

# Norton Ghost™ 2001 User's Guide

Norton  
Ghost™ 2001

# Norton Ghost™ 2001 User's Guide

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# C O N T E N T S

## **Chapter 1 About Norton Ghost 2001**

What is Norton Ghost 2001? .....	9
Understanding cloning and image files .....	9
Norton Ghost components .....	10
Typical usage examples .....	11
Upgrade your hard drive .....	11
Back up and recovery of your computer .....	11
Clone disks at optimum speed .....	11

## **Chapter 2 Getting started**

Setting up Norton Ghost software .....	13
Setting up transfer methods .....	13
Hardware requirements for Norton Ghost transfer modes .....	15
Internal drives .....	16
Local devices .....	16
Peer-to-peer connections .....	16
Peer-to-peer parallel port and USB connections .....	17

## **Chapter 3 Installing Norton Ghost**

System requirements .....	19
Installation procedures .....	20
Installing Norton Ghost .....	20
Manually installing Norton Ghost on a hard disk .....	20
Uninstalling Norton Ghost .....	20
Updating Norton Ghost .....	21

## **Chapter 4 Using Ghost Boot Wizard to create boot disks**

Creating boot disks .....	23
Standard boot disks with the option of LPT and USB support .....	24
Boot disks with network support .....	24
Boot disks with CD-ROM support .....	26
Creating a multcard template .....	26
Adding network drivers to the Ghost Boot Wizard .....	27
Setting up a DOS boot disk without the Ghost Boot Wizard .....	29

---

## Chapter 5 Cloning disks and partitions

Starting Norton Ghost .....	31
Navigating without a mouse .....	32
Using Norton Ghost .....	32
Cloning disks .....	33
Cloning disk to disk .....	33
Cloning a disk to an image file .....	35
Cloning a disk from an image file .....	36
Cloning partitions .....	38
Cloning from partition to partition .....	38
Cloning a partition to an image file .....	39
Cloning a partition from an image file .....	41
Adding switches to your cloning task .....	42
Cloning dynamic disks in Windows 2000 .....	43

## Chapter 6 Working with image files

Image files and compression .....	45
Image files and CRC32 .....	46
Image files and volume spanning .....	46
Standard image files .....	46
Size-limited, multi-segment image files .....	47
Spanned image files .....	47
Spanning across multiple volumes and limiting span sizes .....	47
Loading from a spanned image .....	48
Image files and tape drives .....	49
Image files and CD writers .....	50

## Chapter 7 Norton Ghost utilities

Working with files in image files .....	53
Modifying image files in Ghost Explorer .....	55
Saving a list of files within an image file .....	55
Setting span file sizes .....	55
Compiling a file .....	56
Determining Norton Ghost image file version .....	56
Using Ghost Explorer from the command-line .....	57
Ghost GDisk .....	58
Overview of main command-line switches .....	59
Online help for command-line switches .....	59
Switches common to all GDisk commands .....	60
Creating a partition .....	60
Reinitializing the Master Boot Record .....	61

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Displaying information about disks .....	62
Batch mode .....	62
FAT16 partitions in Windows NT .....	63
Deleting and wiping your disk .....	64
Activate or deactivate a partition .....	65
Hide or unhide a partition .....	65
Support for large hard disks .....	66

## **Appendix A Command-line switches**

Norton Ghost command-line switches .....	67
Cloning combination options .....	71
Examples of clone switch usage .....	72

## **Appendix B The wattcp.cfg network configuration file**

## **Appendix C Troubleshooting**

Norton Ghost error codes .....	91
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## **Appendix D Diagnostics**

Hard drive detection and diagnostic information .....	93
Norton Ghost abort error file (ghosterr.txt) .....	93
Hard disk geometry diagnostics .....	94
Full diagnostic statistics dump summary .....	94
Elementary network testing techniques .....	94
TCP/IP .....	94

## **Appendix E USB and DirectParallel Cables**

Parallel Technologies cables .....	97
Other USB cables .....	98

## **Service and support solutions**

## **CD Replacement Form**

## **Index**



# About Norton Ghost 2001

## What is Norton Ghost 2001?

Norton Ghost 2001 is a fast and reliable software solution to satisfy all of your computer disk cloning and copying needs. The high-performance utilities help you upgrade, back up, and recover entire disks or selected partitions. Norton Ghost can determine the partition sizes for the destination drive automatically. You can clone directly between two computers using a network, USB, or parallel connection.

This new version supports the Linux EXT2 file system, writes disk images directly to CDR/RW drives, clones from computer to computer, and supports Windows 2000 and Windows Millennium Edition. Designed for technically proficient computer users, Norton Ghost 2001 is based on Symantec Ghost Enterprise. Whether you want to back up your existing hard disk or clone it to a new one, Norton Ghost provides fast, safe computer cloning.

## Understanding cloning and image files

Norton Ghost creates image files that contain all the information required to recreate a complete disk or partition. Image files are a useful way to store and reliably compress images of model system configurations, or to create backup copies of complete drives or partitions.

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

- Various levels of compression
- CRC32 data integrity checking

- Spanning across removable media

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 about 600 MB or smaller if you use compression.

If you also use the Ghost Explorer application, an image file companion utility, individual files from these image files can be recovered selectively without having to restore the complete partition or disk.

## Norton Ghost components

Norton Ghost includes the following products and utilities:

- Norton Ghost executable

The Norton Ghost executable is what makes disk cloning possible. Because the executable is small with minimal conventional memory requirements, it can easily be run from a DOS boot disk or hard drive. Norton Ghost can restore a computer from an image file containing both Windows 98 and the full installation of Office 97 in about seven minutes.

Norton Ghost can make complete backups of disks or partitions, copying system files that other backup utilities miss. This makes it a great tool for disaster recovery operations.

- Ghost Boot Wizard

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

- Ghost Explorer

Ghost Explorer is a Windows application that lets you add, recover, and delete individual directories and files from an image file.

- GDisk

A complete replacement for the FDISK and FORMAT utilities that allows on-the-fly formatting, better disk space utilization, batch mode operation, hiding and unhiding of partitions, secure disk wiping, and extensive partition reporting. GDisk is a DOS application.

Unlike FDISK, which uses interactive menus and prompts, GDisk is command line driven and offers quicker configuration of a disk's partitions.

# Typical usage examples

## Upgrade your hard drive

Use Norton Ghost to create a copy of your hard disk before upgrading to another one. Create an image file on removable media, or clone directly to another computer using a network, USB, or parallel connection. For even greater flexibility, Norton Ghost supports Linux EXT2, as well as Microsoft FAT and NTFS file systems. Norton Ghost determines the partition sizes for the destination drive automatically. Once the hard disk is installed, you can restore saved files by cloning the old hard disk onto the new hard disk, or restoring a saved image file.

## Back up and recovery of your computer

Use Norton Ghost to create an image file of your computer on removable media, such as CD-R/RW, ZIP disks, and JAZ disks, and back up an entire hard disk or selected partitions. Use it for weekly backups or specific events, such as the installation of a new operating system. If you run out of space when backing up to a removable disk, Norton Ghost prompts you to insert another disk or save to an alternate location. Once an image is created, Norton Ghost can be used to restore the hard disk or any of the partitions saved.

## Clone disks at optimum speed

Norton Ghost saves you time when copying one hard drive onto another, or to an image file on another hard drive, especially when both drives are installed in the same computer.

A wide range of computer hardware is available today with many choices of components such as processors, hard drives, and memory. Many modern computers are capable of transferring data at speeds of 1 Gigabyte per minute. This is an astounding speed especially considering that a compressed image of a drive containing a Windows 98 operating system will only be a few hundred megabytes in size. Using Norton Ghost to restore Windows 98 in this manner may take only seconds.



# Getting started

Before installing Norton Ghost, you need to identify how you are going to clone; to an internal drive, over a parallel cable, and so on. Next, set up the hardware and software for the desired transfer method. Hardware requirements vary for the transfer methods.

## Setting up Norton Ghost software

To set up the Norton Ghost software, complete the following tasks:

- Install Norton Ghost software on your computer.  
For more information, see [“Installation procedures”](#) on page 20.
- Create an appropriate boot disk using Ghost Boot Wizard.  
For more information, see [“Creating boot disks”](#) on page 23.

For information on using Norton Ghost to clone, create, and restore image files, see [“Cloning disks”](#) on page 33.

## Setting up transfer methods

The following sections summarize the information you need to prepare devices and drives for Norton Ghost operation.

- 1 Identify what you want Norton Ghost to do:
  - Disk duplication
  - Disk image file creation
  - Disk creation from image file
  - Partition duplication

- Partition image file creation
  - Partition creation from image file
- 2 Select the hardware setup required to perform the operation.
- One or more internal drives, and:
- No external connection
  - Another peripheral device not needing additional setup (for example, JAZ or ZIP drive, or IDE CD writer)
  - SCSI tape drive or CD writer requiring DOS ASPI driver setup
  - Third-party device requiring DOS driver setup
  - Peer-to-peer connection using LPT or USB ports
  - Peer-to-peer connection using TCP/IP and network interface cards connection
- 3 Set up the hardware and system for the method chosen.
- a Ensure that both hard drives are installed correctly and the BIOS of the system is configured and correctly displays the valid parameters of the drives.
  - b Set up additional drivers required for other devices:

### **SCSI tape drive requiring DOS driver setup**

Install the SCSI ASPI DOS driver in the config.sys file as outlined in SCSI Tape Drive documentation.

### **Third-party device requiring DOS driver setup**

Install the DOS driver as outlined in device documentation.

### **Peer-to-peer connection: LPT or USB**

- Configure LPT or USB port.
- Connect cabling.
- Use Ghost Boot Wizard to create an LPT and USB boot disk.
- Decide which machine is the master and which is the slave. You can dump an image from the master disk to the slave disk and restore from the slave disk to the master disk, but not the other way around. For more information, see [“Peer-to-peer connections”](#) on page 16.

### **Peer-to-peer connection: TCP/IP**

- Install network interface card (NIC).
- Connect cabling.
- Create a Network Boot Disk with Ghost Boot Wizard.

- Select which machine is the master and which is the slave. You can dump an image from the master disk to the slave disk and restore from the slave disk to the master disk, but not the other way around.

## Hardware requirements for Norton Ghost transfer modes

This table lists the hardware required for the different transfer methods.

Type of connection	Hardware
Peer-to-peer LPT/parallel port connection	<p>Parallel connection cable and a bidirectional parallel port on each machine. ECP is the best option for connection and has a data transfer rate of approximately 5 MB/min.</p> <p>For data transfer of approximately 19-25 MB/min, Norton Ghost provides support for the Parallel Technologies universal DirectParallel cable. See <a href="#">Appendix E, “USB and DirectParallel Cables”</a> on page 97 for more information.</p>
Peer-to-peer USB port connection	<p>USB cable that supports a host-to-host connection and a data transfer of approximately 20-30 MB/min.</p> <p>See <a href="#">Appendix E, “USB and DirectParallel Cables”</a> on page 97 for more information.</p>
Peer-to-peer TCP/IP connection	<p>Ethernet or Token Ring network interface card. Established network connection, which includes one of the following:</p> <ul style="list-style-type: none"> <li>■ Crossover Ethernet cable (pins 1236 &gt; 3612)</li> <li>■ Coaxial cable</li> <li>■ Standard cables with hub or MAU</li> </ul>
SCSI tape driver	<p>DOS ASPI driver. Tape media.</p>
Removable media	<p>Removable media drive and media. Media drivers required to use in DOS.</p>
CD-ROM usage	<p>CD-ROM writer. Blank CD-R or CD-RW media.</p> <p>See <a href="#">“Image files and CD writers”</a> on page 50 for more information.</p>

## 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, the jumpers on the drives are set up correctly, and the BIOS of the machine is configured for the disk arrangement. Both the source and the destination drive must be free from file corruption and physical hard drive defects.

