IDENTIFICATION

Product Code:	MAINDEC-08-D5DB-D
Product Name:	DF32 MULTI DISK
Date Created:	August 22, 1968
Maintainer:	Diagnostic Group
Author:	E. Haight

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.

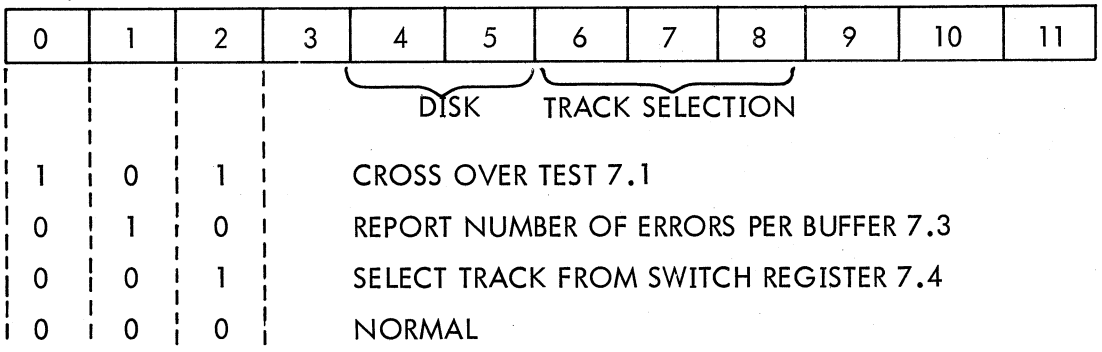
b. Error printouts will occur on any disk error or any data error when the read buffer is compared to the write buffer. Refer to paragraphs 8.2 and 8.3.

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



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. STATUS REPORTING

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 Data Errors

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.

AUG 26 1968

E Haught

```
                    /MULTI DISK II
                    /DF32 IOTS
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                DTCA=6762           /CLEAR DECTAPE FLAGS
```



```
      0020          *20
                    /CONSTANTS + TAGS
0020  0000          SAV,    0
0021  0000          SAV1,   0
0022  0000          SAV2,   0
0023  0000          SAV3,   0
0024  0000          BCOUNT, 0
0025  0000          DCOUNT, 0
0026  0002          K0002,  0002
0027  0200          K0200,  0200
0030  0260          K0260,  0260
0031  7600          K7600,  7600
0032  0100          K0100,  0100
0033  0004          K0004,  0004
0034  1000          K1000,  1000
0035  0370          K0370,  0370
0036  3000          K3000,  3000
0037  6000          K6000,  6000
0040  7000          K7000,  7000
0041  1777          K1777,  1777
0042  5477          K5477,  5477
0043  2000          K2000,  2000
0044  3477          K3477,  3477
0045  0003          K0003,  0003
0046  4000          K4000,  4000
0047  0700          K0700,  0700
0050  0070          K0070,  0070
0051  0007          K0007,  0007
0052  1477          K1477,  1477
0053  3777          K3777,  3777
0054  0000          CC,     0
0055  0000          TKA,    0
0056  0203          K0203,  0203
0057  0057          M1,     M1
0060  0215                  0215
0061  0212                  0212
0062  0000                  0
0063  0240                  0240    /SPACE
0064  0305                  0305    /E
0065  0330                  0330    /X
0066  0311                  0311    /I
0067  0323                  0323    /S
0070  0324                  0324    /T
0071  0305                  0305    /E
0072  0316                  0316    /N
0073  0324                  0324    /T
0074  0240                  0240    /SPACE
0075  0304                  0304    /D
0076  0311                  0311    /I
0077  0323                  0323    /S
0100  0313                  0313    /K
0101  0250                  0250    /(
0102  0323                  0323    /S
0103  0251                  0251    /)
```

```
0104  0000                    0       /STOP CODE
0105  0642              RAW,  RANDOM
0106  7750              WCT,  WC
0107  7751              CAT,  CA
0110  0667              ER,   ERROR
0111  0661              RE,   RESTORE
0112  0714              CU,   COMPARE
0113  0421              NU,   0421
0114  0000              BU,   0
0115  0000              GU,   0
0116  0000              SR,   0
0117  0000              DMA,  0
0120  1035              EP1,  SRP
0121  1071              EP2,  UP
0122  0600              L1,   L1A
0123  0200              MES1, MESAGE
0124  0264              SETUP, SIXTY
0125  0400              BEG,  BEGIN
0126  0466              DAT,  DA+15
0127  0736              CHK,  ICB
0130  0276              PNT,  SIXTY+12
0131  7600              SYSTEM, /600
0132  0000              AC,   0
0133  0000              LINL, 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 C245                  /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  0077              MASK7, 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, HLT
0265  7000                     NOP
0266  7000                     NOP             /STORE INIT NEXT TIME
0267  7200                     CLA
0270  1664                     TAU 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                     TAU I SIXTY+7   /AC (OPERAND)
0277  0051                     AND K0007
0300  3344                     DCA MASKA               /000X
0301  1673                     TAU I SIXTY+7   /AC (OPERAND)
0302  0050                     AND K0070
0303  3345                     DCA MASKB               /00X0
0304  1673                     TAU I SIXTY+7   /AC (OPERAND)
0305  0047                     AND K0700
0306  3346                     DCA MASKC               /0X00
0307  1673                     TAU I SIXTY+7   /AC (OPERAND)
0310  0040                     AND K7000
0311  3347                     DCA MASKD               /X000
0312  1346                     TAU MASKC               /0X00
0313  7112                     RTR CLL
0314  7010                     RAR             /0X00 RS3 00X0
0315  1347                     TAU MASKD               /X0X0
0316  7012                     RTR
0317  7010                     RAR
0320  1350                     TAU MASKD+1     /X0X0 RS3 0X0X
0321  3346                     DCA MASKC               /TEMP STORAGE
0322  2264                     ISZ SIXTY               /INCREMENT FOR STORAGE
0323  4274                     JMS SIXTY+10    /FIND STORAGE ADDRESS
0324  1346                     TAU MASKC               /6X6X
0325  3673                     DCA I SIXTY+7   /STORE OPERAND AS SPECIFIED
0326  1345                     TAU MASKB               /00X0
0327  7004                     RAL
0330  7006                     RTL             /00X0 SL3 0X00
0331  1344                     TAU MASKA               /0X00+000X=0X0X
0332  1350                     TAU 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                     TAU MASKD               /6X6X
0337  3673                     DCA I SIXTY+7   /STORE OPERAND AS SPECIFIED
```

