Hard Drives

Drive Makeup

One or more **platters**. Magnetic coating on both sides of the platters
Magnetic record/play **heads** on an arm that moves to access various areas of the platters, one for each side and all moving at the same time on this arm.
Invisible **tracks** (concentric circles) closely spaced from the outside to the inside on all sides of each platter
Tracks are divided into **Sectors** each holding 512 bytes
Clusters are one or more sectors as determined by the operating system.
The drives **geometry**: cylinders, heads, and (average) sectors pre track must be made available to the computer's BIOS by CMOS configuration information in order for the computer to properly communicate with it.

Preparing The Hard Drive

The information that follows assumes that you are installing it into a working computer, equipped with at least a floppy drive. The computer should also be tested or known to boot to an operating system from a floppy disk. If this is to be the boot drive, you should make sure that jumpers are set to "master" as opposed to "slave", before mounting. Also observe where pin 1 of the data cable should be oriented in case it can not be observed after being mounted. The drive should be securely mounted with 2 screws on each side.

Preparation by the user involves several steps, assuming it is new and has never been used: partitioning, formatting, loading the basic operating system, loading the CD drivers and configuration files, and the balance of the operating system such as Windows 95/98/Me.

If the drive is new, it will have been "low level formatted" by the manufacturer. The process of "low level formatting" is the process of "addressing each sector at its beginning on every side of every platter in the drive. The address makes it possible for every sector to be found and used. The low level format by the factory also verifies that the sector works and can hold data in it as well as writing a special track that contains the skew factor, drive geometry, model, and serial number. If it contains a partition, it may not be new or the dealer may have pre-tested it.

Partition The Hard Drive

Partitioning is the process of writing a table of information to a track on the drive on how the drive is divided, what operating system partitioned it, and how the drive will be sectored (how many sectors per cluster). Before performing the partitioning steps below, the hard drive owner needs to decide how he or she wishes to partition the hard drive. There many be an advantage to using one big partition and there may be an advantage to using multiple partitions, depending on the operating system and how you want to use the drive. With Windows 98, one partition gives 4K clusters (very good) with a large partition as opposed to DOS and Windows 95 giving 32K clusters (very poor – wasted sectors) with some large partitions. For simplicity purposes, the assumption is made that the goal is to use one partition for the entire disc. Dealing with multiple partitions may be confusing in many cases. The following assumes you have a boot disk that contains the necessary utility files as mentioned. The steps for partitioning are:

1. Insert the Windows startup disc in to the floppy drive.
2. Start the computer and let the computer boot to the 'A:\>' prompt.
3. Type 'FDISK' after the 'A:\>' prompt.
4. Select large disk support (Y), then option 1 to create the partition or simply hit the ENTER key (default is 1).
   Fdisk runs an integrity test before it asks you about dividing the drive and again after you select to use the whole drive. It then writes the partition table. (Large disk support uses FAT32 or 4K clusters for drives 20GB and under)

5 The computer must be rebooted for the new table to be seen and used.

Format the Hard Drive

1. Insert the Windows 98 floppy disk in to the A floppy drive.
2. Boot or reboot the computer to again get to the "A" prompt.
3. Type "format c: /s" to start the format process. This process may take many minutes, depending on the size of the drive.
4. Upon completion, the hard drive can be booted with out the floppy disk. The process of placing the operating system basic files was caused by the "/s" after the format command with places IO.SYS, MSDOS.SYS and COMMAND.COM on the hard drive. Command.com is the only file visible with the "DIR" command as the others are actually hidden. Two other files are also placed on the hard drive, both hidden: Bootlog.txt and DRVSPACE.BIN. You can use the ATTRIB command to view them if you are curious. Hopefully, you will never use DRVSPACE (compressing the data on your hard drive as it kills about 50% of the computer's performance while gaining you twice the data storage space. MSDOS.SYS is about 9 bytes in size at this point.

Preparation for Windows Installation

1 Copy 'OAKCDROM.SYS' MSCDEX.EXE and HIMEN.SYS from the windows startup disk over to the HD. Both of these are needed to provide CD ROM support. Do this by typing from a C:\>: prompt "copy a:\oakcdrom.sys <enter>." Do the same for the MSCDEX.EXE and HIMEN.SYS

Next, you will need a config.sys and autoexec.bat file to call these device drivers into use. They may be on the floppy and you can copy them to the hard drive or you can follow the following procedure to create them:
The following command will create a file: Copy CON So type Copy Con Config.sys <enter> Then type the following:
Device=himem.sys
device=oakcdrom.sys /D:mscd001<enter>
<control key> <z> The control z closes the file completing it

The /D in the above example does not designate Drive letter, but indicates that it is a Device name. The mscd001 in the above example can be named anything as long is it agrees with that which is in your autoexec.bat file in the next step.

Type "copy con autoexec.bat <enter>
Mscdex.exe /D:mscd001
<control key> <z> to close the file. (MSCDEX assigns the drive letter)

Reboot the computer. You should see the CD drive recognized and a drive letter assigned. If you do not, look to see what went wrong.

Once the complete Windows is loaded and set up and properly operating, you can rename to config and autoexec so they are not read, increasing the performance of your computer.

Install the Graphic Interface Windows 9x

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Boot to the hard drive so the CD ROM drive letter is available
Type MD WIN98 <enter> (assuming this is for Windows 98)
Type CD WIN98 <enter>
Type copy d:\win98*.*
All files from the CD Drive in the Win98 directory should copy to the C drive
This process will speed installation as well as assure you that the files are available quickly to the computer when another driver or program calls for them.

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You should still be at the C:\win98 prompt for the next step to work
Type "setup" and follow directions having the COA license number available.
After Windows completes, determine what drivers still needs to be installed including Motherboard, Display, Modem, and Sound Drivers.

Supplemental Information Installing Windows

Hard Drives must always be prepared in order to use them. (Partitioned and Formatted)
Newer computers have code built into the BIOS that is actually the "CD ROM drivers", so that the CD ROM Drive is recognized as a boot drive that makes it capable of booting from a CD ROM disk. If the Windows CD ROM disk is bootable, it is capable of preparing the hard drive before installing Windows, by partitioning and formatting the hard drive, all without you understanding what is going on. Some Windows 98 CD's, all Windows Me CDs, all Windows 2000 CDs, and all Windows XP CDs have the information on the CD to partition, and format the hard drive before the operating system is loaded, thereby eliminating the manual process of partitioning and formatting.

In the case of Windows XP, you still might want to manually partition and format the hard drive with your boot floppy (from Windows 98) so that you can use FAT32 as opposed to NTFS. FAT32 and NTFS are different types of file systems. When you use the XP CD to prepare your hard drive, you do not have the option of using FAT32.

NTFS provides security and FAT32 does not. Security means booting from a floppy to get to your hard drive should something happen. If you can't boot to your hard drive from a floppy, your files are protected from unwanted access, because the passwords are also so secure, there is no back door into the computer. Microsoft also claims that NTFS is much more robust than FAT32, meaning it is harder to corrupt. Actually, I see just as many corrupt NTFS systems as I do FAT32, so you be the judge. Personally, I would like to be able to get to my data via a floppy if something happens, so I use FAT32.

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