

For Brochem
Richard Wrenn

IDENTIFICATION

PRODUCT CODE: MAINDEC-Ø8-DIDFC-A-D
 REPLACES MAINDEC-Ø8-D5CG
PRODUCT NAME: DF32/DF32D DISK DATA MINI DISK,
 INTERFACE ADDRESS, DATA TEST
DATE: MARCH 26, 1973
MAINTAINER: DIAGNOSTIC GROUP
AUTHOR: JOHN HITTELL/BILL LAFLAME/
 ED FORTMILLER

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Digital Equipment Corporation
Maynard, Massachusetts

ADDENDUM

1. With an ASR 37 (15 CPS TTY) change following locations

loc 5773 from 7635 to 7553
loc 3155 from 4611 to 3133
loc 3156 from 3200 to 4652

1. ABSTRACT

The DF32/DF32D Disk Data is a complete test of the disk system. Also included is a short processor test that is executed while waiting for interrupts, and during data breaks.

2. REQUIREMENTS

2.1 Equipment

PDP-8, PDP-8/S, PDP-8/I, PDP-8/L, or PDP-8/E

If PDP-8/S, DATA BREAK INTERFACE

DF32 or DF32D DISK LOGIC

1 to 4 disks.

2.2 Storage

2.2.1 Program Storage - The program uses most of memory-

C000 through 7400

7000 to 7177 is the out buffer storage.

7200 to 7377 is the in buffer storage.

3. LOADING PROCEDURES

3.1 Method

Procedures for normal binary tapes should be followed.

4. STARTING PROCEDURES

4.1 Control Switch Settings

For normal operation, all switches should be 0s (down).

4.2 Starting Address

100 is the starting address for DF32/DF32D Disk Data,

(cont)
the program will print an initial printout of
"RPM XXXX SYNC TIME = XXXX MICRO SECS", and upon
completion of a pass, "PCXX", then will loop to
start of program.

4.3

Program and/or Operation Action

Load Disk Data Test into memory.

Select EMO (All other units to OFF).

Write inhibit switches OFF.

Set the SWITCH REGISTER to 100. (77 for the PDP-8/s)

Load Address.

Set the SWITCH REGISTER to all 0's or 0002 for 50 cycle.

Press START

Program will run and loop upon completion. The only
printout that should occur are "RPMXXXX SYNC TIME =
XXXX MICRO SECS" and "PCXX".

REMEMBER
TO TURN
THE PICKER
INTERFACE
TO MANUAL

or
turn power
off to
interface

5.

OPERATING PROCEDURE

5.1

Operational Switch Settings

SW0	UP	Delete Printouts. <i>Too soft</i>
SW1	UP	Halt after error.
SW2	UP	Subtest scope loop.
SW3	UP	Do not exit section.
SW10	UP	50 cycle.
SW11	UP	Trace (Type starting address of each TEST as the program enters it).

5700

5.1.1

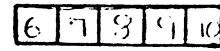
Special Entrance Address

101	Address Test (slow).
102	Track Decode Test.
103	Track Error Ratio Test.
104	Data Break Test.

- 105 Data Test.
- 106 Read Recovery Time Test. (NOT USED ON PDP-8/S)
- 107 Disk Write Current Saturation Test.
- 110 Random, Disk, Track, Address and Data Test.

5.1.2 Special Scope Loops

- 111 Scope loop for Data Failure, automatic setup.
- 112 Write one word - SR = Disk Address. (Address Test)
- 113 Read one word - SR = Disk Address. (Address Test)
- 114 Address loop with bell on error - SR = Disk Address.
(Address Test)
- 115 Data Test.
 - 1st halt SR 6 to 10 = disk and track selections.



- 2nd halt SR = Disk Address. Disk Track
- 3rd halt SR = Data with bell on error.
- Routine will monitor SR for data.

5.1.3 Track Scope Loops

- 116 Writes track. Press START.
 - 1st halt Load data for out buffer in SR, press CONTINUE
 - 2nd halt Set SR 6 to 11 = disk and track selection,
press CONTINUE.
- 117 Read track - SR 6 to 11 = Disk and track selection,
SR 0 = 1 to inhibit Printouts
- 120 Write/Read track.
 - 1st halt Load data in SR. Press CONTINUE.
 - 2nd halt SR 6 to 11 = disk and track selection.

121 Read amplifier adjustment program. SRO should be up to inhibit printouts.

{Another method of adjusting the read amplifier is to use entrance address 116 to write known data on a track, then use entrance address 117 to continuously read that track}

122 All data patterns on a page basic. All switches down.

123 A quick test of each track to be used for margins.

124 Routine to test extended memory banks with data. Bits 9, 10 and 11 select the bank, (Bank 0 is not extended Memory.

5.2 Subroutine Abstracts

Reference Diagram 11.1

5.2.1 Disk RPM Test

Using the teletype clock, gaps are counted for 10 seconds and multiplied by six to compute RPM. Using the computer clock the duration of one gap is computed. Both numbers are typed out in decimal. Because of the cycle time of the PDP-8/s, the sync time is not computed. ??? will be typed for sync time when running on a PDP-8/s.

Because of the tolerances of the teletype and computer clocks these typeouts are not absolutely accurate. If a typeout occurs outside of the specified ranges, a scope should be used to check the time or speed accurately.

Ranges

	DF32		DF32D	
	50Hz	60Hz	50Hz	60Hz
RPM	1450-1550	1750-1850	1450-1550	1750-1850
SYNC TIME	170-230	170-230	1000-3000	1000-3000

5.2.2

100

Interface Test (BEGIN)

This is an incremental test of flags, interrupts, error condition and status register (Located in core from 425 through 1117)

5.2.3

101

Disk Address Test - Reference Diagram 11.5

- a. Using a write instruction test each address at sync time. (4000 to 7777)
- b. Using a read instruction test each address at sync time. (0000 to 4000)
- c. Using a write instruction test for incrementing address comparison at transfer complete time.
- d. Write different data on each track, read and compare data to make sure that each track address can be decoded properly.
- e. Test that no address is found more than once per disk cycle. These are located from 1120 through 1777.

5.2.4

102

Track Error Ratio Test - Reference Diagram 11.4. This is a bad track detector test. Each track is sequentially tested for a high error ratio. If the ratio is high, the count is printed. If the ratio is low there is no print-out. The purpose of this test is to detect a shoe not flying correctly.

5.2.5

Data Break Processor Test (DBTST) - This is a small test of JMS, ROTATES, TAD and ISZ instruction while doing a continuous write on the disk; interrupts are also tested.

5.2.6

Data Test (DISKO) - Reference Diagram 11.6. The disk is tested with fixed and random numbers. The tracks are

(cont)

tested from outside to inside, the test sequence is write a track, then read the track. Advance to the next inside track, and repeat until the inside track is tested. Then do a check read from out to in (the second read is a test of the guard band).

5.2.7 Read Recovery Time (RDREC) - This is a test of the turn on time of the readers.

5.2.8 Disk Current Saturation Test (DKI) - Writes all 7s on the disk 10 times. Then, the magnetic complement is written once, and read back. This test makes sure that each write saturates the disk.

5.2.9 Random Selection Test (RANDSK) - This routine randomly selects, data words, disk address and track. Then write and read one word only at these locations.

5.2.10 Margin Test (MARGIN)- 200g locations on each track are tested with random data.

5.2.11 Data Breaks to Extended Memory (XBANK)

- a. Bank 0 writes (7s) to the disk
- b. Disk transfers (7s) to extended memory
- c. Bank 0 erases the disk area
- d. Extended memory writes back to the disk
- e. Disk data is transferred to Bank 0 and compared with Step 1. (Extended memory locations 7200 through 7377 are the storage area.)

5.3 Program and/or Operator Action

6. ERRORS

6.1 Error Printout and Description

6.1.1 Disk RPM Test

See paragraph 5.2.1.

6.1.2 Interface and Logic (Halt on Error SW1 = 1)

(For more detailed information refer to the listing)

<u>Address Tag</u>	<u>Function Tested?</u>
0427	DOES START KEY CLEAR (TRC) TRANSFER COMPLETE FF
0434	DOES START KEY CLEAR THE (DRL) DATA REQUEST LATE FF
0440	DOES START KEY CLEAR THE (ADC) ADDRESS CONFIRMED FF
0445	DOES START KEY CLEAR THE COMPUTER AND DISK EXT ADDRESS REGISTER
0453	NO INTERRUPT BOTH (TRC) AND (NED) ARE CLEARED
0464	DOES THE DCMA INSTRUCTION CLEAR NED?
0472	DOES START KEY CLEAR THE PARITY! FF, STATUS IS TESTED
0503	FLAG UP TOO SOON ON A (DMAW) INSTRUCTION
0514	WILL A WRITE INSTRUCTION RAISE THE (TRC) FLAG
0525	DOES A WRITE INSTRUCTION CLEAR THE AC
0527	SKIP ON NO ERROR, ALL ERROR STATUS BITS ARE DOWN
0541	FLAG UP TOO SOON ON A (DMAR) CLEAR THE INSTRUCTION
0501	WILL A READ INSTRUCTION (DMAR) RAISE THE (TRC) FLAG
0601	DOES A READ INSTRUCTION (DMAR) CLEAR THE AC
0625	A DEAL INSTRUCTION SHOULD NOT CHANGE THE AC
0632	A DEAL INSTRUCTION SHOULD NOT CHANGE THE AC
0642	RAISED BY SELECTING EM3 WITH THE COMPUTER
0650	DOES THE DSAC INSTRUCTION CLEAR THE AC
0663	CAN (ADC) BE RAISED, TESTED BY SKIPPING ON (ADC) DSAC
0672	HAS (WLO) ON NED RAISED (PSM) STATUS
0705	TEST FOR NO WLO STATUS BIT
1015	DOES WC BREAK TO 7750
1020	DOES CA BREAK TO 7751
1034	THE SYNC MARK FOUND
1037	NED IS RAISED
1046	ADC IS UP WITH TRC SET (SHOULD ONLY BE UP DURING DATA BREAKS)
1063	DMAC DOES NOT SKP ON "TRC"
1077	WILL THE DISK INTERRUPT ON "TRC"
1111	WILL THE DISK INTERRUPT ON "NED"

6.1.3 Address Test

6.1.3.1 Address Test at Sync Time

note: these bit patterns are only examples of general problems. Any combination of patterns can occur.

GA	0002	Sync	0040	/"TTA" OR "TTB" NOT SHIFTING CORRECTLY
GA	0012	Sync	0011	/ADDRESS NOT INCREMENTED CORRECTLY
GA	0014	Sync	0013	/ADDRESS NOT INCREMENTED CORRECTLY
GA	5076	Sync	5066	/BIT BEING DROPPED ON TRANSFER BETWEEN DISK AND COMPUTER

→ GA = Address that is being tested.

→ Sync = Contents of Disk Memory Address Register at Sync (Photo Cell) Time. (*ie address read off of disk*)

6.1.3.2 Address Test at TRC Time (TRANSFER COMPLETE = TRC)

1304 GA 2777 BA 3000
Extra Increment of the Address Register

6.1.3.3 Track Address Test

1424 GTXX BTXX

GT = GOOD TRACK
BT = BAD TRACK

6.1.3.4 Track Address Increment and Decode Test

1526 GTXX BTXX

GT = TRACK ADDRESSED
BT = DATA READ

6.1.3.5 Test for False Compare of Address

FALCOM 0005
FALCOM 0006
FALCOM 0007
FALCOM 0013
FALCOM 0013
FALCOM 0017
FALCOM 0021

These addresses were found twice in one disk cycle.

6.1.4 Track Error Ratio Test

TK XX BAD XXX₈

TK XX = the track being tested
BAD XX = number of errors found on track
Maximum error count = 4020

6.1.5 Processor Instruction and Data Break Test, Reference 11

<u>Halt (PC)</u>	<u>Function Tested</u>
2260	ISZ AND DATA BREAKS
2264	ISZ AND DATA BREAKS
2406	ROTATES AND DATA BREAKS
2412	ROTATES AND DATA BREAKS
2424	ROTATES AND DATA BREAKS
2430	ROTATES AND DATA BREAKS
2456	TAD AND DATA BREAKS
2633	JMS AND DATA BREAKS
2654	INTERRUPT (NOT GENERATED BY DISK)

Any of the above halts represent a failure of the processor, while data breaks are occurring.

6.1.6 Read Recovery Time Test (Not used on PDP-8/S)

5200 GD7777 BDXXXX

Read recovery time too slow, replace reader.

6.1.7 Disk Current Saturation Test

Replace Writer

6.1.8 Random Selector Test

5303	XXXX = Error	/ERROR CONDITION
5322	GD XXXX BD XXXX	/COMPARISON ERROR

6.1.9 Data Test

Status Error Printout

STAT ERR WRITE	SA = TKXX DAXXXX
READ	
PE = X NED or WLO = X	DRL = X

(SA = Starting Address, TK = Track, DA = Disk Address, PE = Parity Error)

Data Error Printout

XXXX TK XX DAXXXX GDXXXX BDXXXX

7. RESTRICTIONS

None

8. MISCELLANEOUS

8.1 Execution Time

Approximately 30 minutes for PDP-8,/I,/L/E	60 Cycles
Approximately 35 minutes for PDP-8,/I,/L/E	50 Cycles
Approximately 40 minutes for PDP-8/S	60 Cycles
Approximately 55 minutes for PDP-8/S	50 Cycles

9. PROGRAM DESCRIPTION

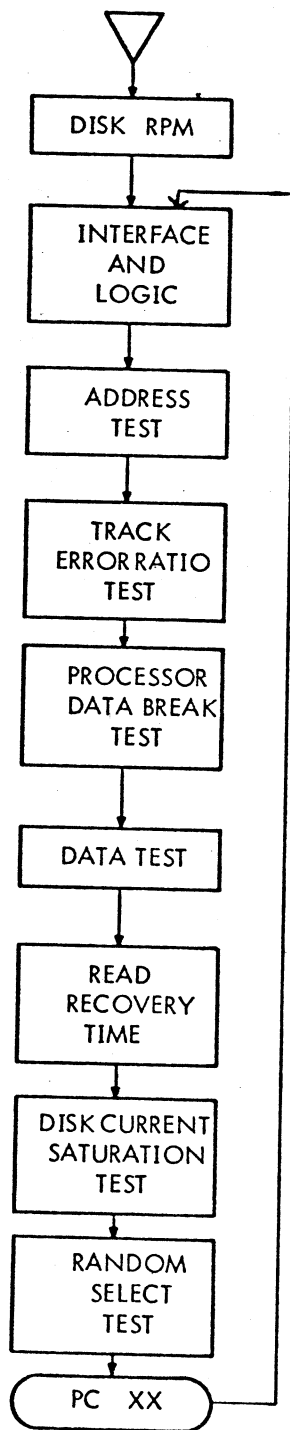
9.1 Discussion

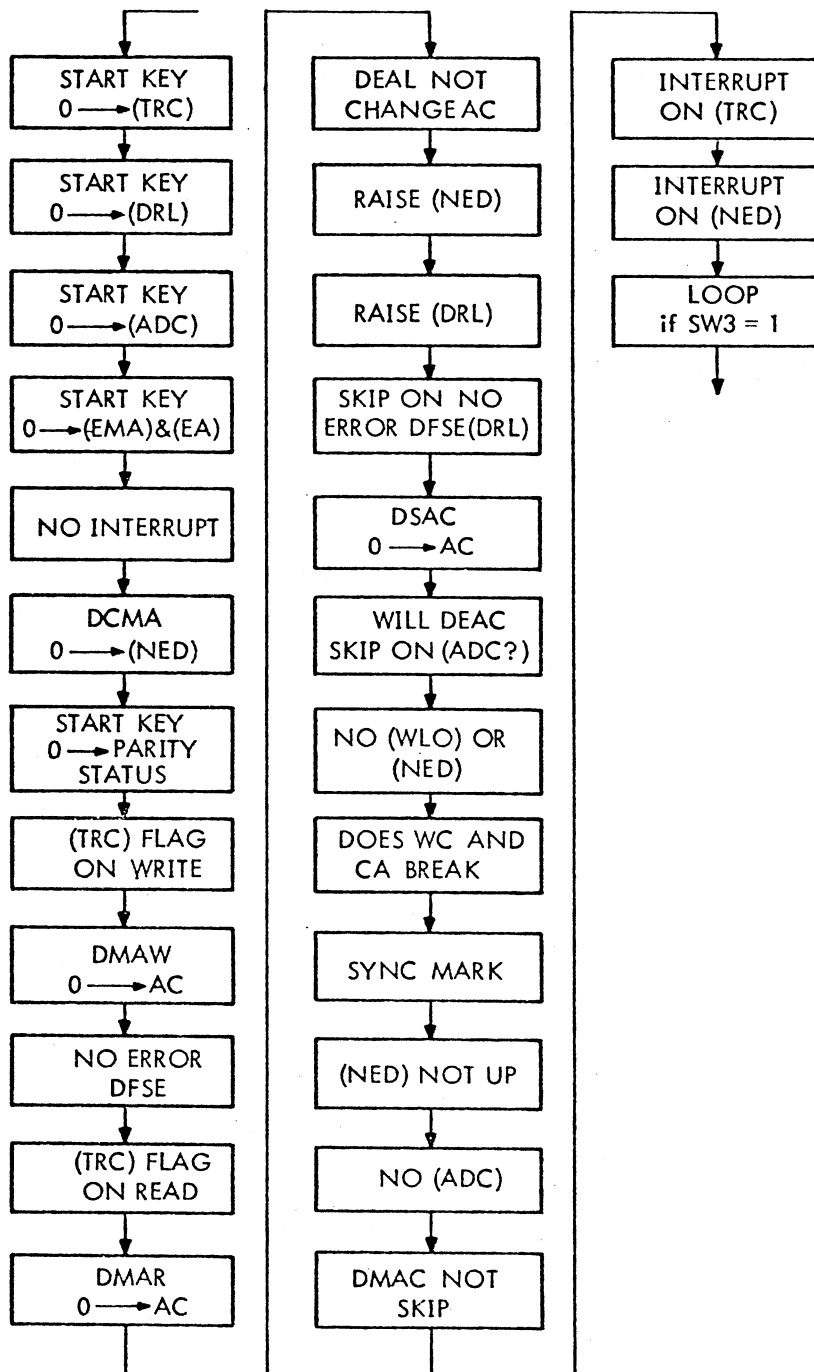
The DF32/DF32D Disk Data Test can be broken down into three sections. Section 1 is an interface test between the disk logic and the computer, testing the disk instructions, error detection interrupts and data break. Section 2 is an address test of the disk using both read and write instructions to verify that all addresses exist on the disk and that maximum access time is not greater than specified, also tested is that no address is found twice in one revolution. Section 3 is data test of the disk. A 200 word outbuffer is filled with a data pattern, this data is written on the track in 200 word segments into a 200 word input buffer. During the read, the disk error flag is being tested. If an error occurs, the disk address and status register at the time of the error is recorded and printed. After the transfer complete flag is set, the comparison is made between the input buffer and output buffer area. If the comparisons test fails the disk address, the good data and the bad data are printed out.