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0340  1130                     TAU PNT         /HOUSE KEEPING
0341  3274                     DCA SIXTY+10
0342  2264                     ISZ SIXTY               /INCREMENT FOR RETURN
0343  5664                     JMP I SIXTY     /RETURN
0344  0000              MASKA, 0
0345  0000              MASKB, 0
0346  0000              MASKC, 0
0347  0000              MASKD, 0
0350  6060              6060
```

```
0000 0000          *0
0000 0000 INT,     0
0001 5537          JMP I CLFL              /GO SERVICE INTERRUPT
                   /
0002 0000 CCSU,    0
0003 5525          JMP I BEG       /ENTER MAIN ROUTINE
0004 6002          IOF
0005 5402          JMP I CCSU
```



```
0400               *400
                   /ROUTINE TO DETERMINE # OF DISK'S
                   /ON EACH SYSTEM
0400 6601 BEGIN,   DCMA
0401 7200          CLA
0402 3054          DCA CC
0403 3021          DCA SAV1                /DISK ADDRESS
0404 3025          DCA DCOUNT      /# COUNT OF DISK
0405 6615          DEAL
0406 7200          CLA
0407 6616          DEAC
0410 0026          AND K0002               /TEST FOR NON-EXTSTENT
0411 7440          SZA
0412 5230          JMP .+16
0413 1025          TAD DCOUNT
0414 7001          IAC             /+1 DISK COUNT
0415 3025          DCA DCOUNT
0416 1021          TAD SAV1
0417 1034          TAD K1000               /SELECT NEXT DISK
0420 3021          DCA SAV1
0421 1025          TAD DCOUNT
0422 7041          CIA
0423 1033          TAD K0004
0424 7650          SNA CLA
0425 5230          JMP .+3
0426 1021          TAD SAV1                /NEXT DISK
0427 5205          JMP BEGIN+5
0430 7200          CLA
0431 1025          TAD DCOUNT
0432 7450          SNA
0433 7402          HLT             /NO DISK PRESENT
0434 1030          TAD K0260
0435 3062          DCA M1+3                /ASCII CODE
0436 1057          TAD M1
0437 3010          DCA 10
0440 6042          TCF
0441 7200          CLA
0442 1410          TAD I 10                /AUTO INDEX
0443 7450          SNA             /END OF MESSAGE
0444 5251          JMP DA          /YES
0445 6046          TLS
0446 6041          TSF
0447 5246          JMP .-1
0450 5240          JMP .-10
0451 7200 DA,      CLA             /DATA TEST
0452 6611          DCLA            /CLEAR DISK EXT, ADDRESS
0453 6601          DCMA            /CLEAR DISK FLAGS
0454 6001          ION             /TURN INTERRUPT ON
0455 3024          DCA BCOUNT
0456 3055          DCA TKA
0457 1040          TAD K7000               /MINUS 1000
0460 1021          TAD SAV1
0461 1047          TAD K0700               /MAX, AMOUNT OF STORAGE PER DISK
0462 7040          CMA
```

