

Norton Ghost™ User's Guide



Norton Ghost™ User's Guide

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Documentation version 6.8

PN: 10024709

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Contents

Chapter 1	About Norton Ghost	
	Introducing Norton Ghost	14
	What's new in Norton Ghost 2003	14
	How Norton Ghost works	15
	Virtual Partition	15
	Hardware restrictions	16
	Preparing for an emergency	16
	Norton Ghost components	17
	Norton Ghost wizards	17
	Norton Ghost executable	21
	Ghost Boot Wizard	22
	Ghost Explorer	22
	GDisk	23
	Ghost Walker	24
Chapter 2	Installing Norton Ghost	
	Minimum system requirements	26
	Ghost.exe	26
	CD and DVD writing	26
	Supported backup media	26
	File systems supported for backup, restore, and cloning tasks	27
	Disaster recovery requirements	27
	Installing Norton Ghost	27
	Installing Norton Ghost if purchased with Norton SystemWorks Pro	28
	Installing Norton Ghost	29
	If the opening screen does not appear	29
	Registering Norton Ghost	29
	Updating Norton Ghost	31
	Uninstalling Norton Ghost	31

Chapter 3	Backing up, restoring, and cloning from Norton Ghost	
	When to use Norton Ghost in Windows	34
	Starting Norton Ghost in Windows	34
	Starting Norton Ghost from the tray icon	35
	Creating a backup image file	36
	Restoring your computer from an image file	37
	Cloning a hard disk or partition	39
	Launching Ghost.exe peer-to-peer	40
	Identifying a hard disk	43
Chapter 4	Setting options and defaults	
	Setting Norton Ghost options and defaults	46
	Adding command-line switches to a task	47
	Assigning a drive letter to a CD/DVD drive	47
	Setting the options for a mapped network drive	47
	Setting display options	48
	Setting the DOS version	49
	Setting the image integrity check default	51
	Setting a compression level	51
	Assigning a password to an image file	52
	Adding free space to the Virtual Partition	52
	Installing SCSI drivers	53
	Setting external storage device drivers	54
	Setting TCP/IP drivers	54
	Setting LPT peer-to-peer drivers	55
	Installing extra drivers	56
	Installing USB peer-to-peer drivers	57
	Running your computer from the Virtual Partition	57
	Restarting your computer from the Virtual Partition	58
	Checking the integrity of an image file	58
	Viewing the task log	59
	Starting Ghost.exe	59
	What to do if a task fails	60

Chapter 5	Image file options	
	About Norton Ghost image files	62
	Image files and compression	62
	Performance expectations on a network	63
	Image files and CRC32	63
	Image files and volume spanning	63
	Standard image files	63
	Limitations on the image file size	64
	Size-limited image files	64
	Spanned image files	64
	Spanning across multiple volumes and limiting span sizes	65
	Restoring from a spanned image	65
	Image files and tape drives	66
	GoBack and Norton Ghost	67
	GoBack and Ghost.exe	67
	Dynamic disks in Windows 2000/XP	68
	Hibernation and swap files	69
Chapter 6	Creating boot disks with the Ghost Boot Wizard	
	Introducing the Norton Ghost Boot Wizard	72
	What is a Ghost boot disk	72
	When to create a Ghost boot disk	72
	How to use a Ghost boot disk	72
	Files included on a Ghost boot disk	73
	When to include MS-DOS on a boot disk	73
	Creating a recovery boot disk	73
	Opening the Ghost Boot Wizard	74
	Creating boot disks and boot images	75
	Standard boot disks	76
	Boot disks with network support	79
	Boot disks with CD-ROM and DVD support	81
	Boot disks with drive mapping network support	82
	Selecting a template	84
	Multicard templates and the boot disk	85
	Adding network drivers to the Ghost Boot Wizard	86
	Adding packet drivers to the Ghost Boot Wizard	86
	Adding NDIS2 drivers to the Ghost Boot Wizard	87
	Customizing the template	88
	Adding command-line parameters to a boot package	88
	Providing MS-DOS	89

Chapter 7	Backing up, restoring, and cloning from DOS	
	An overview of using Ghost.exe	92
	Starting the Norton Ghost executable	93
	Marking your disks	94
	Navigating without a mouse	94
	Establishing a peer-to-peer connection with Ghost.exe	95
	Creating a backup image file	97
	Backing up a hard disk to an image file	97
	Backing up a partition to an image file	99
	Restoring from an image file	101
	Restoring a hard disk from an image file	101
	Restoring a partition from an image file	103
	Cloning disks and partitions	104
	Cloning disk to disk	105
	Cloning partition to partition	106
	Verifying image integrity	107
	Adding switches to your Ghost operation	108
Chapter 8	Backing up and restoring with CD-R/RW and DVD-R/RW	
	Image files and CD/DVD writers	112
	Saving an image file directly to a CD-R/RW or DVD-R/RW drive	113
	Saving an image file to an unsupported CD-R/RW or DVD-R/RW drive	114
	Splitting an image file during a backup	115
Chapter 9	Using Ghost Explorer to modify image file contents	
	Understanding Ghost Explorer	118
	Viewing image files	119
	Launching a file	119
	Extracting a file or directory from an image file	120
	Modifying image files in Ghost Explorer	120
	Adding, moving, and deleting files	121
	Listing the contents of an image file	121
	Setting span file sizes	121
	Splitting an image file	122
	Compiling a file	122
	Determining Norton Ghost image file version	123
	Using Ghost Explorer from the command line	123
	Using Ghost Explorer with long file names	125

Chapter 10	Managing partitions using GDisk	
	Introducing GDisk	128
	Running GDisk	128
	Overview of main command-line switches	129
	Online Help for command-line switches	130
	Switches common to all GDisk commands	130
	Creating a partition	131
	Reinitializing the Master Boot Record	132
	Showing information about disks	133
	Performing multiple GDisk operations using batch mode	134
	FAT16 partitions in Windows NT	135
	Deleting and wiping your disk	135
	Activating or deactivating a partition	137
	Hiding or un hiding a partition	137
	Modifying the Windows NT/2000/XP boot menu	138
	Specifying the boot.ini path and file name	138
	Displaying the list of current boot entries	138
	Adding an entry to Boot.ini	138
	Removing an entry from Boot.ini	141
	Setting the default boot option and timeout	141
	Support for Large Hard Disks	142
Chapter 11	Updating Security Identifiers (SIDs) and computer names	
	Making SID changes with Ghost Walker on Windows NT-based	
	clients	144
	Norton Ghost Walker capabilities	144
	Norton Ghost Walker limitations	144
	SID changing limitations	145
	Loss of access to external data objects	145
	Identical user names and passwords across workstations	145
	Using Ghost Walker	146
	Running Ghost Walker from the command line	148
Appendix A	Command-line switches	
	Using Norton Ghost with switches	154
	Command-line switches	154
	Clone switch usage	166
	Defining the type of clone command	166
	Setting a source for the clone switch	167
	Setting a destination for the clone switch	169
	Setting a destination size for the clone switch	169
	Examples of clone switch usage	170

-CRC32 switch usage	172
Examples of -CRC32 usage	173
Files not checked with CRC	174
Ghost.exe and the Virtual Partition	175

Appendix B Transfer methods and hardware setup

Transfer and hardware requirements	178
Peer-to-peer connections	178
SCSI tape drives	179
Removable media	179
CD/DVD usage	179
Internal drives	180
Third-party devices	180

Appendix C USB and DirectParallel Cables

Parallel Technologies cables	182
Other USB cables	182

Appendix D The Wattcp.cfg network configuration file

The Wattcp.cfg configuration file	184
Wattcp.cfg key words	184

Appendix E Cloning with Linux

Supported configurations	188
Position of disk	188
Boot configuration	188
Norton Ghost utility support	189

Appendix F Troubleshooting

Ghost.exe error messages	192
Problems running Norton Ghost	193
Card not found/Card not installed	193
Creating an image on an NTFS partition	193
Cannot start from drive A	193
Windows NT blue screen	194
Missing hibernation file	194
Computer fails to restart	194
Getting out of the Virtual Partition	195
Cancelling a Ghost.exe operation	195
Installing and uninstalling Norton Ghost	195
Connecting using USB peer-to-peer	196

Writing to a recordable CD or DVD	196
Supported CD-R/RW and DVD drives	196
Inaccessible CD-ROM drive	197
CD-R/RW disc	198
Using the correct boot disk	199
Loading CD-R/RW drivers	199
If the CD-R/RW does not appear in the list of destination drives	199
Loading Ghost.exe from the floppy disk drive	199
Outdated computer BIOS	199
Outdated CD-R/RW drive BIOS	200
Using PC-DOS or MS-DOS	200
High compression	200
Using third-party software to write to the CD-R/RW disc	200

Appendix G Diagnostics

Hard drive detection and diagnostic information	202
View Log	202
Abort error file (Ghosterr.txt)	202
Creating a full diagnostic statistics dump summary	202
Testing TCP/IP functionality	203

Appendix H Installing Norton Ghost from the command line

Choosing an interface type for installation	206
Choosing an installation mode	206
Installing from the command line	207
Uninstalling from the command line	208

Service and support solutions

Glossary

Index

CD Replacement Form

About Norton Ghost

This chapter includes the following topics:

- [Introducing Norton Ghost](#)
- [What's new in Norton Ghost 2003](#)
- [How Norton Ghost works](#)
- [Norton Ghost components](#)

Introducing Norton Ghost

Norton Ghost protects your data from computer disasters. The intuitive Windows interface lets you create backup images of your hard disk or selected partitions. You can clone directly between two computers using a network, USB, or parallel connection. Norton Ghost is based on the robust cloning technology of Symantec Ghost Enterprise.

Norton Ghost includes the following features:

- **Backup flexibility:** Back up directly to a wide range of hard drives and removable media, including CD-R/RW drives, FireWire and USB hard drives, DVD devices, Iomega, ZIP, and JAZ drives.
- **Peer-to-peer communication:** Fast peer-to-peer communication using high-speed parallel, USB, or network IP connections.
- **Operating system support:** You can back up, restore, or clone computers installed with DOS, Windows 2000/XP/NT/9x, OS/2, or Linux.
- **File system support:** You can back up, restore, or clone FAT, FAT32, NTFS, and Linux Ext2/3 file systems.
- **Image file editing:** Ghost Explorer lets you edit FAT and FAT32 image files.
- **Restore individual files:** Ghost Explorer lets you restore individual files from an image file.
- **Disk and partition management:** You can run GDisk from DOS or in a command shell from within Windows to manage partitions and disks.
- **Tutorials:** A set of tutorials is included in Norton Ghost to provide a demonstration of the most commonly used functions.

What's new in Norton Ghost 2003

- **Windows user interface:** You can launch Norton Ghost directly from Windows without having to restart your computer.
- **Virtual Partition:** Eliminates the need for a boot disk in most situations.
- **Linux support:** You can back up, restore, and clone EXT3 file systems.
- **NTFS support:** Norton Ghost now writes to NTFS partitions. You can store an image file on an NTFS drive and restore from an image file located on an NTFS drive.

- **Mapped network drives:** A computer on a network can be mapped to a drive letter. This lets Norton Ghost see the computer as a local drive and back up to and restore from it.
- **Ghost Walker:** This utility lets you update Security Identifiers (SID) and computer names. Ghost Walker was previously available only in Symantec Ghost, the corporate version of Norton Ghost.
- **Support for FireWire, USB 1.1, USB 2.0:** You can now use Norton Ghost to back up, restore, and clone to and from FireWire, USB 1.1, and 2.0 devices, including hard disks and supported CD-R/RW and DVD drives.
- **DVD support:** You can use Norton Ghost to back up to and restore from supported DVD+ R/RW and DVD-R/RW drives.
- **Expanded CD-R/RW support:** The CD-R/RW drives supported by Norton Ghost have been increased to include most new drives.
- **Large drive support:** Norton Ghost supports backing up, restoring, and cloning IDE drives larger than 128 GB.

How Norton Ghost works

The basis of Norton Ghost is a cloning function that creates an image file that contains all of the information required to recreate a complete disk or partition. Image files contain a backup copy of an entire drive or one or more partitions. The image file can be restored to one or more partitions or disks, replacing existing data.

Virtual Partition

The Virtual Partition is a partition that is created when you perform a backup, restore, clone, or other operation from Windows. All the files required for the backup, restore, or clone are automatically installed into the Virtual Partition and the task performed. Most of the Virtual Partition operation is not apparent to you. However, there may be some occasions when you must know what the Virtual Partition is and what it does, such as if you want to run Ghost.exe or another application from the Virtual Partition.

One primary partition slot must be available in the MBR for the Virtual Partition.

Hardware restrictions

Norton Ghost is designed to restore to and clone identical hardware. When Microsoft Windows is installed, drivers necessary to support your hardware are installed to the hard disk and recorded in the Windows Registry. If you move an installation of Windows to another computer, either by directly moving the hard disk or copying it using a Ghost operation, there is no guarantee that it will boot or function correctly. Although Microsoft provides tools, such as Sysprep, that may alleviate these problems to volume license holders, these tools are usually unavailable to consumer or small business users.

A computer with Windows installed should be copied to a computer with identical hardware. Moving or cloning file systems that do not contain an operating system does not usually present a problem.

Preparing for an emergency

After you have installed Norton Ghost and created a backup image, you must create and test a recovery boot disk for use in an emergency. If you experience a critical failure and cannot start your computer, then you must have a recovery boot disk. This lets you start your computer in DOS and run Norton Ghost to restore your computer.

Note: If you saved your image file directly to CD or DVD, then you do not need a recovery boot disk. Norton Ghost includes Ghost.exe if you save the image file to CD or DVD.

There are two methods of restoring your computer:

- Norton Ghost
If you are able to start in Windows, then you may be able to run Norton Ghost from Windows on your hard disk and restore your computer with the latest backup image file that you have created.
See [“Restoring your computer from an image file”](#) on page 37.
- Ghost.exe
If you cannot start Windows, then you must start your computer from a recovery boot disk or CD/DVD. This starts your computer and starts Norton Ghost in DOS. From Norton Ghost, you can access your image file and restore your computer to the latest backup image file.
See [“Restoring from an image file”](#) on page 101.
The Ghost Boot Wizard helps you create a recovery boot disk.
See [“Creating boot disks and boot images”](#) on page 75.

Warning: Create and test a recovery boot disk before you need it. If your computer crashes and you do not have a recovery boot disk, then you will have to find another computer on which to create a boot disk.

Norton Ghost components

Norton Ghost includes a number of products and utilities.

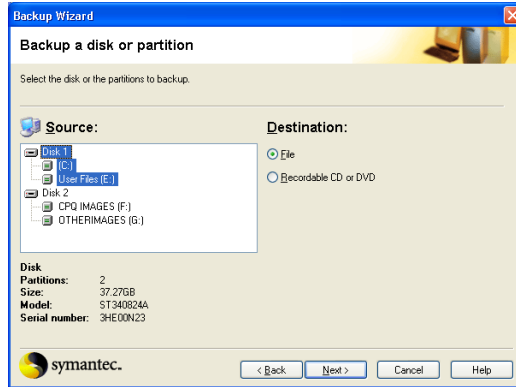
Norton Ghost wizards

Norton Ghost includes Windows wizards to guide you through the basic tasks.

These wizards include:

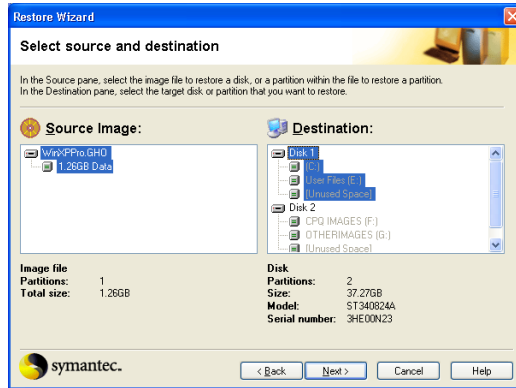
Backup Wizard

The Backup Wizard lets you select a hard disk or partition to back up to an image file.



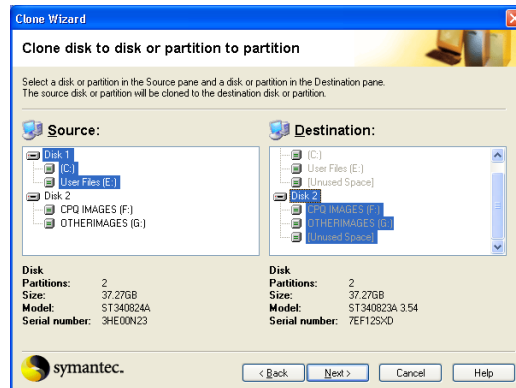
Restore Wizard

The Restore Wizard lets you restore a hard disk or partition from an image file.



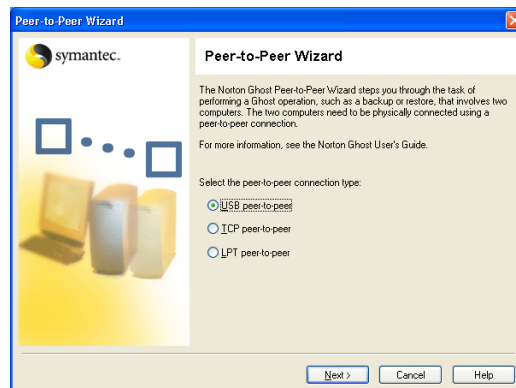
Clone Wizard

The Clone Wizard lets you clone a hard disk or partition directly from another hard disk or partition.



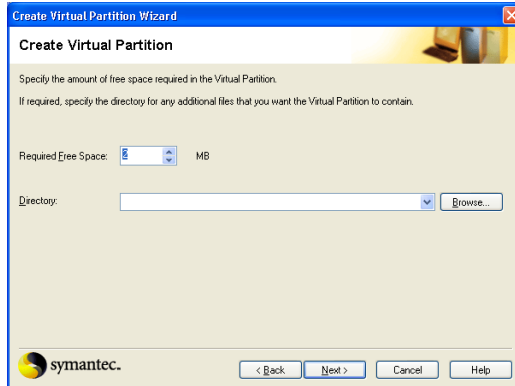
Peer-to-Peer Wizard

The Peer-to-Peer Wizard starts Ghost.exe in the Virtual Partition with the peer-to-peer drivers loaded.



Create Virtual Partition Wizard

The Create Virtual Partition Wizard restarts your computer in the Virtual Partition in DOS with files from a selected directory. This enables you to run DOS applications.



Run Ghost Interactively Wizard

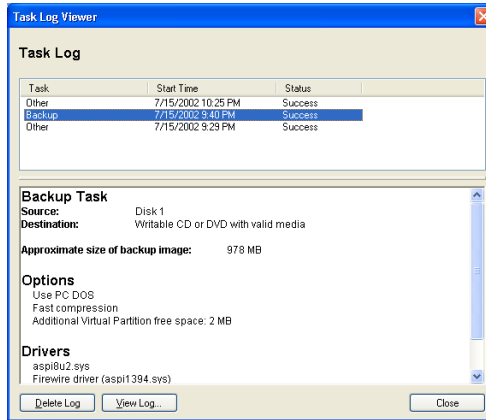
The Run Ghost Interactively Wizard restarts your computer in DOS and runs Ghost.exe.

Integrity Check

The image integrity check runs an integrity check on backup image files.

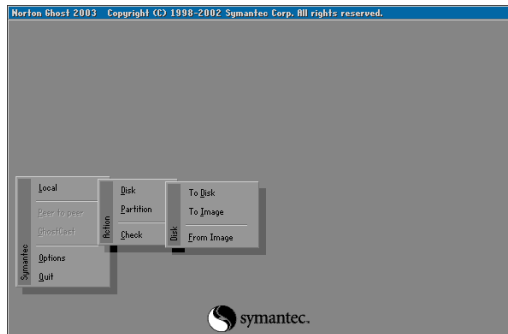
View Log

View Log lets you view logs created during Norton Ghost operations.



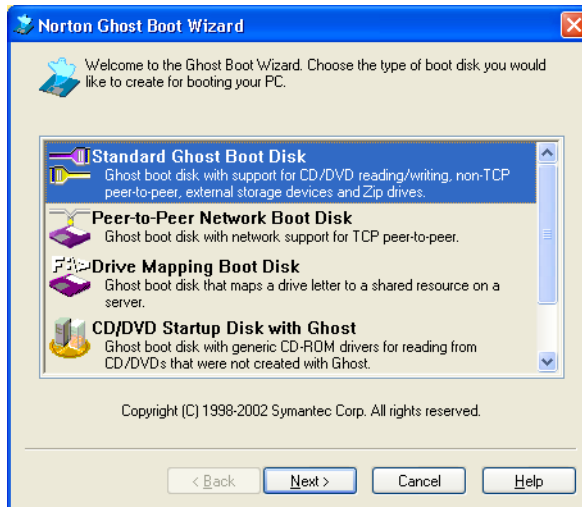
Norton Ghost executable

Ghost.exe runs in DOS and lets you back up, restore, and clone. Because the executable is small with minimal conventional memory requirements, you can run it easily from a DOS boot disk or hard drive.



Ghost Boot Wizard

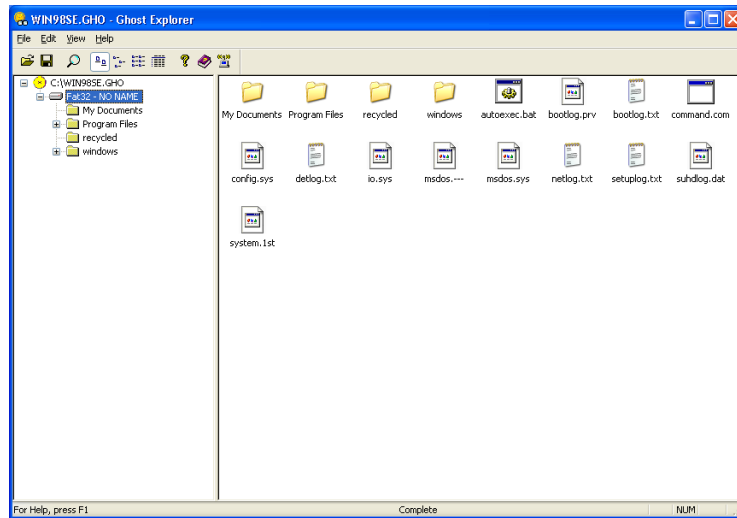
The Ghost Boot Wizard is a Windows application that creates boot disks that start Norton Ghost when you turn on your computer. You can create boot disks for various cloning tasks. The wizard guides you through adding the drivers that are needed to create a boot disk.



Ghost Explorer

Ghost Explorer is a Windows application that lets you view directories and files in an image file. You can also add, recover, and delete individual directories and files from a FAT16/32 file system image file.

Note: You can restore individual files from NTFS images, but you cannot update NTFS images.



GDisk

GDisk is a complete replacement for the Microsoft FDISK and FORMAT utilities that allows the following:

- FAT file system formatting
- Batch mode operation
- Hiding and un hiding of partitions
- Secure disk wiping to US Department of Defense standards
- Extensive partition reporting
- Boot.ini manipulation (GDisk32 only)

Two versions of GDisk are supplied:

- GDisk: Runs in DOS
- GDisk32: Runs from the command prompt in a Windows operating system

Ghost Walker

Ghost Walker assigns a statistically unique security identifier (SID) and a unique computer name to cloned Microsoft Windows NT/2000/XP workstations. The SID is an important part of the Windows NT/2000/XP security architecture as it provides a unique identifier when these computers are networked. If you are cloning more than one computer using the multiuser pack, you can use Ghost Walker to set up each computer on a network with a unique identification, which is mandatory on a Microsoft network.

Installing Norton Ghost

This chapter includes the following topics:

- [Minimum system requirements](#)
- [Installing Norton Ghost](#)
- [Updating Norton Ghost](#)
- [Uninstalling Norton Ghost](#)

Minimum system requirements

To install and run Norton Ghost, the minimum requirements are as follows:

- IBM computer or 100% compatible
- 486 processor
- VGA monitor (Super VGA recommended)
- 16 MB RAM (32 MB RAM recommended)
- Microsoft-compatible mouse recommended
- Microsoft Windows 98/2000/Me/XP or Microsoft Windows NT4 SP6a
- Internet Explorer 5

Ghost.exe

Ghost.exe must be installed on a computer with the Norton Ghost minimum requirements. However, you can run Ghost.exe on a computer with the following minimum requirements:

- IBM PC computer or 100% compatible
- 486 processor
- 16 MB RAM
- VGA monitor
- Microsoft-compatible mouse recommended

CD and DVD writing

- CD or DVD writer supported by Norton Ghost

Supported backup media

In addition to saving a backup to a secondary partition or an internal hard disk, Norton Ghost can also save a backup to the following external media devices:

- CD-R/RW
- DVD+RW/-RW/+R/-R
- USB 1.1/2.0 hard drive and CD/DVD recordable devices
- FireWire (iEEE) 1394 hard drive and CD/DVD recordable devices

- Atapi tape (QIC157) devices
- SCSI tape
- A second computer using a peer-to-peer connection
- Mapped network drive
- ZIP drive
- JAZ drive

To determine whether your device is supported by Norton Ghost, check that your device is listed on the Symantec support Web site.

<http://www.ghost.com>

File systems supported for backup, restore, and cloning tasks

- All FAT
 - All NTFS
 - EXT2/3
- See “[Cloning with Linux](#)” on page 187.

Disaster recovery requirements

To restore a backup image in the event of an operating system or hard disk failure, you must have one of the following recovery mechanisms in place before the emergency occurs:

- Floppy disk drive and floppy disk with the correct drivers for the selected backup device
- CD or DVD device and a bootable CD-ROM with the backup image created by Norton Ghost

See “[Preparing for an emergency](#)” on page 16.

Installing Norton Ghost

The installation instructions for Norton Ghost differ depending on how you have purchased Norton Ghost:

- As a part of Norton SystemWorks Pro
- Norton Ghost 2003

Installing Norton Ghost if purchased with Norton SystemWorks Pro

If you have purchased Norton Ghost as part of Norton SystemWorks Pro, then Norton Ghost is installed from the Norton SystemWorks Pro CD.

To install Norton Ghost from Norton SystemWorks

- 1 Insert the Norton SystemWorks 2003 CD into the CD-ROM drive.
- 2 In the Norton SystemWorks 2003 window, click **Install Norton SystemWorks 2003**.
- 3 Click **OK** to accept the Virus detection message.
- 4 Click **Next**.
- 5 In the License Agreement window, click **I accept the license agreement**, and then click **Next**.
If you select **I do not accept the license agreement**, you cannot continue with the installation.
- 6 Confirm the installation location.
To select a different location for the installed files, click **Browse**.
- 7 Click **Next**.
- 8 Select an installation type:
 - **Typical**: The most common programs are installed. This is the best choice for most users.
 - **Complete**: All programs are installed. This is the best choice for users who want to take advantage of all the product features.
 - **Express**: The most common programs are installed with the default settings and fewer prompts.
- 9 In the Select Features window, select **Norton Ghost 2003** and click one of the following:
 - **Will be installed on local hard drive**
 - **Entire feature will be installed on local hard drive**
To install only Norton Ghost, click the other Norton SystemWorks components and select **Entire feature will be unavailable**.
- 10 Click **Next**.
- 11 Continue with the type of installation you chose. After installation, you may receive a prompt telling you that your computer needs to be restarted for the updates to take effect.

Installing Norton Ghost

If you have purchased Norton Ghost separately from Norton SystemWorks Pro, then Norton Ghost is installed from the Norton Ghost CD.

To install Norton Ghost from the Norton Ghost CD

- 1 Insert the Norton Ghost CD into the CD-ROM drive.
- 2 In the Norton Ghost 2003 window, click **Install Norton Ghost 2003**.
- 3 In the Norton Ghost 2003 - InstallShield Wizard window, click **Next**.
- 4 In the License Agreement window, click **I accept the license agreement**, and then click **Next**.
If you select **I do not accept the license agreement**, you cannot continue with the installation.
- 5 In the User name field, type a user name.
- 6 In the Organization field, type an organization, if you belong to one.
- 7 Click **Next**.
- 8 Confirm the installation location.
To select a different location for the installed files, click **Change**.
- 9 Click **Next**.
- 10 Click **Install** to start the installation.

If the opening screen does not appear

Sometimes, a computer's CD-ROM drive does not automatically start a CD.

To start the installation from the Norton Ghost CD

- 1 On your desktop, double-click **My Computer**.
- 2 In the My Computer dialog box, double-click the icon for your CD-ROM drive.
- 3 From the list of files, double-click **Ncdstart.exe**.

Registering Norton Ghost

To stay informed of upcoming Symantec products, please fill out the details for registration of Norton Ghost. If you choose not to register the software using the Information Wizard or if registration fails for some reason, you can register on the Symantec Web site at www.symantec.com or by using the Product

Registration option in the Help menu in the Norton Ghost window. On the Web site, go to the Products page for the registration link.

To register Norton Ghost

- 1 In the first Registration window, select the country from which you are registering and the country in which you live (if different), and then click **Next**.
- 2 If you would like information from Symantec about Norton Ghost, select the method by which you want to receive that information, and then click **Next**.
- 3 Type your name and whether you want Norton Ghost registered to you or your company, and then click **Next**.
- 4 Type your address, and then click **Next**.
- 5 Do one of the following:
 - Answer the survey questions to help Symantec improve its products and services, and then click **Next**.
 - Skip the survey by clicking **Next**.
- 6 Select whether you want to register Norton Ghost through the Internet or by mail.
 - If you want to register by mail, your computer must be connected to a printer that the Information Wizard can use to print the registration form.
 - If you want to register using the Internet, you must be connected to the Internet.
- 7 Click **Next**.

If you submitted your registration through the Internet, the Information Wizard displays the serial number for your product.
- 8 Write down the serial number or click **Print** to get a copy of your registration information for future reference.
- 9 Click **Next**.
- 10 Select whether you want to use your existing profile the next time you register a Symantec product or type the information as part of registration.
- 11 Click **Finish**.

Updating Norton Ghost

Symantec may provide updates for Norton Ghost. Symantec does not charge for these updates. However, your normal Internet access fees apply.

To update Norton Ghost using LiveUpdate

- 1 On the Windows taskbar, click **Start > Programs > Norton Ghost 2003 > Norton Ghost**.
- 2 Click **LiveUpdate**.
- 3 Follow the on-screen instructions.

Uninstalling Norton Ghost

Norton Ghost is uninstalled from the Control Panel in Windows.

To uninstall Norton Ghost

- 1 On the Windows taskbar, click **Start > Settings > Control Panel**.
- 2 In the Control Panel window, double-click **Add/Remove Programs**.
- 3 Click **Norton Ghost**.
- 4 Click **Remove**.