## Local devices

To use Norton Ghost with a SCSI tape device, the tape device needs to have an Advanced SCSI Programming Interface (ASPI) driver for DOS installed. The driver is installed in the config.sys file as shown in the example below:

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

Refer to the documentation included with the SCSI tape device for further details.

## Peer-to-peer connections

Peer-to-peer connections enable Norton Ghost to run on two machines and transfer drives and partitions, and to use image files between them.

The following table describes different cloning situations, and the master/slave relationship.

Action	Master	Slave
Disk-to-disk copy	Machine containing source disk	Machine containing destination disk
Disk-to-image file copy	Machine containing source disk	Machine receiving destination image file
Image file-to-disk copy	Machine containing destination disk	Machine containing source image file
Partition-to-partition copy	Machine containing source partition	Machine containing destination partition
Partition-to-image file copy	Machine containing source partition	Machine receiving destination image file
Image file-to-partition copy	Machine containing destination partition	Machine containing source image file

## Peer-to-peer parallel port and USB connections

Connect both computers through the LPT or USB port with an appropriate transfer cable. Norton Ghost must be running under DOS on both computers. The parallel port must be set to bidirectional. ECP will give the best performance.

Select which computer is the master (the machine from which you control the connection), and which is the slave (the other machine participating in the connection). All operator input must occur on the master computer. Use the previous table to choose which machine will be the master and which will be slave.



# Installing Norton Ghost

This chapter details how to install Norton Ghost on your computer, and how to install the Norton Ghost executable.

## System requirements

The Norton Ghost executable and GDisk run under DOS. The Norton Ghost installation CD includes a version of DOS so you can boot into DOS and run these components.

### For PCs to be cloned

- IBM PC or 100% compatible
- DOS 5.0 or higher
- 386 SX processor or higher (486 or higher recommended)
- 8 MB RAM for Windows 95/98
- 16 MB RAM for Windows NT/2000
- 5 MB of available disk space
- VGA monitor (minimum)
- Microsoft compatible mouse recommended
- CD-ROM drive
- Windows 9x, NT 4.0, 2000 or Millennium Edition required for Norton Ghost Explorer and the Ghost Boot Wizard

# Installation procedures

## Installing Norton Ghost

### To install Norton Ghost:

- 1 Insert the Norton Ghost CD into the CD-ROM drive and click **Install Norton Ghost 2001**.
- 2 Follow the instructions on the screen.
- 3 Complete registration information.

## Manually installing Norton Ghost on a hard disk

You can install Norton Ghost using the installation CD or by copying the DOS-based applications directly onto your machine.

### To manually install Norton Ghost on a hard disk:

- 1 Create a directory on the destination drive.
- 2 Copy ghostPE.exe and gdisk.exe to the directory from the Tools directory on the installation CD.

---

**Note:** If a Windows drag-and-drop or copy and paste operation is used instead of a DOS command, the files being copied from the CD retain their read-only attributes when copied to a floppy disk or hard disk. You must manually change the attribute on the Norton Ghost executable (ghostPE.exe) and all other files that will be updated or edited.

---

## Uninstalling Norton Ghost

### To uninstall Norton Ghost:

- If you installed Norton Ghost from the install program, do one of the following:
  - Uninstall from Add/Remove Programs in the Control Panel.
  - On the Windows taskbar, click **Start > Programs > Norton Ghost 2001 > Uninstall Norton Ghost 2001**.
- If you manually copied the Norton Ghost files, delete the ghostpe.exe executable file and associated files.

# Updating Norton Ghost

LiveUpdate is a convenient method for registered users to obtain updates for Norton Ghost. LiveUpdate uses an Internet connection to connect to Symantec to see if updates are available for Norton Ghost. Updates can then be selected, downloaded, and installed.

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

## To update Norton Ghost using LiveUpdate:

- 1 On the Windows taskbar, click **Start > Programs > Norton Ghost 2001 > Ghost Explorer**.
- 2 On the Help menu, click **LiveUpdate**.
- 3 Follow the instructions that appear on the screen.



# Using Ghost Boot Wizard to create boot disks

The Ghost Boot Wizard creates boot disks and guides you to the drivers needed.

## Creating boot disks

The Ghost Boot Wizard lets you create:

- Boot disks enabling peer-to-peer services for USB and LPT
- Standard boot disks that enable the use of Norton Ghost on a single computer
- Network boot disks with network support for TCP peer-to-peer connections
- Boot disks with generic CD-ROM drivers that allow you to write a disk image to a CD

IBM DOS is supplied for the purposes of creating boot disks. The DOS files are installed automatically when creating the boot disk in Ghost Boot Wizard.

### To open the Ghost Boot Wizard:

- On the Windows taskbar, click **Start > Programs > Norton Ghost 2001 > Ghost Boot Wizard**.

## Standard boot disks with the option of LPT and USB support

**To create a boot disk for use on a single computer or with support for LPT and USB cables:**

- 1 Open the Ghost Boot Wizard.
- 2 Click **Standard Boot Disk with LPT & USB Support**, then click **Next**.
- 3 Do one or more of the following, then click **Next**:
  - Click **USB support** to add support for USB to the boot disk.
  - Click **LTP support** to add support for LPT to the boot disk.
  - Click to clear **USB support** and **LPT support** to create a boot disk to run Norton Ghost on a single machine.
- 4 The default path to the Ghost executable is entered in the GhostPE.exe field.

If the executable has been moved or you want to use a different version of Ghost, type the correct path in the GhostPE.exe field.
- 5 In the Parameters field, type any required command line parameters, then click **Next**.

See [Appendix A, “Command-line switches”](#) on page 67 for a complete description of command-line switches.
- 6 In the Floppy Disk Drive field, enter the appropriate drive letter.
- 7 In the Number of disks to create field, enter the number of disks you want to create.
- 8 Click **Format disk(s) first** to format the disks before disk creation.
- 9 Click **Quick Format** to perform a quick format, then click **Next**.

## 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 need to know the type of network card installed on your machines before you can start this process. Create different boot disks for every network card installed on your machines unless you use the multiscard template.

**To create a boot disk with network support:**

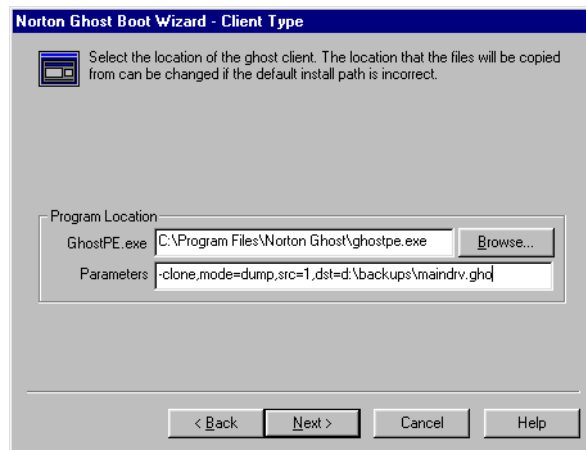
- 1 Open the Ghost Boot Wizard.
- 2 Click **Peer-to-Peer Network Boot Disk**, then click **Next**.

- 3 Click the network driver for the particular make and model of the network card installed on the machine. Then click **Next**.

If the correct driver isn't in the list, see [“Adding network drivers to the Ghost Boot Wizard”](#) on page 27 for instructions. To add more than one driver to the boot disk, see [“Creating a multicard template”](#) on page 26 for instructions.

- 4 The default path to the Ghost executable is entered in the GhostPE.exe field. If the executable has been moved, or you want to use a different version of Ghost, type the correct path in the GhostPE.exe field.
- 5 In the Parameters field, type any required command line parameters, then click **Next**.

See [Appendix A, “Command-line switches”](#) on page 67 for a complete description of command-line switches.



- 6 Do one of the following and then click **Next**:
  - 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.
- 7 In the Floppy disk Drive field, enter the appropriate drive letter.
- 8 In the Number of disk to create field, enter the number of disks you want to create.
- 9 Click **Format disk(s) first** to format the disks before disk creation.
- 10 Click **Quick Format** to perform a quick format, then click **Next**.

## Boot disks with CD-ROM support

**To create a boot disk that allows access to images stored on CD-ROM disks:**

- 1 Open the Ghost Boot Wizard.
- 2 Click **CD-ROM Boot Disk**, then click **Next**.
- 3 The default path to the Ghost executable is entered in the GhostPE.exe field. If the executable has been moved, or you want to use a different version of Ghost, type the correct path in the GhostPE.exe field.
- 4 In the Parameters field, type any required command line parameters, then click **Next**.  
See [Appendix A, “Command-line switches”](#) on page 67 for a complete description of command-line switches.
- 5 In the Floppy Disk Drive field, enter the appropriate drive letter.
- 6 In the Number of disks to create field, enter the number of disks you want to create.
- 7 Click **Format disk(s) first** to format the disks before disk creation.
- 8 Click **Quick Format** to perform a quick format, then click **Next**.

## Creating a multicard template

Multicard templates allow a boot disk containing several NDIS2 drivers to be created. When the computer is booted, 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.

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**To create a template containing more than one driver:**

- 1 Open Ghost Boot Wizard.
- 2 Select the type of boot disk you want to create.
- 3 Click **Multicard Template**, then click **Next**.
- 4 From the list of NDIS2 drivers, click the required drivers, then click **Next**. If you are creating a floppy disk from the boot disk, select no more than four or five drivers, as space is limited on a floppy disk.

# Adding network drivers to the Ghost Boot Wizard

The Ghost Boot Wizard includes drivers to over 80 network interface cards. If your driver isn't in the list, you can add it to the wizard so it's already set up the next time you need it.

## To add a network driver to the Ghost Boot Wizard:

- 1 Open Ghost Boot Wizard.
- 2 Select the type of boot disk you want to create.
- 3 Click **Add**.
- 4 Click **Packet Driver** or **NDIS2 Driver**, then click **OK**.

Many manufacturers ship both drivers with their network cards so you generally have a choice of which one you use.

### For packet drivers:

Packet drivers are usually DOS executables (with a .com or .exe file extension) 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.

- a In the Driver Executable field, enter the packet driver location so the Ghost Boot Wizard can copy the file to the current template. Packet drivers are generally 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 will probably be inside a directory called Packet or Pktdrv.
- b In the Parameters field, enter 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.
- c Set the multicasting mode. 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 doesn't work, try Receive Mode 6.

Although Norton Ghost does not support the multicasting of Ghost images, it might still be necessary to set a multicasting mode.

### For NDIS2 drivers:

NDIS2 drivers work with Microsoft's Network Client, but Norton Ghost can also use them for multicasting. NDIS2 drivers are DOS drivers that load from the DOS config.sys file. Norton Ghost does not communicate with NDIS2 directly, but uses a shim (supplied by the Ghost Boot Wizard) to access the network card.

- a Click **Setup** and 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 the choice of DOS and OS2 folders, choose DOS.
  - b Review the following parameters and correct if necessary:
    - Enter the DOS filename for the NDIS driver.
    - In the Driver Name field, enter 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. If the Setup did not fill in this field for you, read the sample protocol.ini file in the same directory as the driver itself to find the driver name.
    - In the Parameters field, enter the parameters that go into 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 box empty.
- 5 Click the **Advanced** tab, click **Options**, then click **Next**.

You may require additional drivers and programs to be loaded in order to use the network device attached to your computer. For example, many USB network devices need to load an extra driver for the USB port before the driver for the network device. In this dialog you can add files to the template and customize the autoexec.bat and config.sys files of the resulting boot disk.

