IDENTIFICATION

Product Code: MAINDEC-08-D5DB-D

Product Name: DF32 MULTI DISK

Date Created: August 22, 1968

Maintainer: Diagnostic Group

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1. ABSTRACT

   "MULTI DISK" is a high speed confidence test that exercises the disk system with random data and restores the disk surface to its original state at completion.

2. REQUIREMENTS

   PDP-8 or PDP-8/I
   DF32 DISK LOGIC
   Plus additional slave disks up to three

3. STORAGE

   The main body of the program is located between loc. 0 and 1250 in memory.
   Three buffers of 2000 words each. Take up the rest of memory up to 7500.
   1500 to 3477 Disk Storage Buffer
   3500 to 5477 Out Buffer
   5500 to 7477 In Buffer

4. LOADING PROCEDURE

   The procedure for normal binary tape should be followed.

5. STARTING ADDRESS AND PROCEDURE

5.1 Normal Operation

   Starting Address 150 (follow procedure 6.1)

5.2 System Operation

   Starting Address 155 (follow procedure 6.2)

6. OPERATING PROCEDURE

6.1 Normal Operation

   a. Load MULTI DISK into memory.
   b. Turn Write Inhibit switches to OFF.
   c. Load address 150.

d. Set switch register to mode of operation desired.

e. Press START.

f. The program will continue to loop upon completion of the system being exercised.

g. End of test command.

When the end of test command (CONTROL C) is given in the normal mode of operation, the test comes to a halt at the completion of the 2000 word buffer being exercised at the time.

6.2 MULTI DISK Used in Conjunction with the Disk Builder

a. Call MULTI DISK from the system.

b. Upon successful loading the program will start automatically.

c. Set switches to desired mode of operation. Refer to paragraph 7.

d. End of test command. When the end of test command (CONTROL C) is given in this mode, an exit from MULTI DISK to the system builder is accomplished.

6.3 Printouts

a. When the program is first initialized it prints out the number of existing disks. Refer to paragraph 8.1.

b. Error printouts will occur on any disk error or any data error when the read buffer is compared to the write buffer. Refer to paragraphs 8.2 and 8.3.

c. A report of the number of data errors for each 2000 word buffer may be selected. Refer to paragraph 8.4

6.4 Error Halts

An error halt at loc. 433 will occur when no disk is present.

7. SWITCH REGISTER SETTINGS

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

DISK   TRACK SELECTION

1	0	1	CROSS OVER TEST 7.1
0	1	0	REPORT NUMBER OF ERRORS PER BUFFER 7.3
0	0	1	SELECT TRACK FROM SWITCH REGISTER 7.4
0	0	0	NORMAL

7.1   SR0 set the test exercises 2000 words starting at disk memory address 7000. The track must be selected by the operator.

7.2   With SR1 set only the number of data errors per 2000/word buffer area is reported.

7.3   SR2 set enables the operator to select the disk and track from the switch register.

8.   <u>STATUS REPORTING</u>

8.1   Upon initialization the number of existent disks will be reported. If the number is incorrect, do not press PROGRAM HALT! Type CONTROL C, this will enable the program to restore the disk then halt.

        Example:
                3 EXISTENT DISK(s)

8.2   When a status register error is detected, only one error in a block will be reported.

        Example:
                TA0300 DA3124 SR0301
                TA = DISK and TRACK
                SR = STATUS REGISTER

8.3   <u>Data Errors</u>

        All data compare errors will be reported for each block.

        Example:
                TA0100 WC1021 GD3670 BD3603
                TA = DISK and TRACK
                WC = WORD COUNT
                GD = DATA WRITTEN
                BD = DATA READ

8.4   The number of data error can also be reported.

        Example:
                TA1100 ERROR(S) 0001
                TA = DISK and TRACK
                ERROR(S) = NUMBER OF DATA ERRORS PER BUFFER

9.   DESCRIPTION

MULTI DISK is not a diagnostic it is merely a confidence test, to insure the user the system can transfer data without errors. The test first stores 2000 words of the disk in core, then exercises that 2000 word area with random data. After exercising the disk, the program restores the disk to its original state. Then the test goes on to exercise the next 2000 word block.

