

Hard Drive Installation Options

Ontrack Data Recovery™ Technical Paper.2004



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Table of Contents

Preface	2
Terms Used in this Paper	2
Background on IDE ATA/ATAPI Hard Drives	2
Ontrack Drive Installation Software	2
Possible Data Loss and Corruption	3
Installation Options that Prevent Data Loss and Corruption	3
Installation Option 1: Upgrade Operating System Software	3
Installation Option 2: Install 48 Bit LBA Compliant Driver from Chipset Manufacturer	4
Installation Option 3: Attach Large Drive to Additional ATA Controller	6
Intel® Application Accelerator	7
References	8

Installation Options for IDE ATA/ATAPI Hard Drives Larger than 137 GB

Preface

To allow full use of a large IDE ATA/ATAPI hard drive (capacity greater than 137 GB) without data loss and corruption, you must configure your system to be 48-Bit LBA compliant.

There are three options that ensure 48-Bit LBA compliancy; upgrade the operating system software, update the IDE ATA/ATAPI Controller Driver, or attach the hard drive to an additional ATA controller with a 48-Bit LBA compliant driver.

Ontrack Data Recovery™ provides disk installation software that checks for 48-Bit LBA compliancy and if needed enables operating system support for large drives and installs a Dynamic Drive Overlay (DDO) to overcome BIOS limitations related to 48-Bit addressing.

Terms Used in this Paper

IDE ATA/ATAPI	Refers to the three names used by various hard drive manufacturers for the same drive technology
IDE	Intelligent Drive Electronics or Integrated Drive Electronics
ATA	AT Attached drives
ATAPI	AT Attached Packet Interface
BIOS	Basic Input/Output System
LBA	Logical Block Addressing
PCI	Peripheral Component Interconnect

Background on IDE ATA/ATAPI hard drives

Hard drive manufacturers have created IDE ATA/ATAPI hard drives with increasing capacity since the early 90s. The standards committees have kept up with the next generation of interface standards as needed. In the latest standard (ATA-6/ATAPI-6), IDE ATA/ATAPI drives were allowed to be defined at sizes larger than 137 GB by increasing the LBA addressing from 28 bit to 48 bit addressing. This new standard requires 48-Bit LBA compliant software drivers within the operating system and/or specific 48-Bit LBA compliant hardware to be capable of safely accessing drives beyond the 137 GB range defined by the older ATAPI definitions. Intelligent third party controller cards or embedded controllers are an alternative in lieu of Operating System solutions or other software drivers. SCSI hard drive technology does not have the limits of large IDE ATA/ATAPI drives.

Ontrack Drive Installation Software

Ontrack drive installation software can safely install IDE ATA/ATAPI hard drives larger than 137 GB, as long as the operating system/controller driver and hardware requirements have been met. Ontrack software can also install these large drives safely if the requirements have not been met, but then the hard drive capaci-

ty is limited to 137 GB. The Windows versions of Ontrack software can also review and test the current OS to advise customers if they have met the OS requirements. If the BIOS cannot support the new large drive sizes, a Dynamic Drive Overlay (DDO) to provide full capacity with Ontrack software can also safely be used if the other requirements have been fulfilled.

Dynamic Drive Overlay in Ontrack drive installation software provides translation for BIOSs that provide limited capacity for IDE ATA/ATAPI drives; however, it neither supports nor inhibits operating systems for drives accessing above 137 GB. Kroll Ontrack does try to make a check for OS support, and enable it if necessary, as part of advising customers during installation of a new drive within the Windows versions of its drive installation software.

Possible Data Loss and Corruption

A drive formatted beyond 137 GB, and used on a system without a 48-Bit LBA compliant driver or operating system has the potential for serious data loss or corruption. The following situations can result in data loss or corruption:

- Moving a large hard drive from a 48-Bit LBA compliant system to a system that is not 48-Bit LBA compliant.
- Booting from a CD, a floppy, or another drive without 48-Bit LBA support.
- Booting to another OS without 48-Bit LBA support on the same machine.
- Re-installation of Windows XP or Windows 2000 without simultaneously upgrading the service packs.

Installation Options that Prevent Data Loss and Corruption

There are three options for installing a large IDE ATA/ATAPI hard drive so as to prevent possible data loss and corruption. The options are to upgrade the operating system software, update the IDE ATA/ATAPI Controller Driver, or attach the hard drive to an additional ATA controller (with a 48-Bit LBA compliant driver). After installing the large hard drive, you can run Ontrack drive installation software to detect and enable the 48-Bit LBA compliant support. You can also run the software to install a disk drive overlay (DDO) to provide full capacity on computers whose BIOS cannot support the new large drive sizes.

Installation Option 1: Upgrade Operating System Software

Upgrading to Windows XP (service pack 1 or newer), or Windows 2000 (service pack 3 or newer) provides 48 Bit LBA support for drives attached to the primary or secondary channel on the motherboard controller.

