

GHOST SPECIAL EDITION

Installation

and

User's Guide

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1

Introducing Ghost Special Edition

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What is Ghost Special Edition?

Ghost Special Edition is a cloning program. Using Ghost Special Edition, you can copy the entire contents of a hard disk to another hard disk, or you can copy the contents of a partition to another partition. Ghost Special Edition can clone from one computer to another using a parallel cable, and from drive to drive within a single computer. Ghost Special Edition can clone MS-DOS, Windows 95, Windows NT, UNIX, OS/2, Linux, and NetWare operating systems.

Ghost Special Edition is a fast and complete solution for cloning a hard drive, backing up a system, and upgrading to a new hard drive. With Ghost Special Edition, you can easily create and store a compressed image file of an entire hard drive or individual partition on a Jaz, Zip, secondary hard drive, writable CD-ROM or other removable media device. The image file can then be restored from the source and used for disaster recovery, or the installation of a complete operating system onto a new computer.

Using Ghost Special Edition, you can configure a workstation and install operating systems such as Windows 95, Windows NT, and OS/2 in just minutes. This speed is what makes Ghost Special Edition a robust program, saving technical professionals hours of time deploying standard software configurations on similar hardware, thus eliminating all traditional setup times.

With Ghost Special Edition, you can clone multiple workstations, making it particularly useful for organizations having a large number of similarly configured workstations to install. For example, Ghost Special Edition reduces the time to install a typical 300 megabyte Windows 95 system from one hour (with substantial operator input) to approximately five minutes (with no operator input required).

Putting Ghost Special Edition to work

Because Ghost Special Edition clones an entire hard drive, including operating systems, data, and other applications, it is a very flexible tool. Use Ghost Special Edition whenever you need an exact duplicate of a hard drive.

Cloning a computer

There are two methods you can use to duplicate a computer using Ghost Special Edition. You can copy the entire contents from one computer to another over a parallel cable, or you can create an image file on removable media such as Jaz or Zip, and then restore it to the computer you want to clone. For more information, refer to chapter 2.

Upgrading or replacing a hard drive

With Ghost, you can upgrade the hard drive on your desktop computer. If you are replacing your hard drive, and want to keep all of the data from your existing hard drive, you can use Ghost Special Edition to quickly copy all of your data, including boot information and all of your partitions, to the new drive. For more information, refer to chapter 2.

Backing up a hard drive

If you back up for disaster recovery, cloning can be a very useful tool. With ordinary backup programs, you generally need to format a disk and install an operating system before you can restore your data. With Ghost Special Edition, however, formatting and operating system transfer are handled automatically.

There are several ways in which you can do backups using Ghost Special Edition. You can back up a laptop to a desktop, back up to another hard drive, or back up to removable drives, such as Jaz and Zip. With Ghost, the entire contents of a disk are copied to a compressed disk image file. When a hard drive fails, you can restore from the image, reproducing the entire hard drive (down to the boot sector).

Features and benefits of Ghost Special Edition

With Ghost Special Edition, you can configure a workstation in just minutes, and make a complete backup of a hard drive, including “in-use” system files. Ghost is a robust, easy-to-use copying program.

Ghost Special Edition:

- Clones a number of operating systems such as MS-DOS, Windows 95, Windows NT, UNIX, OS/2, Linux, and NetWare.
- Allows you to select individual partitions within a hard drive, instead of copying the entire contents of a hard drive.
- Clones many types of partitions, including NTFS, FAT, FAT32, and VFAT.
- Automatically formats, resizes, and partitions a hard drive while copying data to it.
- Supports the file systems for all versions of Windows 95 and Windows NT, MS-DOS, NTFS, and HPFS partition types.
- Preserves long file names on all file system types (as in Windows 95 and Windows NT).
- Resizes partitions, FAT16, FAT32, and NTFS file systems.
- Spans images across multiple devices, such as Jaz, Zip, and other removable media.
- Verifies the integrity of a hard drive and image files.
- Offers several levels of compression for image files.
- Offers two modes of operation—menu driven (interactive), and batch mode.
- Supports OS/2 extended attributes and boot manager partitions.

How Ghost Special Edition works

Ghost Special Edition copies the entire contents of a hard drive from a source disk to a target disk. In the cloning process, Ghost copies all the partitions within a disk (hard drive) from the source disk to the target disk.

Ghost Special Edition is a MS-DOS-based program which can be run from the hard drive in MS-DOS, from an MS-DOS window (in Windows), or from an MS-DOS boot disk. Because multi-tasking operating systems like Windows 95 and Windows NT operate with open files on the hard drive, it is highly recommended that you run Ghost from MS-DOS so that the image files are an exact copy of your hard drive. In MS-DOS, the hard drive is completely inactive, and no files are open.

With Ghost Special Edition, you can copy information between drives or over a parallel cable. You can work with Ghost in a menu driven (interactive) mode, or in a batch mode. The menu driven mode of operation is simply using the up and down arrow keys on your keyboard. This mode is the default for using Ghost Special Edition. Batch mode, however, is very useful for repetitive situations such as installing a large number of workstations. To use the batch mode, you simply type the commands at the MS-DOS prompt. For more information on batch mode, see page 50.

Cloning complete disks

Using Ghost, you can copy every partition, regardless of the type, from the source (disk or disk image file) to the target disk. Ghost positions each partition or logical drive on the target disk using the same rules as the MS-DOS FDISK utility. If the source and target disks are different sizes, Ghost dynamically partitions and formats the target disk, allowing FAT16, FAT32 and NTFS partitions to be expanded or contracted to fit the target drive.

The source and target disks may be on the same computer, or the target disk may be on a different computer, if the two computers are connected together via the LapLink parallel cable. With Ghost Special Edition, you can copy the contents of a disk to a disk image file. This image file can then be used as a template to create copies of the original disk.

Cloning partitions

With Ghost, you can copy the contents of one partition to another partition, or copy selected partitions to an image file. Once an image file is created, the contents of the selected partition can be loaded onto a target partition. This image file can be used as a template to create copies of the original partitions. The source and target partitions may reside on the same physical drive, or different drives.

Note: The destination partition must be large enough to accommodate the selected partition from the image file. The target partition is defined by FDISK when using partition options; however, they may already be defined on new disks.

Creating and restoring image files

In addition to cloning hard drives and partitions, Ghost Special Edition can also create image files. An image file is a compressed file that includes the complete image of a source hard drive or partition. Typically, you will use an image file in two ways:

- **Backup**—Ghost Special Edition is excellent for full system and partition backups. In this case, you would create an image file and store it on another hard drive, or on a removable drive (Jaz or Zip). In the event of a system problem, you could then use Ghost Special Edition to restore the complete hard drive image.
- **System installation**—Image files are especially useful for saving time if you are setting up multiple computers. First, you would set up one “generic” computer with the operating system, applications, and data files you want to place on all the systems. Then, you run Ghost Special Edition on the generic computer to create a hard drive image file, saving the image file to a “master” computer. You can then quickly install new computers by restoring the image file onto their hard drives, saving hours over the traditional installation process.

2

Working with Ghost Special Edition

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Requirements for using Ghost Special Edition

Before you begin setting up Ghost Special Edition, you should be aware of the following requirements.

- For Windows NT, you will need to start your computer with an MS-DOS boot disk.

Ghost Special Edition clones NTFS type file systems, but you will need to start your computer in MS-DOS mode in order to run Ghost.
- If you are cloning between two computers, you will need a LapLink parallel cable. You will need to set your parallel port as bi-directional, EPP, or ECP.
- If you are cloning the contents of a hard drive to removable media (Jaz or Zip), you will need to create a bootable disk that contains MS-DOS-based drivers for that device. These MS-DOS-based drivers are required for accessing any removable media.

Installing Ghost Special Edition

Before you can use Ghost Special Edition, you will need to install the Ghost program on your computer. If you are going to clone between two computers, you will need to install Ghost on the second computer as well.

To install Ghost Special Edition:

- 1 Insert the LapLink Tech CD-ROM in a CD-ROM drive.

Or, if you downloaded LapLink from the Web, double-click the Welcome.exe file in the folder where you downloaded LapLink.

Note: The LapLink Welcome screen should appear automatically when you insert the CD-ROM; if it does not, open Windows Explorer and double-click the Welcome.exe file on the LapLink CD-ROM.

- 2 On the Welcome screen, click Install Software Now!
- 3 On the Install Software screen, select Install Disk Cloning.

Note: If your computer runs only Windows NT, and uses only NTFS for its file system, you should copy Ghost.exe onto a floppy disk. You can then use a floppy boot disk to start your computer, and run Ghost from the floppy disk.

Starting Ghost Special Edition

How you run Ghost Special Edition depends on which operating system you have on your computer:

- If you have Windows 95, Ghost Special Edition will run automatically in an MS-DOS window when you start Ghost Special Edition.

Note: For some operations, you must start (boot) your computer in MS-DOS mode first, then run Ghost Special Edition. The following Ghost transfer options will not work in an MS-DOS window: Restore Disk from Image File, Clone Partition to Partition, and Restore Partition from Image File.

- If you have Windows NT, you will need to restart your computer with an MS-DOS boot disk, and then run Ghost Special Edition. Ghost Special Edition can clone a Windows NT operating system, but you cannot run Ghost in Windows NT.