If this template is a Multicard template then any additional files or modifications will be overridden by the settings in the Multicard template.

- Click **New** to add a file to the template. This is either a DOS driver or an executable program, but any type of file can be added. Files added to the template are displayed in the list to the right of the button.
- Click **Delete** to delete the selected file from the list.

- In the Autoexec.bat field, enter any additional autoexec.bat entries for the driver. The lines will be inserted before any network related commands, such as netbind.com or the packet driver executable.
- In the Config.sys field, enter any additional config.sys entries for the driver. The lines will be inserted before any driver-related devices are loaded to ensure that enabling drivers load before the main network device drivers specified in the network driver page.

## Setting up a DOS boot disk without the Ghost Boot Wizard

Norton Ghost is a DOS-based application that should be run in DOS mode outside of Windows. On some systems, such as Windows NT, Windows 2000, and other non-DOS operating systems, a DOS boot disk must be used to start the system to allow Norton Ghost to operate. Additional DOS drivers may be required to allow Norton Ghost to access local or network hardware. The configuration files on a DOS boot disk can be altered to load these drivers as detailed in [“Setting up transfer methods”](#) on page 13.

Normally, you should use the Ghost Boot Wizard to create a Ghost boot disk. Ghost Boot Wizard automatically adds IBM DOS to the boot disk. You only need to create a DOS boot disk if you want to use Norton Ghost with MS-DOS. You should not use a DOS boot disk for CD-ROM, TCP/IP, or other peer-to-peer connections.

### To create a DOS boot disk for Norton Ghost within Windows 95/98:

- 1 Insert a blank floppy disk into the A drive of a Windows 9x machine.
- 2 Copy the system files onto the disk.
  - a Double-click the My Computer icon.
  - b Right-click the floppy drive, and click **Format**.
  - c Click **Copy System Files**.
- 3 Copy ghostpe.exe onto the boot disk. For example:  
**C:\> copy c:\progra~1\symantec\norton~1\ghostpe.exe a:\**
- 4 Set up any drivers required for the transfer method. For more information, see [“Setting up transfer methods”](#) on page 13.

### To create a DOS boot disk for Norton Ghost in DOS:

- 1 Insert a blank floppy disk into the A drive of a DOS (Windows 9x) machine.

- 2 Copy the system files onto the disk.

Use the following DOS command to format and copy the system files to the unformatted disk:

**C:\> format a: /s**

- 3 Copy ghost.exe onto the boot disk. For example:

**C:\> copy c:\progra~1\symantec\norton~1\ghostpe.exe a:\**

- 4 Set up any drivers required for the transfer method. For more information, see [“Setting up transfer methods”](#) on page 13.

# Cloning disks and partitions

## Starting Norton Ghost

Norton Ghost is a DOS-based application and should run in DOS mode outside of Windows. If you run Norton Ghost within Windows 95/98, note the following:

- Files may be in an open or changing state. If these files are cloned, the resulting destination files will be left in an inconsistent state.
- The partition where Windows 95/98 is installed must not be overwritten.
- If you overwrite a drive or partition, the system must be restarted.
- Norton Ghost will not automatically reboot the system.
- Hard disk sizes may be displayed smaller than their actual size. Norton Ghost will only be able to access the displayed destination size. The remaining space will not be used.
- Norton Ghost will fail if you try to overwrite any of the following:
  - Windows swap files
  - Registry files
  - Open files

Norton Ghost cannot be run within Windows NT, Windows 2000, Linux, OS/2, or other non-DOS operating systems. To run Norton Ghost on a machine running a non-DOS operating system, use a Ghost boot disk.

### To start Norton Ghost:

- Do one of the following:
  - Start the machine using a Ghost Boot Disk. For more information, see [“Creating boot disks”](#) on page 23.
  - For Windows 95 and 98 machines, start the machine in DOS. At the DOS prompt, type:

```
C:> \progra~1\symantec\Norton~1 \ghostpe.exe
```

Running Norton Ghost in DOS may require additional DOS drivers to be started to allow Norton Ghost to access and use some hardware.

- You can boot your computer to DOS using the Norton Ghost installation CD if your computer is configured to boot from the CD-ROM drive. Consult your computer documentation for instructions.

## Navigating without a mouse

If you have mouse drivers loaded then the mouse can be used to navigate your way around Ghost. You can always use the keyboard to navigate.

### To use Norton Ghost without a mouse:

- 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.

## Using Norton Ghost

### To use Norton Ghost:

- 1 Start Norton Ghost. Optionally, add command-line switches. For information on the Norton Ghost command-line switches, see [Appendix A, “Command-line switches”](#) on page 67.
- 2 Select the transfer method and Norton Ghost operation.
- 3 Select source hard drive, partitions, or image file.

- 4 Select destination hard drive, partition, or image file.  
Make sure you select the correct destination to overwrite. In most cases, you will not be able to recover data from an incorrectly selected destination drive.
- 5 Follow the prompts on the screen and proceed with the clone.
- 6 Restart the machine.

## Cloning disks

Disk cloning procedures are accessed from the main menu. To specify the transfer method, select one of the following options from the Norton Ghost main menu:

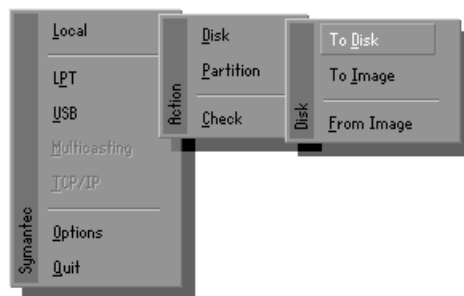
- Local
- LPT > Master
- USB > Master
- TCP/IP > Master

## Cloning disk to disk

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

### To clone disk to disk:

- 1 On the Norton Ghost main menu, click **Local > Disk > To Disk**.



- 2 In the Source Drive dialog box, select the source drive.  
The Source Drive dialog box displays the details of every disk Norton Ghost can find on the local machine.
- 3 In the Destination Drive dialog box, select the destination drive.

---

**Warning:** Choose carefully as this is the disk that is going to get overwritten.

---

If a peer-to-peer connection is established, this will be the slave machine's disks. (If this is a local disk-to-disk copy, then the source disk will be unavailable for selection.)

- 4 Confirm or change the destination drive partition layout.

The Destination Drive Details dialog box displays a suggested partition layout for the destination drive. By default Norton Ghost tries to maintain the same size ratio between the new disk partitions.

However:

- You can change the size of any destination FAT, NTFS, or Linux Ext2 partition at this stage simply 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.

- 5 Click **OK**.

- 6 When the "Proceed with Disk Clone?" question displays, check the details displayed and ensure the correct options are selected. Do one of the following:

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

The system performs a quick 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 use Ctrl-C, but be aware that this leaves the destination disk in an unknown state.

---

**Warning:** Only click Yes if you are really sure you want to proceed. The destination drive will be completely overwritten with no chance of recovering any data.

---

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

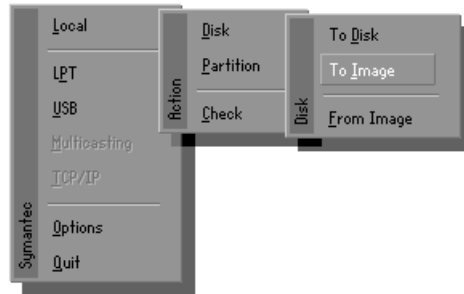
- 7 When the disk clone is complete, reboot the machine. Symantec Disk Doctor, ScanDisk, or a similar utility can then be run to verify the integrity of the destination disk.

## Cloning a disk to an image file

Use this method to clone a disk to an image file. Then you can copy this image file to another disk or use the image file as a backup file.

### To clone a disk to an image file:

- 1 On the Norton Ghost main menu, click **Local > Disk > To Image**.



- 2 In the Source Drive dialog box, select the source drive.  
The Source Drive dialog box displays the details of every disk Norton Ghost can find on the local machine.
- 3 In the File Locator dialog box, specify the image file destination and name.  
The image file may reside on a local drive (but not the one that is being copied from). Local drives include writable CD, Tape, ZIP, JAZ, and LS120 Superdisk drives.  
When using peer-to-peer connections, the image file will be created on the slave machine.  
It is advisable to write the image file to a bootable CD. If a bootable disk is placed in the floppy drive before the cloning session begins, Norton Ghost will copy the files onto the CD from the boot disk.
- 4 If required, in the Image file description dialog box, type a description of the image file. This description can be modified in Ghost Explorer.
- 5 Click **Save**.
- 6 When the “Compress Image File?” question displays, select the compression type:
  - Click **No** for no compression (high speed).
  - Click **Fast** for low compression (medium speed).
  - Click **High** for high compression (slower speed).

For more information on compression, see [“Image files and compression”](#) on page 45.

If spanning is enabled, Norton Ghost prompts for the additional disks and volumes. See [“Image files and volume spanning”](#) on page 46 for more information.

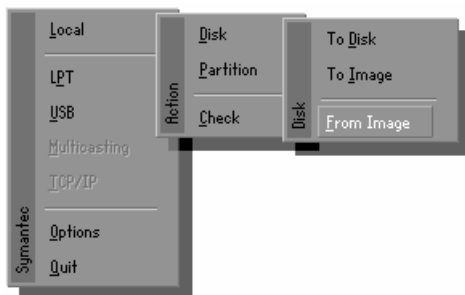
- 7 When the “Proceed with Image File Creation?” question appears, check the details displayed and ensure the correct options have been selected. Do one of the following:
  - Click **Yes** to proceed with the image file creation.

The system performs a quick integrity check of the file structure on the source disk and then copies the source disk to the destination image file. If you need to abort the process use Ctrl-C, but be aware that this leaves the destination image file in an unknown state.
  - Click **No** to return to the menu.
- 8 After the image file creation is complete, Norton Ghost can verify the integrity of the image file. On the main menu, click **Check > Image File**.

## Cloning a disk from an image file

To clone a disk from an image file:

- 1 On the main menu, click **Local > 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.
  - Browse to locate the image file.

Specify the drive or device and select the full path name. Note that the image file may reside on a local drive (but not the one that is being copied to). When using peer-to-peer connections, the file will be located on the slave machine.

- 3 Press **Enter**.
- 4 In the Destination Drive dialog box, select the destination drive.

---

**Warning:** Choose carefully as this is the disk that is going to get overwritten.

---

The Destination Drive dialog box displays the details of every drive Norton Ghost can find on the local machine. The disk containing the source image file is not available for selection.

- 5 In the Destination Drive Details dialog box, confirm or change the destination drive partition layout.

The Destination Drive Details dialog box displays a suggested partition layout for the destination drive. By default Norton Ghost tries to maintain the same size ratio between the new disk partitions.

However:

- You can change the size of any target FAT, NTFS, or Linux Ext2 partition at this stage simply 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 partition.

- 6 Click **OK**.
- 7 When the final "Proceed with disk load?" question displays, check the details displayed and ensure the correct options have been selected. Do one of the following:

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

Norton Ghost creates the destination drive using the source image file drive details. If you need to abort the process use Ctrl-C, but be aware that this leaves the destination drive in an unknown state.

---

**Warning:** Only click Yes if you are really sure you want to proceed. The destination drive will be completely overwritten with no chance of recovering any data.

---

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

For more information about how Norton Ghost handles spanned and split image files, see "[Image files and volume spanning](#)" on page 46.

- 8 When the disk image load is complete, reboot the machine. Run Symantec Disk Doctor, ScanDisk, or a similar utility to verify the integrity of the destination drive.

