332              JMS MTSAVE       /SAVE PI STUFF
        2015  6001              ION
        2016  1105              TAD K7200
        2017  3013              DCA 13
        2020  1112              TAD BUFF2
        2021  3012              DCA 12
        2022  1230              TAD .+6
        2023  1021              TAD MTFELD
        2024  3226              DCA .+2
        2025  4763              JMS I PNTR27
        2026  6201              CDF
        2027  3412              DCA I 12         /STORE DATA IN OUTPUT BUFFER
        2030  6201              CDF
        2031  2013              ISZ 13           /DONE?
        2032  5225              JMP .-5          /NO
        2033  6002              IOF
        2034  4344              JMS MTREST       /RESTORE PI STUFF
```

```
        2035  4764           JMS I PNTR28     /WRITE DATA ONTO MAG TAPE
        2036  6712           MTAF             /CLEAR FLAGS
        2037  7604           LAS
        2040  0134           AND K0020
        2041  7648           SZA CLA          /SUPPRESS MAGTAPE?
        2042  5423           JMP I PNTR6      /YES, EXIT
        2043  4765           JMS I PNTR29     /READ DATA FROM MAGTAPE
        2044  6712           MTAF             /CLEAR FLAGS
        2045  4332           JMS MTSAVE       /SAVE PI STUFF
        2046  6001           ION              /TURN ON INTERRUPT
        2047  1112           TAD BUFF2        /OUTPUT BUFFOR
        2050  3012           DCA 12


        2051  1111           TAD BUFF5        /INPUT BUFFOR
        2052  3013           DCA 13
        2053  1105           TAD K7200        /COUNT
        2054  3173           DCA MTCNTR
        2055  1264           TAD .+7
        2056  1021           TAD MTFELD
        2057  3260           DCA .+1
        2060  6201           CDF
        2061  1412           TAD I 12         /COMPARE DATA OUT WITH DATA IN
        2062  7041           CIA
        2063  1413           TAD I 13
        2064  6201           CDF
        2065  7440           SZA              /GOOD?
        2066  4767           JMS I PNTR31     /NO, DATA ERROR
        2067  2173           ISZ MTCNTR       /DONE?
        2070  5260           JMP .-10         /NO
        2071  6002           IOF              /YES
        2072  4344           JMS MTREST       /RESTORE PI STUFF
        2073  4766           JMS I PNTR30     /READ COMPARE DATA
        2074  6712           MTAF             /CLEAR MTF AND EF
        2075  7604           LAS
        2076  7010           RAR
        2077  7630           SZL CLA          /CHANGE MEMORY FIELD?
        2100  5200           JMP MTEXER       /NO
        2101  4763           JMS I PNTR27     /YES
        2102  0123           AND K0070
        2103  3021           DCA MTFELD
        2104  1162           TAD FELD
        2105  7041           CIA
        2106  1021           TAD MTFELD
        2107  7740           SMA SZA CLA
        2110  5301           JMP .-7
        2111  5200           JMP MTEXER



                            /MAGTAPE SPACE FORWARD SUBROUTINE

        2112  0000           SPCFWD, 0
        2113  1370           TAD K0666
        2114  6716           MTLC             /LOAD CM WITH "ODD,7CH, SPACE FORWARD, ENABLE, 800" AND CLEAR FLAGS
        2115  7240           CLA CMA
```

```
          2116  1198          TAD RECORD
          2117  7450          SNA
          2120  5712          JMP I SPCFWD
          2121  7041          CIA
          2122  3477          DCA I  K7752      /SET UP WC
          2123  6722          MTGO             /SET "GO",
          2124  4447          JMS I PNTR32      /WAIT FOR MT FLAG AND NO ERRORS
          2125  4441          JMS I PNTR28      /ERRORS
          2126  7610          SKP CLA          /YES
          2127  5712          JMP I SPCFWD      /NO
          2130  4440          JMS I PNTR19      /REWIND TAPE, TRY AGAIN
          2131  5313          JMP SPCFWD+1