For parallel cable connections, you will need to plug a LapLink parallel cable into the printer (LPT) port of both computers.

To start Ghost Special Edition from Windows 95:

- Click the Start button, point to Programs, point to Ghost Special Edition, and then click Ghost Special Edition.

Starting Ghost Special Edition from Windows NT

Ghost can clone a Windows NT operating system. However, in order to run Ghost Special Edition in Windows NT, you will need to restart your computer with an MS-DOS boot disk.

Note: If Ghost Special Edition is installed on an NTFS partition, you will not be able to access the Ghost program while running MS-DOS. Copy the Ghost.exe file to a floppy disk before starting your computer in MS-DOS.

To start Ghost from Windows NT:

- 1 Restart your computer with an MS-DOS boot disk.
- 2 Change to the Ghost directory (by default, this is C:\Program Files\Ghost Special Edition).
- 3 Type **Ghost**, and press ENTER.

Note: This is also the same procedure you use to start Ghost from MS-DOS.

Cloning a computer

Ghost Special Edition offers two ways to clone a computer:

- You can clone *directly*, using a parallel cable (disk to disk), or
- You can clone *indirectly* by saving an image file onto removable media and restoring the image file to another computer.

Cloning directly over a parallel cable

With Ghost Special Edition, you can clone another computer using the parallel cable connection. For example, if you have a computer configured with networking, Microsoft Office and other applications, you can purchase a new computer and automatically set it up with an identical configuration by cloning from the old computer to the new one. To do this, you will need two computers connected by a parallel cable.

To clone a computer via parallel cable (Slave/Master):

- 1 Start Ghost on both computers.
- 2 On the computer that will receive the clone (that is, the one that is new and unconfigured), select Parallel Port–Slave, and press Enter.

Note: By selecting the Slave computer first, your computer will not time out while waiting for a signal from the Master computer. The waiting time for your Master computer to make a connection is approximately two seconds.
- 3 On the computer that is already properly configured, select Parallel Port–Master, and press ENTER.

Note: For the rest of these steps, you will need to issue the commands on the Master computer.
- 4 On the Transfer Option menu, select Clone Disk to Disk, and press ENTER.
- 5 On the Select Local Source Drive screen, select the local source drive, and then press ENTER. If there is more than one drive listed, be sure to select the correct drive. In most cases, drive 1 is used to start (boot) the computer.
- 6 On the Select Remote Destination Drive screen, select the remote destination drive, and then press ENTER. This is the drive that will receive the clone (on the Slave computer).

Caution: This is the drive that will be overwritten, therefore, choose carefully.

7 On the Destination Drive Details screen, press ENTER to confirm the destination drive details.

8 When prompted, select Yes to proceed with disk cloning.

Note: Parallel port speeds vary; cloning will take approximately 3-5 minutes per megabyte of data.

9 When asked, press CTRL+ALT+DEL to restart both computers. Ghost Special Edition will prompt you with the following message:

Clone complete
Press Ctrl+Alt+Del to restart system.

Cloning indirectly using a removable drive

With Ghost Special Edition, you can save an entire disk to a Jaz drive, or multiple Zip drives, and then restore the image to another computer. There are two steps for this process: creating the cloned image, and restoring the image file.

Note: The computer that will receive the clone must be booted from MS-DOS, and must be capable of reading the removable disks.

Preparation: You may need to create a bootable disk that contains any MS-DOS-based drivers that are required to access the removable media, such as drivers for Jaz or Zip drives. In other words, make sure that your MS-DOS boot disk loads the MS-DOS drivers for your Jaz or Zip drives.

Step 1: Create the cloned image

- 1 Ensure that you have ample removable disks to store the cloned image. Ghost can span an image over as many disks as required.
- 2 On the source computer, be sure that the removable drive is working properly, and then start Ghost.
- 3 Select Local/Server on the Connection Type menu, and then press ENTER.
- 4 On the Transfer Option menu, select Save Entire Disk to Image File, and then press ENTER.
- 5 On the Select Local Source Drive screen, select the local source drive, and then press ENTER. This is the drive you want to clone.
- 6 On the File Name To Copy Image To screen, press TAB and ENTER.

- 7 Select the drive you want using the up and down arrow keys, and press ENTER.
- 8 Press TAB once to get your cursor below the word File, type a name for your image file, and then press ENTER.
- 9 When asked whether to compress the image file, select No, Fast, or High, and then press ENTER.

Choosing “No” creates an image file without using any compression, and “Fast” applies some compression. Choosing “High” applies greater compression to make an image file smaller, but at the cost of additional processing time.

If you get the following message: “There may not be enough space—Enable Spanning?”, refer to “Spanning image files across multiple volumes”, page 47.

Note: Be sure to label your removable disks with the file names you assigned when spanning.

- 10 When asked, select Yes to proceed with disk saving (disk dump), and then press ENTER.
- 11 Press any key to continue with the Ghost program.

Step 2: Restore the image file

- 1 Make sure that the receiving computer is started in MS-DOS, and that the removable drive is working.
- 2 Start Ghost Special Edition.
- 3 On the Connection Type menu, select Local/Server, and then press ENTER.
- 4 On the Transfer Option menu, select Restore Disk from Image File, and then press ENTER.
- 5 On the File Name To Load Image From screen, tab to the device list and choose the removable drive letter, then locate your image file. Press ENTER.
- 6 On the Select Local Destination Drive screen, select the local destination drive, and then press ENTER. Choose carefully, this is the drive that will be overwritten.
- 7 On the Destination Drive Details screen, you can change the size of any target FAT or NTFS partition by entering the new size in megabytes.
- 8 Press ENTER to confirm your destination drive details.
- 9 When asked whether you want to proceed with restoring an image file, select Yes, and then press ENTER.

Caution: Only select Yes if you want to proceed; the target drive will be completely overwritten, **with no chance** of recovering any data.

- 10 After restoring an image file is completed, restart your target computer by pressing CTRL+ALT+DEL.

Upgrading or replacing a hard drive

With Ghost Special Edition, you can upgrade or replace an existing hard drive by simply cloning the old hard drive to the new hard drive. The most efficient way to do this is to install the new hard drive in the computer's secondary (Slave) position, and then clone from disk to disk. When cloning is completed, you can move the hard drive to the primary (Master) position and reboot.

To upgrade or replace a hard drive:

- 1 Install your new hard drive (according to the manufacturing directions) as your second hard drive (Slave), and then start Ghost.
- 2 On the Connection Type menu, select Local/Server, and then press ENTER.
- 3 On the Transfer Option menu, select Clone Disk to Disk, and then press ENTER.
- 4 On the Select Local Source Drive screen, select the local source drive, and then press ENTER. This is the original drive, the one you want to copy to the destination drive.
- 5 On the Select Local Destination Drive screen, select the local destination drive, and then press ENTER. This is where the source drive will be copied to.

Caution: This is the disk that will be overwritten, therefore, choose carefully.

- 6 On the Destination Drive Details screen, you can change the size of any destination FAT or NTFS partition, by entering the new size (in megabytes). Ghost will not allow you to enter a value that exceeds the available space, or a value that is not large enough to contain the data stored in the source partition.
- 7 When you are ready to proceed with disk cloning, select Yes, and then press ENTER.

Caution: Select Yes only if you want to proceed; the destination drive will be completely overwritten, with **absolutely no chance** of recovering any data. No is the default for the prompt.

- 8 When asked, press CTRL+ALT+DEL to restart the system.
- 9 Remove the old drive and install the new drive as the primary hard drive (Master), and then reboot your computer.

Backing up using Ghost Special Edition

With Ghost Special Edition, you can back up a hard drive within the same computer, back up onto another computer, or back up onto removable media (Jaz, Zip, or writable CD-ROM drives).

Ghost is an excellent tool for disaster recovery. For example, if your hard drive crashes, you can install a new hard drive and restore a previously created image file of your hard drive onto that drive. The new hard drive will contain an exact replica of the computer when it was last imaged.

To back up a hard drive using the Save Entire Disk to Image File option:

- 1 To back up to removable media or to a second mirror hard drive, select Local/Server on the Connection Type menu. To back up to another computer, select the Parallel connection on the Connection Type menu.
- 2 On the Transfer Option menu, select Save Entire Disk to Image File, and then press ENTER.
- 3 On the Select Local Source Drive screen, select the local source drive, and then press ENTER. This is the drive that you want to copy to an image file.
- 4 On the File Name To Copy Image To screen, press TAB, and then press ENTER.
- 5 Select the drive you want to copy the image file to, and press ENTER.
- 6 Press TAB until your cursor is below the word File and type the full path name of the disk image file (for example, D:\Dupe.gho), and then press ENTER.
- 7 When prompted, select No, Fast, or High for image file compression, and then press ENTER.

Choosing “No” creates an image file without using any compression, and “Fast” applies some compression. Choosing “High” applies greater compression to make an image file smaller, but at the cost of additional processing time.

- 8 When asked, select Yes to proceed with disk saving.
- 9 When prompted, press any key to exit Ghost.

Note: If you are running Ghost in a DOS window, you will need to close the DOS window to exit the Ghost program.

Working with partitions

A partition is a physical separate area of a disk. Only four partitions can exist on a hard drive, and only one primary partition can be active at a time. Once a hard drive is physically formatted, it can be divided into separate partitions.