Backing up, restoring, and cloning from Norton Ghost

This chapter includes the following topics:

- [When to use Norton Ghost in Windows](#)
- [Starting Norton Ghost in Windows](#)
- [Creating a backup image file](#)
- [Restoring your computer from an image file](#)
- [Cloning a hard disk or partition](#)
- [Launching Ghost.exe peer-to-peer](#)
- [Identifying a hard disk](#)

When to use Norton Ghost in Windows

Use Norton Ghost in Windows to do the following:

- Back up your computer
- Restore an image file onto your computer
You can use the Restore Wizard to restore an image file if you can still start Windows.
- Clone a hard disk or partition directly to another hard disk or partition

Do not use Norton Ghost in Windows for the following tasks. Use Ghost.exe in DOS for any of the following:

- If you cannot start Windows on your computer
See [“Restoring from an image file”](#) on page 101.
- Cloning a computer that does not have Windows installed
See [“Cloning disks and partitions”](#) on page 104.

Note: Sometimes the drive letter in Norton Ghost in DOS does not match the drive letter in Windows.

For example:

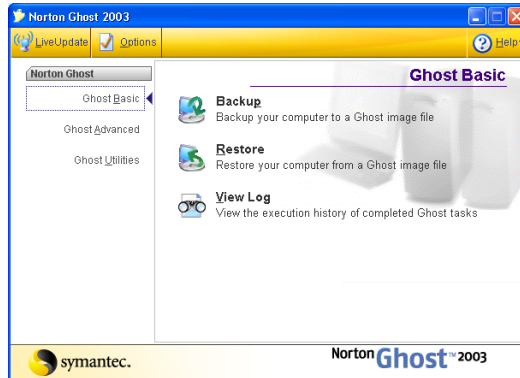
You back up to a file, F:\test.gho. When you execute a backup task, the backup appears in Ghost.exe as E:\test.gho.

Starting Norton Ghost in Windows

Before starting Norton Ghost, close all open programs.

To start Norton Ghost in Windows

- ◆ Do one of the following:
 - On the Windows taskbar, click **Start > Programs > Norton Ghost 2003 > Norton Ghost**.
 - On the Windows XP taskbar, click **Start > All Programs > Norton Ghost 2003 > Norton Ghost**.



Starting Norton Ghost from the tray icon

By default, Norton Ghost displays a single Windows tray icon in the system notification area at the end of the Windows 9x/Me/NT/2000/XP taskbar. Use the tray icon as a shortcut to open the Backup, Restore, and Clone Wizards.



From the tray icon you can initiate any of the following tasks:

- Launch Norton Ghost
- Run the Restore Wizard
- Run the Backup Wizard
- View the task log

To start Norton Ghost from the tray icon

- 1 Move your mouse cursor over the Norton Ghost tray icon.
- 2 Right-click the tray icon.
- 3 On the tray icon menu, click the option that you want.

Creating a backup image file

You can create a backup image file of your hard disk or one or more partitions using the Backup Wizard.

To back up a hard disk or partition

- 1 In the Ghost Basic window, click **Backup**, and then click **Next**.
- 2 In the Backup Wizard window, in the Source pane, do one of the following:
 - Select a whole disk to back up.
 - Select one or more partitions to back up.
The partitions must reside on the same disk.
- 3 Do one of the following:
 - Click **File** to back up to a file.
 - Click **Recordable CD or DVD** to back up to a CD or DVD drive.
Norton Ghost selects the CD or DVD drive that contains writable media.
- 4 Click **Next**.
- 5 If you selected to back up to a file, click **Browse** to select a destination and file name to which the disk or partition(s) is to be backed up.
- 6 Click **Next**.

- 7 If this is the first time that you have used Norton Ghost on this computer, in the Add Ghost Disk Identification dialog box, identify the disk.
See [“Identifying a hard disk”](#) on page 43.
If you have previously used Norton Ghost on this computer, then this dialog box does not appear.
- 8 If you want to set advanced settings for the backup, then click **Advanced Settings**.
See [“Setting Norton Ghost options and defaults”](#) on page 46.
- 9 Click **Next**.
- 10 In the Important Information dialog box, if you do not want to view this warning again, click **Don’t show this screen again**, and then click **Next**.
- 11 In the Disaster Recovery dialog box, click **Continue**.
This dialog box warns you to ensure that you can run Ghost.exe and access your image file once it has been created. You may need to create a recovery boot disk.
See [“Creating a recovery boot disk”](#) on page 73.
- 12 Select one of the following:
 - **Run Now**: Creates the backup image file.
Your computer is restarted and the backup image file is created.
 - **Disaster Recovery**: Starts the Ghost Boot Wizard and creates a recovery boot disk.
See [“Creating a recovery boot disk”](#) on page 73.

Restoring your computer from an image file

You can restore a hard disk or a partition from an image file stored on another hard disk, partition, or external media using the Restore Wizard from within Windows.

If you cannot start Windows, then you must use Ghost.exe to restore your hard disk or partition.

See [“Restoring from an image file”](#) on page 101.

To restore a disk or partition

- 1** In the Ghost Basic window, click **Restore**, and then click **Next**.
- 2** In the Restore Wizard window, click **Browse**, and find the image file from which to restore.
- 3** If you want to view the contents of the image file in Ghost Explorer, click **Open image in Ghost Explorer**.
See [“Viewing image files”](#) on page 119.
- 4** Click **Next**.
- 5** In the left pane, select the image file or partition within the image file to restore.
- 6** In the right pane, select the destination hard disk or partition that is to be overwritten.
- 7** Click **Next**.
- 8** The Overwrite partition warning dialog box appears if you are overwriting any of the following:
 - The current Windows partition
 - The Ghost installationClick **Next** to continue.
- 9** If this is the first time that you have used Norton Ghost on this computer, in the Add Ghost Disk Identification dialog box, identify the disk.
See [“Identifying a hard disk”](#) on page 43.
If you have previously used Norton Ghost on this computer, then this dialog box does not appear.
- 10** If you want to set advanced settings for the restore, then click **Advanced Settings**.
See [“Setting Norton Ghost options and defaults”](#) on page 46.
- 11** Click **Next**.
- 12** In the Important Information dialog box, if you do not want to view this warning again, click **Don’t show this screen again**, and then click **Next**.
- 13** Click **Run Now** to restore the image file to the selected hard disk or partition. Your computer is rebooted and the restore operation completed.

Warning: The destination disk or partition is completely overwritten with no chance of recovering any data.

Cloning a hard disk or partition

You can clone a hard disk directly to another hard disk or a partition directly to another partition.

To create a clone task

- 1 In the Ghost Advanced window, click **Clone**, and then click **Next**.
- 2 In the Clone Wizard window, in the left pane, do one of the following:
 - Click a disk to select it as the source for the clone operation.
 - Click a partition to select it as the source for the clone operation.
- 3 In the right pane, do one of the following:
 - Click a disk to select it as the destination for the clone operation.
 - Click a partition to select it as the destination for the clone operation.

Warning: The destination disk or partition is completely overwritten with no chance of recovering any data.

- 4 Click **Next**.
- 5 The Overwrite partition warning dialog box appears if you are overwriting any of the following:
 - The current Windows partition
 - The Ghost installationClick **Next** to continue.
- 6 If this is the first time that you have used Norton Ghost on this computer, in the Add Ghost Disk Identification dialog box, identify the disk.
See [“Identifying a hard disk”](#) on page 43.
If you have previously used Norton Ghost on this computer, then this dialog box does not appear.
- 7 If you want to set advanced settings for the clone, then click **Advanced Settings**.
See [“Setting Norton Ghost options and defaults”](#) on page 46.
- 8 Click **Next**.

- 9 In the Important Information dialog box, if you do not want to view this warning again, click **Don't show this screen again**, and then click **Next**.
- 10 Click **Run Now** to start the clone operation.
Ensure that all applications on your computer are closed before you run the clone operation.
Your computer is restarted and the destination hard disk or partition is cloned from the source hard disk or partition.

Launching Ghost.exe peer-to-peer

From Norton Ghost you can launch Ghost.exe over a USB, LPT, or TCP/IP peer-to-peer connection. Once you have established the settings for the connection, Ghost.exe launches ready for you to establish a connection.

Both computers must be running Ghost.exe for you to make the peer-to-peer connection. On your second computer, you can run Norton Ghost as described in this section, or you can restart it from a Peer-to-Peer Network Boot Disk or Standard Boot Disk.

See [“Boot disks with network support”](#) on page 79 and [“Standard boot disks”](#) on page 76.

To run Ghost.exe peer-to-peer

To run Ghost.exe peer-to-peer using USB

- 1 In the Ghost Basic window, click **Ghost Advanced**, and then click **Peer-to-Peer**.
- 2 Click **USB peer-to-peer**.
- 3 Click **Next**.
- 4 If you want to set advanced settings, then click **Advanced Settings**.
See [“Setting Norton Ghost options and defaults”](#) on page 46.
- 5 If you want to set advanced USB peer-to-peer settings, then click **USB driver settings**.
See [“Installing USB peer-to-peer drivers”](#) on page 57.
- 6 In the Important Information dialog box, if you do not want to view this warning again, click **Don't show this screen again**, and then click **Next**.

- 7 In the Disaster Recovery window, select one of the following:
 - **Launch Tutorials:** Opens the tutorial index.
From the tutorials, you can select a tutorial that demonstrates how to create a recovery boot disk.
 - **Continue:** Returns to the Create Task dialog box.
This dialog box warns you to ensure that you can run Ghost.exe and access your image file once it has been created. You may need to create a recovery boot disk.
See [“Creating a recovery boot disk”](#) on page 73.
- 8 Select one of the following:
 - **Run Now:** Restarts your computer into DOS and starts Ghost.exe.
 - **Disaster Recovery:** Starts the Ghost Boot Wizard and creates a recovery boot disk.
See [“Creating a recovery boot disk”](#) on page 73.

To run Ghost.exe peer-to-peer using TCP

- 1 In the Ghost Basic window, click **Ghost Advanced**, and then click **Peer-to-Peer**.
- 2 Click **TCP peer-to-peer**.
- 3 Click **Next**.
- 4 If you want to set advanced settings, then click **Advanced Settings**.
See [“Setting Norton Ghost options and defaults”](#) on page 46.
- 5 If you want to set TCP/IP driver settings, then click **TCP/IP Driver Settings**.
See [“Setting TCP/IP drivers”](#) on page 54.
- 6 In the Important Information dialog box, if you do not want to view this warning again, click **Don't show this screen again**, and then click **Next**.

- 7 In the Disaster Recovery window, select one of the following:
 - **Launch Tutorials:** Opens the tutorial index.
From the tutorials, you can select a tutorial that demonstrates how to create a recovery boot disk.
 - **Continue:** Returns to the Create Task dialog box.
This dialog box warns you to ensure that you can run Ghost.exe and access your image file once it has been created. You may need to create a recovery boot disk.
See [“Creating a recovery boot disk”](#) on page 73.
- 8 Select one of the following:
 - **Run Now:** Restarts your computer into DOS and starts Ghost.exe.
 - **Disaster Recovery:** Starts the Ghost Boot Wizard and creates a recovery boot disk.
See [“Creating a recovery boot disk”](#) on page 73.

To run Ghost.exe peer-to-peer using LPT

- 1 In the Ghost Basic window, click **Ghost Advanced**, and then click **Peer-to-Peer**.
- 2 Click **LPT peer-to-peer**.
- 3 Click **Next**.
- 4 If you want to set advanced settings, then click **Advanced Settings**.
See [“Setting Norton Ghost options and defaults”](#) on page 46.
- 5 If you want to set advanced LPT peer-to-peer driver settings, then click **LPT driver settings**.
See [“Setting LPT peer-to-peer drivers”](#) on page 55.
- 6 In the Important Information dialog box, if you do not want to view this warning again, click **Don't show this screen again**, and then click **Next**.

- 7 In the Disaster Recovery window, select one of the following:
 - **Launch Tutorials:** Opens the tutorial index.
From the tutorials you can select a tutorial that demonstrates how to create a recovery boot disk.
 - **Continue:** Returns to the Create Task dialog box.
This dialog box warns you to ensure that you can run Ghost.exe and access your image file once it has been created. You may need to create a recovery boot disk.
See [“Creating a recovery boot disk”](#) on page 73.
- 8 Select one of the following:
 - **Run Now:** Restarts your computer into DOS and starts Ghost.exe.
 - **Disaster Recovery:** Starts the Ghost Boot Wizard and creates a recovery boot disk.
See [“Creating a recovery boot disk”](#) on page 73.

Identifying a hard disk

Before you can use Norton Ghost on a hard disk, Norton Ghost must identify the disk. You can do this during any backup, restore, or clone operation.

This dialog box appears during a backup, restore, or clone operation if you have not previously identified the hard disk.

To identify a disk

- ◆ In the Add Ghost Disk Identification dialog box, click OK to identify all hard disks.



Setting options and defaults

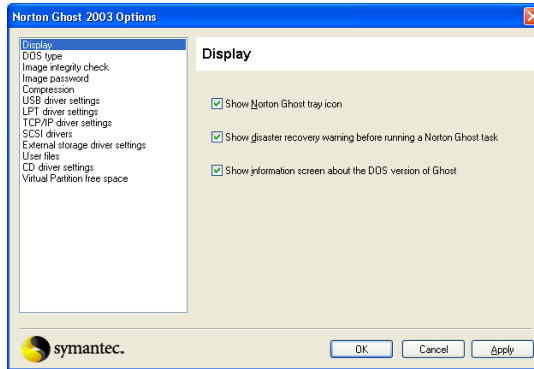
This chapter includes the following topics:

- [Setting Norton Ghost options and defaults](#)
- [Running your computer from the Virtual Partition](#)
- [Checking the integrity of an image file](#)
- [Viewing the task log](#)
- [Starting Ghost.exe](#)
- [What to do if a task fails](#)

Setting Norton Ghost options and defaults

Norton Ghost lets you set defaults for the tasks that you run from the wizards. You can change many of these defaults in the wizards as you create a task.

Norton Ghost
default options



Some options can only be set as you create the task in the wizard.

The options and defaults include the following:

- Adding command-line switches to a task
- Assigning a drive letter to a CD/DVD drive
- Setting the options for a mapped network drive
- Setting display options
- Setting the DOS version
- Setting the image integrity check default
- Setting a compression level
- Assigning a password to an image file
- Adding free space to the Virtual Partition
- Installing SCSI drivers
- Setting external storage device drivers
- Setting TCP/IP drivers
- Setting LPT peer-to-peer drivers
- Installing extra drivers
- Installing USB peer-to-peer drivers

Adding command-line switches to a task

You can add command-line switches to a task to alter its operation.

To add command-line switches to a task

- 1 Do one of the following:
 - To set this option as a default, in the Ghost Basic window, click **Options**.
 - To add command-line switches while running a Windows wizard task, in the settings window, click **Advanced Settings**.
- 2 On the Ghost Command Line tab, type the extra command-line switches. See [“Using Norton Ghost with switches”](#) on page 154.
- 3 Click **OK**.

Warning: The syntax of your command line is not checked when the task runs. Therefore, review these instructions carefully to avoid errors. The consequences of an error could be serious.

Assigning a drive letter to a CD/DVD drive

You can assign a drive letter to a CD or DVD drive. This lets you select a drive letter when restoring an image file from a CD/DVD.

Use this option if you are restoring an image file that was written to a CD/DVD using a tool other than Norton Ghost.

To assign a drive letter to a CD/DVD drive

- 1 Do one of the following:
 - To set this option as a default, in the Ghost Basic window, click **Options**.
 - To assign a drive letter to a CD or DVD drive while running a Windows wizard task, in the Advanced Settings window, click **Advanced Settings**.
- 2 On the CD Driver tab, click **Assign drive letters to CD/DVD drives**.
- 3 Click **OK**.

Setting the options for a mapped network drive

You can set the options for connecting to a mapped network drive.

To set the options for a mapped network drive

- 1 While running a Windows wizard task, in the Advanced Settings window, click **Advanced Settings**.
- 2 Click **Map network drive**.
- 3 Do one of the following:
 - Select a network card from the drop-down list.
Norton Ghost displays any installed drivers that it detects. Select the network driver for the particular make and model of the network card that is installed on the computer.
See [“Selecting a template”](#) on page 84.
 - Click **Browse** to open the Ghost Boot Wizard and select a network card.
From the Ghost Boot Wizard, you can add a network card. If your network card is not on the list, you can modify a network card template.
See [“Selecting a template”](#) on page 84 and [“Adding network drivers to the Ghost Boot Wizard”](#) on page 86.
- 4 Select one of the following:
 - **Use DHCP:** Use this option if your network contains a DHCP server.
 - **Static IP Address:** Complete the fields below this option if your network does not contain a DHCP server.
- 5 In the Network resource field, type a network resource.
- 6 In the User name field, type a user name.
- 7 In the Domain field, type a domain name.
- 8 Click **OK**.

Setting display options

You can set some default display options.

To set display options

- 1 In the Ghost Basic window, click **Options**.
- 2 Click **Display**.
- 3 Check **Show Norton Ghost tray icon on start up** to display the Norton Ghost icon in the taskbar.
- 4 Check **Show disaster recovery warning before running a Norton Ghost task** to display the Disaster Recovery dialog box before running a task.

- 5 Check **Show information screen about the DOS version of Ghost** to display the warning that Norton Ghost restarts into DOS while running a task.
- 6 Click **OK**.

Setting the DOS version

By default, Norton Ghost includes PC-DOS in the Virtual Partition. However, some computer models may not start from a Virtual Partition that contains PC-DOS. If your computer does not start from the Virtual Partition, set the default option to MS-DOS.

You must provide MS-DOS on a floppy disk formatted on a Windows 95/98 computer before you can run Norton Ghost with MS-DOS.

See [“Providing MS-DOS”](#) on page 89.

To set DOS files

To select a DOS version

- 1 In the Ghost Basic window, click **Options**.
- 2 On the DOS Type tab, select one of the following:
 - Use **PC-DOS**: Includes PC-DOS in the Virtual Partition.
 - Use **MS-DOS**: Includes MS-DOS in the Virtual Partition.
- 3 Click **OK**.

To install MS-DOS

- 1 Insert the MS-DOS formatted floppy disk into drive A of the computer on which Norton Ghost is running.
- 2 In the DOS Type window, click **Get MS-DOS Files**.
- 3 Click **OK**.

To uninstall MS-DOS

- 1 In the DOS Type window, click **Remove MS-DOS Files**.
- 2 Click **OK**.

Installing MS-DOS Client files

If you are using the mapped network drive functionality and MS-DOS, you must include the Microsoft DOS Client files. You must install the files on the computer before you can include them in the Virtual Partition.

The following files are required:

- EMSBFR.EXE
- LMHOSTS
- NEMM.DOS
- NET.EXE
- NET.MSG
- NETBIND.COM
- NETH.MSG
- NETWORKS
- NMTSR.EXE
- PROTMAN.DOS
- PROTMAN.EXE
- PROTOCOL
- TCPDRV.DOS
- TCPTSREXE
- TCPUTILS.INI
- TINYRFC.EXE
- UMB.COM
- IFSHLP.SYS
- EMM386.EXE
- HIMEM.SYS
- WFWSYS.CFG

To install the Microsoft DOS Client files

- 1 In the Ghost Basic window, click **Options**.
- 2 In the Norton Ghost 2003 Options dialog box, click **DOS Type**.
- 3 Insert a floppy disk containing the MS-DOS LAN Client files into drive A, and then click **Supply MS-DOS LAN Client Files**.

Setting the image integrity check default

You can set a default option for Norton Ghost to perform an integrity check of an image file after it has been created and before it is restored.

Some CD-RW drives eject a CD once an image has been saved to it. If this is preventing the integrity check, then ensure that this option is not selected, and perform an integrity check using the Image Integrity Check Wizard.

See [“Checking the integrity of an image file”](#) on page 58.

To set Norton Ghost to perform an integrity check on an image file

- 1 In the Ghost Basic window, click **Options**.
- 2 In the Norton Ghost 2003 Options dialog box, click **Image Integrity check**.
- 3 Check **Always perform an image integrity check** to set the default.
- 4 Click **OK**.

Setting a compression level

A compression level can be set as a default or from a wizard. You can set the compression level to None, Fast, or High. Compression is set to Fast by default.

See [“Image files and compression”](#) on page 62.

To set the compression level

- 1 Do one of the following:
 - To set the default compression level, in the Ghost Basic window, click **Options**.
 - To set the compression level while running a Windows wizard task, in the Advanced Settings window, click **Advanced Settings**.
- 2 On the Compression tab, select one of the following:
 - **None**: No compression (high speed)
 - **Fast**: Low compression (medium speed)
 - **High**: High compression (slower speed)
- 3 Click **OK**.

Assigning a password to an image file

You can assign a password to an image file. The password is entered when the image file is created. Then, each time the image file is accessed in Ghost.exe, you are prompted to enter the password.

To assign a password

- 1 Do one of the following:
 - To set the default to create an image password, in the Ghost Basic window, click **Options**.
 - To set the option to create an image password while running a Windows wizard task, in the Advanced Settings window, click **Advanced Settings**.
- 2 On the Image password tab, check **Prompt for an image password** to set the option to prompt for a password when the image file is created.

Adding free space to the Virtual Partition

You can specify additional space to be added to the Virtual Partition. This is added to the Virtual Partition when it is created.

To specify additional free space in the Virtual Partition

- 1 Do one of the following:
 - To set the default to specify additional free space, in the Ghost Basic window, click **Options**.
 - To specify additional free space while running a Windows wizard task, in the Advanced Settings window, click **Advanced Settings**.
- 2 In the Norton Ghost 2003 Options window, on the Virtual Partition Free Space tab, in the Required Free Space field, select an additional amount of free space (in MB) to add to the Virtual Partition.
- 3 Click **OK**.

Installing SCSI drivers

Norton Ghost automatically installs Adaptec SCSI drivers in the Virtual Partition if it finds a SCSI hard disk. The SCSI drivers allow Norton Ghost to access any SCSI device. If you want to install SCSI drivers manually, you can set this as a default preference or install the drivers from a wizard. You can scan for Adaptec SCSI cards and let Norton Ghost select the correct drives.

If you are using a card other than Adaptec, then you must manually install the correct drivers.

See [“Installing extra drivers”](#) on page 56.

To install SCSI drivers

- 1 Do one of the following:
 - To set the default installation of SCSI drivers, in the Ghost Basic window, click **Options**.
 - To install the SCSI drivers while running a task, in the Advanced Settings window, click **Advanced Settings**.
- 2 Check the SCSI drivers that you want to install.
- 3 To let Norton Ghost scan for Adaptec SCSI cards, click **Auto-Detect for SCSI drivers**.
- 4 Click **OK**.

Setting external storage device drivers

Norton Ghost usually installs USB and FireWire drivers in the Virtual Partition if it finds a USB or FireWire external device. You may need to install these drivers manually as a default option or while running a Windows wizard task.

Note: Do not use this option if you want to connect to another computer using peer-to-peer.

See [“Installing USB peer-to-peer drivers”](#) on page 57.

To install external device drivers

- 1 Do one of the following:
 - To set the default installation of external drivers, in the Ghost Basic window, click **Options**.
 - To install the external device drivers while running a Windows wizard task, in the Advanced Settings window, click **Advanced Settings**.
- 2 On the External Storage tab, select one of the following:
 - **No USB Drivers:** Does not install USB drivers
 - **USB 1.1 Drivers:** Installs USB 1.1 drivers
Select this option if any of your cards or chipsets are USB 1.1.
 - **USB 2.0 Drivers:** Installs USB 2.0 drivers
Do not select this option if any of your cards or chipsets are USB 1.1.
- 3 If you want to install FireWire drivers to the Virtual Partition, then click **Firewire Support**.
- 4 If you want to assign a drive letter to the external storage device, then click **Assign drive letters**.
By default, a drive letter is assigned to an external storage device. This option assigns a drive letter to USB and FireWire devices in DOS.
- 5 Click **OK**.

Setting TCP/IP drivers

Norton Ghost automatically searches for and installs the correct TCP/IP drivers for your hardware setup. However, you can set the TCP/IP configuration manually if your task fails or you need settings that are different from the automatic setup. If your computer is running Windows NT 4 and you are using TCP/IP, then you must manually set the network driver.

To install TCP/IP drivers

- 1 To set the default installation of TCP/IP drivers, in the Ghost Basic window, click **Options**.
- 2 In the Norton Ghost 2003 Options dialog box, click **TCP/IP Driver Settings**.
- 3 Do one of the following:
 - Select a network card from the drop-down list.
Norton Ghost displays any detected installed drivers. Select the network driver for the particular make and model of the network card that is installed on the computer.
See [“Selecting a template”](#) on page 84.
 - Click **Browse** to open the Ghost Boot Wizard and select a network card.
From the Ghost Boot Wizard you can add a network card. If your network card is not on the list, you can modify a network card template.
See [“Selecting a template”](#) on page 84 and [“Adding network drivers to the Ghost Boot Wizard”](#) on page 86.
- 4 Select one of the following:
 - **Use DHCP:** Use this option if your network contains a DHCP server.
 - **Static IP Address:** Complete the fields below this option if your network does not contain a DHCP server.
- 5 Click **OK**.

Setting LPT peer-to-peer drivers

Norton Ghost automatically installs default LPT peer-to-peer drivers for your hardware setup. However, you can set the LPT configuration manually if your task fails or you need settings that are different from the automatic setup.

To install LPT peer-to-peer drivers

- 1 To set the default installation of LPT drivers, in the Ghost Basic window, click **Options**.
- 2 In the Norton Ghost 2003 Options dialog box, click **LPT Driver Settings**.
- 3 Select a mode.
The default mode for an LPT connection is ECP/EPP High Speed. If you are having problems with your LPT connection, set the mode to Bidirectional 8bit or Bidirectional 4bit. The next time that you create a boot disk, the mode is reset to the default, ECP/EPP High Speed.
- 4 Select a port.
If you have multiple parallel ports and want to connect using a port other than the default LPT1, use the LPT port option to specify the port into which your cable is plugged.
- 5 Click **OK**.

Installing extra drivers

You can install drivers that are not included with Norton Ghost. You can also modify Autoexec.bat and Config.sys, which are installed in the Virtual Partition.

To install extra drivers

- 1 Do one of the following:
 - To set the default installation of extra drivers, in the Ghost Basic window, click **Options**.
 - To install the extra drivers while running a Windows wizard task, in the Advanced Settings window, click **Advanced Settings**.
- 2 On the User files tab, click **Add Files** to add additional drivers.
- 3 Click **Add Directory** to add additional directories.
- 4 In the AUTOEXEC.BAT Additions field, type any additional Autoexec.bat entries for the driver.
- 5 In the CONFIG.SYS Additions field, type any additional Config.sys entries for the driver.
- 6 Click **OK**.

Installing USB peer-to-peer drivers

You can select USB peer-to-peer drivers to install into the Virtual Partition. In most cases, you do not need to alter the driver's default. However, if you have problems connecting using peer-to-peer, then select the other options and retry the task.

To select USB peer-to-peer drivers

- 1 Do one of the following:
 - To set the default installation of extra drivers, in the Ghost Basic window, click **Options**, and then click **USB peer-to-peer settings**.
 - To install the USB drivers while running a Peer-to-Peer Wizard task, in the Advanced Settings window, click **USB peer-to-peer settings**.
- 2 Select one of the following:
 - **All drivers:** Installs all USB peer-to-peer drivers into the Virtual Partition.
 - **UHCI driver:** Installs only UHCI drivers into the Virtual Partition.
 - **OHCI driver:** Installs only OHCI drivers into the Virtual Partition.
- 3 Click **OK**.

Running your computer from the Virtual Partition

From Norton Ghost you can restart your computer into the Virtual Partition. The Virtual Partition is created in DOS and includes the files that you have saved in a selected folder. Once you have created a Virtual Partition from a folder, you can run any application that you have provided in the selected folder.

The Virtual Partition is created with the following files:

- **Ghreboot.exe**
This executable file lets you restart your computer back into Windows.
- **Selected driver settings**
You can select drivers to include in the Virtual Partition that will let you access external hardware.
- **DOS applications stored in the selected folder**
Any DOS applications that you provided in the selected folder are bundled and included in the Virtual Partition.

If you include Autoexec.bat and Config.sys in the selected folder, then they are modified by Norton Ghost when the Virtual Partition is created.

Before you create the Virtual Partition, you must create a folder that contains the files that you want included in the Virtual Partition.

To create the Virtual Partition from a folder

- 1 In the Ghost Basic window, click **Ghost Advanced**, and then click **Create Virtual Partition**.
- 2 Click **Next**.
- 3 Click **Browse** to select a directory from which to create the Virtual Partition.
- 4 In the Required Free Space field, set the size in MB of the Virtual Partition.
- 5 Click **Next**.
- 6 If you want to set advanced driver settings, then click **Advanced Settings**. See “[Setting Norton Ghost options and defaults](#)” on page 46.
- 7 Click **Next**.
- 8 Click **Run Now** to restart your computer in the Virtual Partition.
The task summary displays the size of the folder that you have selected. The Virtual Partition cannot be smaller than the folder size.

Restarting your computer from the Virtual Partition

To restart your computer back into Windows from the Virtual Partition, you must run the Ghreboot executable.

You may also need to run Ghreboot if a task has failed and your computer is left in the Virtual Partition.

To restart your computer in Windows

- 1 At the command line, type **ghreboot**.
- 2 Press **Enter**.

Checking the integrity of an image file

You can check the integrity of a Ghost image file. An integrity check ensures that the data read from the image file is the same as the data written to the image file. Norton Ghost performs a dummy restore of the image file. It does not check that the data on the disk is the same as the data in the image file.

To check the integrity of an image file

- 1 In the Ghost Basic window, click **Ghost Advanced**, and then click **Image Integrity Check**.
- 2 Click **Next**.
- 3 In the Create Image Integrity Check Wizard window, click **Browse** and find the image file that you want to verify.
- 4 If you want to view the contents of the image file in Ghost Explorer, click **Open image in Ghost Explorer**.
See “[Viewing image files](#)” on page 119.
- 5 Click **Next**.
- 6 If you want to set advanced settings for the verification, then click **Advanced Settings**.
See “[Adding command-line switches to a task](#)” on page 47.
- 7 Click **Next**.
- 8 In the Important Information dialog box, if you do not want to view this warning again, click **Don't show this screen again**, and then click **Next**.
- 9 Click **Run Now** to start the image verification.

Viewing the task log

The task log displays the tasks performed from the Norton Ghost wizards.

To view the task log

- 1 In the Ghost Basic window, click **View Log**.
- 2 In the Task Log Viewer window, select a log entry and click **View Log**.

Starting Ghost.exe

You can start Ghost.exe from Windows. This option restarts your computer in DOS and opens Ghost.exe, which lets you run Norton Ghost interactively.

To start Ghost.exe

- 1 In the Ghost Basic window, click **Ghost Advanced**, and then click **Run Ghost Interactively**.
- 2 Click **Next**.
- 3 If you want to set advanced settings for the backup, then click **Advanced Settings**.
See “[Setting Norton Ghost options and defaults](#)” on page 46.
- 4 Click **Next**.
- 5 In the Important Information dialog box, if you do not want to view this warning again, click **Don’t show this screen again**, and then click **Next**.
- 6 In the Disaster Recovery window, select one of the following:
 - **Launch Tutorials:** Opens the tutorial index.
From the tutorials, you can select a tutorial that demonstrates how to create a recovery boot disk.
 - **Continue:** Returns to the Run Ghost Interactively Wizard.
This dialog box warns you to ensure that you can run Ghost.exe and access your image file once it has been created. You may need to create a recovery boot disk.
See “[Creating a recovery boot disk](#)” on page 73.
- 7 Select one of the following:
 - **Run Now:** Restarts your computer into DOS and launches Ghost.exe.
 - **Disaster Recovery:** Starts the Ghost Boot Wizard and creates a recovery boot disk.
See “[Creating a recovery boot disk](#)” on page 73.

