

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. 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.

	/MULTI DISK II	
	/DF32 IUTS	
/750	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

*24
/CONSTANTS + TAGS

0200

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 5000
 0037 6000
 0040 7000
 0041 1777
 0042 5477
 0043 2000
 0044 3477
 0045 0003
 0046 4000
 0047 0700
 0050 0070
 0051 0007
 0052 1477
 0053 5777
 0054 0000
 0055 0000
 0056 0203
 0057 0057
 0060 0215
 0061 0212
 0062 0000
 0063 0240
 0064 0305
 0065 0350
 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

SAV, 0
 SAV1, 0
 SAV2, 0
 SAV3, 0
 BCOUNT, 0
 DCOUNT, 0
 K0002, 0002
 K0200, 0200
 K0260, 0260
 K7600, 7600
 K0100, 0100
 K0004, 0004
 K1000, 1000
 K0370, 0370
 K5000, 5000
 K6000, 6000
 K7000, 7000
 K1777, 1777
 K5477, 5477
 K2000, 2000
 K3477, 3477
 K0003, 0003
 K4000, 4000
 K0700, 0700
 K0070, 0070
 K0007, 0007
 K1477, 1477
 K5777, 5777
 CC, 0
 TKA, 0
 K0203, 0203
 M1, M1
 0215
 0212
 0
 0240 /SPACE
 0305 /E
 0350 /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 /)

/STOP CODE

W104	W360	RAM,	0	RANDOM
W105	W542	W01,	0	AC
W106	7750	CA1,	0	UA
W107	7751	ER,	0	EMUR
W110	0607	RC,	0	RESTORE
W111	0501	CU,	0	COMPARE
W112	W/14	NU,	0	0421
W113	0421	BU,	0	0
W114	0000	GJ,	0	0
W115	0000	SR,	0	0
W116	0000	DMA,	0	0
W117	0000	EPI,	0	SMP
W120	1035	EP2,	0	UP
W121	10/1	LI,	0	LIA
W122	0600	MES1,	0	MESSAGE
W125	0200	SETUP,	0	SIXTY
W124	0204	BEG,	0	BEGIN
W125	0440	DAI,	0	DA+15
W126	0466	CHK,	0	ICB
W127	0736	PVI,	0	SIXTY+12
W130	0276	SYSTEM,	0	7000
W131	7600	AC,	0	0
W132	0000	LINK,	0	0
W133	0000	LINK,	0	0
W134	0000	ECOUNT,	0	0
W135	0000	SHERIL,	0	SHERIT
W136	1200	CLFL,	0	ULF
W137	1000	IR2L,	0	IR2
W140	1155			

/WITH DATA FOLLOWING
 /RETURN FOLLOWING END OF MESSAGE
 /CODE (00)

```

0200 0200
0201 6002
0202 7240
0203 1200
0204 5012
0205 1412
0206 5217
0207 1217
0210 7012
0211 7012
0212 7012
0213 4220
0214 1217
0215 4220
0216 5205
0217 0000
0220 0000
0221 0254
0222 7450
0223 5251
0224 1255
0225 7500
0226 5231
0227 1256
0230 5244
0231 1257
0232 7440
0233 5236
0234 1260
0235 5244
0236 1261
0237 7440
0240 5243
0241 1262
0242 5244
0243 1263
0244 6046
0245 6041
0246 5245
0247 7200
0250 5620
0251 6042
0252 6001
0253 5412

*200
MESSAGE, 0
      IOF
      CLA CMA          /SET C(AC)=-1
      IAU MESSAGE     /ADD LOCATION
      UCA 12          /AUTO=INDEX REGISTER
      IAU I 12        /FETCH FIRST WORD
      UCA MSRGT       /SAVE IT
      IAU MSRGT
      RTR
      RTR              /ROTATE 6 BITS RIGHT
      RTR
      JMS TYPECH      /TYPE IT
      IAU MSRGT       /GET DATA AGAIN
      JMS TYPECH      /TYPE RIGHT HALF
      JMP MESSAGE+5
MSRGT, 0              /TEMPORARY STORAGE
TYPECH, 0            /TYPE CHARACTER IN C(AC)6-11
      ANU MASK77
      SNA
      JMP MTP+5        /IS IT END OF MESSAGE?
                        /YES: EXIT
      IAU M40          /SUBTRACT 40
      SMA
                        /<40?
      JMP ,+3          /NO
      IAU C340         /YES: ADD 300
      JMP MTP          /TO CODES <40
      IAU M3           /SUBTRACT 3
      SZA
                        /IS IT ZERO?
      JMP ,+3          /NO
      IAU C212         /YES: CODE 45 IS
      JMP MTP          /LINE FEED (212)
      IAU M2           /SUBTRACT 2
      SZA
                        /IS IT ZERO?
      JMP ,+3          /NO
      IAU C215         /YES: CODE 45 IS
      JMP MTP          /CARRIAGE=RETURN (215)
      IAU C245         /ADD 200 TO OTHERS >40
MTP,  ILS             /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

