



Image for DOS

User Manual

TeraByte Unlimited
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Notices

Image for DOS was compiled using Open Watcom, which can be found at www.openwatcom.org.

Technical Support Policy

Technical support is provided online. Software and documentation updates are available at www.terabyteunlimited.com.

- * The Image for DOS home page, with software and documentation update information, and support resources, can be found at www.terabyteunlimited.com/image-for-dos.htm.
- * A support knowledge base for all TeraByte Unlimited products, including Image for DOS, can be found at www.terabyteunlimited.com/kb.

Registered users can email their questions to support@terabyteunlimited.com if you can't find a suitable resolution via the aforementioned support resources. If we cannot resolve the issue via email, we may provide telephone support.

Unregistered users will be provided technical support and product information through email only.

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System Requirements

- * IBM-compatible personal computer (i386 or newer)
- * 32-MB RAM
- * Recommended: External hard drive

<i>Note: You can use a writable CD or DVD drive, but the external hard drive is the preferred method.</i>
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Data Storage Size Unit Conventions

Since Image for DOS and this document refer to data storage size units, this section provides clarification on the definitions we use. Storage device manufacturers typically define gigabytes (GB) in base *decimal*, where 1 GB = 1,000 MB = 10^9 bytes = 1,000,000,000 bytes. Microsoft Windows, on the other hand, defines GB in base *binary*, where 1 GB = 1,024 MB = 2^{30} bytes = 1,073,741,824 bytes.

Because of the confusion that can result when these different data storage size unit conventions are each referred to as “gigabytes”, the *gibibyte* (along with the kibibyte, mebibyte, etc.) was established in 1998 by the International Electrotechnical Commission (IEC). A gibibyte (abbreviated GiB) is a base binary unit, so 1 GiB = 2^{30} bytes = 1,073,741,824 bytes. The IEC retained the term *gigabyte* to refer to base decimal, where 1 GB = 10^9 bytes = 1,000,000,000 bytes.

Image for DOS and this document will follow IEC recommendations, and will thus use the terms megabyte (MB), gigabyte (GB), etc. to refer to base decimal, and mebibytes (MiB), gibibytes (GiB), etc. to refer to base binary. So, when you read about the data storage size convention used by Windows, the units will appear as mebibytes (MiB) or gibibytes (GiB), even though Windows itself refers to the units as megabytes (MB) or gigabytes (GB).

How Image for DOS Works

Image for DOS (IFD) is a backup and restore program that is designed to function in the DOS operating environment but can back up a hard disk containing any type of operating system. Image for DOS protects your system by creating a compressed or uncompressed “snapshot” of all *used areas* of your FAT, FAT32, NTFS, Ext2/3, or ReiserFS partition or volume. For other file systems, it saves and restores a compressed or uncompressed snapshot of *all sectors* in the partition or volume, both used and unused areas.

The snapshot backup created by Image for DOS is referred to as an *image*. You can write the image backup to a set of files that you store in a different partition of the hard drive you are backing up, on an external hard drive, on a network drive, or directly to most USB 2, IEEE 1394, ATAPI CD-R/RW, or DVD/RW drives. Image for DOS can also work with drives that make use of ASPI drivers, if you provide the appropriate DOS-based driver.

When you create the image, the file system and files are backed up exactly as they are stored on the sectors of your hard drive at the time you make the backup, effectively taking a snapshot of your hard drive at the time you create the image. Image for DOS does not examine the files on your hard drive to make decisions about whether they should be backed up. See Appendix A for a description of file-based backups vs. sector-based backups. Appendix B describes the types of backup strategies you can use, and the strategy you choose plays an important role when you need to restore a backup.

When you create a backup using Image for DOS, you back up not only your data files but also the operating system in its entirety. To understand the full impact of having an image backup, suppose that you install a program to test it and discover it is not what you expected. You attempt to uninstall it and it misbehaves. Before you know it, the fully functional, well-behaved computer you fondly remember from 30 minutes ago is gone, and, in its place, you now have a devil child that won't even boot. If you restore an image backup taken before you installed the errant program, you effectively remove all traces of the program—your computer returns to the state it was in before you installed the errant program and life goes on as if the errant program never existed on your hard drive. To understand the technical details of how Image for DOS creates a sector-based image, see Appendix C, “Introduction to Hard Drive Storage.”

After backing up with Image for DOS, your computer is protected from crashes, data loss, hardware problems, and malicious software (i.e. viruses), since you can restore the snapshot image whenever necessary.

You can view individual files or folders from an image backup by using the free TBIView add-on. You can obtain TBIView from www.terabyteunlimited.com; if you purchased a disk-based version of Image for DOS, you'll find TBIView on your installation media. TBIView only runs under Windows.

<i>Note: At the time of this writing, the current version of TBIView doesn't support Image for DOS Version 2 files, but TBIView will be updated soon.</i>
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The images you create using Image for DOS are fully compatible with the other TeraByte Unlimited Version 2 imaging programs, such as Image for Windows and Image for Linux. For example, you can create an image using Image for DOS and restore it using Image for Windows. The reverse is also true: Images created by other TeraByte Unlimited imaging programs are compatible with Image for DOS.

Ways to Use Image for DOS

You can use Image for DOS in a variety of ways:

- * **Local Usage:** You can boot with your Image for DOS media (i.e. floppy diskette or CD/DVD or USB drive), and backup the operating system partition on your hard disk. Store your image backups on a secondary hard drive partition, on an external hard drive, or on a CD's or DVD's. Then, when you need to restore, boot from your Image for DOS media again, and use Image for DOS to restore using an Image for DOS image.
- * **Across a Network:** You can create a network-capable DOS diskette (not included), and then use Image for DOS to create an image file to a mapped network drive. You also can restore an image file from a mapped network drive. You can use (PXE) push technology (not included) to automatically start the backup or restore across a network.
- * **With a Hidden Recovery Partition:** You can find information on setting up a hidden recovery partition here:

<http://www.terabyteunlimited.com/kb/article.php?id=277>

Image for DOS Quick Start

In this section, you'll find a general overview of the major processes Image for DOS can perform: backing up, restoring, and validating an existing backup image. Each of these processes is described in detail, including pictures, later in this manual.

To make a full back up a drive or partition using Image for DOS, follow these steps:

Note: For detailed steps on creating a full backup, see the section, "Creating Backups with Image for DOS."

1. Create a boot disk that contains Image for DOS using either the MakeDisk utility that comes with Image for DOS or using an alternative method.
 - * To read about creating an Image for DOS boot disk using the MakeDisk utility, see the section, "Installing Image for DOS."
 - * To read about other ways to create an Image for DOS boot disk, see the section, "Installing Image for DOS Manually".
2. Boot the computer that you want to back up using the Image for DOS boot disk.
3. Using the Image for DOS menus, select a drive or partition to back up.
 - * For details on using the Image for DOS menus, see the section, "Navigating the Image for DOS Interface."
4. Select the target location where you want to store the backup image file(s).
5. Provide a name for the backup image file.
6. Set backup options.
 - * For details on available backup options, see the section, "Understanding Backup Options."

You can make a differential backup using the same steps; you simply select the Changes Only option on the Image for DOS menus instead of the Full Backup option. For details on backup strategies—that is, deciding whether to make full backups or use a combination of full backups and differential backups—see Appendix B. For details on creating a differential backup, see the section, "Creating a Differential Backup."

You can restore an Image for DOS backup using these steps:

Note: For detailed steps to restore a backup, see the section, "Using Image for DOS to Restore a Backup."

1. Boot your computer using the Image for DOS boot disk.

2. On the Image for DOS main menu, select Restore.
3. Select the source location that contains the backup image file that you want to restore.
4. Select the backup image file you want to restore.
5. Select the target location that you want Image for DOS to overwrite with the information contained in the backup image file.
6. Set restore options.
 - * For details on available restore options when you are restoring an entire drive, see the section, "Understanding Restore Options for an Entire Drive."
 - * For details on available restore options when you are restoring an individual partition, see the section, "Understanding Restore Options for an Individual Partition."

You can validate a backup as you create it or, if you don't have time to validate it when you create it, you validate it later. Follow these steps:

Note: For detailed steps to validate a backup, see the section, "Validating Backups with Image for DOS."

1. Boot your computer using the Image for DOS boot disk.
2. On the Image for DOS main menu, select Validate.
3. Select the source location that contains the backup image file that you want to validate.
4. Select the backup image file you want to validate.
5. Set validation options.
 - * For details on available validation options, see the section, "Understanding Validation Options."

Obtaining Image for DOS

You can download either the **unregistered trial version**, or the **registered version** of Image for DOS:

- * If you *have not* purchased Image for DOS, click here to download the **unregistered trial version**.

<http://www.terabyteunlimited.com/image-for-dos.htm>

- * If you *have* purchased Image for DOS, click here to display a product download form for obtaining the **registered version**. *You will need to provide your name, email address, and Image for DOS order number.*

<https://terabyteunlimited.com/product-download.php>

The file you download is a compressed file that contains at least these seven files:

- * CDBOOT.F35 is the file required to create a bootable CD/DVD. Based on information stored in CDBOOT.INS, Image for DOS will look in the current directory for CDBOOT.F35 during the creation of a CD/DVD and use it to create a bootable disc.

About CDBOOT.F35

You use CDBOOT.F35 to create a bootable CD or DVD; CDBOOT.F35 is an image of a bootable 3.5-inch floppy diskette. Image for DOS is contained within CDBOOT.F35, allowing you to both back up and restore as needed.

If you use the trial version of Image for DOS to create a bootable CD or DVD, you will be able to restore that image for 30 days. After that time, you will only be able to restore that image using a registered version of Image for DOS.

Registered copies of Image for DOS include a full-use version of CDBOOT.F35 that allows you to both boot with any CD or DVD you create with the software and restore any images you create, free of any time restriction.

Based on information stored in CDBOOT.INS, Image for DOS expects CDBOOT.F35 to appear in the current directory of the DOS environment. This may be of importance to you if you plan to create and use your own custom batch file with Image for DOS. For information on customizing CDBOOT.F35, see the section, "Installing Image for DOS Manually."

- * CDBOOT.INS is used to control the content and configuration of bootable CD/DVD discs created by Image for DOS and used to store images.
- * IMAGE.EXE is the Image for DOS program.
- * IFD_EN.PDF is a copy of this manual.

- * LICENSE.TXT is a copy of the Image for DOS license agreement.
- * MAKEDISK.CFG is the MakeDisk configuration file for Image for DOS.
- * MAKEDISK.EXE is the MakeDisk utility, which allows you to easily create bootable media to run Image for DOS.
- * ORDER.TXT is an order form for Image for DOS, and is included in the trial version only.

Installing Image for DOS

Image for DOS is not “installed” in the usual sense of the word. Instead, you run Image for DOS by creating a bootable floppy diskette or CD/DVD disc that contains the Image for DOS program. Then, you simply boot with that disc or diskette to run Image for DOS.

If you use Windows, you can create a bootable Image for DOS disc, diskette or USB flash drive using the MakeDisk utility, which is included with Image for DOS.

If you use an operating system platform that doesn't support MakeDisk or if you wish to control the contents of the bootable diskette or disc that you create, see the section, “Installing Image for DOS Manually” to create a bootable media that contains Image for DOS.

Follow these steps to use the MakeDisk utility to create a bootable Image for DOS disc or diskette; the MakeDisk utility is included in the ZIP archive file along with Image for DOS:

1. Extract the contents of the Image for DOS ZIP archive file to a folder of your choice.

*Note: If you are using a version of Windows that has a built-in compressed folders feature (e.g. Windows Me or Windows XP), you can double click the ZIP file and then open the **File** menu and choose **Extract all files** in Windows Explorer to extract the contents*

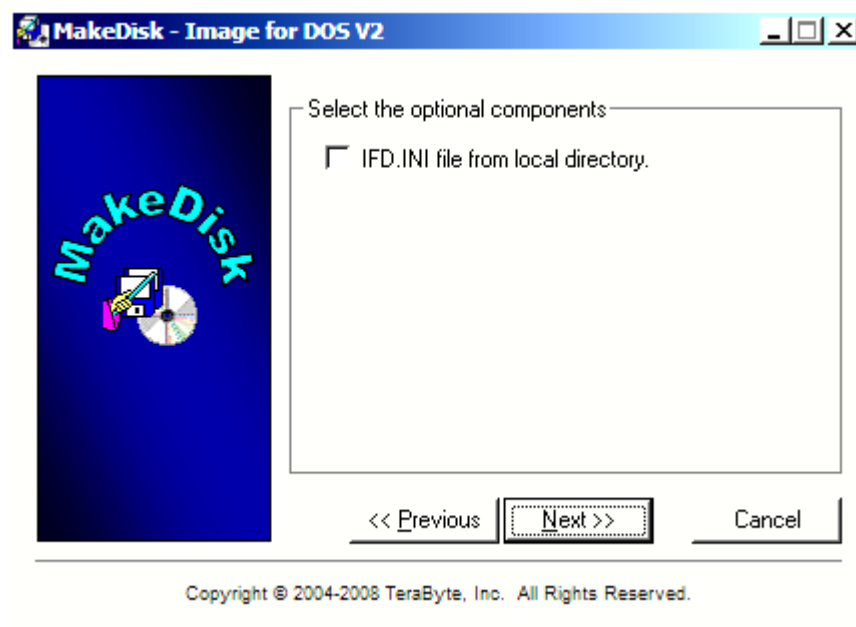
2. Double-click MAKEDISK.EXE. The MakeDisk welcome screen appears.

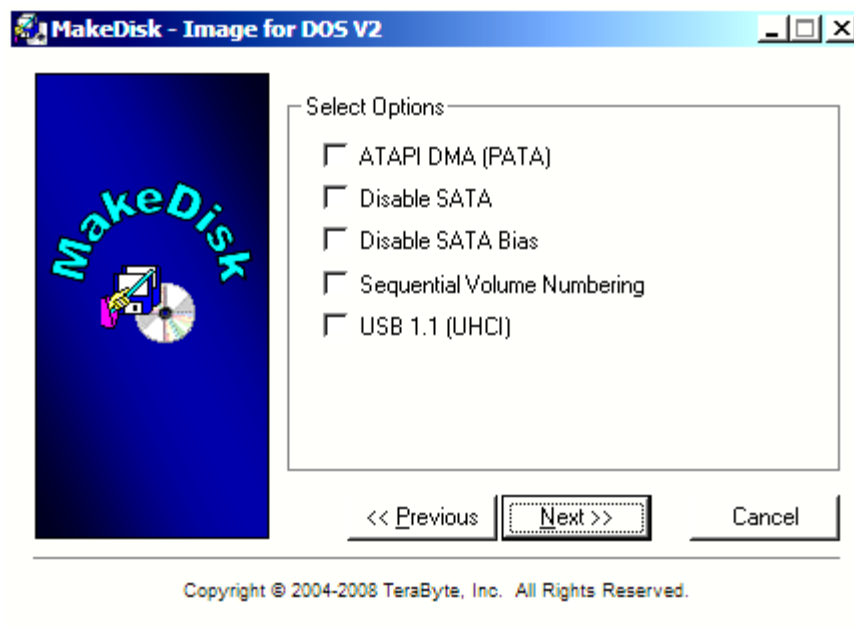


3. Click Next on the MakeDisk welcome screen. The “License Agreement” screen appears.



4. Read the Image for DOS license agreement, and if you accept it, select the “I accept the agreement” button and click Next. Either the “Select the optional components” or the “Select Options” screen will appear.



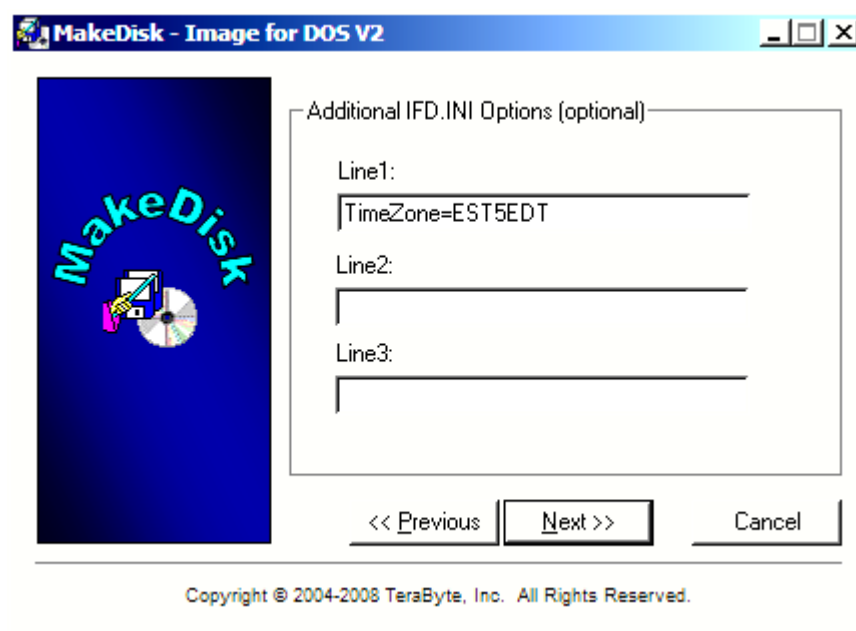


5. If you have a copy of IFD.INI in the folder where makedisk.exe resides, you may enable the “IFD.INI file from local directory” option to include that file in the Image for DOS bootable disc or diskette, and then click Next to arrive at the “Select Options” screen. If you don’t have a preexisting copy of IFD.INI, you won’t see the “Select the optional components” screen at all.

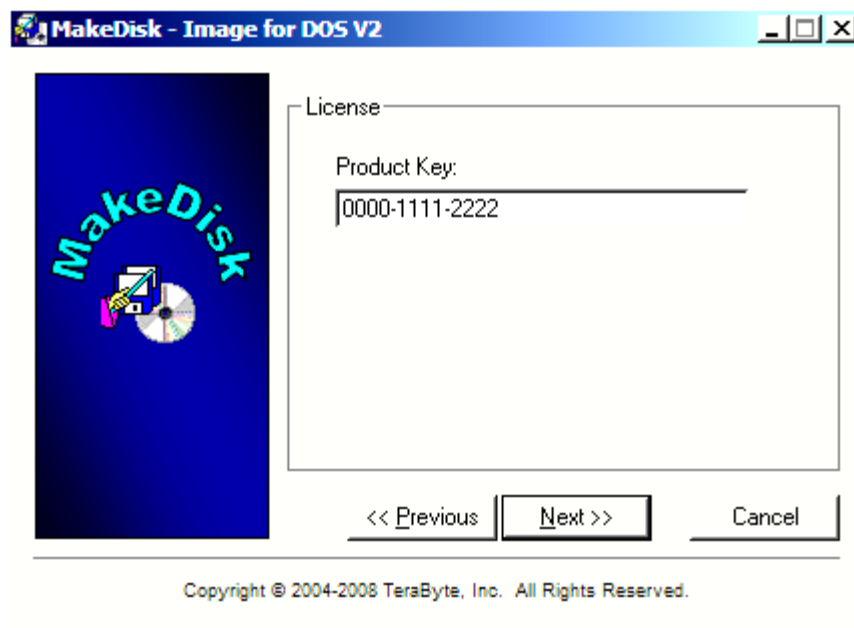
Enable the desired options on the “Select Options” screen:

- * **ATAPI DMA (PATA)** – If your PATA CD/DVD drive supports ATAPI DMA, enabling this option dramatically speeds up reading-from and writing-to the CD/DVD drive. This option will not work with some drives; therefore, if you enable this option and have problems using your CD/DVD drive with Image for DOS, create a new boot disk and leave the option disabled.
- * **Disable SATA** – Image for DOS includes low level support for SATA when the SATA controller is configured in ACHI mode. A problem can occur when Image for DOS takes control of the SATA drives and the BIOSes doesn’t provide the information that allows Image for DOS to match which drive is which. In that case Image for DOS may default to using the BIOS drive which can cause the system to hang until the BIOS returns control (if ever). If you experience hangs and/or the inability to access a hard drive without an error message then create a new boot disk with the Disable SATA checkbox checked.
- * **Disable SATA Bias** – Because some systems have no support whatsoever to match BIOS and SATA drives (see paragraph above), Image for DOS employs a special matching routine to try and determine which drive is which. In some cases this can cause Image for DOS to match a BIOS drive to SATA when it shouldn’t. If you experience such an issue, create a new boot disk with the Disable SATA Bias checkbox checked.

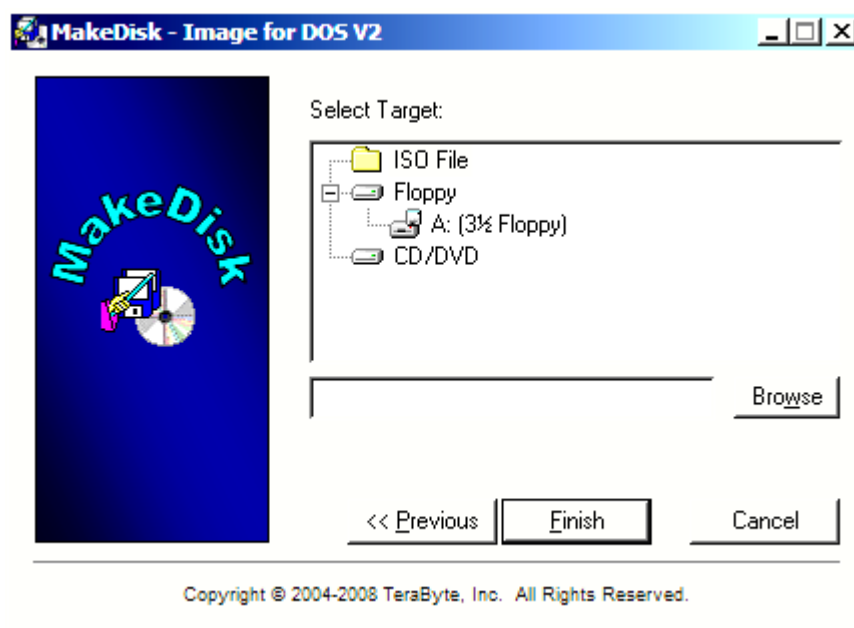
- * **Sequential Volume Numbering** – For the volumes inside an extended partition (not the main partition), checking the Sequence Volume Numbering option will assign ID numbers based on the order of the volumes within the extended partition. If you don't check this box, the ID numbers assigned to volumes inside an extended partition might be random. You cannot get in trouble if you check this box.
 - * **USB 1.1 (UHCI)** – If you need USB 1.1 (UHCI) support for older systems that don't support USB 2.0, enable this option. In addition, some new systems require this option or the USB port will hang and no USB devices will be detected. USB 2.0 support is always enabled regardless of this option.
6. Click Next, and the Additional IFD.INI Options screen appears. Most of the options you should set to use Image for DOS are set for you by default, but you can use this screen to set additional options. For example, you might want to use the TimeZone variable to identify your time zone for Image for DOS, as shown in the figure. For a complete list of available environment variables, see the section, "Image for DOS Environment Variables."