10: LISTINGS

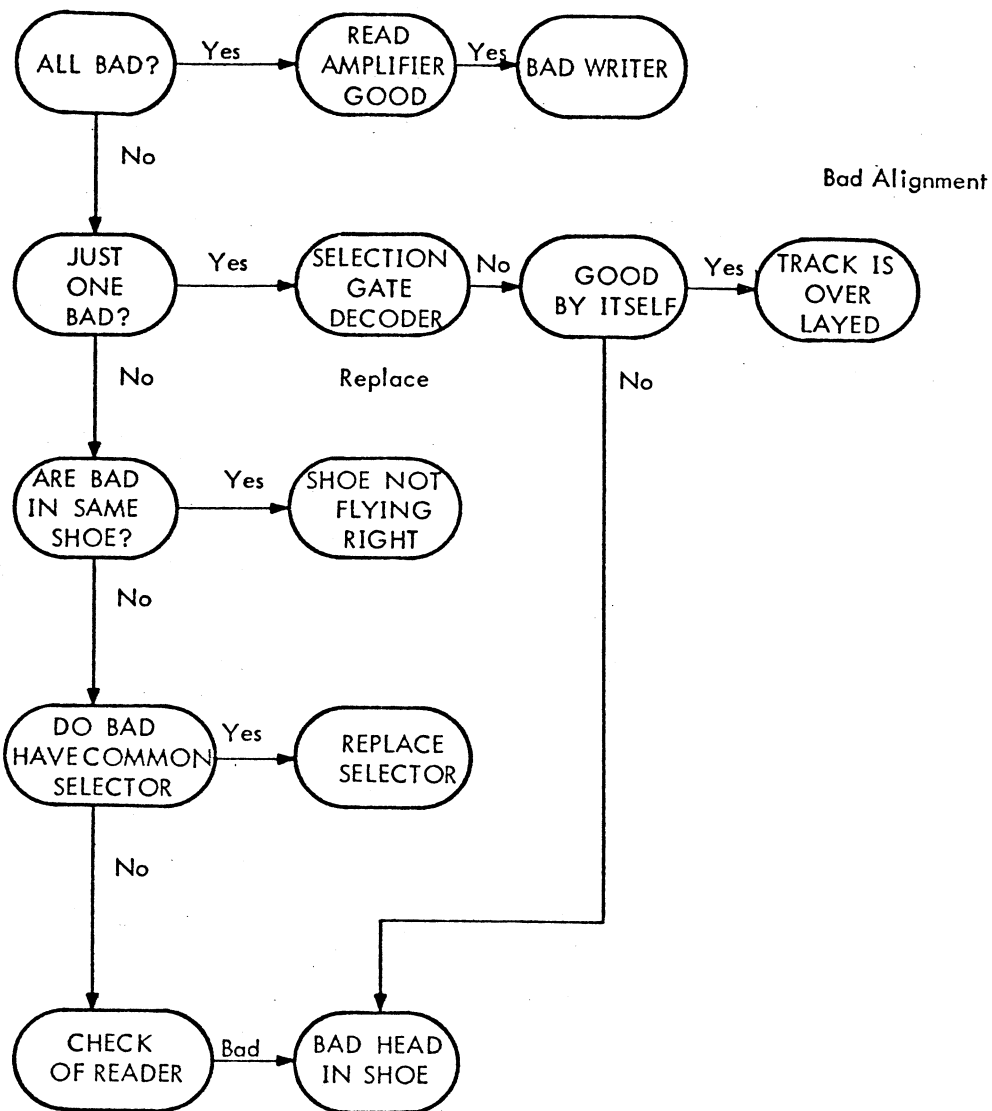
11. 2 FLOW DIAGRAMS

11.1 Basic System Flow

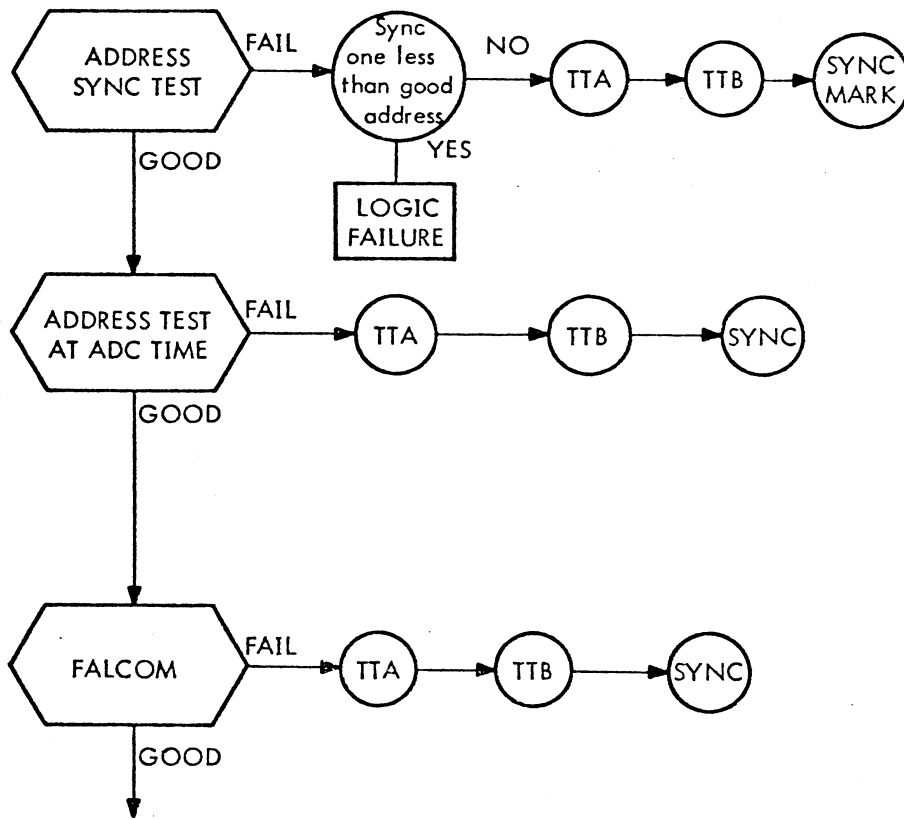




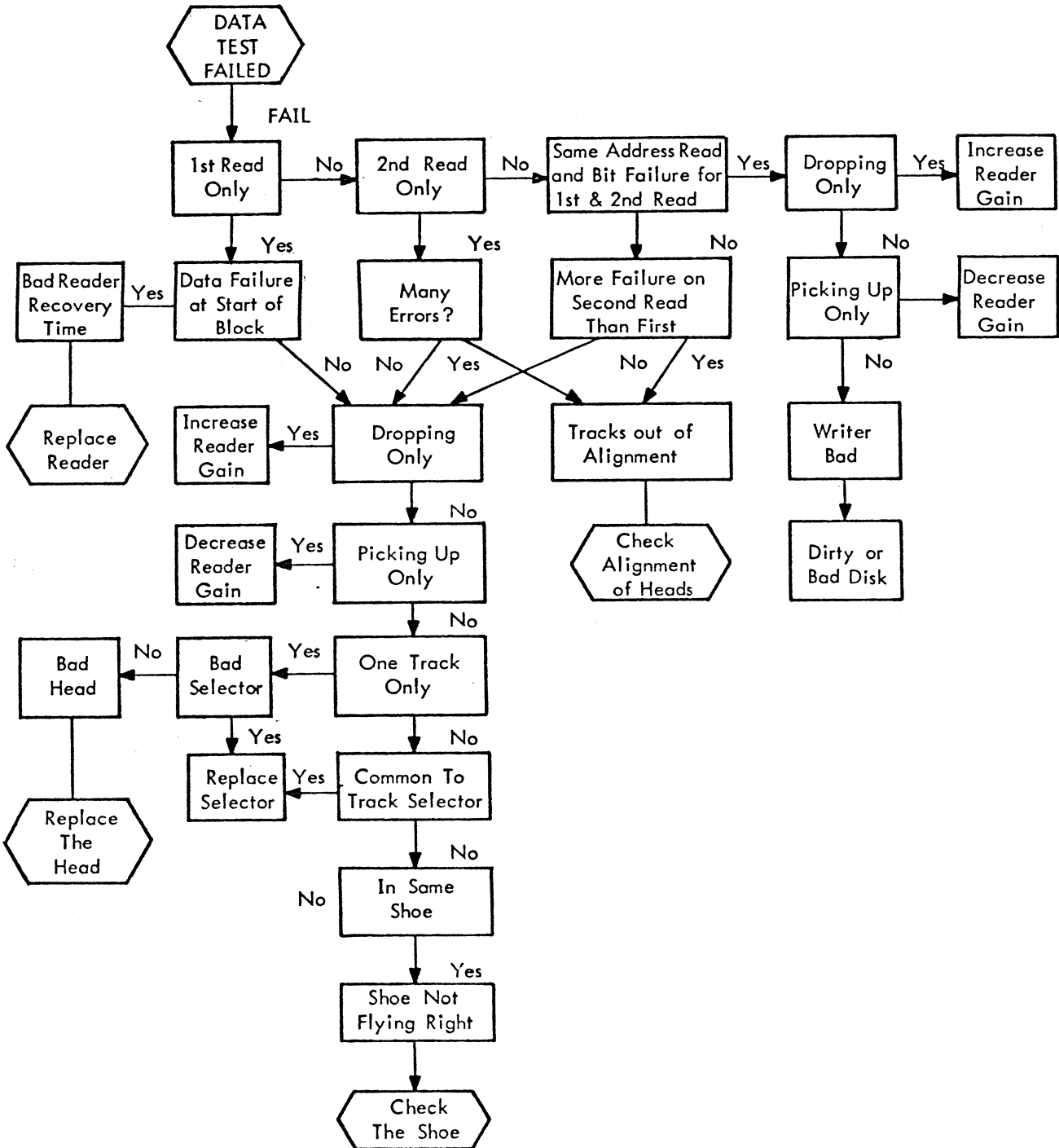
11.4 Track Error Ratio Test Trouble Flow



11.5 Disk Data Test (Address) Trouble Flow



TO TRACK ERROR RATIO TEST



/DF32/DF320 DISK DATA TEST MAINDEC=08-DIOPC=A
/COPYRIGHT 1972, 1973 DIGITAL EQUIPMENT CORP., MAYNARD, MASS, 01754

/SWITCH CONTROLS
/SWITCH0=1 * DELETE PRINTOUTS
/SWITCH1=1 * HALT AFTER ERROR
/SWITCH2=1 * SUBTEST SCOPE LOOP
/SWITCH3=1 * DO NOT EXIT SECTION
/SWITCH10=1 * 30 CYCLE
/SWITCH11=1 * TRACE (TYPE STARTING ADDRESS OF EACH TEST
AS THE PROGRAM ENTERS IT)

/STARTING ADDRESSES
/0077 ** 8/S ENTRANCE ADDRESS
/0100 ** START TEST
/0101 ** ADDRESS TEST
/0102 ** TRACK DECODE TEST
/0103 ** TRACK ERROR RATIO TEST
/0104 ** DATA BREAK TEST
/0105 ** DATA TEST
/0106 ** READ RECOVERY TEST
/0107 ** DISK CURRENT SATURATION TEST
/0110 ** RANDOM SELECTION

/SPECIAL STARTING ADDRESSES FOR SCOPE LOOPS
/0111 ** AUTOMATIC SCOPE SETUP
/0112 ** WRITE
/0113 ** READ
/0114 ** ADDRESS WITH BELL ON ERROR
/0115 ** DATA SCOPE LOOP
/0116 ** WRITE TRACK
/0117 ** READ TRACK
/0120 ** WRITE READ TRACK
/0121 ** READ AMPLIFIER ADJUSTMENT
/0122 ** ALL DATA PATTERNS ON A PAGE BASIC
/0123 ** QUICK TEST OF EACH TRACK
/0124 ** SR9,10,11 * EXT MEMORY BANK

/7400 ** RESTART BINARY LOADER (BIN)

0020 2132
0021 4777
0022 7604
0023 0176
0024 7640
0025 5021
*20
/DISPATCH TABLE
DISPATCH DISK7A-53
JMS ROREC
LAS AND (400
SEA CLA
JMP 104
/READ RECOVERY TEST
/POPO ONLY

```

0026 7000 NOP
0027 7604 LAs
0030 0176 AND (400)
0031 7640 SZa CLa
0032 5026 JMp I=4
0033 7000 NOP
0034 7604 LAs
0035 0176 AND (400)
0036 7640 SZa CLa
0037 5033 JMp I=4
0040 4775 JMs DkI
0041 7604 LAs
0042 0176 AND (400)
0043 7640 SZa CLa
0044 5040 JMp I=4
0045 4774 JMs RANOSK
0046 2055 IZ I=7
0047 5045 JMp I=2
0050 7604 LAs
0051 0176 AND (400)
0052 7640 SZa CLa
0053 5045 JMp I=6
0054 5420 JMp I DISPAT /EXIT
0055 0000 0
0056 7402 RL6:
0057 7106 CLa RTL
0060 7006 Rtl
0061 7006 Rtl
0062 5456 JMp I RL6

0063 7402 SLOWB:
0064 1173 XX
0065 3021 TAD (JMP DISPAT+20)
0066 1172 DCA DISPAT+1
0067 3771 TAD (CLa CHA
0070 1170 DCA DBTST+5
0071 3767 TAD (SKP
0072 5463 DCA NOSYNG
JMp I SLOWB

0077 0877 /JUMP OFF POINT
0077 4863 JMs SLOWB
0100 5776 JMp RPh
0101 5766 JMp ATeST
0102 5765 JMp TKDEC
0103 5764 JMp RATIO
0104 5763 JMp TSTOB
0105 5762 JMp DISK0
0106 5021 JMp DISPAT+1
0107 5043 JMp DISPAT+20
0110 5045 JMp DISPAT+25

/BB ENTRANCE ADDRESS
/START OF TEST IEI DISC RPM
/ADDRESS TEST SLOW
/TRACK DECODE TEST
/TRACK ERROR RATIO TEST
/ATA BREAK TEST
/ATA TEST
/READ RECOVERY TEST
/DISC CURRENT SATURATION TEST
/RANDOM SELECTION

/SPECIAL SCOPE LOOPS

```

```

0111 5761' JMP SCOPE
0112 5760' JMP SARD
0113 5757' JMP SARD
0114 5756' JMP DBELL+41
0115 5755' JMP DBELL
0116 5754' JMP FILLX=11
0117 5753' JMP FILLX=6
0120 5752' JMP FILLX=4
0121 5751' JMP ROADJ
0122 5750' JMP WRCX
0123 5747' JMP MARGIN
0124 5746' JMP XBANK

/AUTOMATIC SCOPE SETUP
/WRITE
/READ
/ADDRESS WITH BELL ON ERROR
/DATA SCOPE LOOP
/WRITE TRACK
/READ TRACK
/WRITE/READ TRACK
/READ AMPLIFIER ADJUSTMENT PROGRAM
/ALL DATA PATTERNS ON A PAGE BASIC
/QUICK TEST OF EACH TRACK
/BR 9,10,11=EXT MEMORY BANK

```

```

/DIGITAL 8=180U
/MESSAGE TYPE=OUT
/CALL WITH A JMS MESSAGE
/WITH DATA FOLLOWING
/RETURN FOLLOWING END OF MESSAGE
/COOE(00)

```

```

0200 5100 JMP 0 START
0201 0000 CLA CMA
0202 7240 TAD MESSAGE
0203 1201 DCA 10
0204 3010 TAD I 10
0205 1410 DCA MSRGT
0206 3217 TAD MSRGT
0207 1217 RTR
0210 7012 RTR
0211 7012 RTR
0212 7012 RTR
0213 4220 JMS TYPECH
0214 1217 TAD MSRGT
0215 4220 JMS TYPECH
0216 5205 JMP MESSAGE+4
0217 0000 MSRGT,

/SET CIAC)=1
/ADD LOCATION
/AUTO-INDEX REGISTER
/FETCH FIRST WORD
/SAVE I

```

```

/ROTATE 6 BITS RIGHT
/TYPE II
/GET DATA AGAIN
/TYPE RIGHT HALF
/CONTINUE
/TEMPORARY STORAGE

```

```

/TYPE CHARACTER IN CIAC)=11
/IS IT END OF MESSAGE?
/YES! EXIT
/SUBTRACT 40
/40?
/NO
/YES! ADD 300
/TO CODES <40
/SUBTRACT 3
/IS IT ZERO?
/NO
/YES! CODE 43 IS
/LINE-FEED (212)
/SUBTRACT 2

```

```

0220 0000 AND MASK77
0221 0231 SNA I 10
0222 7430 JMP I 10
0223 5410 TAD M40
0224 1202 SMA I+3
0225 7500 JMP I+3
0226 5231 TAD C340
0227 1203 JMP MTP
0230 5244 TAD M3
0231 1204 SZA I+3
0232 7440 JMP C212
0233 5236 TAD MTP
0234 1205 JMP MTP
0235 5244 TAD M2
0236 1236 TAD M2

```

```

0237 7440 SEA
0240 5243 JMP I+3
0241 1257 TAD C215
0242 5244 JMP MTP
0243 1260 TAD C245
0244 6046 TLS
0245 6041 TSE
0246 5245 JMP I-1
0247 7200 CLA
0250 5620 JMP I TYPECH

```

```

/CONSTANTS
MASK77I 77
M40I 40
C340I 340
M3I 3
C212I 212
M2I 2
C215I 215
C245I 245

```

```

0251 0077
0252 7740
0253 0340
0254 7795
0255 0212
0256 7776
0257 0215
0260 0245

```

```

0261 7402 HLT
0262 7000 NOP
0263 7000 NOP
0264 7200 CLA
0265 1661 TAD I 1=4
0266 3270 DCA I+2
0267 5671 JMP I 1=2
0270 0000 0
0271 0273 SIXTY+12
0272 5264 JMP SIXTY+3
0273 1670 TAO I SIXTY+7
0274 0377 AND (0007
0275 3341 DCA MASKA
0276 1670 TAO I SIXTY+7
0277 0376 AND (0070
0300 3342 DCA MASKB
0301 1670 TAO I SIXTY+7
0302 0375 AND (0700
0303 3343 DCA MASKC
0304 1670 TAO I SIXTY+7
0305 0374 AND (7000
0306 3344 DCA MASKD
0307 1343 TAD MASKC
0310 7112 RTR CLL
0311 7010 RAR
0312 1344 TAD MASKD
0313 7012 RTR
0314 7010 RAR
0315 1345 TAD MASKD+1
0316 3343 DCA MASKC
0317 2261 TSE SIXTY
0320 4271 JMS SIXTY+10
0321 1343 TAO MASKC
0322 3670 DCA I SIXTY+7

```

/STORE INIT NEXT TIME

/ADDRESS OP OPERAND

/ADDRESS OP OPERAND
/CHANGING REFERENCE (P)

/AC (OPERAND)

/000X

/AC (OPERAND)

/00X0

/AC (OPERAND)

/0X00

/AC (OPERAND)