Execution Time: 15 seconds per disk.

```
                        /MULTI DISK II
                        /OF 32 IOT'S
        7750            WC=7750                 /WORD COUNT
        7751            CA=7751                 /INITIAL ADDRESS
        6601            DCMA=6601               /CLEAR DISK FLAGS
        6603            DMAR=6603               /READ
        6605            DMAW=6605               /WRITE
        6611            DCEA=6611               /CLEAR DISK EXT, ADDRESS
        6612            DSAC=6612               /SKIP ON ADC
        6615            DEAL=6615               /LOAD DISK EXT, ADDRESS
        6616            DEAC=6616               /READ DISK STATUS
        6621            DFSE=6621               /SKIP ON NO ERROR
        6622            DFSC=6622               /SKIP ON COMPLETION FLAG
        6626            DMAC=6626               /READ DISK MEMORY ADDRESS REGISTER
        6762            DICA=6762               /CLEAR DECTAPE FLAGS
```

```
                              *20
0020   0020   0000            /CONSTANTS + TAGS
0021   0000            SAV,    0
0022   0000            SAV1,   0
0023   0000            SAV2,   0
0024   0000            SAV3,   0
0025   0000            BCOUNT, 0
0026   0002            DCOUNT, 0
0027   0200            K0002,  0002
0030   0260            K0200,  0200
0031   7600            K0260,  0260
0032   0100            K7600,  7600
0033   0004            K0100,  0100
0034   1000            K0004,  0004
0035   0370            K1000,  1000
0036   3000            K0370,  0370
0037   6000            K3000,  3000
0040   7000            K6000,  6000
0041   1777            K7000,  7000
0042   5477            K1777,  1777
0043   2000            K5477,  5477
0044   3477            K2000,  2000
0045   0003            K3477,  3477
0046   4000            K0003,  0003
0047   0700            K4000,  4000
0050   0010            K0700,  0700
0051   0007            K0010,  0010
0052   1477            K0007,  0007
0053   3777            K1477,  1477
0054   0000            K3777,  3777
0055   0000            CC,     0
0056   0203            TKA,    0
0057   M1              K0203,  0203
0060   0215            M1.
0061   0212
0062   0000
0063   0240                    /SPACE
0064   0305                    /E
0065   0330                    /X
0066   0311                    /I
0067   0323                    /S
0070   0324                    /T
0071   0305                    /E
0072   0316                    /N
0073   0324                    /T
0074   0240                    /SPACE
0075   0304                    /D
0076   0311                    /I
0077   0323                    /S
0100   0313                    /K
0101   0250                    /(
0102   0323                    /S
0103   0251                    /)
```

```
0104   0000            RAN,     0        /STOP CODE
0105   0542                     RANDOM
0106   7750            RJI,     RC
0107   7751            CAT,     CA
0110   0667            ERR,     ERROR
0111   0551            RG,      RESTORE
0112   0714            CO,      COMPARE
0113   0421            NU,      0421
0114   0000            BJ,      0
0115   0000            GJ,      0
0116   0000            SR,      0
0117   0000            DMA,     0
0120   1035            EP1,     SRP
0121   1071            EP2,     UP
0122   0600            LI,      LIA
0123   0200            MES1,    MESAGE
0124   0264            SETUP,   SIXTY
0125   0400            BEG,     BEGIN
0126   0466            DAT,     UA+15
0127   0736            CRK,     ICB
0130   0276            PNT,     SIXTY+12
0131   7600            SYSTEM,  /600
0132   0000            AC,      0
0133   0000            LIML,    0
0134   0000            LINK,    0
0135   0000            ECOUNT,  0
0136   1200            SHERTL,  SHERT
0137   1000            CLFL,    CLF
0140   1135            IR2L,    IR2
```

```
                        /WITH DATA FOLLOWING
                        /RETURN FOLLOWING END OF MESSAGE
                        /CODE (00)
        0200            *200
0200    0000            MESAGE, 0
0201    6002                    IOF
0202    7240                    CLA CMA         /SET C(AC)=-1
0203    1200                    TAD MESAGE      /ADD LOCATION
0204    3012                    DCA 12          /AUTO-INDEX REGISTER
0205    1412                    TAD I 12                /FETCH FIRST WORD
0206    3217                    DCA MSRGHT      /SAVE IT