## Cloning partitions

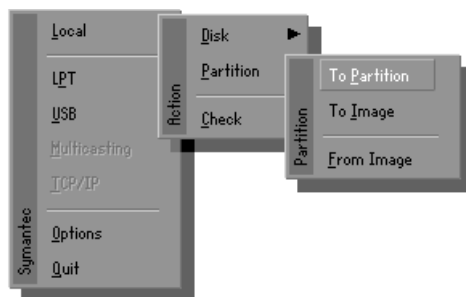
Partition cloning procedures are accessed from the main menu. To specify a transfer method, select one of the following options from the Norton Ghost main menu:

- Local
- LPT > Master
- USB > Master
- TCP/IP > Master

### Cloning from partition to partition

To clone from partition to partition:

- 1 On the main menu, click **Local > Partition > To Partition**.



- 2 In the Source Drive dialog box, select the source drive.  
The Source Drive dialog box displays the details of every drive Norton Ghost can find on the local machine.
- 3 In the Source Partition dialog box, select the source partition.  
The Source Partition dialog box displays the details of all the partitions on the selected source drive.
- 4 In the Destination Drive dialog box, select the destination drive.  
The Destination Drive dialog box displays the details of every disk Norton Ghost can find on the destination machine. For peer-to-peer connections, the slave machine is the destination.
- 5 In the Destination Partition dialog box, select the destination partition.

---

**Warning:** Choose an existing partition carefully as this is the partition that is going to be overwritten.

---

The Destination Partition dialog box displays the details of all the partitions on the selected destination drive, plus an option to 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**.
- 7 When the final “Proceed with Partition Copy?” question displays, check the details displayed and ensure the correct options have been selected. This is the last chance to back out. Do one of the following:
  - Click **Yes** to proceed with the partition copy.
    - If you need to abort the process use Ctrl-C, but be aware that this leaves the destination drive in an unknown state.

---

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

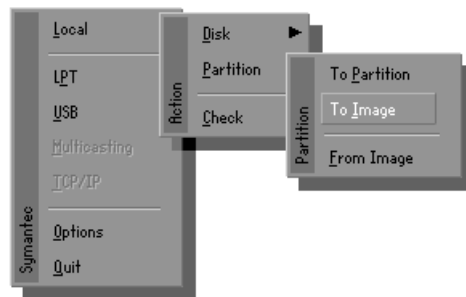
---

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

## Cloning a partition to an image file

To clone a partition to an image file:

- 1 On the main menu, click **Local > Partition > To Image**.



- 2 In the Source Drive dialog box, select the source drive.
 

The Source Drive dialog box displays the details of every disk Norton Ghost can find on the local machine.

- 3 In the Source Partition dialog box, select the source partitions to be included in the destination image file and click **OK**.

The Source Partition dialog box displays the details of all the partitions on the selected source drive. Multiple partitions may be selected.

- 4 In the File Locator dialog box, select the image file and do one of the following:
  - Type the path and file name for the disk image file.
  - Browse to locate the image file.

The image file may reside on a local drive (but not the one that is being copied from). Local drives include writable CD, Tape, ZIP, JAZ, and LS120 Superdisk drives.

When using peer-to-peer connections, the image file will be created on the slave machine.

It is advisable to write the image file to a bootable CD. If a bootable disk is placed in the floppy drive before the cloning session begins, Norton Ghost will copy the files onto the CD from the boot disk.

- 5 Press **Enter**.
- 6 When the “Compress Image?” question displays, select the compression type.
  - Click **No** for no compression (high speed).
  - Click **Fast** for low compression (medium speed).
  - Click **High** for high compression (slower speed).

Compression may affect the speed of operations. On selection of 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.

If spanning is enabled, Norton Ghost prompts for the additional disks and volumes. See [“Image files and volume spanning”](#) on page 46 for more information.

- 7 When the final “Proceed with Partition Dump?” question displays, check the details displayed and ensure the correct options have been selected. Do one of the following:
  - Click **Yes** to proceed with the image file creation.

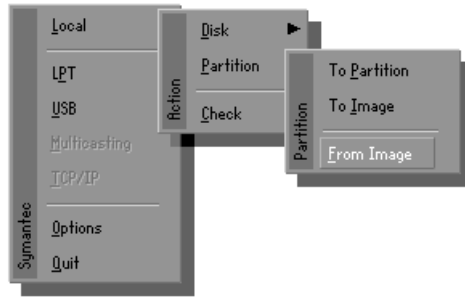
The system performs a quick integrity check of the file structure on the source partitions and then copies the source partitions to the destination image file. If you need to abort the process use Ctrl-C, but be aware that this leaves the destination image file in an unknown state.

- Click **No** to return to the menu.
- 8 After the image file creation is complete, Norton Ghost can verify the integrity of the image file. On the main menu, click **Check > Image File**.

## Cloning a partition from an image file

To clone a partition from an image file:

- 1 On the main menu, click **Local > Partition > From Image**.



- 2 In the File Locator dialog box, do one of the following, then press **Enter**:
  - Type the path and file name of the image file.
  - Browse to locate the image file.

Specify the drive or device and select the full path name. Note that the image file may reside on a local drive (but not the one that is being copied to). When using peer-to-peer connections, the image file will be located on the slave machine.

- 3 In the Source Partition dialog box, select the source partition for the image file.

The Source Partition dialog box displays the details of all the partitions in the image file.

- 4 In the Destination Drive dialog box, select the destination drive.

The Destination Drive dialog box displays the details of every disk Norton Ghost can find on the local machine.

- 5 In the Destination Partition dialog box, select the destination partition.

---

**Warning:** Choose an existing partition carefully as this is the partition that is going to be overwritten.

---

The Destination Partition dialog box displays the details of all the partitions on the selected destination drive, plus an option to create a new partition if space is available. If you create a new partition, you can resize it during the cloning operation.

- 6 When the final “Proceed with Partition Load?” question displays, check the details displayed and ensure the correct options have been selected. 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 use Ctrl-C, but be aware that this leaves the destination partition in an unknown state.

---

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

---

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

For more information about how Norton Ghost handles spanned and split image files, see “[Image files and volume spanning](#)” on page 46.

- 7 When the partition copy is complete, reboot the destination machine. Run Symantec Disk Doctor, ScanDisk, or a similar utility to verify the integrity of the destination partition.

## Adding switches to your cloning task

When defining your cloning task, you can include a number of options (or switches) that are usually entered via the command-line.

### To add switches to your cloning task:

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

---

<b>Tabs</b>	<b>Command-line options</b>
Span/CRC	-span, -auto, -crcignore, -fcr
FAT 32/64	-f32, -f64, -fatlimit, -fnw
Misc	-fro, -rb, -fx

---

Tabs	Command-line options
Image/Tape	-ia, -ib, -id  -tapebuffered, plus options to: make safe, unbuffer, and eject the tape
HDD access	-ffx, -fnx, -ffi, -fni, -ffs, -fns

For a full description of these switches, see [Appendix A, “Command-line switches”](#) on page 67.

- 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.

## Cloning dynamic disks in Windows 2000

Norton Ghost supports the cloning of simple or mirrored volumes in dynamic disks. Cloning of spanned, striped, and RAID-5 volumes is not supported by Norton Ghost. You can dump an image from a partition to a dynamic disk. You can restore this image to a basic disk, but not on a dynamic disk.

You can only 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 that the image is to be loaded to must be identical to the source disk in every way. This function is only useful for creating a backup of an image. If you load an image created using -ia onto a drive with different geometry, Windows 2000 will not understand the dynamic disk.

---

**Warning:** If you load an -ia disk image of a dynamic disk onto a SCSI hard drive and you get the error, “Destination drive too small,” you must load the ASPI driver for the SCSI card. Without an ASPI driver, Norton Ghost does not always have the correct size of the SCSI drive and cannot distinguish if the drive is large enough to hold the image.

---



# Working with image files

Norton Ghost can create an image file that contains all the information required to recreate a complete disk or partition. Image files are a useful way to create backup copies of complete drives or partitions.

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

- 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 about 600 MB or smaller if you use compression.

If you also use the Ghost Explorer application, an image file companion utility, individual files from these image files can be recovered selectively without having to restore the complete partition or disk.

## Image files and compression

Image files created in Norton Ghost support several levels of data compression. When using Norton Ghost in interactive mode, three compression options are provided: none, fast, and high. The Norton Ghost command-line switches provide access to nine levels of compression. The compression switch -z is detailed in [Appendix A, “Command-line switches”](#) on page 67.

As a general 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 need to be sent over the cable. Decompression of high-compressed images is much faster than the original compression. The level of compression you should select depends on your own individual requirements.

## Image files and CRC32

Cyclic Redundancy Checking (CRC) is a data error checking technique. CRC ensures that the original data that was written to the image file is the same as the data that is being used from the image file. The 32 value in CRC32 indicates the CRC technique uses a 32-bit value to store error checking information. The use of CRC32 increases detection of errors in the image file.

When image files are created, CRC32 details are embedded into the file to ensure image file corruption can be detected when it is being restored to disk. CRC32 is currently included on a file-by-file basis with FAT and Linux Ext2 partitions and on a MFT table basis for NTFS partitions.

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

A text file containing CRC values and associated file attributes can be generated using the `-CRC32` command-line switch. These switches and functions are detailed in Appendix A.

## Image files and volume spanning

### 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 used for storing system configurations on other hard drives and tape drives where

the volume is large enough and capable of holding the complete image file in one piece.

## Size-limited, multi-segment image files

There are situations where it may not be practical to have a standard image file. Norton Ghost can split up 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 550 MB for later transfer onto CD-ROM. The default and maximum file size is 2 GB.

## Spanned image files

Spanned image files are similar to size-limited, multi-segment 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 the image is being saved to. This allows you to specify a drive and file name and let Norton Ghost sort out when to request another volume or location for the remaining data. For example, this is very useful when using ZIP, JAZ, LS120 Superdisk, CD-R/RW drives, and other drive types.

---

**Warning:** Spanning must be executed locally. If you try to use spanning over a peer-to-peer connection (LPT, USB, TCP/IP), a disk full error message will display. However splitting can be used in all situations.

---

Norton Ghost also allows size limiting of spans when spanning volumes, ensuring 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.

## Spanning across multiple volumes and limiting span sizes

When creating an image file from a disk or partition, the destination drive might have insufficient space to store the image file. If Norton Ghost determines 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 determining whether the image will fit. Alternatively, you can use the `-span` and `-split` command-line switches to

configure Norton Ghost to use image file splitting. See [Appendix A, “Command-line switches”](#) on page 67 for more information.

Before saving the disk contents to the image file, Norton Ghost displays the source and destination details and offers a chance to back out. The default is to back out.

Once the process starts, the image file creation continues until the destination volume is full. You are prompted either to press Enter to continue or to specify the location of the next span of the image file. Click OK to continue on the same form of media or enter a file name to span to a different location.

For example, if you started spanning onto a JAZ disk and wish to span a 3.0 GB drive onto JAZ disks, press Enter to continue on JAZ disks. If you would like to span across different forms of media, selecting FileName gives you the option to span onto a different location.

---

**Note:** Record where the span segments are saved and the segment file names. Norton Ghost does not record the location and file name 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.

## Loading from a spanned image

When loading a disk or partition from a spanned image file, the process is the same as loading from an unspanned image file. The loading procedure is the reverse of the saving procedure. However, during the loading of the spanned image file you are prompted for the location of the image file spans:

- Click OK to continue on the same form of media. For example, if you originally spanned onto a JAZ disk and wish to restore a 3.0 GB drive from JAZ disks, replace the disk and press Enter to continue from JAZ disks.
- If restoring from different forms of media, click FileName to restore from a different location.

