

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.
- | | | | | |
|---|---|---|---|----|
| 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|----|
- 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

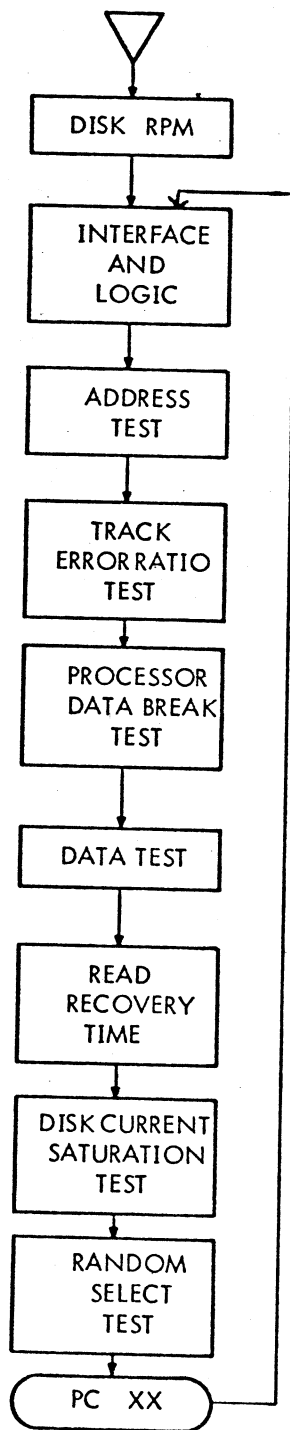
9.1 Discussion

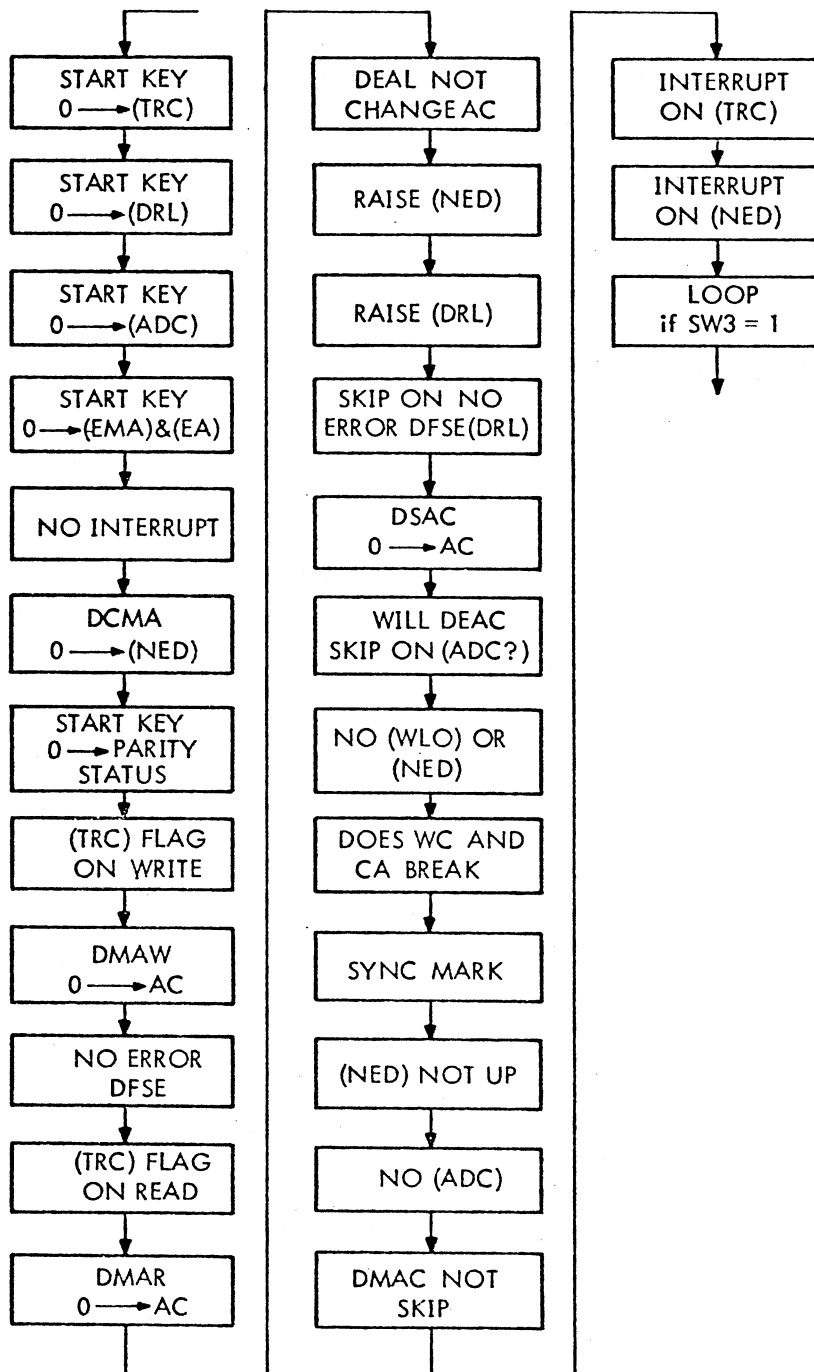
The DF32/DF32D Disk Data Test can be broken down into three sections. Section 1 is an interface test between the disk logic and the computer, testing the disk instructions, error detection interrupts and data break. Section 2 is an address test of the disk using both read and write instructions to verify 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

