

DataGeneral

**TECHNICAL
STATEMENT**

DTOS Rev. 8.99

TEXT LISTING

068-000169-13

PROGRAM

MOVING HEAD DISK CONTROL
DIAGNOSTIC

TEXT TAPE

097-000169-13

ABSTRACT

THIS PROGRAM IS A HARDWARE DIAGNOSTIC FOR THE 4046 MOVING HEAD DISK CONTROLLER AND ADAPTER LOGIC. IT IS ASSUMED THAT THE DISK TERMINAL IS FUNCTIONING PROPERLY.

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1977
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```

0001 MHDD. MACRO REV 04.00      09:43:04 06/30/77
01
02
03
04
05
06
07
08 ;*****
09 ; NAME: MHDD.TX                PART NUMBER: 097-000164
10 ;
11 ;
12 ; DESCRIPTION: MOVING HEAD DISK CONTROL DIAGNOSTIC
13 ;                   TEXT FILE
14 ;
15 ;
16 ; REVISION HISTORY:
17 ;
18 ;     REV.          DATE
19 ;
20 ;     00            10/28/71
21 ;     01            06/13/72
22 ;     02            11/20/72
23 ;     03            07/03/73
24 ;     04            08/24/73
25 ;     05            04/26/74
26 ;     06            XX/XX/XX
27 ;     07            XX/XX/XX
28 ;     08            12/12/75
29 ;     09            04/23/76
30 ;     10            07/16/76
31 ;     11            12/31/76
32 ;     12            04/15/77
33 ;     13            07/08/77
34 ;
35 ;
36 ; COPYRIGHT © DATA GENERAL CORPORATION, 1971, 1972, 1973, 1974
37 ; 1975, 1976, 1977
38 ; ALL RIGHTS RESERVED.
39 ;*****

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```

10002 MHDD.
01
02
03 .TITLE MHDD.TX
04
05 ;MOVING HEAD DISK CONTROL DIAGNOSTIC
06
07 ;***** AUTO-RUN AUTO LOAD MODIFIED 3/7/72
08 ;END OF CYLINDER TEST INCLUDED 06/28/73
09 ;100 MS TIMES FOR LOUPS 08/07/73
10
11 ; 1. ABSTRACT
12 ;     THIS PROGRAM IS A HARDWARE DIAGNOSTIC FOR THE
13 ;     4046 MOVING HEAD DISK CONTROLLER AND ADAPTER
14 ;     LOGIC. IT IS ASSUMED THAT THE DISK TERMINAL
15 ;     IS FUNCTIONING PROPERLY.
16
17 ; 2. REQUIREMENTS
18 ;     1. NUVA (EXCEPT MICRO) OR ECLIPSE FAMILY CENTRAL PROCESSOR
19 ;     2. MINIMUM OF 4K READ/WRITE MEMORY
20 ;     3. 4046 MOVING HEAD DISK CONTROL
21 ;     4. 4047,4048,4049 OR 4057
22 ;     5. 1 TO 4 DISK TERMINALS
23 ;     6. TELETYPE AND CONTROL
24
25 ; 3. OPERATING PROCEDURE
26 ;     1. LOAD USING THE BINARY LOADER OR DIAGNOSTIC
27 ;     OPERATING SYSTEM.
28 ;     2. STARTING ADDRESSES:
29 ;         6- RANDOM SEEK EXERCISER
30 ;         200- START DIAGNOSTIC
31 ;     3. THE PROGRAM PRINTS "PASS" FOLLOWING EACH
32 ;     COMPLETE PASS THROUGH THE TESTS. RANDOM
33 ;     SEEK EXERCISER PERFORMS 5000 SEEKS
34 ;     PER "PASS" MESSAGE.
35 ;     4. SWITCH SETTINGS
36 ;         SW1= FROM ERROR, GO TO NEXT TEST.
37 ;         SW2= INHIBIT TTY OUTPUT.
38 ;         SW3= PRINT FAILURE RATE.
39 ;         SW5= OUTPUT TO LPT
40 ;         SW6-7= UNIT # FOR RECAL DURING SCOPE LOOP
41 ;         SW8= RECALIBRATE DURING SCOPE LOOP
42 ;         SW9= 1 SEC DELAY IN SCOPE LOOP
43
44 ; 4. ERRORS
45 ;     WHEN AN ERROR IS DETECTED THE PROGRAM HALTS.
46 ;     (AC3) POINTS TO THE LOCATION FOLLOWING THE
47 ;     ERROR HALT CALL "EHALT". CONSULT THE COMMENTS
48 ;     AREA OF THE DIAGNOSTIC PROGRAM LISTING FOR
49 ;     CLUES AND POSSIBLE CAUSES OF THE FAILURE.
50 ;     PUSHING CONTINUE WILL CAUSE THE PROGRAM TO
51 ;     PRINT THE (AC3) AND ENTER A SCOPE LOOP.
52 ;     SET SW3 TO CAUSE THE ERROR RATE (0-100%) TO BE
53 ;     PRINTED. SET SW1 TO EXIT FROM THE SCOPE LOOP
54 ;     AND PROCEED TO THE NEXT TEST.

```

10003 MHDD.

01
02 ;
03 ; SOME SCOPE LOOPS WILL REQUIRE A RECALIBRATE
04 ; TO INITIALIZE THE DISK DRIVE FOLLOWING A FAILURE.
05 ; SET SWITCH 8 TO INTRODUCE THE RECALIBRATE. THE
06 ; UNIT TO BE RECALIBRATED MUST BE SFT INTO SWITCHES
07 ; 6 AND 7.
08 ;
09 ; TESTS THAT PERFORM A RECALIBRATE HAVE A 2 SEC.
10 ; DELAY BUILT INTO THE SCOPE LOOP AS PROTECTION
11 ; FOR THE DISK DRIVE ELECTRONICS. SET SWITCH 9
12 ; TO INTRODUCE AN ADDITIONAL 1 SECOND DELAY DURING
13 ; THE SCOPE LOOP.
14 ;
15 ; IN GENERAL EACH SUCCESSIVE TEST ASSUMES ALL
16 ; PREVIOUS TESTS WORK. BYPASSING ERRORS
17 ; CAN RESULT IN CONFUSING SITUATIONS
18 ; IN THE SETUP OF MORE COMPLEX TESTS.
19 ; 5. DISK PACKS
20 ; ONLY USE DISK PACKS FORMATTED BY THE DGC DISK
21 ; PACK FORMATTER PROGRAM. THE DIAGNOSTIC PROGRAM
22 ; WILL WRITE OVER MOST OF THE DISK SURFACE.
23 ; THE FORMAT MODE IS NOT CHECKED.

10004 MHDD.

**00000 TOTAL ERRORS, 00000 PASS 1 ERRORS

LISTING

096-000169-07

PROGRAM

MOVING HEAD DISK CONTROL
DIAGNOSTIC

TAPE

095-000069-07

ABSTRACT

THIS PROGRAM IS A HARDWARE DIAGNOSTIC FOR THE 4046 MOVING HEAD DISK CONTROLLER AND ADAPTER LOGIC. IT IS ASSUMED THAT THE DISK TERMINAL IS FUNCTIONING PROPERLY.

0001 .MAIN

```
01
02
03
04
05
06
07
08
09 /*****
10 / NAME: MHDD,SR PART NUMBER: 094-000211
11 /
12 / DESCRIPTION: MOVING HEAD DISK CONTROL DIAGNOSTIC
13 /
14 /
15 / REVISION HISTORY:
16 /
17 / REV. DATE
18 /
19 / 00 10/20/71
20 / 01 06/13/72
21 / 02 11/20/72
22 / 03 07/03/73
23 / 04 06/24/73
24 / 05 04/26/74
25 /
26 /
27 / COPYRIGHT (C) DATA GENERAL CORPORATION, 1971, 1972, 1973, 1974
28 / ALL RIGHTS RESERVED.
29 /*****
```

A 0002 .MAIN

```
01
02 /MOVING HEAD DISK CONTROL DIAGNOSTIC
03
04 /***** AUTO-RUN AUTO LOAD MODIFIED 3/7/72
05 /END OF CYLINDER TEST INCLUDED 06/20/73
06 /100 MS TIMES FOR LOOPS 08/07/73
07 / REVISION 07
08
09 / 1. ABSTRACT
10 / THIS PROGRAM IS A HARDWARE DIAGNOSTIC FOR THE
11 / 4046 MOVING HEAD DISK CONTROLLER AND ADAPTER
12 / LOGIC. IT IS ASSUMED THAT THE DISK TERMINAL
13 / IS FUNCTIONING PROPERLY.
14
15 / 2. REQUIREMENTS
16 / 1. NOVA FAMILY CENTRAL PROCESSOR
17 / 2. MINIMUM OF 4K READ/WRITE MEMORY
18 / 3. 4046 MOVING HEAD DISK CONTROL
19 / 4. 4047,4048,4049 OR 4057
20 / DISK ADAPTER
21 / 5. 1 TO 4 DISK TERMINALS
22 / 6. TELETYPE AND CONTROL
23
24 / 3. OPERATING PROCEDURE
25 / 1. LOAD USING THE BINARY LOADER
26 / 2. STARTING ADDRESSES
27 / SA2- TO IDENTIFY DISK TYPE
28 / PROGRAM THEN PROCEEDS TO 500.
29 / SA4- SET DISK CONTROL ADDRESS TO 33
30 / SA5- SET DISK CONTROL ADDRESS TO 73
31 / SA6- RANDOM SEEK EXERCISER,
32 / SA500- START DIAGNOSTIC
33 / 3. THE PROGRAM PRINTS "PASS" FOLLOWING EACH
34 / COMPLETE PASS THROUGH THE TESTS, RANDOM
35 / SEEK EXERCISER PERFORMS 5000 SEEKS
36 / PER "PASS" MESSAGE.
37 / 4. SWITCH SETTINGS
38 / SW0- FROM ERROR, GO TO NEXT TEST.
39 / SW1- INHIBIT TELETYPE PRINTING,
40 / SW2- PRINT FAILURE RATE,
41 / SW3- RECALIBRATE DURING SCOPE LOOP
42 / SW4- 1 SEC DELAY IN SCOPE LOOP
43 / SW5-6- UNIT # FOR RECAL DURING SCOPE LOOP
44
45 / 4. ERRORS
46 / WHEN AN ERROR IS DETECTED THE PROGRAM HALTS.
47 / (AC3) POINTS TO THE LOCATION FOLLOWING THE
48 / ERROR HALT CALL "EMALT". CONSULT THE COMMENTS
49 / AREA OF THE DIAGNOSTIC PROGRAM LISTING FOR
50 / CLUES AND POSSIBLE CAUSES OF THE FAILURE.
51 / PUSHING CONTINUE WILL CAUSE THE PROGRAM TO
52 / PRINT THE (AC3) AND ENTER A SCOPE LOOP,
53 / SET SW2 TO CAUSE THE ERROR RATE (0-100%) TO BE
54 / PRINTED. SET SW0 TO EXIT FROM THE SCOPE LOOP
55 / AND PROCEED TO THE NEXT TEST,
```

```

A 0003 .MAIN
01
02 / SOME SCOPE LOOPS WILL REQUIRE A RECALIBRATE
03 / TO INITIALIZE THE DISK DRIVE FOLLOWING A FAILURE,
04 / SET SWITCH 3 TO INTRODUCE THE RECALIBRATE, THE
05 / UNIT TO BE RECALIBRATED MUST BE SET INTO SWITCHES
06 / 5 AND 6.
07
08 / TESTS THAT PERFORM A RECALIBRATE HAVE A 2 SEC.
09 / DELAY BUILT INTO THE SCOPE LOOP AS PROTECTION
10 / FOR THE DISK DRIVE ELECTRONICS, SET SWITCH 4
11 / TO INTRODUCE AN ADDITIONAL 1 SECOND DELAY DURING
12 / THE SCOPE LOOP.
13
14 / IN GENERAL EACH SUCCESSIVE TEST ASSUMES ALL
15 / PREVIOUS TESTS WORK, BYPASSING ERRORS
16 / CAN RESULT IN CONFUSING SITUATIONS
17 / IN THE SETUP OF MORE COMPLEX TESTS.
18
19 / 5. DISK PACKS
20 / ONLY USE DISK PACKS FORMATTED BY THE JGC DISK
21 / PACK FORMATTER PROGRAM. THE DIAGNOSTIC PROGRAM
22 / WILL WRITE OVER MOST OF THE DISK SURFACE.
23 / THE FORMAT MODE IS NOT CHECKED.

```

```

A 0004 .MAIN
01
02 / 000001 .LOC 1
03
04 00001 005571 IRET ;INTERRUPT RETURN
05 00002 000201 INIT ;INITIALIZE
06 00003 000007 JMP #TS ;GO TO 500
07 00004 022244 JMP #ISJ3 ;SET ADDR TO J3
08 00005 002245 JMP #IS73 ;SET ADDR TO 73
09 00006 002010 JMP #IRUSK ;TO SEEK EXERCISER
10 00007 000500 TS: START
11 00008 000513 IRDSK: RANSK
12 00009 000002 C2: 2
13
14 / 000045 .LOC 45
15 000045 000046 EGGS
16 000046 000000 EGGS: 0 ;HEN FLAG
17 000047 000000 ;DEVICE CODE THIS RUN
18 000048 000000 ;NOT USED
19 000049 000000 ;# OF PASS THIS RUN
20 000050 000000 ;RETURN ADDRESS
21
22 00053 000000 .TU: 0
23 00054 040000 40000
24 00055 100000 100000
25 00056 140000 140000
26 00057 000001 UNTBIT: 1
27 00058 000002 Kb14: 2
28 00059 000004 Kb13: 4
29 00060 000010 Kb12: 10
30 00061 000020 Kb11: 20
31 00062 000040 Kb10: 40
32 00063 000100 Kb9: 100
33 00064 000200 Kb8: 200
34 00065 000400 Kb7: 400
35 00066 001000 Kb6: 1000
36 00067 002000 Kb5: 2000
37 00068 004000 Kb4: 4000
38 00069 010000 Kb3: 10000
39 00070 020000 Kb2: 20000
40 00071 000054 Kb1=.TU+1
41
42 00075 177775 Z014: 177775
43 00076 177773 Z013: 177773
44 00077 177767 Z012: 177767
45 00078 177757 Z011: 177757
46 00079 177737 Z010: 177737
47 00080 177677 Z09: 177677
48 00081 177577 Z08: 177577
49 00082 177377 Z07: 177377
50 00083 176777 Z06: 176777
51 00084 175777 Z05: 175777
52 00085 173777 Z04: 173777
53 00086 167777 Z03: 167777
54 00087 157777 Z02: 157777
55 00088 137777 Z01: 137777
56
57 00113 000201 TRCL: RECL0
58 00114 000202 RECL1
59 00115 000203 RECL2

```

0005 .MAIN
01 00116 000234

RECL3

A 0000 .MAIN
01
02 00117 000003 C3: 3
03 00120 000007 C7: 7
04 00121 000017 C17: 17
05 00122 000037 C37: 37
06 00123 000077 C77: 77
07 00124 000177 C177: 177
08 00125 000377 C377: 377
09 00126 000777 C777: 777
10 00127 001777 C1777: 1777
11 00130 003777 C3777: 3777
12 00131 007777 C7777: 7777
13 00132 017777 C017: 17777
14 00133 037777 C037: 37777
15
16 00134 010421 BIT1: 010421
17 00135 021042 BIT2: 021042
18 00136 042104 BIT4: 042104
19 00137 104210 BIT8: 104210
20
21 00140 052525 C2525: 052525
22 00141 125252 C5252: 125252
23 00142 123456 RANDOM: 123456
24 00143 123456 RELNAN: 123456
25 00144 000000 TEMP: 0
26 00145 000000 TIME: 0
27 00146 000000 TIME1: 0
28 00147 000000 KDQB: DQB 1,0
29 00150 000000 DTYPE: 0
30 00151 000001 NDSKS: 000001
31 00152 000000 TESTU: 0
32 00153 000000 UNUM: 0
33 00154 000033 CDSK: 33
34 00155 000000 CYL: 0
35 00156 000000 HEAD: 0
36 00157 000000 SECT: 0
37 00160 000330 HUFF: PRGEND
38 00161 100037 MSK1: 100037
39 00162 000033 DP10: 000033
40 00163 177700 MSK2: 177700
41 00164 000000 ITNCNT: 0
42 00165 000436 STALL: .STL

10=CART, 1=2311, 15=2314
15=UNIT 0, 14=1, 13=2, 12=3
1 001 = UNIT #
1 14=15 = UNIT #

```

A 0007 ,MAIN
01
02 00160 000004 C4: 4
03 00167 000005 C5: 5
04 00170 000006 C6: 6
05 00171 000011 C11: 11
06 00172 000012 C12: 12
07 00173 000015 C13: 15
08 00174 000016 C16: 16
09 00175 000030 C30: 30
10 00176 000033 C33: 33
11 00177 000036 C36: 36
12 00200 000060 C60: 60
13 00201 000063 C63: 63
14 00202 000070 C70: 70
15 00203 000120 C120: 120
16 00204 000137 C137: 137
17 00205 000157 C157: 157
18 00206 000277 C277: 277
19 00207 000312 C312: 312
20 00210 000317 C317: 317
21 00211 000402 C402: 402
22 00212 000420 C420: 420
23 00213 177400 C1774: 177400
24
25
26 00214 177400 M400: -400
27 00215 001400 C1400: 1400
28 00216 003600 C3600: 3600
29 00217 020400 C2040: 20400
30 00220 074000 C74K: 74000
31 000056 C140K=.TU+3
32 00221 174000 C174K1 174000
33 000070 C1000=K06
34
35 00222 024047 BEGIN: LDA 1,EGGS+1
36 00223 020176 LDA 0,C33
37 00224 100414 SUB# 0,1,SR
38 00225 002245 JMP #IS73
39 00226 002244 JMP #IS33

```

```

A 0006 ,MAIN
01 00227 000400 I,WAIT: ,WAIT
02 00230 000445 I,SSEK: ,SSEK
03 00231 000477 I,RC0: ,RCL0
04 00232 000501 I,RC1: ,RCL1
05 00233 000503 I,RC2: ,RCL2
06 00234 000504 I,RC3: ,RCL3
07 00235 000557 I,INT: ,INT
08 00236 000573 I,AUSK: ,AUSK
09 00237 000622 I,SET: ,SET
10 00240 000625 I,SETP: ,SETP
11 00241 000630 I,STUP: ,STUP
12 00242 000775 I,EMAI: ,EMALT
13 00243 000807 I,LOOP: ,LOOP
14 00244 000402 IS33: ,S33
15 00245 000403 IS73: ,S73
16 00246 000501 I,S: ,SK
17 00247 000265 ICHLF: ,CHLF
18 00250 000125 IMESS: ,MESS
19 00251 000255 I,INI: ,INI
20 00252 000772 I,EMI: ,EMI
21 00253 000515 I,DOH: ,DOHW
22 00254 000631 I,HAN: ,HAN
23 00255 000119 I,GEN: ,GEN
24 00256 000150 I,READ: ,READ
25 00257 000123 I,WRT: ,WRITE
26 00260 000566 ICHK: ,CHECK
27 00261 000166 I,US: ,OUSEK
28 00262 000656 I,LD: ,LUPD
29
30 000241 ,DUSR SETUP=JSR #I,STUP
31 000240 ,DUSR SETP1=JSR #I,SETP
32 000242 ,DUSR EMALT=JSR #I,EMA
33 000243 ,DUSR LOOP=JSR #I,LOO
34 000033 ,DUSR USKP=33
35 000252 ,DUSR EMLT=JSR #I,EMI
36 000262 ,DUSR LLOOP=JSR #I,LD
37
38 000250 MESSAGE=JSR #IMESS
39 000247 PCMLF=JSR #ICRLF
40 000227 WAIT=JSR #I,WAIT
41 000230 SSEK=JSR #I,SSEK
42 000231 RECL0=JSR #I,RC0
43 000232 RECL1=JSR #I,RC1
44 000233 RECL2=JSR #I,RC2
45 000234 RECL3=JSR #I,RC3
46 000235 ITWRT=JSR #I,INT
47 000236 GAUSK=JSR #I,AUSK
48 000246 SEEK=JSR #I,S
49 000251 INIT=JSR #I,INI
50 000255 GENDAT=JSR #I,GEN
51 000256 REAU=JSR #I,READ
52 000257 WRITE=JSR #I,WRT
53 000260 CHECK=JSR #I,CHK
54 000261 OUSEK=JSR #I,OUS
55 000253 DOHW=JSR #I,DO
56

```



```

A 0009 .MAIN
01 000500 .LOC 000
02
03 000500 000401 START: JMP .+1
04 000501 024046 LDA 1,EGGS
05 000502 125004 MOV 1,1,SZR
06 000503 000405 JMP A.
07 000504 020150 LDA 0,DTYPE
08 000505 101005 MOV 0,0,SNR
09 000506 000251 INIT
10 000507 000403 JMP A0
11 000510 120020 A.: SUBZR 1,1
12 000511 044150 STA 1,OTYPE
13
14 000512 020151 A0: LDA 0,NDSKS
15 000513 101202 MOVK 0,0,SZC
16 000514 000231 RECL0
17 000515 062677 IORST
18
19 000516 020151 LDA 0,NDSKS
20 000517 024000 LDA 1,K014
21 000520 123404 AND 1,0,SZR
22 000521 000232 RECL1
23 000522 062677 IORST
24
25 000523 020151 LDA 0,NDSKS
26 000524 024001 LDA 1,K013
27 000525 123404 AND 1,0,SZR
28 000526 000233 RECL2
29 000527 062677 IORST
30
31 000530 020151 LDA 0,NDSKS
32 000531 024002 LDA 1,K012
33 000532 123404 AND 1,0,SZR
34 000533 000234 RECL3

```

IF PARAMETERS NOT YET SPECIFIED
DUO IT NOW.

UNIT 0 SPECIFIED ?

YES, RECALIBRATE IT

UNIT 1 SPECIFIED ?

YES RECALIBRATE IT

UNIT 2 SPECIFIED ?

YES, RECALIBRATE IT

UNIT 3 SPECIFIED ?

YES, RECALIBRATE IT

```

A 0010 .MAIN
01
02 000534 000241 A1: SETUP
03 000535 003700 SKPBZ 0
04 000536 000242 EHALT
05 000537 000243 LOOP
06
07 000540 000241 A2: SETUP
08 000541 003500 SKPBZ 0
09 000542 000242 EHALT
10 000543 000243 LOOP
11
12 000544 000241 A3: SETUP
13 000545 003503 SKPBZ DSKP
14 000546 000242 EHALT
15 000547 000243 LOOP
16
17 000550 000241 A4: SETUP
18 000551 003703 SKPBZ DSKP
19 000552 000242 EHALT
20 000553 000243 LOOP
21
22 000554 000241 A5: SETUP
23 000555 000400 DIA 0,0
24 000556 101004 MOV 0,0,SZR
25 000557 000242 EHALT
26 000560 000243 LOOP
27
28 000561 000241 A6: SETUP
29 000562 001433 DIB 0,DSKP
30 000563 101004 MOV 0,0,SZR
31 000564 000242 EHALT
32 000565 000243 LOOP
33
34 000560 000241 A7: SETUP
35 000567 062433 DIC 0,DSKP
36 000570 101004 MOV 0,0,SZR
37 000571 000242 EHALT
38 000572 000243 LOOP
39
40 000573 000241 A8: SETUP
41 000574 102000 AUC 0,0
42 000575 002033 DUB 0,DSKP
43 000576 000433 DIB 1,DSKP
44 000577 122434 SUBZ# 1,0,SZR
45 000580 000242 EHALT
46 000581 000243 LOOP

```

CHECK SELD BUS LINE
SKIP IF LINE HIGH
SKIP HAS SELD GROUNDED.

CHECK SELB BUS LINE
SKIP IF LINE HIGH
SKIP HAS SELB GROUNDED

CHECK DISK PACK BUSY
SKIP IF BUSY 0
"OP BUSY" STUCK ON

CHECK DISK PACK DONE
SKIP IF DONE 0
"OP DONE" STUCK ON

CHECK I/O DATA LINES
DIA TO DEVICE 0

GROUNDED DATA LINE(S)

CHECK CA REGISTER FOR
ZEROS AFTER "RESET"
POSSIBLE FAILURE OF "RESET"
FOR THE REGISTER.

CHECK DISK ADDRESS REG.
FOR ZEROS FOLLOWING IORST
FAILING REGISTER IC OR
POSSIBLE FAILURE OF "RESET"
FOR "RESET S".

TRY TO LOAD CA WITH
ALL ONES
LOAD CA REGISTER
READ IT BACK
CHECK "OP DATOB",
"OPDATIB", CA REGISTER,
AND DATA PATH THRU MUX'S.

```

A 0011 .MAIN
01
02 00002 000241 A9:  SETUP      /SEE IF DOB LOAUS
03 00003 102000      AUC 0,0  /DISK ADDRESS REGISTER
04 00004 052033      UOB 0,OSKP /LOAD CA REG.
05 00005 060433      DIC 1,OSKP /READ DISK ADDR REG.
06 00006 125004      MOV 1,1,SZR /IT SHOULD STILL BE ALL 0'S
07 00007 000242      EHALT
08 00010 000243      LOOP
09
10 00011 000241 A10:  SETUP      /SEE IF DDC LOAUS THE
11 00012 102000      AUC 0,0  /CA REGISTER
12 00013 063033      DUC 0,OSKP /LOAD DISK ADDR REG
13 00014 060433      DIB 1,OSKP /READ CA REGISTER
14 00015 125004      MOV 1,1,SZR /CA REGISTER SHOULD
15 00016 000242      EHALT      /REMAIN ALL ZERO
16 00017 000243      LOOP
17
18 00020 000241 A11:  SETUP      /SEE IF THE DISK ADDRESS
19 00021 102000      AUC 0,0  /REGISTER EXISTS
20 00022 063033      DUC 0,OSKP /LOAD IT WITH ALL 1'S
21 00023 060433      DIC 1,OSKP /READ IT BACK
22 00024 122414      SUB# 1,0,SZR /CHECK REGISTER AND
23 00025 000242      EHALT      /DATA PATHS THROUGH
24 00026 000243      LOOP      /THE MUX'S
25
26 00027 000241 A12:  SETUP      /SEE IF IORST WILL
27 00030 102000      AUC 0,0  /CLEAR THE CA REGISTER
28 00031 062033      UOB 0,OSKP /LOAD IT WITH ALL 1'S
29 00032 062677      IORST    /CLEAR IT TO ZEROS (RESET)
30 00033 060433      DIB 1,OSKP /READ IT BACK
31 00034 125004      MOV 1,1,SZR
32 00035 000242      EHALT
33 00036 000243      LOOP
34
35 00037 000241 A13:  SETUP      /SEE IF IORST WILL
36 00040 102000      AUC 0,0  /CLEAR DISK ADDRESS
37 00041 063033      DUC 0,OSKP /REGISTER. LOAD ALL 1'S
38 00042 062677      IORST    /CLEAR TO ZEROS
39 00043 060433      DIC 1,OSKP /READ BACK
40 00044 125004      MOV 1,1,SZR /S1,S2,S4,S8,ARE CLEARED
41 00045 000242      EHALT      /VIA "RESET" THRU "RESET S")
42 00046 000243      LOOP
43

```

```

A 0012 .MAIN
01
02 /THE FOLLOWING TEST REPLACES TESTS A14 TO A29
03 /TEST OF SINGLE BIT LOAUS INTO CA (DOB 0,OSKP)
04 /AT EHALT: ACO WILL=GOOD AC1 WILL=BAD
05 /SUBZL 0,0 /START BIT 15
06 00047 102520      SUBZL 0,0
07 00050 040144      STA 0,TEMP
08 00051 000241 A14.29:  SETUP
09 00052 020144      LDA 0,TEMP
10 00053 062033      DUB 0,OSKP
11 00054 060433      DIB 1,OSKP /GET SINGLE BIT BACK
12 00055 122414      SUB# 1,0,SZR /SKP=NOT ERROR
13 00056 000242      EHALT
14 00057 000243      LOOP      /ITERATE SINGLE BIT
15 00058 020144      LDA 0,TEMP
16 00059 101124      MOVZL 0,0,SZR /SKP=DONE 16 BITS
17 00062 000700      JMP A14.29-1 /DO ONE MORE
18
19 /THE FOLLOWING TEST REPLACES TESTS A30 TO A45
20 /TEST OF SINGLE 0 BIT LOAUS INTO THE CA (DOB 0,OSKP)
21 /START =177776
22 00063 102120      AUCZL 0,0
23 00064 040144      STA 0,TEMP
24 00065 000241 A30.45:  SETUP
25 00066 020144      LDA 0,TEMP
26 00067 062033      DUB 0,OSKP /OUT SINGLE NO BIT
27 00070 060433      DIB 1,OSKP
28 00071 122414      SUB# 1,0,SZR /OUT=IN? SKP
29 00072 000242      EHALT
30 00073 000243      LOOP      /ITERATE SINGLE NO BIT
31 00074 020144      LDA 0,TEMP
32 00075 101142      MOVZL 0,0,SZR /CRY=0 IS DONE 10
33 00076 000700      JMP A30.45-1 /DO NEXT BIT

```

```

A 0013 .MAIN
01      ;THE FOLLOWING TEST REPLACES TESTS A40 TO A61
02      ;TEST OF SINGLE BIT LOADS INTO DSK ADRS (DCC 0,DSKP)
03      ;AT EHALL: AC0 WILL=GOOD AC1 WILL=BAD
04 00677 102520      SUBZL 0,0      ;START BIT 15
05 00700 040144      STA 0,TEMP
06 00701 000241      A40,61: SETUP
07 00702 020144      LDA 0,TEMP
08 00703 063033      DCC 0,DSKP
09 00704 066433      DIC 1,DSKP      ;GET SINGLE BIT BACK
10 00705 122414      SUB# 1,0,SZR      ;SKIP=NOT ERROR
11 00706 000242      EHALL
12 00707 000243      LOOP      ;ITERATE SINGLE BIT
13 00710 020144      LDA 0,TEMP
14 00711 101124      MOVZL 0,0,SZR      ;SKIP=ONE 16 BITS
15 00712 000766      JMP A40,61-1      ;DO ONE MORE
16
17      ;THE FOLLOWING TEST REPLACES TESTS A62 TO A77
18      ;TEST OF SINGLE 0 BIT LOADS INTO THE DSK ADRS (DCC 0,DSKP)
19 00713 102120      AUCZL 0,0      ;START =17776
20 00714 040144      STA 0,TEMP
21 00715 000241      A62,77: SETUP
22 00716 020144      LDA 0,TEMP
23 00717 063033      DCC 0,DSKP      ;OUT SINGLE NO BIT
24 00720 066433      DIC 1,DSKP
25 00721 122414      SUB# 1,0,SZR      ;OUT=IN? SKP
26 00722 000242      EHALL
27 00723 000243      LOOP      ;ITERATE SINGLE NO BIT
28 00724 020144      LDA 0,TEMP
29 00725 101142      MOVUL 0,0,SZC      ;CRY#0 IS DONE 16
30 00726 000766      JMP A62,77-1      ;DO NEXT BIT
31
32      ;BIT# BIT NOBIT BIT NAME
33 113 000001 177770 SC1
34 114 000002 177775 SC2
35 115 000004 177773 SC4
36 112 000010 177767 SC8
37 111 000020 177757 S1
38 110 000040 177737 S2
39 19 000100 177677 S4
40 18 000200 177577 S8
41 17 000400 177377 M01
42 16 001000 176777 M02
43 15 002000 175777 M04
44 14 004000 173777 M08
45 13 010000 167777 M016
46 12 020000 157777 FURMAT
47 11 040000 137777 01
48 10 100000 077777 00
49

```

```

A 0014 .MAIN
01
02 00727 102400 A78: SUB 0,0      ;CHECK CA REGISTER, ALL
03 00730 000237      JSR #ISET      ;POSSIBLE PATTERNS
04 00731 062033      DDB 0,DSKP      ;LOAD CA
05 00732 065433      DIB 1,DSKP      ;READ IT BACK
06 00733 122414      SUB# 1,0,SZR      ;AC0=GOOD
07 00734 000242      EHALL          ;AC1=BAD
08 00735 000243      LOOP          ;DO IT ONLY ONCE FOR EACH PAT
09 00736 101404      INC 0,0,SZR      ;NEXT PATTERN
10 00737 000771      JMP #-7
11
12 00740 000237 A79: JSR #ISET      ;CHECK DISK ADDRESS REGISTER
13 00741 063033      DCC 0,DSKP      ;ALL POSSIBLE PATTERNS
14 00742 066433      DIC 1,DSKP      ;LOAD/READ BACK
15 00743 122414      SUB# 1,0,SZR      ;AC0=GOOD
16 00744 000242      EHALL          ;AC1=BAD
17 00745 000243      LOOP          ;NEXT PATTERN
18 00746 101404      INC 0,0,SZR
19 00747 000771      JMP #-7
20
21 00750 000241 A80: SETUP
22 00751 102400      SUB 0,0      ;SPECIAL TEST FOR 0291
23 00752 030134      LDA 2,BIT1      ;IC PACKS. SET RIGHTMOST
24 00753 072433      DDB 2,DSKP      ;BIT IN EACH PACK WITH
25 00754 072033      DDB 2,DSKP      ;3 SUCCESSIVE LOADS, THEN
26 00755 072033      DDB 2,DSKP      ;LOAD ZERO. MARGINAL
27 00756 062033      DDB 0,DSKP      ;PACKS WILL HOLD THE "1".
28 00757 065433      DIB 1,DSKP      ;TESTING CA REGISTER
29 00760 125004      MOV 1,1,SZR      ;AC0=GOOD
30 00761 000242      EHALL          ;AC1=BAD
31 00762 000243      LOOP

```

A 0015 .MAIN

```
01
02 00763 000241 AB1:  SETUP      ISPECIAL TEST FOR 0291
03 00764 102400      SUB 0,0    IIC PACKS, SET POSITION 2
04 00765 030135      LDA 2,BIT2 I(PIN 9) IN EACH PACK WITH
05 00766 072033      DUB 2,DSKP I3 SUCCESSIVE LOADS, THEN
06 00767 072033      DUB 2,DSKP ILOAD ZEROS, MARGINAL
07 00770 072033      DUB 2,DSKP IPACKS WILL HOLD A "1"
08 00771 000233      DUB 0,DSKP
09 00772 000433      DIB 1,DSKP ITESTING CA REGISTER
10 00773 122414      SUB# 1,0, SZH IAC0#GOOD
11 00774 000242      EHALT    IAC1#BAD
12 00775 000243      LOOP
13
14 00776 000241 AB2:  SETUP      ISPECIAL TEST FOR 0291
15 00777 102400      SUB 0,0    IIC PACKS, SET POSITION 4
16 01000 030136      LDA 2,BIT4 I(PIN 9) IN EACH PACK WITH
17 01001 072033      DUB 2,DSKP I3 SUCCESSIVE LOADS, THEN
18 01002 072033      DUB 2,DSKP ILOAD ZEROS, MARGINAL
19 01003 072033      DUB 2,DSKP IPACKS WILL HOLD A "1".
20 01004 062433      DUB 0,DSKP
21 01005 000433      DIB 1,DSKP ITESTING CA REGISTER
22 01006 122414      SUB# 1,0, SZH IAC0#GOOD
23 01007 000242      EHALT    IAC1#BAD
24 01010 000243      LOOP
25
26 01011 000241 AB3:  SETUP      ISPECIAL TEST FOR 0291
27 01012 102400      SUB 0,0    IIC PACKS, SET POSITION 8
28 01013 030137      LDA 2,BIT8 I(PIN 12) IN EACH PACK WITH
29 01014 072033      DUB 2,DSKP I3 SUCCESSIVE LOADS, THEN
30 01015 072033      DUB 2,DSKP ILOAD ZEROS, MARGINAL
31 01016 072033      DUB 2,DSKP IPACKS WILL HOLD A "1"
32 01017 000233      DUB 0,DSKP
33 01020 000433      DIB 1,DSKP ITESTING CA REGISTER
34 01021 122414      SUB# 1,0, SZH IAC0#GOOD
35 01022 000242      EHALT    IAC1#BAD
36 01023 000243      LOOP
37
38 01024 000241 AB4:  SETUP      ISPECIAL TEST FOR 0291
39 01025 102400      SUB 0,0    IIC PACKS, SET POSITION 1
40 01026 030134      LDA 2,BIT1 I(PIN 5) OF EACH PACK WITH
41 01027 073033      DUC 2,DSKP I3 SUCCESSIVE LOADS, THEN
42 01030 073033      DUC 2,DSKP ILOAD ZEROS, MARGINAL
43 01031 073033      DUC 2,DSKP IPACKS WILL HOLD A "1".
44 01032 003033      DUC 0,DSKP
45 01035 000433      DIC 1,DSKP ITESTING DISK ADDR REG.
46 01034 122414      SUB# 1,0, SZH IAC0#GOOD
47 01035 000242      EHALT    IAC1#BAD
48 01036 000243      LOOP
```

A 0010 .MAIN

```
01
02 01037 000241 AB0:  SETUP      ISPECIAL TEST FOR 0291
03 01040 102400      SUB 0,0    IIC PACKS, SET POSITION 2
04 01041 030135      LDA 2,BIT2 I(PIN 9) OF EACH PACK WITH
05 01042 073033      DUC 2,DSKP I3 SUCCESSIVE LOADS, THEN
06 01043 073033      DUC 2,DSKP ILOAD ZEROS, MARGINAL
07 01044 073033      DUC 2,DSKP IPACKS WILL RETAIN A "1".
08 01045 003033      DUC 0,DSKP
09 01046 000433      DIC 1,DSKP ITESTING DISK ADDR REG.
10 01047 122414      SUB# 1,0, SZH IAC0#GOOD
11 01050 000242      EHALT    IAC1#BAD
12 01051 000243      LOOP
13
14 01052 000241 AB0:  SETUP      ISPECIAL TEST FOR 0291
15 01053 102400      SUB 0,0    IIC PACKS, SET POSITION 4
16 01054 030136      LDA 2,BIT4 I(PIN 2) OF EACH PACK WITH
17 01055 073033      DUC 2,DSKP I3 SUCCESSIVE LOADS, THEN
18 01056 073033      DUC 2,DSKP ILOAD ZEROS, MARGINAL
19 01057 073033      DUC 2,DSKP IPACKS WILL RETAIN A "1".
20 01060 003033      DUC 0,DSKP
21 01061 000433      DIC 1,DSKP ITESTING DISK ADDR REG.
22 01062 122414      SUB# 1,0, SZH IAC0#GOOD
23 01063 000242      EHALT    IAC1#BAD
24 01064 000243      LOOP
25
26 01065 000241 AB7:  SETUP      ISPECIAL TEST FOR 0291
27 01066 102400      SUB 0,0    IIC PACKS, SET POSITION 8
28 01067 030137      LDA 2,BIT8 I(PIN 12) OF EACH PACK WITH
29 01070 073033      DUC 2,DSKP I3 SUCCESSIVE LOADS, THEN
30 01071 073033      DUC 2,DSKP ILOAD ALL ZEROS, MARGINAL
31 01072 073033      DUC 2,DSKP IPACKS WILL RETAIN A "1".
32 01073 003033      DUC 0,DSKP
33 01074 000433      DIC 1,DSKP ITESTING DISK ADDR REG.
34 01075 122414      SUB# 1,0, SZH IAC0#GOOD
35 01076 000242      EHALT    IAC1#BAD
36 01077 000243      LOOP
37
38 01100 020147 B1:   LDA 0,K000 ICHECK FOR ILLEGAL
39 01101 040403      STA 0,B1.1 IDEVICE SELECT BY
40 01102 024140      LDA 1,C2525 IDISK PACK CONTROL
41 01103 000242      SETP1    IPERFORM "DOB" TO EVERY
42 01104 000000 B1.1: DOB 1,0    IUTHER DEVICE ADDRESS
43 01105 001433      DIB 0,DSKP IAND CHECK DSKP
44 01106 122415      SUB# 1,0, SNR Ieach TIME TO SEE
45 01107 000242      EHALT    IT RECOGNIZED THE "DOB".
46 01110 000243      LOOP
47 01111 010773 B1.2: ISZ B1.1  ILODE FROM HERE ON IS
48 01112 020772      LDA 0,B1.1 IFOR INCREMENTING TO
49 01113 030123      LDA 2,C77  INEXT DEVICE ADDRESS
50 01114 143400      AND 2,0, SNR
51 01115 000400      JMP B2
52 01116 030104      LDA 2,C00A
53 01117 142410      SUB# 2,0, SNR
54 01120 000771      JMP B1.2
55 01121 000702      JMP B1.1-1
```

```

A 0017 .MAIN
01
02 01122 000241 B2:  SETUP          ISEE IF (S) PULSE WILL SET
03 01123 020070      LDA 0,C1000  I"OP BUSY".  START A
04 01124 061133      DQAS 0,DSKP ISEEK
05 01125 063433      SKPBN DSKP  ISKIP IF "DP BUSY" = 1
06 01126 006252      EHMT       ICHECK "OP START", "DP BUSY",
07 01127 006262      LOOPD     I"SELB" OC GATE.
08
09 01130 000241 B3:  SETUP          ISEE IF (C) PULSE WILL CLEAR
10 01131 020070      LDA 0,C1000  I"OP BUSY".  START A SEEK.
11 01132 061133      DQAS 0,DSKP I THEN CLEAR
12 01133 060233      NI0C DSKP  ICHECK "CLEAR"
13 01134 063533      SKPBZ DSKP
14 01135 006252      EHMT
15 01136 006262      LOOPD
16
17 01137 000241 B4:  SETUP          ISEE IF IORST WILL CLEAR
18 01140 020070      LDA 0,C1000  I"OP BUSY".  START A SEEK.
19 01141 061133      DQAS 0,DSKP I THEN CLEAR IT
20 01142 006267      IORST
21 01143 063533      SKPBZ DSKP  ICHECK "RESET", "CLEAR"
22 01144 006252      EHMT
23 01145 006262      LOOPD
24
25 01146 000241 B5:  SETUP          ICHECK TO INSURE THAT
26 01147 004433      DIA 1,DSKP  IALL SEEKING FF'S ARE
27 01150 020216      LDA 0,C3600  ICLEARED BY IORST
28 01151 107404      AND 0,1,SZR IAC1=BAD SEEKING
29 01152 000242      EHMT        ISTATUS FROM DIA.
30 01153 006243      LOOP        ICHECK DATA THRU MUX
31
32 01154 000241 B6:  SETUP          ICHECK FOR PROPER
33 01155 102000      ADC 0,0      IINPUT OF STATUS THRU
34 01156 062033      DDB 0,DSKP  ITHE MULTIPLEXONS TO
35 01157 063033      DDC 0,DSKP  ITHE DATA BUSS OC GATES
36 01158 064433      DIA 1,DSKP
37 01161 020216      LDA 0,C3600
38 01162 107414      AND# 0,1,SZR
39 01163 006242      EHMT
40 01164 006243      LOOP
41
42 01165 000241 B7:  SETUP          ITRY TO SET "SEEKING 0"
43 01166 020070      LDA 0,C1000  I VIA (S) PULSE
44 01167 061133      DQAS 0,DSKP
45 01170 064433      DIA 1,DSKP  I"OP START" SETS "START"
46 01171 020071      LDA 0,K05   ICHECK "ADAPTER SEL", "SEEK"
47 01172 123415      AND# 1,0,SNR IAND "START SEEK"
48 01173 006252      EHMT
49 01174 006262      LOOPD

```

```

A 0018 .MAIN
01
02 01175 000241 B0:  SETUP          ITRY TO SET "SEEKING 0"
03 01176 020070      LDA 0,C1000  I WITH A (P) PULSE
04 01177 061333      DQAP 0,DSKP
05 01200 024071      LDA 1,K05   ICHECK "OP IOP"
06 01201 006433      DIA 0,DSKP  ISET LINE TO "START"
07 01202 123415      AND# 1,0,SNR
08 01203 006252      EHMT
09 01204 006262      LOOPD
10
11 01205 000241 B9:  SETUP          ICHECK UNIT SELECTION
12 01206 020070      LDA 0,C1000  ISTART UNIT 0 SEEKING
13 01207 061333      DQAP 0,DSKP  IAND VERIFY THAT NO
14 01210 070433      DIA 2,DSKP  IOTHER UNIT SEEKS.
15 01211 020071      LDA 0,K05   IAC2=STATUS DURING SEEK
16 01212 024216      LDA 1,C3600 IAC1=BAD SEEKING STATUS
17 01213 147400      AND 2,1     IAC0=GOOD
18 01214 122414      SUB# 1,0,SZR ICHECK UNIT # DECODER
19 01215 006252      EHMT
20 01216 006262      LOOPD
21
22 01217 000241 B10:  SETUP          ICHECK UNIT SELECTION 1
23 01220 020070      LDA 0,K01   ISTART UNIT 1 SEEKING
24 01221 063033      DDC 0,DSKP  IAND VERIFY THAT NO
25 01222 020070      LDA 0,C1000  IOTHER UNIT SEEKS.
26 01223 061333      DQAP 0,DSKP  IAC2=STATUS DURING SEEK
27 01224 070433      DIA 2,DSKP  IAC1=BAD SEEKING STATUS
28 01225 024216      LDA 1,C3600 IAC0=GOOD
29 01226 020070      LDA 0,K05   ICHECK UNIT # DECODER,
30 01227 147400      AND 2,1     I"UNIT 1", AND "SEEKING 1"
31 01230 122414      SUB# 1,0,SZR
32 01231 006252      EHMT
33 01232 006262      LOOPD
34
35 01233 000241 B11:  SETUP          ICHECK UNIT SELECTION
36 01234 102620      SUBZR 0,0   ISTART UNIT 2 SEEKING AND
37 01235 063033      DDC 0,DSKP  IVERIFY THAT NO OTHER
38 01236 020070      LDA 0,C1000  IUNIT SEEKS
39 01237 061333      DQAP 0,DSKP  IAC2=STATUS DURING SEEK
40 01240 070433      DIA 2,DSKP  IAC1=BAD SEEKING STATUS
41 01241 024216      LDA 1,C3600 IAC0=GOOD
42 01242 020067      LDA 0,K07   ICHECK "UNIT 2",
43 01243 147400      AND 2,1     I"SEEKING 2"
44 01244 122414      SUB# 1,0,SZR
45 01245 006252      EHMT
46 01246 006262      LOOPD

```

A 0019 .MAIN

```

01
02 01247 000241 B12:  SETUP
03 01250 020056      LDA 0,C140K
04 01251 060033      DUC 0,DSKP
05 01252 020070      LDA 0,C1000
06 01253 061333      DUAP 0,USKP
07 01254 070433      OIA 2,DSKP
08 01255 024216      LDA 1,C3000
09 01256 020066      LDA 0,K08
10 01257 147404      AND 2,1
11 01260 122414      SUB# 1,0,SZR
12 01261 000252      EHLT
13 01262 000262      LOOPD
14
15 01263 000241 B13:  SETUP
16 01264 152520      SUBZL 2,2
17 01265 000230      SSEEK
18 01266 060233      NIOL USKP
19 01267 020071      LDA 0,K05
20 01270 064433      OIA 1,DSKP
21 01271 107404      AND 0,1,SZR
22 01272 000252      EHLT
23 01273 000262      LOOPD
24
25 01274 000241 B14:  SETUP
26 01275 030060      LDA 2,K014
27 01276 000230      SSEEK
28 01277 060233      NIOL USKP
29 01300 020070      LDA 0,K06
30 01301 064433      OIA 1,DSKP
31 01302 107404      AND 1,1,SZR
32 01303 000252      EHLT
33 01304 000262      LOOPD
34
35 01305 000241 B15:  SETUP
36 01306 030061      LDA 2,K013
37 01307 000230      SSEEK
38 01310 060233      NIOL USKP
39 01311 020067      LDA 0,K07
40 01312 064433      OIA 1,DSKP
41 01313 107404      AND 0,1,SZR
42 01314 000252      EHLT
43 01315 000262      LOOPD
44

```

```

ICHECK UNIT SELECTION
I*START UNIT 3 SEEKING
I*AND VERIFY THAT NO
I*OTHER UNIT SEEKS,
I*AC2#STATUS DURING SEEK
I*AC1#BAD SEEKING STATUS
I*AC0#GOOD
I*CHECK "UNIT 3", AND
I*"SEEKING 3"

```

```

ICHECK THE "CLEAR"
I*RESET OF "SEEKING 0".
I*START UNIT 0 SEEKING
I*ISSUE (C) PULSE

I*HEAD STATUS
I*"SEEKING 0" BIT NOT
I*CLEARED BY (C) PULSE

```

```

ICHECK THE "CLEAR"
I*RESET OF "SEEKING 1"
I*START UNIT 1 SEEKING.
I*ISSUE (C) PULSE

I*HEAD STATUS
I*"SEEKING 1" BIT NOT
I*CLEARED BY (C) PULSE

```

```

ICHECK THE "CLEAR" RESET
I*OF "SEEKING 2",
I*START UNIT 2 SEEKING.
I*ISSUE (C) PULSE

I*HEAD STATUS
I*"SEEKING 2" BIT NOT
I*RESET BY (C) PULSE

```

A 0020 .MAIN

```

01
02 01310 000241 B16:  SETUP
03 01317 030062      LDA 2,K012
04 01320 000230      SSEEK
05 01321 060233      NIOL USKP
06 01322 020066      LDA 0,K08
07 01323 064433      OIA 1,USKP
08 01324 107404      AND 0,1,SZR
09 01325 000252      EHLT
10 01326 000262      LOOPD
11
12 01327 020101 B17:  LDA 0,NUSKS
13 01330 101203      MOVN 0,0,SNC
14 01331 000415      JMP B18
15 01332 000237      JSR #ISET
16 01333 000231      RECL0
17 01334 020054      LDA 0,K01
18 01335 123414      AND# 1,0,SZR
19 01336 000403      JMP ,+3
20 01337 000202      EHLT
21 01340 000405      JMP ,+5
22 01341 030220      LDA 2,C74K
23 01342 133400      AND 1,2
24 01343 112404      SUB 0,2,SZR
25 01344 000252      EHLT
26 01345 000243      LOOP
27
28 01346 020151 B18:  LDA 0,NUSKS
29 01347 101200      MOVN 0,0
30 01350 101203      MOVN 0,0,SNC
31 01351 000415      JMP B19
32 01352 000237      JSR #ISET
33 01353 000232      RECL1
34 01354 020074      LDA 0,K02
35 01355 123414      AND# 1,0,SZR
36 01356 000403      JMP ,+3
37 01357 000252      EHLT
38 01360 000405      JMP ,+5
39 01361 030220      LDA 2,C74K
40 01362 133400      AND 1,2
41 01363 112404      SUB 0,2,SZR
42 01364 000252      EHLT
43 01365 000243      LOOP

```

```

ICHECK THE "CLEAR" RESET
I*OF "SEEKING 3"
I*START UNIT 3 SEEKING.
I*ISSUE (C) PULSE

```

```

I*HEAD STATUS
I*"SEEKING 3" BIT NOT
I*CLEARED BY (C) PULSE

```

```

I*ATTEMPT TO OBTAIN
I*"SEEK DONE 0" FROM
I*A RECALIBRATE
I*(SKIP OVER IF NO UNIT 0)
I*HEAD UNIT 0
I*AC1#STATUS
I*"ATTEN0" DID NOT SET

```

```

ICHECKN FOR SHORTED
I*ATTENTION LINES. ON A HALT
I*CK IF OTHER DONE FLOPS SET WITH
I*"SEEK DONE 0"

```

```

I*ATTEMPT TO OBTAIN
I*"SEEK DONE 1" FROM
I*A RECALIBRATE
I*(SKIP OVER IF NO UNIT 1)
I*HEAD UNIT 1
I*AC1#STATUS
I*"ATTEN1" DID NOT SET

```

```

ICHECKN FOR SHORTED
I*ATTENTION LINES. ON A HALT
I*CK IF OTHER DONE FLOPS SET WITH
I*"SEEK DONE 1"

```

```

A 0021 ,MAIN
01 01366 020151 B19: LDA 0,NDSKS      ;ATTEMPT TO OBTAIN
02 01367 024061 LDA 1,KB13     ;"SEEK DONE 2" FROM
03 01370 123405 AND 1,0,SNR   ;A RECALIBRATE
04 01371 000415 JMP B20       ;(SKIP OVER IF NO UNIT 2)
05 01372 000237 JSR #ISET
06 01373 000233 RECL2        ;RECAL UNIT 2
07 01374 020073 LDA 0,KB3     ;IAC1=STATUS
08 01375 123414 ANDM 1,0,SZR  ;"ATTEN2" DID NOT SET
09 01376 000403 JMP ,+3
10 01377 000252 EHLT
11 01400 000405 JMP ,+5
12 01401 030220 LDA 2,C74K   ;CHECKN FOR SHORTED
13 01402 133400 AND 1,2      ;ATTENTION LINES. ON A HALT
14 01403 112404 SUB 0,2,SZR   ;CK IF OTHER DONE FLOPS SET WITH
15 01404 000252 EHLT
16 01405 000243 LOOP
17
18 01406 020151 B20: LDA 0,NDSKS      ;ATTEMPT TO OBTAIN
19 01407 024062 LDA 1,KB12     ;"SEEK DONE 3" FROM
20 01410 123405 AND 1,0,SNR   ;A RECALIBRATE
21 01411 000415 JMP B21       ;(SKIP OVER IF NO UNIT 3)
22 01412 000237 JSR #ISET
23 01413 000234 RECL3        ;RECAL UNIT 3
24 01414 020072 LDA 0,KB4     ;IAC1=STATUS
25 01415 123414 ANDM 1,0,SZR  ;"ATTEN3" FAILED TO SET
26 01416 000403 JMP ,+3
27 01417 000252 EHLT
28 01420 000405 JMP ,+5
29 01421 030220 LDA 2,C74K   ;CHECKN FOR SHORTED
30 01422 133400 AND 1,2      ;ATTENTION LINES. ON A HALT
31 01423 112404 SUB 0,2,SZR   ;CK IF OTHER DONE FLOPS SET WITH
32 01424 000252 EHLT
33 01425 000243 LOOP
34
35 01426 062677 B21: IORST        ;DISK DRIVE WILL NOT TAKE
36 01427 030107 LDA 2,C5     ;SUCCESSIVE RECALIBRATES
37 01430 000227 WAIT
38
39 01431 020151 LDA 0,NDSKS      ;SEE IF "SEEK DONE 0"
40 01432 101203 MOVK 0,0,SNC   ;WILL RESET "SEEKING 0"
41 01433 000407 JMP B22       ;(SKIP IF NO UNIT 0)
42 01434 000237 JSR #ISET
43 01435 000231 RECL0        ;RECAL UNIT 0
44 01436 020071 LDA 0,KB5     ;IAC1=STATUS
45 01437 123414 ANDM 1,0,SZR  ;"SEEKING 0" SHOULD GET
46 01440 000252 EHLT
47 01441 000243 LOOP
48
49 01442 020151 B22: LDA 0,NDSKS      ;SEE IF "SEEK DONE 1"
50 01443 101202 MOVK 0,0     ;WILL RESET "SEEKING 1"
51 01444 101203 MOVK 0,0,SNC   ;(SKIP OVER IF NO UNIT 1)
52 01445 000407 JMP B23
53 01446 000237 JSR #ISET
54 01447 000232 RECL1        ;RECAL UNIT 1
55 01450 020070 LDA 0,KB6     ;IAC1=STATUS
56 01451 123414 ANDM 1,0,SZR  ;"SEEKING 1" SHOULD GET
57 01452 000252 EHLT
58 01453 000243 LOOP

```

```

A 0022 ,MAIN
01
02 01454 020151 B23: LDA 0,NDSKS      ;SEE IF "SEEK DONE 2"
03 01455 024061 LDA 1,KB13     ;WILL RESET "SEEKING 2"
04 01456 123405 AND 1,0,SNR   ;(SKIP OVER IF NO UNIT 2)
05 01457 000407 JMP B24
06 01460 000237 JSR #ISET
07 01461 000233 RECL2        ;RECAL UNIT 2
08 01462 020067 LDA 0,KB7     ;IAC1=STATUS
09 01463 123414 ANDM 1,0,SZR  ;"SEEKING 2" SHOULD GET
10 01464 000252 EHLT
11 01465 000243 LOOP
12
13 01466 020151 B24: LDA 0,NDSKS      ;SEE IF "SEEK DONE 3"
14 01467 024062 LDA 1,KB12     ;WILL RESET "SEEKING 3"
15 01470 123405 AND 1,0,SNR   ;(SKIP IF NO UNIT 3)
16 01471 000407 JMP B25
17 01472 000237 JSR #ISET
18 01473 000234 RECL3        ;RECAL UNIT 3
19 01474 020066 LDA 0,KB8     ;IAC1=STATUS
20 01475 123414 ANDM 1,0,SZR  ;"SEEKING 3" SHOULD GET
21 01476 000252 EHLT
22 01477 000243 LOOP
23
24 01500 062677 B25: IORST        ;DISK DRIVE WILL NOT TAKE
25 01501 030107 LDA 2,C15   ;SUCCESSIVE RECALIBRATES
26 01502 000227 WAIT
27
28 01503 020151 LDA 0,NDSKS      ;ATTEMPT TO RESET "SEEK DONE 0"
29 01504 101203 MOVK 0,0,SNC   ;WITH "DATOA"
30 01505 000411 JMP B26       ;SKIP OVER IF NO UNIT 0
31 01506 000237 JSR #ISET
32 01507 000231 RECL0        ;SET "SEEK DONE 0" VIA
33 01510 020054 LDA 0,KB1     ;RECALIBRATE
34 01511 001033 ODA 0,DSKP   ;ATTEMPT RESET
35 01512 064433 DIA 1,DSKP   ;READ STATUS
36 01513 123414 ANDM 1,0,SZR  ;"SEEK DONE 0" RESET FAILED
37 01514 000252 EHLT
38 01515 000243 LOOP
39
40 01516 020151 B26: LDA 0,NDSKS      ;ATTEMPT TO RESET "SEEK DONE 1"
41 01517 101202 MOVK 0,0     ;WITH "DATOA"
42 01520 101203 MOVK 0,0,SNC   ;(SKIP OVER IF NO UNIT 1)
43 01521 000411 JMP B27
44 01522 000237 JSR #ISET
45 01523 000232 RECL1        ;SET "SEEK DONE 1"
46 01524 020074 LDA 0,KB2     ;WITH A RECALIBRATE
47 01525 061033 ODA 0,DSKP   ;ATTEMPT RESET
48 01526 064433 DIA 1,DSKP   ;READ STATUS
49 01527 123414 ANDM 1,0,SZR  ;"SEEK DONE 1" RESET FAILED
50 01530 000252 EHLT
51 01531 000243 LOOP

```

A 0023 .MAIN

```
01
02 01032 020151 H27:  LDA 0,NDSKS  IATTEMPT TO RESET "SEEK DONE 2"
03 01033 024001  LDA 1,KB13  IWITH "DATA0"
04 01034 123405  AND 1,0,SNR
05 01035 000411  JMP 028  I(SKIP OVER IF NO UNIT 2)
06 01036 000247  JSR 0ISET  JSR 0ISET
07 01037 000233  RECL2  ISET "SEEK DONE 2"
08 01040 020073  LDA 0,KB3  IWITH A RECALIBRATE
09 01041 001033  DDA 0,DSKP  IATTEMPT RESET
10 01042 004433  DIA 1,DSKP  IREAD STATUS
11 01043 123414  AND# 1,0,SZR
12 01044 000252  EHLT  I"SEEK DONE 2" RESET FAILED
13 01045 000243  LOOP
14
15 01046 020151 H28:  LDA 0,NDSKS  IATTEMPT TO RESET "SEEK DONE 3"
16 01047 024002  LDA 1,KB12  IWITH "DATA0"
17 01050 123405  AND 1,0,SNR
18 01051 000411  JMP 029  I(SKIP OVER IF NO UNIT 3)
19 01052 000237  JSR 0ISET  JSR 0ISET
20 01053 000204  RECL3  ISET "SEEK DONE 3"
21 01054 020072  LDA 0,KB4  IWITH A RECALIBRATE
22 01055 001033  DDA 0,DSKP  IATTEMPT RESET
23 01056 004433  DIA 1,DSKP  IREAD STATUS
24 01057 123414  AND# 1,0,SZR
25 01060 000252  EHLT  I"SEEK DONE 3" RESET FAILED
26 01061 000243  LOOP
27
28 01062 020151 H29:  LDA 0,NDSKS  IATTEMPT TO RESET "SEEK DONE 0"
29 01063 101203  MOV# 0,0,SNR  IWITH A (C) PULSE
30 01064 000411  JMP 030  I(SKIP OVER IF NO UNIT 0)
31 01065 000237  JSR 0ISET  JSR 0ISET
32 01066 000231  RECL0  ISET "SEEK DONE 0" VIA RECAL
33 01067 020054  LDA 0,KB1  LDA 0,KB1
34 01070 000233  NI0C USKP  IATTEMPT CLEAR
35 01071 004433  DIA 1,DSKP  IREAD STATUS
36 01072 123414  AND# 1,0,SZR
37 01073 000252  EHLT  I"SEEK DONE 0" RESET FAILED
38 01074 000243  LOOP
39
40 01075 020151 H30:  LDA 0,NDSKS  IATTEMPT TO RESET "SEEK DONE 1"
41 01076 101200  MOV# 0,0  IWITH A (C) PULSE
42 01077 101203  MOV# 0,0,SNR
43 01080 000411  JMP 031  I(SKIP IF NO UNIT 1)
44 01081 000237  JSR 0ISET  JSR 0ISET
45 01082 000232  RECL1  ISET "SEEK DONE 1" VIA RECAL
46 01083 020074  LDA 0,KB2  LDA 0,KB2
47 01084 000233  NI0C USKP  IATTEMPT RESET
48 01085 004433  DIA 1,DSKP  IREAD STATUS
49 01086 123414  AND# 1,0,SZR
50 01087 000252  EHLT  I"SEEK DONE 1" RESET FAILED
51 01088 000243  LOOP
```

A 0024 .MAIN

```
01
02 01011 022151 H01:  LDA 0,NDSKS  IATTEMPT TO RESET "SEEK DONE 2"
03 01012 024001  LDA 1,KB13  IWITH A (C) PULSE
04 01013 123405  AND 1,0,SNR
05 01014 000411  JMP 032  I(SKIP OVER IF NO UNIT 2)
06 01015 000237  JSR 0ISET  JSR 0ISET
07 01016 000233  RECL2  ISET "SEEK DONE 2" VIA RECAL
08 01017 020073  LDA 0,KB3  LDA 0,KB3
09 01020 000233  NI0C USKP  IATTEMPT RESET
10 01021 004433  DIA 1,DSKP  IREAD STATUS
11 01022 123414  AND# 1,0,SZR
12 01023 000252  EHLT  I"SEEK DONE 2" RESET FAILED
13 01024 000243  LOOP
14
15 01025 022151 H02:  LDA 0,NDSKS  IATTEMPT TO RESET "SEEK DONE 3"
16 01026 024002  LDA 1,KB12  IWITH A (C) PULSE
17 01027 123405  AND 1,0,SNR
18 01030 000411  JMP 033  I(SKIP OVER IF NO UNIT 3)
19 01031 000237  JSR 0ISET  JSR 0ISET
20 01032 000204  RECL3  ISET "SEEK DONE 3" VIA RECAL
21 01033 020072  LDA 0,KB4  LDA 0,KB4
22 01034 000233  NI0C USKP  IATTEMPT RESET
23 01035 004433  DIA 1,DSKP  IREAD STATUS
24 01036 123414  AND# 1,0,SZR
25 01037 000252  EHLT  I"SEEK DONE 3" RESET FAILED
26 01040 000243  LOOP
27
28 01041 000241 H03:  SETUP  IIDLE STATE STATUS CHECK
29 01042 004433  DIA 1,DSKP  DIA 1,DSKP
30 01043 100200  SUBZR 0,0  SUBZR 0,0
31 01044 107414  AND# 0,1,SZR  AND# 0,1,SZR
32 01045 000242  EHLT  EHLT
33 01046 000243  LOOP  LOOP
34
35 01047 000241 H04:  SETUP  IIDLE STATE STATUS CHECK
36 01050 004433  DIA 1,DSKP  DIA 1,DSKP
37 01051 000175  LDA 0,C30  LDA 0,C30
38 01052 123414  AND# 1,0,SZR  AND# 1,0,SZR
39 01053 000242  EHLT  EHLT
40 01054 000243  LOOP  LOOP
```


A 0025 .MAIN

```
01
02 01055 000241 H37:  SETUP      IDLE STATE STATUS CHECK
03 01056 004433      DIA 1,DSKP
04 01057 020001      LDA 0,KB13
05 01060 107414      ANDR 0,1,SZR
06 01061 000242      EHHLT
07 01062 000243      LOOP
08
09 01063 000241 H38:  SETUP      IDLE STATE STATUS CHECK
10 01064 004433      DIA 1,DSKP
11 01065 020117      LDA 0,C3
12 01066 123414      ANDR 1,0,SZM
13 01067 000242      EHHLT
14 01070 000243      LOOP
15
16 01071 020101 H39:  LDA 0,NDSKS  ISEE IF "SEEK DONE 0"
17 01072 101203      MOVK 0,0,SNL I'LL CAUSE INTERRUPT
18 01073 000406      JMP 040      I(SKIP IF NO UNIT 0)
19 01074 000237      JSR 0ISET
20 01075 000231      RECL0      ISET "SEEK DONE 0"
21 01076 000235      ITRWT      IIS THERE AN INTERRUPT?
22 01077 000252      EHHLT      I'NO, CHECK "INTERRUPT",
23 01700 000243      LOOP      I"OP INT REQ".
24
25 01701 020101 H40:  LDA 0,NDSKS  ISEE IF "SEEK DONE 1"
26 01702 101203      MOVK 0,0,SNL I'LL CAUSE INTERRUPT
27 01703 101203      MOVK 0,0,SNL
28 01704 000406      JMP 041      I(SKIP IF NO UNIT 1)
29 01705 000237      JSR 0ISET
30 01706 000232      RECL1      ISET "SEEK DONE 1"
31 01707 000235      ITRWT      IIS THERE AN INTERRUPT?
32 01710 000252      EHHLT      I'NO, CHECK "INTERRUPT",
33 01711 000243      LOOP      I"OP INT REQ".
34
35 01712 020101 H41:  LDA 0,NDSKS  ISEE IF "SEEK DONE 2"
36 01713 024001      LDA 1,KB13  I'LL CAUSE INTERRUPT
37 01714 123405      AND 1,0,SNR
38 01715 000406      JMP 042      I(SKIP IF NO UNIT 2)
39 01716 000237      JSR 0ISET
40 01717 000233      RECL2      ISET "SEEK DONE 2"
41 01720 000235      ITRWT      IIS THERE AN INTERRUPT?
42 01721 000252      EHHLT      I'NO, CHECK "INTERRUPT",
43 01722 000243      LOOP      I"OP INT REQ".
44
45
```

A 0026 .MAIN

```
01
02 01723 020101 H42:  LDA 0,NDSKS  ISEE IF "SEEK DONE 3"
03 01724 024002      LDA 1,KB12  I'LL CAUSE INTERRUPT
04 01725 123405      AND 1,0,SNR
05 01726 000406      JMP 043      I(SKIP IF NO UNIT 3)
06 01727 000237      JSR 0ISET
07 01730 000234      RECL3      ISET "SEEK DONE 3"
08 01731 000235      ITRWT      IIS THERE AN INTERRUPT?
09 01732 000252      EHHLT      I'NO, CHECK "INTERRUPT",
10 01733 000243      LOOP      I"OP INT REQ".
11
12 01734 000240 H43:  SETP1      ITEST SEEK TO CYLINDER 0
13 01735 020102      LDA 0,TESTU I(FIRST ATTEMPT AT COMPLETE SEEK)
14 01736 020033      DDC 0,DSKP  ISELECT AN ACTIVE UNIT #
15 01737 020070      LDA 0,KB6
16 01740 001333      DDAP 0,DSKP  ISEEK I
17 01741 030107      LDA 2,C5
18 01742 000227      WAIT      IWAIT 500MS (OR UNTIL "DONE")
19 01743 020020      LDA 0,C74K  IACI=STATUS
20 01744 123415      ANDR 1,0,SNR I'NO SEEK DONE STATUS
21 01745 000242      EHHLT      I'CHECK "SEEK","CONTROL 1","CYL",
22 01746 000243      LOOP      I"MD+DIR","CONTROL 2", SEQUENCING.
23
24 01747 000240 H44:  SETP1      ITEST SEEK TO CYLINDER 0
25 01750 020102      LDA 0,TESTU
26 01751 003033      DDC 0,DSKP  ISELECT AN ACTIVE UNIT #
27 01752 020070      LDA 0,KB6
28 01753 001333      DDAP 0,DSKP  ISEEK I
29 01754 030107      LDA 2,C5
30 01755 000227      WAIT      IWAIT 500MS (OR UNTIL "DONE")
31 01756 020064      LDA 0,KB10  IACI=STATUS
32 01757 123414      ANDR 1,0,SZM ISEEK ERROR STATUS
33 01760 000242      EHHLT      I'CHECK "SEEK","CONTROL 1","CYL",
34 01761 000243      LOOP      I"MD+DIR", "DIFF", "CONTROL 2".
35
36 01762 000240 H45:  SETP1      ITEST SEEK CYLINDER 77 (OCTAL)
37 01763 000230      GAOSK
38 01764 000246      SEEK
39 01765 000077      77
40 01766 020065      LDA 0,KB9   IACI=ENDING STATUS
41 01767 030064      LDA 2,KB10
42 01770 107414      ANDR 0,1,SZR
43 01771 147414      ANDR 2,1,SZM ISEEK ERROR OR
44 01772 000242      EHHLT      I'NO READY STATUS
45 01773 000243      LOOP
46
47 01774 000240 H46:  SETP1      ITEST SEEK CYLINDER 300 (OCTAL)
48 01775 000236      GAOSK
49 01776 000246      SEEK
50 01777 000300      300
51 02000 020065      LDA 0,KB9   IACI=ENDING STATUS
52 02001 030064      LDA 2,KB10
53 02002 107414      ANDR 0,1,SZR
54 02003 147414      ANDR 2,1,SZM ISEEK ERROR OR
55 02004 000242      EHHLT      I'NO READY STATUS
56 02005 000243      LOOP
```

```

A 0027 .MAIN
01
02 02000 000240 B47:  SETP1      ICMOOSE AN ACTIVE DISK
03 02007 000230      GADSK      IAND SET INTERRUPT VIA SEEK.
04 02010 000246      SEEK        ICHECK FOR PROPER DISK
05 02011 000000      0           IADDRESS RESPONSE TO INTA
06 02012 000235      ITRWT      IALLOW INTERRUPT
07 02013 000401      JMP ,+1
08 02014 020154      LUA 0,CDSK
09 02015 000477      INTA 1     IGET THE ADDRESS
10 02016 122414      SUB# 1,0,SZK IINTA FAILED.
11 02017 000242      EHALT     IAC0=6C0D
12 02020 000243      LOOP     IAC1=0A0D
13
14 02021 000240 B48:  SETP1      ISEE IF (C) PULSE WILL
15 02022 000236      GADSK      ICLEAR "DP INT REQ"
16 02023 000246      SEEK        ISET "INTERRUPT" WITH
17 02024 000000      0           IA SEEK
18 02025 000233      NIUL USKP ICLEAR INT REQ
19 02026 000235      ITRWT      ICHECK FOR INTERRUPT
20 02027 000402      JMP ,+2    INO INTERRUPT, OK!!
21 02030 000242      EHALT     I(C) THRU "CLEAR ALL" FAILS TO
22 02031 000243      LOOP     ICLEAR "DP INT REQ".
23
24 02032 000242 B49:  SETP1      IINSURE THAT "DP INT DISABLE"
25 02033 020067      LUA 0,K07 IINHIBITS INTERRUPTS
26 02034 000077      MSKU 0    ISET DISABLE
27 02035 000236      GADSK      IGET ACTIVE UNIT # IN (AC2)
28 02036 000246      SEEK        ISTART A SEEK
29 02037 000000      0
30 02040 000235      ITRWT      IIS THERE AN INTERRUPT ?
31 02041 000402      JMP ,+2    INO, GOOD
32 02042 000242      EHALT     IMSAO BIT 7 DID NOT SET "DP DISABLE"
33 02043 000243      LOOP     IAND INHIBIT "DP INT REQ".
34
35 02044 000240 B50:  SETP1      IINSURE THAT IONST #ILL
36 02045 020067      LUA 0,K07 ICLEAR "DP INT DISABLE"
37 02046 000077      MSKU 0    ISET "DP INT DISABLE"
38 02047 000267      IONST     ICLEAR IT
39 02050 000236      GADSK      IGET ACTIVE UNIT # IN (AC2)
40 02051 000246      SEEK        ISTART A SEEK
41 02052 000000      0
42 02053 000235      ITRWT      IIS THERE AN INTERRUPT
43 02054 000242      EHALT     INO, CHECK RESET OF "DP INT
44 02055 000243      LOOP     DISABLE".

```