                        /MAGTAPE SAVE SUBROUTINE
          2132  0000    MTSAVE, 0
          2133  1144          TAD AC            /SAVE AC
          2134  3356          DCA MTAC
          2135  1145          TAD LINK          /LINK
          2136  3357          DCA MTLINK
          2137  1456          TAD I PNTR40      /MEMORY FIELD
          2140  3360          DCA MTIB
          2141  1000          TAD 0   /AND LOC 0
          2142  3361          DCA MTPC
          2143  5732          JMP I MTSAVE


                        /MAGTAPE RESTORE SUBROUTINE
          2144  0000    MTREST, 0
          2145  1356          TAD MTAC          /RESTORE SAVED AC
          2146  3144          DCA AC
          2147  1357          TAD MTLINK        /LINK
          2150  3145          DCA LINK
          2151  1360          TAD MTIB          /MEMORY FIELD
          2152  3456          DCA I PNTR40
          2153  1361          TAD MTPC          /AND LOC 0
          2154  3000          DCA 0
          2155  5744          JMP I MTREST
          2156  0000    MTAC,   0
          2157  0000    MTLINK, 0
          2160  0000    MTIB,   0
          2161  0000    MTPC,   0
          2162  2206    PNTR26, MTDATA+6
          2163  2510    PNTR27, RAND2
          2164  1532    PNTR28, MTRITE
          2165  1200    PNTR29, MTREAD
          2166  1220    PNTR30, RDCOMP
          2167  2200    PNTR31, MTDATA
          2170  0666    K0666,  0666           /ODD, 7CH, SPACE FWD, ENABLE, 800
          2171  6363    MESS03, 6363           /3,3
          2172  7040            7040           /8,SP
          2173  0411            0411           /0,I
          2174  2320            2320           /S,P
          2175  1401            1401           /L,A
          2176  3177            3177           /Y,?
```

```
2177  8888              0                    /END


      2288       *2288
                 /MAGTAPE DATA ERROR ROUTINE

2288  8888    MTDATA, 0
2281  7684              LAS
2282  8103              AND K0400
2283  7648              SZA CLA
2284  5247              JMP CHNGE2+1
2285  6002              IOF
2286  7618              SKP CLA              /OR CLA
2287  5223              JMP .+14
2210  1356              TAD PMES16
2211  4403              JMS I PNTR1          /TYPE OUT HEADER
2212  1021              TAD MTFELD
2213  7110              RAR CLL
2214  7012              RTR
2215  4445              JMS I PNTR24         /AND DATA FIELD
2216  1074              TAD PMES15
2217  4403              JMS I PNTR1          /TYPE OUT REST OF HEADER
2220  1105              TAD K7200
2221  3206              DCA MTDATA+6
2222  4450              JMS I PNTR33
2223  1021              TAD MTFELD
2224  1246              TAD CHNGE2
2225  3226              DCA .+1
2226  6201              CDF
2227  1012              TAD 12               /PICK UP "GOOD" ADDRESS
2230  4445              JMS I PNTR24
2231  1125              TAD K0240
2232  4446              JMS I PNTR25
2233  1571              TAD I TEMP           /PICK UP "GOOD" DATA
2234  4445              JMS I PNTR24
2235  1125              TAD K0240
2236  4446              JMS I PNTR25
2237  1013              TAD 13               /PICK UP "BAD" ADDRESS
2240  4445              JMS I PNTR24
2241  1125              TAD K0240
2242  4446              JMS I PNTR25
2243  1571              TAD I TEMP           /PICK UP "BAD" DATA
2244  4445              JMS I PNTR24
2245  4450              JMS I PNTR33
2246  6201    CHNGE2,  CDF
2247  7604              LAS
2250  7004              RAL
2251  7700              SMA CLA              /HALT ON ERROR?
2252  7402              HLT                  /YES
2253  5600              JMP I MTDATA


                 /INPUT FROM KEYBOARD AN OCTAL DIGIT, SKIP IF OK

2254  0000    INPUT,  0
```

```
2255  4406              JMS I PNTR4
2256  3153              DCA CHAR
2257  1153              TAD CHAR
2260  7841              CIA
2261  1360              TAD K0260
2262  7540              SMA SZA
2263  5273              JMP QUEST
2264  1135              TAD K0010
2265  7710              SPA CLA
2266  5273              JMP QUEST
2267  1153              TAD CHAR
2270  0130              AND K0007
2271  2254              ISZ INPUT
2272  5654              JMP I INPUT
2273  1357      QUEST,  TAD K0277
2274  4446              JMS I PNTR25
2275  4450              JMS I PNTR33
2276  5654              JMP I INPUT
```

/OCTAL PRINT SUBROUTINE