0207    1217                    TAD MSRGHT
0210    7012                    RTR
0211    7012                    RTR             /ROTATE 6 BITS RIGHT
0212    7012                    RTR
0213    4220                    JMS TYPECH      /TYPE IT
0214    1217                    TAD MSRGHT      /GET DATA AGAIN
0215    4220                    JMS TYPECH      /TYPE RIGHT HALF
0216    5205                    JMP MESAGE+5
0217    0000            MSRGHT, 0               /TEMPORARY STORAGE
0220    0000            TYPECH, 0               /TYPE CHARACTER IN C(AC)6-11
0221    0254                    AND MASK77
0222    7450                    SNA             /IS IT END OF MESSAGE?
0223    5251                    JMP MTP+5               /YES: EXIT
0224    1255                    TAD M40         /SUBTRACT 40
0225    7500                    SMA             /<40?
0226    5231                    JMP .+3         /NO
0227    1256                    TAD C340                /YES: ADD 300
0230    5244                    JMP MTP         /TO CODES <40
0231    1257                    TAD M3          /SUBTRACT 3
0232    7440                    SZA             /IS IT ZERO?
0233    5236                    JMP .+3         /NO
0234    1260                    TAD C212                /YES:  CODE 45 IS
0235    5244                    JMP MTP         /LINE FEED (212)
0236    1261                    TAD M2          /SUBTRACT 2
0237    7440                    SZA             /IS IT ZERO?
0240    5243                    JMP .+3         /NO
0241    1262                    TAD C215                /YES: CODE 45 IS
0242    5244                    JMP MTP         /CARRIAGE-RETURN (215)
0243    1263                    TAD C240                /ADD 200 TO OTHERS >40
0244    6046            MTP,    TLS             /TRANSMIT CHARACTER
0245    6041                    TSF             /WAIT FOR FLAG
0246    5245                    JMP .-1         /NOT SET YET
0247    7200                    CLA             /SET: CLEAR C(AC)
0250    5620                    JMP I TYPECH    /RETURN
0251    6042                    TCF             /CLEAR TELEPRINTER
0252    6001                    ION             /TURN INTERRUPT ON
0253    5412                    JMP I 12        /RETURN
```

```
                                /CONSTANTS
0254    0011            MASK77,  77
0255    7740            M40,     -40
0256    0340            C340,    340
0257    7775            M3,      -3
0260    0212            C212,    212
0261    7776            M2,      -2
0262    0215            C215,    215
0263    0245            C245,    245

0264    7402            SIXTY,   MLI
0265    7000                     NOP
0266    7000                     NOP                /STORE INIT NEXT TIME
0267    7200                     CLA
0270    1664                     TAD I ,-4                  /ADDRESS OF OPERAND
0271    3273                     DCA,+2
0272    5674                     JMP I ,+2
0273    0000                     0                  /ADDRESS OF OPERAND
0274    0276                     SIXTY+12                   /CHANGING REFERENCE (P)
0275    5267                     JMP SIXTY+3
0276    1673                     TAD I SIXTY+7      /AC (OPERAND)
0277    0051                     AND K000/
0300    3344                     DCA MASKA                  /000X
0301    1673                     TAD I SIXTY+7      /AC (OPERAND)
0302    0050                     AND K00/0
0303    3345                     DCA MASKB                  /00X0
0304    1673                     TAD I SIXTY+7      /AC (OPERAND)
0305    0047                     AND K0/00
0306    3346                     DCA MASKC                  /0X00
0307    1673                     TAD I SIXTY+7      /AC (OPERAND)
0310    0046                     AND K/000
0311    3347                     DCA MASKD                  /X000
0312    1346                     TAD MASKC                  /0X00
0313    7112                     RTR CLL
0314    7010                     RAR                        /0X00 RSS 00X0
0315    1347                     TAD MASKD                  /X0X0
0316    7012                     RTR
0317    7010                     RAR
0320    1350                     TAD MASKD+1                /X0X0 RSS 0X0X
0321    3346                     DCA MASKC                  /TEMP STORAGE
0322    2264                     ISZ SIXTY                  /INCREMENT FOR STORAGE