What to do if a task fails

If a Norton Ghost task fails, you are prompted to select one of the following options:

- **Exit to DOS:** Closes Ghost.exe and returns to DOS.
- **Return to Windows:** Restarts your computer into Windows.
- **Retry the operation:** Executes the task again.

Image file options

This chapter includes the following topics:

- [About Norton Ghost image files](#)
- [Image files and compression](#)
- [Image files and CRC32](#)
- [Image files and volume spanning](#)
- [Image files and tape drives](#)
- [GoBack and Norton Ghost](#)
- [Dynamic disks in Windows 2000/XP](#)
- [Hibernation and swap files](#)

About Norton Ghost image files

The image files created with Norton Ghost have a .gho or .ghs extension by default. They contain the entire disk or partitions of the disk. Image files support the following:

- Various levels of compression
- CRC32 data integrity checking
- Splitting of media files
- Spanning across volumes

Norton Ghost images contain only the actual data on a disk. If you have a 9 GB drive with only 600 MB of data, the Norton Ghost image is approximately 600 MB, and is smaller if you use compression.

If you also use the Ghost Explorer application, an image file companion utility, you can recover individual files selectively from these image files without restoring the complete disk or partition.

Image files and compression

Image files created in Norton Ghost support several levels of data compression. When Norton Ghost is in interactive mode, three compression options are available: none, fast, and high. The Norton Ghost command-line switch `-z` provides access to nine levels of compression.

See [“Command-line switches”](#) on page 153.

As a rule, the more compression you use, the slower Norton Ghost operates. However, compression can improve speed when there is a data transfer bottleneck. There is a big difference in speed between high compression and no compression when creating an image file on a local disk. Over a network connection, fast compression is often as fast as, or faster than, no compression. Over a parallel cable, high compression is often faster than no compression because fewer bytes are sent over the cable. Decompression of high-compressed images is much faster than the original compression. The level of compression that you select depends on your individual requirements.

Performance expectations on a network

One advantage of Norton Ghost is speed. Many factors affect performance. There are ways to gauge whether Norton Ghost is running optimally.

When you use Norton Ghost across a network, use the fast compression option. If disk space is at a premium, you can use higher compression, but it can affect speed.

Image files and CRC32

Cyclic Redundancy Checking (CRC) is a data error checking technique. CRC ensures that the original data written to the image file is the same as the data on the disk. CRC32 is a CRC technique that uses a 32-bit value to store error checking information.

When an image file is created, CRC32 details are embedded into the file to ensure that image file corruption is detected when the image is restored to disk. CRC32 is currently included on a file-by-file basis with FAT partitions and on a volume basis for NTFS partitions.

In addition to image file error detection, the CRC values are used to verify that image files and partitions or disks are identical. This offers an additional method to detect bad sector writes and other drive anomalies that may be missed during normal imaging checks.

You can generate a text file that contains CRC values and associated file attributes using the `-CRC32` command-line switch.

See “[Command-line switches](#)” on page 153.

Image files and volume spanning

Images can be contained in a single file or spanned across a number of files.

Standard image files

Standard image files consist of a single file that contains the contents of the complete disk or required partitions. This type of image file is stored on other hard drives, tape, CD, or DVD drives where the volume is large enough to hold the complete image file.

Limitations on the image file size

The default (and maximum) image file size is 2GB. However, by using size-limited, multisegment image files, you can take an image of a disk or partition that is larger than 2 GB.

Norton Ghost does support IDE drives larger than 128 GB. However, at the time of this printing, no operating system supports these large drives.

Size-limited image files

There are situations in which it is not practical to have a standard image file. Norton Ghost can split an image file into segments (known as spans) that are limited to a user-specified size. This option is most commonly used to limit span sizes to 620 MB for later transfer to a CD-ROM disc.

Spanned image files

Spanned image files are similar to size-limited image files. The difference is that each segment file (or span) of the image file is limited by the actual volume size of the media to which the image is being saved. This lets you specify a drive and file name and lets Norton Ghost determine when to request another volume or location for the remaining data. This is very useful when using ZIP, JAZ, LS120 Superdisk, CD-R/RW, and other drive types.

Spanning must be executed locally. If you try to span over a peer-to-peer connection (LPT, USB, TCP/IP), a disk full error message appears. However, size limiting can be used in all situations.

Norton Ghost also allows size limiting of spans when spanning volumes to ensure that no span exceeds the maximum size.

With all image files, the only constraint on the selection of the destination volume is that it must not be part of the source selection. For example, it cannot be on a source disk or partition if that disk or partition is to be included in the image.

The spanned files are named according to Microsoft application guidelines. For example:

- First file: Filename.gho
- Second file: Filen001.ghs
- Third file: Filen002.ghs

You can use the `-cns` switch for an alternative naming standard. For example:

- First file: Image.gho
- Second file: Image.001
- Third file: Image.002

Spanning across multiple volumes and limiting span sizes

When you create an image file from a disk or partition, the destination drive might have insufficient space to store the image file. If Norton Ghost determines that this is the case, it alerts you and asks whether to enable spanning. Norton Ghost assumes that compression reduces the size of the image by one-third when it determines whether the image will fit. Alternatively, you can use the `-span` and `-split` command-line switches to configure Norton Ghost to use image file size limiting.

See [“Command-line switches”](#) on page 153.

Before it saves the disk contents to the image file, Norton Ghost shows the source and destination details and offers a chance to cancel. The default is to cancel.

Once the process starts, the image file creation continues until the destination volume is full.

If you started spanning onto a JAZ disk and want to span a 3.0 GB drive onto JAZ disks, you can choose to continue on JAZ disks. If you want to span across different forms of media, you can select a different type of media once the first portion of the span has completed. You cannot mix CD/DVD media with other types of media, such as JAZ or hard disk.

Record where the span segments are saved and the segment file names. Norton Ghost does not record the locations and file names you selected.

Information about the partitions is stored at the start of the image file. This is updated at the end of the Ghost process, which might require you to reinsert the first disk in the span set. Norton Ghost prompts you for the first disk in the span set and for subsequent volumes when restoring from an image.

Restoring from a spanned image

The process when restoring a disk or partition from a spanned image file is the same as restoring from an unspanned image file. However, during the restoration of the spanned image file, you are prompted for the locations of the image file spans. You must know the span segment locations and file names.

You can continue on the same form of media. For example, if you originally spanned onto a JAZ disk and want to restore a 3.0 GB drive from JAZ disks, you can replace the disk and continue from JAZ disks. Alternatively, you can restore from different media types.

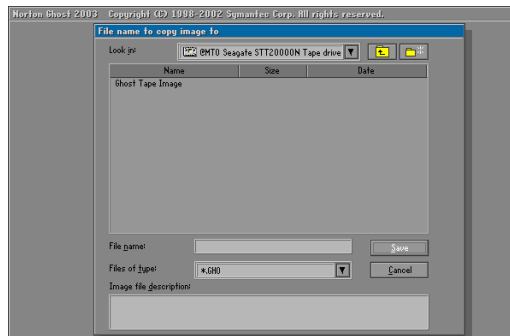
Norton Ghost automatically restores spanned images without prompting if it can find the next span.

See [“Adding switches to your Ghost operation”](#) on page 108.

Image files and tape drives

The Backup, Restore, and Clone Wizards do not support tape drives. You can back up, restore, and clone using Ghost.exe. Ghost.exe support of SCSI tape drives allows the storage of a single image file on a tape. When the image is written to the tape, Ghost.exe uses no associated file system, which means that you are unable to access the tape from a drive letter as if it were another storage drive. SCSI tapes do not support spanning to multiple tapes.

When you use tape drives with Ghost.exe, you can select the tape drive as the source or destination device in the File Locator window. Each SCSI tape device is shown as MTx, where x is a number starting at 0 and increasing incrementally for each drive present. For example, the following screen shows a tape drive MT0 available for use.



For Ghost.exe to access SCSI tape drives, a DOS ASPI driver must be installed prior to use.

See [“Standard boot disks”](#) on page 76.

Ghost.exe in its default mode performs well with most SCSI tape devices. In some situations with older SCSI tape devices and possibly with unreliable tapes, Ghost.exe may need to be configured to slow down or alter the way it uses the tape device.

See [“Command-line switches”](#) on page 153.

Note: Ghost Explorer cannot access an image stored on tape.

GoBack and Norton Ghost

If GoBack is installed on your computer, then you cannot directly create image files or restore your computer.

You must disable GoBack before you use Norton Ghost wizards.

GoBack and Ghost.exe

To run Ghost.exe with GoBack, do one of the following:

- Uninstall GoBack and then run Ghost.exe as usual to take an image or restore a computer.
- To take an image of your computer, in the GoBack Boot Screen, select the option to start your computer from a floppy disk with the GoBack drivers loaded. You can then use a Ghost boot disk to start Ghost.exe and take an image file.
See the GoBack user documentation.
See [“Creating a backup image file”](#) on page 97.
- To restore your computer, start your computer from a floppy disk. You can then use a Ghost boot disk to start Ghost.exe and restore your computer.
See [“Restoring from an image file”](#) on page 101.

Dynamic disks in Windows 2000/XP

Norton Ghost supports backing up, restoring, and cloning simple or mirrored volumes on dynamic disks. Spanned, striped, and RAID-5 volumes are not supported by Norton Ghost. You can back up an image of a partition on a disk in a dynamic disk set to an image file. If you back up a disk, then all of the partitions that Ghost supports on the disk, and only those partitions, are backed up to an image file.

Note: Norton Ghost supports simple volumes in a contiguous space. If a partition is not of this type, then it is not included in the image file.

Operations that support dynamic disks are as follows:

- Partition to partition
- Partition to image
- Disk to disk
- Disk to image
- Check image
- Check disk
- CRC32
- CRC32 verify

You can restore an image of a dynamic disk only to a basic disk, not to a dynamic disk. After you have restored the image file to a basic disk, you can then use Windows 2000 Disk Manager to convert the disk to a dynamic disk.

To delete a dynamic disk, use GDisk. Use the switch `gdisk /mbr /wipe` to delete all partitions from the disk. This method destroys all data on the disk.

See [“Reinitializing the Master Boot Record”](#) on page 132.

You can also take a disk image of a dynamic disk if you use the `image all (-ia)` switch. The `-ia` switch performs a sector-by-sector copy of the entire disk. The disk on which the image is to be restored must be identical to the source disk in every way. This function is only useful for creating a backup. If you restore an image created using `-ia` onto a drive with different geometry, Windows 2000 cannot interpret the dynamic disk.

If you restore an -ia disk image of a dynamic disk onto a SCSI hard drive and you see a Destination drive too small message, you must load the ASPI driver for the SCSI card. Without an ASPI driver, Norton Ghost does not always detect the correct size of the SCSI drive and cannot determine whether the drive is large enough to hold the image.

Note: You should not take an image all of a dynamic disk because the method is slow and the image file would be very large.

Hibernation and swap files

When Norton Ghost creates image files or clones, it does not include hibernation and swap files. These files are valid only for one Windows session, and when they are included in an image file, they make it significantly larger.

Norton Ghost implements file skipping differently for each type of file system.

- FAT file systems: Files are not included on the image file or destination disk.
- NTFS file systems: A file with the same name is created on the image file or destination disk, but the contents of the file are not copied.

The following files are skipped on all file systems:

- 386Spart.par
- Amizvsus.pmf
- Dos data.sf
- Ghost.dta
- Hiberfil.sys
- Hibrn8.dat
- Hybern8
- Navsysl.dat
- Navsysr.dat
- Pagefile.sys
- Pm_hiber.bin
- Save2dsk.bin
- Saveto.dsk

- Spart.par
- Swapper.dat
- Toshiber.dat
- Virtpart.dat
- Win386.swp

Creating boot disks with the Ghost Boot Wizard

This chapter includes the following topics:

- [Introducing the Norton Ghost Boot Wizard](#)
- [What is a Ghost boot disk](#)
- [When to create a Ghost boot disk](#)
- [How to use a Ghost boot disk](#)
- [Files included on a Ghost boot disk](#)
- [Creating a recovery boot disk](#)
- [Opening the Ghost Boot Wizard](#)
- [Creating boot disks and boot images](#)
- [Selecting a template](#)
- [Multicard templates and the boot disk](#)
- [Adding network drivers to the Ghost Boot Wizard](#)
- [Adding command-line parameters to a boot package](#)
- [Providing MS-DOS](#)

Introducing the Norton Ghost Boot Wizard

The Ghost Boot Wizard creates Ghost boot disks that let you complete various Ghost tasks when starting Norton Ghost from DOS. For any task, the Ghost Boot Wizard guides you through the different steps to select the settings and drivers that are needed to create the boot disk.

What is a Ghost boot disk

A Ghost boot disk can be created using the Ghost Boot Wizard, a utility supplied with Norton Ghost. A boot disk is a floppy disk that loads DOS and driver files to let you run Ghost.exe on your computer.

Depending upon the driver files included on your boot disk, more than one floppy disk may be required to create a boot disk set.

When to create a Ghost boot disk

If you start and run Norton Ghost from Windows, then the only boot disk you need is a recovery boot disk. If you are running Norton Ghost from Windows, then the system files and drivers required to perform the backup, restore, or clone are provided for you.

Note: If you saved your image file directly to CD or DVD, then you do not need a recovery boot disk. Norton Ghost includes Ghost.exe if you save the image file to CD or DVD.

To use Ghost.exe you must have a Ghost boot disk. The following tasks require a boot disk:

- Restoring your computer with Ghost.exe after software or hardware failure
- Cloning a computer that does not have Windows installed

How to use a Ghost boot disk

Once you have created the necessary boot disks, you can insert a boot disk into your computer and restart your computer. This starts the computer in DOS and starts Ghost.exe. You can then run Ghost.exe to back up, restore, and clone on your computer from DOS.

See [“Starting the Norton Ghost executable”](#) on page 93.

Files included on a Ghost boot disk

A Ghost boot disk contains the files required to run Ghost.exe. This includes the following:

- Ghost.exe
The Norton Ghost for DOS executable.
- DOS system files
PC-DOS is supplied for the purpose of creating Ghost boot disks. The DOS files are installed automatically when you create the boot disk in Ghost Boot Wizard.
- Any files and drivers required to access the selected hardware
This includes CD-R/RW drivers, network protocol files, or network interface card drivers.

Note: In previous versions of Norton Ghost, MSCDEX was required to read an image from a CD. This is no longer necessary in Norton Ghost 2003.

When to include MS-DOS on a boot disk

By default, Norton Ghost includes PC-DOS on a Ghost boot disk. However, some computer models may not start from a Ghost boot disk that contains PC-DOS. If your computer does not start from a Ghost boot disk, create a new Ghost boot disk from the Ghost Boot Wizard and include Windows 95/98 MS-DOS.

You must provide Windows 95/98 MS-DOS for the computer running the Ghost Boot Wizard before you create an MS-DOS Ghost boot disk.

See [“Providing MS-DOS”](#) on page 89.

Creating a recovery boot disk

When you have created your first backup image, you must create a recovery boot disk and ensure that you can start your computer and access the backup image using the boot disk.

Note: If you saved your image file directly to CD or DVD, then you do not need a recovery boot disk. Norton Ghost includes Ghost.exe if you save the image file to CD or DVD.

See [Table 6-1](#) to determine which type of boot disk you should create as a disaster recovery disk.

Once you have created a recovery boot disk, ensure that your computer starts with the boot disk or the CD/DVD.

To test your recovery boot disk or CD/DVD

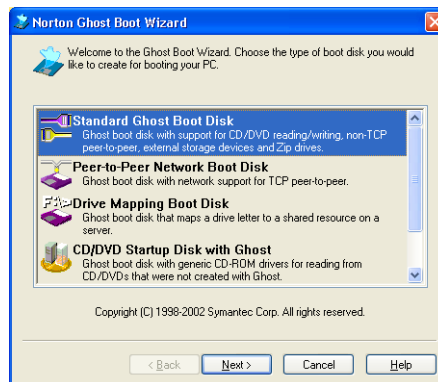
- 1 Turn off your computer.
- 2 Insert the boot disk or CD/DVD into the disk drive of your computer and start your computer.
- 3 Ensure that Ghost.exe starts and that you can access your backup image file. See [“Restoring a hard disk from an image file”](#) on page 101.
- 4 Remove the disk from the disk drive of your computer and restart your computer.

Opening the Ghost Boot Wizard

The procedures in this chapter assume that you know how to open the Ghost Boot Wizard.

To open the Ghost Boot Wizard

- 1 On the Windows taskbar, click **Start > Programs > Norton Ghost**.
- 2 In the Ghost Basic window, click **Ghost Utilities**.
- 3 In the Ghost Advanced window, click **Norton Ghost Boot Wizard**.



Creating boot disks and boot images

The processes for creating boot images and disks can include any of the following features:

- Support for CD-R/RW, DVD, LPT, USB, and FireWire
- Network support for TCP/IP peer-to-peer connections
- Support for reading an image from a CD-ROM
- Support for mapping network drives

See [Table 6-1](#) to decide which boot disk you should make.

Table 6-1 Boot disk types

Intended use of boot disk	Ghost Boot Wizard options to select
<p>Local use of Norton Ghost:</p> <ul style="list-style-type: none"> ■ Disk-to-disk clone ■ Partition-to-partition clone ■ Disk or partition backup to local disk or partition ■ Disk or partition backup to local JAZ or ZIP drive ■ Disk or partition restore from local disk or partition ■ Disk or partition restore from local JAZ or ZIP drive 	<p>You can use either of the following options:</p> <ul style="list-style-type: none"> ■ Standard Ghost Boot Disk See “Standard boot disks” on page 76. ■ Peer-to-Peer Network Boot Disk See “Boot disks with network support” on page 79.
<ul style="list-style-type: none"> ■ Clone, back up, or restore over peer-to-peer connection between two computers using LPT or USB cable. 	<p>Standard Ghost Boot Disk See “Standard boot disks” on page 76.</p>
<ul style="list-style-type: none"> ■ Clone, back up, or restore over TCP/IP peer-to-peer connection with network support between two computers 	<p>Peer-to-Peer Network Boot Disk See “Boot disks with network support” on page 79.</p>
<ul style="list-style-type: none"> ■ Back up a computer directly to an image file on a CD-ROM on a CD writer supported by Norton Ghost. ■ Restore a computer from an image file on a CD-ROM on a CD-R/RW drive supported by Norton Ghost. See “Image files and CD/DVD writers” on page 112. 	<p>Standard Ghost Boot Disk See “Standard boot disks” on page 76.</p>

Table 6-1 Boot disk types

Intended use of boot disk	Ghost Boot Wizard options to select
<ul style="list-style-type: none"> ■ Back up a computer directly to an image file on a DVD on a DVD writer supported by Norton Ghost. ■ Restore a computer from an image file on a DVD on a DVD drive supported by Norton Ghost. 	<p>Standard Ghost Boot Disk</p> <p>See “Standard boot disks” on page 76.</p>
<ul style="list-style-type: none"> ■ Restore a computer from a Ghost image file on a CD-ROM on a CD-R/RW drive not supported by Norton Ghost. The image file was not stored on the CD-ROM using Norton Ghost. Contains generic CD-ROM drivers. 	<p>CD/DVD Startup Disk with Ghost</p> <p>See “Boot disks with CD-ROM and DVD support” on page 81.</p>
<ul style="list-style-type: none"> ■ Access files other than a Ghost image file on a CD-ROM. 	<p>CD/DVD Startup Disk with Ghost</p> <p>See “Boot disks with CD-ROM and DVD support” on page 81.</p>
<ul style="list-style-type: none"> ■ Map a drive on a workstation to a shared resource on a server and use Norton Ghost to clone, back up, or restore. 	<p>Drive Mapping Boot Disk</p> <p>See “Boot disks with drive mapping network support” on page 82.</p>

Standard boot disks

The Ghost Boot Wizard creates a boot disk that does any one or a combination of the following:

- Runs Ghost.exe for local operations.
- Lets you write Ghost images directly to a CD-R/RW on a CD writer supported by Norton Ghost.
See [“Image files and CD/DVD writers”](#) on page 112.
- Lets you write Ghost images directly to a DVD on a DVD writer supported by Norton Ghost.

- Runs Ghost.exe on two computers connected by either an LPT or USB cable. The default mode for an LPT connection is ECP/EPP High Speed. If you are having problems with your LPT connection, set the mode to Bidirectional 8bit or Bidirectional 4bit. The next time that you create a boot disk, the mode is reset to the default, ECP/EPP High Speed.
 If you have multiple parallel ports and want to connect using a port other than the default LPT1, use the LPT port option to specify the port into which your cable is plugged.
- Lets you use Ghost.exe to back up to or restore from an external device connected by USB or FireWire.

To create a boot disk to run Ghost.exe, or with support for LPT, USB, or FireWire cables

- 1 In the Ghost Boot Wizard window, click **Standard Ghost Boot Disk**.
- 2 Click **Next**.
- 3 Do one or more of the following:
 - Check **USB support** to add support for USB peer-to-peer to the boot disk.
 - Click **Advanced** to set the USB peer-to-peer drivers.
 See “[Setting the USB peer-to-peer drivers](#)” on page 79.
 - Check **LPT support** to add support for LPT peer-to-peer to the boot disk.
 - Click **Advanced** to change the LPT mode or port.
 - Click **No USB support** to exclude support for USB external devices.
 - Click **USB 1.1 support** to add support for USB 1.1 external devices to the boot disk.
 If any of your USB cards/chipsets are USB 1.1, then you must select this option.
 - Click **USB 2.0 support** to add support for USB 2.0 external devices to the boot disk.
 If any of your USB cards/chipsets are USB 1.1, then do not select this option. Select the USB 1.1 support option.
 - Click **Firewire Support** to add support for FireWire external devices to the boot disk.

- Click **Assign DOS drive letters** to assign a DOS drive letter to a USB or FireWire external device.
 - Click **Include Adaptec ASPI drivers** to add Adaptec ASPI drivers to the boot disk.
These drivers are required to write an image directly to a SCSI CD-R that is supported by Norton Ghost.
- 4 Click **Next**.
 - 5 Select one of the following:
 - Use **PC-DOS**: Includes PC-DOS on the boot disk.
 - Use **MS-DOS**: Includes MS-DOS on the boot disk.
See [“Providing MS-DOS”](#) on page 89.
 - 6 Click **Next**.
 - 7 In the **Ghost.exe** field, type the correct path if the executable has been moved or you want to use a different version of Norton Ghost.
The default path to the Norton Ghost executable appears in the **Ghost.exe** field.
 - 8 In the **Parameters** field, type any required command-line parameters.
See [“Adding command-line parameters to a boot package”](#) on page 88.
 - 9 Click **Next**.
 - 10 In the **Floppy Disk Drive** field, select the appropriate drive letter.
 - 11 In the **Number of disks to create** field, select the number of disks that you want to create.
 - 12 Ensure that **Format disk(s) first** is checked to format the disks before disk creation.
Ensure that this option is checked unless you are creating a custom boot disk with custom system files. If this option is unchecked, the boot disk is not bootable.
 - 13 Ensure that **Quick Format** is checked to perform a quick format.
 - 14 Click **Next**.
 - 15 Review the boot disk details and click **Next** to start creating the boot disks.
Follow the prompts to format the disks and create a boot disk set.

Setting the USB peer-to-peer drivers

You can select USB peer-to-peer drivers to include on the boot disk. In most cases, you do not need to alter the driver default. However, if you have problems connecting using peer-to-peer, then select the other options and retry the task.

To select USB peer-to-peer drivers

- 1 Select one of the following:
 - **All drivers:** Includes all USB peer-to-peer drivers on the boot disk.
 - **UHCI driver:** Includes only UHCI drivers on the boot disk.
 - **OHCI driver:** Includes only OHCI drivers on the boot disk.
- 2 Click OK.

Boot disks with network support

The Ghost Boot Wizard helps you create boot disks that provide network support for TCP/IP peer-to-peer connections. You can use these boot disks to clone, restore, or back up using Norton Ghost on computers that are connected over a TCP/IP peer-to-peer connection.

Before you start this process, you need to know the types of network cards that are installed on your client computers. Unless you use the multicard template, you must create a boot disk for each network card.

To create a boot disk with network support

- 1 In the Ghost Boot Wizard window, click **Peer-to-Peer Network Boot Disk**.
- 2 Click **Next**.
- 3 Select the network driver for the make and model of the network card installed on the client computer.

See [“Selecting a template”](#) on page 84.

If the correct driver is not in the list, add the driver.

See [“Adding network drivers to the Ghost Boot Wizard”](#) on page 86.

You can add more than one driver to the boot package.

See [“Multicard templates and the boot disk”](#) on page 85.
- 4 Click **Next**.

- 5 Select one of the following:
 - Use **PC-DOS**: Includes PC-DOS on the boot disk.
 - Use **MS-DOS**: Includes MS-DOS on the boot disk.
See [“Providing MS-DOS”](#) on page 89.
- 6 In the Ghost.exe field, type the correct path if the executable has been moved or you want to use a different version of Ghost.
The default path to the Norton Ghost executable appears in the Ghost.exe field.
- 7 In the Parameters field, type any required command-line parameters.
See [“Adding command-line parameters to a boot package”](#) on page 88.
- 8 Click **Next**.
- 9 Do one of the following:
 - Click **DHCP will assign the IP settings** if your network contains a DHCP server.
 - Click **The IP settings will be statically defined** and complete the fields below this option if your network does not contain a DHCP server.
If you create more than one boot disk, then the static IP address incrementally increases as each boot disk is created.
- 10 Click **Next**.
- 11 In the Floppy Disk Drive field, select the appropriate drive letter.
- 12 In the Number of disks to create field, select the number of disks that you want to create.
- 13 Ensure that **Format disk(s) first** is checked to format the disks before disk creation.
Ensure that this option is checked unless you are creating a custom boot disk with custom system files. If this option is unchecked, the boot disk is not bootable.
- 14 Ensure that **Quick Format** is checked to perform a quick format.
- 15 Click **Next**.
- 16 Review the boot disk details and click **Next** to start creating the boot disks.
Follow the prompts to format the disks and create a boot disk set.

Boot disks with CD-ROM and DVD support

A boot disk with CD-ROM and DVD support lets you access images and other files stored on CD-R/RW and DVD drives that are not supported by Norton Ghost.

This kind of disk also contains the DOS system files and Norton Ghost.

To create a boot disk with CD-ROM and DVD support

- 1 In the Ghost Boot Wizard window, click **CD/DVD Startup Disk with Ghost**.
- 2 Click **Next**.
- 3 Select one of the following:
 - **Use PC-DOS:** Includes PC-DOS on the boot disk.
 - **Use MS-DOS:** Includes MS-DOS on the boot disk.
See [“Providing MS-DOS”](#) on page 89.
- 4 Click **Next**.
- 5 In the Ghost.exe field, type the correct path if the executable has been moved or you want to use a different version of Ghost.
The default path to the Ghost executable appears in the Ghost.exe field.
- 6 In the Parameters field, type any required command-line parameters.
See [“Adding command-line parameters to a boot package”](#) on page 88.
- 7 Click **Next**.
- 8 In the Floppy Disk Drive field, select the appropriate drive letter.
- 9 In the Number of disks to create field, select the number of disks that you want to create.
- 10 Ensure that **Format disk(s) first** is checked to format the disks before disk creation.
Ensure that this option is checked unless you are creating a custom boot disk with custom system files. If this option is unchecked, the boot disk is not bootable.
- 11 Ensure that **Quick Format** is checked to perform a quick format.
- 12 Click **Next**.
- 13 Review the boot disk details and click **Next** to start creating the boot disks.
Follow the prompts to format the disks and create a boot disk set.

Boot disks with drive mapping network support

When your computers need to access a network drive, use the Ghost Boot Wizard to create boot disks that map a drive letter to a shared resource on a network server. This lets you use the local option in Ghost.exe to access a network drive.

To create a boot disk that supports mapping network drives

- 1 In the Ghost Boot Wizard window, click **Drive Mapping Boot Disk**.
- 2 Click **Next**.
- 3 Select the network driver for the particular make and model of the network card installed on the computer.
See [“Selecting a template”](#) on page 84.
If the correct driver is not in the list, add the driver.
See [“Adding network drivers to the Ghost Boot Wizard”](#) on page 86.
You can add more than one driver to the boot package.
See [“Multicard templates and the boot disk”](#) on page 85.
- 4 Click **Next**.
- 5 Select one of the following:
 - Use **PC-DOS**: Includes PC-DOS on the boot disk.
 - Use **MS-DOS**: Includes MS-DOS on the boot disk.
See [“Providing MS-DOS”](#) on page 89.
- 6 Click **Get MS Client** and browse to the MS-DOS Client files to include the Microsoft Client files if you are using MS-DOS.
If you are using MS-DOS, you must include the Microsoft DOS Client files. You must install the files on the Ghost Boot Wizard computer before you can include them in the boot package.
See [“Installing MS-DOS Client files”](#) on page 49.
- 7 Click **Next**.
- 8 In the **Computer Name** field, type the name of the client computer.
This specifies the name of the computer after it starts from the floppy disk and does not have to be the same name given to the computer in Windows. If you create more than one disk, a number is added to the computer name so that the names for subsequent disks are unique.
- 9 In the **User Name** field, type the user name that the boot disk will use to log on to the network.
This user must exist on the network and have sufficient access rights to the files and directories that you want to use.

- 10 In the Domain field, type the domain to which the user belongs.
- 11 In the Drive Letter field, select a drive letter to access a network share through a mapped drive.
Select a drive letter greater than any existing drive letter.
- 12 If you want to prevent the boot package from mapping a drive when the computer starts, click **None**.
In this case, map a drive from the DOS prompt after the computer has started.
- 13 In the Maps To field, type the complete UNC path to the network share.
For example, to access a shared folder named Ghost on a computer named Boss, the UNC path is \\Boss\Ghost.
- 14 Click **Next**.
- 15 Do one of the following:
 - Click **DHCP will assign the IP settings** if your network contains a DHCP server.
 - Click **The IP settings will be statically defined** and complete the fields below this option if your network does not contain a DHCP server. Your network administrator can provide the values for these fields.
- 16 Click **Next**.
- 17 In the Floppy Disk Drive field, select the appropriate drive letter.
- 18 In the Number of disks to create field, select the number of disks that you want to create.
- 19 Ensure that **Format disk(s) first** is checked to format the disks before disk creation.
Ensure that this option is checked unless you are creating a custom boot disk with custom system files. If this option is unchecked, the boot disk is not bootable.
- 20 Ensure that **Quick Format** is checked to perform a quick format.
- 21 Click **Next**.
- 22 Review the boot disk details and click **Next** to start creating the boot disks.
Follow the prompts to format the disks and create a boot disk set.

