```
  3700 ok44 call incts
? 3000 ok3 call incts
? 3700
? 3700 ok4 call incts
? 2
delt 2440
? 2471 error pop h
? 2472  pop d
? 2473  pop b
? 2474  stc
? 2475  ret
? 2461  ora a
? assme 4000

41b3 00 00 00     0      2790  slhd mend
41b9 00 00 00     0      2800  mxi h,mss3
? 2790  shld mend
? 2800  lxi h,mss3
? assme 4000

? wrtpSTART? ? files
disk  0040  1d93

? wrtpSTART? 0040 END? 1d93
NAME? disk!
? rdtpADDR? ? file /v/2000
v     2000  2000

? rdtpADDR? 2000 NAME? disk!
? lis
files
```

```
v     2000  2000
disk  0040  1d93

? fixfADDR? 2000
? files
v     2000  3d53
disk  0040  1d93

? files
v     2000  3d53
disk  0040  1d93

? file
v     2000  3d53

? file disc
WHAT?
? file /disc/
WHAT?
? file /disk/
disk  0040  1d93

? list


  ..

0050  org 4000h
0100 dkin push h
0110  push d
0120  push b
0130  mov a,d   ;track number
0140  call nwtrk
0150  call dski
0160  pop b
0170  pop d
0180  pop h
0190  ret
0200 dkout push h
0210  push d
0220  push b
0230  mov a,d
0240  call nwtrk
0250  mvi a,137
0260  call dsk0
0270  pop b
0280  pop d
0290  pop h
0300  ret
0310 *
0320 *
0330 *
0340 init out 8
0350 loop1 in 8
0360  ani 40h
0370  jz trk0 ;there now
0380 wait1 in 8 ;wait for head movement
0390  ani 02h
0400  jnz wait1
0410  mvi a,2    ;move head
0420  out 9
```

```
0430  mvi a,0
0440  out 9
0450  jmp loop1
0460 trk0 mvi a,0
0470  sta crtrk
0480  ret
0490 nwtrk push b  ;desired trk is in A
0500  mov b,a  ;now it's in b
0510 again lda crtrk
0520  mov c,a  ;put real one in c
0530  cmp b
0540  jz done  ;all finished
0550  jnc mvout ;must so out
0560 wait2 in 8  ;here we move in
0570  ani 02h
0580  jnz wait2
0590  mvi a,1
0600  out 9
0610  mvi a,0
0620  out 9
0630  inr c
0640  mov a,c
0650  sta crtrk
0660  jmp again
0670 mvout in 8    ;wait
0680  ani 02h
0690  jnz mvout
0700  mvi a,2
0710  out 9
0720  mvi a,0
0730  out 9
0740  dcr c
0750  mov a,c
0760  sta crtrk
0770  jmp again
0780 done pop b
0790  ret
0800 *
0810 *
0820 *
0830 dsk0 mov c,a  ;from MITS
0840  mvi a,136
0850  sub c
0860  mov b,a
0870  call secset
0880  mvi a,128
0890  out 9
0900 ohlds mvi d,1
0910  mvi a,128
0920  ora m
0930  mov e,a
0940  inx h
0950 notyt in 8
0960  ana d
0970  jnz notyt
0980  add e
0990  out 10
1000  mov a,m
1010  inx h
1020  mov e,m
1030  inx h
1040  dcr c
1050  jz zrlop
1060  dcr c
1070  out 10
1080  jnz notyt
```

```
1090 zrlop in 8
1100  ana d
1110  jnz zrlop
1120  out 10
1130  dcr b
1140  jnz zrlop
1150  ei
1160  mvi a,8
1170  out 9
1180  ret
1190 dski call secset
1200  mvi c,137
1210 readp in 8
1220  ora a
1230  jm readp
1240  in 10
1250  mov m,a
1260  inx h
1270  dcr c
1280  nop
1290  in 10
1300  mov m,a
1310  inx h
1320  jnz readp
1330 retdp ei
1340  mvi a,8