/X000

/0X00

/0X00 RSS 00X0

/X0X0

/X0X0 RSS 0X0X

/TEMP STORAGE

/INCREMENT FOR STORAGE

/FIND STORAGE ADDRESS

/0X0X

/STORE OPERAND AS SPECIFIED

0323	1342	TAD MASKB	/00X0
0324	7004	RAL	
0325	7006	RTL	
0326	1341	TAD MASKA	/00X0 SL3 0X00
0327	1345	TAD MASKD+I	/0X00+000X=0X0X
0330	3344	DCA MASKD	/0X0X+6060=6X6X
0331	2261	ISZ SIXTY	/TEMP STORAGE
0332	4271	JMS SIXTY+I0	/INCREMENT FOR STORAGE
0333	1344	TAD MASKD	/FIND STORAGE ADDRESS
0334	3670	DCA I SIXTY+7	/6X6X
0335	1373	TAD (SIXTY+12	/STORE OPERAND AS SPECIFIED
0336	3271	DCA SIXTY+I0	/HOUSE KEEPING
0337	2261	ISZ SIXTY	/INCREMENT FOR RETURN
0340	5661	JMP I SIXTY	/RETURN

0341	0000	MASKA,	0
0342	0000	MASKB,	0
0343	0000	MASKC,	0
0344	0000	MASKD,	0
0345	6060		6060

/POP=8 DISK MEMORY INTERFACE TEST

0373	0273	
0374	7000	
0375	0700	
0376	0070	
0377	0007	
	0400	

PAGE /RMX5 DISC TEST
 /DISK MOTOR SPEED CHECK USING SYNC MARK
 /DISK RPM XXXX RMX5 3/31/67

0400	7200	RPM,	CLA	TAD (ADDR&177 200 ISZ
0401	1377			DCA ADDING
0402	3776			TAD (=23
0403	1375			DCA CTC
0404	3774			TAD (TABL
0405	1373			DCA ADDR
0406	3772			JMS SPEED
0407	4771			JMS SYNC
0410	4770			JMS CONV
0411	4767			CLA END
0412	7200			DCA END
0413	3766			LAS
0414	7604			AND (400
0415	0365			SZA CLA
0416	7640			JMP RPH
0417	5200			JMP BEGIN+2
0420	5223			

```

DEFINE HALT
< JMS ERADD>
/
/FLAG TEST (CLEAR)
BEGIN, DCMA
DCEA
JMS SCOPEA
OFSC
SKP
HALT
JMS ERADD
JMS SCOPEA
/TEST NO DRL
DEAC
AND (4
SEA
HALT
JMS ERADD
JMS SCOPEA
/TEST NO ADC
OSAC
SKP
HALT
JMS ERADD
JMS SCOPEA
/EXT ADDRESS CL BY START KEY
DEAC
AND (3770
SEA
HALT
JMS ERADD
JMS SCOPEA
/INTERRUPT TEST
JMS CLFLAG
/INTERRUPT ON
/INTERRUPT UP
/INTERRUPT I
ION
JMS ERADD
JMS SCOPEA
DCEA
/WHILE DCMA CL NED
DCMA
DEAC
NOP
AND (2
SEA
0421 6601
0422 6611
0423 4764'
0424 6622
0425 7410
0426 4763'
0427 4764'
0430 6616
0431 0362
0432 7440
0433 4763'
0434 4764'
0435 6612
0436 7410
0437 4763'
0440 4764'
0441 6616
0442 0361
0443 7440
0444 4763'
0445 4764'
0446 4760'
0447 6001
0450 5253
0451 6002
0452 4763'
0453 6002
0454 4764'
0455 6611
0456 6601
0457 6616
0460 7000
0461 0397
0462 7440

```

/CLEAR MAR, PE DONE, NED
 /CLEAR EXT ADDRESS REGISTER
 /SKIP ON FLAG
 /FLAG SHOULD BEEN CLEARED BY START
 /START NOT CL ADC
 /CLEAN PD FLAGS
 /INTERRUPT ON
 /INTERRUPT UP
 /INTERRUPT I
 /WHILE DCMA CL NED

HALT
JMS ERADD
JMS SCOPEA
/NED OR WLO SET

/NO PARITY STATUS BIT

DEAC
NOP
AND (1
SZA
HALT
JMS ERADD
JMS SCOPEA

/PARITY STATUS BIT UP

/DISK MEMORY ADDRESS WRITE
(DMAN)(OFSC)

CLA CMA
DCA IACH
CLA CMA
DCA WC
DMAN
DFSC
SKP
HALT
JMS ERADD
NOP
ISE CTD
JMP 101
ISE CTD
JMP 101
ISE CTD
JMP 101
DFSC
HALT
JMS ERADD
JMS SCOPEA

/MEMORY LOCATION ZERO
/AC=7777
/WORD COUNT=7777
/START WRITE ONE WORD
/SKIP ON FLAG
/FLAG UP 100 SOON

/18 MILL SEC
/36 MILL SEC
/24 MILL SEC
/SKIP ON FLAG
/FLAG UP NOT AFTER 24 MILLI SEC.

/IS AC CLEARED BY DMAN?

CLA CMA
DCA WC
CLA CMA
DMAN
DFSC
JMP 101
SZA
HALT
JMS ERADD

/ONE WORD
/NOT SHOULD CLEAR AC
DATA TRANSFER COMPLETE?
/WAIT FOR FLAG
/AC NOT CLEARED

/IS ERROR STILL CLEARED?

JMS SCOPEA
DFSC
HALT
JMS ERADD
JMS SCOPEA

/PARITY ERROR FLAG UP

0463 4763'
0464 4764'

0465 6616
0466 7000
0467 2356
0470 7440

0471 4763'
0472 4764'

0502 4763'
0503 7000
0504 2753'
0505 5304
0506 2753'
0507 5306
0510 2753'
0511 5310
0512 6622

0513 4763'
0514 4764'

0515 7240
0516 3724'
0517 7240
0520 6005
0521 6622
0522 5301
0523 7440

0524 4763'

0525 4764'
0526 6621

0527 4763'
0530 4764'

/DISK MEMORY ADDRESS READ

0531	7240	CLA CMA	/READ ONE WORD
0532	3754	DCA WC	
0533	7240	CLA CMA	/MEMORY LOCATION ZERO
0534	3755	DCA IACH	/START READ ONE WORD
0535	6603	DMAR	/SKIP ON FLAG
0536	6622	DFSC	
0537	7410	SKP	
		HALT	/FLAG UP 100 \$00N
0540	4763	JMS ERADD	
0541	2753	ISE CTD	
0542	5341	JMP I=1	/18 MILL SEC
0543	2753	ISE CTD	
0544	5343	JMP I=1	/36 MILL SEC
0545	2753	ISE CTD	
0546	5345	JMP I=1	/54 MILL SEC
0547	6622	DFSC	/SKIP ON FLAG
		HALT	/FLAG NOT UP AFTER 54 MILL SEC
0550	4763	JMS ERADD	

NPAGE JMP I (1,20087600

0551	5752		
0552	0600		
0553	6611		
0554	7750		
0555	7751		
0556	0001		
0557	0002		
0560	4600		
0561	3770		
0562	0004		
0563	5600		
0564	5042		
0565	0400		
0566	6617		
0567	4271		
0570	4235		
0571	5701		
0572	5754		
0573	6733		
0574	6603		
0575	7755		
0576	5746		
0577	2354		
	0600		

PAGE 1/IS AC CLEARED BY DMAR

0600	4777	JMS SCOPEA	
0601	7240	CLA CMA	/ONE WORD
0602	3776	DCA WC	
0603	7240	CLA CMA	/NOT SHOULD CLEAR AC
0604	6603	DMAR	
0605	6622	DFSC	
0606	5205	JMP I=1	/WAIT FOR FLAG
0607	7440	SEA	

0610 4775' HALT ERADD
0611 4777' JMS SCOPEA
/AC NOT CLEARED

0612 7200 /LOAD EXTENDED ADDRESS
0613 6614 /DOES "DEAL" CHANGE THE AC?
0614 7700 CLA
0615 5212 /LOOK FOR SYNC
0616 6614 /SYNC YET?
0617 7710 /NO, CONTINUE WAITING;
0620 5216 /LOOK FOR SYNC TO GO AWAY;
0621 6601 /SYNC GONE?
0622 6615 /NO, WAIT FOR IT TO GO BY;
0623 7440 /NOT SHOULD NOT CHANGE AC

0624 4775' /AC SHOULD BE ZERO
0625 7240 /AC#7777
0626 6615 /SHOULD NOT CHANGE AC
0627 7040
0630 7440

0631 4775' /AC SHOULD BE ZERO
0632 4777' HALT ERADD
JMS SCOPEA

0633 7200 /RAISE NED (NON EXISTANT DISC)
0634 1374 CLA
0635 6615 TAD (3000) /EM3
0636 6616 /SELECT EM3
0637 0373 DEAC
0640 7430 AND (2) /NED STATUS
SNA /EM3 DID NOT RAISE NED
HALT ERADD
JMS SCOPEA

0641 4775' /DOES 0612 CLEAR THE AC? (DSAC)
0642 4777' DC5A
0643 6611 CLA CMA /SET AC TO SEVENS
0644 7240 DSAC
0645 6612 SZA
0646 7440 HALT ERADD
JMS SCOPEA /HALT BECAUSE AC NOT ZERO OR ACC UP

0647 4775' /WILL DEAC SKIP DURING DATA BREAK?
0650 4777' DC5A
0651 6611 DCA WC
0652 3776' DCA TACH /ONE WORD
0653 3772' DMAH
0654 6605 DEAC
0655 6616

0656 7410 SKP
 0657 5263 JMP 1,4
 0660 6622 DFSC
 0661 5255 JMP 1,4
 HALT
 0662 4775' JMS ERADD
 0663 4777' JMS SCOPEA

/DID NOT SEE ADC PULSE

/CHECK TO SEE IF WRITE LOCK OR NED = (1)

0664 6611 DCEA
 0665 6616 DEAC
 0666 7030 NOP
 0667 7006 RTL
 0670 7430 SZH

/READ STATUS

/ACL UP WRITE LOCK OUT SWITCH

0671 4775' JMS ERADD
 0672 4777' JMS SCOPEA

/TEST WRITE LOCK OUT

0673 7240 CLA CMA
 0674 3776' DCA WC
 0675 6605 DMAH
 0676 6622 DFSC
 0677 5276 JMP 1,4
 0700 6616 DEAC
 0701 7000 NOP
 0702 0373 AND (2
 0703 7440 SZA
 0704 4775' HALT
 0705 5771 JMS ERADD
 NPAGE
 JMP 1 (,+200&7600

PAGE

/DOES DISK BREAK TO RIGHT LOG

1000 4777' JMS SCOPEA
 1001 6611 DCEA
 1002 7240 CLA CMA
 1003 3776' DCA WC
 1004 7240 CLA CMA
 1005 3775' DCA TACH
 1006 6625 DMAH
 1007 6622 DFSC
 1010 5207 JMP 1,4
 1011 7200 CLA
 1012 1776' TAD WC

/WRITE ONE WORD

1013 7640 SZA CLA /WORD COUNT NOT CORRECT
 1014 4774' JMS ERADD
 1015 1775' TAD IACH
 1016 7440 SZA /ADDRESS CONTROL, WORD NOT CORRECT
 1017 4774' JMS ERADD
 1020 4777' JMS SCOPEA

/DEAC READ DISK EXTENDED ADDRESS
 /CHECK FOR SYNC MARK
 /CHECK FOR ADDRESS COMPAR

1021 6611 DCEA
 1022 7301 CLA CLL IAC
 1023 3773' DCA CTD
 1024 6616 DEAC
 1025 7000 NOP
 1026 7700 SMA CLA /SYNC?
 1027 7410 SKP /NO
 1030 5234 JMP I+4 /YES
 1031 2773' ISZ CTD /LOOP
 1032 5224 JMP I=6 /NO SYNC PULSE
 1033 4774' HALT
 1034 1773' JMS ERADD
 1035 7450 TAD CTD
 SNA
 HALT /SYNC OR NED ALWAYS UP
 JMS ERADD
 JMS SCOPEA

/CHECK FOR NO ADDRESS COMPARE PULSE

1040 6611 DCEA
 1041 7200 CLA
 1042 3773' DCA CTD /SKIP ON ADC
 1043 6616 DEAC /ADC PULSE
 1044 7410 SKP
 HALT
 1045 4774' JMS ERADD
 1046 2773' ISZ CTD
 1047 5243 JMP I=4
 1050 4777' JMS SCOPEA

/CHECK THAT DMAC DOES NOT SKIP ON DONE FLAG

1051 6611 DCEA
 1052 7240 CLA CMA /ONE WORD
 1053 3776' DCA HC
 1054 3775' DCA IACH
 1055 6605 DMAM
 1056 6622 DFSC
 1057 5256 JMP I=1
 1060 6626 DMAC /FLAG IS SET
 1061 7410 SKP /DMAC SKIPPED
 HALT
 1062 4774' JMS ERADD
 1063 4777' JMS SCOPEA

/WILL THE DISK HONOR AN INTERRUPT ON DONE

1064	6611	DCEA
1065	4772'	JMS CLFLAG
1066	1371	TAD (JMP I C, +11
1067	3001	DCA 0001
1070	7240	CLA CMA
1071	3776'	DCA WC
1072	6605	DMAH
1073	6001	ION
1074	6622	DF9C
1075	5274	JMP I=1 /DONE FLAG
		HALT
1076	4774'	JMS ERADD
1077	4777'	JMS SCOPEA

/INTERRUPT ON NED

1100	4772'	JMS CLFLAG
1101	1370	TAD (3000
1102	6615	DEAL
1103	7220	CLA
1104	1367	TAD (JMP I C, +5
1105	3001	DCA 0001
1106	6001	ION
1107	7000	OPR
		HALT
1110	4774'	JMS ERADD
1111	4777'	JMS SCOPEA
1112	6611	DCEA
1113	6601	DCMA
1114	7604	LAY
1115	0366	AND (400
1116	7640	SZA CLA
1117	5765'	JMP BEGIN

/INSTRUCTION TO BE EXECUTED ON INTERRUPT

/NO INTERRUPT ON NED

/SWITCH 3

/LOOP ON INTERFACE TEST

PAUSE

/TAPE 2
 /CHECK FOR ALL ADDRESS = SYJC WRITE
 /NOT USING DATA BREAK 4000=7777
 ATESTI

1120	7000	OPR
1121	4777'	JMS SCOPEA
1122	6611	DCEA
1123	1364	TAD (4000
1124	3763'	DCA GA
1125	7200	CLA
1126	1763'	TAD GA
1127	4762'	JMS HONEH7
1130	6616	DEAC
1131	7500	SHA
1132	5330	JMP I=2
1133	6626	DMAC
1134	3761'	DCA BA
1135	1761'	TAD BA
1136	7041	CIA
1137	1763'	TAD GA

/IACH91

/SYNC PULSE
/NO
/YES = READ MAG

1140 7450 SNA
 1141 5347 JMP I*6
 1142 4760 JMS ERSYNG /A=GOOD BAEBAD
 1143 7604 LAS
 1144 3357 AND (1000
 1145 7440 SZA
 1146 5325 JMP I*21
 1147 2763 ISZ GA
 1150 5325 JMP I*23
 NPAGE
 1151 5756 JMP I (,0200&7600

1156 1200
 1157 1000
 1160 6100
 1161 6621
 1162 4731
 1163 6622
 1164 4000
 1165 0421
 1166 0400
 1167 5544
 1170 3000
 1171 5545
 1172 4000
 1173 6611
 1174 3600
 1175 7751
 1176 7750
 1177 5042
 1200

PAGE

/CHECK ALL ADDRESS SYNC READ
 /NOT USING DATA BREAK 0000 TO 3777

1200 4777 JMS SCOPEA
 1201 6611 DQA
 1202 1376 TAD (4000
 1203 3775 DCA KA
 1204 3774 DCA GA
 1205 7200 CLA
 1206 3773 DCA CTC
 1207 1774 TAD GA
 1210 3000 DCA 0000
 1211 7240 CLA CMA
 1212 3772 DCA WC
 1213 7240 CLA CMA
 1214 3771 DCA IACH
 1215 1000 TAD 0000
 1216 6603 DMAR
 1217 6622 DF3C
 1220 7610 SKP CLA
 1221 5225 JMP ASR3
 1222 0222 AND
 1223 2773 ISZ CTC

ASR1

/TIMES COUNTER
 /INITIAL ADDRESS=0000
 /ADDRESS ON DISK
 /STORE IN ZERO
 /ONE WORD

ASR2

/START READ
 /SKIP ON FLAG
 /NO
 /YES
 /TIME KILLER

1224	JMP ASR2	/READ STATUS
1225	DEAC	
1226	OPR	/SYNC PULSE
1227	SMA	/NO
1230	JMP I=3	/YES = READ ADDRESS
1231	DMAC	
1232	DCA BA	
1233	TAD BA	
1234	CIA	
1235	ISZ GA	
1236	TAD GA	
1237	SNA	/COMPARE WITH GOOD
1240	JMP I=13	/NO
1241	JMS ERSYNC	
1242	LA\$	
1243	AND (1000)	
1244	SNA	
1245	JMP I=6	
1246	CLA	
1247	TAD GA	
1250	TAD (=1	
1251	DCA GA	
1252	JMP ASR1	/YES = HAVE WE CHECKED ALL
1253	ISE KA	/NO = LOOP
1254	JMP ASR1	/YES
1255	JMS SCOPEA	

/CHECK FOR ALL ADDRESS INCREMENTS USING DATA BREAK
/TRACKS 0000 TO 7777

1256	DCA	/CLEAR DISC ADDRESS AND FLAGS
1257	DCEA	/CLEAR DISC EXTENDED ADDRESS
1260	CLA	/SET ADDRESS TO 0
1261	DCA GA	
1262	CLA	/WORD COUNT=2
1263	TAD (=2	/FETCH DISC ADDRESS
1264	DCA WC	/WRITE 2 WORDS
1265	DCA IACH	/WRITE COMPLETE?
1266	TAD GA	/NO WAIT
1267	DMAH	/INCREMENT GOOD ADDRESS FOR COMPARE
1270	DFSC	
1271	JMP I=1	
1272	ISE GA	/READ DISC ADDRESS
1273	NOP	/SAVE DISC ADDRESS
1274	DMAC	/BRING UP DISC ADDRESS
1275	DCA BA	
1276	TAD BA	
1277	CIA	
1300	TAD GA	
1301	SNA	/SUBTRACT DISC ADDRESS FROM GOOD ADDRESS
1302	JMP I=13	/DO ADDRESSES COMPARE
1303	JMS BADADD	/NO, GO TO ERROR
1304	LA\$	
1305	AND (1000)	

1306	7450	SNA
1307	5315	JMP I+6
1310	7200	CLA
1311	1774'	TAD GA
1312	1365	TAD (=1
1313	3774'	DCA GA
1314	5262	JMP I=32
1315	1774'	TAD GA
1316	7440	SEA
1317	5262	JMP I=35
1320	4777'	JMS SCOPEA

/YES, LOAD ADDRESS
/END?
/NO, RETURN
/YES, EXIT

NPAGE JMP I (+200&7600

1321	5762	
1362	1400	
1363	6316	
1364	7776	
1365	7777	
1366	1000	
1367	6100	
1370	6621	
1371	7751	
1372	7750	
1373	6603	
1374	6622	
1375	6600	
1376	4000	
1377	5042	
	1400	