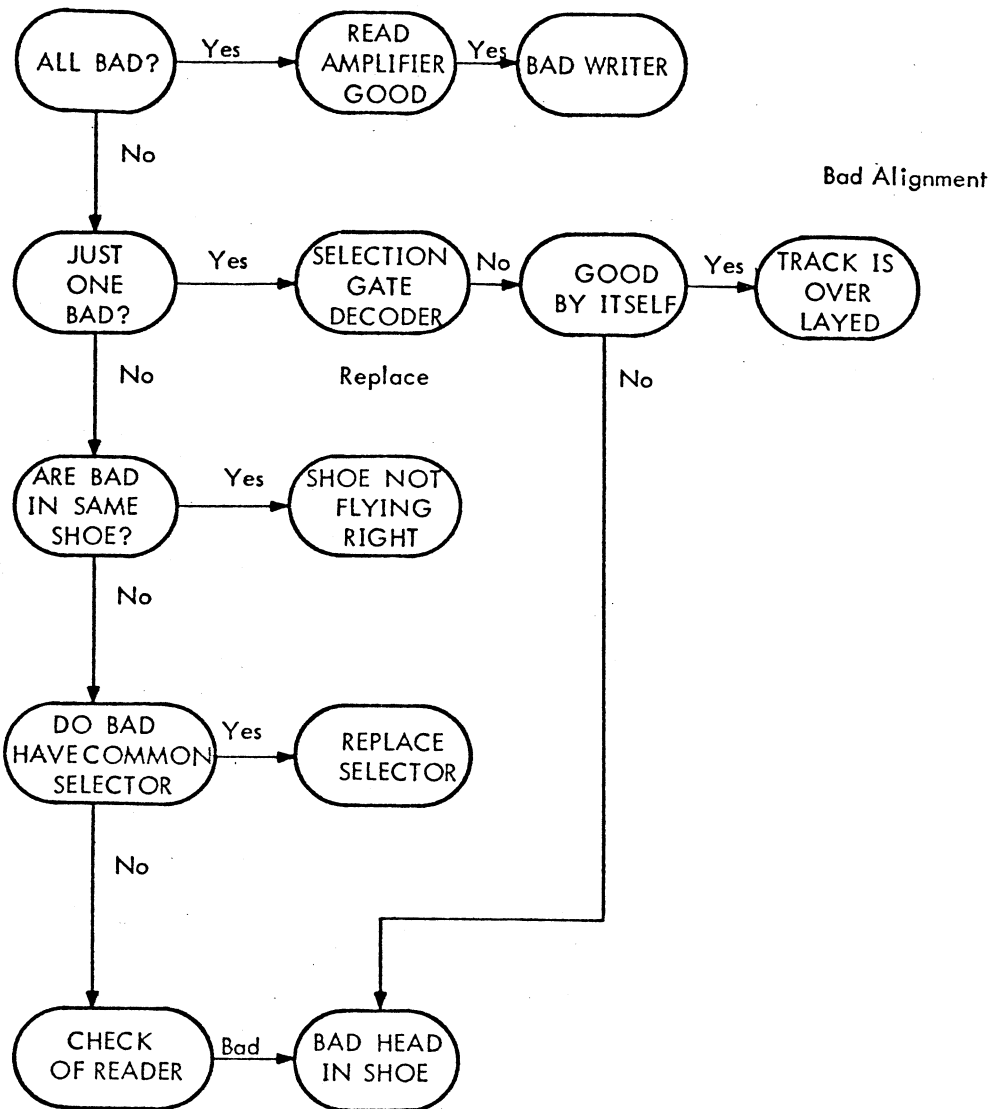
11. 2 FLOW DIAGRAMS

11.1 Basic System Flow

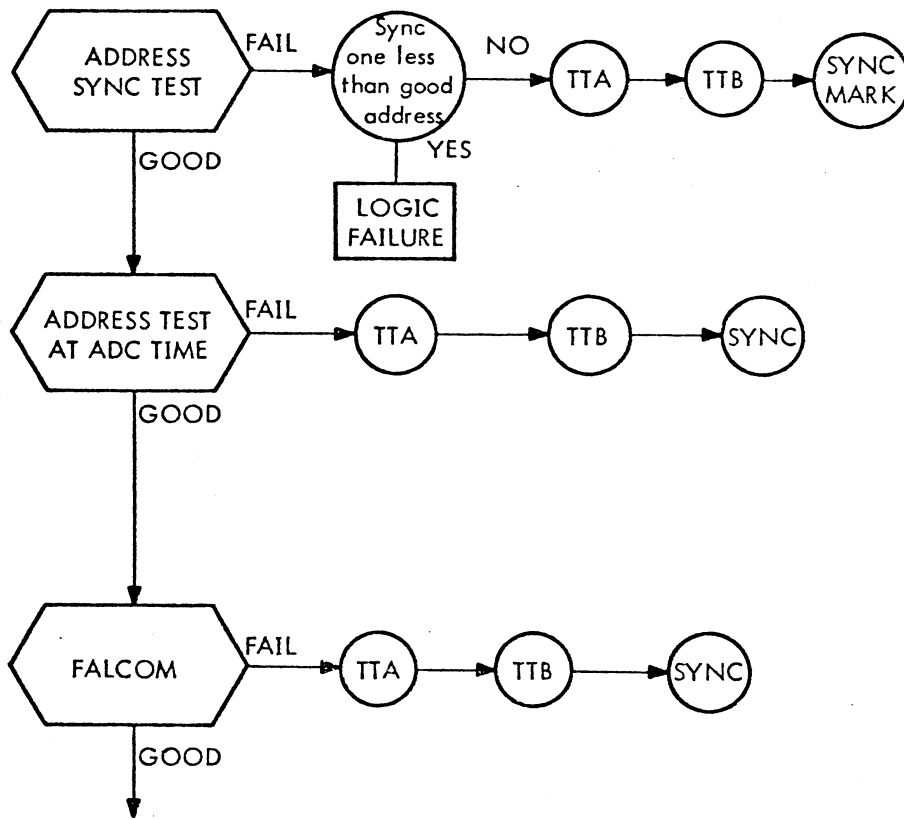




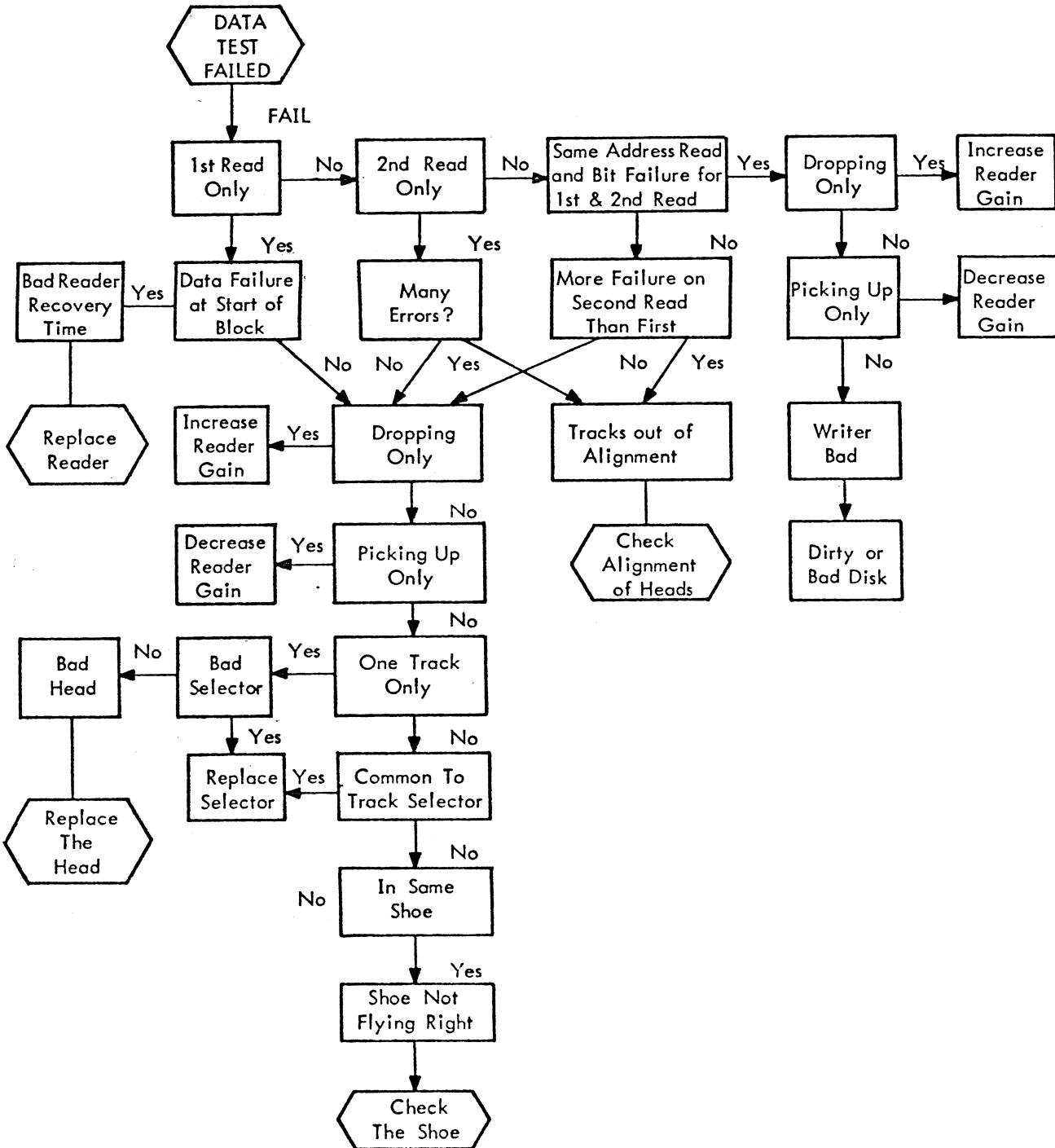
11.4 Track Error Ratio Test Trouble Flow



