Developed with the Padus Foundation Class toolkit by the Padus Team.

Welcome to the help file for DiscJuggler Standard Edition, DiscJuggler Professional Edition, and DiscJuggler.NET. This document is organized into the following chapters.

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DiscJuggler Standard Edition, DiscJuggler Professional Edition and DiscJuggler.NET are software applications designed to do a variety of tasks with optical storage discs. Each of these products support the Windows 95/98/Me/NT/2000/XP/2003 operating systems, but not all features may function on older operating systems.

The program's feature set is designed to provide any CD or DVD writing drive owner with a comprehensive set of disc creation, duplication, and extraction functions in a straightforward user interface. The focus of DiscJuggler is to allow the user to create new discs, make duplicates of most existing discs, and extract content from some discs in the fastest, easiest, and most reliable way possible.

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Padus Incorporated is a privately held firm with headquarters in the heart of Silicon Valley. With a creative and innovative approach to software development we are focused not only on CD/DVD duplication, but on other optical disc technologies, including CD and DVD mastering, multimedia authoring, data archiving, and retrieval solutions for industries, businesses, and end-users.

Our mission is to deliver professional-quality products and technologies at a fair price. With more than two decades of combined experience in the optical media field and a proven record of delivering award winning commercial applications (at Incat Systems designing and leading the development of Easy-CD Pro®, the application that pioneered modern pre-mastering). Padus' entire team is committed to the long term satisfaction of our customers.

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This document describes how to install and use DiscJuggler, more specifically the following information.

This first chapter, **Welcome**, introduces the product and gives an overview of conceptual and legal issues involved in disc create, duplication, and extraction.

The second chapter, **Getting Started**, describes the application feature set, the hardware and software requirements for using the program, hardware installation procedures, and troubleshooting information.

The third chapter, **Introduction to Tasks**, presents procedures for creating and duplicating discs, creating disc image files in a variety of formats and extracting disc content using popular formats such as mp3, Windows Media, and MPEG.

The fourth chapter, **Options**, contains a detailed description of all application options.

The fifth chapter, **Device Explorer**, contains a detailed description of the DiscJuggler Device Explorer, a powerful tool to browse drives, device capabilities, and disc formats.

The sixth chapter, **Menus**, contains a detailed description of each DiscJuggler menu function.

The seventh chapter, **Networking**, goes through some of the networking capabilities available in DiscJuggler Professional Edition and DiscJuggler.NET.

The eighth chapter, **Advanced Concepts**, presents a brief introduction to disc technology and disc recording basics.

The ninth chapter, **Autoloaders**, in an introduction to automated disc-loading devices such as autoloaders and jukeboxes.

The tenth chapter, **Getting Help**, lists contact information for Customer and Technical Support, along with a brief list of things you can do as a customer to speed up the process.

The eleventh chapter, **Appendices**, consists of a troubleshooting section, a detailed list of error messages, and a complete glossary of terms.

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This section provides the following information that you should know before working with DiscJuggler.

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Currently there are two types of optical disc formats that are widely available for consumer use. This section will better explain the purpose of these formats and their place in history.

- **Compact Discs**

  Digital Audio Compact Discs (CD-DA) were first introduced to the consumer audio market in 1980 by Philips and Sony as an alternative to vinyl records and magnetic tape cassettes. In 1984, Philips and Sony extended the technology to include data storage and retrieval and introduced a new format: the Data Compact Disc (CD-ROM).

  Since then, the Compact Disc has dramatically changed the way that we listen music and handle electronic information. With a capacity of up to 700 megabytes of computer data or 80 minutes of high quality audio, the Compact Disc has revolutionized the distribution of every kind of electronic information.

  In 1990, Philips and Sony extended the technology again and the Compact Disc became recordable (CD-R). Before the introduction of the CD-R technology, compact discs were produced in commercial replication plants by stamping the media with a pre-recorded master. Today, discs are produced in replication plants where large quantities are required. For small production volumes (up to 500 copies or more, depending on your location and manufacturers in your market), it can be significantly less expensive to master your own discs using commercially available Compact Disc writing drives.

  DiscJuggler is designed to facilitate this task, making the in-house production of small quantities of Compact Discs as simple and convenient as possible.

  Whether a Compact Disc was stamped at a replication facility or "burned" using a compact disc recorder, it can theoretically be read by any available CD-ROM drive. In reality, some inexpensive media and CD players do not work very well together. Only the physical composition of a commercially replicated disc and a CD-R disc are different. The former is coated with a reflective layer of aluminum resulting in a typical silver color. The latter is coated with a reflective layer behind a thin layer of dye (colors can range from blue, silver, green, and others).

- **Digital Versatile Discs**

  In January of 1995, Sony was the first to showcase Digital Versatile Disc technology after having announced co-development six months earlier. Three weeks later, Pioneer, Time Warner, and Toshiba announced their own version of DVD, which had major differences from the format developed by Philips and Sony. Immediately disputes started over which format should be used, since each had their own advantages and disadvantages.

  The disputes did not stop until May of 1995, when a major report was released by leading hardware and software manufacturers (Apple, Compaq, Fujitsu, HP, IBM, and Microsoft), stating that the two formats were not going to be supported by the industry when there were clear advantages in using one format. The result was a mix of the two formats and the formation of the DVD Forum by all companies involved in the two original formats (Matsushita, Mitsubishi, Pioneer, Philips, Hitachi, JVC, Sony, Thompson, Toshiba, and Time Warner).

In 1996, the specifications for DVD-ROM and DVD-Video were finalized and DVD players began to ship to market. One year later, the DVD Forum worked on the specifications for the first recordable (DVD-R) implementation of DVD. In November of 1997, Pioneer announced the first DVD-R drives, while Matsushita and Toshiba released the first DVD erasable (DVD-RAM) drives.

During 1998, a new coalition was formed to develop re-writable discs specifically for storage of data based on 25-year-old CD patents. This format was initially called DVD+RW and was not allowed to use the DVD logo after the DVD Forum ruled that it could not be used in the branch technology. While the technologies between the two formats are similar, licensing rules dictate differences, some of which can be witnessed in the logo branding of devices and media.

For a more detailed description of disc technology, see the **Advanced Concepts** section.

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DiscJuggler Standard Edition contains a wide-arrange of features, giving professional options not at the expense of DiscJuggler's ease-of-use.

- Support for Microsoft® Windows™ 95/98/Me/NT/2000/XP/2003
- Independent ASPI layer
- CD writing methods:
  - Track-At-Once
  - Session-At-Once
  - Disc-At-Once
  - RAW Disc-At-Once (with full PQ/R-W sub-code support and the ability to burn multiple sessions at once)
- CD-TEXT (read and write)
- CDDB (on-the-fly conversion to and from CD-TEXT, ID3 tags, and Windows Media tags)
- Multiple indexes with variable gaps and hi-speed transitions search
- High speed digital audio extraction with multiple jitter correction and resynchronization algorithms
- ISRC and UPC
- Low level algorithms for ECC/EDC scrambling and full PQ sub-code generations
- On-the-fly high speed compression and decompression of mp3 and Windows Media audio streams
- Support for CD+G (Karaoke) encoding and decoding
- CD file systems supported:
  - ISO-9660
  - Joliet
  - UDF
  - Bridge (any combination of the above)
- CD file system extensions supported:
  - XA / Bridge
  - El Torito (bootable)
  - Apple hybrid
- CD formats supported:
  - CD-DA
  - CD+G
  - CD-ROM
  - CD-XA
  - CD+ (Enhanced CD)
  - Mixed Mode
  - Video CD
  - Super Video CD
  - Photo CD
  - Multi-session CD
- High speed pre-mastering engine (>52x CD speed)
- Support for all CD drives currently available (SCSI and ATAPI)
- Full support for FireWire (IEEE-1394) and USB protocols
- Support for buffer under-run prevention technologies including: BURN-Proof™, JustLink™, Power-Burn™, SafeBurn™, and Seamless Link
- Support for optimized write strategies including: PoweRec™ and PoweRec II™
- Support for high quality CD-DA mastering technologies including: AudioMASTER™, VariRec™, and

VariRec II™
- Support for density increasing technologies including: GigaRec™
- Support for simultaneous writing to multiple drives

DiscJuggler Professional Edition contains all of the features listed above, including the following features.

- Shared Network Writer(s) for CD/DVD writing over LAN/WAN
- Single NT service for the complete server front-end and back-end
- Fully functional web interface for administrative and client tasks
- Administrative control available via: Padus Network Console, Web
- Client interaction available via: Padus Network Console, DiscJuggler, Web
- Automatic repair of invalid VIDEO_TS structures
- Support for setting DVD-ROM BookType
- DVD writing methods:
  - Session-At-Once
  - Disc-At-Once
- DVD file systems supported:
  - ISO-9660
  - UDF
  - Bridge (any combination of the above)
- DVD file system extensions supported:
  - El Torito (bootable)
  - Apple hybrid
- DVD formats supported:
  - DVD-ROM
  - DVD-Video
  - DVD-Audio
- High speed pre-mastering engine (>52x CD speed, >16x DVD speed)
- Support for all CD and DVD drives currently available (SCSI and ATAPI)
- Support for CD/DVD autoloaders (special license only)

DiscJuggler.NET contains all of the features listed above, including the following features.

- Unlimited queue for jobs sent over LAN/WAN
- Server access assignable by:
  - IP Address access lists
  - Local user (to Padus Network Service)
- User rank templates:
  - Operator
  - Superuser
  - User
- Access rights assignable per user:
  - Individual drives
  - Drive types
  - Number of drives per job
  - Number of discs

- Job priority
- Drive control

Feature limitations between each product are discussed in great detail in the **Feature Limitations** section of the **Getting Help** chapter.

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For basic use of DiscJuggler Standard Edition and DiscJuggler Professional Edition, the minimum system requirements include the following.

- Microsoft® Windows™ 95/98/Me/NT/2000/XP/2003 operating system.
- 250 MHz or higher AMD® or Intel® x86-class CPU.
- 128 MB or more of RAM.
- 3800 RPM or faster hard disk, large enough to hold application executables and data. A complete Compact Disc image requires between 650 and 700 megabytes of disk space, while a complete Digital Versatile Disc image requires between 4.37 and 7.95 gigabytes of disk space.
- One or more FireWire/SCSI/USB host adapters if using FireWire/SCSI/USB reading or writing drives.
- One or more supported CD-ROM or DVD-ROM drives.
- One or more supported drives capable of writing to CD and/or DVD, preferably of the same make, model, and firmware.

For expanded use of DiscJuggler Standard Edition, DiscJuggler Professional Edition, and DiscJuggler.NET, the recommended system requirements include the following.

- Microsoft® Windows™ 2000/XP/2003 operating system.
- 1 GHz or higher AMD® or Intel® x86-class CPU.
- 512 MB or more of RAM.
- 7200 RPM or faster hard disk, large enough to hold application executables and data. A complete Compact Disc image requires between 650 and 700 megabytes of disk space, while a complete Digital Versatile Disc image requires between 4.37 and 7.95 gigabytes of disk space.
- One or more FireWire/SCSI/USB host adapters if using FireWire/SCSI/USB reading or writing drives.
- One or more supported CD-ROM or DVD-ROM drives.
- One or more supported drives capable of writing to CD and/or DVD, preferably of the same make, model, and firmware.

Please read the **Writing to Multiple Drives** section of the **Advanced Concepts** chapter for requirements on writing to multiple drives at the same time.

Please visit our web site at **http://www.padus.com/support/** for the latest information on supported drives, hardware recommendation and system configuration.

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It is important before installing DiscJuggler to make sure your system is properly configured and meets all previously described **System Requirements**. Particular emphasis should be put into the drive interface. Currently the most popular interfaces used by reading and writing drives are **FireWire, IDE, SCSI, Serial ATA, and USB**.

If possible, always refer to the interface manufacturer installation and configuration instructions. The correct operation of these interfaces is crucial to the success of the entire disc writing process. The speed of these interfaces is also an important element to consider when writing discs. If information is not transferred fast enough to the writing drive, errors may occur that could ruin the blank disc. The importance of this is multiplied when using multiple drives at once on the same bus.

For many years, DiscJuggler has "talked" directly to the reading and writings drives using a proprietary communication protocol. DiscJuggler no longer requires the presence of a software component usually referred to as an "ASPI layer" that is provided in some versions of Microsoft Windows or with your interface card. Furthermore, DiscJuggler has been carefully designed not to interfere with existing ASPI layers should these components exist on your system.

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The vast majority of CD/DVD reading and writing drives are offered in one of the following interfaces.

- **SCSI Interface**

  SCSI (pronounced "skuh-zee") is an acronym for the Small Computer Systems Interface. This interface is an American National Standards Institute (ANSI) standard for high-speed parallel data communication between computers and their peripheral devices. SCSI is a complex and powerful standard which allows you to connect, using a technique known as "daisy chaining," up to seven (SCSI 1 & 2) or fifteen (SCSI 3) different SCSI-compliant devices to one SCSI connection in your computer. The SCSI connection is made via a SCSI host adapter. SCSI devices that are commonly used with computers include hard disk drives, tape drives, disc reading drives, removable cartridge drives, disc writing drives, jukeboxes, scanners, and printers. The disconnect option must be enabled for all system SCSI devices and cards.

  Following are some general rules to help you avoid any problems with SCSI devices.

  - Always make sure that power is off on your computer and on all SCSI devices when connecting or removing a SCSI device.
  - When you install a new SCSI device, check its address (SCSI ID) to make sure another device in the same chain is not already using that address
  - Always use high quality cables and host adapters.
  - Avoid individual SCSI cables longer than six feet, and try to keep the total length of cabling in every single SCSI chain below 15 feet. If you absolutely must have long cabling runs, use an active terminator to boost and clean up signals on the SCSI bus.
  - Make sure all the SCSI buses in the system are properly terminated. Only the first and the last device in the chain must be terminated. If the SCSI host adapter is the last device on the chain, make sure it is terminated (most SCSI host adapters provide internal bus termination that can usually be enabled or disabled from the board BIOS). Terminators may be internal or external. External terminators are small plugs that attach to the rear-panel of a device. Internal terminators are usually installed on the main circuit board of the SCSI device. Some internally terminated devices provide switches that let you switch the internal terminators on or off. Having more than two terminators in a SCSI chain can cause start-up problems, data transmission errors, and possible hardware damage. Whenever possible, use external active termination blocks.
  - If you mix and match narrow (8 bit) and wide (16 bit) SCSI devices on the same SCSI bus, move all the wide devices to the end of the chain and make sure the last device is terminated.
  - If you have more than one SCSI bus, try to balance the SCSI load among all the buses and keep the writing drives separated from all the other SCSI devices attached to the system. Generally, you should not daisy chain more than four writing drives to the same SCSI bus.
  - Periodically check the SCSI interface and drive manufacturers' web site to download the latest device driver and firmware upgrade.

- **IDE Interface**

  IDE stands for Integrated Drive Electronics. Other standards like ATA, UDMA, or EIDE may have different performance details but are all inter-compatible. IDE is a parallel data interface that is normally provided by PC manufacturers and is generally included when you purchase a new

computer. Most computer motherboards come with Primary and Secondary IDE channels. Up to two IDE devices, a master and a slave, can be connected to each channel.

Because this interface is less sophisticated than other interfaces, IDE devices are usually more affordable. Please note that there are trade-offs. IDE devices rely on the CPU for calculating operations, where other devices have their own controller for operations. In a lot of cases this can limit how IDE devices are used.

Following are some general rules to help you avoid any problems with IDE devices.

- Always make sure that power is off on your computer and on all IDE devices when connecting or removing an IDE device.
- If you are considering using DiscJuggler with multiple drives, FireWire or SCSI are the recommended interfaces.
- Any device that you are communicating to and from cannot be interrupted during the recording process, or buffer under-runs will occur. To limit this make sure any device you and sending data to and from is a Master device on the IDE channel.

- **Serial ATA Interface**

Serial ATA replaces the IDE interface. Serial ATA was introduced at speeds up to 150 megabytes per second and is moving forward with plans to support speeds up to 600 megabytes per second. This new interface is fully compliant with the ATA protocol, resulting in automatic support from operating systems and software supporting ATA devices. While IDE supports two devices each shared channel, Serial ATA uses a point-to-point connection for dedicated bandwidth to each device. Additional benefits of Serial ATA over IDE include smarter cabling, hot-swap support, and error checking.

Following are some general rules to help you avoid any problems with Serial ATA devices.

- If you are considering using DiscJuggler with multiple drives, FireWire or SCSI are the recommended interfaces. Writing to multiple drives through Serial ATA is feasible, but only likely with a completely native solution.
- Some Serial ATA controllers require that the device be removed from the Device Manager before being unplugged. Failing to do so can result in the controller hanging.
- DiscJuggler will not display changes to devices plugged in or unplugged while running and will need to be restarted.

- **FireWire Interface**

FireWire is a standard interface for connecting storage, digital video, and many other devices to your computer. Developed by Apple Computer, FireWire 400 (IEEE-1394a) offers data bandwidth up to 50 per second and FireWire 800 (IEEE-1394b) offers data bandwidth up to 100 megabytes per second. One FireWire controller can support up to 63 devices, with the assistance of one or more FireWire hubs. The FireWire standard has special modes for transferring video and other "synchronous" information, making it ideal for communicating with video cameras. The version of FireWire developed by Sony for its video equipment is called i.LINK.

Following are some general rules to help you avoid any problems with FireWire devices.

- Neither Windows NT nor Windows 95 support this interface.
- Windows XP Service Pack 2 was released with crippled support of FireWire 800. Check with Microsoft and the manufacturers of your FireWire 800 devices for solutions.
- The amount of devices that you can have daisy-chained to one FireWire host adapter depends on many factors. There should be no problems running 4 drives on one host adapter, or possibly even more than that. If you notice performance is lacking with the amount of drives you have on one host adapter, purchase an identical host adapter and split up the number of drives evenly between host adapters.
- Always use high quality cables and host adapters.
- Windows will assign drive letters randomly, as these are Plug-and-Play devices. Take note of what drives are assigned to what drive letters by using the Eject command in Explorer, if important to you and your use of these drives.
- DiscJuggler will not display changes to devices plugged in or unplugged while running and will need to be restarted.

- **USB Interface**

  USB stands for Universal Serial Bus. USB 1.1 offers a data speed of up to 1.2 megabytes per second and was developed to connect a low bandwidth devices such as keyboards, mice, scanners, and printers. USB 2.0 offers a data bandwidth up to 60 megabytes per second and was developed to compete with FireWire, offering bandwidth needed for multimedia devices. USB is a low cost interface integrated with most modern PCs and offers many benefits over traditional connection methods including better cabling and greater expansibility. With the assistance of one or more USB hubs, a single USB controller can handle up to 125 devices.

  Following are some general rules to help you avoid any problems with USB devices.

  - Neither Windows NT nor Windows 95 support this interface.
  - If you are considering using DiscJuggler with multiple drives, FireWire or SCSI are the recommended interfaces.
  - Always use high quality cables and host adapters.
  - Because of the low bandwidth found in USB 1.1, we recommend using that bus only when none of the above are available.
  - Windows will assign drive letters randomly, as these are Plug-and-Play devices. Take note of what drives are assigned to what drive letters by using the Eject command in Explorer, if important to you and your use of these drives.
  - DiscJuggler will not display changes to devices plugged in or unplugged while running and will need to be restarted.

Please visit the **Writing to Multiple Drives** section of the **Advanced Concepts** chapter for additional information on multiple drive interfaces.

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The following procedures, while not necessary, may solve problems that DiscJuggler can encounter with your system.

Before you install DiscJuggler on ***Windows XP Professional Edition***:

1. Make sure "Auto-insert notification" is disabled by using the following steps to modify the system configuration (recommended):
   a. Click on Start and then on Run. Type "gpedit.msc" and press Enter.
   b. Navigate the directory structure to: Computer Configuration\Administrative Templates\System
   c. Locate the entry entitled "Turn autoplay off" and double-click to open.
   d. Check the radio button of "Enabled".
   e. Set the option below of "Turn off Autoplay on:" to "All drives".
   f. Click "Apply" and exit Group Policy window.
2. Use Disk Management to un-assign the drive letter of every writing drive not used as a reading drive (optional):
   a. Right-click on My Computer, click Manage, and click Disk Management.
   b. Configure drive(s) to have no drive letter assignments.
   c. Locate the entry entitled "Turn autoplay off" and double-click to open.
   d. Exit Computer Management.
3. Install the latest Windows XP Professional Edition service pack (see **Microsoft Windows Update**).
4. Restart the system.

Before you install DiscJuggler on ***Windows XP Home Edition***:

1. Make sure "Auto-insert notification" is disabled by using the following steps to modify the system registry (recommended):
   a. Click on Start and then on Run. Type "regedit" and press Enter.
   b. Select the Registry section HKEY_LOCAL_MACHINE
   c. Navigate to: HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\policies\Explorer
   d. Create a new key called: NoDriveTypeAutoRun
   e. Type is: DWORD
   f. Value is: 0x000000b5 (181)
2. Use Disk Management to un-assign the drive letter of every writing drive not used as a reading drive (optional):
   a. Right-click on My Computer, click Manage, and click Disk Management.
   b. Configure drive(s) to have no drive letter assignments.
3. Install the latest Windows XP Home Edition service pack (see **Microsoft Windows Update**).
4. Restart the system.

Before you install DiscJuggler on ***Windows 2000***:

1. Login to the system with administrator privileges.
2. Make sure "Auto-insert notification" is disabled by setting the following value in the system registry (recommended):
   HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Cdrom\Autorun = 0x00000000

3. Use Disk Management (Administrative Tools » Computer Management » Disk Management) to un-assign the drive letter of every writing drive not used as a reading drive (optional).
4. Install the latest Windows 2000 service pack (see **Microsoft Windows Update**).
5. Restart the system.