```

0254	0877	/CONSTANT	
0255	7740	MASK77, 77	
0256	0340	M40, -40	
0257	7775	C340, 340	
0260	0212	M3, -3	
0261	7776	C212, 212	
0262	0215	M2, -2	
0263	0245	C215, 215	
		C245, 245	
0264	7402	SIXTY, MLI	
0265	7000	NOP	
0266	7000	NOP	
0267	7200	ULA	/STORE INIT NEXT TIME
0270	1604	TAU I, =4	/ADDRESS OF OPERAND
0271	3273	UCA, +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 K0001	
0300	3344	UCA MASKA	/000X
0301	1673	TAU I SIXTY+7	/AC (OPERAND)
0302	0050	AND K0010	
0303	3345	UCA MASKB	/00X0
0304	1573	TAU I SIXTY+7	/AC (OPERAND)
0305	0047	AND K0700	
0306	3346	UCA MASKC	/0X00
0307	1673	TAU I SIXTY+7	/AC (OPERAND)
0310	0040	AND K7000	
0311	3347	UCA MASKD	/X000
0312	1346	TAU MASKC	/0X00
0313	7112	RTR CLL	
0314	7010	RAK	/0X00 RSS 00X0
0315	1347	TAU MASKD	/X0X0
0316	7012	RTR	
0317	7010	RAK	
0320	1350	TAU MASKD+1	/X0X0 RSS 0X0X
0321	3346	UCA MASKC	/TEMP STORAGE
0322	2264	SIXTY	/INCREMENT FOR STORAGE
0323	4274	JMS SIXTY+10	/FIND STORAGE ADDRESS
0324	1346	TAU MASKC	/6X6X
0325	3673	UCA I SIXTY+7	/STORE OPERAND AS SPECIFIED
0326	1345	TAU MASKC	/00X0
0327	7004	RAL	
0330	7006	RIL	/00X0 SL3 0X00
0331	1344	TAU MASKA	/0X00+000X=0X0X
0332	1350	TAU MASKD+1	/0X0X+6000=6X6X
0333	3347	UCA MASKD	/TEMP STORAGE
0334	2264	ISE SIXTY	/INCREMENT FOR STORAGE
0335	4274	JMS SIXTY+10	/FIND STORAGE ADDRESS
0336	1347	TAU MASKD	/6X6X
0337	3673	UCA I SIXTY+7	/STORE OPERAND AS SPECIFIED

0340 1150
 0341 3274
 0342 2264
 0343 5604
 0344 0000
 0345 0000
 0346 0000
 0347 0000
 0350 0060

IAU PNT /HOUSE KEEPING
 UCA SIXTY+10
 USE SIXTY /INCREMENT FOR RETURN
 JMP I SIXTY /RETURN
 0
 0
 0
 0
 MASKA:
 MASKB:
 MASKC:
 MASKD:
 6060

6000	6000		
6001	6001	JMP I 0000	/GO SERVICE INTERRUPT
6002	6002		
6003	6003	JMP I 0000	/ENTER MAIN ROUTINE
6004	6004	LUP	
6005	6005	JMP I 0000	

0400

0400 0601
 0401 7200
 0402 3054
 0403 3021
 0404 3025
 0405 6615
 0406 7200
 0407 6616
 0410 0026
 0411 7440
 0412 5230
 0413 1025
 0414 7001
 0415 3025
 0416 1021
 0417 1034
 0420 3021
 0421 1025
 0422 7041
 0423 1033
 0424 7650
 0425 5230
 0426 1021
 0427 5205
 0430 7200
 0431 1025
 0432 7450
 0433 7402
 0434 1030
 0435 3062
 0436 1057
 0437 3010
 0440 6042
 0441 7200
 0442 1410
 0443 7450
 0444 5251
 0445 6046
 0446 6041
 0447 5246
 0450 5240
 0451 7200
 0452 6611
 0453 6601
 0454 6001
 0455 3024
 0456 3055
 0457 1040
 0460 1021
 0461 1047
 0462 7040