There are two main types of partitions: primary and extended. A primary partition can store operating systems, applications, and data files. Although up to four primary partitions can exist on a hard drive, only one partition may be “active” at a time. An extended partition can store data and applications, but cannot be made “active”—that is, an operating system cannot boot from it. Only one extended partition can exist on a hard drive, and it can be subdivided into multiple logical partitions.

Ghost can clone a single partition, or make an image file containing a copy of one or more disk partitions. Once an image file has been created, the contents for the selected partition can be saved into the destination partition.

Note: You will need to be in MS-DOS mode in order to have access to two partition options in Ghost: Clone Partition to Partition, and Restore Partition from Image File.

To clone a partition to another partition:

- 1 Select either the Slave/Master (parallel) or the Local/Server connection type on the Connection Type menu.

Note: If you choose the Slave/Master parallel connection type, see the table on page 24 for help in determining which computer is Master and which is Slave.
- 2 On the Transfer Option menu, select Clone Partition to Partition, and then press ENTER.
- 3 On the Select Local Source Drive screen, select the local source drive, and then press ENTER. This is the drive which contains the partition you want to copy to the destination drive.
- 4 On the Select Source Partition screen, select the source partition, and then press ENTER. This is the partition that you want to copy to the destination drive.
- 5 On the Select Local Destination Drive screen, select the local destination drive, and then press ENTER. This is the drive where you want to copy the partition.
- 6 On the Select Destination Partition, select the destination partition, and then press ENTER.

Caution: This partition will be completely overwritten, with **absolutely no chance** to recover any data; therefore, choose carefully.

7 When prompted, press CTRL+ALT+DEL to restart the system.

To save a partition to an image file:

- 1 Select either the Slave/Master (parallel) or the Local/Server connection type.
- 2 On the Transfer Option menu, select Save Partition(s) to Image File, and then press ENTER.
- 3 On the Select Local Source Drive screen, select the local source drive, and then press ENTER. This is the drive that you want to save the partition to the image file.
- 4 On the Select Source Partition screen, type Y to select one or more source partitions, and then press ENTER.
- 5 On the File Name To Copy Image To screen, press TAB, and then press ENTER to select the device (drive) you want.
- 6 Select the local drive, and press ENTER.
- 7 Press TAB until your cursor is below the word File, type the full path name of the image file, and then press ENTER.
- 8 When asked whether you want to proceed, select Yes to proceed with saving a partition to an image file, and then press ENTER.

Note: When the partition copying is complete, Ghost returns you to the MS-DOS prompt.

To restore a partition from an image file:

- 1 Select either the Slave/Master (parallel) or the Local/Server connection on the Connection Type menu.
- 2 On the Transfer Option menu, select Restore Partition from Image File, and then press ENTER.
- 3 On the File Name To Load Image From screen, locate your image file.
- 4 Select the device (drive) you want, and press ENTER.
- 5 If necessary, move to the directory containing the image file, and press ENTER.
- 6 Select the image file you want, and press ENTER.

- 7 On the Select Source Partition From Image File screen, select the source partition from the image file, and then press ENTER. This is the partition that you want to copy to the destination drive.
- 8 On the Select Local Destination Drive screen, select the local destination drive, and press ENTER. This is where the source partition will be copied to.
- 9 On the Select Destination Partition screen, select the destination partition, and then press ENTER. This is the partition from the image file that you want to restore.
- 10 When asked whether to proceed, select Yes to proceed with restoring the partition from the image file, and then press ENTER.

Caution: Only select Yes if you want to proceed; the destination partition will be completely overwritten, with **absolutely no chance** of recovering any data.

- 11 When prompted, restart the destination computer by pressing CTRL+ALT+DEL (when the partition restoration is completed).

3

Ghost Special Edition Command Walk Through

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Selecting the connection type

With Ghost Special Edition, you can choose between two connection types: Local/Server or Parallel Port (cable). The Parallel Port connection is useful when you want to connect two computers in order to do the cloning. Local/Server is the default connection type.

Selecting the Local/Server connection type allows you to copy disks and partitions onto other disks or partitions of a local computer. Also, you can copy disk and partition contents to and from Ghost image files, which you can use for backing up or restoring onto another computer.

To start a Local/Server connection:

- 1 Start Ghost. A welcome screen appears, as in the following illustration.

```

                          About Ghost
    General Hardware Oriented System Transfer
    Copyright © Binary Research Ltd, 1996

    Version  Ghost Special Edition
    Supplier  Traveling Software, Inc.
              Ph (800) 343-8080 or (425)483-8088
    License   Traveling Software Customer
    MaxPCs    1

    Switches  Load=Y,Dump=Y,Disk=Y,Peer=Y,
              Write=Y,Fprnt=Y

    Name      Traveling Software, Inc.
    Address    18702 N.Creek Pkwy
              Bothell, WA 98011

    Press any key to continue
  
```

- 2 Press any key to continue with the Ghost program.

```

                          Connection Type

    Local/Server
    Parallel Port - Slave
    Parallel Port - Master
    Exit
  
```

- 3 On the Connection Type menu, select Local/Server using the up and down arrow keys, and then press ENTER.

From this point on, you can continue using Ghost by selecting any one of the transfer options shown on your screen. For more information on the transfer options, such as Clone Disk to Disk, see page 28.

The other connection type, Parallel, is useful when you want to copy a drive or partition to another computer. Parallel connection speeds are typically 5-8 megabytes per minute. If you select the Parallel connection type, one computer becomes the Master, and the other computer becomes the Slave. Both computers must be connected with the LapLink parallel cable.

Which computer is Slave, and which is Master depends on what action you plan to perform. Use the following table to choose which computer will be Master, and which computer will be Slave.

Action To Take	The Master Computer contains the...	The Slave Computer contains the...
Clone disk to disk	source disk	destination disk
Save entire disk to image file	source disk	destination image file
Restore disk from image file	destination disk	source image file
Clone partition to partition	source partition	destination image file
Save partition(s) to image file	source partition	destination image file
Restore partition from image file	destination partition	source image file

In summary, the Master computer is usually equal to the source computer. However, when restoring from an image file, the Master computer is equal to the destination computer.

To start a Parallel connection:

- 1 Start Ghost. The Ghost Welcome screen appears.
- 2 Press any key to continue with the Ghost program.
- 3 On the Connection Type menu, select Parallel Port—Slave, and then press ENTER.

Note: By selecting the Slave computer first, your computer will not time out while waiting for a signal from the Master computer.

The following screen appears:

```

Slave
Attempting to connect via parallel port [ ]
Press Esc to interrupt
```

- 4 Start Ghost on your other computer (if you have not already done so).
- 5 On the Connection Type menu, select Parallel Port —Master, and press ENTER.

The two computers then connect. Once a there is a connection, the Transfer Option menu appears on your screen.

Note: You will execute all your commands on the Master computer.

Transfer Option
Clone disk to disk... Save entire disk to image file... Restore disk from image file...
Check disk integrity... Check image file integrity...
Clone partition to partition... Save partition(s) to image file... Restore partition from image file...
Back to previous menu

Clone disk to disk

By selecting Clone Disk to Disk, you can copy the entire contents of a disk (including all partitions) from one disk to another. Cloning disk to disk requires three main procedures: selecting the source drive, selecting the destination drive, and confirming the destination drive details.

As you go through each step, Ghost Special Edition automatically displays the details of every disk on your local computer, giving you a chance to cancel out before making any selections.

To clone a disk to another disk:

- 1 On the Transfer Option menu, select Clone Disk to Disk, and then press ENTER.

The following screen appears.

Select local source drive					
Drive	Size in Megabytes	Primary Partitions	Cylinders	Heads	Sectors per Track
1	2055	2	522	128	63
2	3063	2	778	128	63

- 2 On the Select Local Source Drive screen, select the local source drive, and then press ENTER. This is the drive that you want to copy to the destination drive.
- 3 On the Select Local Destination Drive screen, select the local destination drive, and then press ENTER. This is where the source drive will be copied to.

Caution: This is the disk that will be overwritten, therefore, choose carefully.

Select local destination drive					
Drive	Size in Megabytes	Primary Partitions	Cylinders	Heads	Sectors per Track
1	2055	2	522	128	63
2	3063	2	778	128	63

- On the Destination Drive Details screen, you can change the size of any destination FAT or NTFS partition, by entering the new size (in megabytes). Ghost will not allow you to enter a value which exceeds the available space, or a value that is not large enough to contain the data stored in the source partition.