```
2277  0000      PRINT,  0
2300  3171              DCA TEMP
2301  1121              TAD M0004
2302  3172              DCA TEMP1
2303  1171              TAD TEMP
2304  7104              RAL CLL
2305  7004              RAL
2306  7006              RTL
2307  3171              DCA TEMP
2310  1171              TAD TEMP
2311  0130              AND K0007
2312  1360              TAD K0260
2313  4446              JMS I PNTR25
2314  1171              TAD TEMP
2315  2172              ISZ TEMP1
2316  5305              JMP .-11
2317  7200              CLA
2320  5677              JMP I PRINT
```

/MESSAGE PRINT SUBROUTINE

```
2321  0000      MESAGE, 0
2322  3171              DCA TEMP
2323  4450              JMS I PNTR33
2324  1571              TAD I TEMP
2325  0362              AND K7700
2326  7450              SNA
2327  5721              JMP I MESAGE
2330  7110              RAR CLL
2331  7010              RAR
2332  7012              RTR
2333  7012              RTR
2334  4344              JMS POSIT
```

```
2335  1571            TAD I TEMP
2336  #361            AND K#077
2337  7450            SNA
2340  5721            JMP I MESAGE
2341  4344            JMS POSIT
2342  2171            ISZ TEMP
2343  5324            JMP MESAGE+3
2344  #0##   POSIT,   0
2345  3172            DCA TEMP1
2346  1172            TAD TEMP1
2347  1131            TAD M##40
2350  7710            SPA CLA
2351  1132            TAD K0100
2352  1104            TAD K0200
2353  1172            TAD TEMP1
2354  4446            JMS I PNTR25
2355  5744            JMP I POSIT
2356  1156   PMES16,  MESS16
2357  #277   K#277,   277              /"?"
2360  #260   K#260,   260
2361  #077   K#077,   77
2362  7700   K7700,   7700
                      /CARRIAGE RETURN-LINE FEED SUBROUTINE
2363  #0##   CRLF,    0
2364  1126            TAD K0215
2365  4446            JMS I PNTR25
2366  1127            TAD K0212
2367  4446            JMS I PNTR25
2370  5763            JMP I CRLF
2371  2#03   MESS#4,  2#03             /T,C
2372  6570            6570             /5,8
2373  4015            4015             /SP,M
2374  0107            0107             /A,G
2375  2#01            2#01             /T,A
2376  2##5            2##5             /P,E
2377  7700            7700             /?,END


2#00           #2400
               /RANDOM NUMBER GENERATOR

2#00  #0##   RANGEN,  0
2#01  7200            CLA
2#02  1242            TAD RANTND
2#03  1227            TAD RANDEX
2#04  7640            SZA CLA
2#05  5215            JMP RANTAD
2#06  1231            TAD RANTBL
2#07  3227            DCA RANDEX
2410  1230            TAD RANCON
2411  7104            CLL RAL
2412  7430            SZL
2413  7001            IAC
2414  3230            DCA RANCON
2415  1230   RANTAD,  TAD RANCON
```

```
2416  1027                 TAD I RANDEX
2417  3027                 DCA I RANDEX
2420  1243                 TAD RANSAV
2421  7010                 RAR
2422  1627                 TAD I RANDEX
2423  2227                 ISZ RANDEX
2424  3243                 DCA RANSAV
2425  1243                 TAD RANSAV
2426  5600                 JMP I RANGEN
2427  2442       RANDEX,   RANTNO
2430  6543       RANCON,   6543
2431  2432       RANTBL,   .+1
2432  6543                 6543
2433  3210                 3210
2434  0765                 0765
2435  5432                 5432
2436  2107                 2107
2437  7654                 7654
2440  4321                 4321
2441  1076                 1076
2442  5336       RANTNO,   -RANTND
2443  0000       RANSAV,   0