Selecting a template

For the boot disk to work correctly, it is important that you select the correct template. When you create a boot disk for client computers, the template that you select must be suitable for the network cards installed in the computers that are to start from the package.

To determine which network interface card is installed in a computer, find the name of the driver from Network Properties within Windows. This must be done on the client computer for which you are preparing the boot disk.

To determine which network interface card is installed

To determine which network interface card is installed on a Windows 98 computer

- 1 On the Windows taskbar, click **Start > Settings > Control Panel**.
- 2 Double-click **System**.
- 3 Click **Device Manager**.
- 4 Expand **Network Adapter**.
The make and model of the installed network interface card are listed.

To determine which network interface card is installed on a Windows NT 4 computer

- 1 On the Windows taskbar, click **Start > Settings > Control Panel**.
- 2 Double-click **Network**.
The make and model of the installed network interface card are listed on the Adapters tab.

To determine which network interface card is installed on a Windows 2000 computer

- 1 On the Windows taskbar, click **Start > Settings > Control Panel**.
- 2 Double-click **System**.
- 3 On the Hardware tab, click **Device Manager**.
- 4 Expand **Network adapters**.
The make and model of the installed network interface card are listed.

The name of the network interface card as shown in Windows may not exactly match the name of the correct template in the Ghost Boot Wizard.

For example, Windows may list the card as 3Com Fast EtherLink XL 10/100Mb TX Ethernet NIC (3C905B-TX). In this case the text in parenthesis is the actual model number of the card, which indicates that the Ghost Boot Wizard template named 3COM 3C90X (which works for all 3C90- cards) is the correct template.

In some cases you may have a choice between an NDIS2 driver and a packet driver version of the same template. Both templates should work, but you may find that one gives better performance. Experiment to see which one works better.

It is possible that there is no existing template in the Ghost Boot Wizard that is suitable for the network interface card installed in your computer. In this case, obtain the DOS drivers for the network interface card either from the disk supplied with the card or from the manufacturer's Web site, and add a new template to the Ghost Boot Wizard.

See [“Adding network drivers to the Ghost Boot Wizard”](#) on page 86.

If you have different network interface cards installed in client computers, then you may be able to use the multicard template to create a single boot package that works on each of your computers without modification.

Multicard templates and the boot disk

You can use multicard templates to create a boot disk package containing several NDIS2 drivers. When the computer starts from the boot disk, a special multicard driver checks the computer's hardware to see if any of the NDIS2 drivers can be used to access the installed network card.

Multicard templates are useful because several makes and models of network cards are often used in a single LAN. You can create a single boot disk for use with all of your computers without modification.

Refer to the Software License Agreement for use restrictions.

The Network Interface Card window is available when creating a Peer-to-Peer Network Boot Disk or a Drive Mapping Boot Disk.

To create a multicard template

- 1 In the Network Interface Card window, click **Multicard Template**.
- 2 Click **Next**.
- 3 Select the required drivers from the list of NDIS2 drivers.
Select no more than four or five drivers, as space is limited on a floppy disk.
- 4 Click **Next** to continue creating the boot disk.

Adding network drivers to the Ghost Boot Wizard

The Ghost Boot Wizard includes drivers for over 130 network interface cards. If your driver is not in the list, you can add it to the wizard so that it is set up the next time that you need it.

The Network Interface Card window is available when creating a Peer-to-Peer Network Boot Disk or a Drive Mapping Boot Disk.

To begin adding a network driver to the Ghost Boot Wizard

- 1 In the Network Interface Card window, click **Add**.
- 2 Select one of the following:
 - **Packet Driver**
 - **NDIS2 Driver**

Many manufacturers ship both drivers with their network cards so you have a choice of which one to use.
- 3 Click **OK** to continue creating the boot disk.

Adding packet drivers to the Ghost Boot Wizard

Packet drivers are usually DOS executables (with .com or .exe file extensions) that load from the Autoexec.bat file before Norton Ghost loads. Norton Ghost communicates directly with the packet driver to use the services provided by the network card.

To add a packet driver to the Ghost Boot Wizard

- 1 In the Template Properties window, on the Packet Driver tab, in the Driver Executable field, click **Browse** to locate the packet driver so that the Ghost Boot Wizard can copy the file to the current template.

Packet drivers are usually included on the driver disk supplied with the network card. If you are installing the packet driver from the original disks that came with your network interface card, the packet driver should be in a directory called Packet or Pktdrv.
- 2 In the Parameters field, type the command-line parameters if the network card requires them.

These parameters vary from driver to driver and are usually optional with plug-and-play network cards. Consult the documentation that came with the network card. This is often in the form of a Readme.txt file in the same directory as the driver itself.

- 3 Click **Select Automatically** to let Ghost determine the best multicasting mode based on the information in the packet driver.
If the Select Automatically mode does not work, try Receive Mode 5. If that does not work, try Receive Mode 6.

Adding NDIS2 drivers to the Ghost Boot Wizard

NDIS2 drivers work with the Microsoft Network Client. NDIS2 drivers are DOS drivers that load from the DOS Config.sys file.

To add an NDIS2 driver to the Ghost Boot Wizard

- 1 In the Template Properties window, on the NDIS Driver tab, click **Setup**.
- 2 Locate the NDIS2 driver.
In many cases Ghost can automatically determine the other parameters for your network. When locating the directory that contains the driver, look for a folder named Ndis or Ndis2. If you have a choice between DOS and OS2 folders, select DOS.
- 3 Click **OK**.
If the setup fails to complete the driver properties, then complete the following fields manually:
 - **Filename:** Type the DOS file name for the NDIS2 driver.
 - **Driver Name:** Type the internal name of the driver.
The internal name of the driver is used when generating the Protocol.ini configuration file and must always end with a \$ character. Read the sample Protocol.ini file in the same directory as the driver itself to find the driver name.
 - **Parameters:** Type the parameters for the Protocol.ini configuration file.
If you use Setup to automatically fill in this page, you will see the parameters that you need to adjust. For the majority of plug-and-play cards, all of the parameters are optional, so you can either accept the defaults or leave this field empty.
- 4 Click **OK**.

When you have created the template that you require, you can continue creating a boot disk.

Customizing the template

You may require additional drivers and programs in order to use the network device attached to your computer. For example, many USB network devices must load an extra driver for the USB port before the driver for the network device.

You can add files to the template and customize the Autoexec.bat and Config.sys files of the resulting boot disk. Usually these are either DOS drivers or executable programs, but you can add any type of file. Files added to the template appear in the list to the right of the button.

If this template is used as a multiscard template, then any additional files or modifications are overridden by its settings.

The Template Properties window is available when creating a Peer-to-Peer Network Boot Disk or a Drive Mapping Boot Disk.

To modify a template

- 1 In the Template Properties window, on the Advanced tab, click **New**.
- 2 Click **Delete** to delete the selected file from the list.
- 3 In the Autoexec.bat field, type any additional Autoexec.bat entries for the driver.
The entries appear before any network-related commands, such as Netbind.com or the packet driver executable.
- 4 In the Config.sys field, type any additional Config.sys entries for the driver.
The entries appear before any driver-related devices to ensure that the enabling drivers load before the main network device drivers specified on the network driver page.

Adding command-line parameters to a boot package

You can add command-line parameters to a boot package to instruct Norton Ghost to perform certain actions.

See [“Command-line switches”](#) on page 153.

Command-line parameters can be added while creating a Standard Boot Disk, a Peer-to-Peer Network Boot Disk, or a CD/DVD Startup Disk with Ghost boot disk in the Ghost executable location window.

In the following example, the parameters instruct Norton Ghost to back up your main disk to an image on another drive.

```
-clone,mode=create,src=1,dst=d:\backups\maindrv.gho
```

Table 6-2 Command parameters

Clone Parameters	Description
mode=create	Creates an image file
src=1	Specifies drive 1 as the source drive
dst=D:\Backups\Maindrv.gho	Saves the image to the file D:\Backups\Maindrv.gho

Providing MS-DOS

The Ghost Boot Wizard includes PC-DOS on boot disks. However, a boot disk that includes PC-DOS might not start all computers. When you create a boot disk, you can include MS-DOS instead of PC-DOS.

If you use MS-DOS, then you must provide MS-DOS files on the computer on which you are creating the boot disk. Using an MS-DOS system disk that was formatted on a Windows 95/98 computer, you can install the MS-DOS files during the creation of the boot disk.

To install MS-DOS on your computer

To create an MS-DOS system disk on a Windows 95/98 computer

- 1 Insert a blank floppy disk into drive A of a Windows 95/98 computer.
- 2 Click **Start > Program Files > Windows Explorer**.
- 3 Right-click drive A.

Warning: Do not right-click drive C.

- 4 Click **Format**.
- 5 Check **Copy System Files**.
- 6 Click **Start** to format the disk.

You can install or uninstall MS-DOS while you are creating a boot disk.

To install MS-DOS on your computer

- 1** Insert the formatted floppy disk into drive A of the computer on which the Ghost Boot Wizard is running.
- 2** In the DOS Version window, click **Get MS-DOS**.
- 3** Click **OK**.

To uninstall MS-DOS from your computer

- 1** In the DOS Version window, click **Remove MS-DOS**.
- 2** Click **OK**.

Backing up, restoring, and cloning from DOS

This chapter includes the following topics:

- [An overview of using Ghost.exe](#)
- [Starting the Norton Ghost executable](#)
- [Navigating without a mouse](#)
- [Establishing a peer-to-peer connection with Ghost.exe](#)
- [Creating a backup image file](#)
- [Restoring from an image file](#)
- [Cloning disks and partitions](#)
- [Verifying image integrity](#)
- [Adding switches to your Ghost operation](#)

An overview of using Ghost.exe

You can use the Norton Ghost executable, Ghost.exe, to clone a computer, create a backup, and restore a computer. You can add switches to the cloning task in the Options window or as parameters to Ghost.exe. Ghost.exe is run within DOS.

The following is an overview of the process of using Ghost.exe.

To use Norton Ghost

- 1 Start Ghost.exe.
Add command-line switches, if necessary.
See “[Command-line switches](#)” on page 153.
- 2 If you want to establish a peer-to-peer connection, then set up the connection.
- 3 Select the Norton Ghost operation:
 - Disk or partition to image file
 - Disk or partition from image file
 - Disk to disk
 - Partition to partition
- 4 Do one of the following:
 - Select the source hard disk or partitions.
 - Select the image file.
- 5 Do one of the following:
 - Select the destination hard disk or partition.
 - Select the image file.

Make sure that you select the correct destination to overwrite. The destination disk is completely overwritten with no chance of recovering any data.
- 6 Complete the Ghost operation.

Note: On the Ghost.exe main menu, the option of GhostCast is not supported. The GhostCast functionality is available only with Symantec Ghost Enterprise Edition. If you require GhostCast functionality, see “[Service and support solutions](#)” on page 209.

Starting the Norton Ghost executable

The Norton Ghost executable is a DOS-based application and runs in DOS mode outside of Windows. If you run the Norton Ghost executable (Ghost.exe) within Windows 95/98/Me, note the following:

- Files may be in an open or changing state. If these files are cloned or backed up, the resulting destination files are left in an inconsistent state.
- The partition on which Windows is installed must not be overwritten.
- If you overwrite a disk or partition, the computer must be restarted.
- Ghost.exe does not automatically restart the system.
- Hard disk sizes may appear smaller than their actual sizes. The Norton Ghost executable can only access the shown destination size. The remaining space is not used.
- The Norton Ghost executable fails if you try to overwrite any of the following:
 - Windows swap files
 - Registry files
 - Open files

You cannot run Ghost.exe within Windows NT, Windows 2000/XP, Linux, OS/2, or other non-DOS operating systems. To run Ghost.exe on a computer that runs a non-DOS operating system, start the computer in DOS using a Ghost boot disk.

To start the Norton Ghost executable

- ◆ Do one of the following:
 - Insert a Ghost boot disk into the floppy disk drive of your computer and start your computer.
See “[Creating boot disks and boot images](#)” on page 75.
 - For Windows 98 computers, start your computer in DOS. At the DOS prompt, type:
`C:>\progra~1\symantec \Norton~1\ghost.exe`
Running Norton Ghost in DOS may require additional DOS drivers to let Norton Ghost access and use some hardware. If you cannot access some hardware, such as a CD-R/RW drive, then create a boot disk that contains the drivers to access the hardware in DOS.
See “[Creating boot disks and boot images](#)” on page 75.
 - Use the Run Ghost Interactively Wizard.
See “[Starting Ghost.exe](#)” on page 59.

Marking your disks

The first time that you run Ghost.exe on your computer, the License agreement warning dialog box appears. When you click OK, Norton Ghost marks all hard disks to ensure that you do not see this message again.

To mark your disks

- ◆ In the License agreement warning dialog box, click **OK** to mark your hard disks.

Navigating without a mouse

If you have mouse drivers loaded, then you can use the mouse to navigate in Norton Ghost. You can also use the keyboard.

- Use arrow keys to navigate the menu.
- Press Tab to move from button to button.
- Press Enter to activate the selected button.
- Press Enter to select an item in a list.

Establishing a peer-to-peer connection with Ghost.exe

If you are using an LPT, USB, or TCP peer-to-peer connection, then you must set up the connection between your computers before a clone, backup or restore operation.

The computers must be physically connected using one of the following:

- LPT: A parallel connection cable
- USB: A USB 1.1 cable
- TCP peer-to-peer: A network connection
 See “[TCP/IP connections](#)” on page 178.

In a peer-to-peer operation, one computer is designated the master computer, and the other is designated the slave computer. This table describes the possible Norton Ghost processes and the master/slave relationships that exist between two computers.

Table 7-1 Master and slave computers

Action	Master	Slave
Disk-to-disk clone	Computer containing source disk	Computer containing destination disk
Back up disk to image file	Computer containing source disk	Computer receiving destination image file
Restore disk from image file	Computer containing destination disk	Computer containing source image file
Partition-to-partition clone	Computer containing source partition	Computer containing destination partition
Back up partition to image file	Computer containing source partition	Computer receiving destination image file
Restore partition from image file	Computer containing destination partition	Computer containing source image file

Select which computer is the master (the computer from which you control the connection), and which is the slave (the other computer participating in the connection). All operator input must occur on the master computer.

You must have two Ghost boot disks with which to start your computers. Create the boot disks using the Ghost Boot Wizard.

Note: Ensure that both boot disks are created with the same version of Norton Ghost. You cannot use one boot disk created in Norton Ghost 2002 and one boot disk created in Norton Ghost 2003 in the same task.

See [“Creating boot disks and boot images”](#) on page 75.

To connect two computers peer-to-peer

- 1 Insert a Ghost Boot Disk into the floppy disk drive of each computer.
- 2 Restart each computer.
- 3 On the slave computer, on the main menu, do one of the following:
 - Click **Peer to peer > USB > Slave** to start the computer as the slave computer in a USB connection.
 - Click **Peer to peer > LPT > Slave** to start the computer as the slave computer in an LPT connection.
 - Click **Peer to peer > TCP/IP > Slave** to start the computer as the slave computer in a TCP/IP connection.
Take note of the IP address displayed in the Slave Connect dialog box.
- 4 On the master computer, on the main menu, do one of the following:
 - Click **Peer to peer > USB > Master** to start the computer as the master computer in a USB connection.
 - Click **Peer to peer > LPT > Master** to start the computer as the master computer in an LPT connection.
 - Click **Peer to peer > TCP/IP > Master** to start the computer as the master computer in a TCP/IP connection and type the IP address displayed on the slave computer.



Creating a backup image file

You can create a backup of either of the following:

- A hard disk
- A partition

The backup is saved as an image file, which you can store on one of the following:

- A second hard disk
- A second partition on your hard disk (partition backup only)
- LS120 Superdisk, JAZ, or ZIP disk
- CD-R/RW or DVD-R/RW

See [“Saving an image file directly to a CD-R/RW or DVD-R/RW drive”](#) on page 113.

- Tape
- Locally mapped network file server
- Another computer using peer-to-peer

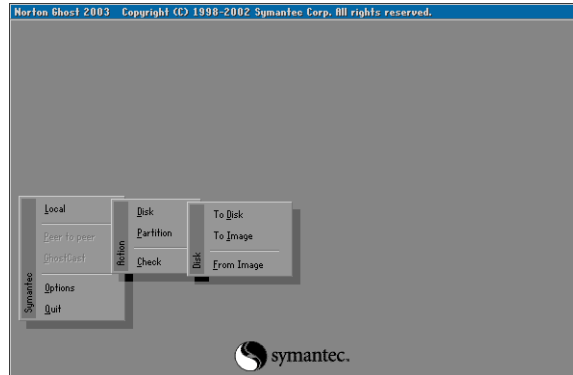
Compression may affect the speed of operations. When you select a compression level, Norton Ghost estimates the amount of space available for the destination image file. If there is insufficient space, Norton Ghost prompts you to enable spanning of image files.

Backing up a hard disk to an image file

When you back up a hard disk, a copy of the entire disk is saved as an image file.

To back up a disk to an image file

- 1 On the Norton Ghost main menu, do one of the following:
 - Local: Click **Local** > **Disk** > **To Image**.
 - Peer-to-peer connection: Click **Disk** > **To Image**.



- 2 In the Source Drive dialog box, select the source disk.
The Source Drive dialog box shows details of every disk that Norton Ghost finds on the local computer.
- 3 In the File Locator dialog box, type the image file destination and name.
- 4 In the Image file description dialog box, type a description of the image file.
You can modify this description in Ghost Explorer when the image file has been created.
- 5 Click **Save**.
- 6 In the Compress Image? dialog box, do one of the following:
 - Click **No** for no compression (high speed).
 - Click **Fast** for low compression (medium speed).
 - Click **High** for high compression (slower speed).See [“Image files and compression”](#) on page 62.
- 7 When the “Proceed with Image File Creation?” question appears, check the details and ensure that the correct options are selected.

- 8 Do one of the following:
 - Click **Yes** to proceed with the image file creation.

The system performs an integrity check of the file structure on the source disk and then copies the source disk to the destination image file. If you need to abort the process, press **Ctrl+C**, but be aware that this leaves the destination image file in an unknown state.
 - Click **No** to return to the menu.
- 9 If spanning is enabled and required, click **Yes** and type the location of the next span of the image file.

See [“Image files and volume spanning”](#) on page 63.

Note: If the image file reaches the size of 2 GB and there is not enough space to continue, you are prompted to insert the next media to continue.

Verify the integrity of the image file when it has been created.

See [“Verifying image integrity”](#) on page 107.

Backing up a partition to an image file

You can create an image file from one or more partitions to use as a backup or to clone onto another partition or disk.

To back up a partition to an image file

- 1 On the main menu, do one of the following:
 - Local: Click **Local > Partition > To Image**.
 - Peer-to-peer connection: Click **Partition > To Image**.
- 2 In the Source Drive dialog box, select the source drive.

The Source Drive dialog box contains the details of every disk that Norton Ghost finds on the local computer.
- 3 In the Source Partition dialog box, select the source partitions to include in the destination image file.

The Source Partition dialog box contains the details of all the partitions on the selected source disk. Multiple partitions may be selected.
- 4 Click **OK**.
- 5 In the File Locator dialog box, select the image file destination and name.

- 6 In the Image file description dialog box, type a description of the image file. You can modify this description in Ghost Explorer when the image file has been created.
- 7 Click **Save**.
- 8 In the Compress Image? dialog box, do one of the following:
 - Click **No** for no compression (high speed).
 - Click **Fast** for low compression (medium speed).
 - Click **High** for high compression (slower speed).See “[Image files and compression](#)” on page 62.
- 9 In the Proceed with partition image creation? dialog box, ensure that the correct options are selected.
- 10 Do one of the following:
 - Click **Yes** to proceed with the image file creation.

The system performs a quick integrity check of the file structure on the source partitions and then copies the source partitions to the destination image file. If you need to abort the process, press **Ctrl+C**, but be aware that this leaves the destination image file in an unknown state.
 - Click **No** to return to the menu.
- 11 If spanning is enabled and required, click **Yes** and type the location of the next span of the image file.

See “[Image files and volume spanning](#)” on page 63.

Note: If the image file reaches the size of 2 GB and there is not enough space to continue, you are prompted to insert the next media to continue.

Verify the integrity of the image file when it has been created.

See “[Verifying image integrity](#)” on page 107.

Restoring from an image file

You can restore either of the following:

- A hard disk
- A partition

The restore is made from a previously created image file that has been stored on one of the following:

- A second hard disk
- A second partition on your hard disk
- JAZ or ZIP disk
- CD-R/RW
- DVD
- Tape
- Mapped network drive
- Drive on another computer (peer-to-peer)

Restoring a hard disk from an image file

When you restore a hard disk, it is overwritten by the contents of the image file.

To restore a disk from an image file

- 1 On the main menu, do one of the following:
 - Local: Click **Local** > **Disk** > **From Image**.
 - Peer-to-peer connection: Click **Disk** > **From Image**.
- 2 In the File Locator dialog box, do one of the following:
 - Type the path and file name of the image file.
 - Click **Browse** to locate the image file.

Specify the drive or device and select the full path name. The image file may reside on a local drive or on a locally mapped network file server. When using peer-to-peer connections, the image file is located on the slave computer.
- 3 Press **Enter**.

- 4 In the Destination Drive dialog box, select the destination disk.
Choose carefully as this is the disk that will be overwritten.
The Destination Drive dialog box shows the details of every drive that Norton Ghost finds on the local computer. If the source image file resides on a local disk, then this disk is not available for selection.
- 5 In the Destination Drive Details dialog box, confirm or change the destination disk partition layout.
The Destination Drive Details dialog box shows a suggested partition layout for the destination disk. By default, Norton Ghost tries to maintain the same size ratio between the new disk partitions. However, you should note the following:
 - You can change the size of any target FAT, NTFS, or Linux Ext2/3 partition by entering the new size in megabytes.
 - You cannot enter a value that exceeds the available space, is beyond the file system's limitations, or is not large enough to contain the data held in the source image.

6 Click **OK**.

7 Do one of the following:

- Click **Yes** to proceed with the disk cloning.
Norton Ghost creates the destination disk using the source image file disk details. If you need to abort the process, press **Ctrl+C**, but be aware that this leaves the destination disk in an unknown state.

Warning: Only click **Yes** if you are sure that you want to proceed. The destination disk is completely overwritten with no chance of recovering any data.

- Click **No** to return to the menu.

8 If spanning is enabled, do one of the following:

- Click **OK** to continue on the same form of media.
- Click **Filename** to restore from a different location, and then type the location and file name of the image file span.
Insert the next media, if prompted.

9 Restart the computer when the disk image restore is complete.

Run Symantec Disk Doctor, ScanDisk, or a similar utility to verify the integrity of the destination disk.

Restoring a partition from an image file

When you restore a partition, it is overwritten by the data from an image file.

To restore a partition from an image file

- 1 On the main menu, do one of the following:
 - Local: Click **Local** > **Partition** > **From Image**.
 - Peer-to-peer connection: Click **Partition** > **From Image**.
- 2 In the File Locator dialog box, do one of the following:
 - Type the path and file name of the image file.
 - Click **Browse** to locate the image file.

Specify the drive or device and select the full path name. The image file may reside on a local drive or on a locally mapped network file server. When using peer-to-peer connections, the image file is located on the slave computer.
- 3 Press **Enter**.
- 4 In the Source Partition dialog box, select the source partition from the image file.

The Source Partition dialog box contains the details of all of the partitions in the image file.
- 5 In the Destination Drive dialog box, select the destination disk.

The Destination Drive dialog box contains the details of every disk that Norton Ghost finds on the local computer.
- 6 In the Destination Partition dialog box, select the destination partition. Select an existing partition carefully as this is the partition that will be overwritten.

The Destination Partition dialog box contains the details of all of the partitions on the selected destination disk. If this is a local partition-to-partition copy, then the source partition is unavailable for selection. However, you can create a new partition if space is available. If you create a new partition, it can be resized during the cloning operation.
- 7 In the Proceed with partition restore? dialog box, ensure that the correct options are selected.

- 8 Do one of the following:
 - Click **Yes** to proceed with the partition cloning.
Norton Ghost overwrites the destination partition using the partition details contained in the image file. If you need to abort the process, press **Ctrl+C**, but be aware that this leaves the destination partition in an unknown state.

Warning: Only click **Yes** if you are sure that you want to proceed. The destination partition is completely overwritten with no chance of recovering any data.

- Click **No** to return to the menu.
- 9 If spanning is enabled, do one of the following:
 - Click **OK** to continue on the same form of media.
 - Click **Filename** to restore from a different location, and then type the location and file name of the image file span.
Insert the next media if prompted.
 - 10 Restart the destination computer when the partition copy is complete.

Run Symantec Disk Doctor, ScanDisk, or a similar utility to verify the integrity of the destination partition.

Cloning disks and partitions

By default, Norton Ghost tries to maintain the same size ratio between the new disk partitions. However, you should note the following:

- You can change the size of any destination FAT, NTFS, or Linux Ext2/3 partition by entering the new size in megabytes.
- You cannot enter a value that exceeds the available space, is beyond the file system's limitations, or that is not large enough to contain the data held in the source partition.

Cloning disk to disk

When you clone disk to disk, Norton Ghost copies the contents of one hard disk onto another.

To clone disk to disk

- 1 On the Norton Ghost main menu, do one of the following:
 - Local: Click **Local > Disk > To Disk**.
 - Peer-to-peer connection: Click **Disk > To Disk**.
 - 2 In the Source Drive dialog box, select the source disk.

The Source Drive dialog box shows the details of every disk that Norton Ghost finds on the local computer.
 - 3 In the Destination Drive dialog box, select the destination disk.

Choose carefully as this is the disk that will be overwritten.

If a peer-to-peer connection method is used, the destination disk can be any of the slave computer's disks. However, if this is a local disk-to-disk copy, then the source disk is unavailable for selection.
 - 4 Confirm the destination disk layout.
-
- Warning:** The Destination Drive Details dialog box shows a suggested partition layout for the destination drive once the cloning process has been completed. This partition layout may mirror the source drive layout. Therefore, the destination drive details appear similar to the source drive.
-
- 5 Click **OK**.
 - 6 When the "Proceed with disk clone?" question appears, check the details and ensure that the correct options are selected.

7 Do one of the following:

- Click **Yes** to proceed with the disk cloning.

The system performs an integrity check of the file structure on the source disk, and then copies the source disk to the destination. If you need to abort the process press, **Ctrl+C**, but be aware that this leaves the destination disk in an unknown state.

Warning: Only click Yes if you are sure that you want to proceed. The destination disk is overwritten with no chance of recovering any data.

- Click **No** to return to the menu.

8 Restart the computer.

Warning: You should remove one of the hard disks before you restart your computer. If you leave two hard disks in the computer, damage can occur to both of the bootable operating systems.

Run Symantec Disk Doctor, ScanDisk, or a similar utility to verify the integrity of the destination disk.

Cloning partition to partition

When you clone partition to partition, Norton Ghost copies the contents of one partition onto another.

To clone from partition to partition

1 On the main menu, do one of the following:

- Local: Click **Local > Partition > To Partition**.
- Peer-to-peer connection: Click **Partition > To Partition**.

2 In the Source Drive dialog box, select the source disk.

The Source Drive dialog box shows details of every disk that Norton Ghost finds on the local computer.

3 In the Source Partition dialog box, select the source partition.

The Source Partition dialog box shows the details of all of the partitions on the selected source disk.

4 In the Destination Drive dialog box, select the destination disk.

The Destination Drive dialog box shows the details of every disk that Norton Ghost finds on the destination computer. For peer-to-peer connections, the slave computer is the destination.

- 5 In the Destination Partition dialog box, select the destination partition. Select an existing partition carefully as this is the partition that is overwritten.
The Destination Partition dialog box shows the details of all of the partitions on the selected destination disk. If this is a local partition-to-partition copy, then the source partition is unavailable for selection. However, you can create a new partition if space is available. If you create a new partition, it can be resized during the cloning operation.
- 6 Click OK.
When the final “Proceed with Partition Copy?” question appears, ensure that the correct options are selected.
This is the last chance to back out.
- 7 Do one of the following:
 - Click **Yes** to proceed with the partition copy.
If you need to abort the process, press **Ctrl+C**, but be aware that this leaves the destination disk in an unknown state.

Warning: Only click **Yes** if you are sure that you want to proceed. The destination partition is completely overwritten with no chance of recovering any data.

 - Click **No** to return to the menu.
- 8 Restart the destination computer when the partition copy is complete.
Run Symantec Disk Doctor, ScanDisk, or a similar utility to verify the integrity of the destination partition.

Verifying image integrity

After a backup, restore, or clone, run a check to verify the integrity of the partition, hard disk, or computer.

To verify an image file or disk

To verify the integrity of an image file

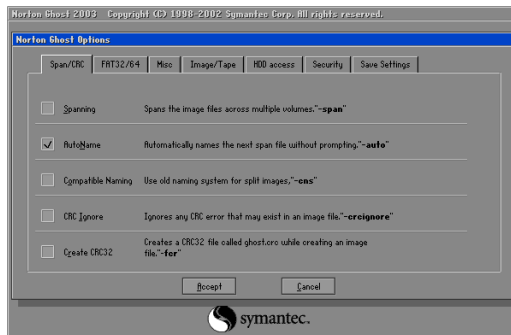
- ◆ On the computer on which the image file is saved, on the main menu, do one of the following:
 - Local: Click **Local > Check > Image File**.
 - Peer-to-peer connection: Click **Check > Image File**.

To verify the integrity of a disk

- 1 On the main menu, do one of the following:
 - Local: Click **Local** > **Check** > **Disk**.
 - Peer-to-peer connection: Click **Check** > **Disk**.
- 2 Select the source disk to verify.
- 3 Click **OK**.
- 4 Click **Yes** to continue with the disk check.

Adding switches to your Ghost operation

You can include a number of options (or switches) that can also be entered using the command-line. These switches are set in the Ghost.exe user interface.



To add switches to your Ghost operation

- 1** On the main menu, click **Options**.
- 2** On the following tabs, select the options to include in your current cloning task:

Table 7-2 Optional switches

Tab	Command-line options
Span/CRC	-span, -auto, -cns, -crcignore, -fcr
FAT 32/64	-f32,-f64, -fatlimit
Misc	-sure, -fro, -rb, -fx
Image/Tape	-ia, -ib, -id -tapebuffered, -tapeject, -tapesafe, -tapeunbuffered
HDD access	-ffx, -fnx, -ffi, -fni, -ffs, -fns
Security	-pwd, -locktype=type

See [“Command-line switches”](#) on page 153.

- 3** On the Save Settings tab, click **Save Settings** to confirm the list of active switches listed.
- 4** Click **Accept** to include the settings in the current task.

