

IDENTIFICATION

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

COPYRIGHT © 1971
DIGITAL EQUIPMENT CORPORATION

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. 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

```

/750
7751
0601
0603
0605
0611
0612
0615
0616
0621
0622
0626
6762

```

```

/MULTI DISK II
/UF32 IOI'S
WC=7750
CA=7751
DCMA=0601
DMAN=0603
DMAN=0605
UCEA=0611
DSAC=0612
DLAL=0615
DLAC=0616
DFSL=0621
DFSC=0622
DMAC=0626
DTCA=6762

```

```

/WORD COUNT
/INITIAL ADDRESS
/CLEAR DISK FLAGS
/READ
/WRITE
/CLEAR DISK EXT, ADDRESS
/SKIP ON ADC
/LOAD DISK EXT, ADDRESS
/READ DISK STATUS
/SKIP ON NO ERROR
/SKIP ON COMPLETION FLAG
/READ DISK MEMORY ADDRESS REGISTER
/CLEAR DECTAPE FLAGS

```

```

0020
0020 0000
0021 0000
0022 0000
0023 0000
0024 0000
0025 0000
0026 0002
0027 0200
0030 0200
0031 7600
0032 0100
0033 0004
0034 1000
0035 0370
0036 3000
0037 6000
0038 7000
0041 1777
0042 5477
0043 2000
0044 3477
0045 0003
0046 4000
0047 0700
0050 0070
0051 0007
0052 1477
0053 3777
0054 0000
0055 0000
0056 0203
0057 0057
0060 0215
0061 0212
0062 0000
0063 0240
0064 0305
0065 0330
0066 0311
0067 0323
0070 0324
0071 0305
0072 0316
0073 0324
0074 0240
0075 0304
0076 0311
0077 0323
0100 0313
0101 0250
0102 0323
0103 0251

```

```

*20
/CONSISTANT + TAGS
SAV, 0
SAV1, 0
SAV2, 0
SAV3, 0
BCOUNT, 0
DCOUNT, 0
K0002, 0002
K0200, 0200
K0200, 0200
K7600, 7600
K0100, 0100
K0004, 0004
K1000, 1000
K0370, 0370
K3000, 3000
K6000, 6000
K7000, 7000
K1777, 1777
K5477, 5477
K2000, 2000
K3477, 3477
K0003, 0003
K4000, 4000
K0700, 0700
K0070, 0070
K0007, 0007
K1477, 1477
K3777, 3777
CC, 0
TKA, 0
K0203, 0203
M1, M1
0215
0212
0
0240 /SPACE
0305 /E
0330 /X
0311 /I
0323 /S
0324 /T
0305 /E
0316 /N
0324 /T
0240 /SPACE
0304 /D
0311 /I
0323 /S
0313 /K
0250 /I
0323 /S
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,	MESSAGE
0124	0204	SETUP,	SIXTY
0125	0400	BEG,	BEGIN
0126	0466	DAT,	0A+15
0127	0756	CHK,	ICB
0130	0276	PNT,	SIXTY+12
0131	7600	SYSTEM,	7600
0132	0000	AC,	0
0133	0000	LINL,	0
0134	0000	LINK,	0
0135	0000	ECOUNT,	0
0136	1200	SMERTL,	SMERT
0137	1000	CLFL,	CLF
0140	1135	IR2L,	IR2