2444  0000       RAND1,    0
2445  7200                 CLA
2446  1306                 TAD .+40
2447  1273                 TAD .+24
2450  7640                 SZA CLA
2451  5261                 JMP .+10
2452  1275                 TAD .+23
2453  3273                 DCA .+20
2454  1274                 TAD .+20
2455  7104                 CLL RAL
2456  7430                 SZL
2457  7001                 IAC
2460  3274                 DCA .+14
2461  1274                 TAD .+13
2462  1673                 TAD I .+11
2463  3673                 DCA I .+10
2464  1277                 TAD .+13
2465  7010                 RAR
2466  1673                 TAD I .+5
2467  2273                 ISZ .+4
2470  3307                 DCA .+17
2471  1307                 TAD .+16
2472  5644                 JMP I .-26
2473  2506                 .+13
2474  6543                 6543
2475  2476                 .+1
2476  1076                 1076
2477  7654                 7654
2500  5432                 5432
2501  3210                 3210
2502  6543                 6543
```

```
          2503  0765              0765
          2504  2107              2107
          2505  4321              4321
          2506  5272              -.
          2507  0000              0

          2510  0000      RAND2,  0
          2511  7200              CLA
          2512  1352              TAD .+40
          2513  1337              TAD .+24
          2514  7640              SZA CLA
          2515  5325              JMP .+10
          2516  1341              TAD .+23
          2517  3337              DCA .+20
          2520  1340              TAD .+20
          2521  7104              CLL RAL
          2522  7430              SZL
          2523  7001              IAC
          2524  3340              DCA .+14
          2525  1340              TAD .+13
          2526  1737              TAD I .+11
          2527  3737              DCA I .+10
          2530  1343              TAD .+13
          2531  7010              RAR
          2532  1737              TAD I .+5
          2533  2337              ISZ .+4
          2534  3353              DCA .+17
          2535  1353              TAD .+16
          2536  5710              JMP I .-26
          2537  2552              .+13
          2540  6543              6543
          2541  2542              .+1
          2542  6543              6543
          2543  0765              0765
          2544  2107              2107
          2545  4321              4321
          2546  1076              1076
          2547  7654              7654
          2550  5432              5432
          2551  3210              3210
          2552  5226              -.
          2553  0000              0
                          /GET SUBROUTINE
          2554  0000      GET,    0
          2555  6031              KSF
          2556  5355              JMP .-1
          2557  6036              KRB
          2560  6046              TLS
          2561  6041              TSF
          2562  5361              JMP .-1
          2563  6042              TCF
          2564  5754              JMP I GET
          2565  0406      MESS07, 0406          /D,F
          2566  6362              6362          /3,2
          2567  4004              4004          /SP,D
```

```
        2570  1123              1123              /1.9
        2571  0377              0377              /C.7
        2572  0000              0                 /END


              2600              *2600
        2600  3144    SCAN,     DCA AC
        2601  7004              RAL
        2602  3145              DCA LINK
        2603  6234              RIB
        2604  7104              RAL CLL
        2605  7006              RTL
        2606  0123              AND K0070
        2607  1366              TAD CHNGE3
        2610  3234              DCA MEMORY
        2611  6031              KSF                 /KEYBOARD FLAG?
        2612  7410              SKP                 /NO
        2613  5230              JMP EXIT            /YES
        2614  6771              DTSF                /DECTAPE FLAG?
        2615  7410              SKP
        2616  5637              JMP I DTFLAG        /YES
        2617  6701              MTSF                /MAGTAPE FLAG?
        2620  7410              SKP
        2621  5641              JMP I MTFLAG        /YES
        2622  6622              6622                /DISC OR DRUM DONE FLAG?
        2623  7410              SKP
        2624  5643              JMP I DDFLAG        /YES
        2625  6621              6621                /DISC OR DRUM ERROR FLAG?
        2626  7200              CLA                 /YES
        2627  7200              CLA                 /OR YES, DEPENDING ON DISC OR DRUM TESTED
        2630  6032    EXIT,     KCC                 /CLEAR AC & KEYBOARDFLAG
        2631  1145              TAD LINK            /RESTORE LINK & AC
        2632  7110              RAR CLL
        2633  1144              TAD AC
        2634  6201    MEMORY,   CDF                 /RESTORE MEMORY FIELDS
        2635  6001              ION                 /TURN ON INTERRUPT
        2636  5400              JMP I 0             /EXIT