1350  mvi a,8
1360  out 9
1370  ret
1380 secset mvi a,4
1390  out 9
1400  di
1410 seclp in 9
1420  rar
1430  jc seclp
1440  ani 31
1450  cmp e
1460  jnz seclp2
1470  ret
1480 *
1490 * sector write with checksum
1500 *
1510 * hl->data
1520 * de = t/s
1530 *
1540 dout push b
1550  push d
1560  push h
1570  mvi a,-1
1580  sta buff
1590  mov a,d
1600  sta buff+1
1610  mov a,e
1620  sta buff+2
1630  mvi a,0
1640  sta buff+4
1650  sta buff+5
1660  sta buff+6
1670  sta buff+7
1680  pop h
1690  push h
1700  lxi d,buff+8
1710 lp mov a,m
1720  stax d
1730  inx h
1740  inx d
```

```
1750  dcr b
1760  jnz lp
1770  mvi b,136
1780  lxi h,buff
1790  mvi a,0
1800 lp2 mov c,m
1810  add c
1820  inx h
1830  dcr b
1840  jnz lp2
1850  sta buff+136
1860  pop h
1870  pop d
1880  push d
1890  push h
1900  lxi h,buff
1910  call dkout
1920  pop h
1930  pop d
1940  pop b
1950  ret
1960 *
1970 * sector read with checksum
1980 *
1990 * hl->data
2000 * de = t/s
2010 din push b
2020  push d
2030  push h
2040  mvi a,1
2050  sta mode
2060 comb lxi h,buff
2070  call dkin
2080  lxi d,buff+8
2090  pop h
2100  push h
2110  lda mode
2120  ora a
2130  jz nread
2140  mvi b,128
2150 lp3 ldax d
2160  mov m,a
2170  inx h
2180  inx d
2190  dcr b
2200  jnz lp3
2210 nread pop h
2220  pop d
2230  push d
2240  push h
2250  lda buff+1
2260  cmp d
2270  jnz error
2280  lda buff+2
2290  cmp e
2300  jnz error
2310  mvi b,136
2320  lxi h,buff
2330  mvi a,0
2340 lp4 mov c,m
2350  add c
2360  inx h
2370  dcr b
2380  jnz lp4
2390  mov c,a
2400  lda buff+136
```

```
2410  cmp c
2420  jnz error
2430  pop h
2450  pop d
2460  pop b
2461  ora a
2470  ret
2471 error pop h
2472  pop d
2473  pop b
2474  stc
2475  ret
2480 *
2490 * verification only entry to above
2500 *
2510 dver: push b
2520  push d
2530  push h
2540  mvi a,0
2550  sta mode
2560  jmp comb
2570 *
2580 * routine to increment a t/s in de
2590 * no check is made fro track overflow or val
2600 *
2610 incts inr e
2620  mov a,e
2630  cpi 32
2640  rnz
2650  mvi e,0
2660  inr d
2670  ret
2680 *
2690 * WRDK - write disk command - Prompts for pa
2700 *
2720 wrdk call nlnc
2730  lxi h,mss1
2740  call hxans
2750  shld mstrt
2760  call nlnc
2770  lxi h,mss2
2780  call hxans
2790  shld mend
2795  call nlnc
```

```
3020  shld ts
3030  xchg
3040  lxi d,128 ; bytes
3050  dad d
3060  shld mstrt
3070  jmp wloop
3080 *
3090 dkerr call nlnc
3100  lxi h,mss4
3110  call tell
3120  mov a,d
3130  call hotnc
3140  mov a,e
3150  call hotnc
3160  ret
3170 *
3180 cmphd mov a,h  ; result is carry=1 if hl >= de
3190  sub d
3200  jc hlsml
3210  jnz hlbig
3220  mov a,l
3230  sub e
3240  jc hlsml
3250 hlbig stc
3260  ret
3270 hlsml ora a
3280  ret
3290 *
3300 done2 call nlnc