```

/ WITH DATA FOLLOWING
/ RETURN FOLLOWING END OF MESSAGE
/ CODE (00)
*200
MESSAGE, 0
      IOF
      CLA CMA           /SET C(AC)=-1
      TAU MESSAGE      /ADD LOCATION
      UCA 12           /AUTO=INDEX REGISTER
      TAU I 12        /FETCH FIRST WORD
      UCA MSRGHT      /SAVE IT
      TAU MSRGHT
      MTR
      MTR
      MTR           /ROTATE 6 BITS RIGHT
      JMS TYPECH     /TYPE IT
      TAU MSRGHT    /GET DATA AGAIN
      JMS TYPECH    /TYPE RIGHT HALF
      JMP MESSAGE+5
MSRGHT, 0           /TEMPORARY STORAGE
TYPECH, 0          /TYPE CHARACTER IN C(AC)6-11
      ANU MASK77
      SNA
      JMP MTP+5      /IS IT END OF MESSAGE?
      TAU M40       /YES: EXIT
      SNA           /SUBTRACT 40
      JMP ,+3       /<40?
      TAU C340     /NO
      JMP MTP       /YES: ADD 300
      TAU M5       /TO CODES <40
      S2A          /SUBTRACT 3
      JMP ,+3       /IS IT ZERO?
      TAU C212    /NO
      JMP MTP       /YES: CODE 45 IS
      TAU M2       /LINE FEED (212)
      S2A          /SUBTRACT 2
      JMP ,+3       /IS IT ZERO?
      TAU C212    /YES: CODE 45 IS
      JMP MTP       /CARRIAGE=RETURN (215)
      TAU C242    /ADD 200 TO OTHERS >40
MTP,  TLS          /TRANSMIT CHARACTER
      TSF          /WAIT FOR FLAG
      JMP ,=1      /NOT SET YET
      CLA          /SET: CLEAR C(AC)
      JMP I TYPECH /RETURN
      ICF          /CLEAR TELEPRINTER
      ION          /TURN INTERRUPT ON
      JMP I 12     /RETURN
    
```

```

/CONSTANTS
MASK7, /7
M40, -40
C340, 340
M3, -3
C212, 212
M2, -2
C215, 215
C245, 245

0254 0277
0255 7740
0256 0340
0257 7775
0260 0212
0261 7776
0262 0215
0263 0245

0264 7402
0265 7000
0266 7000
0267 7200
0270 1664
0271 3273
0272 5674
0273 0000
0274 0276
0275 5267
0276 1673
0277 0051
0300 3344
0301 1673
0302 0050
0303 3345
0304 1673
0305 0047
0306 3346
0307 1673
0310 0040
0311 3347
0312 1346
0313 7112
0314 7010
0315 1347
0316 7012
0317 7010
0320 1350
0321 3346
0322 2264
0323 4274
0324 1346
0325 3673
0326 1345
0327 7004
0330 7006
0331 1344
0332 1350
0333 3347
0334 2264
0335 4274
0336 1347
0337 3673

SIXTY, MLI
NOP
NOP /STORE INIT NEXT TIME
CLA
IAU I ,=4 /ADDRESS OF OPERAND
UCA ,+2
JMP I ,+2
0 /ADDRESS OF OPERAND
SIXTY+12 /CHANGING REFERENCE (P)
JMP SIXTY+3
IAU I SIXTY+7 /AC (OPERAND)
AND K000/
UCA MASKA /0000
IAU I SIXTY+7 /AC (OPERAND)
AND K0070
UCA MASKB /00X0
IAU I SIXTY+7 /AC (OPERAND)
AND K0700
UCA MASKC /0X00
IAU I SIXTY+7 /AC (OPERAND)
AND K7000
UCA MASKD /X000
IAU MASKC /0X00
MTR CLL
MTR /0X00 RS3 00X0
IAU MASKD /X000
MTR
MTR
IAU MASKD,1 /X0X0 RS3 0X0X
UCA MASKC /TEMP STORAGE
ISE SIXTY /INCREMENT FOR STORAGE
JMS SIXTY+10 /FIND STORAGE ADDRESS
IAU MASKC /6X6X
UCA I SIXTY+7 /STORE OPERAND AS SPECIFIED
IAU MASKB /00X0
MTR
MTR /00X0 SL3 0X00
IAU MASKA /0X00+000X=0X0X
IAU MASKD+1 /0X0X+6000=6X6X
UCA MASKD /TEMP STORAGE
ISE SIXTY /INCREMENT FOR STORAGE
JMS SIXTY+10 /FIND STORAGE ADDRESS
IAU MASKD /6X6X
UCA I SIXTY+7 /STORE OPERAND AS SPECIFIED

```

10