                    /DECTAPE FLAG RETURN ADDRESS

        2637  0000    DTFLAG,  0
        2640  5230              JMP EXIT            /EXIT TO TURN P.I. ON

                    /MAGTAPE FLAG RETURN ADDRESS

        2641  0000    MTFLAG,  0
        2642  5230              JMP EXIT

                    /DISC OR DRUM FLAG RETURN ADDRESS

        2643  0000    DDFLAG,  0
        2644  5230              JMP EXIT

                    /TYPE SUBROUTINE
```

```
2645   0000    TYPE,   0
2646   6046            TLS
2647   6041            TSF
2650   5247            JMP .-1
2651   6042            TCF
2652   7200            CLA
2653   5645            JMP I TYPE


2654   0000    RAND3,  0
2655   7200            CLA
2656   1316            TAD .+40
2657   1303            TAD .+24
2660   7640            SZA CLA
2661   5271            JMP .+10
2662   1305            TAD .+23
2663   3303            DCA .+20
2664   1304            TAD .+20
2665   7104            CLL RAL
2666   7430            SZL
2667   7001            IAC
2670   3304            DCA .+14
2671   1304            TAD .+13
2672   1703            TAD I .+11
2673   3703            DCA I .+10
2674   1307            TAD .+13
2675   7010            RAR
2676   1703            TAD I .+5
2677   2303            ISZ .+4
2700   3317            DCA .+17
2701   1317            TAD .+16
2702   5654            JMP I .-26
2703   2716            .+13
2704   6543            6543
2705   2706            .+1
2706   2107            2107
2707   5432            5432
2710   7654            7654
2711   0765            0765
2712   4321            4321
2713   3210            3210
2714   1076            1076
2715   6543            6543
2716   5062            -.
2717   0000            0


        /DISC OR DRUM DATA ERROR ROUTINE

2720   0000    DDDATA, 0
2721   7604            LAS
2722   0103            AND K0400
2723   7640            SZA CLA
2724   5367            JMP CHNGE3+1
```

```
        2725  6002              IOP
        2726  7610              SKP CLA         /OR CLA
        2727  5343              JMP .+14
        2730  1374              TAD PMES17
        2731  4403              JMS I PNTR1     /TYPE OUT HEADER
        2732  1022              TAD DDFELD
        2733  7110              RAR CLL
        2734  7012              RTR
        2735  4445              JMS I PNTR24    /AND DATA FIELD
        2736  1074              TAD PMES15
        2737  4403              JMS I PNTR1     /TYPE OUT REST OF HEADER
        2740  1105              TAD K7200
        2741  3326              DCA DDDATA+6
        2742  4450              JMS I PNTR33
        2743  1022              TAD DDFELD
        2744  1366              TAD CHNGE3
        2745  3346              DCA .+1
        2746  6201              CDF
        2747  1014              TAD 14          /PICK UP "GOOD" ADDRESS
        2750  4445              JMS I PNTR24
        2751  1125              TAD K0240
        2752  4446              JMS I PNTR25
        2753  1571              TAD I TEMP      /PICK UP "GOOD" DATA
        2754  4445              JMS I PNTR24
        2755  1125              TAD K0240
        2756  4446              JMS I PNTR25
        2757  1015              TAD 15          /PICK UP "BAD" ADDRESS
        2760  4445              JMS I PNTR24
        2761  1125              TAD K0240
        2762  4446              JMS I PNTR25
        2763  1571              TAD I TEMP      /PICK UP "BAD" DATA
        2764  4445              JMS I PNTR24
        2765  4450              JMS I PNTR33
        2766  6201     CHNGE3,  CDF
        2767  7604              LAS
        2770  7004              RAL
        2771  7700              SMA CLA         /HALT ON ERROR?
        2772  7402              HLT             /YES
        2773  5720              JMP I DDDATA
        2774  1357     PMES17,  MESS17


              3000              *3000
        3000  0417     MESS01,  0417    /0,0
        3001  0523              0523    /E,S
        3002  4024              4024    /SP,T
        3003  1005              1005    /H,E
        3004  4003              4003    /SP,C
        3005  1715              1715    /0,M
        3006  2025              2025    /P,U
        3007  2405              2405    /T,E
        3010  2240              2240    /R,SP
        3011  1001              1001    /H,A
        3012  2605              2605    /V,E
```