PAGE

/TRACK INCREMENT ADDRESS TEST

1400	4777'	JMS SCOPEA
1401	7000	NOP
1402	6611	DCEA
1403	7200	CLA
1404	1376	TAD (=7
1405	3773'	DCA CTA
1406	3774'	DCA GT
1407	7200	CLA
1410	1774'	TAD GT
1411	6615	DEAL CMA
1412	7240	CLA HONEY7
1413	4773'	DEAC
1414	6616	JMS HONEY7
1415	0372	AND (3700
1416	3771'	DCA BT
1417	1771'	TAD BT
1420	7041	CLA
1421	1774'	TAD GT
1422	7640	SEA CLA
1423	4770'	JMS ETRACK
1424	1774'	TAD GT

/GOOD TRACK

/LOAD TRACK ADDRESS

/WRITE ONE WORD
/READ TRACK ADDRESS
/TRACK MASK
/BAD TRACK

/COMPARISON ERROR

1425 1367
 1426 2775'
 1427 5206
 1432 4777'

/LOOP TILL DONE

/CHECK TO SEE THAT ALL TRACK ADDRESSES CAN BE DECODED
 /THIS ROUTINE WRITES THE TRACK ADDRESS IN THE FIRST
 /AND LAST WORDS ON EACH TRACK THEN READS THEM BACK
 /AND COMPARES THEM
 /IF AN ERROR PRINT OUT OCCURS GT IS THE ADDRESS EXPECTED
 /AND BT IS THE ADDRESS READ

1431	6611	TKDEC'	DCEA	/CLEAR TRACK ADDRESS
1432	6601		DQRA	/CLEAR DISK ADDRESS
1433	1366		TAD (=20)	
1434	3775'		DCA CTA	/SET TRACK COUNT
1435	3765'		DCA OUTBUF	/FIRST DATA WORD=0
1436	7021		IAC	/SECOND DATA WORD=1
1437	3764'		DCA OUTBUF+1	
1440	1363	TKHT'	TAD (=2	/SET WORD COUNT FOR 2 WORDS
1441	3762'		DCA WC	/SET BEGINNING ADDRESS
1442	1361		TAD (OUTBUF+1	/BRING IN DISK ADDRESS AND MODIFY
1443	3760'		DCA IACH	/WRITE THE LAST WORD OF
1444	6626		DMAC	/ONE TRACK AND THE FIRST
1445	1357		TAD (3777	/WORD OF THE NEXT TRACK
1446	6605		DMAH	/INCREMENT DATA
1447	6622		DFSC	/INCREMENT TRACK COUNTER
1450	5247		JMP (=1	/CLEAR TRACK ADDRESS
1451	2765'		ISE OUTBUF	/SET TRACK COUNT
1452	2764'		ISE OUTBUF+1	/SET COMPARE WORD=0
1453	2775'		ISE CTA	/CLEAR DISK ADDRESS
1454	5240		JMP TKHT	
1455	6611		DCEA	
1456	1366		TAD (=20	
1457	3775'		DCA CTA	
1460	3774'		DCA GT	
1461	6601		DCHA	
1462	7300		CLA CLL	
1463	3756'		DCA CTADC	

1464	2756'	TKRD'	ISE CTADC
1465	7300		CLA
1466	1756'		TAD CTADC
1467	7420		SNL
1470	1395		TAD (3776
1471	3756'		DCA CTADC
1472	1361		TAD (OUTBUF+1
1473	3760'		DCA IACH
1474	7040		CMA
1475	3762'		DCA WC
1476	1756'		TAD CTADC
1477	6603		DMAR

1500	6622	DFSC
1501	5300	JMP I#1
1502	7210	CLA RAR
1503	3754'	DCA CTB
1504	1765'	TAD OUTBUF
1505	7041	CLA
1506	1774'	TAD GT
1507	7440	SZA
1510	5323	JMP TKERR
1511	7300	CLA CLL
1512	1754'	TAD CTB
1513	7004	RAK
1514	7020	CMW
1515	7420	SNL
1516	5264	JMP TKRD
1517	2774'	ISZ GT
1520	2775'	ISZ CTA
1521	5264	JMP TKRD
1522	5330	JMP I#6
1523	7200	TKERR,
1524	1765'	CLA OUTBUF
1525	3771'	DCA BT
1526	4770'	JMS ETRACK
1527	5312	JMP I#13
1530	5793	NPAGE
		JMP I (+20087600

1553	1600
1554	3661
1555	3776
1556	6627
1557	3777
1560	7751
1561	6777
1562	7750
1563	7776
1564	7001
1565	7000
1566	7760
1567	0100
1570	6000
1571	6624
1572	3700
1573	4731
1574	6623
1575	6610
1576	7771
1577	5042
	1600

PAGE

/CHECK FOR NO MORE THAN ONE ADC PER REV

/DETECT FALSE ADDRESS COMPARE

/THIS ROUTINE FINDS ITS OWN ISE TIME AND SHOULD WORK IN ANY MACHINE /READ SWITCHES FOR 50 CYCLE

1600 7604

```

1601 7112 CL4 RTR /SR10=>LINK
1602 7630 SZL CLA /50 CYCLE7
1603 1377 TAD (64=6 /YES,
1604 1376 TAD (6 /
1605 3302 DCA TOL /
1606 4775 JMS SCOPEA /
1607 7000 NOP /
1610 6611 DCEA /SET UP TO FIND ISZ
1611 7200 CLA GA /TIME
1612 3774 DCA GA (=5
1613 7200 CLA GA REVCNT
1614 1373 TAD (=5
1615 3301 DCA (=5
1616 7200 CLA GA
1617 1774 TAD GA
1620 4772 JMS WONE /START=REFERENCE
1621 6622 DFSC /DONE FLAG
1622 5221 JMP 1=1 /FOUND REFERENCE
1623 7200 CLA GA
1624 1774 TAD GA /LOOK AGAIN
1625 4772 JMS WONE /CYC=HOW LONG
1626 7200 CLA CTC
1627 3771 DCA CTC
1630 6622 DFSC
1631 7410 SKP
1632 5237 JMP 1=5 /FOUND SECOND TIME
1633 0233 AND /TIME KILLER
1634 2771 ISZ CTC
1635 5230 JMP 1=5 /TOOK OVER 40 MILLISEC /REP
1636 4770 JMS ERADD
1637 7200 CLA
1640 1771 TAD CTC /HOW LONG
1641 7040 GMA
1642 1302 TAD TOL /ADD
1643 3367 DCA (XX /TEH STORAGE

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1644 7200 FALCOM: CLA GA
1645 1774 TAD GA
1646 4772 JMS WONE
1647 6622 DFSC
1650 5247 JMP 1=1
1651 7200 CLA
1652 1774 TAD GA
1653 4772 JMS WONE
1654 1367 TAD (XX
1655 3771 DCA CTC
1656 6622 DFSC
1657 5202 JMP 1=3
1660 4766 JMS TEXTE
1661 5244 JMP FALCOM
1662 0262 AND
1663 2771 ISZ CTC
1664 5256 JMP 1=6

```

```

/ADDRESS
/WRITE IN
/FLAG = DID II
/DO IT AGAIN
/FALSE COMPARE, FLAG BEFORE ISZ OUT
/TIME KILLER
/ISZ AND CHECK FOR FLAG

```

```

1665 6622 DFSC
1666 5265 JMP I,1
1667 2774' /INCREMENT ADDRESS
1670 5276 JMP I,6 /TRY ALL ADDRESS
1671 7604 LAS
1672 0365 AND (400)
1673 7640 SEA CLA
1674 5764' JMP ATEST /LOOP ON ADDRESS TEST
1675 5763 NPAGE
1676 2301 JMP I (,200&7600)
1677 5244 /SE REVCNT
1678 5213 JMP FALCOM
1679 0000 JMP FCOM1
1701 0000 REVCNT, 0
1702 0000 TOL, 0

```

```

1763 2000
1764 1120
1765 0400
1766 6130
1767 7422
1770 5000
1771 6003
1772 2665
1773 7773
1774 6622
1775 2042
1776 0006
1777 0056
2000

```

PAGE /ROUTINE TO DETECT TRACK WITH HIGH ERROR RATIO

```

2000 4777' JMS SCOPE
2001 7200 CLA (RPAGE+12&377 200 JMP /EQUAL TO (JMP RPAGE+12&JMP ,01)
2002 1376 TAD RPAGE+13 /SKIP ON DONE
2003 3775' DCA RPAGE+11 /TO CORRECT TRACK COUNT ON NO ERRORS
2004 1374 TAD (JMS I 0000 /READ ROUTINE
2005 3773' DCA RPAGE+11 /INS ERROR CT
2006 1392 TAD (ISE I CKA /COMPARE ROUTINE
2007 3771' DCA COMA+11
2010 1390 TAD (NOP
2011 3767' DCA RPAGE+10 /INCREMENT KA ON ERROR
2012 1366 TAD (TKTST /TRACK COUNTER
2013 3000 DCA 0000 /ERROR COUNT PER TRACK
2014 3765' DCA ERRTK
2015 3764' DCA KA
2016 7240 CLA CMA
2017 4763' JMS FILL
2020 7777 7777
2021 4762' JMS HOISK
2022 4761' JMS CKROOI
2023 1300 TAD (JMS I CSTATUS
2024 3773' DCA RPAGE+11
2025 1357 TAD (DPSE

```

/WRITE THE DISC
/READ AND INCREMENT ON ERROR
/RESTORE

2026 3767' DCA RPAGE+10
 2027 1356 TAD (JMS I CERRCOM
 2030 3771' DCA COMA+11 /RESTORE
 2031 1355 TAD (RPAGE+10&377 200 JMP /JMP ;+3
 2032 3775' DCA RPAGE+13
 2033 4777' JMS SCOPEA
 2034 7624 LAS /SW3
 2035 0354 AND (400
 2036 7642 SZA CLA
 2037 5200 JMP RATIO /LOOP ON RATIO TEST
 2040 4753' JMS DBIST /3 CYCLE BREAK TEST
 2041 7604 LAS
 2042 0354 AND (400
 2043 7640 SZA CLA
 2044 5240 JMP ;+4 /DATA BREAK TEST

/ROUTINE TO WRITE READ COMPARE AND CHECK READ DISK
 DISK0, JMS SCOPEA
 2045 4777' CLA
 2046 7200 JMS FILL
 2047 4763' 0000
 2050 0000 JMS DISK
 2051 4752'

DISK7, JMS SCOPEA
 2052 4777' TAD DISK7+3
 2053 1255 JMS FILL
 2054 4763' 0000
 2055 7777 JMS DISK
 2056 4752'

DISK7A, JMS SCOPEA
 2057 4777' TAD DISK7+3
 2060 1255 JMS FILL
 2061 4763' 0000
 2062 0000 JMS DISK
 2063 4752' JMS SCOPEA
 2064 4777' TAD ;+2
 2065 1267 JMS FILL
 2066 4763' 7070
 2067 7070 JMS DISK
 2070 4752' JMS SCOPEA
 2071 4777' TAD ;+3
 2072 1267 JMS FILL
 2073 4763' 0707
 2074 0707 JMS DISK
 2075 4752' JMS SCOPEA
 2076 4777' TAD ;+3
 2077 1351 JMS FILL
 2100 4763' 2525
 2101 2525 JMS DISK
 2102 4752' JMS SCOPEA
 2103 4777' TAD ;+2
 2104 1306 JMS FILL
 2105 4763' 0002
 2106 0002 JMS DISK
 2107 4752'

```

2110 JMS SCOPEA
2111 TAD (3776
2112 JMS FILL
2113 4001
2114 JMS DISK
2115 JMS SCOPEA
2116 TAD (020
2117 DCA (XX
2118 JMS SCOPEA
2119 JMS RANFIL
2120 JMS DISK
2121 JSE (XX
2122 JMP I=3
2123 LAS
2124 AND (400
2125 SZA
2126 JMP DISK0
2127 JMS DISPAT
2128 JMS ENDOCT
2129 JSE END
2130 DCEA
2131 DCMA
2132 JMP BEGIN
2133 NOP

```

/LOOP ON DATA TEST

/COMPLETED DISK TEST

```

2110 4777'
2111 1350
2112 4763'
2113 4021
2114 4752'
2115 4777'
2116 1347
2117 3346
2120 4777'
2121 4745'
2122 4752'
2123 2346
2124 5321
2125 7604
2126 0354
2127 7440
2130 5245
2131 4020
2132 4744'
2133 2743'
2134 6611
2135 6601
2136 5742'
2137 7000
2142 0421
2143 6617
2144 5657
2145 4627
2146 7402
2147 7760
2150 3776
2151 5252
2152 2200
2153 2205
2154 0400
2155 5225
2156 4541
2157 6621
2160 4542
2161 3504
2162 5065
2163 5013
2164 6600
2165 6686
2166 4504
2167 3625
2170 7000
2171 3655
2172 2543
2173 3626
2174 4400
2175 3630
2176 5227
2177 5042
2200

```

```

2200 7000 NOP
2201 4777' JMS DMRCOI
2202 4776' JMS CKRDOO
2203 5600 JMP I DISK
2204 7000 NOP
/ DATA BREAK TEST FOR DISK

2205 7402 DBTST, XX
2206 6611 DCEA
2207 4775' JMS CLFLAG
2210 4774' JMS WONEW7
2211 7200 CLA
2212 1373 TAD (7760
2213 3772' DCA KA
2214 1371 TAD (JMS I CWRK
2215 3001 DCA I
2216 1370 TAD (JMP I 0000
2217 3002 DCA 0002
2220 4767' JMS WTRK
2221 4245 JMS ISEIST
2222 4766' JMS ROT1TS
2223 4765' JMS ROT2TS
2224 4764' JMS TADTST
2225 4763' JMS JHSTST
2226 4245 JMS ISEIST
2227 4245 JMS ISEIST
2230 4766' JMS ROT1TS
2231 4765' JMS ROT2TS
2232 4765' JMS TADTST
2233 4764' JMS TADTST
2234 4764' JMS TADTST
2235 4763' JMS JHSTST
2236 4763' JMS JHSTST
2237 2772' ISZ KA
2240 5221 JMP DBTST+14
2241 6002 IOF
2242 6622 DFSC
2243 5242 JMP I 01
2244 5605 JMP I DBTST

```

/DISK WRITE READ OUT IN
/CHECK READ DISK QUI IN

/SET FLAG
/CLA CMA FOR PDPS

/PROCESS OR TEST FOR DISK
/TESTS ARE RUN WHILE WAITING FOR INT

```

2245 7402 /ISE TEST ABOUT 61 MILLISECONDS
2246 7040 ISEIST, XX
2247 3762' CMA
2250 3761' DCA TEMP3
2251 3760' DCA TEMP2
2252 2760' DCA TEMP1
2252 2760' ISZ TEMP1

```

```

2253 2761' ISZ TEMP2
2254 5252 JMP I P2
2255 1761' TAD TEMP2
2256 7440 SZA
2257 7402 HLT
2260 7240 CLA CMA
2261 1762' TAD TEMP1
2262 7440 SZA
2263 7402 HLT
2264 2762' ISZ TEMP5
2265 7410 SKP
2266 5251 JMP ISZTST+4
2267 5645 JMP I ISZTST

```

/COMPUTER BAD

/COMPUTER BAD

PAGE

/ROTATE 1 TEST ABOUT 67 MILLISECONDS

```

2400 7402 ROTATS: XX
2401 1777' TAD TEMP2
2402 7130 STL RAR
2403 7004 RAL
2404 7420 SNL
2405 7402 HLT
2406 7041 CHA IAC
2407 1777' TAD TEMP2
2410 7440 SZA
2411 7402 HLT
2412 2777' ISZ TEMP2
2413 5201 JMP ROTATS+1
2414 7200 CLA
2415 5600 JMP I ROTATS

```

/COMPUTER BAD

/COMPUTER BAD

/ROTATE 2 TEST ALSO ABOUT 67 MILLISECONDS

```

2416 7402 ROTATS: XX
2417 1777' TAD TEMP2
2420 7106 CLL RTL
2421 7012 RTR
2422 7430 SEL
2423 7402 HLT

```

/COMPUTER BAD


```

2506 2770' ISZ CTA
2507 5302 JMP I=5
2510 3765' DCA GD
2511 7300 CLA CLL
2512 1765' TAD GD
2513 1364 TAD (=I44
2514 3765' DCA GD
2515 1766' TAD BD
2516 7430 SZL
2517 7001 IAC
2520 7100 CLL
2521 1363 TAD
2522 3766' DCA
2523 7420 SNL
2524 5327 JMP I=3
2525 2770' ISZ CTA
2526 5311 JMP I=15
2527 5762' JMP CONVB

```

```

2562 4314
2563 7777
2564 7634
2565 6626
2566 6623
2567 3000
2570 6610
2571 6611
2572 7767
2573 2644
2574 2647
2575 2646
2576 2643
2577 2642
2600

```

PAGE

/JMS IST MAKE 13 PASSES OF 128 CONSECUTIVE JMS ,
/AND COMPARE RESULTS FOR ABOUT 63 MILLISECONDS

```

JMSTST1 XX /NUMBER OF LOOPS
TAD (7763 /200 LOCATIONS
DCA TEMP1 /STARTING LOCATION
TAD (7001 /JMS INSTRUCTION
DCA TEMP2 /STORE 128 JMS
TAD (OUTBUF /STARTING AT ADDRESS
DCA TEMP3 /5000
TAD (4200
DCA TEMP4
TAD TEMP4
DCA I TEMPS
ISZ TEMP4
ISZ TEMP3
ISZ TEMP2
JMP I=3
TAD (5600
DCA I TEMPS

```

```

2600 7402
2601 1377
2602 3241
2603 1376
2604 3242
2605 1375
2606 3243
2607 1374
2610 3244
2611 1244
2612 3043
2613 2244
2614 2243
2615 2242
2616 5211
2617 1373
2620 3643

```

2621	4775'	JMS OUTBUF	/EXECUTE 128 JMS
2622	1372	JMRETU, TAD (7603	/RETURN FROM EXECUTE
2623	3242	DCA TEMP2	
2624	1371	TAD (OUTBUF+2	
2625	3243	DCA TEMP3	/COMPARE ADDRESSES
2626	1243	TAU TEMP3	/FOR I+1
2627	7040	CMA	
2630	1643	TAD I TEMP3	
2631	7440	SZA	/PROCESSOR BAD
2632	7402	HLI	/INC COMP AND FETCH
2633	2243	ISZ TEMP3	/DONE 128 YET
2634	2242	ISZ TEMP2	
2635	5226	JMP JMRETU+4	
2636	2241	ISZ TEMP1	
2637	5203	JMP JMSTST+3	
2640	5600	JMP I JMSTST	

2641	0000	TEMP1,	
2642	0000	TEMP2,	
2643	0000	TEMP3,	
2644	0000	TEMP4,	
2645	0000	TEMP5,	
2646	4263	PRAN1,	4263
2647	2634	PRAN2,	2634
2650	2622	RETUJM, JMRETU	

2651	7402	WTRK,	XX	/SKIP ON DONE FLAG
2652	6622	DFSG	DFSG	/PARITY ERROR GEN INTERRUPT
2653	7402	HLI	HLI	/SAVE AC
2654	3770'	DCA AC	DCA AC	/TRACK ZERO
2655	6611	DCEA	DCEA	
2656	7200	CLA	CLA	
2657	3767'	DCA HC	DCA HC	
2660	3766'	DCA IACH	DCA IACH	
2661	6605	DMAH	DMAH	
2662	6001	ION	ION	
2663	1770'	TAD AC	TAD AC	/RESTORE AC
2664	5651	JMP I WTRK	JMP I WTRK	