Before you install DiscJuggler on ***Windows NT***:

1. Login to the system with administrator privileges.
2. Make sure "Auto-insert notification" is disabled by setting the following value in the system registry (recommended):
   HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Cdrom\Autorun = 0x00000000
3. Using "Disk Administrator" un-assign the drive letter of every writing drive not used as a reading drive (optional).
4. Install the latest Windows NT service pack (see **Microsoft Windows Update**).
5. Restart the system.

Before you install DiscJuggler on ***Windows 95/98/Me***:

1. For every reading and writing drive present on the system, open the "property page" and make sure:
   a. Auto-insert notification is not checked (optional).
   b. Disconnect is checked.
   c. DMA (if available) is checked. Manual intervention may be required to enable the Microsoft driver to perform IDE DMA transfers. Refer to your system manufacturer or the **http://www.microsoft.com/whdc/archive/ididma.mspx** article for more information.
2. Install the latest Windows service pack (see **Microsoft Windows Update**).
3. Restart the system.

Before you install DiscJuggler on ***Windows 95 (non-OSR2)***:

1. For every reading and writing drive present on the system, open the "property page" and make sure:
   a. Auto-insert notification is not checked (optional).
   b. Disconnect is checked.
2. Install the latest Windows service pack (see **Microsoft Windows Update**).
3. Restart the system.

* * *

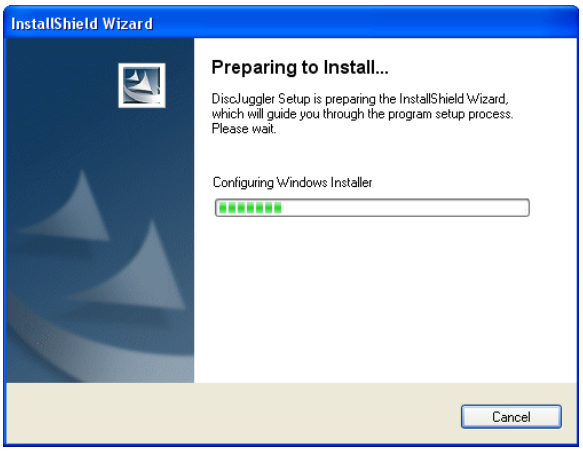
Once your system is properly configured with all devices functioning correctly, you can install DiscJuggler.

If you are installing DiscJuggler on Windows NT/2000/XP/2003, make sure you have administrative privileges. Otherwise the installation file will not be able to change the system configuration. Ask your network administrator how to obtain administrative privileges.

To install DiscJuggler:

1. If you downloaded DiscJuggler from the Internet, locate the "setup.exe" file in your system and double-click on the "setup.exe" icon. Otherwise use Windows to navigate to the drive containing the installation disc and use the "AutoPlay" option.

2. A "wizard-like" application will guide you through the entire installation process.

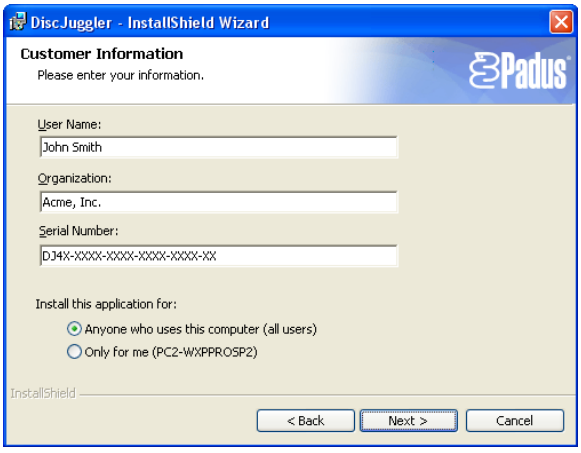


Note: If you are running Windows 95/98/Me/NT/2000, you may need to install the latest version of the Windows Installer runtime. This application should automatically download the updates required from our servers. In the case that is unavailable to you, please contact **Technical Support** or visit the Microsoft web site to obtain the latest Windows Installer update.

3. The setup wizard will supply a default option for most selections. At any point of the setup, you can use the "Next" and "Previous" buttons to move back and forth through the entire installation process and customize the selections to best fit your needs.

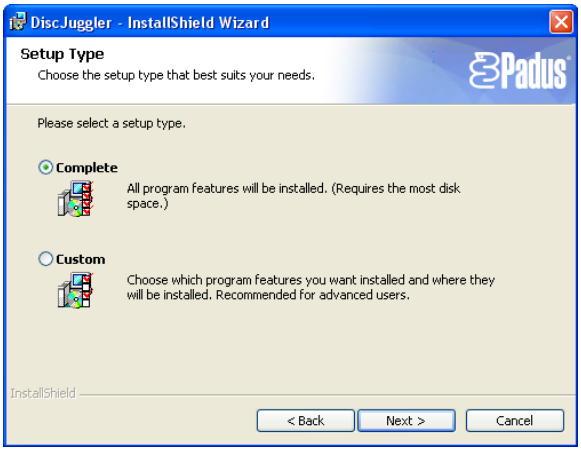
4. Please carefully read the Software License and if you agree with all terms of the license, click the "Agree" button; this will enable the "Next" button and allow you to proceed to the Customer Information window.

5. Enter your name, your organization (optional), and your serial number (the edit field is case sensitive). Pressing the "Next" button to proceed with the installation. If you are installing the Demo Edition, you do not need to enter the serial number and you may leave the field empty. If you made a mistake with the serial number, DiscJuggler will run as the Demo Edition until you are able to register your serial number using the "Register DiscJuggler..." command from the "Help" menu.

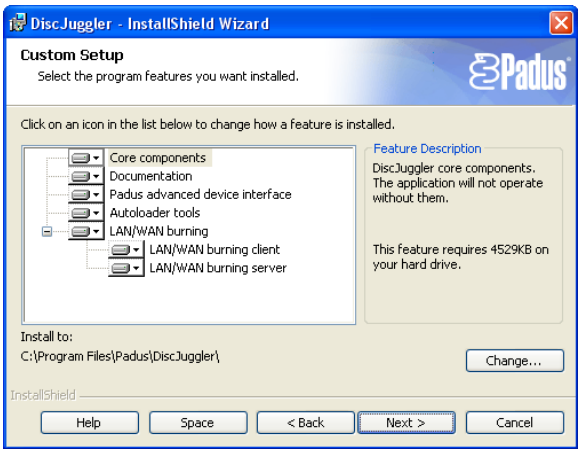


Note: DiscJuggler allows you to purchase licenses with support for writing to different number of drives at the same time. You can start using DiscJuggler with your existing number of writing drives and, should you later decide use more drives in your system, contact a Padus sales representative and ask to upgrade to a license of DiscJuggler supporting the number of writing drives in your system. Contact information can be found on the web at **http://www.padus.com/**.

6. Select "Complete" to perform a standard installation of DiscJuggler to the default Program Files directory and press the "Next" button to proceed to the next window.

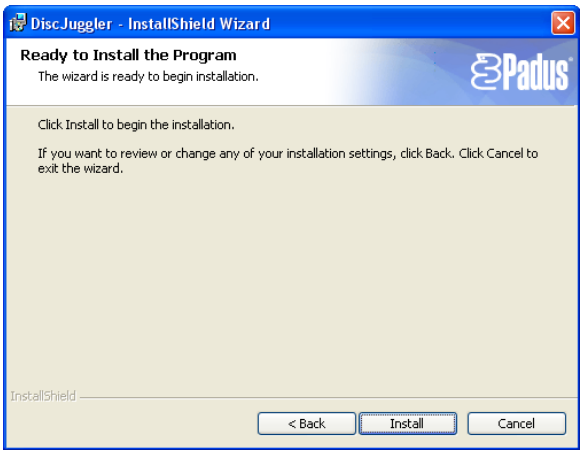


By selecting "Custom" and pressing the "Next" button, you will be able to modify the default installation directory and choose which optional components will be installed to your system.

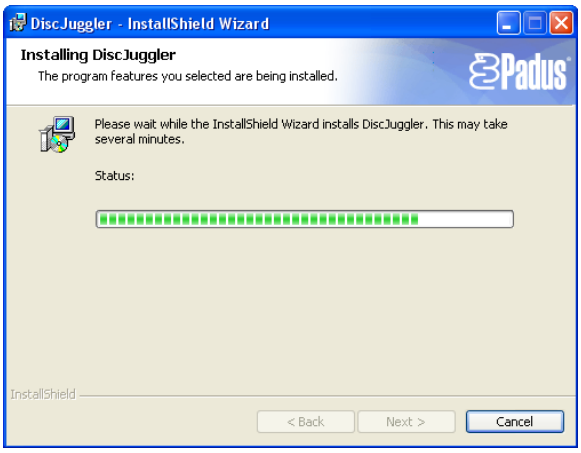


Note: DiscJuggler uses a proprietary interface to communicate with reading and writing drives. Choosing not to install this component may result in DiscJuggler not being able to find an ASPI layer to use devices on your system.

7. At this point all configuration options for the installation of DiscJuggler are complete. One more confirmation window is included if you previously made a mistake that you would like to change.



8. If you wish to change any of your previous configuration options, click the "Back" button. To continue with the installation, click the "Install" button. Setup will begin copying files and registering components.



9. Once Setup has finished installing DiscJuggler, it will report whether or not the installation was successful. Choose the Finish button to close Setup and complete the installation process.

10. If necessary, Setup will ask you to restart the system for all the changes to take effect. Please do so. This concludes the installation of DiscJuggler.

* * *

Once DiscJuggler has been installed on your system, a new program group should be available on the Start menu of the Windows operating system and a new icon should have been conveniently added to your Desktop.

To start DiscJuggler, just double-click the "DiscJuggler" icon.

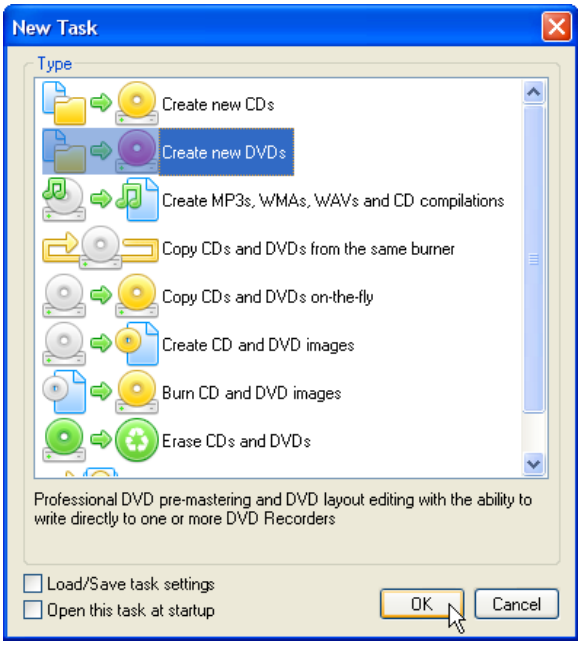
* * *

This section describes the types of documents within DiscJuggler facilitating the creation of new discs, duplication of existing discs, extraction of disc content, and many other uses.

DiscJuggler is a document-centric application, implementing a complete MDI (Multiple Document Interface) environment. In concept, DiscJuggler is similar to a word processor allowing you to create a new document from an existing set of templates, edit that document and then save it in a file format that can be opened and reused.

Like a word processor, DiscJuggler can load a new task from an existing set of settings (referred as "templates"), and it can save the task to perform a predetermined sequence of events to solve specific disc reading/writing needs. The task can be saved in a file format that can be reopened to repeat the same saved disc reading/writing sequence.

DiscJuggler handles "task" documents instead of "document" documents. The definition of "task" in DiscJuggler is "a set of actions that need to be performed to complete a disc process."



Task List:

Open the "File" menu and select "New..." command to access the list of available tasks.

With the task list, you can choose the task to perform. As you select a task to perform, a detailed description of the task is displayed below. The number of task templates vary depending on the DiscJuggler license and attached hardware. Here is the full list of possible task templates:

- **Create new CDs**

  This task allows you to drag and drop files from other sources, to a drive capable of writing CDs. You

can create audio, data, mixed-mode, bootable, and other types of CDs.

- **Create new DVDs**

This task allows you to drag and drop files from other sources, to a drive capable of writing DVDs. You can create data or bootable DVDs.

- **Create MP3s, WMAs, WAVs and CD compilations**

Use this task to extract audio in mp3, WMA, and WAV formats and to create music and CD+G Karaoke disc compilations.

- **Copy CDs and DVDs from the same burner**

This task automatically copies a CD or DVD using the same writing drive for both reading and writing. This task type is useful when there are no other supported reading drives available, when the writing drive is supported as both a reader and a writer.

- **Copy CDs and DVDs on-the-fly**

This task directly copies a CD or DVD from a reading drive to one or more writing drives with no intermediate steps. This is the quickest and easiest way to duplicate a disc, but also the most demanding on your system's resources.

- **Create CD and DVD images**

This task dumps the contents of an entire CD or DVD into a DiscJuggler Image file on your hard disk. The image can be used later to generate multiple copies of the same disc at different times. This task, in conjunction with the next task, is also useful to duplicate a disc when the reading drive is slower than the writing drive.

- **Burn CD and DVD images**

This task writes a DiscJuggler Image file created by DiscJuggler or other CD/DVD mastering

application to one or more writing drive.

- **Erase CDs and DVDs**

This task allows for the erasure of re-writable CDs or DVDs as an independent task. One or multiple identical re-writable drives can be used in this task.

- **Print CDs and DVDs**

This task allows you to fully automate disc printing. By using a supported autoloader device and a disc printer, DiscJuggler will allow you to print multiple discs at once in fully-unattended mode.

Load/Save task settings:

By checking this box, you instruct DiscJuggler to automatically open a document (of the same type as the selected task) based on the previous settings used. This box will also save the settings used when the task is closed. This feature is useful when you mostly use the same settings.

Open this task at startup:

By checking this box, you instruct DiscJuggler to automatically open a document (of the same type as the selected task), every time the application is first launched. This feature is useful when you mostly use one only task type.

You can use the New command in the File menu to create a new task document at any time. A "New Task" window will appear allowing you to choose the type of task to perform.

As you use a task document, DiscJuggler saves a complete task log with detailed status and error report about the current disc reading/writing process. You can export this log with the Export command in the File menu. Sending the log (.txt) file to Padus is extremely helpful for technical support.

A task document can be saved in file format with the commands Save and Save As in the File menu. The first time you save a document and each time you choose Save As, a standard Save dialog will prompt you for a new document name: the default task document extension is .CDJ.

The following data will be saved:

- Source devices/files description.
- Destination devices/files description.
- Detailed table of contents of each disc written.
- Time stamp of each writing process.
- Method, speed, and cache options used.

- Detailed list of errors generated during each recording process.

With the Open command from the File menu, you can reload previously saved task documents. All previous settings including source and destination devices/files, cache options, and speed options are preserved.

* * *

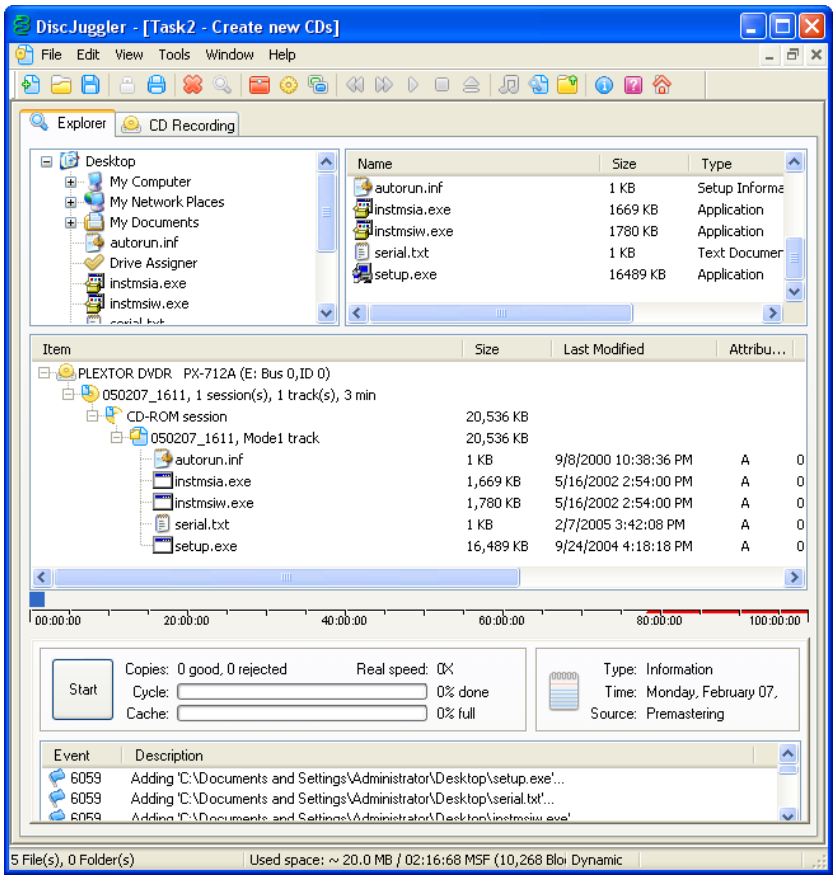
This task provides an integrated environment to create:

- CD-ROMs
- CD-ROM XAs
- Mixed Mode CDs
- Enhanced CDs (CD+)
- Multi-session CDs
- Audio CDs from any combination of mp3, WMA, and WAV files

DiscJuggler employs sophisticated procedures to transparently create a CD by dynamically checking the content of the disc to be mastered against possible CD standards and by not allowing certain illegal operations.

This avoids the use of complex and lengthy "Wizards" to choose which type of CD to create. DiscJuggler will automatically determine the "best" CD type to create by constantly monitoring the user actions and the data being added to the CD Layout.

Of course, this can create problems for those who are looking to do something specific. Fortunately DiscJuggler provides an array of every imaginable option so experienced users can create exactly what they want.



The following is a list of common tasks with detailed procedures that can be executed using this environment.

Creating a Data CD:

1. Select the horizontal "CD Recording" tab on the upper-left corner of the main window.
2. Insert a blank CD into a drive capable of writing CD-R or CD-RW media and select the same drive in the **Destination** panel.
3. Select the horizontal "Explorer" tab on the upper-left corner of the main window.
4. In the Explorer section, select the files and folders you want to record, and then drag-and-drop them over the "Open session" item in the in the CD Layout window. Repeat until CD Layout contains all of the files and folders that you want to record.
5. Click the "Start" button.

Creating an Audio CD:

1. Select the horizontal "CD Recording" tab on the upper-left corner of the main window.
2. Insert a blank CD into a drive capable of writing CD-R or CD-RW media and select the same drive in the **Destination** panel.
3. Select the horizontal "Explorer" tab on the upper-left corner of the main window.
4. In the Explorer section, select any combination of mp3, WMA, and WAV audio files you want to record, and then drag-and-drop them over the "Open session" item in the in the CD Layout window. Repeat until CD Layout contains all of the songs you want to record.
5. Click the "Start" button.

Creating an Enhanced CD (CD+):

1. Select the horizontal "CD Recording" tab on the upper-left corner of the main window.
2. Insert a blank CD into a drive capable of writing CD-R or CD-RW media and select the same drive in the **Destination** panel.
3. Select the horizontal "Explorer" tab on the upper-left corner of the main window.
4. In the Explorer section, select any combination of mp3, WMA, and WAV audio files you want to record, and then drag-and-drop them over the "Open session" item in the in the CD Layout window. Repeat until the first session contains all of the songs you want to record.
5. Still in the Explorer section, select the files and folders you want to record in the data portion of the CD, and then drag-and-drop them over the "CD-DA, 1 session(s), ..." item in the in the CD Layout window. A second "data" session will be automatically appended to the CD Layout. Repeat until the second session contains all of the files and folders that you want to record.
6. Click the "Start" button.

Creating a Mixed-mode CD:

1. Select the horizontal "CD Recording" tab on the upper-left corner of the main window.
2. Insert a blank CD into a drive capable of writing CD-R or CD-RW media and select the same drive in the **Destination** panel.
3. Select the horizontal "Explorer" tab on the upper-left corner of the main window.
4. In the Explorer section, select any combination of mp3, WMA, and WAV audio files you want to record, and then drag-and-drop them over the "Open session" item in the in the CD Layout window. Repeat until the first session contains all of the songs you want to record.

5. Still in the Explorer section, select the files and folders you want to record in the data portion of the CD, and then drag-and-drop them over the "CD-DA session" item in the in the CD Layout window. A second "data" track will be automatically created at the beginning of CD Layout. Repeat until the first data track contains all of the files and folders that you want to record.
6. Click the "Start" button.