```
          3013  4024                4024       /SP,T
          3014  1005                1005       /H,E
          3015  4006                4006       /SP,F
          3016  1714                1714       /O,L
          3017  1417                1417       /L,O
          3020  2711                2711       /W,I
          3021  1607                1607       /N,G
          3022  4004                4004       /SP,D
          3023  0526                0526       /E,V
          3024  1103                1103       /I,C
          3025  0523                0523       /E,S
          3026  4050                4050       /SP,(
          3027  2431                2431       /T,Y
          3030  2005                2005       /P,E
          3031  4031                4031       /SP,Y
          3032  5531                5531       /-,Y
          3033  0523                0523       /E,S
          3034  4016                4016       /SP,N
          3035  5516                5516       /-,N
          3036  1751                1751       /0,)
          3037  0000                0          /END


          3040  2206      MESS08,   2206       /R,F
          3041  6070                6070       /0,8
          3042  4004                4004       /SP,D
          3043  1123                1123       /I,S
          3044  0377                0377       /C,?
          3045  0000                0          /END
          3046  0530      MESS09,   0530       /E,X
          3047  2422                2422       /T,R
          3050  0140                0140       /A,SP
          3051  1505                1505       /M,E
          3052  1517                1517       /M,O
          3053  2231                2231       /R,Y
          3054  7700                7700       /?,END
          3055  1017      MESS10,   1017       /H,O
          3056  2740                2740       /W,SP
          3057  1525                1525       /M,U
          3060  0310                0310       /C,H
          3061  7700                7700       /?,END
          3062  0411      MESS11,   0411       /D,I
          3063  2303                2303       /S,C
          3064  4005                4005       /SP,E
          3065  2222                2222       /R,R
          3066  1722                1722       /O,R
          3067  4023                4023       /SP,S
          3070  2401                2401       /T,A
          3071  2425                2425       /T,U
          3072  2340                2340       /S,SP
          3073  4000                4000       /SP,END


          3074  2403      MESS12,   2403       /T,C
          3075  6061                6061       /0,1
```

```
3076   4005                  4005     /SP,E
3077   2222                  2222     /R,R
3100   1722                  1722     /O,R
3101   4023                  4023     /SP,S
3102   2401                  2401     /T,A
3103   2425                  2425     /T,U
3104   2340                  2340     /S,SP
3105   4000                  4000     /SP,END
3106   2403    MESS13,       2403     /T,C
3107   6570                  6570     /5,8
3110   4005                  4005     /SP,E
3111   2222                  2222     /R,R
3112   1722                  1722     /O,R
3113   4023                  4023     /SP,S
3114   2401                  2401     /T,A
3115   2425                  2425     /T,U
3116   2340                  2340     /S,SP
3117   4000                  4000     /SP,END
3120   0422    MESS14,       0422     /D,R
3121   2515                  2515     /U,M
3122   4005                  4005     /SP,E
3123   2222                  2222     /R,R
3124   1722                  1722     /O,R
3125   4023                  4023     /SP,S
3126   2401                  2401     /T,A
3127   2425                  2425     /T,U
3130   2340                  2340     /S,SP
3131   4000                  4000     /SP,ENO
3132   0701    MESS15,       0701     /G,A
3133   0404                  0404     /D,D
3134   4007                  4007     /SP,G
3135   0401                  0401     /D,A
3136   2440                  2440     /T,SP
3137   0201                  0201     /B,A
3140   0404                  0404     /D,D
3141   4002                  4002     /SP,B
3142   0401                  0401     /D,A
3143   2400                  2400     /T,END


3144   2403    MESS18,       2403     /T,C
3145   6061                  6061     /8,1
3146   4004                  4004     /SP,D
3147   0124                  0124     /A,T
3150   0140                  0140     /A,SP
3151   0522                  0522     /E,R
3152   2217                  2217     /R,O
3153   2240                  2240     /R,SP
3154   1116                  1116     /I,N
3155   4002                  4002     /SP,B
3156   0116                  0116     /A,N
3157   1340                  1340     /K,SP
3160   4000                  4000     /SP,END