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 ISZ 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: XX
0057 7106 CLR RTL
0060 7006 RTL
0061 7006 RTL
0062 5456 JMP I RL6

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

0077 0877 /JUMP OFF POINT
0077 4863 JMS SLOWB
0100 5776 /START: JMP RPH
0101 5766 JMP ATEST
0102 5765 JMP TKDEC
0103 5764 JMP RATIO
0104 5763 JMP TSTOB
0105 5762 JMP DISKB
0106 5021 JMP DISPAT+1
0107 5043 JMP DISPAT+20
0110 5045 JMP DISPAT+25 /SPECIAL SCOPE LOOPS

/DB 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

```

```

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=EXTI 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)=01
/ADD LOCATION
/AUTO-INDEX REGISTER
/FETCH FIRST WORD
/SAVE II
/ROTATE 6 BITS RIGHT
/TYPE II
/GET DATA AGAIN
/TYPE RIGHT HALF
/CONTINUE
/TEMPORARY STORAGE
/TYPE CHARACTER IN CIAC)=0-11

```

```

0220 0000 AND MASK77
0221 0231 SNA I 10
0222 7480 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 1254 SZA I+3
0232 7440 JMP C212
0233 5236 TAD MTP
0234 1255 JMP MTP
0235 5244 TAD M2
0236 1256 TAD M2
/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

```

```

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 R33 00X0

/X0X0

/X0X0 R33 00X0

/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 /RMS DISC TEST
 /DISK MOTOR SPEED CHECK USING SYNC MARK
 /DISK RPM XXXX RMS 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
JMP 103
IOF
HALT
JMS ERADD
IOF
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
/CLEAR PD FLAGS
/INTERRUPT ON
/INTERRUPT UP
/INTERRUPT I

```

```

0463 4763' HALT
0464 4764' JMS ERADD
          JMS SCOPEA
/
/NO PARITY STATUS BIT
0465 6616 DEAC
0466 7000 NOP
0467 2356 AND (1
0470 7440 SZA
HALT
0471 4763' JMS ERADD
0472 4764' JMS SCOPEA
/
/DISK MEMORY ADDRESS WRITE
          (DMAN)(OFSC)
0473 7240 CLA CMA
0474 3755' DCA IACW
0475 7240 CLA CMA
0476 3754' DCA WC
0477 6625 DMAN
0500 6622 DFSC
0501 7410 SKP
HALT
0502 4763' JMS ERADD
0503 7000 NOP
0504 2753' ISE CTD
0505 5304 JMP I=1
0506 2753' ISE CTD
0507 5306 JMP I=1
0510 2753' ISE CTD
0511 5310 JMP I=1
0512 6622 DFSC
HALT
0513 4763' JMS ERADD
0514 4764' JMS SCOPEA
/

```

/PARITY STATUS BIT UP

```

/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?
0515 7240 CLA CMA
0516 3754' DCA WC
0517 7240 CLA CMA
0520 6605 DMAN
0521 6622 DFSC
0522 5301 JMP I=1
0523 7440 SZA
HALT
0524 4763' JMS ERADD
          JMS SCOPEA
/

```

/ONE WORD