Windows XP and 2000 with the newest service packs can be used without additional hardware requirements. This option assumes you are attaching the hard drive to the primary or secondary motherboard controller. If you are attaching the hard drive to an additional controller (e.g., PCI adapter card), see option 3.

Step 1: Attach the Large Hard Drive to the Primary or Secondary Motherboard Controller.

Step 2: Install one of the following operating systems:

- Microsoft® Windows XP using Service Pack 1 or newer.

- Microsoft® Windows 2000 using Service Pack 3 or newer.

Step 3: Run Ontrack drive installation software.

Ontrack drive installation software for windows can detect and enable 48-Bit LBA support for the two types of operating systems listed above, as well as partition and format IDE ATA/ATAPI hard drives larger than 137 GB. In addition, if the BIOS cannot fully support the new large hard drive, Ontrack software can install a dynamic drive overlay (DDO) to provide full capacity, as long as the other software and hardware requirements have been met.

Installation Option 2: Install 48 Bit LBA Compliant Driver from chipset manufacturer.

For drives attached to the primary or secondary channel on the motherboard controller – and you don't have Windows XP (service pack 1 or newer) or Windows 2000 (service pack 3 or newer) – install a 48-Bit LBA compliant IDE ATA/ATAPI controller driver, and run drive installation software.

If you are not using Windows XP (service pack 1 or newer) or Windows 2000 (service pack 3 or newer), you must use an IDE ATA/ATAPI controller driver supplied by the controller chipset manufacturer to provide 48-Bit LBA support. This option assumes you are attaching the hard drive to the primary or secondary motherboard controller. If you are attaching a hard drive to an additional controller (e.g., PCI adapter card), see option 3.

A popular example of a 48 Bit LBA compliant driver from a chipset manufacturer is the Intel® Application Accelerator. The Intel Application Accelerator provides 48-Bit LBA compliant IDE ATA/ATAPI controller drivers for systems with supported Intel Chipsets. See the last section of this paper for more information on the Intel Application Accelerator.

Other chipset manufacturers may provide 48 Bit LBA compliant drivers for use with their chipsets. You must check with the manufacturer for availability of these drivers.

Step 1: Attach the large hard drive to the primary or secondary motherboard controller.

Step 2: Identify the chipset used in your operating system.

In order to obtain the necessary driver with 48-Bit LBA support, your must first determine which controller chipset the system is using. Do one of the following:

- Check System documentation or the Web site for information on the motherboard, chipset, or manufacturer of your computer.
- Display the Microsoft Windows PCI Bus Listing in Device Manager.

Windows XP*:

On the **Start** menu -> click **Control Panel** -> double-click the **System** applet -> select the **Hardware** tab -> click the **Device Manager...** button -> expand the '**IDE ATA/ATAPI Controllers**' listing.

Windows 95, Windows 98, Windows 98 Second Edition (SE), and Windows Me:

On the **Start** menu -> click **Settings** -> click **Control Panel** -> double-click the **System** applet -> select the **Device Manager** tab -> expand the '**Hard Disk Controllers**' listing.

Windows 2000:

On the **Start** menu -> click **Settings** -> click **Control Panel** -> double-click the **System** applet -> select the **Hardware** tab -> click the **Device Manager...** button -> -> expand the 'System devices' listing.

Windows NT 4.0*:

The Intel Chipset Software Installation Utility is not required on systems running Windows NT 4.0. Windows NT 4.0 gets updated by installing Service Pack (SP) updates that are available from Microsoft.

*In the list, note the model number and manufacturer of items that are listed as "controllers." These are the "chipsets" that may require 48-Bit LBA compliant drivers.

Step 3: Download and install the updated 48-Bit LBA compatible chipset driver.

Consult the chipset manufacturer's Web site or technical support to check for updated 48-Bit LBA compatible chipset drivers. For information about 48-Bit LBA compatible drivers for many Intel® chipsets, see the "Intel Application Accelerator" section at the end of this paper.

Step 4: Run Ontrack drive installation software.

Ontrack drive installation software can detect and, if necessary, enable 48-Bit LBA support, as well as partition and format IDE ATA/ATAPI hard drives larger than 137 GB. In addition, if the BIOS cannot support the new large hard drive, Ontrack software can install a disk drive overlay (DDO) to provide full capacity, as long as the other software and hardware requirements have been met.

Table 1 summarizes the requirements for installation options 1 and 2.

Table 1. Installation Requirements for Drives Attached to the Primary or Secondary Channel of the Motherboard Controller			
Operating System	Service Pack	48-Bit LBA Compliant IDE ATA/ATAPI Controller Drivers	Dynamic Drive Overlay for Limited Capacity BIOS
Windows XP	SP1	Not Needed	Installed if Needed
Windows 2000	SP 3	Not Needed	Installed if Needed
Windows XP	None	Required	Installed if Needed
Windows 2000		Required	Installed if Needed
Windows NT 4.0	SP6	Required	Installed if Needed
Windows ME	Latest	Required	Installed if Needed
Windows 98 SE	Latest	Required	Installed if Needed
Windows 98	Latest	Required	Installed if Needed
Windows 95 (All Versions)		Not Possible	Installed if Needed
DOS 4-6		Not Possible	Installed if Needed

The Dynamic Drive Overlay in Ontrack drive installation software provides translation for BIOS's that provide limited capacity for IDE ATA/ATAPI drives. DDO can be used with any of the combinations listed in table 1 to overcome this BIOS limitation.