*400
 /ROUTINE TO DETERMINE # OF DISK'S
 /ON EACH SYSTEM

BEGIN, UCMA
 CLA CC
 UCA CC
 UCA SAV1 /DISK ADDRESS
 UCA DCOUNT /# COUNT OF DISK
 UCAL
 UCA
 UCAU /TEST FOR NON-EXISTENT
 AND K0002
 SFA
 JMP ,+16
 IAU DCOUNT
 IAC DCOUNT
 UCA DCOUNT
 IAU SAV1
 IAU K1000 /SELECT NEXT DISK
 UCA SAV1
 IAU DCOUNT
 CIA
 IAU K0004
 SNA CLA
 JMP ,+3
 IAU SAV1 /NEXT DISK
 JMP BEGIN+5
 CLA
 IAU DCOUNT
 SNA
 MLI K0200 /NO DISK PRESENT
 IAU M1+5 /ASCII CODE
 IAU M1
 UCA 10
 ICF
 CLA
 IAU I 10 /AUTO INDEX
 SNA /END OF MESSAGE
 JMP DA /YES
 ILS
 ISF
 JMP , -1
 JMP , -10
 CLA
 UCL /DATA TEST
 UCMA /CLEAR DISK EXT, ADDRESS
 UCMA /CLEAR DISK FLAGS
 ION /TURN INTERRUPT ON
 UCA DCOUNT
 UCA TA
 IAU K1000 /MINUS 1000
 IAU SAV1
 IAU K0700 /MAX, AMOUNT OF STORAGE PER DISK
 UCMA

DA,

W463 5020
W464 1020
W465 3221
W466 7604
W467 3222

JCA SAV
IAJ SAV
JCA SAV1
LAS
JCA SAV2

/SELECT MODE OF OPERATION

/

0470	1055	TK,	IAU TKA	/TRACK
0471	0615		JEAL	/LOAD DISK AND TRACK
0472	7200		CLA	/
0473	4505		JMS I RAW	/GENERATE RANDOM WORD
0474	1022		IAU SAV2	/FETCH MODE
0475	7000		NOP	
0476	0234		ANU K1000	/COMPARE FOR TRACK SELECT
0477	7450		SNA	
0500	5322		JMP RA1	/NO
0501	7200		CLA	/YES
0502	1022		IAU SAV2	
0503	0235		ANU K0370	
0504	7006		RTL	
0505	7004		RAL	
0506	3055		UCA TKA	
0507	1055		IAU TKA	
0510	0615		JEAL	/LOAD TRACK ADDRESS
0511	7200		CLA	
0512	1022		IAU SAV2	/COMPARE FOR CROSSOVER
0513	7000		NOP	
0514	0246		ANU K4000	
0515	7450		SNA	
0516	5322		JMP ,+4	/EXERCISE TRACK
0517	7200		CLA	
0520	1040		IAU K7000	/CROSSOVER ADDRESS
0521	3024		UCA BCOUNT	
0522	1057	RA1,	IAU K6000	
0523	3506		UCA I WCT	
			/	
0524	1052		IAU K1477	
0525	3507		UCA I CAT	/LOAD CURRENT ADDRESS
0526	1024		IAU BCOUNT	
0527	0603		UMAR	/SAVE DISK CONTENTS
0530	7000		NOP	
0531	5351		JMP ,	
0532	4511	WA1,	JMS I RE	/RESTORE ORG, TRACK
0533	1057		IAU K6000	/2000 TRANSFERS
0534	3506		UCA I WCT	
0535	1044		IAU K5477	/WRITE BUFFER=1
0536	3507		UCA I CAT	
0537	1024		IAU BCOUNT	
0540	0605		UMAR	/WRITE
0541	7000		NOP	
0542	5342		JMP ,	
0543	4511	RA2,	JMS I RE	/RESTORE ORG TRACK
0544	1057		IAU K6000	
0545	3506		UCA I WCT	
0546	1042		IAU K5477	/READ BUFFER=1
0547	3507		UCA I CAT	
0550	1024		IAU BCOUNT	
0551	0603		UMAR	/READ
0552	7000		NOP	
0553	5353		JMP ,	
0554	4512		JMS I CU	/COMPARE DATA

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0000 4011
 0001 7200
 0002 1057
 0003 5506
 0004 1052
 0005 5507
 0006 1024
 0007 6600
 0008 7000
 0009 5566
 0010 4011
 0011 5522

JMS I RE
 JLA
 JAU K000P
 JCA I WLT
 JAJ K1477
 JCA I CAT
 JAU HCOUNT
 JMAW
 JUP
 JMS I RE
 JMP I LI

/LOAD A.C.
 /LOAD C.A.
 /WRITE
 /CHECK FOR ERROR
 /RESTORE DRG, TRACK.