```

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

```

/AC NOT CLEARED

```

/IS ERROR STILL CLEARED?
0525 4764' JMS SCOPEA
0526 6621 DFSC
HALT
0527 4763' JMS ERADD
0530 4764' JMS SCOPEA
/

```

/PARITY ERROR FLAG UP

/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)

PAGE /IS AQ 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	

HALT ERADD
JMS SCOPEA
/AC NOT CLEARED

0610 4775'
0611 4777'

/LOAD EXTENDED ADDRESS
/DOES "DEAL" CHANGE THE AC?
CLA
DIEF /LOOK FOR SYNC
SMA CLA /SYNC YET?
JMP 1=3 /NO, CONTINUE WAITING;
DIEF /LOOK FOR SYNC TO GO AWAY;
SPA CLA /SYNC GONE?
JMP 1=2 /NO, WAIT FOR IT TO GO BY;
DCMA /NOT SHOULD NOT CHANGE AC
DEAL /AC SHOULD BE ZERO
SEA /AC#7777
HALT ERADD /SHOULD NOT CHANGE AC
JMS SCOPEA

0624 4775'
0625 7240
0626 6615
0627 7040
0630 7440

0631 4775'
0632 4777'

/RAISE NED (NON EXISTANT DISC)

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

0641 4775'
0642 4777'

/DOES 0612 CLEAR THE AC? (DSAC)

0643 6611
0644 7240
0645 6612
0646 7440
DCSA /SET AC TO SEVENS
CLA CMA
DSAC
SEA
HALT ERADD /HALT BECAUSE AC NOT ZERO OR ACC UP
JMS SCOPEA

/WILL DEAC SKIP DURING DATA BREAK?

0647 4775'
0650 4777'

/ONE WORD

0651 6611
0652 3776'
0653 3772'
0654 6605
0655 6616
DCSA
DCA WC
DCA TACH
DMAH
DEAC

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 /READ STATUS
 0666 7030 NOP
 0667 7006 RTL
 0670 7430 SZH
 HALT
 0671 4775' JMS ERADD
 0672 4777' JMS SCOPEA

/ACL UP WRITE LOCK OUT SWITCH

/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
 HALT
 0704 4775' JMS ERADD
 NPAGE
 0705 5771 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
1014 4774'
1015 1775'
1016 7440
1017 4774'
1020 4777'

SEA CLA
JMS ERADD
TAD IACH
SEA
JMS ERADD
JMS SCOPEA

/WORD COUNT NOT CORRECT
/ADDRESS CONTROL WORD NOT CORRECT

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

1021 6611
1022 7301
1023 3773'
1024 6616
1025 7000
1026 7700
1027 7410
1030 5234
1031 2773'
1032 5224

DCEA
CLA CLL IAC
DCA CTD
DEAC
NOP
SMA CLA
SKP
JMP I+4
ISZ CTD
JMP I=6
HALT
JMS ERADD
TAD CTD
SNA
HALT
JMS ERADD
JMS SCOPEA

/SYNC?
/NO
/YES
/LOOP
/NO SYNC PULSE

1033 4774'
1034 1773'
1035 7450
1036 4774'
1037 4777'

HALT ERADD
TAD CTD
SNA
HALT
JMS ERADD
JMS SCOPEA

/SYNC OR NED ALWAYS UP

/CHECK FOR NO ADDRESS COMPARE PULSE

1040 6611
1041 7200
1042 3773'
1043 6616
1044 7410
1045 4774'
1046 2773'
1047 5243
1050 4777'

DCEA
CLA
DCA CTD
DEAC
SKP
HALT
JMS ERADD
ISZ CTD
JMP I=4
JMS SCOPEA

/SKIP ON ADC
/ADC PULSE

/CHECK THAT DMAC DOES NOT SKIP ON DONE FLAG

1051 6611
1052 7240
1053 3776'
1054 3775'
1055 6605
1056 6622
1057 5256
1060 6626
1061 7410
1062 4774'
1063 4777'

DCEA
CLA CMA
DCA HC
DCA IACH
DMAH
DFSC
JMP I=1
DMAC
SKP
HALT ERADD
JMS SCOPEA

/ONE WORD

/FLAG IS SET
/DMAC SKIPPED

/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

/INSTRUCTION TO BE EXECUTED ON INTERRUPT

/NO INTERRUPT ON NED

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

/SWITCH 3

/LOOP ON INTERFACE TEST

PAUSE

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

1120 7000 JMS SCOPEA
 1121 4777' DCEA
 1122 6611 TAD (4000
 1123 1364 DCA GA
 1124 3763' CLA
 1125 7200 TAD GA
 1126 1763' JMS HONEH7
 1127 4762' DEAC
 1130 6616 SHA
 1131 7500 JMP I=2
 1132 5330 DMAC
 1133 6626 DCA BA
 1134 3761' TAD BA
 1135 1761' CIA
 1136 7041 TAD GA
 1137 1763' /IACH91
 /SYNC PULSE
 /NO
 /YES = READ MAG

1140	7450	SNA
1141	5347	JMP I*6
1142	4760	JMS ERSYNG
1143	7604	LAS
1144	3357	AND (1000
1145	7440	SEA
1146	5325	JMP I*21
1147	2763	ISE 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	6411
1174	5600
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	5000	DCA 0000
1211	7240	CLA CMA
1212	3772	DCA WC
1213	7240	CLA CMA
1214	3771	DCA IACH
1215	1000	TAD 0000
1216	6003	DMAR
1217	6022	DF30
1220	7610	SKP CLA
1221	5225	JMP ASR3
1222	0222	AND
1223	2773	ISE 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	
1273	NOP	/READ DISC ADDRESS
1274	DMAC	/SAVE DISC ADDRESS
1275	DCA BA	/BRING UP DISC ADDRESS
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	

14151 PAGE 1014 20 MAR 73

SNA
 JMP I+6
 CLA
 TAD GA
 TAD (a1
 DCA GA
 JMP I=32
 TAD GA
 SZA
 JMP I=35
 JMS SCOPEA
 /YES, LOAD ADDRESS
 /END?
 /NO, RETURN
 /YES, EXIT

NPAGE JMP I (+200&7600

PAGE /TRACK INCREMENT ADDRESS TEST

1306 7450
 1307 5315
 1310 7200
 1311 1774'
 1312 1365
 1313 3774'
 1314 5262
 1315 1774'
 1316 7440
 1317 5262
 1320 4777'
 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

JMS SCOPEA
 NOP
 DCEA
 CLA
 TAD (a7
 DCA CTA
 DCA GT
 CLA
 TAD GT
 DEAL CMA
 CLA HONEY7
 JMS HONEY7
 DEAC
 AND (3700
 DCA BT
 TAD BT
 CIA
 TAD GT
 SZA CLA
 JMS ETRACK
 TAD GT
 /GOOD TRACK
 /LOAD TRACK ADDRESS
 /WRITE ONE WORD
 /READ TRACK ADDRESS
 /TRACK MASK
 /BAD TRACK
 /COMPARISON ERROR

1400 4777'
 1401 7000
 1402 6611
 1403 7200
 1404 1376
 1405 3773'
 1406 3774'
 1407 7200
 1410 1774'
 1411 6615
 1412 7240
 1413 4773'
 1414 6616
 1415 0372
 1416 3771'
 1417 1771'
 1420 7041
 1421 1774'
 1422 7640
 1423 4770'
 1424 1774'

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		DCHA	/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	CIA
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

LAG /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

```

```

1644 7200 FALCOM: CLA GA
1645 1774 TAD GA
1646 4772 JMS WONE
1647 6622 DFSC
1650 5247 JMP 1=1 /FLAG = DID II
1651 7200 CLA GA
1652 1774 TAD GA /DO IT AGAIN
1653 4772 JMS WONE
1654 1367 TAD (XX
1655 3771 DCA CTC
1656 6622 DFSC
1657 5202 JMP 1=3 /FALSE COMPARE, FLAG BEFORE ISZ OUT
1660 4766 JMS TEXTE /TIME KILLER
1661 5244 JMP FALCOM
1662 0262 AND
1663 2771 ISZ CTC /ISZ AND CHECK FOR FLAG
1664 5256 JMP 1=6

```

```

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 0020 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+13 /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 DBTST /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 CKRDOI
2203 5620     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
          /SET FLAG
2211 7200     CLA
2212 1373     TAD (7760
          /CLA CMA FOR PDPS
2213 3772'    DCA KA
2214 1371     TAD (JMS I CTRK
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
          /JMP DBTST+14
2240 5221     IOF
2241 6002     DFSC
2242 6622     JMP I 01
2243 5242     JMP I DBTST
2244 5605

```

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

/ISE TEST ABOUT 61 MILLISECONDS

```

2245 7402     ISEIST, XX
2246 7040     CMA
2247 3762'    DCA TEMP3
2250 3761'    DCA TEMP2
2251 3760'    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

2424 7041 CMA IAC
 2425 1777' TAD TEMP2
 2426 7440 SZA /COMPUTER BAD
 2427 7402 HLT
 2430 2777' ISZ TEMP2
 2431 5217 JMP ROT2TS+1
 2432 7200 CLA
 2433 5616 JMP I ROT2YS

/TAD TEST ADD EVERY COM TO RAN NO
 /ABOUT 86 MILLISECONDS
 TADTST, XX

2434 7402 DCA TEMP3
 2435 3776' TAD PRAN1
 2436 1775' CL4 RAL
 2437 7104 SEL
 2440 7430 IAC
 2441 7001 DCA PRAN1
 2442 3775' TAD PRAN2
 2443 1774' TAD PRAN1
 2444 1775' DCA PRAN2
 2445 3774' TAD PRAN2
 2446 1774' DCA TEMP4
 2447 3773' TAD PRAN2
 2450 1774' TAD TEMP3
 2451 1776' CHA IAC
 2452 7041 TAD TEMP4
 2453 1773' SZA /COMPUTER BAD
 2454 7440 HLT
 2455 7402 ISZ TEMP4
 2456 2773' NOP
 2457 7000 ISZ TEMP3
 2460 2776' JMP I=11
 2461 5250 CLA
 2462 7200 JMP I TADTST
 2463 5634

NOTE,	CLA	TAD	DCA	CTA	CTD	ISZ	JMP	DCA	JMS	DCA	DCA	DCA	TAD	CTA	DCA	CL4	TAD	SEL	ISZ
2464	7200																		
2465	1372																		
2466	3771'																		
2467	1770'																		
2470	2771'																		
2471	5267																		
2472	3770'																		
2473	4767'																		
2474	3771'																		
2475	3766'																		
2476	3765'																		
2477	1770'																		
2500	7041																		
2501	3770'																		
2502	7100																		
2503	1771'																		
2504	7430																		
2505	2766'																		

/OTA, 0AND, OF CYCLES

/GET CYCLE TIME

/MSH
 /LSH

/NO, OF CYCLES; CYCLE TIME