```

A 0028 .MAIN
01
02 02056 020151 B51:  LUA 0,NUSKS IIF UNIT 0 NOT AVAILABLE
03 02057 101203      MOVN 0,0,SNC IGO ON TO UNIT 1
04 02060 000423      JMP B53    I(UNIT 0 NOT BEING TESTED)
05 02061 000241      SETUP     IIDLE STATE STATUS CHECK
06 02062 152520      SUBZL 2,2 ISELECT THE ADAPTER
07 02063 000246      SEEK        IWITH A SEEK 0
08 02064 000000      0
09 02065 000433      DIA 1,USKP IREAD STATUS
10 02066 020005      LUA 0,K09
11 02067 123415      AND# 1,0,SNR
12 02070 000242      EHALT     INO READY STATUS, UNIT 0
13 02071 000243      LOOP
14
15 02072 000241 B52:  SETUP     IIDLE STATE STATUS CHECK
16 02073 152520      SUBZL 2,2 ISELECT THE ADAPTER
17 02074 000246      SEEK        IWITH A SEEK 0
18 02075 000000      0
19 02076 000433      DIA 1,USKP IREAD STATUS
20 02077 020004      LDA 0,K010
21 02100 123414      AND# 1,0,SZK
22 02101 000242      EHALT     ISEEK ERROR STATUS, UNIT 0
23 02102 000243      LOOP
24
25
26 02103 020151 B53:  LUA 0,NUSKS IIF UNIT 1 IS NOT
27 02104 101200      MOVN 0,0   IAVAILABLE, GO ON TO UNIT 2
28 02105 101203      MOVN 0,0,SNC
29 02106 000423      JMP B55    ISKIP THIS TEST
30 02107 000241      SETUP     IIDLE STATE STATUS CHECK
31 02110 030000      LUA 2,K014 ISELECT THE ADAPTER
32 02111 000246      SEEK        IWITH A SEEK 0
33 02112 000000      0
34 02113 000433      DIA 1,USKP IREAD STATUS
35 02114 020005      LUA 0,K09
36 02115 123415      AND# 1,0,SNR
37 02116 000242      EHALT     INO READY STATUS, UNIT 1
38 02117 000243      LOOP
39
40 02120 000241 B54:  SETUP     IIDLE STATE STATUS CHECK
41 02121 030000      LUA 2,K014
42 02122 000246      SEEK        ISELECT THE ADAPTER
43 02123 000000      0           IWITH A SEEK 0
44 02124 000433      DIA 1,USKP IREAD STATUS
45 02125 020004      LDA 0,K010
46 02126 123414      AND# 1,0,SZK
47 02127 000242      EHALT     ISEEK EHROR STATUS, UNIT 1
48 02130 000243      LOOP

```

A 0029 .MAIN

```
01
02 02131 020151 B50: LDA 0,NDSKS      JIF UNIT 2 IS NOT AVAILABLE
03 02132 024061 LDA 1,KB13      JGO ON TO UNIT 3
04 02133 107405 AND 0,1,SNR
05 02134 000423 JMP 057        JSKIP THIS TEST, NO UNIT 2
06 02135 000241 SETUP        JIDLE STATE STATUS CHECK
07 02136 030061 LDA 2,KB13     JSELECT THE ADAPTER
08 02137 000246 SEEK          JWITH A SEEK 0
09 02140 000000 0
10 02141 004433 VIA 1,DSKP     JREAD STATUS
11 02142 020065 LDA 0,KB9
12 02143 123415 ANDN 1,0,SNH
13 02144 000242 EMALT
14 02145 000243 LOOP
15
16 02146 000241 B56: SETUP        JIDLE STATE STATUS CHECK
17 02147 030061 LDA 2,KB13     JSELECT THE ADAPTER
18 02150 000246 SEEK          JWITH A SEEK 0
19 02151 000000 0
20 02152 004433 VIA 1,DSKP     JREAD STATUS
21 02153 020064 LDA 0,KB10
22 02154 123414 ANDN 1,0,SZR
23 02155 000242 EMALT
24 02156 000243 LOOP
25
26 02157 020151 B57: LDA 0,NDSKS      JIF UNIT 3 IS NOT AVAILABLE
27 02160 024062 LDA 1,KB12     JGO TO NEXT TEST.
28 02161 123405 AND 1,0,SNR
29 02162 000423 JMP D1
30 02163 000241 SETUP        JIDLE STATE STATUS CHECK
31 02164 030062 LDA 2,KB12     JSELECT THE ADAPTER
32 02165 000246 SEEK          JWITH A SEEK 0
33 02166 000000 0
34 02167 004433 VIA 1,DSKP     JREAD STATUS
35 02170 020065 LDA 0,KB9
36 02171 123415 ANDN 1,0,SNH
37 02172 000242 EMALT
38 02173 000243 LOOP
39
40 02174 000241 B58: SETUP        JIDLE STATE STATUS CHECK
41 02175 030062 LDA 2,KB12     JSELECT THE ADAPTER
42 02176 000246 SEEK          JWITH A SEEK 0
43 02177 000000 0
44 02200 004433 VIA 1,DSKP     JREAD STATUS
45 02201 020064 LDA 0,KB10
46 02202 123414 ANDN 1,0,SZR
47 02203 000242 EMALT
48 02204 000243 LOOP
```

A 0030 .MAIN

```
01
02 02205 000241 D1: SETUP
03 02206 020152 LDA 0,TESTU   JCHECK THE FIRST 2 DATA
04 02207 000033 DUC 0,DSKP    JCHANNEL CYCLES OF A WRITE
05 02210 030160 LDA 2,BUFF    J(FIRST ATTEMPT AT WRITE)
06 02211 072033 DUB 2,DSKP
07 02212 020067 LDA 0,KB7     JLOAD CA REG.
08 02213 001133 DUAS 0,DSKP
09 02214 000165 JSR 0STALL   JWRITE 11
10 02215 000233 NIOL DSKP    JALLOW TIME FOR DCH CYCLES
11 02216 001433 OIB 0,DSKP   JCLEAN THE WRITE OPERATION
12 02217 024000 LDA 1,KB14    JAC0=STARTING MEMORY ADDRESS
13 02220 147000 ADD 2,1       J2 DCH CYCLES SHOULD HAVE
14 02221 122414 SUB# 1,0,SZH  JOCURRED
15 02222 000242 EMALT
16 02223 000243 LOOP
17
18
19
20
21 02224 000241 D2: SETUP
22 02225 020152 LDA 0,TESTU   JCHECK THE FIRST 2 DATA
23 02226 053033 DUC 0,DSKP    JCHANNEL CYCLES OF A WRITE
24 02227 030160 LDA 2,BUFF
25 02230 072033 DUB 2,DSKP
26 02231 024140 LDA 1,C2525
27 02232 040060 STA 1,0,2
28 02233 040061 STA 1,1,2
29 02234 020067 LDA 0,KB7
30 02235 001133 DUAS 0,DSKP
31 02236 000165 JSR 0STALL   JWRITE 11
32 02237 000233 NIOL DSKP    JALLOW TIME FOR 2 DCH'S
33 02240 021000 LDA 0,0,2     JCLEAR THE WRITE
34 02241 031001 LDA 2,1,2     JIS THE DATA STILL IN MEMORY
35 02242 106415 SUB# 0,1,SNR  JIF NOT A DCHI MAY HAVE
36 02243 146414 SUB# 2,1,SZR  JBEEN PERFORMED INSTEAD
37 02244 000242 EMALT
38 02245 000243 LOOP
JOF A DCHO
JAC0&AC2=BAD WORDS
JAC1=GOOD
```

```

A 0031 ,MAIN
01
02 02246 000241 D01  SETUP          ICHECK PROPER CA REGISTER
03 02247 020152          LDA 0,TESTU      INCREMENT BY ALLOWING
04 02250 063033          DDC 0,DSKP      ITHE FIRST 2 DATA CHANNEL
05 02251 102400          SUB 0,0         ICYCLES AT THE BEGINNING
06 02252 002033          DDB 0,DSKP     IUF A WRITE.
07 02253 024007          LDA 1,K07
08 02254 005133          DGAS 1,USKP    I WRITE !!
09 02255 006165          JSR #STALL
10 02256 000233          NIUC DSKP      ISTOP THE WRITE
11 02257 030000          LDA 2,K014     JAC0=STARTING MEMORY ADDRESS
12 02260 005433          DIB 1,DSKP     JAC1=ACTUAL ENDING MEMORY
13 02261 113000          ADD 0,2        I ADDRESS
14 02262 146414          SUB# 2,1,SZK   JAC2=CORRECT ENDING MEMORY
15 02263 000242          EHALT         I ADDRESS
16 02264 000243          LOOP
17
18 02265 000241 D01  SETUP          ICHECK PROPER CA REGISTER
19 02266 020152          LDA 0,TESTU      INCREMENT BY ALLOWING
20 02267 063033          DDC 0,DSKP      ITHE FIRST 2 DATA CHANNEL
21 02270 102400          SUB#L 0,0       ICYCLES AT THE BEGINNING
22 02271 002033          DDB 0,DSKP     IUF A WRITE.
23 02272 024007          LDA 1,K07
24 02273 005133          DGAS 1,USKP    I WRITE !!
25 02274 006165          JSR #STALL
26 02275 000233          NIUC DSKP      ISTOP THE WRITE
27 02276 030000          LDA 2,K014     JAC0=STARTING MEMORY ADDRESS
28 02277 005433          DIB 1,DSKP     JAC1=ACTUAL ENDING MEMORY
29 02300 113000          ADD 0,2        I ADDRESS
30 02301 146414          SUB# 2,1,SZK   JAC2=CORRECT ENDING MEMORY
31 02302 000242          EHALT         I ADDRESS
32 02303 000243          LOOP
33
34 02304 000241 D01  SETUP          ICHECK PROPER CA REGISTER
35 02305 020152          LDA 0,TESTU      INCREMENT BY ALLOWING
36 02306 063033          DDC 0,DSKP      ITHE FIRST 2 DATA CHANNEL
37 02307 020117          LDA 0,C3        ICYCLES AT THE BEGINNING
38 02310 002033          DDB 0,DSKP     IUF A WRITE.
39 02311 024007          LDA 1,K07
40 02312 005133          DGAS 1,USKP    I WRITE !!
41 02313 006165          JSR #STALL
42 02314 000233          NIUC DSKP      ISTOP THE WRITE
43 02315 030000          LDA 2,K014     JAC0=STARTING MEMORY ADDRESS
44 02316 005433          DIB 1,DSKP     JAC1=ACTUAL ENDING MEMORY
45 02317 113000          ADD 0,2        I ADDRESS
46 02320 146414          SUB# 2,1,SZK   JAC2=CORRECT ENDING MEMORY
47 02321 000242          EHALT         I ADDRESS
48 02322 000243          LOOP

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A 0032 ,MAIN
01
02 02323 000241 D01  SETUP          ICHECK PROPER CA REGISTER
03 02324 020152          LDA 0,TESTU      INCREMENT BY ALLOWING
04 02325 063033          DDC 0,DSKP      ITHE FIRST 2 DATA CHANNEL
05 02326 020120          LDA 0,C7        ICYCLES AT THE BEGINNING
06 02327 002033          DDB 0,DSKP     IUF A WRITE.
07 02330 024007          LDA 1,K07
08 02331 005133          DGAS 1,USKP    I WRITE !!
09 02332 006165          JSR #STALL
10 02333 000233          NIUC DSKP      ISTOP THE WRITE
11 02334 030000          LDA 2,K014     JAC0=STARTING MEMORY ADDRESS
12 02335 005433          DIB 1,USKP     JAC1=ACTUAL ENDING MEMORY
13 02336 113000          ADD 0,2        I ADDRESS
14 02337 146414          SUB# 2,1,SZK   JAC2=CORRECT ENDING MEMORY
15 02340 000242          EHALT         I ADDRESS
16 02341 000243          LOOP
17
18 02342 000241 D01  SETUP          ICHECK PROPER CA REGISTER
19 02343 020152          LDA 0,TESTU      INCREMENT BY ALLOWING
20 02344 063033          DDC 0,USKP      ITHE FIRST 2 DATA CHANNEL
21 02345 020121          LDA 0,C17       ICYCLES AT THE BEGINNING
22 02346 002033          DDB 0,DSKP     IUF A WRITE.
23 02347 024007          LDA 1,K07
24 02350 005133          DGAS 1,USKP    I WRITE !!
25 02351 006165          JSR #STALL
26 02352 000233          NIUC DSKP      ISTOP THE WRITE
27 02353 030000          LDA 2,K014     JAC0=STARTING MEMORY ADDRESS
28 02354 005433          DIB 1,USKP     JAC1=ACTUAL ENDING MEMORY
29 02355 113000          ADD 0,2        I ADDRESS
30 02356 146414          SUB# 2,1,SZK   JAC2=CORRECT ENDING MEMORY
31 02357 000242          EHALT         I ADDRESS
32 02360 000243          LOOP
33
34 02361 000241 D01  SETUP          ICHECK PROPER CA REGISTER
35 02362 020152          LDA 0,TESTU      INCREMENT BY ALLOWING
36 02363 063033          DDC 0,DSKP      ITHE FIRST 2 DATA CHANNEL
37 02364 020122          LDA 0,C37       ICYCLES AT THE BEGINNING
38 02365 002033          DDB 0,DSKP     IUF A WRITE.
39 02366 024007          LDA 1,K07
40 02367 005133          DGAS 1,USKP    I WRITE !!
41 02370 006165          JSR #STALL
42 02371 000233          NIUC DSKP      ISTOP THE WRITE
43 02372 030000          LDA 2,K014     JAC0=STARTING MEMORY ADDRESS
44 02373 005433          DIB 1,DSKP     JAC1=ACTUAL ENDING MEMORY
45 02374 113000          ADD 0,2        I ADDRESS
46 02375 146414          SUB# 2,1,SZK   JAC2=CORRECT ENDING MEMORY
47 02376 000242          EHALT         I ADDRESS
48 02377 000243          LOOP

```

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A 0033 .MAIN
01
02 02400 000241 D01:  SETUP          /CHECK PROPER CA REGISTER
03 02401 020152      LDA 0,TESTU /INCREMENT BY ALLOWING
04 02402 003033      DDC 0,DSKP /THE FIRST 2 DATA CHANNEL
05 02403 020123      LDA 0,C77  /CYCLES AT THE BEGINNING
06 02404 002033      DDB 0,DSKP /OF A WRITE.
07 02405 024067      LDA 1,K07
08 02406 005133      DNAS 1,USKP / WRITE !!
09 02407 000165      JSR #STALL
10 02410 000233      NIOL DSKP
11 02411 030060      LDA 2,K014 /STOP THE WRITE
12 02412 005433      DIB 1,DSKP /AC0=STARTING MEMORY ADDRESS
13 02413 113000      ADD 0,2   /AC1=ACTUAL ENDING MEMORY
14 02414 146414      SUB# 2,1,SZR / ADDRESS
15 02415 000242      EHALT   /AC2=CORRECT ENDING MEMORY
16 02416 000243      LOOP    / ADDRESS
17
18 02417 000241 D10:  SETUP          /CHECK PROPER CA REGISTER
19 02420 020152      LDA 0,TESTU /INCREMENT BY ALLOWING
20 02421 003033      DDC 0,DSKP /THE FIRST 2 DATA CHANNEL
21 02422 020124      LDA 0,C177 /CYCLES AT THE BEGINNING
22 02423 002033      DDB 0,DSKP /OF A WRITE.
23 02424 024067      LDA 1,K07
24 02425 005133      DNAS 1,USKP / WRITE !!
25 02426 000165      JSR #STALL
26 02427 000233      NIOL DSKP
27 02430 030060      LDA 2,K014 /STOP THE WRITE
28 02431 005433      DIB 1,DSKP /AC0=STARTING MEMORY ADDRESS
29 02432 113000      ADD 0,2   /AC1=ACTUAL ENDING MEMORY
30 02433 146414      SUB# 2,1,SZR / ADDRESS
31 02434 000242      EHALT   /AC2=CORRECT ENDING MEMORY
32 02435 000243      LOOP    / ADDRESS
33
34 02436 000241 D11:  SETUP          /CHECK PROPER CA REGISTER
35 02437 020152      LDA 0,TESTU /INCREMENT BY ALLOWING
36 02440 003033      DDC 0,DSKP /THE FIRST 2 DATA CHANNEL
37 02441 020123      LDA 0,C377 /CYCLES AT THE BEGINNING
38 02442 002033      DDB 0,USKP /OF A WRITE.
39 02443 024067      LDA 1,K07
40 02444 005133      DNAS 1,USKP / WRITE !!
41 02445 000165      JSR #STALL
42 02446 000233      NIOL DSKP
43 02447 030060      LDA 2,K014 /STOP THE WRITE
44 02450 005433      DIB 1,DSKP /AC0=STARTING MEMORY ADDRESS
45 02451 113000      ADD 0,2   /AC1=ACTUAL ENDING MEMORY
46 02452 146414      SUB# 2,1,SZR / ADDRESS
47 02453 000242      EHALT   /AC2=CORRECT ENDING MEMORY
48 02454 000243      LOOP    / ADDRESS

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A 0034 .MAIN
01
02 02455 000241 D12:  SETUP          /CHECK PROPER CA REGISTER
03 02456 020152      LDA 0,TESTU /INCREMENT BY ALLOWING
04 02457 003033      DDC 0,DSKP /THE FIRST 2 DATA CHANNEL
05 02460 020126      LDA 0,C777 /CYCLES AT THE BEGINNING
06 02461 002033      DDB 0,DSKP /OF A WRITE.
07 02462 024067      LDA 1,K07
08 02463 005133      DNAS 1,USKP / WRITE !!
09 02464 000165      JSR #STALL
10 02465 000233      NIOL DSKP
11 02466 030060      LDA 2,K014 /STOP THE WRITE
12 02467 005433      DIB 1,DSKP /AC0=STARTING MEMORY ADDRESS
13 02470 113000      ADD 0,2   /AC1=ACTUAL ENDING MEMORY
14 02471 146414      SUB# 2,1,SZR / ADDRESS
15 02472 000242      EHALT   /AC2=CORRECT ENDING MEMORY
16 02473 000243      LOOP    / ADDRESS
17
18 02474 000241 D13:  SETUP          /CHECK PROPER CA REGISTER
19 02475 020152      LDA 0,TESTU /INCREMENT BY ALLOWING
20 02476 003033      DDC 0,DSKP /THE FIRST 2 DATA CHANNEL
21 02477 020127      LDA 0,C177 /CYCLES AT THE BEGINNING
22 02500 002033      DDB 0,DSKP /OF A WRITE.
23 02501 024067      LDA 1,K07
24 02502 005133      DNAS 1,USKP / WRITE !!
25 02503 000165      JSR #STALL
26 02504 000233      NIOL DSKP
27 02505 030060      LDA 2,K014 /STOP THE WRITE
28 02506 005433      DIB 1,DSKP /AC0=STARTING MEMORY ADDRESS
29 02507 113000      ADD 0,2   /AC1=ACTUAL ENDING MEMORY
30 02510 146414      SUB# 2,1,SZR / ADDRESS
31 02511 000242      EHALT   /AC2=CORRECT ENDING MEMORY
32 02512 000243      LOOP    / ADDRESS
33
34 02513 000241 D14:  SETUP          /CHECK PROPER CA REGISTER
35 02514 020152      LDA 0,TESTU /INCREMENT BY ALLOWING
36 02515 003033      DDC 0,DSKP /THE FIRST 2 DATA CHANNEL
37 02516 020130      LDA 0,C377 /CYCLES AT THE BEGINNING
38 02517 002033      DDB 0,DSKP /OF A WRITE.
39 02520 024067      LDA 1,K07
40 02521 005133      DNAS 1,USKP / WRITE !!
41 02522 000165      JSR #STALL
42 02523 000233      NIOL DSKP
43 02524 030060      LDA 2,K014 /STOP THE WRITE
44 02525 005433      DIB 1,DSKP /AC0=STARTING MEMORY ADDRESS
45 02526 113000      ADD 0,2   /AC1=ACTUAL ENDING MEMORY
46 02527 146414      SUB# 2,1,SZR / ADDRESS
47 02530 000242      EHALT   /AC2=CORRECT ENDING MEMORY
48 02531 000243      LOOP    / ADDRESS

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A 0035 .MAIN
01
02 02532 000241 D10:  SETUP          /CHECK PROPER CA REGISTER
03 02533 020152      LDA 0,TESTU /INCREMENT BY ALLOWING
04 02534 063033      DUC 0,DSKP /THE FIRST 2 DATA CHANNEL
05 02535 020131      LDA 0,C7777 /CYCLES AT THE BEGINNING
06 02536 062033      DDB 0,DSKP /OF A WRITE.
07 02537 024067      LDA 1,K07
08 02540 065133      DUAS 1,DSKP / WRITE !!
09 02541 006165      JSR #STALL
10 02542 000233      NIUC DSKP /STOP THE WRITE
11 02543 030060      LDA 2,K014 /AC0=STARTING MEMORY ADDRESS
12 02544 065433      D10 1,DSKP /AC1=ACTUAL ENDING MEMORY
13 02545 113000      ADD 0,2 / ADDRESS
14 02546 146414      SUB# 2,1,SZM /AC2=CORRECT ENDING MEMORY
15 02547 000242      EHMT / ADDRESS
16 02550 000243      LOOP
17
18 02551 000241 D10:  SETUP          /CHECK PROPER CA REGISTER
19 02552 020152      LDA 0,TESTU /INCREMENT BY ALLOWING
20 02553 063033      DUC 0,DSKP /THE FIRST 2 DATA CHANNEL
21 02554 020132      LDA 0,C017 /CYCLES AT THE BEGINNING
22 02555 062033      DDB 0,DSKP /OF A WRITE.
23 02556 024067      LDA 1,K07
24 02557 065133      DUAS 1,DSKP / WRITE !!
25 02560 006165      JSR #STALL
26 02561 000233      NIUC DSKP /STOP THE WRITE
27 02562 030060      LDA 2,K014 /AC0=STARTING MEMORY ADDRESS
28 02563 065433      D10 1,DSKP /AC1=ACTUAL ENDING MEMORY
29 02564 113000      ADD 0,2 / ADDRESS
30 02565 146414      SUB# 2,1,SZM /AC2=CORRECT ENDING MEMORY
31 02566 000242      EHMT / ADDRESS
32 02567 000243      LOOP
33
34 02570 000241 D17:  SETUP          /CHECK PROPER CA REGISTER
35 02571 020152      LDA 0,TESTU /INCREMENT BY ALLOWING
36 02572 063033      DUC 0,DSKP /THE FIRST 2 DATA CHANNEL
37 02573 020133      LDA 0,C037 /CYCLES AT THE BEGINNING
38 02574 062033      DDB 0,DSKP /OF A WRITE.
39 02575 024067      LDA 1,K07
40 02576 065133      DUAS 1,DSKP / WRITE !!
41 02577 006165      JSR #STALL
42 02580 000233      NIUC DSKP /STOP THE WRITE
43 02581 030060      LDA 2,K014 /AC0=STARTING MEMORY ADDRESS
44 02582 065433      D10 1,DSKP /AC1=ACTUAL ENDING MEMORY
45 02583 113000      ADD 0,2 / ADDRESS
46 02584 146414      SUB# 2,1,SZM /AC2=CORRECT ENDING MEMORY
47 02585 000242      EHMT / ADDRESS
48 02586 000243      LOOP

```

```

A 0036 .MAIN
01
02 02607 000241 D10:  SETUP          /CHECK PROPER CA REGISTER
03 02610 020152      LDA 0,TESTU /INCREMENT BY ALLOWING
04 02611 063033      DUC 0,DSKP /THE FIRST 2 DATA CHANNEL
05 02612 102220      ADCR 0,0 /CYCLES AT THE BEGINNING
06 02613 062033      DDB 0,DSKP /OF A WRITE.
07 02614 024067      LDA 1,K07
08 02615 065133      DUAS 1,DSKP / WRITE !!
09 02616 006165      JSR #STALL
10 02617 000233      NIUC DSKP /STOP THE WRITE
11
12 02620 065433      D10 1,DSKP /AC0=STARTING MEMORY ADDRESS
13 02621 152520      SUBZL 2,2 /AC1=ACTUAL ENDING MEMORY
14 02622 146414      SUB# 2,1,SZM / ADDRESS
15 02623 000242      EHMT /AC2=CORRECT ENDING MEMORY
16 02624 000243      LOOP / ADDRESS
17
18 02625 000241 D10:  SETUP          /CHECK PROPER CA REGISTER
19 02626 020152      LDA 0,TESTU /INCREMENT BY ALLOWING
20 02627 063033      DUC 0,DSKP /THE FIRST 2 DATA CHANNEL
21 02630 102000      ADC 0,0 /CYCLES AT THE BEGINNING
22 02631 062033      DDB 0,DSKP /OF A WRITE.
23 02632 024067      LDA 1,K07
24 02633 065133      DUAS 1,DSKP / WRITE !!
25 02634 006165      JSR #STALL
26 02635 000233      NIUC DSKP /STOP THE WRITE
27 02636 065433      D10 1,DSKP /AC0=STARTING MEMORY ADDRESS
28 02637 152620      SUBZM 2,2 /AC1=ACTUAL ENDING MEMORY
29 02640 151400      INC 2,2 / ADDRESS
30 02641 146414      SUB# 2,1,SZM /AC2=CORRECT ENDING MEMORY
31 02642 000242      EHMT / ADDRESS
32 02643 000243      LOOP
33
34
35

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A 0037 .MAIN
01
02 02644 006240 D20:  SETP1          ;ATTEMPT A COMPLETE WRITE
03 02645 024160      LDA 1,BUFF      ;(FIRST WRITE WITH WC OVFL0)
04 02646 066033      DDB 1,DSKP      ;ONE SECTOR
05 02647 020152      LDA 0,TESTU
06 02650 024121      LDA 1,C17
07 02651 123000      ADD 1,0
08 02652 063033      DDC 0,DSKP
09 02653 020007      LDA 0,KB7
10 02654 061133      DQAS 0,USKP
11 02655 066235      ITRMT
12 02656 006242      EHALT
13 02657 006243      LOOP
14
15 02660 006240 D21:  SETP1          ;ATTEMPT TO CLEAR "DP DONE"
16 02661 024160      LDA 1,BUFF      ;WITH (C) PULSE.
17 02662 066033      DDB 1,DSKP
18 02663 020152      LDA 0,TESTU
19 02664 024121      LDA 1,C17
20 02665 123000      ADD 1,0
21 02666 063033      DDC 0,DSKP
22 02667 020007      LDA 0,KB7
23 02670 061133      DQAS 0,USKP
24 02671 152520      SUBZL 2,2
25 02672 006227      WAIT
26 02673 000233      NIQC DSKP
27 02674 063733      SKPBZ DSKP
28 02675 006242      EHALT
29 02676 006243      LOOP
30
31 02677 006240 D22:  SETP1          ;ATTEMPT TO RESET
32 02700 024160      LDA 1,BUFF      ;"DP DONE" WITH "DP DATOA"
33 02701 066033      DDB 1,DSKP      ;AND "DATA 0".
34 02702 020152      LDA 0,TESTU
35 02703 024121      LDA 1,C17
36 02704 123000      ADD 1,0
37 02705 063033      DDC 0,DSKP
38 02706 020007      LDA 0,KB7
39 02707 061133      DQAS 0,USKP
40 02710 152520      SUBZL 2,2
41 02711 006227      WAIT
42 02712 102620      SUBZR 0,0
43 02713 061033      DUA 0,USKP
44 02714 063733      SKPBZ DSKP
45 02715 006242      EHALT
46 02716 006243      LOOP

```

```

A 0036 .MAIN
01
02 02717 006240 D23:  SETP1          ;CHECK BUSY-DONE
03 02720 024160      LDA 1,BUFF      ;FOLLOWING A 1 SECTOR WRITE
04 02721 066033      DDB 1,DSKP
05 02722 020152      LDA 0,TESTU
06 02723 024121      LDA 1,C17
07 02724 123000      ADD 1,0
08 02725 063033      DDC 0,DSKP
09 02726 020007      LDA 0,KB7
10 02727 061133      DQAS 0,USKP
11 02730 152520      SUBZL 2,2
12 02731 006227      WAIT
13 02732 063733      SKPBZ DSKP
14 02733 063533      SKPBZ DSKP
15 02734 006242      EHALT
16 02735 006243      LOOP
17
18 02736 006240 D24:  SETP1          ;SEE IF A 1 SECTOR
19 02737 024160      LDA 1,BUFF      ;WRITE CAUSES "DATA LATE"
20 02740 066033      DDB 1,DSKP
21 02741 020152      LDA 0,TESTU
22 02742 024121      LDA 1,C17
23 02743 123000      ADD 1,0
24 02744 063033      DDC 0,DSKP
25 02745 020007      LDA 0,KB7
26 02746 061133      DQAS 0,DSKP
27 02747 152520      SUBZL 2,2
28 02750 006227      WAIT
29 02751 064433      DIA 1,DSKP
30 02752 020006      LDA 0,KB14
31 02753 107414      ANDW 0,1,SZR
32 02754 006242      EHALT
33 02755 006243      LOOP
34
35 02756 006240 D25:  SETP1          ;CHECK ENDING MEMORY
36 02757 024160      LDA 1,BUFF      ;ADDRESS (CA REGISTER)
37 02760 066033      DDB 1,DSKP      ;FOLLOWING A 1 SECTOR WRITE
38 02761 020152      LDA 0,TESTU
39 02762 024121      LDA 1,C17
40 02763 123000      ADD 1,0
41 02764 063033      DDC 0,DSKP
42 02765 020007      LDA 0,KB7
43 02766 061133      DQAS 0,USKP
44 02767 152520      SUBZL 2,2
45 02770 006227      WAIT
46 02771 065433      DIA 1,USKP
47 02772 020160      LDA 0,BUFF
48 02773 030211      LDA 2,C402
49 02774 143000      ADD 2,0
50 02775 122414      SUMW 1,0,SZR
51 02776 006242      EHALT
52 02777 006243      LOOP

```

A 0039 .MAIN

```
01
02 03000 000240 D20:  SETP1
03 03001 024160      LDA 1,BUFF
04 03002 000033      DDB 1,OSKP
05 03003 020152      LDA 0,TESTU
06 03004 024121      LDA 1,C17
07 03005 123000      ADD 1,0
08 03006 003033      DDC 0,OSKP
09 03007 020007      LDA 0,KB7
10 03010 061133      DDAS 0,OSKP
11 03011 152520      SUBZL 2,2
12 03012 000227      WAIT
13 03013 000433      DIC 1, OSKP
14 03014 030133      LDA 2,C037
15 03015 147400      AND 2,1
16 03016 020063      LDA 0,KB11
17 03017 122414      SUB# 1,0,SZK
18 03020 000242      EHALT
19 03021 000243      LOOP
20
21 03022 000240 D27:  SETP1
22 03023 020160      LDA 0,BUFF
23 03024 062033      DDB 0,OSKP
24 03025 020152      LDA 0,TESTU
25 03026 024174      LDA 1,C16
26 03027 123000      ADD 1,0
27 03030 003033      DDC 0,OSKP
28 03031 020067      LDA 0,KB7
29 03032 061133      DDAS 0,OSKP
30 03033 152520      SUBZL 2,2
31 03034 000227      WAIT
32 03035 000433      DIC 1,OSKP
33 03036 020133      LDA 0,C037
34 03037 107400      AND 0,1
35 03040 020064      LDA 0,KB10
36 03041 122414      SUB# 1,0,SZK
37 03042 000242      EHALT
38 03043 000243      LOOP
39
40 03044 000240 D28:  SETP1
41 03045 020160      LDA 0,BUFF
42 03046 062033      DDB 0,OSKP
43 03047 020152      LDA 0,TESTU
44 03050 024174      LDA 1,C16
45 03051 123000      ADD 1,0
46 03052 003033      DDC 0,OSKP
47 03053 020067      LDA 0,KB7
48 03054 061133      DDAS 0,OSKP
49 03055 152520      SUBZL 2,2
50 03056 000227      WAIT
51 03057 064433      DIA 1,OSKP
52 03060 003033      SKPUN OSKP
53 03061 000242      EHALT
54 03062 000243      LOOP
```

```
!CHECK FOR PROPER ENDING
!DISK ADDRESS FOLLOWING
!1 SECTOR WRITE ON HEAD 0
!SECTOR 0
!"INC SC" CAUSES "SC1-SC0"
!TO GO FROM 1111 TO 0000
!AND SETS "S1".

!WRITE !!

!WAIT 100MS (OR UNTIL "DONE")
!READ ENDING DISK ADDRESS

!MASK OUT UNIT #
!SECTOR = 1

!ENDING DISK ADDRESS NOT
!HEAD=0, SECTOR=1, SC=0

!ATTEMPT A 2 SECTOR
!WRITE.
!FIRST ATTEMPT AT A WRITE
!LONGER THAN 1 SECTOR

!SELECT UNIT / 2 SECTORS

!WRITE !!

!WAIT 100MS (OR UNTIL "DONE")
!READ ENDING DISK ADDRESS
!MASK OFF UNIT #

!ENDING DISK ADDRESS NOT
!HEAD=0, SECT=2, SC=0
!AC0=GOOD ADDR, AC1=BAD

!ATTEMPT A 2 SECTOR WRITE

!SELECT UNIT / 2 SECTORS

!WRITE !!

!WAIT 100MS (OR UNTIL "DONE")
!READ STATUS
!NO "MDP DONE"
!FOLLOWING 2 SECTOR WRITE
!(AC1)=STATUS REG.
```

A 0040 .MAIN

```
01
02 03003 000240 D29:  SETP1
03 03004 020160      LDA 0,BUFF
04 03005 062033      DDB 0,OSKP
05 03006 020152      LDA 0,TESTU
06 03007 030150      LDA 2,DTYPE
07 03010 024171      LDA 1,C11
08 03011 153103      ADDL 2,2,SNC
09 03012 024117      LDA 1,C3
10 03013 123000      ADD 1,0
11 03014 003033      DDC 0,OSKP
12 03015 020067      LDA 0,KB7
13 03016 061133      DDAS 0,OSKP
14 03017 152520      SUBZL 2,2
15 03018 000227      WAIT
16 03019 000433      DIC 1,OSKP
17 03022 061133      LDA 2,C037
18 03023 147400      AND 2,1
19 03024 020212      LDA 0,C420
20 03025 122414      SUB# 1,0,SZR
21 03026 000242      EHALT
22 03027 000243      LOOP
23
24 03110 000240 D30:  SETP1
25 03111 020160      LDA 0,BUFF
26 03112 062033      DDB 0,OSKP
27 03113 020152      LDA 0,TESTU
28 03114 003033      DDC 0,OSKP
29 03115 020067      LDA 0,KB7
30 03116 061133      DDAS 0,OSKP
31 03117 152520      SUBZL 2,2
32 03120 000227      WAIT
33 03121 000433      DIC 1,OSKP
34 03122 020065      LDA 0,KB9
35 03123 030070      LDA 3,KB6
36 03124 030150      LDA 2,DTYPE
37 03125 153103      ADDL 2,2,SNC
38 03126 170220      MOVZK 3,0
39 03127 163000      ADD 3,0
40 03130 034133      LDA 3,C037
41 03131 107400      AND 3,1
42 03132 122414      SUB# 1,0,SZR
43 03133 000242      EHALT
44 03134 000243      LOOP
```

```
!INSURE THAT "INC HEAD"
!FUNCTIONS PROPERLY
!TRANSFER 7 SECTORS ON 13
!SECTORS DEPENDING UPON
!THE DISK TYPE

!LOAD UNIT # & # SECTORS

!WRITE !!

!WAIT 100 MS (OR UNTIL "DONE")
!READ ENDING DISK ADDRESS

!THROW AWAY UNIT #
!AC0=GOOD, HEAD=1 SECT=1
!AC1=BAD
!CHECK "ADV MD", "INC HEAD"

!ATTEMPT A 16 SECTOR WRITE
!VERIFY CORRECT ENDING
!DISK ADDRESS

!UNIT # / 16 SECTORS

!WRITE !!

!WAIT 100MS (OR UNTIL "DONE")
!READ ENDING DISK ADDRESS
!SECTOR 4
!HEAD 2

!SKIP IF 2311
!HEAD 1

!AC1=ACTUAL ENDING DISK ADDRESS
!AC0=CORRECT ENDING DISK ADDRESS
!16 SECTOR TRANSFER.
```



```

A 0041 ,MAIN
01
02 03135 000240 D31:  SETP1
03 03136 020100      LDA 0,BUFF
04 03137 020033      DDB 0,DSKP
05 03140 020152      LDA 0,TESTU
06 03141 003033      DDC 0,DSKP
07 03142 020067      LDA 0,KB7
08 03143 001133      DNAS 0,USKP
09 03144 152520      SUBZL 2,2
10 03145 000227      WAIT
11 03146 020100      LDA 0,BUFF
12 03147 024060      LDA 1,KB14
13 03150 030073      LDA 2,KB3
14 03151 123000      ADD 1,0
15 03152 143000      ADD 2,0
16 03153 005433      DIB 1,DSKP
17 03154 122414      SUB# 1,0,SZK
18 03155 000242      EHALT
19 03156 000243      LOUP
20
21 03157 000240 D32:  SETP1
22 03160 020150      LDA 0,DTYPE
23 03161 030027      LDA 2,DAD1-1
24 03162 101112      MOVL# 0,0,SZC
25 03163 000404      JMP ,+4
26 03164 151400      INC 2,2
27 03165 101202      MOV# 0,0,SZC
28 03166 151400      INC 2,2
29 03167 021000      LDA 0,0,2
30 03170 024152      LDA 1,TESTU
31 03171 123000      ADD 1,0
32 03172 003033      DDC 0,DSKP
33 03173 020100      LDA 0,BUFF
34 03174 002033      DDB 0,DSKP
35 03175 020067      LDA 0,KB7
36 03176 001133      DNAS 0,USKP
37 03177 152520      SUBZL 2,2
38 03200 000227      WAIT
39 03201 004433      DIA 1,DSKP
40 03202 020412      LDA 0,DAD4
41 03203 107400      AND 0,1
42 03204 106414      SUB# 0,1,SZK
43 03205 000242      EHALT
44 03206 000243      LOUP
45 03207 000407      JMP D32A
46
47 03210 000211      ,+1
48 03211 000076 DAD1:  076
49 03212 004536      4536
50 03213 011676      11676
51 03214 100021 DAD4:  100021
52 03215 000020 EUCNT: 20

```

```

IATTEMPT A 16 SECTOR WRITE
IAND VERIFY CORRECT ENDING
IMEMORY ADDRESS

IUNIT # / 16 SECTORS

IWRITE !!

IWAIT 100MS (OR UNTIL "DONE")
ISTARTING ADDRESS
I T=0
I 10,000

IENDING MEMORY ADDRESS
IERR#N FOLLOWING A 16 SECTOR
IWRITE
IAC0=GOOD
IAC1=BAD

ICAUSE "END OF CYLINDER"
ITO OCCUR DURING A
I2 SECTOR WRITE

ICAKNIDGE DISK

ISKIP IF 2311 DISK PACK
I2314 DISK PACK
IGET PROPER DISK ADDRESS TO
ICAUSE "EOC"
IADD IN UNIT #
IFINALLY

IFLOAD MEM ADDN.

IWRITE !!

IWAIT 100MS (OR UNTIL "DONE")
IFREAD STATUS

INO "EOC" OR "ERR" OR "DP DONE"
IFOLLOWING WRITE OVER END CYL
IAC0=EXPECTED ENDING STATUS
IAC1=ENDING STATUS

ICART HEAD 1 SECT 13 2 SECTORS
I2311 HEAD 9 SECT 5 2 SECTORS
I2314 HEAD 23 SECT 13 2 SECTORS
I"DP DONE","EOC","ERR",STATUS MASK.

```

```

A 0042 ,MAIN
01
02 03210 000240 D32A: SETP1
03 03211 020150      LDA 0,DTYPE
04 03220 101113      MOVL# 0,0,SNC
05 03221 000423      JMP D32C
06 03222 020067      LDA 0,KB11
07 03223 040772      STA 0,EUCNT
08 03224 020152      LDA 0,TESTU
09 03225 003033      DDC 0,DSKP
10 03226 020100 D32B: LDA 0,BUFF
11 03227 002033      DDB 0,DSKP
12 03230 020067      LDA 0,KB7
13 03231 001133      DNAS 0,USKP
14 03232 152520      SUBZL 2,2
15 03233 000227      WAIT
16 03234 004433      DIA 1,DSKP
17 03235 020757      LDA 0,DAD4
18 03236 107400      AND 0,1
19 03237 106415      SUB# 0,1,SNR
20 03240 000404      JMP ,+4
21 03241 014754      DSZ EUCNT
22 03242 000764      JMP D32B
23 03243 000242      EHALT.
24 03244 000243 D32C: LOUP

IURIVE DISK ADAPTER

IINTO END OF CYLINDER TO
ICHECK INC HD FLUP IN
IADAPTER LOGIC, EOC
IFOR CARTRIDGE OCCURS ON
I2ND WRITE CYCLE.

I
I
IEUCNT
I16 SECTOR WRITE CYCLE
ICOUNTER IS LOADED WITH
IMAX, NUMBER OF LOOPS
IREQUIRED TO ACHIEVE
IAN EOC AFTER A START
IFROM HDR, SECTOR 0.
IKB11(C) OCTAL 20.
IND EOC & MORE LOOPS
INO EOC, CK INC HD, HEAD,&
IEOC FLUP IN ADAPTER LOGIC.

```

A 0043 ,MAIN

```
01
02 03245 000240 D33:  SETP1
03 03246 020152 LDA 0,TESTU
04 03247 024121 LDA 1,C17
05 03250 123000 ADD 1,0
06 03251 063033 DDC 0,DSKP
07 03252 020074 LDA 0,KB2
08 03253 062033 DDB 0,DSKP
09 03254 102400 SUB 0,0
10 03255 061133 DDCAS 0,DSKP
11 03256 152520 SUBZL 2,2
12 03257 000227 WAIT
13 03260 064433 DIA 1,DSKP
14 03261 125113 MOVLM 1,1,SNC
15 03262 000242 EMALT
16 03263 000243 LOOP
17
18 03264 000240 D34:  SETP1
19 03265 020152 LDA 0,TESTU
20 03266 024121 LDA 1,C17
21 03267 123000 ADD 1,0
22 03270 063033 DDC 0,DSKP
23 03271 020074 LDA 0,KB2
24 03272 062033 DDB 0,DSKP
25 03273 102400 SUB 0,0
26 03274 061133 DDCAS 0,DSKP
27 03275 152520 SUBZL 2,2
28 03276 000227 WAIT
29 03277 064433 DIA 1,DSKP
30 03300 020060 LDA 0,KB14
31 03301 123414 ANDM 1,0,SZR
32 03302 000242 EMALT
33 03303 000243 LOOP
34
35 03304 000240 D35:  SETP1
36 03305 020152 LDA 0,TESTU
37 03306 024121 LDA 1,C17
38 03307 123000 ADD 1,0
39 03310 063033 DDC 0,DSKP
40 03311 020074 LDA 0,KB2
41 03312 062033 DDB 0,DSKP
42 03313 102400 SUB 0,0
43 03314 061133 DDCAS 0,DSKP
44 03315 152520 SUBZL 2,2
45 03316 000227 WAIT
46 03317 060433 DIA 1,DSKP
47 03320 020217 LDA 0,C204M
48 03321 123414 SUM# 1,0,SZR
49 03322 000242 EMALT
50 03323 000243 LOOP
```

```
JATTEMPT A READ
J( FIRST READ !!!!! )
JUNIT # / 1 SECTOR XFER
ICA = 20000
JREAD !!
JWAIT 100MS (OR UNTIL "DONE")
JREAD STATUS
J DONE ?
JNO "DP DONE" ON READ
JACI=BAD ENDING STATUS
JATTEMPT A READ
J 1 SECTOR
JUNIT # / 1 SECTOR XFER
ICA = 20000
JREAD !!
JWAIT 100MS (OR UNTIL "DONE")
JREAD STATUS
J"DATA LATE" STATUS ON
JA 1 SECT READ
JACI=BAD ENDING STATUS
JATTEMPT A READ
J 1 SECTOR READ
JUNIT # / 1 SECT XFER
ICA = 20000
JREAD !!
JWAIT 100MS (OR UNTIL "DONE")
JREAD STATUS
JENDING MEMORY ADDRESS
JIS WRONG FOLLOWING 1 SECT READ
JAC0=GOOD
JACI=BAD
```

A 0044 ,MAIN

```
01
02 03324 000240 D36:  SETP1
03 03325 020152 LDA 0,TESTU
04 03326 024121 LDA 1,C17
05 03327 123000 ADD 1,0
06 03330 063033 DDC 0,DSKP
07 03331 020074 LDA 0,KB2
08 03332 062033 DDB 0,DSKP
09 03333 060133 NIOS DSKP
10 03334 152520 SUBZL 2,2
11 03335 000227 WAIT
12 03336 020202 LDA 0,C70
13 03337 123414 ANDM 1,0,SZR
14 03340 000242 EMALT
15 03341 000243 LOOP
16
17 03342 020150 D37:  LDA 0,UTYPE
18 03343 101102 MOVLM 0,0,SZC
19 03344 000410 JMP E1
20 03345 000240 SETP1
21 03346 020152 LDA 0,TESTU
22 03347 024074 LDA 1,KB2
23 03350 123000 ADD 1,0
24 03351 063033 DDC 0,DSKP
25 03352 020074 LDA 0,KB2
26 03353 062033 DDB 0,DSKP
27 03354 060133 NIOS DSKP
28 03355 152520 SUBZL 2,2
29 03356 000227 WAIT
30 03357 125113 MOVLM 1,1,SNC
31 03360 000242 EMALT
32 03361 000243 LOOP
33
34
```

```
JATTEMPT A READ
J 1 SECTOR READ
JUNIT # / 1 SECT XFER
ICA = 20000
JREAD !!
JWAIT 100MS (OR UNTIL "DONE")
JACI=STATUS
JERROR STATUS FOLLOWING A
JREAD. "SEEK ER", OR "ADDRESS/
JUNSAFE"
JIF CARTRIDGE DISK
JDON'T ATTEMPT A FORMAT
JMODE READ
JATTEMPT A READ
JIN THE FORMAT MODE
J(FIRST USE OF FORMAT MODE)
JUNIT # FORMAT MODE BIT
JCA = 20000
JREAD!!
JWAIT 100MS (OR UNTIL "DONE")
JACI=STATUS
JNO "DP DONE" FOLLOWING FMT READ
JCHECK "F DONE","R/W DONE"
```

```

A 0045 ,MAIN
01
02 03362 006237 E1: JSR #ISET      /DO SEEK/WRITE/READ
03 03363 006261     DOSEK      /CHECK DATA
04 03364 000000     0          /SEEK CYLINDER ZERO
05 03365 006242     EHALT      /ERROR DURING SEEK, AC1=STATUS
06 03366 000422     JMP E1E    /SKIP REMAINDER OF TEST
07
08 03367 006255     GEN DAT   /GENERATE DATA
09 03370 005215     ZEROS     /DATA=ALL ZEROS
10 03371 006330     PRGEN D   /DATA BUFFER ADDRESS
11
12 03372 006257     WRITE     /DO THE WRITE
13 03373 006330     PRGEN D   /DATA BUFFER ADDRESS
14 03374 000017     17        /HEAD=0, SECT=0, 1 SECTOR
15 03375 006242     EHALT      /ERROR IN WRITE, AC1=STATUS
16 03376 000412     JMP E1E    /SKIP REMAINDER OF TEST
17
18 03377 006256     READ      /READ THE DATA
19 03400 006730     PRGEN D+400 /DATA BUFFER ADDRESS
20 03401 000017     17        /HEAD=0, SECT=0, 1 SECTOR
21 03402 006242     EHALT      /ERROR IN READ, AC1=STATUS
22 03403 000405     JMP E1E
23
24 03404 006260     CHECK     /COMPARE DATA BUFFERS
25 03405 006330     PRGEN D   /GOOD BUFFER
26 03406 006730     PRGEN D+400 /QUESTIONABLE BUFFER
27 03407 006242     EHALT      /ERROR, AC0=GOOD WORD
28 03410 000243 E1E: LOOP      /AC1=BAD WORD
29
30 03411 006237 E2: JSR #ISET      /DO SEEK/WRITE/READ
31 03412 006261     DOSEK      /CHECK DATA
32 03413 000000     0          /SEEK CYLINDER ZERO
33 03414 006242     EHALT      /ERROR DURING SEEK, AC1=STATUS
34 03415 000422     JMP E2E    /SKIP REMAINDER OF TEST
35
36 03416 006255     GEN DAT   /GENERATE DATA
37 03417 005214     ONES     /DATA=ALL ONES
38 03420 006330     PRGEN D   /DATA BUFFER ADDRESS
39
40 03421 006257     WRITE     /DO THE WRITE
41 03422 006330     PRGEN D   /DATA BUFFER ADDRESS
42 03423 000017     17        /HEAD=0, SECT=0, 1 SECTOR
43 03424 006242     EHALT      /ERROR IN WRITE, AC1=STATUS
44 03425 000412     JMP E2E    /SKIP REMAINDER OF TEST
45
46 03426 006256     READ      /READ THE DATA
47 03427 006730     PRGEN D+400 /DATA BUFFER ADDRESS
48 03430 000017     17        /HEAD=0, SECT=0, 1 SECTOR
49 03431 006242     EHALT      /ERROR IN READ, AC1=STATUS
50 03432 000405     JMP E2E
51
52 03433 006260     CHECK     /COMPARE DATA BUFFERS
53 03434 006330     PRGEN D   /GOOD BUFFER
54 03435 006730     PRGEN D+400 /QUESTIONABLE BUFFER
55 03436 006242     EHALT      /ERROR, AC0=GOOD WORD
56 03437 006243 E2E: LOOP      /AC1=BAD WORD

```

```

A 0046 ,MAIN
01
02 03440 006237 E3: JSR #ISET      /DO SEEK/WRITE/READ
03 03441 006261     DOSEK      /CHECK DATA
04 03442 000000     0          /SEEK CYLINDER ZERO
05 03443 006242     EHALT      /ERROR DURING SEEK, AC1=STATUS
06 03444 000422     JMP E3E    /SKIP REMAINDER OF TEST
07
08 03445 006255     GEN DAT   /GENERATE DATA
09 03446 005233     NUMSEW   /DATA=NUMBERS 0-377
10 03447 006330     PRGEN D   /DATA BUFFER ADDRESS
11
12 03450 006257     WRITE     /DO THE WRITE
13 03451 006330     PRGEN D   /DATA BUFFER ADDRESS
14 03452 000017     17        /HEAD=0, SECT=0, 1 SECTOR
15 03453 006242     EHALT      /ERROR IN WRITE, AC1=STATUS
16 03454 000412     JMP E3E    /SKIP REMAINDER OF TEST
17
18 03455 006256     READ      /READ THE DATA
19 03456 006730     PRGEN D+400 /DATA BUFFER ADDRESS
20 03457 000017     17        /HEAD=0, SECT=0, 1 SECTOR
21 03460 006242     EHALT      /ERROR IN READ, AC1=STATUS
22 03461 000405     JMP E3E
23
24 03462 006260     CHECK     /COMPARE DATA BUFFERS
25 03463 006330     PRGEN D   /GOOD BUFFER
26 03464 006730     PRGEN D+400 /QUESTIONABLE BUFFER
27 03465 006242     EHALT      /ERROR, AC0=GOOD WORD
28 03466 000243 E3E: LOOP      /AC1=BAD WORD
29
30 03467 006237 E4: JSR #ISET      /DO SEEK/WRITE/READ
31 03470 006261     DOSEK      /CHECK DATA
32 03471 000000     0          /SEEK CYLINDER ZERO
33 03472 006242     EHALT      /ERROR DURING SEEK, AC1=STATUS
34 03473 000422     JMP E4E    /SKIP REMAINDER OF TEST
35
36 03474 006255     GEN DAT   /GENERATE DATA
37 03475 005223     ALT1     /DATA PATTERN = 1010101 ETC.
38 03476 006330     PRGEN D   /DATA BUFFER ADDRESS
39
40 03477 006257     WRITE     /DO THE WRITE
41 03500 006330     PRGEN D   /DATA BUFFER ADDRESS
42 03501 000017     17        /HEAD=0, SECT=0, 1 SECTOR
43 03502 006242     EHALT      /ERROR IN WRITE, AC1=STATUS
44 03503 000412     JMP E4E    /SKIP REMAINDER OF TEST
45
46 03504 006256     READ      /READ THE DATA
47 03505 006730     PRGEN D+400 /DATA BUFFER ADDRESS
48 03506 000017     17        /HEAD=0, SECT=0, 1 SECTOR
49 03507 006242     EHALT      /ERROR IN READ, AC1=STATUS
50 03510 000405     JMP E4E
51
52 03511 006260     CHECK     /COMPARE DATA BUFFERS
53 03512 006330     PRGEN D   /GOOD BUFFER
54 03513 006730     PRGEN D+400 /QUESTIONABLE BUFFER
55 03514 006242     EHALT      /ERROR, AC0=GOOD WORD
56 03515 006243 E4E: LOOP      /AC1=BAD WORD

```

```

A 0047 .MAIN
01
02 03516 006237 ESI JSR #ISET
03 03517 006261 DOSEK
04 03520 000000 0
05 03521 000242 EHMT
06 03522 000422 JMP ESE
07
08 03523 006255 GENDAT
09 03524 005225 ALT0
10 03525 006330 PRGEN0
11
12 03526 006257 WRITE
13 03527 006330 PRGEN0
14 03530 000017 17
15 03531 000242 EHMT
16 03532 000412 JMP ESE
17
18 03533 006256 READ
19 03534 006730 PRGEN0+400
20 03535 000017 17
21 03536 006242 EHMT
22 03537 000405 JMP ESE
23
24 03540 006200 CHECK
25 03541 006330 PRGEN0
26 03542 006730 PRGEN0+400
27 03543 006242 EHMT
28 03544 006243 ESE: LOOP

DO SEEK/WRITE/READ
ICHECK DATA
ISEEK CYLINDER ZERO
IERROR DURING SEEK, AC1=STATUS
ISKIP REMAINDER OF TEST

IGENERATE DATA
IATA PATTERN = 0101010 ETC.
IATA BUFFER ADDRESS

I/O THE WRITE
IATA BUFFER ADDRESS
IHEAD=0, SECT=0, 1 SECTOR
IERROR IN WRITE, AC1=STATUS
ISKIP REMAINDER OF TEST

I/O THE DATA
IATA BUFFER ADDRESS
IHEAD=0, SECT=0, 1 SECTOR
IERROR IN READ, AC1=STATUS

ICOMPARE DATA BUFFERS
IGOOD BUFFER
IQUESTIONABLE BUFFER
IERROR, AC0=GOOD WORD
IAC1=BAD WORD

```

```

A 0048 .MAIN
01
02 03545 020142 LDA 0,RANDOM
03 03546 040143 STA 0,RELHAN
04 03547 000237 ESI JSR #ISET
05 03550 000261 DOSEK
06 03551 000000 0
07 03552 000242 EHMT
08 03553 000424 JMP ESE
09
10 03554 020143 LDA 0,RELHAN
11 03555 040142 STA 0,RANDOM
12 03556 000255 GENDAT
13 03557 000031 RAN
14 03560 006330 PRGEN0
15
16 03561 006257 WRITE
17 03562 006330 PRGEN0
18 03563 000017 17
19 03564 000242 EHMT
20 03565 000412 JMP ESE
21
22 03566 006256 READ
23 03567 006730 PRGEN0+400
24 03570 000017 17
25 03571 006242 EHMT
26 03572 000405 JMP ESE
27
28 03573 006200 CHECK
29 03574 006330 PRGEN0
30 03575 006730 PRGEN0+400
31 03576 006242 EHMT
32 03577 006243 ESE: LOOP

I/O SEEK/WRITE/READ
ICHECK DATA
ISEEK CYLINDER ZERO
IERROR DURING SEEK, AC1=STATUS
ISKIP REMAINDER OF TEST

IGENERATE DATA
IATA = RANDOM
IATA BUFFER ADDRESS

I/O THE WRITE
IATA BUFFER ADDRESS
IHEAD=0, SECT=0, 1 SECTOR
IERROR IN WRITE, AC1=STATUS
ISKIP REMAINDER OF TEST

I/O THE DATA
IATA BUFFER ADDRESS
IHEAD=0, SECT=0, 1 SECTOR
IERROR IN READ, AC1=STATUS

ICOMPARE DATA BUFFERS
IGOOD BUFFER
IQUESTIONABLE BUFFER
IERROR, AC0=GOOD WORD
IAC1=BAD WORD

```

A 0049 .MAIN

```
01
02 DISCUSSION OF TESTS E7/E8 AND E9/E10
03
04 / AT THIS POINT IN TESTING IT HAS BEEN DETERMINED
05 / THAT READING AND WRITING CAN BE PERFORMED CORRECTLY. THE
06 / NEXT FOUR TESTS ARE A CYLINDER ADDRESS CHECK. CYLINDERS
07 / ARE FIRST SELECTED IN ORDER (0-312) AND DATA EQUAL TO THE
08 / CYLINDER NUMBER IS WRITTEN (TEST E7) ON HEAD=0
09 / SECTOR=0 OF EACH. THE FOLLOWING TEST THEN READS THIS DATA
10 / BACK IN THE SAME SEQUENCE IN WHICH IT WAS WRITTEN. IF ONE
11 / CYLINDER IS WRITTEN ON MORE THAN ONCE DUE TO A (ALWAYS 0 OR
12 / ALWAYS 1) CYLINDER ADDRESS BIT LINE AN ERROR WILL SHOW UP
13 / IN THE DATA COMPARE CHECK.
14
15 / I.E. IF "CYL 4" IS ALWAYS A ZERO THEN AN ATTEMPT
16 / TO SEEK TO CYLINDER 4 ACTUALLY SELECTS
17 / CYLINDER 0. DATA WORDS OF "4" ARE WRITTEN
18 / THERE AND WHEN THE DATA AT CYLINDER 0 IS
19 / LATER READ AND CHECKED IT WILL BE "4" WHEN
20 / IT SHOULD BE "0".
21
22 / TESTS E7&E8 CHECK ALL CYLINDERS IN SEQUENCE 0-312
23 / AND TESTS E9&E10 CHECK THE CYLINDERS IN ORDER
24 / FROM 312 TO 0, USING THE COMPLEMENT OF THE CYLINDER
25 / NUMBER AS THE DATA WORDS.
```

A 0050 .MAIN

```
01
02 03000 102400 SUB 0,0 /CYL. ADDRESSING CHECK. SEE DISCUSSION
03 03001 040403 STA 0,E7.1 /PRECEDING E7. WRITE ON HEAD=0, SECTOR=0
04 03002 000237 E7: JSR #ISET /OF EACH CYLINDER. IN EACH SECTOR DATA
05 /EQUALS THE CYL #. WRITE IN ASCENDING
06 /ORDER FROM CYL 0 TO 312.
07 03003 000201 DOSEK /SEEK
08 03004 000000 E7.1: 0 /CYLINDER NUMBER (IT CHANGES)
09 03005 000242 EHALT /ERROR DURING SEEK; AC1=STATUS
10 03006 000411 JMP E7E /SKIP TO END OF TEST
11 03007 000255 GENUAT /GENERATE DATA
12 03010 005231 CYLN /ADDRESS OF DATA GENERATOR
13 03011 000330 PRGEND /DATA BUFFER ADDRESS
14 03012 000257 /WRITE 1
15 03013 000330 PRGEND /DATA BUFFER ADDRESS
16 03014 000017 17 /DISK ADDRESS
17 03015 000242 EHALT /ERROR DURING WRITE, AC1=STATUS
18 03016 000401 JMP .+1
19 03017 000243 E7E: LOOP
20 03020 010704 ISZ E7.1 / (E7.1)=CYL #
21 03021 020703 LDA 0,E7.1 /DO IT ONCE FOR
22 03022 024007 LDA 1,C312 /EACH CYLINDER
23 03023 122427 SUBZ 1,0,5BN
24 03024 000756 JMP E7
25
26
27
28
29 03025 102400 SUB 0,0 /CYLINDER ADDRESS CHECK. SEE DISCUSSION
30 03026 040403 STA 0,E8.1 /PREVIOUS TO TEST E7. READ FIRST SECTOR
31 03027 000237 E8: JSR #ISET /OF EACH CYLINDER AND CHECK FOR PROPER
32 /DATA. IN EACH CASE DATA SHOULD EQUAL
33 /THE CYLINDER #.
34 03030 000201 DOSEK /SEEK
35 03031 000000 E8.1: 0 /CYLINDER NUMBER (IT CHANGES)
36 03032 000242 EHALT /ERROR DURING SEEK; AC1=STATUS
37 03033 000412 JMP E8E /READ
38 03034 000256 HEAD /DATA BUFFER ADDRESS
39 03035 000330 E8.2: 17 /DISK ADDRESS
40 03036 000017 17 /DISK ADDRESS
41 03037 000242 EHALT /ERROR DURING READ; AC1=STATUS
42 03040 000405 JMP E8E /SKIP TO END OF TEST
43 03041 020774 LDA 1,E8.2 /FIRST WORD IN DATA BUFFER
44 03042 020707 LDA 0,E8.1 /SHOULD = CYLINDER #
45 03043 122414 SUB# 1,0,SZR /AC0=GOOD
46 03044 000242 EHALT /AC1=BAD
47 03045 000243 E8E: LOOP /READ THE TEST DESCRIPTION
48 03046 010703 ISZ E8.1 /REPEAT THE TEST FOR
49 03047 020702 LDA 0,E8.1 /EACH CYLINDER
50 03050 024007 LDA 1,C312
51 03051 122427 SUBZ 1,0,5BN
52 03052 000755 JMP E8
```

```

A 0051 .MAIN
01
02 03053 020207 LDA 0,C312      ;CYL. ADDRESSING CHECK. SEE DISCUSSION
03 03054 040403 STA 0,E9.1      ;PRECEDING TEST E7. WRITE ON HEAD=0
04 03055 000237 JSR #ISET ;SECTOR=0, OF EACH CYLINDER. IN
05                                     ;EACH THE DATA WORDS EQUAL THE COMP.
06                                     ;OF THE CYL #. WRITE IN DESCENDING
07                                     ;ORDER FROM CYL 312 TO 0.
08 03650 000261 DOSEK      ;SEEK
09 03657 000000 0      ;CYLINDER NUMBER (IT CHANGES)
10 03660 000242 EHALT     ;ERROR DURING SEEK, AC1=STATUS
11 03661 000411 JMP E9E      ;SKIP TO END OF TEST
12 03662 000255 GEN DAT   ;GENERATE DATA
13 03663 000227 CYLNC     ;ADDRESS OF DATA GENERATOR
14 03664 000330 PRGENU    ;DATA BUFFER ADDRESS
15 03665 000257 WRITE     ;WRITE I
16 03666 000330 PRGENU    ;DATA BUFFER ADDRESS
17 03667 000017 17      ;DISK ADDRESS
18 03670 000242 EHALT     ;ERROR DURING WRITE, AC1=STATUS
19 03671 000401 JMP .+1
20 03672 000243 E9E:     ;
21 03673 014764 LOOP     ;(E9.1)=CYL #
22 03674 000401 JMP .+1
23 03675 020702 LDA 0,E9.1 ;DO IT ONCE FOR
24 03676 101103 MVL 0,0,SNC ;EACH CYLINDER
25 03677 000756 JMP E9
26
27
28
29
30 03700 020207 LDA 0,C312      ;CYLINDER ADDRESS CHECK. SEE DISCUSSION
31 03701 040403 STA 0,E10.1    ;PREVIOUS TO TEST E7. READ FIRST SECTOR
32 03702 000237 JSR #ISET ;OF EACH CYLINDER AND CHECK FOR PROPER
33                                     ;DATA. IN EACH CASE DATA SHOULD EQUAL
34                                     ;THE COMPLEMENT OF THE CYL #
35 03703 000261 DOSEK      ;SEEK
36 03704 000000 0      ;CYLINDER NUMBER (IT CHANGES)
37 03705 000242 EHALT     ;ERROR DURING SEEK, AC1=STATUS
38 03706 000413 JMP E10E   ;
39 03707 000256 READ     ;READ
40 03710 000330 E10.2:   ;DATA BUFFER ADDRESS
41 03711 000017 17      ;DISK ADDRESS
42 03712 000242 EHALT     ;ERROR DURING READ, AC1=STATUS
43 03713 000406 JMP E10E   ;SKIP TO END OF TEST
44 03714 020774 LDA 1,0,E10.2 ;FIRST WORD IN DATA BUFFER
45 03715 020707 LDA 0,E10.1 ;SHOULD = CYLINDER #
46 03716 100000 COM 0,0
47 03717 122414 SUB# 1,0,SZR ;AC0#GOOD
48 03720 000242 EHALT     ;AC1#BAD
49 03721 000243 E10E:   ;READ THE TEST DESCRIPTION
50 03722 014762 DSZ 0,1 ;REPEAT THE TEST FOR
51 03723 000401 JMP .+1
52 03724 020700 LDA 0,E10.1 ;EACH CYLINDER
53 03725 101103 MVL 0,0,SNC
54 03726 000754 JMP E10
55
56

```

```

A 0052 .MAIN
01
02 ;DISCUSSION OF THE SECTOR ADDRESSING CHECK.
03 ;(TESTS E11/E12 AND E13/E14)
04
05 ;USING CYLINDER=0, HEAD=0 TEST E11 WRITES ON
06 ;EACH SUCCESSIVE SECTOR INDIVIDUALLY FROM 0-5,
07 ;FOR 0-11. IN EACH CASE EACH DATA WORD EQUALS
08 ;THE SECTOR NUMBER. TEST E12 READS THE INDIV-
09 ;IDUAL SECTORS BACK IN THE SAME ORDER AND
10 ;CHECKS THE DATA. TESTS E13/E14 PERFORM THE SAME
11 ;TASK EXCEPT THAT THE SECTOR SEQUENCE IS IN THE
12 ;REVERSE ORDER AND THE DATA WRITTEN EQUALS THE
13 ;COMPLEMENT OF THE SECTOR NUMBER.
14
15 ;THIS TEST IS DESIGNED TO CATCH ERRONEOUS SECTOR
16 ;SELECTION ERRORS.
17
18 ; I.E. IF "SC2" IS ALWAYS AT GROUND WHEN SECTOR
19 ; 2 IS SELECTED, SECTOR 0 WILL ACTUALLY
20 ; BE CHOSEN AND "2'S" WILL BE WRITTEN THERE.
21 ; IN THE SUBSEQUENT READ A DATA COMPARE
22 ; ERROR WILL RESULT WITH THE GOOD="0",
23 ; AND THE BAD="2".
24
25 03727 102400 SUB 0,0 ;SEE DISCUSSION PRECEDING THIS TEST.
26 03730 040107 STA 0,SECT ;WRITE ON CYL=0, HEAD=0, ONCE
27 03731 020121 LDA 0,C17 ;FOR EACH SECTOR. IN EACH
28 03732 040413 STA 0,E11.1 ;CASE THE DATA WORDS EQUAL
29 03733 000237 JSR #ISET ;THE SECTOR NUMBER
30 03734 000261 DOSEK ;SEEK I
31 03735 000000 0 ;CYLINDER 0
32 03736 000242 EHALT ;ERROR IN SEEK, AC1=STATUS
33 03737 000411 JMP E11E ;SKIP TO END OF TEST
34 03740 000255 GEN DAT   ;GENERATE DATA
35 03741 000252 SECTN    ;ADDRESS OF DATA GEN ROUT.
36 03742 000330 PRGENU    ;ADDRESS OF DATA BUFFER
37 03743 000257 WRITE     ;WRITE I
38 03744 000330 PRGENU    ;DATA BUFFER ADDRESS
39 03745 000017 E11.1: 17 ;DISK ADDRESS (IT CHANGES)
40 03746 000242 EHALT     ;ERROR IN WRITE, AC1=STATUS
41 03747 000401 JMP .+1
42 03750 000243 E11E:  LOOP
43
44 03751 010157 ISZ SECT ;INCREMENT THE SECTOR
45 03752 020773 LDA 0,E11.1 ;NUMBER
46 03753 024003 LDA 1,K011
47 03754 123000 ADD 1,0
48 03755 040770 STA 0,E11.1
49 03756 024150 LDA 1,UTYPE ;SEE IF DONE
50 03757 030205 LDA 2,C157
51 03760 127103 ADDL 1,1,SNC
52 03761 030210 LDA 2,C017
53 03762 112404 SUB 0,2,SZR
54 03763 000750 JMP E11 ;DO ANOTHER

```

A 0053 ,MAIN

```
01
02 03764 102400      SUB 0,0
03 03765 040157      STA 0,SECT
04 03766 020121      LDA 0,C17
05 03767 040410      STA 0,E12.2
06 03770 000237      JSR @ISET E12:
07 03771 000261      DOSEK
08 03772 000000      0
09 03773 000242      EHALT
10 03774 000412      JMP E12E
11 03775 000256      READ
12 03776 000330      PRGEND E12.1:
13 03777 000017      E12.2: 17
14 04000 000242      EHALT
15 04001 000405      JMP E12E
16 04002 020157      LDA 0,SECT
17 04003 020773      LDA 1,@E12.1
18 04004 122414      SUB# 1,0,SZR
19 04005 000242      EHALT
20 04006 000243      LOOP E12E:
21
22 04007 010157      ISZ SECT
23 04010 020767      LDA 0,E12.2
24 04011 024063      LDA 1,KB11
25 04012 123000      ADD 1,0
26 04013 040764      STA 0,E12.2
27 04014 024150      LDA 1,OTYPE
28 04015 030205      LDA 2,C157
29 04016 127103      ADUL 1,1,SNC
30 04017 030210      LDA 2,C317
31 04020 112404      SUB 0,2,SZR
32 04021 000747      JMP E12
```

```
/SEE THE DISCUSSION PRECEDING
/TEST E11. READ ONCE FROM
/EAACH SECTOR AT CYL=0, HEAD=0.
/CHECK DATA IN EACH CASE.
/UAATA WORDS=SECTOR #.
/SEEK
/ICYLINDER 0
/ERROR IN SEEK, AC1=STATUS
/JSKIP TO END OF TEST
/READ 1
/UAATA BUFFER ADDRESS
/UISK ADDRESS (IT CHANGES)
/ERROR IN READ, AC1=STATUS
/JSKIP TO END OF TEST
/GET SECT #
/GET A WORD READ
/UAATA ERROR, SEE ABOVE DESCRIPTION
/AC0=GOOD WORD
/AC1=BAD
```

```
/INCREMENT THE SECTOR
/NUMBER
```

/SEE IF DONE

/GO AGAIN

A 0054 ,MAIN

```
01
02 04022 020150      LDA 0,OTYPE
03 04023 024204      LDA 1,C137
04 04024 103103      ADUL 0,0,SNC
05 04025 024206      LDA 1,C277
06 04026 044420      STA 1,E13.1
07 04027 120220      MOVZR 1,1
08 04030 120220      MOVZR 1,1
09 04031 120220      MOVZR 1,1
10 04032 120220      MOVZR 1,1
11 04033 044157      STA 1,SECT
12 04034 000237      JSR @ISET E13:
13 04035 000261      DOSEK
14 04036 000000      0
15 04037 000242      EHALT
16 04040 000411      JMP E13E
17 04041 000255      GENUAT
18 04042 000250      SETNC
19 04043 000330      PRGEND
20 04044 000257      WRITE
21 04045 000330      PRGEND
22 04046 000017      E13.1: 17
23 04047 000242      EHALT
24 04050 000401      JMP .+1
25 04051 000243      LOOP E13E:
26
27 04052 014157      DSZ SECT
28 04053 000401      JMP .+1
29 04054 020772      LDA 0,E13.1
30 04055 024063      LDA 1,KB11
31 04056 122400      SUB 1,0
32 04057 040767      STA 0,E13.1
33 04060 101404      INC 0,0,SZR
34 04061 000753      JMP E13
```

```
/SEE DISCUSSION PRECEDING
/TEST E11. WRITE ON CYL=0,
/HEAD=0, ONCE FOR EACH SECTOR.
/IN EACH CASE THE DATA EQUALS
/THE COMPLEMENT OF THE SECTOR
/NUMBER
```

```
/BEGINNING SECTOR
/SETUP
/SEEK 1
/ICYLINDER 0
/ERROR IN SEEK, AC1=STATUS
/JSKIP TO END OF TEST
/GENERATE DATA
/ADDRESS OF DATA GENERATOR
/ADDRESS OF DATA BUFFER
/WRITE 1
/ADDRESS OF DATA BUFFER
/UISK ADDRESS (IT CHANGES)
/ERROR IN WRITE, AC1=STATUS
```

```
/DECREMENT THE SECTOR
/NUMBER
```