/WRITE ONE WORD AT DISK ADDRESS CONTAINED IN SR
/DO NOT WAIT FOR DONE FLAG

2665	7402	WONE,	XX	/START WRITE
2666	3000	DCA	DCA 0000	
2667	7240	CLA	CLA CMA	
2670	3767'	DCA HC	DCA HC	
2671	7240	CLA	CLA CMA	
2672	3766'	DCA IACH	DCA IACH	
2673	1000	TAD	TAD 0000	
2674	6605	DMAH	DMAH	

2675 5665 JMP I WONE

/READ ONE WORD DO NOT WAIT FOR FLAG

RONE,
 XX
 DCA 0000
 CLA CMA
 DCA WC
 CLA CMA
 DCA IACH
 TAD 0000
 DMAR
 JMP I RONE

/START READ

/SCOPE LOOP FOR ADDRESS TEST (WRITE)
 /CONTENTS OF SWITCH REGISTER EQUAL DISK ADDRESS

SAWD,
 LAS
 JMS WONE
 DFSC
 ISZ CTA
 JMP I+1
 JMP I+5

/SCOPE LOOP FOR ADDRESS TEST READ

SARD,
 LAS
 JMS RONE
 DFSC
 ISZ CTA
 JMP I+1
 JMP I+5

/WRITE EACH TRACK WITH IT RACK ADDRESS
 /READ EACH TRACK 5 TIMES BEFORE SEQUENCING TO NEXT

RDADJ,
 0
 CLA BT
 DCA BT
 JMS TKCAL
 TAD I+5
 DCA RDADJ=1
 TAD BT
 RAR
 SEL CLA
 JMP I+5
 TAD BT
 JMS RL5
 JMS ROLD
 JMP I+4
 TAD BT
 JMS RL5
 JMS RDH1
 ISZ RDADJ=1
 JMP RDADJ+5
 TAD I+7
 TAD BT

/COUNT
 /TRACK ADDRESS
 /WRITE TRACKS
 /READ EACH TRACK 5 TIMES

/ODD OR EVEN?
 /ODD
 /EVEN

/READ 5 TIMES
 /NO
 /YES

SNA CLA /ALL TRACKS
 JMP ROADJ /YES --- START OVER
 ISE BT /NO --- INCREMENT TRACK
 JMP ROADJ+3

2750 7650
 2751 5324
 2752 2764'
 2753 5327
 2756 7761
 2757 4121
 2760 4104
 2761 4724
 2762 7773
 2763 3200
 2764 6624
 2765 5610
 2766 7751
 2767 7750
 2770 6614
 2771 7002
 2772 7603
 2773 5600
 2774 4200
 2775 7000
 2776 7601
 2777 7763
 3000

PAGE

3000	0000	CTIME1	0	KCC	/COMPUTE CYCLE TIME
3001	6032			KCF	
3002	6042			CLA CLL	
3003	7300			TAD	(JMP I 2
3004	1377			DCA	1
3005	3001			TAD	(CTIMEA
3006	1376			DCA	2
3007	3002			DCA	CTIMEX
3010	3345			DCA	CTIMEY
3011	3346			TLS	
3012	6046			TSP	
3013	6041			JMP	1=1
3014	5213			TLS	
3015	6046			ION	
3016	6001			ISE	CTIMEX
3017	2345			JMP	1=1
3020	5217			ISE	CTIMEY
3021	2346			JMP	1=3
3022	5217			HLT	
3023	7402			TSP	
3024	6041			JMP	CTIMEB
3025	5336			CLA	(=3
3026	7200			TAD	CHPYR
3027	1395			DCA	X
3030	3350			DCA	
3031	3351			CLL	CTIMEX TIMES 3
3032	7100			TAD	/ADD LEAST SIG HALP
3033	1345			SEL	/OVERFLOW?
3034	7430			ISE	/YES, INCREMENT MOST SIG HALP
3035	2351				

3036	2350	ISZ	CHPYR	/INCREMENT MULTIPLIER
3037	5232	JMP	I=5	/STORE LEAST SIG HALF
3040	3352	DCA	X+1	
3041	1346	TAD	CTIMEY	
3042	7041	CIA		
3043	3350	DCA	CHPYR	
3044	3353	DCA	Y	
3045	3354	DCA	Y+1	
3046	7300	CLA CLL		
3047	1353	TAD	Y	
3050	1374	TAD	(3	
3051	3353	DCA	Y	
3052	7300	CLA CLL		
3053	1354	TAD	Y+1	
3054	1374	TAD	(3	
3055	3354	DCA	Y+1	
3056	7430	SEL		
3057	2353	ISZ	Y	
3060	2350	ISZ	CHPYR	
3061	5246	JMP	I=13	
3062	7200	CLA		
3063	1351	TAD	X	
3064	1353	TAD	Y	
3065	3353	DCA	Y	
3066	7200	CLA		
3067	7100	CLL		

3070	1352	TAD	X+1	/OVERFLOW?
3071	1354	TAD	Y+1	/YES, INCREMENT MSH
3072	3354	DCA	Y+1	/1,10**7/YMCYCLE TIME,100
3073	7430	SEL		/Y=0Y
3074	2353	ISZ	Y	
3075	7200	CLA		
3076	3347	DCA	CYCLE	
3077	1353	TAD	Y	
3100	7040	CMA		
3101	3353	DCA	Y	
3102	7300	CLA CLL		
3103	1354	TAD	Y+1	
3104	7041	CIA		
3105	3354	DCA	Y+1	
3106	7430	SEL		
3107	2353	ISZ	Y	
3110	7200	CLA		
3111	1353	TAD	C4611	/MOST SIG HALF OF 10**7
3112	3351	DCA	X	/LEAST SIG HALF OF 10**7
3113	1356	TAD	C3200	
3114	3352	DCA	X+1	
3115	7300	CLA CLL		
3116	1352	TAD	X+1	/X=0Y LSH
3117	1354	TAD	Y+1	
3120	3352	DCA	X+1	/X=0Y MSH
3121	1351	TAD	X	
3122	7430	SEL		

3123	7001	IAC			
3124	7100	CLL			
3125	1353	TAD			
3126	3351	DCA			
3127	7420	SNL			
3132	5333	JMP			
3131	2347	ISZ			
3132	5315	JMP			
3133	7200	CLA			
3134	1347	TAD			
3135	5600	JMP			
3136	6032	KCC			
3137	1345	TAD			
3140	1373	TAD			
3141	3345	DCA			
3142	7430	SEL			
3143	2346	ISZ			
3144	5400	JMP			
3145	2000	CTIMEX			
3146	0000	CTIMEY			
3147	0000	CYCLE			
3150	0000	CMPYR			
3151	0000	X			
3152	0000	Y			
3153	0000				
3154	0000				
3155	4611	C4611			
3156	3200	C3200			

3173	0007				
3174	0003				
3175	7775				
3176	3024				
3177	5402				
3200	3200				
3201	7402				
3202	6611				
3203	7200				
3204	4776				
3205	0000				
3206	1377				
3207	4775				
3210	1374				
3211	4776				
3212	0001				
3213	1377				
3214	4773				
3215	1372				
3216	4776				
3217	0002				
3220	1371				
3221	4775				

/WRONG INTERRUPT
 /TRACK WRITERS FOR DISC CALIBRATION
 PAGE /TRACK WRITERS FOR DISC CALIBRATION
 TKCAL: XX DCEA
 CLA
 TAD (0000)
 JMS FILL
 0000
 TAD (0)
 JMS WRITLO
 TAD (1)
 JMS FILL
 1
 TAD (0)
 JMS WRITH
 TAD (2)
 JMS FILL
 2
 TAD (100)
 JMS WRITLO

3222	1370	TAD (3
3223	4776'	JMS FILL
3224	0003	3
3225	1371	TAD (100
3226	4773'	JMS WRTHI
3227	1367	TAD (4
3230	4776'	JMS FILL
3231	0004	4
3232	1366	TAD (200
3233	4775'	JMS WRTLO
3234	1365	TAD (5
3235	4776'	JMS FILL
3236	0005	5
3237	1366	TAD (200
3240	4773'	JMS WRTHI
3241	1364	TAD (6
3242	4776'	JMS FILL
3243	0006	6
3244	1363	TAD (300
3245	4775'	JMS WRTLO
3246	1362	TAD (7
3247	4776'	JMS FILL
3250	0007	7
3251	1363	TAD (300
3252	4773'	JMS WRTHI
3253	1361	TAD (10
3254	4776'	JMS FILL
3255	0010	10
3256	1360	TAD (400
3257	4775'	JMS WRTLO

3260	1357	TAD (11
3261	4776'	JMS FILL
3262	0011	11
3263	1360	TAD (400
3264	4773'	JMS WRTHI
3265	1356	TAD (12
3266	4776'	JMS FILL
3267	0012	12
3270	1355	TAD (500
3271	4775'	JMS WRTLO
3272	1354	TAD (13
3273	4776'	JMS FILL
3274	0013	13
3275	1355	TAD (500
3276	4773'	JMS WRTHI
3277	1353	TAD (14
3300	4776'	JMS FILL
3301	0014	14
3302	1352	TAD (600
3303	4775'	JMS WRTLO
3304	1351	TAD (15
3305	4776'	JMS FILL
3306	0015	15

3307 1352 TAD 1600
 3310 4773' JMS WRTHI
 3311 1350 TAD 116
 3312 4776' JMS FILL
 3313 0016 16
 3314 1347 TAD 1700
 3315 4775' JMS WRTLO
 3316 1346 TAD 117
 3317 4776' JMS FILL
 3320 0017 17
 3321 1347 TAD 1700
 3322 4773' JMS WRTHI
 3323 5600 JMP I TKCAL

PAUSE

3346 0017
 3347 0700
 3350 0016
 3351 0015
 3352 0600
 3353 0014
 3354 0013
 3355 0500
 3356 0012
 3357 0011
 3360 0400
 3361 0010
 3362 0007
 3363 0300
 3364 0006
 3365 0005
 3366 0200
 3367 0004
 3370 0003
 3371 0100
 3372 0002
 3373 4067
 3374 0001
 3375 4053
 3376 5013
 3377 0000
 3400

PAGE /DATA TEST = TAPE 3
 /WRITE READ DISK COMPAR (OUT TO IN)
 DWRQOI, NOP

3400 7000
 3401 7200
 3402 1377
 3403 4776'
 3404 1377
 3405 4775'
 3406 1377
 3407 4774'
 3410 1377

CLA /TRACK 0
 TAD (0) JMS WRTLO
 TAD (0) JMS ROLO
 TAD (0) JMS WRTHI
 TAD (0) JMS WRTHI

3411 4773' JMS RDHI /IRACK 2
3412 1372 TAD (100)
3413 4776' JMS WRTLO
3414 1372 TAD (100)
3415 4775' JMS ROLO
3416 1372 TAD (100)
3417 4774' JMS WRTHI
3420 1372 TAD (100)
3421 4773' JMS RDHI /IRACK 3
3422 1371 TAD (200)
3423 4776' JMS WRTLO
3424 1371 TAD (200)
3425 4775' JMS ROLO
3426 1371 TAD (200)
3427 4774' JMS WRTHI /IRACK 4
3430 1371 TAD (200)
3431 4773' JMS RDHI /IRACK 5
3432 1370 TAD (300)
3433 4776' JMS WRTLO
3434 1370 TAD (300)
3435 4775' JMS ROLO
3436 1370 TAD (300)
3437 4774' JMS WRTHI /IRACK 6
3440 1370 TAD (300)
3441 4773' JMS RDHI /IRACK 7
3442 1367 TAD (400)
3443 4776' JMS WRTLO
3444 1367 TAD (400)
3445 4775' JMS ROLO
3446 1367 TAD (400)
3447 4774' JMS WRTHI /IRACK 8
/IRACK 9

3450 1367 TAD (400)
3451 4773' JMS RDHI /IRACK 10
3452 1366 TAD (500)
3453 4776' JMS WRTLO
3454 1366 TAD (500)
3455 4775' JMS ROLO
3456 1366 TAD (500)
3457 4774' JMS WRTHI /IRACK 11
3460 1366 TAD (500)
3461 4773' JMS RDHI /IRACK 12
3462 1365 TAD (600)
3463 4776' JMS WRTLO
3464 1365 TAD (600)
3465 4775' JMS ROLO
3466 1365 TAD (600)
3467 4774' JMS WRTHI /IRACK 13
3470 1365 TAD (600)
3471 4773' JMS RDHI /IRACK 14
3472 1364 TAD (700)
3473 4776' JMS WRTLO
3474 1364 TAD (700)
3475 4775' JMS ROLO

3476	1364	TAD (700	/IRACK 15
3477	4774'	JMS WRTHI	
3500	1364	TAD (700	
3501	4773'	JMS RDHI	
3502	7000	NOP	
3503	5600	JMP I DWRCOI	

3504	7000	/DISK CHECK READ (OUT TO IN)	/IRACK 15I
3505	7200	CKRDOI, NOP	
3506	4775'	CLA	
3507	1377	JMS RDOLO	
3510	4773'	TAD (0	
3511	1372	JMS RDHI	
3512	4775'	TAD (100	
3513	1372	JMS RDOLO	
3514	4773'	TAD (100	
3515	1371	JMS RDHI	
3516	4775'	TAD (200	
3517	1371	JMS RDOLO	
3520	4773'	TAD (200	
3521	1370	JMS RDHI	
3522	4775'	TAD (300	
3523	1370	JMS RDOLO	
3524	4773'	TAD (300	
3525	1367	JMS RDHI	
3526	4775'	TAD (400	
3527	1367	JMS RDOLO	
3530	4773'	TAD (400	
3531	1366	JMS RDHI	
3532	4775'	TAD (500	
3533	1366	JMS RDOLO	
3534	4773'	TAD (500	
3535	1365	JMS RDHI	
3536	4775'	TAD (600	
3537	1365	JMS RDOLO	
3540	4773'	TAD (600	
3541	1364	JMS RDHI	
3542	4775'	TAD (700	
3543	1364	JMS RDOLO	
3544	4773'	TAD (700	
3545	5704	JMS RDHI	
		JMP I CKRDOI	
		/EXECT WRITE READ DISK	

3546	4200	JMS DWRCOI	
3547	4304	JMS CKRDOI	
3550	5346	JMP I 02	
3564	0700		
3565	0600		
3566	0500		
3567	0400		
3570	0300		

```

3571 0200
3572 0100
3573 4121
3574 4067
3575 4104
3576 4053
3577 0000
3600 7000
3601 3777'
3602 1376
3603 3775'
3604 1374
3605 3773'
3606 1777'
3607 6605
3610 6621
3611 4772'
3612 6622
3613 5210
3614 5620

PAGE
/ WRITE ONE PAGE
/ JMS '11' WITH DISK ADDRESS IN AC
/ WPAGE, NOP
/ DISK ADDRESS
/ WORD COUNT
/ INITIAL ADDRESS
/ DISK ADDRESS
/ LOAD DISK = WRITE
/ HAIT FOR FLAG

DCA WADD
TAD (=200)
DCA WC
TAD (OUTBUF=1)
DCA IACH
TAD WADD
DMAH
DFSE
JMS STATUS
DFSC
JMP I=3
JMP I WPAGE
/ EXIT

```

```

/ READ ONE PAGE
/ JMS '11' WITH DISK ADDRESS IN AC

RPAGE, NOP
/ DISK ADDRESS
/ WORD COUNT
/ INITIAL ADDRESS
/ DISK ADDRESS
/ LOAD DISK '11' READ
/ HAIT FOR FLAG

DCA RADD
TAD (=200)
DCA WC
TAD (INBUF=1)
DCA IACH
TAD RADD
DMAH
DFSE
JMS STATUS
DFSC
JMP I=3
JMP I WPAGE
/ EXIT

```

```

/ COMPARE OUTBUFFER WITH INBUFFER
COMPARE, JMP ,
CLA
TAD (=10)
DCA ERCT
TAD (INBUF=1)
DCA I1
TAD (OUTBUF=1)
DCA I2
TAD (=200)
DCA CTB
CLA
TAD I I1

/ ERROR COUNT
/ INBUFFER = IAH
/ OUTBUFFER = IAH
/ LOOP COUNTER

COMA,

```

3646 3765' DCA BD /DATA THAT WAS READ
 3647 1412 TAD I 12 /DATA THAT WAS WRITTEN
 3650 3764' DCA GD
 3651 1764' TAD GD
 3652 7041 CIA
 3653 1765' TAD BD
 3654 7640 SEA CLA
 3655 4763' JMS ERRCOM
 3656 2261 ISZ CTB
 3657 5244 JMP COMA
 3660 5632 JHP I COMPAR
 3661 0000 CTB, 0

/ERROR
 /DONE
 /NO
 /YES EXIT

/WRITE READ COMPARE
 PHRC, NOP
 CLA PHRC
 TAD RDOLO
 DCA RDOLO
 TAD (3700
 JMS WPAGE
 JMS FLUSH
 TAD (3700
 JMS RPAGE
 JMS COMPARE
 JMP I PHRC

/CHECK ZEROS

3675 7000 WRC00, NOP
 3676 7200 CLA
 3677 1357 TAD (0000
 3700 4756' JMS FILL
 3701 0000 0000
 3702 4262 JMS PHRC
 3703 5675 JMP I WRC00

/0000

/CHECK SEVENS

3704 7000 WRC77, NOP
 3705 7000 NOP
 3706 7600 CLA
 3707 1355 TAD (7777
 3710 4756' JMS FILL
 3711 7777 7777
 3712 4262 JMS PHRC
 3713 5705 JMP I WRC77

/7777
 /7777

3755 7777
 3756 5013
 3757 0000
 3760 5000
 3761 3700
 3762 4104
 3763 6200
 3764 6626

3765 6625
 3766 6612
 3767 7770
 3770 7177
 3771 6602
 3772 6400
 3773 7751
 3774 6777
 3775 7750
 3776 7600
 3777 6601
 4000

PAGE

/DO WRC OF DIFFERENT NUMBER = PAGE BASIC

WRCX,	NOP
4000	7000
4001	7200
4002	6615
4003	7200
4004	1377
4005	4776'
4006	0000
4007	4775'
4010	1374
4011	4776'
4012	7070
4013	4775'
4014	1373
4015	4776'
4016	7070
4017	4775'
4020	1372
4021	4776'
4022	2525
4023	4775'
4024	1371
4025	4776'
4026	4567
4027	4775'
4030	1370
4031	4776'
4032	0303
4033	4775'
4034	1367
4035	4776'
4036	7474
4037	4775'
4040	4766'
4041	4775'
4042	1377
4043	4776'
4044	0001
4045	4775'
4046	1365

WRCX,	NOP
4000	7000
4001	7200
4002	6615
4003	7200
4004	1377
4005	4776'
4006	0000
4007	4775'
4010	1374
4011	4776'
4012	7070
4013	4775'
4014	1373
4015	4776'
4016	7070
4017	4775'
4020	1372
4021	4776'
4022	2525
4023	4775'
4024	1371
4025	4776'
4026	4567
4027	4775'
4030	1370
4031	4776'
4032	0303
4033	4775'
4034	1367
4035	4776'
4036	7474
4037	4775'
4040	4766'
4041	4775'
4042	1377
4043	4776'
4044	0001
4045	4775'
4046	1365