0323    4274                     JMS SIXTY+10       /FIND STORAGE ADDRESS
0324    1346                     TAD MASKC                  /6X6X
0325    3673                     DCA I SIXTY+7      /STORE OPERAND AS SPECIFIED
0326    1345                     TAD MASKB                  /00X0
0327    7004                     RAL
0330    7006                     RTL                        /00X0 SLS 0X00
0331    1344                     TAD MASKA                  /0X00+000X=0X0X
0332    1350                     TAD MASKD+1                /0X0X+6060=6X6X
0333    3347                     DCA MASKD                  /TEMP STORAGE
0334    2264                     ISZ SIXTY                  /INCREMENT FOR STORAGE
0335    4274                     JMS SIXTY+10       /FIND STORAGE ADDRESS
0336    1347                     TAD MASKD                  /6X6X
0337    3673                     DCA I SIXTY+7      /STORE OPERAND AS SPECIFIED
```

```
0340  1130        TAD PNT       /HOUSE KEEPING
0341  3274        DCA SIXTY+10
0342  2264        ISZ SIXTY     /INCREMENT FOR RETURN
0343  5504        JMP I SIXTY   /RETURN
0344  0000  MASKA,  0
0345  0000  MASKB,  0
0346  0000  MASKC,  0
0347  0000  MASKD,  0
0350  6060        6060
```

```
0003  0003   *
0004  0004        JMP I SRPL        /GO SERVICE INTERRUPT
0001  0057   /
0002  0000   CRSV,  JMP I REG       /ENTER MAIN ROUTINE
0003  0225   10▸
0004  6402        JMP I CRSV
```

```
0400                    *0400
                        /ROUTINE TO DETERMINE # OF DISK'S
                        /ON EACH SYSTEM
0400  6601     BEGIN,   DCMA
0401  7200              CLA
0402  3054              DCA CC           /DISK ADDRESS
0403  3021              DCA SAV1
0404  3025              DCA DCOUNT       /# COUNT OF DISK
0405  6615              DEAL
0406  7200              CLA
0407  6616              DEAC
0410  0026              AND K0002        /TEST FOR NON-EXISTENT
0411  7440              SZA
0412  5230              JMP .+16
0413  1025              IAD DCOUNT
0414  7001              IAC
0415  3025              DCA DCOUNT
0416  1021              IAD SAV1
0417  1034              IAD K1000        /SELECT NEXT DISK
0420  3021              DCA SAV1
0421  1025              IAD DCOUNT       /+1 DISK COUNT
0422  7041              CIA
0423  1033              IAD K0004
0424  7650              SNA CLA
0425  5230              JMP .+3
0426  1021              IAD SAV1
0427  5205              JMP BEGIN+5
0430  7200              CLA
0431  1025              IAD DCOUNT
0432  7450              SNA
0433  7402              MLI              /NO DISK PRESENT
0434  1030              IAD K0200        /ASCII CODE
0435  3062              DCA 41+3
0436  1057              IAD M1
0437  3010              IAD 10
0440  6042              ICF
0441  7200              CLA
0442  1410              TAD I 10         /AUTO INDEX
0443  7450              SNA
0444  5251              JMP DA           /END OF MESSAGE
0445  6046              ILS              /YES
0446  6041              ISF
0447  5246              JMP .-1
0450  5240              JMP .-10
0451  7200      DA,     CLA
0452  6611              DCEA             /DATA TEST
0453  6601              DCMA             /CLEAR DISK EXT, ADDRESS
0454  3024              ION              /CLEAR DISK FLAGS
0455  3055              DCA DCOUNT       /TURN INTERRUPT ON
0456  1040              DCA TKA
0457  1021              IAD K7000
0461  1047              IAD SAV1         /MINUS 1000
0462  7040              IAD K0700
                        CMA              /MAX, AMOUNT OF STORAGE PER DISK
```

```
04403   3020    DCA SAV
04404   1020    TAD SAV
04405   3021    DCA SAV1
04406   7604    LAS
04407   3022    DCA SAV2    /SELECT MODE OF OPERATION
```

```
0470   1055            TK,     TAD TKA          /TRACK
0471   6615                    JEAL             /LOAD DISK AND TRACK
0472   7200                    CLA              /
0473   4565                    JMS I RAW              /GENERATE RANDOM WORD
0474   1022                    TAD SAV2               /FETCH MODE
0475   7000                    NOP
0476   0034                    AND K1000              /COMPARE FOR TRACK SELECT
0477   7450                    SNA
0500   5322                    JMP RA1          /NO
0501   7200                    CLA              /YES
0502   1022                    TAD SAV2
0503   0035                    AND K0370
0504   7006                    RTL