The Ontrack DDP neither supports nor inhibits operating systems for drives accessing above 137 GB. Kroll Ontrack does try to make a check for OS support, and enables it if necessary as part of advising customers during installation of a new drive within the Windows versions of its drive installation software.

Installation Option 3: Attach Large Drive to additional ATA Controller

Attach the large hard drive to an additional ATA controller with a 48-Bit LBA compliant controller driver, and run drive installation software.

Older Microsoft Operating Systems and other Operating Systems, such as LINUX variants, can support large drives with the addition of an IDE ATA/ATAPI controller. Some of these are embedded motherboard controllers, but additional card controllers can be added to a system by inserting the controller in an open PCI bus slot. Most IDE ATA/ATAPI drive controllers capable of 48-Bit LBA support, such as those available from Promise, Highpoint, VIA, have 48-Bit LBA compliant drivers for many of these operating systems. Using an IDE ATA/ATAPI controller that has a 48-Bit LBA compatible controller driver will allow safe use of large drives beyond the previous limits of 137 GB capacity. Additional controllers that do not have 48-Bit compliant drives cannot safely access drives larger than 137 GB.

Step 1: Attach the large hard drive to the additional controller (e.g., PCI adapter card).

Step 2: Install a 48-Bit LBA compatible controller driver.

Most IDE ATA/ATAPI drive controllers capable of 48-Bit LBA support, such as those available from Promise, Highpoint, VIA, and other manufacturers, have 48-Bit LBA compliant drivers for many operating systems. If your additional controller does not come with a 48-Bit LBA compliant controller driver, you must download one from the chipset manufacturer's Web site as described in the "Option 2" section above.

Step 3: Run Ontrack drive installation software.

Ontrack drive installation software can partition and format IDE ATA/ATAPI hard drives larger than 137 GB. In addition, if the BIOS cannot support the new large hard drive, Ontrack software can install a dynamic drive overlay (DDO) to provide full capacity, as long as the other software and hardware requirements have been met.

Table 2 summarizes the requirements for installation option 3.

Operating System	48-Bit LBA Compliant IDE ATA/ATAPI Controller Drivers
Windows XP	Required
Windows 2000	Required
Windows NT 4.0	Required
Windows ME	Required
Windows 98 SE	Required
Windows 98	Required
Windows 95 (Any Version)	Required
DOS 4-6	Required

Intel® Application Accelerator

The Intel Application Accelerator provides 48-Bit LBA compliant IDE ATA/ATAPI controller drivers for systems with supported Intel Chipsets.

System Requirements (as of version 2.3):

- An Intel® Pentium® 4, Pentium III, Pentium II, Celeron®, Intel Xeon™, Pentium III Xeon, or Pentium II Xeon processor.
- A motherboard with a supported Intel chipset.
- The Intel chipset must be properly recognized by the operating system. Some systems require the [Intel Chipset Software Installation Utility](#) in order for the operating system to fully recognize the chipset. Do I need the [Intel Chipset Software Installation Utility](#)?
- A supported operating system.
 - Microsoft Windows XP (prior to Service Pack 1)
 - Microsoft Windows 2000 (prior to Service Pack 3)
 - Microsoft Windows NT 4.0
 - Microsoft Windows Millennium Edition
 - Microsoft Windows 98 SE
 - Microsoft Windows 98
- A supported Intel Chipset: [Identify Your Intel Chipset](#)

The Intel® Application Accelerator supports the following Intel® chipsets (as of version 2.3):

Intel® 810 Chipset	Intel® 810E Chipset	Intel® 810E2 Chipset
Intel® 810L Chipset	Intel® 815 Chipset	Intel® 815E Chipset
Intel® 815EP Chipset	Intel® 815G Chipset	Intel® 815EG Chipset
Intel® 815P Chipset	Intel® 820 Chipset	Intel® 820E Chipset
Intel® 840 Chipset	Intel® 845 Chipset	Intel® 845E Chipset
Intel® 845G Chipset	Intel® 845GE Chipset	Intel® 845GL Chipset
Intel® 845GV Chipset	Intel® 845PE Chipset	Intel® 850 Chipset
Intel® 850E Chipset	Intel® 860 Chipset	

If the Intel Application Accelerator is being used as a solution on a Windows 9x System, Dynamic Drive Overlay (DDO) must be installed in BIOS standard format. Ontrack drive installation software will install DDO in this format for all drives larger than 137 GB on Windows 9x Systems.

References

<http://support.microsoft.com/default.aspx?scid=kb;en-us;303013>

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<http://support.intel.com/support/chipsets/iaa/supported.htm>

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