7. Click Next, and the License screen appears. If you own a licensed copy of Image for DOS, supply your serial number.



8. Click Next, and the “Select Target” screen appears. Choose the target that MakeDisk should use to create the bootable Image for DOS media.



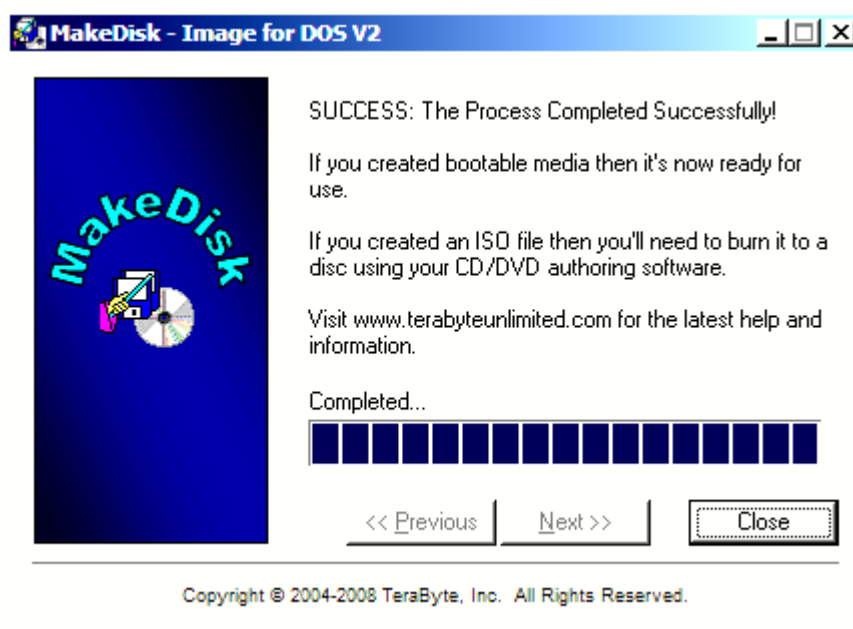
You can create a bootable USB flash drive with MakeDisk as long as the USB flash drive is smaller than 2 GB.

- * If you choose the “ISO File” option, also supply an ISO file name in the box provided.

- * If you choose the “3 ½ Floppy” option, be sure to insert a floppy diskette before proceeding. The entire contents of this floppy diskette will be overwritten.
- * If you choose the “CD/DVD” option, be sure to insert a *writable* CD or DVD disc before proceeding. The entire contents of this disc will be overwritten.

MakeDisk can automatically overwrite CD-RW, and DVD+RW media. However, if you wish to use DVD-RW media, it must be either brand new or fully blanked before being processed by MakeDisk. To fully blank the DVD-RW media, use your burning software's “full erase” function. (The “quick erase” function will not work for this purpose.)

9. Click Finish, and respond to subsequent prompts as necessary. MakeDisk will then create your bootable media or ISO image. When it is done, the Success screen appears, as shown below.



10. Click Close on the MakeDisk Success screen.

- * If you selected the “3½ Floppy” or “CD/DVD” option in Step 8, you can now use that media to boot and run Image for DOS.
- * If you selected the “ISO File” option in Step 6, you will have to use other CD/DVD authoring software to create a bootable disc from the ISO file.

Navigating the Image for DOS Interface

To select menu items in Image for DOS, use the arrow keys to select the desired option and then press **Enter** to display the next screen. The Backup Options screen contains several sections of options; some of the options can be toggled on or off. On the Backup Options screen, use the **Tab** key to move from section to section. For options that you can toggle on and off, highlight the option using the arrow keys and then use the space bar to toggle the option on or off, as desired.

Image for DOS also makes wide use of accelerator keys. An accelerator key is an individual letter that you can press (or press in combination with the **Alt** key) to select an option or a menu item. In Image for DOS, accelerator keys appear in yellow.

How you use an accelerator key depends on the current location of the cursor; if it is in the same section of the screen as the desired accelerator key, simply press the applicable accelerator letter. If the cursor is in any other section, press and hold the **Alt** key, and then press the applicable accelerator letter. For example, when the Backup Options screen first appears, the cursor is in the **Options** section. If you want to select **None** in the **Compression** section, press and hold the **Alt** key and then press the **n** key. Pressing just the **n** key would not work in this case, because of the initial position of the cursor. However, when you press **Alt+n**, the cursor jumps to and selects the **None** option in the **Compression** section. At that point, you can press only the **t** key to select the **Standard** option instead of the **None** option.

You can use the **Esc** key to undo menu selections and move back to the previous menu. If you use the **Esc** key in this manner, Image for DOS remembers the selections you have already made throughout the Image for DOS session, in the event that you return to the same screen.

Creating Backups with Image for DOS

Create the bootable floppy diskette or CD/DVD disc using any of the techniques described in the section “Installing Image for DOS” or “Installing Image for DOS Manually.” Insert the media into the appropriate drive, and reboot your computer.

To boot from a CD/DVD, you may need to change the order in which your computer selects boot devices. As your computer begins to boot, you should see a message—before you ever get to Windows—that tells you what key to press to enter Setup—typically the Delete key, F2, or F12. Once in the BIOS, you need to follow the instructions provided in your BIOS to reorder the boot sequence to permit your CD/DVD drive to be examined before your hard drive. If your system starts by offering you the option to select a boot menu, you can use the boot menu to identify the device you want to use to boot.

When you create a backup, you can create either a full backup or a differential backup. A full backup is exactly what it sounds like—Image for DOS backs up your entire hard disk. A differential backup works in conjunction with a full backup—you create a full backup the first time and then create differential backups, which contain only changes, for subsequent backups. A differential backup will, initially, be smaller than a full backup but, as you make changes, the size of the differential backup will grow over time.

Before you make the decision concerning the type of backup you want to create, read Appendix B for a detailed explanation of full backups and differential backups.

Things to Consider Before Backing Up

There are very few rules to follow when formulating a backup plan. Please consider the following ideas to help you create a backup that will help you easily recover from a disaster. For more information on backup strategies, see Appendix B.

Consider the destination for your backup. For example, if you will be backing up around 30 GB of data, you probably will not want to store the backup on a set of CD-R/RW discs, since the backup will likely require 20 discs or more (based on an expected compression ratio of 40-60%). A better option in this case would be:

- * Backup directly to a set of DVD discs.
- * Backup to an alternate hard drive partition (and perhaps use the free add-on utility BINGBURN later to burn the backup to a set of DVD discs).
- * Backup to an external hard drive (recommended).

Plan your backup with a restore strategy in mind. You can:

- * Save the backup directly to a set of bootable CD or DVD discs, as explained in this manual. To restore, simply boot with the restore disc, and use Image for DOS to perform the restore.

- * *Save the backup to an alternate hard drive partition. To restore, run Image for DOS from a bootable floppy disk, a USB drive, or a CD/DVD disc.*
- * *Save the backup to an external hard drive (recommended). To restore, run Image for DOS from a bootable floppy diskette or CD/DVD disc.*

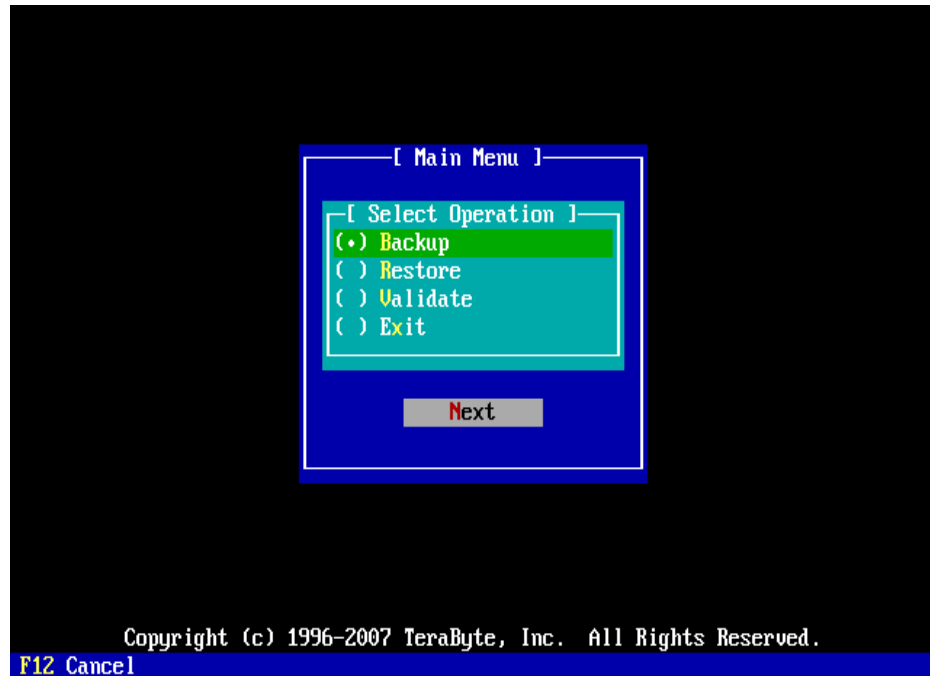
Strike your own balance between convenience and resiliency. Consider these simple ideas:

- * *Save your backups directly to an alternate hard drive partition and use the free utility BINGBURN to burn a second copy of the backup to a set of CD/DVD discs. Then, if you need to restore, you can quickly and conveniently use the backup stored on the hard drive. But, if things really go wrong and the primary copy of the backup is not available, you can fall back on the copy of the backup that you saved on CD/DVD discs.*
- * *Don't get rid of an existing set of backup discs when you create a new set. Instead, keep two or more sets of backup discs. That way, you can fall back to an older backup if something should go wrong with the newest backup.*
- * *If you are using multiple sets of backup CD/DVD discs, keep the newest set offsite to guard against physical damage.*

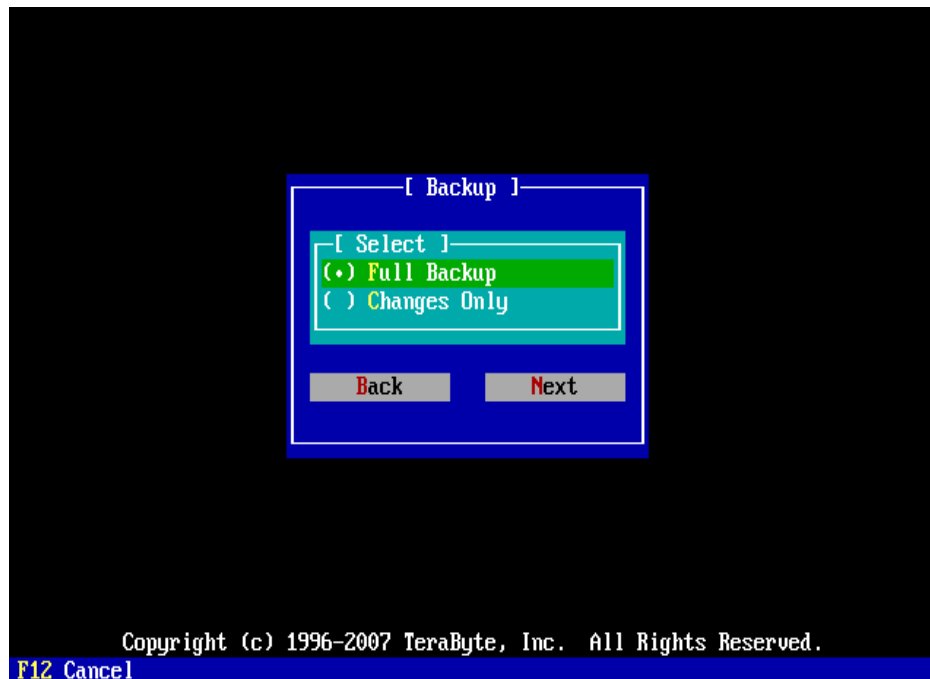
Creating a Full Backup

You walk through a series of menus to create a full backup. Insert your Image for DOS boot disk into the appropriate drive and boot your computer. Then, follow these steps:

1. On the Image for DOS **Main Menu/Select Operation** screen, select **Backup**.



2. On the **Backup/Select** screen that appears, select **Full Backup**.

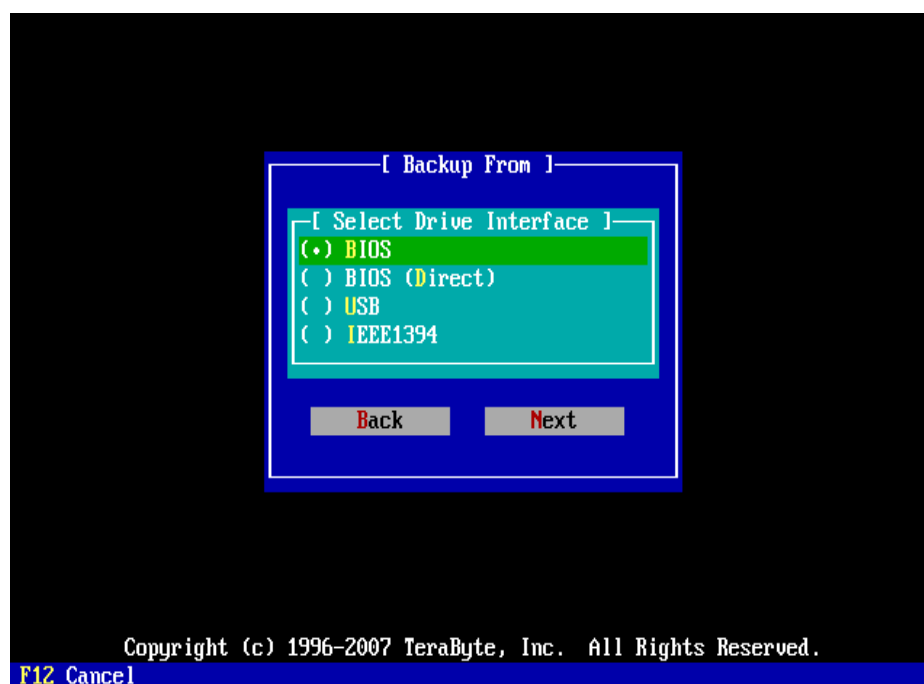


3. On the **Backup From/Select Drive Interface** screen that appears, select one of the following options; these options refer to how Image for DOS should attempt to access the hard drive that contains the partition you want to back up:
 - * **BIOS** – Locates and accesses drives using the system BIOS. Please note that any problems or limitations inherent to the system BIOS will apply.

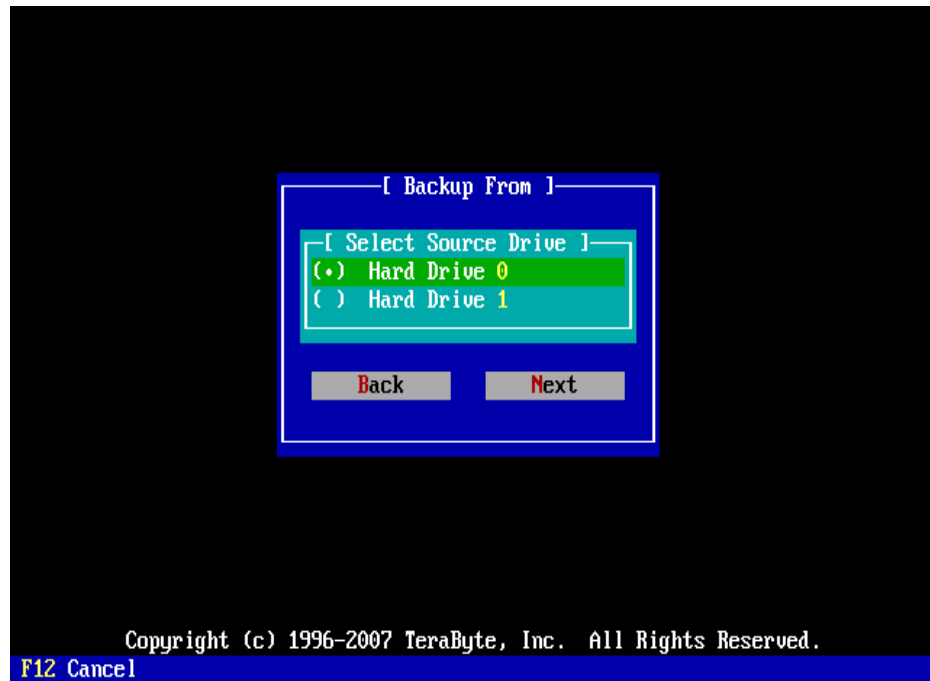
- * **BIOS (Direct)** – Attempts to locate the hard drive using the system BIOS, but then attempts to access it directly, bypassing the BIOS. This can sometimes be helpful in cases where performance with the **BIOS** option is very poor. In order to get the most out of this option when creating an image, you should select a file (direct)—rather than file (os)—as the target for saving the image. (This advice applies to step 6 below.)

Use BIOS (direct) when you are going to be accessing SATA hard drives and CD/DVD drives or using the BIOS (direct) option anywhere.

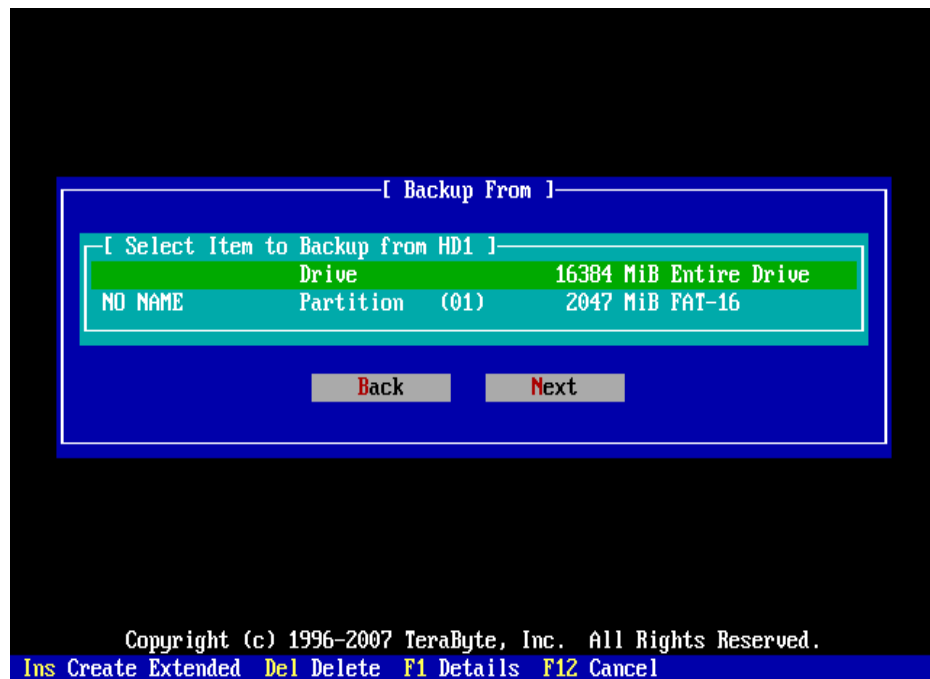
- * **USB** – Examines the attached USB controller, if any, for available high-speed hard drives.
- * **IEEE1394** – Examines the attached IEEE 1394 controller, if any, for available hard drives.



4. On the **Backup From/Select Source Drive** screen that appears, select the hard drive that you want to back up or the hard drive that contains the partition you want to backup.



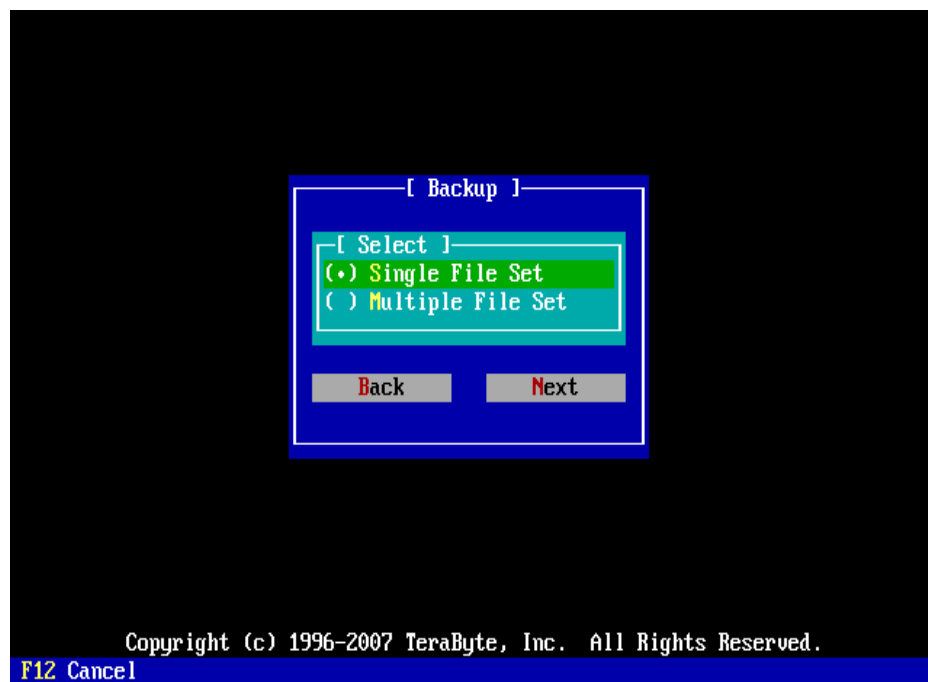
5. From the **Backup From/Select Item to Backup from HD** screen that appears, select the partition you wish to backup. If you choose to back up a partition, skip to Step 7.



6. On the **Backup/Select** screen that appears if you chose to back up a drive in Step 5, choose one of the following options:
 - * **Single File Set** – Select this option to create a backup that is comprised of a single image, regardless of how many individual partitions you are backing

up. The first file created for the image set will be named <name> . TBI, where <name> is a character string you supply. If Image for DOS creates additional files, Image for DOS will name them <name> . 1, <name> . 2, <name> . 3, and so on. The number of files Image for DOS will create depends on the overall size of the backup and the File Size setting you choose when you set the options for the backup in Step 11.

- * **Multiple File Set** – Select this option to create a backup that is comprised of one image for every individual partition that Image for DOS backs up. Image for DOS names the first file created for the first image set <name>_0 . TBI, where <name> is a character string you supply. Image for DOS adds _0 to identify the image file set. If Image for DOS creates additional files for the same image set, they will be named <name>_0 . 1, <name>_0 . 2, <name>_0 . 3, and so on. Image for DOS names the files of the *second* image set (i.e. the second partition included in the backup) <name>_1 . TBI, <name>_1 . 1, <name>_1 . 2, <name>_1 . 3, and so on. Image for DOS will name subsequent image sets accordingly with _2, _3, and so on, appended to the file name.
- * If you choose this option, each file Image for DOS creates represents only a partition and you won't be able to completely restore a drive with one menu option but will have to restore each partition separately.
- * The number of files Image for DOS will create for each image set depends on the size of the corresponding partition and the **File Size** setting you choose in a later step.