/SEE IF DONE
/NOT YET

A 0055 .MAIN

```
01
02 04062 020150 LDA 0,OTYPE
03 04063 024204 LDA 1,C137
04 04064 103103 ADDL 0,0,SNC
05 04065 024206 LDA 1,C277
06 04066 044415 STA 1,E14.2
07 04067 125220 MOVZR 1,1
08 04070 125220 MOVZR 1,1
09 04071 125220 MOVZR 1,1
10 04072 125220 MOVZR 1,1
11 04073 044157 STA 1,SECT
12 04074 006237 E14: JSR 0,ISET
13 04075 006201 DUSEK
14 04076 006000 0
15 04077 006242 EHALT
16 04100 006413 JMP E14E
17 04101 006256 READ
18 04102 006330 E14.1: PRGEND
19 04103 006017 E14.2: 17
20 04104 006242 EHALT
21 04105 006406 JMP E14E
22 04106 020157 LDA 0,SECT
23 04107 100000 COM 0,0
24 04110 020772 LUA 1,0E14.1
25 04111 122414 SUB# 1,0,SZR
26 04112 006242 EHALT
27 04113 006243 E14E: LOUP
28
29 04114 014157 DSZ SECT
30 04115 000401 JMP ,+1
31 04116 020765 LDA 0,E14.2
32 04117 024003 LDA 1,KB11
33 04120 122400 SUB 1,0
34 04121 040762 STA 0,E14.2
35 04122 101404 INC 0,0,SZR
36 04123 000751 JMP E14
```

```
ISEE THE DISCUSSION PRECEDING
ITEST 11, READ ONCE FROM
ISECTOR OF CYL=0, HEAD=0,
IREAD SUCCESSIVE SECTORS
IIN ORDER FROM HI TO LOW.
IIN EACH CASE THE DATA EQUALS
ITHE COMPLEMENT OF THE
ISECTOR NUMBER

ISTARTING SECTOR #

ISEEK !
ICYLINDER 0
IERROR IN SEEK, AC1=STATUS
ISKIP TO END OF TEST
IREAD !
IATA BUFFER ADDRESS
IDISK ADDRESS (IT CHANGES)
IERROR IN READ, AC1=STATUS
ISKIP TO END OF TEST
IGET SECTOR #

IGET A WORD READ
IATA ERROR, SEE ABOVE DESCRIPTION
IAC0=GOOD WORD
IAC1=BAD

IDECREMENT TO NEXT SECTOR

IONE ?
INO, GO AGAIN
```

A 0050 .MAIN

```
01
02 IDISCUSSION OF THE HEAD ADDRESSING CHECK.
03 I (TESTS E15/E16 AND E17/E18)
04
05 IUSING CYLINDER=0, SECTOR=0, TEST E15 WRITES ONE
06 ISECTOR ON EACH SUCCESSIVE HEAD INDIVIDUALLY.
07 IIN EACH CASE THE DATA WORDS EQUAL THE HEAD
08 INUMBER. TEST E16 HEADS EACH OF THESE SECTORS
09 IBACK IN THE SAME ORDER THEY WERE WRITTEN AND
10 ICHECKS THE DATA. TESTS E17 AND E18 PERFORM
11 ITHE SAME FUNCTIONS EXCEPT THAT THE HEADS ARE
12 ISELECTED IN REVERSE ORDER AND THE COMPLEMENT
13 IOF THE HEAD NUMBER IS USED AS THE DATA.
14
15 I THESE TEST ARE DESIGNED TO CATCH ERRONEOUS
16 I HEAD SELECTION OR MULTIPLE HEAD SELECTION
17 I ERRORS.
18
19 I I.E. IF "HD2" IS ALWAYS AT GROUND WHEN HEAD 2
20 I IS SELECTED, HEAD 0 WILL ACTUALLY BE
21 I CHOSEN. "2'S" WILL BE WRITTEN ON THIS
22 I SECTOR WHERE "0'S" HAD BEEN WRITTEN
23 I PREVIOUSLY. THE SUBSEQUENT READ WILL
24 I THEN ENCOUNTER A DATA ERROR WITH THE
25 I GOOD WORD = 0 AND THE BAD WORD = 2.
```


A 0057 .MAIN

```

01
02 04124 102400      SUB 0,0
03 04125 040156      STA 0,HEAD
04 04126 020121      LDA 0,C17
05 04127 040413      STA 0,E15.1
06 04130 000237 E15: JSR #ISET
07 04131 000201      DOSEK
08 04132 000000      0
09 04133 000242      EHMT
10 04134 000411      JMP E15E
11 04135 000255      GENDAT
12 04136 000246      HDN
13 04137 000330      PRGENU
14 04140 000257      WRITE
15 04141 000330      PRGENU
16 04142 000017 E15.1: 17
17 04143 000242      EHMT
18 04144 000401      JMP .+1
19 04145 000243 E15E: LOOP
20
21 04146 010156      ISZ HEAD
22 04147 020773      LDA 0,E15.1
23 04150 024067      LDA 1,KB7
24 04151 123000      ADD 1,0
25 04152 040770      STA 0,E15.1
26 04153 024150      LDA 1,OTYPE
27 04154 030454      LDA 2,ADR-1
28 04155 125112      MUVL# 1,1,SZC
29 04156 000404      JMP .+4
30 04157 151400      INC 2,2
31 04160 125202      MOVR 1,1,SZC
32 04161 151400      INC 2,2
33 04162 025000      LDA 1,0,2
34 04163 122404      SUB 1,0,SZR
35 04164 000744      JMP E15

```

```

/SEE THE DISCUSSION ABOVE.
/WRITE ON CYL=0, SECT=0,
/ONCE FOR EACH HEAD.
/DATA WORDS = HEAD #

/SEEK 1
/ICYLINDER 0
/ERROR IN SEEK, AC1=STATUS
/SKIP TO END OF TEST
/GENERATE DATA
/ADDRESS OF DATA GENERATOR
/DATA BUFFER ADDRESS
/WRITE 1
/DATA BUFFER ADDRESS
/UISK ADDRESS (IT CHANGES)
/ERROR IN WRITE, AC1=STATUS

/INCREMENT TO NEXT HEAD

/DONE ?

/ICART DISK

/SKIP IF 2311
/2314
/GET END DISK ADDR

/NOT DONE YET

```

A 0058 .MAIN

```

01
02 04165 102400      SUB 0,0
03 04166 040156      STA 0,HEAD
04 04167 020121      LDA 0,C17
05 04170 040410      STA 0,E16.2
06 04171 000237 E16: JSR #ISET
07 04172 000201      DOSEK
08 04173 000000      0
09 04174 000242      EHMT
10 04175 000412      JMP E16E
11 04176 000256      READ
12 04177 000330 E16.1: PRGENU
13 04200 000017 E16.2: 17
14 04201 000242      EHMT
15 04202 000405      JMP E16E
16 04203 020156      LDA 0,HEAD
17 04204 020773      LDA 1,0E16.1
18 04205 122414      SUB# 1,0,SZR
19 04206 000242      EHMT
20 04207 000243 E16E: LOOP
21
22 04210 010156      ISZ HEAD
23 04211 020767      LDA 0,E16.2
24 04212 024067      LDA 1,KB7
25 04213 123000      ADD 1,0
26 04214 040764      STA 0,E16.2
27 04215 024150      LDA 1,OTYPE
28 04216 030412      LDA 2,ADR-1
29 04217 125112      MUVL# 1,1,SZC
30 04220 000404      JMP .+4
31 04221 151400      INC 2,2
32 04222 125202      MOVR 1,1,SZC
33 04223 151400      INC 2,2
34 04224 025000      LDA 1,0,2
35 04225 122404      SUB 1,0,SZR
36 04226 000743      JMP E16
37 04227 000405      JMP .+5
38
39 04230 004231      .+1
40 04231 001017 ADR: 1017
41 04232 005017      5017
42 04233 012017      12017

```

```

/SEE THE DISCUSSION PRECEDING
/TEST E15, READ ONCE FROM
/EACH HEAD ON CYL=0, SECT=0.
/VERIFY THAT DATA=HEAD #

/SEEK 1
/ICYLINDER 0
/ERROR IN SEEK, AC1=STATUS
/SKIP TO END OF TEST
/HEAD 1
/ADDRESS OF DATA BUFFER
/UISK ADDRESS (IT CHANGES)
/ERROR IN READ, AC1=STATUS
/SKIP TO END OF TEST
/GET HEAD #
/GET A WORD READ
/DATA ERROR, SEE ABOVE DISCUSSION
/AC0=GOOD WORD
/AC1=BAD

/INCREMENT TO NEXT HEAD

/DONE YET ??

/ICART DISK

/SKIP IF 2311
/2314
/GET ENDING DISK ADDRESS

/MORE TO GO
/GO TO NEXT TEST

/ICART, HEAD 2 SECT 0 1 SECT
/2311, HEAD 12 SECT 0 1 SECT
/2314, HEAD 24 SECT 0 1 SECT

```

A 0059 .MAIN

```
01
02 04234 020150 LDA 0,DTYPE ISEE THE DISCUSSION
03 04235 030500 LDA 2,AUR1=1 IPRECEDING TEST E10.
04 04236 101112 MOVL# 0,0,SZC IWRITE ON CYL=0, SECT=0,
05 04237 000404 JMP ,+4 IUNCE FOR EACH HEAD.
06 04240 151400 INC 2,2 IJATA = HEAD #
07 04241 101202 MOVH 0,0,SZC
08 04242 151400 INC 2,2
09 04243 025000 LDA 1,0,2 ISTARTING DISK ADDRESS
10 04244 044416 STA 1,E17,1 ISELECT HEADS IN REVERSE ORDER
11 04245 020213 LDA 0,C1774
12 04246 123700 ANDS 1,0
13 04247 040156 STA 0,HEAD IJURRENT HEAD #
14 04250 000237 E17: JSR #ISET
15 04251 000201 DUSEK
16 04252 000000 0
17 04253 000242 EMALT IERROR IN SEEK, AC1=STATUS
18 04254 000411 JMP E17E ISKIP TO END OF TEST
19 04255 000255 GENUAT IGENERATE DATA
20 04256 000244 MUNC IADDRESS OF DATA GENERATOR
21 04257 000330 PRGEND IJATA BUFFER ADDRESS
22 04260 000257 WRITE IWRITE I
23 04261 000330 PRGEND IJATA BUFFER ADDRESS
24 04262 000017 E17.1: IJISK ADDRESS (IT CHANGES)
25 04263 000242 EMALT IERROR IN WRITE, AC1=STATUS
26 04264 000401 JMP ,+1
27 04265 000243 E17E: LOOP
28
29 04266 014156 DSZ HEAD
30 04267 000401 JMP ,+1
31 04270 020772 LDA 0,E17.1 IDECREMENT HEAD #
32 04271 024007 LDA 1,KB7
33 04272 122400 SUB 1,0
34 04273 040767 STA 0,E17.1
35 04274 101103 MOVL 0,0,SNC IJONE YET ?
36 04275 000753 JMP E17 INO
```

A 0062 .MAIN

```
01
02 04276 020150 LDA 0,DTYPE ISEE THE DISCUSSION PRECEDING
03 04277 030444 LDA 2,AUR1=1 ITEST E15. READ ONCE FROM
04 04280 101112 MOVL# 0,0,SZC IWRITE ON CYL=0, SECT=0,
05 04301 000404 JMP ,+4 IVERIFY THAT DATA=HEAD #
06 04302 151400 INC 2,2
07 04303 101202 MOVH 0,0,SZC ISKIP IF 2311
08 04304 151400 INC 2,2 I2314
09 04305 025000 LDA 1,0,2 IGET DISK ADDRESS TO BEGIN WITH
10 04306 044413 STA 1,E18,2
11 04307 020213 LDA 0,C1774
12 04310 123700 ANDS 1,0
13 04311 040156 STA 0,HEAD IBEGINNING HEAD #
14 04312 000237 E18: JSR #ISET
15 04313 000201 DUSEK
16 04314 000000 0
17 04315 000242 EMALT IERROR IN SEEK, AC1=STATUS
18 04316 000413 JMP E18E ISKIP TO END OF TEST
19 04317 000256 REAU IREAD I
20 04320 000330 E18.1: PRGEND IADDRESS OF DATA BUFFER
21 04321 000017 E18.2: IJISK ADDRESS (IT CHANGES)
22 04322 000242 EMALT IERROR IN READ, AC1=STATUS
23 04323 000406 JMP E18E ISKIP TO END OF TEST
24 04324 020156 LDA 0,HEAD IGET HEAD #
25 04325 100000 COM 0,0 IUSE THE COMP.
26 04326 026772 LDA 1,0E18.1 IGET A WORD READ
27 04327 122414 SUB# 1,0,SZC IJATA ERROR, SEE ABOVE DISCUSSION
28 04330 000242 EMALT IAC0=GOOD WORD
29 04331 000243 E18E: LOOP IAC1=BAD
30
31 04332 014156 DSZ HEAD
32 04333 000401 JMP ,+1
33 04334 020765 LDA 0,E18,2 IDECREMENT HEAD #
34 04335 024067 LDA 1,KB7
35 04336 122400 SUB 1,0
36 04337 040762 STA 0,E18,2
37 04340 101103 MOVL 0,0,SNC IJONE YET ?
38 04341 000751 JMP E18 INO
39 04342 000405 JMP E19 IYES, GO TO NEXT TEST
40
41 04343 000444 ,+1
42 04344 000417 AUR1: 417 IJART, HEAD 1 SECT 0 1 SECT
43 04345 0004417 4417 I2311, HEAD 11 SECT 0 1 SECT
44 04346 011417 11417 I2314, HEAD 23 SECT 0 1 SECT
```

```

A 0061 .MAIN
01
02 04347 000240 E19:  SETP1      /CAUSE SEEK ERROR BY
03 04350 000261      DOSEK      /SEEKING TO CYL 313
04 04351 000313      313
05 04352 000403      JMP .+3
06 04353 000402      JMP .+2
07 04354 000242      EHALL
08 04355 000243      LOOP
09
10 04356 030153      LDA 2,UNUM  /NECALIBRATE THE
11 04357 021113      LDA 0,TRCL,2 /UNIT WITH A SEEK ERR
12 04360 040401      STA 0,+.1
13 04361 000231      RECL0
14
15 04362 000240 E20:  SETP1      /CAUSE SEEK ERRUR BY
16 04363 000261      DOSEK      /SEEKING TO CYL 313
17 04364 000313      313
18 04365 020004      LDA 0,KB10
19 04366 123415      AND# 1,0,SNR
20 04367 000242      EHALL
21 04370 000243      LOOP
22
23 04371 030153      LDA 2,UNUM  /NECALIBRATE THE UNIT
24 04372 021113      LDA 0,TRCL,2 /WITH A SEEK ERR0R
25 04373 040401      STA 0,+.1
26 04374 000231      RECL0
27
28 04375 000240 E21:  SETP1      /CHECK FOR ILLEGAL ERROWS
29 04376 000261      DOSEK      /ALONG WITH SEEK ERR0R
30 04377 000313      313
31 04400 020177      LDA 0,C36
32 04401 123414      AND# 1,0,SRZ
33 04402 000242      EHALL
34 04403 000243      LOOP
35
36 04404 030153      LDA 2,UNUM  /NECALIBRATE THE UNIT
37 04405 021113      LDA 0,TRCL,2 /WITH A SEEK ERROR
38 04406 040401      STA 0,+.1
39 04407 000231      RECL0

```

```

A 0062 .MAIN
01
02 04410 000253 E22:  DORN      /SETUP SECTOR 3 & 4
03 04411 000000      0          /CYL #
04 04412 000217      THREE     /DATA TYPE
05 04413 000077      77        /DISK ADDRESS
06
07 04414 000253      DORN      /SECT 4
08 04415 000000      0
09 04416 000221      FOUR
10 04417 000117      117
11
12 04420 000257      JSR #1SET /TEST READ SECT 3=WRITE SECT 4
13
14 04421 000256      READ      /SEQUENCE
15 04422 000330      PRGEN0   /READ A SECTOR
16 04423 000077      77        /MEM BUFFER ADDRESS
17 04424 000242      EHALL    /SECTOR THREE
18 04425 000422      JMP E22E /ERR0R, AC1=STATUS
19
20 04426 000257      WRITE    /SKIP TO END OF TEST
21 04427 000330      PRGEN0   /WRITE A SECTOR
22 04430 000117      117      /BUFF ADDR (3'S JUST HEAD)
23 04431 000242      EHALL    /SECTOR 4
24 04432 000415      JMP E22E /ERR0R, AC1=STATUS
25
26 04433 000255      GENDAT   /SKIP TO END OF TEST
27 04434 000217      THREE    /GENERATE DATA BUFFER
28 04435 000330      PRGEN0   /ADDR OF DATA GEN
29
30 04436 000256      READ     /BUFFER ADDR.
31 04437 000730      PRGEN0+400 /READ A SECTOR
32 04440 000117      117      /BUFF ADDR.
33 04441 000242      EHALL    /SECTOR 4
34 04442 000405      JMP E22E /ERR0R, AC1=STATUS
35
36 04443 000260      CHECK    /SKIP TO END OF TEST
37 04444 000330      PRGEN0   /COMPARE BUFFERS A/B
38 04445 000730      PRGEN0+400 /ADDR OF BUFF A (CORRECT)
39 04446 000242      EHALL    /ADDR OF BUFF B
40 04447 000243 E22E: LOOP /COMPARE ERROR, AC0=GOOD

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A 0063 .MAIN
01
02 04450 000253 E23: DORN      ISETUP SECTOR 3 & 4
03 04451 000000      0          I CYL # 0
04 04452 005217      THREE     I DATA TYPE
05 04453 000077      77         I DISK ADDRESS (SECT 3)
06
07 04454 000253      DORN      ISECTOR 4
08 04455 000000      0
09 04456 005221      FOUR      I TEST WRITE SECT 3=HEAD SECT 4
10 04457 000117      117         I SEQUENCE.
11
12 04460 000237      JSR #ISLT IGENERATE DATA
13
14 04461 000255      GENUAT   I41S
15 04462 005221      FOUR     I ADDR OF DATA BUFF
16 04463 000330      PRGEND
17
18 04464 000257      WRITE    IWRITE A SECTOR
19 04465 000330      PRGEND  I ADDR OF DATA BUFF
20 04466 000077      77         ISECTOR 3
21 04467 000242      EMALT   IERROR, AC1=STATUS
22 04470 000417      JMP E23E ISKIP TO END OF TEST
23
24 04471 000256      READ     IREAD A SECTOR
25 04472 000730      PRGEND+400 I MEM BUFF ADDRESS
26 04473 000117      117         ISECTOR 4
27 04474 000242      EMALT   IERROR, AC1=STATUS
28 04475 000412      JMP E23E ISKIP TO END OF TEST
29
30 04476 000256      READ     IREAD A SECTOR
31 04477 000330      PRGEND  I MEM ADDR
32 04500 000077      77         ISECTOR 3
33 04501 000242      EMALT   IERROR, AC1=STATUS
34 04502 000405      JMP E23E ISKIP TO END OF TEST
35
36 04503 000260      CHECK    ICOMPARE SECTOR 3 & 4
37 04504 000330      PRGEND  ISECT 3
38 04505 000730      PRGEND+400 ISECT 4
39 04506 000242      EMALT   ICOMPARE ERROR, AC=GOOD (SECT 3)
40 04507 000243 E23E: LOOP    IAC1=BAD (SECT 4)
41 04510 102000      ADC #,R
42 04511 040545      STA 0,SSKFLG
43 04512 000406      JMP E24
44 04513 102440      SUBD #,R RANSK:
45 04514 040542      STA 0,SSKFLG
46 04515 000251      INIT
47 04516 024011      LDA 1,C2   ISET COUNT FOR
48 04517 044540      STA 1,SSCNT I5000 SEKS

```

```

A 0064 .MAIN
01 04520 102400 E24: SUB #,0      IWRITE CYL # INTO EACH
02 04521 040405      STA 0,CLL  ISECT 0, HEAD 0, OF ALL
03 04522 040420      STA 0,.SCYL I CYLINDERS
04 04523 020207      LDA 0,C312
05 04524 040405      STA 0,LCYL
06 04525 000253      DORN      I CYL #
07 04526 000000      .CL: 0      I ADDR OF DATA GEN ROUT.
08 04527 005231      CYLN      I DISK ADDRESS
09 04530 000017      17
10
11 04531 010775      ISZ ,CL
12 04532 020774      LDA 0,.CL
13 04533 020207      LDA 1,C312
14 04534 122437      SUB# 1,0,SNR
15 04535 000770      JMP ,CL=1
16 04536 020441      LDA 0,C500
17 04537 040441      STA 0,CCNT I DU 500 SEKS
18
19
20
21 04540 000240      IAT 5 TIMES EACH BETWEEN RANDOM
22 04541 000201      ICYLINDER NUMBERS
23 04542 000000      GO: JSR #I.SETP
24 04543 000242      DOSEK
25 04544 000406      .SCYL: 0
26
27 04545 000256      EMALT   ISEK 11
28 04546 000330      JMP E24H I CYL #
29 04547 000017      EMALT   IERROR, AC1=STATUS
30 04550 000242      JMP E24H ISKIP TO END OF TEST
31 04551 000403
32
33 04552 020155      READ     IREAD DATA IN SECT 0
34 04553 020100      PRGEND  I MEM ADDR
35 04554 122415      17         I DISK ADDR
36 04555 000403      EMALT   IERROR, AC1=STATUS
37 04556 000242      JMP E24H ISKIP TO END OF TEST
38 04557 000423
39 04560 000201      LDA 0,CYL I CURRENT CYLINDER #
40 04561 000000      LDA 1,#BUFF I ACTUAL CYL #
41 04562 000242      SUB# 1,0,SNR I (LCYL) = LAST CORRECT
42 04563 000417      JMP ,*3 I NO ERR
43 04564 000256      EMALT   I CYLINDER #
44 04565 000330      JMP E24H
45 04566 000017      DOSEK
46 04567 000242      EMALT   ISEEK LAST CYL
47 04570 000412      JMP E24H ICHANGES 1
48 04571 020155      READ     IREAD SEC 0
49 04572 020100      PRGEND
50 04573 122415      17
51 04574 000412      EMALT   I MAYBE ADDR ERR
52 04575 000242      JMP E24H I CURCYL #
53 04576 000404      LDA 1,#BUFF I WHERE WE REALLY ARE
54 04577 000704 CS00: SUB# 1,0,SNR I SHD BE SAME
55 04578 000000      EMALT
56 04581 000002      JMP E24H ISEEK ITERATION COUNT (2 X 2500).

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^ 0065 .MAIN
01          E24R IS TO RECALIBRATE DRIVE AFTER SEEK ERROR
02 04002 030153 E24X1  LDA 2,UNUM
03 04003 021113        LDA 0,TRCL,2
04 04004 040401        STA 0,+.1
05 04005 006231        RECL0
06 04006 006243 E24E1  LOOP
07 04007 020752        LDA 0,LCYL      ;SAVE CYLINDER JUST DONE
08 04010 040732        STA 0,SCYL
09 04011 006254 GRAN1  JSR 0,IRAN      ;GET RANDOM CYLINDER #
10 04612 024207        LDA 1,C312
11 04013 030125        LDA 2,C377      ;# MUST BE 4313
12 04014 143400        AND 2,0
13 04015 100433        SUBZ# 0,1,SNC
14 04016 000773        JMP GRAN        ;TRY AGAIN
15 04017 040742        STA 0,LCYL
16 04020 014760        DSZ CCNT
17 04021 000717        JMP GU
18 04022 020434        LDA 0,SSKFLG    ;TEST THE SPECIAL SEEK FLAG,
19 04023 101064        MOV 0,0,SZR     ;IF NON=ZERO, PGM IS NORMAL
20 04024 000415        JMP E24X      ;DIAGNOSTIC, IF 0 IT IS SEEK
21 04025 014432        DSZ SSCNT    ;TEST LOOP, COUNT 5000 SEEK 5
22 04026 000402        JMP ,+2
23 04027 000404        JMP ,+4
24 04030 020747        LDA 0,C500
25 04031 040747        STA 0,CCNT
26 04032 000706        JMP GU
27 04033 020740        LDA 0,SKITR
28 04034 040423        STA 0,SSCNT    ;RELOAD COUNT AND LOOP.
29 04035 006247        PCRLF
30 04036 006250        MESSAGE    ;RELOAD MULTIPLIER COUNTER.
31 04037 000355        MSG0
32 04040 000770        JMP ,+10
33 04041 020152 E24X1  LDA 0,TESTU
34 04042 024054        LDA 1,K01
35 04043 010153        ISZ UNUM
36 04044 123022        ADDZ 1,0,SZC
37 04045 000413        JMP E24Y
38 04046 040152        STA 0,TESTU    ;CHECK TO REPEAT TSTS
39 04047 030153        LDA 2,UNUM      ;STEP TO NEXT UNIT
40 04050 025057        LDA 1,UNTHBIT,2 ;SAVE UNIT
41 04051 020151        LDA 0,NDSKS    ;GET UNIT BIT
42 04052 107405        AND 0,1,SNR    ;AND EXISTING BITS
43 04053 000766        JMP E24X      ;SKP=DRIVE EXISTS
44 04054 002401        JMP 0,+.1     ;CHK ON NEXT DRV
45 04055 002205        D1
46 04056 000000 SSKFLG: 0
47 04057 000000 SSCNT: 0
48 04060 152400 E24Y1  SUB 2,2
49 04061 021057        LDA 0,UNTHBIT,2 ;RESET TO LOWEST
50 04062 025053        LDA 1,+,TU,2   ;EXISTING DRV
51 04063 034151        LDA 3,NDSKS    ;EXIST BITS
52 04064 103404        AND 3,0,SZR    ;SKP=NO DRV
53 04065 000403        JMP ,+3
54 04066 151400        INC 2,2
55 04067 000772        JMP E24Y+1     ;TRY NEXT
56 04070 044152        STA 1,TESTU
57 04071 050153        STA 2,UNUM

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^ 0066 .MAIN
01          ;THE FOLLOWING TESTS CHECK FOR THE CORRECT OPER.
02          ;OF THE FOLLOWING DISK FUNCTIONS:
03          ; 1. THAT A WRITE INTO END OF CYLINDER
04          ; A. WILL CAUSE AN END OF CYLINDER ERROR
05          ; B. DOES NOT TURN THE WRITE FUNCTION OFF
06          ; UNTIL THE CHECKSUM HAS BEEN COMPLETELY WRITTEN.
07          ; (SEE INC, SC, DELAY)
08          ; C. DOES TURN THE WRITERS OFF COMPLETELY SO THAT THE
09          ; NEXT HEAD SELECTION DOES NOT TURN THE WRITE
10          ; CURRENT ON WHERE IT IS NOT WANTED.
11          ; (SEE DIRECT CLEAR INPUT TO WREN,)
12 04672 102420        SUBZ 0,0
13 04073 040511        STA 0,E250
14 04074 101100        MOVL 0,0
15 04075 040506        STA 0,E25M    ;DRIVE MASK
16 04076 006241 E25:  SETUP
17 04677 020150        LDA 0,0,TYPE
18 04700 040505        LDA 2,E25T    ;HEAD ADRS TBLE
19 04701 101112        MOVL# 0,0,SZC
20 04702 000404        JMP ,+4
21 04703 151400        INC 2,2
22 04704 101202        MOVR 0,0,SZC    ;SKP IS 2311
23 04705 151400        INC 2,2    ;2314 IS THE TYPE
24 04706 025000        LDA 1,0,2
25 04707 044502        STA 1,E25M    ;GET LAST HEAD #
26 04710 030473        LDA 2,E25M    ;AND SAVE IT
27 04711 020151        LDA 0,NDSKS
28 04712 113405        AND 0,2,SNR
29 04713 000457        JMP E25L+1
30 04714 020470        LDA 0,E250
31 04715 003233        DUCC 0,DSKP    ;SELECT CURRENT DISK
32 04716 024070        LDA 1,K06
33 04717 005333        DQAP 1,DSKP    ;STRT SEEK 0
34 04720 030166        LDA 2,C4
35 04721 006227        WAIT
36 04722 020462        LDA 0,E250
37 04723 024406        LDA 1,E25M
38 04724 107000        ADD 0,1
39 04725 007233        OCC 1,DSKP    ;DRV LAST HD SEC 13 ,2 SECTORS
40          ;UNLESS 2311 SECTOR 5,2 SECTORS
41 04726 020067        LDA 0,K07
42 04727 061033        DQA 0,DSKP    ;"WRITE"
43 04730 062133        DDBS 0,DSKP
44 04731 030060        LDA 2,K014
45 04732 006227        WAIT
46 04733 006433        DIA 0,DSKP
47 04734 105223        MOVZR 0,1,SNC   ;ERR SHD=1
48 04735 000404        JMP E25E1
49 04736 024003        LDA 1,K011
50 04737 123414        AND# 1,0,SZR    ;ERR SHD #1
51 04740 000403        JMP ,+3
52 04741 006242 E25E1: HALT
53 04742 000427        JMP E25L    ;END OF CYLINDER NOT FOUND
54          ;WRITE INTO END OF SECTOR AT LEAST APPEARS CORRECT
55          ;SEE IF THE DATA CAN BE READ CORRECTLY

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A 0067 .MAIN
01 IREAD SEC 13 OF LAST HEAD FOR NO CHKWRD ERR
02 FOR SECTOR 5 OF LAST HEAD IF 2311
03 04743 020100 LDA 0,BUFF
04 04744 024445 LUA 1,E25H
05 04745 030437 LDA 2,E25D
06 04746 147000 ADD 2,1
07 04747 152400 SUB 2,2
08 04750 002233 DDMC 0,DSKP
09 04751 067033 UUC 1,DSKP
10 04752 071133 DQAS 2,DSKP ISTKT 2 CYL READ
11 04753 030060 LDA 2,KB14
12 04754 006227 WAIT
13 04755 060433 DIA 0,DSKP IGET STATUS
14 04756 101113 MOVLM 0,0,SNC IHEAD DONE?
15 04757 000411 JMP E25E2 JNO
16 04760 105203 MOVR 0,1,SNC IERR SHD #1
17 04761 000407 JMP E25E2 IECC SHD #1
18 04762 030062 LDA 2,KB12 IEND BIT
19 04763 147415 ANDM 2,1,SNR ISHD #1 FOR EOC
20 04764 000404 JMP E25E2 IOUT DOESN'T
21 04765 125200 MOVR 1,1
22 04766 125203 MOVR 1,1,SNC ISKP HERE IS ERR
23 04767 000402 JMP ,+2 IOK NO CHKWORD ERR
24 04770 006242 E25E2: EHALT ISEL ACM FOR DSK STAT
25 IEIFTER A, NO HEAD DONE B, NO EOC C, A CHKWORD ERR
26 I BIT 0#0 BIT 11#0 OR BIT 13#1
27 04771 006243 E25L1 LOOP
28 04772 020412 LDA 0,E25D
29 04773 024054 LDA 1,KB1
30 04774 123022 ADDZ 1,0,SZC I+1 TILL DRV 3 DONE
31 04775 000415 JMP NMES
32 04776 040406 STA 0,E25D
33 04777 020404 LDA 0,E25M
34 05000 101120 MOVZL 0,0
35 05001 040402 STA 0,E25H
36 05002 000674 JMP E25
37 05003 000000 E25M1 0
38 05004 000000 E25D1 0
39 05005 005006 E25T1 ,+1
40 05006 000676 076 ICARTRIDGE
41 05007 004536 4536 I2311 LAST HEAD
42 05010 011676 11676 I2314 HD 23
43 05011 000000 E25H1 0

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A 0068 .MAIN
01
02 05012 006247 NMES1 PRLF IEND TEST
03 05013 000250 MESSAGE
04 05014 000355 MSG6 I"PASS"
05 05015 030045 LDA 2,45
06 05016 025000 LDA 1,0,2
07 05017 125005 MOVR 1,1,SNR
08 05020 002410 JMP 0,+10
09 05021 015003 SZ 3,2
10 05022 002404 JMP 0,+4
11 05023 060277 INTUS
12 05024 035004 LUA 3,4,2
13 05025 021003 LUA 0,3,2
14 05026 041776 STA 0,-2,3
15 05027 001400 JMP 0,3
16 05030 000012 AC
17
18
19

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A 0069 ,MAIN
01
02          RANDOM NUMBER GENERATOR
03
04 05031 054431 RANI   STA 3,,UD03   IGENERATE A RANDOM
05 05032 050427       STA 2,,UD02
06 05033 044425       STA 1,,UD01
07 05034 020142       LDA 0,RANDOM   INUMBER IN AC0
08 05035 004410       JSR ,UD00
09 05036 034426       LDA 3,,UD20
10 05037 163000       ADD 3,0
11 05040 040142       STA 0,RANDOM   ISTORE NEW VALUE.
12 05041 111100       MOVL 0,2
13 05042 030417       LDA 2,,UD02
14 05043 024415       LDA 1,,UD01
15 05044 002410       JMP 0,UD03
16
17 05045 024420 ,UD01: LDA 1,,UD21   IRANDOM CONTINUED
18 05046 044415       STA 1,,UD10
19 05047 105120       MOVZL 0,1
20 05050 125120       MOVZL 1,1
21 05051 014412       DSZ ,UD10
22 05052 000776       JMP ,=2
23 05053 107000       ADD 0,1
24 05054 125120       MOVZL 1,1
25 05055 125120       MOVZL 1,1
26 05056 123000       ADD 1,0
27 05057 001400       JMP 0,3
28 05060 000000 ,UD01: 0
29 05061 000000 ,UD02: 0
30 05062 000000 ,UD03: 0
31 05063 000000 ,UD10: 0
32 05064 030331 ,UD20: 33031
33 05065 000010 ,UD21: 10

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A 0070 ,MAIN
01
02          ICHECK DATA SUBROUTINE
03          I CALL CHECK
04          I ADDRESS OF DATA BUFFER 1
05          I ADDRESS OF DATA BUFFER 2
06          I ERROR RETURN, (AC1)=BAD (AC0)=GOOD
07          I NORMAL RETURN
08
09 05060 054460 ,CHECK: STA 3,GENRET
10 05067 030214       LDA 2,M400
11 05070 050417       STA 2,CTR
12 05071 031400       LDA 2,0,3
13 05072 030401       LDA 3,1,3
14 05073 010453       ISZ GENRET
15 05074 010452       ISZ GENRET
16 05075 021000 ,CNE1: LDA 0,0,2
17 05076 025400       LDA 1,0,3
18 05077 100414       SUB# 0,1,SZR
19 05100 002446       JMP 0,GENRET   IERROR
20 05101 151400       INC 2,2
21 05102 175400       INC 3,3
22 05103 010404       ISZ CTR
23 05104 000771       JMP ,CNE1     ICHECK MORE
24 05105 010441       ISZ GENRET
25 05106 002440       JMP 0,GENRET   INORMAL RETURN
26 05107 000000 CTR: 0
27
28          IGENERATE ONE SECTOR OF DATA
29          I CALL GENDAT
30          I ADDRESS OF DATA GEN ROUTINE
31          I DATA BUFFER ADDRESS
32          I RETURN
33
34 05110 054436 ,GEN1: STA 3,GENRET
35 05111 024214       LDA 1,M400
36 05112 031401       LDA 2,1,3
37 05113 034433 ,GEN1: LDA 3,GENRET
38 05114 007400       JSR 0,3       IGET A DATA WORD
39 05115 041000       STA 0,0,2
40 05116 151400       INC 2,2
41 05117 125404       INC 1,1,SZR
42 05120 000773       JMP ,GEN1     IDO MORE
43 05121 034425       LDA 3,GENRET   IDONE
44 05122 001402       JMP 2,3

```

```

A 0071 ,MAIN
01
02 ;WRITE SUBROUTINE
03 ; CALL WRITE
04 ; DATA BUFFER ADDRESS
05 ; DISK ADDRESS
06 ; ERROR RETURN, (AC1) = STATUS
07 ; JMP TO END OF TEST
08 ; NORMAL RETURN
09
10 ;ERROR RETURN IF
11 ; TIMEOUT (100MS)
12 ; DATA LATE
13 ; ADDRESS ERROR/UNSAFE
14 ; END CYLINDER
15 ; SEEK ERROR
16 ; ANY "SEEKING"
17 ; ANY "SEEK DONE"
18 ; NO "R/W DONE"
19
20 05120 054423 ,WRITE: STA 3,GENRET
21 05124 021400 LDA 0,0,3
22 05120 002033 ODB 0,DSKP ICA
23 05120 020152 LDA 0,TESTU
24 05127 025401 LDA 1,1,3
25 05130 123000 ADD 1,0
26 05131 003233 DOCC 0,DSKP ;UNIT # & DISK ADDRESS
27 05132 020126 LDA 0,C777 ;BIT 7 AND ALL CYL BITS=1
28 05133 001133 OQAS 0,DSKP ;WRITE I
29 05134 010412 ISZ GENRET
30 05135 010411 ISZ GENRET
31 05130 000235 ITRWT ;WAIT 100MS FOR INTERRUPT
32 05137 002407 JMP 0,GENRET ;TIMEOUT
33 05140 020407 ,WR1: LDA 0,WM ;ERROR BIT MASK
34 05141 107415 AND# 0,1,SNR
35 05142 120113 MOVL# 1,1,SNC
36 05143 002403 JMP 0,GENRET ;ERROR STATUS
37 05144 034402 LDA 3,GENRET
38 05145 001402 JMP 2,3
39
40 05140 000000 GENRET: 0
41 05147 077677 ,WM: 77677

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A 0072 ,MAIN
01
02 ;READ SUBROUTINE
03 ; CALL READ
04 ; DATA BUFFER ADDRESS
05 ; DISK ADDRESS
06 ; ERROR RETURN, (AC1)=STATUS
07 ; JMP TO END TEST
08 ; NORMAL RETURN
09
10 ;ERROR RETURN IF
11 ; TIMEOUT (100MS)
12 ; DATA LATE
13 ; CHECK WORD ERROR
14 ; ADDRESS ERROR/UNSAFE
15 ; END CYLINDER
16 ; SEEK ERROR
17 ; ANY "SEEKING"
18 ; ANY "SEEK DONE"
19 ; NO "R/W DONE"
20
21 05150 054776 ,READ: STA 3,GENRET
22 05151 021400 LDA 0,0,3
23 05152 002033 ODB 0,DSKP ICA
24 05153 020152 LDA 0,TESTU
25 05154 025401 LDA 1,1,3
26 05155 123000 ADD 1,0
27 05156 003233 DOCC 0,DSKP ;UNIT # & DISK ADDRESS
28 05157 102400 SUB 0,0
29 05160 001133 OQAS 0,DSKP ;READ I
30 05161 010765 ISZ GENRET
31 05162 010764 ISZ GENRET
32 05160 000235 ITRWT ;WAIT 100 MS FOR INTERRUPT
33 05164 002702 JMP 0,GENRET ;TIMEOUT
34 05165 000753 JMP ,WR1 ;CHECK STATUS

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A 0073 ,MAIN
01
02 ISEEK SUBROUTINE
03 I CALL DOSEK
04 I CYL N
05 I ERROR RETURN (AC1)=STATUS
06 I JMP TO END TEST
07 I NORMAL RETURN
08
09 IERRON RETURN IF
10 I TIMEOUT (300MS)
11 I DATA LATE
12 I CHECK WORD ERRON
13 I ADDRESS ERROR/UNSAFE
14 I END CYLINDER
15 I SEEK ERROR
16 I ANY "SEEKING"
17 I NO "SEEK DONE"
18 I "R/W DONE"
19
20 05166 054760 ,DOSEK: STA 3,GENKET
21 05167 010737 ISZ GENKET
22 05170 020152 LDA 0,TESTU
23 05171 063233 OUCG 0,DSKP ISELECT UNIT
24 05172 02140E LDA 0,0,3
25 05173 024125 LDA 1,C377
26 05174 123400 AND 1,0
27 05175 040155 STA 0,CYL ISAVE CYL N
28 05176 024070 LDA 1,K86
29 05177 123000 ADD 1,0 ICYL N + SEEK
30 05200 061333 DOAP 0,DSKP
31 05201 030167 LVA 2,C5
32 05202 000227 WAIT IWAIT 500MS (OR UNTIL "DONE")
33 05203 020410 LDA 0,,DM
34 05204 123414 ANDR 1,0,SZK
35 05205 002741 JMP #GENRET IERRON STATUS
36 05206 020220 LDA 0,C74K
37 05207 123415 ANDR 1,0,SNR
38 05210 002736 JMP #GENRET INO SEEK DONE
39 05211 034735 LVA 3,GENKET
40 05212 001402 JMP 2,3
41
42 05213 103677 ,DM1 103677

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A 0074 ,MAIN
01
02 05214 102001 ONES: AUC 0,0,SKP
03 05215 102400 ZEROS: SUB 0,0
04 05216 001400 JMP 0,3
05
06 05217 020117 THREE: LDA 0,C3
07 05220 001400 JMP 0,3
08
09 05221 020166 FOUR: LDA 0,C4
10 05222 001400 JMP 0,3
11
12 05223 020140 ALT1: LDA 0,C2525
13 05224 001400 JMP 0,3
14
15 05225 020141 ALT0: LDA 0,C5252
16 05226 001400 JMP 0,3
17
18 05227 020155 CYLNC: LDA 0,CYL
19 05230 100001 COM 0,0,SKP
20 05231 020155 CYLN: LDA 0,CYL
21 05232 001400 JMP 0,3
22
23 05233 054407 NUMSEQ: STA 3,NSRET
24 05234 010407 ISZ NS1
25 05235 000401 JMP +1
26 05236 020405 LDA 0,NS1
27 05237 054125 LDA 3,C377
28 05240 103400 AND 3,0
29 05241 002401 JMP #NSRET
30 05242 000000 NSRET: 0
31 05243 000000 NS1: 0
32
33 05244 020156 HONC: LDA 0,HEAD
34 05245 100001 COM 0,0,SKP
35 05246 020156 HUN: LDA 0,HEAD
36 05247 001400 JMP 0,3
37
38 05250 020157 SETNC: LDA 0,SECT
39 05251 100001 COM 0,0,SKP
40 05252 020157 SECTN: LDA 0,SECT
41 05253 001400 JMP 0,3

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A 0075 ,MAIN
01
02
03 05254 000420      JPRUGHAM INITILAIZATION
04 05255 054514      PTIME ,CALIBRATION ROUTINE
05 05256 020145      .INI1: STA 3, INHET
06 05257 101004      LDA 0, TIME
07 05260 000406      MOV 0,0, SZR      ;SKIP=NOT CALIB.
08 05261 000773      JMP ,+6
09 05262 124400      JSR 0, INI-1
10 05263 044140      NEG 1,1
11 05264 150400      STA 1, TIME1
12 05265 050145      NEG 2,2
13 05266 000247      STA 2, TIME
14 05267 000250      PCRLF
15 05270 000203      MESSAGE
16 05271 000247      MSG1
17 05272 000250      ;UI SK PACK TYPE
18 05273 000276      PCRLF
19 05274 000247      MESSAGE
20 05275 000250      MSG2
21 05276 000314      ;I TYPE 0 FOR CART
22                                     I      1 FOR 2311
23                                     I      2 FOR 2314
24 05277 000247      PCRLF
25 05300 000210      .INI1: NIQC TTI
26 05301 0003610      ;WAIT FOR TTI INPUT
27 05302 000777      SKPDN TTI
28 05303 000410      JMP ,+1
29 05304 001111      VIA 0, TTI
30 05305 024124      ;I READ CHAR
31 05306 107400      ;ECHO IT
32 05307 030200      DOAS 0, TTI
33 05310 034201      LDA 1, C177
34 05311 132437      AND 0,1
35 05312 100432      ;I 17 BIT MASK
36 05313 000407      LDA 2, C60
37 05314 024117      LDA 3, C63
38 05315 123400      SUBZM 1,2, SBN
39 05316 101224      ;I LCHAR MUST 0,1, OR 3
40 05317 000404      SUBZM 3,1, SZC
41 05320 101205      JMP QUEST
42 05321 101241      ;I ILLEGAL CHAR TYPED
43 05322 101220      LDA 1, C3
44 05323 040150      AND 1,0
45                                     ;IF NO UNIT NUMBERS TYPED
46                                     ;IT IS AN ERROR
47                                     ;I=2, 2314, BIT 15 IS SET, DONE
48                                     ;I=0, CART, MUST SET BIT 0
49                                     ;I=1, 2311, MUST SET BIT 1
50                                     STA 0, DTYPE

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A 0075 ,MAIN
01
02 05324 102400      SUB 0,0
03 05325 040151      STA 0, NUSKS
04 05326 000247      .INI2: PCRLF
05 05327 000250      MESSAGE
06 05330 000335      MSG5
07 05331 000247      PCRLF
08
09 05332 000210      .INI3: NIQC TTI
10 05333 003610      SKPDN TTI
11 05334 000777      JMP ,+1
12 05335 000410      VIA 0, TTI
13 05336 001111      ;I READ CHAR TYPED
14 05337 024124      ;ECHO THE CHAR
15 05340 107400      DOAS 0, TTI
16 05341 030173      LDA 1, C177
17 05342 132415      AND 0,1
18 05343 000422      ;I 17 BIT ASCII
19 05344 030200      LDA 2, C15
20 05345 034201      SUBM 1,2, SNR
21 05346 100437      JMP CR
22 05347 132436      ;I CR TYPED
23 05350 000420      LDA 2, C60
24 05351 030117      LDA 3, C63
25 05352 113400      SUBZM 3,1, SBN
26 05353 021057      ;I M MUST BE 0,1,2, OR 3
27 05354 025053      SUBZM 1,2, SEZ
28 05355 044152      JMP GST1
29 05356 050153      ;I ILLEGAL CHAR TYPED
30 05357 110000      LDA 2, C3
31 05360 024151      AND 0,2
32 05361 147400      LDA 0, UNTBIT,2
33 05362 107000      LDA 1, TU,2
34 05363 044151      ;I (NUSKS) = BIT 15 = UNIT 0
35 05364 000746      STA 1, TESTU
36                                     ;I BIT 14 = UNIT 1
37                                     ;I BIT 13 = UNIT 2
38                                     ;I BIT 12 = UNIT 3
39 05365 020151      ;I IF NO UNIT NUMBERS TYPED
40 05366 101005      ;IT IS AN ERROR
41 05367 000407      LDA 0, NUSKS
42 05370 002401      MOV 0,0, SNR
43 05371 000000      JMP GST1
44                                     ;I INRET: 0
45                                     ;I=2, 2314, BIT 15 IS SET, DONE
46                                     ;I=0, CART, MUST SET BIT 0
47                                     ;I=1, 2311, MUST SET BIT 1
48 05372 000247      QUEST: PCRLF
49 05373 000250      MESSAGE
50 05374 000332      MSG4
51 05375 000702      JMP .INI1
52
53 05376 000247      GST1: PCRLF
54 05377 000250      MESSAGE
55 05400 000332      MSG4
56 05401 000725      JMP .INI2

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A 0077 .MAIN
01
02
03
04 05402 102401 .S33: SUB 0,0,SKP /SET TO 33
05 05403 020064 .S73: LDA 0,K010 /SET TO 73
06 05404 024176 LDA 1,C33
07 05405 123000 ADD 1,0
08 05406 040154 STA 0,CDSK
09 05407 030425 LDA 2,FIRST
10 05410 021000 .SN0: LDA 0,0,2
11 05411 024101 LDA 1,MSK1
12 05412 107400 AND 0,1
13 05413 034162 LDA 3,DPID
14 05414 166404 SUB 3,1,SZR
15 05415 000406 JMP ,SN1 /GO ON
16 05416 024163 LDA 1,MSK2 /DISK PACK IO INST.
17 05417 034154 LDA 3,CDSK
18 05420 123400 AND 1,0
19 05421 163000 ADD 3,0
20 05422 041000 STA 0,0,2
21 05423 151400 .SN1: INC 2,2
22 05424 024411 LDA 1,LAST
23 05425 132414 SUB# 1,2,SZR
24 05426 000762 JMP ,SN0
25 05427 024046 LDA 1,EUGS
26 05430 125005 MOV 1,1,SNR
27 05431 063077 HALT
28 05432 002401 JMP 0,+1
29 05433 000500 START
30
31 05434 000500 FIRST: START
32 05435 000622 LAST: .SET
33
34 /DELAY SUBROUTINE
35
36 05436 054406 .STL: STA 3,.STLRET
37 05437 034000 LDA 3,K014
38 05440 054000 STA 3,0
39 05441 014000 DSZ 0
40 05442 000777 JMP ,+1
41 05443 002401 JMP 0,.STLRET
42 05444 000000 .STLRET:0

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A 0070 .MAIN
01
02
03
04 /"SET A SEEKING FLOP" SUBROUTINE
05 /FOR THE UNITS INDICATED BY (AC2).
06 / BIT 15 = UNIT 0
07 / BIT 14 = UNIT 1
08 / BIT 13 = UNIT 2
09 / BIT 12 = UNIT 3
10
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24
25 05445 020056 .SSEK: LDA 0,C140K
26 05446 151005 MOV 2,2,SNR
27 05447 001400 JMP 0,3 /DONE
28 05450 024054 LDA 1,K01
29 05451 123000 ADD 1,0
30 05452 151223 MOVZR 2,2,SNC
31 05453 000773 JMP ,SSEK+1 /TRY ANOTHER UNIT
32 05454 063033 DDC 0,OSKP /NECAL THIS UNIT
33 05455 024070 LDA 1,C1000
34 05456 065333 DOAP 1,USKP /SEEK !!
35 05457 000767 JMP ,SSEK+1
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A 0079 ,MAIN
01
02
03
04
05 05477 102400 ,HCL01 SUB 0,0      JUNIT 0 ENTRY
06 05500 000405      JMP ,RCL3+1
07 05501 020054 ,RCL1: LDA 0,K01    JUNIT 1 ENTRY
08 05502 000403      JMP ,RCL3+1
09 05503 102021 ,RCL2: SUBZR 0,0,SKP JUNIT 2 ENTRY
10 05504 020056 ,RCL3: LDA 0,C140K  JUNIT 3 ENTRY
11 05505 060233      DOCC 0,0SKP  JSELECT UNIT
12 05506 020210      LDA 0,C1400  JRECALIBRATE
13 05507 001333      DOAP 0,0SKP
14 05510 054404      STA 3,RCLRET
15 05511 030173      LDA 2,C15
16 05512 000227      WAIT
17 05513 002401      JMP #NCLRET  JWAIT 1,3SEC (OR UNTIL DONE)
18 05514 000000 RCLMET: 0

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A 0080 ,MAIN
01
02
03
04
05
06
07
08
09 05515 054441 ,DORW: STA 3,DRWRET
10 05516 021400      LDA 0,0,3    JXFER CYL #
11 05517 040410      STA 0,,00
12 05520 021401      LDA 0,1,3    JXFER ADDR DAT GEN
13 05521 040412      STA 0,,001
14 05522 021402      LDA 0,2,3    JXFER DISK ADDR
15 05523 040414      STA 0,,002
16 05524 040420      STA 0,,003
17
18 05525 000237      JSR #ISET
19 05526 000261      UDSEK
20 05527 000000 ,001: 0
21 05530 000242      EMALT
22 05531 000422      JMP E,00
23
24 05532 000255      GENDAT
25 05533 005214 ,001: ONES
26 05534 000330      PRGEND
27
28 05535 000257      WRITE
29 05536 000330      PRGEND
30 05537 000017 ,002: 17
31 05540 000242      EMALT
32 05541 000412      JMP E,00
33
34 05542 000256      READ
35 05543 000730      PRGEND+400
36 05544 000017 ,003: 17
37 05545 000242      EMALT
38 05546 000405      JMP E,00
39
40 05547 000260      CHECK
41 05550 000330      PRGEND
42 05551 000730      PRGEND+400
43 05552 000242      EMALT
44 05553 000243 E,00: LOUP
45
46 05554 034402      LDA 3,DRWRET
47 05555 001403      JMP 3,3
48
49 05556 000000 DRWRET: 0

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A 0081 ,MAIN
01
02          IWAIT FOR INTERRUPT TIMEOUT AFTER 100 MS
03          IRETURN+1 IF TIMEOUT
04          IRETURN+2 IF INTERRUPT
05
06 05557 020146 ,IWT: LDA 0,TIME1
07 05560 050177      INTEN  IENABLE INTERRUPT
08 05561 101000      MOV 0,0
09 05562 101405      INC 0,0,SNR      ICOUNT 100 MS
10 05563 080403      JMP ,+3
11 05564 053400      SKPBN 0      ITYPE 1 LOOP
12 05565 080774      JMP ,IWT+2
13 05566 060277      INTDS      INO INTERRUPT
14 05567 064433      DIA 1,DSKP
15 05570 001400      JMP 0,3      IERROR RETURN
16
17 05571 064433 IRET: DIA 1,DSKP
18 05572 001401      JMP 1,3      INORM INTERRUPT RETURN
19
20          ICHOOSE AN ACTIVE DISK UNIT
21          IRETURN WITH UNIT # IN AC2
22          I      UNIT 0 = 1
23          I      UNIT 1 = 2
24          I      UNIT 2 = 4
25          I      UNIT 3 = 10
26
27 05573 152521 ,ADSK: SUBZL 2,2,SKP
28 05574 151120      MOVZL 2,2
29 05575 020151      LDA 0,ADSKS
30 05576 143405      AND 2,0,SNR
31 05577 060775      JMP ,+3
32 05600 001400      JMP 0,3
33
34          ISEEK SUBROUTINE
35          I CALL SEEK      IAC2 = UNIT
36          I      N      ICYL #
37          I      RETURN      IAC1 = STATUS
38
39 05601 054420 ,SK: STA 3,SKRET
40 05602 126400      SUB 1,1
41 05603 020054      LDA 0,K01
42 05604 151222      MOVZR 2,2,SZC
43 05605 000403      JMP ,SK1
44 05606 107000      ADD 0,1
45 05607 000775      JMP ,+3
46
47 05610 067033 ,SK1: DOC 1,DSKP      ISELECT UNIT
48 05611 021400      LDA 0,0,3
49 05612 024070      LDA 1,K06
50 05613 123000      ADD 1,0      ISEEK + CYL #
51 05614 061333      OJAP 0,DSKP
52 05615 030107      LDA 2,C5
53 05616 060227      WAIT      IWAIT 500MS (OR UNTIL DONE)
54 05617 010402      ISZ SKRET      IAC1=STATUS
55 05620 002401      JMP #SKRET
56 05621 000000 SKRET: 0

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A 0082 ,MAIN
01
02 05622 054432 ,SETI STA 3,LOOPR      ITERATE ONCE
03 05623 17652F      SUBZL 3,3
04 05624 000400      JMP ,SETUP+2
05
06 05625 054427 ,SETP1: STA 3,LOOPR      ITERATE 5 TIMES
07 05626 034167      LDA 3,C5
08 05627 000403      JMP ,SETUP+2
09
10 05630 054424 ,SETUP: STA 3,LOOPR      IADDRESS OF TOP OF LOOP
11 05631 034413      LDA 3,ITR      ITHIS ROUTINE INITIALIZES
12 05632 002677      IORST
13 05633 040420      STA 0,SAVE
14 05634 044416      STA 1,SAV1
15 05635 050414      STA 2,SAV2
16 05636 175400      INC 3,3
17 05637 054406      STA 3,ITRCT      IEACH TEST
18 05640 176400      SUB 3,3
19 05641 054405      STA 3,ESWIT
20 05642 054405      STA 3,ENRCT
21 05643 000436      JMP ,LOP1+1
22
23 05644 000144 ITR: 144
24 05645 000000 ITRCT: 0
25 05646 000000 ESWIT: 0
26 05647 000000 ENRCT: 0
27 05650 000000 ,RTRN: 0
28 05651 000000 SAV2: 0
29 05652 000000 SAV1: 0
30 05653 000000 SAV0: 0
31 05654 000000 LOOPR: 0
32 05655 000000 DSHT: 0

```

A 0083 .MAIN

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01
02 05656 054772 .LUPD1 STA 3,.RTRN      ;INTRODUCE A SHORT
03 05657 176401      SUB 3,3,SKP      ;AC3#0 IS WAIT SW,
04
05 05660 054770 .LOOP1 STA 3,.RTRN      ;END OF TEST ITERATION
06 05661 050772      STA 2,SAV2
07 05662 044770      STA 1,SAV1
08 05663 040770      STA 0,SAV0
09 05664 175004      MOV 3,3,SZR      ;INSERT WAIT?
10 05665 000413      JMP .LOP1       ;NO
11 05666 020146      LDA 0,TIME1
12 05667 024213      LDA 1,C1774      ;TIME/1024
13 05670 123700      ANDS 1,0
14 05671 123240      ADDOR 1,0
15 05672 121240      MOVOR 1,0
16 05673 101000      MOV 0,0
17 05674 101405      INC 0,0,SNR
18 05675 000403      JMP .LOP1       ;STALLED 00
19 05676 053400      SKPBN 0        ;MICROSEC
20 05677 000774      JMP .-4
21 05700 062077 .LOP1: IORST
22 05701 014744      USZ ITRCT
23 05702 000430      JMP CYCTS      ;NOT 100 TIMES ITERATED
24 05703 034741      LDA 3,ITR      ;RESET ITERATION CNTR
25 05704 054741      STA 3,ITRCT
26 05705 034741      LDA 3,ESWIT
27 05706 175005      MOV 3,3,SNR
28 05707 002741 .LOPX: JMP 0,.RTRN
29 05710 074477      READS 3
30 05711 175120      MOVZL 3,3
31 05712 175100      MOVL 3,3
32 05713 175103      MOVL 3,3,SNC
33 05714 000414      JMP PCENT+1
34 05715 000247      PCRLF        ;PRINT CARRIAGE
35 05716 024731      LDA 1,ERRCT
36 05717 030725      LDA 2,ITR
37 05720 004555      JSR MULT
38 05721 030723      LDA 2,ITR
39 05722 004537      JSR DIVO
40 05723 006511      JSR #IPUEC   ;PRINT VALUE
41 05724 020403      LDA 0,PCENT  ;EXAMPLE: 89X
42 05725 006506      JSR #ICHAH
43 05726 000402      JMP PCENT+1
```

A 0084 .MAIN

```
01
02 05727 000045 PCENT: "%          ;CHARACTOR
03 05730 176400      SUB 3,3
04 05731 054716      STA 3,ERRCT
05 05732 034714 CYCTS: LDA 3,ESWIT
06 05733 175004      MOV 3,3,SZR
07 05734 000410      JMP CNS
08 05735 020710 CYC1: LDA 0,SAV0      ;THERE HAS BEEN AN ERROR
09 05736 024714      LDA 1,SAV1      ;RESTORE AC'S
10 05737 030712      LDA 2,SAV2
11 05740 175112      MOVL# 3,3,SZC
12 05741 000746      JMP .LOPX
13 05742 000165      JSR #STALL
14 05743 002711      JMP #LOOPR
15
16 05744 074477 CNS:  READS 3          ;ERROR LOOP, IS A RECAL
17 05745 024073      LDA 1,KB3      ;REQUESTED ?
18 05746 137415      ANON 1,3,SNR
19 05747 000410      JMP CNS1
20 05750 175300      MOVS 3,3
21 05751 024170      LDA 1,C6
22 05752 137620      ANDZR 1,3
23 05753 021513      LDA 0,TRCL,3
24 05754 040401      STA 0,#+1
25 05755 000234      RECL3
26 05756 004533      JSR .DLY
27
28 05757 074477 CNS1: READS 3          ;IF SW#1 DELAY
29 05760 020072      LDA 0,KB4      ; 1 SEC.
30 05761 117404      AND 0,3,SZR
31 05762 004527      JSR .DLY
32 05763 034872      LDA 3,USWT
33 05764 175005      MOV 3,3,SNR
34 05765 000403      JMP .+3
35 05766 004523      JSR .DLY
36 05767 004522      JSR .DLY
37 05770 074477      READS 3
38 05771 000744      JMP CYC1
39
```

```

A 0005 .MAIN
01
02 05772 054656 ,EM1: STA 3,,RTRN      IERR WITH FORCED 1 SEC DELAY
03 05773 176520      SUMZL 3,3
04 05774 000403      JMP ,EM2
05 05775 054653 ,EMALT: STA 3,,RTRN      IERROR SUBROUTINE
06 05776 176400      SUB 3,3      IERROR WITH NO DELAY FORCED
07 05777 054656 ,EM2: STA 3,DSWT      IDELAY SWITCH
08 06000 034646      LDA 3,ESWIT
09 06001 175004      MOV 3,3,SZR
10 06002 000410      JMP ERET
11 06003 034645 ERR1: LDA 3,,RTRN
12                      IERROR, C(3)=PC
13 06004 004433      JSR AUTOER      IOPERATOR, SET SWITCHES
14 06005 054641      STA 3,ESWIT
15 06006 074477      READS 3
16 06007 177112      ADDL# 3,3,SZC   ILOOK AT SWITCH 1
17 06010 000402      JMP ERET
18 06011 004404      JSR EPRINT
19 06012 010635      ERET: ISZ ERRCY
20 06013 002635      JMP 0,RTRN
21 06014 002634      JMP 0,RTRN
22 06015 054634 EPRINT: STA 3,SAV2
23 06016 040635      STA 0,SAV0
24 06017 044633      STA 1,SAV1
25 06020 006247      PCRLF          IPRINT CARRIAGE
26 06021 000250      MESSAGE      IAND HEADER
27 06022 006035      HEADER
28 06023 020625      LDA 0,,RTRN
29 06024 040622      STA 0,ESWIT
30 06025 126000      AUC 1,1
31 06026 070000      ADD 0,1
32 06027 004525      JSR POCY      IPC OF ERROR
33 06030 020623      LDA 0,SAV0
34 06031 024621      LDA 1,SAV1
35 06032 002617      JMP 0SAV2
36 06033 006240      ICHAR: CHAR
37 06034 006160      IPDEC: PDEC
38                      HEADER: ,TXTE 1
39 06035 141520      PC 1
06036 000011
40 06037 054415 AUTOER: STA 3,,AA03
41 06040 044413      STA 1,,AA01
42 06041 024040      LDA 1,EGGS
43 06042 125004      MOV 1,1,SZR
44 06043 000405      JMP ,+5
45 06044 024407      LDA 1,,AA01
46 06045 034603      LDA 3,,RTRN
47 06046 063077      MALT
48 06047 002405      JMP 0,AA03
49 06050 004745      JSR EPRINT
50 06051 000277      INTUS
51 06052 002052      JMP 0EGGS+4
52 06053 000000      ,AA01: 0
53 06054 000000      ,AA03: 0
54

```

```

A 0006 .MAIN
01
02                      IAC1 MEM AC0=(AC0,AC1)/AC2
03 06055 102400      DIVIO: SUB 0,0
04 06056 054431      DIVDO: STA 3,MSAV
05 06057 142432      SUBZ# 2,0,SZC
06 06060 000413      JMP DEXT
07 06061 054426      DIVDI: STA 3,MSAV      IDIVIDE
08 06062 034426      LDA 3,M20
09 06063 125120      MOVZL 1,1
10 06064 101100      DLOOPI: MOVL 0,0
11 06065 142412      SUB# 2,0,SZC
12 06066 142400      SUB 2,0
13 06067 125100      MOVL 1,1
14 06070 175404      INC 3,3,SZR
15 06071 000773      JMP DLOOP
16 06072 176441      SUBO 3,3,SKP
17 06073 176420      DEXT: SUBZ 3,3
18 06074 002413      JMP 0MSAV
19
20                      I(AC0,AC1)=AC1*AC2*AC0
21 06075 102400      MULTI: SUBC 0,0      IMULTIPLY
22 06076 054411      MULTA: STA 3,MSAV
23 06077 034411      LDA 3,M20
24 06100 125203      MLOOP: MOVK 1,1,SNC
25 06101 101201      MOVN 0,0,SKP
26 06102 143220      ADDZR 2,0
27 06103 175404      INC 3,3,SZR
28 06104 000774      JMP MLOOP
29 06105 125200      MOVCR 1,1
30 06106 002401      JMP 0MSAV
31 06107 000000      MSAV: 0
32
33 06110 177700      M20: ~20
34
35 06111 020172      .DLY: LDA 0,C12      IDELAY 1 SEC
36 06112 040164      STA 0,IYRCNT      I10.X100MS
37 06113 020145      .DLY1: LDA 0,TIME
38 06114 000000      NIO 0
39 06115 004433      DIA 1,DSKP
40 06116 127401      AND 1,1,SKP
41 06117 063077      MALT
42 06120 101404      INC 0,0,SZR      INSTALLED 100?
43 06121 000773      JMP .DLY1+1      INOT YET
44 06122 014104      OSZ IYRCNT      I1 SEC.7
45 06123 000770      JMP .DLY1      INSTALL MORE
46 06124 001400      JMP 0,3

```

```

A 0087 .MAIN
01 ;TELETYPE NON INTERRUPT PACKAGE
02 ;AC1,AC2 SAVED
03 ;"MESS" PRINTS ASCII MESSAGES AS SPECIFIED BY ASSEMBLER
04 ;"CRLF" PRINTS A CARRIAGE RETURN
05 ;"POCT" PRINTS C(1) IN OCTAL
06 ;"ZOCT" PRINTS C(1) IN OCTAL, LEADING ZEROS SUPPRESSED
07 ;"PDEC" PRINTS C(1) IN DECIMAL, LEADING ZEROS SUPPRESSED,
08 ;THE ABOVE THREE ARE FOLLOWED BY THE TAB IN P,TAB
09 ;"TINO" ACCEPTS OCTAL, AND
10 ;"TIND" ACCEPTS DECIMAL SINGLE PRECISION SIGNED INTEGERS
11 ;INTO AC1 FROM THE TTI, LEADING NULLS, TABS,
12 ;AND SPACES ARE IGNORED, A 16 BIT UNSIGNED INTEGER IS
13 ;FORMED, THEN NEGATED IF A MINUS SIGN IS TYPED,
14 ;EXIT AT CALL+1 IF INPUT ERROR WITH AC0=BAD CHARACTER,
15 ; (NOT A LEGAL DIGIT OR TERMINATING CHARACTER)
16 ;EXIT AT CALL+2 UPON TERMINATING CHARACTER
17 ; WITH AC0=0, 0, 40, 12, 55
18 ; FOR NULL, TAB, SPACE, CARRIAGE RETURN, COMMA
19 ;THE ABOVE WAIT FOR TTD DONE, THEN CLEAK TTD.
20 ;"CHAR" PRINTS ASCII CHARACTER IN C(0)R1 C(0)L MUST BE 0.
21 ;EXITS CALL +2 IF C(3)R=0, CORRECTS THE PARITY,
22 ;SIMULATES TAB ON ASR33.
23 ;"TYPE" PRINTS C(0)R. MUST HAVE PROPER PARITY. EXITS AT
24 ;CALL+1. REPLACE "TYPE" WITH INTERRUPT TYPE IF DESIRED.
25
26 06125 054551 MESS1 STA 3,MESSR ;PRINT A TEXT MESSAGE
27 06126 044505 STA 1,P,AC1
28 06127 050505 STA 2,P,AC2
29 06130 010546 ISZ MESSR
30 06131 031400 LDA 2,0,3 ;C(2) POINTS TO MESSAGE
31 06132 024505 LDA 1,P,377 ;A 8 BIT MASK
32 06133 021000 LDA 0,0,2 ;C(2)=DATA WORD
33 06134 125112 MOVL# 1,1,SZC
34 06135 125701 ANDS 1,0,SKP
35 06136 123401 AND 1,0,SKP ;C(0)=DATA CHARACTER MIGHT
36 06137 151400 INC 2,2 ;INC TO NEXT WORD
37 06140 124000 COM 1,1 ;FLIP MASK
38 06141 004477 JSR CHAR ;PRINT
39 06142 000771 JMP MESS+6 ;ANOTHER
40 06143 000402 JMP +2
41 06144 004474 P.LST1 JSR CHAR
42 06145 024466 PEXIT1 LDA 1,P,AC1
43 06146 030466 LDA 2,P,AC2
44 06147 003511 SKPBZ TTD
45 06150 000777 JMP ,-1
46 06151 000211 NI0C TTD
47 06152 002524 JMP #MESSR ;LAST
48

```

```

A 0088 .MAIN
01 06153 102401 ZOCT1: SUB 0,0,SKP
02 06154 020402 PUCT1: LDA 0,P,C00
03 06155 030457 STA 2,P,AC2
04 06156 030435 LDA 2,OCTAB ;PRINT C(1) IN OCTAL
05 06157 000404 JMP +4
06 06160 050454 PDEC1: STA 2,P,AC2
07 06161 030442 LDA 2,DECTB ;PRINT C(1) IN DECIMAL
08 06162 102400 SUB 0,0
09 06163 054513 STA 3,MESSR ;BOTH ENTRIES PRINT NUMBER
10 06164 044447 STA 1,P,AC1
11 06165 040445 STA 0,ZSUPP ;THEN TAB TO NEXT POSITION
12 06166 050461 STA 2,+1
13 06167 000000 DECOCT1: 0 ;"LDA 2,TABLE" INSTRUCTION
14 06170 010777 ISZ ,-1
15 06171 020444 LDA 0,P,TAB
16 06172 151005 MOV 2,2,SNR ;IF TABLE ENTRY=0
17 06173 000752 JMP PEXIT ;EXIT WITH NO TAB
18 06174 034436 LDA 3,ZSUPP ;ZEROS SUPPRESS TUF
19 06175 102400 SUB 0,0
20 06176 140452 DECOT1: SUBUM 2,1,SZC
21 06177 000405 JMP DECP
22 06200 140400 SUB 2,1 ;FORM THE DIGIT
23 06201 034435 LDA 3,P,C00
24 06202 101400 INC 0,0
25 06203 000773 JMP DECOT
26 06204 151235 DECP1: MOVZR# 2,2,SNR
27 06205 034431 LDA 3,P,C00
28 06206 054424 STA 3,ZSUPP ;C(0)=DIGIT
29 06207 163000 ADD 3,0 ;MAKE ASCII
30 06210 175004 MOV 3,3,SZR
31 06211 004427 JSR CHAR ;PRINT
32 06212 000755 JMP DECUCT ;GET NEXT DIGIT
33
34 06213 030425 OCTAB1: LDA 2,+1+,-DECOCT
35 06214 100000 100000
36 06215 010000 10000
37 06216 001000 1000
38 06217 000100 100
39 06220 000010 10
40 06221 000001 1
41 06222 000000 0
42 06223 030435 DECTB1: LDA 2,+1+,-DECOCT
43 06224 000012 ,RDX 10
44 06224 023420 10000
45 06225 001750 1000
46 06226 000144 100
47 06227 000012 10
48 06230 000001 1
49 06231 000000 0
50 06232 000010 ,RDX 0
51 06232 000000 ZSUPP1: 0
52 06233 000000 P.AC11: 0
53 06234 000000 P.AC21: 0
54 06235 000011 P.TAB1: 11 ;CHARACTER PRINTED AFTER NUMBERS
55 06236 000000 P.C001: 0
56 06237 0000377 P.3771: 377

```



```

A 0000 .MAIN
01 06240 054434 CHAR1 STA 3,CHRET ;PRINT C(0) RIGHT
02 06241 101305 MOVS 0,0,SNR ;RETURN +2 IF NULL
03 06242 081401 JMP 1,3
04 06243 115120 MOVZL 0,3 ;COMPUTE EVEN PARITY
05 06244 177004 ADD 3,3,SZR
06 06245 000777 JMP ,=-1
07 06246 103200 ADDR 0,0
08 06247 101300 MOVS 0,0
09 06250 034452 CHAR1: LDA 3,P,C11 ;IS THIS A TAB
10 06251 116415 SUB# 0,3,SNR
11 06252 000403 JMP CHA,3 ;YES
12 06253 004424 JSR TYPE ;NO PRINT IT
13 06254 002420 JMP @CHRET ;EXIT
14 06255 020450 CHA,3: LDA 0,P,240 ;SIMULATE A TAB
15 06256 004421 JSR TYPE ;WITH 1 TO 7 SPACES
16 06257 020410 LDA 0,CHORZ
17 06260 034441 LDA 3,P,C7
18 06261 103404 AND 3,0,SZR
19 06262 000773 JMP CHA,3
20 06263 040412 STA 0,CHORZ
21 06264 002410 JMP @CHRET
22
23 06265 054411 CRLF: STA 3,MESSR ;SAVE RETURN
24 06266 044745 STA 1,P,AC1
25 06267 050745 STA 2,P,AC2
26 06270 020434 LDA 0,P,C15
27 06271 004747 JSR CHAR ;PRINT CARRIAGE AND LF
28 06272 020431 LDA 0,P,C12
29 06273 000651 JMP P,LST
30
31 06274 000000 CHRET: 0
32 06275 000000 CHORZ: 0
33 06276 000000 MESSR: 0

```

```

A 0000 .MAIN
01 06277 054430 TYPE: STA 3,TYPRET ;TYPE THE C(0)R IF
02 06300 074477 READS 3 ;SWITCH 1(0).
03 06301 177122 ADDZL 3,3,SZC
04 06302 000404 JMP ,+4 ;INHIBIT TYPE EXIT,
05 06303 003511 SKPBZ TTO
06 06304 000777 JMP ,=-1
07 06305 001111 DQAS 0,TTO
08 06306 034731 LDA 3,P,377
09 06307 175220 MOVZR 3,3
10 06310 103400 AND 3,0
11 06311 110043 ADDC 0,3,SNC
12 06312 034414 LDA 3,P,C40
13 06313 102432 SUBZ# 3,0,SZC ;SKIP NON-PRINTING CHAR
14 06314 010701 ISZ CHORZ
15 06315 034407 LDA 3,P,C15
16 06316 110445 SUB# 0,3,SNR
17 06317 054756 STA 3,CHORZ ;CLR HORZ POS
18 06320 002407 JMP @TYPRET
19 06321 000007 P,C7: 7
20 06322 000011 P,C11: 11
21 06323 000012 P,C12: 12
22 06324 000015 P,C15: 15
23 06325 000240 P,240: 240
24 06326 000040 P,C40: 40
25 06327 000000 TYPRET: 0
26 06330 000000 PRGEND: 0 ;REST OF CORE IS BUFFER

```