0505   7004                    RAL
0506   3055                    DCA TKA
0507   1055                    TAD TKA
0510   6615                    JEAL             /LOAD TRACK ADDRESS
0511   7200                    CLA
0512   1022                    TAD SAV2               /COMPARE FOR CROSSOVER
0513   7000                    NOP
0514   0046                    AND K4000
0515   7450                    SNA
0516   5322                    JMP .+4          /EXERCISE TRACK
0517   7200                    CLA
0520   1040                    TAD K7000              /CROSSOVER ADDRESS
0521   3024                    DCA BCOUNT
0522   1037            RA1,    TAD K6000
0523   3506                    DCA I WCT
                                                /
0524   1052                    TAD K1477
0525   3507                    DCA I CAT              /LOAD CURRENT ADDRESS
0526   1024                    TAD BCOUNT
0527   6603                    DMAR             /SAVE DISK CONTENTS
0530   7000                    NOP
0531   5331                    JMP .
0532   4511            WA1,    JMS I RE               /RESTORE ORG, TRACK
0533   1037                    TAD K6000              /2000 TRANSFERS
0534   3506                    DCA I WCT
0535   1044                    TAD K3477        /WRITE BUFFER=1
0536   3507                    DCA I CAT
0537   1024                    TAD BCOUNT
0540   6605                    DMAW             /WRITE
0541   7000                    NOP
0542   5342                    JMP .
0543   4511            RA2,    JMS I RE               /RESTORE ORG TRACK
0544   1037                    TAD K6000
0545   3506                    DCA I WCT
0546   1042                    TAD K3477              /READ BUFFER=1
0547   3507                    DCA I CAT
0550   1024                    TAD BCOUNT
0551   6603                    DMAR             /READ
0552   7000                    NOP
0553   5353                    JMP .
0554   4512                    JMS I CO         /COMPARE DATA
```

```
W2,     JMS I RE
        CLA
        TAD KODDU
        DCA I WCI
        TAD K147/       /LOAD W.C.
        DCA I CAT
        TAD ACOUNT      /LOAD C.A.
        JMAW            /WRITE
        NOP
        JMP .           /CHECK FOR ERROR
        JMS I RE        /RESTORE ORG, TRACK.
        JMP I LI
```

```
0222    4211
0223    7200
0224    1037
0225    3306
0226    1022
0227    3307
0230    1064
0231    6600
0232    7200
0233    5366
0234    4211
0235    5522
```

```
*0200
L1A,    CLA
        TAD CC
        CIA
        TAD K0203
        SNA CLA
        JMP CCSU+2      /COMPARE FOR COMPLETION COMMAND
        TAD BCOUNT      /YES EXIT
                        /NO CONTINUE
                        /
IDT,    CLA
        TAD K6000
        SNA
        JMP .+6         /INCREMENT TRACK
        CLA
        TAD BCOUNT
        TAD K2000
        DCA BCOUNT
        JMP I DAT
        CLA
        DCA BCOUNT      /ZERO BUFFER COUNT
        TAD TKA
        TAD K0100
        DCA TKA
        TAD SAV1
        CMA
        SZA CLA
        SKP
        JMP .+5
        TAD SAV1
        TAD K0100
        DCA SAV1
        JMP I DAT
        TAD SAV
        DCA SAV1
        DCA TKA         /SET UP FOR NEXT PASS
        JMP I DAT       /FILL OUTBUFFER WITH RANDOM DATA

RANDOM, 0
        TAD K6000       /2000 TRANSFERS
        DCA SAV3
        TAD K3477       /OUT PUT BUFFER-1
        DCA 11          /AUTO INDEX
        TAD NU          /RANDOM#
        RAL CLL
        SEL
        TAD K0003
        DCA NU
        TAD NU
        DCA I 11        /FILL BUFFER
        ISZ SAV3        /DONE
        JMP .-10        /NO
        JMP I RANDOM    /YES
                        /
```

```
                                             /
0001   0000          RESTORE,        0
0002   7200                  CLA
0003   1055                  TAD TKA
0004   6615                  DEAL              /LOAD TK
0005   7200                  CLA
0006   5601                  JMP I RESTORE
                                             /
0007   7200          ERROR,  CLA
0010   6621                  DFSE
0011   5300                  JMP .+7
0012   6622                  DFSC
0013   5267                  JMP .-4
0014   6611                  DCEA
0015   6601                  DCMA              /NO ERROR'S
0016   6001                  ION
0017   5400                  JMP I INT
0100   7200                  CLA
0101   1024                  TAD BCOUNT