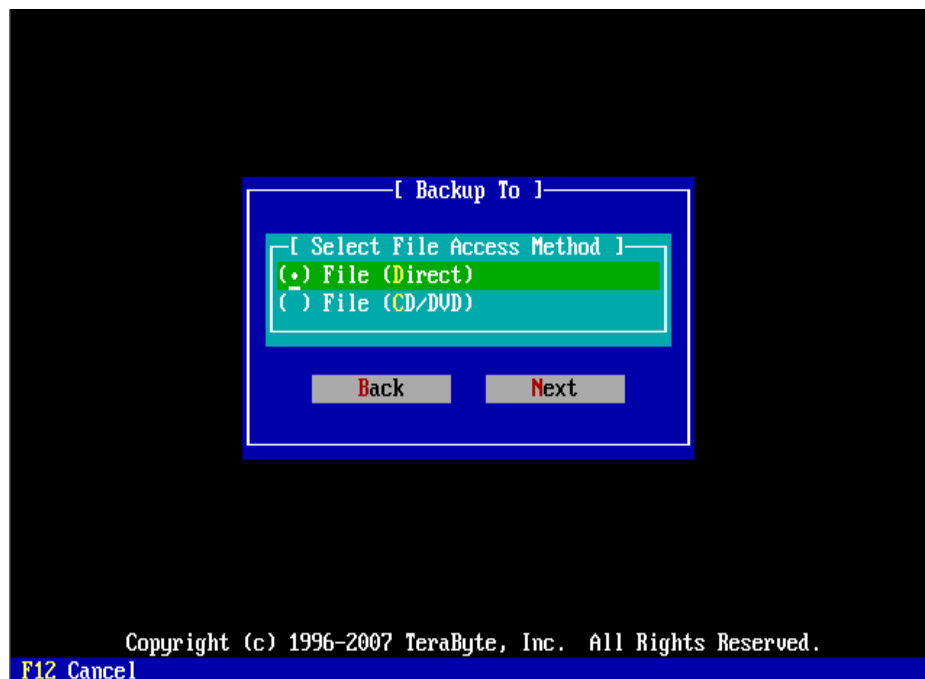
7. On the **Backup To/Select File Access Method** screen that appears, select one of the following options, which refer to the location where Image for DOS should save the backup:

- * **File (OS)** – This option appears only if you boot using a DOS boot disk that you created using any method other than the MakeDisk utility and does not appear in the figure. Choose this option to use the operating system file services to save the image files. You must use this option when saving images to a mapped network drive.
- * **File (Direct)** – This option allows you to save the image file(s) to a folder on a hard drive that does not have a drive letter assigned to it by DOS.

Note: Do not save your image to the same partition you are backing up.

- * **File (CD/DVD)** – This option allows you to save the backup file(s) to a CD or DVD disc. The first CD/DVD disc created will automatically be made bootable by Image for DOS.

Note: Image for DOS can automatically overwrite CD-RW and DVD+RW media. If you wish to use DVD-RW media, Image for DOS can format it, but the process takes 1 hour per disc, so you may prefer to use fully formatted, fully blanked, or brand new discs. To fully blank the DVD-RW media, use your burning software's "full erase" function. (The "quick erase" function will not work for this purpose.)



8. On the **Backup To/Select Drive Interface** screen that appears, select one of the following options. These options refer to how Image for DOS should attempt to access the hard drive or CD/DVD drive where your image will be saved:

If you chose **File (Direct)** in Step 7, you can choose one of the following options:

- * **BIOS** – Locates and accesses drives using the system BIOS. Please note that any problems or limitations inherent to the system BIOS will apply.
- * **BIOS (Direct)** – Attempts to locate the hard drive using the system BIOS, but then attempts to access it directly, bypassing the BIOS. This can sometimes be helpful in cases where performance with the **BIOS** option is very poor. In order to get the most out of this option when creating an image, you should select a file (direct)—rather than file (os)—as the target for saving the image.

Use BIOS (direct) when you are going to be accessing SATA hard drives and CD/DVD drives or using the BIOS (direct) option anywhere.

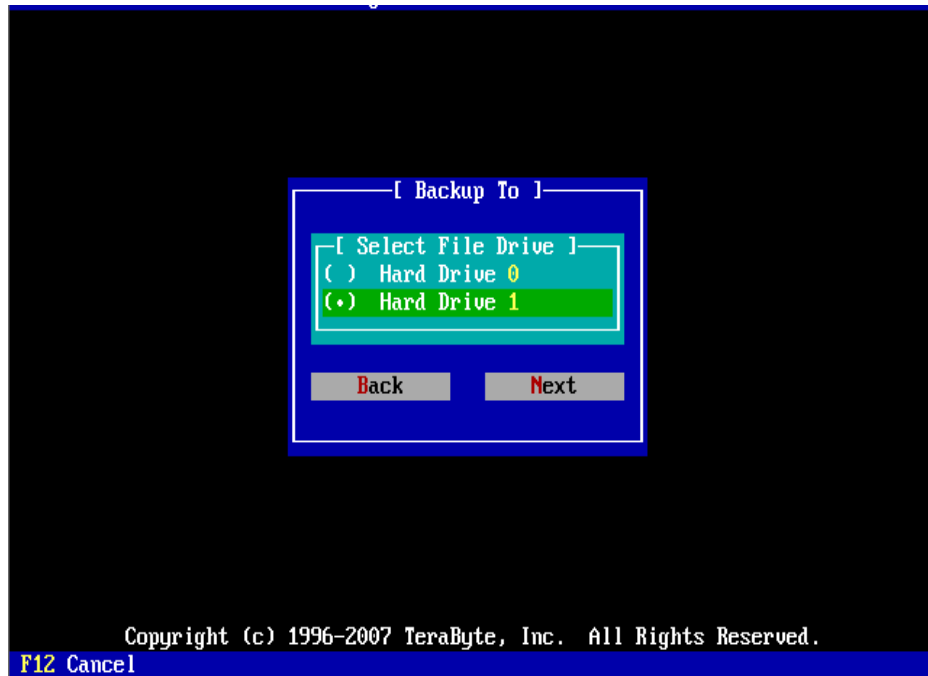
- * **USB** – Examines the attached USB controller, if any, for available high-speed hard drives.
- * **IEEE1394** – Examines the attached IEEE 1394 controller, if any, for available hard drives.

If you chose **File (CD/DVD)** in Step 7, you can choose one of the following options:

- * **ATAPI** – Select this option if your CD/DVD drive is an ATAPI device, and none of the other selections apply. This is the most common option.
- * **ASPI** – Select this option if your CD/DVD drive will be accessed using an ASPI layer. (You must supply the ASPI driver for this option to work.)
- * **USB2** – Select this option if your CD/DVD drive is attached to a USB 2 controller.
- * **IEEE1394** – Select this option if your CD/DVD drive is attached to an IEEE 1394 controller.

If your USB device does not appear at first, please try pressing the Esc key, waiting a few seconds, and selecting the USB or USB2 option again.

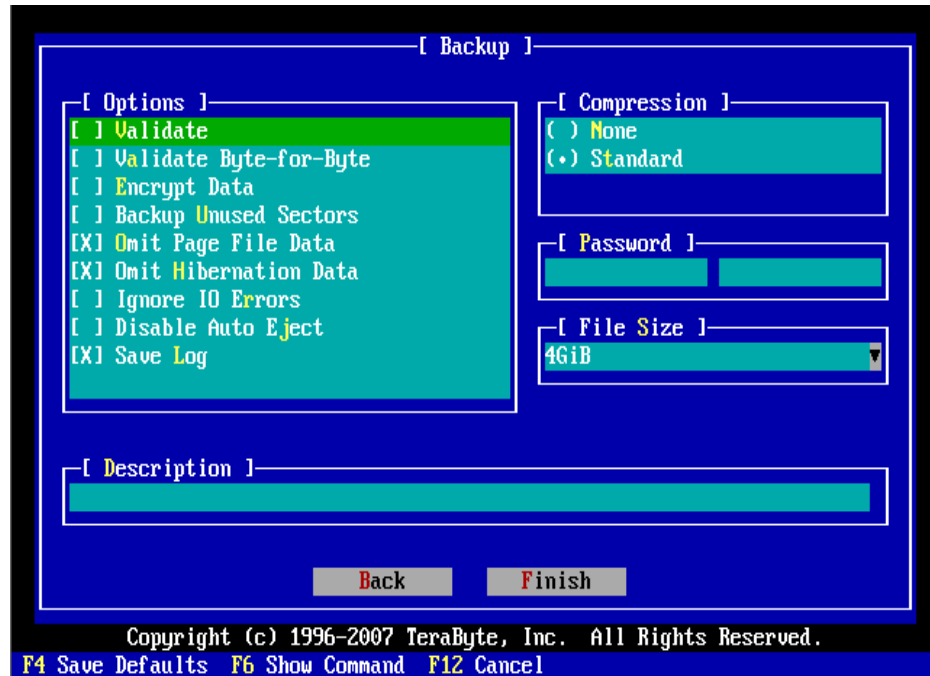
9. Either the **Backup To/Select File Drive** shown in the figure or the **Backup To/Select Target Drive** screen appears, depending on whether you are saving the backup to CD/DVD discs or to a hard drive. Select the target CD/DVD drive or hard drive. If you select a hard drive, the **Backup To/Select File Location on HD** screen appears. You can select a partition on the hard drive if it contains partitions; otherwise, press Enter.



10. On the screen that appears, type a name for the image file you want to create. You do not have to supply a file extension—just the path and file name itself; Image for DOS will automatically add the .TBI extension. If you selected File (OS), you must follow DOS naming conventions and use a file name that does not exceed eight characters. You might consider using today's date in numeric form and include F as the final character to help you identify a full backup. For example, if you are creating your backup on November 1, 2007, use 110107F as the file name.

Note: To access drives using UNC paths, first map the drive using the "net use x: \\server\share" command. Then, simply specify the path as usual (e.g. "x:\folder\file", where "x:" is the mapped drive).

11. On the **Backup Options** screen that appears, select the options you want to use. See the next section, "Understanding Backup Options," for an explanation of each option.



12. When you select Finish, the imaging process begins, and a progress bar appears on-screen. You can interrupt the backup and validation operations at any time by pressing the F12 key. Image for DOS will ask you to confirm that you want to cancel before it interrupts the current operation. When Image for DOS finishes, this message appears.



Note: If a message appears, stating that the discs created will not be bootable because the CDBOOT.INS file was not found or it contained invalid references appears, please refer to the section, "Customizing CDBOOT.F35" for information on setting up CDBOOT.INS.

After you press Enter, the main menu for Image for DOS reappears. Select **Exit** and, when prompted, remove the Image for DOS boot disk and press **Enter** to reboot your computer.

Understanding Backup Options

You can set the same options when backing up in Image for DOS whether you are backing up a partition or an entire drive:

Validate – If you select this option, Image for DOS will perform internal consistency checks on the backup file(s) after creating them. Enabling this option increases the overall processing time, but can help ensure that the backup is reliable.

Validate Byte-for-Byte – If you select this option, Image for DOS will verify that every byte in the source data was backed up correctly, ensuring 100% accuracy. This option generally doubles the processing time of the overall backup operation, but is advisable to use where maximum reliability is required. You can but do not need to select the **Validate** option if you select the **Validate Byte-for-Byte** option.

Encrypt Data – If you select this option, Image for DOS will encrypt the backup file(s) with 256-bit AES encryption prior to saving them to the target medium. If you select the **Encrypt Data** option, you must also supply a password in the **Password** text boxes. Enter the password in the first **Password** text box and retype it in the second **Password** text box for verification.

*Note: If you create a backup with the **Encrypt Data** option, you will need to supply the password whenever you wish to validate the backup, restore it, or open it in TBIView. If you lose and/or forget the password, you won't be able to open or restore from the backup. **TeraByte Unlimited has no way of recovering data from an encrypted backup with an unknown password.***

*If you do not enable the **Encrypt Data** setting, Image for DOS will use the **Password** text boxes to password-protect the image file without any encryption.*

The maximum password length is 128 characters. Passwords are case sensitive and may contain upper-case letters, lower-case letters, numbers, special characters, spaces, and non-ASCII characters.

Backup Unused Sectors – By default, if the file system(s) you are backing up are one of the recognized types (i.e. FAT, FAT32, NTFS, Ext2/3, ReiserFS, or XFS), Image for DOS will backup only used sectors. If you select this option, Image for DOS will include all used and unused sectors in the backup. This option has no effect on partitions that do not contain a recognized file system; such partitions will always be backed up in full, regardless of this setting.

Omit Page File Data – If you select this option and the PAGEFILE . SYS file resides in the root directory of the source partition, Image for DOS will not back up PAGEFILE . SYS. If PAGEFILE . SYS resides anywhere else on the source partition other than the root directory, Image for DOS *will* back it up, regardless of this setting.

Omit Hibernation Data – If you select option and the HIBERFIL . SYS file resides in the root directory of the source partition, Image for DOS will not back up HIBERFIL . SYS. If HIBERFIL . SYS resides anywhere else on the source partition other than the root directory, Image for DOS *will* back it up, regardless of this setting.

Ignore IO Errors – This option only affects how Image for DOS handles bad sectors on the *source* drive, and it applies to both the backup phase and the validation phase of the backup operation. Normally, if Image for DOS encounters a bad sector on a source partition during a backup operation, it will notify you concerning the read error and give you the option to continue or abort. If you select this option, Image for DOS will ignore the error and continue. Generally, you should

select this option only if you need to backup a source partition on a drive you know contains bad sectors. On some systems, if you select this setting and Image for DOS encounters bad sectors, there will be a significant delay as the internal retry/recovery routine of the drive attempts to handle the bad sector(s). In addition, some systems may hang if the **BIOS** option is used to access the source drive. In such cases, try using the **BIOS (Direct)** option instead.

Disable Auto Eject – This option prevents Image for DOS from automatically opening the optical drive tray. If you don't select this option, Image for DOS will open the drive tray whenever a disc is needed and at the completion of the backup operation.

Save Log – Select this option to make Image for DOS log the date and time it completes the backup operation. Image for DOS saves the log as IFD.LOG in the IMAGE.EXE program directory. To be able to save IFD.LOG, Image for DOS must be running from a writable medium such as a non-write-protected floppy diskette. You can use the /logfile or LogFile options to specify an alternate location for IFD.LOG.

Validate Disk – If you store your backup on optical media, you also can choose to validate each disc to ensure that no media errors occur while Image for DOS stores the backup on each CD/DVD disc. If Image for DOS detects an error, it prompts you to replace the failed disc at the time the error is detected. If you don't enable this option, Image for DOS notifies you of errors only after the backup process is complete.

Limit Disk Usage – This option only applies when saving images to CD/DVD targets. If enabled, this option instructs Image for DOS to leave the last 10% of each disc unused to help prevent data errors that are more common near the edges of discs.

Compression – Select **Standard** to compress the backup files that Image for DOS creates. Typically, if you select **Standard**, Image for DOS produces smaller image files but it may take longer to back up. If you select **None**, Image for DOS creates your backup more quickly but produces larger image file(s). The attainable compression ratio depends on a number of factors, including the number, size, and content of the files on the source partition and the level of file fragmentation on the source partition. Typically, Image for DOS compresses backup files 40% - 60%. However, if the source partition primarily contains files that do not compress well, such as media files like MP3, JPG, and AVI, or archive files like 7Z, RAR, and ZIP, the compression ratio will be much lower.

File Size – If you are saving the image to a hard disk, you may select this option to choose the maximum size of the image files created by Image for DOS. The available options are:

- * Max – Automatically creates the largest file(s) allowed by the file system in use on the target medium. For example, the largest files that may reside on FAT, FAT32, and NTFS partitions are 2 GiB, 4 GiB, and (just under) 16 TiB, respectively.

- * 4 GiB – Useful for FAT32 compatibility.
- * 2 GiB – Useful for FAT compatibility.
- * 698 MiB – Useful if the image file(s) will later be burned to 700-MiB CD disc(s).
- * 648 MiB – Useful if the image file(s) will later be burned to 650-MiB CD disc(s).

Write Speed – This option appears in place of the **File Size** option if you chose to save your image to CD/DVD discs. We recommend that you use the default setting for this option, which is “Optimal,” unless you encounter problems.

Description – You can use this text box to assign descriptive text to individual backups. The description you enter will be visible in the file list that appears when you are preparing to restore or validate a backup. You view the description by selecting the backup and pressing **F1**.

Creating a Differential Backup

When you create a differential backup, Image for DOS compares the condition of the source partition or hard drive to a full backup you identify to determine what changes have occurred on the source partition or hard drive since you created the full backup. A differential backup contains only the changed sectors. For details on differential backups, see Appendix B.

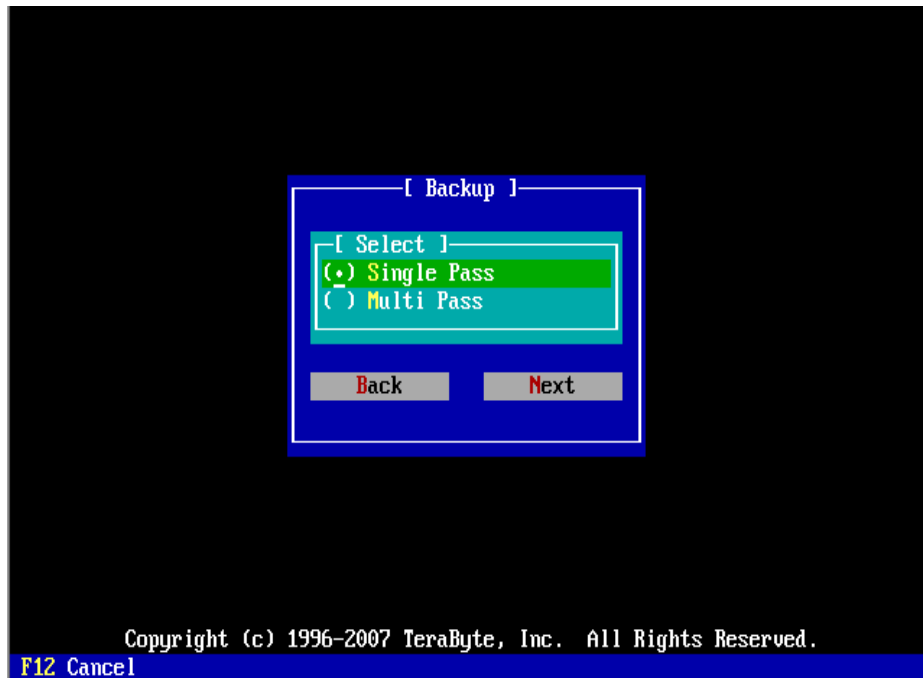
The process for creating a differential backup is very similar to the process for creating a full backup, and you set many of the same options during both processes. When you analyze the steps you take, you’ll notice the following differences:

- * When you create a full backup, you identify the source drive you want to back up.
- * When you create a differential backup, you identify the full backup Image for DOS should reference when creating the differential backup. By identifying the full backup, you also identify the drive.

Insert your Image for DOS boot disk into the appropriate drive and boot your computer. On the Image for DOS Main Menu, select **Backup**. Then, follow these steps:

1. On the **Backup** screen that appears, select **Changes Only**.
2. On the **Backup/Select** screen that appears, select an option to determine how Image for DOS detects changes and performs the differential backup:
 - * If you choose **Single Pass**, Image for DOS identifies the changes you have made to the source partition since you created the full backup and then backs up those changes, all in one pass. You *cannot use* this option if the associated full backup spans multiple CD/DVD’s.

- * If you choose **Multi Pass**, Image for DOS compares the source partition against the full backup in one pass and then makes the differential backup in a second pass. You *must use* this option if the associated full backup spans multiple CD/DVD's.



3. On the **Select Full Backup To Continue/Select File Access Method** screen that appears, choose **File (OS)**, **File (Direct)** or **File (CD/DVD)** to identify the location of the full backup related to this differential backup.

*Note: The **File (OS)** option appears only if you boot using a DOS boot disk that you created using any method other than the MakeDisk utility. Choose this option to use the operating system file services to save the image files. You must use this option when saving images to a mapped network drive.*

4. On the **Select Full Backup To Continue/Select Drive Interface** screen that appears, select one of the following options. These options refer to how Image for DOS should attempt to access the hard drive or CD/DVD drive where the full backup is stored:

If you chose **File (Direct)** in Step 3, you can choose one of the following options:

- * **BIOS** – Locates and accesses drives using the system BIOS. Please note that any problems or limitations inherent to the system BIOS will apply.
- * **BIOS (Direct)** – Attempts to locate the hard drive using the system BIOS, but then attempts to access it directly, bypassing the BIOS. This can sometimes be helpful in cases where performance with the **BIOS** option is very poor. To get the most out of this option when creating an image, you

should select a file (direct)—rather than file (os)—as the target for saving the image.

Use BIOS (direct) when you are going to be accessing SATA hard drives and CD/DVD drives or using the BIOS (direct) option anywhere.

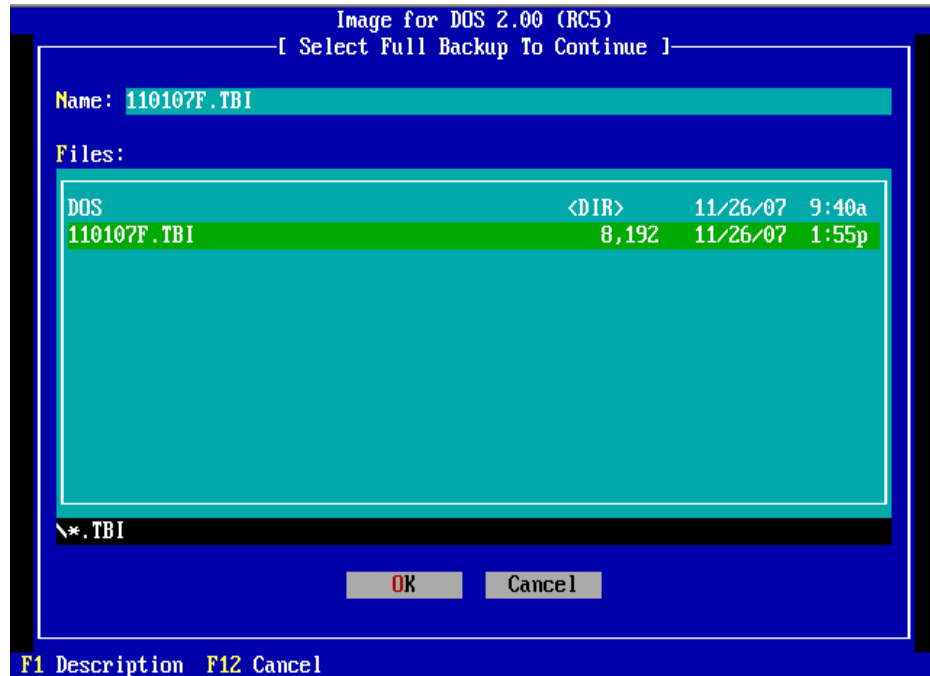
- * **USB** – Examines the attached USB controller, if any, for available high-speed hard drives.
- * **IEEE1394** – Examines the attached IEEE 1394 controller, if any, for available hard drives.