```

A 0091 ,MAIN
01 06331 020772 TINC.1 LDA 0,P,C12
02 06332 004745 JSR TYPE
03 06333 010743 TINX.1 ISZ MESSR
04 06334 024677 TINR.1 LDA 1,P,AC1
05 06335 034675 LDA 3,ZSUPP
06 06336 175102 MOVL 3,3,SZC
07 06337 124400 NEG 1,1
08 06340 000006 JMP PEXIT*1
09
10 06341 102121 TIND.1 ADCZL 0,0,SKP /OCTAL ENTRY
11 06342 102440 TIND.1 SUBO 0,0 /DECIMAL ENTRY
12 06343 054733 STA 3,MESSR
13 06344 050070 STA 2,P,AC2 /AC2 IS SAVED
14 06345 030756 LDA 2,P,C12
15 06346 113000 ADD 0,2
16 06347 102440 SUBO 0,0
17 06350 040002 STA 0,ZSUPP /MINUS SIGN AND LEADING SPACES FLAG
18 06351 034001 TINS.1 LDA 3,ZSUPP
19 06352 175004 MOV 3,3,SZR
20 06353 000760 JMP TINX.
21 06354 054657 TINW.1 STA 3,P,AC1
22 06355 063610 SKPDN TTI
23 06356 000777 JMP -1
24 06357 000610 DIAC 0,TTI
25 06358 004600 JSR CHAR
26 06361 034745 LDA 3,P,C40
27 06362 116414 SUBW 0,3,SZR
28 06363 101015 MOVW 0,0,SNR
29 06364 000705 JMP TINS. /SPACE, TAB, OR NULL
30 06365 024432 LDA 1,TIN2.
31 06366 106015 ADCW 0,1,SNR /COMMA
32 06367 000744 JMP TINX.
33 06370 100424 SUBZ 0,1,SZR /MINUS
34 06371 000405 JMP TINW. /NO
35 06372 034640 LDA 3,ZSUPP
36 06373 177200 ADDR 3,3 /COMPLEMENT SIGN
37 06374 054636 STA 3,ZSUPP
38 06375 000760 JMP TINW.*1
39 06376 130415 TINW.1 SUBW 1,3,SNR /IS IT A CARRIAGE RETURN?
40 06377 000732 JMP TINC.
41 06400 024418 TINW.1 LDA 1,TIN1.
42 06401 107022 ADDZ 0,1,SZC /SKIP IF NOT A DIGIT
43 06402 146513 SUBLW 2,1,SNR /SKIP IF DIGIT
44 06403 000731 JMP TINW.
45 06404 010026 ISZ ZSUPP /OUT OF LEADING SPACES
46 06405 020026 LDA 0,P,AC1
47 06406 101120 MOVZL 0,0
48 06407 115120 MOVZL 0,3
49 06410 175120 MOVZL 3,3
50 06411 137000 ADD 1,3 /8 OLD P,AC1'S + NEW DIGIT
51 06412 140220 MOVZR 2,1
52 06413 125232 MOVZRW 1,1,SZC /SKIP IF OCTAL MODE
53 06414 117000 ADD 0,3 /ADD 2 OLD P,AC1'S
54 06415 000737 JMP TINW.
55 06416 177200 TIN1.1 -00
56 06417 000005 TIN2.1 S0

```

```

A 0092 ,MAIN
01 /PROCESSOR TIMER PACKAGE
02 /THIS PACKAGE IS CALLED WHENEVER IT IS NECESSARY TO
03 /IDENTIFY THE MEAN TIME BASE OF THE COMPUTER IN
04 /WHICH THE PROGRAM RESIDES. THE MEAN TIME BASE MAY
05 /THEN BE UTILIZED TO VERIFY OR CALCULATE THE RELATIONSHIPS
06 /OF OTHER PERIPHERAL FUNCTIONS.
07 /
08 /THE PACKAGE RETURNS TO THE CALL INSTRUCTION WITH
09 /THE CONTENTS OF AC1= TO A CALIBRATION COUNT
10 /THAT MAY BE INCREMENTED TO OVERFLOW IN 100 MILLI-
11 /SECONDS BY THE FOLLOWING DELAY LOOP.
12 /TYPE1: MOV 0,0
13 / INC 0,0,SZC /SKIP NOT OVERFLOW
14 / JMP 1,3 /EXIT LOOP
15 / 0 /ANY FLAVOR IO SKP
16 / JMP TYPE1
17 /
18 /THE CONTENTS OF AC2 WILL CONTAIN A SIMILAR 100 MS
19 /ITERATION COUNT BUT FOR THE FOLLOWING LOOP:
20 /TYPE2: NIO 0
21 / DIA 1,,DEV /GET DEVICE STATUS
22 / ANDW 2,1,SZR /ANY STATUS COMPARE
23 / JMP ,+4 /EXPECTED STATUS EXIT
24 / INC 0,0,SZR /SKIP OUT ON LOOP OFLOW
25 / JMP TYPE2
26 /
27 /THE VALUES RETURNED MAY BE ARITHMETICALLY
28 /PROCESSED (MULTIPLIED/DIVIDED) FOR LONGER OR
29 /SHORTER DELAYS AS LONG AS THE STANDARD LOOPS
30 /LISTED ABOVE ARE UTILIZED.
31 /
32 /IT IS RECOMMENDED THAT ALL TIMING FUNCTIONS
33 /BE PERFORMED WITHIN THE SAME GENERAL AREA OF
34 /MEMORY AS THIS TIMING PACKAGE.

```

```

A 0003 .MAIN
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
16 06420 054557 PTIME: STA 3,SVTIME
17 06421 063514 SKPBZ RTC      ]TEST FOR CAS/RTC
18 06422 000416 JMP SCORE      ]CAS RTC NONEXIS.
19 06423 060114 NIOS RTC      ]TURN CLOCK ON
20 06424 063514 SKPBZ RTC      ]BUSY #1 IS RTC
21 06425 000403 JMP ,+3
22 06426 060614 SKPDN RTC      ]DONE #0 NO RTC
23 06427 000411 JMP SCORE      ]AND DEV TTD IS USED
24 06430 002677 IORST
25 06431 102520 SUBZL 0,0      ]=10 HZ FOR RTC
26 06432 004473 JSR TYME
27 06433 061114 DUAS 0,RTC     ]PASSED TO "TYME"
28 06434 063514 SKPBZ RTC      ]FOR EXECUTION
29 06435 002542 JMP #SVTIME    ]AC1 AND AC2=LOOP COUNTS
30
31
32
33
34
35 06436 024540 .3DI: LDA 1,NUCAL
36 06437 001400 JMP 0,3

```

```

A 0004 .MAIN
01
02
03
04 06440 002677 SCORE: IORST
05 06441 102400 SUB 0,0        ]AC0=NULL CHARACTER
06 06442 004463 JSR TYME
07 06443 061111 DUAS 0,TTD     ]PASSED TO TYME
08 06444 063511 SKPBZ TTD     ]FOR EXECUTION
09 06445 006533 SCONA: JSR #TUMBLER ]OUT TEXT
10 06446 006610 SESOUT       ]ASKING FOR BAUD RATE
11
12
13
14
15
16 06447 006533 JSR #KEYS
17 06450 000775 JMP SCORA     ]INPUT ERROR
18 06451 044530 STA 1,LUCK   ]SAVE BAUD RATE
19 06452 030535 LDA 2,S,3D1  ]10
20
21 06453 151400 INC 2,2      ]ASSUME 11 BITS
22 06454 024521 LDA 1,ORDINAL ]COUNT FOR FULL CHAN
23 06455 102400 SUB 0,0
24 06456 006526 JSR #KEYS+2  ]CHAR TIME/#BITS
25 06457 101004 MOV 0,0,SZR  ]IF ANY REM.
26 06460 125400 INC 1,1      ]FUDGE BIT COUNT
27 06461 020520 LDA 0,LOCK
28 06462 044517 STA 1,LOCK   ]SAVE ITR COUNT 1 BIT
29 06463 131000 MOV 1,2
30 06464 105000 MOV 0,1      ]AC1 = BAUD RATE
31
32
33
34
35
36
37
38
39
40
41
42

```

```

]THERE IS NO RTC-UTILIZE DEVICE TTD AND ASK FOR
]BAUD RATE INPUT FROM OPERATOR
]THE FOLLOWING SERIES OF INSTRUCTIONS WILL
]CALCULATE THE ITERATION COUNT FOR
]1 BIT OF TTD OUTPUT AFTER RETRIEVING
]THE CONSOLE BAUD RATE FROM THE
]TEST OPERATOR---REQUIRES SUBROUTINE TIND
]ROUTINE ASSUMES AN 11 BIT CHARACTER
]COUNT FOR FULL CHAN
]CHAR TIME/#BITS
]IF ANY REM.
]FUDGE BIT COUNT
]SAVE ITR COUNT 1 BIT
]AC1 = BAUD RATE
]BAUD RATE TIMES COUNT FOR 1 BIT
]WILL EQUAL ITERATION COUNT FOR 1 SECOND
]MUL AC1*AC2
]SAVE DOUBLE LENGTH
]RESULT
]1 SECOND DIVIDED BY 10 = 100 MILLISECONDS
]10
]COUNT FOR 1 CHAR
]ORDINAL=100 MS TYPE 1
]CONTINUE CALCULATIONS NEXT PAGE

```

```

A 0095 ,MAIN
01
02
03
04 06475 020511 LDA 0,KX
05 06476 024507 LDA 1,KS
06 06477 006505 JSR @KEYS*2
07 06500 044505 STA 1,KS
08
09
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31

```

;1 SECOND COUNT/1 CHAR COUNT = # CHAR'S PER SEC
 ;THIS CALCULATION IS USED TO EXPAND THE TYPE 2 COUNT
 ;CALC RELATIONSHIP OF REM. TO 1 CHAR TO FILL SECOND
 ;AC1=FUDGE FACTOR 1 RELEATIONSHIP OF CHAR TO TOTAL 1 SEC
 ;FINISH CALCULATIONS ON LOOP TYPE 1 TO= 1SECOND
 ;WILL =
 ;PORTION OF CHAR
 ;TO COMPLETE 1 SECOND
 ;1 CHAR, TYPE 2 LOOP
 ;# CHARS IN 1 SEC
 ;* PORTION OF CHAR
 ;DOUBLE LENGTH AC0,AC1=1 SECOND FOR TYPE 2 LOOP
 ;DIVIDE BY 10 FOR 100 MS
 ;AC2=100MS LOOP2
 ;AC1 =100MS LOOP 1
 ;SVTIME

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A 0090 ,MAIN
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;THE FOLLOWING SUBROUTINE DETERMINES THE ITERATION
 ;COUNTS FOR THE DEVICE SPECIFIED BY THE INSTRUCTIONS
 ;FOLLOWING THE JSK CALL TO TYME
 ;DOAS 0,RTC OR DUAS 0,TTD
 ;SKPBZ RTC OR SKPBZ TTD
 ;TYPE1 LDA 1,1 ;SAVE INTR. LINK
 ;STA 1,RVTMP
 ;LDA 1,ENTYM
 ;STA 1,1 ;FOR LOOP 2 INTR.
 ;LDA 1,0,3 ;GET DOAS
 ;STA 1,TIMA
 ;STA 1,TIMB
 ;STA 1,TIMC ;FOR EXECUTE
 ;LDA 1,1,3 ;GET SKPBZ
 ;STA 1,TIMA+1
 ;STA 1,TIMB+4 ;FOR EXECUTE
 ;SUB 2,2
 ;SUB 1,1 ;CLR CTRS
 ;DOAS 0,RTC ;UR TTD
 ;SKPBZ RTC
 ;JMP ,-1 ;WAIT FOR DONE
 ;COM 1,1,SZR ;AND 2ND DONE
 ;JMP TIMA ;THEN START COUNTING
 ;DUAS 0,RTC ;THE THIRD DONE
 ;THE FOLLOWING COMPRISES LOUP TYPE 1
 ;MOV 0,0
 ;INC 1,1,SNR ;WATCH FOR OFLOW
 ;JMP ,+3
 ;SKPBZ RTC
 ;JMP TIMB+1
 ;LOOP TYPE 2 IS COUNTED UNTIL PI FROM DEVICE
 ;DOAS 0,RTC
 ;INTEN
 ;THE FOLLOWING INSTR. COMPRISE THE LOOP TYPE 2
 ;NID 0 ;AND IT ITERATES UNTIL
 ;DIA 0,0 ;INTERRUPTED BY PI
 ;ADC 0,0,SNR
 ;HALT ;FILL INSTR.
 ;INC 2,2,SZR ;LOOP CTR
 ;JMP TIMC+2
 ;HALT ;DEVICE OR PI FAILED
 ;,+1 ;TO HERE WHEN PI
 ;STA 1,ORDINAL ;SAVE LOOP 1
 ;STA 2,NUCAL ;AND LOOP 2
 ;LDA 0,RVTMP
 ;STA 0,1 ;RESTORE INTR. LINK
 ;JMP 2,3 ;RETURN TO CALL

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A 0097 .MAIN
01      I
02      ICONSTANTS SUBR. LINKS AND TEMP STORES
03 00574 000000 RVTMP: 0
04 00575 000000 ORDINAL: 0
05 00576 000000 NUCAL: 0
06 00577 000000 SVTIME: 0
07 00600 000125 TUMBLER: MESS
08 00601 000000 LUCK: 0
09 00602 000342 KEYS: TIND
10 00603 000076 MULTA
11 00604 000066 DIVDD
12 00605 000000 KS: 0
13 00606 000000 KN: 0
14 00607 000012 S,JD1: 10.
15      SESOUT: .TXTE |<15><12><12>
16 00610 005215
00611 152012 TTD BAUD RATE ?= |
00612 147724
00613 041240
00614 052501
00615 120104
00616 040722
00617 142724
00620 037040
00621 120275
00622 000000

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A 0098 .MAIN
01
02      000203      .LUC I,LD*1
03      .TYPE 0 FOR CARTRIDGE
04      MSG1:      .TXTE |TYPE 0 FOR CARTRIDGE|
00203 054724
00204 142520
00205 030011
00206 143240
00207 151317
00270 141040
00271 151101
00272 151324
00273 040311
00274 142507
00275 000000
05      )          1 FOR 10 SURFACE DISK PACK
06      MSG2:      .TXTE | 1 FOR 10 SURFACE DISK PACK|
00276 130411
00277 143240
00300 151317
00301 130040
00302 120000
00303 052523
00304 143322
00305 141501
00306 120305
00307 144504
00310 045523
00311 050240
00312 141501
00313 000113
07      )          2 FOR 20 SURFACE DISK PACK
08      MSG3:      .TXTE | 2 FOR 20 SURFACE DISK PACK|
00314 151011
00315 143240
00316 151317
00317 131240
00320 120000
00321 052523
00322 143322
00323 141501
00324 120305
00325 144504
00326 045523
00327 050240
00330 141501
00331 000113
09      ) -?-
10      MSG4:      .TXTE | -?-|
00332 026640
00333 026477
00334 000000
11      )TYPE UNIT NUMBERS (0-3) TO TEST
12      MSG5:      .TXTE |TYPE UNIT NUMBERS (0-3) TO TEST|
00335 054724
00336 142520
00337 052040
00340 144510
00341 120324

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0099 .MAIN
00342 052516
00343 041115
00344 151305
00345 120123
00346 030000
00347 031405
00350 120251
00351 147724
00352 152240
00354 051705
00354 000324

01 /PASS
02 MSG01 .TXTE IPASS!
00355 040520
00356 051523
00357 000000

03
04 .TXT /COPYRIGHT (C) DGC,1971,72,73,74

00360 047503
00361 054520
00362 044522
00363 044107
00364 020124
00365 041450
00366 020051
00367 043504
00370 020103
00371 034401
00372 030407
00373 033454
00374 020002
00375 031407
00376 033454

05 00377 040404 ALL RIGHTS RESERVED/
00400 040114
00401 051040
00402 043511
00403 052110
00404 020123
00405 042522
00406 042523
00407 053122
00410 042105
00411 000000

06
07
08 006630 .LOC SESOUT*20
09 .TXTE IDKP DIAG 71

00630 045504
00631 120120
00632 144504
00633 043501
00634 133040
00635 000000

10 00636 000002
11 00637 000222 BEGIN
12 00640 000001
13 00641 000000
14 00642 000020

0100 .MAIN
01 00043 000000 000000
02 00044 000000 000000
03 00045 100033 100033
04
05 .END

0101 .MAIN

A0	000512	9/10	9/14	68/16					
A1	000534	10/02							
A10	000611	11/10							
A11	000620	11/10							
A12	000627	11/20							
A13	000637	11/30							
A14.2	000651	12/06	12/15						
A2	000540	10/07							
A3	000544	10/12							
A30.4	000665	12/21	12/30						
A4	000550	10/17							
A46.6	000701	13/06	13/15						
A5	000554	10/22							
A6	000561	10/28							
A62.7	000715	13/21	13/30						
A7	000566	10/34							
A78	000727	14/02							
A79	000740	14/12							
A8	000573	10/40							
A80	000750	14/21							
A81	000763	15/02							
A82	000776	15/14							
A83	001011	15/26							
A84	001024	15/30							
A85	001037	16/02							
A86	001052	16/14							
A87	001065	16/26							
A9	000602	11/02							
ADR	004231	57/27	58/20	58/40					
ADR1	004344	59/03	60/03	60/42					
ALT0	005225	47/09	74/15						
ALT1	005223	46/37	74/12						
AUTOE	006037	85/13	85/40						
A.	000510	9/06	9/11						
B1	001100	16/30							
B10	001217	18/22							
B11	001233	18/35							
B12	001247	19/02							
B13	001263	19/15							
B14	001274	19/25							
B15	001305	19/35							
B16	001316	20/02							
B17	001327	20/12							
B18	001346	20/14	20/28						
B19	001360	20/31	21/01						
B1.1	001104	16/39	16/42	16/47	16/40	16/55			
B1.2	001111	16/47	16/54						
B2	001122	16/51	17/02						
B20	001400	21/04	21/18						
B21	001426	21/21	21/35						
B22	001442	21/41	21/49						
B23	001454	21/52	22/02						
B24	001466	22/05	22/13						
B25	001500	22/16	22/24						
B26	001516	22/30	22/40						
B27	001532	22/43	23/02						
B28	001540	23/05	23/15						
B29	001562	23/18	23/28						
B3	001130	17/09							

0102 .MAIN

B30	001575	23/30	23/40						
B31	001611	23/43	24/02						
B32	001625	24/05	24/15						
B35	001641	24/18	24/28						
B36	001647	24/35							
B37	001655	25/02							
B38	001663	25/09							
B39	001671	25/16							
B4	001137	17/17							
B40	001701	25/18	25/25						
B41	001712	25/28	25/35						
B42	001723	25/36	26/02						
B43	001734	26/05	26/12						
B44	001747	26/24							
B45	001762	26/36							
B46	001774	26/47							
B47	002006	27/02							
B48	002021	27/14							
B49	002032	27/24							
B5	001146	17/25							
B50	002044	27/35							
B51	002056	28/02							
B52	002072	28/15							
B53	002103	28/04	28/26						
B54	002120	28/40							
B55	002131	28/29	29/02						
B56	002146	29/16							
B57	002157	29/05	29/26						
B58	002174	29/40							
B6	001154	17/32							
B7	001165	17/42							
B8	001175	18/02							
B9	001205	18/11							
BEGIN	000222	7/35	99/11						
B1T1	000134	6/16	14/23	15/40					
B1T2	000135	6/17	15/04	16/04					
B1T4	000136	6/18	15/16	16/16					
B1T8	000137	6/19	15/28	16/28					
BUFF	000160	6/3/	30/05	30/24	37/03	37/16	37/32	38/03	38/10
		38/36	38/47	39/03	39/22	39/41	40/03	40/25	41/03
		41/11	41/33	42/10	64/34	64/49	67/03		
C017	000132	6/13	35/21						
C037	000133	6/14	35/37	39/14	39/33	40/17	40/40		
C1000	000070	7/33	17/03	17/10	17/18	17/43	18/03	18/12	18/25
		18/38	19/05	78/17					
C11	000171	7/05	40/07						
C12	000172	7/06	86/35						
C120	000203	7/15							
C137	000204	7/16	54/03	55/03					
C1400	000215	7/2/	79/12						
C140K	000056	7/31	19/03	78/09	79/10				
C15	000173	7/07	22/25	76/16	79/15				
C157	000205	7/17	52/50	53/28					
C16	000174	7/08	39/25	39/44					
C17	000121	6/04	32/21	37/06	37/19	37/35	38/06	38/22	38/39
		39/00	43/04	43/20	43/37	44/04	52/27	53/04	57/04
		58/04							
C174K	000221	7/32	78/27						
C177	000124	6/07	33/21	75/29	76/14				

0103 MAIN

C1774	000213	7/23	59/11	60/11	83/12				
C1777	000127	6/10	34/21						
C2	000011	4/12	63/47						
C204	000217	7/29	43/47						
C2525	000146	6/21	16/46	30/26	74/12				
C277	000206	7/18	54/05	55/05					
C3	000117	6/02	25/11	31/37	40/09	74/06	75/36	76/24	
C30	000175	7/09	24/37						
C312	000207	7/19	50/22	50/50	51/02	51/30	64/84	64/13	65/10
C317	000216	7/20	52/52	53/30					
C33	000170	7/10	7/36	77/06					
C36	000177	7/11	01/31						
C3600	000216	7/20	17/27	17/37	10/16	10/20	10/41	19/08	
C37	000122	6/05	32/37						
C377	000125	6/08	33/37	65/11	73/25	74/27			
C3777	000130	6/11	34/37						
C4	000160	7/02	66/34	74/09					
C402	000211	7/21	30/48						
C420	000212	7/22	40/19						
C5	000167	7/03	21/36	26/17	26/29	73/31	81/52	82/07	
C500	000577	64/16	64/54	65/24					
C5252	000141	6/22	74/15						
C6	000176	7/04	64/21						
C60	000200	7/12	75/31	76/19					
C63	000201	7/13	75/32	76/20					
C7	000120	6/03	32/05						
C70	000202	7/14	44/12						
C74K	000220	7/30	20/22	20/39	21/12	21/20	20/19	73/36	
C77	000123	6/06	16/49	33/05					
C777	000120	6/09	34/05	71/27					
C7777	000131	6/12	35/05						
C8NT	000000	64/17	64/55	65/16	65/25				
C8SK	000154	6/33	16/52	27/00	77/08	77/17			
C8AK	000246	85/36	87/38	87/41	88/31	89/01	89/27	91/25	
C8AR1	000256	89/04							
C8A,3	000255	89/11	89/14	89/19					
C8ECK	000260	8/33	45/24	45/52	46/24	46/52	47/24	48/28	62/36
		63/36	60/46						
C80KZ	000275	89/10	89/20	89/32	90/14	90/17			
C8RET	000274	89/01	89/13	89/21	89/31				
C8S	000744	84/07	84/16						
C8S1	000757	84/19	84/20						
C8R	000365	76/10	76/37						
C8L+	000265	8/17	89/23						
C8R	000107	70/11	70/22	70/26					
C8C1	000735	84/00	84/30						
C8CTS	000732	83/23	84/05						
C8L	000155	6/34	64/33	64/48	73/27	74/16	74/20		
C8L^	000231	50/12	64/00	74/20					
C8L^C	000227	51/13	74/10						
D1	000205	29/29	30/02	65/45					
D10	0002417	33/10							
D11	0002436	33/34							
D12	0002455	34/02							
D13	0002474	34/10							
D14	0002513	34/34							
D15	0002536	35/02							
D16	0002551	35/10							
D17	0002570	35/34							

0104 MAIN

D10	000207	36/02							
D19	000205	36/16							
D2	000224	30/21							
D20	0002044	37/02							
D21	0002050	37/15							
D22	0002077	37/31							
D23	0002717	38/02							
D24	0002730	38/10							
D25	0002750	38/35							
D26	0003000	39/00							
D27	0003020	39/21							
D28	0003044	39/40							
D29	0003063	40/02							
D3	0002240	31/02							
D30	0003110	40/24							
D31	0003135	41/02							
D32	0003157	41/21							
D32A	0003210	41/45	42/02						
D32B	0003220	42/10	42/22						
D32C	0003244	42/05	42/24						
D33	0003245	43/00							
D34	0003264	43/10							
D35	0003304	43/35							
D36	0003324	44/02							
D37	0003342	44/17							
D4	0002265	31/10							
D5	0002304	31/34							
D6	0002323	32/02							
D7	0002342	32/10							
D8	0002361	32/34							
D9	0002400	33/02							
DAD1	0003211	41/23	41/40						
DAL4	0003214	41/40	41/51	42/17					
DECCUC	000107	80/13	80/30	80/34	80/42				
DECLT	000170	80/20	80/25						
DECP	0002004	80/21	80/20						
DELTB	000223	80/07	80/42						
DEXT	000073	86/00	86/17						
DIVL	000061	83/30	86/07						
DIVUC	000055	86/04	97/11						
DIVIC	000055	86/03							
DLDDUP	000004	86/10	86/15						
DUMK	000253	6/55	62/02	62/07	63/02	63/07	64/06		
DUSEK	000201	6/54	45/03	45/31	46/03	46/31	47/03	48/05	50/07
		50/34	51/00	51/35	52/30	53/07	54/13	55/13	57/07
		58/07	59/15	60/15	61/03	61/16	61/20	64/22	64/39
		80/10							
DFIL	000102	6/30	77/13						
DWME	000550	60/09	80/40	80/40					
USWT	000555	62/30	84/30	85/07					
DTYME	000150	6/20	9/07	9/12	40/06	40/36	41/22	42/03	44/17
		52/40	53/27	54/02	55/00	57/26	58/27	59/02	60/02
		60/17	75/40						
E1	0003302	44/19	45/02						
E10	0003700	51/30	51/54						
E10E	0003721	51/30	51/43	51/49					
E10.1	0003704	51/31	51/30	51/45	51/54	51/52			
E10.2	0003710	51/40	51/44						
E11	0003733	52/29	52/54						

0105 .MAIN

E11E	003750	52/33	52/42						
E11.1	003745	52/28	52/30	52/45	52/48				
E12	003770	53/06	53/32						
E12E	004000	53/10	53/15	53/20					
E12.1	003776	53/12	53/17						
E12.2	003777	53/00	53/13	53/23	53/26				
E13	004034	54/12	54/34						
E13E	004051	54/16	54/25						
E13.1	004046	54/06	54/22	54/29	54/32				
E14	004074	55/12	55/36						
E14E	004113	55/16	55/21	55/27					
E14.1	004102	55/18	55/24						
E14.2	004103	55/06	55/19	55/31	55/34				
E15	004130	57/06	57/35						
E15E	004145	57/10	57/19						
E15.1	004142	57/05	57/16	57/22	57/25				
E16	004171	58/05	58/30						
E16E	004207	58/10	58/15	58/20					
E16.1	004177	58/12	58/17						
E16.2	004200	58/05	58/13	58/23	58/26				
E17	004250	59/14	59/36						
E17E	004265	59/18	59/27						
E17.1	004262	59/10	59/24	59/31	59/34				
E18	004312	60/14	60/38						
E18E	004331	60/18	60/23	60/29					
E18.1	004320	60/20	60/26						
E18.2	004321	60/10	60/21	60/33	60/36				
E19	004347	60/39	61/02						
E1E	003410	45/06	45/16	45/22	45/28				
E2	003411	45/30							
E20	004302	61/15							
E21	004375	61/20							
E22	004410	62/02							
E22E	004447	62/18	62/24	62/34	62/40				
E23	004450	63/02							
E23E	004507	63/22	63/28	63/34	63/40				
E24	004520	63/43	64/01						
E24E	004606	64/51	65/06						
E24R	004602	64/25	64/31	64/38	64/42	64/47	64/53	65/02	
E24X	004641	65/20	65/33	65/43					
E24Y	004660	65/37	65/48	65/55					
E25	004676	66/16	67/36						
E25D	005004	66/13	66/30	66/36	67/05	67/28	67/32	67/38	
E25E1	004741	66/40	66/52						
E25E2	004770	67/15	67/17	67/20	67/24				
E25H	005011	66/25	66/37	67/04	67/43				
E25L	004771	66/20	66/53	67/27					
E25M	005003	66/15	66/26	67/33	67/35	67/37			
E25T	005005	66/18	67/30						
E2E	003437	45/34	45/44	45/50	45/56				
E3	003440	46/02							
E3E	003466	46/06	46/16	46/22	46/28				
E4	003467	46/30							
E4E	003515	46/34	46/44	46/50	46/56				
E5	003516	47/02							
E5E	003544	47/06	47/16	47/22	47/28				
E6	003547	48/04							
E6E	003577	48/08	48/20	48/26	48/32				
E7	003602	50/04	50/24						

0106 .MAIN

E7E	003617	50/10	50/19						
E7.1	003604	50/03	50/08	50/20	50/21				
E8	003627	50/31	50/52						
E8E	003645	50/37	50/42	50/47					
E8.1	003631	50/30	50/35	50/44	50/48	50/49			
E8.2	003635	50/39	50/43						
E9	003655	51/04	51/25						
E9E	003672	51/11	51/20						
E9.1	003657	51/05	51/09	51/21	51/23				
EGGS	000046	4/15	4/16	7/35	9/04	77/25	85/42	85/51	
ENTYM	006566	96/10	96/44						
LUCNT	003215	41/52	42/07	42/21					
EPRIN	006015	85/18	85/22	85/49					
ERET	006012	85/10	85/17	85/19					
ERR1	006003	85/11							
ERRCT	005647	82/20	82/26	83/35	84/04	85/19			
ESWIT	005646	82/19	82/25	83/26	84/05	85/08	85/14	85/20	
E.DU	005553	80/22	80/32	80/38	80/44				
FIRST	005434	77/09	77/31						
FOUR	005221	62/09	63/09	63/15	74/09				
GADSK	006236	8/47	26/37	26/48	27/03	27/15	27/27	27/39	
GENDA	006255	8/50	45/08	45/36	46/08	46/36	47/00	48/12	80/11
		51/12	52/34	54/17	57/11	59/19	62/26	63/14	80/24
GENRE	005146	70/09	70/14	70/15	70/19	70/24	70/25	70/34	70/37
		70/43	71/20	71/20	71/20	71/29	71/32	71/36	71/40
		72/21	72/30	72/31	72/33	73/20	73/21	73/35	73/38
		73/39							
GU	004540	64/21	65/17	65/26					
GRAN	004611	65/09	65/14						
HON	005246	57/12	74/35						
HDNC	005244	59/20	74/33						
HEAD	000156	6/35	57/03	57/21	58/03	58/16	58/22	59/13	59/29
		60/13	60/24	60/31	74/33	74/35			
HEAD	000035	85/27	85/38						
ICMAR	000033	83/42	85/36						
ICMK	000200	8/20	8/53						
ICRLF	000247	8/17	8/39						
IDOS	000251	8/27	8/54						
IWEN	000255	8/23	8/50						
IMESS	000250	8/18	8/38						
INIT	000251	4/05	8/49	9/09	63/46				
IPDEC	000034	83/40	85/37						
IRAN	000254	8/22	65/09						
IRDSK	000010	4/09	4/11						
IREAD	000256	8/24	8/51						
IRET	005571	4/04	81/17						
ISJJ	000244	4/07	7/39	8/14					
IS7J	000245	4/08	7/38	8/15					
ISET	000237	8/09	14/03	14/12	20/15	20/32	21/05	21/22	21/42
		21/53	22/06	22/17	22/31	22/44	23/06	23/19	23/31
		23/44	24/06	24/19	25/19	25/29	25/39	26/00	45/02
		45/30	46/02	46/30	47/02	48/04	50/04	50/31	51/04
		51/32	52/29	53/06	54/12	55/12	57/06	58/06	59/14
		60/14	62/12	63/12	80/18				
ITR	005644	82/11	82/23	83/24	83/30	83/38			
ITRCN	000164	6/41	78/25	78/35	86/36	86/44			
ITRCT	005645	82/17	82/24	83/22	83/25				
ITRWT	000235	8/46	25/21	25/31	25/41	26/08	27/06	27/19	27/30
		27/42	37/11	71/31	72/32				

0109 .MAIN	
RANSK	004513 4/11 63/44
RCLRE	005514 79/14 79/17 79/18
READ	006256 8/51 45/18 45/46 46/18 46/46 47/18 48/22 50/38
	51/39 53/11 55/17 58/11 60/19 62/14 62/38 63/24
	63/36 64/27 64/43 68/34
RECL0	006231 4/57 8/42 9/16 28/16 21/43 22/32 23/32 25/28
	61/13 61/26 61/39 65/85
RECL1	006232 4/58 8/43 9/22 28/33 21/54 22/45 23/45 25/38
RECL2	006233 4/59 8/44 9/28 21/86 22/87 23/87 24/87 25/48
RECL3	006234 5/01 8/45 9/34 21/23 22/18 23/28 24/28 26/87
	84/25
RELRA	000143 8/24 48/83 48/10
RVTMP	005574 96/89 96/47 97/83
SAV0	005653 82/13 82/38 83/84 84/88 85/23 85/33
SAV1	005652 82/14 82/29 83/87 84/89 85/24 85/34
SAV2	005651 82/15 82/28 83/86 84/90 85/22 85/35
SCDMA	000445 94/89 94/17
SCDME	000446 93/18 93/23 94/84
SECT	000157 8/36 52/26 52/44 53/83 53/16 53/22 54/11 54/27
	55/11 55/22 55/29 74/38 74/48
SECTN	005252 52/35 74/48
SEEL	006246 8/48 26/38 26/49 27/84 27/16 27/28 27/48 28/87
	28/17 28/32 28/42 29/88 29/18 29/32 29/42
SESQU	005618 94/18 97/15 99/88
SETNC	005258 54/18 74/38
SKITR	004681 64/56 65/27
SKRET	005621 81/39 81/54 81/55 81/56
SSENY	004657 63/48 65/21 65/28 65/47
SSEK	006238 8/41 19/17 19/27 19/37 20/84
SSKFL	004656 63/42 63/45 65/18 65/46
STALL	000165 6/42 38/89 38/31 31/89 31/25 31/41 32/89 32/25
	32/41 33/89 33/25 33/41 34/89 34/25 34/41 35/89
	35/25 35/41 36/89 36/25 84/13
START	000588 4/18 9/83 77/29 77/31
SVTIM	005577 93/16 93/29 95/31 97/86
SJDI	006607 94/19 94/38 95/26 97/14
TEMP	000144 8/25 12/85 12/87 12/13 12/26 12/22 12/28 13/85
	13/87 13/13 13/28 13/22 13/28 78/26 78/38
TESTU	000152 6/31 26/13 28/25 38/83 38/22 31/83 31/19 31/35
	32/83 32/19 32/35 33/83 33/19 33/35 34/83 34/19
	34/35 35/83 35/19 35/35 36/83 36/19 37/85 37/18
	37/34 38/85 38/21 38/38 39/85 39/24 39/43 40/85
	40/27 41/85 41/38 42/88 43/83 43/19 43/36 44/83
	44/21 65/33 65/38 65/56 71/23 72/24 73/22 76/28
THREE	005217 62/84 62/27 63/84 74/86
TIMA	005542 96/13 96/17 96/21 96/25
TIMB	005547 96/14 96/18 96/26 96/32
TIMC	005555 96/15 96/34 96/42
TIME	000145 6/26 75/85 75/12 78/28 86/37
TIME1	000146 6/27 75/18 81/86
TIN1.	000416 91/41 91/55
TIN2.	000417 91/38 91/56
TINC.	000331 91/81 91/48
TIND	000342 91/11 97/89
TINN.	000376 91/34 91/39
TINN.	000488 91/41
TINO	000341 91/18
TINK.	000334 91/84 91/44
TINS.	000351 91/18 91/29

0110 .MAIN	
TINN.	000354 91/21 91/38 91/54
TINX.	000333 91/83 91/28 91/32
TKCL	000114 4/57 8/11 61/24 61/37 65/83 84/23
TS	000887 4/88 4/18
TUMBL	000688 94/89 97/87
TYPE	000525 93/26 94/86 96/88
TYPE	006277 89/12 89/15 90/81 91/82
TYPRE	006327 90/81 90/18 98/25
UNTD1	000657 4/26 8/48 8/49 76/26
UNUM	000153 6/32 8/18 81/23 81/38 85/82 85/35 85/39 85/87
	76/29
WAIT	006227 8/48 21/37 22/26 26/18 26/38 37/25 37/41 38/12
	38/28 38/45 39/12 39/31 39/58 48/15 48/32 41/18
	41/38 42/15 43/12 43/28 43/45 44/11 44/29 66/35
	66/45 67/12 73/32 79/16 81/53
WHITE	006257 8/52 45/12 45/48 46/12 46/48 47/12 48/18 58/14
	51/15 52/37 54/28 57/14 59/22 62/28 63/18 88/28
WTD	005474 78/32 78/37
Z81	000112 4/55
Z810	000181 4/46
Z811	000188 4/45
Z812	000077 4/44
Z813	000076 4/43
Z814	000875 4/42
Z82	000111 4/54
Z83	000118 4/53
Z84	000187 4/52
Z85	000186 4/51
Z86	000185 4/50
Z87	000184 4/49
Z88	000183 4/48
Z89	000182 4/47
Z8RDS	005215 45/88 74/83
ZOCT	005153 88/81
ZSUPP	006232 88/11 88/18 88/28 88/51 91/85 91/17 91/18 91/35
	91/37 91/45
.JDI	006436 93/35
.AA01	006053 85/41 85/45 85/52
.AA03	006054 85/48 85/48 85/53
.ADSK	005573 8/88 81/27
.CHE1	005075 78/18 78/23
.CHEC	005066 8/28 78/89
.CL	004526 64/82 64/87 64/11 64/12 64/15
.DLY	006111 84/28 84/31 84/35 84/36 86/35
.DLY1	006113 86/37 86/43 86/45
.DM	005213 73/33 73/42
.DU	005527 88/11 88/28
.DU1	005533 88/13 88/25
.DU2	005537 88/15 88/36
.DU3	005544 88/18 88/36
.DORR	005515 8/21 88/89
.DOSE	005166 8/27 73/28
.EM1	005772 8/28 85/82
.EM2	005777 85/84 85/87
.EMAL	005775 8/12 85/85
.GEN	005118 8/23 78/34
.GEN1	005113 78/37 78/42
.INI	005255 8/19 75/84 75/88
.INI1	005277 75/23 76/46

0111 .MAIN									
.IN12	005326	76/04	76/51						
.IN13	005332	76/09	76/35						
.INNE	005371	75/04	76/40	76/41					
.INT	005557	8/07	81/06	81/12					
.LOOP	005606	8/13	83/05						
.LDP1	005700	82/21	83/10	83/18	83/21				
.LDPX	005707	83/28	84/12						
.LUPD	005656	8/28	83/02						
.RCL0	005477	8/05	79/05						
.RCL1	005501	8/04	79/07						
.RCL2	005503	8/05	79/09						
.RCL3	005504	8/06	79/06	79/08	79/10				
.READ	005150	8/24	72/21						
.RTNN	005650	82/27	83/02	83/05	83/28	85/02	85/05	85/11	85/20
		85/21	85/28	85/46					
.S33	005402	8/14	77/04						
.S73	005403	8/15	77/05						
.SCYL	004542	64/03	64/23	65/08					
.SET	005622	8/09	77/32	82/02					
.SETP	005625	8/10	82/06						
.SETU	005630	8/11	82/04	82/08	82/10				
.SK	005601	8/16	81/39						
.SK1	005610	81/43	81/47						
.SN0	005410	77/10	77/24						
.SN1	005423	77/15	77/21						
.SSEK	005445	8/02	78/09	78/15	78/19				
.STL	005436	6/42	77/36						
.STLR	005444	77/30	77/41	77/42					
.TU	008053	4/22	4/40	7/31	65/50	76/27			
.UD01	005050	69/06	69/14	69/28					
.UD02	005051	69/05	69/13	69/29					
.UD03	005052	69/04	69/15	69/30					
.UD10	005053	69/18	69/21	69/31					
.UD20	005054	69/09	69/32						
.UD21	005055	69/17	69/33						
.UD50	005045	69/08	69/17						
.WAIT	005460	8/01	78/25						
.WM	005147	71/33	71/41						
.WR1	005140	71/33	72/34						
.WRIT	005123	8/25	71/20						
.WTL.	005463	78/28	78/34	78/36					





DTOS 8.00

TEXT LISTING

068-000171-09

PROGRAM

MOVING HEAD DISK RELIABILITY
PROGRAM

TEXT TAPE

097-000171-09

ABSTRACT

THE MOVING HEAD DISK RELIABILITY PROGRAM IS A MAINTENANCE PROGRAM DESIGNED TO EXERCISE AND TEST THE 4046 DISK CONTROLLER AND 1-4 DISK DRIVES. THE DISK DRIVES MAY BE SHARED BETWEEN TWO COMPUTERS IN WHICH CASE THIS PROGRAM MAY BE RUNNING IN EACH COMPUTER.




```

0001 .MAIN      MACRO REV 06.30      09:29:32 02/16/79
01
02
03
04
05
06
07
08 ;*****
09 ; NAME: MHDR.TX          PART NUMBER: 097-000171
10 ;
11 ;
12 ; DESCRIPTION: MOVING HEAD DISK RELIABILITY PROGRAM
13 ;
14 ;
15 ; REVISION HISTORY:
16 ;
17 ;     REV.      DATE
18 ;
19 ;     00      10/28/71
20 ;     01      01/14/72
21 ;     02      04/25/72
22 ;     03      11/20/72
23 ;     04      02/08/73
24 ;     05      12/12/73
25 ;     06      04/26/74
26 ;     07      02/14/75
27 ;     08      XX/XX/XX
28 ;     09      04/23/76
29 ;
30 ;
31 ; COPYRIGHT © DATA GENERAL CORPORATION, 1971,72,73,74,75,76
32 ; ALL RIGHTS RESERVED.
33 ;*****

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10002 .MAIN
01
02 ; MOVING HEAD DISK RELIABILITY PROGRAM
03
04 ;***** AUTO-RUN AUTO-LOAD MODIFIED 4/7/72
05
06 ;1. ABSTRACT
07
08 ; THE MOVING HEAD DISK RELIABILITY PROGRAM
09 ; IS A MAINTENANCE PROGRAM DESIGNED TO
10 ; EXERCISE AND TEST THE 4046 DISK CONTROLLER
11 ; AND 1-4 DISK DRIVES. THE DISK DRIVES MAY BE
12 ; SHARED BETWEEN TWO COMPUTERS IN WHICH CASE
13 ; THIS PROGRAM MAY BE RUNNING IN EACH COMPUTER.
14
15 ; NOTE
16 ; ****
17 ; ONE COMPUTER RUNNING RELIABILITY
18 ; TEST (SA 501), THE OTHER (SA 502)
19 ; ONLY!!!
20
21 ; THE CONTROL CAN BE DEVICE 33 OR 73.
22
23 ;2. MACHINE REQUIREMENTS
24
25 ; NOVA(EXCEPT MICRO)OR ECLIPSE FAMILY CENTRAL PROCESSOR
26 ; 4K READ/WRITE MEMORY
27 ; TELETYPE
28 ; 4046 DISK CONTROL
29 ; 4047 OR 4048 CONTROL ADAPTER
30 ; 1-4 MOVING HEAD DISK DRIVES
31
32 ;3. OPERATING PROCEDURES
33
34 ; A. VERIFY DRIVE (DRIVES) ARE READY ON-LINE
35 ; B. LOAD PROGRAM USING BINARY LOADER OR DIAGNOSTIC
36 ; OPERATING SYSTEM.
37 ; C. RESET AND START AT ONE OF THE
38 ; ADDRESSES SHOWN BELOW IF LOADED WITH BINARY LOADER.
39 ; D. IF LOADED BY DIAGNOSTIC OPERATING SYSTEM,
40 ; RELIABILITY(BELOW) WILL BE STARTED.
41
42
43 ; STARTING ADDRESS
44 ; 2 RUN ALL
45 ; 4 CHANGE DISK CONTROL ADDRESS
46 ; 200 RELIABILITY TEST, ALL CYLINDERS(DTOS START)
47 ; 501 RELIABILITY TEST, EVEN CYLINDERS
48 ; 502 RELIABILITY TEST, ODD CYLINDERS
49 ; 503 DISK ADDRESS TEST
50 ; 504 CORE DUMP ROUTINE
51 ; 505 COMMAND STRING INTERPRETER
52 ; 506 ONES TEST
53 ; 507 ZEROS TEST
54 ; 510 110110110 TEST
55 ; 511 FLOATING ONE TEST
56 ; 512 FLOATING ZERO TEST
57 ; 513 RUN ALL
58 ; 514 SEEK EXERCISER
59

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10003 .MAIN
01 ; E. ERRORS - ERROR STATUS IS PRINTED
02 ; WHENEVER ENCOUNTERED. WHEN DATA ERRORS
03 ; ARE FOUND ONLY THREE ARE PRINTED PER
04 ; ENCOUNTER. (SEE PARAGRAPH 5)
05 ;
06 ; SWITCH SETTINGS
07 ; SW1=0 FROM ERROR, DO SCOPE LOOP
08 ; SW1=1 FROM ERROR, GO TO NEXT TEST
09 ; SW2=1 INHIBIT TTY OUTPUT
10 ; SW5=1 OUTPUT TO LPT
11 ; SW6=1 HALT AFTER ERROR
12 ; SW7=1 INHIBIT CHECK WORD AND DATA ERROR MESSAGES
13 ; SW8=1 BREAK TO ALLOW DISK INTERCHANGE
14 ; SW9=1 FOR READ ONLY MODE
15 ;
16 ; F. STATISTICS - TYPE ANY KEY DURING
17 ; RANDOM TESTING TO GET A REPORT OF THE
18 ; NUMBER OF WORDS WRITTEN AND READ, PLUS
19 ; THE NUMBER OF ERRORS.
20 ; **** NOTE ****
21 ; THE PROGRAM WILL ACCOUNT FOR UP TO A MAX.
22 ; OF 2*31 WORDS WRITTEN OR READ. SPECIAL
23 ; TEST RUNS EXCEEDING THIS FACILITY WILL
24 ; REQUIRE AN OPERATOR'S TEST LOG TO AUGMENT
25 ; SOFTWARE ACCOUNTING.
26 ;
27 ;3.1 PROGRAM RUNTIME
28 ;
29 ; PROGRAM RUNTIMES ARE SUBSTANTIALLY REDUCED WITH
30 ; MEMORIES OF 8K OR LARGER. RUNTIMES BELOW ARE FOR
31 ; AN 8K CORE MEMORY.
32 ;
33 ; RUNTIME IS DEFINED AS TIME FROM
34 ; START TO A "PASS" MESSAGE. TYPICAL
35 ; RUNTIMES ARE LISTED AS FOLLOWS:
36 ; RUNALL (SA 2): APPROX. 27 MIN.
37 ; (NOVA 800, CORE, & 2 SURFACE DISK)
38 ; SEEKEXERCISER (SA 514): APPROX. 5 MIN.
39 ; (NOVA 800, CORE, & 2 SURFACE DISK)
40 ;
41 ;3.2 BAUD RATE
42 ;
43 ; READ, WRITE AND SEEK OPERATIONS ARE TIMED
44 ; BY SPECIAL ROUTINES. WHEN THE PROGRAM IS
45 ; FIRST STARTED, THE TIMING ROUTINE WILL TEST
46 ; FOR THE PRESENCE OF A REAL TIME CLOCK (RTC)
47 ; TO DERIVE TIMING FROM IT. IF NO RTC IS
48 ; PRESENT, THE PROGRAM WILL TYPE "TTO BAUD
49 ; RATE". THIS MESSAGE REFERS TO THE BAUD RATE
50 ; OF THE CONSOLE TERMINAL (DEVICE 10 & 11).
51 ; TYPE IN THE BAUD RATE. IF A TYPING ERROR OCCURS
52 ; IN THE NUMBER STRING (BEFORE THE CARRIAGE RETURN),
53 ; SIMPLY TYPE A NON-NUMERIC CHARACTER AND
54 ; THE REQUEST FOR THE BAUD RATE WILL BE
55 ; REPEATED. IF THE CARRIAGE RETURN HAS BEEN
56 ; GIVEN AFTER A TYPING ERROR, RELOAD THE PROGRAM.
57 ;
58 ;4. PROGRAM DESCRIPTION
59 ;

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```

10004 .MAIN
01 ;
02 ;
03 ; A. RELIABILITY TEST (SA 200)
04 ; A RANDOM NUMBER GENERATOR IS USED TO SELECT A
05 ; DISK DRIVE,CYLINDER,HEAD,BEGINNING SECTOR,
06 ; AND NUMBER OF CONSECUTIVE SECTORS. RANDOM
07 ; DATA IS THEN GENERATED, WRITTEN, AND READ.
08 ; THE SEQUENCE IS REPEATED INDEFINITELY.
09 ;
10 ; B. RELIABILITY TEST (SA 501)
11 ; SAME AS A. EXCEPT THAT ONLY EVEN
12 ; NUMBERED CYLINDERS ARE USED. THIS
13 ; ALLOWS A TWO COMPUTER SYSTEM TO RUN
14 ; SIMULTANEOUS RELIABILITY TESTS.
15 ;
16 ; C. RELIABILITY TEST (SA 502)
17 ; SAME AS B. ONLY FOR ODD NUMBERED
18 ; CYLINDERS.
19 ;
20 ; D. DISK ADDRESS TEST (SA 503)
21 ; RANDOM DATA IS FIRST WRITTEN THEN READ
22 ; FROM ALL SECTORS ON EACH READY DISK. THIS
23 ; INSURES THAT ALL DISK PACK SURFACES ARE
24 ; USEABLE AND THAT THE DISK PACK IS FORMATTED
25 ; PROPERLY.
26 ;
27 ;
28 ; F. COMMAND STRING INTERPRETER (SA 505)
29 ; AS A TROUBLE SHOOTING AID THE SERVICE
30 ; ENGINEER MAY TYPE IN HIS OWN TEST LOOP.
31 ; AFTER STARTING AT 505, THREE ARGUMENTS
32 ; MUST BE ENTERED IN RESPONSE TO THREE
33 ; PROGRAM QUESTIONS: "UNIT", "DATA", AND
34 ; "COMMAND STRING".
35 ;
36 ;
37 ; I. UNIT: TYPE UNIT # OR CARRIAGE TO
38 ; USE THE PREVIOUS ENTRY
39 ;
40 ;
41 ; II. DATA:
42 ; RAN=RANDOM
43 ; ALO=ALL ONES
44 ; ALZ=ALL ZEROS
45 ; PAT=110110 PATTERN
46 ; FLO=FLOATING ONE PATTERN
47 ; FLZ=FLOATING ZERO PATTERN
48 ;
49 ; ALTERNATIVELY ENTER A STRING OF
50 ; OCTAL 16 BIT WORDS TO BE
51 ; USED AS DATA. THE WORDS
52 ; ENTERED ARE USED REPEATEDLY
53 ; TO MAKE UP A SECTOR BLOCK.
54 ; TYPE CARRIAGE TO USE THE
55 ; PREVIOUS ENTRY.
56 ;
57 ; III. COMMAND STRING:
58 ;
59 ; OPTIONS 1. READ HEAD,SECTOR,#SECTORS
60 ; 2. WRITE SAME

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10005 .MAIN
01 ; 3. SEEK CYLINDER
02 ; 4. RECALIBRATE
03 ; 5. LOOP (GO TO BEGINNING)
04 ; 6. DELAY (N) 12.5MS INCREMENTS
05 ; 7. TYPE CARRIAGE TO USE THE
06 ; PREVIOUS COMMAND STRING.
07 ;
08 ; NOTE THAT EITHER SPACES OR A COMMA
09 ; MAY BE USED AS AN ARGUMENT DELIMITER.
10 ; EACH RESPONSE IS TERMINATED BY
11 ; TYPING CARRIAGE RETURN. IF MORE
12 ; ROOM IS NEEDED ON A LINE, TYPE
13 ; LINE FEED TO SPACE TO THE NEXT LINE.
14 ; THE WORD "SAME" USED WITH READ, OR WRITE,
15 ; WILL CAUSE THE PREVIOUS DISK
16 ; ADDRESS PARAMETERS TO BE USED.
17 ;
18 ; THE FOLLOWING EXAMPLE WOULD CAUSE UNIT
19 ; 1 TO REPEATEDLY SEEK CYLINDER
20 ; 50, WRITE SECTORS 2 AND 3 WITH HEAD 5,
21 ; THEN READ IT BACK AND CHECK. DATA IS SPECIFIED
22 ; AS ALTERNATE WORDS OF ZEROS THEN ONES.
23 ;
24 ; UNIT: 1
25 ; DATA: 0,177777
26 ; COMMAND STRING: SEEK 50 WRITE 5,2,2 READ SAME LOOP
27 ;
28 ;
29 ; G. ONES TEST (DATA = ALL 1'S)
30 ; ZEROS TEST (DATA = ALL 0'S)
31 ; 110110 TEST (DATA = WORDS OF 1101101101101101)
32 ; FLOATING ONE TEST (EACH SUCCESSIVE WORD
33 ; CONTAINS ONE 1 BIT WHICH IS MOVED
34 ; RIGHT ONE BIT EACH WORD)
35 ; FLOATING ZERO TEST (COMPLEMENT OF THE
36 ; FLOATING 1 TEST)
37 ;
38 ; EACH OF THE ABOVE USE THE BASIC DISK ADDRESS
39 ; TEST, SUBSTITUTING THE APPROPRIATE DATA.
40 ; ANY OF THESE PATTERNS INCLUDING THE RANDOM
41 ; DATA USED FOR THE DISK ADDRESS TEST MAY
42 ; BE RUN IN THE "READ ONLY" MODE. THIS IS USEFUL
43 ; FOR CHECKING THE INTERCHANGEABILITY OF DISK
44 ; PACKS BETWEEN VARIOUS DISK DRIVES.
45 ;
46 ; TO GENERATE A DATA PATTERN START AT THE
47 ; APPROPRIATE LOCATION AND SET SW8 TO 1.
48 ; WHEN THE ENTIRE PACK HAS BEEN WRITTEN AND
49 ; READ THE TELETYPE PRINTS "INTERCHANGE DISK"
50 ; AND THE PROGRAM HALTS. THIS PACK MAY NOW
51 ; BE READ FROM OTHER DISK DRIVES IN THE READ
52 ; ONLY MODE (SW9=1).
53 ;
54 ;
55 ; 5. ERROR REPORTING AND RECOVERY
56 ;
57 ; ALL PHASES OF THE SOFTWARE WORK THROUGH
58 ; 4 MAIN SUBROUTINES DESCRIBED BELOW. EACH
59 ; SUBROUTINE HAS A NORMAL RETURN (+3) AND

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10006 .MAIN
01 ; AN ERROR RETURN (+1). EACH SUBROUTINE WAITS FOR DISK
02 ; COMPLETION WITH INTERRUPT ENABLED. A FAILURE
03 ; TO DETECT INTERRUPT WITHIN 500MS (3 SEC FOR
04 ; RECALIBRATE) RESULTS IN A "TIMEOUT" ERROR.
05 ;
06 ; RECALIBRATE - ANY UNUSUAL STATUS IS REPORTED
07 ; IMMEDIATELY AND AN ERROR RETURN EXECUTED.
08 ;
09 ; SEEK - SEEK ERROR STATUS INCREMENTS SEEK
10 ; ERROR COUNTER. ANY ERROR STATUS RESULTS
11 ; IN STATUS PRINTOUT.
12 ;
13 ; WRITE - FOLLOWING "DONE" ON A WRITE, ERRORS ARE
14 ; CHECKED IN THE SEQUENCE SHOWN BELOW. ERROR
15 ; RECOVERY PROCEDURE IS OUTLINED FOR EACH CASE.
16 ; IF THE ERROR IS NOT PRESENT THE NEXT CHECK IS MADE.
17 ;
18 ; 1. READ/WRITE DONE STATUS - IF NONE, INCREMENT THE
19 ; MISC ERROR COUNT, PRINT ILLEGAL STATUS MESSAGE
20 ; AND DO AN ERROR RETURN.
21 ;
22 ; 2. MISC STATUS BITS - (ANY SEEK DONE, ANY SEEKING
23 ; BIT, SEEK ERROR, END CYLINDER, OR DATA LATE).
24 ; IF ANY ERROR INCREMENT THE MISC ERROR COUNT,
25 ; PRINT THE ILLEGAL STATUS, AND DO AN ERROR RETURN.
26 ;
27 ; 3. ADDRESS ERROR
28 ; 3.1 FIRST TIME - INCREMENT ADDRESS ERROR COUNT
29 ; AND REPEAT THE WRITE.
30 ; 3.2 SECOND SUCCESSIVE FAILURE - INCREMENT
31 ; PERMANENT ADDRESS ERROR COUNT AND DO A
32 ; ERROR RETURN.
33 ;
34 ; 4. ENDING MEMORY ADDRESS - INCREMENT THE MISC ERROR
35 ; COUNTER, PRINT THE ERROR MESSAGE, SET THE FATAL FLAG,
36 ; AND GO TO 5.
37 ;
38 ; 5. ENDING DISK ADDRESS - INCREMENT THE MISC ERROR
39 ; COUNTER, PRINT THE ERROR MESSAGE, SET THE FATAL FLAG,
40 ; AND GO TO 6.
41 ;
42 ; 6. NO FURTHER CHECKS
43 ; 6.1 FATAL SWITCH ON - DO A ERROR RETURN.
44 ; 6.2 OTHERWISE - DO A NORMAL RETURN.
45 ;
46 ; READ - FOLLOWING "DONE" ON A READ, ERRORS ARE
47 ; CHECKED IN THE SEQUENCE SHOWN BELOW. ERROR
48 ; RECOVERY PROCEDURE IS OUTLINED FOR EACH CASE.
49 ; IF THE ERROR IS NOT PRESENT THE NEXT CHECK IS MADE.
50 ;
51 ; 1. READ/WRITE DONE STATUS - IF NONE, INCREMENT THE
52 ; MISC ERROR COUNT, PRINT ILLEGAL STATUS MESSAGE
53 ; AND DO AN ERROR RETURN.
54 ;
55 ; 2. MISC STATUS BITS - (ANY SEEK DONE, ANY SEEKING
56 ; BIT, SEEK ERROR, END CYLINDER, OR DATA LATE).
57 ; IF ANY ERROR INCREMENT THE MISC ERROR COUNT,
58 ; PRINT THE ILLEGAL STATUS, AND DO AN ERROR RETURN.
59 ;

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10007 .MAIN

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```

3. ADDRESS ERROR

- 3.1 FIRST TIME - INCREMENT ADDRESS ERROR COUNT AND REPEAT THE READ.
- 3.2 SECOND SUCCESSIVE FAILURE - INCREMENT PERMANENT ADDRESS ERROR COUNT AND DO A ERROR RETURN.

4. CHECK WORD ERROR

- 4.1 FIRST TIME - INCREMENT THE CHECK WORD ERROR COUNT AND SET THE RETRY FLAG. PRINT "CHECK WORD ERROR" AND GO TO 5.
- 4.2 SECOND SUCCESSIVE ERROR - INCREMENT THE PERMANENT CHECK WORD ERROR COUNTER AND SET THE FATAL FLAG. PRINT "CHECK WORD ERROR" AND GO TO 5.

5. DATA ERROR

- 5.1 FIRST TIME - SET THE RETRY FLAG AND PRINT ERROR REPORT.
 - 5.1.1 CHECK WORD ERROR - DECREMENT THE CHECK WORD ERROR COUNTER AND INCREMENT THE CHECK WORD & DATA ERROR COUNTER. GO TO 6.
 - 5.1.2 NO CHECK WORD ERROR - INCREMENT THE DATA ERROR COUNTER AND GO TO 6.
- 5.2 SECOND SUCCESSIVE ERROR - SET THE FATAL FLAG AND PRINT THE ERROR REPORT.
 - 5.2.1 CHECK WORD ERROR - DECREMENT THE PERMANENT CHECK WORD ERROR COUNTER AND INCREMENT THE PERMANENT CHECK WORD & DATA ERROR COUNTER. GO TO 6.
 - 5.2.2 NO CHECK WORD ERROR - INCREMENT THE PERMANENT DATA ERROR COUNTER. GO TO 6.

6. ENDING MEMORY ADDRESS - INCREMENT THE MISC ERROR COUNTER, PRINT THE ERROR MESSAGE, SET THE FATAL FLAG, AND GO TO 7.

7. ENDING DISK ADDRESS - INCREMENT THE MISC ERROR COUNTER, PRINT THE ERROR MESSAGE, SET THE FATAL FLAG, AND GO TO 8.

8. NO FURTHER CHECKS

- 8.1 RETRY SWITCH ON - PRINT "TRY AGAIN" AND REPEAT THE TEST.
- 8.2 FATAL SWITCH ON - DO A ERROR RETURN.
- 8.3 NO SWITCHES ON - DO A NORMAL RETURN.

.EOT

0008 .MAIN

**00000 TOTAL ERRORS, 00000 PASS 1 ERRORS





DataGeneral

**DIAGNOSTIC
LISTING**

LISTING

096-000171-06

Coakley

PROGRAM

MOVING HEAD DISK CONTROL
RELIABILITY

TAPE

095-000068-06

ABSTRACT

THE MOVING HEAD DISK RELIABILITY PROGRAM IS A MAINTENANCE PROGRAM DESIGNED TO EXERCISE AND TEST 4046 DISK CONTROLLER AND 1-4 DISK DRIVES. THE DISK DRIVES MAY BE SHARED BETWEEN TWO COMPUTERS IN WHICH CASE THIS PROGRAM MAY BE RUNNING IN EACH COMPUTER.



0001 .MAIN MACRO REV 02

00121116 06/19/74

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.....
/ NAME: MHOK,SR                PART NUMBER: 094-000207
/
/ DESCRIPTION: MOVING HEAD DISK RELIABILITY PROGRAM
/
/ REVISION HISTORY:
/
/   REV.      DATE
/   ---      ---
/   00       10/28/71
/   01       01/14/72
/   02       04/25/72
/   03       11/20/72
/   04       02/08/73
/   05       12/12/73
/   06       04/26/74
/
/ COPYRIGHT (C) DATA GENERAL CORPORATION, 1971,1972,1973,1974
/ ALL RIGHTS RESERVED.
.....

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10002 .MAIN

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/ MOVING HEAD DISK RELIABILITY PROGRAM
/***** AUTO-RUN AUTO-LOAD MODIFIED 4/7/72
11. ABSTRACT
/ THE MOVING HEAD DISK RELIABILITY PROGRAM
/ IS A MAINTENANCE PROGRAM DESIGNED TO
/ EXERCISE AND TEST THE 4046 DISK CONTROLLER
/ AND 1-4 DISK DRIVES. THE DISK DRIVES MAY BE
/ SHARED BETWEEN TWO COMPUTERS IN WHICH CASE
/ THIS PROGRAM MAY BE RUNNING IN EACH COMPUTER.
/
/ NOTE
/ ****
/ ONE COMPUTER RUNNING RELIABILITY
/ TEST (SA 001), THE OTHER (SA 002)
/ ONLY!!!
/
/ THE CONTROL CAN BE DEVICE 33 OR 73.
12. MACHINE REQUIREMENTS
/ NOVA FAMILY CENTRAL PROCESSOR
/ 4K READ/WRITE MEMORY
/ TELETYPE
/ 4046 DISK CONTROL
/ 4047 OR 4048 CONTROL ADAPTER
/ 1-4 MOVING HEAD DISK DRIVES
13. OPERATING PROCEDURES
/ A. VERIFY DRIVE (DRIVES) ARE READY ON-LINE
/ B. LOAD PROGRAM USING BINARY LOADER
/ C. RESET AND START AT ONE OF THE
/ ADDRESSES SHOWN BELOW.
STARTING ADDRESS
2 RUN ALL
4 SET DISK CONTROL ADDRESS TO 33
5 SET DISK CONTROL ADDRESS TO 73
500 RELIABILITY TEST, ALL CYLINDERS
501 RELIABILITY TEST, EVEN CYLINDERS
502 RELIABILITY TEST, ODD CYLINDERS
503 DISK ADDRESS TEST
504 (NOT USED)
505 COMMAND STRING INTERPRETER
506 ONES TEST
507 ZEROS TEST
510 110110110 TEST
511 FLOATING ONE TEST
512 FLOATING ZERO TEST
513 RUN ALL
514 SEEK EXERCISEK
515 RECALIBRATE UNIT 1
516 RECALIBRATE UNIT 2
517 RECALIBRATE UNIT 3
520 RECALIBRATE UNIT 0

```

In DPφ, MHDR.SV geändert:

From LOC. 755 : LDA φ, C17 (=020212)
to LDA φ, 377 (=020377)

In 377 sind die zu folgenden

Units einzusetzen:

Bit 15 : Unit φ

Bit 14 : Unit 1

Bit 13 : Unit 2

Bit 12 : Unit 3

```

10003 .MAIN
01
02 / C. ERRORS - ERROR STATUS IS PRINTED
03 / WHENEVER ENCOUNTERED. WHEN DATA ERRORS
04 / ARE FOUND ONLY THREE ARE PRINTED PER
05 / ENCOUNTER. (SEE PARAGRAPH 5)
06
07 / SWITCH SETTINGS
08 / SW0=1 DO NOT HALT FOLLOWING ERROR
09 / SW1=1 INHIBIT ERROR PRINTOUTS
10 / SW2=1 REPEAT CURRENT TEST (SCOPE LOOP)
11 / SW3=1 INHIBIT CHECK WORD AND DATA ERROR MESSAGES
12 / SW4=1 BREAK TO ALLOW DISK INTERCHANGE
13 / SW5=1 FOR READ ONLY MODE.
14
15 / D. STATISTICS - TYPE ANY KEY DURING
16 / RANDOM TESTING TO GET A REPORT OF THE
17 / NUMBER OF WORDS WRITTEN AND READ, PLUS
18 / THE NUMBER OF ERRORS.
19 / **** NOTE ****
20 / THE PROGRAM WILL ACCOUNT FOR UP TO A MAX.
21 / OF 2*31 WORDS WRITTEN OR READ. SPECIAL
22 / TEST RUNS EXCEEDING THIS FACILITY WILL
23 / REQUIRE AN OPERATOR'S TEST LOG TO AUGMENT
24 / SOFTWARE ACCOUNTING.
25
26 / 13.1 PROGRAM RUNTIME
27
28 / PROGRAM RUNTIMES ARE SUBSTANTIALLY REDUCED WITH
29 / MEMORIES OF 8K OR LARGER. RUNTIMES BELOW ARE FOR
30 / AN 8K CORE MEMORY.
31
32 / RUNTIME IS DEFINED AS TIME FROM
33 / START TO A "PASS" MESSAGE. TYPICAL
34 / RUNTIMES ARE LISTED AS FOLLOWS:
35 / RUNALL (SA 2): APPROX. 27 MIN.
36 / (NOVA 800, CORE, & 2 SURFACE DISK)
37 / SEEKEXERCISER (SA 514): APPROX. 5 MIN.
38 / (NOVA 800, CORE, & 2 SURFACE DISK)
39
40 / 13.2 BAUD RATE
41
42 / READ, WRITE AND SEEK OPERATIONS ARE TIMED
43 / BY SPECIAL ROUTINES. WHEN THE PROGRAM IS
44 / FIRST STARTED, THE TIMING ROUTINE WILL TEST
45 / FOR THE PRESENCE OF A REAL TIME CLOCK (RTC)
46 / TO DERIVE TIMING FROM IT. IF NO RTC IS
47 / PRESENT, THE PROGRAM WILL TYPE "TTO BAUD
48 / RATE". THIS MESSAGE REFERS TO THE BAUD RATE
49 / OF THE CONSOLE TERMINAL (DEVICE 10 & 11).
50 / TYPE IN THE BAUD RATE. IF A TYPING ERROR OCCURS
51 / IN THE NUMBER STRING (BEFORE THE CARRIAGE RETURN),
52 / SIMPLY TYPE A NON-NUMERIC CHARACTER AND
53 / THE REQUEST FOR THE BAUD RATE WILL BE
54 / REPEATED. IF THE CARRIAGE RETURN HAS BEEN
55 / GIVEN AFTER A TYPING ERROR, RELOAD THE PROGRAM.

```

```

10004 .MAIN
01
02 / 14. PROGRAM DESCRIPTION
03
04 / A. RELIABILITY TEST (SA 500)
05 / A RANDOM NUMBER GENERATOR IS USED TO SELECT A
06 / DISK DRIVE, CYLINDER, HEAD, BEGINNING SECTOR,
07 / AND NUMBER OF CONSECUTIVE SECTORS. RANDOM
08 / DATA IS THEN GENERATED, WRITTEN, AND READ.
09 / THE SEQUENCE IS REPEATED INDEFINITELY.
10
11 / B. RELIABILITY TEST (SA 501)
12 / SAME AS A. EXCEPT THAT ONLY EVEN
13 / NUMBERED CYLINDERS ARE USED. THIS
14 / ALLOWS A TWO COMPUTER SYSTEM TO RUN
15 / SIMULTANEOUS RELIABILITY TESTS.
16
17 / C. RELIABILITY TEST (SA 502)
18 / SAME AS B. ONLY FOR ODD NUMBERED
19 / CYLINDERS.
20
21 / D. DISK ADDRESS TEST (SA 503)
22 / RANDOM DATA IS FIRST WRITTEN THEN READ
23 / FROM ALL SECTORS ON EACH READY DISK. THIS
24 / INSURES THAT ALL DISK PACK SURFACES ARE
25 / USEABLE AND THAT THE DISK PACK IS FORMATTED
26 / PROPERLY.
27

```

10005 ,MAIN

```
01
02
03 / F. COMMAND STRING INTERPRETER (SA 505)
04 / AS A TROUBLE SHOOTING AID THE SERVICE
05 / ENGINEER MAY TYPE IN HIS OWN TEST LOOP.
06 / AFTER STARTING AT 505, THREE ARGUMENTS
07 / MUST BE ENTERED IN RESPONSE TO THREE
08 / PROGRAM QUESTIONS; "UNIT", "DATA", AND
09 / "COMMAND STRING".
10
11
12
13 / I. UNIT: TYPE UNIT # OR CARRIAGE TO
14 / USE THE PREVIOUS ENTRY
15
16 / II. DATA: RAN=RANDOM
17 / ALO=ALL ONES
18 / ALZ=ALL ZEROS
19 / PAT=110110 PATTERN
20 / FLO=FLOATING ONE PATTERN
21 / FLZ=FLOATING ZERO PATTERN
22
23 / ALTERNATIVELY ENTER A STRING OF
24 / OCTAL 16 BIT WORDS TO BE
25 / USED AS DATA, THE WORDS
26 / ENTERED ARE USED REPEATEDLY
27 / TO MAKE UP A SECTOR BLOCK.
28 / TYPE CARRIAGE TO USE THE
29 / PREVIOUS ENTRY.
30
31 / III. COMMAND STRING:
32
33 / OPTIONS 1. READ HEAD,SECTOR,#SECTORS
34 / 2. WRITE SAME
35 / 3. SEEK CYLINDER
36 / 4. RECALIBRATE
37 / 5. LOOP (GO TO BEGINNING)
38 / 6. DELAY (N) 12.5MS INCREMENTS
39 / 7. TYPE CARRIAGE TO USE THE
40 / PREVIOUS COMMAND STRING.
41
42 / NOTE THAT EITHER SPACES OR A COMMA
43 / MAY BE USED AS AN ARGUMENT DELIMITER.
44 / EACH RESPONSE IS TERMINATED BY
45 / TYPING CARRIAGE RETURN. IF MORE
46 / ROOM IS NEEDED ON A LINE, TYPE
47 / LINE FEED TO SPACE TO THE NEXT LINE.
48 / THE WORD "SAME" USED WITH READ, OR WRITE,
49 / WILL CAUSE THE PREVIOUS DISK
50 / ADDRESS PARAMETERS TO BE USED,
```

10006 ,MAIN

```
01
02 / THE FOLLOWING EXAMPLE WOULD CAUSE UNIT
03 / 1 TO REPEATEDLY SEEK CYLINDER
04 / 50, WRITE SECTORS 2 AND 3 WITH HEAD 5,
05 / THEN READ IT BACK AND CHECK, DATA IS SPECIFIED
06 / AS ALTERNATE WORDS OF ZEROS THEN ONES.
07
08 / UNIT: 1
09 / DATA: 0,177777
10 / COMMAND STRING: SEEK 50 WRITE 5,2,2 READ SAME LOOP
11
12
13 / G. ONES TEST (DATA = ALL 1'S)
14 / ZEROS TEST (DATA = ALL 0'S)
15 / 110110 TEST (DATA = WORDS OF 1101101101101101)
16 / FLOATING ONE TEST (EACH SUCCESSIVE WORD
17 / CONTAINS ONE 1 BIT WHICH IS MOVED
18 / RIGHT ONE BIT EACH WORD)
19 / FLOATING ZERO TEST (COMPLEMENT OF THE
20 / FLOATING 1 TEST)
21
22 / EACH OF THE ABOVE USE THE BASIC DISK ADDRESS
23 / TEST, SUBSTITUTING THE APPROPRIATE DATA.
24 / ANY OF THESE PATTERNS INCLUDING THE RANDOM
25 / DATA USED FOR THE DISK ADDRESS TEST MAY
26 / BE RUN IN THE "READ ONLY" MODE. THIS IS USEFUL
27 / FOR CHECKING THE INTERCHANGEABILITY OF DISK
28 / PACKS BETWEEN VARIOUS DISK DRIVES.
29
30 / TO GENERATE A DATA PATTERN START AT THE
31 / APPROPRIATE LOCATION AND SET SW4 TO 1.
32 / WHEN THE ENTIRE PACK HAS BEEN WRITTEN AND
33 / READ THE TELETYPE PRINTS "INTERCHANGE DISK"
34 / AND THE PROGRAM HALTS, THIS PACK MAY NOW
35 / BE READ FROM OTHER DISK DRIVES IN THE READ
36 / ONLY MODE (SW3=1).
```

10007 .MAIN

```
01
02
03      15. ERROR REPORTING AND RECOVERY
04
05      / ALL PHASES OF THE SOFTWARE WORK THROUGH
06      / 4 MAIN SUBROUTINES DESCRIBED BELOW. EACH
07      / SUBROUTINE HAS A NORMAL RETURN (+3) AND
08      / AN ERROR RETURN (+1). EACH SUBROUTINE WAITS FOR DISK
09      / COMPLETION WITH INTERRUPT ENABLED. A FAILURE
10      / TO DETECT INTERRUPT WITHIN 500MS (3 SEC FOR
11      / RECALIBRATE) RESULTS IN A "TIMEOUT" ERROR.
12
13      / RECALIBRATE = ANY UNUSUAL STATUS IS REPORTED
14      / IMMEDIATELY AND AN ERROR RETURN EXECUTED.
15
16      / SEEK = SEEK ERROR STATUS INCREMENTS SEEK
17      / ERROR COUNTER. ANY ERROR STATUS RESULTS
18      / IN STATUS PRINTOUT.
19
20      / WRITE = FOLLOWING "DONE" ON A WRITE, ERRORS ARE
21      / CHECKED IN THE SEQUENCE SHOWN BELOW. ERROR
22      / RECOVERY PROCEDURE IS OUTLINED FOR EACH CASE.
23      / IF THE ERROR IS NOT PRESENT THE NEXT CHECK IS MADE.
24
25      / 1. READ/WRITE DONE STATUS = IF NONE, INCREMENT THE
26      / MISC ERROR COUNT, PRINT ILLEGAL STATUS MESSAGE
27      / AND DO AN ERROR RETURN.
28
29      / 2. MISC STATUS BITS = (ANY SEEK DONE, ANY SEEKING
30      / BIT, SEEK ERROR, END CYLINDER, OR DATA LATE).
31      / IF ANY ERROR INCREMENT THE MISC ERROR COUNT,
32      / PRINT THE ILLEGAL STATUS, AND DO AN ERROR RETURN.
```

10008 .MAIN

```
01
02      /
03      /
04      /
05      /
06      /
07      /
08
09      /
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14      /
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17      /
18      /
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21      /
22      /
23      /
24
25      /
26      /
27      /
28
29      /
30      /
31      /
32      /
```

3. ADDRESS ERROR
3.1 FIRST TIME = INCREMENT ADDRESS ERROR COUNT
AND REPEAT THE WRITE.
3.2 SECOND SUCCESSIVE FAILURE = INCREMENT
PERMANENT ADDRESS ERROR COUNT AND DO A
ERROR RETURN.

4. ENDING MEMORY ADDRESS = INCREMENT THE MISC ERROR
COUNTER, PRINT THE ERROR MESSAGE, SET THE FATAL FLAG,
AND GO TO 5.

5. ENDING DISK ADDRESS = INCREMENT THE MISC ERROR
COUNTER, PRINT THE ERROR MESSAGE, SET THE FATAL FLAG,
AND GO TO 6.

6. NO FURTHER CHECKS
6.1 FATAL SWITCH ON = DO A ERROR RETURN.
6.2 OTHERWISE = DO A NORMAL RETURN.