3161   0414    PRO338,       414               /SET SCALE TO 1, INTENSITY TO 4
```

```
3162  1107           1107          /ENTER POINT MODE AND DATA STATE, CLEAR COORD AND SECTORS
3163  0100           100           /SET Y=100
3164  4100           4100          /SET X=100, ESCAPE
3165  1121           1121          /ENTER VECTOR MODE AND DATA STATE
3166  4000           4000          /DELTA Y=0, INTENSIFY
3167  1600           1600          /DELTA X=1600
3170  5600           5600          /DELTA Y=1600, INTENSIFY
3171  0000           0             /DELTA X=0
3172  4000           4000          /DELTA Y=0, INTENSIFY
3173  3600           3600          /DELTA X=-1600
3174  7600           7600          /DELTA Y=-1600, INTENSIFY
3175  4000           4000          /DELTA X=0, ESCAPE
3176  2000           2000          /JMP I .+1
3177  3165           PRO338+4
               S
```

```
0000  01111111  00000000  11111111  11111111  11111111  11111111  11111111  11111111
0100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111100

0200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111110

0400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111110

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111110


1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11100000

1200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11110000

1600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111100


2000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

2200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

2400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11100000

2600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111000


3000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

3200
3300

3400
3500

3600
3700
```

4000
4100

4200
4300

4400
4500

4600
4700

5000
5100

5200
5300

5400
5500

5600
5700

6000
6100

6200
6300

6400
6500

6600
6700

7000
7100

7200
7300

7400
7500

7600
7700

Symbol	Value	Symbol	Value	Symbol	Value	Symbol	Value
AC	0144	DIMA	6616	HALT2	1310	LINK	0145
ASK1	0216	DIML	6615	HALT3	1497	LOCBED	1843
ASK2	0225	DIS338	0345	HALT4	0733	LOOK	0175
ASK3	0234	DISCAD	0140	INPUT	2254	M0003	0115
ASK4	0243	DISCEA	0137	INTERN	0143	M0004	0121
ASK5	0253	DMAC	6626	INTERR	0207	M0040	0131
ASK6	0263	DMAR	6603	JMP338	0161	M0316	0116
ASK7	0272	DMAW	6605	JMPCON	0706	M0331	0117
BUFF1	0106	DRCF	6611	JMPD32	0157	M2700	0120
BUFF2	0112	DRCN	6624	JMPDEC	0154	MAGTAP	0610
BUFF3	0114	DRCR	6603	JMPMAG	0155	MEMORY	2634
BUFF4	0107	DRCW	6605	JMPR08	0160	MESAGE	2321
BUFF5	0111	DREF	6612	JMPRM8	0156	MESS01	3000
BUFF6	0113	DRES	6612	K0002	1152	MESS02	1565
CDF	6201	DRFS	6624	K0003	1153	MESS03	2171
CHAR	0153	DRMSEC	0152	K0003A	1711	MESS04	2371
CHNGE1	1760	DRSC	6622	K0004	1767	MESS06	1770
CHNGE2	2246	DRSE	6621	K0007	0130	MESS07	2565
CHNGE3	2766	DRTS	6615	K0010	0135	MESS08	3040
CIF	6202	DRUMAD	0141	K0014	0110	MESS09	3046
CRLF	2363	DRUMWT	1434	K0020	0134	MESS10	3055