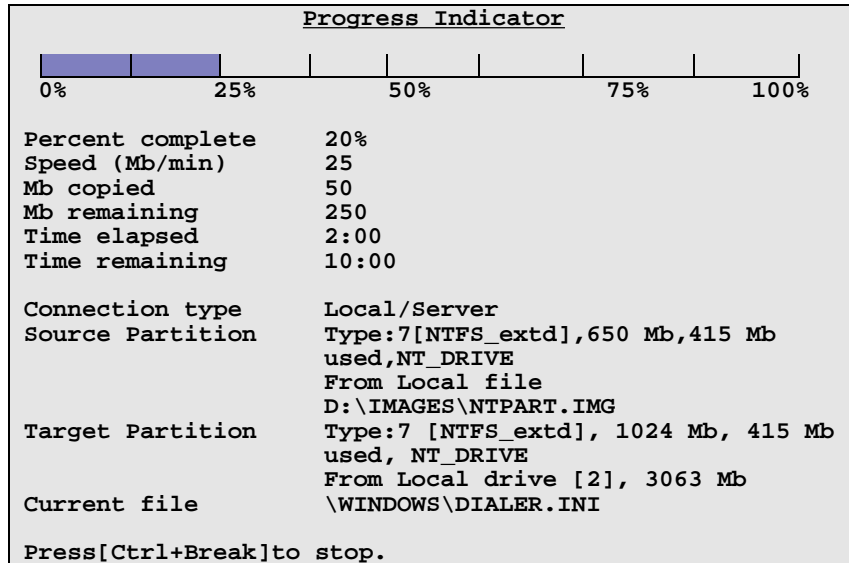
<u>Destination drive details</u>						
Part	Type	Description	Volume Label	New size in Mb	Old size in Mb	Change in Mb
1	06	Fat16 Free	No Name	2445	2012	794
2	04	Fat16	MY_DATA	200	200	0
Total				2645	2212	794

- When you are ready to proceed with disk cloning, select Yes, and then press ENTER.

Caution: Select Yes only if you want to proceed; the destination drive will be completely overwritten, with **absolutely no chance** of recovering any data. No is the default for the prompt below.

<u>Progress Indicator</u>					
0%	25%				
50%	75%				
100%					
Percent complete					
Speed (Mb/min)					
Mb copied					
Mb remaining					
Time elapsed					
Time remaining					
<table border="1"> <tr> <td colspan="2">Proceed with disk clone? - destination drive will be overwritten.</td> </tr> <tr> <td>Yes</td> <td>No</td> </tr> </table>		Proceed with disk clone? - destination drive will be overwritten.		Yes	No
Proceed with disk clone? - destination drive will be overwritten.					
Yes	No				
Connection type	Local/Server				
Source Destination	Local drive [1], 2055 Mb				
Current partition	Local drive [2], 3063 Mb				
Current file					
Press [Ctrl+Break] to stop					

When you select Yes, Ghost Special Edition will copy the entire contents from the source drive to the destination drive. Ghost will update you (using the Progress Indicator) with the following information, as shown below:



When the disk copying is complete, you will need to restart (reboot) the destination computer (as you would after a change made by FDISK).

- 6 When asked, press CTRL+ALT+DEL to restart the system.

Clone complete
Press Ctrl+Alt+Del to restart system.

The Clone Disk to Disk transfer option is now complete.

Save entire disk to image file

By selecting Save Entire Disk to Image File, you can copy the entire contents of a hard drive onto another physical hard drive within the same computer or over a parallel cable.

To save an entire disk to an image file:

- 1 On the Transfer Option menu, select Save Entire Disk to Image File, and then press ENTER.

The following screen appears, displaying the details of every disk on the local computer.

<u>Select local source drive</u>					
Drive	Size in Megabytes	Primary Partitions	Cylinders	Head s	Sectors per Track
1	2055	2	522	128	63
2	3063	2	778	128	63

- 2 On the Select Local Source Drive screen, select the local source drive, and then press ENTER. This is the drive that you want to save an image file.
- 3 On the File Name To Copy Image To screen, press TAB and ENTER.
- 4 Select the drive you want using the up and down arrow keys, and press ENTER. This is where you assign the name of your image file and where you save your image file to.
- 5 Press TAB once to get your cursor below the word File, assign a name to your image file, and then press ENTER.

Note: If you use the Local/Server connection type, the destination disk image file must reside on a local drive.

If you use the Parallel connection type, the image file disk must reside on one of the remote drives.

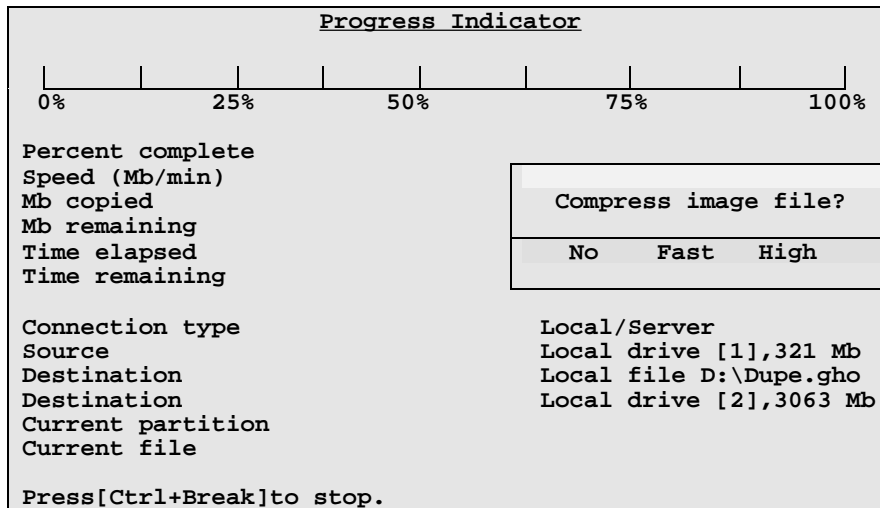
For example, if you are saving the entire contents of a workstation disk to an image file on your D: drive, you must enter the drive letter, subdirectory name, and the image file name, as in the following illustration.

<u>File name to copy image to</u>	
File	Device
D:\Dupe.gho	C:
..	
Ghost.exe	
C:\Ghost*.*	
..	

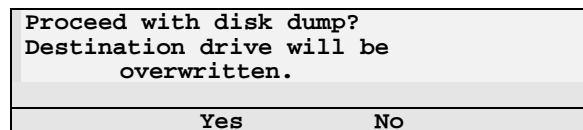
- When asked whether to compress the image file, select No , Fast or High, and then press ENTER.

Choosing “No” creates an image file without using any compression, and “Fast” applies some compression. Choosing “High” applies greater compression to make an image file smaller, but at the cost of additional processing time.

Note: No is the default for no compression. If you select compression, the copying operations are slower. For this reason, you may want to use compression only when you have very limited space on the destination device.



- When asked, select Yes to proceed with disk saving (disk dump), and then press ENTER.



Caution: This is the drive that will be overwritten; therefore, choose carefully.

Once copying begins, Ghost Special Edition will keep updating the Progress Indicator with pertinent information such as how many megabytes are being copied and the speed per minute.

- Press any key to continue with the Ghost program.

The Save Entire Disk to Image File transfer option is now complete.

Restore disk from image file

By selecting Restore Disk from Image File, you can restore the contents of a disk image file onto the disk of the local computer. For example, suppose that your computer has two physical hard drives, C and D. If your drive C crashes, you can restore the image file you created in drive D, and download it to drive C. Or, you can restore a disk from an image file over a parallel cable.

Note: To restore a disk from an image file, you will need to restart your computer in MS-DOS mode. For more information on starting your computer in MS-DOS, see page 10.

As you go through each step, Ghost Special Edition automatically displays the details of every disk on your local computer, giving you a chance to cancel out before making any selections.

To restore a disk from an image file:

- 1 On the Transfer Option menu, select Restore Disk from Image File, and then press ENTER.
- 2 On the File Name To Load Image From screen, press TAB and ENTER to select the drive you want, and then press ENTER.
- 3 Select the drive you want using the up and down arrow keys, and press ENTER. This is the drive you want to restore the image file from.
- 4 Select the image file name using the up and down arrow keys, and press ENTER.

File name to load image from	
File	Device
D:\Dupe.gho	C:
..	
Ghost.exe	
C:\Ghost*.*	
..	

Note: If you use the Local/Server connection type, the source disk image file must reside on a local drive.

If you use the Parallel connection type, the disk image must reside on one of the remote drives.

- On the Select Local Destination Drive screen, select the local destination drive, and press ENTER. This is the drive you want to restore the contents of the image file to.

Select local destination drive					
Drive	Size in Megabytes	Primary Partitions	Cylinders	Heads	Sectors per Track
1	2055	2	522	128	63
2	3063	2	778	128	63

Caution: This is the disk that will be overwritten, therefore, choose carefully.

- On the Destination Drive Details screen, you can change the size of any destination FAT or NTFS partition, by entering the new size in megabytes.

Ghost Special Edition will not allow you to enter a value that exceeds the available space, or which is not large enough to contain the data held in the source partition.

- Press ENTER to confirm your destination drive details.

Destination drive details						
Part	Type	Description	Volume Label	New size in Mb	Old size in Mb	Change in Mb
1	06	Fat16 Free	No Name	2445	2012	794
2	04	Fat16	MY_DATA	200	200	0
Total				2645	2212	794

- When asked whether you want to proceed with disk restoring (disk load), select Yes, and then press ENTER.

Progress Indicator

0% 25% 50% 75% 100%

Percent complete Speed (Mb/min) Mb copied Mb remaining Time elapsed Time remaining Connection type Source Destination Current partition Current file Press [Ctrl+Alt+Del] to stop.	Proceed with disk load? - destination drive will be overwritten. Yes No Local/Server D:\Images\Win95.img Local drive (2), 3063 Mb 1 FAT16 C_Drive \Windows\Dialer.ini
---	--

Caution: Only select Yes if you want to proceed; the destination drive will be completely overwritten, with **absolutely no chance** of recovering any data.