```
0463  3020          DCA SAV
0464  1020          TAD SAV
0465  3021          DCA SAV1
0466  7604          LAS             /SELECT MODE OF OPERATION
0467  3022          DCA SAV2
                    /
```



```
0470  1055    TK,   TAD TKA         /TRACK
0471  6615          DEAL            /LOAD DISK AND TRACK
0472  7200          CLA             /
0473  4505          JMS I RAN               /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          DEAL            /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 K5477       /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 K5477               /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
```

```
0355  4511          WA2,    JMS I RE
0356  7200                  CLA
0357  1037                  TAU K6000
0360  3506                  DCA I WCT           /LOAD W.C.
0361  1052                  TAU K1477
0362  3507                  DCA I CAT           /LOAD C.A.
0363  1024                  TAU BCOUNT
0364  6605                  DMAW            /WRITE
0365  7000                  NOP
0366  5366                  JMP .           /CHECK FOR ERROR
0367  4511                  JMS I RE            /RESTORE ORG, TRACK.
0370  5522                  JMP I L1
```



```
      0600          *600
0600  7200          L1A,    CLA
0601  1054                  TAU CC
0602  7041                  CIA
0603  1056                  TAU K0203       /COMPARE FOR COMPLETION COMMAND
0604  7650                  SNA CLA
0605  5004                  JMP CCSU+2      /YES EXIT
0606  1024          IBT,    TAU BCOUNT          /NO CONTINUE
                            /
0607  7041                  CIA
0610  1037                  TAU K6000
0611  7450                  SNA
0612  5220                  JMP .+6         /INCREMENT TRACK
0613  7200                  CLA
0614  1024                  TAU BCOUNT
0615  1043                  TAU K2000
0616  3024                  DCA BCOUNT
0617  5526                  JMP I DAT
0620  7200                  CLA
0621  3024                  DCA BCOUNT          /ZERO BUFFER COUNT
0622  1055                  TAU TKA
0623  1032                  TAU K0100
0624  3055                  DCA TKA
0625  1021                  TAU SAV1
0626  7040                  CMA
0627  7640                  SZA CLA
0630  7410                  SKP
0631  5236                  JMP .+5
0632  1021                  TAU SAV1
0633  1032                  TAU K0100
0634  3021                  DCA SAV1
0635  5526                  JMP I DAT
0636  1020                  TAU SAV
0637  3021                  DCA SAV1            /SET UP FOR NEXT PASS
0640  3055                  DCA TKA
0641  5526                  JMP I DAT
                            /FILL OUTBUFFER WITH RANDOM DATA
0642  0000          RANDOM, 0
0643  1037                  TAU K6000           /2000 TRANSFERS
0644  3023                  DCA SAV3
0645  1044                  TAU K3477           /OUT PUT BUFFER-1
0646  3011                  DCA 11          /AUTO INDEX
0647  1113                  TAU NU          /RANDOM#
0650  7104                  RAL CLL
0651  7430                  SZL
0652  1045                  TAU K0003
0653  3113                  DCA NU
0654  1113                  TAU NU
0655  3411                  DCA I 11            /FILL BUFFER
0656  2023                  ISZ SAV3            /DONE
0657  5247                  JMP .-10            /NO
0660  5642                  JMP I RANDOM    /YES
                            /
```