If you chose **File (CD/DVD)** in Step 3, you can choose one of the following options:

- * **ATAPI** – Select this option if your CD/DVD drive is an ATAPI device and none of the other selections apply. This is the most commonly selected option.
- * **ASPI** – Select this option if your CD/DVD drive will be accessed using an ASPI layer. (You must supply the ASPI driver for this option to work.)
- * **USB2** – Select this option if your CD/DVD drive is attached to a USB 2 controller.
- * **IEEE1394** – Select this option if your CD/DVD drive is attached to an IEEE 1394 controller.

If your USB device does not appear at first, please try pressing the Esc key, waiting a few seconds, and selecting the USB or USB2 option again.

5. On the **Select Full Backup To Continue/Select File Drive** screen that appears, select the drive that contains the full backup.
 - * If the full backup resides on CD/DVD discs, insert the first disc in the set and then select the corresponding CD/DVD drive from the list.
 - * If the full backup resides on a hard drive, select the applicable hard drive from the list shown and then select the correct partition.
6. On the **Select Full Backup To Continue/File Selection** screen that appears, select the .TBI file that corresponds to the desired full backup. You can type the name of the .TBI file (you don't need to type the .TBI file extension) or you can press **Tab** and then use the arrow keys to highlight the file and press **Enter** to select it. If the .TBI file resides inside a folder, highlight the folder and press **Enter** to display the contents of the folder.



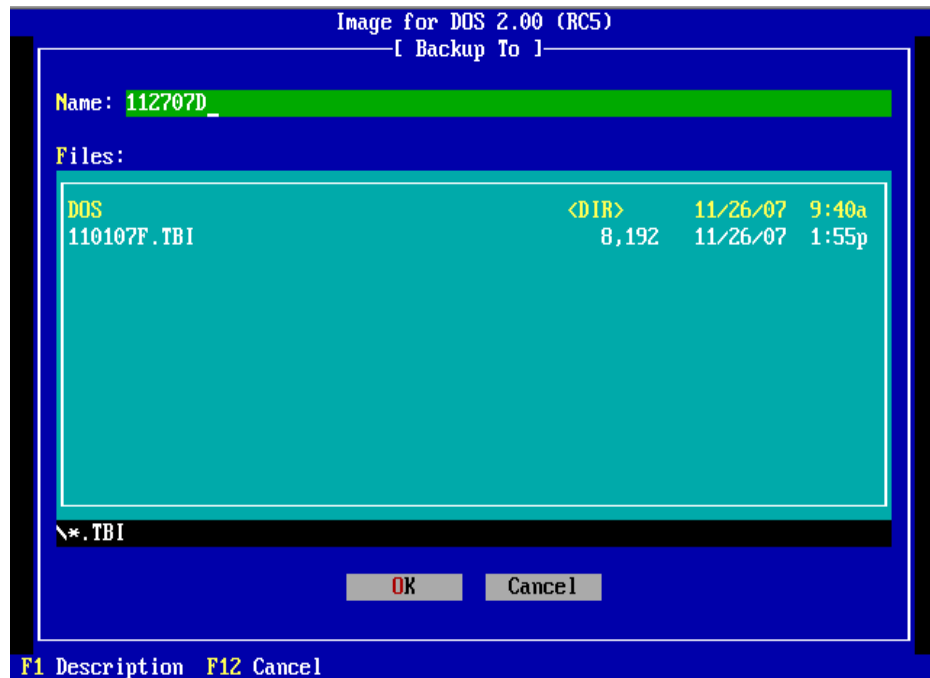
If you open a folder and want to navigate back to the parent folder, select the .. list item and press **Enter**.

If you select a file that you created using the encryption or the password-protect option, supply the correct password to continue.

7. On the **Backup To/Select File Access Method** screen that appears, choose **File (OS)**, **File (Direct)** or **File (CD/DVD)** to identify the location where you want to save the differential backup files.

Note: You do not need to store files from a differential backup in the same location where you store full backup files. When you restore a differential backup, Image for DOS will prompt you for locations for both the full backup files and the differential backup files.

8. The appearance of the screen that Image for DOS displays next depends on the choice you selected in Step 7. See Step 4 for a description of your choices.
9. On the **Backup To/Select File Drive** screen or the **Backup To/Select Target Drive** screen that appears, select the target drive where you want to store the differential backup.
10. On the **Backup To/File Name** screen that appears, supply a name for the differential backup file(s). You do not have to supply a file extension—just the path and file name itself—Image for DOS will add the extension automatically. If you are using the File (OS) option, you must follow DOS naming conventions and use a file name that does not exceed eight characters. You might consider using today's date in numeric form and include D as the final character to help you identify a differential backup. For example, if you are creating your backup on November 26, 2007, use 112607D as the file name.



11. On the **Backup Options** screen that appears, select the options you want to use. See the section, “Understanding Backup Options,” for an explanation of each option.
12. When you select Finish, the imaging process begins, and a progress bar appears on-screen. When Image for DOS finishes, a message appears to let you know that the backup was successful. You can interrupt the backup and validation operations at any time by pressing the F12 key. Image for DOS will ask you to confirm that you want to cancel before it interrupts the current operation.

Note: If a message appears, stating that the discs created will not be bootable because the CDBOOT.INS file was not found or it contained invalid references appears, please refer to the section, “Customizing CDBOOT.F35” for information on setting up CDBOOT.INS.

After you press **Enter** to dismiss the message, the main menu for Image for DOS reappears. Select **Exit** and, when prompted, remove the Image for DOS boot disk and press **Enter** to reboot your computer.

Using Image for DOS to Restore a Backup

It is important to remember that you cannot restore an image over the partition that contains the image file you are using to restore.

The size of the target location where you restore an image is important. The target must be large enough to accommodate the data from the source partition. The *minimum* amount of space required in the target location is determined by the amount of space encompassed from the beginning of the source partition to the last used area of the source partition. For example, if the source partition had 2 GB of data, and the last part of that data ended 15 GB from the beginning of the source partition, the target area needs to be at least 15 GB in size, regardless of the overall size of the source partition.

If the target is larger than the source partition, there will be an area of free space left over unless you perform the restore via command line using the X parameter (as explained later in this manual).

Also, please remember the following.

- * If your computer contains more than one CD/DVD drive, please make sure that you insert your Image for DOS bootable disc in one and no other CD/DVD drive contains a bootable disc.
- * Since the hard drive order during the boot process may be different than it is while Windows is running, you may need to press a key when prompted to access the Image for DOS menu that will allow you to select the appropriate drive from which to restore.

Restoring From a Backup with Image for DOS

Insert your Image for DOS boot disk into the appropriate drive and boot your computer. Then, follow these steps:

1. On the Image for DOS Main Menu, select **Restore**.
2. From the **Restore From/Select File Access Method** screen that appears, select between the following options, which refer to the location where Image for DOS should look for the backup file you want to restore:
 - * **File (OS)** – This option appears only if you boot using a DOS boot disk that you created using any method other than the MakeDisk utility. Choose this option to use the operating system file services to restore the image files. You must use this option when restoring images to a mapped network drive.
 - * **File (Direct)** – This option allows you to look for image file(s) in a folder on a hard drive that does not have a drive letter assigned to it by DOS.
 - * **File (CD/DVD)** – This option allows you to look for image file(s) on a CD or DVD disc.

3. On the **Restore From/Select Drive Interface** screen that appears, select one of the following options. These options refer to how Image for DOS should attempt to access the hard drive or CD/DVD drive where your image is stored:

If you chose **File (Direct)** in Step 2, you can choose one of the following options:

- * **BIOS** – Locates and accesses drives using the system BIOS. Please note that any problems or limitations inherent to the system BIOS will apply.
- * **BIOS (Direct)** – Attempts to locate the hard drive using the system BIOS, but then attempts to access it directly, bypassing the BIOS. This can sometimes be helpful in cases where performance with the **BIOS** option is very poor. In order to get the most out of this option when creating an image, you should select a file (direct)—rather than file (os)—as the target for saving the image.

Use BIOS (direct) when you are going to be accessing SATA hard drives and CD/DVD drives or using the BIOS (direct) option anywhere.

- * **USB** – Examines the attached USB controller, if any, for available high-speed hard drives.
- * **IEEE1394** – Examines the attached IEEE 1394 controller, if any, for available hard drives.

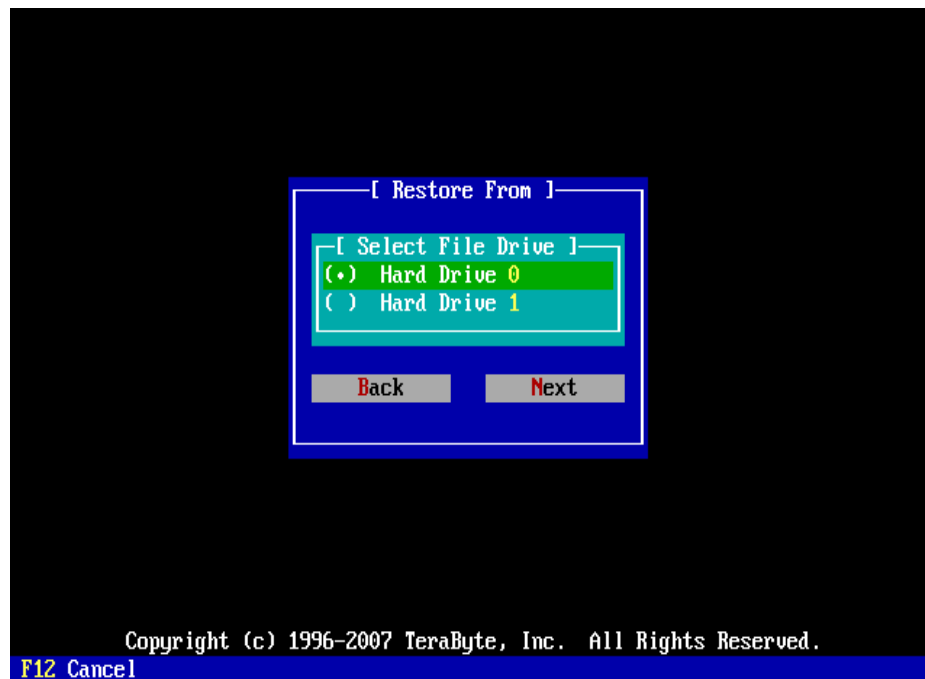
If you chose **File (CD/DVD)** in Step 2, you can choose one of the following options:

- * **ATAPI** – Select this option if your CD/DVD drive is an ATAPI device, and none of the other selections apply. This is the most common option.
- * **ASPI** – Select this option if your CD/DVD drive will be accessed using an ASPI layer. (You must supply the ASPI driver for this option to work.)
- * **USB2** – Select this option if your CD/DVD drive is attached to a USB 2 controller.
- * **IEEE1394** – Select this option if your CD/DVD drive is attached to an IEEE 1394 controller.

If your USB device does not appear at first, please try pressing the Esc key, waiting a few seconds, and selecting the USB or USB2 option again.

4. Either the **Restore From/Select File Drive** shown in the figure or the **Restore From/Select Target Drive** screen appears, depending on whether you are restoring from a hard drive or from CD/DVD discs. Select the target CD/DVD drive or hard drive.

*Note: If you select a hard drive, the **Restore From/Select File Location on HD** screen appears. You can select a partition on the hard drive if it contains partitions; otherwise, press Enter.*



5. On the **Restore From/File Name** screen that appears, navigate to and select the backup file you want to restore. If you select a file stored on a hard drive, select either the entire drive or a partition to restore. The options you can set in Step 8 change, depending on your choice here.

*Note: If you select a differential backup to restore, you will be prompted to select the related full backup file and you will have the option to restore in a single pass or in multiple passes. If you stored your backup on CD/DVD's, select the **Multi Pass** option.*

6. On the **Restore To/Select Drive Interface** screen that appears, select the access method you wish to use for the source hard drive. The choices on this screen are the same as the choices described under Step 3 if you chose File (Direct).
7. On the **Restore To/Select Target Drive** screen that appears, select the hard drive onto which you want to restore the image you selected in Step 5. Then, select the partition on that drive. The partition you select will be deleted before Image for DOS restores the image.

*When the **Restore To/Select Restore Location** screen appears, the following functions become available:*

*You can select a drive or partition and press the **F1** key to view the number of MiB used, free, and needed to restore.*

*You can select a drive and press the **F6** key to set the geometry for the target drive. More information on this function is provided in the “Geometry Settings” section below.*

*If you select a free space partition, you can press the **Insert** key to create an extended partition and restore the backup to that partition.*

8. On the **Restore Options** screen that appears, select the options you want to use while restoring. For an explanation of each option, see the next two sections, “Understanding Restore Options for an Entire Drive” and “Understanding Restore Options for an Individual Partition.”
9. When you select Finish, the restore process begins immediately if you selected the entire drive as the target destination in Step 7. If, in Step 7, you selected an existing partition, Image for DOS prompts you to confirm that you want to overwrite the data in that partition. During the restore process, a progress bar appears on-screen. A message appears when Image for DOS finishes.

After you press Enter, the main menu for Image for DOS reappears. Select **Exit** and, when prompted, remove the Image for DOS boot disk and press **Enter** to reboot your computer.

Note: Until you reboot, the operating system reflects the contents of the drive/partition and file system in the state they were before you restored. Not rebooting can cause data corruption. You can override the reboot prompt by restoring using the command line `/rb:0` switch, but do this only if you are an advanced user and understand the potential ramifications of not rebooting.

Geometry Settings



The Geometry Override settings allow you to set alignment options as well as specific Cylinder (C), Head (H), or Sector (S) to use for a given drive. In addition to manually entering the values, you can enable the Use Original Geometry to have Image for DOS use the geometry from the backup image.

This CHS option is helpful when you need to specify geometry values that differ from those assigned by the operating environment. This is most common when you attach a hard drive from another machine to the USB port to restore the image.

C – Last Cylinder (0 to 1023)

H – Last Head (0 to 254)

S – Sectors per Track (1 to 63)

Use Original Geometry – Use the geometry saved in the backup file.

Align on End – Use this option to instruct Image for DOS to align restored partitions at the end of a cylinder, or when the Align2048 option is enabled, at the end of a 2048 sector boundary.

Align End by Resizing – Use this option to instruct Image for DOS to align both the beginning and end of a partition by resizing. This only affects partitions that Image for DOS can resize.

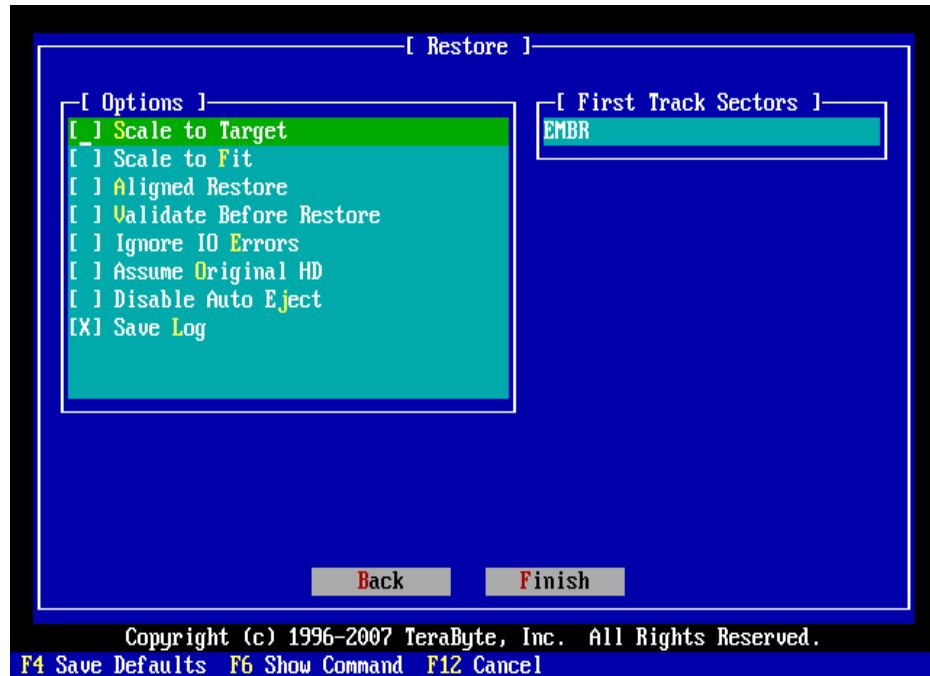
Use 2048 Sector Alignment – Use this option to instruct Image for DOS to align restored partitions based on 2048 sectors.

Align MBR Ending HS – Use this option to instruct Image for DOS to force a restored partition's ending head and sector values in the MBR to match the current geometry.

Align MBR HS when Truncated – Use this option to instruct Image for DOS to set a restored partition's head and sector values in the MBR to match the current geometry when it is located outside the range of the current geometry.

Understanding Restore Options for an Entire Drive

When you restore an entire drive, Image for DOS offers these options that you can set:



Scale to Target – If you use this option when restoring an image, Image for DOS restores the image proportionally to the target drive. For example, suppose that you backed up a 100 MB hard drive and restored the image to a 200 MB hard drive. If you use this option, you allow Image for DOS to double the size of the restored image. This option only works for FAT, FAT32, and NTFS file systems and has no effect on images restored to hard drives using other file systems. You cannot use this option in conjunction with the **Scale to Fit** option. If you inadvertently enable both options, **Scale to Fit** will take precedence.

Scale to Fit – On FAT, FAT32, or NTFS file systems, selecting this option will make Image for DOS assume that the size of the original hard drive is based on the location of the end of the last partition; Image for DOS then applies the same scaling to the target hard drive. If any unpartitioned space existed at the end of the source drive, that unpartitioned space won't exist on the target drive after you restore your image. This option has no effect on images restored to hard drives using other file systems. You cannot use this option in conjunction with the **Scale to Target** option. If you inadvertently enable both options, **Scale to Fit** will take precedence.

Aligned Restore – If you select this option, Image for DOS will align each restored partition to the beginning and end of a cylinder boundary. You may want to enable this option if the target drive has a different geometry than the source drive. Disable this option if you want the target drive to be configured identically to the source drive.

Validate Before Restore – If you select this option, Image for DOS will validate the image file(s) prior to restoring them, will perform internal consistency checks on the backup file(s). If Image for DOS encounters an error during validation, Image for DOS will abort the restore operation without overwriting the partition. If you select this option, the overall processing time Image for DOS takes to restore the image

will increase, but you can restore the image with greater certainty that the restored image will be reliable.

Validate Byte-for-Byte – If you select this option, Image for DOS will verify that every byte in the source backup image file was written back to the drive correctly, ensuring 100% accuracy. This option generally increases the processing time of the overall backup operation, but is advisable to use where maximum reliability is required.

Ignore IO Errors – Under ordinary circumstances, if Image for DOS encounters a bad sector on the target partition while restoring, Image for DOS will notify you concerning the write error and give you the option to continue or abort. If you select the Ignore IO Errors option, Image for DOS will ignore the error and continue. Generally, you should select this option only if you need to restore to a target drive that contains known bad sectors. On some systems, if you select this setting and Image for DOS encounters bad sectors, there will be a significant delay as the internal retry/recovery routine of the drive attempts to handle the bad sector(s). In addition, some systems may hang if the **BIOS** option is used to access the source drive. In such cases, try using the **BIOS (Direct)** option instead.

Assume Original HD – If you select this option, Image for DOS will keep references to the source hard drive number intact within the partitions that have been restored to the target. If you do not select this option and the target drive number differs from that of the source drive, applicable drive references residing within the restored partitions will be updated to reflect the new hard drive number.

This option has no effect if you are restoring to a target drive whose number matches that of the source drive. If you are restoring to a target drive whose number differs from that of the source drive, but you plan to subsequently move the target drive so that its number matches the source drive again, enabling this option can be beneficial.

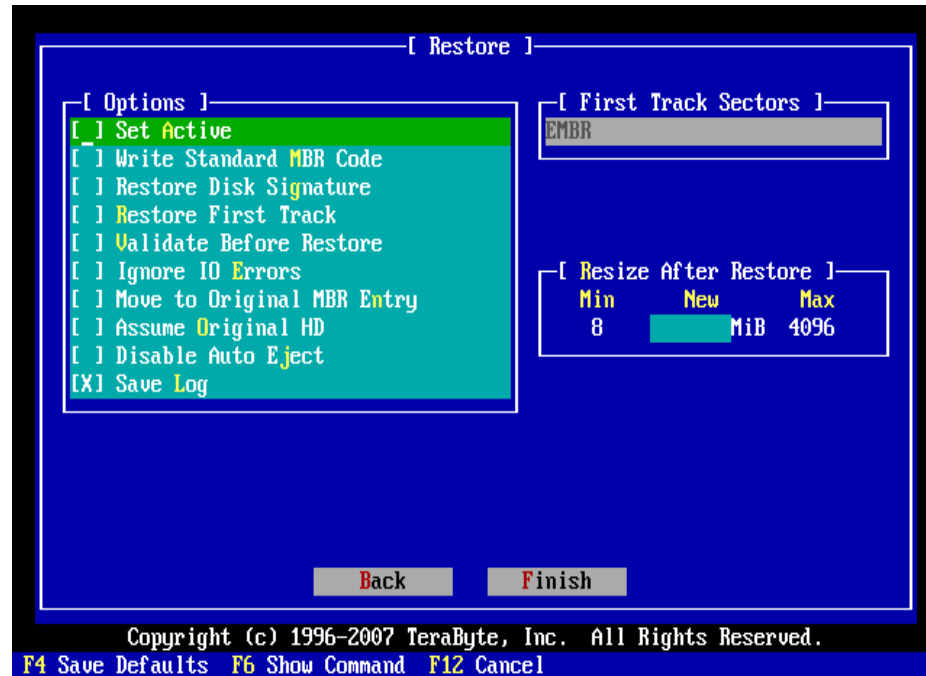
Disable Auto Eject – This option prevents Image for DOS from automatically opening the optical drive tray. If you don't select this option, Image for DOS will open the drive tray whenever a disc is needed and at the completion of the restore operation.

Save Log – Select this option to make Image for DOS log the date and time it completes the restore operation. Image for DOS saves the log as IFD.LOG in the IMAGE.EXE program directory. To be able to save IFD.LOG, Image for DOS must be running from a writable medium such as a non-write-protected floppy diskette. You can use the /logfile or LogFile options to specify an alternate location for IFD.LOG.