Creating a Multi-session CD:

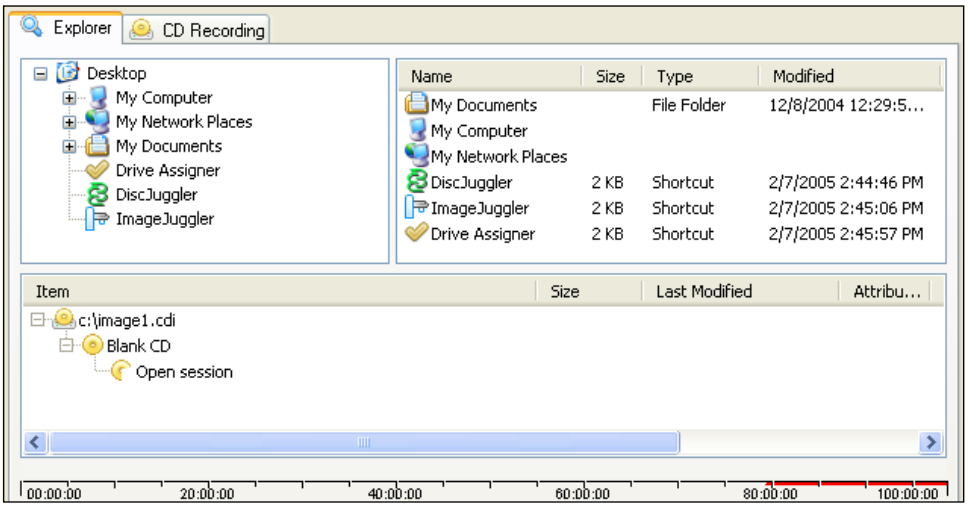
1. Select the horizontal "CD Recording" tab on the upper-left corner of the main window.
2. Insert a blank CD into a drive capable of writing CD-R or CD-RW media and select the same drive in the **Destination** panel.
3. Select the "Advanced" sub-tab and make sure "Close disc" is not checked.
4. Select the horizontal "Explorer" tab on the upper-left corner of the main window.
5. In the Explorer section, select any combination of data files you want to record, and then drag-and-drop them over the "Open session" item in the in the CD Layout window. Repeat until the first session contains all of the files you want to record.
6. Still in the Explorer section, select the files and folders you want to record in the data portion of the CD, and then drag-and-drop them over the "CD-DA session" item in the in the CD Layout window. A second "data" track will be automatically created at the beginning of CD Layout. Repeat until the first data track contains all of the files and folders that you want to record.
7. Click the "Start" button.
8. Close the task when it has been completed and re-insert the disc that was just written. Start a new "Create new CDs" task.
9. Select the horizontal "CD Recording" tab on the upper-left corner of the main window.
10. Select the same drive in the **Destination** panel.
11. Select the horizontal "Explorer" tab on the upper-left corner of the main window.
12. Choose to import or not import the files recorded from the first session to the new session you are about to create.
13. In the Explorer section, select any combination of data files you want to record, and then drag-and-drop them over the "Open session" item in the in the CD Layout window. Repeat until the second session contains all of the files you want to record.
14. Repeat as necessary, selecting "Close disc" in the "Advanced" sub-tab for the last desired session.

This task's main interface is subdivided into six major panels:

- **Explorer & CD Layout**
- **Destination**
- **Advanced**
- **Action & Method**
- **Status**
- **Autoloader**

* * *

This window is conceptually and functionally similar to the standard Windows Explorer. It is subdivided into two smaller sections: the top portion is a standard windows explorer that can be used as a drag-and-drop source while the bottom part of the windows represents the disc layout being constructed.



Explorer (top):

The Explorer section is where you select the files, folders, and audio you want to add to the CD Layout. In the Explorer section you can see how folders are organized on your computer or network volumes and all the files and folders in each selected folder. If you click a volume or folder in the left box of the Explorer section, the right box displays its contents.

To create a CD you must select the files, folders, and audio that you want to record from the Explorer section and then drag-and-drop them over the CD Layout section.

CD Layout (bottom):

The CD Layout section is where you assemble and organize the files, folders, and audio that you want to record to a CD. The CD Layout must contain all of the files and/or audio before you can create a CD. To add files, folders, and audio to the CD Layout simply select them in the Explorer and then drag-and-drop them over the appropriate CD Layout location.

When you add files, folders, or audio to the CD Layout, the CD Layout doesn't store the data locally but instead it keeps track of where the information is located on your local system or network and uses this information when recording the CD.

A full set of editing functionalities are provided to:

- Create new folders

  Right-click with the mouse on the location where you would like to create the new folder and then select the "New Folder" command from the floating menu.

- Move files and folders

Select the desired items and drag-and-drop them to the new location.

- Remove files and folders

  Select the file or folder in the CD Layout and press the <Delete> key or right-click with the mouse and then select the "Delete" command from the floating menu.

- Rename files and folders

  Select the file or folder to be renamed and press the <F2> key or right-click with the mouse and then select the "Rename" command from the floating menu.

- Find files

  Right-click with the mouse on the location that will serve as base for your search and then select the command "Find" from the floating menu.

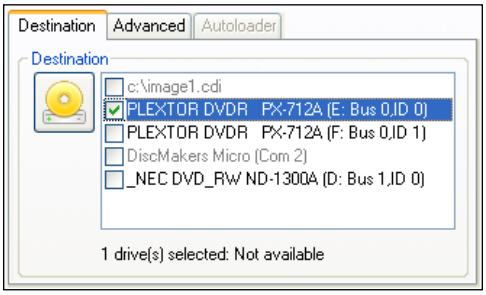
- Import selected files and folders from any previous session

  Double-click on any previous session to see the list of tracks, double-click on a data track to access its file-system an drag-and-drop the requested files and folders in the last session at the bottom of the window.

Note: Right-clicking on most CD Layout items and selecting the "Properties" command from the floating menu will display the corresponding properties window containing detailed information on the selected item itself.

* * *

This section provides controls to specifies one or more destination writing drives to be used during the pre-mastering process.



The first item of the list is always the DiscJuggler Virtual Drive and can be used in place of a real drive to create disc images on your local hard disk.

In a newly created document, DiscJuggler will automatically select the first non-virtual available writing drive. If the document task is being reopened, DiscJuggler will try to re-select the same recorder configuration in use when the document was last saved.

After a writing drive has been selected, DiscJuggler will continuously poll the selected device to read the Table of Contents (TOC) of the mounted media and display a short description of disc contents under the corresponding selected writing drive.

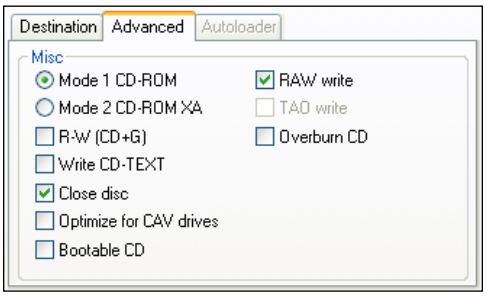
DiscJuggler will not start a duplication session until a blank writable disc is mounted in the selected destination writing drive.

Please read the **Writing to Multiple Drives** section of the **Advanced Concepts** chapter for requirements on writing to multiple drives at the same time.

Note: Clicking on the drive icon will eject the media mounted in the selected drive. Clicking on the drive icon while pressing the <Ctrl> key will load, if possible, the media mounted in the selected drive. Clicking on the drive icon while the first item (Virtual Drive) is selected will display the standard Windows Browse dialog which will allow you to change the current disc image path and name.

* * *

The Advanced tab contains settings that don't usually need to be changed before a standard disc writing process. In most cases these settings will be on their default values, but using the option to Load/Save task settings or changes in **Options** will affect these settings.



Mode 1 CD-ROM:

This is the standard format for single session discs containing data only or data and audio. Multi-session is also supported.

Mode 2 CD-ROM XA:

This is the recommended format for multimedia applications like Video CD, Photo CD or when multi-session is required like in Enhanced CD (CD+). "Mode 2 CD-ROM XA" is the default selection.

Write CD-TEXT:

Checking this option will instruct DiscJuggler to write information such as the name of the album, the artist, and the track titles when creating Audio CDs.

Close disc:

If this option is checked DiscJuggler will close the disc at the end of writing. You will no longer be able to write additional content to the disc.

Optimize for CAV drives:

Most newer drives use Constant Angular Velocity (CAV). This new technology causes the disc to spin at a constant angular speed. The advantage of CAV over Constant Linear Velocity (CLV) is that drives do not need to constantly change speed and therefore they are simpler to produce, faster and cheaper. Since the data density on the disc is constant across the whole area, the "net" effect of CAV is that read speed on the inner edge of the disc is much slower that on the outer edge. This is why drive manufacturers often declare the read speed of their drives to be for example 14x-40x where 14x is the read speed at the beginning of the disc and 40x is the read speed at the outer edge.

If the data disc you are burning is not full, by selecting this option you will allow DiscJuggler to generate an appropriate number of dummy (empty) blocks at the beginning of the recording process thus moving your data as close as possible to the outer edge disc where the read speed is highest.

Additionally, you can using DiscJuggler's integrated CD Layout to prioritize the files being written to disc. By doing this you can precisely place most important files on areas of the disc with the highest read speed.

You will be not able to add any additional content to your disc after writing with this option.

Bootable CD:

Select this option if you wish to create a bootable CD. A bootable CD is a standard data disc with a special extension that will allow the CD to boot your computer emulating a floppy disk. To make a bootable CD, you will need to create a bootable floppy disks containing all the necessary files before you burn, as DiscJuggler does not create the bootable information for you.

RAW write:

RAW write will disable the automatic hardware regeneration of error correction codes and reproduce the source data "as is" using, whenever possible (not all recorders allow this option), the RAW recording method. When this option is selected, DiscJuggler will read and write blocks and associated sub-codes transparently without interfering with their content.

Checking this box can be useful if intentional discrepancies between the error detection encoding and user data are present in the source. This option should be used with extreme caution as DiscJuggler cannot detect legitimate read errors when operating in this mode.

TAO write:

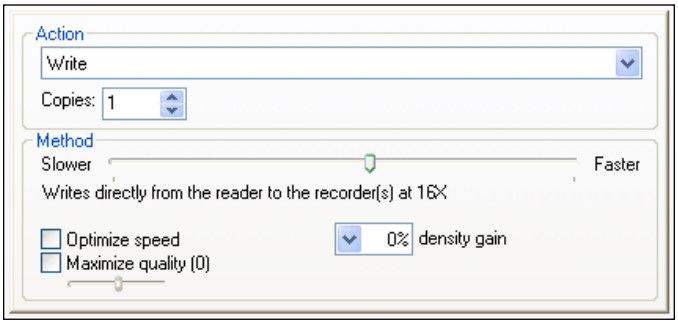
Selecting this option will force DiscJuggler to write discs in Track-At-Once (TAO). TAO forces a 2 seconds gap between tracks and adds a few additional unreadable blocks at the beginning and at the end of each track. DiscJuggler by default uses Session-At-Once (SAO) when supported by your drive. Use TAO recording method only if for any reason your drive is not working in SAO or Disc-At-Once (DAO) writing.

Overburn CD:

You can attempt to "overburn" content that exceeds the maximum size of a standard CD by checking this box. When you select this option DiscJuggler will simply ignore the maximum available space on the target CD and will let you start the recording process anyway. However, there is no guarantee that you will be successful or how much space, if any, is available beyond the standard maximum size for the CD brand that you are using. DiscJuggler will give you the choice of overburning or terminating on a task-by-task basis if you have checked the box for this in the confirmation dialog.

* * *

Using the Action & Method panels, located in the upper right corner of the main task window, you can control various aspects of the disc writing process.



Action:

Several combinations of the four actions listed below are selectable using the drop-down list box. When multiple actions are combined together, DiscJuggler will perform them in sequence from left to right. Only actions that can actually be performed are active at any given time, so for example the "Print" action will not be selectable if a disc label printer is not present on the system where the application is running.

- **Write:**

  Using Write will instruct DiscJuggler to immediately execute a complete disc write process. No test action will be performed.

- **Verify:**

  Using Verify will instruct DiscJuggler to perform a bit-by-bit comparison of the disc in the source device with all disc copies in the target devices to certify that the discs are identical. This operation is only useful for non-audio tracks.

- **Test:**

  Using Test will instruct DiscJuggler to execute a complete disc write process with the only difference that the writing drive's laser is set to read power instead of write power. The result of this action, sometimes referred to as a "pseudo-write", is to test the ability of the whole system (computer, reading drives, and writing drives) to successfully perform the requested task without wasting a blank disc.

  The test takes the same time to complete as an actual write. It also will require you to insert blank discs in each selected writing drive, to check media integrity.

  Make sure you run a test every time you change system configuration or when you increase the writing speed.

- **Print:**

  If this action is available (i.e. a disc label printer is connected to the system), when selected, DiscJuggler will automatically print the specified disc labels for both good and rejected discs.

Copies:

You can use the "Copies" control to specify the total number of discs. At the end of every duplication cycle, DiscJuggler will ask you to insert new blank discs in the selected writing drive(s) until the number of copies required is reached. For example, assume that you need 6 copies of one disc and you have only writing drives available. With 6 entered in this field, DiscJuggler will perform the following cycles:

	Copies	Good	Rejected	Total
1st cycle	2	2	0	2
2nd cycle	2	1	1	3
3rd cycle	2	2	0	5
4th cycle	1	1	0	6

A special "Auto" value is available to instruct DiscJuggler to continue to write until a destination drive runs out of blank media. This option is particularly useful when in conjunction with autoloaders and jukeboxes. If the "Ask for more media" confirmation is selected in **Options**, DiscJuggler will prompt the user to reload the destination device with more media and to continue writing.

Directly edit the control field or use the spin-buttons to enter a positive number.

Method:

Using the Method slider, you can choose the writing speed. The slider is automatically initialized with appropriate speeds that DiscJuggler calculates by analyzing the performance of the selected source and target. A detailed description of the currently selected method is given underneath the slider control.

Usually the slowest writing method consists of temporarily caching the entire disc contents into a Disc Image file on the hard disk and writing the image to the writing drive at one speed. The fastest method consists of writing disc contents on-the-fly directly from the source drive to the selected writing drive(s) at maximum allowed speed.

Optimize speed:

This option will enabled drive specific technologies like JustSpeed™, PoweRec™, or PoweRec II™ for optimum writing speed control to disc media. These technologies will fetch the ATIP information from the blank media, determine speed information by doing a test write to the OPC area of the disc, and check for disc precision before writing to the blank disc. This option may result in varying times for writing to discs as it automatically adjusts the speed during the writing process, but vastly improve quality of the recorded disc. This option will not appear for drives that do not feature these writing technologies.

Boost speed:

This option will enable writing speeds higher than 44x for writing drives. This option will not appear for drives that do not feature this writing technology.

Maximize quality (0):

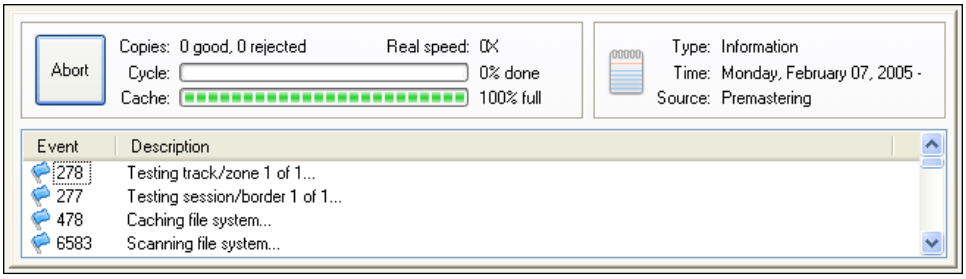
This option will enable drive specific technologies like Audio Master™, Audio Master HQ™, VariRec™, and VariRec II™ for high quality writing. By optimizing the laser power and limiting the writing speed to nothing higher than 8x speed, these technologies vastly improve the quality of the resulting disc. Changes in the writing speed will significantly slow down the time to write a disc. This option will not appear for drives that do not feature these writing technologies.

Features discussed in this section relating to autoloaders are only available in limited licenses of DiscJuggler Professional Edition and DiscJuggler.NET. See **Feature Limitations** *for more information.*

* * *

The Status panel is a user interface component common to all task documents' main windows and is responsible for displaying and monitoring the status of every task's ongoing operation.

The panel is subdivided into three smaller sections.



The progress section, in the upper left corner, contains a Start button to initiate and abort the current task and several gauges to measure the disc writing status:

- **Start/Abort:**

  This button is available only when all the task's settings have been properly configured and both source and target drives are ready.

  Click the Start button to initiate a writing process.

  The button switches to Abort once a duplication process is in progress; it can be used at any time during the duplication process to cancel the operation.

- **Copies Good and Rejected:**

  Estimates the percentage of the current duplication cycle completed. This estimate can be inaccurate at times and does not include the overhead time at the beginning and end of a recording.

- **Cycle:**

  Estimates the percentage of the current duplication cycle completed. This estimate can be inaccurate at times and does not include the overhead time at the beginning and end of a recording.

- **Cache:**

  Shows the percentage of secondary memory cache full. When the cache is not consistently full, the write speed is too high and the system cannot sustain the throughput required by the writing drives.

- **Speed:**

Shows the live and real speed of recording based on bitrate. The writing speed selected in the Action & Method may significantly differ from what the real speed displays. Optimize write, Maximize quality, and certain writing strategies like CAV (Constant Angular Velocity).

The log section, occupying the entire bottom area, displays the complete list of all the events generated by the associated task document. All events are sorted by time in descending order with the most recent event displayed on top of the list:

- **Event:**

  Unique numeric event identifier. Click on the event with the mouse to display information that is more detailed.

- **Print:**

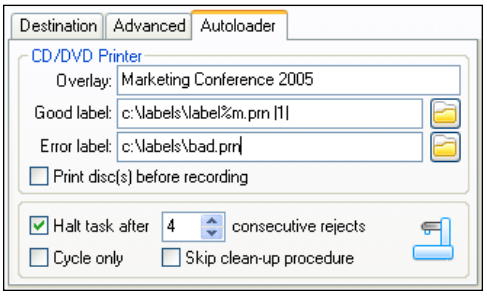
  A detailed event description.

Note: When an error occurs in this log, it is important that you save it for Technical Support to examine. Please read the **Error Reports** *in our* **Getting Help** *section of this documentation.*

* * *

The Autoloader panel allows you to control many aspects of autoloading robotics. You can specify a label image file and even pass information to a third party printing application for printing on a supported disc printer. You can also specify a quality control threshold for halting the entire task based on rejects in consecutive duplication cycles and cycle the mechanical aspects of the autoloader and its drives without writing.

The Autoloader panel is only activated if you have a robotic autoloader currently attached to your system and are running a DiscJuggler license with autoloader support.



CD/DVD Printer:

DiscJuggler allows you to specify a string that will be passed to popular disc printing applications, for printing a label and/or serializing discs. Alternatively .BMP (Windows bitmap), .JPG, and .PRN (raw printer data) files can be specified in which case DiscJuggler will send it directly to the disc printer.

Overlay:

A simple overlay of Arial, 12pt text centered at the lower region of the disc. New lines can be created by using the | (pipe) character.

Good label:

These parameters are used whenever DiscJuggler needs to print a disc that has been successfully written. In the image above the "%m" variable will be replaced with the value 1 (one) and automatically incremented each time DiscJuggler writes a good copy of a master disc.

For example the following string:

Good label: "c:\labels\label%m.prn |1|"

... will be expanded as follows:

Master 1, copy 1: "c:\labels\label1.prn"
Master 1, copy 2: "c:\labels\label1.prn"
Master 2, copy 1: "c:\labels\label2.prn"
Master 2, copy 2: "c:\labels\label2.prn"
Master 2, copy 3: "c:\labels\label2.prn"

Error label:

These are the parameters used by DiscJuggler to print a disc that was not recorder successfully. Please refer to the "Good label" section for a detailed syntax explanation.

Print disc(s) before recording:

Checking this option allows autoloader to print the disc label(s) before writing the discs. This option is especially useful when you using card-type discs as they need to be inserted into the disc label printer with the same orientation due to their asymmetric shape.

Halt task after *n* consecutive rejects:

A quality control measure to halt the process when producing at least one unacceptable disc on *n* consecutive cycles of the duplication task. This type of failure could indicate a hardware or media problem.

Cycle only (ignore action):

Allows the robotic elements of the autoloader system to be exercised for purposes of testing or demonstrating without performing the action specified in the Action & Method panel.

Skip clean-up procedure:

When DiscJuggler starts a new task where an autoloader is being used, it assumes all the drives in the unit are empty and trays closed. If you are sure that all drives are empty and trays closed, you can use this option to skip the clean-up procedure and save time.

Please check the **Autoloaders** chapter for additional features and information.

Features discussed in this section relating to autoloaders are only available in limited licenses of DiscJuggler Professional Edition and DiscJuggler.NET. See **Feature Limitations** *for more information.*

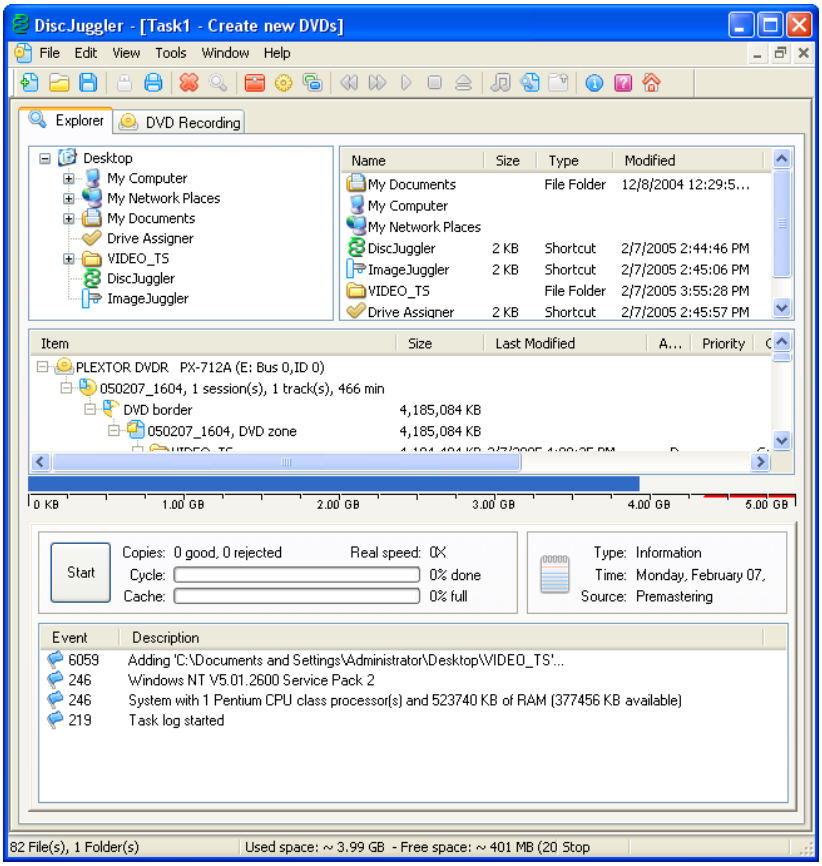
* * *

This task provides an integrated environment to create:

- Data DVDs
- DVD-Videos (from applicable VIDEO_TS structures)

DiscJuggler employs sophisticated procedures to transparently create a DVD by dynamically checking the content of the disc to be mastered against possible DVD standards and by not allowing certain illegal operations.