- To load spanned images without prompting, choose Options from the Ghost main menu, and set the AutoName switch. For more information, see [“Adding switches to your cloning task”](#) on page 42.

---

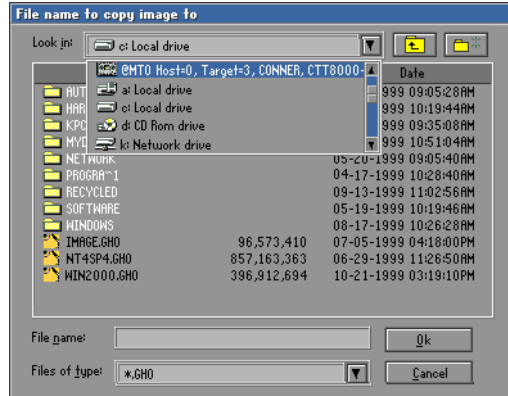
**Note:** You need to know the span segment locations and filenames.

---

## Image files and tape drives

Norton Ghost support of SCSI tape drives allows storage of a single image file onto a tape. When written onto the tape, there is no associated file system used, 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 using tape drives with Norton Ghost, the tape drive can be selected 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.



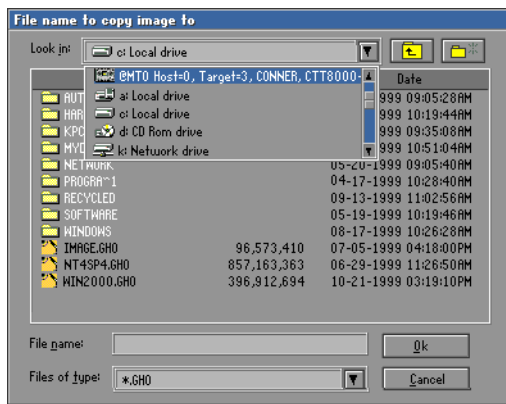
For Norton Ghost to access SCSI tape drives, a DOS ASPI driver must be installed prior to use. See [“Setting up transfer methods”](#) on page 13 for more information.

Norton Ghost in its default mode performs well with most SCSI tape devices. In some situations with older style SCSI tape devices and possibly with unreliable tapes, Norton Ghost may need to be configured to slow down or alter the way it uses the tape device. For these options, see [“Norton Ghost command-line switches”](#) on page 67.

## Image files and CD writers

Norton Ghost support of SCSI and IDE CD writers allows storage of a single image file onto one or more CD-R or CD-RW disks. The CDs can be read by any modern CD reader.

When using CD writers with Norton Ghost, a writer can be selected as the destination device in the File Locator window. Each writer is shown as CD-Rx, where x is a number starting at one and increasing incrementally for each writer present. For example, the following screen shows a CD writer available for use.



For Norton Ghost to access SCSI CD writers, a DOS ASPI driver must be installed prior to use. See [“Updating Norton Ghost” on page 21](#) for more information.

Norton Ghost has been tested with the CD writers listed below. It will probably work with most SCSI and IDE writers produced in 2000. It may or may not work with older models. Use the latest firmware available for your CD writer. If your CD-R device is not listed below, use the Check Image feature of Norton Ghost to ensure that your image can be restored. For more information see [“Cloning a disk to an image file” on page 35](#).

Use blank CD-R media or fully formatted CD-RW media for Norton Ghost. Fast-formatted CD-RW media is not suitable.

When creating an image on CD, you can make the CD bootable. You need an appropriate boot disk with CD drivers and MSCDEX loaded for this option. The Ghost Boot Wizard can create a suitable boot disk for you.

Start from a disk with appropriate drivers and MSCDEX loaded. Norton Ghost restores images from CD as it does from other media, so the CD-reader must have a CD-drive letter.

- Acer CRW4432A, Acer 8432A, use firmware 5.FV or newer
- Creative Labs 4224, Creative Labs Blaster 8432
- HP 8200, 9110, 9210e
- Imation IMW0802201S
- Iomega ZipCD/Phillips PCRW404
- Lacie 8424 external, Lacie 8/2/20 SCSI external (sensitive to media used)
- LG CED-8080B
- Pacific Digital (Mitsumi) CR-480TE
- Plextor PX-8432, PX-R412, PX-R820, PX-W124, PX-W4220, PX-W8220
- Que PX-W8432Ti
- Ricoh MP9060A
- Smart and Friendly 8220, Smart and Friendly 2224 (sensitive to media used)
- Sony CRX140E, CRX145
- TDK VeloCD
- TEAC CDR-58S (8/24)
- Yamaha 6416S, 8424SZ, CRW8424E

Additional drive support might be available. Check the Norton Ghost product information on the Symantec Web site for a list of currently supported devices.



## Norton Ghost utilities

Norton Ghost includes the following utility programs to make cloning easier:

- Ghost Explorer lets you quickly and easily restore files and directories, and work with files and directories within image files.
- Ghost GDisk is a replacement for Fdisk and Format that lets you perform on-the-fly partition formatting and reporting.  
See “[Ghost GDisk](#)” on page 58 for more information.

### Working with files in image files

Ghost Explorer allows you to quickly and easily restore files or directories from an image file. Using Ghost Explorer you can:

- View image file contents and save a list of files within an image file.
- Restore 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 of an image file.

---

**Note:** You can right-click a file or directory in Ghost Explorer to access a list of file commands.

---

Ghost Explorer supports the following partition types:

- FAT12
- Linux Ext2
- FAT16
- NTFS
- FAT32

### To open Ghost Explorer:

- Click **Start > Programs > Norton Ghost > Ghost Explorer**.

### To view an image file:

- 1 Open Ghost Explorer and on the File menu, click **Open**.
- 2 Select an image file and click **Open**.  
This displays the contents of the image file. It also displays the partition, directories, and files.
- 3 To view the image file properties, on the File menu, click **Properties**.  
To add or modify the image file description, type in the Description field.

---

**Note:** There may be some degradation of performance when viewing image files created with Norton Ghost V3.0. Ghost Explorer cannot view image files created with a version earlier than version 3.0. To check the Norton Ghost version in which your image file was created, see “[Determining Norton Ghost image file version](#)” on page 56.

---

### To restore a file or directory from an image file:

- 1 Open the image file in Ghost Explorer, and select the file or directory to be restored.
- 2 On the File menu, click **Restore**.
- 3 Select where you want to restore the file or directory.
- 4 Click **Restore** to restore the file or directory to the chosen directory.

---

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

---

## Modifying image files in Ghost Explorer

With Ghost Explorer you can add files or directories from Windows Explorer to any image file that is not NTFS and was created in Norton Ghost version 6.0 or greater. You can also delete files from any image file that is not NTFS and was created in Norton Ghost v5.1c or a later version.

To check the version of Norton Ghost used to create your image file, see [“Determining Norton Ghost image file version”](#) on page 56.

### Adding, moving, and deleting files

Within image files, Ghost Explorer supports general 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.

## Saving a list of files within an image file

This option saves a text file with a list of the directories (and optionally, files and their details) contained in the current image file.

### To save a list of contents of an image file:

- 1 In Ghost Explorer, open the image file.
- 2 On the File menu, click **Save Contents**.
- 3 Specify whether to include directories only, or to include files and file details.
- 4 Select a directory, enter a file name, and click **Save**.

## Setting span file sizes

Norton Ghost allows you to split an image file into smaller files called spans. The Span Split Point function in Ghost Explorer allows you to 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 it creates.

## Compiling a file

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

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

### To compile a file:

- 1 On the File menu, click **Properties**.
- 2 If compilation is recommended, on the File menu, click **Compile**.
- 3 Type a new name for the compiled file.
- 4 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 you used to create the image file. Ghost Explorer will not open a file created with a version of Norton Ghost earlier than 3.0. However, if the image file was created in Norton Ghost 3.0 or greater, you can determine the version by looking at its properties in Ghost Explorer.

### To determine the version of Norton Ghost used to create your image file:

- 1 In Ghost Explorer, open the image file.
- 2 On the File menu, click **Properties**.

This displays the Properties window. The version of Norton Ghost used to create this image file is displayed beside Produced by Ghost version.

## Using Ghost Explorer from the command-line

You can start Ghost Explorer from an MS-DOS prompt by typing its path and name. For example:

```
C:\progra~1\symantec\Norton~1\ghostexp
```

---

**Note:** If Ghost Explorer is in the current directory, or in a directory on your path, you do not need to type the path name.

---

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 will only use these options when asked to do so by Ghost Explorer technical support. Start the program with one of the following 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 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 where it carries out a single command and then exits. In this version, batch mode supports only the saving of the contents listing to a text file. To use this mode, specify one of the following switches:

- t            Save 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          Save a list of directories and files.
- tv          Save a verbose listing of directories and files.
- t[vf]=filename   Save the list to the file specified.

See [“Saving a list of files within an image file”](#) on page 55 for more information on this command.

If Ghost Explorer reports that a spanned or split image is corrupt, without ever 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.

The image index created by versions of Norton Ghost prior to 5.1c did not correctly handle long file names containing double byte characters, such as file names in Asian or Eastern European languages. Ghost Explorer may be able to display these names properly by reading them directly from the image file instead of from the index, although the loading of the image will be much slower. Use the switch `-ignoreindex` to force this behavior.

## Ghost GDisk

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

- On-the-fly formatting.
- The ability to hide a partition or make a hidden partition visible. This option allows for more than one primary DOS partition with different versions of the appropriate operating system on each partition. The ability to hide partitions allows the computer to be used to boot into the selected bootable partition, ignoring other installations of the same operating system in other hidden partitions.
- Extensive partition reporting.
- High security disk wiping. You have the option of wiping your disk to the U.S. Department of Defence standard or even higher security.

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.

### To run Ghost GDisk:

- 1 Restart your machine in DOS mode.
- 2 Next to the DOS prompt, type:  
**C: \progra~1\symantec\Norton~1\gdisk**  
followed by the required disk and switches.

## Overview of main command-line switches

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

Create	/cre	Creating partitions: primary DOS partitions, extended DOS partitions
Delete	/del	Deleting partitions of any type, including non-DOS partitions
Status, (default)	/status	Listing information on the specified fixed disk and its partitions
Activate	/act	Activating and deactivating a partition (nominating it as the bootable partition)
Hide	/hide	Hide an existing partition or unhide a hidden partition
Reinitialize MBR	/mbr	Reinitializing the Master Boot Record
Batch	/batch	Batch-mode command execution
Disk wipe	/diskwipe	Wipes the content of the whole disk

## Online help for command-line switches

An overview of the eight modes of operation and their switches may be displayed by using the help switch:

```
C:\progra~1\symantec\Norton~1\gdisk /?
```

---

**Note:** An additional switch not shown in the help text is the /VERSION switch. This switch displays the version information for the GDisk executable.

---

More detailed help is available by qualifying the help command with the switch for one of the main eight modes listed in the table above.

For example, to view the detailed help file for Hide, type the following command line:

```
C:\progra~1\symantec\Norton~1\gdisk /hide /?
```

## Switches common to all GDisk commands

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

- `/x` Prevents GDisk from using extended disk access support. This may result in GDisk not being aware of the full capacity of the disk.
- `/i` Prevents GDisk from using direct IDE disk-access support. This may result in GDisk not being aware of the full capacity of the disk.
- `/s` Prevents GDisk from using direct SCSI disk-access support. This may result in GDisk not being aware of the full capacity of the disk.
- `/y` Suppress prompting to confirm the operation. However, if you do not use this switch you will not necessarily be prompted before a partition is deleted or another possibly destructive operation is executed.
- `/sure` Suppress prompting to confirm the operation. However, if you do not use this switch you will not necessarily be prompted before a partition is deleted or another possibly destructive operation is executed.
- `/r` Causes GDisk to reboot the machine if the operation has been 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. See below. You cannot create a dynamic disk partition.