0102   3117                  DCA DMA           /STORE
0103   6616                  DEAC              /READ STATUS
0104   7000                  NOP
0105   3116                  DCA SR            /STORE
0106   6622                  DFSC              /SKIP ON COMPLETION
0107   5306                  JMP .-1
0110   6611                  DCEA
0111   6601                  DCMA              /CLEAR THE WORLD
0112   4520                  JMS I EP1               /PRINT ERROR
0113   5400                  JMP I INT         /CONTINUE
0114   0000          COMPARE,        0               /COMPARE FOR DATA ERROR
0115   7200                  CLA
0116   3135                  DCA ECOUNT              /ZERO ERROR COUNT
0117   1044                  TAD K3477               /OUT BUFFER-1
                                             /
                                             /
0120   3010                  DCA 10                  /AUTO INDEX
0121   1042                  TAD K5477               /IN BUFFER-1
0122   3011                  DCA 11            /AUTO. INDEX
0123   1037                  TAD K6000               /MINUS 2000
0124   3025                  DCA DCOUNT
0125   1410                  TAD I 10
0126   3115                  DCA GD            /GOOD WORD (OUT BUFFER)
0127   1411                  TAD I 11
0130   3114                  DCA BD            /BAD WORD (IN BUFFER)
0131   1115                  TAD GD
0132   7041                  CIA
0133   1114                  TAD BD
0134   7640                  SZA CLA
0135   5341                  JMP .+4           /ERROR
0136   2025          ICB,    ISZ DCOUNT
0137   5325                  JMP COMPARE+11    /FETCH NEXT WORD
0140   5354                  JMP ERXT          /DONE
0141   7604                  LAS
0142   0043                  AND K2000
0143   7640                  SZA CLA
```

```
0744  5552              JMP .+6
0745  1025              TAD JCOUNT
0746  0041              AND K1777
0747  7000              NOP
0750  3117              DCA DMA          /DISK ADDRESS
0751  5365              JMP .+14
0752  2135              ISZ ECOUNT              /+1 ERROR COUNT
0753  5336              JMP ICB                 /FETCH NEXT WORD
0754  7604      ERX1,   LAS                     /COMPARE FOR AC BIT 1
0755  0043              AND K2000
0756  7450              SNA
0757  5714              JMP I COMPARE           /NORMAL TYPE OUT
0760  7200              CLA
0761  1135              TAD ECOUNT
0762  7440              SZA
0763  4556              JMS I SHRTL
0764  5714              JMP I COMPARE           /RETURN TO ROUTINE
0765  4521              JMS I EP2               /PRINT DATA ERROR
0766  5336              JMP ICB
```

```
       1000                    *1000
                                          /
                                          /ROUTINE TO SERVICE INTERRUPTS
                                          /
                                          /
  1000  3132          CLF,     DCA AC      /STORE AC
  1001  7010                   RAR
  1002  3134                   DCA LINK    /STORE LINK
  1003  6041                   TSF         /SKIP ON TELEPRINTER FLAG
  1004  5207                   JMP .+3     /NO FLAG
  1005  6042                   TCF         /CLEAR FLAG
  1006  5227                   JMP EXIT          /EXIT SERVICE
  1007  6031                   KSF         /SKIP ON KEYBOARD FLAG
  1010  5214                   JMP .+4     /NO FLAG
  1011  6036                   KRB         /READ BUFFER
  1012  3054                   DCA CC      /STORE CHARACTER
  1013  5227                   JMP EXIT    /EXIT SERVICE
  1014  7200                   CLA
  1015  1051                   TAD K0007
  1016  7040                   CMA
  1017  3135                   DCA ECOUNT
  1020  2135                   ISZ ECOUNT
  1021  5220                   JMP .-1
  1022  6622                   DFSC        /SKIP ON DISK COMPLETION
  1023  5226                   JMP .+3
  1024  2000                   ISZ INT
  1025  5510                   JMP I ER
  1026  5540                   JMP I IR2L  /REPORT UNDEFINED INTERRUPT
  1027  7200          EXIT,    CLA
  1030  1134                   TAD LINK    /FETCH LINK
  1031  7004                   RAL         /RESTORE LINK
  1032  1132                   TAD AC      /FETCH AC
  1033  6001                   ION         /TURN INTERRUPT ON
  1034  5400                   JMP I INT   /RETURN