0000	L1A,	LJA CC	
0001	0000	LJA K6200	/COMPARE FOR COMPLETION COMMAND
0002	0001	SNA CLA	/YES EXIT
0003	0002	JMP CCSU+2	/NO CONTINUE
0004	0003	IAU BCOUNT	/
0005	0004	LJA	
0006	0005	IAU K6000	
0007	0006	SNA ,+6	/INCREMENT TRACK
0008	0007	JMP ,+6	
0009	0008	LJA BCOUNT	/ZERO BUFFER COUNT
0010	0009	IAU TKA	
0011	0010	IAU K0100	
0012	0011	JCA TKA	
0013	0012	JMP I DAT	
0014	0013	LJA BCOUNT	
0015	0014	IAU TKA	
0016	0015	IAU K0100	
0017	0016	JCA TKA	
0018	0017	JMP I DAT	
0019	0018	LJA BCOUNT	
0020	0019	IAU TKA	
0021	0020	IAU K0100	
0022	0021	JCA TKA	
0023	0022	JMP I DAT	
0024	0023	LJA BCOUNT	
0025	0024	IAU TKA	
0026	0025	IAU K0100	
0027	0026	JCA TKA	
0028	0027	JMP I DAT	
0029	0028	LJA BCOUNT	
0030	0029	IAU TKA	
0031	0030	IAU K0100	
0032	0031	JCA TKA	
0033	0032	JMP I DAT	
0034	0033	LJA BCOUNT	
0035	0034	IAU TKA	
0036	0035	IAU K0100	
0037	0036	JCA TKA	
0038	0037	JMP I DAT	
0039	0038	LJA BCOUNT	
0040	0039	IAU TKA	
0041	0040	IAU K0100	
0042	0041	JCA TKA	
0043	0042	JMP I DAT	
0044	0043	LJA BCOUNT	
0045	0044	IAU TKA	
0046	0045	IAU K0100	
0047	0046	JCA TKA	
0048	0047	JMP I DAT	
0049	0048	LJA BCOUNT	
0050	0049	IAU TKA	
0051	0050	IAU K0100	
0052	0051	JCA TKA	
0053	0052	JMP I DAT	
0054	0053	LJA BCOUNT	
0055	0054	IAU TKA	
0056	0055	IAU K0100	
0057	0056	JCA TKA	
0058	0057	JMP I DAT	
0059	0058	LJA BCOUNT	
0060	0059	IAU TKA	
0061	0060	IAU K0100	
0062	0061	JCA TKA	
0063	0062	JMP I DAT	
0064	0063	LJA BCOUNT	
0065	0064	IAU TKA	
0066	0065	IAU K0100	
0067	0066	JCA TKA	
0068	0067	JMP I DAT	
0069	0068	LJA BCOUNT	
0070	0069	IAU TKA	
0071	0070	IAU K0100	
0072	0071	JCA TKA	
0073	0072	JMP I DAT	
0074	0073	LJA BCOUNT	
0075	0074	IAU TKA	
0076	0075	IAU K0100	
0077	0076	JCA TKA	
0078	0077	JMP I DAT	
0079	0078	LJA BCOUNT	
0080	0079	IAU TKA	
0081	0080	IAU K0100	
0082	0081	JCA TKA	
0083	0082	JMP I DAT	
0084	0083	LJA BCOUNT	
0085	0084	IAU TKA	
0086	0085	IAU K0100	
0087	0086	JCA TKA	
0088	0087	JMP I DAT	
0089	0088	LJA BCOUNT	
0090	0089	IAU TKA	
0091	0090	IAU K0100	
0092	0091	JCA TKA	
0093	0092	JMP I DAT	
0094	0093	LJA BCOUNT	
0095	0094	IAU TKA	
0096	0095	IAU K0100	
0097	0096	JCA TKA	
0098	0097	JMP I DAT	
0099	0098	LJA BCOUNT	
0100	0099	IAU TKA	
0101	0100	IAU K0100	
0102	0101	JCA TKA	
0103	0102	JMP I DAT	
0104	0103	LJA BCOUNT	
0105	0104	IAU TKA	
0106	0105	IAU K0100	
0107	0106	JCA TKA	
0108	0107	JMP I DAT	
0109	0108	LJA BCOUNT	
0110	0109	IAU TKA	
0111	0110	IAU K0100	
0112	0111	JCA TKA	
0113	0112	JMP I DAT	
0114	0113	LJA BCOUNT	
