[23] How do I determine what PDRIVE settings to use for a NEWDOS/80 disk?

This question comes up a lot, but I'm a complete LDOS bigot with no NEWDOS/80 experience, so I'm not equipped to answer it. Here is some information kindly supplied by others:

Answer by Nick Andrew

Let's say you have a diskette, no idea whatsoever how it is formatted. Notes:

- This process may only work on NEWDOS/80 diskettes
- SD diskettes are usually 10 sectors/track
- DD diskettes are usually 18 sectors/track
- For double-sided, multiply number of sectors by 2
- DD diskettes usually format track 0 single density, and 1 fewer DD track
- I assume user has an 80tk DSDD drive and it's not drive 3 (which on a Model I can only be single sided)
- When changing PDRIVE settings, remember to add A on the end to activate it
- Quick way to copy PDRIVE settings which is not shown in the online NEWDOS/80 manual is "PDRIVE 0 2=9" which will copy from #9 into #2
- User is using NEWDOS/80 v2 with ZAP/CMD
- Reading sectors on superzap:
  "dd"
  "2,0" (e.g. drive 2, sector 0)
  "+" and "-" to step forward and back, "k" to choose another sector,
  "x" to return to the menu (or you can type "EXIT" while sector browsing)

a1. set pdrive to double sided single density 10 sectors/track
a2. use zap read sectors 0 through 5
a3. if sector 5 fails, you have a double-density diskette, track 0 SD, go to b1.
a4. read sectors 6 through 10.
a5. if sector 10 fails, you have a single-sided single-density diskette. go to c1.
a6. if sector 10 is identical to sector 0, you have a side-select problem (on a Model I, drive 3 can be single-sided only)
a7. read sectors 11 through 20.
a8. if sector 20 fails, you have a 40 track diskette.
a9. look for the directory track. Look at sector 0 byte 2. Also try disk sectors 170, 340, 400, 800 looking for the 'P' marker on the sector.

b1. set pdrive to DSDD 18 sectors/track
b2. read sectors 0 through 18.
b3. if sector 18 fails, you have a single-sided diskette.
b4. read sectors 19 through 36.
b5. if sector 36 fails, you have a 40 track diskette.
b6. look for the directory track. Look at sector 0 byte 2. Also try disk sectors 170, 340, 400, 612, 720, 800, 1440 looking for the 'P' marker on the sector.

c1. set pdrive to SSSD 10 sectors/track
c2. read sectors 0 through 10.
c3. if sector 10 fails, you have a 40-track diskette.
c4. look for the directory track. Look at sector 0 byte 2. Also try disk sectors 170, 400 looking for the 'P' marker on the sector.

Answer by Phil Ereaut

In Newdos the mysterious Pdrives are just information for each drive, such as, No. of tracks, Single or double density, Single or Double sided, and a few other parameters needed by the DOS to interface with that that disk on that drive.

The pdrive information can be displayed by the command "Pdrive 0". Unfortunately, this display does not really mean much to anyone who has not read and understood the manual.

The first line of the display may be:

```
0*  TI = A, TD = E, TC = 40, SPT = 18, TSR = 00, GPL = 2, DDSL = 17, DDGA = 2
```

This would be a Drive 0, 40 Track, 5 Inch, Single sided, Double Density disk.

Generally, the settings for standard type disks are much the same, but a few people along the way, used many and varied settings for their GPL, DDSl, etc, which can makes it difficult to read, if you get one of these disks.

A Newdos Pdrive table is kept on each disk at, Track 0, Sector 2. ONLY the table on the SYSTEM disk is used for the drive settings. It has 10 rows of 16 bytes each, from 00 - 9F hex. Each row is the Pdrive values 0 to 9 as shown when a "Pdrive 0" command is done. These are the permanent Pdrive parameters, kept on the SYSTEM disk.

The number of these actually used is dependant on the number of drives in use on the system, and are termed active drive slots. The others are spares, which can be copied to the active drive slots to allow different type of disks to be used in those drives. This is done by using the Pdrive command. Example:

```
pdrive 0,1=6,A
```

This command moves the values stored in slot 6 to Slot 1. The ,A causes the change to be made in memory as well as to disk. If ,A is not used, the change is made only on disk and thus does not take effect until the next time you reboot. [Note: information about ,A corrected by Robert Kircher. Thanks.]

New single Pdrive parameters also can be input, and saved in the table. Example:

```
pdrive 0,1,TD=G,DDSL=20
```

This command changes the parameters in slot 1 on disk only. Adding the ,A at the end of the command would also make the change in memory.

A Pdrive table is on every disk, but it is only the table on the SYSTEM disk that is used by the System. One use for this table on a NON SYSTEM disk can be to determine the Pdrive's of this particular disk. Usually, on a non system disk, the top Pdrive shown is the Pdrive settings for that disk. (Even though it is not used by the System for that disk) This allows us to read these settings with a machine language program, and display the settings of an unknown disk.