Once copying begins, Ghost Special Edition will update you via the Progress Indicator with information such as how many megabytes it is copying, and the speed per minute.

- 9 Restart your destination computer by pressing CTRL+ALT+DEL after Restore Disk from Image File is complete. Ghost will prompt you with the following message:

`Press Ctrl+Alt+Del to restart system.`

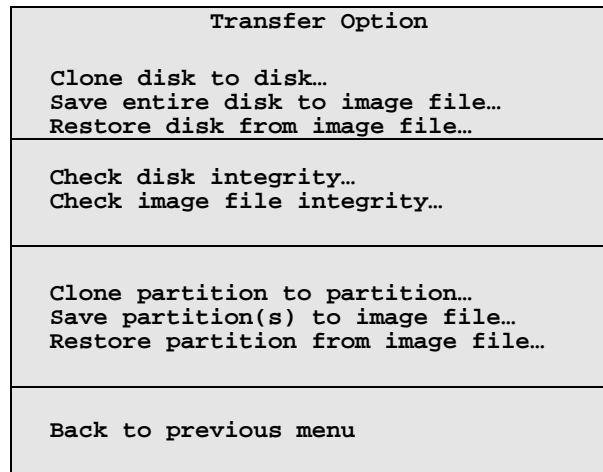
The Restore Disk from Image File transfer option is now complete.

Check disk integrity

By selecting Check Disk Integrity, Ghost Special Edition quickly scans through your specified hard drive and checks the file structures of that particular drive. At the end of this process, Ghost prompts you with a message at the bottom of your screen such as “Disk OK, Data size 114 (megabytes).”

To check the disk integrity:

- 1 On the Transfer Option menu, select Check Disk Integrity, and then press ENTER.



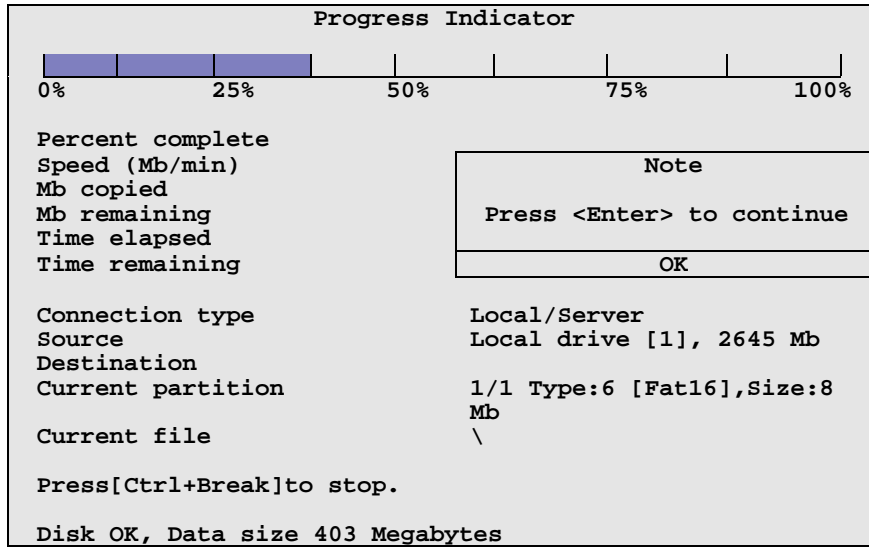
- 2 Select the local source drive you want to check, and press ENTER.

Note: Ghost automatically displays the details of every disk it finds on the local computer.

- 3 When asked to proceed, select Yes to proceed with the integrity check, or No to cancel out.

Yes is the default to proceed with the integrity check. Otherwise, Ghost proceeds with checking the directory structures of the chosen drive.

When Ghost finishes checking the drive, the results will be at the bottom of the screen. In this example, the disk is OK, data size is 403 megabytes.



- 4 Press ENTER to exit the Check Disk Integrity transfer option, which returns you to a blank screen.

The Check Disk Integrity transfer option is now complete.

Check image file integrity

When you choose the Check Image File Integrity option, Ghost Special Edition quickly scans through your specified image file and checks the FAT partition with CRC32, and checks the file structures of that particular image file. This helps ensure that the image file is not corrupted.

To check the image file integrity:

- 1 On the Transfer Option menu, select Check Image File Integrity, and then press ENTER.
- 2 On the Disk Image File Name screen, press TAB to get to the Device (drive) field, and then press ENTER.
- 3 Select the drive where the image file is stored, and press ENTER.
- 4 Press TAB until your cursor is below the word File, and type the full path name of the image file to check. Press ENTER.

Note: If you use the Local/Server connection type, the image file must reside on a local drive.

If you use the Parallel connection type, the image file must reside on one of the remote drives.

Disk image file name	
File	Device
D:\Dupe.gho	C:
..	
Ghost.exe	
C:\Ghost*.*	
..	

- 5 When prompted, select Yes to proceed with the image file integrity check.

Note: No is the default.

- 6 Press ENTER to verify that the image file passed the integrity check.

The Check Image File Integrity transfer option is now complete.

Clone partition to partition

With the Clone Partition to Partition transfer option, you can copy a disk partition to another partition. The destination partition can be on a local disk or on the disk of a computer that is connected via a parallel cable.

Note: The destination partition must be pre-defined using the FDISK utility in MS-DOS.

As you go through each step, Ghost Special Edition automatically displays the details of every disk on your local computer, giving you a chance to cancel out before making any selections.

Note: You will need to be in the MS-DOS mode to clone one partition to another. For more information on the MS-DOS mode, see page 10.

To clone a partition to another partition:

- 1 On the Transfer Option menu, select Clone Partition to Partition, and then press ENTER.
- 2 On the Select Local Source Drive screen, select the local source drive, and then press ENTER. This is the drive that you want to copy to the destination drive.

Select local source drive					
Drive	Size in Megabytes	Primary Partitions	Cylinders	Heads	Sectors per Track
1	2055	4	522	128	63
2	3063	2	778	128	63

- 3 On the Select Source Partition screen, select the source partition, and then press ENTER. This is the partition that you want to clone to the destination drive.

Select source partition from drive: 1						
Part	Type	Description	Volume Label	Size in Mb	Data in Mb	Select (Y/N)
1	06	FAT16	C_Drive	800	356	N
2	06	FAT16 extended	My_Data	540	24	N
3	07	NTFS extended	NT_Drive	650	415	Y
4	07	HPFS extended	OS2Drive	350	273	N
		Free		0		
Total				2340	1068	

- On the Select Local Destination Drive screen, select the local destination drive, and then press ENTER. This is the drive where the source partition will be copied to.

Select local destination drive					
Drive	Size in Megabytes	Primary Partitions	Cylinders	Heads	Sectors per Track
1	2000	2	500	120	63
2	3000	4	700	120	63

- On the Select Destination Partition screen, select the destination partition, and then press ENTER. This is where the source partition will be copied to.

Select destination partition from drive: 2					
Part	Type	Description	Volume Label	Size in Mb	Data in Mb
1	06	FAT16	C_Drive	500	356
2	06	FAT16 extended	Old_Data	540	24
3	07	NTFS extended	NT_Drive	1024	415
4	07	HPFS extended	OS2Drive	994	20
		Free		0	0
Total				3058	815

Caution: This partition will be completely overwritten, with **absolutely no chance** to recover any data; therefore, choose carefully .

- When prompted, select Yes to continue with partition copying (No is the default).

Progress Indicator	
0% 25% 50% 75% 100%	
Percent complete	Proceed with partition copy?- target partition will be overwritten.
Speed (Mb/min)	
Mb copied	Yes No
Mb remaining	
Time remaining	
Connection type	Local/Server
Source Partition	Type:7[NTFS_extd],650 Mb
Target Partition	Local file D:\IMAGES\NTPAR.IMG
Current file	Type:7 [NTFS_extd], 1024 Mb, From Local drive [2],3063 Mb
Press[Ctrl+Break]to stop.	

When Ghost Special Edition begins copying, you will receive updates through the Progress Indicator screen with the following information: percentage complete, megabytes copied, time remaining to copy, source partition and destination partition information.

- When prompted, press CTRL+ALT+DEL to restart the destination computer (when the partition copying is completed).

The Clone Partition to Partition transfer option is now complete.

Save partition(s) to image file

With the Save Partition(s) to Image File transfer option, you can save an exact image copy of one or more disk partitions to an image file. The file can be on a local disk, or on the drive of a computer that is connected via a LapLink parallel cable.

As you go through each step, Ghost Special Edition automatically displays the details of every disk on your local computer, giving you a chance to cancel out before making any selections.

To save a partition to an image file:

- 1 On the Transfer Option menu, select Save Partition(s) to Image File, and then press ENTER.
- 2 On the Select Local Source Drive screen, select the local source drive, and then press ENTER. This is the drive containing the partition that you want to copy to an image file.

Select local source drive						
Drive	Size in Megabytes	Primary Partitions	Cylinders	Heads	Sectors per Track	
1	2055	4	522	128	63	
2	3063	2	778	128	63	

- 3 Type Y to select one ore more source partitions, and press ENTER.