The syntax for this command is as follows:

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

- `disk` The physical fixed disk, 1 to 8.
- `/cre` Create a DOS partition or logical DOS drive.
- `/pri` Create a primary DOS partition.
- `/ext` Create an extended DOS partition.
- `/log` Create 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.

<code>/sz:pcent{p %}</code>	Specifies the size of the partition as a percentage of the total disk size, not the available disk space.
<code>/for</code>	Format the new partition once it has been created. Unless the <code>/ntfat16</code> or <code>/-32</code> switches are used, the partition type is determined by the following: <ul style="list-style-type: none"><li>■ If the partition is less than 16MB: FAT12</li><li>■ If the partition is between 16MB and 512MB: FAT16</li><li>■ If the partition is greater than 512MB: FAT32</li></ul>
<code>/q</code>	Performs a quick format if used in combination with the <code>/for</code> switch. If you do not use this switch, then GDisk will do a surface scan of the partition and mark any bad sectors.
<code>/v[:label]</code>	Use in combination with the <code>/for</code> switch to give the new formatted partition the specified label.
<code>/-32</code>	Partition is not formatted as FAT32. Limits primary and logical partitions to 204MB. Partitions over 16MB will be formatted as FAT16. This switch is useful if the operating system running does not support FAT32, for example, Windows NT4.
<code>/ntfat16</code>	Partition is not formatted as FAT32, but 64KB, cluster FAT16 is allowed. This limits primary and logical partitions to 4097MB. Partitions over 16MB are formatted as FAT16. Windows 9x and DOS systems are unable to access partitions that are over 204MB and were created with this switch.

## Reinitializing the Master Boot Record

Use the `/mbr` switch to rewrite the boot code in the Master Boot Record. The usual reason for needing to reinitialize the MBR is to eliminate a boot sector virus residing there. You can also use the `/mbr` switch with the `/wipe` option to delete a dynamic disk.

---

**Note:** This switch has to be used when deleting Linux partitions if LILO resides in the MBR.

---

The syntax for this command is as follows:

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

disk     The physical fixed disk for which to get partition information, 1 to 8.

/mbr     Reinitializes the boot code in the Master Boot Record.

/wipe    Delete the partition on the disk.

## Displaying information about disks

The status switch displays information about the fixed disks and partitions on a disk, including the model of the disk. To display the information about the partitions on a disk, you must specify the disk number. The syntax for this command is as follows:

```
gdisk [disk] [/status] [/raw] [/lba] [/ser]
```

disk     The physical fixed disk for which to get partition information, 1 to 8

/raw     Displays the contents of the partition table in CHS form if used with the disk switch

/lba     Displays the contents of the partition table in logical block form if used with the disk switch

/ser     Displays the serial number of the disk

## Batch mode

Use the batch mode switch, /BATCH, to perform multiple GDisk operations with a single command. 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:

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

If the batch mode switch is supplied without a file name, GDisk will prompt 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.

Here is an example batch command file called two-new.gg. Blank lines and lines starting with the hash symbol are considered to be 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
/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.gg
```

The four commands that will 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, so if a second file called STD\_INIT.GG contained the following lines:

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

then this command performs the actions of two-new.gg on both fixed disks:

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

## FAT16 partitions in Windows NT

Windows NT allows FAT16 partitions to be up to 4 GB in size using 64K clusters. GDisk can create a FAT16 partition using 64K clusters when the /NTFAT16 switch is added to the create partition command line. This switch disables the creation of FAT32 partitions and allows FAT16 partitions to be created up to 4 GB.

---

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

---

## Deleting and wiping your disk

Gdisk provides a choice to delete data and partitions on your disk or wipe your entire disk. You cannot delete a dynamic disk partition.

- The switch `/del/all` deletes all partitions that are on the disk. Partitions are removed. Any other space that has not been used for creating a partition will not be deleted. Deleting an extended partition also deletes any logical partition within it.
- The `/diskwipe` switch wipes the whole disk, partitions, partition table, MBR and all used and unused spaces.

The syntax for the delete switch command is as follows:

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

<code>disk</code>	The physical fixed disk, 1 to 8.
<code>/del</code>	Delete a DOS partition or logical DOS drive.
<code>/pri[:nth]</code>	Delete the nth primary DOS partition, the default is 1.
<code>/ext[:nth]</code>	Delete the nth extended DOS partition, the default is 1. Also deletes any logical partitions in the extended partition.
<code>/log:nth</code>	Delete the nth logical DOS drive from the extended DOS partition.
<code>/p:partn-no</code>	The partition to delete. Use the number reported by Gdisk in standard display mode (not using <code>/lba</code> or <code>/raw</code> ) for <code>partn-no</code> .
<code>/all</code>	Delete all partitions.
<code>/qwipe</code>	Overwrites the partition's data area before deleting the partition. Makes one pass of the disk.

`/dodwipe` Overwrites the partition's data area before deleting the partition. Makes 7 passes of the disk. This is the security standard for the U.S. Department of Defence.

`/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.

## Activate or deactivate a partition

The syntax for this command is as follows:

```
gdisk disk [-l]act /p:partn-no
```

`disk` The physical fixed disk, 1 to 8.

`/act` Activate a partition.

`/-act` Deactivate a partition.

`/p:partn-no` Partition to activate or deactivate. Only primary partitions can be activated. Use the number reported by GDisk in standard display mode (not using `/lba` or `/raw`) for `partn-no`.

## Hide or unhide a partition

The syntax for this command is as follows:

```
gdisk disk [-l]hide /p:partn-no
```

`disk` The physical fixed disk, 1 to 8.

`/hide` Hide a partition.

`/-hide` Unhide a partition.

`/p:partn-no` Partition to hide or unhide. Use the number reported by GDisk in standard display mode (not using `/lba` or `/raw`) for `partn-no`.

## Support for large hard disks

GDisk includes large disk drive support for IDE and SCSI hard drives (those 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. Care should be taken when creating partitions for operating systems with inherent partition size limitations.

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

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

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

- According to the Microsoft Support Knowledgebase, Windows NT NTFS bootable partitions cannot exceed 7.8 GB (8,455,716,864 bytes). This information is fully detailed in the Windows Knowledgebase Article “Windows NT Boot Process and Hard Disk Constraints,” Article ID: Q114841.  
Non-bootable NTFS partitions do not have this size limitation.
- NT cannot boot from partitions that start or end over the 1024-cylinder boundary. If this condition exists, 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 Windows Knowledgebase Article “IBM DTTA-351010 10.1 GB Drive Capacity Is Inaccurate,” Article ID: Q183654.



# Command-line switches

## Norton Ghost command-line switches

Norton Ghost can be run:

- Interactively with no command-line switches
- Interactively with selected switches

The Norton Ghost command-line switches are used to alter Norton Ghost behavior and automate procedures. To list Norton Ghost command-line switches, type one of the following:

```
ghostpe.exe -h
```

```
ghostpe.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.

### @filename

Specifies a file containing additional command-line switches that should be 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 new line. This feature allows you to exceed the DOS command-line limit of 150 characters.

Example:

```
ghostpe.exe @ghswitch.txt
```



**-clone**

The syntax for this switch is:

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

Clone operation switch. This switch allows automation of Norton Ghost operations and has a series of arguments that define the operation parameters. No spaces are allowed in the command line. The number of size switches depends on the number of partition sizes you want to specify. There may be none.

**MODE={copy | load | dump | pcopy | pload | pdump}**

MODE defines the type of clone command:

copy	Disk-to-disk copy
load	File-to-disk load
dump	Disk-to-file dump
pcopy	Partition-to-partition copy
pload	File-to-partition load
pdump	Partition-to-file dump, allows multi-part Ghost dump selection for file

**SRC={disk | file | tape }**

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

disk	drive number	Source disk drive number - numbers start at 1. For example, SRC=1  A partition on a drive can also be specified. Numbers start at 1. For example, SRC=1:2
file	filename	The source image filename. For example, SRC= g:\source.gho  A partition in an image file can also be specified. For example, SRC=g:\source.gho:2  Files can also be read from a CD-ROM drive.

## Command-line switches

---

tape	@MTx	The tape drive number. Numbers start at 0. For example, SRC=@MT0  A partition on a tape can also be specified. For example, SRC=@MT0:3
------	------	--

### **DST={disk | file | tape | cdwriter}**

DST defines the destination location for the operation:

disk	drive	The destination disk drive number. For example, DST=2  A partition on a drive can also be specified. For example, DST=2:1  To create a new partition, type a destination partition one greater than the existing number of partitions, if there is enough free space.
file	filename	The destination image filename. For example, DST= g:\destination.gho
tape	@MTx	The tape drive number. Numbers start at 0. For example, DST=@MT0
cdwriter	@CDx	The CD writer drive number. Numbers start at 1. For example, DST=@CD1

## Cloning combination options

Mode	Source	Destination
copy	disk	disk
load	file tape	disk
dump	disk	file tape cdwriter
pcopy	disk:partition	disk:partition
pload	file:partition tape:partition	disk:partition
pdump	disk:partition:partition:partition More than one partition can be specified	file tape cdwriter

### **SZE{E | F | L | n={nnnnM | nnP} F | V}**

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

Available options

- n=xxxxM Indicates that the nth destination partition is to have a size of xxxx MB (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 in the destination as it was in 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

The following table describes clone switches and their functions.

Use this switch	To do this
<code>ghostpe.exe -clone,mode=copy,src=1,dst=2</code>	Copy local disk one to local disk two.
<code>ghostpe.exe -clone,mode=dump,src=2,dst=c:\drive2.gho -lpm</code> The slave machine can be started with <code>ghostpe.exe -lps</code>	Connect using LPT to another machine running Norton Ghost in slave mode, and save a disk image of local disk two to the remote file <code>c:\drive2.gho</code>
<code>ghostpe.exe -clone,mode=pcopy,src=1:2,dst=2:1</code>	Copy the second partition of the local disk one to the first partition of local disk two.
<code>ghostpe.exe -clone,mode=load,src=g:\2prtdisk.gho,dst=2, size1=60P,size2=40P</code>	Load disk two from an image file and resize the destination partitions into a 60:40 allocation.
<code>ghostpe.exe -clone,mode=copy,src=1,dst=2,size2=F</code>	Clone a two partition disk and keep the second partition on the destination disk the same size as on the source disk, and allow the first partition to use the remaining space, leaving no unallocated space.
<code>ghostpe.exe -clone,mode=load,src=g:\3prtdisk.gho,dst=1,size1=450M,size2=1599M,size3=2047M</code>	Load 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.
<code>ghostpe.exe -clone,mode=load,src=g:\2prtdisk.gho,dst=1,sizeL</code>	Load a disk from an image file and resize the last partition to fill the remaining space.

Use this switch	To do this
ghostpe.exe -clone,mode=copy,src=2:2,dst=@MT0	Create an image file of the second partition in disk 2 onto the first tape drive.
ghostpe.exe clone,mode=pdump,src2:1:4:6,dst=d:\part246.gho	Create an image file with only selected partitions.  This is an example of selecting partitions 1, 4, and 6 from disk 2.

## -CRC32

The -CRC32 switch allows making a list of the files on a disk or partition, or in an image file with CRC values for each, and to verify that list against the original or a clone. 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. 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 against a disk.