```

0340 1130
0341 3274
0342 2264
0343 5664
0344 0000
0345 0000
0346 0000
0347 0000
0350 6060

TAU PNT /HOUSE KEEPING
UCA SIXTY+10
ISE SIXTY /INCREMENT FOR RETURN
JMP I SIXTY /RETURN

MASKA, 0
MASKB, 0
MASKC, 0
MASKD, 0
6060

```

```

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

```

0400          *400
0401 6601          /ROUTINE TO DETERMINE # OF DISK'S
0402 7200          /ON EACH SYSTEM
0403 3054          BEGIN, UCMA
0404 3021          CLA
0405 3025          UCA CC
0406 6615          UCA SAV1          /DISK ADDRESS
0407 7200          UCA DCOUNT          /# COUNT OF DISK
0408 6616          UEAL
0409 6026          CLA
0410 7440          UEAC
0411 5230          AND K0002          /TEST FOR NON-EXTSTENT
0412 1025          SEA
0413 7001          JMP ,+16
0414 3025          TAU DCOUNT          /*+1 DISK COUNT
0415 7001          TAU
0416 1021          UCA DCOUNT
0417 1034          TAU SAV1          /SELECT NEXT DISK
0418 3021          TAU K1000
0419 1025          UCA SAV1
0420 7041          TAU DCOUNT
0421 1033          CIA
0422 7850          TAU K0004
0423 5230          SNA CLA
0424 1021          JMP ,+3
0425 5205          TAU SAV1          /NEXT DISK
0426 5205          JMP BEGIN+5
0427 7200          CLA
0428 1025          TAU DCOUNT
0429 7450          SNA
0430 7402          HLT          /NO DISK PRESENT
0431 1030          TAU K0200
0432 3062          UCA M1+3          /ASCII CODE
0433 1257          TAU M1
0434 3010          UCA 10
0435 6042          TCF
0436 7200          CLA
0437 1410          TAU I 10          /AUTO INDEX
0438 7450          SNA          /END OF MESSAGE
0439 5251          JMP DA          /YES
0440 6046          ILS
0441 6041          TST
0442 5246          JMP ,=-1
0443 5240          JMP ,=-10
0444 7200          DA, CLA
0445 6611          UCMA          /DATA TEST
0446 6601          UCMA          /CLEAR DISK EXT, ADDRESS
0447 3024          ION          /CLEAR DISK FLAGS
0448 3025          UCA BCOUNT          /TURN INTERRUPT ON
0449 3055          UCA TKA
0450 1040          TAU K7000          /MINUS 1000
0451 1021          TAU SAV1
0452 1047          TAU K0700          /MAX, AMOUNT OF STORAGE PER DISK
0453 7040          CMA
    
```