Of course, this can create problems for those who are looking to do something specific. Fortunately DiscJuggler provides an array of every imaginable option so experienced users can create exactly what they want.



The following is a list of common tasks with detailed procedures that can be executed using this environment.

Creating a Data DVD:

1. Select the horizontal "DVD Recording" tab on the upper-left corner of the main window.
2. Insert a blank DVD into a drive capable of writing DVD-R, DVD-R DL, DVD-RW, DVD-RAM, DVD+R, DVD+R DL, or DVD+RW media and select the same drive in the **Destination** panel.
3. Select the horizontal "Explorer" tab on the upper-left corner of the main window.
4. In the Explorer section, select the files and folders you want to record, and then drag-and-drop them

over the "Open session" item in the in the DVD Layout window. Repeat until DVD Layout contains all of the files and folders that you want to record.
5. Click the "Start" button.

Creating a DVD-Video:

1. Select the horizontal "DVD Recording" tab on the upper-left corner of the main window.
2. Insert a DVD containing data and an open session into a drive capable of writing DVD-R, DVD-R DL, DVD-RW, DVD-RAM, DVD+R, DVD+R DL, or DVD+RW media and select the same drive in the **Destination** panel.
3. Select the horizontal "Explorer" tab on the upper-left corner of the main window.
4. In the Explorer section, select the VIDEO_TS folder you want to record and drag-and-drop it over the "Open session" item in the in the DVD Layout window.
5. Click the "Start" button.

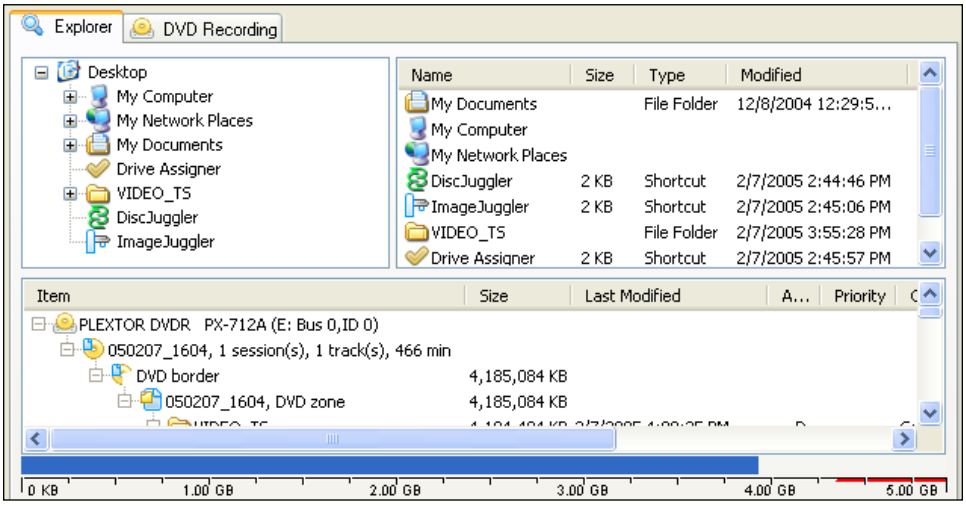
This task's main interface is subdivided into six major panels:

- **Explorer & DVD Layout**
- **Destination**
- **Advanced**
- **Action & Method**
- **Status**
- **Autoloader**

Features discussed in this section relating to DVD writing are only available in DiscJuggler Professional Edition and DiscJuggler.NET. See **Feature Limitations** *for more information.*

* * *

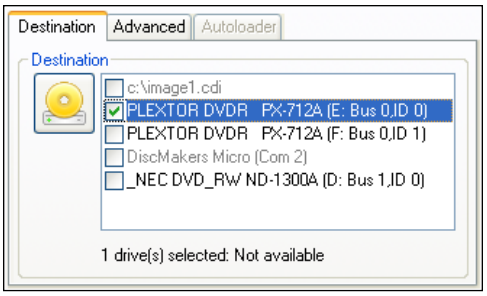
This window is conceptually and functionally similar to the standard Windows Explorer. It is subdivided into two smaller sections: the top portion is a standard windows explorer that can be used as a drag-and-drop source while the bottom part of the windows represents the disc layout being constructed.



See the **Explorer & CD Layout** overview in the **Create new CDs** section for a detailed description of this component.

* * *

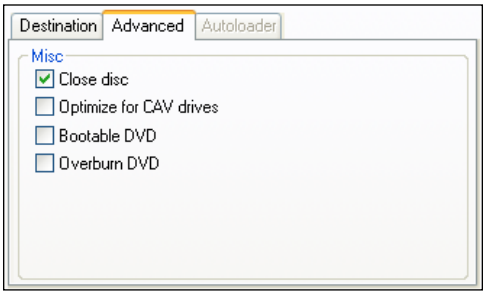
This section provides controls to specifies one or more destination writing drives to be used during the pre-mastering process.



See the **Destination** overview in the **Create new CDs** section for a detailed description of this component.

* * *

The Advanced tab contains settings that don't usually need to be changed before a standard disc writing process. In most cases these settings will be on their default values, but using the option to Load/Save task settings or changes in **Options** will affect these settings.



Bootable DVD:

Select this option if you wish to create a bootable DVD. A bootable DVD is a standard data disc with a special extension that will allow the DVD to boot your computer emulating a floppy disk. To make a bootable DVD, you will need to create a bootable floppy disk containing all the necessary files before you burn, as DiscJuggler does not create the bootable information for you.

Overburn DVD:

You can attempt to "overburn" a DVD that exceeds the maximum size of a standard DVD by checking this box. When you select this option DiscJuggler will simply ignore the maximum available space on the target DVD and will let you start the recording process anyway. However, there is no guarantee that you will be successful or how much space, if any, is available beyond the standard maximum size for the DVD brand media that you are using. DiscJuggler will give you the choice of overburning or terminating on a task-by-task basis if you have checked the box for this in the confirmation dialog.

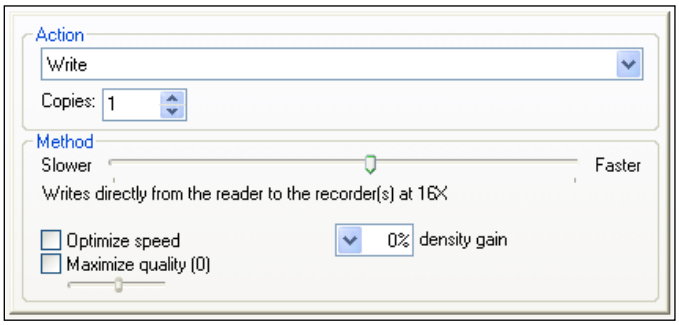
For detailed information on the following options:

- **Optimize for CAV drives**
- **Close disc**

... see the **Advanced** overview in the **Create new CDs** section.

* * *

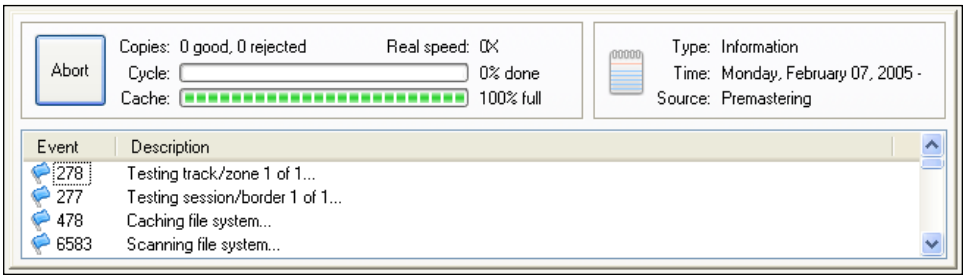
Using the Action & Method panels, located in the upper right corner of the main task window, you can control various aspects of the disc writing process.



See the **Action & Method** panel in the **Create new CDs** section for a detailed description of this component.

* * *

The Status panel is a user interface component common to all task documents' main windows and is responsible for displaying and monitoring the status of every task's ongoing operation.

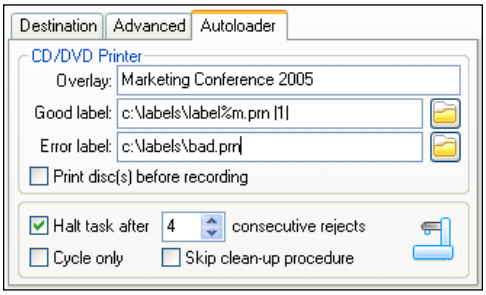


See the **Status** panel in section **Create new CDs** for a detailed description of this component.

* * *

The Autoloader panel allows you to control many aspects of autoloading robotics. You can specify a label image file and even pass information to a third party printing application for printing on a supported disc printer. You can also specify a quality control threshold for halting the entire task based on rejects in consecutive duplication cycles and cycle the mechanical aspects of the autoloader and its drives without writing.

The Autoloader panel is only activated if you have a robotic autoloader currently attached to your system and are running a DiscJuggler license with autoloader support.

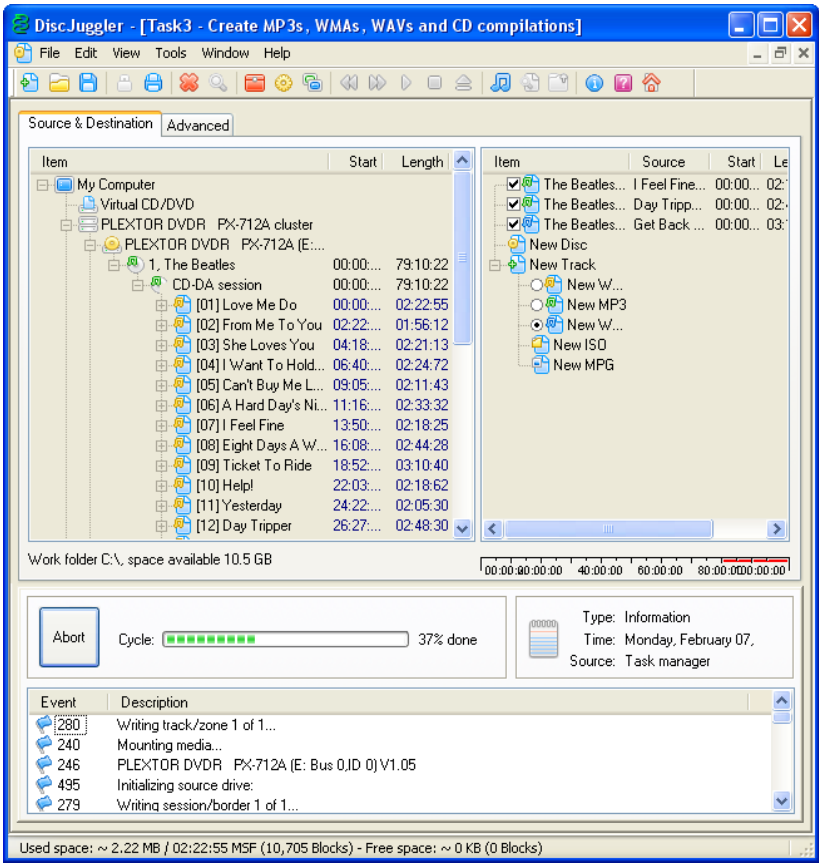


See the **Autoloader** panel in section **Create new CDs** for a detailed description of this component.

* * *

This task provides a powerful and simple environment to:

- Extract and compress on-the-fly songs from any Audio CD and create files on your local computer in, mp3, Microsoft Windows Media (WMA), and Microsoft WAVE (WAV) formats.
- Extract a data track from any data CD or CD image and save it as a standard ISO-9660 image
- Create powerful music and CD+G Karaoke compilations with songs from different discs with a few drag-and-drops while at the same time maintaining full control over sophisticated features such as:
  - Gap and index editing
  - R-W sub-codes read/write
  - ISRC and UPC definition
  - CD-TEXT custom editing with 2-way automatic encoding from and to CDDB data

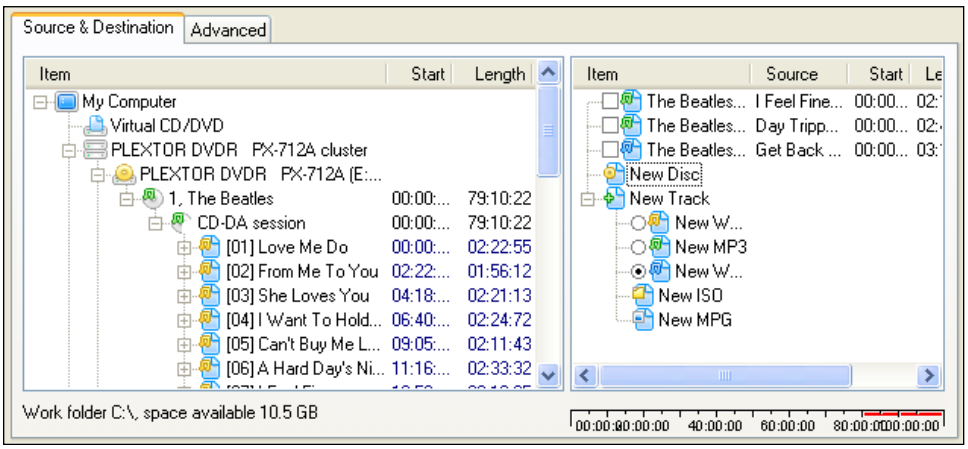


This task only allows you to extract tracks from discs or to create music compilations. The main interface is subdivided into four major panels:

- **Source & Destination**
- **Advanced**
- **Waveform**
- **Status**

* * *

The Source & Destination panel of this task is conceptually similar to that of the Windows Explorer.



Source:

On the left side of the window, the "Source & Destination" panel displays the list of available drives that can be used to extract digital music and data from a disc. DiscJuggler will automatically detect when a drive is loaded with a new disc and it will display a detailed graphic representation of its Table of Contents (TOC).

Any border, session, track, or zone in the this panel can be used as source item in a drag-and-drop operation.

Work Folder:

The "Work folder" is where your files and disc images will be stored by default. You can change this location on a project basis from the **Advanced** panel or permanently from the **I/O** panel in the **Options** section.

Destination:

This panel is the target of every drag-and-drop operation and gives you a tree-like representation of your current project. When a new task is created this window contains only two main items:

- New Disc:

  This serves as initial drag-and-drop target to create a new compilation using items (either sessions or tracks) from the "Source" panel.

- New Track:

  This serves as initial drag-and-drop target to create a new DiscJuggler Image file using items (either sessions or tracks) from the "Source" panel. The following file types can be encoded:

  - New WAV:

    Dragging an audio track to this destination will prepare DiscJuggler to extract the track as a

Microsoft Wave file, an uncompressed format.

- New MP3:

  Dragging an audio track to this destination will prepare DiscJuggler to extract the track as a mp3 (MPEG Layer 3) file, a compressed format. Compression attributes can be changed in the **General** Audio section of the **Options** section.

- New WMA:

  Dragging an audio track to this destination will prepare DiscJuggler to extract the track as a Windows Media Audio file, a compressed format. Compression attributes can be changed in the **General** Audio section of the **Options** chapter.

- New ISO:

  This serves as initial drag-and-drop target to create a new ISO disc image or compilation using items (either sessions or tracks) from the "Source" panel.

- New MPG:

  This serves as initial drag-and-drop target to create a MPEG file by stripping only the MPEG video content of a Video CD.

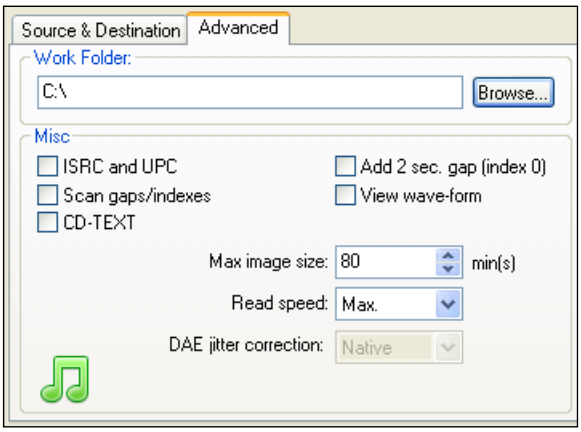
If you are creating disc images, this panel will display a detailed graphic representation of its Table of Contents (TOC) including the type, attributes, start position and the length of every session and track. By right-clicking with the mouse on discs and tracks items, the corresponding properties can be viewed.

Similarly to the Windows Explorer, you can delete selected items with the <Delete> key and you can rename them with the <F2> key.

All session track and index addresses and sizes are shown in MSF (Minute, Second, Frame) format where a frame is a 1/75th of a second or in LBA (Logical Block Address) where 0 is the beginning of index 1 of the first track on the disc. The colors of the times displayed indicate the same level in the Explorer hierarchy.

* * *

The Advanced tab contains settings that don't usually need to be changed before a standard disc writing process. In most cases these settings will be on their default values, but using the option to Load/Save task settings or changes in **Options** will affect these settings.



Work Folder:

The "Work Folder" is where your files will be stored. If you want to change the location, simply click the "Browse" button to open the standard Windows Browse dialog. You can also change this option permanently from the **I/O** panel in the **Options** dialog.

Add 2 sec. gap (index 0):

When reading an Audio CD's Table of Contents (TOC), DiscJuggler will automatically assume a 2 seconds gap (index 0) between tracks of an Audio CD.

View wave-form:

When this option is selected DiscJuggler displays the **Waveform** panel.

ISRC and UPC:

Conceptually very similar to the ISBN number used for books, the ISRC (acronym for International Standard Recording Code) is a 12-character code defined to uniquely identify a music track song). Unfortunately, over the years very few artists have adopted this standard and currently less than one percent Audio CDs use the ISRC.

The UPC (Universal Product Code) is a 13-digit number that uses the UPC/EAN bar coding standard to uniquely identify the whole CD. The same ISRC considerations apply to the UPC code; very few Audio CDs currently use the UPC.

These codes are rarely used and they are slow to decode. Furthermore, not all writing drives are capable of reading these codes and not all writing drives are capable of writing these codes. Check the "ISRC and UPC" box only if these codes are required for writing.

If the selected device does not support ISRC and UPC, this option is disabled.

Scan gaps/indexes:

Indexes are a way to subdivide an audio track in "sections" and to have variable sized gaps between tracks. Indexes are most often used in Classical music Audio CDs to mark a transition, such as between acts of an opera. Indexes are not commonly used as the CD's Table of Contents does not contain a list of index points. This requires scanning the entire disc for index structures as the only way to retrieve index transition points. Even with faster reading speeds, this operation could take several minutes.

DiscJuggler implements a sophisticated algorithm to optimize index point scanning. With a reasonably fast drive, DiscJuggler will take less than one minute to retrieve the entire CD's index structure. Many CD-ROM-capable drives and consumer CD players do not support index points and, so each music track will appear as a single segment.

By default the Scan gaps and indexes box is not checked. If you know that the CD you are duplicating contains index points or has variable gaps between tracks, check this box to replicate the same index structure in the copies.

If a selected device does not support indexes, the option is disabled.

CD-TEXT:

This option copies the CD-TEXT information that is present on some audio discs. Both the source and destination must support CD-TEXT for this option to be active

Introduced by Sony, this protocol uses the R-W sub-codes in the lead-in area of the first session to store information such as the artist, the album, the track titles, the genre, etc.

Max image size:

Sets the maximum image size. DiscJuggler will ask if you want to truncate the image or continue if the disc image file is larger than the specified size. Make sure you set the maximum image size to the same size of the blank media you use to avoid creating images that will not fit on the media.

Read speed:

Use this control to adjust the reading speed for audio and data extraction. Slowing the reading speed can be a valuable means of improving the quality of Digital Audio Extraction (DAE) on some reading drives. Usually some experimentation is needed to determine the optimum setting. Please be careful to set the read speed at or above the write speed when duplicating directly to a writing drive to avoid buffer under-run problems.

DAE jitter correction:

The Audio CD standard was designed for sequential access (audio streaming) only: digital audio was intended to be read in real time, converted to an analog signal and sent immediately to a stereo amplifier.

Reading audio with random access and moving digital data over the interface bus without converting it to an analog signal, is a feature added to CD-ROM drives. However, even the best reading or writing drive cannot provide perfect seek accuracy (the drive cannot seek the exact audio frame position two times in a row) because of the way CD audio data are stored (to optimize sequential access).

When reading audio data and the computer is not fast enough, the drive's internal cache gets filled and the drive stops streaming audio and is forced to re-seek. Audible glitches and gaps could be introduced at this point by the drive; here is where a resynchronization of the audio stream becomes necessary.

DiscJuggler offers three levels of audio resynchronization with different impacts in terms of software assistance versus speed. Each method can be selected using the Audio Resynch slider:

- **Native**

  This method relies on the drive's native ability to provide an accurate audio stream. This algorithm offers the highest reading speed but the smallest software assist to reading accuracy. You should use this setting if you have a very high quality reading drive. With other reading drives, audible glitches could be present.

- **Overlapped**

  DiscJuggler re-reads the last few audio blocks from the previous read operation as part of each new read operation and tries to rematch the audio stream to try to ensure that no data is lost or repeated. A warning message will be issued if accuracy can not be assured at any point. This algorithm can offer the best compromise between reading speed and accuracy. However, the extra time needed to apply the software assist can result in buffer under-runs.

- **Redundant**

  With this method DiscJuggler applies statistical correction patterns to try to ensure that the audio stream produced is accurate to the audio frame (~ 0.02 ms). This algorithm offers the lowest reading speed but the highest reading accuracy. However, if it is not possible to produce a very accurate duplicate, the process will be terminated and the disc ruined. Problems with the source disc (e.g. scratches or dirt) or hardware can result in lack of success with this option.