  1035  0000          SKP,     0
  1036  4524                   JMS I SETUP
  1037  0055                   IKA         /TRACK ADDRESS
  1040  1055                   .+15
  1041  1056                   .+15
  1042  4524                   JMS I SETUP
  1043  0117                   DMA
  1044  1061                   .+15
  1045  1062                   .+15
  1046  4524                   JMS I SETUP
  1047  0116                   SR
  1050  1065                   .+15
  1051  1066                   .+15
  1052  4523                   JMS I MES1
  1053  4543                   4543
  1054  2401                   2401        /TA (TRACK ADDRESS)
                                          /
  1055  4060                   4060
  1056  6060                   0000        /DISK MEMORY ADDRESS
  1057  4004                   4004
```

```
1000   0140        0140
1001   6000        6000
1002   6000        6000
1003   4023        4023        /SWITCH REGISTER
1004   2240        2240
1005   6000        6000
1006   6000        6000
1007   0000        0
1010   5635        JMP I SRP

1011   0000   UP,  0           /DATA PRINT OUT ROUTINE
1012   4524        JMS I SETUP
1013   0055        IKA
1014   1115        .+21
1015   1116        .+21
1016   4524        JMS I SETUP
1017   0117        UMA

1100   1121        .+21
1101   1122        .+21
1102   4524        JMS I SETUP
1103   0115        GU          /GOOD DATA
1104   1125        .+21
1105   1126        .+21
```

```
1106  4524              JMS I SETUP
1107  0114              30              /BAD DATA
1110  1131              .+21
1111  1132              .+21
1112  4523              JMS I MES1
1113  4543              4543
1114  2401              2401            /TA (TRACK ADDRESS
1115  4060              4000
1116  6060              0000
1117  4027              4027            /WORDCOUNT
1120  0340              0340
1121  0060              0000
1122  6060              0000
1123  4007              4007            /GD (GOOD DATA)
1124  0440              0440
1125  6060              0000
1126  6060              0000
1127  4002              4002            /BD (BAD DATA)
1130  0440              0440
1131  6060              0000
1132  6060              0000
1133  0000              0
1134  5571              JMP I OP
                                        /ERROR MESSAGE FOR UNDEFINED
                                        /INTERRUPT
                                        /
1135  4523     IR2,     JMS I MES1              /GO TO PRINTOUT ROUTINE
1136  4543              4543            /CARRIAGE RETURN*LINE FEED
                                        /CHARACTERS
1137  2516              2516            /U AND N
1140  0405              0405            /D AND E
1141  0656              0656            /F AND ,
1142  4011              4011            /SPACE AND I
1143  1624              1624            /N AND T
1144  5640              5640            /, AND SPACE
1145  0000              0               /STOP CODE
1146  7402              HLT
                /
                /PRINTOUT ROUTINE FOR DATA ERROR'S
                /PRINTS # OF ERROR'S

      1200              *1200
1200  0000     SHERT,   0
1201  4524              JMS I SETUP
1202  0355              IKA
1203  1215              .+12
1204  1216              .+12
1205  4524              JMS I SETUP     /SETUP WORD FOR PRINTOUT
1206  0135              ECOUNT          /#OF DATA ERRORS
1207  1225              .+16
1210  1226              .+16
1211  4523              JMS I MES1      /PRINT REPORT
1212  4543              4543
1213  4024              4024
```

```
1214  0140        0140
1215  6060        6060
1216  6060        6060
1217  4040        4040
1220  0522        0522
1221  2217        2217
1222  2250        2250
1223  2351        2351
1224  7240        7240
1225  6060        6060
1226  6060        6060
1227  0000        0
1230  5600        JMP I SHRT      /STOP CODE
                                  /RETURN

                  *150
                  START1, JMS CCSU
0150  4002
0151  7402                MLT

                  *155
                  START2, RRB       /CLEAR READER FLAG
0155  6012                PCF       /CLEAR PUNCH FLAG
0156  6222                DTCA      /CLEAR DECTAPE FLAG
0157  6762                NOP
0160  7000                NOP
0161  7000                NOP
0162  7000                JMS CCSU
0163  4002                JMP I SYSTEM
0164  5531
```