0115	0114	IAU TKA	
0116	0115	IAU K0100	
0117	0116	JCA TKA	
0118	0117	JMP I DAT	
0119	0118	LJA BCOUNT	
0120	0119	IAU TKA	
0121	0120	IAU K0100	
0122	0121	JCA TKA	
0123	0122	JMP I DAT	
0124	0123	LJA BCOUNT	
0125	0124	IAU TKA	
0126	0125	IAU K0100	
0127	0126	JCA TKA	
0128	0127	JMP I DAT	
0129	0128	LJA BCOUNT	
0130	0129	IAU TKA	
0131	0130	IAU K0100	
0132	0131	JCA TKA	
0133	0132	JMP I DAT	
0134	0133	LJA BCOUNT	
0135	0134	IAU TKA	
0136	0135	IAU K0100	
0137	0136	JCA TKA	
0138	0137	JMP I DAT	
0139	0138	LJA BCOUNT	
0140	0139	IAU TKA	
0141	0140	IAU K0100	
0142	0141	JCA TKA	
0143	0142	JMP I DAT	
0144	0143	LJA BCOUNT	
0145	0144	IAU TKA	
0146	0145	IAU K0100	
0147	0146	JCA TKA	
0148	0147	JMP I DAT	
0149	0148	LJA BCOUNT	
0150	0149	IAU TKA	
0151	0150	IAU K0100	
0152	0151	JCA TKA	
0153	0152	JMP I DAT	
0154	0153	LJA BCOUNT	
0155	0154	IAU TKA	
0156	0155	IAU K0100	
0157	0156	JCA TKA	
0158	0157	JMP I DAT	
0159	0158	LJA BCOUNT	
0160	0159	IAU TKA	
0161	0160	IAU K0100	
0162	0161	JCA TKA	
0163	0162	JMP I DAT	
0164	0163	LJA BCOUNT	
0165	0164	IAU TKA	
0166	0165	IAU K0100	
0167	0166	JCA TKA	
0168	0167	JMP I DAT	
0169	0168	LJA BCOUNT	
0170	0169	IAU TKA	
0171	0170	IAU K0100	
0172	0171	JCA TKA	
0173	0172	JMP I DAT	
0174	0173	LJA BCOUNT	
0175	0174	IAU TKA	
0176	0175	IAU K0100	
0177	0176	JCA TKA	
0178	0177	JMP I DAT	
0179	0178	LJA BCOUNT	
0180	0179	IAU TKA	
0181	0180	IAU K0100	
0182	0181	JCA TKA	
0183	0182	JMP I DAT	
0184	0183	LJA BCOUNT	
0185	0184	IAU TKA	
0186	0185	IAU K0100	
0187	0186	JCA TKA	
0188	0187	JMP I DAT	
0189	0188	LJA BCOUNT	
0190	0189	IAU TKA	
0191	0190	IAU K0100	
0192	0191	JCA TKA	
0193	0192	JMP I DAT	
0194	0193	LJA BCOUNT	
0195	0194	IAU TKA	
0196	0195	IAU K0100	
0197	0196	JCA TKA	
0198	0197	JMP I DAT	
0199	0198	LJA BCOUNT	
0200	0199	IAU TKA	
0201	0200	IAU K0100	
0202	0201	JCA TKA	
0203	0202	JMP I DAT	
0204	0203	LJA BCOUNT	
0205	0204	IAU TKA	
0206	0205	IAU K0100	
0207	0206	JCA TKA	
0208	0207	JMP I DAT	
0209	0208	LJA BCOUNT	
0210	0209	IAU TKA	
0211	0210	IAU K0100	
0212	0211	JCA TKA	
0213	0212	JMP I DAT	
0214	0213	LJA BCOUNT	
0215	0214	IAU TKA	
0216	0215	IAU K0100	
0217	0216	JCA TKA	
0218	0217	JMP I DAT	
0219	0218	LJA BCOUNT	
0220	0219	IAU TKA	
0221	0220	IAU K0100	
0222	0221	JCA TKA	
0223	0222	JMP I DAT	
0224	0223	LJA BCOUNT	
0225	0224	IAU TKA	
0226	0225	IAU K0100	
0227	0226	JCA TKA	
0228	0227	JMP I DAT	
0229	0228	LJA BCOUNT	
0230	0229	IAU TKA	
0231	0230	IAU K0100	
0232	0231	JCA TKA	
0233	0232	JMP I DAT	