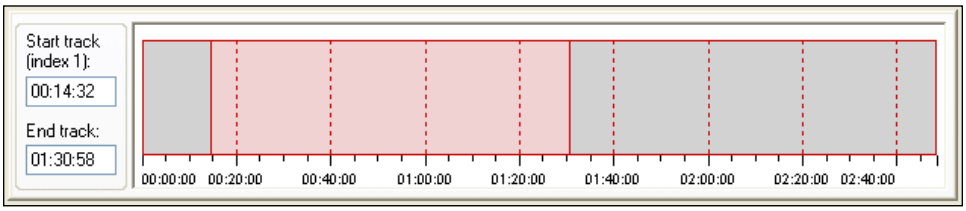
In most cases, the default selection (overlapped resynchronization) will be appropriate. However, with the highest-quality CD reading drives, you should use Native Resynchronization since the reading drive has sophisticated logic to avoid resynchronization problems.

See the **Advanced Audio Features** section in the **Advanced Concepts** chapter for more information.

* * *

This panel can be activated using the "View Waveform" button ( ) from the toolbar menu. The purpose of the Waveform panel is twofold:

1. When playing back a song, using the "Play" command in the **Tools** menu, and the option "View Waveform" is selected in the **Advanced** panel, this window will display a graphic representation of the audio.
2. When editing a song or a track within an audio compilation this panel can modify the starting point and the duration of the item to process.



When an item is selected in the Destination window the Waveform panel will display its corresponding time line: move the mouse over the window with the left-button pressed to edit the item boundaries. Alternatively this can also be done using the text controls present on the left side of the panel.

Start Track:

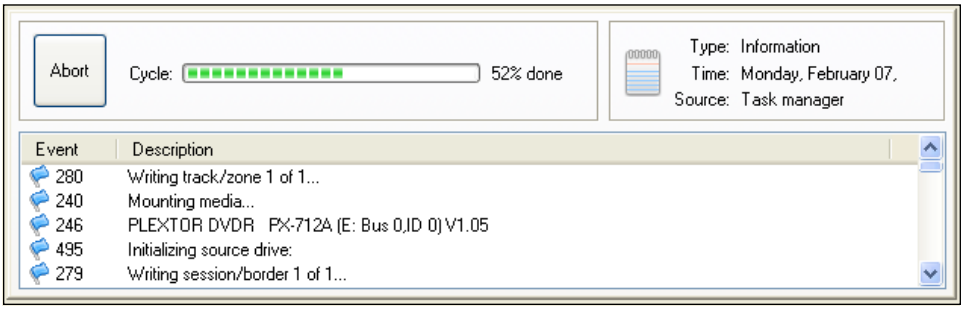
This represents the offset from the beginning of the source track/song, where DiscJuggler will start extracting the destination track/song.

End Track:

This represents the offset from the end of the source track/song, where DiscJuggler will stop extracting the destination track/song.

* * *

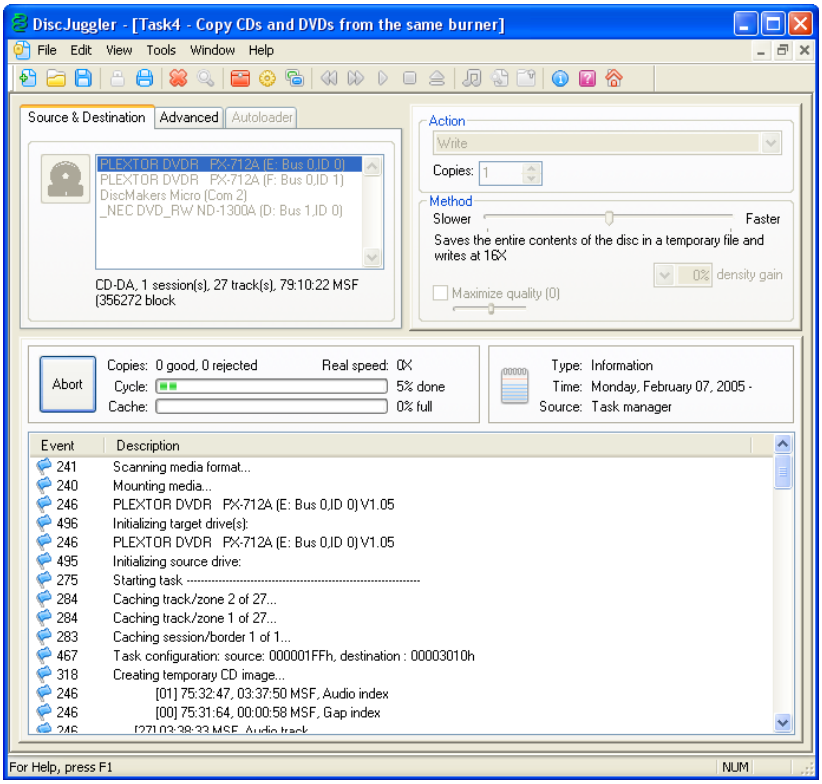
The Status panel is a user interface component common to all task documents' main windows and is responsible for displaying and monitoring the status of every task's ongoing operation.



See the **Status** panel in section **Create new CDs** for a detailed description of this component.

* * *

This task allows you to duplicate CDs or DVDs using the same drive for reading and writing. It provides a straight-forward method to duplicating discs without having to deal with multiple tasks, utilizing the same advanced features.



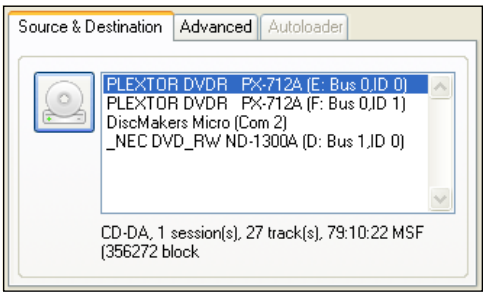
The task's main interface is subdivided into five major panels:

- **Source & Destination**
- **Advanced**
- **Action & Method**
- **Status**
- **Autoloader**

Features discussed in this section relating to DVD writing are only available in DiscJuggler Professional Edition and DiscJuggler.NET. See **Feature Limitations** *for more information.*

* * *

This tab is designed to specify the device used for reading and writing discs. Once the reading process is complete, the same drive is used as the device for writing the temporary image file to a blank disc.



Each time you start DiscJuggler, it performs a scan to identify all supported drives attached to the system. In this task, all drives found to be suitable as both input and output devices are listed. You can only select one device at a time.

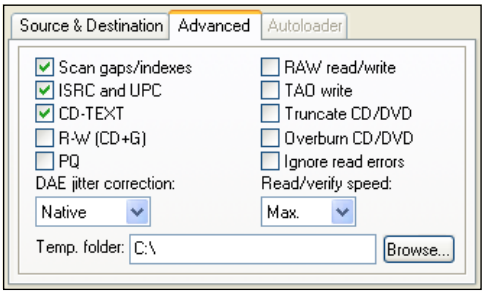
After a writing drive has been selected, DiscJuggler will continuously poll the selected device to read the Table of Contents (TOC) of the mounted media and will display a short description of disc contents under the list of devices.

DiscJuggler will not start a duplication session until a non-blank disc is placed in the selected device and will prompt for a blank disc at the appropriate time (after a complete image of the disc has been temporarily copied to a local hard disk).

Note: Clicking on the writing drive icon will eject the media mounted in the selected drive. Clicking on the writing drive icon while pressing the <Ctrl> key will load, if possible, the media mounted in the selected drive.

* * *

The Advanced tab contains settings that don't usually need to be changed before a standard disc writing process. In most cases these settings will be on their default values, but using the option to Load/Save task settings or changes in **Options** will affect these settings.



R-W (CD+G):

R-W sub-codes are 96 extra bytes of user data "logically" attached to every sector of a CD. These 96 bytes were originally intended to store text and low-quality graphics for display during audio playback. Very few CDs use this extra space; and just as the case with ISRC and UPC codes, not all CD-ROM drives can read these areas and not all writing drives can write them. Furthermore, due to these extra 96 bytes per block, the total data throughput required will be ~ 4% higher than normal. See the **Optical Disc Recording & Data Throughput** section in the **Advanced Concepts** chapter for more information on this topic.

PQ:

When this option is selected DiscJuggler will not regenerate correct PQ sub-code data, but will instead use whatever data was provided by the source drive. This is only possible if the writing drive is capable of recording in RAW mode. This option should be used with extreme caution since not all the writing drives can return valid PQ data, in which case the resulting CD will be unreadable.

RAW read/write:

RAW read will disable the source drive hardware error correction while RAW write will disable the automatic hardware regeneration of error correction codes and reproduce the source data "as is" using, whenever possible (not all writing drives allow this option), the RAW recording method. When this option is selected DiscJuggler will read and write blocks, and associated sub-codes if either "R-W" or "PQ" options are selected, transparently without interfering with their content.

Checking this box can be useful if intentional discrepancies between the error detection encoding and user data are present in the source. However, this option should be used with extreme caution since DiscJuggler cannot detect legitimate read errors when operating in this mode.

TAO write:

Selecting this option will force DiscJuggler to write CDs in Track-At-Once (TAO). TAO forces a 2 seconds gap between tracks and adds a few additional unreadable blocks at the beginning and at the end of each track. DiscJuggler by default uses Session-At-Once (SAO) when supported by your drive. You can use the TAO recording method if your drive is not operating with SAO or Disc-At-Once (DAO) recording methods.

Truncate CD/DVD:

Check this box if you want to truncate (cut off the end) of your source disc or image so that it fits on a standard size blank disc. Truncation may make sense for an Audio CD but it will most likely render a Data CD or DVD unusable. DiscJuggler will give you the choice of truncating or terminating on a task-by-task basis if you have checked the box for this in the confirmation dialog.

Overburn CD/DVD:

You can attempt to "overburn" a disc that exceeds the maximum size of a standard disc by checking this box. When you select this option DiscJuggler will simply ignore the maximum available space on the target CD and will let you start the recording process anyway. However, there is no guarantee that you will be successful or how much space, if any, is available beyond the standard maximum size for the disc brand that you are using. DiscJuggler will give you the choice of overburning or terminating on a task-by-task basis if you have checked the box for this in the confirmation dialog.

Ignore read errors:

By selecting this option you instruct DiscJuggler to complete the current task even if read errors are detected. Some compact discs will incorporate data that will cause a read error that would normally terminate duplication. This option is useful when you are certain that errors have been introduced intentionally in the source disc or an error may be inconsequential (e.g. on a Video CD). If this box is checked, the copying process will continue regardless of whether a read error is encountered.

Please do not check this box if you do not want to duplicate discs with this type of error or your discs contains critical data.

Temp. folder:

This will be the location used by DiscJuggler to save the temporary disc image file.

When writing to the same device used for reading, DiscJuggler must first cache the entire contents of the disc to a local hard disk and then write the disc image file to the device.

In addition, the writing drive should receive an uninterrupted transfer of data to its internal buffer (Level 1 cache) at a speed equal to or greater than its write speed. In the event the required data rate is not sustained, the writing drive could generate a buffer under-run error (empty Level 1 cache) and the recordable disc could be ruined.

Caching the entire contents of the disc to your local hard disk before writing is a convenient way to make the duplication process more reliable (hard disks are usually faster than writing drives).

See the **Optical Disc Recording & Data Throughput** in the **Advanced Concepts** chapter for detailed information on disc writing data transfer requirements.

Browse:

Use this button to browse your system for a specific location where DiscJuggler will save the temporary images.

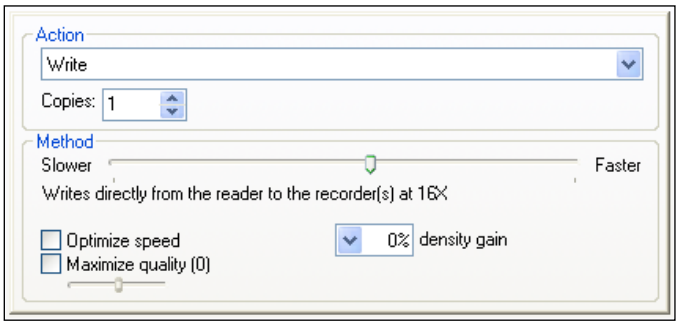
For detailed information on the following options:

- **Scan gaps/indexes**
- **ISRC and UPC**
- **CD-TEXT**
- **DAE jitter correction**

... see the **Advanced** overview in the **Create MP3s, WMAs, WAVs, and CD compilations** section.

* * *

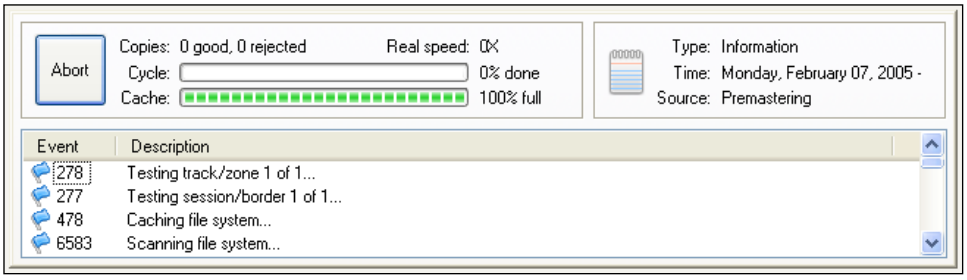
Using the Action & Method panels, located in the upper right corner of the main task window, you can control various aspects of the disc writing process.



See the **Action & Method** panel in the **Create new CDs** section for a detailed description of this component.

* * *

The Status panel is a user interface component common to all task documents' main windows and is responsible for displaying and monitoring the status of every task's ongoing operation.

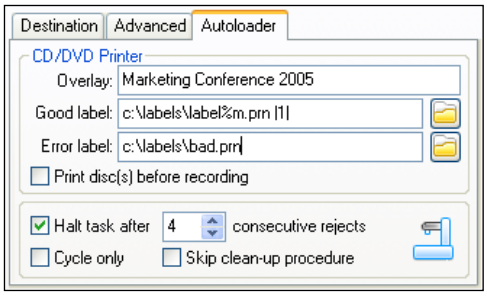


See the **Status** panel in section **Create new CDs** for a detailed description of this component.

* * *

The Autoloader panel allows you to control many aspects of autoloading robotics. You can specify a label image file and even pass information to a third party printing application for printing on a supported disc printer. You can also specify a quality control threshold for halting the entire task based on rejects in consecutive duplication cycles and cycle the mechanical aspects of the autoloader and its drives without writing.

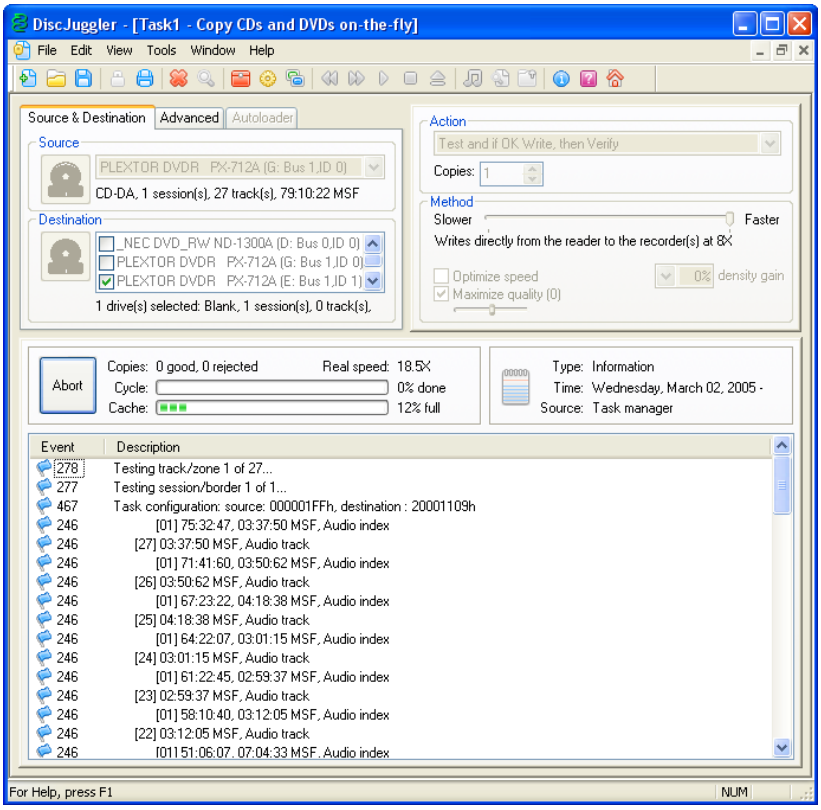
The Autoloader panel is only activated if you have a robotic autoloader currently attached to your system and are running a DiscJuggler license with autoloader support.



See the **Autoloader** panel in section **Create new CDs** for a detailed description of this component.

* * *

This task directly copies a disc from a reading drive to one or more writing drives with no intermediate steps. This is the quickest and easiest way to duplicate an existing disc, but also the most system intensive, demanding the strictest hardware configuration.



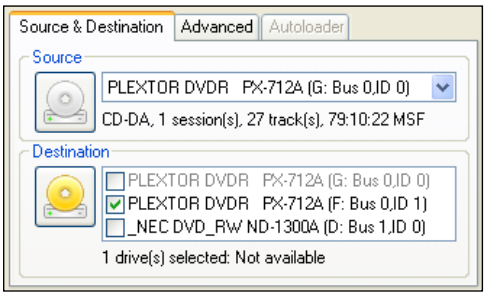
The task's main interface is subdivided into five major panels:

- **Source & Destination**
- **Advanced**
- **Action & Method**
- **Status**
- **Autoloader**

Features discussed in this section relating to DVD writing are only available in DiscJuggler Professional Edition and DiscJuggler.NET. See **Feature Limitations** *for more information.*

* * *

Each time you start DiscJuggler, it performs a scan to identify all supported drives attached to the system. The Source section lists all drives suitable as input devices for disc duplication. The Destination section lists all compatible writing drives.



You must select one source device and at least one destination device.

After one reading drive and at least one writing have been selected, DiscJuggler will continuously poll the selected devices to read the Table of Contents (TOC) of all mounted media and display a short disc description underneath the selected drive.

DiscJuggler will not start a duplication session until a non-blank disc is mounted in the selected source device, and a blank or erasable disc is mounted in every destination device.

Source:

Specifies the source reading drive where the disc to duplicate is mounted. Once the disc has been successfully mounted, DiscJuggler describes its Table of Contents (TOC), at the bottom of the source frame.

Note: Clicking on the reading drive icon will eject the media mounted in the selected drive. Clicking on the reading drive icon while pressing the <Ctrl> key will load, if possible, the media mounted in the selected drive.

Destination:

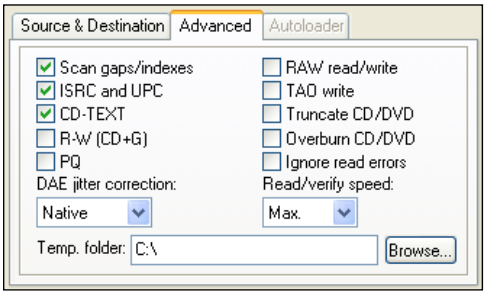
Select one or more writing drives to be used in the duplication process. Select the checkbox of each drive you plan to use. Holding the <Ctrl> key as you select a device will select all equivalent devices.

Note: Clicking on the writing drive icon will eject the media mounted in all the selected drive. Clicking on the writing drive icon while pressing the <Ctrl> key will load, if possible, the media mounted in all the selected drive.

Please read the **Writing to Multiple Drives** section of the **Advanced Concepts** chapter for requirements on writing to multiple drives at the same time.

* * *

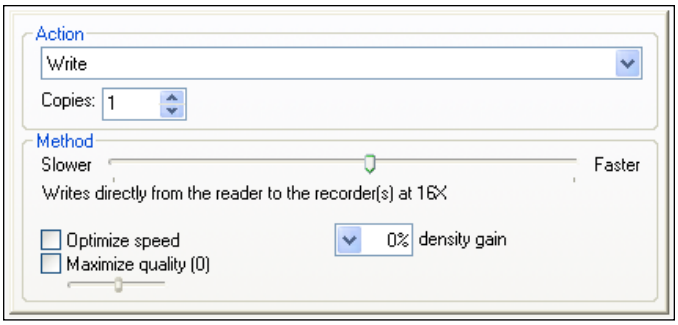
The Advanced tab contains settings that don't usually need to be changed before a standard disc writing process. In most cases these settings will be on their default values, but using the option to Load/Save task settings or changes in **Options** will affect these settings.



See the **Advanced** panel in the **Copy CDs and DVDs from the same burner** section for a detailed description of this component.

* * *

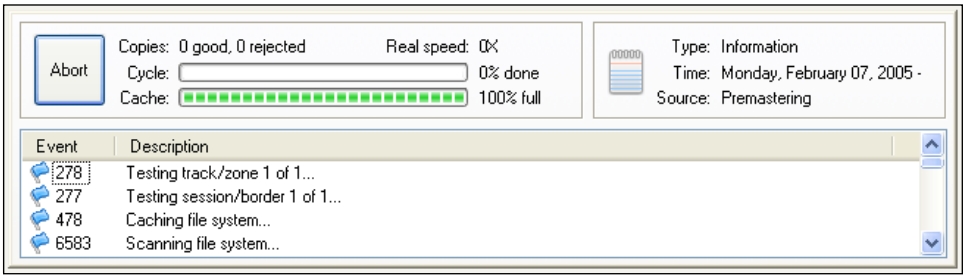
Using the Action & Method panels, located in the upper right corner of the main task window, you can control various aspects of the disc writing process.



See the **Action & Method** panel in the **Create new CDs** section for a detailed description of this component.

* * *

The Status panel is a user interface component common to all task documents' main windows and is responsible for displaying and monitoring the status of every task's ongoing operation.