Backing up and restoring with CD-R/RW and DVD- R/RW

This chapter includes the following topics:

- [Image files and CD/DVD writers](#)
- [Saving an image file directly to a CD-R/RW or DVD-R/RW drive](#)
- [Saving an image file to an unsupported CD-R/RW or DVD-R/RW drive](#)

If your CD/DVD device is not listed on the Web site, use the Integrity Check Wizard to ensure that your image can be restored. The Integrity Check Wizard performs a dummy restore and confirms that your CD/DVD drive is compatible with Norton Ghost.

[Table 8-1](#) lists the media that you should use with CD and DVD writers and the action that Norton Ghost takes.

Table 8-1 CD and DVD media

Type of drive	Media
CD-R	Blank
CD-RW	Prompts to erase existing data before writing new data
DVD-R	Blank
DVD-RW	Prompts to erase existing data before writing new data
DVD+R	Blank
DVD+RW	Prompts to overwrite existing data

When you create an image on CD/DVD, you can make the CD/DVD bootable. The Backup Wizard does this automatically, but when you create an image from Ghost.exe, then you need an appropriate boot disk created with the Ghost Boot Wizard to make the CD/DVD bootable.

See [“Standard boot disks”](#) on page 76.

Saving an image file directly to a CD-R/RW or DVD-R/RW drive

You can save an image file directly to a CD or DVD. You can also make the CD/DVD bootable.

When writing an image file directly to a CD-R/RW or DVD-R/RW, note the following:

- The CD/DVD drive must be compatible with Norton Ghost.
- Norton Ghost automatically spans CD-R/RW disks if necessary. You do not need to use a spanning switch on the command line.
 See [“Image files and volume spanning”](#) on page 63.
- If the CD-RW/DVD-RW contains existing data, Norton Ghost prompts you to confirm that you want the data erased.

If Norton Ghost does not support your CD-R/RW drive and the image file is too large to fit on one CD, you can still save the image file to CD.

See [“Saving an image file to an unsupported CD-R/RW or DVD-R/RW drive”](#) on page 114.

Saving an image file to an unsupported CD-R/RW or DVD-R/RW drive

Not all CD-R/RW/DVD drives are supported by Norton Ghost. If your drive is unsupported, you can create an image file and then write it to CD/DVD using third-party software.

If your drive is unsupported, and the image file is too large to fit onto one disk, you can still save the image file to CD/DVD.

There are two methods of saving an image file to an unsupported CD-R/RW/DVD drive:

- Splitting the image file while creating it
- Splitting the image file after it has been created

The image file is initially saved to another partition or hard disk and then copied to a CD-R/RW/DVD disk using your CD/DVD recording software.

To save an image file onto a CD, you must split the image file into files that fit on a CD-ROM. Split the image into files that are not larger than 620 MB. This leaves room on a CD for any additional files that you might need or any difference in the capacity of the CD.

Note: Some CD/DVD writers let you write directly to the CD-RW/DVD as if to a drive letter. This is not supported by Norton Ghost.

See [“Using third-party software to write to the CD-R/RW disc”](#) on page 200.

Splitting an image file during a backup

To split an image file as it is created, run Norton Ghost from the command line in DOS, using the `-split` and `-autoname` switches.

To split an image file as it is created

- 1 Start Ghost.exe using the `-split` and `-auto` switches.
For example:
`a:\ghost.exe -split=600 -auto`
See [“Starting the Norton Ghost executable”](#) on page 93.
- 2 Create and save the image file.
See [“Creating a backup image file”](#) on page 97.

The `-split` command in this example limits the image size to a maximum of 600 megabytes for any one segment. The `-auto` switch names each of the segments numerically.

See [“Command-line switches”](#) on page 153.

Using Ghost Explorer to modify image file contents

This chapter includes the following topics:

- [Understanding Ghost Explorer](#)
- [Viewing image files](#)
- [Launching a file](#)
- [Extracting a file or directory from an image file](#)
- [Modifying image files in Ghost Explorer](#)
- [Listing the contents of an image file](#)
- [Setting span file sizes](#)
- [Splitting an image file](#)
- [Compiling a file](#)
- [Determining Norton Ghost image file version](#)
- [Using Ghost Explorer from the command line](#)

Understanding Ghost Explorer

The Ghost Explorer utility lets you view, alter, add, and extract files from an image file. This means that you can add extra files to the image file, move the files within the image file, and extract files from the image file to copy onto client computers.

Note: If an image file has been created from an NTFS partition, you can view and extract files from the image file. You cannot add files to or delete files from the image file.

Ghost Explorer lets you quickly and easily extract files or directories from an image file. Using Ghost Explorer, you can do the following:

- View image file contents and save a list of files within an image file.
- Extract files or directories from an image file.
- Add, move, copy, delete, and launch files from and within an image file.
- Use drag-and-drop or cut-and-paste functionality to add files and directories from Windows Explorer to the image file.
- Set span sizes.
- Add a description to an image file.

Note: Right-click a file or directory in Ghost Explorer to access a list of file commands.

Ghost Explorer supports the following partition types:

- FAT12
- FAT16
- FAT32
- NTFS (read only)
- Linux Ext2/3

To open Ghost Explorer

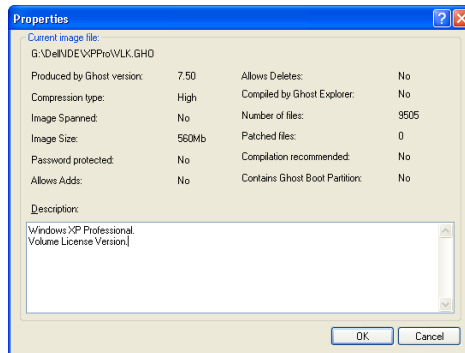
- 1 On the Windows taskbar, click **Start > Programs > Norton Ghost 2003 > Norton Ghost**.
- 2 Click **Ghost Utilities**.
- 3 Click **Norton Ghost Explorer**.

Viewing image files

You can view the contents of an image file, including details of the partitions, directories, and files.

To view an image file

- 1 Open Ghost Explorer.
See [“To open Ghost Explorer”](#) on page 119.
- 2 On the File menu, click **Open**.
- 3 Select an image file.
- 4 Click **Open**.
- 5 On the File menu, click **Properties** to view the image file properties.



Launching a file

This command is available only when you select a file in the right pane.

Ghost Explorer restores a file to a temporary directory and attempts to open it. If the file is an executable program, it is run. If it is a data file and there is an

application installed and associated with this file type, the application opens with the data file.

If you try to launch an application that depends on other files within the image file, it will probably fail. Ghost Explorer does not determine what dependencies exist. Extract the required files and then run the application file.

To launch a file

- 1 In Ghost Explorer, in the right pane, select a file.
- 2 On the File menu, click **Launch**.

Extracting a file or directory from an image file

You can extract a file or directory directly from an image file using Ghost Explorer. This does not delete the original file, but copies it to a new location.

To extract a file or directory from an image file

- 1 In Ghost Explorer, open the image file.
- 2 Select the file or directory to be extracted.
- 3 On the File menu, click **Extract**.
- 4 Select the location to which you want to extract the file or directory.
- 5 Click **Extract** to save the file or directory to the chosen location.

Note: You can also drag and drop a file from Ghost Explorer to Windows Explorer to extract it.

Modifying image files in Ghost Explorer

You can use Ghost Explorer to add files or directories from Windows Explorer to any image file that was created in Norton Ghost version 6.0 or later and is not NTFS. You can also delete files from any image file that was created in Norton Ghost 5.1d or later and is not NTFS. You can check the version of Norton Ghost used to create your image file in Ghost Explorer.

See “[Determining Norton Ghost image file version](#)” on page 123.

Adding, moving, and deleting files

Within image files, Ghost Explorer supports Windows cut-and-paste operations, including copying, pasting, moving, deleting, and adding files to images. You can also drag and drop from Windows Explorer to Ghost Explorer.

Listing the contents of an image file

You can create a text file that contains a list of the directories (and, optionally, files and their details) that are in the current image file. You can store this file with the image file to keep an easily accessible list of the image file contents.

To list the contents of an image file

- 1 In Ghost Explorer, open the image file.
- 2 On the File menu, click **List Contents**.
- 3 Do one of the following:
 - Click **Directories only** to include directories only.
 - Click **Include Files** to include files.
 - Click **Include Details** to include file details.
- 4 Select a directory to which to save the text file.
- 5 Type a file name.
- 6 Click **Save**.

Setting span file sizes

Norton Ghost lets you split an image file into smaller files called spans. The Span Split Point function in Ghost Explorer lets you set the size of each span so that when you add files or directories, each span file does not get bigger than the specified size.

To set a span file size

- 1 On the View menu, click **Options**.
- 2 In the Span Split Point (MB) field, type the required size.
- 3 Click **Autoname Spans** if you want Ghost Explorer to choose a default name for additional span files that it creates.

Splitting an image file

You can split an existing image file into smaller spans. This function is useful if, for example, you need to split a file into two or more files that can then be saved onto a CD/DVD drive that is unsupported by Norton Ghost. Once this option is set, it becomes the default for all regenerated files.

See [“Spanned image files”](#) on page 64.

Note: If the CD-R/RW drive is supported by Norton Ghost, then you can save an image file directly to CD as it is created.

See [“Creating a backup image file”](#) on page 36.

To split an existing image file

- 1 In Ghost Explorer, open the image file.
- 2 Select one of the following:
 - The image file
 - A single partition
- 3 On the File menu, click **Options**.
- 4 In the Span Split Point (MB) field, type the required size.
If you are splitting the file to save onto CD, then set the size to 600 MB.
- 5 Click **Autoname Spans** if you want Ghost Explorer to choose a default name for additional span files that it creates.
- 6 Click **OK**.
- 7 Type a name and location for the first new file.
All the new files created are saved in the same location. Use a different name from the original image file to avoid confusion.
- 8 Click **OK** to start the regeneration.
- 9 Click **OK** each time that you are prompted to create a new span segment.

Compiling a file

If you add or delete files from within an image file, the image file becomes fragmented. Norton Ghost takes longer to restore a fragmented image than a compiled file. Compiling a file defragments it, which improves performance during the restore.

Check the properties of the image file to see whether compilation is recommended.

To compile a file

- 1 On the File menu, click **Compile** if compilation is recommended.
- 2 Type a new name for the compiled file.
- 3 Click **Save**.

Determining Norton Ghost image file version

Whether you can add, delete, or view an image file, or move files within an image file depends on the version of Norton Ghost that was used to create the image file. Ghost Explorer cannot open a file created with a version of Norton Ghost earlier than 3.0. If the image file was created in Norton Ghost 3.0 or later, you can determine the version by looking at the file's properties in Ghost Explorer.

To determine the version of Norton Ghost used to create an image file

- 1 In Ghost Explorer, open the image file.
- 2 On the File menu, click **Properties**.
The Properties window appears. The version of Norton Ghost used to create the image file appears next to **Produced by Ghost version**.

Using Ghost Explorer from the command line

You can start Ghost Explorer from an command prompt by typing its path and file name.

To start Ghost Explorer from a command prompt

- 1 On the Windows taskbar, click **Start > Programs > Accessories > Command Prompt**.
- 2 Type **Ghostexp**.
- 3 Press **Enter**.

You can also provide a Ghost image file as an argument for Ghost Explorer to open. For example:

```
Ghostexp n:\Images\Myimage.gho
```

If Ghost Explorer reports a corruption in your image file, you may be able to get further details of the nature of the corruption. Normally, you would only use these options when asked to do so by Ghost Explorer Technical Support.

[Table 9-1](#) lists the arguments with which you can start the program.

Table 9-1 Ghost Explorer arguments

-d1	Reports on corruptions or significant events in FAT file systems
-d2	Reports on corruptions or significant events in NTFS file systems
-d4	Reports on corruptions or significant events in Ext2/3 files

The reports are presented to you as dialog boxes. You can use all switches or use -d7 to turn on all options.

Ghost Explorer has a batch mode in which it carries out a single command and then exits. In this version, batch mode supports the saving of the contents to a text file only. To use this mode, specify one of the switches in [Table 9-2](#).

Table 9-2 Batch mode switches

-t	Saves the list of directories in the dump file to a file with the same name as the image file but with an extension of .txt
-tf	Saves a list of directories and files
-tv	Saves a verbose listing of directories and files
-t[vf]=filename	Saves the list to the file specified

See [“Listing the contents of an image file”](#) on page 121.

If Ghost Explorer reports that a spanned or split image is corrupt without prompting for the second part of the image, it may not recognize that the image is split. Starting with the -split argument forces Ghost Explorer to treat an image as a split image.

See [“Setting span file sizes”](#) on page 121.

Using Ghost Explorer with long file names

The image index created by versions of Norton Ghost prior to 5.1c did not handle long file names containing double-byte characters correctly, such as file names in Asian or Eastern European languages. Ghost Explorer may be able to show these names properly by reading them directly from the image file instead of from the index. However, the restoring of the image is much slower. Use the switch `-ignoreindex` to force this behavior. You must have the correct char set loaded.

To set the correct char set

- 1** On the Windows taskbar, click **Start > Settings > Control Panel**.
- 2** Double-click **Regional Options**.
- 3** Select the required language option, and then click **OK**.

Managing partitions using GDisk

This chapter includes the following topics:

- [Introducing GDisk](#)
- [Running GDisk](#)
- [Overview of main command-line switches](#)
- [Creating a partition](#)
- [Reinitializing the Master Boot Record](#)
- [Showing information about disks](#)
- [Performing multiple GDisk operations using batch mode](#)
- [FAT16 partitions in Windows NT](#)
- [Deleting and wiping your disk](#)
- [Activating or deactivating a partition](#)
- [Hiding or unhiding a partition](#)
- [Modifying the Windows NT/2000/XP boot menu](#)
- [Support for Large Hard Disks](#)

Introducing GDisk

GDisk lets you create partitions, reinitialize Master Boot Records, delete data, and wipe your disks in many different ways.

Two versions of GDisk are supplied with Norton Ghost:

- GDisk: Runs in DOS
- GDisk32: Runs from the command line in a Windows operating system
Not all GDisk command-line switches can be run with GDisk32.

GDisk is a complete replacement for the Fdisk and Format utilities that offers the following features:

- On-the-fly formatting
- Extensive partition reporting
- High-security disk wiping
- The ability to hide a partition or make a hidden partition visible

Unlike Fdisk, which uses interactive menus and prompts, GDisk is command-line driven. This offers quicker configuration of a disk's partitions and the ability to define GDisk operations in a batch file.

Running GDisk

Run either GDisk in DOS or GDisk32 in Windows.

To run GDisk

- 1 Start your computer in DOS mode.
- 2 At the DOS prompt, type **GDisk** followed by the required disk and switches.

Note: The default path for GDisk is `progra~1\symantec\Norton~1\GDisk`.

To run GDisk32

- 1 On the Windows taskbar, open a DOS window.
- 2 At the DOS prompt, type **GDisk32** followed by the required disk and switches.

Overview of main command-line switches

GDisk has nine main modes of operation. The first four correspond to the menu options on the Fdisk main menu. The mode in which GDisk operates is selected by one of the following switches:

Table 10-1 GDisk main commands

Mode	Switch	Explanation
Create	/cre	Creates partitions: primary DOS partitions, extended DOS partitions. This switch functions with GDisk only.
Delete	/del	Deletes partitions of any type, including non-DOS partitions. This switch functions with GDisk only.
Status (default)	/status	Lists information on the specified fixed disk and its partitions.
Activate	■ /act ■ /-act	Activates and deactivates a partition (specifying it as the bootable partition).
Hide	■ /hide ■ /-hide	Hides an existing partition or unhides a hidden partition.
Reinitialize MBR	/mbr	Reinitializes the Master Boot Record. This switch functions with GDisk only.
Batch	/batch	Uses batch-mode command execution.
Disk wipe	/diskwipe	Wipes the contents of the whole disk. This switch functions with GDisk only.
Boot.ini	/bootini	Makes a modification to the Windows NT/2000/XP boot menu. This switch functions with GDisk32 only.

Online Help for command-line switches

You can get an overview of the nine modes of operation and their switches by using the Help switch as follows:

- GDisk: `gdisk /?`
- GDisk32: `gdisk32 /?`

Note: An additional switch not shown in Help is the `/VERSION` switch. This switch shows the version information for the GDisk executable.

More detailed Help is available by qualifying the Help command with the switch for one of the nine main modes of operation.

For example, to view the detailed Help file for Hide, type one of the following command lines:

- GDisk: `gdisk /hide /?`
- GDisk32: `gdisk32 /hide /?`

Switches common to all GDisk commands

You can use the following switches for any of the nine main GDisk operations:

Table 10-2 Switches common to all GDisk commands

Switch	Explanation
<code>/x</code>	Prevents GDisk from using extended disk access support. This may result in GDisk not being aware of the full capacity of the disk.
<code>/i</code>	Prevents GDisk from using direct IDE disk access support. This may result in GDisk not being aware of the full capacity of the disk.
<code>/s</code>	Prevents GDisk from using direct SCSI disk access support. This may result in GDisk not being aware of the full capacity of the disk.
<code>/y</code>	Suppresses prompting to confirm the operation. If you do not use this switch, you are not necessarily prompted before a partition is deleted or another possibly destructive operation is executed.
<code>/sure</code>	Suppresses prompting to confirm the operation. Same functionality as <code>/y</code> .
<code>/r</code>	Causes GDisk to restart the computer if the operation is successful.

Creating a partition

The create switch creates a partition of the specified type using the largest block of unused disk space. The partition is not formatted during the operation unless the /for switch is used. You cannot create an NTFS partition or a dynamic disk partition.

This switch functions with GDisk only.

Note: When GDisk creates a FAT32 partition, it aligns the first data sector to a 4 KB boundary from the start of the partition.

The syntax for this command is as follows:

```
gdisk disk /cre {/pri|/ext|/log} [/sz: {MB|pcent{p|}%}]
[/end] [/for [/q] [/v[:label]]] [/-32] [/ntfat16]
```

For example, to create a FAT32 formatted partition that uses the entire disk, type the following command:

```
gdisk 1 /cre /pri /for /q
```

Table 10-3 Create switches

Switch	Explanation
disk	Represents the physical fixed disk, from 1 to 8.
/cre	Creates a DOS partition or logical DOS drive.
/pri	Creates a primary DOS partition.
/ext	Creates an extended DOS partition.
/log	Creates a logical DOS drive in the extended DOS partition.
/sz:MB	Specifies the size of the partition in megabytes (MB). This is rounded up to the nearest cylinder.
/sz:pcent{p }%}	Specifies the size of the partition as a percentage of the total disk size, not the available disk space.
/end	Creates the partition at the end of the free space. If this switch is not used, then the partition is created at the beginning of the free space. If the command line specifies that all of the available space is to be used to create the partition, then the /end switch is ignored.

Table 10-3 Create switches

Switch	Explanation
/for	Formats the new partition once it has been created. Unless the /ntfat16 or /-32 switches are used, the partition type is determined by the following: <ul style="list-style-type: none"> ■ If the partition is less than 16MB: FAT12 ■ If the partition is between 16MB and 512MB: FAT16 ■ If the partition is greater than 512MB: FAT32
/q	Performs a quick format if used in combination with the /for switch. If you do not use this switch, then GDisk performs a surface scan of the partition and marks any bad sectors.
/v[:label]	Gives the new formatted partition the specified label when used in combination with the /for switch.
/-32	Indicates that the partition is not formatted as FAT32. Limits primary and logical partitions to 2048 MB. Partitions over 16 MB are formatted as FAT16. This switch is useful if the operating system does not support FAT32, such as Windows NT 4.
/ntfat16	Lets you create a FAT16 primary or logical partition, up to 4097 MB. The cluster size is 64 KB. Partitions over 16 MB are formatted as FAT16. Windows 9x and DOS systems may be unable to access partitions that are created with this switch and are over 2048 MB.

Reinitializing the Master Boot Record

Use the /mbr switch to rewrite the boot code in the Master Boot Record (MBR). You may need to reinitialize the MBR to eliminate a boot sector virus residing there. You can also use the /mbr switch with the /wipe option to delete a dynamic disk.

This switch functions with GDisk only.

Note: The switch must be used when you delete Linux partitions if LILO resides in the MBR.

The syntax for this command is as follows:

```
gdisk disk /mbr [/wipe]
```

Table 10-4 /mbr switches

Switch	Explanation
disk	Represents the physical fixed disk, from 1 to 8.
/mbr	Reinitializes the boot code in the Master Boot Record.
/wipe	Deletes the partition on the disk.

Showing information about disks

The status switch shows information about the fixed disks and partitions on a disk, including the model of the disk. You must specify the disk number to get information about the partitions on a disk.

Depending on the version of GDisk that you require, the syntax for this command is one of the following:

- GDisk: `gdisk [disk] [/status] [/raw] [/lba] [/ser]`
- GDisk32: `gdisk32 [disk] [/status] [/raw] [/lba] [/ser]`

Table 10-5 /status switches

Switch	Explanation
disk	Represents the physical fixed disk, from 1 to 8.
/raw	Shows the contents of the partition table in CHS form if used with the disk switch.
/lba	Shows the contents of the partition table in logical block form if used with the disk switch.
/ser	Shows the serial number of the disk.

Performing multiple GDisk operations using batch mode

Use the batch mode switch, `/batch`, to perform multiple GDisk operations with a single command. Using the `/batch` switch lets you avoid loading GDisk from the boot disk each time. Batch commands can either be supplied interactively at a prompt or in a pre-prepared text file.

If the name of a text file is supplied along with the batch mode switch, GDisk opens the file and executes the commands within it until all commands have been executed or one of the commands encounters an error.

Note: To use the Windows version of GDisk in the example commands, replace `gdisk` with `gdisk32`.

For example:

```
C:\> gdisk /batch:cmds.txt
```

If the batch mode switch is supplied without a file name, GDisk prompts for the commands to execute.

Command-line arguments that apply to all of the batch commands can be specified on the original command line along with the batch mode switch. The lines found in the batch file (or typed at the prompt) are appended to the already partially formed command line.

Following is a sample batch command file called `Two-new.txt`. Blank lines and lines starting with the number (hash) symbol are considered comments. These lines are ignored. (In this example, the commands do not specify the fixed disk on which to operate.)

```
# delete all partitions
/del /all
# create formatted FAT16 primary DOS partition and then create an extended
# partition
/cre /pri /-32 /for /q
/cre /ext
# create formatted FAT16 logical DOS partition
/cre /log /-32 /for /q
```

The following command deletes all partitions and creates two new ones on the second fixed disk with confirmation prompting turned off:

```
gdisk 2 /y /batch:two-new.txt
```

The four commands to be executed are a combination of the original command plus the commands from the batch file:

```
gdisk 2 /y /del /all
gdisk 2 /y /cre /pri /-32 /for /q
gdisk 2 /y /cre /ext
gdisk 2 /y /cre /log /-32 /for /q
```

Batch files may be nested recursively. For example, a second file called Std_init.txt contains the following lines:

```
1 /batch:two-new.txt
2 /batch:two-new.txt
```

As a result, the following command performs the actions of Two-new.txt on both fixed disks:

```
gdisk /batch:std-init.txt
```

FAT16 partitions in Windows NT

FAT16 partitions can be up to 4 GB in size using 64 K clusters in Windows NT. GDisk can create a FAT16 partition using 64 K clusters when the /ntfat16 switch is added to the create partition command line. This switch disables the creation of FAT32 partitions and allows the creation of FAT16 partitions up to 4 GB.

Note: DOS and Windows 9x do not support FAT16 partitions using 64 K clusters and are limited to 2 GB FAT16 partitions.

Deleting and wiping your disk

GDisk lets you delete data and partitions on your disk or wipe your entire disk. You cannot delete a dynamic disk partition with the /del switch.

The switch /del /all deletes all partitions that are on the disk. Any other space that has not been used for creating a partition is not deleted. Deleting an extended partition also deletes any logical partition within it.

The /diskwipe switch wipes the entire disk, partitions, partition table, MBR, and all used and unused space.

These switches function with GDisk only.

The syntax for the delete switch is as follows:

```
GDisk: gdisk disk /del {/pri[:nth]}/ext[:nth]}/log:nth}/p:partn-no}/all}
[/qwipe|/dodwipe|/customwipe:n]
```

The syntax for the diskwipe switch is as follows:

```
GDisk: gdisk disk /diskwipe [dodwipe|/customwipe:n]
```

Table 10-6 /diskwipe switches

Switch	Explanation
disk	Represents the physical fixed disk, from 1 to 8.
/del	Deletes a DOS partition or logical DOS drive.
/pri[:nth]	Deletes the nth primary DOS partition. The default is 1.
/ext[:nth]	Deletes the nth extended DOS partition. The default is 1. Also deletes any logical partitions in the extended partition.
/log:nth	Deletes the nth logical DOS drive from the extended DOS partition.
/p:partn-no	Indicates the partition to delete. Use the number reported by GDisk in standard display mode (not using /lba or /raw) for partn-no.
/all	Deletes all partitions.
/qwipe	Overwrites the partition's data area before deleting the partition. Makes one pass of deleting the data on the disk.
/dodwipe	Overwrites the partition's data area before deleting the partition. Makes seven passes of deleting the data on the disk. This is the security standard for the U.S. Department of Defense.
/customwipe:n	Overwrites the partition's data area n times before deleting the partition. n can be set from 1 to 100. /customwipe:7 is equivalent to /dodwipe.

For example:

- `gdisk 1 /del /all /qwipe` completes one pass to delete all partitions and data on disk 1.
- `gdisk 1 /del /p:2 /qwipe` wipes partition 2 on disk 1 with one pass.
- `gdisk 1 /diskwipe /customwipe:15` wipes the entire disk with 15 passes.

Activating or deactivating a partition

A computer starts in an active partition. Using the `/act` or `/-act` switches, you can choose the partition to which the computer starts.

Depending on the version of GDisk that you require, the syntax for this command is one of the following:

- GDisk: `gdisk disk /[-]act /p:partn-no`
- GDisk32: `gdisk32 disk /[-]act /p:partn-no`

Table 10-7 /act switches

Switch	Explanation
<code>disk</code>	Represents the physical fixed disk, from 1 to 8.
<code>/act</code>	Activates a partition.
<code>/-act</code>	Deactivates a partition.
<code>/p:partn-no</code>	Indicates the partition to activate or deactivate. Only primary partitions can be activated. Use the number reported by GDisk in standard display mode (not using <code>/lba</code> or <code>/raw</code>) for <code>partn-no</code> .

Hiding or unhiding a partition

You can hide a partition so that a user cannot see it.

Depending on the version of GDisk that you require, the syntax for this command is one of the following:

- GDisk: `gdisk disk /[-]hide /p:partn-no`
- GDisk32: `gdisk32 disk /[-]hide /p:partn-no`

Table 10-8 /hide switches

Switch	Explanation
<code>disk</code>	Represents the physical fixed disk, from 1 to 8.
<code>/hide</code>	Hides a partition.
<code>/-hide</code>	Unhides a partition.
<code>/p:partn-no</code>	Indicates the partition to hide or unhide. Use the number reported by GDisk in standard display mode (not using <code>/lba</code> or <code>/raw</code>) for <code>partn-no</code> .

Modifying the Windows NT/2000/XP boot menu

The `/bootini` switch lets you make a modification to a Windows NT/2000/XP boot menu. The following modifications are supported:

- Displaying a list of current boot entries
- Adding an entry to `Boot.ini`
- Removing an entry from `Boot.ini`
- Setting the default boot option and timeout

This switch functions with GDisk32 only.

When GDisk32 changes the state of `Boot.ini`, a copy of the current `Boot.ini` is created. The copy is named either `C:\boot_gdisk32_copy.ini` or `C:\boot.ini_gdisk32_copy`.

Specifying the `boot.ini` path and file name

The `/inifile` switch is common to all operations performed with the `/bootini` switch.

`/inifile` lets you specify the full path and file name of the current Windows NT/2000/XP `Boot.ini` file. This lets you locate `Boot.ini` if it is not on the C drive.

The default value for this switch is `C:\boot.ini`.

Displaying the list of current boot entries

Use the `/bootini` switch to display the existing boot menu for the current Windows NT/2000/XP operating system.

The syntax for this command is as follows:

```
gdisk32 /bootini [/inifile:filename]
```

Adding an entry to `Boot.ini`

There are two types of functions that you can add to a `Boot.ini` file:

- Start another installation of Windows NT/2000/XP that resides on a different partition.
- Start a non-Windows NT/2000/XP operating system that resides on a different partition.

GDisk does not add an entry to Boot.ini in the following cases:

- An entry with the description already exists in Boot.ini (case insensitive).
- The referenced partition is of type Extended.
- The referenced partition is hidden.

The following table describes the function of each switch for both types of entries.

Table 10-9 Boot.ini switches

Switch	Explanation
/bootini	Modifies Boot.ini.
/add	Creates a new entry in Boot.ini.
/d:diskno	Represents the physical fixed disk, from 1 to 8.
/p:partno	Indicates the partition from which to boot.
/desc:description	Specifies the description to appear in the NT boot loader menu.
/inifile:filename	Specifies the full path and file name for Boot.ini. The default value is C:\boot.ini.
/bsectfile:filename	Specifies the boot sector file to create. For example, C:\bsect.dat.
/winnt	Adds an entry to start a Windows NT/2000/XP operating system.
/sysfolder:folder	Specifies the system folder on the Windows NT/2000/XP operating system from which to start. The default value is Winnt.
/r	Restarts after the execution of the command.

Adding an entry for starting Windows NT/2000/XP

The syntax for this command is as follows:

```
gdisk32 /bootini /add /d:disknumber/p:partno /desc:description /winnt
[/sysfolder:folder] [/inifile:filename] [/r]
```

This entry uses the Advanced RISC Computing (ARC) style path to describe the relative disk location for the entry. The entry has the following format:

```
<ARC style path>\<system folder>="description"
```

For example:

```
multi(0)disk(0)rdisk(0)partition(1)\winnt="Boot NT System"
```

For more information, see the Microsoft Knowledge Base article Q102873 - "BOOT.INI and ARC Path Naming Conventions and Usage."

Note the following:

- GDisk uses only MULTI(X) syntax when describing ARC style paths, as opposed to SCSI(X).
- GDisk always uses multi(0)disk(0) as the beginning of the ARC style path.
- /winnt instructs GDisk32 to create an ARC style entry and must be used if the target operating system is Windows NT/2000/XP. If this switch is not used, then GDisk32 creates an entry as if the target operating system is not Windows NT/2000/XP.
- /sysfolder lets you specify the Windows system folder on the target operating system. The system folder is usually Winnt. If the system folder is not Winnt, then provide the path to this folder, but do not include the root directory. For example, use /sysfolder:"2k\WinNt", not /sysfolder:"f:\2k\WinNt".

Adding an entry for starting a non-Windows NT/2000/XP operating system

The syntax for this command is as follows:

```
gdisk32 /bootini /add /d:diskno/p:partno /desc:description [/inifile:filename] [/bsectfile:filename] [/r]
```

This entry to Boot.ini references a boot sector file used to continue the boot up process.