0234	0233	LJA BCOUNT	
0235	0234	IAU TKA	
0236	0235	IAU K0100	
0237	0236	JCA TKA	
0238	0237	JMP I DAT	
0239	0238	LJA BCOUNT	
0240	0239	IAU TKA	
0241	0240	IAU K0100	
0242	0241	JCA TKA	
0243	0242	JMP I DAT	
0244	0243	LJA BCOUNT	
0245	0244	IAU TKA	
0246	0245	IAU K0100	
0247	0246	JCA TKA	
0248	0247	JMP I DAT	
0249	0248	LJA BCOUNT	
0250	0249	IAU TKA	
0251	0250	IAU K0100	
0252	0251	JCA TKA	
0253	0252	JMP I DAT	
0254	0253	LJA BCOUNT	
0255	0254	IAU TKA	
0256	0255	IAU K0100	
0257	0256	JCA TKA	
0258	0257	JMP I DAT	
0259	0258	LJA BCOUNT	
0260	0259	IAU TKA	
0261	0260	IAU K0100	
0262	0261	JCA TKA	
0263	0262	JMP I DAT	
0264	0263	LJA BCOUNT	
0265	0264	IAU TKA	
0266	0265	IAU K0100	
0267	0266	JCA TKA	
0268	0267	JMP I DAT	
0269	0268	LJA BCOUNT	
0270	0269	IAU TKA	
0271	0270	IAU K0100	
0272	0271	JCA TKA	
0273	0272	JMP I DAT	
0274	0273	LJA BCOUNT	
0275	0274	IAU TKA	
0276	0275	IAU K0100	
0277	0276	JCA TKA	
0278	0277	JMP I DAT	
0279	0278	LJA BCOUNT	
0280	0279	IAU TKA	
0281	0280	IAU K0100	
0282	0281	JCA TKA	
0283	0282	JMP I DAT	
0284	0283	LJA BCOUNT	
0285	0284	IAU TKA	
0286	0285	IAU K0100	
0287	0286	JCA TKA	
0288	0287	JMP I DAT	
0289	0288	LJA BCOUNT	
0290	0289	IAU TKA	
0291	0290	IAU K0100	
0			

```

0001 0000 RESTORE, 0
0002 7200 CLA
0003 1000 TAU TKA
0004 6510 DEAL /LOAD TK
0005 7200 CLA
0006 0001 JMP I RESTORE

0007 7200 ERROR, CLA
0010 6621 UFSE
0011 5300 JMP ,+7
0012 6622 UFSC
0013 0267 JMP , -4
0014 6611 UCEA
0015 6601 UCMA /NO ERRORS
0016 6001 IQN
0017 5400 JMP I INT
0018 7200 CLA
0019 1024 TAU BCOUNT
0020 3117 UCA DMA /STORE
0021 6616 DEAC /READ STATUS
0022 7000 NOP
0023 3116 UCA SR /STORE
0024 6622 UFSC /SKIP ON COMPLETION
0025 5306 JMP , -1
0026 6611 UCEA
0027 6601 UCMA /CLEAR THE WORLD
0028 4520 JMS I EP1 /PRINT ERROR
0029 5400 JMP I INT /CONTINUE
0030 0000 COMPARE, 0 /COMPARE FOR DATA ERROR
0031 7200 CLA
0032 3130 UCA ECOUNT /ZERO ERROR COUNT
0033 1044 TAU K3477 /OUT BUFFER-1

0034 0000 /
0035 0000 /
0036 3010 UCA 10 /AUTO INDEX
0037 1042 TAU K5477 /IN BUFFER-1
0038 3011 UCA 11 /AUTO INDEX
0039 1037 TAU K6000 /MINUS 2000
0040 3020 UCA DCOUNT
0041 1410 TAU I 10
0042 3115 UCA GD /GOOD WORD (OUT BUFFER)
0043 1411 TAU I 11
0044 3114 UCA BD /BAD WORD (IN BUFFER)
0045 1115 TAU GD
0046 7041 CIA
0047 1114 TAU BD
0048 7640 SEA CLA
0049 0341 JMP ,+4 /ERROR
0050 2025 ICB, ISZ DCOUNT
0051 5320 JMP COMPARE+11 /FETCH NEXT WORD
0052 5354 JMP ERXT /DONE
0053 7604 LAS
0054 0043 ANU K2000
0055 7640 SEA CLA