The full syntax for this switch is:

```
-CRC32,action={create|verify|pcreate|pverify|
dcreate|dverify},src={{Disk Spec}|{Part Spec}|
{File}},{crcfile={File}|vlist={File}|vexcept=
{File}}
```

---

**Note:** Spaces are not allowed within the -CRC32 switch.

---

crcfile={File}::ASCII CRC32 file - default=ghost.crc

vlist={File}::Verification list file - default=ghost.ls

vexcept={File}::Verification exception file - no default

The possible actions (with descriptions) are:

create            Create an ASCII CRC32 file from a disk.

verify            Verify a disk from a CRC32 file.

## Command-line switches

---

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.

## Examples of -CRC32 usage

Use this switch	To do this
<code>ghostpe.exe -fcr</code>	Create a CRC32 file (called <code>ghost.crc</code> ) while making an image file.
<code>ghostpe.exe -fcr=d:\test.crc</code>	Create a CRC32 file while making an image file with a different name.
<code>ghostpe.exe -CRC32,action=create,src=1,crcfile=ghost.crc</code>	Create a list of files and CRC32 values for a disk.
<code>ghostpe.exe -crc32,action=dverify,src=x:dumpfile.gho</code> <code>                  crcfile=ghost.crc</code>	Verify the list against an image file.
<code>ghostpe.exe -crc32,</code> <code>          action=pverify,src=1:2,crcfile=filename.crc:2</code>	Verify partition in an image file with multiple partitions.
This will verify that partition 2 on disk 1 is the same as partition 2 in the <code>crc</code> file.	
<code>ghostpe.exe -crc32,action=create</code>	Create an ASCII CRC32 file from the primary hard drive.
Note that the default disk is the primary drive, the default ASCII CRC32 file is <code>ghost.crc</code> .	
<code>ghostpe.exe -CRC32,action=create,src=2,crcfile=myfile.txt</code>	Create an ASCII CRC32 file.
Same as previous except you specify the disk and ASCII CRC32 file. This example uses disk 2 as the source drive and the outfile <code>myfile.txt</code> .	
<code>ghostpe.exe -CRC32,action=verify</code>	Verify the contents of the primary disk against a CRC32 file.
Once again, the default disk is the primary drive and the default ASCII CRC32 file is <code>ghost.crc</code> (in the current directory). In addition, the default verification list file is <code>ghost.ls</code> .	

Use this switch	To do this
<pre>ghostpe.exe -CRC32,action=verify,src=1,crcfile=myfile.txt vlist=myfile.out</pre> <p>Same as previous but specify the disk, CRC file, and list file. This example uses disk 1 as the source drive, myfile.txt as the ASCII CRC32 file, and myfile.out as the verification list file.</p>	Verify the contents of the primary disk against a CRC32 file.
<pre>ghostpe.exe -CRC32,action=verify,src=1 crcfile=myfile.txt,vlist=myfile.out,vexcept=myfile.exc</pre> <p>Same as above with the inclusion of the EXCEPTION argument that excludes compared files based upon its entries.</p>	Verify the contents of the primary disk against a CRC32 file.

### **vexcept=filename**

Specifies files that are not checked with CRC. This is normally used to exclude files that are always changed on boot. 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 follows UNIX rules, it is more powerful than the MS-DOS \*. In particular it matches the . as well as any other character, but other characters can follow the \*. Thus, a wildcard of \*br\* matches any files containing the letters “br”, for example, brxyz.txt, abr.txt, and abc.dbr.

The specification of `\WINDOWS\COOKIES\*.*` in the example above means match all files in the subdirectory `\WINDOWS\COOKIES` that have an extension. To match all files with or without an extension, `WINDOWS\COOKIES\*` should be used.

Short file names should be used in exclusion files and 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 above exclusion file matches any file with an extension of `.1` in any subdirectory on the second partition. Apart from this, wildcards should be used for files, not for directories.

### **-crcignore**

Ignores CRC errors. CRC errors indicate data corruption. This switch overrides the CRC error detection and may allow a corrupted image file to be used. Using this switch leaves the corrupted files in an unknown state.

### **-dd**

Dumps disk metrics information to the dump log file `ghstat.dmp`. 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 can not be included in the `@ ghost` switch text file.

### **-di**

Displays diagnostics. This is useful for technical support purposes. For each disk present on the machine, the physical attributes such as drive number, cylinders, heads, sectors per track, and total sectors are displayed. The diagnostics may be redirected to a file and given to Technical Support to assist with problem solving.

Example:

```
ghostpe.exe -di > diag.txt
```

outputs disk diagnostics to the file `diag.txt`.

### **-dl=number**

Specifies the number of hard drives present. Valid numbers are in the range 1-8. This may help when the BIOS does not report the number of drives correctly.

### **-f32**

Allows Norton Ghost to convert all FAT16 volumes to FAT32 volumes when the destination partition is larger than 256 MB in size. Ensure that the installed operating systems requiring access to the volumes that will be converted support FAT32.

### **-f64**

Allows Norton Ghost to resize FAT16 partitions to be greater than 2047 MB using 64K clusters. This is only supported by Windows NT and Windows 2000. Do not use on systems including other operating systems.

### **-fatlimit**

Limits the size of FAT16 partitions to 2047 MB. Useful when Windows NT OS FAT16 partitions are present on the disk, and 64K clusters are not wanted.

### **-fcr**

Creates a CRC32 file (called ghost.crc) while creating an image file.

### **-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.

### **-ffi**

Prefer the use of direct IDE access for IDE hard disk operations. This switch does not have any effect when running Norton Ghost in Windows 95/98.

### **-ffs**

Prefer the use of direct ASPI/SCSI disk access for SCSI hard disk operations.

### **-ffx**

Prefer the use of Extended Interrupt 13h disk access for hard disk operations.

**-finger**

Displays the fingerprint details written on a hard disk created by Norton Ghost. The fingerprint displays the process used to create the disk or partition and the time, date, and disk the operation was performed on.

**-fis**

Use all available disk space when creating partitions. By default, Ghost often leaves a small amount of free space at the end of the disk. Because partitions must be aligned to cylinder boundaries, Ghost may leave up to 5 MB free even when -fis is specified.

**-fni**

Disables direct IDE access support for IDE hard disk operations.

**-fns**

Disables direct ASPI/SCSI access support for SCSI hard disk operations.

**-fnx**

Disables extended INT13 support for hard disk operations.

**-fro**

Forces Norton Ghost to continue cloning even if source contains bad clusters.

**-fx**

Flag Exit. Causes Norton Ghost to exit to DOS after operation completion. By default, Norton Ghost prompts the user to reboot or exit when the operation has finished. See -rb for rebooting on completion.

**-h or -?**

Displays the Norton Ghost command-line switch help page.

**-ia**

Image All. The Image All switch forces Norton Ghost to do 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 loaded to a disk with identical geometry.

### **-ial**

Forces a sector-by-sector copy of Linux partitions. Other partitions are copied as normal.

### **-ib**

Image Boot. 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 boot track. You cannot perform partition-to-partition or partition-to-image functions with the -ib switch.

### **-id**

Image Disk. Similar to -ia (Image All), but also copies the boot track, as in -ib (ImageBoot), extended partition tables, and unpartitioned space on the disk. When looking at an image made with -id, you will see the unpartitioned space and extended partitions in the list of partitions. The -id switch is primarily for the use of law enforcement agencies who 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, and you will need an identical or larger disk than the original to restore to.

Norton Ghost does not wipe the destination disk when restoring from an -id image. Geometry differences between disks may leave some 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.

**-jl:x=filename**

Creates a log file to assist diagnosing problems. 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 where the log will 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**

Displays 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	Compaq
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 machines defined by the type chosen and the source machine.

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 machine.

**-lpm**

LPT master mode. This switch causes Norton Ghost to automatically go into LPT master mode, and is the equivalent of selecting LPT Master in the main menu. See [“Peer-to-peer connections”](#) on page 16 for more information.

### **-lps**

LPT slave mode. This switch causes Norton Ghost to automatically go into LPT slave mode, and is the equivalent of selecting LPT Slave in the main menu. See “[Peer-to-peer connections](#)” on page 16 for more information.

### **-memcheck**

Activates internal memory usage checking for technical support.

### **-nofile**

Disables the Image File Selection dialog box. Useful when opening directories with large numbers of files and overly slow links.

### **-nolilo**

Do not attempt to patch the LILO boot loader after a clone. If you use the -nolilo switch you will need to boot from a floppy after the clone, and then rerun LILO.

### **-noscsi**

Disables accessing SCSI devices via ASPI.

### **-ntc**

Disables NTFS contiguous run allocation.

### **-ntchkdsk**

Cloned NTFS volume will have the CHKDSK bit set. This will cause Windows NT to check the integrity of the volume when it is booted.

### **-ntd**

Enables NTFS internal diagnostic checking.

### **-ntic**

Ignores the NTFS volume CHKDSK bit. Norton Ghost checks the CHKDSK bit on a NTFS volume before performing operations. When Norton Ghost indicates the CHDSK bit is set, we recommend running CHKDSK on the volume to ensure the disk is in a sound state before cloning.

**-ntiid**

By default, Norton Ghost copies partitions participating in an 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 clone the partition as if it were an NTFS partition to allow it to be intelligently cloned on a file-by-file basis. Care should be taken when using this switch. Use of the -ntiid switch with volume sets and stripe sets is not recommended. When cloning mirrored partitions, also known as NT software RAID partitions, use the following procedure:

- 1 With Windows NT disk administrator, break the mirror set.
- 2 Using the -ntiid switch, clone just one of the mirror partitions, and 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.
- 3 After cloning, recreate a mirror set using the Windows NT disk administrator. The disk administrator creates the partitions in the mirror set.

**-ntil**

Ignores non-empty NTFS log file check (inconsistent volume).

**-or**

Override. Allows the override of internal space and integrity checks. Use of this switch should be avoided.

**-pwd and -pwd=x**

Specifies 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 will prompt for one.

**-pmbr**

Specifies the memory boot record of the destination disk be preserved when performing a disk-to-disk or image-to-disk cloning operation.

**-quiet**

Quiet mode. Disables status updates and user intervention.

### **-rb**

Reboots after finishing a load or copy. After completing a load or copy operation, the target machine must be rebooted so that the operating system can load the new disk/partition information. Normally, Norton Ghost prompts the user to reboot or exit. `-rb` tells Norton Ghost to automatically reboot after completing the clone. See also `-fx` switch.

### **-script**

Allows you to specify a series of commands (one per line) and Norton Ghost will execute them in a sequential order.

Example:

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

Here is an example of `script.txt`:

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

### **-skip=x**

Skip File. Causes Norton Ghost to exclude the indicated files during an operation. A skip entry can specify a single file, directory, or multiple files using the `*` wildcard. File names must be given in short file name format and all pathnames are absolute. Only FAT system files are able to 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.