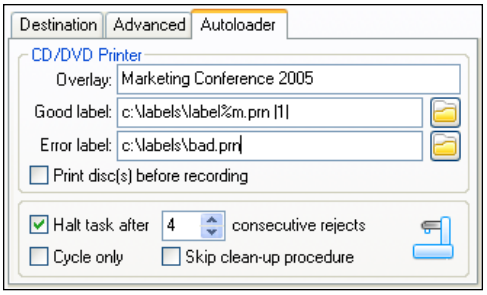


See the **Status** panel in section **Create new CDs** for a detailed description of this component.

* * *

The Autoloader panel allows you to control many aspects of autoloading robotics. You can specify a label image file and even pass information to a third party printing application for printing on a supported disc printer. You can also specify a quality control threshold for halting the entire task based on rejects in consecutive duplication cycles and cycle the mechanical aspects of the autoloader and its drives without writing.

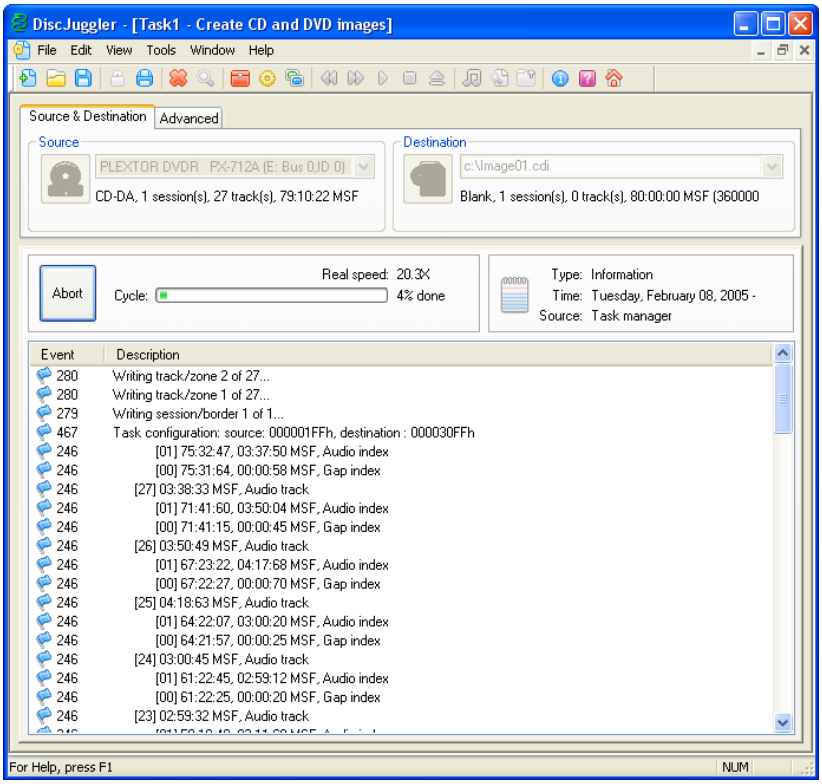
The Autoloader panel is only activated if you have a robotic autoloader currently attached to your system and are running a DiscJuggler license with autoloader support.



See the **Autoloader** panel in section **Create new CDs** for a detailed description of this component.

* * *

This task directly copies a disc from a reading drive to one or more writing drives with no intermediate steps. This is the quickest and easiest way to duplicate an existing disc, but also the most system intensive, demanding the strictest hardware configuration.

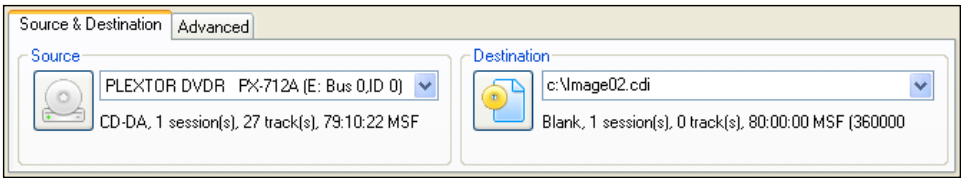


The task's main interface is subdivided into three major panels:

- **Source & Destination**
- **Advanced**
- **Status**

* * *

In the context of this document task, the Destination device is a "virtual" writing drive, similar in every aspect to a physical writing drive. The only difference is instead of writing discs, this device writes files. Following the same analogy, we consider a disc image file to be a "virtual" recordable disc and an empty file to be a "virtual" blank disc.



If the destination DiscJuggler Image file already exists, DiscJuggler will ask for confirmation to overwrite existing file. The Source section lists all the reading drives supported by DiscJuggler that can be used as input devices during disc duplication. In the Destination section, the "virtual" writing drive is automatically selected. You must specify a file name and a location to store the DiscJuggler Image, i.e. mount a "virtual" disc.

To select a different Source device, click on the drop-down menu to view other devices on the system. Clicking on the device you wish to use will instruct DiscJuggler to use that device.

Once the Source device has been selected, DiscJuggler will continuously poll the selected Source and Destination devices to read the Table of Contents (TOC) of all mounted media. It will display a short disc description underneath the selected drive.

DiscJuggler will not start the writing process until a non-blank disc is mounted in the selected Source device.

Source:

Specifies the device containing the disc to be read. Once the disc has been successfully mounted, DiscJuggler displays a brief description of its Table of Contents (TOC) at the bottom of the Source frame.

Note: Clicking on the reading drive icon will eject the media mounted in the selected drive. Clicking on the reading drive icon while pressing the <Ctrl> key will load, if possible, the media mounted in the selected drive.

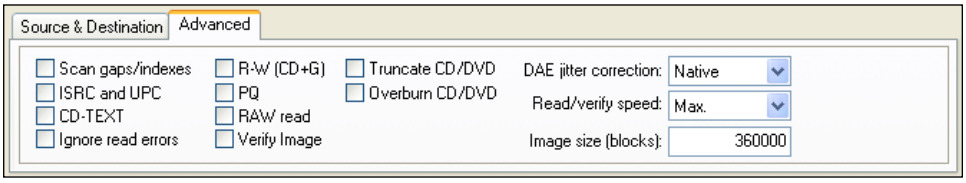
Destination:

Specifies the location and the name of the DiscJuggler Image file to be created. To use the writing drive analogy, entering a file name in the Destination field is logically the same as mounting a disc into a writing drive. The default DiscJuggler Image file extension is .CDI.

Note: Click on the image icon to browse your file system for a specific location and file.

* * *

The Advanced tab contains settings that don't usually need to be changed before a standard disc writing process. In most cases these settings will be on their default values, but using the option to Load/Save task settings or changes in **Options** will affect these settings.



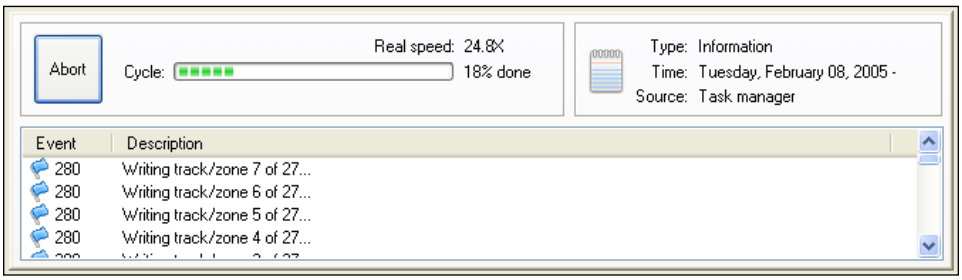
For detailed information on the following options:

- **Scan gaps/indexes**
- **ISRC and UPC**
- **CD-TEXT**
- **Ignore read errors**
- **R-W (CD+G)**
- **PQ**
- **RAW read**
- **Verify Image**
- **Truncate CD/DVD**
- **Overburn CD/DVD**
- **DAE jitter correction**
- **Read/verify speed**
- **Image size (blocks)**

... see the **Advanced** panel in the **Create MP3s, WMAs, WAVs, and CD compilations** section or the **Advanced** panel in the **Copy CDs and DVDs from the same burner** section.

* * *

The Status panel is a user interface component common to all task documents' main windows and is responsible for displaying and monitoring the status of every task's ongoing operation.

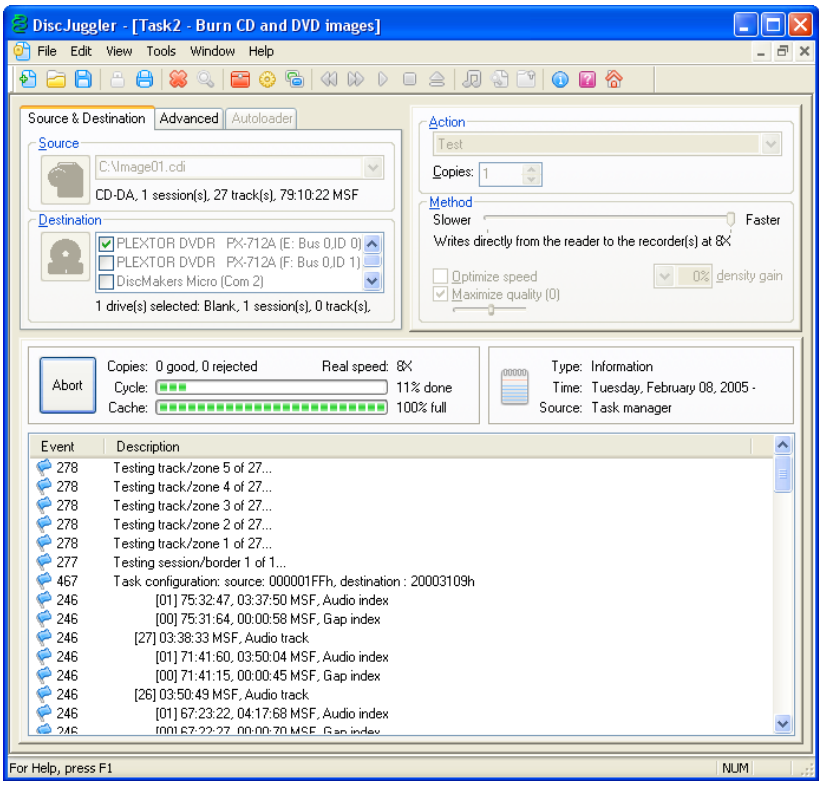


See the **Status** panel in section **Create new CDs** for a detailed description of this component.

* * *

This task is the complement to the **Create CD and DVD images** task. With this task, you can write disc image files previously generated by DiscJuggler (or other applications generating a supported format) to one or more writing drives. This task is especially useful when making several copies of the same disc at different times. Simply generate the a disc image file with the **Create CD and DVD images** task, store the disc image file on your hard disk, and reuse the disc image file when you need to make copies of the disc.

The default DiscJuggler Image extension is .CDI. DiscJuggler also supports disc image formats generated by third-party disc mastering applications. Supported third-party disc image format extensions include .BIN+.CUE, .ISO, and .NRG.



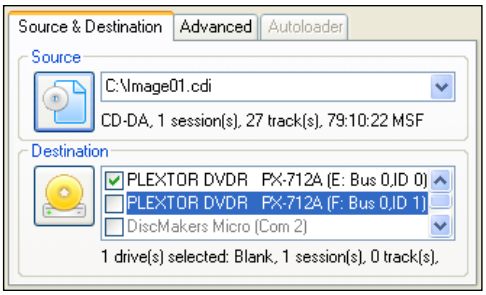
The task's main interface is subdivided into five major panels:

- **Source & Destination**
- **Advanced**
- **Action & Method**
- **Status**
- **Autoloader**

Features discussed in this section relating to DVD writing are only available in DiscJuggler Professional Edition and DiscJuggler.NET. See **Feature Limitations** *for more information.*

* * *

In **Create CD and DVD images**, you thought of the Destination device as a "virtual" writing drive similar to a physical writing drive. In the context of this document task, think of the Source device as a "virtual" reading drive similar to a physical one. The only difference is instead of reading discs, this device reads disc image files. In the Source section, the "virtual" reading drive is automatically selected.



The Destination section lists all devices supported by DiscJuggler that can be used during the disc writing process.

After at least one writing drive has been selected, DiscJuggler will continuously poll both Source and Destination devices to read the Table of Contents (TOC) of all mounted media and display a short disc contents description underneath the selected devices.

DiscJuggler will not start a duplication session until a supported disc image file is mounted in the Source section and the appropriate blank media is mounted in each Destination device.

Source:

Specifies the location and the name of the disc image file to be used. Following the reading drive analogy, entering a file name in the Source field is logically the same of mounting a disc into a reading drive.

Once a support disc image file has been successfully mounted, DiscJuggler displays a brief description of its Table of Contents (TOC) at the bottom of the Source frame.

Note: Click on the image icon to browse your file system for a specific location and file.

Destination:

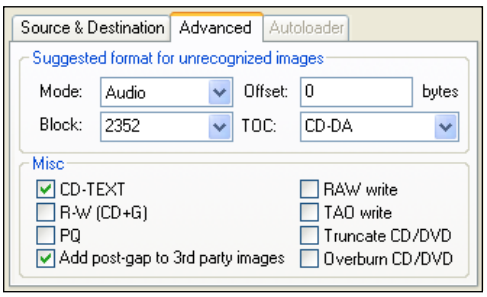
Selects one or more devices to be used in the writing process. Select the checkbox of each device you plan to use.

Note: Clicking on the writing drive icon will eject the media mounted in all the selected drive. Clicking on the writing drive icon while pressing the <Ctrl> key will load, if possible, the media mounted in all the selected drive.

Please read the **Writing to Multiple Drives** section of the **Advanced Concepts** chapter for requirements on writing to multiple drives at the same time.

* * *

The Advanced tab contains settings that don't usually need to be changed before a standard disc writing process. In most cases these settings will be on their default values, but using the option to Load/Save task settings or changes in **Options** will affect these settings.



Mode:

DiscJuggler recognizes most disc image file formats. In the unlikely event that DiscJuggler cannot probably understand the contents of the currently mounted disc image file, you can suggest the contents with this control. The three following options are available:

- Audio:

  Used for Audio CDs.

- Mode 1:

  Used for the vast majority of data discs.

- Mode 2:

  Used for Video CD, Photo CD, and most multimedia CDs.

See the **Data Formats** section in the **Advanced Concepts** chapter for more information on this option.

Block:

DiscJuggler recognizes most of the existing disc image files. In the unlikely event that DiscJuggler cannot detect the currently mounted disc image contents, with this control you can suggest a block size. The five following options are available:

- 2048 bytes:

  Used for disc images containing only data. This block size is commonly used for Mode 1 tracks.

- 2336 bytes:

  Used for disc images containing data. Commonly with Mode 2 tracks.

- 2352 bytes:

  Used for disc images containing audio or raw data.

- 2368 bytes:

  Used for disc images containing audio plus PQ sub-codes or raw data.

- 2448 bytes:

  Used for disc images containing audio plus PQ and R-W sub-codes or raw data.

See the **Data Formats** section in the **Advanced Concepts** chapter for more information on this option.

Offset:

This is useful when you do not want to start recording a disc image file from the beginning. If the disc image file contents are not recognized and you know that the file has a header, by entering the header size (in bytes), you can instruct DiscJuggler to skip it.

TOC:

If DiscJuggler cannot recognize the disc image Table of Contents (TOC), you can specify it here.

- CD-DA (Red Book):

  An audio-only format used on every Audio CD. Index points and variable gaps between tracks are implemented via PQ sub-codes.

- CD-ROM/DVD (Yellow Book):

  This is the standard for most common data discs. The Yellow Book defines more error correction than defined by the Red Book; a small error while playing back audio is significantly less damaging than an error in retrieving data files.

- CD-XA & CD-I Bridge (Extended Architecture):

  This is used for most mixed mode CDs (audio + data), and multi-session CDs. The CD-ROM XA standards provide synchronized data and audio, as well as a method for the compression of audio information.

- CD-I (Green Book):

  Improves the synchronization of data retrieval and audio information and established the Compact Disc Interactive format. For example, with the introduction of CD-I, sounds could be better synchronized with graphics than in the standards provided in Mode 2 Yellow Book.

See the **Data Formats** section in the **Advanced Concepts** chapter for more information on this option.

Add post-gap to 3rd party images:

Checking this option adds a two second gap to the end of a disc image that was not been created by DiscJuggler. If you create discs without adding a two second post-gap, some drives can accidentally step on the lead-out area while trying to read files recorded at the end of the disc, resulting in read errors.

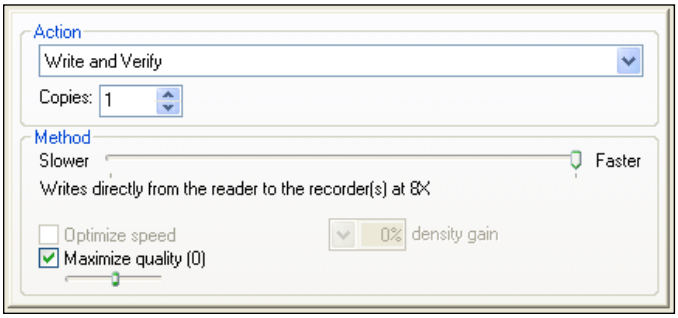
For detailed information on the following options:

- **CD-TEXT**
- **R-W (CD+G)**
- **PQ**
- **RAW write**
- **TAO write**
- **Truncate CD/DVD**
- **Overburn CD/DVD**

... see the **Advanced** panel in the **Copy CDs and DVDs from the same burner** section.

* * *

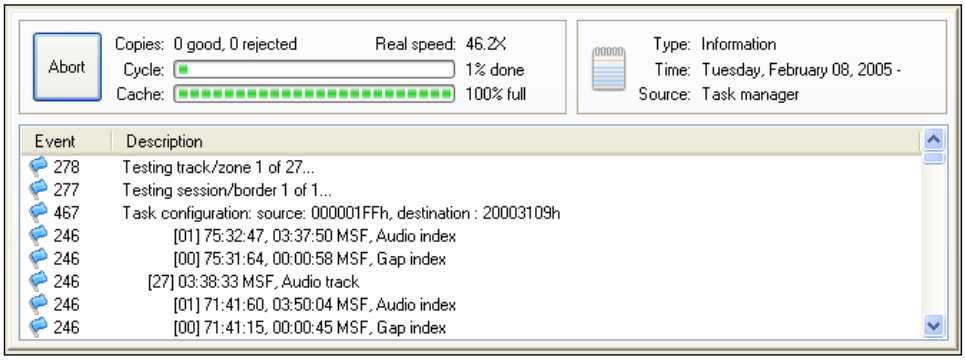
Using the Action & Method panels, located in the upper right corner of the main task window, you can control various aspects of the disc writing process.



See the **Action & Method** panel in the **Create new CDs** section for a detailed description of this component.

* * *

The Status panel is a user interface component common to all task documents' main windows and is responsible for displaying and monitoring the status of every task's ongoing operation.

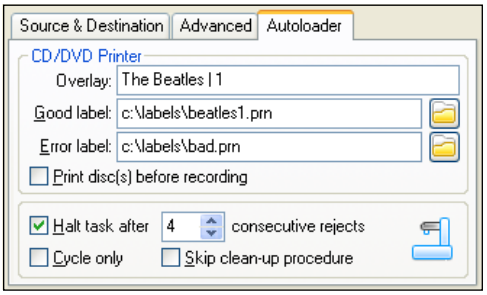


See the **Status** panel in section **Create new CDs** for a detailed description of this component.

* * *

The Autoloader panel allows you to control many aspects of autoloading robotics. You can specify a label image file and even pass information to a third party printing application for printing on a supported disc printer. You can also specify a quality control threshold for halting the entire task based on rejects in consecutive duplication cycles and cycle the mechanical aspects of the autoloader and its drives without writing.

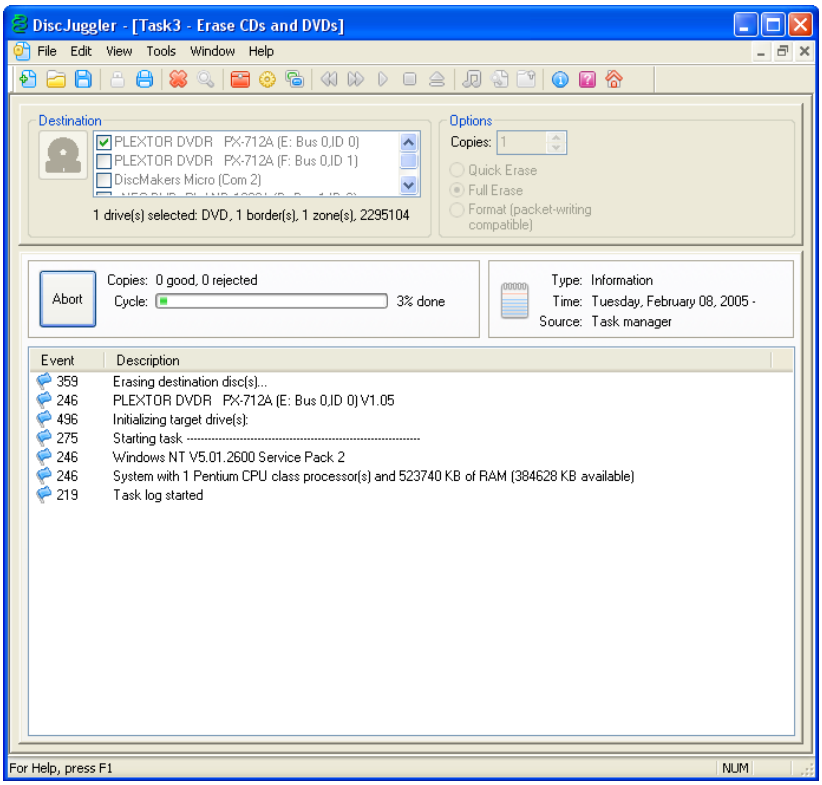
The Autoloader panel is only activated if you have a robotic autoloader currently attached to your system and are running a DiscJuggler license with autoloader support.



See the **Autoloader** panel in section **Create new CDs** for a detailed description of this component.

* * *

With this task you can erase CD-RW, DVD-RW, and DVD+RW discs. If you attempt to write to a non-blank re-writable disc in the course of other tasks, you will be prompted to confirm the erasure of the disc before writing commences.