4047 4776' JMS FILL
 4001 4001
 4250 JMS PWRC
 4251 4775' JMP WRXC
 4252 5200

/ROUTINE TO WRITE EVEN TRACKS
 /JMS WRTLO ';; WITH TRACK ADDRESS IN AC

4253 5253 JMP
 4054 0364 AND (3700 /TRACK ADDRESS
 4055 3763' DCA TKADD /LOAD TRACK ADDRESS
 4256 1763' TAD TKADD
 4257 6615 DEAL
 4260 7200 CLA
 4061 4762' JMS WPAGE /WRITE A PAGE
 4062 4761' JMS WSYNC /RETURN WITH MAC I N AC
 4063 7500 SMA /SAME TRACK
 4064 5261 JMP I=3 /YES
 4265 7200 CLA /NO DONE EXIT
 4066 5653 JMP I WRTLO

/ROUTINE TO WRITE ODD TRACKS
 /JMS WRTHI ';; WITH TRACK ADDRESS IN AC

4067 5267 JMP
 4070 0364 AND (3700 /STORE TRACK ADDRESS
 4071 3763' DCA TKADD /LOAD EXTENDED ADDRESS
 4072 1763' TAD TKADD
 4073 6615 DEAL
 4074 7200 CLA /2048 TO 4095
 4075 1360 TAD (4000 /WRITE A PAGE
 4076 4762' JMS WPAGE /RETURN WITH MAC IN AC
 4077 4761' JMS WSYNC /SAME TRACK
 4100 7510 SPA /YES
 4101 5276 JMP I=3 /NO DONE EXIT
 4102 7200 CLA
 4103 5667 JMP I WRTHI

/ROUTINE TO READ EVEN TRACKS
 /JMS RDOLO ';; WITH TRACK ADDRESS IN AC

4104 5304 JMP
 4105 0364 AND (3700 /TRACK ADDRESS
 4106 3763' DCA TKADD /LOAD TRACK ADDRESS
 4107 1763' TAD TKADD
 4110 6615 DEAL
 4111 7200 CLA
 4112 4757' JMS RPAGE /READ A PAGE
 4113 4756' JMS COMPARE /COMPARE
 4114 4755' JMS SYNC /RETURN WITH MAC IN AC
 4115 7500 SMA /SAME TRACK
 4116 5312 JMP I=4 /YES
 4117 7200 CLA

```

4120 5704 JMP I RDLO
/ROUTINE TO READ ODD TRACKS
/JMS RDHI !!! WITH TRACK ADDRESS IN AC

RDHI, JMP
4121 5321 AND (3700
4122 0364 DCA TKADD
4123 3763' TAD TKADD
4124 1763' DEAL
4125 6615 CLA
4126 7200 TAD (4000
4127 1360 JMS RPAGE
4130 4757' JMS COMPAR
4131 4756' JMS SYNC
4132 4755' SPA
4133 7510 JMP I=4
4134 5330 CLA
4135 7200 JMP I RDHI
4136 5721 /NO * DONE * EXIT

```

```

/TRACK ADDRESS
/LOAD TRACK ADDRESS

/HEAD A PAGE
/COMPARE
/RETURN WITH MAC IN AC
/SAME TRACK
/YES
/NO * DONE * EXIT

```

```

4155 4472
4156 3652
4157 3615
4160 4000
4161 4500
4162 3600
4163 6604
4164 3700
4165 3776
4166 4627
4167 7474
4170 0303
4171 0123
4172 5252
4173 0707
4174 7070
4175 3662
4176 5813
4177 7777
4200

```

PAGE

/QUICK TEST OF EACH TRACK

```

0800
4201 0800
4202 4777'
4203 1376
4204 3201
4205 7200
4206 3200
4207 1200
4210 3200

```

```

/TRACK STORAGE
/OUNTER
/RANDOM FILL
/OUNTER
/TRACK

```

```

MARGIN, JMS RANFIL
TAD (07
DCA MARGIN#1
CLA
DCA MARGIN#2
TAD MARGIN#2
DCA MARGIN#2

```


4211	1200	TAD MARGIN=2	/PAGE WRITE READ COMPARE
4212	6615	DEAL	
4213	4775'	JMS PWRQ	
4214	7200	CLA	
4215	1374	TAD (0100	
4216	2201	ISE MARGIN=1	
4217	5207	JMP I=10	
4220	7200	CLA	
4221	5203	JMP MARGIN+1	

/WRITE ONE PAGE TO BE USED WITH MARGIN TEST
/WRITE FROM INBUFFER AREA

4222	7402	WPAGEX; XX	/DISC ADDRESS
4223	3773'	DCA WADD	
4224	1372	TAD (=200	/WORD COUNT
4225	3771'	DCA WC	
4226	1370	TAD (INBUF=1	/CURRENT ADDRESS
4227	3767'	DCA IACH	
4230	1773'	TAD WAOD	/WRITE
4231	6605	DMAH	/SKIP ON DONE
4232	6622	DFSC	
4233	5232	JMP I=1	/EXIT
4234	5622	JMP I WPAGEX	

4235	0000	SYNCT; 0	
4236	7200	CLA CTA	
4237	3766'	DCA CTA	
4240	1365	TAD (=6660	
4241	3764'	DCA CTC	
4242	1764'	TAD CTC	
4243	3763'	DCA CTD	
4244	6616	DEAC	
4245	7000	NOP	
4246	7500	SMA	
4247	5253	JMP I=4	
4250	2764'	ISE CTC	
4251	5244	JMP I=5	
4252	5635	JMP I SYNCT	
4253	6616	DEAC	
4254	7000	NOP	
4255	7510	SPA	
4256	5266	JMP I=10	
4257	2763'	ISE CTD	
4260	5253	JMP I=5	
4261	5635	JMP I SYNCT	
4262	6616	DEAC	
4263	7000	NOP	
4264	7500	SMA	
4265	5635	JMP I SYNCT	
4266	2766'	ISE CTA	
4267	5262	JMP I=5	
4270	5635	JMP I SYNCT	

4271	7000	CONV,	0
4272	7270	CLA	
4273	1362	TAD (12)	
4274	3763'	DCA CTD	
4275	1761'	TAD CTB	
4276	2763'	ISZ CTD	
4277	5275	JMP I*2	
4300	3761'	DCA CTB	
4301	7330	CLA CLL CML RAR	
4302	7002	7002	
4303	7710	SPA CLA	
4304	5760'	JMP	NOT8E
4305	1357	TAD (12)	
4306	7041	CLA	
4307	3763'	DCA CTD	
4310	1766'	TAD CTA	
4311	2763'	ISZ CTD	
4312	5310	JMP I*2	
4313	3766'	DCA CTA	
4314	7200	CLA	
4315	1761'	TAD CTB	
4316	4756'	JMS DEC	
4317	4333	RCT	
4320	7200	CLA	
4321	1766'	TAD CTA	

CONVB,

4322	4756'	NOSYNQ,	JMS DEC
4323	4343	SCY	
4324	6046	TLS	
4325	6041	TSE	
4326	5325	JMP I*1	
4327	4755'	JMS MESSAGE	
4330	4543	4543	
4331	2220	2220	
4332	1540	1540	
4333	2000	0	
4334	2000	0	
4335	4023	4023	
4336	3116	3116	
4337	2040	2040	
4340	2411	2411	
4341	1505	1505	
4342	7540	7540	
4343	7777	7777	
4344	7777	7777	
4345	4015	4015	
4346	1103	1103	
4347	2217	2217	
4350	4023	4023	
4351	0503	0503	
4352	2300	2300	
4353	5671	JMP I CONV	

RCT,

SCY,

4355 0201

4356	6634
4357	2012
4360	2464
4361	3661
4362	7772
4363	6611
4364	6603
4365	1120
4366	6610
4367	7751
4370	7177
4371	7750
4372	7600
4373	6621
4374	0120
4375	3662
4376	7771
4377	4627

4400	PAGE	
4400	/DISK WRITE	CURRENT TEST
4401	DKI,	XX
4402	CLA	TAD (7777
4403	JMS	FILL
4404	JMS	WDISK
4405	JMS	WDISK
4406	JMS	WDISK
4407	TAD	(3777
4410	JMS	FILL
4411	JMS	FILL
4412	JMS	WDISK
4413	JMS	CKRDO1
4414	JMS	WDISK
4415	JMS	WDISK
4416	TAD	(7777
4417	JMS	FILL
4420	JMS	FILL
4421	JMS	WDISK
4422	JMS	CKRDO1
4423	JMS	I DKI
4424	JMS	I DKI

/FILL WITH SEVENS

/MAKE SURE DISC IS SATURATED

/WRITE COMPLIMENT

/READ COMPARE

/WRITE NEW PATTERN
/TO SATURATE DISK
/COMPLIMENTED DATA

/WRITE COMPLIMENT
/READ COMPARE

/ROUTINE TO TRANSFER DATA TO EXT MEMORY
/S, R, BIT 9,10,11, ; ; SELECT EXT BANK

4425	XBANK,	HLT
4426	LAS	
4427	RAL	
4430	RTL	
4431	AND	(0070
4432	OCA	BX
4433	DEAL	
4434	JMS	WRQ77
4435	CLA	
4436	TAD	BX
4437	DEAL	
4440	CLA	
4441	TAD	(3700
4442	JMS	RPAGE
4443	CLA	
4444	DEAL	
4445	JMS	WRQ00
4446	CLA	
4447	TAD	BX
4450	DEAL	
4451	CLA	
4452	TAD	(3700
4453	JMS	WPAGEX
4454	CLA	
4455	DEAL	
4456	CLA	

/BANK "X"

/BANK 0 TO DISC

/DISC TO X6200 TO X6400
/DISC TO BANK "X"

/CLEAN THE DISC FROM BANK 0

/BANK X TO DISC

4457 1367 TAD (3700 /DISC TO BANK 0
 4460 4766 JMS RPAGE
 4461 7242 CLA CMA
 4462 4763 JMS FILLA
 4463 7777 7777
 4464 4762 JMS COMPAR
 4465 5226 JMP XBANK+1

/GROUP OF SUBROUTINES

4466 5266 /WAIT FOR FLAG
 4467 6622 FLAG, JMP,
 4470 5267 DFSC
 4471 5666 JMP I=1
 /YES EXIT
 /NO

/WAIT FOR SYNC ; EXIT WITH DMAC IN AC

4472 5272 SYNC, JMP,
 4473 6616 DEAC,
 4474 7500 SMA
 4475 5273 JMP I=2
 4476 6626 DMAC
 4477 5672 JMP I SYNC
 /READ SYNC BIT 0
 /SYNC
 /NO
 /YES = READ MAC
 /EXIT

/EXIT WITH DMAC PLUS ONE IN AC

4500 5300 WSYNC, JMP,
 4501 4272 JMS SYNC
 4502 1361 TAD (1)
 4503 5700 JMP I WSYNC
 /EXIT

/SUBROUTINE TO INCREMENT ON TRACK ERROR

4504 7402 TKTST, XX
 4505 2760 ISE KA
 4506 4292 JMS SYNC
 4507 0357 AND (3776
 4510 7640 SZA CLA
 4511 5704 JMP I TKTST
 4512 1760 TAD KA
 4513 0356 AND (7300
 4514 7640 SZA CLA
 4515 4795 JMS ERTK
 4516 2734 ISE ERTK
 4517 3760 DCA KA
 4520 5704 JMP I TKTST
 /DMA IN AC
 /NEW TRACK
 /NO
 /ERROR PER TRACK
 /LESS THAN 400
 /NO
 /YES = TRACK BEING TESTED
 /CLEAR FOR NEXT TRACK

/INHIBIT PRINT OUT WHEN SW0 = 1

4521 7402 IPRINT, XX
 4522 3753 DCA AC
 4523 7604 LAS
 4524 7700 SMA CLA
 4525 5333 JMP I=6
 /CHECK SWITCH
 /SW0 = 1
 /NO = PRINTOUT

4526 1321 TAD IPRINT
4527 1352 TAD (=2
4530 3321 DCA IPRINT
4531 1721 TAD I IPRINT
4532 3321 DCA IPRINT
4533 1753' TAD AC
4534 5721 JMP I IPRINT

/WRITE MEMORY IN FIRST TWO TRACKS

4535 5335 WALL,
4536 6611 JMP ,
4537 3751' DCEA
4540 3750' DCA WC
4541 6605 DCA IACH
4542 5735 DMAM
JMP I WALL

EXSW,
XX
LAS
DEAL
CLA
JMP I EXSW

4543 7402
4544 7604
4545 6615
4546 7200
4547 5743

4550 7751
4551 7750
4552 7776
4553 6614
4554 6606
4555 5632
4556 7300
4557 3776
4560 6600
4561 0001
4562 3632
4563 5035
4564 4222
4565 3675
4566 3615
4567 3700
4570 3705
4571 6613
4572 0070
4573 3504
4574 3777
4575 5065
4576 5013
4577 7777
4600

/TRACK ZERO
/4096 WORDS
/0000
/LOAD MAG, WRITE
/EXIT

PAGE

/ROUTINE TO CLEAR FLAG AND SETUP INTERRUPT

4600 7000
4601 7200
4602 1377
4603 3001

CLFLAG, NOP
CLA
TAD (JMP I 0000
DCA 0001

4604 6002 IOF
 4605 6022 PCF
 4626 6042 TCF
 4627 6012 RRB
 4612 6072 6072
 4611 7000 NOP
 4612 6032 KCC
 4613 7000 NOP
 4614 6104 6104
 4615 6601 DCMA
 4616 5600 JMP I CLFLAG

4617 5217 RANDOM: JMP I
 4620 1776' TAD NUM
 4621 7104 RAL CLL
 4622 7430 SZL
 4623 1375 TAD (3
 4624 3776' DCA NUM
 4625 1776' TAD NUM
 4626 5617 JMP I RANDOM

4627 7402 RANFIL: HLT
 4630 7200 CLA
 4631 1374 TAD (=200
 4632 3773' DCA CTA
 4633 1372 TAD (OUTBUF=1
 4634 3011 DCA 11
 4635 7200 CLA
 4636 4217 JMS RANDOM
 4637 3411 DCA I 11
 4640 2773' ISE CTA
 4641 5235 JMP I=4 FLUSH
 4642 4771' JMS
 4643 5627 JMP I RANFIL

/ROUTINE TO WRITE A TRACK
 /1ST HALT LOAD DATA IN SR
 /WHILE RUNNING SR 8=11=TRACK

4644 4255 JMS FILLX /WRITE A TRACK
 4645 4266 JMS WRTX
 4646 9245 JMP I=1 //
 4647 4305 JMS RDX /READ A TRACK
 4650 5247 JMP I=1
 4651 4255 JMS FILLX /WRITE/READ A TRACK
 4652 4266 JMS WRTX
 4653 4305 JMS RDX
 4654 5252 JMP I=2

4655 7402 FILLX: XX
 4656 7402 HLT
 4657 7604 LAS
 4660 3263 DCA I=3
 4661 1263 TAD I=2

4662 4770' JMS FILL
 4663 7402 XX
 4664 7402 WLT
 4665 5655 JMP I FILLX

/IO SET UP TK SELECTION

/WRITE SPECIFIED TRACK

4666 7402 WRTX, XX
 4667 7604 LAS
 4670 3767' DCA TKADD
 4671 1767' TAD TKADD
 4672 7010 RAR
 4673 7630 SEL CLA
 4674 5301 JMP I *5
 4675 1767' TAD TKADD
 4676 4324 JMS RL5
 4677 4766' JMS WRTLO
 4700 5666 JMP I WRTX
 4701 1767' TAD TKADD
 4702 4324 JMS RL5
 4703 4765' JMS WRTHI
 4704 5666 JMP I WRTX

/READ SPECIFIED TRACK

4705 7402 RDX, XX
 4706 7604 LAS
 4707 3767' DCA TKADD
 4710 1767' TAD TKADD
 4711 7010 RAR
 4712 7630 SEL CLA
 4713 5320 JMP I *5
 4714 1767' TAD TKADD
 4715 4324 JMS RL5
 4716 4764' JMS ROLO
 4717 5705 JMP I RDX
 4720 1767' TAD TKADD
 4721 4324 JMS RL5
 4722 4763' JMS ROHI
 4723 5705 JMP I RDX

/ROTATE LEFT 5 AND CLEAR LINK

4724 7402 RLS, XX
 4725 7106 CLL RTL
 4726 7006 RIL
 4727 7004 RAL
 4730 5724 JMP I RLS

/SUB ROUTINES
 /WRITE ONE WORD OF 7777 AT SPECIFIED ADDRESS
 /JMS HONEY7
 /ACR ADDRESS OF WHERE TO BE WRITTEN

HONEY7, JMP I 0000
 4731 5331 DCA 0000
 4732 3000 DCA CTC
 4733 3762' CLA CMA
 4734 7240 DCA CMA
 4735 3761' DCA WC

/ST STORE DISK ADDRESS
CLEAR WAIT COUNTER

/ONE WORD SET WORD COUNT = -1

4736 7240 CLA CMA
 4737 3760' DCA IACH
 4740 1000 TAD 0000
 4741 6605 DMAH
 4742 7020
 4743 7000
 4744 6622
 4745 7410
 4746 5351
 4747 2762'
 4750 5342
 4751 5731
 4752 0000

4760 7751
 4761 7750
 4762 6603
 4763 4121
 4764 4104
 4765 4067
 4766 4053
 4767 6604
 4770 5013
 4771 5000
 4772 6777
 4773 6610
 4774 7600
 4775 0003
 4776 6607
 4777 5400
 5000

5000 5200
 5001 7200
 5002 1377
 5003 3776'
 5004 1375
 5005 3011
 5006 7200
 5007 3411
 5010 2776'
 5011 5206
 5012 5600

5013 5213
 5014 3774'
 5015 4200
 5016 1613
 5017 3773'
 5020 2213
 5021 1372

/(IACH) = 0000 #1 SET CURRENT ADDRESS = 7777
 /LOAD DISK ADDRESS AND INITIATE WRITE

/CHECK FOR COMPLETION
 /WAIT

/RETURN IF COMPLETE
 /TIME OUT ?