0463 3020
 0464 1020
 0465 3021
 0466 7004
 0467 3022

UCA SAV
 TAU SAV
 UCA SAV1
 LAS
 UCA SAV2
 /SELECT MODE OF OPERATION
 /

0470	1055	TK,	TAU TKA	/TRACK
0471	6615		UEAL	/LOAD DISK AND TRACK
0472	7200		CLA	/
0473	4505		JMS I RAW	/GENERATE RANDOM WORD
0474	1022		TAU SAV2	/FETCH MODE
0475	7000		NOP	
0476	0034		ANU K1000	/COMPARE FOR TRACK SELECT
0477	7450		SNA	
0500	5322		JMP RA1	/NO
0501	7200		CLA	/YES
0502	1022		TAU SAV2	
0503	0035		ANU K0370	
0504	7006		RTL	
0505	7004		RAL	
0506	3055		UCA TKA	
0507	1055		TAU TKA	
0510	6615		UEAL	/LOAD TRACK ADDRESS
0511	7200		CLA	
0512	1022		TAU SAV2	/COMPARE FOR CROSSOVER
0513	7000		NOP	
0514	0046		ANU K4000	
0515	7450		SNA	
0516	5322		JMP ,+4	/EXERCISE TRACK
0517	7200		CLA	
0520	1040		TAU K7000	/CROSSOVER ADDRESS
0521	3024		UCA BCOUNT	
0522	1037	RA1,	TAU K6000	
0523	3506		UCA I WCT	
			/	
0524	1052		TAU K1477	
0525	3507		UCA I CAT	/LOAD CURRENT ADDRESS
0526	1024		TAU BCOUNT	
0527	6603		UMAR	/SAVE DISK CONTENTS
0530	7000		NOP	
0531	5331		JMP ,	
0532	4511	WA1,	JMS I RE	/RESTORE ORG, TRACK
0533	1037		TAU K6000	/2000 TRANSFERS
0534	3506		UCA I WCT	
0535	1044		TAU K5477	/WRITE BUFFER=1
0536	3507		UCA I CAT	
0537	1024		TAU BCOUNT	
0540	6605		UMAR	/WRITE
0541	7000		NOP	
0542	5342		JMP ,	
0543	4511	RA2,	JMS I RE	/RESTORE ORG TRACK
0544	1037		TAU K6000	
0545	3506		UCA I WCT	
0546	1042		TAU K5477	/READ BUFFER=1
0547	3507		UCA I CAT	
0550	1024		TAU BCOUNT	
0551	6603		UMAR	/READ
0552	7000		NOP	
0553	5353		JMP ,	
0554	4512		JMS I CO	/COMPARE DATA

```

0005 4511      WA2,   JMS I RE
0006 7200      CLA
0007 1037      TAU K6000
0008 3506      UCA I WCT           /LOAD W.C.
0009 1032      TAU K1477
0010 3507      UCA I CAT           /LOAD C.A.
0011 1024      TAU BCOUNT
0012 0605      UMAW           /WRITE
0013 7000      NOP
0014 5306      JMP ,           /CHECK FOR ERROR
0015 4511      JMS I RE           /RESTORE ORG, TRACK.
0016 5522      JMP I LI

```

```

0000 0600      *000
0001 7200      LIA,   CLA
0002 1034      TAU CC
0003 7041      CIA
0004 1036      TAU K0203           /COMPARE FOR COMPLETION COMMAND
0005 7650      SNA CLA
0006 5004      JMP CCSU*2       /YES EXIT
0007 1024      IBT,   TAU BCOUNT           /NO CONTINUE
0008 7041      CIA
0009 1037      TAU K6000
0010 7450      SNA
0011 5220      JMP ,+6           /INCREMENT TRACK
0012 7200      CLA
0013 1024      TAU BCOUNT
0014 1043      TAU K2000
0015 3024      UCA BCOUNT
0016 5526      JMP I DAT
0017 7200      CLA
0018 3024      UCA BCOUNT           /ZERO BUFFER COUNT
0019 1035      TAU TKA
0020 1032      TAU K0100
0021 3035      UCA TKA
0022 1021      TAU SAV1
0023 7040      CMA
0024 7640      SEA CLA
0025 7410      SKP
0026 5236      JMP ,+5
0027 1021      TAU SAV1
0028 1032      TAU K0100
0029 3021      UCA SAV1
0030 5526      JMP I DAT
0031 1020      TAU SAV           /SET UP FOR NEXT PASS
0032 3021      UCA SAV1
0033 3035      UCA TKA
0034 5526      JMP I DAT
0035 0000      RANDOM, 0           /FILL OUTBUFFER WITH RANDOM DATA
0036 1037      TAU K6000           /2000 TRANSFERS
0037 3023      UCA SAV3
0038 1044      TAU K3477           /OUT PUT BUFFER-1
0039 3011      UCA 11           /AUTO INDEX
0040 1113      TAU NU           /RANDOM#
0041 7104      XAL CLL
0042 7430      SEL
0043 1045      TAU K0003
0044 3113      UCA NU
0045 1113      TAU NU
0046 3411      UCA I 11           /FILL BUFFER
0047 2023      ISE SAV3           /DONE
0048 5247      JMP ,+10         /NO
0049 5642      JMP I RANDOM       /YES
0050