Select source partition(s) from drive: 1						
Part	Type	Description	Volume Label	Size in Mb	Data in Mb	Select (Y/N)
1	06	FAT16	C_Drive	800	356	N
2	06	FAT16 extended	My_Data	540	24	N
3	07	NTFS extended	NT_Drive	650	415	Y
4	07	HPFS extended	OS2Drive	350	273	N
		Free		0		
Total				2340	1068	

- 4 Press TAB and ENTER to select the device (drive).
- 5 Select the local drive where the image file resides, and press ENTER.

- Press TAB until your cursor is below the word, type the full path name of the image file, and then press ENTER.

File name to copy image to	
File	Device
D:\Dupe.gho	C:
..	
DAILYG~1\ EMAILI~1\ C:\MYDOCU~1*.*	
..	

Note: If you use the Local/Server connection type, the destination disk image file must reside on a local drive.

If you use the Parallel connection type, the destination image file must reside on one of the remote drives.

- When asked if you want to compress the image file, select Yes, and then press ENTER (the default is **no** compression).

Choosing “No” creates an image file without using any compression, and “Fast” applies some compression. Choosing “High” applies greater compression to make an image file smaller, but at the cost of additional processing time.

Before Ghost Special Edition starts copying the disk contents to the image file, the source and destination details are shown, giving you the option to cancel out of the Save Partition to Image File transfer option.

Once copying begins, Ghost updates the Progress Indicator with information such as percentage complete, megabytes remaining to copy, connection type, and source and destination drive information.

Note: When the partition copying is complete, Ghost returns you to the MS-DOS prompt.

The Save Partition to Image File transfer option is now complete.

Restore partition from image file

With Restore Partition from Image File, you can restore the contents of a partition image file onto a partition of a local computer.

Note: Although the image file can contain more than one partition, you can choose only one partition at a time. This file can be on a local disk, or on a computer drive that is connected via a parallel cable.

If you are using the Local/Server connection type, then the image file must reside on a local drive. If you are using the Parallel connection type, then the image file must reside on one of the remote drives.

As you go through each step, Ghost Special Edition automatically displays the details of every disk on your local computer, giving you a chance to cancel out before making any selections.

To restore a partition from an image file:

- 1 On the Connection Type menu, select either the Slave/Master (parallel) or the Local/Server connection.
- 2 On the Transfer Option menu, select Restore Partition from Image File, and then press ENTER.
- 3 On the File Name To Load Image From screen, press TAB once to move to the Device list.
- 4 Select the device (drive) and press ENTER.
- 5 If necessary, move to the directory containing the image file, and press ENTER.

File name to load image from	
File	Device
D:\Dupe.gho	C:
..	
DAILYG~1\	
EMAILI~1\	
C:\MYDOCU~1*.*	
..	

- 6 Select the image file you want and press ENTER.

- 7 On the Select Source Partition From Image File screen, select the source partition from the image file, and then press ENTER. This is the partition that you want to copy to the destination drive.

Ghost displays the details of the partitions in the image file, allowing you to select the partition you wish to copy.

Select source partition from image file					
Part	Type	Description	Volume Label	Size in Mb	Data in Mb
1	06	FAT16	C_Drive	500	356
2	06	FAT16 extended	Old_Data	540	24
3	07	NTFS extended	NT_Drive	1024	415
4	07	HPFS extended	OS2Drive	994	20
		Free		0	0
Total				3058	815

- 8 On the Select Local Destination Drive screen, select the local destination drive, and then press ENTER. This is where the source partition will be copied to.

Select local destination drive					
Drive	Size in Megabytes	Primary Partitions	Cylinders	Heads	Sectors per Track
1	2055	2	522	128	63
2	3063	4	778	128	63

- 9 On the Select Destination Partition screen, select the destination partition, and then press ENTER. This is the partition from the image file that you want to restore.

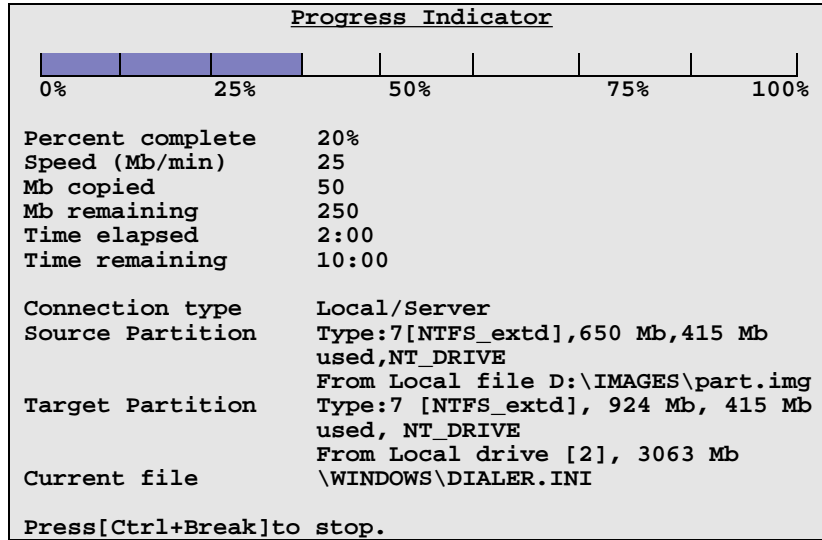
Ghost displays the details of all the partitions on the selected destination drive and allows you to select the partition you wish to restore.

Select destination partition from drive: 2						
Part	Type	Description	Volume Label	Size in Mb	Data in Mb	Select (Y/N)
1	06	FAT16	C_Drive	800	356	N
2	06	FAT16 extended	My_Data	540	24	N
3	07	NTFS extended	NT_Drive	650	415	Y
4	07	HPFS extended	OS2Drive	350	273	N
		Free		0		
Total				2340	1068	

- 10 When asked whether to proceed, select Yes to proceed with restoring the partition from the image file, and then press ENTER.

Caution: Only select Yes if you want to proceed; the destination partition will be completely overwritten, with **absolutely no chance** of recovering any data.

Once restoring begins, the Progress Indicator screen appears, giving you the progress on restoring the partition from the image file, as shown below.



- 11 When prompted, restart the destination computer by pressing CTRL+ALT+DEL (when the partition restoration is completed).

Press Ctrl+Alt+Del to restart the system.

The Restore Partition from Image File transfer option is now complete.

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Appendix A—Checking your disk with MS-DOS utilities

This appendix contains information on MS-DOS disk utilities such as ScanDisk, and FDISK. The ScanDisk utility checks for file system errors and the FDISK utility verifies that there is sufficient space on the destination drive in order to restore the desired partitions from an image file.

- Run a disk utility such as ScanDisk on each partition of the source drive to check for file system errors, and correct any problems.
- Run the MS-DOS FDISK disk utility to verify that there is sufficient space on the destination drive to restore the desired partitions from an image file. With FDISK, you can also create an MS-DOS partition, make a partition active, delete a partition, and display partition information.
- OS/2 users using FAT partitions with extended attributes must have a minimum of five megabytes of free space on each partition so that they can be resized on the destination drive.

To run ScanDisk:

- 1 Click the Windows Start button, and point to Shut Down to restart your computer in MS-DOS mode. **Note:** You can use your MS-DOS boot disk to restart your computer as well.
- 2 On the Shut Down Windows dialog box, click Restart the Computer in MS-DOS Mode, and then point to Yes.
- 3 Type ScanDisk at the MS-DOS prompt. ScanDisk quickly tests the file structures of your hard drive.
- 4 When asked if you want to perform a *surface scan*, select No using the up and down arrow keys, and then press ENTER.

Note: This is optional. If you do decide to perform a surface scan, this will take an additional 15 minutes.

- 5 On the ScanDisk screen, select Exit, and then press ENTER to return to the initial MS-DOS prompt.

To run FDISK:

- 1 Click the Start button, and point to Shut Down to restart your computer in MS-DOS mode. **Note:** You can use your MS-DOS boot disk to restart your computer as well.
- 2 On the Shut Down Windows dialog box, click Restart the computer in MS-DOS mode, and then point to Yes.
- 3 Type FDISK (case insensitive) at the MS-DOS prompt, and press ENTER.
- 4 Select 4 to display partition information.
- 5 Press ESC twice to get out of FDISK.

Appendix B—Spanning image files across multiple volumes

When an image file is too large to save into a single destination drive, Ghost Special Edition will allow you to save a disk or partition image file across multiple volumes (e.g. Jaz, Zip, etc.) in a spanned format. The image file is composed of two or more files called *spans*, which are copied onto separate volumes.

Note: The only constraint in selecting the destination volume is that the image file must not be part of the source selection. For example, the image file can not be on a source disk or a partition if that disk or partition is being included in the image.

How spanning an image file works

When selecting the Save Entire Disk to Image File transfer option, you may not have sufficient free space in your destination drive to fit the image file.

If you don't have enough space, the following message appears:

Not enough space - use compression?		
No	Fast	High

If you select Fast or High to compress an image file, and you still do not have sufficient space, the following prompt appears:

There may not be enough space - Enable Spanning?	
Yes	No

If you choose not to enable spanning, the following message appears:

There may not be enough space - proceed anyway?	
Yes	No

Note: This message is a second warning, letting you know that there is insufficient space on your destination drive.