Examples:

```
-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 whole program files directory (note the short file name).

`-skip=@skipfile.txt`

Skips files as outlined in the skipfile.txt file. For example, the skipfile.txt contains:

```
*\*.tmt
[partition:1]
\windows\
*\*.exe
[Partition:2]
*\*me.txt
```

This would skip all \*.tmt files on any partition, the windows directory and any \*.exe files on the first partition, and any file that ended with the me.txt on the second partition.

#### **-span**

Enables spanning of image files across volumes.

#### **-split=x**

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

```
ghostpe.exe -split=200
```

divides the image into 200 MB segments.

#### **-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. Earlier versions ejected the tape by default. By default, Norton Ghost does not eject the tape and 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**

Specifies the tape block size in units of 512 bytes.

### **-tapespeed=x**

Allows control of tape speed. Where x equals 0 to F. 0 is default, 1-F increases 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 actually physically written to the medium.)

### **-tcpml:slave IP address]**

TCP/IP master mode. This switch causes Norton Ghost to automatically go into TCP/IP master mode, and is the equivalent of selecting TCP/IP Master in the main menu. See [“Peer-to-peer connections”](#) on page 16 for more information. The IP address of the slave machine may be specified.

### **-tcps**

TCP/IP slave mode. This switch causes Norton Ghost to automatically go into TCP/IP slave mode, and is the equivalent of selecting TCP/IP Slave in the main menu. See [“Peer-to-peer connections”](#) on page 16 for more information.

### **-usbm**

USB master mode. This switch causes Norton Ghost to automatically go into USB master mode, and is the equivalent of selecting USB Master on the main menu. See [“Peer-to-peer connections”](#) on page 16 for more information.

### **-usbs**

USB slave mode. This switch causes Norton Ghost to automatically go into USB slave mode, and is the equivalent of selecting USB Slave on the main menu. See “[Peer-to-peer connections](#)” on page 16 for more information.

### **-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**

Displays the version number of Norton Ghost.

### **-ver=value**

Tests the version of Norton Ghost. If Norton Ghost is older than the specified version, it aborts and exits, otherwise it proceeds as normal. The version number should be specified without the period. For example, Norton Ghost 6.5 is `-ver=650`.

### **-z**

Compress when saving a disk or partition to an image file.

- `-z` or `-z1` low compression (fast)
- `-z2` high compression (medium)
- `-z3` thru `-z9` higher compression (slower)



## The wattcp.cfg network configuration file

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

The wattcp file specifies the IP address of the machine and the subnet mask and allows you to set other optional network parameters. The file should be located in the current directory when ghostpe.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
```

The keywords in the wattcp.cfg configuration file are the following:

**IP** Specifies the IP address of the local machine. Each machine 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 machines. This allows identical boot disks to be used on machines 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 machines are located on different subnets.

Example: GATEWAY=192.168.100.1

## The wattcp.cfg network configuration file

---

Bootpto (optional)	Overrides the time-out value (in seconds) for BOOTP/DHCP. Example: BOOTPTO=60
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 value is 4.



# Troubleshooting

## Norton Ghost error codes

A Norton Ghost error message consists of an error number, a description, and possibly a suggestion of what can be done to remedy the problem. Below is a list of the more common errors that Norton Ghost may report. Make sure you are running the latest version as many errors have been fixed through revisions.

Refer to [Appendix D, “Diagnostics”](#) on page 93 for information on the ghosterr.txt file generated when an abort error occurs. Further information is available on the Norton Ghost technical support Web site. See [“Service and support solutions”](#) on page 99.

Error code	Description
8006, 8008	The trial period of the evaluation has expired. Visit the Symantec Web site at <a href="http://www.symantec.com">http://www.symantec.com</a> for details on how to purchase Norton Ghost.
10098	The partition number must be included in the command-line switches. See <a href="#">Appendix A, “Command-line switches”</a> on page 67 for further information.
10010,10014, 11000	Incorrect path/file syntax. Ensure path and file name are correct and complete. Also make sure you have the proper user rights to read or create the image file on the network.
14030	An unregistered version of Norton Ghost has encountered a file with a date beyond its expiration date. Scan your system for files beyond this date and temporarily remove them from the system to allow Norton Ghost to continue. You can locate the offender by looking at the drive:\path\file name at the bottom of the Norton Ghost window when this error occurs. Visit the Symantec Web site at <a href="http://www.symantec.com">www.symantec.com</a> for details on how to purchase Norton Ghost.

## Troubleshooting

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Error code	Description
15170	Due to an unformatted or invalid partition on the source hard drive. Make certain the source drive is completely allocated as Norton Ghost looks for 100% viable media.
19913	Can't find BOOTP/DHCP server. Check 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, try going into DOS and copying the image file off the CD-ROM using copy verification.

---

# Diagnostics

This appendix contains information that may be helpful for diagnostic purposes.

## Hard drive detection and diagnostic information

Norton Ghost has the ability to generate several different diagnostic reports outlining the hard drive devices detected, other system-related information, and error conditions when they are detected.

### Norton Ghost abort error file (ghosterr.txt)

An error message consists of an error number, a description, and possibly a suggestion of what can be done 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 an erroneous condition is detected by the software which 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\file name command line switch.

For more information on some common error codes, see [Appendix C, “Troubleshooting”](#) on page 91.

### Hard disk geometry diagnostics

A list of all detected hard drives on the system and their associated geometry values can be displayed on-screen using the command line switch `-di`. To generate a file containing the details, the DOS redirect output can be used as shown in the following example:

```
c:\ > ghostpe.exe -di > drives.txt
```

### 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 `ghstat.txt`. The location and file name of a file generated by Norton Ghost can be altered by adding the `-dfile=drive:\path\file name` command-line switch.

## Elementary network testing techniques

### TCP/IP

There are several basic testing utilities available in the Microsoft TCP/IP application suite. An example of two Windows 95 TCP/IP utilities, `ping.exe` and `winipcfg.exe` is included below. On Windows NT, the equivalent utilities are `ping.exe` and `ipconfig.exe`.

The `ping` 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.

`Ping local host` shows basic local TCP/IP functionality. The address used in the following example is a special address which identifies the local host on the network.

## Pinging a local host

In a Windows DOS prompt dialog box on a Windows 95 machine with a computer name Win95PC1 the following command was entered:

```
c:\> ping LocalHost
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 is operating.



# USB and DirectParallel Cables

This appendix contains information on USB and DirectParallel cable availability and ordering.

## 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.

Via Web site	<a href="http://www.lpt.com">http://www.lpt.com</a>
Via telephone	800.789.4784 (U.S.) 425.869.1119 (International)
Via fax	253.813.8730
Via email	<a href="mailto:sales@lpt.com">sales@lpt.com</a>

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

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July 2000

# Norton Ghost 2001 CD Replacement Form

**CD REPLACEMENT:** After your 60-Day Limited Warranty, if your CD becomes unusable, fill out and return 1) this form, 2) your damaged CD, and 3) your payment (see pricing below, add sales tax if applicable), to the address below to receive replacement CD. *DURING THE 60-DAY LIMITED WARRANTY PERIOD, THIS SERVICE IS FREE.* You must be a registered customer in order to receive CD replacements.

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Please send me:  CD Replacement

Name \_\_\_\_\_

Company Name \_\_\_\_\_

Street Address (No P.O. Boxes, Please) \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip/Postal Code \_\_\_\_\_

Country\* \_\_\_\_\_ Daytime Phone \_\_\_\_\_

Software Purchase Date \_\_\_\_\_

\*This offer limited to U.S., Canada, and Mexico. Outside North America, contact your local Symantec office or distributor.

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# I N D E X

## Symbols

#e=filename switch 68  
? switch 79  
@filename switch 67

## A

abort log 68, 93  
afile=filename switch 68  
ASPI driver 14, 16  
auto switch 68  
automation  
    clone switch and examples 69  
    close on completion 79  
    quiet mode 83  
    reboot on completion 84  
    switches 67-87  
    version checking 86, 87

## B

bfc=x switch 68  
boot disk 32  
    setup 29, 30  
boot package  
    creating 23  
bootcd switch 68

## C

cables 97  
CD-ROM 15  
chking,filename switch 68  
clone switch 69  
command line  
    examples 72-76  
    Ghost 67-87  
compression. *See* image files  
copy command 69  
CRC32 46, 73-77, 78

crc32 switch 73  
crcignore switch 77

## D

dd switch 77  
dfile=filename switch 77  
di switch 77  
diagnostics 93-95  
dl=number switch 77  
dst switch 70  
dump command 69

## F

f32 switch 78  
f64 switch 78  
fatlimit switch 78  
fcr switch 78  
fdsp switch 78  
fdsz switch 78  
ffi switch 78  
ffs switch 78  
ffx switch 78  
file system  
    FAT12 54  
    FAT16 54  
        Windows NT 63, 78  
    FAT32 54  
        conversion from FAT16 78  
    Linux Ext2 54, 61  
    NTFS, switches 82  
files, skipping 84  
finger switch 79  
fingerprint. *See* Ghost  
fis switch 79  
fni switch 79  
fns switch 79  
fnx switch 79  
fro switch 79  
fx switch 79

---

## G

Gdisk 10

Ghost

- environment file 68

- fingerprint 79

- hardware requirements for cloning 15

- introduction 9

- scenarios 11

- See also* uninstalling

- See also* procedures

hard disk, *See also* procedures

Ghost Boot Wizard 10, 23-29

Ghost executable 10

Ghost Explorer 10, 53-58

- command line 57

Ghost GDISK 58

- batch mode 62

- command line switches 59

Ghost operation, operating system 32

ghost.err. *See* abort log

ghost.exe 10

## H

h switch 79

hard disk

- active 59

- batch 59

- creating 59

- deleting 59, 64

- hiding partitions 59

- large drives 66

- MBR 59

- status 59

- wiping 64

hardware requirements for cloning 15

## I

ia switch 79

ial switch 80

ib switch 80

id switch 80

image files 54

- compression 35, 45-46, 87

- CRC. *See* CRC32

- creating

  - insufficient space 47

  - See also* image files multi-segment

  - See also* image files spanned

- features 9, 45

- file list 55

- loading 48

- modification 55

- multi-segment 47, 68, 85

- password 83

- restoring 54

- size limited. *See* image files multi-segment

- spanned 47-49, 55, 68, 85

- split. *See* image files multi-segment

- standard 46

- viewing contents 54

## J

jl

- x=filename switch 81

## L

load command 69

lockinfo switch 81

locktype=type switch 81

lpm switch 81

lps switch 82

LPT support 24

LPT. *See* parallel port transfer

## M

master 17

MBR, reinitializing 59

memcheck switch 82

mode switch 69

Multicast Assist Wizard

- See also* Ghost Boot Wizard

---

## N

NetBIOS 15  
    setup 14  
nofile switch 82  
nolilo switch 82  
Norton Ghost  
    *See also* Ghost  
noscsi switch 82  
ntc switch 82  
ntchkdsk switch 82  
ntd switch 82  
ntic switch 82  
ntiid switch 83  
ntil switch 83

## O

Open 54  
operations. *See* procedures  
or switch 83

## P

parallel port transfer 15  
    automation 81, 86  
    setup 14, 17  
pcopy command 69  
pdump command 69  
Peer 15  
peer to peer connection  
    LPT. *See* parallel port transfer  
ping utility 94  
pload command 69  
pmbd switch 83  
procedures  
    disk 33-37  
        from image file 36-37  
        to disk 33-34  
        to image file 35-36  
    partitions 38-42  
        from image file 41-42  
        to image file 39-41  
        to partition 38-39  
pwd, -pwd=x switch 83

## Q

quiet switch 83

## R

rb switch 84  
removable media 15

## S

script switch 84  
SCSI tape 15  
    setup 16  
    switches 85-86  
sector by sector copy 79  
sector, bad 68, 79, 87  
service and support 99  
Setting 13  
setup 16-17  
    *See also* parallel port transfer  
    *See also* SCSI Tape  
skip=x switch 84  
slave 17  
span switch 85  
spanning 47-49  
split=x switch 85  
src switch 69  
Support 66  
Symantec Ghost  
    *See also* Ghost  
size switch 71

## T

tapebuffered switch 85  
tapeject switch 85  
tapesafe switch 86  
tapesize switch 86  
tapespeed=x switch 86  
tapeunbuffered switch 86  
tcpm switch 86  
tcps switch 86  
technical support 99

---

## **U**

uninstalling 20

USB

*See also* peer-to-peer connection

USB support 24

usb switch 87

using

Ghost Explorer 53-58

## **V**

vdw switch 87

ver switch 87

ver=value switch 87

vexcept switch 76

## **W**

wattcp.cfg 89

Windows, running Ghost inside 32

## **Z**

z switch 87