```

10009 .MAIN
01
02 / READ = FOLLOWING "DONE" ON A READ, ERRORS ARE
03 / CHECKED IN THE SEQUENCE SHOWN BELOW. ERROR
04 / RECOVERY PROCEDURE IS OUTLINED FOR EACH CASE,
05 / IF THE ERROR IS NOT PRESENT THE NEXT CHECK IS MADE.
06
07 / 1. READ/WRITE DONE STATUS = IF NONE, INCREMENT THE
08 / MISC ERROR COUNT, PRINT ILLEGAL STATUS MESSAGE
09 / AND DO AN ERROR RETURN.
10
11 / 2. MISC STATUS BITS = (ANY SEEK DONE, ANY SEEKING
12 / BIT, SEEK ERROR, END CYLINDER, OR DATA LATE).
13 / IF ANY ERROR INCREMENT THE MISC ERROR COUNT,
14 / PRINT THE ILLEGAL STATUS, AND DO AN ERROR RETURN.
15
16 / 3. ADDRESS ERROR
17 / 3.1 FIRST TIME = INCREMENT ADDRESS ERROR COUNT
18 / AND REPEAT THE READ.
19 / 3.2 SECOND SUCCESSIVE FAILURE = INCREMENT
20 / PERMANENT ADDRESS ERROR COUNT AND DO A
21 / ERROR RETURN.
22
23 / 4. CHECK WORD ERROR
24 / 4.1 FIRST TIME = INCREMENT THE CHECK WORD
25 / ERROR COUNT AND SET THE RETRY FLAG. PRINT
26 / "CHECK WORD ERROR" AND GO TO 5.
27 / 4.2 SECOND SUCCESSIVE ERROR = INCREMENT THE
28 / PERMANENT CHECK WORD ERROR COUNTER AND SET
29 / THE FATAL FLAG. PRINT "CHECK WORD ERROR"
30 / AND GO TO 5.

```

```

10010 .MAIN
01
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31 /
32 /
33 /

5. DATA ERROR
5.1 FIRST TIME = SET THE RETRY FLAG AND PRINT
ERROR REPORT.
5.1.1 CHECK WORD ERROR = DECREMENT THE
CHECK WORD ERROR COUNTER AND INCREMENT
THE CHECK WORD & DATA ERROR COUNTER.
GO TO 6.
5.1.2 NO CHECK WORD ERROR = INCREMENT
THE DATA ERROR COUNTER AND GO TO 6.
5.2 SECOND SUCCESSIVE ERROR = SET THE FATAL
FLAG AND PRINT THE ERROR REPORT.
5.2.1 CHECK WORD ERROR = DECREMENT
THE PERMANENT CHECK WORD ERROR COUNTER
AND INCREMENT THE PERMANENT CHECK WORD
& DATA ERROR COUNTER. GO TO 6.
5.2.2 NO CHECK WORD ERROR = INCREMENT
THE PERMANENT DATA ERROR COUNTER.
GO TO 6.

6. ENDING MEMORY ADDRESS = INCREMENT THE MISC ERROR
COUNTER, PRINT THE ERROR MESSAGE, SET THE FATAL FLAG,
AND GO TO 7.

7. ENDING DISK ADDRESS = INCREMENT THE MISC ERROR
COUNTER, PRINT THE ERROR MESSAGE, SET THE FATAL FLAG,
AND GO TO 8.

8. NO FURTHER CHECKS
8.1 RETRY SWITCH ON = PRINT "TRY AGAIN"
AND REPEAT THE TEST.
8.2 FATAL SWITCH ON = DO A ERROR RETURN.
8.3 NO SWITCHES ON = DO A NORMAL RETURN.

```

10011 ,MAIN

```
01
02
03      000001      ,LOC 1
04 00001 001013  INTERRUPT
05 00002 002003  JMP #,+1
06 00003 000513  ,RAL
07 00004 002042  JMP #42
08 00005 002043  JMP #43
09 00006 002044  JMP #44
10
11      000022      ,LDL 22
12
13 00022 000001 DRVS: 1
14 00023 000002      2
15 00024 000004      4
16 00025 000010     10
17
18 00026 000000 UNTINS: 0
19 00027 040000     40000
20 00030 100000     100000
21 00031 140000     140000
22 00032 040000 UNTONI: 40000
23 00033 020000     20000
24 00034 010000     10000
25 00035 004000     4000
26
27      000041      ,LOC 41
28 00041 004357  TYPE
29 00042 000525  FXADD
30 00043 000526  FXADD+1
31 00044 007011  START
32 00045 001422  NEST:  EGGS
```

!START HERE, RUN ALL

!SET ADDR TO 33
!SET ADDR TO 73

!UNIT 0 CODE

! 1
! 2
! 3

10012 ,MAIN

```
01
02 00046 002000 UNYSK: 2000
03 00047 001000     1000
04 00050 000400     400
05 00051 000200     200
06
07 00052 000004 CYLF:  ,BLK 4
08 00056 000004 CYLTI:  ,BLK 4
09 00062 000010 SEEKI:  ,BLK 10
10 00072 000004 SEKER:  ,BLK 4
11 00076 000010 WDSW:  ,BLK 10
12 00106 000010 WDSH:  ,BLK 10
13 00110 000004 CWER:  ,BLK 4
14 00122 000004 CWKMP:  ,BLK 4
15 00126 000004 ADDR:  ,BLK 4
16 00132 000004 PADER:  ,BLK 4
17 00136 000004 DATER:  ,BLK 4
18 00142 000004 CWDEI:  ,BLK 4
19 00146 000004 CWDEP:  ,BLK 4
20 00152 000004 PDER:  ,BLK 4
21 00156 000004 MISC:  ,BLK 4
22 00162 000004 SKYMO:  ,BLK 4
23 00166 000004 RWTMO:  ,BLK 4
24
25 00172 000000 MSW:  0
26 00173 000000 CSIF:  0
27 00174 000000 UNIT:  0
28 00175 000000 RDYUNT: 0
29 00176 000000 ,RDYU: 0
30 00177 000000 RALL:  0
31 00200 000000 RDO:  0
32 00201 000000 RETRY: 0
33 00202 000000 FATAL: 0
34 00203 000000 MODE:  0
35 00204 000000 LUPSW: 0
36 00205 000000 SSW:  0
37 00206 000206      .
38
39 00207 000002 LMD:  2
40 00210 000014 LS:  14
41
```

!FROM CYLINDERS
!TO CYLINDERS
!TOTAL SEKS
!TOTAL SEEK ERRORS
!WORDS WRITTEN
!WORDS READ
!CHECK WORD ERRORS
!PERM CHECK WORD ERRORS
!ADDRESS ERRORS
!PERMANENT ADDR ERR
!DATA ERRORS
!CHK WD AND DATA ERROR
!PERM CHK WD AND DATA ERROR
!PERMANENT DATA ERRORS
!MISC ERRORS
!SEEK/RECAL TIMEOUTS,
!READ/WRITE TIMEOUTS,

!HEADER SWITCH
!CMD STRING INTRP FLAG
!CURRENT DISK DRIVE UNIT
!AVAILABLE UNITS

!RUN ALL MODE FLAG
!READ ONLY FLAG
!RETRY TEST FLAG
!FATAL TEST RESULT FLAG
!0=RECAL, 1=SEEK, 2=READ, 3=WRITE
!LOOP ON TEST SWITCH
!SEEK SWITCH

!LAST HEAD+1) 2,10,OR 20.
!LAST SECTOR+1) 6 OR 12,

10013 .MAIN

```
01
02 000023 C2=DRVS+1
03 00211 000003 C3: 3
04 000024 C4=DRVS+2
05 000025 C10=DRVS+3
06 00212 000017 C17: 17
07 00213 000033 C33: 33
08 00214 000037 C37: 37
09 00215 000040 C40: 40
10 00216 000060 C60: 60
11 00217 000067 C67: 67
12 00220 004477 STIME: PTIME
13 00221 000313 C203: 203.
14 00222 000212 C212: 212
15 00223 000215 C215: 215
16 00224 000377 C377: 377
17 00225 001000 C1000: 1000
18 000035 C4K=UNTDN+3
19 00226 007400 C7400: 7400
20 000034 C10K=UNTDN+2
21 00227 077662 CSP1: 77662
22 00230 177677 CSP1: 177677
23 00231 000033 CWRD: 00033
24 00232 077666 CSP3: 77666
25
26
27
28
29
30
31
32
33
34 00233 004723 ICALIB: CALIB
35 00234 000310 .200MS: 200.
36 00235 003720 .2KMS: 2000.
37 00236 010000 .4KMS: 10000
38 00237 000000 DAYRTN: 0
```

10014 .MAIN

```
01
02 00240 000000 OMEGA: 0
03 00241 004702 IXLAY: LAYUP
04 00242 000000 ISTAT: 0
05 00243 000000 SAV0: 0
06 00244 000000 SAV1: 0
07 00245 000000 SAV2: 0
08 00246 000000 SAV3: 0
09 00247 123456 RANDOM: 123456
10 00250 000000 RELRAN: 0
11 00251 000200 CNYOC: NIOC 0
12 00252 007010 LAST: PRGEND
13 00253 000000 LINCT: 0
14 00254 000000 SECI: 0
15 00255 000000 SCI: 0
16 00256 000000 MD: 0
17 00257 007010 CA: PRGEND
18 00260 000000 TERM: 0
19 00261 015410 UBP: UBUFF+UBUFF
20 00262 015574 CSBP: CBUFF+CBUFF
21 00263 006767 VARST: VAR+1
22 00264 007007 VARED: VAR+15.
23 00265 000000 VARSP: 0
24 00266 000000 VARPT: 0
25 00267 007010 BUFF: PRGEND
26 00270 014000 CMEND: 14000
27 00271 000006 SMAX: 6
28 00272 000000 EVODN: 0
29 00273 000000 AECNT: 0
30 00274 000000 CWCNT: 0
31 00275 000000 DACNT: 0
32 00276 000000 RWRDY: 0
33 00277 000000 DADAT: 0
34 00300 000000 CFLG: 0
35 00301 000033 COSK: 33
36 00302 000000 CSC: 0
37 00303 000500 FIRST: BEGIN
38 00304 000000 UMSK: 0
39 00305 000400 HMSK: 400
40 00306 007400 SMSK: 7400
41 00307 007400 LMSK: 7400
42 00310 000000 .SCI: 0
43 00311 000000 RLUP: 0
44 00312 000000 ALLRET: 0

;STATUS AT INTERRUPT
;SAVE ACC,1,2

;CURRENT RANDOM NUMBER

;PROGRAM END
;BYTE POINTER
;STARTING SECTOR (POS)
;SECTOR COUNT
;HEAD
;BEGINNING ADDRESS (VARIABLE)
;HOLDS TERMINATOR FLAG
;UNIT BYTE POINTER
;CMD STRING BYTE POINTER
;VARIABLE DATA, SRT ADDR=1
; " " TABLE END
; " " END MARKER
;VAN POINTER
;DATA BUFFER SRT ADDR (CONSTANT)
;TOP OF USABLE CORE
;MAX SECTOR COUNT
;CYLINDERS, (0)EVEN, (16)ODD

;DATA ADDRESS (DISK ADDR TEST)
;END CYL FLAG

;UNIT MASK 1400 OR 400 OR 0
;HEAD MASK 7400 OR 17400 OR 400
;SECTOR MASK 7400 OR 3400
;# SECTORS MASK 7400 OR 3400
;# SECTOR TRANSFERRED ON CHK WD ERR
;REPEAT TEST ADDRESS
```

```

10015 .MAIN
01
02 00313 000015 .13MS: 13,
03 00314 000052 ICYLF: CYLF
04 00315 001371 IALL: ALL
05 00316 004731 IDLY: DLYM
06 00317 005557 ISAC: SAC
07 00320 005553 ISTAC: STAC
08 00321 004240 IPDEC: PDEC
09 00322 004234 ITAC1: POCT
10 00323 004233 ITZ1: ZOCT
11 00324 004205 IMESS: MESS
12 00325 004345 ICRLF: CRLF
13 00326 005000 ISRH: SRH
14 00327 005002 IGATH: GATH
15 00330 003617 IHSS: HSS
16 00331 005507 IINP: INP
17 00332 005247 IGEN: G
18 00333 005246 ICWK: C
19 00334 005371 IVAR: VAR,0
20 00335 001143 ICLRB: CLRB
21 00336 001155 ISET: SET
22 00337 005011 ISM: SM
23 00340 000672 ISTB0: STB0
24 00341 000717 INIL: INIL.
25 00342 001052 IWAIT: WAIT
26 00343 005442 I,DBD: ,DBD
27 00344 003526 IRDAT: RDATA
28 00345 003165 IWDATA: WDATA
29 00346 002723 IGCS: GCS
30 00347 003402 IRI: ,READ
31 00350 004147 IRI: ,WRITE
32 00351 003103 ISI: ,SEEK
33 00352 003045 IRC: RECL
34 00353 001413 IPS: PS
35 00354 005167 IHED: HED
36 00355 003657 ICSW: ,CSW
37 00356 002274 ISCNT: SCNT
38 00357 002616 ICSI: CMOST
39 00360 002614 IQUST: QUEST
40 00361 001051 INT: WAIT-1
41 00362 005405 IRAN: RAN
42 00363 001427 I,GSD: ,GSD
43 00364 000754 ISU: ,SET
44 00365 000601 IRCAL: RCALL
45 00366 000000 CYLNX: 0
46 00367 000000 NO,HS: 0
47 00370 000102 C102: 102
48 00371 000000 SVLMD: 0
49 00372 123456 ,RAN: 123456
50 00373 002000 C2000: 2000
51 00374 004064 IACAL: ADCAL
52 00375 003673 IFNQR: FNQIK
53
54

```

IBASE RANDOM NUMBER

```

10016 .MAIN
01 101011 SKIP=MOVW 0,0,SKP
02 000020 IDX0=20
03 000021 IDX1=21
04 000033 IUSKP=33
05 000315 DOALL=JSR #IALL
06 000302 RAND=JSR #IRAN
07 000317 SAVAC=JSR #ISAC
08 000320 BETAC=JSR #ISTAC
09 000321 TYPDEC=JSR #IPDEC
10 000322 TYPAC1=JSR #ITAC1
11 000323 TYPZ1=JSR #ITZ1
12 000324 MESSAGE=JSR #IMESS
13 000325 PCRLF=JSR #ICKLF
14 000331 INPUT=JSR #IINP
15 000333 CHECK=JSR #ICMK
16 000332 GEN=JSR #IGEN
17 000330 GETPAR=JSR #IMSS
18 000327 GETATM=JSR #IGATH
19 000326 SEARCH=JSR #ISRH
20 000335 CLRRB=JSR #ICLRB
21 000336 SETP=JSR #ISET
22 000337 SMEM=JSR #ISM
23 000340 SEYB=JSR #ISTB0
24 000341 INITE=JSR #INIL
25 002353 PSTAT=JMP #IPS
26 000347 READ=JSR #IR
27 000350 WRITE=JSR #IRW
28 000351 SEEK=JSR #IS
29 000352 RECAL=JSR #IRC
30 000355 CKSW=JSR #ICSW
31 000354 HEADER=JSR #IHED
32 000361 INTWT=JSR #IWT
33 000041 TYPASC=JSR #41
34 000316 DELAY=JSR #IDLY
35 000401 NOP=401
36
37 000364 SETU=JSR #ISU
38 000374 CALAD=JSR #IACAL

```

```

DO FOLLOWING ROUTINE FOR ALL RDY UNITS
)GENERATE RANDOM # IN AC0
)SAVE AC0,1,2
)RESTORE AC0,1,2
)TYPE (AC1) IN DECIMAL
)TYPE (AC1) IN OCTAL
)TYPE (AC1) IN OCTAL, SUPP LEAD 0'S
)TYPE FOLLOWING MESSAGE IN ASCII
)TYPE CR-LF
)GET A LINE OF INPUT
)CHECK ALL OF DATA BUFFER
)GENERATE DATA BUFFER
)GET HEAD=SECT=# SECT FROM INPUT LINE
)GET NAME OR # FROM INPUT LINE
)SEARCH FOLLOWING TABLE FOR MATCH ON AC1
)CLEAR READ BUFFER
)SET DISK PARAMETERS
)SIZE MEMORY
)SET TIME BASE
)INITIALIZE ERROR COUNTERS ETC.
)PRINT STATUS
)DISK READ & CHECK DATA
)GENERATE DATA AND WRITE DISK
)SEEK NEW CYLINDER
)RECALIBRATE
)CHECK CONSOLE SWITCHES
)PRINT ERROR MESSAGE HEADER
)INTERRUPT WAIT ROUTINE
)TYPE (AC0)R IN ASCII
)M HS DELAY IS IN LOC DELAY*1.

)SET READY UNITS
)ADDRESS CALCULATOR.

```



```

10017 .MAIN
01 /
02 / ** STARTING ADDRESSES **
03 /
04 /
05 000500 .LOC 500
06
07 00000 004421 BEGINT JSR STRT )RELIABILITY TEST, ALL CYL.
08 00001 004420 JSR STRT / " EVEN "
09 00002 004417 JSR STRT / " ODD "
10 00003 004416 JSR STRT )DISK ADDRESS TEST
11 00004 002375 JMP #IFNOK )NOT USED-ILLEGAL START ADDR8
12 00005 000467 JMP STRC )COMMAND STRING INTERPRETER
13 00006 004413 JSR STRT )ONES TEST
14 00007 004412 JSR STRT )ZEROS TEST
15 00010 004411 JSR STRT )110110 TEST
16 00011 004410 JSR STRT )FLOATING ONES TEST
17 00012 004407 JSR STRT )FLOATING ZEROS TEST
18 00013 004406 .RAL1 JSR STRT )RUN ALL
19 00014 004405 JSR STRT )SEEK EXERCISER
20 00015 002365 JMP #IRCAL )RECALIBRATE UNIT 1
21 00016 002365 JMP #IRCAL )RECALIBRATE UNIT 2
22 00017 002365 JMP #IRCAL )RECALIBRATE UNIT 3
23 00020 002365 JMP #IRCAL )RECALIBRATE UNIT 0

```

```

10018 .MAIN
01 /
02 /
03 / *** INITIALIZATION **
04 /
05 /
06 00521 020303 STRT1 LDA 0,FIRST )INITIALIZATION, ALL
07 00522 110400 SUB 0,3
08 00523 054475 STA 3,INDEX
09 00524 006337 RSTRT1 SHEN )SIZE MEMORY
10 00525 006340 SETB )SET TIME BASE
11 00526 003077 MALT )ERROR RTN FROM TIME INITIALIZE.
12 00527 006341 INITE )INITIALIZE BUFFERS, COUNTERS, ETC.
13 00530 006364 SETU )SET READY UNITS
14 00531 126400 SUB 1,1 )AC0=READY UNIT PATTERN
15 00532 101225 MOVZR 0,0,SNR
16 00533 000404 JMP R33 )UNIT 0 ONLY
17 00534 101224 MOVZR 0,0,SZR )UNIT 2 OR 3 MASK#3
18 00535 125140 MOVOL 1,1 )UNIT 1 MASK#1
19 00536 125140 MOVOL 1,1
20 00537 125300 R33: MOV5 1,1
21 00540 044304 STA 1,UMSK )UNIT MASK
22 00541 062677 IORST
23 00542 030045 LDA 2,NEST )IS DISK SIZE
24 00543 025000 LDA 1,0,2
25 00544 125005 MOV 1,1,SNR )SPECIFIED ??
26 00545 006363 JSR #I.USD )NO, GET IT
27 00546 006325 PCHLF
28 00547 006324 MESSAGE
29 00550 006477 MSG70 )"TESTING UNIT "
30 00551 006315 DOALL
31 00552 000502 TUN )TYPE UNIT NUMBERS
32 00553 063511 SKPBZ TTD )WAIT FOR TTD
33 00554 000777 JMP ,=1 )TO FINISH
34 00555 060211 NI0C TTD )CLEAR DONE
35 00556 020424 LDA 0,STR,2
36 00557 030441 LDA 2,INDEX
37 00560 113000 ADD 0,2
38 00561 003000 JMP #0,2 )GO TO IT !!

```

```

10019 .MAIN
01
02 00502 054410 TUN1 STA 3,TUNRET ;TYPE UNIT NUMBER
03 00503 020174 LDA 0,UNIT ;FOLLOWED BY A ", "
04 00504 024210 LDA 1,C00
05 00505 123000 ADD 1,0
06 00506 006041 TYPASC
07 00507 020404 LDA 0,COMA
08 00508 006041 TYPASC
09 00509 002401 JMP #TUNRET
10 00510 000000 TUNRET: 0
11 00511 000054 COMA: ",
12
13 ;COMMAND STRING INTERPRETER DOES NOT REQUIRE
14 ;NORMAL INITIALIZATION.
15
16 00514 006337 STRC: SNEM ;SIZE MEMORY
17 00515 006340 SETB ;SET TIME BASE
18 00516 003077 HALT ;ERROR RTN FROM TIME INITIALIZE.
19 00517 006341 INITE ;INITIALIZE BUFFERS ETC.
20 00518 006363 JSR #I.G80 ;SET LAST HEAD/SECTOR
21 00519 002407 JMP 0,CMD ;DISPATCH TO ROUTINE
22
23
24 ; *****
25 ; *** DISPATCH TABLE TO PROGRAMS ***
26 ; *****
27
28 00502 000002 STR.2: .
29 00503 001010 RELALL ;RELIABILITY TEST, ALL CYL
30 00504 001506 RELEV ; " " EVEN "
31 00505 001505 RELOD ; " " ODD "
32 00506 002002 DATR ;DISK ADDRESS TEST
33 00507 000057 FX.4 ;NOT USED
34 00510 002010 .CMD: CMDST ;COMMAND STRING INTERPRETER
35 00511 002000 DAT1 ;ONES TEST
36 00512 002010 DAT0 ;ZEROS TEST
37 00513 002012 DATP ;110110 PATTERN
38 00514 002014 DATF1 ;FLOAT ONE
39 00515 002010 DATF0 ;FLOAT ZERO
40 00516 001741 RUNALL ;RUN ALL PARTS
41 00517 001772 DAXSK ;SEEK EXERCISER
42 00620 000000 INDEX: 0

```

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10020 .MAIN
01
02 00621 000000 CSP2: 0
03 00622 100037 CIOMSK: 100037 ;*****
04 ;** INITIALIZATION **
05 ;** SUBROUTINES **
06 00623 003656 .LST1: HIAAD ;*****
07 00624 000521 .LST1: STRT
08
09 ;CHANGE I/O ADDRESS TO 33 OR 73
10
11 00625 102401 FXADD: SUB 0,0,SKP ;MAKE IT 33
12 00626 020215 LDA 0,C40 ;MAKE IT 73
13 00627 040772 STA 0,CSP2
14 00630 030774 LDA 2,,LST1 ;POINTER IN MEMORY
15 00631 024771 FX.2: LDA 1,CIOMSK ;INST MASK
16 00632 021000 LDA 0,0,2 ;GET A WORD
17 00633 107400 AND 0,1
18 00634 034231 LDA 3,CWRD ;IS IT AN I/O 33 OR 73 ?
19 00635 136404 SUB 1,3,SZR
20 00636 000400 JMP FX,3 ;NO
21 00637 024432 LDA 1,M41 ;MASK
22 00640 123400 AND 1,0 ;GET RID OF BIT 10
23 00641 024760 LDA 1,CSP2
24 00642 123000 ADD 1,0 ;MAKE ADDR 33 OR 73
25 00643 041000 STA 0,0,2 ;ADDR CHANGED
26 00644 151400 FX.3: INC 2,2
27 00645 034756 LDA 3,,LST
28 00646 156404 SUB 2,3,SZR
29 00647 000762 JMP FX,2 ;MORE
30 00650 020215 LDA 0,C33 ;SET (CDSK) TO
31 00651 024750 LDA 1,CSP2 ;EQUAL THE DEVICE ADDR
32 00652 107000 ADD 0,1
33 00653 044301 STA 1,CDSK
34 00654 030045 LDA 2,NEST
35 00655 025000 LDA 1,0,2
36 00656 125005 MOV 1,1,SNR
37 00657 003077 FX.4: HALT ;ALL DONE
38 00660 002003 JMP #3
39
40 ;RECALIBRATE THE UNIT IN SW 14=15
41
42 00661 000477 RCALL: READS 0
43 00662 024211 LDA 1,C3
44 00663 123400 AND 1,0
45 00664 040174 STA 0,UNIT ;RECALIBRATE 1
46 00665 000352 RECAL
47 00666 000771 JMP FX,4
48 00667 000770 JMP FX,4
49 00670 000767 JMP FX,4
50
51 00671 177737 M41: =41
52

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10021 ,MAIN
01
02
03
04
05 00672 054424 STB01 STA 3,SVSTB
06 00673 062677 IORST
07 00674 020421 LDA 0,IRUP
08 00675 040001 STA 0,1
09 00676 032233 LDA 2,0ICALIB ;SKIP THE TIMER IF CALIB
10 00677 151004 MOV 2,2,SZR ;HAS BEEN LOADED.
11 00700 000413 JMP STB2
12 00701 006220 JSR 0$TIME ;RUN PROCESSOR TIMER.
13 00702 125015 MOV# 1,1,SNR ;CKN COUNT LOADED.
14 00703 000406 JMP STB1 ;ERROR IN TIMING ROUTINE!
15 00704 046233 STA 1,0ICALIB ;STORE COUNT IN CALIB.
16 00705 006241 JSR 0$XLAY ;INIT THE DELAY SUBR.
17 00706 125015 MOV# 1,1,SNR ;VERIFY SUBR. IS SETUP.
18 00707 000402 JMP STB1 ;WERK IS NOT LOADED W/ 1MS COUNT.
19 00710 000403 JMP STB2
20 00711 034405 STB11 LDA 3,SVSTB
21 00712 001400 JMP 0,3 ;ERR IN TIME INIT. RTN TO CALL+1.
22 00713 034403 STB21 LDA 3,SVSTB ;OTHERWISE
23 00714 001401 JMP 1,3 ;RETURN TO CALL+2.
24
25 00715 001013 IRUP1 INTERRUPT
26 00716 000000 SVSTB1 0
27
28
29 ;CLEAR ERROR COUNTERS ETC.
30 00717 030314 INIL1 LDA 2,ICYLF
31 00720 024206 LDA 1,SSW+1
32 00721 102400 SUB 0,0
33 00722 041000 STA 0,0,2
34 00723 151400 INC 2,2
35 00724 132414 SUB# 1,2,SZR
36 00725 000775 JMP ,=3
37 00726 040177 STA 0,RALL
38 00727 020406 LDA 0,INIL0 ;LOAD # LOOPS OF
39 00730 042406 STA 0,0INIL0+1 ;RELIAB. COUNTER
40 00731 020403 LDA 0,=3
41 00732 040247 STA 0,RANDOM
42 00733 001400 JMP 0,3
43 00734 123456 123456
44 00735 001750 INIL0: 1000.
45 00736 001756 CRALL

```

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10022 ,MAIN
01
02 ;FIND AVAILABLE DISK DRIVE UNITS
03
04 00737 054414 SETU1 STA 3,,RET
05 00740 021026 LDA 0,UNTINGS,2
06 00741 063033 UOC 0,,DSKP ;SELECT THE UNIT
07 00742 020225 LDA 0,C1000
08 00743 001333 DOAP 0,,DSKP ;SEEK 0
09 00744 025046 LDA 1,UNTSK,2
10 00745 000433 OIA 0,,DSKP ;WAIT FOR UNIT TO
11 00746 123405 AND 1,0,SNR ;BEGIN SEEKING
12 00747 000776 JMP ,=2
13 00750 006316 DELAY ;WAIT 13 MS
14 00751 000313 .13MS ;TIME CONSTANT FOR DELAY SUBR.
15 00752 002401 JMP 0,,RET
16 00753 000000 ,RET1 0
17
18
19 ;SET READY UNITS
20
21 00754 054436 .SET1 STA 3,,SRET
22 00755 020212 LDA 0,C17 ;FAKE ALL UNITS AVAILABLE
23 00756 040175 STA 0,RDYUNT
24 00757 006315 DDALL ;CHECK ALL TO SEE
25 00758 000737 SETU. ;WHICH ARE THERE
26 00761 006316 DELAY
27 00762 000234 .200MS ;WAIT 200 MILLISECS.
28 00763 000433 OIA 0,,DSKP ;READ STATUS
29 00764 062677 IORST ;RELEASE THE ADAPTER
30 00765 126400 SUB 1,1
31 00766 101300 MOVS 0,0
32 00767 101200 MOVR 0,0
33 00770 101200 MOVR 0,0
34 00771 101200 MOVR 0,0
35 00772 101200 MOVR 0,0 ;A SEEK DONE INDICATES
36 00773 125100 MOVL 1,1 ;A READY UNIT
37 00774 101200 MOVR 0,0
38 00775 125100 MOVL 1,1
39 00776 101200 MOVR 0,0
40 00777 125100 MOVL 1,1
41 01000 101200 MOVR 0,0
42 01001 125100 MOVL 1,1
43 01002 044175 STA 1,RDYUNT
44 01003 125004 MOV 1,1,SZR
45 01004 002406 JMP 0,,SRET ;DONE
46 01005 006325 PCRLF ;NONE READY
47 01006 006324 MESSAGE
48 01007 000043 MSG16 ;"NO READY UNITS"
49 01010 063077 HALT
50 01011 000744 JMP ,SET+1
51 01012 000000 ,SRET1 0

```

```

10023 ,MAIN
01
02
03
04
05
06 01013 054246 INTER: STA 3,SAV3
07 01014 006317 SAVAC
08 01015 065477 INTA 1      ;WHO DID IT???
09 01016 044424 STA 1,S0
10 01017 030301 LDA 2,CDSK
11 01020 132415 SUB# 1,2,SNR
12 01021 000422 JMP INT.1      ;DISK PACK INTERRUPT
13 01022 030025 LDA 2,C10
14 01023 132415 SUB# 1,2,SNR
15 01024 000445 JMP ITTI      ;TTI INTERRUPT
16 01025 034251 LDA 3,CNIOC    ;SOMEONE ELSE
17 01026 137000 ADD 1,3
18 01027 054401 STA 3,+.1
19 01030 000200 NI0C 0      ;DEV ADDR ADDED DYNAMICALLY
20 01031 006325 PCRLF
21 01032 006324 MESSAGE
22 01033 000005 MSG9      ;INTERRUPT FROM DEVICE
23 01034 024406 LDA 1,S0
24 01035 006323 TYPZ1
25 01036 006320 SETAC
26 01037 034246 LDA 3,SAV3
27 01040 000177 INTEN
28 01041 000000 JMP #0
29 01042 000000 001 0      ;RETURN
30

```

```

10024 ,MAIN
01
02
03
04
05
06 01043 000633 INT.1: DIAC 0,,DSKP
07 01044 040242 STA 0, ISTAT ;SAVE FOR ALL TO USE
08 01045 030174 LDA 2, UNIT
09 01046 010421 ISZ WTRET
10 01047 002420 JMP #WTRET
11
12 01050 002000 MSKB5: 2000
13
14
15
16
17 01051 020417 LDA 0,WAYXX ;WAIT=1 IS NORMAL ENTR TO WAIT SUBR.
18 01052 040405 WAIT: STA 0,WAIT: ;WAIT TIME IS IN ACC BEFORE JSR.
19 01053 126400 SUB 1,1
20 01054 054413 STA 3,WTRET
21 01055 000177 INTEN ;ENABLE INTERRUPTS
22 01056 006316 DELAY
23 01057 000001 WAIT: 1
24
25 01060 000277 INTDS ;TIMEOUT, DISABLE INTER.
26 01061 002677 IORST ;CLEAR ADAPTER FOR 2ND COMP.
27 01062 006354 HEADER ;PRINT
28 01063 006325 PCRLF ;ERROR MESSAGE
29 01064 006324 MESSAGE
30 01065 006337 MSG00 ;"INTERRUPT TIMEOUT"
31 01066 002401 JMP #WTRET ;ERROR RETURN (+1)
32 01067 000000 WTRET: 0
33 01070 000235 WAYXX: .2KMS

```

DataGeneral

DIAGNOSTIC LISTING

LISTING

096-000171-06

Castro

PROGRAM

MOVING HEAD DISK CONTROL
RELIABILITY

TAPE

095-000068-06

ABSTRACT

THE MOVING HEAD DISK RELIABILITY PROGRAM IS A MAINTENANCE PROGRAM DESIGNED TO EXERCISE AND TEST 4046 DISK CONTROLLER AND 1-4 DISK DRIVES. THE DISK DRIVES MAY BE SHARED BETWEEN TWO COMPUTERS IN WHICH CASE THIS PROGRAM MAY BE RUNNING IN EACH COMPUTER.

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0001 .MAIN MACRO REV 02

09121118 06/19/74

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.....
; NAME: MMRK.SR          PART NUMBER: 094-000207
;
; DESCRIPTION: MOVING HEAD DISK RELIABILITY PROGRAM
;
; REVISION HISTORY:
;
;   REV.      DATE
;   ---      ---
;   00       10/28/71
;   01       01/14/72
;   02       04/25/72
;   03       11/20/72
;   04       02/08/73
;   05       12/12/73
;   06       04/26/74
;
; COPYRIGHT (C) DATA GENERAL CORPORATION, 1971,1972,1973,1974
; ALL RIGHTS RESERVED.
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10002 .MAIN

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; MOVING HEAD DISK RELIABILITY PROGRAM
;..... AUTO-RUN AUTO-LOAD MODIFIED 4/7/72
11. ABSTRACT
;
; THE MOVING HEAD DISK RELIABILITY PROGRAM
; IS A MAINTENANCE PROGRAM DESIGNED TO
; EXERCISE AND TEST THE 4046 DISK CONTROLLER
; AND 1-4 DISK DRIVES. THE DISK DRIVES MAY BE
; SHARED BETWEEN TWO COMPUTERS IN WHICH CASE
; THIS PROGRAM MAY BE RUNNING IN EACH COMPUTER.
;
; NOTE
; *****
; ONE COMPUTER RUNNING RELIABILITY
; TEST (SA 001), THE OTHER (SA 002)
; ONLY!!!
;
; THE CONTROL CAN BE DEVICE 33 OR 73.
12. MACHINE REQUIREMENTS
;
; NOVA FAMILY CENTRAL PROCESSOR
; 4K READ/WRITE MEMORY
; TELETYPE
; 4046 DISK CONTROL
; 4047 OR 4048 CONTROL ADAPTER
; 1-4 MOVING HEAD DISK DRIVES
13. OPERATING PROCEDURES
;
; A. VERIFY DRIVE (DRIVES) ARE READY ON-LINE
; B. LOAD PROGRAM USING BINARY LOADER
; C. RESET AND START AT ONE OF THE
; ADDRESSES SHOWN BELOW.
;
; STARTING ADDRESS
; 2 RUN ALL
; 4 SET DISK CONTROL ADDRESS TO 33
; 5 SET DISK CONTROL ADDRESS TO 73
; 500 RELIABILITY TEST, ALL CYLINDERS
; 501 RELIABILITY TEST, EVEN CYLINDERS
; 502 RELIABILITY TEST, ODD CYLINDERS
; 503 DISK ADDRESS TEST
; 504 (NOT USED)
; 505 COMMAND STRING INTERPRETER
; 506 ONES TEST
; 507 ZEROS TEST
; 510 110110110 TEST
; 511 FLOATING ONE TEST
; 512 FLOATING ZERO TEST
; 513 RUN ALL
; 514 SEEK EXERCISER
; 515 RECALIBRATE UNIT 1
; 516 RECALIBRATE UNIT 2
; 517 RECALIBRATE UNIT 3
; 520 RECALIBRATE UNIT 0

```

In DPφ1MHD.R.SV geändert:

From LOC. 755 : LDA φ,C17 (=020212)
to LDA φ,377 (=020377)

In 377 sind die zu testenden

Units einzusetzen:

Bit 15 : Unit 0

Bit 14 : Unit 1

Bit 13 : Unit 2

Bit 12 : Unit 3

```

10003 .MAIN
01
02 / C. ERRORS - ERROR STATUS IS PRINTED
03 / WHENEVER ENCOUNTERED. WHEN DATA ERRORS
04 / ARE FOUND ONLY THREE ARE PRINTED PER
05 / ENCOUNTER. (SEE PARAGRAPH 5)
06
07 / SWITCH SETTINGS
08 / SW0=1 DO NOT HALT FOLLOWING ERROR
09 / SW1=1 INHIBIT ERROR PRINTOUTS
10 / SW2=1 REPEAT CURRENT TEST (SCOPE LOOP)
11 / SW3=1 INHIBIT CHECK WORD AND DATA ERROR MESSAGES
12 / SW4=1 BREAK TO ALLOW DISK INTERCHANGE
13 / SW5=1 FOR READ ONLY MODE.
14
15 / D. STATISTICS - TYPE ANY KEY DURING
16 / RANDOM TESTING TO GET A REPORT OF THE
17 / NUMBER OF WORDS WRITTEN AND READ, PLUS
18 / THE NUMBER OF ERRORS.
19 / **** NOTE ****
20 / THE PROGRAM WILL ACCOUNT FOR UP TO A MAX.
21 / OF 2*31 WORDS WRITTEN OR READ. SPECIAL
22 / TEST RUNS EXCEEDING THIS FACILITY WILL
23 / REQUIRE AN OPERATOR'S TEST LOG TO AUGMENT
24 / SOFTWARE ACCOUNTING.
25
26 / 13.1 PROGRAM RUNTIME
27
28 / PROGRAM RUNTIMES ARE SUBSTANTIALLY REDUCED WITH
29 / MEMORIES OF 8K OR LARGER. RUNTIMES BELOW ARE FOR
30 / AN 8K CORE MEMORY.
31
32 / RUNTIME IS DEFINED AS TIME FROM
33 / START TO A "PASS" MESSAGE. TYPICAL
34 / RUNTIMES ARE LISTED AS FOLLOWS:
35 / RUNALL (SA 2): APPROX. 27 MIN.
36 / (NOVA 800, CORE, & 2 SURFACE DISK)
37 / SEEKEXERCISER (SA 514): APPROX. 5 MIN.
38 / (NOVA 800, CORE, & 2 SURFACE DISK)
39
40 / 13.2 BAUD RATE
41
42 / READ, WRITE AND SEEK OPERATIONS ARE TIMED
43 / BY SPECIAL ROUTINES. WHEN THE PROGRAM IS
44 / FIRST STARTED, THE TIMING ROUTINE WILL TEST
45 / FOR THE PRESENCE OF A REAL TIME CLOCK (RTC)
46 / TO DERIVE TIMING FROM IT. IF NO RTC IS
47 / PRESENT, THE PROGRAM WILL TYPE "TTO BAUD
48 / RATE". THIS MESSAGE REFERS TO THE BAUD RATE
49 / OF THE CONSOLE TERMINAL (DEVICE 10 & 11).
50 / TYPE IN THE BAUD RATE. IF A TYPING ERROR OCCURS
51 / IN THE NUMBER STRING (BEFORE THE CARRIAGE RETURN),
52 / SIMPLY TYPE A NON-NUMERIC CHARACTER AND
53 / THE REQUEST FOR THE BAUD RATE WILL BE
54 / REPEATED. IF THE CARRIAGE RETURN HAS BEEN
55 / GIVEN AFTER A TYPING ERROR, RELOAD THE PROGRAM.

```

```

10004 .MAIN
01
02 / 14. PROGRAM DESCRIPTION
03 /
04 / A. RELIABILITY TEST (SA 500)
05 / A RANDOM NUMBER GENERATOR IS USED TO SELECT A
06 / DISK DRIVE, CYLINDER, HEAD, BEGINNING SECTOR,
07 / AND NUMBER OF CONSECUTIVE SECTORS. RANDOM
08 / DATA IS THEN GENERATED, WRITTEN, AND READ.
09 / THE SEQUENCE IS REPEATED INDEFINITELY.
10 /
11 / B. RELIABILITY TEST (SA 501)
12 / SAME AS A. EXCEPT THAT ONLY EVEN
13 / NUMBERED CYLINDERS ARE USED. THIS
14 / ALLOWS A TWO COMPUTER SYSTEM TO RUN
15 / SIMULTANEOUS RELIABILITY TESTS.
16 /
17 / C. RELIABILITY TEST (SA 502)
18 / SAME AS B. ONLY FOR ODD NUMBERED
19 / CYLINDERS.
20 /
21 / D. DISK ADDRESS TEST (SA 503)
22 / RANDOM DATA IS FIRST WRITTEN THEN READ
23 / FROM ALL SECTORS ON EACH READY DISK. THIS
24 / INSURES THAT ALL DISK PACK SURFACES ARE
25 / USEABLE AND THAT THE DISK PACK IS FORMATTED
26 / PROPERLY.
27 /
28

```


10005 .MAIN

```
01
02
03 / F. COMMAND STRING INTERPRETER (SA 505)
04 / AS A TROUBLE SHOOTING AID THE SERVICE
05 / ENGINEER MAY TYPE IN HIS OWN TEST LOOP.
06 / AFTER STARTING AT 505, THREE ARGUMENTS
07 / MUST BE ENTERED IN RESPONSE TO THREE
08 / PROGRAM QUESTIONS: "UNIT", "DATA", AND
09 / "COMMAND STRING".
10
11
12
13 / I. UNIT: TYPE UNIT # OR CARRIAGE TO
14 / USE THE PREVIOUS ENTRY
15
16 / II. DATA: RAN=RANDOM
17 / ALO=ALL ONES
18 / ALZ=ALL ZEROS
19 / PAT=110110 PATTERN
20 / FLO=FLOATING ONE PATTERN
21 / FLZ=FLOATING ZERO PATTERN
22
23 / ALTERNATIVELY ENTER A STRING OF
24 / OCTAL 16 BIT WORDS TO BE
25 / USED AS DATA. THE WORDS
26 / ENTERED ARE USED REPEATEDLY
27 / TO MAKE UP A SECTOR BLOCK.
28 / TYPE CARRIAGE TO USE THE
29 / PREVIOUS ENTRY.
30
31 / III. COMMAND STRING:
32
33 / OPTIONS 1. READ HEAD,SECTOR,#SECTORS
34 / 2. WRITE SAME
35 / 3. SEEK CYLINDER
36 / 4. RECALIBRATE
37 / 5. LOOP (GO TO BEGINNING)
38 / 6. DLLAY (N) 12.5MS INCREMENTS
39 / 7. TYPE CARRIAGE TO USE THE
40 / PREVIOUS COMMAND STRING.
41
42 / NOTE THAT EITHER SPACES OR A COMMA
43 / MAY BE USED AS AN ARGUMENT DELIMITER.
44 / EACH RESPONSE IS TERMINATED BY
45 / TYPING CARRIAGE RETURN. IF MORE
46 / ROOM IS NEEDED ON A LINE, TYPE
47 / LINE FEED TO SPACE TO THE NEXT LINE.
48 / THE WORD "SAME" USED WITH READ, OR WRITE,
49 / WILL CAUSE THE PREVIOUS DISK
50 / ADDRESS PARAMETERS TO BE USED,
```

10006 .MAIN

```
01
02 / THE FOLLOWING EXAMPLE WOULD CAUSE UNIT
03 / 1 TO REPEATEDLY SEEK CYLINDER
04 / 50, WRITE SECTORS 2 AND 3 WITH HEAD 5,
05 / THEN READ IT BACK AND CHECK. DATA IS SPECIFIED
06 / AS ALTERNATE WORDS OF ZEROS THEN ONES.
07
08 / UNIT: 1
09 / DATA: 0,177777
10 / COMMAND STRING: SEEK 50 WRITE 5,2,2 READ SAME LOOP
11
12
13 / G. ONES TEST (DATA = ALL 1'S)
14 / ZEROS TEST (DATA = ALL 0'S)
15 / 110110 TEST (DATA = WORDS OF 1101101101101101)
16 / FLOATING ONE TEST (EACH SUCCESSIVE WORD
17 / CONTAINS ONE 1 BIT WHICH IS MOVED
18 / RIGHT ONE BIT EACH WORD)
19 / FLOATING ZERO TEST (COMPLEMENT OF THE
20 / FLOATING 1 TEST)
21
22 / EACH OF THE ABOVE USE THE BASIC DISK ADDRESS
23 / TEST, SUBSTITUTING THE APPROPRIATE DATA.
24 / ANY OF THESE PATTERNS INCLUDING THE RANDOM
25 / DATA USED FOR THE DISK ADDRESS TEST MAY
26 / BE RUN IN THE "READ ONLY" MODE. THIS IS USEFUL
27 / FOR CHECKING THE INTERCHANGEABILITY OF DISK
28 / PACKS BETWEEN VARIOUS DISK DRIVES.
29
30 / TO GENERATE A DATA PATTERN START AT THE
31 / APPROPRIATE LOCATION AND SET SW4 TO 1.
32 / WHEN THE ENTIRE PACK HAS BEEN WRITTEN AND
33 / READ THE TELETYPE PRINTS "INTERCHANGE DISK"
34 / AND THE PROGRAM HALTS. THIS PACK MAY NOW
35 / BE READ FROM OTHER DISK DRIVES IN THE READ
36 / ONLY MODE (SW5=1).
```

10007 .MAIN

```
01
02
03
04
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22
23
24
25
26
27
28
29
30
31
32
```

15. ERROR REPORTING AND RECOVERY

ALL PHASES OF THE SOFTWARE WORK THROUGH 4 MAIN SUBROUTINES DESCRIBED BELOW. EACH SUBROUTINE HAS A NORMAL RETURN (+3) AND AN ERROR RETURN (+1). EACH SUBROUTINE WAITS FOR DISK COMPLETION WITH INTERRUPT ENABLED. A FAILURE TO DETECT INTERRUPT WITHIN 000MS (3 SEC FOR RECALIBRATE) RESULTS IN A "TIMEOUT" ERROR.

RECALIBRATE = ANY UNUSUAL STATUS IS REPORTED IMMEDIATELY AND AN ERROR RETURN EXECUTED.

SEEK = SEEK ERROR STATUS INCREMENTS SEEK ERROR COUNTER. ANY ERROR STATUS RESULTS IN STATUS PRINTOUT.

WRITE = FOLLOWING "DONE" ON A WRITE, ERRORS ARE CHECKED IN THE SEQUENCE SHOWN BELOW. ERROR RECOVERY PROCEDURE IS OUTLINED FOR EACH CASE. IF THE ERROR IS NOT PRESENT THE NEXT CHECK IS MADE.

1. READ/WRITE DONE STATUS = IF NONE, INCREMENT THE MISC ERROR COUNT, PRINT ILLEGAL STATUS MESSAGE AND DO AN ERROR RETURN.

2. MISC STATUS BITS = (ANY SEEK DONE, ANY SEEKING BIT, SEEK ERROR, END CYLINDER, OR DATA LATE). IF ANY ERROR INCREMENT THE MISC ERROR COUNT, PRINT THE ILLEGAL STATUS, AND DO AN ERROR RETURN.

10008 .MAIN

```
01
02
03
04
05
06
07
08
09
10
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12
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14
15
16
17
18
19
```

3. ADDRESS ERROR

3.1 FIRST TIME = INCREMENT ADDRESS ERROR COUNT AND REPEAT THE WRITE.

3.2 SECOND SUCCESSIVE FAILURE = INCREMENT PERMANENT ADDRESS ERROR COUNT AND DO A ERROR RETURN.

4. ENDING MEMORY ADDRESS = INCREMENT THE MISC ERROR COUNTER, PRINT THE ERROR MESSAGE, SET THE FATAL FLAG, AND GO TO 5.

5. ENDING DISK ADDRESS = INCREMENT THE MISC ERROR COUNTER, PRINT THE ERROR MESSAGE, SET THE FATAL FLAG, AND GO TO 6.

6. NO FURTHER CHECKS

6.1 FATAL SWITCH ON = DO A ERROR RETURN.

6.2 OTHERWISE = DO A NORMAL RETURN.

```

10009 ,MAIN
01
02 / READ = FOLLOWING "DONE" ON A READ, ERRORS ARE
03 / CHECKED IN THE SEQUENCE SHOWN BELOW. ERROR
04 / RECOVERY PROCEDURE IS OUTLINED FOR EACH CASE.
05 / IF THE ERROR IS NOT PRESENT THE NEXT CHECK IS MADE.
06
07 / 1. READ/WRITE DONE STATUS = IF NONE, INCREMENT THE
08 / MISC ERROR COUNT, PRINT ILLEGAL STATUS MESSAGE
09 / AND DO AN ERROR RETURN.
10
11 / 2. MISC STATUS BITS - (ANY SEEK DONE, ANY SEEKING
12 / BIT, SEEK ERROR, END CYLINDER, OR DATA LATE),
13 / IF ANY ERROR INCREMENT THE MISC ERROR COUNT,
14 / PRINT THE ILLEGAL STATUS, AND DO AN ERROR RETURN.
15
16 / 3. ADDRESS ERROR
17 / 3.1 FIRST TIME = INCREMENT ADDRESS ERROR COUNT
18 / AND REPEAT THE READ.
19 / 3.2 SECOND SUCCESSIVE FAILURE = INCREMENT
20 / PERMANENT ADDRESS ERROR COUNT AND DO A
21 / ERROR RETURN.
22
23 / 4. CHECK WORD ERROR
24 / 4.1 FIRST TIME = INCREMENT THE CHECK WORD
25 / ERROR COUNT AND SET THE RETRY FLAG. PRINT
26 / "CHECK WORD ERROR" AND GO TO 5.
27 / 4.2 SECOND SUCCESSIVE ERROR = INCREMENT THE
28 / PERMANENT CHECK WORD ERROR COUNTER AND SET
29 / THE FATAL FLAG. PRINT "CHECK WORD ERROR"
30 / AND GO TO 5.

```

```

10010 ,MAIN
01
02 /
03 /
04 /
05 /
06 /
07 /
08 /
09 /
10 /
11 /
12 /
13 /
14 /
15 /
16 /
17 /
18 /
19 /
20 /
21 /
22 /
23 /
24 /
25 /
26 /
27 /
28 /
29 /
30 /
31 /
32 /
33 /

```

5. DATA ERROR

5.1 FIRST TIME = SET THE RETRY FLAG AND PRINT ERROR REPORT.

5.1.1 CHECK WORD ERROR = DECREMENT THE CHECK WORD ERROR COUNTER AND INCREMENT THE CHECK WORD & DATA ERROR COUNTER. GO TO 6.

5.1.2 NO CHECK WORD ERROR = INCREMENT THE DATA ERROR COUNTER AND GO TO 6.

5.2 SECOND SUCCESSIVE ERROR = SET THE FATAL FLAG AND PRINT THE ERROR REPORT.

5.2.1 CHECK WORD ERROR = DECREMENT THE PERMANENT CHECK WORD ERROR COUNTER AND INCREMENT THE PERMANENT CHECK WORD & DATA ERROR COUNTER. GO TO 6.

5.2.2 NO CHECK WORD ERROR = INCREMENT THE PERMANENT DATA ERROR COUNTER. GO TO 6.

6. ENDING MEMORY ADDRESS = INCREMENT THE MISC ERROR COUNTER, PRINT THE ERROR MESSAGE, SET THE FATAL FLAG, AND GO TO 7.

7. ENDING DISK ADDRESS = INCREMENT THE MISC ERROR COUNTER, PRINT THE ERROR MESSAGE, SET THE FATAL FLAG, AND GO TO 8.

8. NO FURTHER CHECKS

8.1 RETRY SWITCH ON = PRINT "TRY AGAIN" AND REPEAT THE TEST.

8.2 FATAL SWITCH ON = DO A ERROR RETURN.

8.3 NO SWITCHES ON = DO A NORMAL RETURN.

10011 .MAIN

```
01
02
03          000001      .LOC 1
04 00001 001013      INTERRUPT
05 00002 002003      JMP #.+1
06 00003 000513      .RAL
07 00004 002042      JMP #42
08 00005 002043      JMP #43
09 00006 002044      JMP #44
10
11          000022      .LOC 22
12
13 00022 000001 DRVS: 1
14 00023 000002      2
15 00024 000004      4
16 00025 000010      10
17
18 00026 000000 UNTINS: 0
19 00027 040000      40000
20 00030 100000      100000
21 00031 140000      140000
22 00032 040000 UNTDNI: 40000
23 00033 020000      20000
24 00034 010000      10000
25 00035 004000      4000
26
27          000041      .LOC 41
28 00041 004357      TYPL
29 00042 000025      FXADD
30 00043 000026      FXADD+1
31 00044 007011      START
32 00045 001422 NEST: EGGS
```

!START HERE, RUN ALL

JUNIT 0 CODE

```
J 1
J 2
J 3
```

10012 .MAIN

```
01
02 00046 002000 UNTSK: 2000
03 00047 001000      1000
04 00050 000400      400
05 00051 000200      200
06
07 00052 000004 CYLF: .BLK 4
08 00056 000004 CYLT: .BLK 4
09 00062 000010 SEEK: .BLK 10
10 00072 000004 SEKER: .BLK 4
11 00076 000010 WUSW: .BLK 10
12 00106 000010 WDSH: .BLK 10
13 00116 000004 CWER: .BLK 4
14 00122 000004 CWERP: .BLK 4
15 00126 000004 ADDR: .BLK 4
16 00132 000004 PADER: .BLK 4
17 00136 000004 DATER: .BLK 4
18 00142 000004 CWDEI: .BLK 4
19 00146 000004 CWDEP: .BLK 4
20 00152 000004 PDER: .BLK 4
21 00156 000004 MISC: .BLK 4
22 00162 000004 SKYMO: .BLK 4
23 00166 000004 RNTMO: .BLK 4
24
25 00172 000000 HSW: 0
26 00173 000000 CSIF: 0
27 00174 000000 UNIT: 0
28 00175 000000 RDYUNT: 0
29 00176 000000 RDYU: 0
30 00177 000000 RALL: 0
31 00200 000000 RDD: 0
32 00201 000000 RETRY: 0
33 00202 000000 FATAL: 0
34 00203 000000 MODE: 0
35 00204 000000 LUPSW: 0
36 00205 000000 SSW: 0
37 00206 000206 .
38
39 00207 000002 LHD: 2
40 00210 000014 LS: 14
41
```

!FROM CYLINDERS
!TO CYLINDERS
!TOTAL SEKS
!TOTAL SEEK ERRORS
!WORDS WRITTEN
!WORDS READ
!CHECK WORD ERRORS
!PERM CHECK WORD ERRORS
!ADDRESS ERRORS
!PERMANENT ADDR ERR
!DATA ERRORS
!CHK WD AND DATA ERROR
!PERM CHK WD AND DATA ERROR
!PERMANENT DATA ERRORS
!MISC ERRORS
!SEEK/RECAL TIMEOUTS.
!READ/WRITE TIMEOUTS.

!HEADER SWITCH
!CMD STRING INTRP FLAG
!CURRENT DISK DRIVE UNIT
!AVAILABLE UNITS

!RUN ALL MODE FLAG
!READ ONLY FLAG
!RETRY TEST FLAG
!FATAL TEST RESULT FLAG
!0=RECAL, 1=SEEK, 2=READ, 3=WRITE
!LOOP ON TEST SWITCH
!SEEK SWITCH

!LAST HEAD+1! 2,10,OR 20.
!LAST SECTOR+1! 8 OR 12.

10013 ,MAIN

```
01
02      000023 C2=DRVS+1
03 00211 000003 C3: 3
04      000024 C4=DRVS+2
05      000025 C10=DRVS+3
06 00212 000017 C17: 17
07 00213 000033 C33: 33
08 00214 000037 C37: 37
09 00215 000040 C40: 40
10 00216 000060 C60: 60
11 00217 000067 C67: 67
12 00220 004477 STIME: PTIME
13 00221 000313 C203: 203
14 00222 000212 C212: 212
15 00223 000215 C215: 215
16 00224 000377 C377: 377
17 00225 001000 C1000: 1000
18      000035 C4K=UNTDN+3
19 00226 007400 C7400: 7400
20      000034 C10K=UNTDN+2
21 00227 077662 C8P: 77662
22 00230 177677 C8P1: 177677
23 00231 000033 CWRD: 00033
24 00232 077666 C8P3: 77666
25
26
27
28
29
30
31
32
33
34 00233 004723 ICALIB: CALIB
35 00234 000310 .200MS: 200
36 00235 003720 .2KMS: 2000
37 00236 010000 .4KMS: 10000
38 00237 000000 DAXRTN: 0
```

10014 ,MAIN

```
01
02 00240 000000 OMEGA: 0
03 00241 004702 IXLAY: LAYUP
04 00242 000000 ISTAT: 0
05 00243 000000 SAV0: 0
06 00244 000000 SAV1: 0
07 00245 000000 SAV2: 0
08 00246 000000 SAV3: 0
09 00247 123456 RANDOM: 123456
10 00250 000000 RELRAN: 0
11 00251 050200 CNIOC: NIOL 0
12 00252 007010 LAST: PRGEND
13 00253 000000 LINCT: 0
14 00254 000000 SEC: 0
15 00255 000000 SC: 0
16 00256 000000 HD: 0
17 00257 007010 CA: PRGEND
18 00250 000000 TERM: 0
19 00251 015410 UBP: UBUFF+UBUFF
20 00262 015574 CSBP: CBUFF+CBUFF
21 00263 006767 VARST: VAR+1
22 00264 007007 VARED: VAR+15
23 00265 000000 VARSPI: 0
24 00266 000000 VARPT: 0
25 00267 007010 BUFF: PRGEND
26 00270 014000 CMEND: 14000
27 00271 000000 SMAX: 0
28 00272 000000 EVODN: 0
29 00273 000000 AECNT: 0
30 00274 000000 CWCNT: 0
31 00275 000000 DACNT: 0
32 00276 000000 RWRRT: 0
33 00277 000000 DADAT: 0
34 00300 000000 CFLG: 0
35 00301 000033 COSK: 33
36 00302 000000 CSC: 0
37 00303 000500 FIRST: BEGIN
38 00304 000000 UMSK: 0
39 00305 000400 HMSK: 400
40 00306 007400 SMSK: 7400
41 00307 007400 LMSK: 7400
42 00310 000000 .SC: 0
43 00311 000000 RLUP: 0
44 00312 000000 ALLREY: 0

I STATUS AT INTERRUPT
I SAVE AC0,1,2

I CURRENT RANDOM NUMBER

I PROGRAM END
I BYTE POINTER
I STARTING SECTOR (POS)
I SECTOR COUNT
I HEAD
I BEGINNING ADDRESS (VARIABLE)
I HOLDS TERMINATOR FLAG
I UNIT BYTE POINTER
I CMD STRING BYTE POINTER
I VARIABLE DATA, SRT ADDR=1
I " " TABLE END
I " " END MARKER
I VAR POINTER
I DATA BUFFER SRT ADDR (CONSTANT)
I TOP OF USABLE CORE
I MAX SECTOR COUNT
I CYLINDERS, (0)EVEN, (15)ODD

I DATA ADDRESS (DISK ADDR TEST)
I END CYL FLAG

I UNIT MASK 1400 OR 400 OR 0
I HEAD MASK 7400 OR 17400 OR 400
I SECTOR MASK 7400 OR 3400
I # SECTORS MASK 7400 OR 3400
I # SECTOR TRANSFERRED ON CHK WD ERR
I REPEAT TEST ADDRESS
```

```

10015 ,MAIN
01
02 00313 000015 ,13MS: 13.
03 00314 000052 ICYLF: CYLF
04 00315 001371 IALL: ALL
05 00316 004731 IDLY: DLYTM
06 00317 005557 ISAC: SAC
07 00320 005563 ISTAC: STAC
08 00321 004240 IPDEC: PUEC
09 00322 004234 ITAC1: POCT
10 00323 004233 ITZ1: ZOCT
11 00324 004205 IMESS: MESS
12 00325 004345 ICRLF: CRLF
13 00326 005000 ISRH: SRH
14 00327 005062 IGATH: GATH
15 00330 003617 IHSS: HSS
16 00331 005567 INP: INP
17 00332 005247 IGEN: G
18 00333 005246 ICHK: C
19 00334 005371 IYAR: VAR,0
20 00335 001143 ICLRB: CLRB
21 00336 001155 ISET: SET
22 00337 005011 ISM: SM
23 00340 000072 ISTB0: STB0
24 00341 000717 INIL: INIL.
25 00342 001052 WAIT: WAIT
26 00343 005442 I,DBD: ,DBD
27 00344 003526 IRDAT: RDATA
28 00345 003165 IWDAT: WDATA
29 00346 002723 IGCS: GCS
30 00347 003462 IRI: ,READ
31 00350 003147 IW: ,WRITE
32 00351 003103 IS: ,SEEK
33 00352 003045 IRC: RECL
34 00353 001413 IPS: PS
35 00354 005107 IHED: HED
36 00355 003657 ICSN: ,CSN
37 00356 002274 ISCNT: SCNT
38 00357 002616 ICST: CMOST
39 00360 002614 IQUST: QUEST
40 00361 001051 IWT: WAIT=1
41 00362 005405 IRAN: RAN
42 00363 001427 I,GSD: ,GSD
43 00364 000754 ISU: ,SET
44 00365 000661 IRCAL: RCALL
45 00366 000000 CYLNX: 0
46 00367 000000 NO,BS: 0
47 00370 000102 C102: 102
48 00371 000000 SVLHD: 0
49 00372 123456 ,RAN: 123456
50 00373 002000 C2000: 2000
51 00374 004004 IACAL: ADCAL
52 00375 003073 IFNGK: FNGIK
53
54

```

IBASE RANDOM NUMBER

```

10016 ,MAIN
01 101011 SKIP=MOV# 0,0,SKP
02 000020 IDY0=20
03 000021 IDX1=21
04 000033 ,DSKP=33
05 006315 DOALL=JSR #IALL
06 006362 RAND=JSR #IRAN
07 006317 SAVAC=JSR #ISAC
08 006320 SETAC=JSR #ISTAC
09 006321 TYPDEC=JSR #IPDEC
10 006322 TYPAC1=JSR #ITAC1
11 006323 TYPZ1=JSR #ITZ1
12 006324 MESSAGE=JSR #IMESS
13 006325 PCRLF=JSR #ICKLF
14 006331 INPUT=JSR #IINP
15 006333 CHECK=JSR #ICMK
16 006332 GEN=JSR #IGEN
17 006330 GETPAR=JSR #IMSS
18 006327 GETATH=JSR #IGATH
19 006326 SEARCH=JSR #ISRH
20 006335 CLRRB=JSR #ICLRB
21 006336 SETP=JSR #ISET
22 006337 SMEM=JSR #ISM
23 006340 SETB=JSR #ISTB0
24 006341 INITE=JSR #INIL
25 002353 PSTAT=JMP #IPS
26 006347 READ=JSR #IR
27 006350 WRITE=JSR #IW
28 006351 SEEK=JSR #IS
29 006352 RECAL=JSR #IRC
30 006355 CKSW=JSR #ICSW
31 006354 HEADER=JSR #IHED
32 006361 INTWT=JSR #IWT
33 006041 TYPASC=JSR #A1
34 006316 DELAY=JSR #IDLY
35 000401 NOP=401
36
37 006364 SETU=JSR #ISU
38 006374 CALAD=JSR #IACAL

```

```

DO FOLLOWING ROUTINE FOR ALL RDY UNITS
/GENERATE RANDOM # IN ACB
/SAVE AC0,1,2
/RESTORE AC0,1,2
/TYPE (AC1) IN DECIMAL
/TYPE (AC1) IN OCTAL
/TYPE (AC1) IN OCTAL, SUPP LEAD 0'S
/TYPE FOLLOWING MESSAGE IN ASCII
/TYPE CR-LF
/GET A LINE OF INPUT
/CHECK ALL OF DATA BUFFER
/GENERATE DATA BUFFER
/GET HEAD=SECT=# SECT FROM INPUT LINE
/GET NAME OR # FROM INPUT LINE
/SEARCH FOLLOWING TABLE FOR MATCH ON AC1
/CLEAR READ BUFFER
/SET DISK PARAMETERS
/SIZE MEMORY
/SET TIME BASE
/INITIALIZE ERROR COUNTERS ETC.
/PRINT STATUS
/DISK READ & CHECK DATA
/GENERATE DATA AND WRITE DISK
/SEEK NEW CYLINDER
/RECALIBRATE
/CHECK CONSOLE SWITCHES
/PRINT ERROR MESSAGE HEADER
/INTERRUPT WAIT ROUTINE
/TYPE (AC0)R IN ASCII
/MS DELAY IS IN LOC DELAY+1.

```

```

/SET READY UNITS
/ADDRESS CALCULATOR.