```

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 1ST MAKE 13 PASSES OF 128 CONSECUTIVE JMS ,
/AND COMPARE RESULTS FOR ABOUT 63 MILLISECONDS

```

JHSTST1 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
2622 1372 JMRETU, TAD (7603
2623 3242 DCA TEMP2
2624 1371 TAD (OUTBUF+2
2625 3243 DCA TEMP3
2626 1243 TAU TEMP3
2627 7040 CMA
2630 1643 TAD I TEMP3
2631 7440 SZA
2632 7402 HLT
2633 2243 ISZ TEMP3
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,
2647 2634 PRAN2,
2650 2622 RETUJM, JMRETU

```

```

2651 7402 XX
2652 6622 DFSG
2653 7402 HLT
2654 3770' DCA AC
2655 6611 DCEA
2656 7200 CLA
2657 3767' DCA WC
2660 3766' DCA IACH
2661 6605 DMAH
2662 6001 ION
2663 1770' TAD AC
2664 5651 JMP I WTRK

```

```

/SKIP ON DONE FLAG
/PARITY ERROR GEN INTERRUPT
/SAVE AC
/TRACK ZERO

```

```

/RESTORE AC

```

```

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

```

```

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

```

```

/START WRITE

```

2675 5665 JMP I WONE

/READ ONE WORD DO NOT WAIT FOR FLAG

2676 7402 RONE, XX
 2677 3000 DCA 0000
 2700 7240 CLA CMA
 2701 3767 DCA WC
 2702 7240 CLA CMA
 2703 3766 DCA IACH
 2704 1000 TAD 0000
 2705 6603 DMAR
 2706 5676 JMP I RONE

/START READ

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

2707 7604 SAWD, LAS
 2710 4265 JMS WONE
 2711 6622 DFSC
 2712 2765 ISE CTA
 2713 5312 JMP 101
 2714 5307 JMP 105

/SCOPE LOOP FOR ADDRESS TEST READ

2715 7604 SAWD, LAS
 2716 4276 JMS RONE
 2717 6622 DFSC
 2720 2765 ISE CTA
 2721 5320 JMP 101
 2722 5315 JMP 105

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

2723 0000 R0ADJ, 0 /COUNTER
 2724 7200 CLA BT /TRACK ADDRESS
 2725 3764 DCA BT /WRITE TRACKS
 2726 4763 JMS TKCAL /READ EACH TRACK 5 TIMES
 2727 1362 TAD 105
 2730 3323 DCA R0ADJ=1
 2731 1764 TAD BT
 2732 7010 RAR
 2733 7630 SEL CLA /ODD OR EVEN?
 2734 5341 JMP 105 /ODD
 2735 1764 TAD BT /EVEN
 2736 4761 JMS RL5
 2737 4760 JMS R0LD
 2740 5344 JMP 104
 2741 1764 TAD BT
 2742 4761 JMS RL5
 2743 4737 JMS RDM1
 2744 2323 ISE R0ADJ=1 /READ 5 TIMES
 2745 5331 JMP R0ADJ*5 /NO
 2746 1396 TAD 107 /YES
 2747 1764 TAD BT

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			TCF	
3002	6042			CLA CLL	
3003	7300			TAD	
3004	1377			DCA	
3005	3001			TAD	
3006	1376			DCA	
3007	3002			DCA	
3010	3345			DCA	
3011	3346			CLS	
3012	6046			TSP	
3013	6041			JMP	
3014	5213			CLS	
3015	6046			ION	
3016	6001			ISE	
3017	2345			JMP	
3020	5217			ISE	
3021	2346			JMP	
3022	5217			HLT	
3023	7402			TSP	
3024	6041			JMP	
3025	5336			CLA	
3026	7200			TAD	
3027	1395			DCA	
3030	3350			DCA	
3031	3351			CLL	
3032	7100			TAD	
3033	1345			SEL	
3034	7430			ISE	
3035	2351				

(JMP I 2
 1 (CTIMEA
 2 CTIMEX
 CTIMEY
 101
 CTIMEX
 101
 CTIMEY
 103
 CTIMEB
 (=3
 CHPYR
 X
 CTIMEX
 X

/SET UP FOR INTERRUPT
 /SET ITY PRINTER FLAG
 /START ITY FOR 100 MS TIME DELAY
 /COUNT NO. OF CYCLES
 /IN 100 MSECS
 /NO INTERRUPT FROM ITY
 /WRONG INTERRUPT
 /MPY CTIMEX TIMES 3
 /ADD LEAST SIG HALP
 /OVERFLOW?
 /YES, INCREMENT MOST SIG HALP

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	/Y=0Y
3074	2353	ISZ		
3075	7200	CLA	CYCLE	
3076	3347	DCA	Y	
3077	1353	TAD		
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	Y	
3107	2353	ISZ		
3110	7200	CLA	C4611	/MOST SIG HALF OF 10**7
3111	1353	TAD	X	/LEAST SIG HALF OF 10**7
3112	3351	DCA	C3200	
3113	1356	TAD	X+1	
3114	3352	DCA		
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 CL4
3125 1353 TAD
3126 3351 DCA
3127 7420 SN4
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 SZL
3143 2346 ISZ
3144 5400 JMP
3145 2000 CTIMEX
3146 0000 CTIMEY
3147 0000 CTIMEZ
3151 0000 CTIMEY
3152 0000 CTIMEY
3153 0000 CTIMEY
3154 0000 CTIMEY
3155 4611 C4611
3156 3200 C3200
    
```

/WRONG INTERRUPT

PAGE /TRACK WRITERS FOR DISC CALIBRATION

```

TKCAL: XX DCEA
3200 7402 CLA
3201 6611 TAD
3202 7200 JMS
3203 1377 JMS
3204 4776' JMS
3205 0000 TAD
3206 1377 JMS
3207 4775' JMS
3210 1374 TAD
3211 4776' JMS
3212 0001 TAD
3213 1377 JMS
3214 4773' TAD
3215 1372 JMS
3216 4776' JMS
3217 0002 TAD
3220 1371 JMS
3221 4775' JMS
    
```

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

/TRACK 0
 /TRACK 1

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

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 /IRACK 11
 3456 1366 TAD (500)
 3457 4774' JMS WRTHI
 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 /IRACK 13
 3466 1365 TAD (600)
 3467 4774' JMS WRTHI
 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 RDLO	
3510	4773'	TAD (0	
3511	1372	JMS RDHI	
3512	4775'	TAD (100	
3513	1372	JMS RDLO	
3514	4773'	TAD (100	
3515	1371	JMS RDHI	
3516	4775'	TAD (200	
3517	1371	JMS RDLO	
3520	4773'	TAD (200	
3521	1370	JMS RDHI	
3522	4775'	TAD (300	
3523	1370	JMS RDLO	
3524	4773'	TAD (300	
3525	1367	JMS RDHI	
3526	4775'	TAD (400	
3527	1367	JMS RDLO	
3530	4773'	TAD (400	
3531	1366	JMS RDHI	
3532	4775'	TAD (500	
3533	1366	JMS RDLO	
3534	4773'	TAD (500	
3535	1365	JMS RDHI	
3536	4775'	TAD (600	
3537	1365	JMS RDLO	
3540	4773'	TAD (600	
3541	1364	JMS RDHI	
3542	4775'	TAD (700	
3543	1364	JMS RDLO	
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
3601 7000
3602 3777'
3603 1376
3604 3775'
3605 1374
3606 3773'
3607 1777'
3608 6605
3609 6621
3610 4772'
3611 6622
3612 5210
3613 5620
3614

/ WRITE ONE PAGE
/ JMS '111' WITH DISK ADDRESS IN AC
/ WPAGE, NOP
/ DISK ADDRESS
/ WORD COUNT
/ INITIAL ADDRESS
/ DISK ADDRESS
/ LOAD DISK = WRITE
/ HAIT FOR FLAG
/ JMS STATUS
/ DFSC
/ JMP I=3
/ JMP I WPAGE
/ EXIT
/ READ ONE PAGE
/ JMS '111' WITH DISK ADDRESS IN AC