The following contains information about the parameters, and where they are obtained from. It is not necessary to know ALL of this to use Pdrives. A general understanding of the parameters shown in the displayed Pdrive table, and use of some the tables below to interpret the letters, etc, such as, TI = A is all that is required. Some of the settings are as shown in the byte; others use bit mapping of the byte to store the values. Bytes bit mapped are: 02, 07, 0D and 0E, 0F

The table is set up as shown for row 0 (Shown in Hex):

```
00    01    02   03   04    05   06   07   08   09   0a   0b  0c   0d  0e   0f
DDSL Lumps  *    TC   SPT   GPL       *   DDSL DDGA          TSR  - TI -   TD
11    48    04   28    12   02   00   01   11   02   00   00   00  01  00   04
```

This would be shown in the displayed pdrive table using "Pdrive 0" as follows. (Values are displayed in decimal.)

```
0*  TI = A, TD = E, TC = 40, SPT = 18, TSR = 00, GPL = 2, DDSL = 17, DDGA = 2
```

This would be a 40 Track, 5 Inch, Single sided, Double Density disk.

```
DDSL  = Disk Directory starting lump
Lumps = Total lumps on disk
TC    = Track Count: No of tracks on disk
SPT   = Sectors per Track
GPL   = Granules per Lump
DDGA  = Disk Directory Granule Allocation: No of Granules used by the Directory
TSR   = Track step rate: Speed of stepping between tracks
TI    = Shows interface type, and other required parameters.
TD    = Shows Disk size, Density, No of sides, SPT

Byte 02 (TI & Tsr)
Bit 0 = TSR
Bit 1 = TSR
Bit 2 = A  or E (Bits 2&4) or B (Bits 2&3)
Bit 3 = D  or B (Bits 2&3)
Bit 4 = C  or E (Bits 2&4)
Bit 5 = M
Bit 6 = K
Bit 7 = H

Byte 07
Bit 0 = 8 Inch Disk
Bit 1 = Double Sided
Bit 2 =
Bit 3 = I (Lowest track sector is 1)
Bit 4 =
Bit 5 = L (Two steps between tracks)
Bit 6 = K & J (Track 0 Opposite Density)
Bit 7 = Double Density

Bytes 0D & 0E (TI)
Byte 0D                          Byte 0E
Bit: 7  6  5  4  3  2  1  0      7  6  5  4  3  2  1  0
     H     I  E  D  C  B  A               M  L  K  J  I
A = Standard Interface
B = Omnikron
C = Percom Doubler
D = Apparat Disk Controller
E = LNW type
H = 8 Inch drives only. Head settle to be done
I = Lowest sector on Track is 1 (Model3 Trsdos)(Set by flag M)
J = Track No's start from 1 (Is set by K)
K = Track 0 formatted in opposite density to other tracks (Flag J is
    set by flag K)
L = Two steps between tracks. Allows 40 Track disks to be read on 80
    Track drive
M = Standard Trsdos Model 3 (Flag M sets flag I)

Byte 0F (TD Parameter)
Bit 0 =  A : 5 inch   Single Density     Single Sided     10 Secs per Track
Bit 1 =  B : 8 inch   Single Density     Single Sided     17 Secs per Track
Bit 2 =  C : 5 inch   Single Density     Double Sided     20 Secs per Track
Bit 3 =  D : 8 inch   Single Density     Double Sided     34 Secs per Track
Bit 4 =  E : 5 inch   Double Density     Single Sided     18 Secs per Track
Bit 5 =  F : 8 inch   Double Density     Single Sided     26 Secs per Track
Bit 6 =  G : 5 inch   Double Density     Double Sided     36 Secs per Track
Bit 7 =  H : 8 inch   Double Density     Double Sided     52 Secs per Track
(Note that NEWDOS uses the term "track" to mean "cylinder" -- that is,
for double-sided diskettes, NEWDOS counts sectors on both sides of the
disk as part of the same "track".)
```

Normally the disk is mapped in Tracks, Sectors, and granules. Newdos uses a different method of disk mapping, using Lumps, in place of Tracks. These lumps can overlap tracks, starting on one track and ending on the next track. This can be confusing (only to us; the DOS knows what it's doing), particularly with the directory, which starts on a particular lump, not on a particular track.

In the example shown above: Sectors per Granule = 5 (Standard for Newdos): Gpl = 2. Therefore there are 10 sectors per lump. The Directory starts on lump 17, (DDSL = 17). Therefore the Directory starts on sector 170. As each track has 18 sectors, the Directory starts on Track 9 Sector 8. This does not really worry the average user, as the System does all the work. Only those of us who are silly enough to play around with this stuff, really care whether it is tracks, or Lumps, or Doughnuts.

For more NEWDOS/80 information

- NEWDOS/80 Command Summary
- TRS-80 Documentation Preservation Pages: Operation Manuals (includes NEWDOS/80 Model III manual)