The entry has the following format:

```
<full path to boot sector file>\<boot sector file>="description"
```

For example:

```
C:\bootos2s.dat="Boot OS/2 System"
```

When adding this entry, GDisk does the following:

- Reads the first sector of the targeted partition (boot sector).
- Writes out the contents of that sector to a boot sector file.
- Adds a reference to that boot sector file to Boot.ini.

The /bsectfile switch is optional. It is used if you want the created bootsect.dat file to be saved somewhere other than the default location.

You must specify the full path and file name for the boot sector file that is created when you use the /bsectfile switch.

GDisk32 does the following by default:

- Builds the file name from the entry descriptions, omitting any invalid characters under DOS rules for 8.3 file name format.
- Creates the boot sector file in the root directory of the C drive and gives it a .dat file extension.

For example:

```
gdisk32 /add /d:1 /p:2 /desc:"*** Boot OS/2 ***"
```

This produces a boot sector file C:\bootos2.dat.

Removing an entry from Boot.ini

The syntax to remove an entry from Boot.ini is as follows:

```
gdisk32 /bootini /remove /entry:number [/infile:filename] [/r]
```

Table 10-10 /remove switches

Switch	Explanation
/remove	Removes the entry from Boot.ini.
/entry:number	Removes the ID of the entry from Boot.ini.

If the entry to be removed is the default boot option, then GDisk removes the entry and sets the first entry in the remaining list as the default boot entry.

GDisk does not remove the entry if it is the only entry in Boot.ini.

Setting the default boot option and timeout

Use the /default switch to set the default boot option and timeout.

The syntax for this command is as follows:

```
gdisk32 /bootini /default [/entry:number] [/timeout:sec] [/infile:filename] [/r]
```

Table 10-11 Default boot option and timeout switches

Switch	Explanation
/default	Sets the default boot option and timeout.
/entry:number	Sets the ID of entry as the default boot option.
/timeout:sec	Sets the number of seconds before the default boot option is selected.

Support for Large Hard Disks

GDisk includes large disk drive support for IDE and SCSI hard drives (disks that exceed the 1024 cylinder BIOS limitation, which translates to a capacity greater than 7.8 GB). GDisk can directly access hard disks through the IDE controller or ASPI interface provided by an ASPI driver. Take care when creating partitions for operating systems with inherent partition size limitations.

Remember the following information when you create partitions for use in Windows 95/98:

- On a system with a PC BIOS that does not support interrupt 13h extended disk services, ensure that the partitions created can be used as intended. When a primary partition or extended partition starts or ends past the 7.8 GB limit of the hard drive, it is not accessible on such systems in Windows or in DOS-only mode. This affects all logical partitions contained within an extended partition that starts or ends past the limit.

Remember the following information when you create partitions for use in Windows NT:

- According to the Microsoft Knowledge Base, Windows NT NTFS bootable partitions cannot exceed 7.8 GB (8,455,716,864 bytes). This information is detailed in the Microsoft Knowledge Base Article “Windows NT Boot Process and Hard Disk Constraints,” Article ID: Q114841.
Non-bootable NTFS partitions do not have this size limitation.
- Windows NT cannot start from partitions that start or end beyond the 1024-cylinder boundary. If this condition exists, Windows NT reports a “Boot Record Signature AA55 Not Found” error message.

Windows NT does not support drives larger than 7.8 GB unless you install Service Pack 4 or apply the ATAPI hot fix to Service Pack 3. This information is included in the Microsoft Knowledge Base Article “IBM DTTA-351010 10.1 GB Drive Capacity Is Inaccurate,” Article ID: Q183654.

Updating Security Identifiers (SIDs) and computer names

This chapter includes the following topics:

- [Making SID changes with Ghost Walker on Windows NT-based clients](#)
- [Loss of access to external data objects](#)
- [Identical user names and passwords across workstations](#)
- [Using Ghost Walker](#)

Making SID changes with Ghost Walker on Windows NT-based clients

Client computers must be uniquely identified to operate on a network. This is achieved using the Security Identifier (SID) and computer name. When you restore an image onto a number of client computers, you must assign unique identifiers as part of the task. You can use the Ghost Walker utility to do this.

Norton Ghost Walker capabilities

- Runs in native DOS, allowing the SID to be changed without an additional restart following a clone operation.
- Alters the computer SID to a unique and randomly generated value.
- Alters the SIDs of all local workstation users present on the operating system installation.
- Alters all local workstation user SIDs in Access Control Lists (ACLs) for file and registry objects so that local users retain user profiles and access rights.
- Alters computer names for Windows 95, 98, Me, NT, XP, and 2000 operating systems.

Norton Ghost Walker limitations

- Computer name change functionality is limited. The new name must contain the same number of characters as the original.
- Not officially endorsed by Microsoft.

SID changing limitations

SID changing is an approximate technology, as you can only change SIDs in known locations.

Problems arise because of the following factors:

- A growing number of third-party and Microsoft applications are taking their own private or derived copies of the computer name and SID and storing them in proprietary formats in registry and file locations.
- Microsoft technologies such as Windows 2000/XP NTFS File Encryption, Windows NT, and Windows 2000/XP Protected Storage make use of SIDs as unique tokens. They use local workstation user SIDs as part of the encryption key that controls access to encrypted information. Microsoft does not address changing local workstation user SIDs.

For these reasons, you are strongly advised to test computer environments and the applications on them before mass rollouts or upgrades.

Loss of access to external data objects

Changing the SID of a workstation or a clone of a workstation that has been in use for some time may be more problematic than changing the SID of a newly installed workstation or a clone of a newly installed workstation. When a workstation user, as opposed to a domain user, creates data objects on computers that are accessed by a peer-to-peer connection, security information is created for those data objects that is based on the user's SID (which is based on the workstation SID).

When Ghost Walker updates the SID, it not only changes the computer SID, but also all of the workstation user and group SIDs. This is done because user and group SIDs are assumed to be based on the workstation's computer SID (which is now updated). This may mean that the security information on external computers no longer matches the new SIDs of the workstation users, which may result in a loss of access to those data objects.

Identical user names and passwords across workstations

If there are two workstations in a domain that have two users with the same user name and password, the domain gives each of them access to the other's resources even if their SIDs are different. This is a fairly common situation following cloning.

It appears that the accessing user is given the rights that the accessed user has by proxy. For example, the access is performed on behalf of the accessing user by the accessed user, just because there is a user name/password match. This can best be seen when specific access rights are granted remotely by the accessing user to a resource on the accessed computer. The Access Control List shows that the accessed user is the user who has rights to the resource.

Updating the SID on a workstation does not stop this situation from occurring. You must change the password of one of the users.

Using Ghost Walker

Ghost Walker lets you alter identification details of Windows 95, Windows 98, Windows Me, Windows NT, and Windows 2000/XP computers following a clone operation. Each Windows 95, 98, or Me computer can be assigned a unique name. Each Windows NT or 2000/XP computer can be assigned a unique computer name and a Machine Security Identifier (SID).

When you update the SID using Ghost Walker, all existing workstation users and their passwords, permissions, and registry settings are maintained.

Ghost Walker can be operated from the graphical user interface or from the command line. Ghost Walker does not run from:

- A Windows NT or 2000 DOS shell
- A Windows 95, 98, or Me DOS shell

The Ghost Walker window lists all bootable Windows 95, 98, Me, NT, XP, and 2000 systems on the computer hard drives. Ghost Walker determines that there is an installed operating system if a full set of registry hive files and the operating system kernel executable are located in their normal locations.

Ghost Walker lists the following operating system details:

- Logical ID (system ID generated by Ghost Walker)
- Drive number
- Partition number
- Volume label (partition name)
- Partition file system type
- Computer name
- Operating system type, version, or build

To alter identification details for a client computer using Ghost Walker

- 1** Remove any Windows NT/2000/XP workstations that are members of a server domain.
You must add the workstation to the Domain using the new SID and Computer Name once you have completed the update.
- 2** Run DOS.
- 3** At the command line, type `Ghstwalk.exe`.
- 4** Press **Enter**.
Ghost Walker lists all interpretable volumes on the computer.
 - If there is one operating system on the computer, details of this operating system appear in the top pane and all volumes appear in the bottom pane.
 - If there is more than one operating system on the computer, details of all existing operating systems appear in the top pane.
- 5** If there is more than one operating system on the computer, in the Select a System ID field, type an ID for the operating system to appear and click **V - Change Additional Vols** to add or remove non-bootable volumes to be updated.
You must include any additional non-bootable volumes that may have security information or shortcuts containing the computer name of the bootable operating system embedded in them. Failure to do so results in mismatched data and a loss of security access.
- 6** To change the computer name, type **N**, and then press **Enter**.
The new name must be the same length as the previous name. The field you type the name into is the correct length of the name.
The name cannot contain any of the following characters:
`^[]”:;|<>+=,?*`
- 7** Press **Enter** to update.
This lists the new name and, for Windows NT and 2000 computers, a new SID.
The computer name and SID updates occur in the following locations:
 - The registry of the selected operating system
 - The file system on which the operating system resides
 - Any additional volumes selected for the update
- 8** If you removed a Windows NT or 2000 computer from a server domain, add the computer back to the domain.

Running Ghost Walker from the command line

You can run Ghost Walker from the command line in DOS.

The command-line syntax is as follows:

```
GHSTWALK [/CN=  

<new_computer_name> | "<random_computer_name_format>"]  

[/BV=<drv>:<part> [/AV=ALL|/AV=<drv>:<part> ... ]]  

[/SURE] [/DIAG] [/IGNORE_DOMAIN] [/IGNORE_ENCRYPTFILES]  

[/REBOOT] [/REPORT[=<report filename>]] [/#E=<license file>]  

[SID=<replacement SID>] [/FNI] [/FNS] [/FNX]  

[/MNUPD=<registry path>] [@<argumentfile>]  

[LOGGING] [SAFE_LOGGING] [/H|/HELP|/?]
```

[Table 11-1](#) describes the command-line options.

Table 11-1 Command-line options

Switch	Description
/CN=	Specifies a new computer name.
<new_computer_name>	The new name must be the same length as the original name and cannot contain any of the following characters: ^[]"; <>+=?,?* To include spaces in the computer name, enclose the computer name in quotes. For example, /CN="EW PC 123"

Table 11-1 Command-line options

Switch	Description
<p>/CN= "<random_computer_name_format>"</p>	<p>Replaces the original computer name with a randomly generated name using the <random_computer_name_format> template. The <random_computer_name_format> template specifies which sections of the new name will be randomly generated and the type of random value to place in that location.</p> <p>Only one instance of the following keywords is permitted in a template:</p> <p><RANDOM_NUMERIC> - Generate random numbers <RANDOM_ALPHA>- Generate random letters <RANDOM_HEX> - Generate random hex digits (0-9, A-F)</p> <p>Examples:</p> <p>/CN=" PC<RANDOM_NUMERIC>" replaces the computer name with a name that starts with PC, followed by a series of random digits between 0 and 9.</p> <p>/CN=" ID<RANDOM_ALPHA>X" replaces the computer name with a name that starts with ID, followed by a series of random letters, ending with the character X.</p> <p>/CN=" <RANDOM_ALPHA>" replaces the computer name with a name that is randomly generated using letters.</p> <p>The random output fills out the format string to produce a new computer name of the same length as the original name. Ensure that the format string allows enough room to embed at least one random character without exceeding the length of the original name.</p>
<p>/BV=<drv:part></p>	<p>Specifies the drive number and partition number of the bootable operating system installation to update.</p> <p>If there is more than one operating system, then this switch must be included in the command.</p>
<p>/AV=<drv:part></p>	<p>Specifies the drive number and partition number of an additional volume containing a file system to update.</p> <ul style="list-style-type: none"> ■ More than one volume may be specified by repeating the argument for each additional volume. ■ This switch cannot be combined with /AV=ALL.

Table 11-1 Command-line options

Switch	Description
/AV=ALL	Specifies that all other volumes are to be included as additional volumes. /AV=ALL cannot be combined with the /AV=<drv>:<part> switch.
/SURE	Specifies that the update should start without user confirmation.
/DIAG	Specifies that the utility can only generate diagnostic dumps and log files (not update the computer name or SID).
/IGNORE_DOMAIN	Specifies that Ghost Walker should not check Windows NT or 2000 installations for domain membership.
/REBOOT	Restarts the computer after a successful update.
/REPORT [=<filespec>]	Generates a report containing details of the update to \UPDATE.RPT. An alternate report file can be specified.
/LOGGING	Specifies that diagnostic logging is generated to the Gwalklog.txt file. Recommended for Technical Support use only.
/SAFE_LOGGING	Ensures that all diagnostic logging gets flushed to disk by closing and reopening the Gwalklog.txt file after every log statement. This results in very slow execution. Recommended for Technical Support use only.
/#E=<license file>	Specifies a Ghost license file to activate Ghost Walker.
/H /HELP /?	Shows command-line syntax Help.
/SID= <replacement SID>	Specifies a replacement SID to be used instead of a randomly generated one. The replacement SID must be in the format S-1-5-21-xxx-xxx-xxx and have the same number of characters as the original SID.
/IGNORE_ENCRYPTFILES	Disables the warning generated by Ghost Walker when it encounters Windows 2000/XP NTFS encrypted files during its initial disk scan. Changing the SID of a Windows 2000 installation results in indecipherable NTFS encrypted files.

Table 11-1 Command-line options

Switch	Description
/MNUPD= <registry path>	Specifies a registry location that you want Ghost Walker to search for instances of the computer name to update them. This registry key and its subkeys are searched for wholly matched instances of the computer name (of the same length). If any are found, they are updated to the new computer name. Multiple registry locations may be specified with multiple instances of this switch.
@<argumentfile>	Specifies a file containing command-line switches that Ghost Walker should open and read in addition to those specified in the command line.
/FNI	Disables the direct IDE drive access method.
/FNS	Disables the direct SCSI drive access method.
/FNX	Disables the Extended Int0x13 drive access method.

Following is an example of command line use:

```
GHSTWALK /BV=1:2 /AV=1:1 /AV=2:1 /CN="WS4-<RANDOM_HEX>-443" /SURE
```

The above command line does the following:

- Updates the Windows 95, 98, Me, NT, XP, or 2000 installation located on the second partition of the first disk.
- Updates file systems on additional volumes on the first partition of the first and second disks.
- Changes the computer name to one starting with WS4- and ending with -443, placing random hexadecimal values in the remaining spaces until the new name is the same length as the old one. For example, WS4-53ADF76-443.
- Does not prompt the user for final confirmation.

Command-line switches

This chapter includes the following topics:

- [Using Norton Ghost with switches](#)
- [Command-line switches](#)
- [Clone switch usage](#)
- [-CRC32 switch usage](#)
- [Ghost.exe and the Virtual Partition](#)

Using Norton Ghost with switches

Norton Ghost can be run in the following ways:

- Interactively with no command-line switches
- Interactively with selected switches
- Automated in batch files (batch mode)

The Norton Ghost command-line switches are used to alter Norton Ghost behavior and automate procedures.

If you are adding switches from the Advanced Options dialog box, some of these switches, for example, the `-clone` switch, are not applicable to your task. Because you are already performing a backup, restore, or clone operation, the `-clone` switch is redundant.

To list Norton Ghost command-line switches

- ◆ In the Ghost directory, type one of the following:
 - `ghost.exe -h`
 - `ghost.exe -?`

A hyphen (-) or a slash (/) must precede all switches except @. Switches are not case sensitive. They can be entered in upper, lower, or mixed case.

Command-line switches

@filename

Specifies a file that contains additional command-line switches that Norton Ghost should read. Filename indicates the path and file name of the command-line switch file. The command-line switch file can include any Norton Ghost command-line switch, except for `-afile` and `-dfile`. The Norton Ghost command-line switch file must be a text file with each switch on a separate line. This feature lets you exceed the DOS command-line limit of 150 characters.

For example, for the following command line:

```
ghost.exe @ghswitch.txt
```

The file Ghswitch.txt would read:

```
-clone,mode=pcreate,src=1:2,dst=g:\part2.gho  
-fcr  
-sure
```

- afile=filename Replaces the default abort error log file name, Ghosterr.txt, with the directory and file given in filename.
- auto Automatically names spanned image files during creation. Using this switch avoids the user prompt that asks for confirmation of the next destination location for the remainder of the image file that is being loaded. This switch is the default behavior for Norton Ghost.
- batch Batch mode switch. Prevents abort messages from waiting for user acknowledgment, and removes user interaction prompts. The return value of Ghost.exe must be checked to identify whether the operation was successful. Norton Ghost returns 0 on success and 1 or higher on failure or error.
- bfc Handles bad FAT clusters when writing to disk. If this switch is set, and the target partition is FAT, Norton Ghost checks for and works around bad sectors. This option may slow Norton Ghost operation substantially.
- bootcd When writing an image directly to a CD/DVD writer, makes the CD/DVD bootable. You need a bootable floppy disk in drive A. If you use the -sure switch with -bootcd, and a floppy disk is not in drive A, then a non-bootable CD/DVD is created.
- buffersize=x Ghost creates an image file using a small buffer where x = number of KB. The size of the buffer is automatically calculated by Norton Ghost. The buffersize switch lets you override this size. You can set the buffer size value from 1 to 32.
- chkimg,filename Checks the integrity of the image file indicated by filename.
- clone Ghost.exe operation switch. This switch allows automation of Ghost.exe operations and has a series of arguments that define the operation parameters.

See “[Clone switch usage](#)” on page 166.
- cns Reverts the naming of spanned files to the system used by versions of Norton Ghost prior to Symantec Ghost 6.5. If this switch is not used, then the naming of spanned files conforms to Microsoft application guidelines. You do not need to use this switch when reading an existing file. Use this switch when the first five characters in a file name must be unique. For example:

With -cns	Without -cns
Filename.gho	Filename.gho
Filename.001	Filen001.ghs
Filename.002	Filen002.ghs

-CRC32 The **-CRC32** switch lets you make a list of the files on a disk or partition or create an image file with CRC values and then verify the list against the original or a copy. The purpose is to allow both quick listing of the contents of an image file and verification that a disk created by Norton Ghost contains the same files as the original.

See “**-CRC32 switch usage**” on page 172.

-crcignore Ignores CRC errors. CRC errors indicate data corruption. This switch overrides the CRC error detection and may let a corrupted image file be used. Using this switch leaves the corrupted files in an unknown state. You can use this switch to help you extract files from a corrupted image file.

-cvtarea Creates a file, `Cvtarea.tmp`, that is the location of the MFT when the FAT32 partition is converted to NTFS. This switch operates in a similar manner to the `cvtarea` program that Microsoft provides in `Deploy.cab` on the Windows XP installation CD.

For more information, see the Microsoft Web site:

<http://www.microsoft.com/hwdev/tech/storage/ntfs-preinstall.asp>

The file is created in the root directory of the partition during a partition or disk restore and is created as a contiguous space on the disk. The largest size allowed is 4 GB. If the file is larger than this, it is truncated to 4 GB.

The syntax for this switch is as follows:

```
-cvtarea,filename=xxx,size=yyy{%disk,%free,KB,MB,GB},  
firstcluster=zzz{%disk,%free,KB,MB,GB}
```

The default settings are as follows:

filename	cvtarea.tmp
size	12%disk
firstcluster	1 3 GB 33%disk

Defaults to:

- 1/3 of the partition size if the partition size is less than 2 GB
- 1 GB if the partition size is less than 6 GB
- 3 GB if the partition size is equal to or greater than 6 GB

-dd Dumps disk metrics information to the dump log file, `Ghststat.txt`. The file location can be altered using the **-dfile=filename** switch.

-dfile=filename Changes the path and file name of the dump log file created using the **-dd** switch. This switch cannot be included in the **@ Ghost** switch text file

- dl=number** Specifies the number of hard disks present. Valid numbers are between 1 and 8. This may help when the BIOS does not report the number of drives correctly.
- dlist=drives** Specifies a list of drives to search for span files. If a span file cannot be found, then the drive letters in dlist are substituted one by one to look for the file on other drives.

For example, the command `ghost -dlist=CDEFG` instructs Norton Ghost to look for files on C, D, E, F, and G drives. The path remains the same.
- f32** Lets Norton Ghost convert all FAT16 volumes to FAT32 volumes when the destination partition to convert is larger than 256 MB in size. Ensure that the installed operating systems can access the volumes that will be converted to support FAT32.
- f64** Lets Norton Ghost resize FAT16 partitions to be larger than 2047 MB using 64 K clusters. This is only supported by Windows NT and Windows 2000. Do not use on computers with other operating systems
- fatlimit** Limits the size of FAT16 partitions to 2047 MB. Useful when Windows NT FAT16 partitions are present on the disk and 64 K clusters are not wanted
- fcr** Creates a CRC32 file, `Ghost.crc`, while creating an image file.

See “[-CRC32 switch usage](#)” on page 172.
- fdsp** Preserves the signature bytes on the destination disk when performing a disk-to-disk or image-to-disk cloning operation
- fdsz** Clears the signature bytes on the destination disk when performing a disk-to-disk or image-to-disk cloning operation.
- femax** When an extended partition is created in a disk-to-disk or image-to-disk operation, the femax switch ensures that the extended partition takes up all free space.
- ffatid** Forces the FAT partition id. This switch changes the partition id to the recommended partition id for the FAT partition within the destination image file or the destination partition table. This switch only takes effect if the source is a disk or partition, not an image file.

For example, if you are cloning a partition of type 0xA0 (some unknown partition id), and Norton Ghost sees it as a valid FATx (FAT12/FAT16/FAT32) partition, then the partition id is changed from 0xA0 to FATx.

This was default Norton Ghost behavior before Symantec Ghost 7.5. This switch allows for backward compatibility.
- ffi** Prefers the use of direct IDE access for IDE hard disk operations. This switch does not have any effect when running Norton Ghost in Windows 98.
- ffs** Prefers the use of direct ASPI/SCSI disk access for SCSI hard disk operations.
- ffx** Prefers the use of Extended Interrupt 13h disk access for hard disk operations.

- finger** Shows the fingerprint details written on a hard disk created by Norton Ghost. The fingerprint details include the process used to create the disk or partition and the time, date, and disk on which the operation was performed.
- fis** Uses all available disk space when creating partitions. By default, Norton Ghost often leaves a small amount of free space at the end of the disk. Because partitions must be aligned to cylinder boundaries, Norton Ghost may leave up to 5 MB free even when **-fis** is specified.
- fni** Disables direct IDE access support for IDE hard disk operations.
This switch has the same functionality as the **-noide** switch.
- fns** Disables direct ASPI/SCSI access support for SCSI hard disk operations.
This switch has the same functionality as the **-noscsi** switch.
- fnx** Disables extended INT13 support for hard disk operations.
- fro** Forces Norton Ghost to continue cloning even if the source contains bad clusters.
- fx** Causes Norton Ghost to exit to DOS after operation completion. By default, Norton Ghost prompts the user to restart or exit when the operation has finished. If Norton Ghost is run as part of a batch file, it is sometimes useful to exit back to the DOS prompt after completion so that further batch commands can be processed.

See “**-rb**” on page 162.
- ghostoncd** Includes Ghost.exe on a CD/DVD when writing an image to a CD/DVD.
- h or -? or -help** Shows the Norton Ghost command-line switch Help page.
- ia** The image all switch forces Norton Ghost to perform a sector-by-sector copy of all partitions. When copying a partition from a disk to an image file or to another disk, Norton Ghost examines the source partition and decides whether to copy just the files and directory structure, or to do a sector-by-sector copy. If it understands the internal format of the partition, it defaults to copying the files and directory structure. Generally this is the best option. However, if a disk has been set up with special hidden security files that are in specific positions on the partition, the only way to reproduce them accurately on the target partition is through a sector-by-sector copy. If you use this switch to create an image of a dynamic disk, then the image must be restored to a disk with identical geometry.
- ial** Forces a sector-by-sector copy of Linux partitions. Other partitions are copied as normal.
- ib** The image boot switch copies the entire boot track, including the boot sector, when creating a disk image file or copying disk-to-disk. Use this switch when installed applications, such as boot-time utilities, use the boot track to store information. By default, Norton Ghost copies only the boot sector, and does not copy the remainder of the boot track. You cannot perform partition-to-partition or partition-to-image functions with the **-ib** switch.

- id** The image disk switch is similar to **-ia** (image all), but also copies the boot track, as in **-ib** (image boot), extended partition tables, and unpartitioned space on the disk. When looking at an image with **-id**, you see the unpartitioned space and extended partitions in the list of partitions. The **-id** switch is primarily used by law enforcement agencies that require forensic images.
- When Norton Ghost restores from an **-id** image, it relocates partitions to cylinder boundaries and adjusts partition tables accordingly. Head, sector, and cylinder information in partition tables is adjusted to match the geometry of the destination disk. Partitions are not resizeable. You will need an identical or larger disk than the original.
- Norton Ghost does not wipe the destination disk when restoring from an **-id** image. Geometry differences between disks may leave tracks on the destination disk with their previous contents.
- Use the **-ia** (image all) switch instead of the **-id** switch when copying partition-to-partition or partition-to-image. An individual partition can be restored from an image created with **-id**.
- imgdesc** Adds a single-line image file description to the image file. This has the following restrictions:
- Cannot include any new lines
 - Cannot be used with **-imgdescfile**
 - Must be used with the clone switch
 - Clone switch mode must be create, dump, prcreate, or pdump
- imgdescfile** Specifies a text file that contains an image file description to be added to the image file. This has the following restrictions:
- Cannot be used with **-imgdesc**
 - Must be used with the clone switch
 - Clone switch mode must be create, dump, prcreate, or pdump
- ir** The image raw switch copies the entire disk, ignoring the partition table. This is useful when a disk does not contain a partition table in the standard PC format, or you do not want partitions to be realigned to track boundaries on the destination disk. Some operating systems may not be able to access unaligned partitions. Partitions cannot be resized during restore and you need an identical or larger disk.
- jl:x=filename** Creates a log file to assist in diagnosing problems with TCP/IP connections. The amount of information logged is set by the log level, *x*. The log level *x* can be E (errors), S (statistics), W (warnings), I (information), or A (all), in increasing order of logging detail. The file name indicates the path and file name of the log to be created. In general, the error and statistic levels do not affect session performance. All other levels may reduce performance and should be used for diagnostic purposes only.
- lockinfo** Shows the type code and information stored in the BIOS or the Pentium III Processor ID.
- For example:

Type	Based On	Value
M	Manufacturer	Compaq
P	Product name	Deskpro EN Series SFF
V	Version	Award Software
S	Serial number	H925CKH60020
U	UUID	2DA9379B4707D31185E8C800A4F232BC
C	M&P combined	Compaq Deskpro EN Series SFF
I	PIII ID	0000067200028E72A6994A20

- locktype= Type Lets you lock an image file for use with a specific set of computers defined by the type chosen and the source computer.
 For example, ghost -locktype=P creates an image that can be used only on systems that have the same product name type as the source computer.
- lpm The LPT master mode switch causes Norton Ghost to automatically go into LPT master mode, and is the equivalent of selecting LPT Master from the main menu.
 See “[Peer-to-peer connections](#)” on page 178.
- lps The LPT slave mode switch causes Norton Ghost to automatically go into LPT slave mode, and is the equivalent of selecting LPT Slave from the main menu.
 See “[Peer-to-peer connections](#)” on page 178.
- memcheck Activates internal memory usage checking for Technical Support.
- noauto Disables the automatic naming of spanned image files during creation. The user is prompted for confirmation of the next destination location for the remainder of the image file that is being restored.
- noautoskip Includes the hibernation and skip files in the image file. These files are excluded by default. See “[Hibernation and swap files](#)” on page 69.
- nofile Disables the Image File Selection dialog box. Useful when opening directories with large numbers of files and slow links.
- noide Disables access to IDE devices.
- noindex Prevents Norton Ghost from creating an index when creating an image file. This slightly reduces the size of the image file and saves memory but Ghost Explorer is much slower in reading the image file. This switch is useful if you are saving an image file from a large disk with very little memory.

-nolilo	Does not attempt to patch the LILO boot loader after a clone. If you use the -nolilo switch, you need to start from a floppy disk after the clone and then run /sbin/lilo as the root user to reinstall LILO.
-noscsi	Disables access to SCSI devices using ASPI.
-ntc-	Disables NTFS contiguous run allocation.
-ntchkdsk	Sets the CHKDSK bit set on a copied NTFS volume. This causes Windows NT to check the integrity of the volume when it is started.
-ntd	Enables NTFS internal diagnostic checking.
-ntic	Ignores the NTFS volume CHKDSK bit. Norton Ghost checks the CHKDSK bit on an NTFS volume before performing operations. When Norton Ghost indicates that the CHDSK bit is set, you should run CHKDSK on the volume to ensure that the disk is in a sound state before cloning.
-ntiid	By default, Norton Ghost copies partitions participating in an Windows NT volume set, stripe set, or mirror set using image all sector-by-sector copying. This switch forces Norton Ghost to ignore the Windows NT volume set partition status and image the partition as if it were an NTFS partition to let it be intelligently imaged on a file-by-file basis. Take care when using this switch. Do not use the -ntiid switch with volume sets and stripe sets.
To clone mirrored partitions (also known as Windows NT software RAID partitions)	
1 With Windows NT disk administrator, break the mirror set.	
2 Using the -ntiid switch, clone one of the mirror partitions.	
3 Resize as desired. Partitions can only be resized by Norton Ghost during a disk operation. When performing a partition operation, the target partition size must already be established.	
4 After cloning, recreate the mirror set using the Windows NT disk administrator. The disk administrator creates the partitions in the mirror set.	
-ntil	Ignores NTFS log file check (inconsistent volume).
-or	The override switch allows the override of internal space and integrity checks and lets you put a very big image into a small partition. The operation fails if it is unable to write to the limited partition size. This switch lets you override spanning, which fails if there is limited space. Avoid using this switch.
-pmbr	Specifies that the master boot record of the destination disk is to be preserved when performing a disk-to-disk or image-to-disk cloning operation.
-pwd and -pwd=x	Specifies that password protection be used when creating an image file. x indicates the password for the image file. If no password is given in the switch, Norton Ghost prompts for one. You can enter a maximum of 10 alphanumeric characters.

- quiet The quiet mode switch disables status updates and user intervention.
- rb Restarts after finishing a restore or copy. After completing a restore or copy operation, the target computer must be restarted so that the operating system can restore the new disk/partition information. Normally, Norton Ghost prompts the user to restart or exit. -rb tells Norton Ghost to restart automatically after it completes the restore or copy. This is useful when automating Norton Ghost in a batch command file.

See “-fx” on page 158.
- script Allows you to specify a series of commands (one per line) that Norton Ghost will execute in sequential order.

For example:

```
ghost -script=script.txt
```

Following is an example of script.txt:

```
-clone,mode=create,src=2,dst=c:\drv2.gho  
-chkimg,c:\drv2.gho  
-clone,mode=create,src=2,dst=c:\part2.gho  
-chkimg,c:\part2.gho
```

-skip=x The skip file switch causes Norton Ghost to exclude the indicated files during a create or restore operation. A skip entry can specify a single file, a directory, or multiple files using the * wildcard. File names must be given in short file name format and all path names are absolute. Only FAT system files can be skipped. It is not possible to skip files on NTFS or other file systems. The skip switch may only be included in the command line once. To specify multiple skip entries, they must be included in a text file indicated using -skip=@skipfile. The format of the skip text file, skipfile, matches the format used with the CRC32 vexcept option.