```

```

3615 7000
3616 3771'
3617 1376
3620 3775'
3621 1370
3622 3773'
3623 1771'
3624 6605
3625 6621
3626 4772'
3627 6622
3630 5225
3631 5615

/ DISK ADDRESS
/ WORD COUNT
/ INITIAL ADDRESS
/ DISK ADDRESS
/ LOAD DISK '111' READ
/ HAIT FOR FLAG
/ JMS STATUS
/ DFSC
/ JMP I=3
/ JMP I WPAGE
/ EXIT

```

```

3632 5232
3633 7200
3634 1367
3635 3766'
3636 1370
3637 3811
3640 1374
3641 3012
3642 1376
3643 3261
3644 7200
3645 1411

/ COMPARE OUTBUFFER WITH INBUFFER
/ COMPARE, JMP,
/ CLA
/ TAD (=10)
/ OCA ERCT
/ TAD (INBUF=1)
/ OCA 11
/ TAD (OUTBUF=1)
/ OCA 12
/ TAD (=200)
/ OCA GTB
/ CLA
/ TAD I 11
/ ERROR COUNT
/ INBUFFER = IAH
/ OUTBUFFER = IAH
/ LOOP COUNTER

```

3646	3765'	DCA BD	/DATA THAT WAS READ
3647	1412	TAD I 12	
3650	3764'	DCA GD	/DATA THAT WAS WRITTEN
3651	1764'	TAD GD	
3652	7041	CLA	
3653	1765'	TAD BD	
3654	7640	SEA CLA	
3655	4763'	JMS ERRCOM	/ERROR
3656	2261	ISE CTB	/DONE
3657	5244	JMP COMA	/NO
3660	5632	JMP I COMPAR	/YES EXIT
3661	0000	Ø	

3662	7000	/WRITE READ COMPARE	
3663	7200	PHRC:	
3664	1262	NOP	
3665	3762'	CLA	PHRC
3666	1361	TAD	RDLO
3667	4200'	DCA	
3670	4760'	TAD (3700	
3671	1361	JMS WPAGE	
3672	4215	JMS FLUSH	
3673	4232	TAD (3700	
3674	5662	JMS RPAGE	
		JMS COMPARE	
		JMP I PHRC	

/CHECK ZEROS

3675	7000	WRC00:	
3676	7200	NOP	
3677	1357	CLA	/0000
3700	4756'	TAD (0000	
3701	0000	JMS FILL	
3702	4262	Ø000	
3703	5675	JMS PHRC	
		JMP I WRC00	

/CHECK SEVENS

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

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 WRCC
 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

```

0000
4201 0800
4202 4777'
4203 1376
4204 3201
4205 7200
4206 3200
4207 1200
4210 3200

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

/TRACK STORAGE
/COUNTER
/RANDOM FILL
/COUNTER
/TRACK

```



```

4211 1200 TAD MARGIN=2
4212 6615 DEAL
4213 4775 JMS PWRQ
4214 7200 CLA
4215 1374 TAD (0100
4216 2201 ISZ 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
4223 3773 DCA WADD /DISC ADDRESS
4224 1372 TAD (=200 /WORD COUNT
4225 3771 DCA WC /CURRENT ADDRESS
4226 1370 TAD (INBUF=1 /WRITE
4227 3767 DCA IACH /SKIP ON DONE
4230 1773 TAD WAOD /EXIT
4231 6605 DMAH
4232 6622 DFSC
4233 5232 JMP I=1
4234 5622 JMP I WPAGEX

```

```

4235 0000 SYNCI; 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 ISZ CTC
4251 5244 JMP I=5
4252 5635 JMP I SYNCI
4253 6616 DEAC
4254 7000 NOP
4255 7510 SPA
4256 5266 JMP I=10
4257 2763 ISZ CTD
4260 5253 JMP I=5
4261 5635 JMP I SYNCI
4262 6616 DEAC
4263 7000 NOP
4264 7500 SMA
4265 5635 JMP I SYNCI
4266 2766 ISZ CTA
4267 5262 JMP I=5
4270 5635 JMP I SYNCI

```

```

/PAGE WRITE READ COMPARE

```

4271	7000	CONV,	0
4272	7270	CLA	
4273	1362	TAD (16	
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,

4325 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 0100
4375 3662
4376 7771
4377 4627

```

4400 PAGE /DISK WRITE CURRENT TEST
4400 7402 XX
4401 7200 CLA
4402 1377 TAD (7777
4403 4776 JMS FILL
4404 7777 7777
4405 4775 JMS WDISK
4406 4775 JMS WDISK
4407 4775 JMS WDISK
4410 1374 TAD (3777
4411 4776 JMS FILL
4412 3777 3777
4413 4775 JMS WDISK
4414 4773 JMS CKR001
4415 4775 JMS WDISK
4416 4775 JMS WDISK
4417 1377 TAD (7777
4420 4776 JMS FILL
4421 7777 7777
4422 4775 JMS WDISK
4423 4773 JMS CKR001
4424 5600 JMP I DK1
    
```

/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 7402 XBANK, HLT
4426 7604 LAS
4427 7004 RAL
4430 7006 RTL
4431 0372 AND (0070
4432 3771 OCA BX
4433 6615 DEAL
4434 4770 JMS WR077
4435 7200 CLA
4436 1771 TAD BX
4437 6615 DEAL
4440 7200 CLA
4441 1367 TAD (3700
4442 4766 JMS RPAGE
4443 7200 CLA
4444 6615 DEAL
4445 4765 JMS WR000
4446 7200 CLA
4447 1771 TAD BX
4450 6615 DEAL
4451 7200 CLA
4452 1367 TAD (3700
4453 4764 JMS WPAGEX
4454 7200 CLA
4455 6615 DEAL
4456 7200 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

/WAIT FOR FLAG
FLAG, JMP,
DFSC,
JMP I=1
JMP I FLAG
YES EXIT

/WAIT FOR SYNC ; EXIT WITH DMAC IN AC

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

/EXIT WITH DMAC PLUS ONE IN AC

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

/SUBROUTINE TO INCREMENT ON TRACK ERROR

4504 7402 TKTST,
4505 2760 XX
4506 4292 ISE KA
4507 0357 JMS SYNC
4510 7640 AND (3776
4511 5704 SZA CLA
4512 1760 JMP I TKTST
4513 0356 TAD KA
4514 7640 AND (7300
4515 4795 SZA CLA
4516 2734 JMS ERTK
4517 3760 ISE ERTK
4520 5704 DCA KA
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,
4522 3753 XX
4523 7604 DCA AC
4524 7700 LAS
4525 5333 SMA CLA
JMP I=6
CHECK SWITCH
SW0 = 1
NO = PRINTOUT