```

0061 0000
 0062 7200
 0063 1055
 0064 6615
 0065 7200
 0066 5661

RESTORE, 0
 CLA
 TAU TKA
 DEAL /LOAD TK
 CLA
 JMP I RESTORE

0067 7200
 0070 6621
 0071 5300
 0072 6622
 0073 5267
 0074 6611
 0075 6601
 0076 6001
 0077 5400
 0700 7200
 0701 1024
 0702 3117
 0703 6616
 0704 7000
 0705 3116
 0706 6622
 0707 5306
 0710 6611
 0711 6601
 0712 4520
 0713 5400
 0714 0000
 0715 7200
 0716 3135
 0717 1044

ERROR, CLA
 UFSE
 JMP ,+7
 UFSC
 JMP ,-4
 UCMA /NO ERROR'S
 ION
 JMP I INT
 CLA
 TAU HCOUNT
 UCA DMA /STORE
 DEAC /READ STATUS
 NOP
 UCA SR /STORE
 UFSC /SKIP ON COMPLETION
 JMP ,-1
 UCMA
 UCMA /CLEAR THE WORLD
 JMS I EP1 /PRINT ERROR
 JMP I INT /CONTINUE
 COMPARE, 0 /COMPARE FOR DATA ERROR
 CLA
 UCA ECOUNT /ZERO ERROR COUNT
 TAU K3477 /OUT BUFFER-1

0720 3010
 0721 1042
 0722 3011
 0723 1037
 0724 3025
 0725 1410
 0726 3115
 0727 1411
 0730 3114
 0731 1115
 0732 7041
 0733 1114
 0734 7640
 0735 5341
 0736 2025
 0737 5325
 0740 5354
 0741 7604
 0742 0043
 0743 7640

UCA 10 /AUTO INDEX
 TAU K5477 /IN BUFFER-1
 UCA 11 /AUTO INDEX
 TAU K6000 /MINUS 2000
 UCA DCOUNT
 TAU I 10
 UCA GD /GOOD WORD (OUT BUFFER)
 TAU I 11
 UCA BD /BAD WORD (IN BUFFER)
 TAU GD
 CIA
 TAU BD
 SEA CLA
 ICB, JMS I DCOUNT /ERROR
 JMS I DCOUNT +4
 JMS COMPARE+11 /FETCH NEXT WORD
 JMS ERXT /DONE
 LAS
 ANU K2000
 SEA CLA

0744 5352
 0745 1025
 0746 0041
 0747 7000
 0750 3117
 0751 5365
 0752 2135
 0753 5336
 0754 7604
 0755 0043
 0756 7450
 0757 5714
 0760 7200
 0761 1135
 0762 7440
 0763 4536
 0764 5714
 0765 4521
 0766 5336