CLM
 DCA IACH
 TAD 0000
 DMAH
 NOP
 DFSC
 SKP
 JMP 103
 ISZ CTC
 JMP 106
 JMP 1 W0NEW7
 0

PAGE INBUF TO ALL ZEROS
 /CLEAR INBUF TO ALL ZEROS
 /FLUSH
 JMP 1
 CLA
 TAD (=200
 DCA CTA
 TAD (INBUF=1
 DCA 11
 CLA
 DCA 1 11
 ISZ CTA
 JMP 103
 JMP 1 FLUSH

/FILL OUTBUFFER WITH DATA
 /JMS FILL FIRST WORD IN AC
 /XXXX 8 SECOND WORD

FILL,
 JMP
 DCA WORD1
 JMS FLUSH
 TAD 1 FILL
 DCA WORD2
 ISZ FILL
 TAD (=100

/FILL OUTBUFFER WITH DATA
 /JMS FILL FIRST WORD IN AC
 /XXXX 8 SECOND WORD

FILL,
 JMP
 DCA WORD1
 JMS FLUSH
 TAD 1 FILL
 DCA WORD2
 ISZ FILL
 TAD (=100

/FILL OUTBUFFER WITH DATA
 /JMS FILL FIRST WORD IN AC
 /XXXX 8 SECOND WORD

FILL,
 JMP
 DCA WORD1
 JMS FLUSH
 TAD 1 FILL
 DCA WORD2
 ISZ FILL
 TAD (=100

/FILL OUTBUFFER WITH DATA
 /JMS FILL FIRST WORD IN AC
 /XXXX 8 SECOND WORD

FILL,
 JMP
 DCA WORD1
 JMS FLUSH
 TAD 1 FILL
 DCA WORD2
 ISZ FILL
 TAD (=100

/FILL OUTBUFFER WITH DATA
 /JMS FILL FIRST WORD IN AC
 /XXXX 8 SECOND WORD

FILL,
 JMP
 DCA WORD1
 JMS FLUSH
 TAD 1 FILL
 DCA WORD2
 ISZ FILL
 TAD (=100

/FILL OUTBUFFER WITH DATA
 /JMS FILL FIRST WORD IN AC
 /XXXX 8 SECOND WORD

FILL,
 JMP
 DCA WORD1
 JMS FLUSH
 TAD 1 FILL
 DCA WORD2
 ISZ FILL
 TAD (=100

/FILL OUTBUFFER WITH DATA
 /JMS FILL FIRST WORD IN AC
 /XXXX 8 SECOND WORD

```

5022 3776' DCA CTA
5023 1371 TAD (OUTBUF-1)
5024 3011 DCA I1
5025 7272 CLA
5026 1774' TAD WORD1
5027 3411 DCA I 11
5028 1773' TAD WORD2
5029 3411 DCA I 11
5030 2776' ISZ CTA
5031 5225 JMP I=6
5032 5613 JMP I FILL
5033 0000 FILL, 0
5034 3774' DCA WORD1
5035 1235 TAD FILL
5036 3213 DCA FILL
5037 9216 JMP FILL+3

```

```

/IACW OF OUTBUFFER
/DEPOSIT FIRST WORD
/DEPOSIT SECOND WORD
/DONE
/NO !!! LOOP
/YES !!! EXIT

```

```

5042 7402 /SCOPE LOOP SET UP
5043 4770' SCOPEA, XX
5044 7604 JMS TRACE
5045 0367 LAR
5046 7640 AND (1000)
5047 5653 SZA CLA
5048 1242 JMP I RETURN
5049 3253 TAD SCOPEA
5050 5642 DCA RETURN
5051 JMP I SCOPEA
5052 /POINTER FOR SCOPE LOOP

```

```

/LOAD ADDRESS SWITCH
/AND FOR SCOPE LOOP
/SCOPE LOOP
/YES
/NO=SETUP REFERENCE

```

```

5053 5166 RETURN, (BEGIN)
5054 5653 JMP I=1
5055 7402 /ROUTINE TO RING BELL
5056 7200 BELL, XX
5057 1365 CLA
5058 6046 TAD (207)
5059 6041 TLS
5060 5261 TSP
5061 5655 JMP I=1
5062 7000 JMP I BELL
5063 NOP

```

```

5065 7402 /ROUTINE TO WRITE DISK (ANY NUMBER OF DISKS)
5066 6911 WDISK, XX
5067 7200 DCEA
5068 3764' CLA GA
5069 3763' DCA TKADD
5070 1362 TAD (=10)
5071 3776' DCA CTA
5072 1361 TAD (=40)
5073 3360 DCA (XX)
5074 4757' JMS WPAGE

```

```

/TRACK ZERO
/DISC ADDRESS ZERO
/TRACK ZERO
/TRACK COUNTER
/PAGE COUNTER
/WRITE

```

```

5077 1356 TAD (200
5100 1764' TAD GA
5101 3764' DCA GA
5102 1764' TAD GA
5103 2360 ISE (XX
5104 5276 JMP I 06
5105 7200 CLA
5106 1355 TAD (100
5107 1763' TAD TKADD
5110 6615 DEAL
5111 3763' DCA TKADD
5112 2776' ISE CTA
5113 5274 JMP WDISK+7
5114 6611 DCEA
5115 5665 JMP I WDISK
  
```

```

/INCREMENT BY
/PREVIOUS INITIAL ADDRESS
/STORE
/LOAD FOR WRITE
/ALL PAGES
/NO
/YES
/INCREMENT TRACKS
/LOAD TRACK
/STORE TRACK
/ALL TRACKS
/NO
/YES
/EXIT
  
```

```

/ROUTINE OF DISK CAN NUMBER OF DISK1
RDISK, XX
CLA
TAD (0377
DCA (XX
DEAL
CLA
JMS RPAGE
JMS SYNC
ISE (XX
JMP I 03
CLA
JMP I RDISK
  
```

```

5116 7402
5117 7200
5120 1354
5121 3360
5122 6615
5123 7200
5124 4753'
5125 4752'
5126 2360
5127 5324
5130 7200
5131 5716
  
```

```

/NUMBER OF TRACKS
/READ
/FIND NEXT ADDRESS
  
```

```

4472
5153 3615
5154 7401
5155 0100
5156 0200
5157 3600
5160 7402
5161 7740
5162 7770
5163 6604
5164 6922
5165 0207
5166 0421
5167 1000
5170 5327
5171 6777
5172 7700
5173 6616
5174 6615
5175 7177
5176 6610
5177 7600
5200
  
```

/READ RECOVERY TIME
/WRITE 200 TO 377
/READ 400 TO 577
/TIME FROM WRITE TO READ 16.5 * 21 MICROSECONDS
RDREC, XX

5200 7422
5201 7240
5202 4777'
5203 7777
5204 7200
5205 1376
5206 3775'
5207 4774'
5210 6611
5211 1137
5212 1373
5213 3772'
5214 1371
5215 3770'
5216 1367
5217 3766'
5220 1772'
5221 6605
5222 1365
5223 1373
5224 3764'
5225 1371
5226 6622
5227 5226
5230 3770'
5231 1363
5232 3766'
5233 1764'
5234 6603
5235 4762'
5236 6621
5237 4761'
5240 4760'
5241 5600

CLA CHA
JMS FILL
7777
/OUTPUT=7777

/TAG FOR PRINTOUT
/WRITE THE DISC

/REWRITE 200 TO 377

/READ FLAG
/NO

/READ 401 TO 600

PAUSE

/TAPE 4
/RANDOM
/RANDOM RANDSK, WORD ADDRESS AND TRACK TEST

5242 7000
5243 7200
5244 6601
5245 4757'
5246 0356
5247 3323
5250 4757'
5251 3324
5252 4757'
5253 3325
5254 7240
5255 3770'

NOP
CLA
DCHA
JMS RANDOM
AND (0700
DCA RANTK
JMS RANDOM
DCA RANAD
JMS RANDOM
DCA RANWD
CLA CHA
DCA WC

/IRACK ADDRESS

/MEMORY ADDRESS COUNTER

/WORD

/WORD CT=7777

5256 7200
 5257 1355
 5260 3766'
 5261 1323
 5262 6615
 5263 7200
 5264 1324
 5265 6605
 5266 4762'
 5267 7240
 5270 3770'
 5271 1354

CLA
 TAD (RANWD+1
 DCA IACH
 TAD RANTK
 DEAL
 CLA
 TAD RANAD
 DMAH
 JMS FLAG
 CLA CMA
 DCA WC
 TAD (RANWD

/LOAD TRACK ADDRESS
 /LOAD MAC WRITE
 /ONE WORD
 /ONE GREATER THAN READ

5272 3766'
 5273 1323
 5274 6615
 5275 7200
 5276 1324
 5277 6603
 5300 4762'
 5301 6621
 5302 4753'
 5303 7200
 5304 1325
 5305 7041
 5306 1326
 5307 7650
 5310 5642
 5311 6616
 5312 7112
 5313 7630
 5314 5642
 5315 1326
 5316 3752'
 5317 1325
 5320 3751'
 5321 4750'
 5322 5642

DCA IACH
 TAD RANTK
 DEAL
 CLA
 TAD RANAD
 DMAH
 JMS FLAG
 DFSE
 JMS ERADD
 CLA
 TAD RANHD
 CIA
 TAD RANHD+1
 SNA CLA
 JMP I RANDSK
 DEAC
 CLA RTR
 SZL CLA
 JMP I RANDSK
 TAD RANHD+1
 DCA BD
 TAD RANHD
 DCA GO
 JMS BADCOM
 JMP I RANDSK

/LOAD TRACK
 /LOAD MAC READ
 /PARITY ERROR
 /YES
 /NO
 /WRITE
 /READ FROM DISK
 /HEAD FROM DISK
 /READ STATUS
 /WRITE LOCK OR NO DISC
 /GOOD DATA

5323 0000
 5324 7402
 5325 0000
 5326 0000
 5327 0000
 5330 7604
 5331 7010
 5332 7420
 5333 5727
 5334 4747'
 5335 5042
 5336 5342
 5337 5343
 5340 4746'
 5341 4543

RANTK,
 RANAD,
 RANHD,
 TRACE,
 0
 HLT
 0
 0
 0
 LAS
 RAR
 SNL
 JMP I TRACE
 JMS SIXTY
 SCOPEA
 I+4
 I+4
 JMS MESSAGE
 4543

/RANDOM TRACK ADDRESS
 /RANDOM DISK MEMORY ADDRESS COUNTER
 /RANDOM DATA WORD TO BE WRITTEN
 /RANDOM DATA WORD READ BACK

5342 6060
5343 6060
5344 0000
5345 5727
JMP I TRACE

5346 2201
5347 2261
5350 6040
5351 6626
5352 6625
5353 5600
5354 5325
5355 5324
5356 3700
5357 4617
5360 3632
5361 6400
5362 4466
5363 7177
5364 6602
5365 0401
5366 7751
5367 6777
5370 7750
5371 7600
5372 6001
5373 7777
5374 5065
5375 4104
5376 5200
5377 5013
5400 5400

PAGE SCOPE LOOP FOR FAILING DATA LOCATION
/SCOPE LOOP FOR FAILING DATA LOCATION
/THIS ROUTINE USES THE RESULTS OF ERRCOM
/HOUSEKEEPING
SCOPE1 TAD (NOP
CLA TAD ERROSK
SNA
JMP SCOPE1
AND (7000
SNA
JMP SCOPE2
AND (4000
SZA CLA
JMP SCOPE3
TAD ERROSK
TAD (7000
DCA ERROSK
JMP SCOPE4
SCOPE2, CLA
TAD ERROSK
TAD (2777
DCA ERROSK
1377
5400 1377
5401 7200
5402 1776'
5403 7450
5404 5232
5405 0377
5406 7450
5407 5217
5410 0375
5411 7640
5412 5224
5413 1776'
5414 1377
5415 3776'
5416 5236
5417 7200
5420 1776'
5421 1374
5422 3776'
/EQUAL TO ZERO
/YES
/NO
/EQUAL TO 0XXX
/YES
/NO
/EQUAL TO (1XX) (XXX) (XXX) (XXX)
/YES
/NO
/SUBTRACT 1000 FROM DISK ADDRESS
/CORRECT LOW TRACK

5423 5236 JMP SCOPE4
 SCOPE3, CLA /CORRECT HIGH TRACK
 5424 7220 TAD ERRORSK
 5425 1776' TAD (3777
 5426 1373 TAD (4020
 5427 1375 DCA ERRORSK
 5430 3776' JMP SCOPE4
 5431 5236 /CORRECT ZERO CASE
 SCOPE1, CLA
 5432 7202 TAD (3777
 5433 1373 TAD ERRORSK
 5434 1776' DCA ERRORSK
 5435 3776' OPR
 5436 7000

/WRITE 1 WORD AT LOCATION BEFORE FAILING LOCATION,
 5437 7240 CLA CMA /ONE WORD
 5440 3772' DCA WC
 5441 1371 TAD (GD=1 /GOOD DATA = WRITE
 5442 3770' DCA IACH /TRACK ADDRESS
 5443 1767' TAD ERRTK /LOAD TRACK
 5444 6615 DEAL /LOAD DISK ADDRESS START WRITE
 5445 1776' TAD ERRORSK
 5446 6605 DMAR /DONE?
 5447 6622 DFSC /NO
 5450 5247 JMP I=1
 5451 7000 OPR

/READ ONE WORD
 5452 7240 CLA CMA
 5453 3772' DCA WC /ONE WORD
 5454 1366 TAD (BD=1 /BAD DATA READ
 5455 3770' DCA IACH /TRACK ADDRESS
 5456 1767' TAD ERRTK /LOAD TRACK
 5457 6615 DEAL /DISK ADDRESS
 5460 1776' TAD ERRORSK /START READ
 5461 6603 DMAR /DONE
 5462 6622 DFSC /NO
 5463 5262 JMP I=1
 5464 7000 OPR /JUMP TO WRITE
 5465 5236 JMP SCOPE4

/DATA TONE LOOP WITH BELL ON ERROR
 DBELL, HLT
 5466 7402 LAS /LOAD TRACK AND DISC
 5467 7604 AND (76 /LOAD ADDRESS
 5470 0365 JMS RL5
 5471 4764' DEAL
 5472 6615 HLT
 5473 7402 LAS GA
 5474 7604 DCA GA
 5475 3763' HLT
 5476 7402 LAS GD
 5477 7604 DCA CMA
 5500 3762' OPR /ONE WORD
 5501 7240 CLA WC
 5502 3772'

5523	1371	TAD (GD=1	
5524	3772	DCA IACH	
5505	1763	TAD GA	/WRITE
5526	6625	DMAR	
5527	4761	JMS FLAG	/ONE WORD
5510	7240	CLA CMA	
5511	3772	DCA WC	
5512	1366	TAD (BD=1	
5513	3770	DCA IACH	
5514	1763	TAD GA	/READ
5515	6603	DMAR	
5516	4761	JMS FLAG	
5517	7200	CLA	/COMPARE
5520	1762	TAD GD	/ERROR
5521	7041	CIA	
5522	1771	TAD BD	
5523	7440	SZA	
5524	4760	JMS BELL	
5525	5276	JMP DBELL+10	

/ADDRESS SCOPE LOOP WITH BELL ON ERROR

5526	4757	HALT	
5527	7604	JMS ERADD	/LOAD ADDRESS
5530	3763	CLAS	
5531	1763	DCA GA	
5532	4756	TAD GA	
5533	4755	JMS WONEW7	WRITE ONE WORD AT DISK ADDR. IN SWITCHES
5534	7041	JMS SYNC	WAIT FOR PHOTO CELL SYNC AND READ BACK ADDRESS
5535	1763	CIA	
5536	7440	TAD GA	
5537	4760	SZA	
5540	5327	JMS BELL	
		JMP .+11	

/TEST GOOD
/NO
/YES

/PDP 8 DISC

5555	4472		
5556	4731		
5557	5600		
5560	5055		
5561	4466		
5562	6626		
5563	6622		
5564	4724		
5565	0076		
5566	6624		
5567	6606		
5570	7751		
5571	6625		
5572	7750		
5573	3777		

5574	2777		
5575	4000		
5576	6025		
5577	7000		
	5600		
5600	7402		
5601	4777'		
5602	6002		
5603	4776'		
5604	5600		
5605	5611		
5606	5612		
5607	4775'		
5610	4543		
5611	6060		
5612	6060		
5613	4000		
5614	4776'		
5615	6614		
5616	5622		
5617	5623		
5620	4775'		
5621	4040		
5622	6060		
5623	6060		
5624	0000		
5625	7604		
5626	0374		
5627	7640		
5630	7402		
5631	5600		

PAGE
 /PRINT OUT ROUTINES
 /ROUTINE TO PRINT OUT FAILING TEST ADDRESS
 ERADD, XX
 JMS IPRINT
 IOF
 JMS SIXTY
 ERADD
 I+4
 I+4
 JMS MESSAGE
 4543
 6060
 6060
 4000
 JMS SIXTY
 AC
 I+4
 I+4
 JMS MESSAGE
 4040
 6060
 6060
 0000
 LAS
 AND (2000
 SEA CLA
 HLT
 JMP I ERADD

/TEST FOR HALT
 /HALT IF SW1 = ONE

/TRACK ERROR RATIO PRINT OUT
 /TKXX BAD XXXX ***** LESS THAN 200 NDI PRINTED

5632	7402		
5633	4777'		
5634	4776'		
5635	6006		
5636	5647		
5637	5647		
5640	4776'		
5641	6000		
5642	5653		
5643	5654		
5644	4775'		
5645	4543		
5646	2413		
5647	6060		
5650	4040		
5651	0201		

ERTK, XX
 JMS IPRINT
 JMS SIXTY
 ERTK
 I+4
 I+4
 JMS SIXTY
 KA
 I+4
 I+4
 JMS MESSAGE
 4543
 2413
 6060
 4040
 0201

/TRACK NUMBER
 /NUMBER OF ERRORS

5652 0440
 5653 6060
 5654 6260
 5655 2280
 5656 5632
 JMP I ERTK

/PRINT OUT NUMBER OF PASSES

5657 7402
 5660 4776'
 5661 6617
 5662 5667
 5663 5667
 5664 4775'
 5665 4543
 5666 2003
 5667 6060
 5670 0000
 5671 5657
 ENDCT
 XX
 JMS SIXTY
 END
 I+3
 I+4
 JMS MESSAGE
 4543
 2003
 6060
 0
 JMP I ENDCT

/NUMBER OF PASS COMPLETED

5672 7402
 5673 7604
 5674 0374
 5675 7650
 5676 7410
 5677 7402
 5700 5672
 5701 0000
 5702 6032
 5703 6042
 5704 1373
 5705 3772'
 5706 3771'
 5707 7200
 5710 1370
 5711 3002
 5712 1367
 5713 3001
 5714 7200
 5715 6046
 5716 6001
 5717 6616
 5720 7000
 5721 7700
 5722 5317
 5723 6616
 5724 7000
 5725 7710
 5726 5323
 5727 2771'
 5730 7000
 5731 5317
 STOP
 XX
 LAS
 AND (2000
 SNA CLA
 SKP
 HLT
 JMP I STOP
 0
 KCC
 TCF
 TAD (-143
 DCA CTA
 DCA CTB
 CLA
 TAD (PRINT
 DCA 2
 TAD (JMP I 2
 DCA 1
 CLA
 TLF
 ION
 DEAC
 NOP
 SNA CLA
 JMP I+3
 DEAC
 NOP
 SPA CLA
 JMP I+3
 ISE CTB
 NOP
 JMP I+12

DISK DATA TEST

5732 6041 RINT, TSE
 5733 5355 JMP ADDR+1
 5734 6042 TCF
 5735 3357 DCA ACSAV
 5736 1754 TAD I ADDR 215
 5737 6046 TLS
 5740 6001 ION
 5741 7200 CLA
 5742 2766' ISZ CTC
 5743 5346 JMP I+3
 5744 1365 TAD (NOP)
 5745 3346 DCA I+1
 5746 2384 ADDING ISZ ADDR
 5747 1357 TAD ACSAV
 5750 2772' ISZ CTA
 5751 5400 JMP I 0
 5752 6002 TLOF
 5753 9701 JMP I SPEED
 5754 0000 ADDR;
 5755 6001 TON
 5756 5400 JMP I 0
 5757 0000 ACSAV, 0