If you proceed with saving a disk into an image file without spanning your destination drive, you will get the following error message:

Error	
Not enough space: 100 Mb available, 1727 Mb needed.	
OK	

However, if you choose to enable spanning, Ghost will continue to save the image file onto the destination drive until the destination drive is full. If this is the case, the following message appears:

```
Span Volume x Done
Insert the next media and press Enter to
continue...
OK          Filename?
```

When you press ENTER, Ghost will continue with spanning the image file.

You are then prompted to select OK to continue, or specify the file name where you want the image spanned.

If you wish to span across different forms of media, selecting Filename gives you the option to span onto a different location.

Caution: You will need to record where you save your spanned images, and what the file name is for each segment.

If you have a single partition on a drive, or if you are imaging a single partition, Ghost will end on the last spanned volume with no user intervention.

However, if you are imaging a hard drive with multiple partitions, Ghost will record the boundary information onto the first span of the image file. This boundary information is recorded to track the location of the partitions within the spanned set. You are then prompted to confirm that the first span is ready to be updated.

If Ghost needs to write boundary information to the first span, it will prompt you with a message similar to the following example:

```
Re-insert 1st portion of spanned image
D:\D1P1IMG.IMG
```

When saving the partition is complete, you return to the MS-DOS prompt.

Restoring a disk or partition from a spanned image

When restoring a disk or partition from an image file, the process is the same as restoring from a non-spanned image file. For more information on restoring from an image file, see page 31. You are prompted to provide details of each portion of the spanned image:

```
Span Volume x Done
Insert Next media and press Enter to
Continue...
OK          Filename?
```

If you want to continue spanning on the same media, select OK. For example, if you originally spanned onto a Jaz drive and wish to restore a three gigabyte drive from Jaz disks, press ENTER to continue with the next Jaz disk.

If you want to restore from different media, select Filename? to give you the option to restore from a different location.

Caution: You will need to know where you saved the spanned segments of your image file, and the file names of the spans.

When restoring the disk image is complete, you will need to restart the destination computer by pressing CTRL+ALT+DEL (as after a change made by FDISK). Ghost will prompt you with the following message:

```
Press Ctrl-Alt-Del to restart the system.
```

Appendix C—Using Ghost Special Edition in batch files

Ghost Special Edition has two modes of operation: interactive (the default), and batch. The interactive mode requires you to answer questions at discrete intervals, resulting in greater control and efficiency when working with one or two workstations. The batch mode is used by typing any one of a series of command line switches at the MS-DOS prompt.

Batch mode is useful when you are loading image files onto a large number of workstations. Batch mode automates the loading process, saving you time and effort by eliminating the need for you to manually provide input.

Switches for batch mode operation

In order to run in batch mode, Ghost uses a series of command line switches. Each switch contains parameters with specific information such as the source (disk, partition, or image file), the destination (disk, partition, or image file), the type of connection (Local/Server, or parallel port), and the Yes or No confirmation before starting the batch mode. See the *Ghost Switches* table on the next page for a detailed explanation of batch switches.

For example, the following command line would launch Ghost in batch mode to copy drive 1 to drive 2 on a computer, without a final prompt for confirmation:

```
Ghost -clone,mode=copy,src=1,dst=2 -sure
```

Ghost Special Edition will give you a list of command line switches if you type the following at the MS-DOS prompt: **Ghost -h**.

Note: All switches must be preceded with a - (hyphen) or / (slash). Switches are case insensitive. Switches may be entered in upper, lower or mixed case.

The following table lists the available switches and explains the function of each.

Ghost Switches

Switches	Explanation											
-AFILE	Overrides default abort log file with the specified path.											
-CLONE	<p>,mode={COPY LOAD DUMP PCOPY PLOAD PDUMP}, src={drive file}, dst={drive file}, szen={F V nnnnM nnP}</p> <p>CLONE using arguments. This is the most useful of the batch switches, having a series of arguments which are defined as described below:</p>											
	(a) mode	This defines the type of clone command: COPY – copy disk to disk LOAD – restore image file to disk DUMP – save disk to image file PCOPY – copy partition to partition PLOAD – restore image file to partition PDUMP – save partition to image file										
	(b) src	<table border="1"> <thead> <tr> <th>Mode</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>COPY/DUMP</td> <td>Source drive (e.g. 1)</td> </tr> <tr> <td>LOAD</td> <td>Disk image filename (e.g. D:\IMAGES\SYSTEM2.IMG)</td> </tr> <tr> <td>PCOPY/PDUMP</td> <td>Source partition (e.g. 1:2), which indicates the second partition on drive 1.</td> </tr> </tbody> </table>	Mode	Meaning	COPY/DUMP	Source drive (e.g. 1)	LOAD	Disk image filename (e.g. D:\IMAGES\SYSTEM2.IMG)	PCOPY/PDUMP	Source partition (e.g. 1:2), which indicates the second partition on drive 1.		
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COPY/DUMP	Source drive (e.g. 1)											
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	(c) dst	<table border="1"> <thead> <tr> <th>Mode</th> <th>Meaning</th> </tr> </thead> <tbody> <tr> <td>COPY/LOAD</td> <td>Destination drive (e.g. 2)</td> </tr> <tr> <td>DUMP</td> <td>Disk image filename (e.g. D:\IMAGES\SYSTEM2.IMG)</td> </tr> <tr> <td>PCOPY/PLOAD</td> <td>Destination partition (e.g. 2:2), which indicates the second partition on drive 2.</td> </tr> <tr> <td>PDUMP</td> <td>Partition image filename (e.g. D:\IMAGES\DISK1.IMG).</td> </tr> </tbody> </table>	Mode	Meaning	COPY/LOAD	Destination drive (e.g. 2)	DUMP	Disk image filename (e.g. D:\IMAGES\SYSTEM2.IMG)	PCOPY/PLOAD	Destination partition (e.g. 2:2), which indicates the second partition on drive 2.	PDUMP	Partition image filename (e.g. D:\IMAGES\DISK1.IMG).
Mode	Meaning											
COPY/LOAD	Destination drive (e.g. 2)											
DUMP	Disk image filename (e.g. D:\IMAGES\SYSTEM2.IMG)											
PCOPY/PLOAD	Destination partition (e.g. 2:2), which indicates the second partition on drive 2.											
PDUMP	Partition image filename (e.g. D:\IMAGES\DISK1.IMG).											
	d) szen	The szen argument is used to set the size of the destination partitions for either a disk restore or a disk copy operation.										
		<table border="1"> <tbody> <tr> <td>F (Fixed)</td> <td>This indicates that partitions have the same size as the original source partition.</td> </tr> <tr> <td>nnnnM</td> <td>This indicates that the partition is to have a size of nnnn Mb.</td> </tr> <tr> <td>mmP</td> <td>This indicates that the partition is to have a size of mm percent of the target disk.</td> </tr> </tbody> </table>	F (Fixed)	This indicates that partitions have the same size as the original source partition.	nnnnM	This indicates that the partition is to have a size of nnnn Mb.	mmP	This indicates that the partition is to have a size of mm percent of the target disk.				
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nnnnM	This indicates that the partition is to have a size of nnnn Mb.											
mmP	This indicates that the partition is to have a size of mm percent of the target disk.											

Switches	Mode	Meaning
	F	Resizes the <u>first</u> partition to the maximum size allowed based on the file type.
	L	Resizes the <u>last</u> partition to the maximum size allowed based on file type.
	V (Variable)	Indicates that the partition will be resized according to the following rules: Rule 1: If the destination disk is larger than the original source disk, then the partition(s) will be expanded to have the maximum amount of space subject to the free space available and the partition type (e.g. FAT16 partitions will have a maximum size of 2048 Mb). Rule 2: If the destination disk is smaller than the original source disk, the free space left over after the data space has been satisfied will be distributed between the destination partitions in proportion to the data usage in the source partitions.
Switches	Explanation	
	<p>The following examples will help illustrate how these command line switches work.</p> <p>To copy drive 1 to drive 2 on the same computer, without a final prompt: Ghost -clone,mode=copy,src=1,dst=2 -sure</p> <p>To copy drive 1, second partition on a computer to drive 2, first partition on the same computer, without a final prompt: Ghost -clone,mode=pcopy,src=1:2,dst=2:1 -sure</p> <p>To save the disk image file SAVEDSK.IMG onto drive 1 of the local computer (do not prompt if OK to proceed): Ghost -clone,mode=load,src=D:\SAVEDSK.IMG,dst=1 -sure</p> <p>To clone a three-partition disk while keeping the first partition on the destination drive the same size as the source disk, but divide up the remaining space between the other partitions, leaving no unallocated space: Ghost -clone,mode=copy,src=1,dst=2,size1=F,size2=V,size3 =V</p>	
-DD	This option saves disk metrics to the log file.	
-DFILE	Overrides the default dump log file with the specified path.	
-DI	D iagnostics. This is useful for debugging purposes. For each disk present on the computer, the physical attributes such as drive, cylinders, heads, sectors (per track) and total sectors are displayed. For each partition present on each disk, the number, type, physical/logical flag, starting and number of sectors are displayed.	