DCEA	6611	DSAC	6612	K0040	0124	MESS11	3062
DCIM	6611	DTAC	1322	K0070	0123	MESS12	3074
DCMA	6601	DTCA	6762	K0077	2361	MESS13	3106
DDAC	0561	DTCNTR	0170	K0100	0132	MESS14	3120
DDCNTR	0174	DTDATA	1712	K0130	1150	MESS15	3132
DDDATA	2720	DTERR	1137	K0150	1151	MESS16	1156
DDEXER	0400	DTEXER	1600	K0200	0104	MESS17	1357
DDFELD	0022	DTFELD	0020	K0212	0127	MESS18	3144
DDFLAG	2643	DTFLAG	2637	K0215	0126	MTAC	2156
DDIB	0563	DTIB	1324	K0240	0125	MTAF	6712
DDLINK	0562	DTLA	6766	K0260	2360	MTCM	6714
DDLOOP	0565	DTLB	6774	K0277	2357	MTCNTR	0173
DDPC	0564	DTLINK	1323	K0400	0103	MTCR	6711
DDREAD	0443	DTPC	1325	K0600	1154	MTDATA	2200
DDREST	0547	DTPNTR	0163	K0604	0776	MTERR	1255
DDRITE	0435	DTRA	6701	K0614	1155	MTEXER	2000
DDSAVE	0535	DTRB	6772	K0626	1356	MTFELD	0021
DDSTAT	0151	DTREAD	1047	K0636	1355	MTFLAG	2641
DEAC	6616	DTREST	1343	K0666	2170	MTGO	6722
DEAL	6615	DTRITE	1067	K0676	1254	MTHLT1	0614
DECTAP	0600	DTSAVE	1331	K0746	1564	MTHLT2	0617
DF32	0644	DTSF	6771	K1000	0136	MTIB	2160
DF32EX	0526	DTSTAT	0146	K3000	0122	MTLC	6716
DF32PR	0166	DTWAIT	1107	K7200	0105	MTLINK	2157
DF32RD	0755	DTXA	6764	K7700	2362	MTPC	2161
DF32RE	0534	DXAL	6643	K7750	0075	MTPNTR	0164
DF32RI	0533	EXIT	2630	K7751	0076	MTREAD	1200
DF32WR	0735	FELD	0162	K7752	0077	MTREST	2144
DF32WT	0707	FOUND	1145	K7753	0100	MTRITE	1532
DF6C	6622	GET	2554	K7754	0101	MTRS	6706
DF6E	6621	HALT1	1135	K7755	0102	MTSAVE	2132

MTSF	4701	PNTR36	0053	RM08RI	0519
MTSTAT	0147	PNTR38	0054	RM08WR	1416
MTTR	6721	PNTR39	0055	RMF	4244
MTWAIT	1266	PNTR4	0006	SCAN	2600
NODISC	0345	PNTR40	0056	SEARCH	1000
PME11A	0364	PNTR41	0057	SKIP	0133
PMES10	0773	PNTR42	0060	SPCFWD	2112
PMES11	0775	PNTR43	1327	START	0200
PMES12	1147	PNTR44	1330	TEMP	0171
PMES13	1326	PNTR45	0703	TEMP1	0172
PMES14	1563	PNTR46	0704	TEST	0327
PMES15	0074	PNTR47	0705	TRACK	0142
PMES16	0356	PNTR48	0061	TYPE	2645
PMES17	2774	PNTR49	0062		
PMES18	1766	PNTR5	0007		
PMESS1	0063	PNTR6	0023		
PMESS2	0064	PNTR7	0024		
PMESS3	0065	PNTR8	0025		
PMESS4	0066	PNTR9	0026		
PMESS6	0067	POSIT	2344		
PMESS7	0070	PRINT	2277		
PMESS8	0071	PROS38	3161		
PMESS9	0072	QUEST	2273		
PNTR1	0003	RANCON	2430		
PNTR10	0027	RAND1	2444		
PNTR11	0030	RAND2	2510		
PNTR12	0031	RAND3	2654		
PNTR13	0032	RANDEX	2427		
PNTR14	0033	RANGEN	2400		
PNTR15	0034	RANSAV	2443		
PNTR16	0035	RANTAD	2415		
PNTR17	0036	RANTBL	2431		
PNTR18	0037	RANTND	2442		
PNTR19	0040	RDCOMP	1220		
PNTR2	0004	RDF	6214		
PNTR20	0041	RECORD	0150		
PNTR21	0042	REWIND	1240		
PNTR22	0043	RF08	0662		
PNTR23	0044	RF08EX	0517		
PNTR24	0045	RF08PR	0167		
PNTR25	0046	RF08RD	1461		
PNTR26	2162	RF08RE	0525		
PNTR27	2163	RF08RI	0524		
PNTR28	2164	RF08WR	1501		
PNTR29	2165	RF08WT	1521		
PNTR3	0005	RIB	6234		
PNTR30	2166	RIF	6224		
PNTR31	2167	RM08	0627		
PNTR32	0047	RM08EX	0510		
PNTR33	0050	RM08PR	0165		
PNTR34	0051	RM08RD	1400		
PNTR35	0052	RM08RE	0516		

ERRORS DETECTED: #

LINKS GENERATED: #

RUN-TIME: 16 SECONDS

3K CORE USED