7000
 5766 6603
 5767 5402
 5770 5732
 5771 3661
 5772 6610
 5773 7635
 5774 2000
 5775 0201
 5776 0261
 5777 4521
 6000
 7402
 6001 4777'
 6002 4776'
 6003 6000
 6004 6010
 6005 6011
 6006 4775'
 6007 4543
 6010 6060
 6011 6060
 6012 0000
 6013 4776'
 6014 6623
 6015 6027
 6016 6030
 6017 4776'
 6020 6624
 6021 6033

PAGE /PRINT OUT ROUTINE FOR BAD TRACK
 ETRACK, XX
 JMS IPRINT
 JMS SIXTY
 I+3
 I+4
 I+4
 JMS MESSAGE
 4543
 6060
 6060
 0000
 JMS SIXTY
 GT
 I+12
 I+12
 JMS SIXTY
 BT
 I+12

/GOOD TRACK
 /BAD TRACK

6022 6034
 6023 4775
 6024 4040
 6025 0724
 6026 4040
 6027 6060
 6030 6060
 6031 4002
 6032 2440
 6033 6060
 6034 6060
 6035 0000
 6036 4774
 6037 5000

12
 JMS MESSAGE
 4040
 0724
 4040
 6060
 6060
 4002
 2440
 6060
 6060
 0000
 JMS STOP
 JMP I ETRACK

/COMPARISON ERROR PRINT OUT

/G0XXXX BDXXXX
BADCOM: XX

6040 7402
 6041 4777
 6042 4776
 6043 6040
 6044 6050
 6045 6051
 6046 4775
 6047 4543
 6050 6060
 6051 6060
 6052 0000
 6053 4776
 6054 6626
 6055 6067
 6056 6070
 6057 4776
 6060 6625
 6061 6073
 6062 6074
 6063 4775
 6064 4040
 6065 0704
 6066 4040
 6067 6060
 6070 6060
 6071 4002
 6072 0440
 6073 6060
 6074 6060
 6075 0000
 6076 4774
 6077 5640

JMS IPRINT
 JMS SIXTY
 13
 14
 14
 JMS MESSAGE
 4543
 6060
 6060
 0000
 JMS SIXTY
 GD
 12
 12
 JMS SIXTY
 BD
 12
 12
 JMS MESSAGE
 4040
 0704
 4040
 6060
 6060
 4002
 0440
 6060
 6060
 0000
 JMS STOP
 JMP I BADCOM

/900D

/8AD

/GR LE
/900D DATA

/BAD DATA

/EXIT

/SYNC ADDRESS TEST PRINT OUT GAXXX SYNCXXX
ERSYNÇ: XX

JMS IPRINT

6100 7402
6101 4777

6203	SKP	7410
6204	JMP	5775'
6205	CLA	7300
6206	TAD	1774'
6207	AND	0177
6210	TAD	RADD
6211	TAD	(1
6212	DCA	ERROSK
6213	JMS	SYNC
6214	DEAC	
6215	AND	0700
6216	DCA	ERRTK
6217	CLL	
6220	TAD	ERRDSK
6221	RAI	
6222	DCA	ERRDSK
6223	RAI	
6224	DCA	LJNKA
6225	TAD	ERRTK
6226	RTR	
6227	RTR	
6230	RTR	
6231	DCA	ERRTK
6232	TAD	LJNKA
6233	RAR	
6234	TAD	ERRTK
6235	RAI	
6236	DCA	ERRTK
6237	TAD	ERRDSK
6240	RAR	
6241	DCA	ERRDSK
6242	JMS	SIXTY
6243	RDL0	
6244	I+4	
6245	I+4	
6246	JMS	MESSAGE
6247	JMS	4543
6250	6050	
6251	6060	
6252	4000	
6253	JMS	SIXTY
6254	ERRTK	
6255	I+21	
6256	I+20	
6257	JMS	SIXTY
6260	ERRDSK	
6261	I+20	
6262	I+20	
6263	JMS	SIXTY
6264	GD	
6265	I+20	
6266	I+20	
6267	JMS	SIXTY
6270	BD	
6271	I+20	

/COMPARE LOOP COUNTER
 /EXTRACT HOW FAR
 /ADD TO INITIAL DISK ADDRESS
 /CORRECT
 /ERROR DISK ADDRESS

 /READ TRACK COUNTER
 /EXTRACT TRACK
 /ERROR TRACK ADDRESS

/ERROR TRACK

/DISK ADDRESS

/GOOD DATA

/BAD DATA

6272	6312	1+20
6273	4762'	JMS MESSAGE
6274	4024	/OSK ADDRESS
6275	1340	
6276	6060	
6277	4004	
6300	0140	/GOOD DATA
6301	6060	
6302	6060	
6303	4007	
6304	0440	/BAD DATA
6305	6060	
6306	6060	
6307	4002	
6310	0440	
6311	6060	
6312	6060	
6313	0000	
6314	4761'	JMS STOP
6315	5600	JMP I ERRCOM

6316	7402	BADADD; XX
6317	4777'	JMS IPRINT
6320	4763'	JMS SIXTY
6321	6316	1+3
6322	6326	1+4
6323	6327	1+4
6324	4762'	JMS MESSAGE
6325	4543	
6326	6060	
6327	6060	
6330	0000	JMS SIXTY
6331	4763'	GA
6332	6622	1+12
6333	6345	1+12
6334	6346	JMS SIXTY
6335	4763'	BA
6336	6621	1+12
6337	6351	1+12
6340	6352	JMS MESSAGE
6341	4762'	
6342	4040	
6343	0701	
6344	4040	
6345	6060	
6346	6060	
6347	4002	
6350	0140	
6351	6060	
6352	6060	
6353	0000	JMS STOP
6354	4761'	JMP I BADADD
6355	5716	

6361 5672
6362 2201
6363 0261
6364 6632
6365 6606
6366 0700
6367 4472
6370 6605
6371 0001
6372 6602
6373 0177
6374 3661
6375 3660
6376 6612
6377 4521
6400

PAGE

6400	0000	STATUS, 0	JMS IPRINT	
6401	4777		DEAC	
6402	6616		DCA SR	
6403	3776		JMS MESSAGE	
6404	4775		4543	/ST
6405	4543		2324	/AT
6406	2324		0124	/E
6407	0124		4005	/RR
6410	4005		2222	
6411	2222		4040	
6412	4040		0000	
6413	0000		CLA	
6414	7200		TAD STATUS	
6415	1200		CIA	
6416	7041		TAD (HPAGE+12	
6417	1374		SEA	
6420	7440		JMP I+6	
6421	5227		JMS MESSAGE	
6422	4775		2722	/MR
6423	2722		1124	/IT
6424	1124		0500	/E
6425	0500		JMP I+5	
6426	5233		JMS MESSAGE	
6427	4775		2205	/RE
6430	2205		0104	/AD
6431	0104		0000	
6432	0000		TAD TKADD	
6433	1773		AND (0700	
6434	0372		RTR	
6435	7012		RTR	
6436	7012		RTR	
6437	7012		DCA ERRTK	
6440	3771		TAD RADD	
6441	1770		CLL	
6442	7100		RAI	
6443	7004		DCA ERRDSK	
6444	3767			

6445	1771'	TAD ERRK	
6446	7004	RAI	
6447	3771'	DCA ERRK	
6450	1767'	TAD ERRDSK	
6451	7010	RAI	
6452	3767'	DCA ERRDSK	
6453	4766'	JMS SIXTY	
6454	6006	ERRTK	
6455	6471	I+14	
6456	6471	I+13	
6457	4766'	JMS SIXTY	
6460	6005	ERRDSK	
6461	6474	I+13	
6462	6475	I+13	
6463	4775'	JMS MESSAGE	
6464	4040	4040	/SA
6465	2301	2301	/E
6466	7540	7540	/I
6467	4024	4024	/K
6470	1340	1340	/D
6471	6060	6060	/A
6472	4004	4004	
6473	0140	0140	
6474	6060	6060	
6475	6060	6060	
6476	0000	0000	
6477	7200	CLA	
6500	1776'	TAD SR	
6501	4341	JMS STAT	
6502	3306	DCA I+4	
6503	4775'	JMS MESSAGE	
6504	4543	4543	/PE
6505	2005	2005	
6506	6060	6060	
6507	0000	0000	
6510	7200	CLA	
6511	1765'	TAD STATSV	
6512	4341	JMS STAT	
6513	3323	DCA I+10	
6514	4775'	JMS MESSAGE	
6515	4040	4040	/NE
6516	1605	1605	/O
6517	0440	0440	/OR
6520	1722	1722	/H
6521	4027	4027	/LO
6522	1417	1417	
6523	6060	6060	
6524	0000	0000	
6525	7200	CLA	
6526	1765'	TAD STATSV	
6527	4341	JMS STAT	
6530	3335	DCA I+5	
6531	4775'	JMS MESSAGE	

6532	4040	
6533	0422	/DR
6534	1440	/L
6535	6060	
6536	4300	
6537	4764	JMS STOP
6540	5600	JMP I STATUS
6541	2000	0
6542	7120	CLL
6543	7010	RAR
6544	3765	OCA STATSV
6545	7430	SEL
6546	5391	JMP I+S
6547	1353	TAD STAT0
6550	5741	JMP I STAT
6551	1354	TAD STAT1
6552	5741	JMP I STAT
6553	7560	JMP I STAT
6554	7561	STAT0, 7560
6564	5672	STAT1, 7561
6565	6633	
6566	0261	
6567	6605	
6570	6602	
6571	6606	
6572	0700	
6573	6604	
6574	3612	
6575	0201	
6576	6620	
6577	4521	
	6600	

/CONSTANTS

6611	OCEAF=6611
6614	DICF=6614
6601	OCMA=6601
6612	DSAC=6612
6603	DMAR=6603
6605	DMAN=6605
6615	DEAL=6615
6616	DEAC=6616
6621	DFSE=6621
6622	DFSC=6622
6626	DMAC=6626
7402	XX=7402
7750	WC=7750
7751	IACH=7751
7751	CACH=IACH
0000	KA, 0
0000	WADD, 0
0000	RADD, 0
0000	CTC, 0

/CL EXT ADDRESS REGISTER

/CLEAR MAR, PE, DONE

/CLEAR AC SKIP ON ADC

/LOAD AND START READ

/LOAD AND START WRITE

/READ EXTENDED ADDRESS

/SKIP ON NO ERROR

/SKIP ON FLAG

/READ DISK ADDRESS

/IACH=1 FOR WRITE

/IACH=1 FOR READ

PAGE

6604	0000	TKADD,	0	/DISK ERROR ADDRESS
6605	0000	ERRDSK,	0	
6606	0000	ERRTK,	0	
6607	0001	NUM,	1	
6610	0000	CTA,	0	
6611	0000	CTD,	0	
6612	0000	ERCT,	0	
6613	0000	BX,	0	/ERROR COUNT FOR COMPARES
6614	0000	AC,	0	/STORE EXT; MEMORY BANK
6615	0000	WORD1,	0	/SAVE AC
6616	0000	WORD2,	0	
6617	0000	END,	0	
6620	0000	SR,	0	/NUMBER OF PASS COMPLETED
6621	0000	BA,	0	/STATUS REGISTER
6622	0000	GA,	0	/BAD ADDRESS
6623	0000	GT,	0	/GOOD ADDRESS
6624	0000	BT,	0	/GOOD TRACK
6625	0000	BD,	0	/BAD TRACK
6626	0000	GD,	0	/BAD DATA
6627	0000	CTADC,	0	/GOOD DATA
6630	0000		0	
6631	0000		0	
6632	0000	LINKA,	0	
6633	0000	STAISV,	0	

6634	0000	DEG,	0	
6635	3326		0	DCA DECA
6636	3327		0	DCA THOU
6637	3330		0	DCA HUND
6640	3331		0	DCA TENS
6641	3332		0	DCA UNIT
6642	1326		0	TAD DECA
6643	7450		0	SNA
6644	5302		0	JMP PACK
6645	7100		0	CLL
6646	1377		0	TAD (1750)
6647	7420		0	SNL
6650	5253		0	JMP I*3
6651	2327		0	ISE THOU
6652	5245		0	JMP I*5
6653	1376		0	TAD (1750)
6654	7450		0	SNA
6655	5302		0	JMP PACK
6656	1375		0	TAD (144)
6657	7510		0	SPA
6660	5263		0	JMP I*3
6661	2330		0	ISE HUND
6662	5256		0	JMP I*4
6663	1374		0	TAD (144)
6664	7450		0	SNA
6665	5302		0	JMP PACK
6666	1373		0	TAD (112)
6667	7510		0	SPA
6670	5273		0	JMP I*3
6671	2331		0	ISE TENS

6672	5266	JMP	1=4
6673	1372	TAD	(12
6674	7450	SNA	
6675	5302	JMP	PACK
6676	1371	TAD	(=1
6677	2332	ISZ	UNIT
6700	7440	SZA	
6701	5276	JMP	1=3
6702	7200	CLA	
6703	1634	TAD	I DEC
6704	3326	DCA	DECA
6705	2234	ISZ	DEC
6776	1327	TAD	THOU
6707	7106	RTL	CLL
6710	7006	RTL	
6711	7006	RTL	
6712	1330	TAD	HUND
6713	1370	TAD	(6000
6714	3726	DCA	I DECA
6715	2326	ISZ	DECA
6716	1331	TAD	TENS
6717	7106	RTL	CLL
6720	7006	RTL	
6721	7006	RTL	
6722	1332	TAD	UNIT

PACK:

6723	1370	TAD	(6000
6724	3726	DCA	I DECA
6725	5634	JMP	I DEC
6726	0000	0	
6727	0000	0	
6730	0000	0	
6731	0000	0	
6732	0000	0	
6733	0215	TABL	
6734	0212		
6735	0304		
6736	0311		
6737	0323		
6740	0313		
6741	0240		
6742	0304		
6743	0301		
6744	0324		
6745	0301		
6746	0240		
6747	0324		
6750	0305		
6751	0323		
6752	0324		
6753	0215		
6754	0212		
6755	0252		
6770	6060		

DECA:
THOU:
HUND:
TENS:
UNIT:

TABL:

6771 7777
6772 0012
6773 7766
6774 0144
6775 7634
6776 1750
6777 6030

7000 PAGE
7000 OUTBUF, 0
7200 PAGE
7200 INBUF, 0

7400 *7400

/ROUTINE TO RESTORE ADDRESSES 7750 AND 7751 IN BINARY LOADER
/AND TO START BINARY LOADER,

7400 7300 CLA CLL
7401 1206 TAD K1355
7402 3610 DCA I 17750
7403 1207 TAD K5743
7404 3611 DCA I 17751
7405 5612 JMP I 17777
7406 1355 K1355,
7407 5743 K5743,
7410 7750 17750,
7411 7751 17751,
7412 7777 17777,

/START BINARY LOADER;

S

0137 0200
0140 2651
0141 6200
0142 6400
0143 6600
0144 1111
0145 1077
0146 4425
0147 4202
0150 4000
0151 2724
0152 4651
0153 4647
0154 4644
0155 5466
0156 5927
0157 2715
0160 2707
0161 5401
0162 2045
0163 2040
0164 2000
0165 1431
0166 1120
0167 4322
0170 7410
0171 2212
0172 7240
0173 5040
0174 5242
0175 4400

0176 0400
0177 5200

AC	6614	DISK	2200	MASKA	0341	SPEED	5701
ACSAV	5757	DISK0	2045	MASKB	0342	SR	6620
ADDR	5746	DISK7	2052	MASKC	0343	START	0100
ADDR	5754	DISK7A	2057	MASKD	0344	STAT	6541
ASR1	1205	DISPAT	0020	MESAGE	0201	STAT0	6553
ASR2	1217	DKI	4400	MSRGTI	0217	STAT1	6554
ASR3	1225	DMAC	6626	MIP	0244	STATSV	6633
ATEST	1120	DMAR	6603	NOSYNG	4322	STATUS	6400
BA	6621	DMAM	6605	NOYBE	2464	STOP	5672
BADADD	6316	DSAC	6612	OUTBUF	6087	SYNC	4472
BADCOM	6040	DHCOI	3400	PACK	7090	SYNG1	6112
BD	6625	END	6617	PRAN1	6702	SYNGT	4235
BEGIN	0421	ENDCT	5657	PRAN2	2647	TABL	6733
BELL	5055	ERADD	5600	PRAN2	2647	TADTST	2434
BT	6624	ERCT	6612	PWRC	3662	TEMP1	2641
BX	6613	ERRCOM	6200	RADD	6002	TEMP2	2642
C212	0255	ERRDSK	6605	RANAD	5324	TEMP3	2643
C215	0257	ERRTK	6606	RANDOM	4617	TEMP4	2644
C245	0260	ERSYNG	6100	RANDSK	5242	TEMP5	2645
C3200	3156	ERIK	5632	RANFIL	4627	TENS	6731
C342	0253	ETRACK	6000	RANTK	5323	TEXTE	6130
C4611	3155	EXSH	4543	RANWD	5325	THOU	6727
CACH	7751	FALCOM	1644	RATIO	2000	TKADD	6604
CKRDOI	3504	FCOM1	1613	RCT	4333	TKCAL	3200
CLFLAG	4600	FILL	5013	ROADJ	2724	TKDEC	1431
CMPIR	3150	FILLA	5035	RDI	4121	TKERR	1523
COMA	3644	FILLX	4655	ROISK	5116	TKING	1401
COMPAR	3632	FLAG	4466	ROLO	4104	TKRD	1464
CONV	4271	FLUSH	5000	ROREC	5200	TKTST	4504
CONVB	4314	GA	6622	RDX	4705	TOL	1440
CTA	6610	GD	6626	RETURN	2650	TRACE	1702
CTADC	6627	GY	6626	REVCNT	5053	TSTDB	5327
CTB	3661	HUND	6623	RINT	1701	TYPCH	2040
CTC	6603	I7750	6730	RL5	5732	UNIT	0220
CTD	6611	I7751	7410	RL6	4724	WADD	6732
CTIMEA	3000	I7777	7411	RONE	0056	WALL	6601
CTIMEB	3024	IACH	7412	RO1TS	2676	WQ	4535
CTIMEC	3136	INBUF	7751	ROT2TS	2400	WDISK	7700
CTIMEX	3145	IPRINT	7200	RPH	2416	WONE	5065
CTIMEY	3146	ISYST	4521	SARD	3615	WONEW7	2665
CYCLE	3147	JMREU	2245	SAWD	0400	WORD1	4731
DBELL	5466	JMSTST	2622	SCOPE	2715	WORD2	6615
DBYST	2205	K1355	2600	SCOPE1	2707	WPAGE	6616
DCEA	6611	K5743	7406	SCOPE2	5401	WPAGEX	3600
DCEM	6001	KA	7407	SCOPE3	5432	WRC00	4222
DEAC	6616	LINKA	6600	SCOPE4	5417	WRC77	3675
DEAL	6615	M2	6632	SCOPEA	5424	WRCX	3705
DEC	6634	M3	0256	SIXTY	5436	WRTHI	4000
DECA	6726	M40	0254	SLOWB	5042	WRTLO	4067
DF5C	6622	MASK77	0252		4343	WRTX	4053
DFSE	6621		4202		0261	WSYNG	4666
DIEF	6614		0251		0063		4500

WTRK	2651
X	3151
XBANK	4425
XX	7422
Y	3153

ERRORS DETECTED I 0

LINKS GENERATED I 749

RUN-TIME I 20 SECONDS

JK CORE USED