JMP ,+6
 TAU DCOUNT
 ANU K1777
 NOP
 UCA DMA /DISK ADDRESS
 JMP ,+14
 ISE ECOUNT /+1 ERROR COUNT
 JMS ICB /FETCH NEXT WORD
 ERX1, LAS /COMPARE FOR AC BIT 1
 ANU K2000
 SNA
 JMP I COMPARE /NORMAL TYPE OUT
 CLA
 TAU ECOUNT
 SEA
 JMS I SHERTL
 JMS I COMPARE /RETURN TO ROUTINE
 JMS I EP2 /PRINT DATA ERROR
 JMS ICB

```

1000 3132          *1000          /
1001 7210          /ROUTINE TO SERVICE INTERRUPTS
1002 3134          /
1003 6041          /
1004 5207          /STORE AC
1005 6042          /
1006 5227          /STORE LINK
1007 6031          /SKIP ON TELEPRINTER FLAG
1008 5214          /NO FLAG
1009 6036          /CLEAR FLAG
1010 5227          /EXIT SERVICE
1011 6036          /SKIP ON KEYBOARD FLAG
1012 5227          /NO FLAG
1013 5227          /READ BUFFER
1014 7200          UCA AC          /STORE CHARACTER
1015 1251          MAL          /EXIT SERVICE
1016 7040          UCA CC
1017 3135          JMP EXIT
1020 2135          CLA
1021 5220          TAU K000/
1022 6622          CMA
1023 5226          UCA ECOUNT
1024 2000          ISZ ECOUNT
1025 5510          JMP ,+3
1026 5540          ISZ INT
1027 7200          JMP I ER
1030 1134          JMP I IR2L          /REPORT UNDEFINED INTERRUPT
1031 7004          CLA
1032 1132          TAU LINK          /FETCH LINK
1033 6001          MAL          /RESTORE LINK
1034 5400          TAU AC          /FETCH AC
1035 0200          IDN          /TURN INTERRUPT ON
1036 4524          JMP I INT          /RETURN
1037 0255          SHP,
1040 1255          JMS I SETUP
1041 1256          IKA          /TRACK ADDRESS
1042 4524          ,+15
1043 0117          ,+15
1044 1261          JMS I SETUP
1045 1262          UMA
1046 4524          ,+15
1047 0116          ,+15
1050 1265          SR
1051 1266          ,+15
1052 4523          ,+15
1053 4543          JMS I MES1
1054 2401          4543
1055 4060          2401          /TA (TRACK ADDRESS)
1056 6060          /
1057 4064          4060          /DISK MEMORY ADDRESS
1058 6060          6060
1059 4064          4064

```

```

1060 0140          0140
1061 6060          6060
1062 6060          6060
1063 4223          4023          /SWITCH REGISTER
1064 2240          2240
1065 6060          6060
1066 6060          6060
1067 0200          0
1070 5635          JMP I SRP
1071 0200          /
1072 4524          /DATA PRINT OUT ROUTINE
1073 0255          /
1074 1115          0
1075 1116          JMS I SETUP
1076 4524          IKA
1077 0117          ,+21
1078 1116          ,+21
1079 4524          JMS I SETUP
1080 0117          UMA
1081 1121          /
1082 1122          /
1083 4524          ,+21
1084 0115          ,+21
1085 1125          JMS I SETUP          /GOOD DATA
1086 1126          00
1087 1126          ,+21
1088 1126          ,+21

```

```

1106 4524      JMS I SETUP
1107 0114      BU          /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      IN2,   JMS I MES1      /GO TO PRINTOUT ROUTINE
1136 4543      4543      /CARRIAGE RETURN*LINE FEED
                                /CHARACTERS
1137 2516      2516      /U AND N
1140 0400      0400      /U 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
1146 7402      HLT

                                /
                                /PRINTOUT ROUTINE FOR DATA ERROR'S
                                /PRINTS # OF ERROR'S

                                *1200
1200 0000      SHERT, 0
1201 4524      JMS I SETUP
1202 0000      TKA
1203 1215      ,+12
1204 1216      ,+12
1205 4524      JMS I SETUP      /SETUP WORD FOR PRINTOUT
1206 0135      LCCOUNT      /#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 0922      0922
1221 2217      2217
1222 2250      2250
1223 2351      2351
1224 7240      /240
1225 6060      6060
1226 6060      6060
1227 0000      0
1230 5600      JMP I SHERT      /STOP CODE
                                /RETURN

                                *150
0150 4002      START1, JMS CCSU
0151 7402      HLT

                                *155
0155 6012      START2, HRF          /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
    
```