3310  lxi h,mss5
3320  call tell
3330  lhld ts
3340  mov a,h
3350  call hotnc
3360  mov a,l
3370  call hotnc
3380  ret
3390 *
3400 * RDDK - command to read disk --- prompts for parameters
3410 *
3420 rddk  call nlnc
3430  lxi h,mss6
3440  call hxans
3450  shld tsstr
3460  call nlnc
3470  lxi h,mss7
3480  call hxans
3490  shld tsend
3500  call nlnc
3510  lxi h,mss1
3520  call hxans
3530  shld mstrt
3540 * are we through?
3550 rloop lhld tsend
12 3560  xchg
11 3570  call incts
10 3580  lhld tsstr
 9 3590  jc done3
 8 3600 * prepare for read, and read
 7 3610  lhld tsstr
 6 3620  xchg
 5 3630  lhld mstrt
 4 3640  call din
3650  jnc ok4
3660 * here, error
3670  call dkerr
```

```
3680  jmp rloop
3690 * increment ts and mem addr
3700 ok4 call incts
3710  xchs
3720  shld tsstr
3730  xchs
3740  lxi d,128
3750  dad d
3760  shld mstrt
3770  jmp rloop
3780 done3 call nlnc
3790  lxi h,mss8
3800  call ts
3810  lxi h,mstrt
3820  dcx h
3830  mov a,h
3840  call hotnc
3850  mov a,l
3860  call hotnc
3870  ret
7000 nlnc push h
7010  lxi h,crlf
7020  call tell
7030  pop h
7040  ret
7050 crlf dw 0a0dh
7060  dw 0303h
8000 mss1 dw 'EM'
8002  dw ' M'
8004  dw 'TS'
8006  dw 'RA'
8008  dw ':T'
8010  dw 0320h
8012 mss2 dw 'EM'
8014  dw ' M'
8016  dw 'NE'
8018  dw ':D'
8020  dw 0320h
8022 mss3 dw '/T'
8024  dw ':S'
8025  dw 0320h
8028 mss4 dw 'RE'
8030  dw 'OR'
8032  dw ' R'
```

```
8078  dw ' S'
8080  dw 'NE'
8082  dw ':D'
8084  dw 0320h
8086 mss8 dw 'AL'
8088  dw 'TS'
8090  dw 'M '
8092  dw 'ME'
8094  dw 'A '
8096  dw 'DD'
8098  dw ':R'
8100  dw 0320h
9000 crtrk ds 1
9010 mode ds 1 ;1-read 0-verify
9020 buff ds 137
9030 mstrt ds 2
9040 mend ds 2
9050 ts ds 2
9060 tsstr ds 2
9070 tsend ds 2
9500 hotnc equ 0ffbeh
9510 tell equ 0ffdfh
9520 hxans equ 0ffe5h

?
```

DISK

STARTING UP:

① After loading PTOS, OR #DISK 43CE
load tape "disk.obj" ↑ from 4000 to 43ee
making certain there is memory there.

② Put your disk in the drive and do an "exec 4000".

COMMANDS

DRIVER
4000 – DISK INITIALIZATION

Must be done when a new disk is put on the drive. May be done at any time, particularly if you are suspicious of problems.

4003 – DISK READ

Command to move data from disk to memory. All moves are in 128-byte sections (80h). You are prompted for responses (see track/sector below).

4006 – DISK WRITE

The inverse of disk read.

SUBROUTINES

4009 - ENABLE DISK.

Corresponds to disk init. alic
drive number in A.

400C - READ DISK

HL → 128 byte buffer

D = track

E = sector

on return, CY = 0 if good

400F - WRITE DISK

Same arg's as above, e
disregard CY.

4012 - VERIFY DISK

Just like read, but n
moved, so HL is irrelevant. A
after a write (This is what the
DISK WRITE uses.)