First Track Sectors – This text box allows you to specify how many sectors of the first track of each partition should be restored. If you enter AUTO in this box, the tracks needed for the EMBR will be restored. If you aren't sure, type AUTO in this box.

Understanding Restore Options for an Individual Partition

When you restore an individual partition, Image for DOS offers these options that you can set:



Set Active – If you select this option, Image for DOS will make the restored partition the active partition after completing the restore operation.

Write Standard MBR Code – If you select this option, Image for DOS will install standard master boot code to the Master Boot Record (MBR) after completing the restore operation. The other portions of the MBR (i.e. the partition table, disk signature(s), etc.) will not be affected.

Restore Disk Signature – This option applies when you restore a partition that had been assigned a drive letter within Windows prior to being backed up. If you select this option, Image for DOS will restore the disk signature associated with the source partition. If you don't select this option, Image for DOS will use the disk signature already present in the MBR of the target drive; if none exists, Image for DOS will create one if necessary. If you are restoring a partition that had been assigned a drive letter in Windows and you wish to keep that drive letter assignment, select this option.

Restore First Track – Whenever you back up any partition, Image for DOS also backs up the first track of the source hard drive. If you select this option, Image for DOS will restore the first track as well as the partition and the disk signature. This allows you to restore the MBR/EMBR, if desired.

Validate Before Restore – If you select this option, Image for DOS will validate the image file(s) prior to restoring them. If Image for DOS encounters an error during

validation, Image for DOS will abort the restore operation without overwriting the target.

Ignore IO Errors – Under ordinary circumstances, if Image for DOS encounters a bad sector on the target drive while restoring an image, Image for DOS will notify you concerning the write error and give you the option to continue or abort. If you select the Ignore IO Errors option, Image for DOS will ignore the error and continue. Generally, you should select this option only if you need to restore to a target drive that contains known bad sectors. On some systems, if you select this setting and Image for DOS encounters bad sectors, there will be a significant delay as the internal retry/recovery routine of the drive attempts to handle the bad sector(s). In addition, some systems may hang if the **BIOS** option is used to access the source drive. In such cases, try using the **BIOS (Direct)** option instead.

Move to Original MBR Entry – If you select this option, Image for DOS will move the partition table entry of the restored partition to the same location in the master partition table as it had on the source drive. Image for DOS will also move the existing partition table entry to another location rather than overwrite it. You may want to enable this option if you use an environment that tracks master partition table entries, such as Linux.

Assume Original HD – If you select this option, Image for DOS will keep references to the source hard drive number intact within the partitions that have been restored to the target. If you do not select this option and the target drive number differs from that of the source drive, applicable drive references residing within the restored partitions will be updated to reflect the new hard drive number.

This option has no effect if you are restoring to a target drive whose number matches that of the source drive. If you are restoring to a target drive whose number differs from that of the source drive, but you plan to subsequently move the target drive so that its number matches the source drive again, enabling this option can be beneficial.

Disable Auto Eject – This option prevents Image for DOS from automatically opening the optical drive tray. If you don't select this option, Image for DOS will open the drive tray whenever a disc is needed and at the completion of the restore operation.

Save Log – Select this option to make Image for DOS log the date and time it completes the restore operation. Image for DOS saves the log as IFD.LOG in the IMAGE.EXE program directory. To be able to save IFD.LOG, Image for DOS must be running from a writable medium such as a non-write-protected floppy diskette. You can use the /logfile or LogFile options to specify an alternate location for IFD.LOG.

First Track Sectors – This text box allows you to specify how many sectors of the first track of each partition should be restored. If you enter AUTO in this box, the tracks needed for the EMBR will be restored. If you aren't sure, type AUTO in this box.

Resize After Restore – Currently available only for FAT, FAT32, and NTFS partitions, you can use this text box to specify a new size for the restored partition, bound by the **Minimum** and **Maximum** values specified by Image for DOS. The units used here are mebibytes, abbreviated MiB. (Please refer to the section titled **Data Storage Size Unit Conventions** at the beginning of this manual for more information.)

Validating Backups with Image for DOS

You can use Image for DOS to validate backups at the time you create them and also before you restore a backup. You also can validate a backup at any time using the instructions provided below.

When you validate a backup, Image for DOS performs internal consistency checks on the backup file(s), helping to ensure that the backup will be reliable if you need to restore from it.

When you use the steps that follow to validate a backup, Image for DOS performs a standard validation, not a byte-for-byte validation, which provides a more intense scrutiny of a backup file. You can perform a byte-for-byte validation only as part of a backup operation. See the section, “Understanding Backup Options” for details on a byte-for-byte validation.

Validating a Backup

Insert your Image for DOS boot disk into the appropriate drive and boot your computer. Then, follow these steps:

1. On the Image for DOS **Main Menu/Select Operation** screen, select **Validate**.
2. On the **Validate/Select File Access Method** screen that appears, choose one of the following options, which refer to the location where Image for DOS should look for the backup to validate:
 - * **File (OS)** – This option appears only if you boot using a DOS boot disk that you created using any method other than the MakeDisk utility. Choose this option to use the operating system file services to save the image files. You must use this option when saving images to a mapped network drive.
 - * **File (Direct)** – Select this option if the image file(s) you want to validate are stored on a hard drive that does not have a drive letter assigned to it by DOS.
 - * **File (CD/DVD)** – Select this option if the image file(s) you want to validate are stored on CD or DVD discs.
3. On the **Validate /Select Drive Interface** screen that appears, select one of the following options; these options refer to how Image for DOS should attempt to access the hard drive that contains the image you want to validate:

If you chose **File (Direct)** in Step 2, you can choose one of the following options:

- * **BIOS** – Locates and accesses drives using the system BIOS. Please note that any problems or limitations inherent to the system BIOS will apply.
- * **BIOS (Direct)** – Attempts to locate the hard drive using the system BIOS, but then attempts to access it directly, bypassing the BIOS. This can

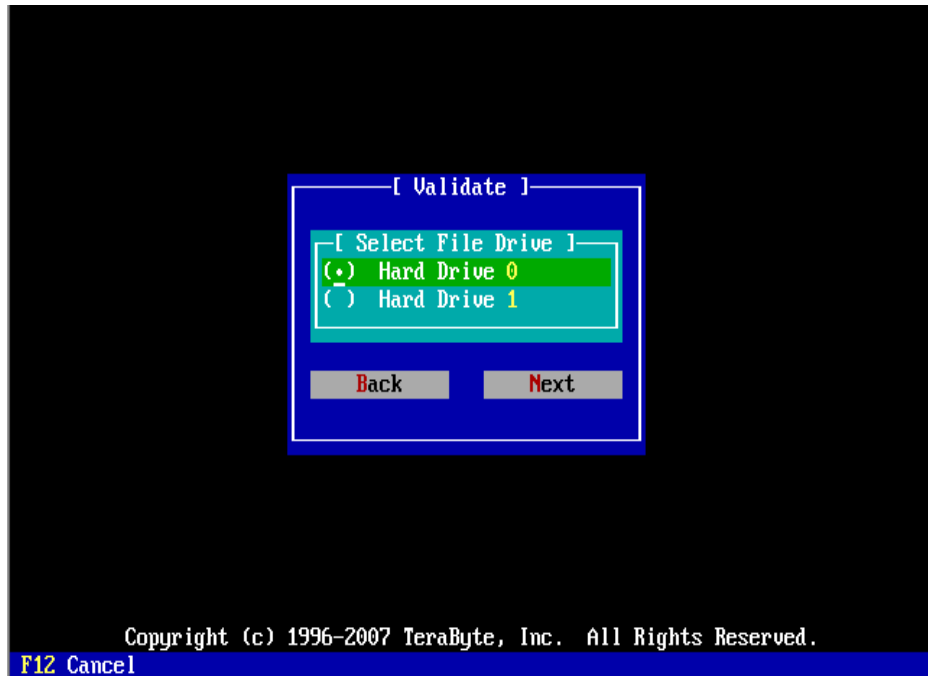
sometimes be helpful in cases where performance with the **BIOS** option is very poor. In order to get the most out of this option when creating an image, you should select a file (direct)—rather than file (os)—as the target for saving the image.

Use BIOS (direct) when you are going to be accessing SATA hard drives and CD/DVD drives or using the BIOS (direct) option anywhere.

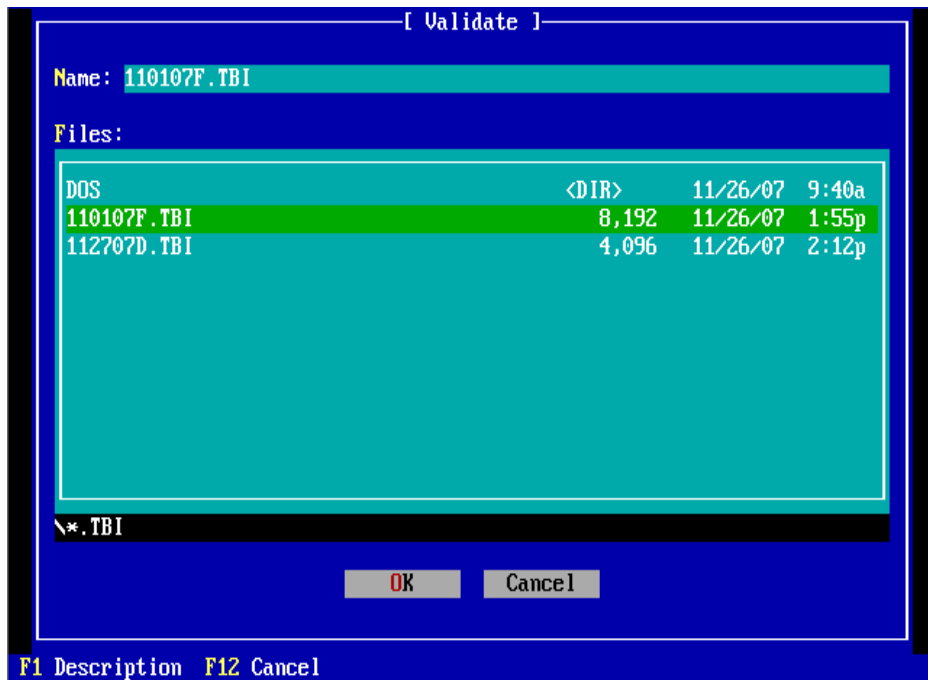
- * **USB** – Examines the attached USB controller, if any, for available high-speed hard drives.
- * **IEEE1394** – Examines the attached IEEE 1394 controller, if any, for available hard drives.

If you chose **File (CD/DVD)** in Step 2, you can choose one of the following options:

- * **ATAPI** – Select this option if your CD/DVD drive is an ATAPI device, and none of the other selections apply. This is the most common option.
 - * **ASPI** – Select this option if your CD/DVD drive will be accessed using an ASPI layer. (You must supply the ASPI driver for this option to work.)
 - * **USB2** – Select this option if your CD/DVD drive is attached to a USB 2 controller.
 - * **IEEE1394** – Select this option if your CD/DVD drive is attached to an IEEE 1394 controller.
4. Either the **Validate/Select File Drive** shown in the figure or the **Validate/Select Target Drive** screen appears, depending on whether you are validating an image stored on a hard drive or on CD/DVD discs. For images stored on CD/DVD discs, insert the first disc in the set and then select the corresponding CD/DVD drive from the list. If you select a hard drive, the **Validate/Select File Location on HD** screen appears. After you select the hard drive, you can select a partition on the hard drive if it contains partitions.

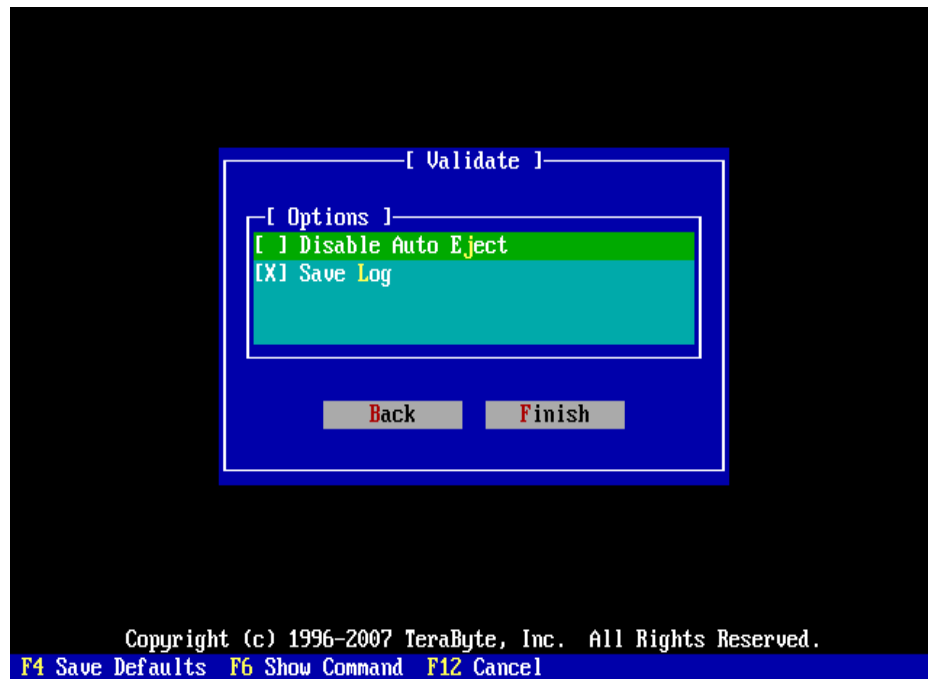


5. On the screen that appears, type the name of the image file you want to validate. You do not have to supply a file extension—just the path and file name itself. If you prefer, use the Tab key and the arrow keys to navigate to the image file you want to validate.



6. On the Validate/Select Item to Process screen, choose to validate the drive or a partition.

7. On the **Validate Options** screen that appears, select the options you want to use. See the next section, “Understanding Validation Options,” for an explanation of each option.



8. When you select Finish, the validation process begins, and a progress bar appears on-screen. A message appears when Image for DOS finishes. You can interrupt the validation operation at any time by pressing the Esc key. Image for DOS will ask you to confirm that you want to cancel before it interrupts the operation.

After you press Enter to dismiss the message that appears when Image for DOS finishes validating, the main menu for Image for DOS reappears. Select **Exit** and, when prompted, remove the Image for DOS boot disk and press **Enter** to reboot your computer.

Understanding Validation Options

You can set two options when you validate an image:

Disable Auto Eject – This option prevents Image for DOS from automatically opening the optical drive tray. If you don’t select this option, Image for DOS will open the drive tray whenever a disc is needed and at the completion of the restore operation.

Save Log – Select this option to make Image for DOS log the date and time it completes the validation operation. Image for DOS saves the log as IFD.LOG in the IMAGE.EXE program directory. To be able to save IFD.LOG, Image for DOS must be running from a writable medium such as a non-write-protected floppy diskette. You can use the /logfile or LogFile options to specify an alternate location for IFD.LOG.

Installing Image for DOS Manually

If you use an operating system platform other than Windows or if you wish to control the contents of the bootable diskette or disc that you create, you can follow these steps to create a bootable media that contains Image for DOS.

1. Extract the contents of the Image for DOS ZIP archive file to a folder of your choice.

*Note: If you are using a version of Windows that has a built-in compressed folders feature (e.g. Windows Me or Windows XP), you can double click the ZIP file and then use the **Extract all files** link shown in the left pane of Windows Explorer to extract the contents.*

2. Create one of the following:
 - * A bootable DOS floppy diskette, using the instructions provided in the next section or using the distribution available from the FreeDOS site.
 - * A bootable CD/DVD compilation, using the CD/DVD authoring software of your choice.
3. Copy the files IMAGE . EXE and CDBOOT . F35 from the folder of step 2 to the bootable DOS floppy diskette, or the bootable CD/DVD compilation.
 - * The bootable floppy diskette or CD/DVD disc can now be used to boot from and run Image for DOS.
 - * If you are creating a bootable CD/DVD, proceed with the creation of the bootable disc at this point.

Creating a DOS Boot Diskette from Windows 95/98/Me

1. Insert a floppy diskette to format.
2. Click Start, then Settings, then Control Panel.
3. Double-click Add/Remove Programs.
4. Click on the **Startup Disk** tab.
5. Click the **Create Disk** button.

Creating a DOS Boot Diskette from Windows XP/Vista

1. Insert a floppy diskette to format.
2. Click **Start** and select **My Computer**.
3. Right-click the A: drive and select **Format**.

4. Check the box next to Create an MS-DOS startup disk.
5. Click **Start**.

Starting Image for DOS Automatically Upon Boot

To have Image for DOS run automatically when booting from diskette, use a text editor such as Notepad to create a file with only one line in it, as follows:

IMAGE.EXE

Save this file using the name AUTOEXEC .BAT and place it on your floppy disk.

Note: If your diskette already has an AUTOEXEC .BAT file on it, use Notepad to open the AUTOEXEC.BAT file, start a new blank line at the end of the file, and add the line above.

Automatically Running Image for DOS from Windows 95/98

You can run Image for DOS automatically from Windows 95/98. After you download the Image for DOS ZIP archive and extract its contents as described previously, you can create a shortcut on your Windows Desktop. Right-click IMAGE . EXE and click Send To. On the menu that appears, click Desktop (Create Shortcut).

On your Windows Desktop, right-click the shortcut and follow these steps:

1. Click **Properties** to display the Properties dialog box.
2. Click the **Program** tab.
3. Click the **Advanced** button.
4. Check **MS-DOS Mode** check box.
5. Click OK until you return to the Windows Desktop.

You can now double-click the shortcut to run Image for DOS.

Creating a Network Boot Diskette

If you are using Windows NT 4 Server, use the Network Client Administrator under Administrative Tools to create a network boot diskette.

If you don't have Windows NT 4 Server, you can download DSK3-1 . EXE and DSK3-2 . EXE from the Microsoft ftp site to obtain the Microsoft Network Client for MS-DOS (<ftp://ftp.microsoft.com/bussys/clients/MSCLIENT/>) to create your own network boot diskettes. You may have to search for a DOS driver for your network card.

You may want to also consider using Bart's Network Boot Disk located at <http://www.nu2.nu/bootdisk/network> or another boot disk found at <http://www.netbootdisk.com>. This disk is easy to set up, and you'll find quite a few DOS drivers available here.

If you experience very slow network speeds, try using the IOBS=A environment variable, as explained later in this document.

Customizing CDBOOT.F35

As long as CDBOOT . INS points to CDBOOT . F35 and CDBOOT . F35 is in the current directory, Image for DOS will create a bootable CD/DVD when creating a backup image and storing it on CD/DVD discs. However, the bootable disc Image for DOS creates will restore only from an ATAPI CD/DVD drive on one of the IDE controllers or SATA controllers in ATA mode or combination PATA/SATA mode. If you would like to restore from another device, you will need to create your own bootable diskette with the appropriate ASPI drivers and AUTOEXEC . BAT file to restore the image.

Used primarily by OEM vendors, IT shops, and advanced users, CDBOOT . INS and CDBOOT . F35 are files you can use to customize the content and configuration of bootable CD/DVD discs created by Image for DOS. By customizing CDBOOT . INS, you can create bootable CD/DVD disc that runs MS-DOS, FreeDOS, or your own batch file(s). For example, you can create a batch file that runs Image for DOS and automatically restores an image stored on the bootable CD/DVD.

The default copy of CDBOOT . INS included with Image for DOS is configured to use CDBOOT . F35.

CDBOOT . INS is a plain text file. You separate parameters using commas, and the required parameters are:

- * Source File Relative path to the source boot file.
- * Target File Relative path and file name to be assigned to the boot file once it is copied to disc by Image for DOS. If this parameter is omitted, the boot file will be placed in the root of the disc and will retain the source file name.
- * Cache Code If set to C, the boot file contents will be cached in memory. If omitted (or set to anything other than C), it will be read from the disc.
- * Emulation Code Type of emulation to be used for the boot file, according to EI Torito standard:
 - 0 – No emulation
 - 1 – 1.2-MB Floppy diskette emulation
 - 2 – 1.44-MB Floppy diskette emulation

3 – 2.88-MB Floppy diskette emulation

4 – Hard drive emulation

- * Load Sectors – Number of virtual/emulated sectors to load at boot.
- * File System Type – Partition file system ID.
- * Load Segment – Segment to load boot.

Each boot file specification must go on its own line, and at least one line with a non-zero **Load Sectors** value is required. If you supply more than one boot file specification with a non-zero **Load Sectors** value, only the first one will be used, and any others will simply be copied to the disc.

The default content of CDBOOT.INS is:

```
CDBOOT.F35, , C, 2, 1
```

Using this default configuration, Image for DOS will:

- * Look for CDBOOT.F35 in the current directory.
- * Place the boot file in the root directory of the disc, with the name CDBOOT.F35.
- * Cache the boot file in memory.
- * Use 1.44-MB floppy emulation.
- * Load one emulated sector.
- * Use the default file system type.
- * Use the default load segment.

Deploying Your Image

When you *deploy* an image, you restore it to a number of computers in an organization. Therefore, the information in this section does not apply to most home users.

Image for DOS does not change the SID of Windows NT/2000/XP/2003 systems. If you are using Image for DOS for deployment purposes and want to change the SID for Windows NT/2000/XP you should use the MS sysprep utility or you can download a free utility named NewSID.

You may want to set up the base machine so that the last partition ends at one track less than the actual end of the hard drive (around 8 MB less) to leave room for different brands or models of the same size hard drive.

You may also want to investigate the free ImageAll utility available from the TeraByte Unlimited web site.

See the following for more information on how to prepare for deployment for Windows XP:

How to Use the Sysprep Tool to Automate Successful Deployment of Windows XP

<http://support.microsoft.com/kb/302577>

Windows XP How-to and Technical Article Resources

<http://technet.microsoft.com/en-us/library/bb878149.aspx>

Download for the Microsoft Windows XP SP1 Deployment Tools

<http://www.microsoft.com/downloads/details.aspx?familyid=7A83123D-507B-4095-9D9D-0A195F7B5F69&displaylang=en>

Download for the Microsoft Windows XP SP2 Deployment Tools

<http://www.microsoft.com/downloads/info.aspx?na=47&p=1&SrcDisplayLang=en&SrcCategoryId=&SrcFamilyId=0c4bfb06-2824-4d2b-abc1-0e2223133afb&u=details.aspx%3ffamilyid%3d3E90DC91-AC56-4665-949B-BEDA3080E0F6%26displaylang%3den>

See the following for more information on how to prepare for deployment for Windows Vista:

<http://technet2.microsoft.com/WindowsVista/en/library/2957d7c4-02c7-4205-afb5-f03434d8f37d1033.mspx?mfr=true>

See the following for more information on how to prepare for deployment for Windows 2003 Server:

What is Sysprep?