```

```

10017 ,MAIN
01 /
02 / ** STARTING ADDRESSES ***
03 /
04 /
05 000500 .LOC 500
06
07 00000 004421 BEGIN: JSR STRY ;RELIABILITY TEST, ALL CYL.
08 00001 004420 JSR STRY / " " EVEN "
09 00002 004417 JSR STRY / " " ODD "
10 00003 004416 JSR STRY ;DISK ADDRESS TEST
11 00004 002375 JMP @IFNOK ;NOT USED-ILLEGAL START ADDR8
12 00005 000467 JMP STRC ;COMMAND STRING INTERPRETER
13 00006 004413 JSR STRY ;ONES TEST
14 00007 004412 JSR STRY ;ZEROS TEST
15 00010 004411 JSR STRY ;110110 TEST
16 00011 004410 JSR STRY ;FLOATING ONES TEST
17 00012 004407 JSR STRY ;FLOATING ZEROS TEST
18 00013 004406 .RAL: JSR STRY ;RUN ALL
19 00014 004405 JSR STRY ;SEEK EXERCISER
20 00015 002365 JMP @IRCAL ;RECALIBRATE UNIT 1
21 00016 002365 JMP @IRCAL ;RECALIBRATE UNIT 2
22 00017 002365 JMP @IRCAL ;RECALIBRATE UNIT 3
23 00020 002365 JMP @IRCAL ;RECALIBRATE UNIT 0

```

```

10018 ,MAIN
01 /
02 / *****
03 / *** INITIALIZATION ***
04 / *****
05
06 00521 020303 STRT: LDA 0,FIRST ;INITIALIZATION, ALL
07 00522 116400 SUB 0,3
08 00523 054475 STA 3,INDEX
09 00524 006337 RSTR: SMEM ;SIZE MEMORY
10 00525 006340 SETB ;SET TIME BASE
11 00526 003077 HALT ;ERROR RTN FROM TIME INITIALIZE,
12 00527 006341 INITE ;INITIALIZE BUFFERS, COUNTERS, ETC.
13 00530 006364 SETU ;SET READY UNITS
14 00531 126400 SUB 1,1 ;AC0=READY UNIT PATTERN
15 00532 101225 MOVZR 0,0,SNR
16 00533 000404 JMP R33 ;UNIT 0 ONLY
17 00534 101224 MOVZR 0,0,SZR ;UNIT 2 OR 3 MASK=3
18 00535 125140 MOVOL 1,1 ;UNIT 1 MASK=1
19 00536 125140 MOVOL 1,1
20 00537 125300 R33: MOVS 1,1
21 00540 044304 STA 1,UMSK ;UNIT MASK
22 00541 002677 IORST
23 00542 030045 LDA 2,NEST ;IS DISK SIZE
24 00543 025000 LDA 1,0,2
25 00544 125005 MOV 1,1,SNR ;SPECIFIED ??
26 00545 006363 JSR @1,USD ;NO, GET IT
27 00546 006325 PCRLF
28 00547 006324 MESSAGE
29 00550 006477 MSG70 ;"TESTING UNIT "
30 00551 006315 DOALL
31 00552 000502 TUN ;TYPE UNIT NUMBERS
32 00553 003511 SKPBZ TTO ;WAIT FOR TTO
33 00554 000777 JMP .=1 ;TO FINISH
34 00555 000211 NIOC TTO ;CLEAR DONE
35 00556 020424 LDA 0,STR.2
36 00557 030441 LDA 2,INDEX
37 00560 113000 ADD 0,2
38 00561 003000 JMP #0,2 ;GO TO IT 11

```

```

10019 .MAIN
01
02 00562 054410 TUN1 STA 3,TUNRET /TYPE UNIT NUMBER
03 00563 020174 LDA 0,UNIT /FOLLOWED BY A ", "
04 00564 024210 LDA 1,C00
05 00565 123000 ADD 1,0
06 00566 006041 TYPASC
07 00567 020404 LDA 0,COMA
08 00570 000041 TYPASC
09 00571 002401 JMP 0TUNRET
10 00572 000000 TUNRET: 0
11 00573 000054 COMA: ",
12
13 /COMMAND STRING INTERPRETER DOES NOT REQUIRE
14 /NORMAL INITIALIZATION.
15
16 00574 006337 STRC1 SMEM /SIZE MEMORY
17 00575 006340 SETB /SET TIME BASE
18 00576 006377 MALT /ERROR RTN FROM TIME INITIALIZE.
19 00577 006341 INITE /INITIALIZE BUFFERS ETC.
20 00000 006363 JSR 0I,0SD /SET LAST HEAD/SECTOR
21 00001 002407 JMP 0.CMD /DISPATCH TO ROUTINE
22
23
24 /
25 / *****
26 / *** DISPATCH TABLE TO PROGRAMS **
27 / *****
28 00602 000602 STR.21 *
29 00003 001510 RELALL /RELIABILITY TEST, ALL CYL
30 00004 001500 RELEV / " EVEN "
31 00005 001505 RELOD / " ODD "
32 00006 002002 DATK /DISK ADDRESS TEST
33 00007 000657 FX,4 /NOT USED
34 00010 002610 ,CMD1 CMDST /COMMAND STRING INTERPRETER
35 00011 002000 DAT1 /ONES TEST
36 00012 002010 DAT0 /ZEROS TEST
37 00013 002012 DATP /110110 PATTERN
38 00014 002014 DATF1 /FLOAT ONE
39 00015 002016 DATF0 /FLOAT ZERO
40 00016 001741 RUNALL /RUN ALL PARTS
41 00017 001772 DAXSK /SEEK EXERCISER
42 00620 000000 INDEX: 0

```

```

10020 .MAIN
01
02 00021 000000 CSP2: 0
03 00022 100037 CIOMSK: 100037 /*****
04 /** INITIALIZATION **
05 /** SUBROUTINES **
06 00023 003656 .LST: MIADD /*****
07 00024 000521 .LST1: STRT
08
09 /CHANGE I/O ADDRESS TO 33 OR 73
10
11 00025 102401 FXADD: SUB 0,0,0KP /MAKE IT 33
12 00026 020215 LDA 0,C40 /MAKE IT 73
13 00027 040772 STA 0,CSP2
14 00030 030774 LDA 2,.LST1 /POINTER IN MEMORY
15 00031 024771 FX,2: LDA 1,CIOMSK /INST MASK
16 00032 021000 LDA 0,0,2 /GET A WORD
17 00033 107400 AND 0,1
18 00034 034231 LDA 3,CWRD /IS IT AN I/O 33 OR 73 ?
19 00035 136404 SUB 1,3,0ZR
20 00036 000406 JMP FX,3 /NO
21 00037 024432 LDA 1,M41 /MASK
22 00040 123400 AND 1,0 /GET RID OF BIT 10
23 00041 024760 LDA 1,CSP2
24 00042 123000 ADD 1,0 /MAKE ADDR 33 OR 73
25 00043 041000 STA 0,0,2 /ADDR CHANGED
26 00044 151400 FX,3: INC 2,2
27 00045 034750 LDA 3,.LST
28 00046 156404 SUB 2,3,0ZR
29 00047 000702 JMP FX,2 /MORE
30 00050 020213 LDA 0,C33 /SET (CDSK) TO
31 00051 024750 LDA 1,CSP2 /EQUAL THE DEVICE ADDR
32 00052 107000 ADD 0,1
33 00053 044301 STA 1,CDSK
34 00054 030045 LDA 2,NEST
35 00055 025000 LDA 1,0,2
36 00056 125005 MOV 1,1,0NR
37 00057 003077 FX,4: MALT /ALL DONE
38 00060 002003 JMP 03
39
40 /RECALIBRATE THE UNIT IN SW 14-15
41
42 00061 000477 RCALL: READS 0
43 00062 024211 LDA 1,C3
44 00063 123400 AND 1,0
45 00064 040174 STA 0,UNIT
46 00065 006352 RECAL /RECALIBRATE ;
47 00066 000771 JMP FX,4
48 00067 000770 JMP FX,4
49 00070 000767 JMP FX,4
50
51 00071 177737 M41: =41
52

```



```

10021 ,MAIN
01
02
03
04
05 00672 054424 STB0: STA 3,SVSTB
06 00673 002077 IORST
07 00674 020421 LDA 0,IRUP
08 00675 040001 STA 0,1
09 00676 032233 LDA 2,@ICALIB ;SKP THE TIMER IF CALIB
10 00677 151004 MOV 2,2,SZR ;HAS BEEN LOADED.
11 00700 000413 JMP STB2
12 00701 000220 JSR @STIME ;RUN PROCESSOR TIMER.
13 00702 125015 MOV# 1,1,SNR ;CKN COUNT LOADED.
14 00703 000406 JMP STB1 ;ERROR IN TIMING ROUTINE!
15 00704 040233 STA 1,@ICALIB ;STORE COUNT IN CALIB.
16 00705 006241 JSR @IXLAY ;INIT THE DELAY SUBR.
17 00706 125015 MOV# 1,1,SNR ;VERIFY SUBR. IS SETUP.
18 00707 000402 JMP STB1 ;,WERK IS NOT LOADED W/ 1MS COUNT.
19 00710 000403 JMP STB2
20 00711 034405 STB1: LDA 3,SVSTB
21 00712 001400 JMP 0,3 ;ERR IN TIME INIT. RTN TO CALL+1.
22 00713 034403 STB2: LDA 3,SVSTB ;OTHERWISE
23 00714 001401 JMP 1,3 ;RETURN TO CALL+2.
24
25 00715 001013 IRUP: INTERRUPT
26 00716 000000 SVSTB: 0
27
28 ;CLEAR ERROR COUNTERS ETC.
29
30 00717 030314 INIL: LDA 2,ICVLF
31 00720 024206 LDA 1,SSH+1
32 00721 102400 SUB 0,0
33 00722 041000 STA 0,0,2
34 00723 151400 INC 2,2
35 00724 132414 SUB# 1,2,SZR
36 00725 000775 JMP -3
37 00726 040177 STA 0,RALL
38 00727 020406 LDA 0,INIL0 ;LOAD # LOOPS OF
39 00730 042406 STA 0,@INIL0+1 ;RELIAB. COUNTER
40 00731 020403 LDA 0,+3
41 00732 040247 STA 0,RANDOM
42 00733 001400 JMP 0,3
43 00734 123456 123456
44 00735 001750 INIL0: 1000.
45 00736 001750 CRALL

```

```

10022 ,MAIN
01
02 ;FIND AVAILABLE DISK DRIVE UNITS
03
04 00737 054414 SETU: STA 3,.RET
05 00740 021026 LDA 0,UNINS,2
06 00741 063033 UDC 0,.DSKP ;SELECT THE UNIT
07 00742 020225 LDA 0,C1000
08 00743 001333 DOAP 0,.DSKP ;SEEK 0
09 00744 025046 LDA 1,UNTSK,2
10 00745 060433 DIA 0,.DSKP ;WAIT FOR UNIT TO
11 00746 123405 AND 1,0,SNR ;BEGIN SEEKING
12 00747 000776 JMP -2
13 00750 000316 DELAY ;WAIT 13 MS
14 00751 000313 .13MS ;TIME CONSTANT FOR DELAY SUBR.
15 00752 002401 JMP #,RET
16 00753 000000 ,RET: 0
17
18
19 ;SET READY UNITS
20
21 00754 054436 ,SET: STA 3,.SRET
22 00755 020212 LDA 0,C17 ;FAKE ALL UNITS AVAILABLE
23 00756 040175 STA 0,RDYUNT
24 00757 000316 DDALL ;CHECK ALL TO SEE
25 00760 000737 SETU. ;WHICH ARE THERE
26 00761 000316 DELAY
27 00762 000234 .200MS ;WAIT 200 MILLISECS.
28 00763 000433 DIA 0,.DSKP ;READ STATUS
29 00764 002677 IORST ;RELEASE THE ADAPTER
30 00765 126400 SUB 1,1
31 00766 101300 MOVS 0,0
32 00767 101200 MOVR 0,0
33 00770 101200 MOVR 0,0
34 00771 101200 MOVR 0,0
35 00772 101200 MOVR 0,0 ;A SEEK DONE INDICATES
36 00773 125100 MOVL 1,1 ;A READY UNIT
37 00774 101200 MOVR 0,0
38 00775 125100 MOVL 1,1
39 00776 101200 MOVR 0,0
40 00777 125100 MOVL 1,1
41 01000 101200 MOVR 0,0
42 01001 125100 MOVL 1,1
43 01002 044175 STA 1,RDYUNT
44 01003 125004 MOV 1,1,SZR
45 01004 002406 JMP 0,SRET ;DONE
46 01005 000325 PCRLF ;NONE READY
47 01006 000324 MESSAGE
48 01007 000043 MSG16 ;"NO READY UNITS"
49 01010 003077 HALT
50 01011 000744 JMP ,SET+1
51 01012 000000 ,SRET: 0

```

```

10023 ,MAIN
01
02
03 / *****
04 / *** INTERRUPT SERVICING **
05 / *****
06 01013 054246 INTER: STA 3,SAV3
07 01014 006317 SAVAC
08 01015 005477 INTA 1 ;WHO DID IT???
09 01016 044424 STA 1,50
10 01017 030301 LDA 2,CDSK
11 01020 132415 SUB# 1,2,SNR
12 01021 000422 JMP INT.1 ;DISK PACK INTERRUPT
13 01022 030025 LDA 2,C10
14 01023 132415 SUB# 1,2,SNR
15 01024 000445 JMP ITTI ;TTI INTERRUPT
16 01025 034251 LDA 3,CNIOC ;SOMEONE ELSE
17 01026 137000 ADD 1,3
18 01027 054401 STA 3,#+1
19 01030 050200 NIOC 0 ;DEV ADDR ADDED DYNAMICALLY
20 01031 006325 PCRLF
21 01032 006324 MESSAGE
22 01033 000005 MSG9 ;INTERRUPT FROM DEVICE
23 01034 024406 LDA 1,50
24 01035 006323 TYPZ1
25 01036 006320 SETAC
26 01037 034246 LDA 3,SAV3
27 01040 000177 INTEN
28 01041 000000 JMP 00 ;RETURN
29 01042 000000 00: 0
30

```

```

10024 ,MAIN
01
02
03 ;DISK PACK INTERRUPT
04
05
06 01043 000033 INT.1: DIAC 0,,DSKP
07 01044 040242 STA 0, ISTAT ;SAVE FOR ALL TO USE
08 01045 030174 LDA 2, UNIT
09 01046 010421 ISZ WTRET
10 01047 002420 JMP #WTRET
11
12 01050 002000 MSKB5: 2000
13
14 ;WAIT FOR INTERRUPT
15 ;RUN TIMER TO PREVENT HANGUP
16
17 01051 020417 LDA 0,HAYXX ;WAIT=1 IS NORMAL ENTR TO WAIT SUBR.
18 01052 040405 WAIT: STA 0,WAIT1 ;WAIT TIME IS IN ACC BEFORE JSR.
19 01053 126400 SUB 1,1
20 01054 054413 STA 3,WTRET
21 01055 000177 INTEN ;ENABLE INTERRUPTS
22 01056 000316 DELAY
23 01057 000001 WAIT1: 1
24
25 01060 000277 INTDS ;TIMEOUT, DISABLE INTER.
26 01061 002077 IORST ;CLEAR ADAPTER FOR 2ND COMP.
27 01062 000354 HEADER ;PRINT
28 01063 000325 PCRLF ;ERROR MESSAGE
29 01064 000324 MESSAGE
30 01065 000337 MSG59 ;"INTERRUPT TIMEOUT"
31 01066 002401 JMP #WTRET ;ERROR RETURN (+1)
32 01067 000000 WTRET: 0
33 01070 000235 HAYXX: .2KMS

```

```

10025 ,MAIN
01
02          ;TELETYPE INTERRUPT
03
04 01071 000210 ITT1:  NIOC TTI          ;KNOCK DOWN THE TTI FLAG
05 01072 020173      LDA 0,C0IF      ;CSI FLAG (SA 505)
06 01073 101004      MOV 0,0,SZR
07 01074 002357      JMP 0,IC8I      ;RETURN TO CSI
08 01075 020272      LDA 0,EVDON      ;IF TWO COMPUTERS
09 01076 101005      MOV 0,0,SNR      ;ONLY PRINT DURING
10 01077 000404      JMP ,+4          ;READ OR WRITE
11 01100 020203      LDA 0,MODE
12 01101 101225      MOVZR 0,0,SNR
13 01102 000433      JMP ITT,5
14 01103 006325      PCRLF
15 01104 006325      PCRLF
16 01105 020174      LDA 0,UNIT
17 01106 040433      STA 0,SAVU
18 01107 020312      LDA 0,ALLRET      ;SAVE ALL RETURN
19 01110 040432      STA 0,SAVA
20 01111 020544      LDA 0,POT-1
21 01112 040021      STA 0,IDX1
22 01113 022021      ITT,1:  LDA 0,0,IDX1      ;PRINT TABLE
23 01114 101005      MOV 0,0,SNR
24 01115 000414      JMP ITT,4
25 01116 040405      STA 0,ITT,2
26 01117 022021      LDA 0,0,IDX1
27 01120 040405      STA 0,ITT,3
28 01121 006325      PCRLF
29 01122 006324      MESSAGE
30 01123 000000      ITT,2:  0
31 01124 006315      DOALL
32 01125 000000      ITT,3:  0
33 01126 003010      SKPDN TTI
34 01127 000764      JMP ITT,1
35 01130 000210      NIOC TTI
36 01131 020410      ITT,4:  LDA 0,SAVU      ;RESTORE UNIT #
37 01132 040174      STA 0,UNIT
38 01133 020407      LDA 0,SAVA      ;RESTORE ALL RETURN
39 01134 040312      STA 0,ALLRET
40 01135 006320      ITT,5:  SETAC
41 01136 034246      LDA 3,SAV3
42 01137 000177      INTEN
43 01140 000000      JMP 00
44 01141 000000      SAVU:  0
45 01142 000000      SAVA:  0
46
47          ;CLEAR READ BUFFER
48
49 01143 102400      CLR8:  SUB 0,0          ;CLEAR READ BUFFER
50 01144 030267      LDA 2,BUFF      ;SPACE TO ZEROS
51 01145 024255      LDA 1,SC
52 01146 125300      MOV5 1,1
53 01147 147000      ADD 2,1
54 01150 041000      STA 0,0,2
55 01151 151400      INC 2,2
56 01152 132414      SUB# 1,2,SZR
57 01153 000775      JMP ,+3
58 01154 001400      JMP 0,3

```

```

10026 ,MAIN
01
02          ;SET PARAMETERS
03
04 01155 054465      SET1:  STA 3,SERET
05 01156 030174      LDA 2,UNIT      ;SETUP DISK CONTROL
06 01157 020255      LDA 0,SC        ;FOR CURRENT INSTRUCTION
07 01160 040310      STA 0,SC
08 01161 034271      LDA 3,SHAX      ;MAX # SECT DUE TO MEM SIZE
09 01162 116433      SUBZ# 0,3,SNC
10 01163 000400      JMP 3,1
11 01164 100400      NEG 0,0        ;MEMORY TOO SMALL
12 01165 024212      LDA 1,C17      ;CA=HEAD=SECTOR
13 01166 107400      AND 0,1        ;SECTOR COUNT
14 01167 021026      LDA 0,UNTINS,2
15 01170 107000      ADD 0,1
16 01171 020204      LDA 0,SEC      ;FIRST SECTOR
17 01172 103120      ADDZL 0,0
18 01173 103120      ADDZL 0,0
19 01174 107000      ADD 0,1
20 01175 020206      LDA 0,HD
21 01178 101300      MOV5 0,0
22 01177 107000      ADD 0,1
23 01200 007233      DOCC 1,,DSKP   ;LOAD UNIT=HEAD=SECT=CNT
24 01201 002433      DIC 0,,DSKP   ;READ IT BACK
25 01202 122415      SUB# 1,0,SNR   ;CHECK
26 01203 000406      JMP SET1
27 01204 006317      SAVAC        ;LOAD ERROR
28 01205 006325      PCRLF
29 01206 006324      MESSAGE
30 01207 006304      MSG53
31 01210 000412      JMP SET2
32
33 01211 024257      SET1:  LDA 1,CA
34 01212 006033      DOB 1,,DSKP   ;LOAD CURRENT ADDRESS
35 01213 001433      DIB 0,,DSKP   ;READ IT BACK
36 01214 106415      SUB# 0,1,SNR   ;CHECK
37 01215 002425      JMP 0,SERET
38 01216 006317      SAVAC        ;LOAD ERROR
39 01217 006325      PCRLF
40 01220 006324      MESSAGE
41 01221 006307      MSG54
42 01222 006324      SET2:  MESSAGE
43 01223 006312      MSG55        ;"LOAD ERROR"
44 01224 006325      PCRLF
45 01225 006324      MESSAGE
46 01226 000276      MSG51        ;GOOD
47 01227 024244      LDA 1,SAV1
48 01230 006322      TYPAC1
49 01231 006324      MESSAGE
50 01232 006301      MSG52        ;BAD

```

10027 ,MAIN

```
01
02 01233 024243 LDA 1,SAV0
03 01234 006322 TYPAC1
04 01235 030174 LDA 2,UNIT
05 01236 011156 ISZ MISC,2
06 01237 000355 CKSW
07 01240 000710 JMP SET+1
08 01241 002401 JMP @SERET
09 01242 000000 SERET: 0
10
11 01243 006317 S,11 SAVAC
12 01244 006325 PCRLF
13 01245 006324 MESSAGE
14 01246 006234 MSG39
15 01247 024243 LDA 1,SAV0
16 01250 006323 TYPZ1
17 01251 006324 MESSAGE
18 01252 006247 MSG40
19 01253 0063077 HALT
20 01254 000400 JMP .
21
22 IPRINT TABLE
23
24 01255 001255 .
25 01256 000021 PDY: MSG13
26 01257 001317 PHDR
27 01260 006034 MSG15
28 01261 001327 PTSEK
29 01262 006025 MSG14
30 01263 001323 PSKER
31 01264 006127 MSG23
32 01265 001332 PTW
33 01266 006137 MSG26
34 01267 001337 PTWR
35 01270 000174 MSG29
36 01271 001346 PTAER
37 01272 000204 MSG30
38 01273 001350 PTPAE
39 01274 006146 MSG27
40 01275 001342 PTCWE
41 01276 006100 MSG20
42 01277 001344 PTCWP
43 01300 006216 MSG31
44 01301 001352 PTDER
45 01302 006343 MSG61
46 01303 001354 PTPDE
47 01304 006401 MSG65
48 01305 001360 PTCWD
49 01306 006415 MSG06
50 01307 001362 PTPCN
51 01310 006354 MSG62
52 01311 001356 PTHS
53 01312 006025 MSG72
54 01313 001364 PSKTO
55 01314 006540 MSG73
56 01315 001366 PRWTO
57 01316 000000 0
```

ICOUNT AS A MISC ERROR

ICHECK SWITCHES

IMEM TOO SMALL

ISECTORS, RESTART

10028 ,MAIN

```
01 01317 054401 PHDK: STA 3,TRET IPRINT HEADER NUMBER
02 01320 024174 LDA 1,UNIT
03 01321 006323 TYPZ1
04 01322 002446 JMP @TRET
05
06 01323 025072 PSKER: LDA 1,SEKER,2 IPRINT # SEEK ERRORS
07 01324 054444 PS,11 STA 3,TRET
08 01325 006321 TYPDEC
09 01326 002442 JMP @TRET
10
11 01327 025062 PTSEK: LDA 1,SEEKT,2 IPRINT # SEEKS
12 01330 031066 LDA 2,SEEKT+4,2
13 01331 000403 JMP PT,1
14
15 01332 025076 PTW: LDA 1,WDSW,2 IPRINT WORDS WRITTEN
16 01333 031102 LDA 2,WDSW+4,2
17 01334 054434 PT,11 STA 3,TRET
18 01335 006343 JSR @I,DBD
19 01336 002432 JMP @TRET
20
21 01337 025106 PTWR: LDA 1,WDSR,2 IPRINT WORDS READ
22 01340 031112 LDA 2,WDSR+4,2
23 01341 000773 JMP PT,1
24
25 01342 025116 PTCWE: LDA 1,CWER,2 IPRINT CHECK WORD ERRORS
26 01343 000761 JMP PS,1
27
28 01344 025122 PTCWP: LDA 1,CWERP,2 IPRINT PERM CHK WD ERRS
29 01345 000757 JMP PS,1
30
31 01346 025126 PTAER: LDA 1,ADDER,2 IPRINT ADDRESS ERRORS
32 01347 000755 JMP PS,1
33
34 01350 025132 PTPAE: LDA 1,PADER,2 IPRINT PERM ADDR ERRS
35 01351 000753 JMP PS,1
36
37 01352 025136 PTDER: LDA 1,DATER,2 IPRINT DATA ERRORS
38 01353 000751 JMP PS,1
39
40 01354 025152 PTPDE: LDA 1,PUER,2 IPRINT PERM DATA ERRS
41 01355 000747 JMP PS,1
42
43 01356 025156 PTHS: LDA 1,MISC,2 IPRINT # MISC ERRORS
44 01357 000745 JMP PS,1
45
46 01360 025142 PTCWD: LDA 1,CWDE,2 IPRINT # CHK WD AND
47 01361 000743 JMP PS,1 IPRINT # DATA ERRORS.
48
49 01362 025146 PTPCW: LDA 1,CWDEP,2 IPRINT # PERM CHECK WORD
50 01363 000741 JMP PS,1 IPRINT # AND DATA ERRORS
51
52 01364 025162 PSKTO: LDA 1,SKTNO,2 IPRINT # OF SEEK AND
53 01365 000737 JMP PS,1 IPRINT # RECAL ERRORS.
54
55 01366 025166 PRWTO: LDA 1,RWTNO,2 IPRINT # OF READ/WRITE
56 01367 000735 JMP PS,1 IPRINT # TIMEOUTS.
57 01370 000000 TRET: 0
```

```

10020 ,MAIN
01
02
03
04
05
06 01371 054312 ALL: STA 3,ALLRET
07 01372 102400 SUB 0,0
08 01373 040174 ALL.1: STA 0,UNIT
09 01374 034312 LDA 3,ALLRET
10 01375 030174 LDA 2,UNIT
11 01376 021022 LDA 0,DRVS,2
12 01377 024175 LDA 1,RDYUNT
13 01400 123414 ANDM 1,0,SZR
14 01401 007400 JSR 00,3
15 01402 000401 JMP .+1
16 01403 000401 JMP .+1
17 01404 010174 ISZ UNIT
18 01405 020174 LDA 0,UNIT
19 01406 024024 LDA 1,C4
20 01407 122414 SUB# 1,0,SZR
21 01410 000703 JMP ALL.1
22 01411 010312 ISZ ALLRET
23 01412 002312 JMP 0ALLRET
24
25
26
27
28
29
30
31 01413 000354 P8: HEADER
32 01414 000325 PCRLF
33 01415 024242 LDA 1,ISTAT
34 01416 000322 TYPAC1
35 01417 000324 MESSAGE
36 01420 005767 MSG1
37 01421 002276 JMP 0RWRET
38
39
40 01422 000000 EGGS: 0
41 01423 000000 0
42 01424 000000 0
43 01425 000000 0
44 01426 000000 0

JEXECUTE THE ROUTINE POINTED TO BY
THE WORD FOLLOWING THE CALL. DO TO
NCE FOR EACH ACTIVE UNIT

;DO IT FOR THIS UNIT
;IGNORE RETURN+1,+2 ROUT'S

;PRINT STATUS

;# = ENDING STATUS"

;WHEN FLAG
;DEVICE CODE THIS RUN
;NOT USED
;# OF PASSES THIS RUN
;RETURN ADDRESS

```

```

10030 ,MAIN
01
02
03
04 01427 054425 ,GSD: STA 3,FDSRET
05 01430 000325 PCRLF
06 01431 000324 MESSAGE
07 01432 000400 MSG69
08 01433 000331 INPUT
09 01434 000261 UBP
10 01435 000445 JMP ,GSD1
11 01436 000327 GETATM
12 01437 100000 MOV 0,1
13 01440 000326 SEARCH
14 01441 001455 MNUM
15 01442 000440 JMP ,GSD1
16 01443 021011 FDS.2: LDA 0,SMX=MNUM,2
17 01444 040010 STA 0,LS
18 01445 021005 LDA 0,MMX=MNUM,2
19 01446 040027 STA 0,LHD
20 01447 021015 LDA 0,MS1=MNUM,2;HEAD MASK
21 01450 040305 STA 0,MMSK
22 01451 021021 LDA 0,MS2=MNUM,2;SECTOR MASK
23 01452 040300 STA 0,SMK
24 01453 002401 JMP 0FDSRET
25 01454 000000 FDSRET: 0

;ASK FOR DISK SIZE

;"TYPE THE NUMBER OF DISK SURFACES "
;WAIT FOR INPUT
;BYTE POINTER
;"CR" ONLY IS ERROR
;GET THE NUMBER

;IS NUMBER 2,4,10 OR 20
;TABLE ADDRESS
;NO !!

;LAST SECTOR+1
;LAST HEAD+1

```

```

10031 ,MAIN
01
02 01455 000002 HNUM1 2
03 01456 000010 10
04 01457 000020 20
05 01460 000004 4
06 01461 000000 0
07
08 01462 000002 HMX1 2
09 01463 000012 10.
10 01464 000024 20.
11 01465 000004 4
12
13 01466 000014 SMX1 12.
14 01467 000000 0
15 01470 000014 12.
16 01471 000014 12.
17
18 01472 000400 MS11 400
19 01473 007400 7400
20 01474 017400 17400
21 01470 001400 1400
22
23 01476 007400 MS21 7400
24 01477 003400 3400
25 01500 007400 7400
26 01501 007400 7400
27
28 01502 006324 ,GSD11 MESSAGE
29 01503 006256 MSG43
30 01504 000724 JMP ,GSD+1

```

```

;CARTRIDGE
;2311
;2314
;
;CARTRIDGE
;2311
;2314
;
;HEAD MASKS
;
;SECTOR MASKS
;
;ERROR
; "-7="

```

```

10032 ,MAIN
01
02
03
04
05
06 01505 102021 RELODI: SUBZR 0,0,SKP ;USE ODD CYLINDERS
07 01506 102520 RELEV: SUBZL 0,0 ;USE EVEN CYLINDERS
08 01507 101001 MOV 0,0,SKP
09 01510 102400 RELALL: SUB 0,0 ;USE ALL CYLINDERS
10 01511 040272 STA 0,EYD0N
11 01512 020302 LDA 0,IRAN ;SET FOR RANDOM DATA
12 01513 042344 STA 0,PIRDAT
13 01514 042345 STA 0,PIWDAT
14 01515 020207 LDA 0,BUFF ;THEN ADDR. CONST
15 01516 040257 STA 0,CA
16 01517 020221 LDA 0,C203.
17 01520 040506 STA 0,RATIO ;RATIO OF REL LOOPS TO EACH SEEK TEST
18
19
20 01521 006302 REL.11: RAND ;GET RANDOM UNIT #
21 01522 030304 LDA 2,UMSK ;UNIT SIZE MASK
22 01523 113700 ANDS 0,2
23 01524 021022 LDA 0,DRVS,2
24 01525 024175 LDA 1,RDYUNT ;UNIT READY ?
25 01526 123405 AND 1,0,SNR
26 01527 000772 JMP REL.1 ;NO, TRY AGAIN
27 01530 050174 STA 2,UNIT
28
29 01531 006362 REL.21: RAND ;GET RANDOM HEAD #
30 01532 024305 LDA 1,MHMK ;HEAD SIZE MASK
31 01533 123700 ANDS 1,0
32 01534 024207 LDA 1,LMD ;HEAD # OK ?
33 01535 106437 SUBZ# 0,1,SNB
34 01536 000773 JMP REL.2 ;TOO LARGE, TRY AGAIN
35 01537 040256 STA 0,HD
36
37 01540 006362 REL.31: RAND ;GET RANDOM STARTING SECTOR
38 01541 024306 LDA 1,SMK ;SECTOR SIZE MASK
39 01542 123700 ANDS 1,0
40 01543 024210 LDA 1,LS ;SECT # OK ?
41 01544 106437 SUBZ# 0,1,SNB
42 01545 000764 JMP REL.2 ;TOO LARGE, TRY AGAIN
43 01546 040254 STA 0,SEC
44
45 01547 006362 REL.41: RAND ;GET RANDOM # OF SEC
46 01550 024307 LDA 1,LMSK ;# SECTORS MASK
47 01551 123705 ANDS 1,0,SNR ;DON'T ALLOW 0
48 01552 020455 LDA 0,C20 ;ZERO IS ACTUALLY 20
49 01553 024271 LDA 1,SMAX ;ENOUGH CORE ?
50 01554 106433 SUBZ# 0,1,SNB
51 01555 000772 JMP REL.4 ;NO, TRY AGAIN
52 01556 040255 STA 0,SC
53 01557 024254 LDA 1,SEC ;CHECK TO SEE IF
54 01558 030256 LDA 2,HD ;TRANSFER WILL CAUSE
55 01561 006317 SAVAC ;"END CYLINDER"
56 01562 010243 ISZ SAVB

```

```

10033 ,MAIN
01
02 01563 014243 REL.5: DSZ SAV0
03 01564 000402 JMP ,+2
04 01565 000420 JMP REL.6
05 01566 010244 ISZ SAV1
06 01567 020244 LDA 0,SAV1
07 01570 024210 LDA 1,LS
08 01571 122434 SUBZ# 1,0,SZR
09 01572 000771 JMP REL.5
10 01573 102400 SUB 0,0
11 01574 040244 STA 0,SAV1
12 01575 010245 ISZ SAV2
13 01576 020245 LDA 0,SAV2
14 01577 024207 LDA 1,LMD
15 01600 122414 SUB# 1,0,SZR
16 01601 000762 JMP REL.5
17 01602 020243 LDA 0,SAV0
18 01603 101224 MOVZ# 0,0,SZR
19 01604 000743 JMP REL.4
20
21 01605 006362 REL.6: RAND
22 01606 024224 LDA 1,C377
23 01607 123400 AND 1,0
24 01610 024272 LDA 1,EVDON
25 01611 125005 MOV 1,1,SNR
26 01612 000404 JMP REL.7
27 01613 101220 MOVZ# 0,0
28 01614 125100 MOVL 1,1
29 01615 101100 MOVL 0,0
30 01616 024221 REL.7: LDA 1,C203.
31 01617 122432 SUBZ# 1,0,SZC
32 01620 000765 JMP REL.6
33 01621 030174 LDA 2,UNIT
34 01622 025056 LDA 1,CYLT,2
35 01623 045052 STA 1,CYLP,2
36 01624 041056 STA 0,CYLT,2
37 01625 000403 JMP ,+3
38 01626 000000 RATIO: 0
39 01627 000020 C20: 20
40
41 J**
42 J** SEEK
43 J**
44
45 01630 102000 ADC 0,0
46 01631 040172 STA 0,H5W
47 01632 006351 SEEK
48 01633 006355 J**
49 01634 000776 JMP ,+2

```

```

;SECTOR COUNT OK!
;CURRENT SECT+1
;HEAD OVERFLOW ?
;NO, COUNT ANOTHER SECT
;YES, SELECT NEXT HEAD
;END CYLINDER ?
;NO, COUNT ANOTHER SECTOR
;YES, DONE IF THIS IS
;THE LAST SECTOR
; GET ANOTHER RAND #
;GET RANDOM CYLINDER #
;USE ALL CYLINDERS
;CYL # RIGHT ONE
;ODD BIT TO (C)
;CYL #, ODD OR EVEN
;IS CYL # < 203.
;NO, TRY ANOTHER #
;#TO#=#FROM#
;NEW "#TO"
;SEEK NEW CYLINDER
;ERROR, CHECK SWITCHES
;LOOP ON IT

```

```

10034 ,MAIN
01
02
03 J** WRITE DISK
04 J**
05
06 01635 102000 ADC 0,0
07 01636 040172 STA 0,H5W
08 01637 020247 LDA 0,RANDOM
09 01640 040250 STA 0,RELKAN
10 01641 020250 LDA 0,RELKAN
11 01642 040247 STA 0,RANDOM
12 01643 006350 WRITE
13 01644 006355 CKSW
14 01645 000774 JMP ,+4
15
16 01646 020272 LDA 0,EVDON
17 01647 101005 MOV 0,0,SNR
18 01650 000406 JMP ,RED
19 01651 102000 ADC 0,0
20 01652 040172 STA 0,H5W
21 01653 006351 SEEK
22 01654 006355 CKSW
23 01655 000776 JMP ,+2
24
25 J** READ DISK
26 J**
27 J**
28
29 01656 102000 ,RED: ADC 0,0
30 01657 040172 STA 0,H5W
31 01660 020250 LDA 0,RELKAN
32 01661 040247 STA 0,RANDOM
33 01662 006347 READ
34 01663 006355 CKSW
35 01664 000774 JMP ,+4
36
37
38 J** CHECK ENDING FOR TERMINATION
39
40 01665 020272 LDA 0,EVDON
41 01666 101004 MOV 0,0,SZR
42 01667 000416 JMP REL.8
43 01670 014736 DSZ RATIO
44 01671 000414 JMP REL.8
45 01672 020221 LDA 0,C203.
46 01673 040733 STA 0, RATIO
47 01674 020475 LDA 0,A1+7
48 01675 040277 STA 0,DADAT
49 01676 006315 DQALL
50 01677 002174 DAX,
51 01700 020362 LDA 0,IRAN
52 01701 042344 STA 0,IRDAT
53 01702 042345 STA 0,IRWAT
54 01703 020267 LDA 0,BUFF
55 01704 040257 STA 0,CA

```

```

;SAVE BEGINNING OF
;RANDOM NUMBERS
;RESET RANDOM NUMBERS
;FOR LOOPING
;GEN DATA & WRITE
;ERROR, CHECK SWITCHES
;LOOP ON IT
;IF TWO COMPUTERS, SEEK AGAIN
;ONLY ONE
;SEEK SAME CYLINDER
;ERROR, CHECK SWITCH CONTROL
;LOOP ON IT
;SET RAN # GEN FOR THE
;READ CHECK
;READ AND CHECK DATA
;ERROR, CHECK SWITCHES
;LOOP ON IT
;NOT RUN SEEK EXERCISER..
;RATIO OF REL. LOOPS TO SEEK TEST
;NO SEEK TEST YET.
;SEEK CHECKER TIME!!
;REFRESH RATIO COUNTER
;GET ADDRESS OF DATA GENERATOR
;STORE FOR WRITE & READ SUBR.
;DO IT FOR EACH DISK
;LOAD FOR CELLS REENTERING
;RELIABILITY.

```

```

10035 .MAIN
01
02
03 01705 020177 REL.0: LDA 0,RALL
04 01706 101005 MOV 0,0,SNR
05 01707 000402 JMP ,+2
06 01710 000411 JMP REL.0
07 01711 014445 DSZ CRALL
08 01712 000007 JMP REL.1
09 01713 006325 PCRLF
10 01714 006324 MESSAGE
11 01715 006253 MSG41
12 01716 020421 LDA 0,CD1K
13 01717 040437 STA 0,CRALL
14 01720 002420 JMP @CD1K+1
15 01721 014435 REL.0: DSZ CRALL
16 01722 002416 JMP @CD1K+1
17 01723 006325 PCRLF
18 01724 006324 MESSAGE
19 01725 006253 MSG41
20 01726 030045 LDA 2,45
21 01727 025000 LDA 1,0,2
22 01730 125005 MOV 1,1,SNR
23 01731 000410 JMP RUNALL
24 01732 015003 DSZ 3,2
25 01733 000406 JMP RUNALL
26 01734 000277 INTDS
27 01735 035004 LDA 3,4,2
28 01736 001400 JMP 0,3
29 01737 001700 CD1K: 1000.
30 01740 001021 REL.1
31

```

```

;IN REL ODD, REL EVN + REL MODE.
;IN RUN ALL MODE.
;COUNT DOWN # REL LOOPS
;AND LOOP.
;
;"PASS"
;RELOAD THE
;RELIAB. LOOP COUNTER
;MORE RELIABILITY
;RUN ALL MODE
;DO 512 LOOPS ONLY
;
;"PASS"

```

```

10036 .MAIN
01
02
03
04
05
06
07
08
09 01741 020234 RUNALL: LDA 0,.200MS
10 01742 040414 STA 0,CRALL
11 01743 040177 STA 0,RALL
12 01744 030410 LDA 2,A1=1
13 01745 050412 STA 2,PADD
14 01746 010411 R.1: ISZ PADD
15 01747 022410 LDA 0,@PADD
16 01750 101005 MOV 0,0,SNR
17 01751 002407 JMP @RADD
18 01752 040277 STA 0,DADAT
19 01753 006315 DQALL
20 01754 002040 DAT,
21 01755 000771 JMP R.1
22 01756 000000 CRALL: 0
23 01757 000000 PADD: 0
24 01760 001510 RADD: RELALL
25
26 01761 001761 .
27 01762 005743 A1: ZEROS
28 01763 005744 ONES
29 01764 005747 PAT1
30 01765 005752 FL1
31 01766 005760 FLZ
32 01767 005405 RAN
33 01770 000000 0
34 01771 005765 CYLADD
35
36 01772 020777 DAXSK: LDA 0,=-1
37 01773 040277 STA 0, DADAT
38 01774 006315 DQALL
39 01775 002174 DAX,
40 01776 006325 PCRLF
41 01777 006324 MESSAGE
42 02000 006253 MSG41
43 02001 000771 JMP DAXSK
44
45

```

```

*****
***** RUN ALL TESTS *****
*****

```

```

;RUN ALL DISK ADDRESS PATTERNS
;THEN RUN RANDOM EXERCISER FOR A
;WHILE. THEN REPEAT

```

```

;DO DISK ADDRESS
;TEST FOR EACH PATTERN

```



```

10037 ,MAIN
01 02002 020755 DATR1 LDA 0,A1+5
02 02003 024372 LDA 1,,RAN
03 02004 044247 STA 1,RANDOM
04 02005 000412 JMP DATF0+1
05
06 02006 020755 DAT11 LDA 0,A1+1
07 02007 000410 JMP DATF0+1
08
09 02010 020752 DAT01 LDA 0,A1
10 02011 000406 JMP DATF0+1
11
12 02012 020752 DATP1 LDA 0,A1+2
13 02013 000404 JMP DATF0+1
14
15 02014 020751 DATF11 LDA 0,A1+3
16 02015 000402 JMP DATF0+1
17
18 02016 020750 DAYF01 LDA 0,A1+4
19 02017 040277 STA 0,DADAT
20 02020 000210 NIJC TTI
21 02021 000325 PCRLF
22 02022 000324 MESSAGE
23 02023 000553 MSG74
24 02024 000325 PCRLF
25 02025 000324 MESSAGE
26 02026 000506 MSG75
27 02027 0003610 SKPDN TTI
28 02030 000777 JMP .-1
29 02031 000210 NIJC TTI
30 02032 000315 DAY1 DOALL
31 02033 0002040 DAT,
32 02034 000325 PCRLF
33 02035 000324 MESSAGE
34 02036 000253 MSG41
35 02037 000773 JMP DAT

```

```

;DISK ADDR TEST
;SET RANDOM N.
;BASE COUNT.

```

```

;"SET SW4 FOR INTERCHANGE,"
;"HIT ANY KEY TO CONTINUE,"

```

```

;DO IT ONCE FOR EACH
;READY DISK

```

```

;"PASS"

```

```

10038 ,MAIN
01
02
03
04
05
06
07
08
09
10 02040 054025 DAT.1 STA 3,DARET
11 02041 074477 READS 3
12 02042 024373 LDA 1,C2000 ;IF SW5=1, READ ONLY
13 02043 020524 LDA 0,DRD ;BIT 5 MASK
14 02044 137404 AND 1,3,SZR ;READ SUBR ADDRESS.
15 02045 000403 JMP .+3
16 02046 126000 AGC 1,1
17 02047 020521 LDA 0,DWT
18 02050 040455 STA 0,DATRW ;WRITE FIRST
19 02051 044515 STA 1,RFLG ;R/W FLAG
20 02052 020252 LDA 0,LAST
21 02053 040257 STA 0,CA ;BUFFER ADDRESS
22 02054 020277 LDA 0,DADAT
23 02055 042344 STA 0,IRDAT ;DEFINE DATA
24 02056 042345 STA 0,IWDAT ;PATTERN
25 02057 020247 LDA 0,RANDOM
26 02060 040511 STA 0,DARAN ;SAVE RANDOM START
27
28 02061 020510 DAT.01 LDA 0,DARAN ;RESET RANDOM FOR
29 02062 040247 STA 0,RANDOM ;RECYCLE
30 02063 102400 SUB 0,0 ;INITIALIZE
31 02064 042506 STA 0,%FLO1 ;FLOATING
32 02065 042506 STA 0,%FLO2 ;PATTERNS
33 02066 102000 ADC 0,0
34 02067 040172 STA 0,MSW ;SET HEADER SWITCH
35 02070 000352 RECAL ;MECALIBRATE DRIVE
36 02071 000355 CKSW ;ERROR, CHECK SWITCHES
37 02072 000776 JMP .-2 ;LOOP ON ERROR
38
39 02073 030174 DAT.11 LDA 2,UNIT ;SEEK NEW CYLINDER
40 02074 021056 LDA 0,CYLT,2 ;TO = FROM
41 02075 041052 STA 0,CYLF,2
42 02076 011056 ISZ CYLT,2 ;TO+1 = TO
43 02077 101400 INC 0,0
44 02100 024221 LDA 1,C203,
45 02101 122405 SUB 1,0,SNR
46 02102 000437 JMP DAT,3 ;DONE, READ OR WRITE
47 02103 102000 ADC 0,0 ;SET HEADER SWITCH
48 02104 040172 STA 0,MSW
49 02105 000351 SEEK
50 02106 000355 CKSW
51 02107 000776 JMP .-2 ;ERROR, CHECK SWITCHES
52 ;LOOP ON ERROR
53 02110 102400 SUB 0,0 ;BEGIN WITH HEAD 0
54 02111 040256 STA 0,HD ;SECTOR 0
55 02112 040254 STA 0,SEC
56 02113 040300 STA 0,CFLG
57 02114 020271 LDA 0,SMAX ;MAX # OF SECTORS
58 02115 040255 STA 0,SC ;DUE TO MEM SIZE
59 02116 040302 STA 0,CSC

```

```

*****
***** DISK ADDRESS TEST *****
*****

```

```

WRITE THE ENTIRE DISK, THEN READ.
DATA PATTERN IN (DADAT).
DISK DRIVE IN (UNIT).

```

```

;IF SW5=1, READ ONLY
;BIT 5 MASK
;READ SUBR ADDRESS.
;WRITE FIRST
;R/W FLAG
;BUFFER ADDRESS
;DEFINE DATA
;PATTERN
;SAVE RANDOM START
;RESET RANDOM FOR
;RECYCLE
;INITIALIZE
;FLOATING
;PATTERNS
;SET HEADER SWITCH
;MECALIBRATE DRIVE
;ERROR, CHECK SWITCHES
;LOOP ON ERROR

```

```

;SEEK NEW CYLINDER
;TO = FROM
;TO+1 = TO
;DONE, READ OR WRITE
;SET HEADER SWITCH
;MAX # OF SECTORS
;DUE TO MEM SIZE

```

10039 .MAIN

```
01
02 02117 102000 DAT.2: ADC 0,0
03 02120 040172 STA 0,MSW
04 02121 020247 LDA 0,RANDOM
05 02122 040250 STA 0,RELTRAN
06 02123 020250 LDA 0,RELTRAN
07 02124 040247 STA 0,RANDOM
08 02125 000350 DAYRW: WRITE
09 02126 000355 CKSW
10 02127 000774 JMP ,=4
11 02130 020300 LDA 0,CFLG
12 02131 101004 MOV 0,0,SZR
13 02132 000741 JMP DAT.1
14 02133 004541 JSR SCNT
15 02134 040254 STA 0,SEC
16 02135 044256 STA 1,HD
17 02136 004536 JSR SCNT
18 02137 050255 STA 2,SC
19 02140 000757 JMP DAT.2
20
21 02141 010425 DAT.3: ISZ RFLG
22 02142 000404 JMP DAT.4
23 02143 020424 LDA 0,OKD
24 02144 040761 STA 0,DATRW
25 02145 000714 JMP DAT.0
26 02146 000477 DAT.4: READS 0
27 02147 024035 LDA 1,C4K
28 02150 107404 AND 0,1,SZR
29 02151 000407 JMP DAT.5
30 02152 024373 LDA 1,C2000
31 02153 107405 AND 0,1,SNR
32 02154 002411 JMP 0DARET
33 02155 024372 LDA 1,MAN
34 02156 044247 STA 1,RANDOM
35 02157 002406 JMP 0DARET
36 02160 006325 DAT.5: PCRLF
37 02161 000324 MESSAGE
38 02162 006445 MSG68
39 02163 003077 MALT
40 02164 000777 JMP ,=1
41 02165 000000 DARET: 0
42 02166 000000 RFLG: 0
43 02167 000347 ORD: READ
44 02170 000350 DWT: WRITE
45 02171 000000 DARANI: 0
46 02172 000751 FLO1: FL1=1
47 02173 000757 FLO2: FL2=1
```

1SET THE HEADER SWITCH

1SAVE RAN # POSITION
1IN CASE OF SCOPE LOOP
1RESTORE RANDOM #
1FOR SCOPE LOOP
1READ OR WRITE
1ERROR, CHECK SWITCHES
1LOOP ON ERROR
1END CYL NOW ?

1YES = SEEK AGAIN
1ADVANCE DISK ADDRESS
1UPDATE SECTOR AND
1HEAD,
1LOOK AHEAD
1SET NEW SECTOR COUNT

1DONE WRITE & READ

1SET TO READ MODE

1IF SW4=1 BREAK FOR DISK
1PACK INTERCHANGE

1IF SW5=1, RESET RANDOM

1"INTERCHANGE DISK"

10040 .MAIN

```
01
02
03
04
05
06
07 02174 054237 DAX.1: STA 3,DAXRTN 1SAVE RETURN ADDRESS
08 02175 020207 LDA 0,LMD
09 02176 040371 STA 0,SVLMD
10 02177 102520 SUBZL 0,0
11 02200 103000 ADD 0,0
12 02201 040207 STA 0,LMD
13 02202 102000 ADC 0,0
14 02203 040763 STA 0,RFLG 1SET THE R/W FLAG
15 02204 020764 LDA 0,DWT 1TO WRITE (ALL '1'S)
16 02205 040445 STA 0,DAXRW 1
17 02206 020252 LDA 0,LAST 1WRITE FIRST
18 02207 040257 STA 0,CA 1
19 02210 020277 LDA 0,DADAT 1BUFFER ADDRESS
20 02211 042344 STA 0,PIRDAT 1DATA GENERATOR ADDRESS IS
21 02212 042345 STA 0,PIWDAT 1PASSED TO READ
22 02213 102000 DAX.0: ADC 0,0 1AND WRITE SUBROUTINES
23 02214 040172 STA 0,MSW 1
24 02215 102440 SUBO 0,0 1SET SWITCH TO PRINT HEADER ONCE
25 02216 040366 STA 0,CYLNK 1
26 02217 006352 RECAL 1CLEAR CYLINDER DATA TO ZERO,
27 02220 000355 CKSW 1RECALIBRATE THE DRIVE,
28 02221 000776 JMP ,=2 1ERROR, CHECK CONSOLE SWITCHES
29 02222 101011 MOVH 0,0,SKP 1LOOP ON ERROR
30 1SKIP THE LOOP INCREMENT ON 1ST PASS
31 02223 010366 DAX.1: ISZ CYLNK 1INC THE CYLINDER DATA
32 02224 030174 LDA 2,UNIT 1
33 02225 021056 LDA 0,CYLT,2 1PASS THE "CYLINDER TO" DATA TO
34 02226 041052 STA 0,CYLF,2 1"CYLINDER FROM" CELL
35 02227 011056 ISZ CYLT,2 1INC "CYLINDER TO" DATA
36 02230 101400 INC 0,0 1ACQ INCD TO NEW SEEK CYLINDER,
37 02231 024221 LDA 1,C203, 1CHECK (C) OF CYLT FOR BEING "313
38 02232 122415 SUB# 1,0,SNR 1
39 02233 000433 JMP DAX,3 1LAST CYLINDER OF R/W OPER.
40 02234 102000 ADC 0,0 1
41 02235 040172 STA 0,MSW 1SET SWITCH TO PRINT HEADER ONCE.
42 02236 000351 SEEK 1
43 02237 006355 CKSW 1ERROR, CHECK CONSOLE SWITCHES
44 02240 000776 JMP ,=2 1LOOP ON ERROR
45 02241 102400 SUB 0,0 1NEW CYLINDER SO
46 02242 040256 STA 0,HU 1CLEAR ALL CONTROL CELLS
47 02243 040254 STA 0,SEC 1BEFORE READING OR WRITING
48 02244 040200 STA 0,CFLG 1THIS CYLINDER.
49 02245 020271 LDA 0,SMAX 1MAX # OF SECTORS
50 02246 040255 STA 0,SC
51 02247 040302 STA 0,CSC
```

```

10041 .MAIN
01
02
03 02250 102000 DAX,21  ADC 0,0      I
04 02251 040172      STA 0,MSW    ISET HEADER SWITCH
05 02252 006350 DAXRW1  WRITE
06 02253 006355      CKSW       IERROR, CHECK CONSOLE SWITCHES.
07 02254 000776      JMP ,=2     ILOOP ON ERROR
08 02255 020300      LDA 0,CFLG ITEST THE END OF CYLINDER FLAG.
09 02256 101004      MOV 0,0,SZR
10 02257 000744      JMP DAX,1  IFLAG IS WAVING! DO NEXT CYLINDER.
11 02260 004414      JSR SCNT  INO FLAG, GO SET NEXT SECTOR & HEAD
12 02261 040254      STA 0,SEC IAC0 (C) STARTING SECTOR.
13 02262 044256      STA 1,HD  IAC1 (C) HEAD ADDRESS.
14 02263 004411      JSR SCNT  IGO GET SECTOR COUNT.
15 02264 050255      STA 2,SC  IAC2 (C) SECTOR COUNT.
16 02265 000763      JMP DAX,2  ILOOP AND READ OR WRITE.
17
18 02266 010700 DAX,31  ISZ RPLG  IINC RPLG TO READ OR EXIT.
19 02267 000404      JMP ,+4    IFINISHED READING
20 02270 000677      LDA 0,DRD ISET OPERATION
21 02271 040701      STA 0,DAXRW ITO READ,
22 02272 000721      JMP DAX,0  IAND LOOP,
23 02273 000433      JMP SPRSK IFINISHED ADDRESS WRITTEN,
24                    IGO TO SEEK TESTS.

```

```

10042 .MAIN
01
02                                I
03                                I
04                                I
05
06                                I
07                                I
08                                I
09
10 02274 054430 SCNT:1  STA 3,SECRET
11 02275 020302      LDA 0,CSC
12 02276 040427      STA 0,WORK
13 02277 020254      LDA 0,SEC  ICURRENT BEGINNING SECTOR
14 02300 024256      LDA 1,HD  ICURRENT BEGINNING HEAD
15
16 02301 101400 SC,11  INC 0,0    ISECT+1
17 02302 030210      LDA 2,LS  ICHECK FOR SECTOR OVERFLOW
18 02303 112405      SUB 0,2,SNR
19 02304 000405      JMP SC,3  IOVERFLOW
20 02305 014420 SC,21  DSZ WORK  IDONE ?
21 02306 000773      JMP SC,1  INO
22 02307 030302      LDA 2,CSC IYES, EXIT
23 02310 002414      JMP #SECRET
24
25 02311 141000 SC,31  MOV 2,0    ISECT#0
26 02312 125400      INC 1,1    IHEAD+1
27 02313 030207      LDA 2,LHD
28 02314 132404      SUB 1,2,SZR IHEAD OVERFLOW ?
29 02315 000770      JMP SC,2  INO
30 02316 010300      ISZ CFLG  IYES, END CYLINDER
31 02317 034406      LDA 3,WORK
32 02320 030302      LDA 2,CSC
33 02321 172400      SUB 3,2
34 02322 151400      INC 2,2
35 02323 002401      JMP #SECRET
36 02324 000000 SCRET: 0
37 02325 000000 WORK:  0

```

10043 .MAIN

```
01
02
03
04
05
06
07
08
09
10 02326 022526 SPRSK: LDA 0, @INHMSG ISET THE INHIBIT
11 02327 040526 STA 3, SEX IMESSAGE SWITCH IN
12 02330 020447 LDA 0, STC,A ITHE DATA CHECK ROUTINE
13 02331 042523 STA 0, @INHMSG IAS A SEEK PATH ERROR
14 I WILL BE DETECTED ON DRIVES
15 I WITHOUT ADDRESS CHECK
16 I AS A DATA ERROR,
17 02332 020521 LDA 0, SCANX IGET COUNT FOR # SCANS
18 02333 040507 STA 0, XTEST ISAVE IN SCAN COUNTER
19 02334 020221 LDA 0, C203,
20 02335 040506 STA 0, DNSEEK ILOAD DOWN SEEK WITH C313.
21 02336 014505 DSZ DNSEEK IDECRMT MAKES IT C312.
22 02337 102440 SUBD 0,0
23 02340 040504 STA 0, UPSEEK ILOAD UP SEEK WITH (CYLN)0 ADDRESS.
24 02341 102520 SUBZL 0,0
25 02342 040255 STA 0, SC
26 02343 020370 LDA 0, C102 ISUBR, SUBSEE WILL SEEK CYLINDER #
27 02344 004512 JSR SUBSEE I07 TO DERIVE AN INIT TIME COUNT,
28 02345 020240 LDA 0, OMEGA IAS CONTAINED IN OMEGA,
29 02346 040477 STA 0, BIGSK IPOR THE BIG SEEK TIME CELL
30 02347 040477 STA 0, LITSK IAND LITTLE SEEK TIME CELL.
31 02350 020473 LDA 0, DNSEEK IALSO INIT THE TWO SEEK
32 02351 040475 STA 0, FBIG IADDRESS CELLS, "FROM" BIG SEEK,
33 02352 040500 STA 0, FLIT IAND "TO" LITTLE SEEK W/312
34 02353 020370 LDA 0, C102 IALSO INIT TWO OTHER SEEK
35 02354 040474 STA 0, TBIG IADDRESS CELLS, "TO" BIG SEEK,
36 02355 040474 STA 0, PLIT IAND "FROM" LITTLE SEEK W/07
37
38 02356 020466 STC: LDA 0, UPSEEK ISTART WITH UPSEEK FIRST.
39 02357 004477 JSR SUBSEE IGO TO SEEK SUBROUTINE.
40 02360 004573 JSR TYMCK ICHECK THE SEEK TIME
41 02361 004511 JSR ROCYL ICHECK IF HEADS ARE ON PROPER CYLINDER.
```

10044 .MAIN

```
01
02 02362 020461 STC.1: LDA 0, DNSEEK IGET DOWN SEEK ADDRESS
03 02363 004473 JSR SUBSEE ISEEK SUBROUTINE
04 02364 004567 JSR TYMCK ICHECK SEEK TIME
05 02365 004505 JSR ROCYL ICHECK IF HEADS ARE ON CYLINDER.
06 02366 020204 LDA 0, LUPSW IIF WE ARE STILL LOOPING
07 02367 101014 MOV# 0,0, SZR IDO NOT MOVE SEEK COUNTERS
08 02370 000706 JMP STC IPATH IS BETWEEN UP & DN SEEK
09 02371 010453 ISZ UPSEEK IINCRMT UPSEEK
10 02372 020452 LDA 0, UPSEEK IAND CHECK (C) FOR NOT
11 02373 024221 LDA 1, C203, I# TO 313.
12 02374 106415 SUB# 0,1, SNK
13 02375 000404 JMP STC.2 IFINISHED 1 SCAN SEQUENCE.
14 02376 014445 USZ DNSEEK ICOUNT DOWN DOWN SEEK
15 02377 000401 STC.A: 401
16 02400 000756 JMP STC ILOOP AND CONTINUE.
```

10045 ,MAIN

```
01
02 02401 014441 STC.2: DSZ XTEST      /FINISHED ALL SCANS?
03 02402 000402      JMP ,+2      /NO
04 02403 000407      JMP STC,3    /YES, GO EXERCISE BIG & LITTLE PATHS
05 02404 024221      LDA 1,C203.  /REFRESH DOWN SEEK
06 02405 044430      STA 1,DNSEEK
07 02406 014435      DSZ DNSEEK
08 02407 102440      SUBO 0,0
09 02410 040434      STA 0,UPSEEK      /AND UP SEEK COUNTERS,
10 02411 000745      JMP STC      /LOOP FOR MORE SCANS.
11
12                    /THIS SECTION EXERCISES THE SEEK PATHS FOUND TO
13                    /BE BIGGEST (SEEK) TIME AND SMALLEST (SEEK) TIME.
14
15 02412 020217 STC.3: LDA 0,C67      /PRELOAD # OF SCANS,
16 02413 040427      STA 0,XTEST
17 02414 000433      LDA 0,FBIG
18 02415 004441      JSR SUBSEE      /GET "FROM BIG" SEEK ADDRESS
19 02416 004454      JSR RUCYL      /SEEK PATH STARTS FROM "FROM" ADDRESS
20 02417 020431      LDA 0,TBIG
21 02420 004430      JSR SUBSEE      /AND ENDS AT "TO" ADDRESS,
22 02421 004451      JSR RDCYL      /THE LONGEST SEEK TIME.
23 02422 020427      LDA 0,FLIT
24 02423 004433      JSR SUBSEE      /PATH AND THE SHORTEST
25 02424 004446      JSR RDCYL      /SEEK TIME PATH MEASURED ARE
26 02425 020420      LDA 0,TLIT
27 02426 004430      JSR SUBSEE      /EXERCISED HERE AND VERIFIED
28 02427 004443      JSR RDCYL      /FOR PROPER HEAD LOCATION.
29 02430 014412      DSZ XTEST
30 02431 000763      JMP STC,3+2    /KEEP ON TRUCK'N...
31 02432 102440      SUBO 0,0
32 02433 004423      JSR SUBSEE
33 02434 004436      JSR RDCYL
34 02435 020420      LDA 0,SEX
35 02436 042416      STA 0,INMSG
36 02437 020371      LDA 0,SVLHD
37 02440 040207      STA 0,LHD
38 02441 002237      JMP @DAXRTN   /AND RETURN.
39
40 02442 000000 XTEST: 0
41 02443 000000 DNSEEK: 0
42 02444 000000 UPSEEK: 0
43 02445 000000 BIGSK: 0
44 02446 000000 LITSK: 0
45 02447 000000 FBIG: 0
46 02450 000000 TBIG: 0
47 02451 000000 FLIT: 0
48 02452 000000 TLIT: 0
49 02453 000004 SCANX: 4
50 02454 005277 INMSG: SINHB
51 02455 000000 ,SEX: 0
52
```

10046 ,MAIN

```
01
02                    /SPECIAL SEEK SUBROUTINE
03
04 02450 054413 SUBSEE: STA 3,SEA
05 02457 030174      LDA 2,UNIT
06 02460 020056      LDA 1,CYLT,2
07 02461 040052      STA 1,CYLF,2
08 02462 041056      STA 0,CYLT,2
09 02463 102000      ADC 0,0
10 02464 040172      STA 0,MSW
11 02465 000351      SEEK
12 02466 000355      CKSW
13 02467 000776      JMP ,+2
14 02470 002401      JMP 0,SEA
15
16 02471 000000 ,SEA: 0
17
18                    /READ CYLINDER SUBROUTINE IS CALLED AFTER SEEK TO
19                    /VERIFY HEADS ARE ON PROPER CYLINDER BY READING DATA
20                    /FIELD ON CYLINDER.
21
22 02472 054410 RDCYL: STA 3,SEF
23 02473 030174      LDA 2,UNIT
24 02474 020056      LDA 1,CYLT,2
25 02475 044366      STA 1,CYLN
26 02476 000347      READ
27 02477 000401      401
28 02500 004412      JSR FTERR
29 02501 002401      JMP 0,SEF
30
31 02502 000000 ,SEF: 0
32
/SET THE HEADER PRINT
/UNCE SWITCH
/SEEK ERROR HERE
/IS REPRODUCEABLE IN
/TA TIGHT LOOP,
/GET UNIT
/AND CYLINDER "ADDRESS DATA",
/AND REFRESH (C) PATTERN GEN.
/FOR READ SUBROUTINE
/RETURN TO CALL+1=FATAL
/GO TO FATAL ERROR SUBR.
/RETURN
```

10047 .MAIN

```
01
02
03          ICOMPARE SUBROUTINE PERFORMS A LOGICAL
04          ICOMPARISON OF (C) OF ADDRESSES IN CALL+1(ARG,A)
05          IAND CALL+2(ARG,B), RETURNS TO CALL+3 IF ARGMT 0
06          IIS > A, RETURNS TO CALL+4 IF A>B, OR A=B.
07
08 02503 027400 GTCOMP1 LDA 1,0,3          IARGMT A
09 02504 023401          LDA 0,0,1,3          IARGMT B
10 02505 106415          SUB# 0,1,SNR
11 02506 001403          JMP 3,3
12 02507 122032          ADCZ# 1,0,SZC
13 02510 001402          JMP 2,3          I(B(AC0))>A(AC1)
14 02511 001403          JMP 3,3          I(A(AC1))>B(AC0)
15
16 02512 054437 FTERR1: STA 3,,SED          ISAVE RETURN
17 02513 020204          LDA 0,LUPSW          ICHECK IF PROGRAM IS LOOPING
18 02514 101014          MOV# 0,0,SZR          IF NOT SET THIS IS 1ST ERROR.
19 02515 000413          JMP ,+13
20 02516 000325          JSR #ICRLF
21 02517 000324          JSR #IMESS
22 02520 006507          MSG#1
23 02521 024723          LDA 1,UPSEEK          ISEEK ERROR PATH BETWEEN
24 02522 006323          TYPZ1          IGO PRINT (C) OF UPSEEK
25 02523 006324          MESSAGE
26 02524 006126          MSG#2          ITAB MESSAGE
27 02525 024716          LDA 1,DNSEEK          IPRINT (C) OF DNSEEK
28 02526 006323          TYPZ1
29 02527 006325          JSR #ICRLF
30 02530 000305          CR#
31 02531 000402          JMP ,+2
32 02532 000404          JMP ,+4
33 02533 000302 FTERR1: RECAL
34 02534 000402          JMP ,+2
35 02535 000411          JMP FTERR2
36 02536 074477          READS 3
37 02537 175132          MOVZL# 3,3,SZC          ICKN IF CONSL SW0 IS SET.
38 02540 000406          JMP FTERR2
39 02541 004401          JSR ,+1
40 02542 063077          HALT
41 02543 034734          LDA 3,,SEF=3          IHALT ON 1ST LOOP.
42 02544 054776          STA 3,,=2          IGET NOP CODE AND USE TO
43 02545 000766          JMP FTERR1          IREPLACE HALT FOR REST OF LOOPS.
44 02546 034404 FTERR2: LDA 3,,SED+1          IRECALIBRATE LOOP.
45 02547 054773          STA 3,,=5          IGET HALT CODE AND
46 02550 002401          JMP 0,SED          IRESTORE LOCATION AND
47                                     ITHEN RETURN.
48 02551 000000 ,SED: 0
49 02552 063077          HALT          IHDLS HALT CODE ....
```

10048 .MAIN

```
01
02          ISUBROUTINE WHICH IS CALLED IMMEDIATELY AFTER
03          ISEEK AND CHECKS TIME COUNT IN OMEGA FOR
04          I> COUNT STORED IN BIGSK OR < COUNT IN LITSK.
05
06 02553 054433 TYMCK1: STA 3,,SEB
07 02554 004727          JSR GTCOMP          IGREATER THAN COMPARE SUBROUTINE.
08 02555 000240          OMEGA          IARGMT A FOR SUBROUTINE
09 02556 002445          BIGSK          IARGMT B FOR SUBROUTINE
10 02557 000410          JMP TYM,1          I>A RETURN
11 02560 024240          LDA 1,OMEGA          I>B SO STORE
12 02561 044664          STA 1,BIGSK          IOMEGA IN BIG SEEK.
13 02562 030174          LDA 2,UNIT
14 02563 025056          LDA 1,CYLT,2          IAND LOAD "TO" CYLINDER ADDRESS
15 02564 044664          STA 1,TBIG          INTO "TO" BIG SEEK CELL,
16 02565 025052          LDA 1,CYLF,2          IAND "FROM" CYLINDER INTO
17 02566 044601          STA 1,FBIG          I"FROM" BIG SEEK CELL.
18 02567 004714 TYM,1: JSR GTCOMP          IGO COMPARE
19 02570 000240          OMEGA          IOMEGA WITH
20 02571 002440          LITSK          ICONTENTS OF LITTLE SEEK.
21 02572 101011          MOV# 0,0,SKP          I>A RETRN, STORE OMEGA
22 02573 000412          JMP TYM,2          I>B RETURN, SO EXIT.
23 02574 024240          LDA 1, OMEGA
24 02575 125015          MOV# 1,1,SNR
25 02576 000407          JMP TYM,2          IDO NOT STORE A 0,
26 02577 044647          STA 1,LITSK          IFOM VALUE OF LITTLE SEEK.
27 02600 030174          LDA 2, UNIT          ISTORE OMEGA IN LITTLE SEEK.
28 02601 025056          LDA 1,CYLT,2
29 02602 044650          STA 1,TLIT          ILOAD "TO" CYLINDER ADDRESS INTO
30 02603 025052          LDA 1,CYLF,2          I"TO" LITTLE SEEK CELL, AND
31 02604 044645          STA 1,FLIT          I"FROM" CYLINDER ADDRESS INTO
32 02605 002401 TYM,2: JMP 0,SEB          I"FROM" LITTLE SEEK CELL
33                                     IRETURN.
34 02606 000000 ,SEB: 0
35 02607 000000 SQIK1: 0
36 02610 054777 FMUNIT: STA 3,SQIK1
37 02611 102440          SUBO 0,0          ICLEAR OUT COMMAND
38 02612 040173          STA 0,CSIF          ISTRING INTERP. FLAG.
39 02613 000405          JMP CMDST+2          ISPECIAL ENTR. FOR UNIT #.
40
```

```

10040 ,MAIN
01
02 / *****
03 / ***** COMMAND STRING INTERPRETER *****
04 / *****
05
06 /GET COMMAND STRING PARAMETERS
07 /UNIT SELECT
08 02014 006324 QUEST: MESSAGE
09 02015 006256 MSG43 / -? =
10 02016 102520 CMOST: SUBZL 0,0 /SET THE CSI FLAG
11 02017 040173 STA 0,CSIF
12 02020 060210 NIOC TTI /CLEAR TTI FLAG
13 02021 000233 NIOC ,DBKP /CLEAR DISK GARBAGE
14 02022 006325 PCRLF
15 02023 006324 MESSAGE
16 02024 006053 MSG17 /"UNIT: "
17 02025 006331 INPUT /ACCEPT INPUT
18 02026 000261 UBP
19 02027 000422 JMP CMD,2 /SAME AS LAST TIME
20 02030 102400 SUB 0,0
21 02031 040175 STA 0,RDYUNT /CLEAR ALL UNITS
22 02032 006327 GETATH
23 02033 125004 MOV 1,1,SZR /AC0# AC1=NAME
24 02034 000760 JMP QUEST /NAMES NOT LEGAL
25 02035 024024 LDA 1,C4
26 02036 122432 SUBZ# 1,0,SZC
27 02037 000750 JMP QUEST /UNIT #>3
28 02040 040174 STA 0,UNIT
29 02041 101003 MOV 0,0,3NC
30 02042 000752 JMP QUEST /MORE LEFT, ERROR
31 02043 024173 LDA 1,CSIF
32 02044 125005 MOV 1,1,3NR
33 02045 002742 JMP #80IK1
34 02046 000403 JMP CMD,2

```

```

10050 ,MAIN
01
02 /DATA SELECT
03
04 02047 006324 MESSAGE
05 02050 000250 MSG43 / -? =
06 02051 006325 CMD,2 PCRLF
07 02052 006324 MESSAGE
08 02053 006057 MSG18 /"DATA: "
09 02054 006331 INPUT /ACCEPT INPUT
10 02055 000261 UBP
11 02056 000440 JMP GCS /SAME AS LAST TIME
12 02057 006327 GETATH
13 02060 125005 MOV 1,1,3NR
14 02061 000412 JMP CMD,3 /NO NAME, MUST BE #
15 02062 006326 SEARCH /SEARCH NAME TABLE
16 02063 005726 DNT
17 02064 000763 JMP CMD,2=2 /NOT FOUND
18 02065 025007 LDA 1,DNT,1-DNT,2
19 02066 040344 STA 1,#IRDAT
20 02067 040345 STA 1,#IWDAT
21 02070 101005 MOV 0,0,3NR
22 02071 000756 JMP CMD,2=2
23 02072 000431 JMP GCS /NO CR FOLLOWING NAME
/GET COMMAND STRING

```

```

10051 .MAIN
01
02 02673 024263 CMD.3: LDA 1,VARST
03 02674 044020 STA 1,IDX0
04 02675 042020 STA 0,IDX0
05 02676 024260 LDA 1,TERM
06 02677 125004 MOV 1,1,SZR
07 02700 000416 JMP CMD,5
08 02701 000327 CMD.4: GETATH
09 02702 125004 MOV 1,1,SZR
10 02703 000744 JMP CMD,2=2
11 02704 042020 STA 0,IDX0
12 02705 101002 MOV 0,0,SZC
13 02706 000410 JMP CMD,5
14 02707 020264 LDA 0,VAR0
15 02710 024020 LDA 1,IDX0
16 02711 122414 SUB# 1,0,SZR
17 02712 000707 JMP CMD,4
18 02713 000320 PCRLF
19 02714 000324 MESSAGE
20 02715 000074 MSG00
21
22 02716 020020 CMD.5: LDA 0,IDX0
23 02717 040260 STA 0,VARSP
24 02720 020334 LDA 0,IVAK
25 02721 042344 STA 0,PIRDAT
26 02722 042345 STA 0,PIWDAT
27
28
29
30
31
32 02723 000325 GCS: PCRLF
33 02724 000324 MESSAGE
34 02725 000063 MSG19
35 02726 000331 INPUT
36 02727 000262 CSBP
37 02730 000401 JMP ,+1
38 02731 003710 GCS.1: SKPDZ TTI
39 02732 000664 JMP CMDST
40 02733 102000 ADC 0,0
41 02734 040172 STA 0,M#W
42 02735 000327 GETATH
43 02736 000326 SEARCH
44 02737 000711 DCT
45 02740 000402 JMP CSER
46 02741 000007 JMP 0DCT,1=0CT,2=DISPATCH
47
48 02742 000324 CSER: MESSAGE
49 02743 000256 MSG43
50 02744 000757 JMP GCS

```

INAMES NOT ALLOWED

IGET COMMAND STRING

/"COMMAND STRING: "
 /ACCEPT INPUT
 /CMD STR BYTE POINTER
 /SAME AS BEFORE
 /INTERRUPT CMD STRING
 /LINCT#BYTE POINTER
 /NAME IN AC1
 /NOT FOUND
 /COMMAND STRING ERROR
 / =? =

```

10052 .MAIN
01
02
03
04 02745 101002 RE: MOV 0,0,SZC
05 02746 000774 JMP CSER
06 02747 000330 GETPAR
07 02750 020250 LDA 0,RELKRN
08 02751 040247 STA 0,RANDOM
09 02752 000347 READ
10 02753 000355 CKSW
11 02754 000774 JMP ,=4
12 02755 020260 RE1: LDA 0,TERM
13 02756 101004 MOV 0,0,SZR
14 02757 000637 JMP CMDST
15 02760 000751 JMP GCS,1
16
17
18 02761 101002 WTI: IWRITE COMMAND
19 02762 000760 MOV 0,0,SZC
20 02763 000330 JMP CSER
21 02764 020247 GETPAR
22 02765 040250 LDA 0,RANDOM
23 02766 020250 STA 0,RELKRN
24 02767 040247 LDA 0,RELKRN
25 02770 000350 STA 0,RANDOM
26 02771 000355 WRITE
27 02772 000774 CKSW
28 02773 000762 JMP ,=4

```

IREAD COMMAND

/CR TERMINATOR ILLEGAL
 /GET R/W PARAMETERS
 /SET RAN # BEGIN
 /READ AND CHECK DATA
 /ERROR, LOOK AT SWITCHES
 /LOOP ON ERROR