```

0/44 5552
 0/45 1225
 0/46 0041
 0/47 7000
 0/50 3117
 0/51 5365
 0/52 2135
 0/53 5336
 0/54 7604
 0/55 0043
 0/56 7450
 0/57 5714
 0/60 7200
 0/61 1135
 0/62 7440
 0/63 4536
 0/64 5714
 0/65 4521
 0/66 5336

ERXI,
 JMP ,+6
 TAU JCOUNT
 AND K1777
 NOP
 DCA DMA /DISK ADDRESS
 JMP ,+14
 ISZ ECOUNT /+1 ERROR COUNT
 JMP ICB /FETCH NEXT WORD
 LAS /COMPARE FOR AC BIT 1
 AND K2000
 SNA
 JMP I COMPARE /NORMAL TYPE OUT
 CLA
 TAU ECOUNT
 SZA
 JMS I SHERTL
 JMP I COMPARE /RETURN TO ROUTINE
 JMS I EP2 /PRINT DATA ERROR
 JMP ICB

1000	3132	CLF,	UCA AC	/	/ROUTINE TO SERVICE INTERRUPTS
1001	7010		RAR	/	
1002	3134		UCA LINK	/	/STORE AC
1003	6041		ISF		/STORE LINK
1004	5207		JMP ,+3		/SKIP ON TELEPRINTER FLAG
1005	6042		ICF		/NO FLAG
1006	5227		JMP EXIT		/CLEAR FLAG
1007	6031		KSF		/EXIT SERVICE
1010	5214		JMP ,+4		/SKIP ON KEYBOARD FLAG
1011	6036		KRB		/NO FLAG
1012	3054		UCA CC		/READ BUFFER
1013	5227		JMP EXIT		/STORE CHARACTER
1014	7200		CLA		/EXIT SERVICE
1015	1051		TAU K0007		
1016	7040		CMA		
1017	3135		UCA ECOUNT		
1020	2135		ISE ECOUNT		
1021	5220		JMP ,-1		
1022	6622		UFSC		/SKIP ON DISK COMPLETION
1023	5226		JMP ,+3		
1024	2000		ISE INT		
1025	5510		JMP I ER		
1026	5540		JMP I IR2L		/REPORT UNDEFINED INTERRUPT
1027	7200	EXIT,	CLA		
1030	1134		TAU LINK		/FETCH LINK
1031	7004		RAL		/RESTORE LINK
1032	1132		TAU AC		/FETCH AC
1033	6001		ION		/TURN INTERRUPT ON
1034	5400		JMP I INT		/RETURN
1035	0000	SHP,	0		
1036	4524		JMS I SETUP		
1037	0055		TKA		/TRACK ADDRESS
1040	1055		,+15		
1041	1056		,+15		
1042	4524		JMS I SETUP		
1043	0117		UMA		
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		

1000 0140
1001 0000
1002 0000
1003 4023
1004 2240
1005 0000
1006 0000
1007 0000
1070 5635

0140
0000
0000
4023
2240
0000
0000
0
JMP I SRP

/SWITCH REGISTER

1071 0000
1072 4524
1073 0000
1074 1115
1075 1116
1076 4524
1077 0117

0
JMS I SETUP
IKA
I*21
I*21
JMS I SETUP
UMA

/DATA PRINT OUT ROUTINE

UP,

1100 1121
1101 1122
1102 4524
1103 0115
1104 1125
1105 1126

I*21
I*21
JMS I SETUP
GU
I*21
I*21

/GOOD DATA

```

1106 4524      JMS I SETUP
1107 0114      BU          /BAD DATA
1110 1151      ,+21
1111 1152      ,+21
1112 4525      JMS I MES1
1113 4545      4545
1114 2401      2401          /TA (TRACK ADDRESS)
1115 4060      4060
1116 6060      6060
1117 4027      4027          /WORDCOUNT
1120 0340      0340
1121 0300      0300
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 0300      0
1134 5571      JMP I DP
                                /ERROR MESSAGE FOR UNDEFINED
                                /INTERRUPT
                                /
1135 4525      IN2,  JMS I MES1          /GO TO PRINTOUT ROUTINE
1136 4545      4545          /CARRIAGE RETURN+LINE FEED
                                /CHARACTERS
1137 2516      2516          /U AND N
1140 0405      0405          /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      7402          /STOP CODE
                                /
                                /PRINTOUT ROUTINE FOR DATA ERROR'S
                                /PRINIS # OF ERROR'S
                                *1200
                                SMERT, 0
1200 0300      JMS I SETUP
1201 4524      1KA
1202 0355      ,+12
1203 1215      ,+12
1204 1216      JMS I SETUP          /SETUP WORD FOR PRINTOUT
1205 4524      ECUUNT          /#OF DATA ERRORS
1206 0155      ,+16
1207 1225      ,+16
1210 1226      JMS I MES1          /PRINT REPORT
1211 4525      4545
1212 4545      4024
1213 4024

```


1214 0140
 1215 0000
 1216 0000
 1217 4040
 1220 0222
 1221 2217
 1222 2250
 1223 2351
 1224 7240
 1225 0000
 1226 0000
 1227 0000
 1230 5000

0140
 0000
 0000
 4040
 0222
 2217
 2250
 2351
 7240
 0000
 0000
 0
 JMP I SHERT

/STOP CODE
 /RETURN

0150
 0150 4002
 0151 7402

*150
 START1,
 JMS CCSU
 MLI

0155
 0155 6012
 0156 6022
 0157 6702
 0160 7000
 0161 7000
 0162 7000
 0163 4002
 0164 5501