<http://technet2.microsoft.com/windowsserver/en/library/c03a5469-ef71-4545-b970-ce2add5e715c1033.msp?mfr=true>

Download for the Microsoft Windows 2003 Server Sysprep Tool:

<http://www.microsoft.com/downloads/details.aspx?familyid=93F20BB1-97AA-4356-8B43-9584B7E72556&displaylang=en>

See the following for more information on how to prepare for deployment for Windows 2000:

Download for the Microsoft Windows 2000 Sysprep Tool:

<http://www.microsoft.com/downloads/details.aspx?familyid=0C4BFB06-2824-4D2B-ABC1-0E2223133AFB&displaylang=en>

Deploying MS Windows 2000 Professional and MS Office 2000 Using Sysprep

<http://www.microsoft.com/technet/prodtechnol/windows2000pro/deploy/depopt/sysprep.msp>

Using Sysprep to Duplicate Disks

http://www.microsoft.com/technet/prodtechnol/windows2000serv/reskit/deploy/dgcb_instizyl.msp?mfr=true

See the following for more information on how to prepare for deployment for Windows NT:

Windows NT Workstation Deployment

<http://www.microsoft.com/technet/archive/ntwrkstn/deploy/depopt/default.msp?mfr=true>

Image for DOS Advanced Configuration Options

Image for DOS offers a number of advanced configuration options. You can set these options in a user-created IFD . INI file or using environment variables that you include on the command line or in a batch file. The way you run Image for DOS affects the way Image for DOS processes advanced options.

If you run Image for DOS using the menu interface as described earlier in this manual, Image for DOS sets all options using IFD . INI, and you can customize IFD . INI. If you also want to set environment variables, store them in a batch file that you run prior to running Image for DOS.

If you run Image for DOS from the command line as described in the section, “Running Image for DOS from the Command Line,” Image for DOS processes the command line switches and uses IFD . INI to process global default options (but ignores all other options in IFD . INI) and finally processes any environment variables you set. So, environment variables take precedence over IFD . INI.

Image for DOS INI File

To apply settings to Image for DOS using the INI file, you create a text file named IFD . INI, using a text editor such as Notepad. Image for DOS will look for IFD . INI in the current directory only.

Settings you specify in IFD . INI need to be placed under a section name. For details on the settings available, refer to Tables 1 to 7 in the section, “Running Image for DOS from the Command Line.” A typical backup IFD . INI file might look like this:

```
[Options]
SeqVolID=1
TimeZone=PST8PDT

[License]
ProductKey=nnnn-nnnn-nnnn

[BACKUP_DEFAULTS]
PostValidate=2

[HD0]
UseOrgGeo=1
```

Image for DOS Environment Variables

You use the SET command is used to establish Image for DOS environment variables. The format for Image for DOS environment variables is:

```
SET IFD=option1:value;option2:value;option3:value
```

All of the environment variables you can use with Image for DOS are set by using the same options as would be used from the command line (not the INI options). The command line options appear in the left column of Tables 1 to 7.

You can display a list of currently set environment variables from the command line by typing the set command with no parameters. To remove an environment variable, type the set command, the variable name, and an equal sign (=) followed by no value.

Image for DOS File Path Variables

You use a set of special variables in the image file name path. The variables are inserted in the file name path by using a special format of %~variablename%. The available variable names are:

YYYY (four digit year), YY (two digit year), MM (two digit month), DD (two digit day of month), DOY (three digit day of year), DOW (three character day of week), and HHMM (four digit hours and minutes).

For Example:

"Backup on %~YYYY%-~MM%-~DD%"

When using % on the DOS command line you'll need to supply two of them to differentiate it from an %environment_variable%. For Example:

"Backup on %%~YYYY%%-%%~MM%%-%%~DD%%"

Running Image for DOS from the Command Line

You can run Image for DOS (IMAGE . EXE) from the command line. Be sure to separate the command line options with spaces or colons (:). You can view all available command line options by typing the following command at the command prompt:

```
image /?
```

When running Image for DOS from the command line, you might need to include references to hard drive numbers and/or partition IDs. To determine the correct hard drive number or partition ID, complete Steps 1 through 4 in the section “Creating a Full Backup,” making sure that you select the hard drive whose number and/or partition IDs you need to obtain. The hard drive number will then appear in the format “HDn” (e.g. “HD0” or “HD1”). The partition ID appears in parenthesis in the middle of each partition description and consists of either two or four characters.

Note: Under certain configurations, hard drive numbers may be different in DOS than they are in Windows or other environments.

The basic format for running Image for DOS from the command line is:

```
image [action] [options]
```

Valid values for [action] are:

B	Backup
R	Restore
V	Validate
L	List partitions, optical drives, or file contents.
REBOOT	Reboot System

When you specify command line options, you precede each option by typing the / (slash) character.

For example, you might type the following at the command prompt to create a backup using Image for DOS. The command specifies the source drive and partition, the target drive and partition, and the backup filename.

```
IMAGE /b /d:0@0x01 /f:1@0x01:\mypath\filename
```

The first parameter, /b, identifies that you want to perform a backup.

The second parameter, /d:0, identifies the drive to back up. This example backs up Hard Drive 0.

The next part of that parameter, @0x01, identifies the partition to back up on the selected hard drive; this example backs up the first partition. If you want to back up the entire drive, simply omit the part of the parameter that identifies the partition.

The third parameter, /f, identifies that you are about to specify where to store the backup file. 1 identifies the target drive and @0x01 again identifies the partition; in this example, Image for DOS will store the backup file on Hard Drive 1 in the partition with ID 0x01. The information after @0x01 represents the path and file name where you want to store the backup file. In this example, Image for DOS stores the backup file in \mypath\filename.

To list partitions on a hard drive, you would type:

```
image /l /d:0
```

In this example, /d:0 identifies hard drive 0 as the drive for which you want to list partitions. You can add /fs to list free space.

You can also omit the /d to list all drives and partitions, /opt:u, /opt:f, /opt:s, /opt to list optical drives, or provide a file name via /f to list the description and partitions.

In Table 1, you find the global parameters you can set for Image for DOS regardless of the action you set (backup, restore, or validate).

The table shows you both the command line option and the INI file variable. In some instances, both forms of the parameter are available; in other cases, only one is available. When one form of an option isn't available, N/A appears. To set up an INI file, place these parameters in the [Options] section except as otherwise noted.

Table 1: Image for DOS Global Parameters

Command Line Option	INI Variable
/uvl:0	VolumeLabels=0
Instructs Image for DOS to display the string found in the partition table of the EMBR, if possible, rather than volume labels.	
<i>Default if omitted:</i> Image for DOS will display volume labels, even if identifiers for applicable partitions exist in the EMBR.	
/seq	SeqVolID=1
Instructs Image for DOS to assign ID numbers to volumes in sequential order rather than random order.	
<i>Default if omitted:</i> Image for DOS will assign ID numbers to the volumes in random order.	
/con	N/A
Instructs Image for DOS to run in console (text-only) mode, rather than the CGUI (character graphical user interface) mode.	
<i>Default if omitted:</i> Image for DOS runs in CGUI mode.	

/nocan	NoCancel=1
Tells Image for DOS not to permit use of the F12 key to cancel the backup, restore, or validate operation once it has begun. <i>Default if omitted:</i> You can use the F12 key to cancel the backup operation.	
/logfile:"x:\path to\logfile.txt"	LogFile="x:\path to\logfile.txt"
Use this parameter to specify the path and file name of the log file. <i>x</i> is a drive letter, <i>path</i> is the desired path, <i>logfile</i> (or <i>log file</i>) is the name of the log file, and <i>txt</i> is the file extension of the log file. Image for DOS doesn't automatically add a file extension. If you use paths and/or file names with imbedded spaces, enclose them in quotation marks. The folder you specify for the log file must exist prior to performing an applicable operation in Image for DOS. If the path does not exist, Image for DOS will not create the specified log file. <i>Default if omitted:</i> If logging has not been disabled with /log:0 , a log named IFD.LOG is created in the current directory of the operating environment.	
/exo	ExtOpen=1
Tells Image for DOS to try using the Extended DOS Open function. The Extended DOS Open function allows DOS to work with files up to 4GiB instead of 2GiB, however it is not supported correctly in all the DOS versions nor when accessing network drives. <i>Default if omitted:</i> Image for DOS will not use the Extended DOS Open function.	
/relax	RelaxedMatching=1
Use this option when performing a differential backup to instruct Image for DOS to relax some of the criteria it uses to determine the drive you used as the source during the corresponding full backup. This option has no effect during full backup operations. <i>Default if omitted:</i> Image for DOS does not relax the criteria it uses to detect the full backup source drive.	
/bgp	BGProgress=1
Use this option to enable updating the progress and elapsed time in the background. When you enable background updating, Image for DOS can update the elapsed time even if the program is waiting for a device to respond. <i>Default if omitted:</i> Image for DOS updates the progress and elapsed time directly, rather than in the background. (This is the default behavior because some systems lock up when background updating is enabled.)	
/npata	NoPATA=1
Use this option to prevent Image for DOS from directly accessing PATA controllers. <i>Default if omitted:</i> Image for DOS may access PATA controllers.	
/nsata	NoSATA=1

Use this option to prevent Image for DOS from directly accessing SATA controllers.

This may be necessary if you are experiencing system hangs or drive access problems when using Image for DOS. This happens when Image for DOS cannot match a SATA drive to a BIOS drive and defaults to using the BIOS drive. When the BIOS drive is accessed the BIOS will hang the system until it times out (if ever). While the ShareSATA=1 option (as explained below) would allow a BIOS to share the devices, it still may be necessary to use this option to disable low level SATA support all together. However, disabling this option would only affect access of SATA CD/DVD drives, the hard drives would continued to be accessible via the BIOS.

Default if omitted: Image for DOS may access SATA controllers directly.

<u>/ssata</u>	<u>ShareSATA=<i>n</i></u>
This option determines how Image for DOS uses the SATA AHCI controller. The valid values for <i>n</i> are:	
0 – Image for DOS takes control of the controller.	
1 – Image for DOS employs a minimally evasive method of accessing the controller.	
2 – Command Line Only – Use method one but do not force BIOS (direct).	
<i>Default if omitted:</i> Image for DOS takes control of the controller.	

<u>/sataign:<i>n</i></u>	<u>SATAIgnoreMask=<i>n</i></u>
Use this option to prevent access to certain SATA AHCI host controllers. To ignore the first SATA controller, use /sataign:1, and to hide the second SATA controller, use /sataign:2. To hide the third SATA controller, use /sataign:4. To hide both the first and second SATA controllers, use /sataign:3.	
Note: Use a basic Bit Mask numbering scheme.	
<i>Default if omitted:</i> Image for DOS takes control of all SATA AHCI host controllers.	

<u>/bmbrm:0</u>	<u>BIOSMBRM=0</u>
Use this option to disable the special matching routine Image for DOS will use if the system BIOS doesn't provide a method for Image for DOS to match SATA drives to BIOS drives. This option is only useful if SATA support is enabled.	
<i>Default if omitted:</i> A special matching routine is used when needed.	

<u>/atapidma:<i>n</i></u>	<u>AtapiDMA=<i>n</i></u>
Use this option to have Image for DOS use a higher performance method of accessing ATAPI devices. Examples of ATAPI-type devices include CD and DVD drives. The assigned value (<i>n</i>) determines which controller this setting applies to:	
1 – PATA	
2 – SATA	
3 – Both PATA and SATA	
<i>Default if omitted:</i> Image for DOS uses an older, yet more compatible, method of accessing ATAPI devices.	

<code>/pataq:n</code>	<code>PATAIRQ=n</code>
This option is used to control drive IRQ options. It may be useful if you find that the BIOS option of accessing (PATA) hard drives hangs after using BIOS (direct) or CD/DVD drives. The value of <i>n</i> is a bitmask which has the following meanings: 0 – No change 1 – Disable device IRQ Generation when IFD starts command 2 – Enable device IRQ Generation when IFD starts command 4 – Disable device IRQ Generation when IFD completes command 8 – Enable device IRQ Generation when IFD completes command Valid combinations: 0, 1, 2, 4, 5, 6, 8, 9, 10. Useful combinations: 6 or 9 <i>Default if omitted:</i> No change.	

<code>/biosata</code>	<code>BIOSATA=1</code>
If you don't supply any modifier for the hard drive via the command line, this option tells Image for DOS to use the BIOS (Direct) access method. In this mode, Image for DOS detects the source and target drives using the system BIOS, but then Image for DOS bypasses the BIOS and accesses them directly. Using this option might improve performance on some systems. <i>Default if omitted:</i> If you don't supply any modifier for the hard drive, Image for DOS uses the BIOS access mode, which permits the system bios to both detect and access the source and target drives.	

<code>/tz:AAAnBBB</code>	<code>TimeZone=AAAnBBB</code>
This option sets the time zone that Image for DOS uses. When you save images to NTFS partitions or CD/DVD discs, using the correct time zone will ensure that the date/time stamps of the image files will be correct when they are viewed within Windows. AAA and BBB are three letters you supply to represent the time zone. The characters don't mean anything to Image for DOS and are for your use. <i>n</i> is a number that indicates the offset from UTC (Coordinated Universal Time), and may be either positive or negative. For example, you might use a time zone setting such as PST8PDT or EST5EDT. Please refer to http://www.terabyteunlimited.com/kb/article.php?id=260 for more information. <i>Default if omitted:</i> Image for DOS does not establish a time zone.	

<code>/usblio</code>	<code>USBLIO=n</code>
Using this option might help in cases where you experience lockups with certain USB 2.0 devices. To disable it use USBLIO=0. <i>Default if omitted:</i> This option is enabled as USBLIO=8.	

<code>/usbign:n</code>	<code>USBIgnoreMask=n</code>
------------------------	------------------------------

Use this option to hide certain USB host controllers. For example, if you have a USB keyboard, Image for DOS might disable the keyboard when it takes control of the USB2 host controller. Using this option, you can hide the host controller of that USB keyboard and attach the USB keyboard to a different controller. It usually takes some experimentation to determine which controller to hide, but the two USB ports next to each other are usually controlled by the same host controller. To hide the first USB controller, use /usbign:1, and to hide the second USB controller, use /usbign:2. To hide the third USB controller, use /usbign:4. To hide both the first and second USB controllers, use /usbign:3.

Note: Use a basic Bit Mask numbering scheme.

Default if omitted: Image for DOS takes control of all detected USB2 host controllers.

<code>/msg:"my message"</code>	Message="my message"
Use this option to specify the text Image for DOS displays on the top of the screen while backing up, restoring, or validating. The maximum length of the message text depends on the memory available in your computer. If your message text contains spaces, place the message text in quotation marks:	
<code>/msg:"my message"</code>	
Use <code>\n</code> to force a new line; otherwise, text wraps to screen width only:	
<code>/msg:"first line\nsecond line"</code>	
<i>Default if omitted:</i> No message text is displayed.	

<code>/npt</code>	NoPartTable=0x10000 Place under the [HDx] section
Use this parameter to tell Image for DOS to treat the selected drive as a drive that doesn't use a partition table. If you use this option on the command line, you must place it before the /d option. It stays in effect until you disable it using /npt:0. You may want to disable this option if you use additional options to select a device/partition such as the /f:0@0x1:\filename option.	
<i>Default if omitted:</i> Image for DOS treats the selected drive as a drive that uses a partition table.	

<code>/anpt</code>	AssumeNoPartTable=0x40000 Place under the [HDx] section
Use this parameter to tell Image for DOS to treat the selected drive as a drive that doesn't use a partition table only if the first sector on the drive is all zeros.	
<i>Default if omitted:</i> Image for DOS treats the selected drive as a drive that uses a partition table.	

<code>/nptrm</code>	NPTOptRemMedOnly=0x80000 Goes under the [HDx] section
Use this parameter to tell Image for DOS to apply the npt or anpt options on removable media only.	

Default if omitted: Image for DOS applies the npt or anpt option to all drives..

/uhci:1	UHCI=1
Enables supports for most built-in USB 1.1 controllers (typically found on older computers).	
<i>Default if omitted:</i> Image for DOS does not recognize UHCI USB1.1 controllers.	

/un	N/A
Use this parameter to perform an unattended backup and tell Image for DOS to assume the answer to all Yes/No prompts is No and the answer to all OK/Cancel messages is Cancel. Image for DOS then aborts the backup process when the first Yes/No prompt appears.	
This option is disabled when additional media is needed (file not found) and /um is not specified.	
<i>Default if omitted:</i> Image for DOS does not run an unattended backup.	

/uy	N/A
Use this parameter to perform an unattended backup and tell Image for DOS to assume the answer to all Yes/No prompts is Yes and the answer to all OK/Cancel messages is OK.	
This option is disabled when additional media is needed (file not found) and /um is not specified.	
<i>Default if omitted:</i> Image for DOS does not run an unattended backup.	

/ui	N/A
Use this parameter when performing an unattended backup to tell Image for DOS to assume the answer to all Abort/Retry/Ignore prompts is Ignore. Use this parameter in conjunction with uy or un .	
<i>Default if omitted:</i> Image for DOS assumes the answer to all Abort/Retry/Ignore prompts is either Yes or No, depending on whether you set uy or un .	

/um	N/A
During an unattended backup using CD/DVD discs, use this parameter to tell Image for DOS to ignore the first request for media. This option helps you start the backup if you have already inserted a disc and a prompt appears asking for the disc. This option works only for the first prompt—you need to respond to other prompts for media unless /uy or /un is specified. If /uy or /un is combined with this option then any additional disc requests will cause the program to end with an error instead of prompting for the media.	
For media other than CD/DVD discs or during a restore/validation, using this option allows the program to end with an error instead of prompting for the media.	
<i>Default if omitted:</i> Media change requests will disable the /uy or /un options and you will be required to respond to the request.	

Image for DOS Backup Options

In Table 2, you find the command line options that you must set to use Image for DOS to make a backup image.

The table shows you both the command line option and the INI file variable. In some instances, both forms of the parameter are available; in other cases, only one is available. When one form of an option isn't available, N/A appears. To set up an INI file, place these parameters in the [Backup_Defaults] section.

Table 2: Image for DOS Required Backup Parameters

Command Line Option	INI Variable
/b	N/A
Use this option to indicate that you want to perform a backup. <i>Also required:</i> Either /d option to specify a full backup or /base option (for differential backup) and the /f option to specify target image file destination.	
/d	N/A
Use when performing a full backup to identify the source hard drive and partition. For most users, the partition ID will be a number from 1 through 4. For partition IDs of 9 or below, you can use a single digit in place of hexadecimal notation (e.g. 1 is equivalent to 0x1, and 5 is equivalent to 0x5). The volume ID will be a number formatted as 0xPVV, where <i>P</i> is the extended partition and <i>VV</i> is the volume number in hexadecimal from 01 to FF. If you are not sure what the partition or volume ID is, run Image for DOS using the interface, choose the Backup option, and click Next. The screen that lists the partitions and volumes also will display the ID in parentheses as a hexadecimal number. You should prefix that number with a 0x on the command line. /d:d@p /d:bd@p /d:ad@p /d:ud@p /d:fd@p /d:sd@p /d:od@p d is the source hard drive number p is the source partition or volume ID (hex or decimal notation), depending on whether you are referring to a partition or a volume. You can use device modifiers as needed. When you use them, you must place them after the /d: and before the source hard drive number: b – BIOS access method d – BIOS (Direct) access method a – ATA/ATAPI access method u – USB device f – IEEE 1394 device	

s – Use ASPI

The **/d** option cannot be used with the **/base** option.

/base

N/A

Use when performing a differential backup to identify the full backup on which Image for DOS should base this differential backup.

/base:x:\bkup

x: is source drive letter

/base:x:\mypath\bkup

mypath or **my path** is path to **bkup**

/base:"x:\my path\bkup"

bkup is name of existing full backup (omit file extension)

Or:

Or:

/base:d@p:\bkup

Specify source device, partition, path, and file name:

/base:d@p:\mypath\bkup

d is source hard drive number

/base:"d@p:\my path\bkup"

p is source partition ID (hex or decimal notation)

You can use device modifiers as needed. When you use them, you must place them after the **/base:** and before the source hard drive number:

b – BIOS access method

d – BIOS (Direct) access method

a – ATA/ATAPI access method

u – USB device

f – IEEE 1394 device

s – Use ASPI

o – Optical drive (when you combine this option with any of the options mentioned above, this option must come last)

Whether using drive letter or device/partition, you may specify any path desired. Paths and/or file names with imbedded spaces require the use of quotes.

The **/base** option cannot be used with **/d** option.

/f

N/A

Use this option to specify the target drive letter, path, and file name for a backup file.

<code>/f:x:\filename</code>	<code>x:\</code> is target drive letter
<code>/f:x:\mypath\filename</code>	<i>mypath</i> or <i>my path</i> is path to filename
<code>/f:"x:\my path\file name"</code>	<i>filename</i> is target file name for image
Or:	Or:
<code>/f:d@p:\filename</code>	Specify target device, partition, path, and file name:
<code>/f:d@p:\mypath\filename</code>	<i>d</i> is target hard drive number
<code>/f:"d@p:\my path\filename"</code>	<i>p</i> is target partition ID (hex or decimal notation)
	<i>mypath</i> or <i>my path</i> is path to filename
	<i>filename</i> is target file name for image
	Device modifiers may be used as needed. When used, they must be placed after the /f: and before the target hard drive number:
	b – BIOS access method
	d – BIOS (Direct) access method
	a – ATA/ATAPI access method
	u – USB device
	f – IEEE 1394 device
	s – Use ASPI
	o – Optical drive (when you combine this option with any of the options mentioned above, this option must come last)
	Whether using drive letter or device/partition, you may specify any path desired. Paths and/or file names with imbedded spaces require the use of quotes.
	<i>o</i> can be used with <i>a</i> , <i>u</i> , <i>f</i> , and <i>s</i>

The above options are required when you perform a backup using Image for DOS from the command line. In Table 3, you find a list of the optional backup parameters you can use when you run Image for DOS from the command line.

The table shows you both the command line option and the INI file variable. In some instances, both forms of the options are available; in other cases, only one is available. When one form of an option isn't available, N/A appears. To set up an INI file, place these parameters in the [Backup_Defaults] section, unless as noted otherwise.