4526 1321 TAD IPRINT /YES --- SET UP RETURN TO
4527 1352 TAD (=2 /SKIP PRINT ROUTINE
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, JMP , /TRACK ZERO
4536 6611 DCEA /4096 WORDS
4537 3751' DCA WC /0000
4540 3750' DCA IACH /LOAD MAG, WRITE
4541 6605 DMAM /EXIT
4542 5735 JMP I WALL

4543 7402 EXSW, XX
4544 7604 LAS
4545 6615 DEAL
4546 7200 CLA
4547 5743 JMP I EXSW

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 4600

PAGE

/ROUTINE TO CLEAR FLAG AND SETUP INTERRUPT

4600 7000 CLRFLAG, NOP
4601 7200 CLA
4602 1377 TAD (JMP I 0000
4603 3001 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 /READ A TRACK
 4647 4305 JMS RDX //
 4650 5247 JMP I=1 /WRITE/READ A TRACK
 4651 4255 JMS FILLX
 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 RL5, XX
 4725 7106 CLL RTL
 4726 7006 RIL
 4727 7004 RAL
 4730 5724 JMP I RL5

/SUB ROUTINES
 /WRITE ONE WORD OF 7777 AT SPECIFIED ADDRESS
 /JMS HONEM7
 /ACR ADDRESS OF WHERE TO BE WRITTEN

HONEM7, 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

/(IACH) = 0000 #1 SET CURRENT ADDRESS = 7777
 /LOAD DISK ADDRESS AND INITIATE WRITE
 /CHECK FOR COMPLETION
 /WAIT
 /RETURN IF COMPLETE
 /TIME OUT ?

0
 1
 2
 3
 4
 5
 6
 7
 8
 9
 10
 11
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 98
 99
 100

PAGE
 /CLEAR INBUF TO ALL ZEROS
 /FLUSH;
 JMP I
 CLA
 TAD (=200
 DCA CTA
 TAD (INBUF=1
 DCA I1
 CLA
 DCA I 11
 ISZ CTA
 JMP I=3
 JMP I FLUSH

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

/IACH OF INBUF
 /DEPOSIT ZERO
 /DONE
 /NO LOOP
 /YES EXIT

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

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

/FIRST WORD
 /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
5034 3774' DCA WORD1
5035 1235 TAD FILL
5036 3213 DCA FILL
5037 9216 JMP FILL+3

```

```

/SCOPE LOOP SET UP
SCOPEA, XX JMS TRACE
LAS AND (1000)
SZA CLA
JMP I RETURN
TAD SCOPEA
DCA RETURN
JMP I SCOPEA
/POINTER FOR SCOPE LOOP

```

```

RETURN, (BEGIN)
JMP I=1
/ROUTINE TO RING BELL
BELL, XX
CLA TAD (207)
TLS
TSP
JMP I=1
JMP I BELL
NOP

```

```

/ROUTINE TO WRITE DISK (ANY NUMBER OF DISKS)
WDISK, XX
DCEA
CLA GA
DCA TKADD
TAD (=10)
DCA CTA
TAD (=40)
DCA (XX)
JMS WPAGE

```

```

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

```

```

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

```

```

/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
  
```

```

3116 7402
3117 7200
3120 1354
3121 3360
3122 6615
3123 7200
3124 4753'
3125 4752'
3126 2360
3127 5324
3130 7200
3131 5716
  
```

```

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 WORD ADDRESS AND TRACK TEST
/RANDOM
RANDSK, CLA

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

DCMA
JMS RANDOM
AND (0700
DCA RANTK
JMS RANDOM
DCA RANAD
JMS RANDOM
DCA RANWD
CLA CHA
DCA WC
/TRACK 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
 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

5346 3221
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

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

/DATA TONE LOOP WITH BELL ON ERROR
 DBELL, HLT
 5466 7402 LAS
 5467 7604 AND (76
 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' DCA WC
 5501 7240
 5502 3772'

/LOAD TRACK AND DISC
 /LOAD ADDRESS
 /LOAD DATA
 /ONE WORD

```

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

/WRITE

/ONE WORD

/READ

/COMPARE
/ERROR

/ADDRESS SCOPE LOOP WITH BELL ON ERROR

```

5526 4757' HALT
5527 7604 JMS ERADD
5530 3763' LAS
5531 1763' DCA GA
5532 4756' TAD GA
5533 4755' JMS WONEW7
5534 7041 JMS SYNC
5535 1763' CIA
5536 7440 TAD GA
5537 4760' SZA
5540 5327 JMS BELL
        JMP .+11
    
```

/LOAD ADDRESS

/AC=ADDRESS
/ADDRESS+1 IN AC

/TEST GOOD
/NO
/YES

WRITE ONE WORD AT DISK ADDR. IN SWITCHES
WAIT FOR PHOTO CELL SYNC AND READ BACK ADDRESS

/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

PAGE
/PRINT OUT ROUTINES
/ROUTINE TO PRINT OUT FAILING TEST ADDRESS
ERADD, XX

5600	7402
5601	4777'
5602	6002
5603	4776'
5604	5600

JMS IPRINT
IOF
JMS SIXTY
ERADD

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

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

/ERTK, XX

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

JMS IPRINT
JMS SIXTY
ERTK
I+11
I+10
JMS SIXTY
KA
I+11
I+11
JMS MESSAGE
4543
2413
6060
4040
0201

/IRACK 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

```

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 TAD OF
5753 9701 JMP I SPEED
5754 0000 ADDR,
5755 6001 TON
5756 5400 JMP I 0
5757 0000 ACSAV, 0

```

PAGE /PRINT OUT ROUTINE FOR BAD TRACK