/ALL DONE
 /GET ANOTHER COMMAND

IWRITE COMMAND

/CR TERMINATOR ILLEGAL
 /GET R/W PARAMETERS
 /SAVE BEGIN OF RANDOM
 /NUMBERS IN CASE OF LOOP
 /RESET RAN # BEGINNING IN
 /THE SCOPE LOOP
 /GENERATE DATA AND WRITE
 /ERROR, CHECK SWITCHES
 /LOOP ON ERROR


```

10053 ,MAIN
01
02          ISEEK COMMAND
03
04 02774 101002 SKI  MOV 0,0,SZC
05 02775 000745     JMP CSER          ICR TERMINATOR ILLEGAL
06 02776 006327     GETATM          IGET CYL # IN ACC
07 02777 152560     SUBCL 2,2
08 03000 050200     STA 2,TERM
09 03001 125004     MOV 1,1,SZR
10 03002 000740     JMP CSER          INAMES ILLEGAL
11 03003 030174     LDA 2,UNIT
12 03004 025005     LDA 1,CYLT,2     ITO = CYL #
13 03005 045052     STA 1,CYLF,2     ITO BECOMES FROM
14 03006 041056     STA 0,CYLT,2     ISET NEW TO
15 03007 006351     SEEK            ITO THE SEEK
16 03010 006355     CKSW           IERROR, LOOK AT SWITCHES
17 03011 000776     JMP ,=2         ILOOP ON ERROR
18 03012 000743     JMP RE1
19
20          IRECALIBRATE
21
22 03013 102500 RCL1  SUBCL 0,0
23 03014 040200     STA 0,TERM
24 03015 006352     RECAL          IRECALIBRATE
25 03016 006355     CKSW           IERROR, CHECK SWITCHES
26 03017 000776     JMP ,=2         ILOOP ON ERROR
27 03020 030174     LDA 2,UNIT     IINCRMT CYLN TO 0
28 03021 011056     ISZ CYLT,2     ION RETURN FROM RECAL
29 03022 000401     NOP            IFOR CMMD STRING INTERP.
30 03023 000732     JMP RE1
31
32          ILOOP
33
34 03024 020202 LUP1  LDA 0,C8BP
35 03025 040203     STA 0,LINCY
36 03026 102000     ADC 0,0
37 03027 040172     STA 0,HSW
38 03030 000701     JMP GCS,1
39
40          IDELAY
41
42 03031 101002 DLAY1  MOV 0,0,SZC
43 03032 000710     JMP CSER
44 03033 006327     GETATM
45 03034 125005     MOV 1,1,SNR
46 03035 101002     MOV 0,0,SZC
47 03036 000704     JMP CSER          INAMES ILLEGAL
48 03037 126520     SUBZL 1,1      ICR TERM IS ILLEGAL
49 03040 123000     ADD 1,0         IDELAY COUNT OF 0 NOT
50 03041 040402     STA 0,+2       IPERMITTED.
51 03042 006316     DELAY
52 03043 000000     0
53 03044 000005     JMP GCS,1
54

```

```

10054 ,MAIN
01
02          I
03          I
04          I
05
06          IRECALIBRATE
07 IRETURN+1 FATAL ERROR
08 IRETURN+3 NORMAL
09
10 03045 054276 RECL1 STA 3,RWRET
11 03046 102400     SUB 0,0         ISET THE PROGRAM MODE
12 03047 040203     STA 0,MODE
13 03050 030174     LDA 2,UNIT
14 03051 021026     LDA 0,UNTINS,2
15 03052 063233     DOCC 0,,DSKP   ISELECT UNIT
16 03053 020427     LDA 0,C1400
17 03054 061333     DOAP 0,,DSKP   IRECAL
18 03055 021056     LDA 0,CYLT,2
19 03056 041052     STA 0,CYLF,2   ITO = FROM
20 03057 102000     ADC 0,0
21 03060 041006     STA 0,CYLT,2
22 03061 020420     LDA 0,RCTYM
23 03062 006342     JSR #WAT
24 03063 101011     SKIP
25 03064 000404     JMP ,+4
26 03065 030174     LDA 2,UNIT     IRECAL TIMEOUTS ARE
27 03066 011162     ISZ SKTMO,2    ICOUNTED HERE !!
28 03067 002276     JMP #RWRET     ITIMEOUT!!!
29 03070 025032     LDA 1,UNTON,2 IRECAL INT. RETURN
30 03071 107405     AND 0,1,SNR
31 03072 002353     PSTAT          INO DONE STATUS
32 03073 124000     COM 1,1
33 03074 034230     LDA 3,CSP1    I177077
34 03075 107400     AND 3,1
35 03076 107404     AND 0,1,SZR
36 03077 002353     PSTAT          IBAD STATUS
37 03100 000557     JMP GENRET
38 03101 000236 RCTYM: .4KMS
39 03102 001400 C1400: 1400

```

```

10055 .MAIN
01
02
03
04
05
06 03103 054276 .SEEK1 STA 3,RWRET
07 03104 102520 SUBZL 0,0 ;SET THE PROGRAM MODE
08 03105 040203 STA 0,MODE
09 03106 030174 LDA 2,UNIT
10 03107 021026 LDA 0,UNITS,2
11 03110 063233 DOCC 0,,DSKP ;SELECT UNIT
12 03111 021056 LDA 0,CYLT,2 ;CYL #
13 03112 024225 LDA 1,C1000
14 03113 123000 ADD 1,0
15 03114 061333 DOAP 0,,DSKP ;SEEK11
16 03115 011066 ISZ SEEK+4,2 ;COUNT SEEKS
17 03116 000402 JMP +2
18 03117 011062 ISZ SEEK,2 ;DOUBLE PRES.
19 03120 000401 NOP
20 03121 000361 INTWT ;WAIT FOR INTERRUPT
21 03122 101011 SKIP
22 03123 000404 JMP +4
23 03124 030174 LDA 2,UNIT ;INCRMT THE SEEK
24 03125 011162 ISZ SKTMO,2 ;TIMEOUTS COUNTER !!
25 03126 002276 JMP 0RWRET ;TIMEOUT!!!
26
27 03127 025032 LDA 1,UNTON,2 ;INTERRUPT RETURN AC2=UNIT #
28 03130 107415 AND# 0,1,SNR ;AC0 = STATUS
29 03131 000407 JMP SE,1 ;IMPROPER DONE STATUS
30 03132 124000 COM 1,1
31 03133 034230 LDA 3,CSP1 ;177077
32 03134 107400 AND 3,1
33 03135 107404 AND 0,1,SZR
34 03136 000402 JMP SE,1 ;WRONG STATUS
35 03137 000520 JMP GENRET
36
37 03140 024215 SE,11 LDA 1,C40 ;SEEK ERR ??
38 03141 107404 AND 0,1,SZR
39 03142 011072 ISZ SEKER,2 ;COUNT SEEK ERRORS
40 03143 002353 PSTAT
41 03144 003077 HALT
42 03145 000400 C4001 400
43

```

```

10056 .MAIN
01
02
03
04
05
06 03146 003106 WDATA+1 ;MTRY ADDRESS
07 03147 054276 .WRITE1 STA 3,RWRET
08 03150 020776 LDA 0,,WRITE=1 ;SET THE MTRY ADDRESS
09 03151 040311 STA 0,RLUP
10 03152 020211 LDA 0,C3 ;SET THE PROGRAM MODE
11 03153 040203 STA 0,MODE
12 03154 102000 ADC 0,0
13 03155 040273 STA 0,AECNT
14 03156 040274 STA 0,CWCNT
15 03157 102400 SUB 0,0
16 03160 040202 STA 0,FATAL ;CLEAR FATAL FLAG
17 03161 040367 STA 0,NO,BS ;CLEAR BAD SECTOR COUNTER
18 03162 020205 LDA 0,SC
19 03163 040310 STA 0,,SC ;# SECTORS TO XFER
20 03164 000332 GEN
21 03165 000000 WDATA1 0 ;ADDR OF DATA GEN ROUT
22 03166 000336 SETP ;SET PARAMETERS
23 03167 030174 LDA 2,UNIT
24 03170 021056 LDA 0,CYLT,2
25 03171 024754 LDA 1,C400
26 03172 123000 ADD 1,0
27 03173 061133 DOAS 0,,DSKP ;WRITE
28 03174 000361 INTWT ;WAIT FOR INTERRUPT
29 03175 101011 SKIP
30 03176 000404 JMP +4
31 03177 030174 LDA 2,UNIT ;INCRMT THE READ/WRITE
32 03200 011166 ISZ RWTMO,2 ;TIMEOUTS COUNTER !!
33 03201 002276 JMP 0RWRET ;TIMEOUT
34
35 03202 101113 MOVL# 0,0,SNC ;INTERRUPT RETURN
36 03203 000476 JMP RE,1 ;NO R/W DONE FLAG
37 03204 024232 LDA 1,CSP3 ;077660
38 03205 107404 AND 0,1,SZR
39 03206 000473 JMP RE,1 ;FATAL STATUS
40 03207 024025 LDA 1,C10
41 03210 107404 AND 0,1,SZR
42 03211 000472 JMP RE,2 ;ADDRESS ERROR
43 03212 061433 DIS 0,,DSKP ;READ MEM ADDR
44 03213 024255 LDA 1,SC ;SECTOR COUNT
45 03214 125300 MOV# 1,1 ;WORD COUNT
46 03215 034257 LDA 3,CA ;STARTING ADDRESS
47 03216 107000 ADU 3,1
48 03217 125400 INC 1,1
49 03220 125400 INC 1,1 ;ADDR+WC SHOULD EQUAL
50 03221 100414 SUB# 0,1,SZR ;THE ENDING ADDRESS
51 03222 000443 JMP WE,1 ;ERROR

```

10057 .MAIN

```
01
02 03223 020255 .W11 LDA 0,SC          )FIND ENDING DISK
03 03224 040302          STA 0,CSC          )ADDRESS
04 03225 000356          JSR 0,ISCNT         )AC0#SECT, AC1#HEAD
05 03226 101004          MOV 0,0,SZR         )IF THE SECT = 0 THE LAST
06 03227 000404          JMP ,+4           )FICH HEAD DID NOT OCCUR
07 03230 020210          LDA 0,LS           )SECT = LAST SECT
08 03231 124400          NEG 1,1           )HEAD =1
09 03232 124000          COM 1,1
10 03233 030174          LDA 2,UNIT
11 03234 035020          LDA 3,UNITS,2       )FORM THE ENDING DISK
12 03235 125300          MOVS 1,1         )ADDRESS AS READ BY "DIC"
13 03236 107000          ADD 3,1
14 03237 103120          ADDZL 0,0
15 03240 103120          ADDZL 0,0
16 03241 107000          ADD 0,1
17 03242 002433          DIC 0,,DSKP
18 03243 100414          SUBW 0,1,SZR
19 03244 000427          JMP WE.2
20
21 03245 020255 .W21 LDA 0,SC          )ADD WORDS WRITTEN
22 03246 101300          MOVS 0,0         )TO TOTAL COUNT
23 03247 025102          LDA 1,WDSH+4,2
24 03250 107022          ADDZ 0,1,SZC
25 03251 011076          ISZ WDSH,2
26 03252 000401          NOP
27 03253 045102          STA 1,WDSH+4,2
28 03254 020202          LDA 0,FATAL
29 03255 101004          MOV 0,0,SZR
30 03256 002270          JMP 0RHWRET
31 03257 020204          GENRET: LDA 0,LUPSW
32 03260 101004          MOV 0,0,SZR
33 03261 002270          JMP 0RHWRET
34 03262 010270          ISZ RHWRET
35 03263 010270          ISZ RHWRET
36 03264 002270          JMP 0RHWRET
37
38 03265 004550 WE.11 JSR SWCE
39 03266 000324          MSG57
40 03267 030174          LDA 2,UNIT
41 03270 011156          ISZ MISC,2
42 03271 010202          ISZ FATAL
43 03272 000731          JMP ,+1
44
45 03273 004542 WE.21 JSR SWCE
46 03274 000431          MSG67
47 03275 030174          LDA 2,UNIT
48 03276 011156          ISZ MISC,2
49 03277 010202          ISZ FATAL
50 03300 000745          JMP ,+2
```

10058 .MAIN

```
01
02 03301 011156 RE.11 ISZ MISC,2
03 03302 002353          PSTAT
04
05 03303 006354 RE.21 HEADER
06 03304 000325          PCRLF
07 03305 000324          MESSAGE
08 03306 000174          MSG29
09 03307 030174          LDA 2,UNIT
10 03310 100273          ISZ AECNT
11 03311 000410          JMP RE.21
12 03312 011126          ISZ ADDR,2
13 03313 020272 RE.201 LDA 0,EVDON
14 03314 101004          MOV 0,0,SZR
15 03315 002276          JMP 0RHWRET
16 03316 000325          PCRLF
17 03317 000324          MESSAGE
18 03320 000363          MSG63
19 03321 020250          LDA 0,RELTRAN
20 03322 040247          STA 0,RANDOM
21 03323 102400          SUB 0,0
22 03324 040201          STA 0,RETRY
23 03325 002677          IORST
24 03326 002311          JMP 0RLUP
25
26 03327 011132 RE.211 ISZ PADER,2
27 03330 002276          JMP 0RHWRET
28
29 03331 000477 RE.31 READS 0
30 03332 100120          ADDZL 0,0
31 03333 100122          ADDZL 0,0,SZC
32 03334 000405          JMP ,+5
33 03335 000354          HEADER
34 03336 000325          PCRLF
35 03337 000324          MESSAGE
36 03340 000370          MSG64
37 03341 030174          LDA 2,UNIT
38 03342 010274          ISZ CWCNT
39 03343 000404          JMP RE.31
40 03344 011116          ISZ CWER,2
41 03345 010201          ISZ RETRY
42 03346 000403          JMP RE.32
43 03347 011122 RE.311 ISZ CWERP,2
44 03350 010202          ISZ FATAL
45 03351 020253 RE.321 LDA 0,CA
46 03352 000433          DIB 1,,DSKP
47 03353 100400          SUB 0,1
48 03354 020405          LDA 0,C174H
49 03355 123705          ANDS 1,0,SNR
50 03356 102520          SUBZL 0,0
51 03357 040310          STA 0,,SC
52 03360 000545          JMP ,R1
53 03361 017400 C174H: 17400
```

10059 .MAIN

01
02 03362 030174 RE,41 LDA 2,UNIT
03 03363 020274 LDA 0,CWCNT
04 03364 010275 ISZ DACNT
05 03365 000422 JMP RE,44
06 03366 010201 ISZ RETRY
07 03367 010404 INC 0,0,SZR
08 03370 000403 JMP RE,41
09 03371 011136 ISZ DATER,2
10 03372 000536 JMP ,R2
11 03373 024202 RE,411 LDA 1,FATAL
12 03374 125004 MOV 1,1,SZR
13 03375 000405 JMP RE,43
14 03376 015116 DSZ CNER,2
15 03377 000401 JMP ,+1
16
17 03400 011142 RE,421 ISZ CWDE,2
18 03401 000527 JMP ,R2
19 03402 015122 RE,431 DSZ CWERP,2
20 03403 000401 JMP ,+1
21 03404 102400 SUB 0,0
22 03405 040202 STA 0,FATAL
23 03406 000772 JMP RE,42
24 03407 024202 RE,441 LDA 1,FATAL
25 03410 125004 MOV 1,1,SZR
26 03411 000403 JMP RE,45
27 03412 011102 ISZ PDER,2
28 03413 000404 JMP RE,46
29 03414 015122 RE,451 DSZ CWERP,2
30 03415 000401 JMP ,+1
31 03416 011146 ISZ CWDEP,2
32 03417 010202 RE,461 ISZ FATAL
33 03420 000510 JMP ,R2

DATA ERROR

DATA ERROR COUNTER
2ND DATA ERROR
SET THE RETRY FLAG
FIRST DATA ERROR
DATA AND CHECK WORD ERROR
NO CHK WD ERR
GO ON

2 CHECK WORD ERRORS
ONLY 1 CHECK WORD ERROR
SKIPS SOMETIMES

COUNT CHK WD & DATA ERRS
GO ON
DON'T COUNT FATAL CHK WD ERR

RESET FATAL ERROR FOR NOW

TRY IT A 3RD TIME
FATAL=NON=ZERO IF 2 CHK WD ERR

DATA & CHK WD ERR
DATA ERR ONLY
2ND ONE IS FATAL
DISCOUNT PERM CHK WD ERR

COUNT PERM COMBO ERR
SET THE FATAL FLAG
GO ON

10060 .MAIN

01
02 03421 004414 RE,51 JSR SWCE
03 03422 000324 MSG57
04 03423 030174 LDA 2,UNIT
05 03424 011106 ISZ MISC,2
06 03425 010202 ISZ FATAL
07 03426 000511 JMP ,R3
08
09 03427 004406 RE,61 JSR SWCE
10 03430 000431 MSG67
11 03431 030174 LDA 2,UNIT
12 03432 011106 ISZ MISC,2
13 03433 010202 ISZ FATAL
14 03434 000540 JMP ,R4
15
16
17
18
19 03435 054423 SWCE1 STA 3,SWCRET
20 03436 030400 LDA 3,0,3
21 03437 054405 STA 3,SWCE1
22 03440 000317 SAVAC
23 03441 000354 HEADER
24 03442 000325 PCRLF
25 03443 000324 MESSAGE
26 03444 000000 SWCE11 0
27 03445 000325 PCRLF
28 03446 000324 MESSAGE
29 03447 000276 MSG51
30 03450 024244 LDA 1,SAV1
31 03451 000322 TYPAC1
32 03452 000324 MESSAGE
33 03453 000301 MSG52
34 03454 024243 LDA 1,SAV0
35 03455 000322 TYPAC1
36 03456 010402 ISZ SWCRET
37 03457 000401 JMP #SWCRET
38 03460 000000 SWCRET1 0

PENDING MEM ADDR ERR
IDENTIFIER
IT'S FATAL
PENDING DISK ADDR ERROR
IDENTIFIER
COUNT AS MISC TYPE ERR
IT'S FATAL
ISA + WC ERROR
IAC0 = BAD, AC1 = GOOD
GET ERROR IDENTIFIER
"GOOD"
"BAD"

```

10061 ,MAIN
01
02
03      /READ SUBROUTINE
04      /RETURN+3, NORMAL
05      /RETURN+1, FATAL ERROR
06
07 03461 003477      RSRD      /RETRY ADDRESS
08 03462 054276      STA 3,RHRET      /STA 3,RHRET
09 03463 020776      LDA 0,READ=1      /LDA 0,READ=1
10 03464 040311      STA 0,RLUP        /STA 0,RLUP
11 03465 020023      LDA 0,C2         /LDA 0,C2
12 03466 040203      STA 0,MODE       /STA 0,MODE
13 03467 102000      AUC 0,0         /AUC 0,0
14 03470 040273      STA 0,AECNT      /STA 0,AECNT
15 03471 040274      STA 0,CWCNT      /STA 0,CWCNT
16 03472 040275      STA 0,DACNT      /STA 0,DACNT
17 03473 102400      SUB 0,0         /SUB 0,0
18 03474 040201      STA 0,RETRY      /STA 0,RETRY
19 03475 040202      STA 0,FATAL      /STA 0,FATAL
20 03476 040367      STA 0,NO,BS     /STA 0,NO,BS
21 03477 006335      RSRD:    CLR RB      /CLR RB
22 03500 006336      SETP          /SETP
23 03501 030174      LDA 2,UNIT      /LDA 2,UNIT
24 03502 021056      LDA 0,CYLT,2    /LDA 0,CYLT,2
25 03503 001133      DNAS 0,,DSKP    /DNAS 0,,DSKP
26 03504 006361      INTWT          /INTWT
27 03505 101011      SKIP          /SKIP
28 03506 000404      JMP ,+4        /JMP ,+4
29 03507 030174      LDA 2,UNIT      /LDA 2,UNIT
30 03510 011166      ISZ R,TH0,2    /ISZ R,TH0,2
31 03511 002276      JMP 0,RHRET     /JMP 0,RHRET
32
33 03512 101113      MOVL# 0,0,SNC   /MOVL# 0,0,SNC
34 03513 002502      JMP 0,IRE1      /JMP 0,IRE1
35 03514 024227      LDA 1,CSP       /LDA 1,CSP
36 03515 107404      AND 0,1,SZR     /AND 0,1,SZR
37 03516 002477      JMP 0,IRE1      /JMP 0,IRE1
38 03517 024025      LDA 1,C10      /LDA 1,C10
39 03520 107404      AND 0,1,SZR     /AND 0,1,SZR
40 03521 002475      JMP 0,IRE2      /JMP 0,IRE2
41 03522 024024      LDA 1,C4        /LDA 1,C4
42 03523 107404      AND 0,1,SZR     /AND 0,1,SZR
43 03524 000005      JMP RE.3        /JMP RE.3
44
45 03525 006333      ,R11          /CHECK
46 03526 000000      RDATA: 0      //ADDR OF DATA GEN ROUTINE
47 03527 000033      JMP RE.4        /JMP RE.4
48
49 03530 001433      ,R21          /DIB 0,,DSKP
50 03531 024310      LDA 1,,SC      /LDA 1,,SC
51 03532 125300      MOVS 1,1       /MOVS 1,1
52 03533 030257      LDA 2,CA       /LDA 2,CA
53 03534 147000      ADU 2,1        /ADU 2,1
54 03535 106414      SUB# 0,1,SZR   /SUB# 0,1,SZR
55 03536 000663      JMP RE.5        /JMP RE.5

```

```

10062 ,MAIN
01
02 03537 020310      ,R31      /LDA 0,,SC
03 03540 040302      STA 0,CSC      /STA 0,CSC
04 03541 000356      JSR 0,ISGNT    /JSR 0,ISGNT
05 03542 034310      LDA 3,,SC      /LDA 3,,SC
06 03543 030255      LDA 2,SC       /LDA 2,SC
07 03544 172414      SUB# 3,2,SZR   /SUB# 3,2,SZR
08 03545 000406      JMP ,+6        /JMP ,+6
09 03546 101004      MOV 0,0,SZR    /MOV 0,0,SZR
10 03547 000404      JMP ,+4        /JMP ,+4
11 03550 020210      LDA 0,LS       /LDA 0,LS
12 03551 124400      NEG 1,1        /NEG 1,1
13 03552 124000      COM 1,1        /COM 1,1
14 03553 030174      LDA 2,UNIT     /LDA 2,UNIT
15 03554 030026      LDA 3,UNIT8,2  /LDA 3,UNIT8,2
16 03555 125300      MOVS 1,1       /MOVS 1,1
17 03556 107000      ADD 3,1        /ADD 3,1
18 03557 103120      ADDZL 0,0     /ADDZL 0,0
19 03560 103120      ADDZL 0,0     /ADDZL 0,0
20 03561 107000      ADD 0,1        /ADD 0,1
21 03562 020310      LDA 0,,SC      /LDA 0,,SC
22 03563 030255      LDA 2,SC       /LDA 2,SC
23 03564 112400      SUB 0,2        /SUB 0,2
24 03565 020212      LDA 0,C17      /LDA 0,C17
25 03566 150400      NEG 2,2        /NEG 2,2
26 03567 113400      AND 0,2        /AND 0,2
27 03570 147000      ADD 2,1        /ADD 2,1
28 03571 002433      DIC 0,,DSKP    /DIC 0,,DSKP
29 03572 106414      SUB# 0,1,SZR   /SUB# 0,1,SZR
30 03573 000634      JMP RE.6       /JMP RE.6
31
32 03574 030174      ,R41          /LDA 2,UNIT
33 03575 020310      LDA 0,,SC      /LDA 0,,SC
34 03576 101300      MOVS 0,0       /MOVS 0,0
35 03577 025112      LDA 1,WD8R+4,2 /LDA 1,WD8R+4,2
36 03600 107022      ADDZ 0,1,SZC   /ADDZ 0,1,SZC
37 03601 011106      ISZ WDSR,2     /ISZ WDSR,2
38 03602 000401      NOP            /NOP
39 03603 045112      STA 1,WD3R+4,2 /STA 1,WD3R+4,2
40 03604 020202      LDA 0,FATAL    /LDA 0,FATAL
41 03605 101004      MOV 0,0,SZR    /MOV 0,0,SZR
42 03606 002276      JMP 0,RHRET    /JMP 0,RHRET
43 03607 020201      LDA 0,RETRY    /LDA 0,RETRY
44 03610 101005      MOV 0,0,SNR    /MOV 0,0,SNR
45 03611 002403      JMP 0,+3       /JMP 0,+3
46 03612 002401      JMP 0,+1       /JMP 0,+1
47 03613 003313      RE.20         /RE.20
48 03614 003207      GENRET        /GENRET
49
50 03615 003301      IRE1:         /RE.1
51 03616 003303      IRE2:         /RE.2

```

```

/IFIND ENDING DISK ADDR
/AC0=SECT AC1=HEAD
/IF ,SC NOT = SC A CHK WD ERR
/TERMINATED THE DATA XFER
/CHK WD ERR
/IF SECT = 0 NO HEAD ICR
/OCCURRED AT THE END OF
/THE DATA TRANSFER
/SECT = LAST SECTOR ON DISK
/HEAD = HEAD=1
/FORM THE DISK ADDR
/WORD AS READ VIA "DIC"
/ SECT+4
/ # SECT XFERRED
/ # SECT SPECIFIED
/AC2= # SECT NOT XFERRED
/INITIALLY AC0= EXPECTED
/DISK ADDRESS
/READ ACTUAL
/ENDING DISK ADDR ERROR
/ADD WORDS READ TO TOTAL
/DOUBLE PRECISION
/END OF TEST
/WHAT TO DO NOW
/(FATAL) ERROR RETURN
/DO NORMAL RETURN
/TRY AGAIN

```

```

10063 ,MAIN
01
02
03
04
05
06
07
08
09 03617 054435 HSSI STA 3,HSSRET
10 03620 006327 GETATM
11 03621 054434 LDA 3,SAM
12 03622 136415 SUB# 1,3,SNR
13 03623 000426 JMP HSS,1
14 03624 125003 MOV 1,1,SNC
15 03625 125004 MOV 1,1,SZR
16 03626 002346 JMP #IGCS
17 03627 024207 LDA 1,LHD
18 03630 106437 SUBZ# 0,1,SBN
19 03631 002360 JMP #IQUST
20 03632 040256 STA 0,HD
21 03633 006327 GETATM
22 03634 125003 MOV 1,1,SNC
23 03635 125004 MOV 1,1,SZR
24 03636 002346 JMP #IGCS
25 03637 024210 LDA 1,LS
26 03640 106437 SUBZ# 0,1,SBN
27 03641 002360 JMP #IQUST
28 03642 040254 STA 0,SEC
29 03643 006327 GETATM
30 03644 101005 MOV 0,0,SNR
31 03645 002360 JMP #IQUST
32 03646 125004 MOV 1,1,SZR
33 03647 002346 JMP #IGCS
34 03650 040255 STA 0,SC
35 03651 102560 HSS.11 SUBCL 0,0
36 03652 040260 STA 0,TERM
37 03653 002401 JMP #HSSRET
38 03654 000000 HSSRET: 0
39 03655 046055 SAM: 46055
40 03656 000000 HIAADD: 0

```

```

*****
**** GENERAL PURPOSE SUBROUTINES ****
*****

```

```

I GET CYL(MAYBE)-HEAD-SECTOR-SECTOR COUNT
I SET (C)=1 ON RETURN IF CR TERMINATOR

```

```

I GET "SAME", OR HEAD #
I AC0=# AC1# NAME

```

```

I "SAME"

```

```

I OTHER NAMES OR CR ILLEGAL
I CHECK HEAD LIMIT

```

```

I LIMIT EXCEEDED

```

```

I HEAD #
I GET SECTOR #
I AC0=# AC1#NAME

```

```

I NAME OR CR TERM ILLEGAL
I CHECK SECT # LIMIT

```

```

I LIMIT EXCEEDED

```

```

I SECTOR #
I GET # OF SECTORS
I NO SECTOR COUNT.

```

```

I NAME ILLEGAL
I # OF SECTORS

```

```

I "SAME"
I I/O ADDRESS MODIFICATION, HI END

```

```

10064 ,MAIN
01
02
03
04
05
06
07
08 03657 000477 .CSWI READS 0
09 03660 101103 MOVL 0,0,SNC
10 03661 003077 HALT
11 03662 002677 IORST
12 03663 000477 READS 0
13 03664 101120 MOVZL 0,0
14 03665 103103 ADDL 0,0,SNC
15 03666 175401 INC 3,3,SKP
16 03667 102521 SUBZL 0,0,SKP
17 03670 102400 SUB 0,0
18 03671 040204 STA 0,LUPSW
19 03672 001400 JMP 0,3
20

```

```

CHECK SWITCH REGISTER ON ERROR,
IF SW0 # 0 HALT
IF SW2 # 1 DO RETURN +1 (SCOPE LOOP)
IF SW2 # 0 DO RETURN +2

```

```

I HALT ON ERROR

```

```

I READ SWITCHES AGAIN IN CASE
I THEY WERE CHANGED.

```

```

I NORMAL RETURN
I SET LOOP SWITCH

```

10005 ,MAIN

```
01          ;QUICKIE FORMATTER PERFORMS THE SINGLE FUNCTION OF
02          ;WRITING CYLINDER ADDRESS INTO THE FORMAT SECTION
03          ;PRECEDING EACH SECTOR ON THE DISK SURFACES, NO
04          ;CHECKING IS PERFORMED, AND PROGRAM WILL HALT
05          ;AFTER THE FORMAT ADDRESSES HAVE BEEN WRITTEN.
06
07 03673 006337 FQIK1: SMEM          ;SIZE MEMORY
08 03674 006340          SETB          ;SET TIME BASE
09 03675 006377          HALT          ;ERROR RTN FROM TIMER
10 03676 006341          INITE         ;INITIALIZE BUFFERS ETC
11 03677 006363          JSR 01,680    ;SET LAST HEAD/SECTOR
12 03700 014207          DSZ LMD
13 03701 000401          401
14 03702 000402          JMP ,+2
15 03703 000610          FMUNIT
16 03704 006777          JSK 0,-1      ;GO FIND UNIT # TO BE FORMATTED.
17 03705 102440          SUBB 0,0      ;CLEAR OUT
18 03706 040256          STA 0,HD      ;SOFTWARE REGISTERS.
19 03707 040254          STA 0,SEC
20 03710 040255          STA 0,SC
21 03711 040501          STA 0,CYLND
22 03712 006352          RECAL
23 03713 006355          CKSW
24 03714 000776          JMP ,+2
25 03715 000401          NOP
26 03716 020474 FQIK1: LDA 0,CYLND  ;UPDATE "TO" AND "FROM"
27 03717 030174          LDA 2,UNIT  ;SOFT REGS BEFORE SEEKING.
28 03720 025056          LDA 1,CYLT,2 ;SEEK SUBROUTINE NEEDS
29 03721 045052          STA 1,CYLP,2 ;THIS DATA TO PROPERLY
30 03722 041056          STA 0,CYLT,2 ;EXECUTE THE SEEK.
31 03723 006351          SEEK
32 03724 000355          CKSW
33 03725 000776          JMP ,+2
34 03726 020465          LDA 0,S400  ;GET SEEK COMMAND.
35 03727 024463          LDA 1,CYLND ;AND CYLINDER ADDRESS,
36 03730 123000          ADD 1,0    ;AND ADDN.
37 03731 042457          STA 0,#GUDAT ;STORE ON END OF FORMAT LIST.
```

10006 ,MAIN

```
01 03732 020211 FQIK2: LDA 0,C3
02 03733 040203          STA 0,MODE
03 03734 102520          SUBZL 0,0
04 03735 040255          STA 0,SC
05 03736 020463          LDA 0,WDLST
06 03737 040257          STA 0,CA
07 03740 006336          SETP
08 03741 062433          DIC 0,,DSKP
09 03742 024444          LDA 1,FMTH
10 03743 123000          ADD 1,0
11 03744 063033          DOC 0,,DSKP
12 03745 024445          LDA 1,CYLND
13 03746 030437          LDA 2,CD202
14 03747 140032          ADCZN 2,1,SZC
15 03750 006437          JSR 0,IFMHT
16 03751 024441          LDA 1,CYLND
17 03752 020432          LDA 0,CWRT
18 03753 123000          ADD 1,0
19 03754 061133          DQAS 0,,DSKP
20 03755 006361          INTWT
21 03756 006451          JSR 0,IFMHT
22 03757 000433          DIA 0,,DSKP
23 03760 101233          MOVZR# 0,0,SNC
24 03761 000410          JMP FQIK3
25 03762 040242          STA 0,ISTAT
26 03763 024403          LDA 1,,+3
27 03764 044276          STA 1,RWRET
28 03765 002353          PSTAT
29 03766 003767          ,+1
30 03767 006355          CKSW
31 03770 000742          JMP FQIK2
32 03771 006374 FQIK3: CALAD
33 03772 003732          FQIK2
34 03773 003716          FQIK1
35 03774 006325          PCRLF
36 03775 006324          MESSAGE
37 03776 004014          FMTOVR
38 03777 006352          RECAL
39 04000 006355          CKSW
40 04001 000776          JMP ,+2
41 04002 063077          HALT
42 04003 000777          JMP ,+1
43
44 04004 174400 CWRT: 174400
45 04005 000312 CD202: 202
46 04006 020000 FMTW: 20000
47 04007 004026 IFMHT: FMHMT
48 04010 004063 GUDAT: IGDAT
49 04011 004044 WDLST: IGUD
50 04012 000000 CYLND: 0
51 04013 000400 S400: 400
52 04014 147706 FMTOVR: .TXTE /FORMAT DONE/
53
54 152101
55 042240
56 047317
57 020705
58 000000
59 04023 005215 MED.R: .TXTE /<15><12>PC /
60 141520
```

```
;SET TIME
;MODE SWITCH TO WRITE
;LOAD SC WITH 1
;SET SECTOR COUNT TO 1,
;AND SET CA POINTER
;TO BEG OF WORD LIST
;SET PARAMETERS LOADS DOC WORD.
;READ IT BACK
;AND ADDN BIT 2,
;THE FORMAT BIT.
;RELOAD FORMAT WORD.
;MAKE SURE THAT
;THIS IS NOT PAST END CYLINDER.
;TO SPECIAL FMT HALT ROUTINE.
;GET CYLINDER ADDRESS
;AND CODE FOR WRITE.
;START WRITING.
;GO WAIT FOR WRITE DONE.
;ERROR RETURN = WRT TIMEOUT.
;READ STATUS
;CK THE ERROR BIT.
;NO ERROR AFTER WRITE.
;SAVE STATUS FOR PRINTING.
;GET CHECK SWITCH ADDRESS.
;STORE IN READ/WRITE RETURN.
;PRINT OUT ERROR STATUS & RETURN
;TO CKSW.
;IF SWITCH#1, LOOP.
;CALCULATE ADDRESS
;CALAD JMP ARGHT IF # SECTS < OR = 13.
;CALAD JMP ARGHT IF CYLNS < 313.
;FINISH FORMATTING
;FORMAT DONE
;RESTART PROGRAM ELSEWHERE.
;PERM. HALT.
```

0067 .MAIN
01 000011

```
10068 .MAIN
01                                /SPECIAL HALT FOR FORMAT ERROR
02                                /PRINTS OUT ERROR PC, THEN HALTS.
03
04 04026 054415 FMHLT: STA 3,SQIK2       /SAVE RETURN ADDRESS.
05 04027 060477          READS 0
06 04030 103122          ADDZL 0,0,SZC   /SWITCH 1(1)=INH PRINT P.C.
07 04031 000410          JMP FMH00
08 04032 000300          PCRLF
09 04033 000324          MESSAGE
10 04034 004023          MED,R
11 04035 024400          LDA 1,SQIK2
12 04036 000322          TYPAC1
13 04037 000320          PCRLF
14 04040 034403          LDA 3,SQIK2
15 04041 003077 FMH00: HALT
16 04042 002401          JMP #SQIK2
17
18 04043 000000 SQIK2: 0
19
20 04044 000000 IGUD: 0
21 04045 000000          0
22 04046 000000          0
23 04047 000000          0
24 04050 000000          0
25 04051 000000          0
26 04052 000000          0
27 04053 000000          0
28 04054 000000          0
29 04055 000000          0
30 04056 000000          0
31 04057 000000          0
32 04060 000000          0
33 04061 000000          0
34 04062 000000          0
35 04063 000400 IGDAT: 400
```


10069 .MAIN

```
01          IADCAL SUBROUTINE IS CALLED BY CALAD AND REQUIRES
02          I2 ARGUMENTS FOLLOWING THE CALL, ARGUMENT IN CALL+1
03          IIS THE LOOP ADDRESS TO WHICH CALAD WILL JUMP IF
04          IN OF SECTORS WRITTEN IS LESS THAN 13, ARGUMENT
05          IIN CALL+2 IS ALTERNATE LOOP ADDRESS TO WHICH
06          ICALAD WILL JUMP IF 13 (OCTAL) SECTORS AND EITHER 2 OR
07          I4 HEADS HAVE BEEN WRITTEN, AND THE NUMBER OF CYLINDERS
08          IIS LESS THAN 312, SUBROUTINE EXITS TO CALL+3 WHEN
09          IALL SECTORS, HEADS, AND CYLINDERS HAVE BEEN WRITTEN.
10
11 04064 021400 ADCAL: LDA 0,0,3
12 04065 040456      STA 0,SEKSW
13 04066 175400      INC 3,3
14 04067 021400      LDA 0,0,3
15 04070 040454      STA 0,CYLSW
16 04071 175400      INC 3,3
17 04072 054453      STA 3,CALRTN
18 04073 020254      LDA 0,SEC
19 04074 024025      LDA 1,C10
20 04075 107415      AND# 0,1,SNR
21 04076 000421      JMP SECOUT
22 04077 024447      LDA 1,XC12
23 04100 106414      SUB# 0,1,SZR
24 04101 000404      JMP ,+4
25 04102 126520      SUBZL 1,1
26 04103 044254      STA 1,SEC
27 04104 002437      JMP #SEKSW
28 04105 125400      INC 1,1
29 04106 106414      SUB# 0,1,SZR
30 04107 000404      JMP ,+4
31 04110 126440      SUBD 1,1
32 04111 044254      STA 1,SEC
33
34 04112 000410      JMP INKHD
35 04113 024025      LDA 1,C10
36 04114 125400      INC 1,1
37 04115 122032      ADCZ# 1,0,SZC
38 04116 004431      JSR SHALT
39 04117 010254      SECOUT: ISZ SEC
40 04120 010254      ISZ SEC
41 04121 002422      JMP #SEKSW
```

10070 .MAIN

```
01 04122 010256 INKHD: ISZ MD
02 04123 020256      LDA 0,MD
03 04124 024207      LDA 1,LMD
04 04125 122032      ADCZ# 1,0,SZC
05 04126 000404      JMP ,+4
06 04127 152440      SUBD 2,2
07 04130 050254      STA 2,SEC
08 04131 002412      JMP #SEKSW
09 04132 010660      ISZ CYLND
10 04133 020657      LDA 0,CYLND
11 04134 024651      LDA 1,CD202
12 04135 122032      ADCZ# 1,0,SZC
13 04136 002407      JMP #CALRTN
14 04137 152440      SUBD 2,2
15 04140 050254      STA 2,SEC
16 04141 050256      STA 2,MD
17 04142 002402      JMP #CYLSW
18
19 04143 000000 SEKSW: 0
20 04144 000000 CYLSW: 0
21 04145 000000 CALRTN: 0
22 04146 000012 XC12: 12
23 04147 063077 SHALT: MALT
24 04150 000777      JMP ,=-1
```

```

10071 .MAIN
01
02      JAC1 REM AC0=(AC0,AC1)/AC2
03 04151 102400 DIVID: SUB 0,0
04 04152 054431 DIVID: STA 3,MSAV
05 04153 142432      SUBZ# 2,0,SZC
06 04154 000413      JMP DEXT
07 04155 054420 DVIU: STA 3,MSAV      /DIVIDE
08 04156 034420      LDA 3,M20
09 04157 125120      MOVZL 1,1
10 04160 101100 DLOOP: MOVL 0,0
11 04161 142412      SUB# 2,0,SZC
12 04162 142400      SUB 2,0
13 04163 125100      MOVL 1,1
14 04164 175404      INC 3,3,SZR
15 04165 000773      JMP DLOOP
16 04166 170441      SUB0 3,3,SKP
17 04167 176420 DEXT: SUBZ 3,3
18 04170 002413      JMP #MSAV
19
20      J(AC0,AC1)*AC1+AC2+AC0
21 04171 102460 MULTI: SUBC 0,0      /MULTIPLY
22 04172 054411 MULTA: STA 3,MSAV
23 04173 034411      LDA 3,M20
24 04174 125203 MLOOP: MOVR 1,1,SNC
25 04175 101201      MOVR 0,0,SKP
26 04176 143220      ADDZR 2,0
27 04177 175404      INC 3,3,SZR
28 04200 000774      JMP MLOOP
29 04201 125260      MOVCR 1,1
30 04202 002401      JMP #MSAV
31 04203 000000 MSAV: 0
32
33 04204 177700 M2P: -20
34

```

```

10072 .MAIN
01      JTELETYPE NON INTERRUPT PACKAGE
02      JAC1,AC2 SAVED
03      J"MESS" PRINTS ASCII MESSAGES AS SPECIFIED BY ASSEMBLER
04      J"CRLF" PRINTS A CARRIAGE RETURN
05      J"POCT" PRINTS C(1) IN OCTAL
06      J"DOCT" PRINTS C(1) IN OCTAL, LEADING ZEROS SUPPRESSED
07      J"POEC" PRINTS C(1) IN DECIMAL, LEADING ZEROS SUPPRESSED,
08      JTHE ABOVE THREE ARE FOLLOWED BY THE TAB IN P,TAB
09      J"TIPO" ACCEPTS OCTAL, AND
10      J"TIPO" ACCEPTS DECIMAL SINGLE PRECISION SIGNED INTEGERS
11      JINTO AC1 FROM THE TTI, LEADING NULLS, TABS,
12      JAND SPACES ARE IGNORED, A 16 BIT UNSIGNED INTEGER IS
13      JFORMED, THEN NEGATED IF A MINUS SIGN IS TYPED,
14      JEXIT AT CALL+1 IF INPUT ERROR WITH AC0=BAD CHARACTER,
15      J (NOT A LEGAL DIGIT OR TERMINATING CHARACTER)
16      JEXIT AT CALL+2 UPON TERMINATING CHARACTER
17      J WITH AC0=0, 0, 40, 12, 55
18      J FOR NULL, TAB, SPACE, CARRIAGE RETURN, COMMA
19      JTHE ABOVE WAIT FOR TTD DONE, THEN CLEAR TTD.
20      J"CHAR" PRINTS ASCII CHARACTER IN C(0)R; C(0)L MUST BE 0.
21      JEXITS CALL +2 IF C(0)R=0, CORRECTS THE PARITY,
22      JSIMULATES TAB ON ASR33,
23      J"TYPE" PRINTS C(0)R, MUST HAVE PROPER PARITY, EXITS AT
24      JCALL+1. REPLACE "TYPE" WITH INTERRUPT TYPE IF DESIRED.
25
26 04205 054551 MESS: STA 3,MESSR      /PRINT A TEXT MESSAGE
27 04208 044505      STA 1,P,AC1
28 04207 050505      STA 2,P,AC2
29 04210 010540      ISZ MESSR
30 04211 031400      LDA 2,0,3      /C(2) POINTS TO MESSAGE
31 04212 024505      LDA 1,P,377      /A 8 BIT MASK
32 04213 021000      LDA 0,0,2      /C(2)=DATA WORD
33 04214 125112      MOVLM 1,1,SZC
34 04215 123701      ANDS 1,0,SKP
35 04216 123401      AND 1,0,SKP      /C(0)=DATA CHARACTER RIGHT
36 04217 151400      INC 2,2      /INC TO NEXT WORD
37 04220 124000      COM 1,1      /FLIP MASK
38 04221 004477      JSR CHAR      /PRINT
39 04222 000771      JMP MESS+0      /ANOTHER
40 04223 000402      JMP +2
41 04224 004474 P.LST: JSR CHAR
42 04225 024466 PEXIT: LDA 1,P,AC1
43 04226 030466      LDA 2,P,AC2
44 04227 063511      SKPBZ TTD
45 04230 000777      JMP -1
46 04231 000211      NI0C TTD
47 04232 002524      JMP #MESSR      /LAST
48

```

```

10073 .MAIN
01 04233 102401 ZOCTI: SUB 0,0,SKP
02 04234 020462 POCTI: LDA 0,P,C60
03 04235 050457 STA 2,P,AC2
04 04236 030435 LDA 2,OCTAB IPRINT C(1) IN OCTAL
05 04237 000404 JMP .+4
06 04240 050454 PDECI: STA 2,P,AC2
07 04241 030442 LDA 2,DECTB IPRINT C(1) IN DECIMAL
08 04242 102400 SUB 0,0
09 04243 054513 STA 3,MESSR IBOOTH ENTRYS PRINT NUMBER
10 04244 044447 STA 1,P,AC1
11 04245 040445 STA 0,ZSUPP ITHEN TAB TO NEXT POSITION
12 04246 050401 STA 2,..+1
13 04247 000000 DECOCT: 0 IALDA 2,TABLE" INSTRUCTION
14 04250 010777 ISZ .-1
15 04251 020444 LDA 0,P,TAB
16 04252 151005 MOV 2,2,SNR IIF TABLE ENTRY=0
17 04253 000751 JMP P,LST IEXIT WITH TAB
18 04254 034436 LDA 3,ZSUPP IZEROS SUPPRESS STUF
19 04255 102400 SUB 0,0
20 04256 146452 DECOT: SUBUM 2,1,SZC
21 04257 000405 JMP DECP
22 04260 146400 SUB 2,1 IFORM THE DIGIT
23 04261 034435 LDA 3,P,C60
24 04262 101400 INC 0,0
25 04263 000773 JMP DECOT
26 04264 151235 DECF: MOVZRN 2,2,SNR
27 04265 034431 LDA 3,P,C60
28 04266 054424 STA 3,ZSUPP IC(0)=DIGIT
29 04267 103000 ADD 3,0 IMAKE ASCII
30 04270 175004 MOV 3,3,SZR
31 04271 004427 JSR CHAN IPRINT
32 04272 000755 JMP DECOCT IGET NEXT DIGIT
33
34 04273 030425 OCTAB: LDA 2,..+1+,-DECOCT
35 04274 100000 100000
36 04275 010000 10000
37 04276 001000 1000
38 04277 000100 100
39 04300 000010 10
40 04301 000001 1
41 04302 000000 0
42 04303 030435 DECTB: LDA 2,..+1+,-DECOCT
43 000012 .RDX 10
44 04304 023420 10000
45 04305 001750 1000
46 04306 000144 100
47 04307 000012 10
48 04310 000001 1
49 04311 000000 0
50 000010 .RDX 8
51 04312 000000 ZSUPP: 0
52 04313 000000 P.AC1: 0
53 04314 000000 P.AC2: 0
54 04315 000011 P.TAB: 11 ICHARACTER PRINTED AFTER NUMBERS
55 04316 000000 P.C60: 00
56 04317 000377 P.S77: 377

```

```

10074 .MAIN
01 04320 054434 CHARI: STA 3,CHRET IPRINT C(0) RIGHT
02 04321 101305 MOVS 0,0,SNR IRETURN +2 IF NULL
03 04322 001401 JMP 1,3
04 04323 110120 MOVZL 0,3 ICOMPUTE EVEN PARITY
05 04324 177004 ADD 3,3,SZR
06 04325 000777 JMP .+1
07 04326 103200 ADDR 0,0
08 04327 101300 MOVS 0,0
09 04330 034452 CHARI: LDA 3,P,C11 IIS THIS A TAB
10 04331 116415 SUB# 0,3,SNH
11 04332 000403 JMP CHA,3 IYES
12 04333 004424 JSR TYPE INO PRINT IT
13 04334 002420 JMP #CHRET IEXIT
14 04335 020400 CHA,3: LDA 0,P,240 ISIMULATE A TAB
15 04336 004421 JSR TYPE IWITH 1 TO 14 SPACES
16 04337 020416 LDA 0,CHORZ
17 04340 034441 LDA 3,P,C7
18 04341 163404 AND 3,0,SZR
19 04342 000773 JMP CHA,3
20 04343 040412 STA 0,CHORZ
21 04344 002410 JMP #CHRET
22
23 04345 054411 CRLF: STA 3,MESSR ISAVE RETURN
24 04346 044745 STA 1,P,AC1
25 04347 050745 STA 2,P,AC2
26 04350 020434 LDA 0,P,C15
27 04351 004747 JSR CHAN IPRINT CARRIAGE AND LF
28 04352 020431 LDA 0,P,C12
29 04353 000651 JMP P,LST
30
31 04354 000000 CHRET: 0
32 04355 000000 CHORZ: 0
33 04356 000000 MESSR: 0

```

```

10075 .MAIN
01 04357 054430 TYPE: STA 3,TYPRET ;TYPE THE C(0)R IF
02 04360 074477 READS 3 ;SWITCH 1(0).
03 04361 177122 ADDZL 3,3,SZC
04 04362 000404 JMP ,+4 ;INHIBIT TYPE EXIT.
05 04363 003511 SKPBZ TTD
06 04364 000777 JMP ,=1
07 04365 061111 DOAS 0,TTD
08 04366 034731 LDA 3,P,377
09 04367 175220 MOVZR 3,3
10 04370 103400 AND 3,0
11 04371 110043 ADCO 0,3,0NC
12 04372 034414 LDA 3,P,C40
13 04373 102432 SUBZ# 3,0,SZC ;SKIP NON-PRINTING CHAR
14 04374 010761 ISZ CMORZ
15 04375 034407 LDA 3,P,C15
16 04376 110445 SUBO 0,3,0NR
17 04377 054756 STA 3,CMORZ ;CLR MORZ POS
18 04400 002407 JMP #TYPRET
19 04401 000007 P.C7: 7
20 04402 000011 P.C11: 11
21 04403 000012 P.C12: 12
22 04404 000015 P.C15: 15
23 04405 000240 P.240: 240
24 04406 000040 P.C40: 40
25 04407 000000 TYPRET: 0

```

```

10076 .MAIN
01 04410 020773 TINC: LDA 0,P,C12
02 04411 004746 JSR TYPE
03 04412 010744 TINC: ISZ MESSR
04 04413 024700 TINC: LDA 1,P,AC1
05 04414 034676 LDA 3,ZSUPP
06 04415 175102 MOVL 3,3,SZC
07 04416 124400 NEG 1,1
08 04417 000007 JMP PEXIT+1
09
10 04420 102121 TINC: ADCZL 0,0,SKP ;OCTAL ENTRY
11 04421 102440 TINC: SUBO 0,0 ;DECIMAL ENTRY
12 04422 054734 STA 3,MESSR
13 04423 050071 STA 2,P,AC2 ;AC2 IS SAVED
14 04424 030757 LDA 2,P,C12
15 04425 113000 ADD 0,2
16 04426 102440 SUBO 0,0
17 04427 040063 STA 0,ZSUPP ;MINUS SIGN AND LEADING SPACES FLAG
18 04430 034662 TINC: LDA 3,ZSUPP
19 04431 175004 MOV 3,3,SZR
20 04432 000760 JMP TINC
21 04433 054660 TINC: STA 3,P,AC1
22 04434 063010 SKPDN TTI
23 04435 000777 JMP ,=1
24 04436 060010 DIAC 0,TTI
25 04437 004601 JSR CHAR
26 04440 034740 LDA 3,P,C40
27 04441 110414 SUB# 0,3,SZR
28 04442 101015 MOV# 0,0,0NR
29 04443 000765 JMP TINC ;SPACE, TAB, OR NULL
30 04444 024432 LDA 1,TIN2
31 04445 106015 ADC# 0,1,0NR ;COMMA
32 04446 000744 JMP TINC
33 04447 106424 SUBZ 0,1,SZR ;MINUS
34 04450 000405 JMP TINC ;NO
35 04451 034041 LDA 3,ZSUPP
36 04452 177200 ADDR 3,3 ;COMPLEMENT SIGN
37 04453 054637 STA 3,ZSUPP
38 04454 000700 JMP TINC,+1
39 04455 136415 TINC: SUB# 1,3,0NR ;IS IT A CARRIAGE RETURN?
40 04456 000732 JMP TINC
41 04457 024415 TINC: LDA 1,TIN1
42 04458 107022 ADDZ 0,1,SZC ;SKIP IF NOT A DIGIT
43 04461 146013 SUBL# 2,1,0NC ;SKIP IF DIGIT
44 04462 000731 JMP TINC
45 04463 010027 ISZ ZSUPP ;OUT OF LEADING SPACES
46 04464 020027 LDA 0,P,AC1
47 04465 101120 MOVZL 0,0
48 04466 115120 MOVZL 0,3
49 04467 175120 MOVZL 3,3
50 04470 137000 ADD 1,3 ;0 OLD P,AC1'S + NEW DIGIT
51 04471 140220 MOVZR 2,1
52 04472 120332 MOVZR# 1,1,SZC ;SKIP IF OCTAL MODE
53 04473 117000 ADD 0,3 ;ADD 2 OLD P,AC1'S
54 04474 000737 JMP TINC
55 04475 177720 TIN1: =60
56 04476 000055 TIN2: 55

```

```

10077 .MAIN
01
02 ;PROCESSOR TIMER PACKAGE
03 ;THIS PACKAGE IS CALLED WHENEVER IT IS NECESSARY TO
04 ;IDENTIFY THE MEAN TIME BASE OF THE COMPUTER IN
05 ;WHICH THE PROGRAM RESIDES, THE MEAN TIME BASE MAY
06 ;THEN BE UTILIZED TO VERIFY OR CALCULATE THE RELATIONSHIPS
07 ;OF OTHER PERIPHERAL FUNCTIONS.
08
09 ;THE PACKAGE RETURNS TO THE CALL INSTRUCTION WITH
10 ;THE CONTENTS OF AC1= TO A CALIBRATION COUNT
11 ;THAT MAY BE INCREMENTED TO OVERFLOW IN 100 MILLI-
12 ;SECONDS BY THE FOLLOWING DELAY LOOP.
13 ;TYPE1: MOV 0,0
14 ; INC 0,0,SZC ;SKP=NOT OVERFLOW
15 ; JMP 1,3 ;EXIT LOOP
16 ; 0 ;ANY FLAVOR IO SKP
17 ; JMP TYPE1
18
19 ;THE CONTENTS OF AC2 WILL CONTAIN A SIMILAR 100 MS
20 ;ITERATION COUNT BUT FOR THE FOLLOWING LOOP:
21 ;TYPE2: NIO 0
22 ; DIA 1,,DEV ;GET DEVICE STATUS
23 ; ANDW 2,1,SZR ;ANY STATUS COMPARE
24 ; JMP ,+4 ;EXPECTED STATUS EXIT
25 ; INC 0,0,SZR ;SKP OUT ON LOOP OFLOW
26 ; JMP TYPE2
27
28 ;THE VALUES RETURNED MAY BE ARITHMETICALLY
29 ;PROCESSED (MULTIPLIED/DIVIDED) FOR LONGER OR
30 ;SHORTER DELAYS AS LONG AS THE STANDARD LOOPS
31 ;LISTED ABOVE ARE UTILIZED.
32
33 ;IT IS RECOMMENDED THAT ALL TIMING FUNCTIONS
34 ;BE PERFORMED WITHIN THE SAME GENERAL AREA OF
;MEMORY AS THIS TIMING PACKAGE.

```

```

10078 .MAIN
01
02 ;
03 ;INITIALLY, THE TIMER PACKAGE ATTEMPTS TO
04 ;DETERMINE IF THE COMPUTER HAS A REAL TIME CLOCK
05 ;AVAILABLE. THE ITERATION COUNTS ARE DEVELOPED SIMPLY
06 ;BY SYNCING WITH THE CLOCK AND COUNTING
07 ;THE #OF LOOP ITERATIONS AT 10 HZ.
08
09 ;IF, HOWEVER THERE IS NO REAL TIME CLOCK THE MEAN
10 ;TIME BASE OF THE LOOPS MUST BE CALCULATED, THIS
11 ;IS PERFORMED BY COUNTING THE #OF TIMES THE
12 ;STANDARD LOOPS ARE ITERATED FOR ONE OUTPUT
13 ;CHARACTER TO DEVICE "TTO" AND REQUESTING THE
14 ;BAUD RATE OF DEVICE TTO TO BE TYPED IN BY THE
15 ;TEST OPERATOR.
16
17 04477 054057 ;PTIME: STA 3,SVTIME
18 04500 063514 ;SKPBZ RTC ;TEST FOR CAS/RTC
19 04501 080416 ;JMP SCORE ;CAS RTC NONEXIS.
20 04502 060114 ;NIOB RTC ;TURN CLOCK ON
21 04503 063514 ;SKPBZ RTC ;BUSY #1 IS RTC
22 04504 060403 ;JMP ,+3
23 04505 063614 ;SKPDN RTC ;DONE #0 NO RTC
24 04506 060411 ;JMP SCORE ;AND DEV TTO IS USED
25 04507 062677 ;IORST
26 04510 102520 ;SUBZL 0,0 ;#10 HZ FOR RTC
27 04511 064473 ;JSR TYME
28 04512 061114 ;DOAS 0,RTC ;PASSED TO "TYME"
29 04513 063514 ;SKPBZ RTC ;FOR EXECUTION
30 04514 082542 ;JMP #SVTIME ;AC1 AND AC2=LOOP COUNTS
31
32 ;
33 ;THE FOLLOWING SUBROUTINE IS TO RETAIN COMPATABILITY
34 ;WITH THE OLD PROCESSOR IDENTIFICATION AND TIMING
35 ;PACKAGE TO RETRIEVE THE LOOP COUNT FOR
36 ;THE DIA,B OR C LOOP TYPE 2
37 ;DIA: LDA 1,NUCAL
38 ; JMP 0,3

```

```

10079 .MAIN
01
02
03
04 04517 002677 SCORE: IORST
05 04520 102400 SUB 0,0 IACB=NULL CHARACTER
06 04521 004463 JSR TYME
07 04522 001111 DOAS 0,TT0 I/PASSED TO TYME
08 04523 003511 SKPBZ TTD I/FOR EXECUTION
09 04524 006033 SCORA: JSR #TUMBLER I/OUT TEXT
10 04525 004667 SESOUT I/ASKING FOR BAUD RATE
11
12 I/THE FOLLOWING SERIES OF INSTRUCTIONS WILL
13 I/CALCULATE THE ITERATION COUNT FOR
14 I/1 BIT OF TTD OUTPUT AFTER RETRIEVING
15 I/THE CONSOLE BAUD RATE FROM THE
16 I/TEST OPERATOR---REQUIRES SUBROUTINE TIND
17 04526 006033 JSR #KEYS
18 04527 000775 JMP SCORA I/INPUT ERROR
19 04530 044030 STA 1,LOCK I/SAVE BAUD RATE
20 04531 030035 LDA 2,S,3D1 I/0
21 I/ROUTINE ASSUMES AN 11 BIT CHARACTER
22 04532 151400 INC 2,2 I/ASSUME 11 BITS
23 04533 024521 LDA 1,ORDINAL I/COUNT FOR FULL CHAR
24 04534 102400 SUB 0,0
25 04535 006026 JSR #KEYS*2 I/CHAR TIME/#BITS
26 04536 101004 MOV 0,0,SZR I/IF ANY REM.
27 04537 125400 INC 1,1 I/FUDGE BIT COUNT
28 04540 020020 LDA 0,LOCK
29 04541 044017 STA 1,LOCK I/SAVE ITR COUNT 1 BIT
30 04542 131000 MOV 1,2
31 04543 105000 MOV 0,1 I/AC1 = BAUD RATE
32 I/BAUD RATE TIMES COUNT FOR 1 BIT
33 I/WILL EQUAL ITERATION COUNT FOR 1 SECOND
34 04544 102400 SUB 0,0
35 04545 006015 JSR #KEYS*1 I/MUL AC1*AC2
36 04546 040017 STA 0,KN I/SAVE DOUBLE LENGTH
37 04547 044015 STA 1,KS I/RESULT
38 I/1 SECOND DIVIDED BY 10 = 100 MILLISECONDS
39 04550 030010 LDA 2,S,3D1 I/0
40 04551 006012 JSR #KEYS*2
41 04552 030002 LDA 2,ORDINAL I/COUNT FOR 1 CHAR
42 04553 044001 STA 1,ORDINAL I/ORDINAL*100 MS TYPE 1
I/CONTINUE CALCULATIONS NEXT PAGE

```

```

10080 .MAIN
01
02 I/1 SECOND COUNT/1 CHAR COUNT = # CHAR'S PER SEC
03 I/THIS CALCULATION IS USED TO EXPAND THE TYPE 2 COUNT
04 04554 020511 LDA 0,KN
05 04555 024007 LDA 1,KS I/1 SEC. RESTORED
06 04556 006505 JSR #KEYS*2 I/DIVIDE BY CHAR.
07 04557 044505 STA 1,KS I/# CHAR. 1 SEC
08 I/CALC RELATIONSHIP OF REM. TO 1 CHAR TO FILL SECOND
09 04560 140120 MOVZL 2,1
10 04561 111005 MOV 0,2,SNR
11 04562 151400 INC 2,2
12 04563 102400 SUB 0,0
13 04564 006477 JSR #KEYS*2 I/DIVIDE REM INTO CHAR
14 I/AC1=FUDGE FACTOR 1 RELEATIONSHIP OF CHAR TO TOTAL 1 SEC
15 I/FINISH CALCULATIONS ON LOOP TYPE 1 TO= 1SECOND
16 04565 131000 MOV 1,2 I/FUDGE FACTOR
17 04566 024467 LDA 1,NUCAL I/INTO CHARACTER TIME
18 04567 120120 MOVZL 1,1
19 04570 102400 SUB 0,0 I/WILL =
20 04571 006472 JSR #KEYS*2 I/PORION OF CHAR
21 04572 121000 MOV 1,0 I/TO COMPLETE 1 SECOND
22 04573 024462 LDA 1,NUCAL I/1 CHAR. TYPE 2 LOOP
23 04574 030470 LDA 2,KS I/# CHARS IN 1 SEC
24 04575 006465 JSR #KEYS*1 I/+ PORTION OF CHAR
25 I/DOUBLE LENGTH AC0,AC1=1 SECOND FOR TYPE 2 LOOP
26 04576 030470 LDA 2,S,3D1 I/DIVIDE BY 10 FOR 100 MS
27 04577 006464 JSR #KEYS*2
28 04600 044455 STA 1,NUCAL
29 04601 131000 MOV 1,2 I/AC2=100MS LOOP2
30 04602 024452 LDA 1,ORDINAL I/AC1 =100MS LOOP 1
31 04603 002453 JMP #BVTIME

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10001 ,MAIN
01
02
03
04
05
06
07
08 04604 024001 TYME: LDA 1,1          ISAVE INTR. LINK
09 04605 044446 STA 1,RVTMP
10 04606 024437 LDA 1,ENTYM
11 04607 044001 STA 1,1          IFOR LOOP 2 INTR.
12 04610 025400 LDA 1,0,3       IGET DOAS
13 04611 044410 STA 1,TIMA
14 04612 044414 STA 1,TIMB
15 04613 044421 STA 1,TIMC       IFOR EXECUTE
16 04614 025401 LDA 1,1,3       IGET SKPBZ
17 04615 044405 STA 1,TIMA+1
18 04616 044414 STA 1,TIMB+4     IFOR EXECUTE
19 04617 152400 SUB 2,2
20 04620 126400 SUB 1,1        ICLR CTRS
21 04621 061114 TYMA: DOAS 0,RTC      IOR TYO
22 04622 063514 SKPBZ RTC
23 04623 000777 JMP ,=1        IWAIT FOR DONE
24 04624 124004 COM 1,1,SZR     IAND 2ND DONE
25 04625 080774 JMP TYMA       ITHEN START COUNTING
26 04626 061114 TYMB: DOAS 0,RTC     ITHE THIRD DONE
27
28 04627 101000 MOV 0,0
29 04630 125405 INC 1,1,SNR     IWATCH FOR OFLOW
30 04631 000403 JMP ,+3
31 04632 063514 SKPBZ RTC
32 04633 000774 JMP TYMB+1
33
34 04634 061114 TYMC: DOAS 0,RTC
35 04635 060177 INTEN
36
37 04636 060000 NID 0          IAND IT ITERATES UNTIL
38 04637 060400 DIA 0,0       IINTERRUPTED BY PI
39 04640 102005 ADC 0,0,SNR
40 04641 063077 HALT          IFILL INSTR.
41 04642 151404 INC 2,2,SZR     ILOOP CTR
42 04643 000773 JMP TYMC+2
43 04644 063077 HALT          IDEVICE OR PI FAILED
44 04645 004646 ENTYM: ,+1          ITO HERE WHEN PI
45 04646 044406 STA 1,ORDINAL   ISAVE LOOP 1
46 04647 050406 STA 2,NUCAL    IAND LOOP 2
47 04650 020403 LDA 0,RVTMP
48 04651 040001 STA 0,1
49 04652 001402 JMP 2,3 IRETURN TO CALL

```

```

10002 ,MAIN
01
02
03 04653 000000 RVTMP: 0
04 04654 000000 ORDINAL: 0
05 04655 000000 NUCAL: 0
06 04656 000000 SVTIME: 0
07 04657 004205 TUNBLER: MESS
08 04660 000000 LOCK: 0
09 04661 004421 KEYS: TIND
10 04662 004172 MULTA
11 04663 004152 DIVUD
12 04664 000000 KS: 0
13 04665 000000 KN: 0
14 04666 000012 S,SD1: 10.
15 04667 005215 SEQOUT: ,TXTE 1<15><12><12>
16 04670 152012 TYO BAUD RATE ?= 1
17 147724
18 041240
19 052501
20 120104
21 040722
22 142724
23 037640
24 120275
25 000000

```

10083 .MAIN

```
01
02
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09
10
11 04702 040423 LAYUP: STA 0,DLY.1      ;SAVE OUR AC'S.
12 04703 050423      STA 2,DLY.2
13 04704 054423      STA 3,DLY.3
14 04705 102448      SUBO 0,0
15 04706 024415      LDA 1,CALIB      ;CLEAR AC0 FOR DIVIDE.
16 04707 125015      MOVW 1,1,SNR      ;CALIB LOADED PREVIOUSLY BY MAIN.
17 04710 000407      JMP .+7          ;CKN IF (C) CALIB = 0.
18 04711 030417      LDA 2,CXL.V
19 04712 006412      JSR 0DLY.0      ;DIVIDE COUNT BY 100.
20 04713 124400      NEG 1,1
21 04714 046402      STA 1,0,+2
22 04716 000402      JMP .+2
23 04716 004701      .WERK
24 04717 020406      LDA 0,DLY.1      ;RESTORE AC'S AND RETURN WITH
25 04720 030406      LDA 2,DLY.2      ;1 MS COUNT IN AC1. (C) AC1 WILL
26 04721 034406      LDA 3,DLY.3      ;BE RETURNED 0 IF CALIB IS
27 04722 001400      JMP 0,3         ;NOT LOADED.
28
29 04723 000000 CALIB: 0
30 04724 004762 DLY.0: DIVD
31 04725 000000 DLY.1: 0
32 04726 000000 DLY.2: 0
33 04727 000000 DLY.3: 0
34 04730 000144 CXL.V: 144
35
```

10084 .MAIN

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01
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39
40
;MAIN PROGRAM SHOULD BE CODED SUCH THAT THIS SUBR.
;WILL BE CALLED BY "DELAY" FOR STANDARD FORMAT.
;BOTH THE PTIME (PROCESSOR TIMER) PACKAGE AND
;SUBROUTINE LAYUP MUST HAVE BEEN CALLED SUCCESSFULLY
;PRIOR TO CALLING THIS SUBROUTINE, THE ARGUMENT FOLLOW-
;ING THE CALL IS THE ADDRESS OF THE DELAY CONSTANT.
;ALL AC'S ARE SAVED. RETURNS TO CALL+2 ON END OF
;DELAY. A SAMPLE INSTRUCTION SEQUENCE SHOWING THE
;PROPER LINKING OF ALL THREE SUBROUTINES IS AS
;FOLLOWS:
;JSR 0STIME ;WHERE STIME: PTIME.
;MOVW 1,1,SNR ;VERIFY COUNT IS LOADED.
;HALT ;NO COUNT,HALT ON ERROR.
;STA 1,0,CALIB ;WHERE ICALIB: CALIB.
;JSR 0IXLAY ;WHERE IXLAY: LAYUP.
;MOVW 1,1,SNR ;VERIFY WERK IS LOADED.
;HALT ;NO COUNT HALT ON ERROR.
;*** PROGRAM CONTINUES TO POINT WHERE DELAY IS REQ'D.**
;DELAY ;WHERE DELAY:JSR0DLY,AND
; ;IDLY: DLYM.
; ;WHERE .25MS: 25, ON PAGE 0.
;*** CONTINUE PROGRAM ..... ***
;PROGRAMMING OVERHEAD SHOULD BE FACTORED INTO ALL
;PRECISE DELAY MEASUREMENTS AND ARE DEFINED AS
;FOLLOWS:.....
;NOVA COMPUTER(FROM CALL TO RETURN).....
; 54 MICROS PLUS 16.4 MICROS PER MILLISEC.
;1200 COMPUTER(FROM CALL TO RETURN).....
; 24.4 MICROS PLUS 5.4 MICROS PER MILLISEC.
;1800 COMPUTER(FROM CALL TO RETURN).....
; 15.2 MICROS PLUS 3.2 MICROS PER MILLISEC.
;SUPER NOVA COMPUTER(FROM CALL TO RETURN).....
; 15.0 MICROS PLUS 3.2 MICROS PER MILLISEC.
;SUPER NOVA SC COMPUTER(FROM CALL TO RETURN)...
; 11.7 MICROS PLUS 1.0 MICROS PER MILLISEC.
;PROGRAMMING OVERHEAD DATA MAY ALSO BE USED TO
;CALCULATE DELAY ACCURACY.
```



```

10085 ,MAIN
01 04731 040425 DLYM: STA 0,DLY.4
02 04732 044425 STA 1,DLY.5
03 04733 050425 STA 2,DLY.6
04 04734 152440 SUBO 2,2
05 04735 050240 STA 2,OMEGA
06 04736 033400 LDA 2,00,3
07 04737 150400 NEG 2,2
08 04740 024421 LDA 1,,WERK
09 04741 121000 DLYY1: MOV 1,0
10 04742 101000 MOV 0,0
11 04743 101405 INC 0,0,SNR
12 04744 080403 JMP ,+3
13 04745 063500 SKPDN 0
14 04746 080774 JMP ,=4
15 04747 010240 ISZ OMEGA
16 04750 151404 INC 2,2,8ZR
17 04751 080770 JMP DLYY1
18 04752 020404 LDA 0,DLY.4
19 04753 024404 LDA 1,DLY.5
20 04754 030404 LDA 2,DLY.6
21 04755 001401 JMP 1,3
22
23 04756 000000 DLY.4: 0
24 04757 000000 DLY.5: 0
25 04758 000000 DLY.6: 0
26 04761 000000 ,WERK: 0
27
28
29
30 04762 054414 DIVD: AC0=(AC0,AC1)/AC2 , AC1 = REM
31 04763 034414 STA 3,MOV.5
32 04764 125120 LDA 3,MOV.1
33 04765 101100 MOVZL 1,1
34 04766 142412 MOVL 0,0
35 04767 142400 SUB# 2,0,SZC
36 04770 125100 SUB 2,0
37 04771 175404 MOVL 1,1
38 04772 000773 INC 3,3,SZR
39 04773 176441 JMP MOV.2
40 04774 176420 SUBO 3,3,8KP
41 04775 002401 JMP MOV.5
42 04776 000000 MOV.5: 0
43 04777 177760 MOV.1: -20
44
45
46
47

```

```

;SAVE OUR AC'S.
;COUNTS MILLISECS
;GET # MILLISECS ARGUMENT,
;AND NEGATE.
;(C),WERK = NEG COUNT FOR IMS.
; ** THESE
; ** INSTRUCTIONS FORM
; ** THE DELAY
; ** TIMING LOOP.
;INC DOWN MULTIPLY COUNTER
;LOOP FOR NX MILLISEC.
;RESTORE AC'S
;AND RETURN.

```

```

10086 ,MAIN
01
02
03
04
05
06
07
08
09 05000 031400 SRH: LDA 2,0,3
10 05001 021000 LDA 0,0,2
11 05002 101005 MOV 0,0,SNR
12 05003 001401 JMP 1,3
13 05004 122415 SUB# 1,0,SNR
14 05005 001402 JMP 2,3
15 05006 151400 INC 2,2
16 05007 000772 JMP SRH+1
17 05010 170000 C170K: 170000
18
19
20
21
22 05011 054441 SM: STA 3,SM,5
23 05012 030252 LDA 2,LAST
24 05013 020222 LDA 0,C212
25 05014 030000 SM.1: LDA 3,0,2
26 05015 051000 STA 2,0,2
27 05016 025000 LDA 1,0,2
28 05017 055000 STA 3,0,2
29 05020 146414 SUB# 2,1,SZR
30 05021 000404 JMP SM.2
31 05022 151400 INC 2,2
32 05023 151133 MOVZL# 2,2,SNC;CHECK FOR < 32K
33 05024 000770 JMP SM.1
34 05025 112400 SM.2: SUB 0,2
35 05026 050270 STA 2,CEND
36 05027 020252 LDA 0,LAST
37 05030 112400 SUB 0,2
38 05031 020757 LDA 0,C170K
39 05032 143414 AND# 2,0,8ZR
40 05033 020413 JMP SM.4
41 05034 020226 LDA 0,C7400
42 05035 113700 ANDS 0,2
43 05036 050271 STA 2,SMAX
44 05037 126400 SUB 1,1
45 05040 125140 MOVOL 1,1
46 05041 151224 MOVZR 2,2,SZR
47 05042 000776 JMP ,=2
48 05043 125300 SM.3: MOV# 1,1
49 05044 044307 STA 1,LMSK
50 05045 002405 JMP 08M,5
51
52
53 05046 024212 SM.4: LDA 1,C17
54 05047 121400 INC 1,0
55 05050 040271 STA 0,SMAX
56 05051 000772 JMP SM.3
57 05052 000000 SM.5: 0
58
;SEARCH ROUTINE
;CALL SEARCH AC1=NAME
; TABLE ADDR.
; RETURN = NOT FOUND
; RETURN = FOUND, AC2=POINTER
;AC2=TABLE ADDRESS
;NOT FOUND
;FOUND
;SIZE MEMORY
;SAVE RETURN
;GET END PROGRAM ADDRESS
;LOADER BUFFER
;SAVE (C) OF LOCATION
;WHILE IT IS VERIFIED
;LOCATION EXISTS.
;RESTORE (C) OF LOCATION
;CHECKING IF LOCATION EXISTS
;NO. 1 STEP BEYOND B
;YES. INC TO NX.
;CHECK FOR < 32K
;STILL UNDER 32K MAX.
;DEDUCT BUFFER FOR BIN. LDR.
;SAVE END OF MEMORY.
;HOW MANY SECTORS WILL MEM
;FOLLOW
;MAXIMUM, 20 OCTAL
;ROOM FOR 17 OR LESS
;MAX SECTOR COUNT
;GENERATE # SECTORS
;MASK
;MAX SECT CNT=20

```