*155
 START2,
 MRB
 PCF
 UTCA
 NOP
 NOP
 NOP
 JMS CCSU
 JMP I SYSTEM

/CLEAR READER FLAG
 /CLEAR PUNCH FLAG
 /CLEAR DECTAPE FLAG

3

THERE ARE NO ERRORS

SYMBOL TABLE

AC	0132
ACOUNT	0024
AD	0114
ADG	0125
ADGIN	0400
AD	7751
ADT	0107
AD	0054
ADSU	0002
ADK	0127
ADL	1000
ADFL	0137
AD	0112
ADPAR	0714
AD12	0250
AD15	0252
AD45	0253
AD40	0250
AD	0451
ADT	0126
ADCA	0011
ADMA	0001
ADOUNT	0025
ADAC	0016
ADAL	0015
ADSC	0022
ADSE	0021
ADMA	0117
ADAC	0020
ADAK	0003
ADAW	0005
AD	1071
ADAC	0012
ADCA	0752
ADOUNT	0135
AD1	0120
AD2	0121
AD	0110
ADROR	0057
ADXT	0754
ADIT	1027
AD	0115
ADT	0006
ADB	0730
ADT	0000
AD2	1135
AD2L	0140
AD002	0020
AD003	0045
AD004	0033
AD007	0051
AD070	0050
AD100	0032

SYMBOL TABLE

K0200	0027
K0203	0030
K0208	0030
K0370	0035
K0700	0047
K1000	0034
K1477	0052
K1777	0041
K2000	0043
K3000	0036
K3477	0044
K3777	0053
K4000	0046
K5477	0042
K0000	0057
K7000	0040
K7600	0031
LINK	0134
LINL	0133
LI	0122
LIA	0040
MASKA	0344
MASKB	0345
MASKC	0346
MASKD	0347
MASK77	0254
MESSAGE	0200
MES1	0123
MORGH1	0217
MIP	0244
M1	0057
M2	0261
M3	0257
M40	0255
NU	0113
PNT	0130
RANDOM	0042
RAW	0105
RA1	0522
RA2	0543
RE	0111
RESTOR	0051
SAV	0020
SAV1	0021
SAV2	0022
SAV3	0023
SETUP	0124
SHEAT	1200
SHEATL	0136
SIXTY	0264
SK	0116
SKP	1035
SIART1	0150

SYMBOL TABLE

SIAMT2	0155
SYSTEM	0131
IK	0470
IKA	0055
TYPECH	0220
WA1	0552
WA2	0555
WL	7/50
WLT	0106

SYMBOL TABLE

INT	0000
UCSU	0002
SAV	0020
SAV1	0021
SAV2	0022
SAV3	0023
BUCOUNT	0024
UCOUNT	0025
K0002	0026
K0200	0027
K0200	0030
K1600	0031
K0100	0032
K0004	0033
K1000	0034
K0310	0035
K0000	0036
K0000	0037
K1000	0040
K1777	0041
K0477	0042
K2000	0043
K0477	0044
K0003	0045
K4000	0046
K0700	0047
K0010	0050
K0007	0051
K1477	0052
K0777	0053
UC	0054
TKA	0055
K0203	0056
M4	0057
MAW	0105
WUT	0106
UAT	0107
ER	0110
RE	0111
OU	0112
NU	0113
BU	0114
GU	0115
SR	0116
UMA	0117
EP1	0120
EP2	0121
LI	0122
MES1	0123
SETUP	0124
BEG	0125
JAT	0126
CHK	0127

SYMBOL TABLE

PNT	0130
SYSTEM	0131
AC	0132
LINK	0133
LINK	0134
ECOUNI	0135
SMERTL	0136
ULFL	0137
IM2L	0140
SIART1	0150
SIART2	0155
MESSAGE	0200
MSRGHT	0217
TYPECH	0220
MIP	0244
MASK//	0254
M40	0255
U340	0256
M0	0257
U212	0260
M2	0251
U215	0262
U245	0263
SIXTY	0264
MASKA	0344
MASKB	0345
MASKC	0346
MASKD	0347
BEGIN	0400
JA	0451
IK	0470
KA1	0522
WA1	0532
KA2	0543
WA2	0555
LJA	0600
IBT	0606
RANDOM	0642
RESTOR	0661
ERRUR	0667
LUMPAR	0714
LCB	0736
EMXT	0754
ULF	1000
EXIT	1027
SKP	1035
UP	1071
IM2	1135
SMERT	1200
ULMA	6601
UMAK	6603
UMAW	6605
UWEA	6611

SYMBOL TABLE

UPAC	6012
UEAL	6019
UEAC	6010
UPSE	6021
UPSC	6022
UMAC	6026
UICA	6/62
MC	7/50
UA	7/51