THERE ARE NO ERRORS

SYMBOL TABLE

```
AC          0132
BCOUNT      0024
BD          0114
BEG         0125
BEGIN       0400
CA          7751
CAT         0107
CC          0054
CCSU        0002
CHK         0127
CLF         1000
CLFL        0137
CU          0112
COMPAR      0714
C212        0260
C215        0252
C245        0253
C340        0256
DA          0451
DAT         0126
DCEA        6611
DCMA        6601
DCOUNT      0025
DEAC        6616
DEAL        6615
DFSC        6022
DFSE        6021
DMA         0117
DMAC        6026
DMAR        6603
DMAW        6605
DP          1071
DSAC        6612
DICA        6752
ECOUNT      0135
EP1         0120
EP2         0121
ER          0110
ERROR       0067
ENXI        0754
EXIT        1027
GD          0115
IBT         0606
ICB         0736
INT         0000
IN2         1135
IN2L        0140
K0002       0026
K0003       0045
K0004       0033
K0007       0051
K0070       0050
K0100       0032
```

SYMBOL TABLE

```
K0200      0027
K0203      0030
K0200      0030
K0370      0035
K0700      0047
K1000      0034
K1477      0052
K1777      0041
K2000      0043
K3000      0036
K3477      0044
K3777      0053
K4000      0046
K5477      0042
K6000      0057
K7000      0040
K7600      0031
LINK       0134
LINL       0135
L1         0122
L1A        0000
MASKA      0344
MASKB      0345
MASKC      0346
MASKD      0347
MASK77     0254
MESAGE     0200
MES1       0123
MSRGHT     0217
MIP        0244
M1         0057
M2         0261
M3         0257
M40        0255
NU         0113
PNT        0130
RANDOM     0642
RAW        0105
RA1        0022
RA2        0343
RE         0111
RESTOR     0651
SAV        0020
SAV1       0021
SAV2       0022
SAV3       0023
SETUP      0124
SHERT      1200
SHERTL     0136
SIXTY      0264
SR         0116
SKP        1035
START1     0150
```

SYMBOL TABLE

```
START2  0155
SYSTEM  0131
IR      0470
IRA     0055
TYPECH  0220
WA1     0552
WA2     0555
WC      7/50
WCT     0106
```

SYMBOL TABLE

```
INT       0000
CCSU      0002
SAV       0020
SAV1      0021
SAV2      0022
SAV3      0023
BCOUNT    0024
UCOUNT    0025
K0002     0026
K0200     0027
K0200     0030
K7600     0031
K0100     0032
K0004     0033
K1000     0034
K0370     0035
K3000     0036
K0000     0037
K7000     0040
K1777     0041
K3477     0042
K2000     0043
K3477     0044
K0003     0045
K4000     0046
K0700     0047
K0070     0050
K0007     0051
K1477     0052
K3777     0053
CC        0054
IRA       0055
K0203     0056
M1        0057
RAW       0105
WCT       0106
CAT       0107
ER        0110
RE        0111
CU        0112
NU        0113
BU        0114
GU        0115
SR        0116
UMA       0117
EP1       0120
EP2       0121
LI        0122
MES1      0123
SETUP     0124
SEG       0125
JAT       0126
CHK       0127
```

SYMBOL TABLE

```
PNT       0130
SYSTEM    0131
AC        0132
LINE      0133
LINK      0134
ECOUNT    0135
SHERTL    0136
CLFL      0137
IR2L      0140
START1    0130
START2    0133
MESAGE    0200
MSRGHT    0217
TYPECH    0220
MIP       0244
MASK77    0254
M40       0255
C040      0256
M3        0257
C212      0260
M2        0261
C213      0262
C243      0263
SIXTY     0264
MASKA     0344
MASKB     0345
MASKC     0346
MASKD     0347
BEGIN     0400
CA        0431
IR        0470
RA1       0522
WA1       0532
RA2       0543
WA2       0555
LIA       0600
IBT       0606
RANDOM    0642
RESTOR    0661
ERROR     0667
COMPAR    0714
ICB       0736
ERXT      0754
CLF       1000
EXIT      1027
SKP       1035
UP        1071
IR2       1135
SHERT     1200
UCMA      6601
UMAR      6603
UMAW      6605
UCEA      6611
```

SYMBOL TABLE

```
USAC    6012
UEAL    6015
UEAC    6016
UPSE    6021
UPSC    6022
UMAC    6026
UICA    6762
NU      7750
CA      7751
```