Switches	Explanation
-FX	F lag E xit. Normally when Ghost has finished copying a new system to a disk, it prompts you to restart your computer by pressing CTRL+ALT+DEL. However, if Ghost is being run as part of a batch file, it is sometimes useful to have it just exit back to the MS-DOS prompt after completion so that further batch commands may be processed. -FX enables this. See -RB for another option on completing a clone.
-F64	Allows 64K of cluster size when loading from old image files.
-FNX	Disables Extended INT13 Support.
-LPM	LPT Master mode . This switch causes Ghost to automatically go into LPT master mode, which is equivalent to selecting the Parallel Port - Master option from the Connection Type menu. For more information on the master mode, see page _.
-LPT	LPT Slave mode . This switch causes Ghost to automatically go into LPT slave mode, which is equivalent to selecting the Parallel Port - Slave option from the Connection Type menu. For more information on the slave mode, see page _.
-NTD	Enables NTFS internal diagnostic checking.
-NTC	Enables NTFS contiguous cluster run allocation.
-NTN	Inhibits CHKDSK on NTFS Volume boot.
-NTIC	Ignores the NTFS volume CHKDSK bit.
-NTIL	Ignores non-empty NTFS Log File Check (inconsistent volume).
-OR	O VERRIDE, allows the user to override Ghost internal space and integrity checks.
-QUIET	Disables status updates and user intervention.
-RB	R e B oot after finishing a load or copy. After completing a load or copy operation, the target computer must be rebooted so that the operating system can load the new disk / partition information. Normally, Ghost prompts the user to Press Ctrl-Alt-Del to reboot in a similar way to FDISK. -RB tells Ghost to automatically reboot after completing the clone, and is useful when automating Ghost in a batch command file. See the -FX switch for another option on the completion of a clone.
-SPAN	Enables Spanning across volumes.
-SPLIT=x	Use this to create a "forced" size volume set. For example, if you would like to force smaller image files from a 1024-megabyte drive, you could specify 200-megabyte segments. For example, Ghost -SPLIT=200 will divide the image into 200-megabyte segments.
-SURE	Use the -SURE switch in conjunction with -CLONE to avoid being prompted with the final PROCEED WITH DISK CLONE-DESTINATION DRIVE WILL BE OVERWRITTEN question. This command is useful in batch mode.
-XINT13ON	Forces the use of BIOS Extended Int13 system calls, if present.
-Z	Forces compression to be used when copying a disk or a partition to an image file. Note: Using this option will cause the operation to be slower; therefore, it is recommended that you store the image file without compression if there is insufficient space on the destination device.

Appendix D—Frequently Asked Questions

- Q. Can Ghost Special Edition for MS-DOS handle long file names for Windows 95, Windows NT and OS/2?**
- A. Yes. Ghost works underneath the file system interface and deals directly with the low level file structure. All file systems are transferred intact.
- Q. Will Ghost work with mixed SCSI and IDE drives?**
- A. This depends on the operating system you have on your computer. If you have either OS/2 or Windows NT, Ghost will do the copying (cloning) successfully. However, when you restart your computer (after the copying is complete), the correct disk drivers may not be present.
- Q. Can Ghost compress a disk image?**
- A. Yes, for disk images for FAT (Windows 3.x), VFAT (Windows 95) and NTFS (Windows NT) which include only the data for directories and files. For other partition types, the partition is treated like a “black box” meaning all sectors are copied.
- Q. My computer has Windows 95, Windows NT, and OS/2 operating systems. Will Ghost work with multiple operating systems?**
- A. Yes, but this is subject to any limitations on the operating system. For example, for Linux and SCO UNIX operating systems, the destination disk must be identical to the source disk.
- Q. Does Ghost support Windows 95 with its FAT32 tables?**
- A. Yes.
- Q. Does Ghost work with NTFS file systems?**
- A. Yes. Ghost copies the partitions, and, if necessary, will resize them in the same manner as in FAT partitions.
- Q. Does Ghost work with HPFS file systems?**
- A. Yes.
- Q. Can Ghost work with Windows NT? What about SIDS (Security Identifiers)?**
- A. Yes, Ghost will work with Windows NT. Care must be taken, however, when cloning Windows NT workstations to avoid SID problems.

Frequently Asked Questions (continued)

- Q. Can a Windows NT system be replicated to a different size disk?**
- A. Yes.
- Q. When I do a `dir /a /s` on the original hard drive (from the root) I get 4,295 files, but on the destination drive I get 4,294 files. Why?**
- A. When copying a FAT partition, some temporary files are not included. These are SWAPPER.DAT, WIN386.SWP, SPART.PAR, PAGEFILE.SYS and 386SPART.PAR. Excluding these files speeds the copying process, therefore reducing the size of the disk image file.
- Q. How does Ghost load an image back to the hard drive without first formatting the hard drive?**
- A. To save time, Ghost formats "on the fly".
- Q. When I copy an image from a 200 megabyte hard drive to a one gigabyte hard drive, what happens to the rest of the 800 megabyte free space?**
- A. The free space gets formatted and becomes part of the partition. Then the 800 megabyte free space becomes available for immediate use.
- Q. How fast does Ghost work?**
- A. This depends on what Ghost is doing, and the speed of the system. For disk-to-disk copying via disk controller, speeds range from 20 to 100 megabytes per minute. Copying over LapLink parallel cables gives transfer rates of 5-8 megabytes per minute.
- Q. I launched Ghost and received the following error message, "Bad GET Parameter...". What does this mean?**
- A. If you have two drives in the system, be certain that only one is the master, and the other is the slave. This message indicates that the master/slave relationship is NOT proper. If you have just one drive in the system, ensure that all cables are firm and that FDISK can load and see the drive properly.
- Q. What is the best way to launch Ghost?**
- A. It is best to execute Ghost at the true MS-DOS level, and not in a MS-DOS window inside the operating system. To do this, you can create a MS-DOS bootable diskette, start your computer with the MS-DOS boot disk, then launch Ghost.

Frequently Asked Questions (continued)

- Q. I know it is best to launch Ghost outside any operating system, but then I won't have access to the, Jaz, Zip, or CD-ROM drive for saving and restoring disk images. How do I work around this?**
- A. Create a bootable diskette with nothing on it except the MS-DOS-based drivers for the removable media, which are required for access to the above devices.
- Q. Can Ghost compress an image file?**
- A. Yes. Ghost has different levels of compression available.
- Q. Does Ghost support writing directly to a SCSI tape drive?**
- A. Versions 3.2 and greater support writing directly to SCSI DAT devices.
- Q. Does Ghost resize FAT32 partitions?**
- A. Yes.
- Q. Will Ghost save and load UNIX and NetWare drives?**
- A. Ghost should be able to save and load UNIX and NetWare volumes. However, resizing is not available. Also, the hardware must be identical between the source and destination systems.
- Q. Does Ghost support Macintosh?**
- A. No.
- Q. I accidentally specified the wrong drive for cloning. Is it possible to restore the original contents of a hard drive?**
- A. No. Ghost completely overwrites the destination hard drive. You must be careful of your selection before you proceed with cloning.
- Q. Does Ghost support spanning multiple Jaz or Zip drives?**
- A. Yes.

Appendix E—Glossary of Terms

This glossary contains software-related terms as well as terms used in Ghost Special Edition.

Batch Mode	Starting Ghost Special Edition with command-line switches, so that the program runs automatically with little or no user interaction.
BIOS	Basic Input/Output System. The BIOS is the program code stored in a computer's ROM to restart the machine and provide basic services such as low-level hard drive access.
Cylinders	A parameter with heads and sectors/tracks, which defines the size of a disk.
Destination	The drive that is copied to during a copy operation.
Disk	A hardware device to store data, typically made up of a Master Boot Record, and a number of partitions.
Drive	Another name for a partition, which is accessed by a drive letter such as C.
Extended Partition	One of two types of partitions (the other being the primary partition). An extended partition can store data and applications, but cannot be made "active"—that is, an operating system cannot boot from it. Only one extended partition can exist on a hard drive, but (unlike primary partitions) the extended partition can be subdivided into multiple logical partitions. Each logical partition is identified by its own drive letter (D:, E:, etc.)
FAT	File Allocation Table. File system used by MS-DOS, Windows 95, Windows NT, and sometimes OS/2 to allocate space to files and directories.
FAT32	FAT32 is an upgrade to the FAT file system which is based on the 32-bit file allocation table entries. FAT32 supports larger volumes, up to two terabytes.
GB	Gigabyte. The size of a gigabyte is 1,073,741,824 bytes.
HPFS	High Performance File System. This is an alternative to a FAT file system which is used by OS/2.

Glossary of Terms (continued)

Interactive Mode	An operation mode where the program's responses alternate with user commands, each being dependent upon the other.
MB	Megabyte. The size of a megabyte is 1,048,576 bytes.
NTFS	New Technology File System. An alternative to FAT and HPFS file systems used by Windows NT.
Partition	A contiguous area of disk space on a hard drive, identified in the drive's Master Boot Record. Every partition contains one type of file system (such as FAT, FAT32, HPFS, NTFS, etc.).
Primary Partition	One of two types of partitions (the other being the extended partition). Operating systems, applications, and data files can be stored in a primary partition. Although up to four primary partitions can exist on a hard drive, only one at a time may be "active" (meaning that the system can boot the operating system from the partition). A primary partition is assigned a single logical drive letter such as C:, D:, etc.
Sector	A 512 byte area on a disk which is the smallest addressable unit.
Track	A group of sectors which make up one ring on a disk platter.
Volume	Synonymous with partition.

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