```
                                /
0661  0000    RESTORE,    0
0662  7200                CLA
0663  1055                TAD TKA
0664  6615                DEAL            /LOAD TK
0665  7200                CLA
0666  5661                JMP I RESTORE
                          /
0667  7200    ERROR,      CLA
0670  6621                DFSE
0671  5300                JMP .+7
0672  6622                DFSC
0673  5267                JMP .-4
0674  6611                DCEA
0675  6601                DCMA            /NO ERRORS
0676  6001                ION
0677  5400                JMP I INT
0700  7200                CLA
0701  1024                TAD BCOUNT
0702  3117                DCA DMA         /STORE
0703  6616                DEAC            /READ STATUS
0704  7000                NOP
0705  3116                DCA SR          /STORE
0706  6622                DFSC            /SKIP ON COMPLETION
0707  5306                JMP .-1
0710  6611                DCEA
0711  6601                DCMA            /CLEAR THE WORLD
0712  4520                JMS I EP1               /PRINT ERROR
0713  5400                JMP I INT       /CONTINUE
0714  0000    COMPARE,    0               /COMPARE FOR DATA ERROR
0715  7200                CLA
0716  3135                DCA ECOUNT              /ZERO ERROR COUNT
0717  1044                TAD K3477               /OUT BUFFER-1
                          /
                          /
0720  3010                DCA 10          /AUTO INDEX
0721  1042                TAD K5477               /IN BUFFER-1
0722  3011                DCA 11          /AUTO INDEX
0723  1037                TAD K6000               /MINUS 2000
0724  3025                DCA DCOUNT
0725  1410                TAD I 10
0726  3115                DCA GD          /GOOD WORD (OUT BUFFER)
0727  1411                TAD I 11
0730  3114                DCA BD          /BAD WORD (IN BUFFER)
0731  1115                TAD GD
0732  7041                CIA
0733  1114                TAD BD
0734  7640                SZA CLA
0735  5341                JMP .+4         /ERROR
0736  2025    ICB,        ISZ DCOUNT
0737  5325                JMP COMPARE+11  /FETCH NEXT WORD
0740  5354                JMP ERXT        /DONE
0741  7604                LAS
0742  0043                ANU K2000
0743  7640                SZA CLA
```



```
0744  5352                JMP .+6
0745  1025                TAD DCOUNT
0746  0041                ANU 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    ERXT,       LAS                     /COMPARE FOR AC BIT 1
0755  0043                ANU K2000
0756  7450                SNA
0757  5714                JMP I COMPARE           /NORMAL TYPE OUT
0760  7200                CLA
0761  1135                TAD ECOUNT
0762  7440                SZA
0763  4536                JMS I SHERTL
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      SRP,    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              6060            /DISK MEMORY ADDRESS
1057  4004              4004
```



```
1060  0140              0140
1061  6060              6060
1062  6060              6060
1063  4023              4023            /SWITCH REGISTER
1064  2240              2240
1065  6060              6060
1066  6060              6060
1067  0000              0
1070  5635              JMP I SRP
                                        /
                                        /DATA PRINT OUT ROUTINE
                                        /
1071  0000      DP,     0
1072  4524              JMS I SETUP
1073  0055              IKA
1074  1115              .+21
1075  1116              .+21
1076  4524              JMS I SETUP
1077  0117              DMA
                                        /
                                        /
1100  1121              .+21
1101  1122              .+21
1102  4524              JMS I SETUP
1103  0115              GO              /GOOD DATA
1104  1125              .+21
1105  1126              .+21
```

```
1106  4524                    JMS I SETUP
1107  0114                    BD              /BAD DATA
1110  1131                    .+21
1111  1132                    .+21
1112  4523                    JMS I MES1
1113  4543                    4543
1114  2401                    2401            /TA (TRACK ADDRESS
1115  4060                    4060
1116  6060                    6060
1117  4027                    4027            /WORDCOUNT
1120  0340                    0340
1121  0000                    0000
1122  6060                    6060
1123  4007                    4007            /GD (GOOD DATA)
1124  0440                    0440
1125  6060                    6060
1126  6060                    6060
1127  4002                    4002            /BD (BAD DATA)
1130  0440                    0440
1131  6060                    6060
1132  6060                    6060
1133  0000                    0
1134  5671                    JMP I DP
                                              /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            /U AND E
1141  0636                    0636            /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  0055                TKA
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               /STOP CODE
1230  5600                JMP I SHERT     /RETURN