```

10087 .MAIN
01
02          ILINE SCAN SUBROUTINE
03          IBYTE POINTER IS LINCT
04
05          ICALL  GETATM
06          I      RETURN = AC0# #
07          I      AC1=NAME
08          I      (C)=1 IF CR DELIMITER
09
10 05053 020510 GA,0: LDA 0,FIND
11 05054 101005      MOV 0,0,SNR
12 05055 000413      JMP GA,1          INO NAME OR # YET
13 05056 020253      LDA 0,LINCT
14 05057 040502      STA 0,SLNCT      IREMEMBER LINCT
15 05058 040502      STA 0,SRCH      ISET SEARCH FLAG
16 05059 000407      JMP GA,1
17
18 05062 054474 GATM: STA 3,GARET
19 05063 102400      SUB 0,0
20 05064 040473      STA 0,ANAM
21 05065 040473      STA 0,ANUM
22 05066 040474      STA 0,SRCH
23 05067 040474      STA 0,FIND
24 05070 030253 GA,1: LDA 2,LINCT
25 05071 010253      ISZ LINCT
26 05072 151220      MOVZ 2,2
27 05073 021000      LDA 0,0,2
28 05074 024224      LDA 1,C377
29 05075 101002      MOV 0,0,SZC
30 05076 101300      MOVS 0,0
31 05077 123400      AND 1,0          I(AC0)R = BYTE
32 05100 024215      LDA 1,C40
33 05101 122415      SUB# 1,0,SNR
34 05102 000751      JMP GA,0          ISPACE DELIMITER
35 05103 024462      LDA 1,C54
36 05104 122415      SUB# 1,0,SNR
37 05105 000746      JMP GA,0          ICOMMA DELIMITER
38 05106 024223      LDA 1,C215
39 05107 122415      SUB# 1,0,SNR
40 05110 000442      JMP EXIT          ICR DELIMITER
41 05111 024451      LDA 1,SRCH
42 05112 125004      MOV 1,1,SZR
43 05113 000434      JMP EX,1          ISEARCH FLAG ON
44 05114 030215      LDA 2,C60
45 05115 034217      LDA 3,C67
46 05116 102033      ADCZ# 3,0,SNC
47 05117 112032      ADCZ# 0,2,SZC
48 05120 000412      JMP ASSN          INOT #
49 05121 024445      LDA 1,C7
50 05122 123400      AND 1,0
51 05123 024435      LDA 1,ANUM
52 05124 127120      ADDZL 1,1          IASSEMBLE OCTAL #
53 05125 125120      MOVZL 1,1
54 05126 123000      ADD 1,0
55 05127 040431      STA 0,ANUM
56 05130 010433      ISZ FIND
57 05131 000737      JMP GA,1          IGET MORE

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10088 .MAIN
01
02 05132 024214 ASSN: LDA 1,C37          IASSEMBLE NAME
03 05133 123400      AND 1,0
04 05134 024423      LDA 1,ANAM
05 05135 030427      LDA 2,C176K      I3 LETTERS YET ?
06 05136 133404      AND 1,2,SZR
07 05137 000731      JMP GA,1          IYES, IGNORE THE REST
08 05140 127120      ADDZL 1,1
09 05141 127120      ADDZL 1,1
10 05142 125120      MOVZL 1,1
11 05143 123000      ADD 1,0
12 05144 040413      STA 0,ANAM
13 05145 010416      ISZ FIND
14 05146 000722      JMP GA,1          IGET MORE
15
16 05147 020412 EX,1: LDA 0,SLNCT
17 05150 040253      STA 0,LINCT
18 05151 101021      MOVZ 0,0,SKP      ICLEAR CARRY
19 05152 101040 EXIT: MOVO 0,0      ISET CARRY
20 05153 020405      LDA 0,ANUM
21 05154 024403      LDA 1,ANAM
22 05155 002401      JMP 0GARET
23
24 05156 000000 GARET: 0
25 05157 000000 ANAM: 0
26 05158 000000 ANUM: 0
27 05159 000000 SLNCT: 0
28 05160 000000 SRCH: 0
29 05161 000000 FIND: 0
30 05164 170000 C176K: 170000
31 05165 000054 C54: 54
32 05166 000007 C7: 7
33

```

```

10089 .MAIN
01
02
03
04 05167 010172 HED: ISZ MSW ;PRINT HEADER ONLY ONCE
05 05170 001400 JMP 0,3 ;FOR EACH COMPLETE TEST
06 05171 054447 STA 3,HRET
07 05172 020447 LDA 0,HRET+1 ;THE MODE DETERMINES
08 05173 030203 LDA 2,MODE ;THE TYPE OF OPERATION
09 05174 113000 ADD 0,2 ;IN PROGRESS
10 05175 021000 LDA 0,0,2
11 05176 040404 STA 0,HED,1
12 05177 006325 PCRLF
13 05200 006325 PCRLF
14 05201 006324 MESSAGE
15 05202 000000 HED.1: 0 ;RECAL OR SEEK, ETC.
16 05203 006324 MESSAGE
17 05204 006261 MSG44 ;CYL-
18 05205 030174 LDA 2,UNIT
19 05206 025056 LDA 1,CYLT,2
20 05207 125415 INC# 1,1,SNR
21 05210 125400 INC 1,1
22 05211 006323 TYPZ1
23 05212 006324 MESSAGE ;HEAD-
24 05213 000264 MSG45
25 05214 024256 LDA 1,MD
26 05215 006323 TYPZ1
27 05216 006324 MESSAGE ;SECT-
28 05217 006267 MSG46
29 05220 024254 LUA 1,SEC
30 05221 006323 TYPZ1
31 05222 006324 MESSAGE ;#SECT-
32 05223 006272 MSG47
33 05224 024255 LDA 1,SC
34 05225 006323 TYPZ1
35 05226 006324 MESSAGE ;UNIT:
36 05227 006053 MSG17
37 05230 024174 LUA 1,UNIT
38 05231 006323 TYPZ1
39 05232 030045 LDA 2,45
40 05233 025000 LDA 1,0,2
41 05234 125005 MOV 1,1,SNR
42 05235 002403 JMP #HRET
43 05236 035004 LDA 3,4,2
44 05237 001400 JMP 0,3
45 05240 000000 HRET: 0
46 05241 005242 .+1
47 05242 005776 MSG2 ;0 RECAL
48 05243 000002 MSG3 ;11 SEEK
49 05244 006225 MSG32 ;12 READ
50 05245 006230 MSG33 ;13 WRITE

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10090 .MAIN
01
02
03
04 05246 102541 C: SUBOL 0,0,SKP ;CHECK DATA...
05 05247 102520 G: SUBZL 0,0 ;GENERATE DATA...
06 05250 040514 STA 0,FSTGC ;C(CA)=START ADDRESS
07 05251 054511 STA 3,GRET ;C(SC) =NUMBER OF SECTORS
08 05252 021400 LDA 0,0,3 ;WORD FOLLOWING THE CALL
09 05253 040512 STA 0,PATT ;DEFINES THE PATTERN.
10 05254 010500 ISZ GRET
11 05255 020263 LUA 0,VARST
12 05256 040266 STA 0,VARPT
13 05257 020257 LDA 0,CA
14 05260 040020 STA 0,IDX0
15 05261 014020 DSZ IDX0
16 05262 020310 LDA 0,.SC
17 05263 101300 MOVS 0,0
18 05264 100400 NEG 0,0
19 05265 040501 STA 0,GWC
20 05266 014476 DSZ FSTGC ;GEN/CHECK FIRST SWITCH
21 05267 000446 JMP CC
22 05270 006475 G: JSR #PATT ;GENERATE DATA
23 05271 042020 STA 0,#IDX0 ;STORE IN MEMORY
24 05272 010474 ISZ GWC
25 05273 000775 JMP GG
26 05274 002466 JMP #GRET
27
28
29 05275 070477 CKER: READS 2 ;IF SW3=1 DON'T PRINT ERRORS
30 05276 153120 ADDZL 2,2
31 05277 153122 SINMB: ADDZL 2,2,5ZC
32 05300 000432 JMP CK4
33 05301 054462 STA 3,CKRET ;A ERROR DETECTED
34 05302 044465 STA 1,BAD
35 05303 040465 STA 0,GOOD
36 05304 010460 ISZ FSTGC
37 05305 000465 JMP CK1 ;DON'T PRINT HEADER
38 05306 006354 HEADER ;"ADDR GOOD BAD WORD
39 05307 006325 PCRLF ;ETC.
40 05310 006324 MESSAGE
41 05311 006114 MSG22
42 05312 030452 CK1: LDA 2,FSTGC
43 05313 176120 ADCZL 3,3
44 05314 157036 ADDZM 2,3,SEZ
45 05315 002446 JMP #CKRET ;EXIT IF>3 ERRORS.

```

```

10091 .MAIN
01
02 05316 006325 PCRLF
03 05317 024020 LDA 1,IDX0
04 05320 006323 TYPZ1 ;PRINT ADDRESS
05 05321 024447 LDA 1,GOOD ;GOOD DATA
06 05322 006322 TYPAC1 ;BAD DATA
07 05323 024444 LDA 1,BAD
08 05324 006322 TYPAC1
09
10 05325 020207 LDA 0,CA
11 05326 024020 LDA 1,IDX0
12 05327 106400 SUB 0,1
13 05330 006323 TYPZ1 ;WORD#
14 05331 002432 JMP 0CKRET
15
16 05332 010432 CK41 ;COUNT ERRORS
17 05333 000401 JMP +1
18 05334 001400 JMP 0,3 ;RETURN
19
20 05335 006430 CC1 ;CHECK THE DATA
21 05336 020020 LDA 1,IDX0
22 05337 106414 SUB# 0,1,SZR
23 05340 004735 JSR CKER ;CHECK ERROR
24 05341 010425 ISZ GWC
25 05342 000773 JMP CC
26 05343 010421 ISZ FSTGC ;ANY ERRORS ??
27 05344 000402 JMP +2
28 05345 000413 JMP CC1 ;NO, EXIT
29 05346 000477 READS 0 ;IF SW3=1 DON'T PRINT ERRORS
30 05347 103120 ADDZL 0,0
31 05350 103122 ADDZL 0,0,SZC
32 05351 002411 JMP 0GRET
33 05352 006325 PCRLF ;YES, PRINT THE
34 05353 024411 LDA 1,FSTGC ;TOTAL # OF ERRORS
35 05354 006323 TYPZ1
36 05355 006324 MESSAGE ;"ERRORS"
37 05356 006320 MSG56
38 05357 002403 JMP 0GRET
39
40 05360 010402 CC1 ; ;NORMAL RETURN + 2
41 05361 002401 JMP 0GRET
42
43 05362 000000 GRET: 0
44 05363 000000 CKRET: 0
45 05364 000000 FSTGC: 0
46 05365 000000 PATT: 0
47 05366 000000 GWC: 0
48 05367 000000 BAD: 0
49 05370 000000 GOOD: 0

```

```

10092 .MAIN
01
02 ;OPERATOR SPECIFIED WORDS
03
04 05371 054413 VAR.01 STA 3,VARET
05 05372 010200 ISZ VARPT
06 05373 030200 LDA 2,VARPT
07 05374 034200 LDA 3,VARSP
08 05375 172015 ADCW 3,2,SNR
09 05376 000403 JMP VAR,1 ;END INPUT
10 05377 021000 LDA 0,0,2
11 05400 002404 JMP 0VARET
12 05401 030203 VAR.11 LDA 2,VARST
13 05402 050200 STA 2,VARPT
14 05403 000707 JMP VAR,0+1
15
16 05404 000000 VARET: 0
17
18
19
20 ;RANDOM NUMBER GENERATOR
21
22 05405 054431 RAN: STA 3,.UD03 ;GENERATE A RANDOM
23 05406 050427 STA 2,.UD02
24 05407 044425 STA 1,.UD01 ;NUMBER IN ACB
25 05410 020247 LDA 0,RANDOM
26 05411 004410 JSR ,UD50
27 05412 034426 LDA 3,.UD20
28 05413 163000 ADD 3,0 ;STORE NEW VALUE,
29 05414 040247 STA 0,RANDOM
30 05415 111100 MOVL 0,2
31 05416 030417 LDA 2,.UD02
32 05417 024415 LDA 1,.UD01
33 05420 002416 JMP 0,UD03
34
35 05421 024420 .UD50: LDA 1,.UD21 ;RANDOM CONTINUED
36 05422 044415 STA 1,.UD10
37 05423 105120 MOVZL 0,1
38 05424 125120 MOVZL 1,1
39 05425 014412 DSZ .UD10
40 05426 000776 JMP +2
41 05427 107000 ADD 0,1
42 05430 125120 MOVZL 1,1
43 05431 125120 MOVZL 1,1
44 05432 123000 ADD 1,0
45 05433 001400 JMP 0,3
46 05434 000000 .UD01: 0
47 05435 000000 .UD02: 0
48 05436 000000 .UD03: 0
49 05437 000000 .UD10: 0
50 05440 033031 .UD20: 33031
51 05441 000010 .UD21: 10

```

```

10093 .MAIN
01 / BINARY TO DECIMAL ASCII CONVERT
02 / CONVERTS A DOUBLE PRECISION, TWO'S COMPLEMENT NUMBER
03 / TO AN ASCII DECIMAL CHARACTER STRING
04
05 / INPUT: D IN AC1, AC2 (HIGH, LOW)
06
07 / OUTPUT: ASCII CHARACTER STRING, TERMINATED BY A
08 / NULL WORD.
09 / CHARACTERS PASSED RIGHT ADJUSTED,
10 / BIT 0 = 0, IN AC0 TO TYPING
11 / ROUTINE .
12
13 / STRING OF FORM:
14 / NNNNNNNNN( NULL)
15
16 / CALLING SEQUENCE
17 / JSR .OBD
18 / RETURN
19
20 / DESTROYED: AC1, AC2, AC3, CARRY
21 / UNCHANGED: AC0
22
23 05442 05445 .OBD: STA 3,FD03 / SAVE RETURN
24 05443 04045 STA 0,FD00 / SAVE AC0
25 05444 02050 LDA 0,FD30 / POINT TO HIGH ORDER POWER IN
26 / TABLE
27 05445 04050 STA 0,FD12
28 05446 17640 SUB 3,3
29 05447 05445 STA 3,DIGIT
30 05450 04450 .FD99: STA 1,FD10 / SAVE ABS(NUMBER)
31 05451 05050 STA 2,FD10+1
32 05452 03447 LDA 3,DIGIT
33 05453 17500 MOV 3,3,SZR
34 05454 00050 JSR @BDTYP / PUT OUT SIGN OR DIGIT
35 05455 02447 LDA 1,FD10 / RESTORE ABS(NUMBER)
36 05456 03047 LDA 2,FD10+1
37 05457 02047 LDA 0,FD22 / GET OCTAL 57
38 05460 04047 STA 0,FD11 / COUNT IT UP IN STORAGE
39 05461 03447 LDA 3,FD12 / CURRENT POINTER TO POWER OF
40 / 10 TABLE
41
42
43 05462 02140 .FD98: LDA 0,1,3 / LOW ORDER WORD
44 05463 10125 MOVZRN 0,0,SNR
45 05464 01043 ISZ DIGIT
46 05465 10100 MOV 0,0,SNR / TEST FOR END OF TABLE
47 05466 00042 JMP .FD97 / DONE
48 05467 11240 SUBZ 0,2
49 05470 02140 LDA 0,0,3 / HIGH ORDER WORD
50 05471 10100 MOV 0,0,SNR
51 05472 10041 ADCO 0,1,SKP
52 05473 10640 SUBO 0,1
53 05474 01045 / COUNT UP DIGIT
54 05475 12513 MOV# 1,1,SNR / TEST FOR <0
55 05476 00076 JMP .FD98 / KEEP SUBTRACTING
56

```

```

10094 .MAIN
01
02 05477 02140 LDA 0,1,3 / RESTORE POSITIVE VALUE
03 05500 11302 ADDZ 0,2,SZC
04 05501 12540 INC 1,1
05 05502 02140 LDA 0,0,3
06 05503 10700 ADD 0,1
07 05504 17540 INC 3,3 / BUMP AC3 TO NEXT TABLE ENTRY
08 05505 17540 INC 3,3
09 05506 05445 STA 3,FD12
10 05507 02043 LDA 0,FD11 / GET DIGIT
11 05510 03421 LDA 3,C60
12 05511 11641 SUB# 0,3,SZR
13 05512 01047 ISZ DIGIT
14 05513 00073 JMP .FD99 / PUT IT OUT
15
16 05514 00632 .FD97: JSR @MESS
17 05515 00012 MSG23 / "TAB"
18
19 05516 00240 JMP 0,FD03 / RETURN
20
21 05517 00000 .FD01: 0 / SAVE AC0
22 05520 00000 .FD03: 0 / SAVE RETURN
23 05521 00000 DIGIT: 0
24
25 05522 03063 .FD05: 35632 / 10**9
26 05523 14500 145000
27 05524 002765 2765 / 10**8
28 05525 100400 100400
29 05526 000230 230 / 10**7
30 05527 113200 113200
31 05530 000017 17 / 10**6
32 05531 041100 41100
33 05532 000001 1 / 10**5
34 05533 103240 103240
35 05534 000012 .RDX 10
36 05535 000000 0 / 10**4
37 05536 023420 10000
38 05537 000000 0 / 10**3
39 05538 001750 1000
40 05540 000000 0 / 10**2
41 05541 000144 100
42 05542 000000 0 / 10**1
43 05543 000012 10
44 05544 000000 0 / 10**0
45 05545 000001 1
46 05546 005522 .FD30: .FD05 / POINTER TO CONVERSION TABLE
47 05547 000000 0 / END OF TABLE INDICATION
48 05548 000010 .RDX 8
49
50 05550 000002 .FD10: 0,BLK 2 / SAVE CURRENT DOUBLE WORD
51 05552 000000 .FD11: 0 / COUNT UP DIGIT WORD
52 05553 000000 .FD12: 0 / POINTER TO POWER OF TEN ENTRY
53
54 05554 000003 .FD20: "+" / ASCII "+"
55 05555 000007 .FD22: 57 / ASCII "0" -1
56 05556 004357 @DTYP: TYPE / PUT CHARACTER ADDRESS.

```

10095 ,MAIN

```
01
02
03 05557 040243 SAC1  JSAVE AC0,1,2
04 05560 044244      STA 0,SAV0
05 05561 050245      STA 1,SAV1
06 05562 001400      STA 2,SAV2
07                      JMP 0,3
08
09 05563 020243 STAC1  JRESTORE AC0,1,2
10 05564 024244      LDA 0,SAV0
11 05565 030245      LDA 1,SAV1
12 05566 001400      LDA 2,SAV2
13                      JMP 0,3
```

10096 ,MAIN

```
01
02
03
04
05
06
07
08
09
10
11
12 05567 054514 INP:  STA 3,INPRET
13 05570 023400      LDA 0,00,3
14 05571 040511      STA 0,BASE
15 05572 040512      STA 0,BPTR
16 05573 060210      NIOC TTI
17 05574 020512      LDA 0,M115,
18 05575 040510      STA 0,CMCNT
19 05576 063610 TTHAIT: SKPUN TTI
20 05577 000777      JMP ,=1
21 05600 064610      DIAC 1,TTI
22 05601 020224      LDA 0,C377
23 05602 106415      SUB# 0,1,SNR
24 05603 000442      JMP RUB
25 05604 020503      LDA 0,C12
26 05605 106414      SUB# 0,1,5ZR
27 05606 000403      JMP ,+3
28 05607 006325      PCRLF
29 05610 000766      JMP TTHAIT
30 05611 060111      DOAS 1,TTO
31 05612 030472      LDA 2,0PTR
32 05613 010471      ISZ 0PTR
33 05614 034223      LDA 3,C215
34 05615 136405      SUB 1,3,3NR
35 05616 000456      JMP CRCUD
36 05617 020471      LDA 0,C177
37 05620 151223 INP.0: MOVZR 2,2,SNC
38 05621 107401      AND 0,1,SKP
39 05622 107701      ANDS 0,1,SKP
40 05623 000403      JMP ,+3
41 05624 021000      LDA 0,0,2
42 05625 107000      ADU 0,1
43 05626 045000      STA 1,0,2
44 05627 010456      ISZ CMCNT
45 05630 000402      JMP ,+2
46 05631 000435      JMP OVFL
47 05632 175004      MOV 3,3,5ZR
48 05633 000743      JMP TTHAIT
49 05634 010447      ISZ INPRET
50 05635 006325 INP.1: PCRLF
51 05636 020444      LDA 0,BASE
52 05637 040253      STA 0,LINCT
53 05640 010443      ISZ INPRET
54 05641 063511      SKPBZ TTO
55 05642 000777      JMP ,=1
56 05643 060211      NIOC TTO
57 05644 002437      JMP #INPRET

JTELETYPE INPUT ROUTINE, NON INTERRUPT
J
JCALL INPUT
J ADDR OF BYTE POINTER
J RETURN = CR ONLY
J RETURN = NORMAL
JINPUT IS STORED R=L IN 7 BIT ASCII
JINPUT IS TERMINATED BY CR, (215) IS
JSTORED. LINE FEED ECHOS CR=LF
JNO DATA STORED, INPUT CONTINUES.

JGET BYTE POINTER
JWAIT FOR INPUT
JREAD INPUT CHAR
JHUB OUT
JLINE FEED TYPED
JECHO CHAR
JCR CODE
JCR TYPED
J7 BIT MASK
JSTORE INTO RH
JSTORE BYTE
JAC3=0 IF CR TYPED
JALL DONE
JWAIT FOR ECHO TO
JFINISH
JCLEAR INTERRUPT
```

```

10097 ,MAIN
01
02 05646 020441 RUB: LDA 0,M115.
03 05646 024437 LDA 1,CHCNT
04 05647 122400 SUB 1,0,SNR
05 05650 000726 JMP TTWAIT
06 05651 014433 DSZ BPTR
07 05652 014433 DSZ CHCNT
08 05653 030431 LDA 2,BPTR
09 05654 151220 MOVZR 2,2
10 05655 021000 LDA 0,0,2
11 05656 101003 MOV 0,0,SNR
12 05657 000400 JMP RUB1
13 05660 024224 LDA 1,C377
14 05661 107400 AND 0,1
15 05662 040000 STA 1,0,2
16 05663 101300 MOV8 0,0
17 05664 061111 RUB1: DDAS 0,TT0
18 05665 000711 JMP TTWAIT
19
20 05666 000320 OVFL: PCRLF
21 05667 000324 MESSAGE
22 05670 000104 MSG21
23 05671 014413 DSZ BPTR
24 05672 014413 DSZ CHCNT
25 05673 000703 JMP TTWAIT
26
27 05674 020400 CRCOD: LDA 0,BASE
28 05675 112410 SUBM 0,2,SNR
29 05676 000737 JMP INP,1
30 05677 020224 LDA 0,C377
31 05700 176400 SUB 3,3
32 05701 000717 JMP INP,0
33
34 05702 000000 BASE: 0
35 05703 000000 INPRET: 0
36 05704 000000 BPTR: 0
37 05705 000000 CHCNT: 0
38 05706 177615 M115.1 =115.
39 05707 000012 C12: 12
40 05710 000177 C177: 177

```

!NOTHING TO RUB

!GET BYTE

!SAVE RM ONLY

!ECHO LM (RUBBED OUT)

!ECHO RUBBED CHAR

!LINE OVERFLOW

!INPUT OVERFLOW

!BACKUP BYTE POINTER

!YES

```

10098 ,MAIN
01
02
03 05711 044241 DCT: 044241 !HEAD
04 05712 057111 057111 !WRITE
05 05713 040245 040245 !SEEK
06 05714 044243 044243 !RECALIBRATE
07 05715 030757 030757 !LOOP
08 05716 010254 010254 !DELAY
09 05717 000000 0
10
11
12
13 05720 002745 DCT,1: RE
14 05721 002761 WT
15 05722 002774 SK
16 05723 003013 RCL
17 05724 003024 LUP
18 05725 003031 DLAY
19
20
21
22 05726 014632 DNT: 14632 !FLOATING ZERO
23 05727 014617 14617 !FLOATING ONE
24 05730 044056 044056 !RANDOM
25 05731 002017 2017 !ALL 1'S
26 05732 002632 2632 !ALL ZEROS
27 05733 040064 40064 !110110 PAT
28 05734 000000 0
29
30
31
32 05735 005760 DNT,1: FLZ
33 05736 005752 FL1
34 05737 005405 RAN
35 05740 005744 ONES
36 05741 005743 ZEROS
37 05742 005747 PAT1

```

!DISK COMMAND TABLE

!DISPATCHES

!DATA TABLE

!DISPATCHES

```

10000 ,MAIN
01
02 05743 102401 ZEROS: SUB 0,0,SKP
03 05744 102000 ONES:  ADC 0,0
04 05745 001400      JMP 0,3
05
06 05746 155555      155555
07 05747 020777 PAT1: LDA 0,-1
08 05750 001400      JMP 0,3
09
10 05751 000000      0
11 05752 020777 FL1:  LDA 0,-1
12 05753 101225      MOVZR 0,0,SNR
13 05754 101240      MOVOR 0,0
14 05755 040774      STA 0,FL1-1
15 05756 001400      JMP 0,3
16
17 05757 000000      0
18 05760 020777 FLZ:  LDA 0,-1
19 05761 101243      MOVOR 0,0,SNR
20 05762 102220      ADCZR 0,0
21 05763 040774      STA 0,FLZ-1
22 05764 001400      JMP 0,3
23
24 05765 020366 CYLADD: LDA 0,CYLNK
25 05766 001400      JMP 0,3
26

```

```

10100 ,MAIN
01
02
03 05767 047305 MSG1: /ENDING STATUS
04      144504      .TXTE /ENDING STATUS|
05      043510
06      001640
07      040724
08      052724
09      000123
10
11 05776 142722 MSG2: /RECAL
12      040703      .TXTE /RECAL |
13      004714
14      000000
15
16 06002 142523 MSG3: /SEEK
17      045705      .TXTE /SEEK |
18      000011
19
20 06005 047311 MSG9: /INTERRUPT FROM DEVICE
21      142724      .TXTE /INTERRUPT FROM DEVICE |
22      151322
23      050125
24      120324
25      151306
26      046717
27      042240
28      053305
29      141711
30      120305
31      000000
32
33 06021 144504 MSG13: /DISK
34      045523      .TXTE /DISK |
35      004411
36      000011
37
38 06025 142523 MSG14: /SEEK ERRORS
39      045705      .TXTE /SEEK ERRORS |
40      142640
41      151322
42      151317
43      004523
44      000011
45
46 06034 147724 MSG15: /TOTAL SEEKS
47      040724      .TXTE /TOTAL SEEKS |
48      120314
49      142523
50      045725
51      004523
52      000011
53
54 06043 147516 MSG16: /NO READY UNITS
55      151240      .TXTE /NO READY UNITS|
56      040705
57      054504
58      052640
59      144516
60      051724

```



```

0101 ,MAIN
01 000000
02
03 00003 047125 MSG17: /UNIT:
      102311 .TXTE /UNIT: |
04
05 120072
06 000000
07
08 00007 040504 MSG18: /DATA:
      040724 .TXTE /DATA: |
09
10 120072
11 000000
12
13 00003 147703 MSG19: /COMMAND STRING:
      040015 .TXTE /COMMAND STRING: |
14
15 047101
16 120104
17 102103
18 144722
19 040516
20 120072
21 000000
22
23 00074 033261 MSG20: /16 NUMBERS MAX.
      047240 .TXTE /16 NUMBERS MAX.: |
24
25 040525
26 142002
27 051782
28 040640
29 154101
30 000000
31
32 00104 047311 MSG21: /INPUT OVERFLOW
      052520 .TXTE /INPUT OVERFLOW: |
33
34 120324
35 053317
36 151305
37 146306
38 103717
39 000000
40
41 00114 042101 MSG22: /ADDR GOOD BAD WORD
      151104 .TXTE /ADDR GOOD BAD WORD: |
42
43 043411
44 147717
45 004504
46 040502
47 004504
48 147727
49 042322
50 000000
51
52 00126 000011 MSG23: /TAB
      042322 .TXTE | |
53 /WORDS WRITTEN
54 00127 147727 MSG25: .TXTE /WORDS WRITTEN |
55
56 120123
57 151327
58 152311
59 142724
60 004516

```

```

0102 ,MAIN
01 000011
02
03 00137 147727 MSG26: /WORDS READ
      042322 .TXTE /WORDS READ |
04
05 120123
06 142722
07 042101
08 004411
09 000000
10
11 00140 044303 MSG27: /CHECK WORD ERRORS
      141705 .TXTE /CHECK WORD ERRORS |
12
13 120113
14 147727
15 042322
16 142040
17 151322
18 151317
19 004523
20 000000
21
22 00160 142520 MSG28: /PERM CHECK WORD ERRORS
      040722 .TXTE /PERM CHECK WORD ERRORS |
23
24 141040
25 142510
26 045703
27 153040
28 151317
29 120104
30 151305
31 147722
32 051722
33 000011
34
35 00174 042101 MSG29: /ADDRESS ERROR
      151104 .TXTE /ADDRESS ERROR |
36
37 051705
38 120123
39 151305
40 147722
41 004722
42 000011
43
44 00204 142520 MSG30: /PERM ADDRESS ERROR
      040722 .TXTE /PERM ADDRESS ERROR |
45
46 040640
47 042104
48 142722
49 051923
50 142040
51 151322
52 151317
53 000011
54
55 00216 040504 MSG31: /DATA ERRORS
      040724 .TXTE /DATA ERRORS |
56
57 142040
58 151322
59 151317
60 004523

```

```

0103 ,MAIN
01 000011
02
03 06225 142722 MSG32: IREAD
04 042101 .TXTE IREAD I
05 000011
06 IWRITE
07 06230 151327 MSG33: .TXTE IWRITE I
08 152311
09 004705
10 000000
11 IMEMORY TOO SMALL
12 06234 142515 MSG39: .TXTE IMEMORY TOO SMALL FOR I
13 147515
14 054722
15 152240
16 147717
17 051640
18 040515
19 146314
20 143240
21 151317
22 000240
23 ISECTORS
24 06247 142523 MSG40: .TXTE ISECTORS:
25 152303
26 151317
27 000123
28 IPASS
29 06253 040520 MSG41: .TXTE IPASS:
30 051523
31 000000
32 I -? -
33 06256 026640 MSG43: .TXTE I -? -
34 026477
35 000000
36 I CYL -
37 06261 054703 MSG44: .TXTE I CYL -
38 026714
39 000000
40 I HEAD -
41 06264 142510 MSG45: .TXTE I HEAD -
42 042101
43 000055
44 I SECT -
45 06267 142523 MSG46: .TXTE I SECT -
46 152303
47 000055
48 I M SECT -
49 06272 051643 MSG47: .TXTE I M SECT -
50 141705
51 026724
52 000000
53 I GOOD
54 06276 147507 MSG51: .TXTE I GOOD I
55 042317
56 000240
57 I BAD
58 06301 040502 MSG52: .TXTE I BAD I
59 120104
60 000000

```

```

0104 ,MAIN
01 I"DOC"
02 06304 042042 MSG53: .TXTE I"DOC"
03 141717
04 000042
05 I"DOB"
06 06307 042042 MSG54: .TXTE I"DOB"
07 041317
08 000042
09 ILOAD ERROR
10 06312 146240 MSG55: .TXTE ILOAD ERROR
11 040717
12 120104
13 151305
14 147722
15 000322
16 IERRORS
17 06320 151305 MSG56: .TXTE IERRORS
18 147722
19 051722
20 000000
21 IENDING MEM ADDR ERROR
22 06324 047305 MSG57: .TXTE IENDING MEM ADDR ERROR
23 144504
24 043510
25 046640
26 046705
27 040640
28 042104
29 120322
30 151305
31 147722
32 000322
33 ITIMEOUT
34 06337 144724 MSG59: .TXTE ITIMEOUT
35 142510
36 052717
37 000324
38 IPERM DATA ERRORS
39 06343 142520 MSG61: .TXTE IPERM DATA ERRORS I
40 040722
41 042240
42 152101
43 120101
44 151305
45 147722
46 051722
47 000011
48 IMISC ERRORS
49 06354 144515 MSG62: .TXTE IMISC ERRORS I
50 141523
51 142640
52 151322
53 151317
54 004523
55 000011
56 ITRY AGAIN
57 06363 151324 MSG63: .TXTE ITRY AGAIN
58 120131
59 043001
60 144501

```

0105 ,MAIN

01 000110
02 /CHECK WORD ERROR
03 06370 044303 MSG64: .TXTE /CHECK WORD ERROR;
04 141705
05 120113
06 147727
07 042322
08 142640
09 151322
10 151317
11 000000
12 /CHECK WORD & DATA ERROR
13 06401 044303 MSG65: .TXTE /CHECK WORD/DATA ERRORS ;
14 141705
15 120113
16 147727
17 042322
18 042257
19 152101
20 120101
21 151305
22 147722
23 051722
24 000011
25 /PERM CHK WD/DATA ERRS
26 06415 142620 MSG66: .TXTE /PERM CHK WD/DATA ERRS ;
27 046722
28 141640
29 045510
30 153640
31 127504
32 040504
33 040724
34 142640
35 151322
36 004523
37 000000
38 /ENDING DISK ADDR ERROR
39 06431 047305 MSG67: .TXTE /ENDING DISK ADDR ERROR;
40 144504
41 043516
42 042240
43 051711
44 120113
45 042101
46 151104
47 142640
48 151322
49 151317
50 000000
51 /INTERCHANGE DISK
52 06445 047311 MSG68: .TXTE /INTERCHANGE DISK;
53 142724
54 141722
55 040510
56 043516
57 120305
58 144504
59 045523
60 000000

0106 ,MAIN

01 /TYPE THE NUMBER OF DISK SURFACES
02 06450 054724 MSG69: .TXTE /TYPE THE NUMBER OF DISK SURFACES ;
03 142520
04 152240
05 142510
06 047240
07 040525
08 142502
09 120322
10 143317
11 042240
12 051711
13 120113
14 052523
15 143322
16 141501
17 051705
18 000240
19 /TESTING UNIT
20 06477 142724 MSG70: .TXTE /TESTING UNIT ;
21 152123
22 047311
23 120107
24 047125
25 152311
26 120240
27 000000
28 06507 142523 MSG71: .TXTE /SEEK ERROR PATH BETWEEN ;
29 045705
30 142640
31 151322
32 151317
33 050240
34 152101
35 120110
36 142502
37 153724
38 142705
39 120110
40 120240
41 000240
42 06525 142523 MSG72: .TXTE /SEEK/RECAL TIMEOUTS ;
43 045705
44 151257
45 141705
46 146101
47 152240
48 040711
49 147705
50 152125
51 004523
52 000000
53 06540 142722 MSG73: .TXTE /READ/WRITE TIMEOUTS ;
54 042101
55 153657
56 144722
57 142724
58 152240
59 046711
60 147705

```

0107 .MAIN
01 152125
02 004023
03 000000
04 06553 142523 MSG741 .TXTE [SET CONSOLE SWITCHES.]
05 120324
06 147703
07 051516
08 146317
09 120305
10 153523
11 152311
12 044303
13 051705
14 000056
15 06566 144810 MSG751 .TXTE [HIT ANY KEY TO CONTINUE.<15><12>]
16 120324
17 047101
18 120131
19 142513
20 120131
21 147724
22 141040
23 047317
24 144724
25 052516
26 027305
27 005215
28 000000

```

```

10100 .MAIN
01
02 06604 000072 UBUFF: .BLK 50.
03 06676 000072 CBUFF: .BLK 50.
04 06770 000020 VAR: .BLK 16.
05 07010 000000 PRGEND: 0
06
07 07011 020213 START: LDA 0,C33
08 07012 030045 LDA 2,NEST
09 07013 025001 LDA 1,1,2
10 07014 100434 SUBZ# 0,1,8ZR
11 07015 002043 JMP #43
12 07016 002003 JMP #3
13
14
15
16 007037 .LOC ,+20
17 07037 045504 .TXTE [OKP RELI 0]
18 120120
19 142722
20 144714
21 033240
22 000000
23 07045 000001 000001
24 07046 000006 000006
25 07047 000001 000001
26 07050 000000 000000
27 07051 000020 000020
28 07052 000000 000000
29 07053 000000 000000
30 07054 100033 100033
31
32 .END

```

0109 .MAIN

A1	001702	34/47	36/12	36/27	37/01	37/06	37/09	37/12		
		37/15	37/10							
ADCAL	004004	15/51	09/11							
ADDER	000126	12/15	28/31	50/12						
AECNT	000273	14/29	56/13	50/10	61/14					
ALL	001371	15/04	29/06							
ALLRE	000312	14/44	25/10	25/39	29/06	29/09	29/22	29/23		
ALL.1	001373	29/08	29/21							
ANAM	005157	07/20	08/04	08/12	08/21	08/25				
ANUM	005100	07/21	47/51	07/55	08/20	08/26				
ASSN	005132	07/48	08/02							
BAD	005307	00/34	01/07	01/40						
BASE	005702	06/14	06/51	07/27	07/34					
BUTYP	005556	03/34	04/56							
BEGIN	000500	14/37	17/07							
BIGSK	002445	43/29	45/43	40/09	40/12					
BPTR	005704	06/15	06/31	06/32	07/00	07/23	07/30			
BUFF	000267	14/25	25/50	32/14	34/54					
C	005246	15/18	00/04							
C.0	000025	13/05	23/13	56/40	61/30	60/19	60/35			
C1000	000225	13/17	22/07	55/13						
C102	000370	15/47	43/26	43/34						
C10K	000034	13/20								
C12	005707	06/25	07/39							
C1400	003102	54/16	54/39							
C17	000212	13/06	22/22	26/12	62/24	06/53				
C170K	005010	06/17	06/30							
C174H	003361	58/48	58/53							
C176K	005164	08/05	08/30							
C177	005710	06/36	07/40							
C2	000023	13/02	01/11							
C20	001627	32/40	33/39							
C2000	000373	15/50	30/12	39/30						
C203.	000221	13/13	32/16	33/30	34/45	30/44	40/37	43/19		
		44/11	45/05							
C212	000222	13/14	06/24							
C215	000223	13/15	07/30	06/33						
C3	000211	13/03	20/43	56/10	66/01					
C33	000213	13/07	20/30	100/07						
C37	000214	13/00	08/02							
C377	000224	13/10	33/22	07/20	06/22	07/13	07/30			
C4	000024	13/04	29/19	49/25	61/41					
C40	000215	13/09	20/12	55/37	07/32					
C400	003145	55/42	56/25							
C4K	000035	13/18	39/27							
C54	005165	07/35	08/31							
C60	000216	13/10	19/04	07/44	04/11					
C67	000217	13/11	45/15	07/45						
C7	005166	07/40	08/32							
C7400	000226	13/19	06/41							
CA	000257	14/17	20/33	32/15	34/55	30/21	40/10	56/46		
		50/45	61/52	66/06	00/13	01/10				
CALAD	006374	10/30	06/32							
CALIB	004723	13/34	03/15	03/29						
CALRT	004145	09/17	70/13	70/21						
CBUFF	006676	14/20	100/03							
CC	005335	00/21	01/20	01/25						
CC1	005360	01/20	01/40							
CD1K	001737	35/12	35/14	35/16	35/29					

0110 .MAIN

CD202	004005	66/13	66/45	70/11						
CDSK	000301	14/35	20/33	23/10						
CFLG	000300	14/34	38/56	39/11	40/40	41/00	42/30			
CHAR	004320	72/30	72/41	73/31	74/01	74/27	76/25			
CHAR1	004330	74/09								
CHA.3	004335	74/11	74/14	74/19						
CHCNT	005705	06/10	06/44	07/03	07/07	07/24	07/37			
CHECK	006333	16/15	61/45							
CHORZ	004355	74/16	74/20	74/32	75/14	75/17				
CHRET	004354	74/01	74/13	74/21	74/31					
CIOMS	000622	20/03	20/15							
CK1	005312	00/37	00/42							
CK4	005332	00/32	01/16							
CKER	005275	00/29	01/23							
CKRET	005303	00/33	00/45	01/14	01/44					
CKSW	006335	16/30	27/06	33/40	34/13	34/22	34/34	30/36		
		30/50	39/00	40/27	40/43	41/06	40/12	47/30		
		52/10	52/26	53/16	53/25	65/23	65/32	66/30		
		66/39								
CLRB	001143	15/20	25/49							
CLRRB	006335	16/20	01/21							
CMOST	002616	15/38	19/34	40/39	49/10	51/39	52/14			
CMO.2	002651	49/19	49/34	50/06	50/17	50/22	51/10			
CMO.3	002673	50/14	51/02							
CMO.4	002701	51/00	51/17							
CMO.5	002716	51/07	51/13	51/22						
CMEND	000270	14/26	06/35							
CNIOC	000251	14/11	23/16							
CUMA	000573	19/07	19/11							
CRALL	001756	21/45	35/07	35/13	35/15	36/10	36/22			
CRCOD	005674	06/35	07/27							
CKLF	004345	15/12	74/23							
CSBP	000202	14/20	51/36	53/34						
CSC	000302	14/36	30/59	40/51	42/11	42/22	42/32	57/03		
		02/03								
CSEK	002742	51/45	51/40	52/05	52/19	53/05	53/10	53/43		
		53/47								
CSIF	000173	12/26	25/05	40/30	49/11	49/31				
CSP	000227	13/21	61/35							
CSP1	000230	13/22	54/33	55/31						
CSP2	000621	20/02	20/13	20/23	20/31					
CSP3	000232	13/24	56/37							
CWCNT	000274	14/30	56/14	58/30	59/03	61/15				
CWDE	000142	12/10	20/46	59/17						
CWDEP	000146	12/19	20/49	59/31						
CWER	000116	12/13	20/25	50/40	59/14					
CWERP	000122	12/14	20/20	50/43	59/19	59/29				
CWRD	000231	13/23	20/10							
CWRT	004004	06/17	06/44							
CXL.V	004730	03/18	03/34							
CYLD	005765	36/34	09/24							
CYLF	000052	12/07	15/03	33/35	30/41	40/34	40/07	40/16		
		40/30	53/13	54/19	65/29					
		65/21	65/26	65/35	66/12	66/16	66/50	70/09		
		70/10								
CYLNK	000366	15/45	40/25	40/31	46/25	99/24				
CYLSW	004144	09/15	70/17	70/20						
CYLT	000056	12/00	33/34	33/36	30/40	30/42	40/33	40/35		

0111 .MAIN

	46/06	46/08	46/24	48/14	48/28	53/12	53/14
	53/28	54/18	54/21	55/12	56/24	61/24	65/28
	65/30	69/19					
DACNT 000275	14/31	59/04	61/16				
DADAT 000277	14/33	34/48	36/18	36/37	37/10	38/22	40/19
DARAN 002171	38/26	38/28	39/45				
DARET 002165	38/10	39/32	39/35	39/41			
DAT 002032	37/30	37/35					
DAT0 002010	18/36	37/09					
DAT1 002086	19/35	37/06					
DATER 000136	12/17	20/37	59/09				
DATF0 002016	19/39	37/04	37/07	37/10	37/13	37/16	37/18
DATF1 002014	19/38	37/15					
DATP 002012	19/37	37/12					
DATR 002002	19/32	37/01					
DATRW 002125	38/18	39/08	39/24				
DAT. 002040	36/20	37/31	38/10				
DAT.0 002001	38/28	39/25					
DAT.1 002073	38/39	39/13					
DAT.2 002117	39/02	39/19					
DAT.3 002141	38/46	39/21					
DAT.4 002146	39/22	39/26					
DAT.5 002100	39/29	39/36					
DAXRT 000237	13/38	40/07	45/38				
DAXRW 000252	40/16	41/05	41/21				
DAXSK 001772	19/41	30/36	36/43				
DAX. 002174	34/50	30/39	40/07				
DAX.0 002213	40/22	41/22					
DAX.1 002223	40/31	41/10					
DAX.2 002250	41/03	41/16					
DAX.3 002266	40/39	41/18					
DCT 000711	51/44	51/46	98/03				
DCT.1 000720	51/46	98/13					
DECOC 004247	73/13	73/32	73/34	73/42			
DECOT 004256	73/20	73/25					
DECP 004264	73/21	73/26					
DECTB 004303	73/07	73/42					
DELAY 006316	16/34	22/13	22/26	24/22	53/51		
DEXT 004167	71/06	71/17					
DIGIT 005521	93/29	93/32	93/45	94/13	94/23		
DIVD 004762	83/38	85/30					
DIVDD 004152	71/04	82/11					
DIVIO 004151	71/03						
OLAY 003031	53/42	98/18					
DLOOP 004160	71/10	71/15					
DLYT1 004741	85/09	85/17					
DLYTM 004731	10/05	85/01					
DLY.0 004724	83/19	83/30					
DLY.1 004725	83/11	83/24	83/31				
DLY.2 004726	83/12	83/25	83/32				
DLY.3 004727	83/13	83/26	83/33				
DLY.4 004756	85/01	85/18	85/23				
DLY.5 004757	85/02	85/19	85/24				
DLY.6 004760	85/03	85/20	85/25				
DNSBE 002443	43/20	43/21	43/31	44/02	44/14	45/06	45/07
	45/41	47/27					
DNT 000726	98/16	98/18	98/22				
DNT.1 000735	98/18	98/32					

0112 .MAIN

DOALL 006315	16/05	18/30	22/24	25/31	34/49	36/19	36/38
	37/30						
DRO 002167	38/13	39/23	39/43	41/20			
DRVS 000022	11/13	13/02	13/04	13/05	29/11	32/23	
DVVD 004155	71/07						
DWT 002170	38/17	39/44	40/15				
EGGS 001422	11/32	29/40					
ENTYM 004645	81/10	81/44					
EVOUN 000272	14/08	25/08	32/10	33/24	34/16	34/40	58/13
EXIT 005152	87/40	88/19					
EX.1 005147	87/43	88/16					
FATAL 000202	12/33	56/16	57/28	57/42	57/49	58/44	59/11
	59/22	59/24	59/32	60/06	60/13	61/19	62/40
	43/32	45/17	45/45	48/17			
FBIG 002447	38/04	38/24	38/25				
FBSRE 001454	38/16						
FDS.2 001443	87/10	87/23	87/56	88/13	88/29		
FIND 005103	14/37	18/06					
FIRST 000303	36/30	39/46	98/33	99/11	99/14		
FL1 005752	43/36	45/23	45/47	48/31			
FLIT 002451	38/31	39/46					
FLO1 000172	38/32	39/47					
FLOZ 002173	36/31	39/47	98/32	99/18	99/21		
FLZ 005760	66/47	68/04					
FMHLT 004026	68/07	68/15					
FMHOO 004041	66/37	66/52					
FMTUV 004014	66/09	66/46					
FMTW 004006	48/36	65/15					
FMUNI 002610	15/52	65/07					
FNGIK 003673	65/26	66/34					
FQIK1 003716	66/01	66/31	66/33				
FQIK2 003732	68/24	68/32					
FQIK3 003771	90/06	90/20	90/36	90/42	91/16	91/26	91/34
FSTGC 005364	91/45						
	47/33	47/43					
FTER1 002533	47/35	47/38	47/44				
FTER2 002546	46/28	47/16					
FTERR 002512	11/29	11/30	20/11				
FXADD 000625	28/15	28/29					
FX.2 000631	28/20	28/26					
FX.3 000644	19/33	20/37	20/47	20/48	20/49		
FX.4 000657	15/17	90/05					
G 005247	87/18	88/22	88/24				
GARET 005156	18/14	87/18					
GATM 005002	87/10	87/34	87/37				
GA.0 006053	87/12	87/24	87/57	88/07	88/14		
GA.1 006070	15/29	50/11	50/23	51/32	51/50		
GCS 002723	51/38	52/15	53/38	53/53			
GCS.1 002731	16/16	56/20					
GEN 006332	54/37	55/35	57/31	62/48			
GENRE 003257	16/18	30/11	49/22	50/12	51/08	51/42	53/06
GETAT 006327	53/44	63/10	63/21	63/29			
	16/17	52/06	52/20				
GETPA 006330	90/22	90/25					
GG 005270	90/35	91/05	91/49				
GOOD 005370	90/07	90/10	90/26	91/32	91/38	91/40	91/41
GRET 005362	91/43						
GTCOM 002503	47/06	48/07	48/18				

0113 ,MAIN

GUDAT	004010	65/37	66/48						
GWC	005366	90/19	90/24	91/24	91/47				
MD	000266	14/10	26/20	32/35	32/54	38/54	39/16	40/46	
		41/13	42/14	63/20	65/18	70/01	70/02	70/16	
		89/25							
HEADE	006354	16/31	24/27	29/31	50/05	58/33	60/23	90/30	
HED	005107	10/35	09/04						
HED.1	005202	09/11	09/15						
HED.R	004023	06/59	08/10						
HIAOD	003656	08/06	03/40						
HMSK	000305	14/39	30/21	32/30					
HMX	001462	30/10	31/08						
HNUM	001455	30/14	30/16	30/10	30/20	30/22	31/02		
HRET	005240	09/06	09/07	09/42	09/45				
HSS	003617	15/15	63/09						
HSSRE	003654	63/09	63/37	63/30					
HSS.1	003651	63/13	63/35						
HSM	000172	12/25	33/46	34/07	34/20	34/30	38/34	30/48	
		39/03	40/23	40/41	41/04	46/10	51/41	53/37	
		89/04							
IACAL	000374	15/51	16/38						
IALL	000310	15/04	16/05						
ICALI	000233	13/34	21/09	21/15					
ICMK	000333	15/10	16/15						
ICLR	000335	15/20	16/20						
ICRLF	000325	15/12	16/13	47/20	47/29				
ICSI	000357	15/30	25/07						
ICSW	000355	15/36	16/30						
ICYLF	000314	15/03	21/30						
IDLY	000316	15/05	16/34						
IDX0	000020	18/02	01/03	51/04	51/11	51/15	51/22	90/14	
		90/15	90/23	91/03	91/11	91/21			
IDX1	000021	16/03	25/21	25/22	25/26				
IFMHT	004007	66/15	66/21	66/47					
IFNQG	000375	15/52	17/11						
IGATH	000327	15/14	16/10						
IGCS	000346	15/29	63/16	63/24	63/33				
IGDAT	004063	66/48	08/35						
IGEN	000332	15/17	16/16						
IGUD	004044	66/49	68/20						
IHED	000334	15/35	16/31						
IHSS	000330	15/15	16/17						
IINP	000331	15/16	16/14						
IMESS	000324	15/11	16/12	47/21	94/16				
INDEX	000020	10/00	10/36	19/42					
INHMS	002454	43/10	43/13	45/35	45/50				
INIL	000341	15/24	16/24						
INIL0	000735	21/38	21/39	21/44					
INIL.	000717	15/24	21/30						
INITE	005341	16/24	18/12	19/19	65/10				
INKMD	004122	69/34	70/01						
INP	005567	15/16	96/12						
INPRE	005703	96/12	96/49	96/53	96/57	97/35			
INPUT	005331	10/14	30/08	49/17	50/09	51/35			
INP.0	005620	96/37	97/32						
INP.1	005635	96/50	97/29						
INTER	001013	11/04	21/25	23/06					
INTWT	006361	16/32	55/20	56/28	61/26	66/20			

0114 ,MAIN

INT.1	001043	23/12	24/06						
IPDEC	000321	15/00	16/09						
IPS	000353	15/34	16/25						
IQUEST	000360	15/39	63/19	63/27	63/31				
IR	000347	15/30	16/26						
IRAN	000362	15/41	16/06	32/11	34/51				
IRC	000352	15/33	16/29						
IRCAL	000365	15/44	17/20	17/21	17/22	17/23			
IRDAT	000344	15/27	32/12	34/52	38/23	40/20	50/19	51/25	
IRE1	003615	61/34	61/37	62/50					
IRE2	003616	61/40	62/51						
IRUP	000715	21/07	21/25						
IS	000351	15/32	16/26						
ISAC	000317	15/06	16/07						
ISCNT	000356	15/37	57/04	62/04					
ISET	000336	15/21	16/21						
ISM	000337	15/22	16/22						
ISRM	000326	15/13	16/19						
ISTAC	000320	15/07	16/08						
ISTAT	000242	14/04	24/07	29/33	66/25				
IST00	000340	15/23	16/23						
ISU	000364	15/43	16/37						
ITAC1	000322	15/09	16/10						
ITY1	001071	23/15	25/04						
ITY.1	001113	25/22	25/34						
ITY.2	001123	25/25	25/30						
ITY.3	001125	25/27	25/32						
ITY.4	001131	25/24	25/36						
ITY.5	001135	25/13	25/40						
ITZ1	000323	15/10	16/11						
IVAR	000334	15/19	01/24						
IW	000350	15/31	16/27						
IWDAT	000345	15/28	32/13	34/53	30/24	40/21	50/20	51/26	
IWT	000361	15/40	16/32						
IXLAY	000241	14/03	21/16						
I.DDD	000343	15/26	28/18						
I.GSD	000303	15/42	18/26	19/20	65/11				
KEYS	004661	79/16	79/24	79/34	79/39	80/06	80/13	80/20	
		80/24	80/27	82/09					
		79/35	80/04	82/13					
KN	004665	79/38	80/05	80/07	80/23	82/12			
KS	004664	14/12	38/20	40/17	86/23	86/36			
LAST	000252	14/03	83/11						
LAYUP	004702	12/39	30/19	32/32	33/14	40/08	40/12	42/27	
LHD	000207	45/37	63/17	65/12	70/03				
		14/13	53/35	87/13	87/24	87/25	88/17	96/52	
LINCT	000253	43/30	45/44	48/20	48/26				
LITSK	002446	14/41	32/46	86/49					
LMSK	000307	79/18	79/27	79/28	82/08				
LQCK	004660	12/40	30/17	32/40	33/07	42/17	57/07	62/11	
LS	000210	63/25							
		53/34	98/17						
LUP	003024	12/35	44/06	47/17	57/31	64/18			
LUPSW	000204	96/17	97/02	97/38					
M110	005706	71/00	71/23	71/33					
M20	004204	20/21	20/51						
M41	000671	85/31	85/43						
MDV.1	004777	85/33	85/38						
MDV.2	004765								

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MDV_3 004774	85/40						
MDV_5 004776	85/30	85/41	85/42				
MESS 004205	15/11	72/26	72/39	82/07			
MESSA 006324	16/12	18/28	22/47	23/21	24/29	25/29	26/29
	26/40	26/42	26/45	26/49	27/13	27/17	29/35
	30/06	31/28	35/10	35/18	36/41	37/22	37/25
	37/33	39/37	47/25	49/08	49/15	50/04	58/07
	51/19	51/33	51/48	58/07	58/17	58/38	68/25
	68/28	68/32	66/36	68/09	69/14	69/16	69/23
	89/27	89/31	89/35	90/40	91/36	97/21	
MESSR 004356	72/26	72/29	72/47	73/09	74/23	74/33	76/03
	76/12						
MISC 000156	12/21	27/05	28/43	57/41	57/48	58/02	60/05
	00/12						
MLOOP 004174	71/24	71/28					
MODE 000203	12/34	25/11	54/12	55/08	56/11	61/12	66/02
	89/08						
MS1 001472	38/20	31/18					
MS2 001476	38/22	31/23					
MSAV 004203	71/04	71/07	71/18	71/22	71/30	71/31	
MSG1 005707	29/36	100/03					
MSG13 006021	27/25	100/33					
MSG14 006025	27/29	100/38					
MSG15 006034	27/27	100/46					
MSG16 006043	22/48	100/54					
MSG17 006053	49/16	89/36	101/03				
MSG18 006057	58/08	101/08					
MSG19 006063	51/34	101/13					
MSG2 005776	89/47	100/11					
MSG20 006074	51/20	101/23					
MSG21 006104	97/22	101/32					
MSG22 006114	90/41	101/41					
MSG23 006126	47/26	94/17	101/52				
MSG25 006127	27/31	101/54					
MSG26 006137	27/33	102/03					
MSG27 006146	27/39	102/11					
MSG28 006168	27/41	102/22					
MSG29 006174	27/35	58/08	102/35				
MSG3 006002	89/48	100/16					
MSG30 006204	27/37	102/44					
MSG31 006216	27/43	102/55					
MSG32 006225	89/49	103/03					
MSG33 006230	89/50	103/07					
MSG39 006234	27/14	103/12					
MSG40 006247	27/10	103/24					
MSG41 006253	35/11	35/19	36/42	37/34	103/29		
MSG43 006256	31/29	49/09	50/05	51/49	103/33		
MSG44 006261	89/17	103/37					
MSG45 006264	89/24	103/41					
MSG46 006267	89/28	103/45					
MSG47 006272	89/32	103/49					
MSG51 006276	26/46	60/29	103/54				
MSG52 006301	26/50	60/33	103/58				
MSG53 006304	26/30	104/02					
MSG54 006307	26/41	104/06					
MSG55 006312	26/43	104/10					
MSG56 006320	91/37	104/17					
MSG57 006324	57/30	60/03	104/22				

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MSG59 006337	24/30	104/34					
MSG61 006343	27/40	104/39					
MSG62 006354	27/51	104/49					
MSG63 006363	58/18	104/57					
MSG64 006370	58/36	105/03					
MSG65 006401	27/47	105/13					
MSG66 006415	27/49	105/26					
MSG67 006431	57/46	60/10	105/39				
MSG68 006445	39/38	105/52					
MSG69 006456	30/07	106/02					
MSG70 006477	18/29	106/20					
MSG71 006507	47/22	106/28					
MSG72 006525	27/53	106/42					
MSG73 006540	27/55	106/53					
MSG74 006553	37/23	107/04					
MSG75 006566	37/28	107/15					
MSGV 005005	23/22	100/20					
MSK85 001050	24/12						
MULT 004171	71/21						
MULTA 004172	71/22	82/10					
NEST 000045	11/32	18/23	20/34	108/08			
NOP 000401	16/35	53/29	55/19	57/26	62/38	65/25	
NOBS 000307	15/46	56/17	61/20				
NUCAL 004655	78/35	80/17	80/22	80/28	81/46	82/05	
OCTAB 004273	73/04	73/34					
OMEGA 000240	14/02	43/28	48/08	48/11	48/19	48/23	85/05
	85/15						
ONES 005744	36/28	98/35	99/03				
ORDIN 004654	79/22	79/40	79/41	80/30	81/45	82/04	
OVFL 005666	96/46	97/26					
PADD 001757	36/13	36/14	36/15	36/23			
PADER 000132	12/16	28/34	58/26				
PAT1 005747	36/29	98/37	99/07				
PATT 005365	90/09	90/22	91/20	91/46			
PCRLF 006325	16/13	18/27	22/46	23/20	24/28	25/14	25/15
	25/28	26/28	26/39	26/44	27/12	29/32	30/05
	35/09	35/17	36/48	37/21	37/24	37/32	39/36
	49/14	50/06	51/18	51/32	58/08	58/16	58/34
	60/24	60/27	66/35	68/08	68/13	69/12	69/13
	90/39	91/02	91/33	96/28	96/50	97/28	
PDEC 004240	15/08	73/06					
PDER 000152	12/20	28/40	59/27				
PEXIT 004225	72/42	76/08					
PHDR 001317	27/26	28/01					
POCT 004234	15/09	73/02					
POT 001256	25/20	27/25					
PRGEN 007010	14/12	14/17	14/25	108/05			
PRMTO 001366	27/56	28/55					
PS 001413	15/34	29/31					
PSKER 001323	27/30	28/06					
PSKTO 001364	27/54	28/52					
PSYAT 002353	16/25	54/31	54/36	55/48	58/03	66/28	
PS_1 001324	28/07	28/26	28/29	28/32	28/35	28/38	28/41
	28/44	28/47	28/50	28/53	28/56		
PTAER 001346	27/36	28/31					
PTCWD 001360	27/48	28/46					
PTCWE 001342	27/40	28/25					
PTCWP 001344	27/42	28/28					

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PTDER 001302	27/44	28/37							
PTIME 004477	13/12	78/16							
PTMS 001306	27/52	28/43							
PTPAE 001350	27/38	28/34							
PTPCH 001302	27/50	28/49							
PTPDE 001304	27/46	28/40							
PTSEK 001327	27/28	28/11							
PTWR 001337	27/34	28/21							
PTWV 001332	27/32	28/15							
PT_1 001334	28/13	28/17	28/23						
P_240 004405	74/14	75/23							
P_377 004317	72/31	73/06	75/08						
P.AC1 004313	72/27	72/42	73/18	73/52	74/24	76/04	76/21		
	76/46								
P.AC2 004314	72/28	72/43	73/03	73/06	73/53	74/25	76/13		
P.C11 004402	74/09	75/20							
P.C12 004403	74/20	75/21	76/01	76/14					
P.C15 004404	74/26	75/15	75/22						
P.C40 004406	75/12	75/24	76/26						
P.C60 004316	73/02	73/23	73/27	73/55					
P.C7 004401	74/17	75/19							
P.LST 004224	72/41	73/17	74/29						
P.TAB 004315	73/15	73/54							
QUEST 002614	15/39	49/08	49/24	49/27	49/30				
RADD 001760	36/17	36/24							
RALL 000177	12/30	21/37	35/03	36/11					
RAN 005405	15/41	36/32	92/22	98/34					
RAND 006362	16/06	32/20	32/29	32/37	32/45	33/21			
RAND0 000247	14/09	21/41	34/08	34/11	34/32	37/03	38/25		
	38/29	39/04	39/07	39/34	52/08	52/21	52/24		
	58/20	92/25	92/29						
RATIO 001626	32/17	33/30	34/43	34/46					
RCALL 000661	15/44	20/42							
RCL 003013	53/22	98/16							
RCTYM 003101	54/22	54/38							
RDATA 003526	15/27	61/46							
RDCYL 002472	43/41	44/05	45/19	45/22	45/25	45/28	45/33		
	46/22								
RUD 000200	12/31								
RDYUN 000175	12/28	22/23	22/43	29/12	32/24	49/21			
RE 002745	52/04	98/13							
RE1 002755	52/12	52/28	53/18	53/30					
READ 006347	16/26	34/33	39/43	46/26	52/09				
RECAL 006352	16/29	20/46	38/35	40/26	47/33	53/24	65/22		
	68/38								
RECL 003045	15/33	54/10							
RELAL 001510	19/29	32/09	36/24						
RELEV 001506	19/30	32/07							
RELOD 001505	19/31	32/06							
RELRA 000250	14/10	34/09	34/10	34/31	39/05	39/06	52/07		
	52/22	52/23	58/19						
REL.1 001521	32/20	32/26	35/08	35/30					
REL.2 001531	32/29	32/34	32/42						
REL.3 001540	32/37								
REL.4 001547	32/45	32/51	33/19						
REL.5 001563	33/02	33/09	33/16						
REL.6 001605	33/04	33/21	33/32						
REL.7 001616	33/26	33/30							

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REL.8 001705	34/42	34/44	35/03						
REL.9 001721	35/06	35/15							
RETHY 000201	12/32	58/22	58/41	59/06	61/10	62/43			
RE.1 003301	56/36	56/39	58/02	62/50					
RE.2 003303	56/42	58/05	62/51						
RE.20 003313	58/13	62/47							
RE.21 003327	60/11	58/26							
RE.3 003331	58/29	61/43							
RE.31 003347	58/39	58/43							
RE.32 003351	58/42	58/45							
RE.4 003302	59/02	61/47							
RE.41 003373	59/08	59/11							
RE.42 003400	59/17	59/23							
RE.43 003402	59/13	59/19							
RE.44 003407	59/05	59/24							
RE.45 003414	59/26	59/29							
RE.46 003417	59/28	59/32							
RE.5 003421	60/02	61/55							
RE.6 003427	60/09	62/30							
RFLG 002166	30/19	39/21	39/42	40/14	41/10				
RFLP 000311	14/43	56/09	56/24	61/10					
RFS 000537	18/16	18/20							
RBRD 003477	61/07	61/21							
RSTRY 000524	18/09								
RUB 000643	96/24	97/02							
RUB1 000664	97/12	97/17							
RUNAL 001741	19/40	39/23	35/25	36/09					
RVTMP 004653	81/09	81/47	82/03						
RWRET 000276	14/32	29/37	54/10	54/20	55/06	55/25	56/07		
	56/33	57/30	57/33	57/34	57/35	57/36	58/15		
	58/27	61/08	61/31	62/42	66/27				
RWTHO 000166	12/23	28/55	56/32	61/30					
R.1 001746	38/14	36/21							
RU 001042	23/09	23/23	23/29						
S400 004013	65/34	66/51							
SAC 005557	15/06	95/03							
SAM 003655	63/11	63/39							
SAV0 000243	14/05	27/02	27/15	32/56	33/02	33/17	60/34		
	95/03	95/09							
SAV1 000244	14/06	26/47	33/05	33/06	33/11	60/30	95/04		
	95/10								
SAV2 000245	14/07	33/12	33/13	95/05	95/11				
SAV3 000246	14/08	23/06	23/26	25/41					
SAVA 001142	25/19	25/38	25/45						
SAVAC 000317	16/07	23/07	26/27	26/38	27/11	32/55	60/22		
SAVU 001141	25/17	25/36	25/44						
SC 000255	14/15	25/51	28/06	32/52	38/50	39/10	40/50		
	41/15	43/25	56/18	56/44	57/02	57/21	62/06		
	62/22	63/34	65/20	66/04	69/33				
SCANX 0002453	43/17	45/49							
SCNT 002274	15/37	39/14	39/17	41/11	41/14	42/10			
SCOKA 004524	79/09	79/17							
SCORE 004517	78/18	78/23	79/04						
SECRET 002324	42/10	42/23	42/35	42/36					
SC.1 002301	42/16	42/21							
SC.2 002305	42/20	42/29							
SC.3 002311	42/19	42/25							
SEARC 006326	16/19	39/13	50/15	51/43					

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SEC	000254	14/14	26/16	32/43	32/53	38/55	38/15	48/47
		41/12	42/13	63/28	65/19	69/18	69/26	69/32
SECOU	004117	69/39	69/48	70/07	70/15	89/29		
SEEK	006351	69/21	69/39					
		16/28	33/47	34/21	38/49	40/42	46/11	53/15
		65/31						
SEEKT	000002	12/09	28/11	28/12	55/16	55/18		
SEKER	000072	12/10	28/06	55/39				
SEKSM	004143	69/12	69/27	69/41	70/08	70/19		
SERET	001242	26/04	26/37	27/08	27/09			
SESOU	004667	79/10	82/15					
SET	001155	15/21	26/04	27/07				
SET1	001211	26/26	26/33					
SET2	001222	26/31	26/42					
SETAC	006320	16/08	23/25	25/48				
SETB	006340	16/23	18/10	19/17	65/08			
SETP	006336	16/21	56/22	61/22	66/07			
SETU	006364	16/37	18/13					
SETU.	000737	22/04	22/25					
SE.1	003140	55/29	55/34	55/37				
SHALT	004147	69/38	70/23					
SINHB	005277	45/58	98/31					
SK	002774	53/04	98/15					
SKIP	101011	16/01	54/24	55/21	56/29	61/27		
SKTMO	000102	12/22	28/52	34/27	55/24			
SLNCT	005161	87/14	88/16	88/27				
SM	005011	15/22	86/22					
SMAx	000271	14/27	26/08	32/49	38/57	40/49	66/43	86/55
SMEH	006337	16/22	18/09	19/16	65/07			
SMSK	000306	14/40	38/23	32/38				
SMX	001466	38/16	31/13					
SM.1	005014	86/25	86/33					
SM.2	005023	86/38	86/34					
SM.3	005043	86/48	86/56					
SM.4	005046	86/40	86/53					
SM.5	005052	86/22	86/58	86/57				
SPRS	002326	41/23	43/10					
SQIK1	002607	48/35	48/36	49/33				
SQIK2	004043	68/04	68/11	68/14	68/16	68/18		
SRCM	005102	87/15	87/22	87/41	88/28			
SRM	005088	15/13	86/09	86/10				
SSW	000205	12/36	21/31					
STAC	005563	15/07	95/89					
START	007011	11/31	168/87					
STB0	000672	16/23	21/05					
STB1	000711	21/14	21/18	21/20				
STB2	000713	21/11	21/19	21/22				
STC	002356	43/38	44/08	44/16	45/18			
STC.1	002302	44/02						
STC.2	002401	44/13	45/02					
STC.3	002412	45/04	45/15	45/38				
STC.A	002377	43/12	44/15					
STIME	000220	13/12	21/12					
STRC	000574	17/12	19/10					
STRY	000521	17/07	17/08	17/09	17/18	17/13	17/14	17/15
		17/16	17/17	17/18	17/19	18/06	20/07	
STR.2	000602	18/35	19/28					
SUBSE	002456	43/27	43/39	44/03	45/18	45/21	45/24	45/27

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SVLHD	000371	45/32	46/04					
SVSTB	000716	15/48	48/09	45/36				
SVTIM	004656	21/05	21/20	21/22	21/26			
SWCE	003435	78/16	78/29	80/31	82/06			
SWCE1	003444	57/38	57/45	60/02	60/09	60/19		
SWCRE	003460	60/21	60/26					
S.1	001243	60/19	60/36	60/37	60/38			
S.3D1	004666	28/10	27/11					
TBIG	002450	79/19	79/38	80/26	82/14			
TERM	000260	43/35	45/20	45/46	48/15			
TIMA	004621	14/18	51/05	52/12	53/08	53/23	63/36	
TIMB	004626	81/13	81/17	81/21	81/25			
TIMC	004634	81/14	81/18	81/26	81/32			
TINI.	004475	81/15	81/34	81/42				
TIN2.	004476	76/41	76/55					
TINC.	004410	76/30	76/56					
TIND	004421	76/01	76/40					
TINN.	004455	76/11	82/09					
TINN.	004457	76/34	76/39					
TINO	004420	76/41						
TINR.	004413	76/10	76/44					
TINS.	004430	76/84	76/44					
TINW.	004433	76/18	76/29	76/54				
TINX.	004412	76/21	76/38	76/32				
TLIT	002452	76/03	76/20	76/32				
TRET	001370	43/33	45/26	48/29				
TTWAI	005576	28/01	28/04	28/07	28/19	28/10	28/57	
TUMBL	004657	96/19	96/29	96/48	97/05	97/18	97/25	
TUN	000562	79/09	82/07					
TUNRE	000572	18/31	19/02					
TYMCK	002553	19/02	19/09	19/10				
TYME	004604	43/48	44/84	48/06				
TYM.1	002567	78/26	79/06	81/08				
TYM.2	002605	48/18	48/18					
TYPAC	006322	48/22	48/25	48/32				
		16/10	26/48	27/03	29/34	60/31	60/35	60/12
		91/06	91/08					
TYPAS	006041	16/33	19/06	19/08				
TYPDE	006321	16/09	28/08					
TYPE	004357	11/28	74/12	74/15	75/01	76/02	84/56	
TYPRE	004407	75/01	75/18	75/25				
TYPZ1	006323	16/11	23/24	27/16	28/03	47/24	47/28	89/22
		89/25	89/38	89/34	89/38	91/04	91/13	91/38
UBP	000261	14/19	38/09	49/18				
UBUFF	006604	14/19	188/02					
UMSK	000304	14/38	18/21	32/21				
UNIT	000174	12/27	19/03	20/45	24/08	25/16	25/37	26/05
		27/04	28/02	29/08	29/10	29/17	29/18	32/27
		33/33	38/39	40/32	46/05	46/23	48/13	48/27
		49/28	53/11	53/27	54/13	54/26	55/09	55/23
		56/23	56/31	57/10	57/40	57/47	58/09	58/37
		59/02	60/04	60/11	61/23	61/29	62/14	62/32
		65/27	69/18	69/37				
UNTDN	000032	11/22	13/18	13/20	54/29	55/27		
UNTDN	000026	11/18	22/05	26/14	54/14	55/18	57/11	62/15
UNTSK	000046	12/02	22/09					
UPSEE	002444	43/23	43/38	44/09	44/18	45/09	45/42	47/23
VAR	006770	14/21	14/22	188/04				