For example:

- -skip=\windows\user.dll
Skips the file User.dll in the Windows directory.
- -skip=*\readme.txt
Skips any file called Readme.txt in any directory.
- -skip=\ghost*.dll
Skips any file ending with .dll in the Ghost directory.
- -skip=\progra~1\
Skips the program files directory (note the short file name).
- -skip=@skipfile.txt
Skips files as outlined in Skipfile.txt. For example, if Skipfile.txt contains:
**.tmt
[partition:1]
\windows\
**.exe
[Partition:2]
**me.txt
This would skip all *.tmt files on any partition, the Windows directory, all *.exe files on the first partition, and any file that ends with me.txt on the second partition.

-span Enables spanning of image files across volumes.

Do not use this switch if you are running Ghost.exe to write an image file directly to a CD-R/RW. Ghost.exe automatically spans CD-R/RW disks if required.

-split=x Splits image file into x MB spans. Use this switch to create a forced-size volume set. For example, if you want to force smaller image files from a 1024 MB drive, you could specify 200 MB segments.

For example:

```
ghost.exe -split=200
```

This divides the image into 200 MB segments.

-sure Use the -sure switch in conjunction with -clone to avoid being prompted with the final question “Proceed with disk clone - destination drive will be overwritten?” This command is useful in batch mode.

- size** Sets the size for the destination partitions for either a disk restore or disk copy operation. When numbering partitions in the **-size** switch, do not include the hidden Ghost partition. See [“Setting a destination size for the clone switch”](#) on page 169.
- sizee** Forces Norton Ghost to keep the sizes of all destination partitions the same as in the source partition (no resizing).
This switch can be used with or without the **-clone** switch.
See [“Setting a destination size for the clone switch”](#) on page 169.
- sizef** Forces Norton Ghost to keep the sizes of all destination partitions, except for the first one, the same as in the source partition. The first partition uses the remaining disk space.
This switch can be used with or without the **-clone** switch.
See [“Setting a destination size for the clone switch”](#) on page 169.
- sizen** Forces Norton Ghost to keep the sizes of all destination partitions, except for the last one, the same as in the source partition. The last partition uses the remaining disk space.
This switch can be used with or without the **-clone** switch.
See [“Setting a destination size for the clone switch”](#) on page 169.
- tapebuffered** Default tape mode. Sets the ASPI driver to report a read/write as successful as soon as the data has been transferred to memory. Useful when using older or unreliable tape devices or sequential media.
- tapeeject** Forces Norton Ghost to eject the tape following a tape operation. If the tape drive does not support remote ejection you must eject and insert the tape manually before further use. Earlier versions ejected the tape by default. By default, Norton Ghost does not eject the tape. It rewinds the tape before exiting to DOS.
- tapesafe** Sets the ASPI driver to report a read/write as successful only when the data has been transferred to the physical medium. Useful when using older or unreliable tape devices or sequential media.
- tapesize=x** Specifies the tape block size in units of 512 bytes, where x is 1 to 128.
- tapespeed=x** Allows control of tape speed, where x is 0 to F. 0 is the default. 1 to F increase tape speed. Only use this when the tape does not work correctly at the speed used by Norton Ghost.
- tapeunbuffered** Sets the ASPI driver to report a read/write as successful only when the data has been transferred to the tape drive. (It is possible that this occurs before the data is physically written to the medium.)
- tcpm[:slave IP address]** The TCP/IP master mode switch causes Norton Ghost to go into TCP/IP master mode automatically, and is the equivalent of selecting TCP/IP Master from the main menu. The IP address of the slave computer may be specified. See [“Peer-to-peer connections”](#) on page 178.

- tcps The TCP/IP slave mode switch causes Norton Ghost to go into TCP/IP slave mode automatically, and is the equivalent of selecting TCP/IP Slave from the main menu. See [“Peer-to-peer connections”](#) on page 178.
- usbm The USB master mode switch causes Norton Ghost to go into USB master mode automatically, and is the equivalent of selecting USB Master from the main menu. This switch should precede the -clone switch. For example,

ghost.exe -usbm -clone,mode=dump,src=1,dst=1:1\image.gho See [“Peer-to-peer connections”](#) on page 178.
- usbs The USB slave mode switch causes Norton Ghost to go into USB slave mode automatically, and is the equivalent of selecting USB Slave from the main menu. This switch should precede the -clone switch. See [“Peer-to-peer connections”](#) on page 178.
- vdw If this switch is set, Norton Ghost uses the disk’s verify command to check every sector on the disk before it is written. This option may slow Norton Ghost operation substantially.
- ver Shows the version number of Norton Ghost.
- z Runs compression when saving a disk or partition to an image file. The greater the compression, the slower the transmission.
- -z or -z1: Low compression (fast transmission)
 - -z2: High compression (medium transmission)
 - -z3 through -z9: Higher compression (slower transmission)
- See [“Image files and compression”](#) on page 62.

Clone switch usage

The syntax for the clone switch is:

```
-clone,MODE={operation},SRC={source},DST={destination},
[SZE{size},SZE{size}.....]
```

Defining the type of clone command

MODE defines the type of clone command. The syntax is as follows:

```
MODE={copy | restore | create | pcopy | prestore | pcreate}
```

Table A-1 Mode commands

Switch	Action
copy	Disk-to-disk copy
restore Note: The load switch has been replaced by the restore switch. The load switch is still fully functional and is interchangeable with restore.	File-to-disk restore
create Note: The dump switch has been replaced by the create switch. The dump switch is still fully functional and is interchangeable with create.	Disk-to-file backup
pcopy	Partition-to-partition copy
prestore Note: The pload switch has been replaced by the prestore switch. The pload switch is still fully functional and is interchangeable with prestore.	File-to-partition restore
pcreate Note: The pdump switch has been replaced by the pcreate switch. The pdump switch is still fully functional and is interchangeable with pcreate.	Partition-to-file backup. This allows multipartition Ghost backup selection for file.

Cloning combination options

Table A-2 illustrates the possible cloning operations that you can perform.

Table A-2 Cloning operations

Mode	Source	Destination
copy	<ul style="list-style-type: none"> ■ disk 	<ul style="list-style-type: none"> ■ disk
restore Note: The load switch has been replaced by the restore switch. The load switch is still fully functional and is interchangeable with restore.	<ul style="list-style-type: none"> ■ file ■ tape ■ CD-ROM ■ USB 1.1 and 2.0 Mass Storage Device ■ DVD 	<ul style="list-style-type: none"> ■ disk
create Note: The dump switch has been replaced by the create switch. The dump switch is still fully functional and is interchangeable with create.	<ul style="list-style-type: none"> ■ disk 	<ul style="list-style-type: none"> ■ file ■ tape ■ CD writer ■ USB 1.1 and 2.0 Mass Storage Device ■ DVD
pcopy	<ul style="list-style-type: none"> ■ disk:partition 	<ul style="list-style-type: none"> ■ disk:partition
prestore Note: The pload switch has been replaced by the prestore switch. The pload switch is still fully functional and is interchangeable with prestore.	<ul style="list-style-type: none"> ■ file:partition ■ tape:partition ■ CD:image:partition ■ USB 1.1 and 2.0 Mass Storage Device 	<ul style="list-style-type: none"> ■ disk:partition
pcreate Note: The pdump switch has been replaced by the pcreate switch. The pdump switch is still fully functional and is interchangeable with pcreate.	<ul style="list-style-type: none"> ■ disk:partition ■ partition:partition You can specify more than one partition.	<ul style="list-style-type: none"> ■ file ■ tape ■ CD writer ■ USB 1.1 and 2.0 Mass Storage Device ■ DVD

Setting a source for the clone switch

The syntax for this switch is as follows:

SRC={disk | file | tape |cd/dvdwriter }

SRC defines the source for the operation selected by the clone mode option.

Table A-3 Source options for cloning

Switch	Source	Explanation
disk	drive number	<p>Source disk drive number. Numbers start at 1. For example: SRC=1</p> <p>A partition on a drive can also be specified. Numbers start at 1. For example: SRC=1:2</p>
file	filename	<p>The source image file name. For example: SRC= g:\source.gho</p> <p>A partition in an image file can also be specified. For example: SRC=g:\source.gho:2</p> <p>Files can also be read from a CD-ROM drive.</p> <p>To specify a file located on a file system not recognized by DOS, such as, NTFS, use the same format as the disk switch, specifying both a disk and partition. For example: src=1:2\image.gho</p> <p>In this example, Image.gho resides on an NTFS file system on the second partition of the first disk.</p>
tape	@MTx	<p>The tape drive number. Numbers start at 0. For example: SRC=@MT0</p> <p>A partition on a tape can also be specified. For example: SRC=@MT0:3</p>
CD ROM	@CDx	<p>The CD or DVD drive number. If you have a CD reader and a CD writer, in the Ghost.exe user interface you would see @CD1 and @ CD2. The number is optional if you are specifying an operation from the command-line.</p> <p>You can specify partitions for the image stored on a CD for a restore operation. For example: SRC=@CD1:2</p>

Setting a destination for the clone switch

The syntax for this switch is as follows:

DST={disk | file | tape | cd/dvdwriter}

DST defines the destination location for the operation.

Table A-4 Destination options for cloning

Switch	Destination	Explanation
disk	drive	<p>The destination disk drive number, such as DST=2</p> <p>A partition on a drive can also be specified. For example: DST=2:1</p> <p>To create a new partition, type a destination partition one greater than the existing number of partitions, if there is enough free space.</p>
file	filename	<p>The destination image file name. For example: DST= g:\destination.gho</p> <p>To specify a file located on a file system not recognized by DOS, such as NTFS, use the same format as the disk switch, specifying both a disk and partition. For example: dst=1:2\image.gho</p> <p>In this case, Image.gho is created on the NTFS volume that resides on the second partition on the first disk.</p>
tape	@MTx	<p>The tape drive number. Numbers start at 0. For example: DST=@MT0</p>
cd/ dvdwriter	@CDx	<p>The CD or DVD writer drive number. Numbers start at 1. For example: DST=@CD1</p> <p>If you have a CD reader and a CD writer, in the Ghost.exe user interface you would see @CD1 and @ CD2. The number is optional if specifying an operation from the command-line.</p>

Setting a destination size for the clone switch

SZE sets the size of the destination partitions for either a disk restore or disk copy operation. This is optional. Multiple partition size switches are supported.

The number of size switches depends on the number of partition sizes that you want to specify. There may be none.

`SZE{E | F | L | n={xxxxM | mmP | F | V}}`

Table A-5 Destination size options for cloning

Switch	Explanation
n=xxxxM	Indicates that the nth destination partition is to have a size of xxxxxMB (for example, SZE2=800M indicates partition two is to have 800 MB).
n=mmP	Indicates that the nth destination partition is to have a size of mm percent of the target disk. Due to partition size rounding and alignment issues, 100% physical use of disk space may not be possible.
n=F	Indicates that the nth destination partition is to remain the same size on the destination as it was on the source. This is referred to as fixed size.
n=V	Indicates that the partition may be made bigger or smaller depending on how much disk space is available. This is the default.
E	The sizes of all partitions remain fixed.
F	The sizes of all partitions except the first remain fixed. The first partition uses the remaining space.
L	The sizes of all partitions except the last remain fixed. The last partition uses the remaining space.

Examples of clone switch usage

Table A-6 describes clone switches and their functions.

Table A-6 Clone switch usage examples

Switch	Function
<code>ghost.exe -clone,mode=copy,src=1,dst=2</code>	Copies local disk one to local disk two.
<code>ghost.exe -lpm -clone,mode=create,src=2,dst=c:\drive2.gho</code>	Connects a master computer using LPT to another computer running Norton Ghost in slave mode, and save a disk image of local disk two to the remote file c:\drive2.gho. The slave computer can be started with <code>ghost.exe -lps</code> .

Table A-6 Clone switch usage examples

Switch	Function
ghost.exe -clone,mode=pcopy,src=1:2,dst=2:1 -sure	Copies the second partition of local disk one to the first partition of local disk two, without the final warning prompt.
ghost.exe -clone,mode=restore,src=e:\savedsk.gho,dst=1-sure	Restores the disk image file Savedsk.gho that is held on the server drive that is mapped locally to drive E onto local disk one. Performed without the final warning prompt. This example is typical of a command line included in a batch file to automate workstation installations from a network file server.
ghost.exe -clone,mode=pcreate,src=1:2,dst=g:\part2.gho	Saves the second partition of disk one to an image file on mapped network drive G.
ghost -clone,mode=prestore,src=g:\part2.gho:2,dst=1:2	Restores partition two from a two-partition image file on mapped drive G onto the second partition of the local disk.
ghost.exe -clone,mode=restore,src=g:\2prtdisk.gho,dst=2size1=60P,size2=40P	Restores disk two from an image file and resizes the destination partitions into a 60:40 allocation.
ghost.exe -clone,mode=copy,src=1,dst=2,size2=F	Clones a two-partition disk and keeps the second partition on the destination disk the same size as on the source disk, and lets the first partition use the remaining space, leaving no unallocated space.
ghost.exe -clone,mode=create,src=1,dst=2:3\image.gho	Saves disk one to the image file image.gho located on the third partition of the second disk. This works only if the third partition of the second disk is NTFS file system.

Table A-6 Clone switch usage examples

Switch	Function
ghost.exe -clone,mode=prestore,src=2:3\image.gho:5,dst=4:2	Restores the fifth partition of the image file image.gho, which is located on the third partition of the second disk, to the second partition on the 4th disk. This switch only works if the third partition on the second disk is NTFS.
ghost.exe -clone,mode=restore,src=g:\3prtdisk.gho,dst=1,size1=450M,size2=1599M,size3=2047M	Restores disk one from an image file and resize the first partition to 450 MB, the second to 1599 MB, and the third to 2047 MB.
ghost.exe -clone,mode=restore,src=g:\2prtdisk.gho,dst=1,sizeL	Restores a disk from an image file and resizes the last partition to fill the remaining space.
ghost.exe -clone,mode=copy,src=2:2,dst=@MT0	Creates an image file of the second partition on disk 2 onto the first tape drive.
ghost.exe -clone,mode=pcreate,src=2:1:4:6,dst=d:\part146.gho	Creates an image file with only the selected partitions. This example selects partitions 1, 4, and 6 from disk 2.

-CRC32 switch usage

CRC checking works file-by-file with FAT partitions. NTFS partitions are CRC-checked within an image file by each MFT table. It is not possible at present to obtain a list of files failing a CRC check with an NTFS file system. When a CRC file is created for an NTFS partition, only a single CRC value is generated. You can also create a CRC file from an image file and verify it against a disk.

The full syntax for this switch is as follows:

```
-CRC32,action={create|verify|pcreate|pverify|dcreate|dverify},
src={{disk}}[partition][file],crcfile={file}[partition],vlist={file},vexcept={file}
```

The following parameters can be used with the -CRC32 switch:

Table A-7 Parameters for the -CRC32 switches

Parameter	Explanation
create	Create an ASCII CRC32 file from a disk
verify	Verify a disk from a CRC32 file
pcreate	Create an ASCII CRC32 file from a partition
pverify	Verify a partition from an ASCII CRC32 file
dcreate	Create an ASCII CRC32 file from an image file
dverify	Verify an image file from an ASCII CRC32 file
crfile	ASCII CRC32 file (default=Ghost.crc)
vlist	Verification list file (default=Ghost.ls)
veexcept	Verification exception file (no default)

Examples of -CRC32 usage

This table provides some examples of how you can use the -CRC32 switch.

Table A-8 -CRC32 usage examples

Switch	Function
ghost.exe -fcr	Creates a CRC32 file (called Ghost.crc) while making an image file.
ghost.exe -fcr=d:\test.crc	Creates a CRC32 file (called Test.crc) while making an image file.
ghost.exe -crc32, action=create,src=1,crcfile=ghost.crc	Creates a list of files and CRC32 values for a disk.
ghost.exe -crc32,action=dverify,src= x:dumpfile.gho,crcfile=ghost.crc	Verifies the list against an image file.
ghost.exe -crc32,action=pverify,src= 1:2,crcfile=filename.crc:2	Verifies a partition in an image file with multiple partitions. This example verifies that partition 2 on disk 1 is the same as partition 2 in the CRC file.

Table A-8 -CRC32 usage examples

Switch	Function
ghost.exe -crc32,action=create	Creates an ASCII CRC32 file from the primary hard drive. Note that the default disk is the primary drive. The default ASCII CRC32 file is Ghost.crc.
ghost.exe -crc32,action=create,src=2,crcfile=myfile.txt	Creates an ASCII CRC32 file, Myfile.txt. This example uses disk 2 as the source drive and the output file.
ghost.exe -crc32,action=verify	Verifies the contents of the primary disk against a default ASCII CRC32 file, Ghost.crc (in the current directory). The default disk is the primary drive. The default verification list file is Ghost.ls.
ghost.exe -crc32,action=verify,src=1,crcfile=myfile.txt,vlist=myfile.out	Verifies the contents of the primary disk, 1, against the CRC32 file, Myfile.txt. This example Myfile.out as the verification list file.
ghost.exe -crc32,action=verify,src=1,crcfile=myfile.txt,vlist=myfile.out,vexcept=myfile.exc	Verifies the contents of the primary disk against a CRC32 file. Same as above with the inclusion of the EXCEPTION argument that excludes compared files based upon its entries.

Files not checked with CRC

The switch vexcept=filename specifies files that are not checked with CRC. This is normally used to exclude files that are always changed on start up. A sample exception file follows:

```
[ghost exclusion list]
\PERSONAL\PHONE
[partition:1]
\WINDOWS\COOKIES\*. *
\WINDOWS\HISTORY\*
\WINDOWS\RECENT\*
\WINDOWS\USER.DAT
\WINDOWS\TEMPOR~1\CACHE1\*
\WINDOWS\TEMPOR~1\CACHE2\*
\WINDOWS\TEMPOR~1\CACHE3\*
```

```
\WINDOWS\TEMPOR~1\CACHE4\*  
[partition:2]  
*\*.1  
[end of list]
```

The exclusion list is case-sensitive; all files should be specified in upper case. The * wildcard symbol follows UNIX rules, and is more powerful than the MS-DOS * wildcard. In particular, it matches the . as well as any other character, but other characters can follow the *. Therefore a wildcard of *br* matches any files containing the letters br, such as, Brxyz.txt, Abr.txt, and Abc.dbr.

The specification of \WINDOWS\COOKIES*. * in the previous example means match all files in the \WINDOWS\COOKIES subdirectory that have extensions. To match all files with or without extensions, use WINDOWS\COOKIES*.

Use short file names in exclusion files. Files specified before the first [Partition:x] heading are used to match files in any partition.

A directory of * matches any subdirectory, regardless of nesting. The previous exclusion file matches any file with an extension of .1 in any subdirectory on the second partition. Apart from this, use wildcards for files, not for directories.

Ghost.exe and the Virtual Partition

Ghost.exe does not see the Virtual Partition when it runs from the command line. The numbering of the partitions is consistent with the numbering that appears when you run the Ghost.exe user interface.

If you use GDisk to view the disk, the Virtual Partition is displayed with the volume label VPSGHBOOT. Therefore, the partition numbering that you can see in GDisk is not the same as the partition numbering in Ghost.exe.

Transfer methods and hardware setup

This chapter includes the following topics:

- [Transfer and hardware requirements](#)
- [Peer-to-peer connections](#)
- [SCSI tape drives](#)
- [Removable media](#)
- [CD/DVD usage](#)
- [Internal drives](#)

Transfer and hardware requirements

Before using Norton Ghost, consider the transfer and hardware requirements for the transfer method that you want to use. Ensure that all hard drives are installed correctly and that the BIOS of the system is configured and shows the valid parameters of the drives.

Peer-to-peer connections

Peer-to-peer connections enable Norton Ghost to run on two computers, copying drives and partitions and using image files between them.

LPT or USB connections

On an LPT/parallel port connection, use a parallel connection cable and a parallel port to connect the computers. For data transfer of approximately 19-25 MB/min, Norton Ghost provides support for the Parallel Technologies universal DirectParallel cable. For peer-to-peer USB port connections, use a USB 1.1 cable that supports a host-to-host connection and a data transfer of approximately 20-30 MB/min.

ECP is the best option for LPT connections and has a data transfer rate of approximately 5 MB/min. Norton Ghost must be running under DOS on both computers.

See [“USB and DirectParallel Cables”](#) on page 181.

TCP/IP connections

Connect the computers with an ethernet or token ring network interface card and an established network connection, which includes one of the following:

- Crossover cable
- Coaxial or twisted pair cable
- Ethernet or Token Ring (Network Interface Card)
- Ethernet or MSAU hub

Install a network interface card (NIC).

SCSI tape drives

To use Norton Ghost with a SCSI tape device, the tape media and the tape device must have an Advanced SCSI Programming Interface (ASPI) driver for DOS installed. The driver is installed in the Config.sys file as shown in the following example:

```
device=C:\scsitape\aspi4dos.sys
```

The Norton Ghost wizards automatically attempt to detect and load Adaptec SCSI cards. If this succeeds you do not need to make any additions to Config.sys. If Norton Ghost does not detect the SCSI card, you can add the drivers in one of the following ways:

- In the Norton Ghost wizards, in the Preferences and Options dialog box, on the SCSI driver settings tab.
- In the Norton Ghost wizards, in the Preferences and Options User dialog box, on the User Files tab. This lets you make an addition to Config.sys.

Refer to the documentation included with the SCSI tape device for more information.

Removable media

The removable media drive, media, and media drivers for use in DOS are required.

CD/DVD usage

A CD/DVD writer and blank CD-R/RW or DVD media are required.

See [“Image files and CD/DVD writers”](#) on page 112.

Internal drives

To work with internal drives, ensure that each of the drives is properly configured. This means that if fixed IDE drives are in use, then the jumpers on the drives are set up correctly and the BIOS of the computer is configured for the disk arrangement. Both the source and the destination drives must be free from file corruption and physical hard drive defects.

Third-party devices

Install the DOS driver as outlined in the device documentation.

USB and DirectParallel Cables

This chapter includes the following topics:

- [Parallel Technologies cables](#)
- [Other USB cables](#)

Parallel Technologies cables

Parallel Technologies USB and DirectParallel® Universal Fast Cable provide high-speed data transfer and can significantly increase Norton Ghost performance.

USB and DirectParallel connection cables are available directly from Parallel Technologies.

Web site	http://www.lpt.com
Telephone	800.789.4784 (U.S.) 425.869.1119 (International)
Fax	253.813.8730
Email	sales@lpt.com

For peer-to-peer connections, Norton Ghost supports USB 1.1 cables and USB 1.1 controller. Some USB 2.0 controllers may work, but Norton Ghost does not support this configuration.

The USB and DirectParallel connection cables can also be used for high-speed computer-to-computer file transfer and networking in Windows 9x and Windows 2000. Norton Ghost contains DirectParallel driver technology from Parallel Technologies, Inc., the developers of the Direct Cable Connection computer-to-computer technology built into Windows 9x and Windows 2000. The DirectParallel drivers and cables contain patent-pending parallel port interface technology.

Other USB cables

The following USB peer-to-peer cables can also be used with Norton Ghost:

- EzLink USB Instant Network, model 2710
- USB LinQ Network
- BusLink USB to USB File Transfer cable, model UFT06
- USB Net Linq Network Bridge cable, model 2K398
- USB Net Linq Network Bridge cable, model 00115G

The Wattcp.cfg network configuration file

This chapter includes the following topics:

- [The Wattcp.cfg configuration file](#)
- [Wattcp.cfg key words](#)

The Wattcp.cfg configuration file

The Wattcp.cfg configuration file contains the TCP/IP networking configuration details for Norton Ghost.

Wattcp.cfg is created automatically when you create a boot package using the Ghost Boot Wizard.

The Wattcp.cfg file specifies the IP address and the subnet mask of the computer and lets you set other optional network parameters. The file should be located in the current directory when Ghost.exe is started.

Comments in the file start with a semicolon (;). Options are set using the format option = value. For example:

```
receive_mode=5 ;set receive mode
```

Wattcp.cfg key words

The keywords in the Wattcp.cfg configuration file are as follows:

Table D-1 Wattcp.cfg keywords

Keyword	Description
IP	Specifies the IP address of the local computer. Each computer must have a unique IP address. Norton Ghost supports the use of DHCP and BOOTP servers and defaults to using them when the IP address is left blank or is invalid. DHCP and BOOTP provide automatic assignment of IP addresses to computers. This lets identical boot disks be used on computers with similar network cards. Example: IP=192.168.100.10
Netmask	Specifies the network IP subnet mask. Example: NETMASK=255.255.255.0
Gateway (optional)	Specifies the IP address of the gateway. This option is required when routers are present on the network and when participating computers are located on different subnets. Example: GATEWAY=192.168.100.1
Bootpto (optional)	Overrides the timeout value (in seconds) for BOOTP/DHCP. Example: BOOTPTO=60

Table D-1 Wattcp.cfg keywords

Keyword	Description
Receive_Mode (Ethernet only)	Overrides the automatically configured packet driver mode used by Norton Ghost. The modes, in order of preference, are 4, 5, and 6. The default mode is 4.

Cloning with Linux

This chapter includes the following topics:

- [Supported configurations](#)
- [Position of disk](#)
- [Boot configuration](#)
- [Norton Ghost utility support](#)

Supported configurations

Norton Ghost can copy or clone many different Linux distributions successfully. However, Norton Ghost is sensitive to any possible changes in Ext2/3 file system and LILO specifications. If changes are made to these specifications, Norton Ghost may no longer support the Linux distribution. Symantec attempts to release new builds of Ghost promptly to address such changes.

Norton Ghost is not sensitive to kernel versions. Use the `-ial` and `-nolilo` command-line switches to resolve problems with any incompatibilities.

See “[Command-line switches](#)” on page 153.

Norton Ghost copies or clones any x86-based Linux system with full support for Ext2/3 file systems (type 0x83) containing 1 KB, 2 KB, or 4 KB block sizes. Other file systems, such as reiserfs, are cloned on a sector-by-sector basis and cannot be resized during cloning.

Linux systems that use LILO as their boot loader in the MBR or in the active Ext2/3 partition are supported with some exceptions. Any references to a disk other than the first hard disk in the system (`/dev/hda` or `/dev/sda`) are not supported. The `/boot` and root file systems must be on the first hard disk. `/boot` can be a directory within the root file system.

Norton Ghost supports type 0 and type 1 Linux swap file systems (type 0x82).

Norton Ghost partially supports Linux extended partitions (type 0x85). It copies file systems inside these extended partitions, but restores them as DOS extended partitions. This is not known to cause problems with Linux systems after cloning.

Position of disk

Linux is sensitive to the position of the disk in hardware. A system running on the primary master disk does not run if the disk is mounted as the primary slave or as the secondary master. Norton Ghost does not resolve this issue.

Boot configuration

Norton Ghost uses the file `/etc/lilo.conf` to determine the boot configuration. If this file does not match the boot configuration, Norton Ghost may be unable to patch LILO during cloning. The keyword, `default`, is not supported in `Lilo.conf`, so the first target specified should be the default target.

If a different boot loader, such as grub, is used, or the preceding conditions are not met, Norton Ghost clones the system but the new disk probably will not boot. The system should be started from a floppy disk or CD, and the boot loader should be reinstalled by running `/sbin/lilo` or an equivalent.

Warning: Always have a boot disk available in case of problems starting a Linux system after cloning.

Norton Ghost utility support

Ghost Explorer substantially supports Ext2/3 file systems within image files, including the restoration, deletion, and addition of files within these file systems. Problems arise when files that have names that are illegal on Windows are manipulated. Ghost Explorer cannot manipulate device files or symbolic links. Sparse files are expanded on restoration, and hard links are broken.

GDisk does not create any Linux file systems or recognize any partitions within a Linux extended partition.

Troubleshooting

This chapter includes the following topics:

- [Ghost.exe error messages](#)
- [Problems running Norton Ghost](#)
- [Writing to a recordable CD or DVD](#)

Ghost.exe error messages

A Norton Ghost error message consists of an error number, a description, and possibly a suggestion to remedy the problem.

A Ghosterr.txt file is generated when an abort error occurs.

See “[Diagnostics](#)” on page 201.

Further information is available on the Norton Ghost Technical Support Web site.

See “[Service and support solutions](#)” on page 209.

[Table F-1](#) includes some error messages that you may encounter.

Table F-1 Error message

Error code	Description
10098	The partition number must be included in the command-line switches. See “ Command-line switches ” on page 153.
10010, 10014, 11000	Incorrect path/file syntax. Ensure that the path and file name are correct. Also make sure that you have the proper user rights to read or create the image file.
19913	Cannot find the BOOTP/DHCP server. Ensure that the computer is connected to the network and that a BOOTP or DHCP server is set up for this subnet.
19916	Duplicate IP address detected. An IP address has been allocated that is already in use.
CDR101: Not ready reading drive X, Abort, Retry, Fail	A system error message. This error is not caused by Norton Ghost. It is caused by malfunctioning hardware or software configurations. The image file on the CD is not readable. To verify this, go into DOS and copy the image file off of the CD-ROM using copy verification, copy /v.

Problems running Norton Ghost

Some errors may occur that do not produce an error code.

Card not found/Card not installed

This error can occur if a driver cannot find a network card installed on your computer. The error can occur when you start your computer with a Ghost boot disk or run a task in the Virtual Partition. Check the following:

- Ensure that you selected the correct network card when you created the Ghost boot disk.
- Ensure that the Plug and Play O/S setting in the BIOS does set up Plug and Play devices.

For example, if the setting in the BIOS is Plug and Play O/S, then the setting for the BIOS to set up Plug and Play devices is N. Some BIOS phrase this differently and require the setting to be Y. Try the generic instructions for accessing the BIOS included in this manual or check your computer manual for instructions specific to your computer.

This applies only to some cards and some BIOSs.

Creating an image on an NTFS partition

You may experience problems if you are attempting to back up in the following situation:

- You have a dual-boot environment.
- You are running Norton Ghost from a Windows 9x partition.
- You are trying to create an image in an NTFS partition.

This cannot be achieved because of a known Windows 9x limitation of reading NTFS partitions.

A workaround for this is to start your computer with a Ghost boot disk and then run Ghost.exe to complete the backup image.

Cannot start from drive A

If your computer does not check drive A first on startup, use your computer's Setup program to change its settings.

Be careful when you make changes using your computer's Setup program. If you have never used it before, you may want to refer to your computer manufacturer's documentation.

To change your computer's settings

- 1** Restart your computer.
- 2** A message appears telling you the key or keys to press to run Setup.
- 3** Press the key or keys to launch the Setup program.
- 4** Set the Boot Sequence to boot drive A first and drive C second.
Setup programs vary from one manufacturer to the next. If you cannot find the Boot Sequence option, use the Setup program's Help system, refer to the documentation that came with your computer, or contact your computer manufacturer.
- 5** Save the changes, then exit the Setup program.