S

THERE ARE NO ERRORS

SYMBOL TABLE

AC	0132
ACOUNT	0024
AD	0114
BEG	0125
BEGIN	0400
CA	7751
CAT	0107
CC	0054
CUSU	0002
CHK	0127
CLF	1000
CLFL	0137
CU	0112
CUMPAK	0714
C212	0260
C213	0262
C243	0263
C340	0256
DA	0451
DAT	0126
DEEA	0011
DEMA	0001
DEUNT	0025
DEAL	0016
DEAL	0015
DFSC	0022
DFSE	0021
DMA	0117
DMAC	0026
DMAK	0003
DMAW	0005
DP	1071
DSAC	0012
DICA	0762
EQOUNT	0135
EP1	0120
EP2	0121
ER	0110
ERROR	0067
EXXI	0754
EXIT	1027
GU	0115
IBT	0006
ICB	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
K0200	0030
K0370	0035
K0700	0047
K1000	0034
K1477	0052
K1777	0041
K2000	0043
K3000	0036
K3477	0044
K3777	0053
K4000	0046
K4477	0042
K0000	0037
K7000	0040
K7600	0031
LINK	0134
LINL	0133
LI	0122
LIA	0000
MASKA	0344
MASKB	0345
MASKC	0346
MASKD	0347
MASK77	0254
MESSAGE	0200
MS1	0123
MORGH	0217
MIP	0244
M1	0057
M2	0201
M3	0257
M40	0255
NU	0113
PNT	0130
RANDOM	0042
RAW	0125
RA1	0522
RA2	0543
RE	0111
RESTOR	0061
SAV	0020
SAV1	0021
SAV2	0022
SAV3	0023
SETUP	0124
SMERT	1200
SMERTL	0136
SIXTY	0264
SM	0116
SMP	1035
START1	0150

SYMBOL TABLE

START2	0155
SYSTEM	0131
TK	0470
TKA	0055
TYPECH	0220
MA1	0532
MA2	0555
ML	7750
MCT	0106

SYMBOL TABLE

INT	0000
CUSU	0022
SAV	0020
SAV1	0021
SAV2	0022
SAV3	0023
UWOUNT	0024
UWOUNT	0025
K0002	0026
K0200	0027
K0250	0030
K7600	0031
K0100	0032
K0004	0033
K1000	0034
K0370	0035
K3000	0036
K0000	0037
K7000	0040
K1777	0041
K0477	0042
K2000	0043
K0477	0044
K0003	0045
K4000	0046
K0700	0047
K0070	0050
K0007	0051
K1477	0052
K0777	0053
CU	0054
TKA	0055
K0203	0056
MI	0057
MAW	0105
MCT	0106
UAT	0107
EM	0110
ML	0111
CU	0112
NU	0113
BU	0114
GU	0115
SK	0116
DMA	0117
EM1	0120
EM2	0121
L1	0122
MES1	0123
SETUP	0124
BEG	0125
UAT	0126
GMK	0127

SYMBOL TABLE

PNT	0130
SYSTEM	0131
AC	0132
LJNL	0133
LJNK	0134
EQUNI	0135
SMENTL	0136
CLFL	0137
IN2L	0140
SIART1	0150
SIART2	0155
MESSAGE	0200
MSRGHT	0217
ITPLCH	0220
MIP	0244
MASK77	0254
M40	0255
U340	0256
M3	0257
U412	0260
M2	0261
U415	0262
U45	0263
SIXTY	0264
MASKA	0344
MASKB	0345
MASKC	0346
MASKD	0347
BEGIN	0400
UA	0421
TK	0470
MA1	0522
MA1	0532
MA2	0543
MA2	0555
LJA	0600
JBT	0606
HANUOM	0642
RESTOR	0661
EMRUR	0667
CUMPAR	0714
ICB	0736
EMXT	0754
CLF	1000
EXIT	1027
SMP	1035
UP	1071
IK2	1135
SMENT	1200
UOMA	6601
UMAH	6603
UMAW	6605
UGEA	6611

SYMBOL TABLE

USAC	6612
UEAL	6615
UEAC	6616
UPSE	6621
UPSC	6622
UMAC	6626
UICA	6762
UC	7750
CA	7751