      0150        *150
0150  4002        START1, JMS CCSU
0151  7402                HLT

      0155        *155
0155  6012        START2, KRB             /CLEAR READER FLAG
0156  6022                PCF             /CLEAR PUNCH FLAG
0157  6762                UTCA            /CLEAR DECTAPE FLAG
0160  7000                NOP
0161  7000                NOP
0162  7000                NOP
0163  4002                JMS CCSU
0164  5531                JMP I SYSTEM


$
```

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	0262
C245	0263
C340	0256
DA	0451
DAT	0126
DCEA	6611
DCMA	6601
DCOUNT	0025
DEAC	6616
DEAL	6615
DFSC	6622
DFSE	6621
DMA	0117
DMAC	6626
DMAR	6603
DMAW	6605
DP	1071
DSAC	6612
DICA	6762
ECOUNT	0135
EM1	0120
EM2	0121
EM	0110
ERROR	0667
EMXT	0754
EXIT	1027
GO	0115
IBT	0606
IWB	0736
INT	0000
IM2	1135
IM2L	0140
K0002	0026
K0003	0045
K0004	0033
K0007	0051
K0070	0050
K0100	0032

SYMBOL TABLE

K0200	0027
K0203	0056
K0260	0030
K0370	0035
K0700	0047
K1000	0034
K1477	0052
K1777	0041
K2000	0043
K3000	0036
K3477	0044
K3777	0053
K4000	0046
K5477	0042
K6000	0037
K7000	0040
K7600	0031
LINK	0134
LINL	0133
L1	0122
L1A	0600
MASKA	0344
MASKB	0345
MASKC	0346
MASKD	0347
MASK77	0254
MESAGE	0200
MES1	0123
MSRGHT	0217
MTP	0244
M1	0057
M2	0261
M3	0257
M40	0255
NU	0113
PNT	0130
RANDOM	0642
RAW	0105
RA1	0522
RA2	0543
RE	0111
RESTOR	0661
SAV	0020
SAV1	0021
SAV2	0022
SAV3	0023
SETUP	0124
SMERT	1200
SMERTL	0136
SIXTY	0264
SR	0116
SRP	1035
START1	0150

SYMBOL TABLE

START2	0155
SYSTEM	0131
TK	0470
TKA	0055
TYPECH	0220
WA1	0532
WA2	0555
WC	7750
WCT	0106

SYMBOL TABLE

INT	0000
CCSU	0002
SAV	0020
SAV1	0021
SAV2	0022
SAV3	0023
BCOUNT	0024
CCOUNT	0025
K0002	0026
K0200	0027
K0260	0030
K7600	0031
K0100	0032
K0004	0033
K1000	0034
K0370	0035
K3000	0036
K6000	0037
K7000	0040
K1777	0041
K5477	0042
K2000	0043
K3477	0044
K0003	0045
K4000	0046
K0700	0047
K0070	0050
K0007	0051
K1477	0052
K3777	0053
CC	0054
TKA	0055
K0203	0056
M1	0057
RAW	0105
WCT	0106
CAT	0107
EM	0110
ME	0111
CC	0112
NC	0113
BC	0114
GC	0115
SM	0116
CMA	0117
EM1	0120
EM2	0121
L1	0122
MES1	0123
SETUP	0124
BEG	0125
CAT	0126
CMK	0127

SYMBOL TABLE

PNT	0130
SYSTEM	0131
AC	0132
LINL	0133
LINK	0134
ELOUNT	0135
SMENTL	0136
CLFL	0137
IM2L	0140
START1	0150
START2	0155
MESAGE	0200
MSRGHT	0217
TYPECH	0220
MIP	0244
MASK77	0254
M40	0255
C340	0256
M3	0257
C212	0260
M2	0261
C213	0262
C243	0263
SIXTY	0264
MASKA	0344
MASKB	0345
MASKC	0346
MASKD	0347
BEGIN	0400
DA	0451
TK	0470
MA1	0522
WA1	0532
MA2	0543
WA2	0553
LIA	0600
IBT	0606
RANDOM	0642
RESTOR	0661
ERROR	0667
COMPAR	0714
IOB	0736
EMXT	0754
CLF	1000
EXIT	1027
SKP	1035
DP	1071
IM2	1135
SMENT	1200
DCMA	6601
DMAR	6603
DMAW	6605
DCEA	6611

SYMBOL TABLE

DSAC	6612
DEAL	6615
DEAC	6616
DFSE	6621
DFSC	6622
DMAC	6626
DICA	6762
WC	7750
CA	7751