Table 3: Image for DOS Optional Backup Parameters

Command Line Option	INI Variable
<code>/pw:mypassword</code> or <code>/pw:"my password"</code>	N/A
Use this option to set a password for Image for DOS to use in conjunction with simple password protection or AES encryption. If your password contains spaces, surround it with quotation marks. Your password cannot exceed 128 characters, and it may contain upper/lowercase letters, numbers, special characters, spaces, and non-ASCII characters. You must use this option if you also specify enc:1 or enc:3, described later in this table. <i>Default if omitted:</i> Image for DOS does not assign a password, and the backup will be neither password protected nor encrypted.	
<code>/te</code>	<code>TermEmulation=1</code>
Instructs Image for DOS to terminate floppy emulation mode after booting from a CD or DVD. This can help rectify certain compatibility issues caused by floppy emulation, but if you use te, the virtual floppy diskette drive will be unavailable while Image for DOS is running. <i>Default if omitted:</i> Image for DOS doesn't terminate BIOS (EL Torito) floppy emulation mode.	
<code>/rb:1</code>	N/A
Instructs Image for DOS to reboot the computer after completing the backup operation. <i>Default if omitted:</i> Image for DOS attempts to determine if the computer needs to be rebooted after completing the backup and, if so, prompts you to reboot.	
<code>/mp</code>	<code>MultiPass=1</code>
Use this parameter to tell Image for DOS to use Multi Pass mode when creating a differential backup. In Multi Pass mode, Image for DOS compares the source partition against the full backup in one pass and performs the differential backup in a second pass. This setting is not applicable when performing a full backup. This option <i>must</i> be used if the applicable full backup resides on removable media. <i>Default if omitted:</i> Image for DOS uses Single Pass mode, identifying changes and backing up in one pass.	
<code>/cdws:n</code>	<code>CDWriteSpeed=n</code>
Use this setting to specify the <i>maximum</i> disc writing speed that Image for DOS will use when burning a CD or DVD disc and force a lower writing speed than that automatically used by the optical drive's firmware. Slower writing speeds may increase reliability. <i>n</i> should be a positive integer (e.g. 2, 4, 16, etc.). The maximum writing speed that Image for DOS actually uses is determined by whichever is <i>lower</i>: The /cdws:n value you specify or the speed deemed appropriate by the drive's firmware, according to the CD/DVD media in use. For example, if you are using media that is rated at 8X for burning, the maximum writing speed will be no more	

than 8X, regardless of the setting you choose here. Similarly, if you supply a value that is beyond or invalid for the drive's design limits, the drive will automatically use the next-highest speed supported by both the drive and the media in use.

DVD speeds are approximately 1/8 CD speeds, so if you are using DVD discs, multiply the desired speed by 8 to determine the value to use. For example, to obtain a maximum burning speed of 2X with a DVD, use **/cdws:16**, since $8 \times 2X = 16$.

Default if omitted: Image for DOS uses the **Optimal** speed setting.

/max:nMiB or /max:nGiB	MaxFileSize=nMiB or MaxFileSize=nGiB
Use this setting to specify the maximum file size of the image files that Image for DOS creates.	
<i>n</i> should be a positive integer (e.g. 648, 698, 877, 1003, etc.). Image for DOS can use either mebibytes or gibibytes, so you must specify either MiB or GiB , respectively. Do not place any spaces between the number and the unit designation.	
The maximum file size is ultimately dictated by the file system used on the target drive. Also, some network redirectors limit file size to 2 GiB, which can be a limiting factor for backup files stored on a network drive.	
<i>Default if omitted:</i> Image for DOS uses the maximum file size supported by the target file system.	

/raw	RawMode=1
Set this parameter to force Image for DOS to use raw mode, which backs up all sectors, rather than just used sectors, even for recognized file systems.	
<i>Default if omitted:</i> Image for DOS backs up only used sectors backed up for recognized file systems and uses raw mode automatically for unrecognized file systems.	

/skp:0	SkipPageFile=0
Set this parameter to instruct Image for DOS to include the page file in the backup.	
<i>Default if omitted:</i> Image for DOS skips the page file.	

/skh:0	SkipHiberFile=0
Set this parameter to instruct Image for DOS to include the hibernation file in the backup.	
<i>Default if omitted:</i> Image for DOS skips the hibernation file.	

/v	PostValidate=1
Set this parameter to instruct Image for DOS to perform a standard validation of the image file(s) as part of the backup operation.	
To set the INI value, use PostValidate=1	
<i>Default if omitted:</i> Image for DOS does not validate the backup image after creating it.	

/vb	PostValidate=2
Set this parameter to instruct Image for DOS to perform a byte-for-byte validation of the	

image file(s) as part of the backup operation. This also performs a standard validation.

To set the INI value, use PostValidate=2

Default if omitted: Image for DOS does not validate the backup image after creating it.

/vpd	ValidateDisk=1
You can use this option when saving images to a CD or DVD drive. This option ensures that the discs containing image files are readable and verifies that the data on the discs appears to be the same as the data that Image for DOS used to create the discs. Per-disc validation can detect media errors that may have occurred during the disc writing process. If Image for DOS detects an error, Image for DOS will prompt you to recreate the failed disc. <i>Default if omitted:</i> If you do not enable this option, Image for DOS will notify you of errors only after the backup process completes, and you will need to recreate all discs in the backup.	

/ldu	LimitDiscUsage=1
You can use this option when saving images to a CD or DVD drive. This option leaves the last 10% of the disc unused which tends to encounter more data errors. <i>Default if omitted:</i> If you do not enable this option, Image for Windows will use the entire disc.	

/comp:n	Compression=n
Specifies how Image for DOS should compress backup files as they are created, where <i>n</i> is one of the following values: 0 – No Compression 1 – Standard Compression 2 – Enhanced – Less 7 – Enhanced – Normal 10 – Enhanced – Max <i>Default if omitted:</i> Image for DOS uses standard compression.	

/enc:1 or /enc:3	Encryption=1 or Encryption=3
Specifies whether simple password protection <i>without</i> encryption (/enc:1), or 256-bit AES encryption (/enc:3) is to be used. If either /enc:1 or /enc:3 are specified, /pw is also required. <i>Default if omitted:</i> No encryption or password protection is used.	

/noej	NoEject=1
Use this parameter to tell Image for DOS never to automatically open the optical drive tray. <i>Default if omitted:</i> Image for DOS will automatically open the optical drive tray whenever a new disc is needed and at the completion of the backup operation.	

<code>/cdrs:n</code>	<code>CDReadSpeed=n</code>
Use this setting to specify the <i>maximum</i> disc reading speed that Image for DOS will use when reading a CD or DVD disc during the validation phase of a backup operation, with <i>n</i> being a positive integer (e.g. 2, 4, 16, etc.). This setting may be used to force a lower reading speed than that automatically used by the optical drive's firmware. Slower reading speeds may increase reliability. <i>n</i> should be a positive integer (e.g. 2, 4, 16, etc.). This setting is only applicable when you are backing up to CD/DVD media and you have also included either the /v or /vb option. The maximum reading speed that is actually used is determined by whichever is <i>lower</i>: The /cdrs:n value that you specify, or the speed deemed appropriate by the drive's firmware, according to the CD/DVD media in use. For example, if you are using media that is rated at 32X (for reading), the maximum reading speed will be no more than 32X, regardless of the setting you choose here. Similarly, if you supply a value that is invalid for or beyond the drive's design limits, the drive will automatically use the next-highest speed supported by both the drive and the media in use. DVD speeds are approximately 1/8 CD speeds, so if you are using DVD discs, multiply the desired speed by 8 to determine the value to use here. For example, to obtain a maximum reading speed of 4X with a DVD, use /cdrs:32, since $8 \times 4X = 32$. <i>Default if omitted:</i> Image for DOS uses the Optimal speed setting.	
<code>/iobs</code>	<code>IOBD=1</code>
Include this option to try to improve I/O performance in cases where network or USB device performance is poor. <i>Default if omitted:</i> Image for DOS does not use this option.	
<code>/err</code>	<code>AllowErrors=1</code>
Use this option to tell Image for DOS to ignore read/write errors caused by bad sectors on the <i>source</i> drive during the backup operation. Image for DOS will also ignore errors during the validation phase. This parameter does not apply to bad sectors on the <i>target</i> drive. <i>Default if omitted:</i> Image for DOS will notify you concerning the error and give you the option to continue or abort.	
<code>/mf</code>	N/A
Instructs Image for DOS to use Multiple File Set mode. Select this option to create a backup that is comprised of one image for every individual partition that you back up. <i>Default if omitted:</i> Image for DOS uses Single File Set mode and creates a single image, regardless of the number of individual partitions you back up.	
<code>/desc:mydescription</code>	N/A

Use this option to specify the descriptive text you want Image for DOS to associate with the backup, up to 127 characters. If your descriptive text includes spaces, surround it with quotation marks: `/desc:"my description"`

Default if omitted: Image for DOS doesn't add any descriptive text.

<code>/log:0</code>	<code>SaveLog=0</code>
Disables logging.	
<i>Default if omitted:</i> Image for DOS logs during a backup operation.	

Image for DOS Restore Options

In Table 4, you find the command line options that you must set to use Image for DOS to restore a backup image. Table 5 shows you optional parameters you can set.

The table shows you both the command line option and the INI file variable. In some instances, both forms of the parameter are available; in other cases, only one is available. When one form of an option isn't available, N/A appears. To set up an INI file, place these parameters in the [Restore_Defaults] section, unless as noted otherwise.

Table 4: Image for DOS Required Restore Parameters

Command Line Option	INI Variable
<code>/r</code>	N/A
Use this option to indicate that you want to restore an image file.	
<i>Also required:</i> Either /ld option to restore from a full backup or /lbase option to restore from a differential backup and the /f option to specify image file Image for DOS should use when restoring.	
<code>/d</code>	N/A
Use when restoring a backup to identify the target hard drive and partition. Image for DOS will restore the image to the same hard drive number and physical location on the drive that you backed up unless you override this setting.	
If the target partition was a volume and no extended partition now exists at the original location, Image for DOS will attempt to create the original extended partition. If Image for DOS cannot create the extended partition, Image for DOS will restore the image as a primary partition.	
If the target partition was originally a primary partition and an extended partition now exists at that location, Image for DOS will restore the image as a volume.	
If an existing partition or volume occupies the same starting location as the partition you want to restore, Image for DOS will display a warning message before overwriting the partition or volume. You can suppress this warning message, as described in Table 5.)	
<code>/d:d@p</code>	d is the target hard drive number
<code>/d:bd@p</code>	
<code>/d:ad@p</code>	p is the target partition or volume ID (hex

/d:ud@p
 /d:fd@p
 /d:sd@p
 /d:od@p

or decimal notation), depending on whether you are referring to a partition or a volume. Use this parameter only if you are restoring an individual partition.

You can use device modifiers as needed. When you use them, you must place them after the **/d:** and before the target hard drive number:

- b** – BIOS access method
- d** – BIOS (Direct) access method
- a** – ATA/ATAPI access method
- u** – USB device
- f** – IEEE 1394 device
- s** – Use ASPI

The **/d** option cannot be used with the **/base** option.

/base

N/A

When restoring from a differential backup, use this parameter to identify the full backup image for DOS should use.

/base:x:\bkup

x:\ is source drive letter

/base:x:\mypath\bkup

mypath or my path is path to bkup

/base:"x:\my path\bkup"

bkup is name of the full backup (omit the file extension)

Or:

Or:

/base:d@p:\bkup

Specify source device, partition, path, and file name:

/base:d@p:\mypath\bkup

d is source hard drive number

/base:"d@p:\my path\bkup"

p is source partition ID (hex or decimal notation)

You can use device modifiers as needed. When you use them, you must place them after the **/base:** and before the source hard drive number:

- b** – BIOS access method
- d** – BIOS (Direct) access method
- a** – ATA/ATAPI access method
- u** – USB device
- f** – IEEE 1394 device

s – Use ASPI

o – Optical drive (when you combine this option with any of the options mentioned above, this option must come last).

Whether using drive letter or device/partition, you may specify any path desired. Paths and/or file names with imbedded spaces require the use of quotes.

The **/base** option cannot be used with **/d** option.

/f	N/A
Use this option to specify the target drive letter, path, and file name for a backup file.	
/f:x:\filename	x:\ is target drive letter
/f:x:\mypath\filename	<i>mypath</i> or <i>my path</i> is path to filename
/f:"x:\my path\file name"	<i>filename</i> is target file name for image
Or:	Or:
/f:d@p:\filename	Specify target device, partition, path, and file name:
/f:d@p:\mypath\filename	<i>d</i> is target hard drive number
/f:"d@p:\my path\filename"	<i>p</i> is target partition ID (hex or decimal notation)
	<i>mypath</i> or <i>my path</i> is path to filename
	<i>filename</i> is target file name for image
	Device modifiers may be used as needed. When used, they must be placed after the /f: and before the target hard drive number:
	b – BIOS access method
	d – BIOS (Direct) access method
	a – ATA/ATAPI access method
	u – USB device
	f – IEEE 1394 device
	s – Use ASPI
	o – Optical drive (when you combine this option with any of the options mentioned above, this option must come last).
	Whether using drive letter or device/partition, you may specify any path

desired. Paths and/or file names with imbedded spaces require the use of quotes.

o can be used with a, u, f, and s

Table 5: Image for DOS Optional Restore Parameters

The above options are required when you restore a backup using Image for DOS from the command line. In Table 5, you find a list of the optional restore parameters you can use when you run Image for DOS from the command line.

The table shows you both the command line option and the INI file variable. In some instances, both forms of the options are available; in other cases, only one is available. When one form of an option isn't available, N/A appears. To set up an INI file, place these parameters in the [Restore_Defaults] section, unless as noted otherwise.

Command Line Option	INI Variable
/o	N/A
Use this option to tell Image for DOS to overwrite the target without first prompting for confirmation.	
<i>Default if omitted:</i> Image for DOS prompts before overwriting the target.	
/clr	N/A
Use this option to have Image for DOS clear the MBR and EMBR prior to restoring an image file.	
<i>Default if omitted:</i> Image for DOS does not clear the MBR and EMBR.	
/rb:1	N/A
Use this option to have Image for DOS reboot the system after restoring an image.	
<i>Default if omitted:</i> Image for DOS attempts to determine if the computer needs to be rebooted after restoring and, if so, prompts you to reboot.	
/sp:p	N/A
Use this option to specify an individual partition ID to restore from a full backup. <i>p</i> is the source partition ID (in hex or decimal notation).	
<i>Default if omitted:</i> If you supply a backup of an entire hard drive as the source for restoring, Image for DOS will restore all partitions contained in the backup.	
/sig	ReplaceNTSig=1
Use this option if you are restoring a partition that Windows had assigned a drive letter before you backed up the drive. If you use this option, Image for DOS will restore the disk signature associated with the source partition.	
<i>Default if omitted:</i> Image for DOS will use the disk signature already present in the MBR	

of the target drive, or, if none exists, Image for DOS will create one.

/ohd	UseOrgHDNum=1
Use this option to tell Image for DOS to keep references to the source hard drive number intact within the partition after Image for DOS has restored the partition to the target drive.	
<i>Default if omitted:</i> If the target drive number differs from that of the source drive, Image for DOS will update applicable drive references residing within the restored partition to reflect the new hard drive number.	

/a	SetActive=1
Use this parameter to make the partition you restore active.	
<i>Default if omitted:</i> Image for DOS does not make the restored partition active unless no other partitions are active and the restored partition is HD0.	

/t	WriteMBR=1
Use this parameter to have Image for DOS install standard MBR code after completing the restore operation. Standard MBR code is the code that boots the active partition.	
<i>Default if omitted:</i> Image for DOS does not write standard MBR code unless the MBR is empty.	

/e	UseSameMBREntry=1
Use this parameter to have Image for DOS move the partition table entry of the restored partition to the same location in the master partition table as it appeared on the source drive. Image for DOS will move the existing partition table entry to another location rather than overwriting it.	
<i>Default if omitted:</i> Image for DOS does not move the partition table of the restored partition.	

/rft	RFT=1
Use this parameter to have Image for DOS restore the first track when it restores the partition.	
<i>Default if omitted:</i> Image for DOS does not restore the first track.	

/fts:n	RFTS=n
Use this option to specify how many sectors of the first track of each partition Image for DOS should restore. Use 0 to indicate the entire track	
<i>Default if omitted:</i> Image for DOS determines the number of tracks needed to restore.	

/stt	Scale=1
For NTFS/FAT/FAT32 partitions, use this parameter to tell Image for DOS to resize each restored partition proportionally, so that each partition takes up the same relative amount of space on the target drive as it did on the source drive. Unpartitioned free space that	

existed on the source drive at the time of the backup will still exist at the end of the target drive after Image for DOS completes the restore operation.

This option only applies when you restore an entire hard drive;

Default if omitted: Image for DOS does not scale each restored partition.

<code>/x</code>	<code>Expand=1</code>
For NTFS/FAT/FAT32 partitions, when restoring to a target that is larger than the source partition, use this parameter to have Image for DOS expand the partition after completing the restore operation. This option is equivalent to the “Scale to Fit” option for fully restoring drives. <i>Default if omitted:</i> Image for DOS will not expand the partition, and free space will remain after Image for DOS completes the restore operation.	

<code>/kf=n</code>	<code>KeepFree=n</code>
Use this parameter if you also use either <code>/x</code> or <code>/stt</code> to specify the amount of space, in MiB, Image for DOS should leave free. <i>Default if omitted:</i> Image for DOS will fill the entire available area.	

<code>/m</code>	<code>FirstFit=1</code>
Use this parameter to tell Image for DOS to choose the target area automatically, based on the first area of available free space large enough to accommodate the partition you want to restore. <i>Default if omitted:</i> You must explicitly specify the target area.	

<code>/v</code>	<code>PreValidate=1</code>
Use this parameter to have Image for DOS perform a standard validation on the image file(s) before restoring them. <i>Default if omitted:</i> Image for DOS does not validate the image files before restoring them.	

<code>/vb</code>	<code>PostValidate=2</code>
Use this parameter to have Image for DOS check that each byte from the source image file was restored to the drive properly. <i>Default if omitted:</i> Image for DOS does not validate the restored data.	

<code>/pw:mypassword</code> or <code>/pw:"my password"</code>	N/A
Use this parameter to supply the password needed to decrypt a backup that you encrypted and/or password protected when you created it. If your password contains embedded spaces, place quotation marks around it. <i>Default if omitted:</i> Image for DOS does not supply a password.	

/noej	NoEject=1
Use this parameter to tell Image for DOS to never automatically open the optical drive tray.	
<i>Default if omitted:</i> Image for DOS will automatically open the optical drive tray whenever a new disc is needed and when Image for DOS finishes restoring.	

/cdrs:n	CDReadSpeed=n
Use this setting to specify the <i>maximum</i> disc reading speed that Image for DOS will use when reading a CD or DVD disc while restoring a backup image, with <i>n</i> being a positive integer (e.g. 2, 4, 16, etc.). This setting may be used to force a lower reading speed than that automatically used by the optical drive's firmware. Slower reading speeds may increase reliability.	
<i>n</i> should be a positive integer (e.g. 2, 4, 16, etc.).	
This setting is only applicable when you are restoring from CD/DVD media and you have also included the /v option.	
The maximum reading speed that is actually used is determined by whichever is <i>lower</i> : The /cdrs:n value that you specify, or the speed deemed appropriate by the drive's firmware, according to the CD/DVD media in use. For example, if you are using media that is rated at 32X (for reading), the maximum reading speed will be no more than 32X, regardless of the setting you choose here. Similarly, if you supply a value that is invalid for or beyond the drive's design limits, the drive will automatically use the next-highest speed supported by both the drive and the media in use.	
DVD speeds are approximately 1/8 CD speeds, so if you are using DVD discs, multiply the desired speed by 8 to determine the value to use here. For example, to obtain a maximum reading speed of 4X with a DVD, use /cdrs:32 , since $8 \times 4X = 32$.	
<i>Default if omitted:</i> Image for DOS uses the Optimal speed setting.	

/iobs	IOBD=1
Include this option to try to improve I/O performance in cases where network or USB device performance is poor.	
<i>Default if omitted:</i> Image for DOS does not use this option.	

/err	AllowErrors=1
Use this option to tell Image for DOS to ignore read/write errors caused by bad sectors on the <i>target</i> drive during the backup operation. This parameter does not apply to bad sectors on the <i>source</i> drive.	
<i>Default if omitted:</i> Image for DOS will notify you concerning the error and give you the option to continue or abort.	

--ubi	UpdateBootIni=1
This option only applies if a copy of boot.ini exists in the root directory of the restored partition. If enabled, this option instructs Image for DOS to update all partition(n) references in the restored partition's boot.ini file, to accommodate a partition layout that differs from that of the original drive. Image for DOS will set all partition-based entries in	

the applicable boot.ini to point to the restored partition (but will not change file-based entries). This option has no effect when doing a full drive restore.

Default if omitted: Image for DOS does not try to update the boot.ini file.

/mp	MultiPass=1
Use this parameter to tell Image for DOS to use Multi Pass mode when restoring a differential backup. In Multi Pass mode, Image for DOS restores the full backup in one pass and then restores the differential backup in a second pass. This setting is not applicable when restoring a full backup. You <i>must</i> use this option if the applicable full backup resides on removable media. <i>Default if omitted:</i> Image for DOS uses Single Pass mode, restoring the full backup and the differential backup in one pass.	

/cds	N/A
Use this parameter to tell Image for DOS to query all available CD/DVD drives when trying to locate the appropriate source backup. <i>Default if omitted:</i> You must explicitly specify the CD/DVD drive that contains the source backup.	

/te	TermEmulation=1
Instructs Image for DOS to terminate floppy emulation mode after booting from a CD or DVD. This can help rectify certain compatibility issues caused by floppy emulation, but if you use te, the physical floppy diskette drive will be unavailable while Image for DOS is running. <i>Default if omitted:</i> Image for DOS uses floppy emulation mode until you exit from Image for DOS.	

/mo	N/A
Instructs Image for DOS to display the following message immediately upon running: Press the <space bar> for the menu interface or wait for the restore to start... If you press the space bar while this message appears, Image for DOS will switch to interactive mode and wait for you to initiate the restore operation via the menu interface. <i>Default if omitted:</i> The Press the <space bar>... message is not displayed and the restore operation proceeds using the command line.	

/aoe:n	AlignOnEnd=n Place under the [HDx] section
Use this option to instruct Image for Windows to align restored partitions at the end of a cylinder, or when the Align2048 option is enabled, end of a 2048 sector boundary. 2 – Align on end by resizing 0 – Disable align on end <i>Default if omitted:</i> Normal alignment (/aoe:1) is used.	