```

ETRACK, XX
6000 7402 JMS IPRINT
6001 4777' JMS SIXTY
6002 4776' I+3
6003 6000 I+4
6004 6010 JMS MESSAGE
6005 6011 4243
6006 4775' 6060
6007 4543 6060
6010 6060 0000
6011 6060 JMS SIXTY
6012 0000 GT
6013 4776' I+12
6014 6023 I+12
6015 6027 BT
6016 6030 JMS SIXTY
6017 4776' I+12
6020 6624
6021 6033

```

/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 5600

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

ERSYN: XX
JMS IPRINT

6100 7402
 6101 4777

6102	4776'	JMS SIXTY	/MAC
6103	6621	BA	/BAD ADDRESS
6104	6123	SYNC1+11	
6105	6124	SYNC1+12	
6106	4776'	JMS SIXTY	
6107	6622	GA	
6110	6116	SYNC1+4	/GOOD ADDRESS
6111	6117	SYNC1+5	
6112	4775'	JMS MESSAGE	
6113	4543	4543	
6114	0701	0701	/CR LF
6115	4040	4040	/GA
6116	6060	6060	/GOOD ADDRESS
6117	6060	6060	/SYNC
6120	4023	4023	
6121	3116	3116	
6122	0340	0340	
6123	6060	6060	
6124	6060	6060	/BAD ADDRESS
6125	0000	0000	
6126	4774'	JMS STOP	
6127	5700	JMP I ERSYNC	

6130	7402	/FALSE COMPARE AT ADDRESS XXXX	
6131	4777'	/FALCOM XXXX	
6132	4776'	TEXTE, XX	
6133	6622	JMS IPRINT	
6134	6144	JMS SIXTY	
6135	6145	GA	
6136	4775'	1+10	/FROM
6137	4543	1+10	/IO
6140	0601	JMS MESSAGE	/IO
6141	1403	4543	/FALCOM XXXX
6142	1715	0601	
6143	4040	1403	
6144	6060	1715	
6145	6060	4040	
6146	0000	6060	
6147	4774'	6060	
6150	5730	0000	
		JMS STOP	
		JMP I TEXTE	

PAGE

6174	5672	/COMPARISON ERROR PRINTOUT	
6175	0201	ERRCOM, XX	
6176	0261	JMS IPRINT	
6177	4521	IS ERCT	
6200	7402	/ERROR COUNT	
6201	4777'		
6202	2776'		

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	CLA	
6220	TAD	ERRDSK
6221	RA	
6222	DCA	ERRDSK
6223	RA	
6224	DCA	LJNKA
6225	TAD	ERRTK
6226	RTR	
6227	RTR	
6230	RTR	
6231	DCA	ERRTK
6232	TAD	LJNKA
6233	RAR	
6234	TAD	ERRTK
6235	RA	
6236	DCA	ERRTK
6237	TAD	ERRDSK
6240	RAR	
6241	DCA	ERRDSK
6242	JMS	SIXTY
6243	RDL	
6244		
6245		
6246	JMS	MESSAGE
6247		
6250		
6251		
6252		
6253	JMS	SIXTY
6254	ERRTK	
6255		
6256		
6257	JMS	SIXTY
6260	ERRDSK	
6261		
6262		
6263	JMS	SIXTY
6264	GD	
6265		
6266		
6267	JMS	SIXTY
6270	BD	
6271		

/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
6273 4762'
6274 4024
6275 1340
6276 6060
6277 4004
6300 0140
6301 6060
6302 6060
6303 4007
6304 0440
6305 6060
6306 6060
6307 4002
6310 0440
6311 6060
6312 6060
6313 0000
6314 4761'
6315 5600

JMS MESSAGE
/OSK ADDRESS
/GOOD DATA
/BAD DATA
JMS STOP
JMP I ERRCOM
    
```

```

BADADD: XX
6316 7402
6317 4777'
6320 4763'
6321 6316
6322 6326
6323 6327
6324 4762'
6325 4543
6326 6060
6327 6060
6330 0000
6331 4763'
6332 6622
6333 6345
6334 6346
6335 4763'
6336 6621
6337 6351
6340 6352
6341 4762'
6342 4040
6343 0701
6344 4040
6345 6060
6346 6060
6347 4002
6350 0140
6351 6060
6352 6060
6353 0000
6354 4761'
6355 5716

JMS IPRINT
JMS SIXTY
I+3
I+4
I+4
JMS MESSAGE
4543
6060
6060
0000
JMS SIXTY
GA
I+12
I+12
JMS SIXTY
BA
I+12
I+12
JMS MESSAGE
4040
0701
4040
6060
6060
4002
0140
6060
6060
0000
JMS STOP
JMP I BADADD
    
```

/INHIBIT PRINTOUT

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	/SA
6446	7004	RAI	/E
6447	3771'	DCA ERRK	/I
6450	1767'	TAD ERRDSK	/K
6451	7010	RAI	/D
6452	3767'	DCA ERRDSK	/A
6453	4766'	JMS SIXTY	
6454	6006	ERRK	
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	
6465	2301	2301	
6466	7540	7540	
6467	4224	4024	
6470	1340	1340	
6471	6060	6060	
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	
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	
6516	1605	1605	
6517	0440	0440	
6520	1722	1722	
6521	4027	4027	
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	

/NE
/O
/OR
/H
/LO

/PE

```

6532 4040
6533 0422
6534 1440
6535 6060
6536 4300
6537 4764
6540 5600
6541 2000
6542 7120
6543 7010
6544 3765
6545 7430
6546 5391
6547 1353
6550 5741
6551 1354
6552 5741
6553 7560
6554 7561
6564 5692
6565 6633
6566 0261
6567 6605
6570 6602
6571 6606
6572 0700
6573 6604
6574 3612
6575 0201
6576 6620
6577 4521
6600

```

/DR
/L

```

STAT,
JMS STOP
JMP I STATUS
0
CLL
RAR
OCA STATSV
SEL
JMP I+S
TAD STAT0
JMP I STAT1
TAD STAT1
JMP I STAT
STAT0, 7560
STAT1, 7561

```

PAGE

```

/CONSTANTS
DCEAF=6611
DIEF=6614
DCMA=6601
DSAC=6612
DMAR=6603
DMAH=6605
DEAL=6615
DEAC=6616
DFSE=6621
DFSC=6622
DMAC=6626
XX=7402
WC=7750
IACH=7751
CACH=IACH
KA,
WADD,
RADD,
CTC,
6600
6601
6602
6603

```

```

/CL EXT ADDRESS REGISTER
/CLEAR MAR, PE, DONE
/CLEAR AC SKIP ON ADC
/LOAD AND START READ
/LOAD AND START WRITE
/LOAD EXTENDED ADDRESS
/READ EXTENDED ADDRESS
/SKIP ON NO ERROR
/SKIP ON FLAG
/READ DISK ADDRESS
/
/IACH=1 FOR WRITE
/IACH=1 FOR READ

```

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	DCA DECA
6635	3326		0	DCA THOU
6636	3327		0	DCA HUND
6637	3330		0	DCA TENS
6640	3331		0	DCA UNIT
6641	3332		0	TAD DECA
6642	1326		0	SNA
6643	7450		0	JMP PACK
6644	5302		0	CLL
6645	7100		0	TAD (1750)
6646	1377		0	SNL
6647	7420		0	JMP I*3
6650	5253		0	ISE THOU
6651	2327		0	JMP I*5
6652	5245		0	TAD (1750)
6653	1376		0	SNA
6654	7450		0	JMP PACK
6655	5302		0	TAD (144)
6656	1375		0	SPA
6657	7510		0	JMP I*3
6660	5263		0	ISE HUND
6661	2330		0	JMP I*4
6662	5256		0	TAD (144)
6663	1374		0	SNA
6664	7450		0	JMP PACK
6665	5302		0	TAD (12)
6666	1373		0	SPA
6667	7510		0	JMP I*3
6670	5273		0	ISE TENS
6671	2331		0	

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:

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	MSRGI	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	SYNGI	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	REVCN1	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	7751	ROT1TS	2676	WALL	4535
CTIMEC	3136	INBUF	7200	ROT2TS	2400	WDC	7750
CTIMEX	3145	IPRINT	4521	RPAGE	2416	WDISK	5065
CTIMEY	3146	ISYST	2245	RPH	3615	WONE	2665
CYCLE	3147	JMREU	2622	SARD	0400	WONEW7	4731
DBELL	5466	JMSTST	2600	SAWD	2715	WORDA	6615
DBYST	2205	K1355	7406	SCOPE	2707	WORD2	6616
DCEA	6611	K5743	7407	SCOPE1	5401	WPAGE	3600
DCEM	6601	KA	6600	SCOPE2	5432	WPAGEX	4222
DEAC	6616	LINKA	6632	SCOPE3	5417	WRC00	3675
DEAL	6615	M2	0256	SCOPE4	5424	WRC77	3705
DEC	6634	M3	0256	SCOPEA	5436	WRCX	4000
DECA	6726	M40	0254	SIXT	5042	WRTHI	4067
DF5C	6622	MASK77	0252	SLOWB	4343	WRTLO	4053
DFSE	6621		4202		0261	WRTX	4666
DIEF	6614		0251		0063	WSYNG	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