Windows NT blue screen

If you are restoring, backing up, or cloning a computer onto another Windows NT computer with incompatible hardware, you may get a blue screen. To solve this problem, you must restore the computer with a previous backup image file.

Missing hibernation file

If the hibernation file is missing, the following message may appear:

Cannot hibernate because there is no hibernation file or the hibernation file has an error.

Recreate the hibernation files according to the instructions for your Windows operating system.

Computer fails to restart

If your computer fails to restart during a Norton Ghost Virtual Partition operation, try running the Ghreboot utility included on the Norton Ghost installation CD.

To run Ghreboot.exe

To run Ghreboot.exe if you installed Norton SystemWorks

- 1 Insert your Windows Startup Disk into the floppy disk drive and restart your computer.
- 2 If you are given a restart choice, then on the boot menu select **Boot with CD Drivers**.
- 3 When the computer has restarted, type the following:
`<drive>:\Ghost\Tools\Ghreboot`
`<drive>` is the drive letter assigned to your CD-ROM drive.

To run Ghreboot.exe if you installed Norton Ghost only

- 1 Insert your Norton Ghost installation CD into your CD-ROM drive and restart your computer.
- 2 When the computer has restarted, type the following:
`<drive>:\Tools\Ghreboot`
`<drive>` is the drive letter assigned to your CD-ROM drive.

Getting out of the Virtual Partition

If your computer is in the Virtual Partition, you must use the executable Ghreboot to restart your computer back into Windows.

To restart your computer back into Windows

- 1 At the command line, type `ghreboot`.
- 2 Press **Enter**.

Cancelling a Ghost.exe operation

If you start a Ghost.exe operation, you can abort the process by pressing **Ctrl+C**. Be aware that this leaves the destination image file in an unknown state.

Installing and uninstalling Norton Ghost

If you are having problems installing or uninstalling Norton Ghost, providing a log file of the installation or uninstallation assists Technical Support in analyzing the problem.

Add the following to the end of a command line to create a Logfile.txt file in the root directory of your computer - /! *v c:\logfile.txt

See “[Installing from the command line](#)” on page 207.

To add logging to the end of a command line for Windows NT/2000/XP installations, use the following command line:

```
Msiexec.exe /i "d:\install\norton ghost.msi" /q INSTALLDIR="c:\program files\symantec\norton ghost 2003\" USERNAME="Me" COMPANYNAME="Symantec" /! *v c:\logfile.txt
```

```
Msiexec.exe /x "d:\install\norton ghost.msi" /q /! *v c:\logfile.txt
```

To add logging to the end of a command line for Windows 9x/Me and XPH installations, use the following command line:

```
d:\install\setup.exe /s /v"/! *v c:\logfile.txt"  
d:\install\setup /x /s /v"/! *v c:\logfile.txt"
```

Connecting using USB peer-to-peer

If you cannot connect using USB peer-to-peer, then try altering the drivers that are installed into the Virtual Partition.

See “[Installing USB peer-to-peer drivers](#)” on page 57.

Writing to a recordable CD or DVD

If you are having problems saving a file directly to a CD-R/RW or DVD, there are a number of possible solutions.

Supported CD-R/RW and DVD drives

Norton Ghost supports a large number of CD-R/RW and DVD drives. Ensure that your drive is listed on the following support Web site:

<http://service1.symantec.com/SUPPORT/ghost.nsf/docid/2002030414141625>

Inaccessible CD-ROM drive

When writing to a compatible CD-R/RW drive, the drive may not be accessible to Norton Ghost. To discover whether this is a problem, check one of the following:

- Ghosterr.txt: Ghosterr.txt is located in the same directory as the Ghost executable.
 See “[Diagnostics](#)” on page 201.
- Log file: A log file may have been created that can be viewed in the View Log.
 See “[Viewing the task log](#)” on page 59.

IDE CD-ROM drives

To see if an IDE CD-R/RW drive is inaccessible to Norton Ghost, open Ghosterr.txt or the log file.

The IDE sections are named one or more of the following:

- IDE
- IDE for PIO
- IDE for UDMA

If the word Unavailable appears under these headings, then check the following:

- Ensure that the firmware for your CD-R/RW drive is current.
 Check the Web site for the CD-R/RW drive manufacturer for the most current firmware.
- Update the computer BIOS with the latest version.
 The computer BIOS may not be enabled to detect the IDE drive.
- Check the controller to which the IDE drive is attached.
 The IDE drive might be attached to a controller that requires a driver for access. Check the documentation for the controller to determine whether you need to load an IDE driver when starting your computer. Drivers may be needed for controllers that are included on the computer’s motherboard.
 Reading and writing from a CD-R/RW drive are different processes. You may be able to access a CD-R/RW drive from DOS to read the drive, but not to write to the drive.

SCSI CD-R/RW drives

To see if a SCSI CD-R/RW drive is inaccessible to Norton Ghost, open Ghosterr.txt or the log file. The SCSI section is named ASPI.

If the word Unavailable appears under the ASPI heading, then check the ASPI files loaded from Config.sys. The following files must be loaded:

- aspi2dos.sys
- aspi4dos.sys
- aspi8dos.sys
- aspi8u2.sys

These drivers can be included in a task from the Advanced Settings dialog box in the Windows wizards.

All SCSI controllers require an ASPI driver. The listed ASPI files are sufficient for most SCSI controllers. The controller might require a driver that is usually supplied with the controller. Copy the driver to the bootable floppy disk and edit Config.sys to load the driver. The controller's documentation should include the correct syntax for loading the driver from DOS. If you do not have the driver, then contact the controller's manufacturer.

If the correct ASPI drivers are loaded, then update the computer BIOS and the controller BIOS with the latest versions.

For example, older versions of the BIOS for the Adaptec 2940 controller card are not compatible with Norton Ghost.

CD-R/RW disc

The CD disc to which you are writing may have a problem. Check the following:

- Use an unformatted CD-RW disc.
To write an image to a CD-RW disc that you have already used, use the CD-RW utility to wipe all information off the disc, including the file system.
- Try a second disc.
If you have tried one disc only, then you have not eliminated the possibility of a damaged disc. Try again, using an unused new disc.
- Try a different brand of disc.
Some CD-R/RW drives do not work with low quality discs or specific manufacture of discs. Use a different brand.
- Use a standard 650 MB CD-R/RW disc.
Norton Ghost or the CD-R/RW drive may have problems with high speed discs or with discs that record more information.

Using the correct boot disk

Do not use the CD/DVD Startup Disk with Ghost boot disk to start a computer when you intend to save image files to the CD-R/RW drive. If you have started your computer with a CD/DVD Startup Disk with Ghost boot disk, Norton Ghost attempts to load the CD-R/RW drivers. Loading unnecessary drivers can cause problems.

Use a bootable floppy disk that contains the Ghost executable to start your computer.

Loading CD-R/RW drivers

You do not need to load CD-R/RW drivers when you start your computer. Ensure that Config.sys and Autoexec.bat on the floppy disk or installed in the Virtual Partition do not load CD-R/RW driver files.

For example, Cdrom.sys and Mscdex.exe should not be loaded when the computer starts.

If the CD-R/RW does not appear in the list of destination drives

It can take time for Norton Ghost to identify and list the CD-R/RW drive in the Destination Drive window. To eliminate this as a problem, wait five minutes to see if the drive appears.

Loading Ghost.exe from the floppy disk drive

If you are loading Ghost.exe from a floppy disk, a problem can be resolved by loading Norton Ghost from the hard drive instead.

For example, if you are creating an image file of the first partition, copy Ghost.exe to the second partition. Edit Autoexec.bat to start Norton Ghost from the second partition as follows:

```
d:\ghost.exe
```

Do not load Ghost.exe from the partition that is being cloned.

Outdated computer BIOS

Your computer might have an old BIOS version. Try updating the BIOS.

Outdated CD-R/RW drive BIOS

The CD-R/RW drive might have an old BIOS version. An update to the BIOS often fixes problems. Check the manufacturer's Web site for an update.

Using PC-DOS or MS-DOS

If you put PC-DOS system files on the boot disk, replace them with MS-DOS system files. You can choose MS-DOS while creating the boot disk.

See [“Providing MS-DOS”](#) on page 89.

High compression

Try using a lower or no compression when creating the image file.

Using third-party software to write to the CD-R/RW disc

If you are unable to write directly to a CD-R/RW disc using Norton Ghost, you can create the Ghost image and then use third-party software to write to the CD-R/RW disc.

To write an image to CD using third-party software

- 1 Create the Ghost image file and save it to a temporary location.
- 2 Collect and edit the other required files.
- 3 Use third-party software to save the image file and other required files to the CD-R/RW disk.
- 4 Make the CD bootable.

If you use software to write an image file directly to the CD, you may experience problems when restoring the image file. Software designed to write directly to a CD, such as Adaptec Direct CD, uses a different file format. Therefore the copied files are not recognized by Ghost.

If you are writing directly to a CD using third-party software, use a program that lays out the format of the disc before it writes it, such as Adaptec E-Z CD Creator.

Norton Ghost does not provide technical support for third-party software, but details on this method can be found in the knowledge base on the Symantec Support Web site.

Diagnostics

This chapter includes the following topics:

- [Hard drive detection and diagnostic information](#)
- [Testing TCP/IP functionality](#)

Hard drive detection and diagnostic information

Norton Ghost can generate diagnostic reports that outline the hard drive devices detected, other system-related information, and error conditions when they are detected.

View Log

If you are running tasks from the wizards, a task log may be generated. This can help in diagnosing problems.

See [“Viewing the task log”](#) on page 59.

Abort error file (Ghosterr.txt)

An error message consists of an error number, a description, and possibly a suggestion of how to remedy the problem.

The Norton Ghost abort error file includes these details along with additional drive diagnostics and details required to assist Technical Support in diagnosing the cause of the problem.

The Norton Ghost abort error file is generated when Norton Ghost detects an erroneous condition that Norton Ghost is unable to recover from or work around. The Ghosterr.txt file is generated in the current directory. If this location is read-only, the Ghosterr.txt file output location should be redirected. The location and file name of the abort file generated by Norton Ghost during an abort can be altered using the `-afile=drive:\path\filename` command-line switch.

See [“Troubleshooting”](#) on page 191.

Creating a full diagnostic statistics dump summary

A full diagnostic statistics dump summary file contains the detected hard disk geometry details along with other Norton Ghost statistics. The full Norton Ghost diagnostic statistics dump can be created using the command-line switch `-dd`. The default statistics dump file name is `Ghststat.txt`. You can alter the location and file name of a file generated by Norton Ghost by adding the `-dfile=drive:\path\filename` command-line switch. For example:

```
ghost.exe -dd -dfile=c:\diagnose\log.txt
```

Testing TCP/IP functionality

There are several testing utilities available in the Microsoft TCP/IP application suite. Examples of the output of two Windows 95 TCP/IP utilities, Ping.exe and Winipcfg.exe, are included below. On Windows NT/2000/XP, the equivalent utilities are Ping.exe and Ipconfig.exe.

The Ping.exe utility shows TCP/IP networking response and can be used to show connectivity between computers. For a mapped network volume connection, a client can ping the server and vice versa to check that they have basic connectivity at any time.

Pinging a local host shows basic local TCP/IP functionality. The address used in the following example identifies the local host on the network.

Pinging a local host

In a Windows DOS prompt dialog box on a Windows 95 computer with a computer name Win95PC1, the following command is entered:

```
c:\> ping LocalHost
```

This gives the following results:

```
Pinging Win95PC1 [127.0.0.1] with 32 bytes of data:  
Reply from 127.0.0.1: bytes=32 time<10ms TTL=128  
Reply from 127.0.0.1: bytes=32 time<10ms TTL=128  
Reply from 127.0.0.1: bytes=32 time<10ms TTL=128  
Reply from 127.0.0.1: bytes=32 time<10ms TTL=128
```

This test indicates that the TCP/IP stack is installed and operating.

Installing Norton Ghost from the command line

This chapter includes the following topics:

- [Choosing an interface type for installation](#)
- [Choosing an installation mode](#)
- [Installing from the command line](#)
- [Uninstalling from the command line](#)

Choosing an interface type for installation

Microsoft Windows Installer lets you choose the interface that you see during installation. If you are installing in Basic or Silent mode, you must run the installation from the command line. If you are using a Windows 9x or Windows NT computer, then you must run the installation from a setup file.

The interface modes are as follows:

- The Full interface mode guides you through a series of dialog boxes to install Norton Ghost, letting you change settings, such as selecting components and changing directories. This mode does not require passing parameters from the command line.
- The Basic interface mode shows a progress bar and any system level error messages. If you alter any default settings, you must pass this information through as parameters from the command line. The syntax for this installation is as follows:

```
msiexec /i "c:\temp\Norton Ghost.msi" /qb
```

- The Silent interface mode does not show any dialog boxes or error messages. If you alter any default settings, you must pass this information through as parameters from the command line. To install Norton Ghost, the syntax is as follows:

```
msiexec /i "c:\temp\Norton Ghost.msi" /q
```

Choosing an installation mode

Microsoft Windows Installer lets you choose the way you install Norton Ghost. Unless you choose a Normal installation, run the installation from the command line. The installation modes are as follows:

- The Normal installation mode provides dialog boxes to guide you through installation. It lets you install Norton Ghost on the target computer by selecting the location and the required components.
- The Administrative installation mode installs the entire installation package to a network location. All installation files are copied from the CD to the specified location. This lets users with access to the network location to install Norton Ghost from this location. This installation requires administrative privileges. The syntax for this installation is as follows:

```
msiexec /a "c:\temp\Norton Ghost.msi"
```

- The Repair installation lets you repair the current installation. It is accessed once Norton Ghost is installed on your computer. You can activate this by clicking Add/Remove Programs in the Control Panel and clicking Ghost. You can also run this mode from the command line. The syntax is as follows:
`msiexec /f "c:\temp\Norton Ghost.msi"`
 The switch /fa reinstalls all files, /fu rewrites all required user registry entries, and /fs overwrites any existing shortcuts.

Installing from the command line

You can specify parameters when installing Norton Ghost from the command line by setting installer packages. The syntax for these packages is as follows:

```
msiexec /i "c:\temp\Norton Ghost.msi" /q PROPERTY = VALUE
```

The property name must be in upper case, and the value is case-sensitive.

On Windows 2000/XP computers, Msiexec.exe is in the path by default, so it can be called from any directory. On Windows NT computers with Installer V2 installed, Msiexec.exe is in the path by default. On Windows 9x computers, Msiexec.exe is not in the path. It is always located in the Windows\System directory on Windows 9x systems, and in Winnt\System32 on Windows NT systems.

If you are not running Windows XP and you do not have Windows Installer V2 installed, then the installation must be performed through a setup file. Setup.exe is located in the same directory as Norton Ghost.msi.

If you are installing in Administration mode, you do not need to set these properties as you are copying the installation package to a location on the network. Set these properties once you run the installation from the network location.

[Table H-1](#) shows the package properties that can be set from the command line.

Table H-1 Package properties

Property	Default value	Description
INSTALLDIR	Program files\Symantec\Ghost	Destination directory
USERNAME	Registered user	User name
COMPANYNAME	Registered company	Company name

Table H-2 contains the switches that can be used with Setup.exe.

Table H-2 Setup.exe switches

Switch	Description
/s	Runs installation in Silent installation mode
/a	Runs installation in Administrative installation mode
/s	Runs installation in Silent installation mode
/x	Uninstalls the application

The /v switch is used to pass the parameters to the installation. All of the parameters must be enclosed in quotation marks and the opening quotation mark must immediately follow the /v switch. Any other quotation marks must be preceded by a backslash.

The following command line installs Norton Ghost in a specified folder, registering Norton Ghost with the user name in silent mode:

```
setup.exe /v"USERNAME=\"Me\" INSTALLDIR=\"c:\temp\" /qn"
```

Uninstalling from the command line

You can uninstall Norton Ghost from the command line using Microsoft Installer.

To uninstall Norton Ghost from the command line

- ◆ In DOS, type the following command:
`Msiexec /x "<path to msi package> \Norton Ghost.msi"`
[/q or /qb]
The switches /q and /qb are optional.

See “[Installing from the command line](#)” on page 207.

Service and support solutions

Service and support information is available from the Help system of your Symantec product. Click the Service and Support topic in the Help index.

Technical support

Symantec offers two technical support options:

- **Online Service and Support**
Connect to the Symantec Service & Support Web site at <http://service.symantec.com>, select your user type, and then select your product and version. This gives you access to current hot topics, knowledge bases, file download pages, multimedia tutorials, contact options, and more.
- **PriorityCare telephone support**
PriorityCare fee-based telephone support services are available to all registered customers. You can access the PriorityCare number for your product through the Service & Support Web site. You'll be led through the online options first, and then to the telephone contact options available for your product and version.

Support for old and discontinued versions

When a new version of this software is released, registered users will receive upgrade information in the mail. Telephone support will be provided for the old version for up to twelve months after the release of the new version. Technical information may still be available through the Service & Support Web site (<http://service.symantec.com>).

When Symantec announces that a product will no longer be marketed or sold, telephone support will be discontinued 60 days later. Support will be available for discontinued products from the Service & Support Web site only.

Customer service

Access customer service options through the Service & Support Web site at <http://service.symantec.com>. From this site, you can receive assistance with non-technical questions, and for information on how to do the following:

- Subscribe to the Symantec Support Solution of your choice.
- Obtain product literature or trialware.
- Locate resellers and consultants in your area.
- Replace missing or defective CD-ROMS, disks, manuals, and so on.
- Update your product registration with address or name changes.
- Get order, return, or rebate status information.
- Access customer service FAQs.
- Post a question to a Customer Service representative.

For upgrade orders, visit the online upgrade center at:
<http://www.symantecstore.com>

Worldwide service and support

Technical support and customer service solutions vary by country. For information on Symantec and International Partner locations outside of the United States, please contact one of the service and support offices listed below, or connect to <http://service.symantec.com> and select your region under the Global Service and Support.

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Symantec Corporation
555 International Way
Springfield, OR 97477
U.S.A.

<http://www.symantec.com/>

Argentina and Uruguay

Symantec Region Sur
Cerrito 1054 - Piso 9
1010 Buenos Aires
Argentina

<http://www.service.symantec.com/mx>
+54 (11) 5382-3802

Asia/Pacific Ring

Symantec Australia
Level 2, 1 Julius Avenue
North Ryde, NSW 2113
Sydney
Australia

http://www.symantec.com/region/reg_ap/
+61 (2) 8879-1000
Fax: +61 (2) 8879-1001

Brazil

Symantec Brasil
Market Place Tower
Av. Dr. Chucri Zaidan, 920
12º andar
São Paulo - SP
CEP: 04583-904
Brasil, SA

<http://www.service.symantec.com/br>
+55 (11) 5189-6300
Fax: +55 (11) 5189-6210

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Ireland

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When you near the end of your subscription, you will be prompted to subscribe when you start LiveUpdate. Simply follow the instructions on the screen. After your initial subscription ends, you must renew your subscription before you can update your virus, firewall, or web content protection. Without these updates, your vulnerability to attack increases. Renewal subscriptions are available for a nominal charge.

Every effort has been made to ensure the accuracy of this information. However, the information contained herein is subject to change without notice. Symantec Corporation reserves the right for such change without prior notice.

January 15, 2002

Glossary

boot disk	A disk that contains the Norton Ghost executable and any necessary drivers. You start a computer from the boot disk and start Norton Ghost to perform a cloning operation. Any drivers required to run supported hardware can be saved onto the boot disk.
cloning	Creating a replica of a specified hard disk of a computer.
command line	The direct DOS interface that lets you type commands to be executed.
create	To copy the contents of a hard disk or partition to an image file. This includes the disk system area (for example, the partition table) and the data contents. To create an image file of a computer. In Norton Ghost, this equates to the terms backup and dump.
DHCP	Dynamic Host Configuration Protocol. This program is used on client-server networks, as opposed to peer-to-peer networks. When a network uses DHCP, the network includes a DHCP server that automatically assigns IP addresses to computers on the network as needed. Each time that a computer disconnects from the network and then reconnects, the DHCP server assigns a new IP address. Most client-server networks have either a DHCP server or a Bootp server. Bootp is a program that performs the same function as DHCP. When a computer is not on a network, or the network does not have a DHCP server or similar server, then the computer uses a static IP address. The computer static IP address does not change until it is changed manually. A static IP address is retained during a system restart.
DOS	Disk Operating System. DOS can be run from within Windows from a command shell, but you cannot run Norton Ghost from a command shell. A Windows 9x computer can be restarted into DOS. Windows NT/Me/XP/2000 computers cannot be restarted into DOS except with the use of a boot disk containing DOS.
dump	See create.
dynamic disk	A proprietary disk partitioning structure used by Microsoft Windows 2000/XP. Dynamic disks can be created and deleted within the operating system without having to reboot. Dynamic disks cannot be accessed by other operating systems.

external mass storage device	A device that is attached to your computer with a network or cable, that is capable of storing large amounts of data. For example, a hard disk attached to a computer with a USB or FireWire cable.
hard disk	A physical disk in your computer or attached as an external device.
image file	A file created using Norton Ghost. An image file of a disk or partition is created and is used to create exact duplicates of the original disk or partition.
IP address	Internet Protocol Address. This term refers to a number that uniquely identifies a computer on a network or on the Internet. IP addresses for computers on a client-server network might change daily or more often. The address for a computer must be unique within a network.
load	See restore.
native copy	Copies only the disk structure information and the files, rather than all sectors on the disk. In addition, on FAT partitions, native cloning saves the files contiguously. That is, when you write the image to the destination drive, the files are no longer fragmented.
NIC	Network Interface Card. The NIC is a physical device inside a computer which coordinates communications between the computer and a network.
partition	A divided part of a hard disk. An operating system sees a partition as a separate disk if it recognizes the file system.
primary partition	A hard disk can contain up to four primary partitions, or up to three primary partitions and one extended partition. Most hard disks have this partitioning structure.
restore	Overwrite all existing data on a computer either with an image file or directly with a copy of another computer. To write information to a disk or partition. In Norton Ghost, this equates to the term load.
sector copy	A copy of an entire disk, including the boot track, all sectors, and unpartitioned space. A sector copy does not filter extraneous or erroneous information from the boot track.
Virtual Partition	A partition that is created when you perform a backup, restore, clone, or other Norton Ghost operation from Windows. The Ghost operation is performed from the Virtual Partition.

Index

Symbols

? switch 158
@filename switch 154

A

abort log 155, 192, 202
abort operation 195
advanced options 46
afile=filename switch 155
ASPI driver 157, 158, 161, 164, 179
auto switch 155
Autoexec.bat 56
automation
 clone switch and examples 166, 170-172
 close on completion 158
 quiet mode 162
 remove confirmation 163
 restart on completion 162
 version checking 165

B

back up
 to a CD-R/RW 113
backup
 Ghost.exe 97, 99
 Norton Ghost 36
Backup Wizard 17, 36
bad sectors 155, 158
batch switch 155
bfc=x switch 155
BIOS 159, 193, 199
blue screen 194
boot
 menu 138
 sector 158
 track 158

boot disk 72, 75, 94, 199, 213
 creating 72, 74
 files included 73
 PC-DOS 73
 setup 72
bootable CD 155
bootcd switch 155
buffersize switch 155

C

cables 182
cancel operation 195
CD drive
 assign a drive letter 47
 drive letter 47
CD writers 112, 113
CD-R/RW
 back up to 113
 making bootable 155
 supported 112
 writing to 76
CD-ROM 179
 opening 29
 support 81
Cdrom.sys 199
chkdsk 161
chking,filename switch 155
clone 39, 213
 compression 63
 Ghost.exe 104
 speed 62, 63
 switch 155, 166
 Windows 2000 68
clone switch 155
Clone Wizard 17, 39
cns switch 155
command line 47
 examples 170-174
 text file 154

- compression 62, 63, 97, 200
- computer
 - restarting in Windows 58
- computer identification
 - details 147
- Config.sys 56
- conversion
 - file system 157
- copy command 166
- CRC 157
- CRC32 switch 63, 157, 172
- crignore switch 156
- creating
 - partition 131
- cvtarea switch 156

D

- data checking 63
- data compression 62
- dd switch 156
- defaults 46
- deleting, partitions 135
- DHCP 54
- diagnostics 202-203
- disaster recovery warning 48
- disk
 - backup 36
 - clone 39
 - dynamic 68
 - large 142
 - marking 94
 - restore 37
 - status 133
- DOS 200
 - boot disk 73
 - IBM DOS 73
 - MS-DOS 73, 89
 - PC-DOS 89
 - version 49
- drive letters
 - mapping 54
- drive, large 64
- drivers 53
- dst switch 169
- dump
 - command 166
 - log file 156

- DVD
 - supported media 112
 - writing to 112
- dynamic disks 68

E

- error log file 155
- extended disk access 157

F

- FAT clusters 155
- FAT file system *See* file system
- fatlimit switch 157
- fcr switch 157
- femax switch 157
- ffi switch 157
- ffs switch 157
- ffx switch 157
- file system
 - FAT partition id 157
 - FAT12 118
 - FAT16 118, 157
 - Windows NT 135, 157
 - FAT32 118, 156
 - conversion from FAT16 157
 - Linux Ext2/3 118, 132
 - NTFS 156, 161
 - partition 193
 - resizing 157
- file-by-file copy 161
- files, skipping 163
- finger switch 158
- fingerprint 36, 37, 39, 158
- FireWire drivers 54
- firmware 197
- fis switch 158
- fni switch 158
- fns switch 158
- fnx switch 158
- fro switch 158
- fx switch 158

G

- GDisk 128
 - batch mode 134
 - large hard disks 142
 - switches 129-141
- GDisk32 128
 - modifying boot menu 138
- Ghost Boot Wizard 17
 - starting 74
 - writing to a CD 112
- Ghost Explorer 22
 - command line 123
 - switches 123
- Ghost Walker 146
 - command line 148
 - switches 148
- Ghost.exe 22, 92
 - cancelling 195
 - starting 59
- Ghost.exe operation 94
- Ghosterr.txt. *See* abort log
- Ghreboot.exe 57, 58
 - restart
 - Windows 195
- GoBack 67

H

- h switch 158
- hard disk
 - active 129
 - batch 129
 - creating 129
 - deleting 129, 135
 - entire copy 159
 - hiding partitions 129
 - large drives 142
 - MBR 129
 - number of 157
 - space 158
 - status 129
 - wiping 135
- hibernation file 69, 194
- hiding partitions 137

I

- ia switch 158

- ial switch 158
- ib switch 158
- id switch 159
- IDE hard disk 157
- image file
 - description 159
 - integrity check 51, 58
 - naming 160
 - password 46
 - spanned 160
 - verifying 58
- image files 214
 - CD writers 112
 - compression 62, 98
 - crc. *See* CRC32
 - creating 65, 104
 - insufficient space 65
 - description 159
 - extracting 120
 - file list 121
 - integrity 155
 - loading 65
 - lock 160
 - modification 120
 - multisegment 155, 163
 - password 161
 - restoring 119, 120
 - selection box 160
 - size limited 64
 - split. *See* image files, size limited
 - standard 63
 - tape drives 66
 - viewing contents 119
- image files, spanned 63, 64-65, 121, 155, 163
- information window 48
- INT13 support 158
- integrity
 - volume 161
- integrity check 51, 58
- internal drives 180
- ir switch 159

J

- jl x=filename switch 159

L

- large drives 64
- LILO boot loader 161
- Linux 93, 105, 118, 132, 158
- load command 166
- lockinfo switch 159
- locktype=type switch 160
- log file 59, 155
- lpm switch 160
- lps switch 160
- LPT
 - drivers 55
 - peer-to-peer 95, 160
 - port 79, 178

M

- map a drive 47
- map a drive letter 47
- mapping network drives 47, 82
- master mode 95, 164
- MBR 161
 - reinitializing 130
- memcheck switch 160
- mode switch 166
- Mscdex.exe 199
- MS-DOS 49, 73, 89, 200
 - uninstalling 90
- multicast 79

N

- network drives, mapping 82
- network, performance 63
- noauto switch 160
- nofile switch 160
- nolilo switch 161
- Norton Ghost
 - adding command-line switches 47
 - display options 48
 - fingerprint 158
 - starting 34
 - starting from Virtual Partition 57
- noscsi switch 161
- ntchkdsk switch 161
- NTFS *See* file system
- ntic switch 161

- ntiid switch 161
- ntil switch 161

O

- options 47
- options, Norton Ghost 48
- or switch 161

P

- parallel port transfer
 - automation 160, 165
 - setup 95
- partition 128
 - backup 36
 - cloning 39, 106
 - cloning mirrored 161
 - creating 131, 158
 - extended 157
 - extended partition tables 159
 - FAT id 157
 - hiding 137
 - restore 37
 - size 164
 - status 133
- password 46, 145, 146, 161
- PC-DOS 49, 89, 200
- pcopy command 166
- pdump command 166
- peer-to-peer 55, 95
 - connections 178
 - TCP/IP 54
- performance network 63
- ping utility 203
- pload command 166
- pmbr switch 161
- procedures
 - disk cloning 104
 - from image file 102
 - to disk 105
 - to image file 98
 - partition cloning 106
 - from image file 103
 - to image file 99
 - to partition 106
- pwd, -pwd=x switch 161

Q

quiet switch 162

R

RAID 68, 161
 rb switch 162
 rebooting 195
 restore
 Ghost.exe 101, 103
 Norton Ghost 37
 Restore Wizard 37

S

script switch 162
 SCSI 161
 drivers 53, 157, 158
 Adaptec 77
 tape
 drives 66
 setup 179
 switches 164
 sector, bad 155, 158, 165
 sector-by-sector copy 158
 Service and Support 209
 setup 180
 See also SCSI tape
 signature bytes 157
 skip=x switch 163
 skipping files 69
 slave mode 95, 165
 source switch 167
 span switch 163
 spanning 64-65, 68
 avoiding user prompt 155
 list of drives to search 157
 naming 155, 160
 override 161
 to a CD-R/RW 113
 split=x switch 163
 starting in 57
 sure switch 163
 swap files 69
 size switch 170

T

tape block size 164
 tape drives 66, 164
 tape speed 164
 tapebsize switch 164
 tapebuffered switch 164
 tapeeject switch 164
 tapesafe switch 164
 tapespeed=x switch 164
 tapeunbuffered switch 164
 task log 59
 TCP/IP 79, 164, 165, 178
 drivers 54
 peer-to-peer 95
 tcpm switch 164
 tcps switch 165
 Technical Support 209
 tray icon 48

U

update
 SID 147
 updating
 computer name 147
 USB
 drivers 54
 peer-to-peer 95
 port 178
 support 79
 usb switch 165
 usbm switch 165
 usbs switch 165

V

vdw switch 165
 ver switch 165
 verify 165
 vexcept switch 174
 Virtual Partition 15, 49, 52, 57, 193, 195
 volume integrity 161

W

Windows

2000 68

boot menu 138

running Ghost.exe 94

wiping

disks 135

partitions 135

writing to a CD-R/RW 112, 113

Z

z switch 165

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