<code>/a2k</code>	Align2048=1 Place under the [HDx] section
Use this option to instruct Image for DOS to align restored partitions based on 2048 sectors. If this option is enabled then you will normally want to enable the AlignEndHS option and disable the AlignOnEnd option. <i>Default if omitted.</i> The alignment is based on cylinders.	
<code>/ahs</code>	AlignEndHS=1 Place under the [HDx] section
Use this option to instruct Image for DOS to force a restored partition's ending head and sector values in the MBR to match the current geometry. <i>Default if omitted.</i> The actual ending head and sector values are used.	
<code>/ahst</code>	AlignHSONTrunc=1 Place under the [HDx] section
Use this option to instruct Image for DOS to set a restored partition's head and sector values in the MBR to match the current geometry when it is located outside the range of the current geometry. <i>Default if omitted.</i> The actual ending head and sector values are used.	
<code>/og</code>	UseOrgGeo=1 Place under the [HDx] section
Set this parameter to tell Image for DOS to use the original geometry of the source drive when restoring the backup image. <i>Default if omitted:</i> Image for DOS uses the geometry of the target drive.	
<code>/c=n</code>	c=n Place under the [HDx] section
Use this parameter in conjunction with /h and /s to manually specify the cylinder, head, and sector values for the target drive when you restore a backup image. This parameter specifies the last cylinder, and n is a number you supply. <i>Default if omitted:</i> Image for DOS uses the BIOS-reported values of the drive.	
<code>/h=n</code>	h=n Place under the [HDx] section
Use this parameter in conjunction with /c and /s to manually specify the cylinder, head, and sector values for the target drive when you restore a backup image. This parameter specifies the last head, and n is a number you supply. <i>Default if omitted:</i> Image for DOS uses the BIOS-reported values of the drive.	
<code>/s=n</code>	s=n

	Place under the [HDx] section
Use this parameter in conjunction with /c and /h to manually specify the cylinder, head, and sector values for the target drive when you restore a backup image. This parameter specifies the last sector, and n is a number you supply.	
<i>Default if omitted:</i> Image for DOS uses the BIOS-reported values of the drive.	

/rs:n	N/A
Use this parameter to resize a partition after restoring. n is the size in MiB's that you want to establish for the restored partition. If you try to use this parameter in conjunction with /x, the Expand option, /x overrides /rs.	
<i>Default if omitted:</i> Image for DOS restores the partition without resizing.	

/log:0	SaveLog=0
Disables logging.	
<i>Default if omitted:</i> Image for DOS logs during a restore operation.	

Image for DOS Validate Options

In Table 6, you find the command line options that you must set to use Image for DOS to validate an image.

The table shows you both the command line option and the INI file variable. In some instances, both forms of the parameter are available; in other cases, only one is available. When one form of an option isn't available, N/A appears. To set up an INI file, place these parameters in the [Validate_Defaults] section, unless as noted otherwise.

Table 6: Image for DOS Required Validate Parameters

Command Line Option	INI Variable
/v	N/A
Use this option to indicate that you want to validate an image file.	
<i>Also required:</i> /CDn or a path name, as described below, to identify the location of the backup image you want to validate.	
/base	N/A
Use when validating a differential backup to identify the full backup Image for DOS should use to validate the differential backup.	
/base:x:\bkup	x:\ is source drive letter
/base:x:\mypath\bkup	mypath or my path is path to bkup
/base:"x:\my path\bkup"	bkup is name of existing full backup (omit file extension)
Or:	Or:
/base:d@p:\bkup	

<pre>/base:d@p:\mypath\bkup</pre> <pre>/base:"d@p:\my path\bkup"</pre>	Specify source device, partition, path, and file name: d is source hard drive number p is source partition ID (hex or decimal notation) You can use device modifiers as needed. When you use them, you must place them after the /base: and before the source hard drive number: b – BIOS access method d – BIOS (Direct) access method a – ATA/ATAPI access method u – USB device f – IEEE 1394 device s – Use ASPI o – Optical drive (when you combine this option with any of the options mentioned above, this option must come last). Whether using drive letter or device/partition, you may specify any path desired. Paths and/or file names with imbedded spaces require the use of quotes. The /base option cannot be used with /d option.
--	---

/f	N/A
Use this option to specify the target drive letter, path, and file name for a backup file.	
<pre>/f:x:\filename</pre>	<i>x:\</i> is target drive letter
<pre>/f:x:\mypath\filename</pre>	<i>mypath</i> or <i>my path</i> is path to filename
<pre>/f:"x:\my path\file name"</pre>	<i>filename</i> is target file name for image
Or:	Or:
<pre>/f:d@p:\filename</pre>	Specify target device, partition, path, and file name:
<pre>/f:d@p:\mypath\filename</pre>	<i>d</i> is target hard drive number
<pre>/f:"d@p:\my path\filename"</pre>	<i>p</i> is target partition ID (hex or decimal notation)
	<i>mypath</i> or <i>my path</i> is path to filename
	<i>filename</i> is target file name for image

Device modifiers may be used as needed. When used, they must be placed after the **/f:** and before the target hard drive number:

b – BIOS access method

d – BIOS (Direct) access method

a – ATA/ATAPI access method

u – USB device

f – IEEE 1394 device

s – Use ASPI

o – Optical drive (when you combine this option with any of the options mentioned above, this option must come last).

Whether using drive letter or device/partition, you may specify any path desired. Paths and/or file names with imbedded spaces require the use of quotes.

o can be used with **a**, **u**, **f**, and **s**

In Table 7, you find the command line parameters that you might want to use with Image for DOS when validating an image.

The table shows you both the command line option and the INI file variable. In some instances, both forms of the parameter are available; in other cases, only one is available. When one form of an option isn't available, N/A appears. To set up an INI file, place these parameters in the [Validate_Defaults] section, unless as noted otherwise.

Table 7: Image for DOS Optional Validation Parameters

/noej	NoEject=1
Use this parameter to tell Image for DOS never to automatically open the optical drive tray.	
<i>Default if omitted:</i> Image for DOS will automatically open the optical drive tray whenever a new disc is needed and at the completion of the backup operation.	

/cdrs:n	CDReadSpeed=n
Use this setting to specify the <i>maximum</i> disc reading speed that Image for DOS will use when reading a CD or DVD disc during validation, with <i>n</i> being a positive integer (e.g. 2, 4, 16, etc.). This setting may be used to force a lower reading speed than that automatically used by the optical drive's firmware. Slower reading speeds may increase reliability.	
<i>n</i> should be a positive integer (e.g. 2, 4, 16, etc.).	

This setting is only applicable when you are validating an image stored on CD/DVD media.

The maximum reading speed that is actually used is determined by whichever is *lower*: The **/cdrs:n** value that you specify, or the speed deemed appropriate by the drive's firmware, according to the CD/DVD media in use. For example, if you are using media that is rated at 32X (for reading), the maximum reading speed will be no more than 32X, regardless of the setting you choose here. Similarly, if you supply a value that is invalid for or beyond the drive's design limits, the drive will automatically use the next-highest speed supported by both the drive and the media in use.

DVD speeds are approximately 1/8 CD speeds, so if you are using DVD discs, multiply the desired speed by 8 to determine the value to use here. For example, to obtain a maximum reading speed of 4X with a DVD, use **/cdrs:32**, since $8 \times 4X = 32$.

Default if omitted: Image for DOS uses the **Optimal** speed setting.

/iobs	IOBD=1
--------------	---------------

Include this option to try to improve I/O performance in cases where network or USB device performance is poor.

Default if omitted: Image for DOS does not use this option.

/mp	MultiPass=1
------------	--------------------

Use this parameter to tell Image for DOS to use **Multi Pass** mode when validating a differential backup. In **Multi Pass** mode, Image for DOS validates the full backup in one pass and the differential backup in a second pass. This setting is not applicable when performing a full backup. This option *must* be used if the applicable full backup resides on removable media.

Default if omitted: Image for DOS uses **Single Pass** mode, validating in one pass.

/log:0	SaveLog=0
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Disables logging.

Default if omitted: Image for DOS logs during a validate operation.

Troubleshooting

If you should encounter any problems while running Image for DOS, please visit our on-line support page at <http://www.terabyteunlimited.com/support-image-for-dos.htm>.

Appendix A: Understanding the Types of Backups

Many software packages create file-based backups, while Image for DOS creates a sector-based backup. This section describes both types of backups and their differences.

File-Based Backup

When you create a file-based backup, you copy files from one storage location to another using a third-party software package, the built in Microsoft backup utility or by dragging-and-dropping files and/or folders using Windows Explorer.

Creating a file-based backup is simple, and you can backup or restore only certain files or folders. But, a file-based backup it has drawbacks. For example, files that are in use may not be backed up. And, restoring a file-based backup can be tricky:

Files in use cannot be restored.

If the required operating system environment and software is not installed and accessible, you will first need to install it before you can restore any data.

Sector-Based Backup

A sector-based backup, also called *imaging*, differs from file-based backup because imaging operates on the entire partition, including all files and the operating system itself. This is the method of backup employed by Image for DOS.

When you create a sector-based image as your backup, you back up not only your data files but also the operating system, in its entirety. If you restore a sector-based backup, your computer returns to the state it was in when you created the image. Image for DOS places all information on the target drive in the exact location where it appeared when you created the image.

In addition, you can:

- * Restore a sector-based backup even if the operating system isn't accessible—effectively performing a bare-metal restoration.
- * Restore individual files, if you want using the free TBIView add-on.

Appendix B: Backup Strategies

Whether you create file-based backups or sector-based backups, you can choose between three different backup methods:

- * Full Backups
- * Incremental Backups
- * Differential Backups

In this section, you find information that explains each of these backup methods. The backup method you choose actually affects you most when you need to restore the backup; some backups are easier to restore than others.

In addition to understanding backup methods, it's also important to store your backup media in a safe, secure location. We strongly recommend that you store your backup media in a different physical location than your computer and that you place your backup media in a fire-proof safe designed for media. By storing your backup media offsite, you don't run the risk of losing both your computer and your backups in the event of fire or theft. By storing your backups in a fire-proof safe designed for media, your backups will be protected if a fire occurs at the location where you store your backups.

Note: Be sure to use a fire-proof safe designed for media because, while paper doesn't burn until 451 degrees Fahrenheit, media will melt.

Full Backups

A full backup, as the name implies, involves backing up all specified data.

How Often Should I Back Up?

We hear this question a lot, and there is no right answer. Instead, there is the answer that works best for you. To figure out how often to back up, ask yourself, "How much data am I willing to re-enter?" because, once you restore your latest backup, you will need to re-enter all information since you made that backup. Many people do not want to re-enter any information, so they back up daily. Others feel their computer usage is such that they are willing to back up once each week and re-enter up to seven days worth of data. Decide how much data you are willing to re-enter and set your backup schedule accordingly.

Incremental Backups

Note: Although you cannot make an incremental backup using Image for DOS, we include information on incremental backups so that you can understand how they work.

Incremental backups include only data that has changed since the *most recent backup* was performed—whether the most recent backup was a full backup or a previous incremental backup. To use this backup method, you perform a full backup at an interval of your choice—say every two weeks. In between full backups, you perform incremental backups. If you need to restore your entire system, you need to restore the latest full backup followed by each of the incremental backups you performed since that full backup.

For example, suppose that you are relying on file-based backups, and you perform a full backup that includes **FILE1**, **FILE2**, and **FILE3**. Then, you change **FILE2**, and you perform an incremental backup. This incremental backup will include only parts of **FILE2**, since you did not change the other files in the most recent full backup. Then, if you change **FILE3** and add **FILE4** and make another incremental backup, the latest incremental backup will include only data from **FILE3** and **FILE4**.

If you are relying on sector-based backups, you perform a full backup at an interval of your choice and, in between, you perform incremental backups. But, an incremental sector-based backup is not based on files that have been added or changed. Instead, an incremental sector-based backup looks for and includes newly allocated sectors and changes to the contents of any sector since the last backup. Suppose that you move a file without changing its contents. In a sector-based backup, the sector reallocation caused by moving the file is a change that will be included in the next incremental backup, even though you didn't change the file itself.

Note: Although defragmenting the file system does not change file content, it can lead to many sector-level changes, because defragmenting files moves them from one disk location to another.

Incremental backups are hard to properly manage and tend to be troublesome during disaster recovery. It is not uncommon to discover, while trying to recover from a disaster, that an incremental backup is either lost or damaged, making all subsequent incremental backups worthless. In addition, if you accidentally restore incremental backups in the wrong order, the problems you experience may not manifest themselves until some future date, at which point recovery can become almost impossible.

Differential Backups

Differential backups include only data that has changed since the *most recent full backup* was performed. To use this method, you make a full backup at an interval of your choice. In between full backups, you perform differential backups, which include all data that has changed since the last full backup. If you need to restore your entire system, you need to restore the latest full backup followed by the latest differential backup. Unlike incremental backups, which rely on every other incremental backup in the chain, a differential backup relies only on the full backup.

For example, suppose that you are relying on file-based backups and you perform a full backup that includes **FILE1**, **FILE2**, and **FILE3**. Then, you change **FILE2**, and you perform a differential backup. This differential backup will include only parts of **FILE2**, since the other files in the most recent full backup have not changed. If you

then change **FILE3** and perform another differential backup, this differential backup will include both data from **FILE2** and **FILE3**.

A differential sector-based backup includes any sector that has changed or been allocated since you created the last full backup.

Differential backups are easy to manage during disaster recovery because you need to restore only the last full backup followed by the last differential backup. You don't run as much risk of discovering that a backup is damaged or missing, and since you only need to restore two backups, you are not as likely to restore them in the wrong order.

By its nature, the size of a differential backup grows over time. If you wait long enough between full backups, your differential backup could become almost as large as a full backup, and take almost as much time to create.

Appendix C: Introduction to Hard Drive Storage

All modern (circa 2007) personal computers make use of at least one partitioned hard drive. Knowing at least the basics of how hard drive partitioning and file systems work can help you understand how to work with TeraByte Unlimited imaging products. The information about physical hard drives that follows is intended to be a broad overview to provide you with a general understanding of the hard drive.

The Physical Hard Drive

Hard drives contain several round, thin, rigid disks called *platters*. The rigidity of these platters serves as the basis for the terms “*hard disk*” and “*hard drive*”. In the center of each platter is a hole by which the platter is mounted to a spindle. The platters rotate around this spindle at high speed (typically 5,400 to 10,000 rotations per minute, or RPM).



Internal view of a hard drive in operation. The arm appears blurred due to its rapid movement.
Photo courtesy of Michael Blessenohl

The Logical Hard Drive—Hard Drive Data Organization

Data is organized on the platters of hard drives in the form of *tracks* and *sectors*, which are established during manufacturing. The tracks, which exist on each side of each platter, are concentric circles. Sectors are defined by radial lines that go from the center point of the platter to the outer edge.

When you set up a hard drive, you can create logical partitions. A logical partition is simply a conceptual division on the hard disk. You can use different file systems in different partitions, and many users partition hard disks so that they can store different operating systems or segregate data on the same hard drive. If you set up different partitions so that you can use different operating and file systems, you can

use Terabyte's BootIT NG to select the operating system in which you want to work each time you boot your computer.

Formatting is the process that prepares a partition on the hard disk to accept data by creating an empty file system that is organized into clusters. A *cluster*, a logical grouping of contiguous sectors, is the smallest logical unit of storage that you can allocate to hold a file's data.

Figures 1 through 3 depict the layout of files within clusters on a hypothetical partition. In each figure shown, 44 clusters contain data. In **Figure 1**, the *last cluster* in use (that is, the one closest to the bottom/right) is at the very end of the partition.

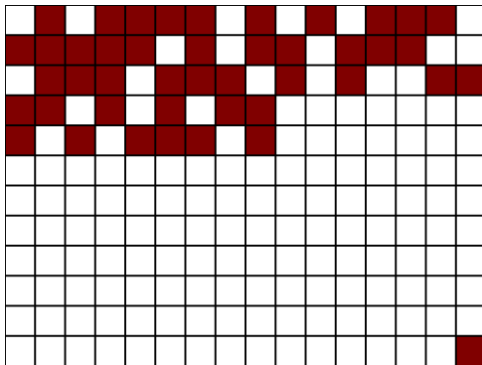


Figure 1

The location of this last cluster at the time that you create an image determines the minimum amount of free space that must be available on the hard drive to which you intend to restore—called the *target drive*.

Note: If you are restoring a partition with an image created using raw mode, or if the partition uses an unrecognized file system, the target drive needs to be equal to the full size of the source partition, regardless of cluster allocation.

Figure 2 shows the same number of clusters in use, but the *last cluster* in use is located in the fifth row, rather than at the very end of the partition:

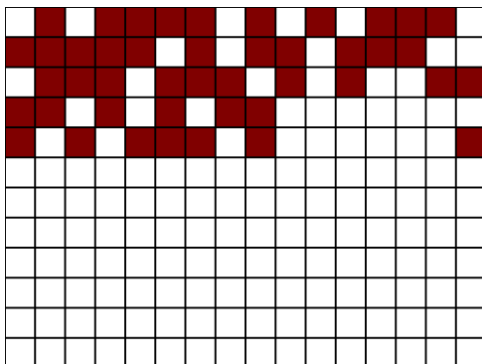


Figure 2

Although **Figure 1** and **Figure 2** depict the exact same number of used clusters, the location of the last used cluster in **Figure 2** allows you to restore an image of that partition to a much smaller target because, when an image is restored, each cluster is placed in a location on the target that is identical, relatively speaking, to its original location on the drive you imaged—called the *source* drive.

Figure 3 shows the same number of clusters in use, but the clusters are arranged optimally, with no unused clusters interspersed.

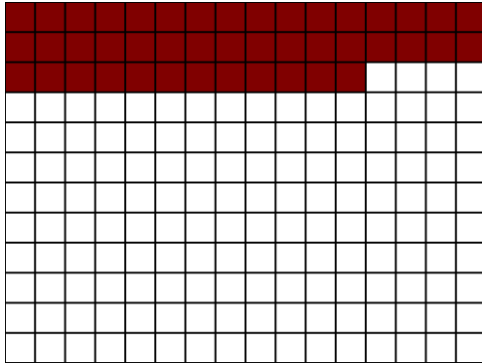


Figure 3

Although the used cluster arrangement of **Figure 3** might be most ideal, you generally can't easily arrange clusters in this way.

Glossary

Hard Drive (HD, HDD)

A high-capacity, non-volatile, data storage device. Hard drives are typically installed inside a computer, out of sight.

Partition

A unique area of a hard drive that is allocated for use by a file system. A hard drive can contain many partitions.

File System

An organized structure that allows data to be stored and accessed by a file name. You can basically think of it as the filing system used by the operating system to store and retrieve your data. On a hard drive, the file system almost always resides in a partition.

Volume

Generally, a volume is considered to be any file system or device that is used to hold data, but, when using Image for DOS, it also represents a specific partition that resides in an extended partition.

Extended Partition

A special type of partition that is divided in to one or more partitions called volumes.

Drive Letter

A single letter that represents a file system in Microsoft operating systems. Since a file system on a hard drive is almost always in a partition or volume, it also represents a partition or volume.

Logical Drive

A term used in Microsoft operating systems to describe the specific drive letters that point to volumes. In practical terms, it is the same thing as a drive letter.

Source

When backing up, “source” refers to the hard drive that you want to back up. When restoring, “source” refers to the location on a storage medium that contains a backup you want to restore.

Target

When backing up, “target” refers to the location on a storage medium (usually a CD/DVD discs, a hard drive partition, or an external hard drive) where you want to store a backup. When restoring, “target” refers to the location on a hard drive where you want to restore a backup you previously created. A restore target can either be an area of free space or a partition. In the latter case, the partition—and any information it contains—will be deleted immediately prior to the restore.

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7. **RESTRICTED RIGHTS - COMMERCIAL COMPUTER SOFTWARE.** The parties acknowledge and agree that: (a) any and all products covered by this Agreement are, and shall be, deemed "commercial computer software" for all purposes in relation to U.S. government acquisition laws, rules and regulations, and (b) all use, duplication and disclosure by, for, or on behalf of the U.S. Government is subject to all conditions, limitations and restrictions applicable to "commercial computer software" as set forth in FAR section 12.212 and in DFAR sections 227.7202-1, 227.7202-3, and 227.7202-4.

8. **GENERAL.**

- (a) **ENTIRE AGREEMENT.** This Agreement constitutes the entire agreement between you and TeraByte in regard to the subject matter herein, and supersedes all previous and contemporaneous agreements, proposals and communications, written or oral between you and TeraByte. No amendment of this Agreement shall be effective unless it is in writing and signed by duly authorized representatives of both parties.
- (b) **NON-WAIVER.** Waiver by TeraByte of any violation of any provision of this License shall not be deemed to waive any further or future violation of the same or any other provision.
- (c) **LAW AND JURISDICTION.** This License and any dispute relating to the Software or to this License shall be governed by the laws of the United States and the laws of the State of Nevada, without regard to U.S. or Nevada choice of law rules. You agree and consent that jurisdiction and proper venue for all claims, actions and proceedings of any kind relating to TeraByte or the matters in this License shall be exclusively in courts located in Las Vegas, Nevada. If a court with the necessary subject matter jurisdiction over a given matter cannot be found in Las Vegas, then jurisdiction for that matter shall be exclusively in a court with the proper jurisdiction as close to Las Vegas as possible, and within Nevada if possible.
- (d) **SEVERABILITY.** If any part or provision of this License is held to be unenforceable for any purpose, including but not limited to public policy grounds, then you agree that the remainder of the License shall be fully enforceable as if the unenforceable part or provision never existed.
- (e) **NON-ASSIGNMENT.** You may not assign this License without the prior written consent of TeraByte, except as part of a sale of all or substantially all of the assets of your business.
- (f) **NO THIRD PARTY BENEFICIARIES.** There are no third party beneficiaries of any promises, obligations or representations made by TeraByte herein.
- (g) **HEIRS AND ASSIGNS.** This Agreement shall be binding on and shall inure to the benefit of the heirs, executors, administrators, successors and assigns of the parties hereto, but nothing in this paragraph shall be construed as a consent by TeraByte to any assignment of this agreement except as provided hereinabove.
- (h) **SURVIVAL.** The provisions of paragraphs 1(b)(iv), 1(b)(vii), 1(b)(ix), 2, 3 and 6 of this Agreement shall survive any termination or expiration of this Agreement.

Image for DOS – Order Form

Text version in file REGISTER.TXT (see web site for additional pricing information)

Send to:

TeraByte Unlimited
10220 Lazy Bear Street
Las Vegas, NV 89131

Registration Name:	Date:		
Mailing Address:	Phone #:		
	Phone #:		
	Fax #:		
E-mail Address:	PC Brand/CPU Type:		
Shipping Address:			
	Primary OS:		
How did you learn about Image for DOS?			
Description	Unit Price	Qty	Extended Price
Image for DOS	\$29.95		\$
			\$
			\$
			\$
			\$
Sub-Total			\$
Shipping and Handling Fees for orders not sent TO YOU via e-mail add \$9.95			\$
Nevada Residents add applicable sales tax			\$
TOTAL CHECK OR MONEY ORDER ENCLOSED*			\$

Check or Money Order must be drawn on a U.S. bank in U.S. Dollars.

If you do not have a US Checking account, you can send an international postal money order or have your bank issue a check on a U.S. bank in U.S. Dollars. Be sure to send this order form whichever method you choose.

☐ Check mailed separately. (Please ask your bank to include your name on the memo line of the check.)