Erasing one or more discs:

1. Select one or more devices listed in the Destination section.
2. Set the desired number of discs to be erased with the "Copies" control in the Options section.
3. Select the desired erasure type. Please note that a "Quick Erase" will only erase the disc Table of Contents (TOC) and may allow access to previously existing data. Do not select "Quick Erase" if the disc contains sensitive data.
4. Press the Start button.

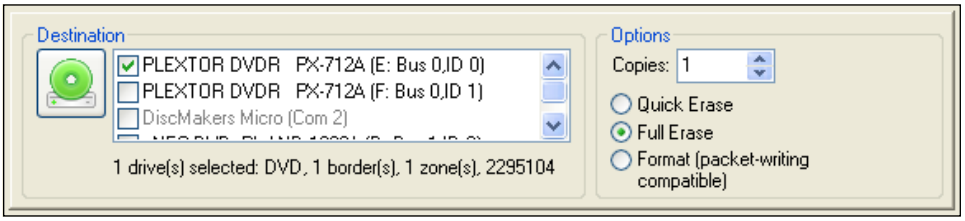
The task's main interface is subdivided in two panels:

- Destination & Options
- Status

Features discussed in this section relating to DVD writing are only available in DiscJuggler Professional Edition and DiscJuggler.NET. See Feature Limitations for more information.

* * *

This task contains no Source device. DiscJuggler applies an erase to all discs in selected Destination devices. If the document task is reopened, DiscJuggler will try to re-select the same drive configuration in use when the document was last saved.



The Start button will be active only if one or more valid devices capable of re-writing CD-RW, DVD-RW, or DVD+RW are specified in the Destination field and all devices contain re-writeable discs.

Destination:

Selects one or more devices capable of re-writing CD-RW, DVD-RW, or DVD+RW to be used in the erase process. Select the checkbox of each device you plan to use.

Note: Clicking on the re-writable icon will eject the media mounted in all the selected drive. Clicking on the re-writable icon while pressing the <Ctrl> key will load, if possible, the media mounted in all the selected drive.

Copies:

With this option you can specify the exact number of re-writable discs that you want to erase. At the end of each cycle DiscJuggler will ask you to insert more discs to erase until the number of copies specified has been reached.

If you are using an autoloader as the Destination device, DiscJuggler will expect all discs loaded in the input bin to be re-writable and it will process the number of copies required in fully unattended mode. Make sure you load the autoloader input bin with a number of re-writable discs grater or equal to the number specified here. The special "Auto" value can be selected in which case DiscJuggler will process the task until the autoloader input bin is empty.

You may select from the following types of erase methods.

- **Quick Erase**

  This is the fastest method: 1 to 5 minutes depending on highest erasing speed supported by both the disc and the drive. It will render the current data contained on the disc inaccessible by only erasing the disc's Table of Contents (TOC). You should be aware that the data on the disc still exists and may be accessible through advanced techniques.

- **Full Erase:**

  The full erase process takes longer, but completely erases a disc so data no longer resides on the disc.

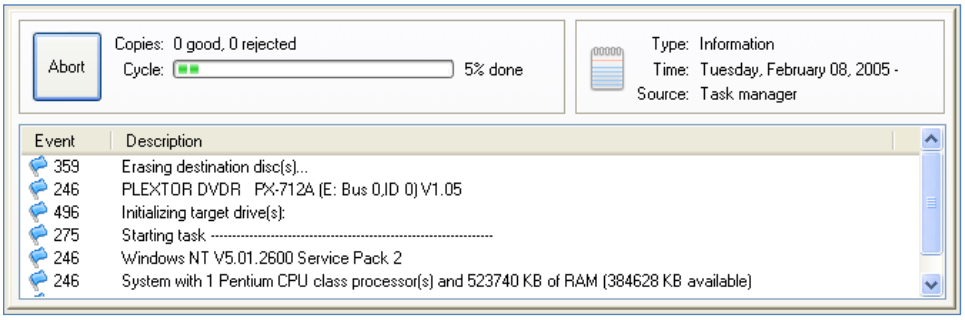
- **Format:**

  The format process will enable an unformatted CD-RW disc to be subsequently used by a packet-written CD recording program. Packet writing programs allow you to write small amounts of data to CDs at a time, emulating the functionality of a hard disk. Performing the formatting process on multiple recorders or in an autoloader can be timesaving.

Features discussed in this section relating to autoloaders are only available in limited licenses of DiscJuggler Professional Edition and DiscJuggler.NET. See **Feature Limitations** *for more information.*

* * *

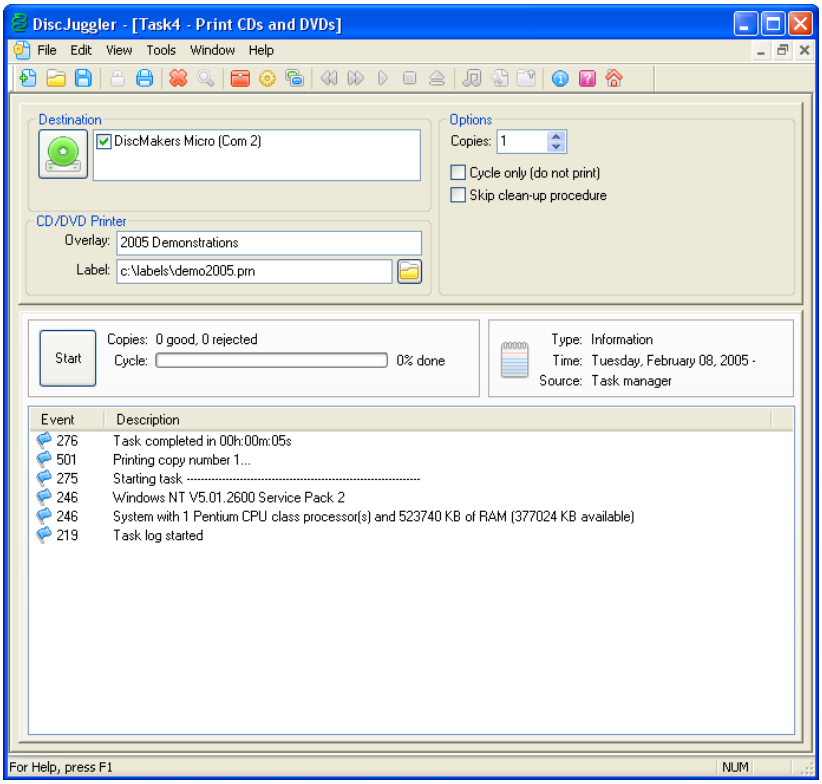
The Status panel is a user interface component common to all task documents' main windows and is responsible for displaying and monitoring the status of every task's ongoing operation.



See the **Status** panel in section **Create new CDs** for a detailed description of this component.

* * *

With this task you can erase CD-RW, DVD-RW, and DVD+RW discs. If you attempt to write to a non-blank re-writable disc in the course of other tasks, you will be prompted to confirm the erasure of the disc before writing commences.



Printing one or more discs:

1. Select an autoloader unit among those listed in the Destination section.
2. Set the desired number of discs to be printed with the "Copies" control in the Options section.
3. Enter the label file name and parameters as in the CD/DVD Printer section.
4. Press the Start button.

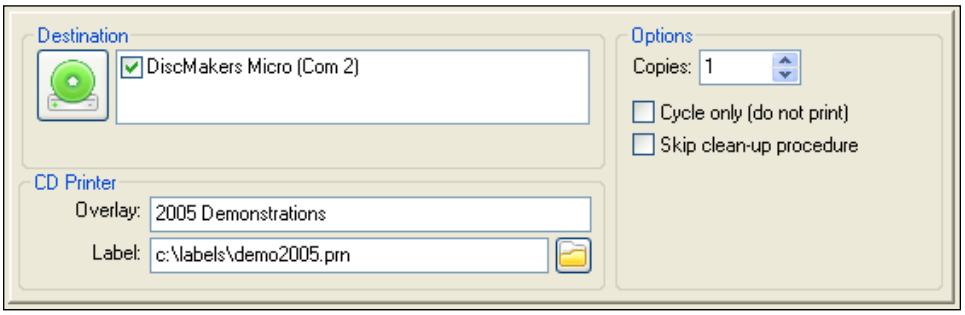
The task's main interface is subdivided in two panels:

- **Destination, Options, and CD/DVD Printer**
- **Status**

Features discussed in this section relating to autoloaders are only available in limited licenses of DiscJuggler Professional Edition and DiscJuggler.NET. See Feature Limitations for more information.

* * *

This task operates with autoloader devices to fully automate the disc printing process. This task doesn't require the presence of reading or writing drives. Make sure that the autoloader input bin is loaded with printable media compatible with the associated disc printer (usually the disc printer is mounted inside or on top of the autoloader unit).



The Start button will be active only if an autoloader unit has been selected in the Destination section.

Destination:

This section lists all autoloaders that can be used to perform this task. Select desired autoloaders from the list to begin using the task.

Copies:

With this option you can specify the exact number of discs that you want to print. Make sure you load the autoloader input bin with a number of re-writable discs grater or equal to the number specified here. The special "Auto" value can be selected in which case DiscJuggler will process the task until the autoloader input bin is empty.

Cycle only (do not print):

Allows the robotic elements of the autoloader system to be exercised for purposes of testing or demonstrating without actually printing.

Skip clean-up procedure:

When DiscJuggler starts a new task where an autoloader is being used, it assumes all the drives in the unit are empty and trays closed. If you are sure that all drives are empty and trays closed, you can use this option to skip the clean-up procedure and save time.

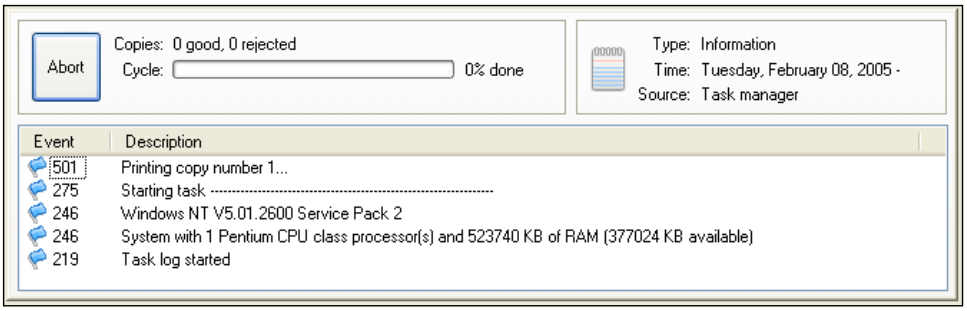
CD/DVD Printer:

DiscJuggler allows you to specify label files that will be sent directly to the disc printer.

See the Autoloader panel in section Create new CDs for a detailed description of this component.

* * *

The Status panel is a user interface component common to all task documents' main windows and is responsible for displaying and monitoring the status of every task's ongoing operation.



See the **Status** panel in section **Create new CDs** for a detailed description of this component.

* * *

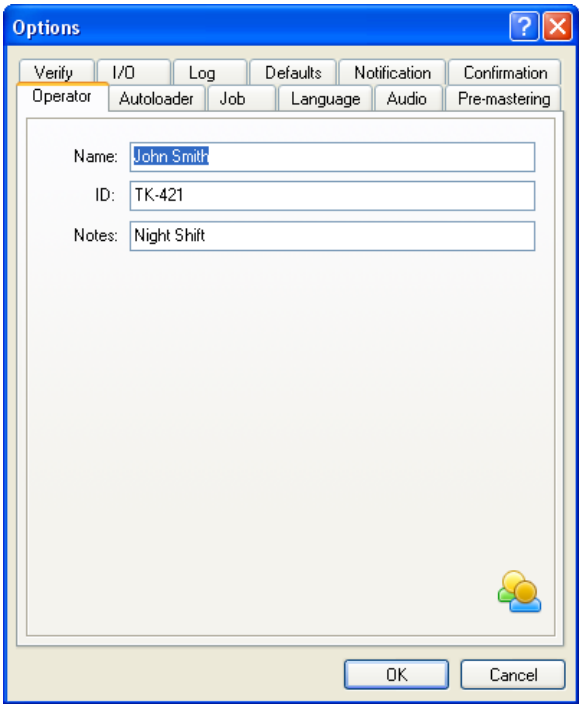
The Options menu choice contains a number of tabbed panels that allow you to set DiscJuggler's default behavior. When a change is made in the any of the panels, it will only take affect for tasks created after the change was applied. The options panels include the following.

- Operator
- Autoloader
- Job
- Language
- Audio
- Pre-mastering
- Verify
- I/O
- Log
- Defaults
- Notification
- Confirmation

Please note that if you have an open task, changing these options will not apply to open task. If you just have the blank, gray DiscJuggler screen without any tasks open, setting these options will apply to all new tasks created after you click the OK button.

* * *

The Operator panel provides an opportunity to enter information for inclusion in all log files until the fields specified in the dialog change, possibly when a different operator begins to use DiscJuggler. This aids record keeping by supplying a uniform way to enter control information concerning who is using DiscJuggler and other relevant information. The fields for Name, ID, and Notes can be any combination of characters and are added to the log file.



The following options are available.

Name:

Enter the current operator name; the field accepts any combination of numbers and characters. By default, DiscJuggler initializes this field with a combination of the current logged-in user and the system name. This field is optional.

ID:

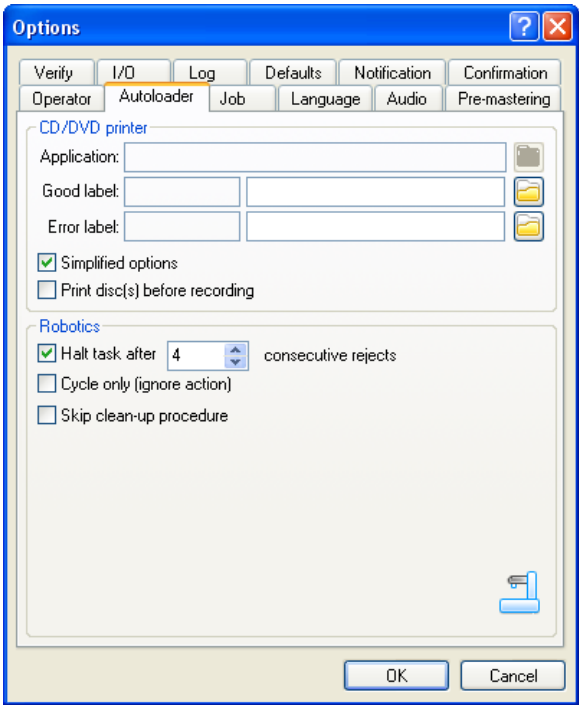
Enter the operator ID, if any: any combination of numbers and characters can be used. This field is optional.

Notes:

General-purpose text field: any combination of numbers and characters can be used. This field is optional.

* * *

The Autoloader panel addresses features associated with use of autoloaders. The values entered here will be used as default values whenever a new task involving an autoloading device is created.



Simplify options:

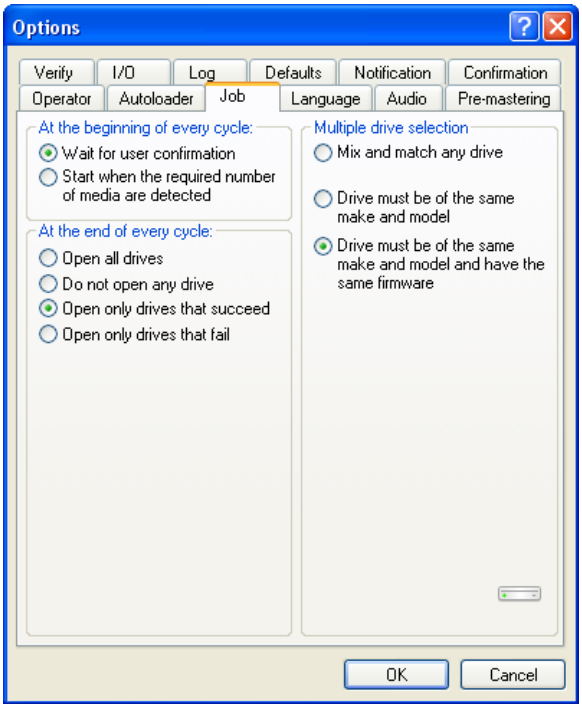
This option disables the more advanced options of the Autoloader tabs throughout DiscJuggler.

See the **Autoloader** panel in section **Create new CDs** for a detailed description of this component.

*Features discussed in this section relating to autoloaders are only available in limited licenses of DiscJuggler Professional Edition and DiscJuggler.NET. See **Feature Limitations** for more information.*

* * *

The Job panel provides ways to modify the default behavior of DiscJuggler during the disc writing process. More specifically, this tab changes the behavior of DiscJuggler at the beginning and end of each writing cycle.



The following options are available.

- **At the beginning of every cycle:**
  - Wait for user confirmation

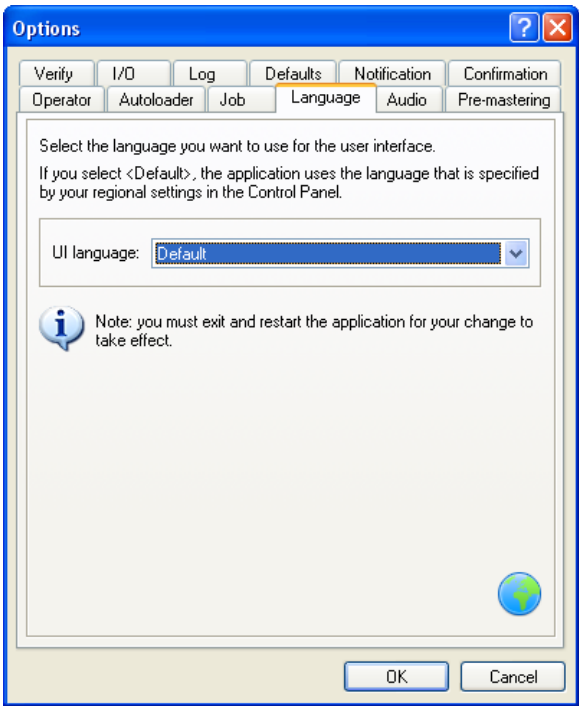
    When the number of copies requested are higher than the number of drives, this setting will require the user to press "OK" or "Cancel" before writing to the next cycle of discs.
  - Start when the required number of media are detected

    This will start the next cycle of writing as soon as all the required blank media has been inserted into the writing drives.
- **At the end of every cycle:**
  - Open all drives
  - Do not open any drive
  - Open only drives that have succeeded
  - Open only drives that have failed

- **Multiple drive selection**
  - Mix and match any drive
  - Drive must be of the same make and model
  - Drive must be of the same make and model and have the same firmware

* * *

In the Language panel, you can set the language to be used by localized versions of DiscJuggler.



UI Language:

This is a list of all the DiscJuggler languages currently available on your computer. An additional "Default" option is available which will automatically select your system default language.

DiscJuggler must be restarted to apply changes made to UI Language.

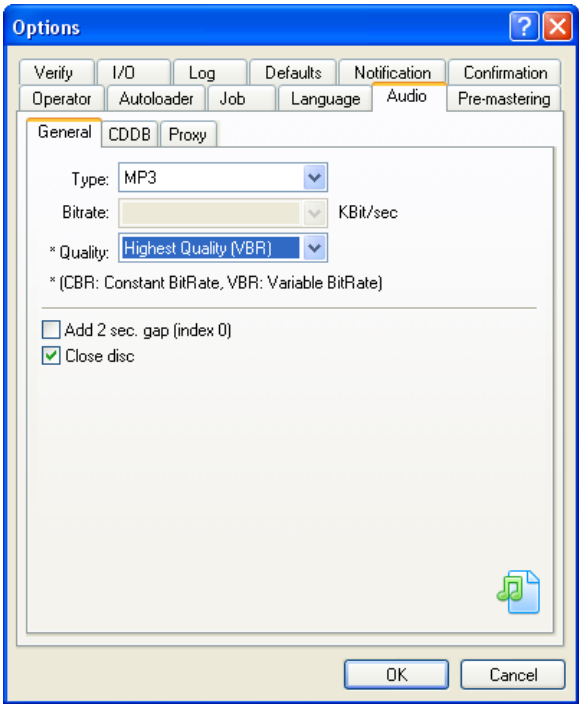
* * *

The Audio panel contains a number of tabbed sub-panels that allow you to set DiscJuggler's default behavior when processing audio content. These audio options are included in the following sub-panels.

- General
- CDDB
- Proxy

* * *

The General sub-panel contains settings to control Audio CDs and audio compression.



Type:

Defines the default format that DiscJuggler will use to extract digital music (a process commonly known as CD ripping) from a CD-DA disc to create music files on your local computer. The following choices are available.

WMA:

Music will be saved compressed in Microsoft Windows Media format.

MP3:

Music will be saved compressed using the MP3 compression format.

WAV:

Music will be saved uncompressed in Microsoft Wave format at 44.1 KHz, 16-bit, and Stereo.

Bitrate:

When compressing digital audio this value indicates the maximum bandwidth that the selected audio codec is allowed to generate. The higher the bitrate, the higher the playback quality and the larger the generated file will be. Usually bitrate values higher than 128 KBit/sec are considered to generate compressed music with near-CD playback quality.

Quality:

This is only available when using the mp3 compression and it will determine if the codec is allowed to generate a variable bitrate (VBR) stream or not. Files of higher quality and smaller size can be generated by using VBR.

Add 2 sec. gap (index 0):

When reading a CD Table of Contents (TOC), if this option is selected, DiscJuggler will automatically assume a 2 seconds gap (index 0) between 2 songs on a CD.

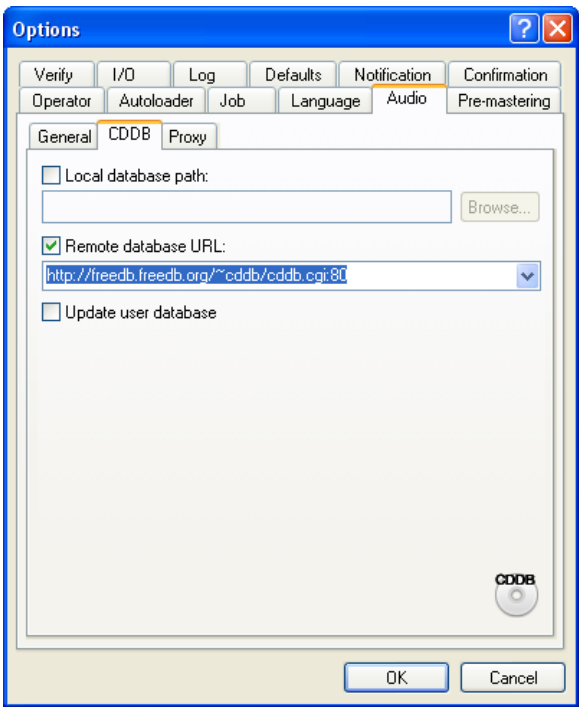
Close disc:

By using this option the resulting discs created by Audio CD compilations will be finalized, preventing further sessions tracks or session from being added. You do not to select this option when creating a CD+ (Enhanced CD) with the first session containing music and the second session containing data.

* * *

CDDB is an Internet-based service letting software display artist, title, track list, and other music-related information for Audio CDs used with a computer. Most commercial Audio CDs do not contain any of this information on the disc itself.

DiscJuggler is compatible with the service provided by the **freedb.org** organization and this sub-panel contains settings to control if, where, and how DiscJuggler retrieves Audio CD information.



Local database path:

This is the full path to a "freedb" database located on your computer or network. A local database can substantially speed-up the process of searching music CD information since it doesn't require an Internet connection. The latest database can always be downloaded free of charge at **http://www.freedb.org/**. Generally the database is available in a compressed .ZIP archive.

After downloading the archive and extracting it to a directory, all you need to do is point to the root of the directory that contains the local CDDB.

Remote database URL:

This is the full URL to a "freedb" Internet site or mirror. If you have a permanent Internet connection this is the preferred choice as the remote database is kept constantly updated with new titles by the site administrators. When DiscJuggler is installed the URL points by default to "http://freedb.freedb.org/~cddb/cddb.cgi:80". A complete list of site mirrors are available at **http://www.freedb.org/**. To optimize access to the remote database, please select the mirror closest to your location.

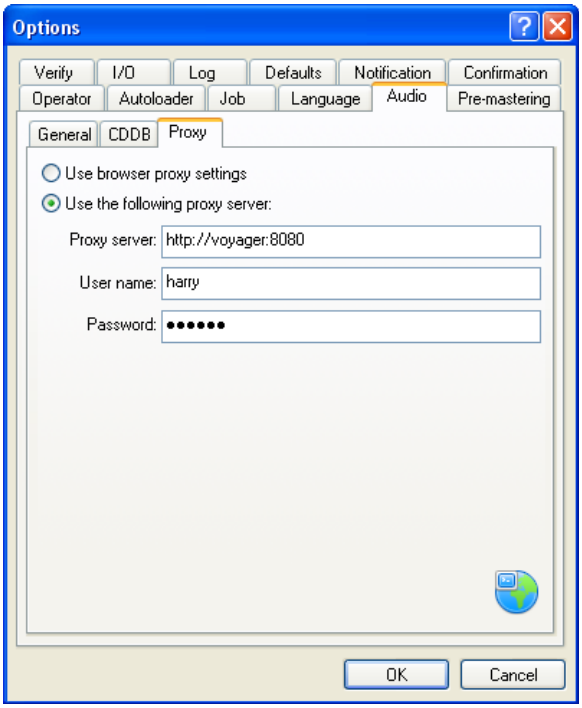
After obtaining the location for the database closest to you, all you need to do is point to that link. In the event that the remote database link is not valid, an error message will be displayed.

Update user database:

When this option is selected DiscJuggler will create a local user database to save Audio CD information previously found in the remote database. This will optimize use of DiscJuggler, if the same Audio CDs are used several times.

* * *

Use the Proxy dialog to specify whether your network uses a proxy server to connect to the Internet. A proxy server is a computer on your network that connects to the Internet without compromising security. If you are not sure how your network connects to the Internet, contact your system administrator.



Use browser proxy settings:

Select this option if your computer is not connected to a network, if your network doesn't have a proxy server, or if your network uses a proxy server to connect to the Internet but you want DiscJuggler to use your Internet browser proxy settings.

Please refer to the "Internet settings" in the Windows Control Panel on how to change your Internet browser proxy settings.

Use the following proxy settings:

If your network uses a proxy server to connect to the Internet and you want DiscJuggler to use proxy settings different from those of your Internet browser enter the following.

Proxy server:

Names and ports of the proxy servers your network uses to connect to the Internet.

User name:

If the proxy server requires user authentication enter the user's name here.

Password:

If the proxy server requires user authentication enter the user's password here.

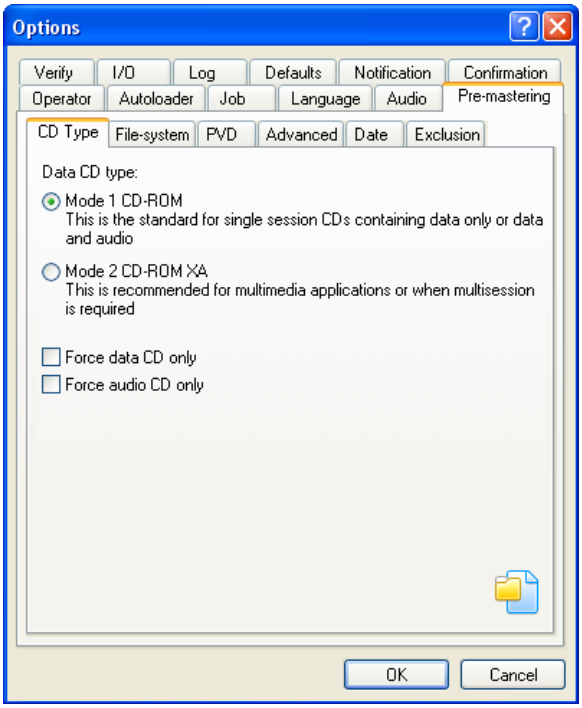
* * *

This dialog contains a number of tabbed sub-panels that allow you to set DiscJuggler's default behavior when performing pre-mastering tasks. The pre-mastering options are included in the following sub-panels.

- CD Type
- File-system
- PVD
- Advanced
- Date
- Exclusion

* * *

When creating Data CDs, you have a choice of two formats: Mode 1 CD-ROM or Mode 2 CD-ROM XA. Generally Mode 1 is best suited for data only CDs while Mode is recommended for multimedia applications.



Mode 1 CD-ROM:

This is the standard for single session discs containing data only or data and audio. Multi-session is also supported. This option provides higher compatibility for older reading drives.

Mode 2 CD-ROM XA:

This is the recommended format for multimedia applications like Video CD, Photo CD, or multi-session formats such as CD+ (Enhanced CD). Mode 2 CD-ROM XA is the default selection.

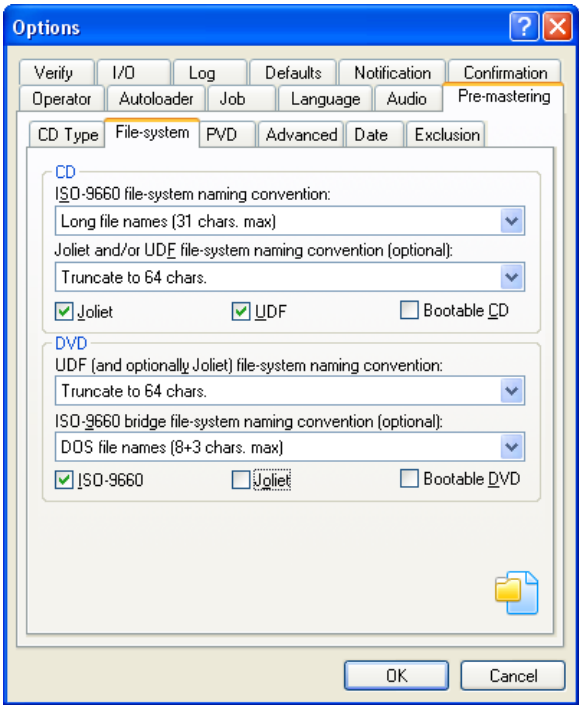
Force data CD only / Force audio CD only:

"Force data CD only" and "Force audio CD only" will restrict what you can add to a CD. If for example you are dragging and dropping an mp3 file and "Force data CD only" is selected, DiscJuggler will always add the mp3 to the disc as a data file. "Force data CD only" option can also be enabled on the fly by pressing the <Ctrl> key while dragging and dropping files.

If you are having trouble adding information to your CD, look at this tab to see if one of these options is checked.

* * *

When creating data discs, this panel will allow you to what choose file-systems and naming conventions to adopt.



CD File-system

- **ISO-9660 file-system naming convention:**

  This drop down list box allows you to select you the ISO-9660 name compatibility level. The following choices are available.

  - Level 1 file names (8+3 only A-Z, 0-9 and "_" chars.):

    This is the strictest standard and as such it will guarantee the broadest compatibility. Files following this naming convention can be read by all operating systems. In addition to the 8.3 names, you are limited to A-Z, 0-9, and the underscore '_' characters only.

  - Long file names (31 chars. max):

    This is the most common standard since it guarantees compatibility with all Microsoft and most other operating systems. This is the default selection.

  - DOS file names (8+3 chars. max):

    This standard will provide limited "long filename" support on UNIX and on most Microsoft platforms but it is incompatible with several other operating systems including MS-DOS.

- Leave file names unchanged:

  When this option is selected DiscJuggler will not modify the source filename. This can be potentially dangerous and could render the CD unreadable if there are filenames incompatible with the target operating system.

- **Joliet and/or UDF file-system naming convention (optional):**

  This drop down list box allows you to select additional file-system name compatibility. The following choices are available.

  - Truncate to 64 chars:

    When selected DiscJuggler will automatically truncate filenames to 64 character which is the maximum allowed by the Joliet file-system. This is the default selection.

  - Leave file names unchanged:

    When this option is selected DiscJuggler will not modify the source filename. This can be potentially dangerous and could render the CD unreadable if there are filenames incompatible with the target operating system.

- **Joliet:**

  Joliet is a CD file-system developed by Microsoft to add full support for long filenames. If this option is selected, in addition to ISO-9660, an additional parallel complete directory structure in UNICODE is created. Joliet file and directory names are allowed to be up to 64 characters long and there are no restrictions in the directory depth.

  Joliet is compatible with most recent operating systems including different flavors of UNIX and it is now the de facto standard for supporting long filenames. This option is selected by default.

- **UDF:**

  UDF is a file-system developed expressly for DVD discs. Since the file-system is independent from the physical medium, it is possible to write CD discs containing this file-system. DiscJuggler supports burning of UDF and UDF Bridge CDs containing any combination of UDF, Joliet and ISO-9660 file systems.

- **Bootable CD:**

  Select this option if you wish to create a bootable CD. A bootable CD is a standard data disc with a special extension that will allow the CD to boot your computer emulating a floppy disk. To make a bootable CD, you will need to create bootable floppy disks containing all the necessary files before you burn, as DiscJuggler does not create the bootable information for you.

DVD File-system

- **UDF (and optionally Joliet) file-system naming convention:**

  This drop down list box allows you to select you the UDF (and optionally Joliet) name compatibility level. The following choices are available.

  - Truncate to 64 chars:

    When selected DiscJuggler will automatically truncate filenames to 64 character which is the maximum allowed by the Joliet file-system. This is the default selection.

  - Leave file names unchanged:

    When this option is selected DiscJuggler will not modify the source filename. This can be potentially dangerous and could render the DVD unreadable if there are filenames incompatible with the target operating system.

- **ISO-9660 bridge file-system naming convention (optional):**

  This drop down list box allows you to select additional file-system name compatibility. The following choices are available.

  - Level 1 file names (8+3 only A-Z, 0-9 and "_" chars.):

    This is the strictest standard and as such it will guarantee the broadest compatibility. Files following this naming convention can be read by all operating systems. In addition to the 8.3 names, you are limited to A-Z, 0-9, and the underscore '_' characters only.

  - DOS file names (8+3 chars. max):

    This is the most common standard since it guarantees compatibility with all Microsoft and most other operating systems. This is the default selection.

  - Long file names (31 chars. max):

    This standard will provide limited "long filename" support on UNIX and on most Microsoft platforms but it is incompatible with several other operating systems including MS-DOS.

  - Leave file names unchanged:

    When this option is selected DiscJuggler will not modify the source filename. This can be potentially dangerous and could render the DVD unreadable if there are filenames incompatible with the target operating system.

- **ISO-9660:**

  If this option is selected, a directory structure parallel to the UDF structure will be created. The name compatibility can be changed according to the above options.

- **Joliet:**

  If this option is selected, in addition to ISO-9660, an additional parallel complete directory structure in UNICODE is created. Joliet file and directory names are allowed to be up to 64 characters long and there are no restrictions in the directory depth.

  Joliet is compatible with most recent operating systems including different flavors of UNIX and it is now the de facto standard for supporting long filenames. This option is selected by default.

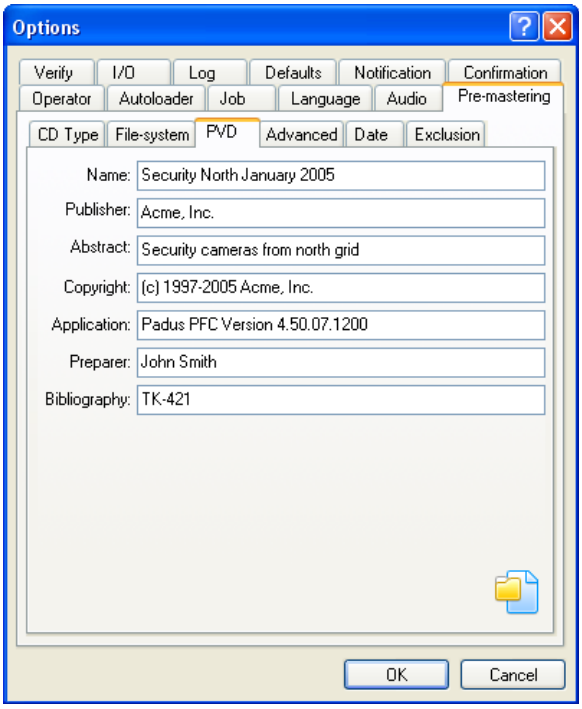
- **Bootable DVD:**

  Select this option if you wish to create a bootable DVD. A bootable DVD is a standard data disc with a special extension that will allow the DVD to boot your computer emulating a floppy disk. To make a bootable DVD, you will need to create bootable floppy disks containing all the necessary files before you burn, as DiscJuggler does not create the bootable information for you.

Features discussed in this section relating to DVD writing are only available in DiscJuggler Professional Edition and DiscJuggler.NET. See **Feature Limitations** *for more information.*

* * *

The Primary Volume Descriptor (PVD) sub-panel allows you to set information about your disc. You are allowed up to 128 characters per field except for the "Name" field which should be up to 32 characters long to be compatible with the ISO-9660 standard.



Name:

Type the name which is used by the system to identify the disc. For the name to be compatible with MS-DOS you should enter only up to 11 characters and use only A-Z, 0-9 and "_".

Publisher:

Allows you to enter disc publisher information like the name, address and telephone numbers. You can either enter the information directly or, if you need more than 128 characters, type the name of a text file containing the extended information. The file name must begin with an underscore symbol "_", meet 8.3 requirements, contain only A-Z, 0-9 and "_" characters, and it must be located in the root directory of the disc you are creating. For example, you could name the file name: _PUBLISH.TXT.

Abstract:

Allows you to enter information that describes the contents of the disc. You can either enter the information directly or, if you need more than 128 characters, type the name of a text file containing the extended information. The file name must begin with an underscore symbol "_", meet 8.3 requirements, contain only A-Z, 0-9 and "_" characters, and it must be located in the root directory of the disc you are creating. For example, you could name the file name: _ABSTRCT.TXT

Copyright:

Allows you to enter copyright information about the disc. You can either enter the information directly or, if you need more than 128 characters, type the name of a text file containing the extended information. The file name must begin with an underscore symbol "_", meet 8.3 requirements, contain only A-Z, 0-9 and "_" characters, and it must be located in the root directory of the disc you are creating. For example, you could name the file name: _COPYRGT.TXT.

Application:

Allows you to enter information about the application and tools used to create the disc. You can either enter the information directly or, if you need more than 128 characters, type the name of a text file containing the extended information. The file name must begin with an underscore symbol "_", meet 8.3 requirements, contain only A-Z, 0-9 and "_" characters, and it must be located in the root directory of the disc you are creating. For example, you could name the file name: _APPLCTN.TXT

Preparer:

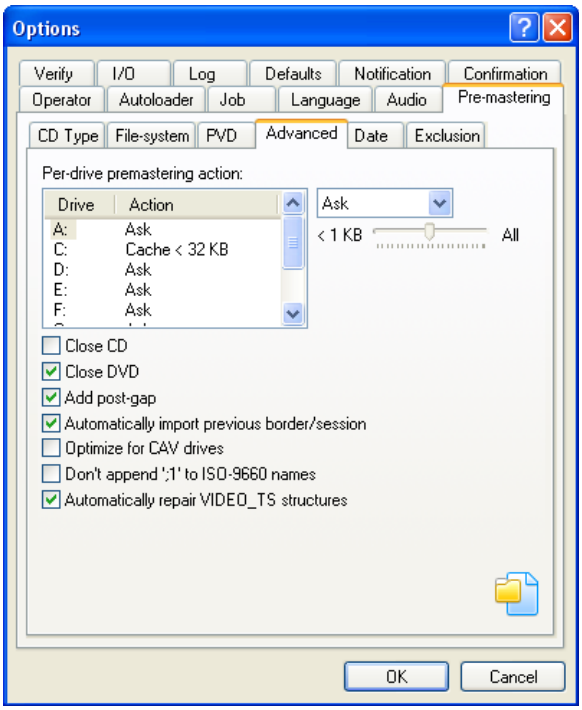
Allows you to enter information about the person who created the disc. You can either enter the information directly or, if you need more than 128 characters, type the name of a text file containing the extended information. The file name must begin with an underscore symbol "_", meet 8.3 requirements, contain only A-Z, 0-9 and "_" characters, and it must be located in the root directory of the disc you are creating. For example, you could name the file name: _PREPRER.TXT.

Bibliography:

Allows you enter bibliographic information about the disc. You can either enter the information directly or, if you need more than 128 characters, type the name of a text file containing the extended information. The file name must begin with an underscore symbol "_", meet 8.3 requirements, contain only A-Z, 0-9 and "_" characters, and it must be located in the root directory of the disc you are creating. For example, you could name the file name: _BIBLIO.TXT.

* * *

This sub-panel contains advanced pre-mastering options used by default or infrequently.



Per-drive pre-mastering action:

If your local drives are fragmented, slow, or you are pre-mastering many small files, it can be a good idea to have DiscJuggler cache all the files into one location and then write to disc. This can help prevent buffer under-runs. For each drive on your computer or network you have the option to do the following.

- Ask:

  When DiscJuggler has to record a file on a drive flagged with this action it will ask the user to which of the actions below should be performed.

- Add

  Files on drives with this action will be automatically burned to the disc regardless of the source drive speed.

- Skip

  Files on drives with this action will be skipped and therefore not burned to the disc regardless of the source drive speed.

- Cache

  Files on drives with this action will be cached ahead to a fast temporary image but only if they are smaller than a specified size.

Close CD/DVD:

If this option is selected, at the end of writing a disc, DiscJuggler will close the disc and you will no longer be able to add additional information to the disc. This option provides higher compatibility for older reading drives.

Add post-gap:

If selected this option will force the pre-mastering engine to append 2 seconds (150 blocks) of dummy data to the end of the data track. This is a standard requirement and can often improve the readability of the last few blocks of the track when the same track is followed by the lead-in area or by a track with a different data format.

Automatically import previous border/session:

A multi-session disc is usually a data disc where data is added incrementally in more than one session, allowing you to periodically add and update files and folders to your disc.

While adding a new session to a CD, if this option is selected, DiscJuggler will automatically "merge" the content of the previous session within the new session.

You can also selectively import from any previous session only specific files and directories using the DiscJuggler integrated disc layout explorer: double-click on any previous session to see the list of tracks, double-click on a data track to access its file-system and drag-and-drop the requested files and directories over the new track at the bottom of the window.

Having this option unchecked will make the disc appear as if the previous sessions on the disc were never burned.

Optimize for CAV drives:

Most newer drives use Constant Angular Velocity (CAV). This new technology causes the disc to spin at a constant angular speed. Before, disc drives used to be Constant Linear Velocity (CLV). The advantage of CAV is that drives do not need to constantly change speed and therefore they are simpler to produce, faster and cheaper. Since the data density on the disc is constant across the whole area, the "net" effect of CAV is that read speed on the inner edge of the disc is much slower that on the outer edge. This is why drive manufacturers often declare the read speed of their drives to be for example 14x-40x where 14x is the read speed at the beginning of the disc and 40x is the read speed at the outer edge.

If the data disc that you are burning is not full by selecting this option you will allow DiscJuggler to generate an appropriate number of dummy (empty) blocks at the beginning of the recording process thus moving your data as close as possible to the outer edge disc where the read speed is highest.

Additionally, you can using DiscJuggler's integrated CD Layout and DVD Layout to prioritize the files being written to disc. By doing this you can precisely place most important files on areas of the disc with the highest read speed.

Keep in mind that you will be not able to add additional information to disc after writing with this option.

Don't append ';1' to ISO-9660 names:

If selected this option will force the pre-mastering engine to remove the ;1 separator from the filenames of the ISO-9660 file-system. This option might be required when making bootable discs.

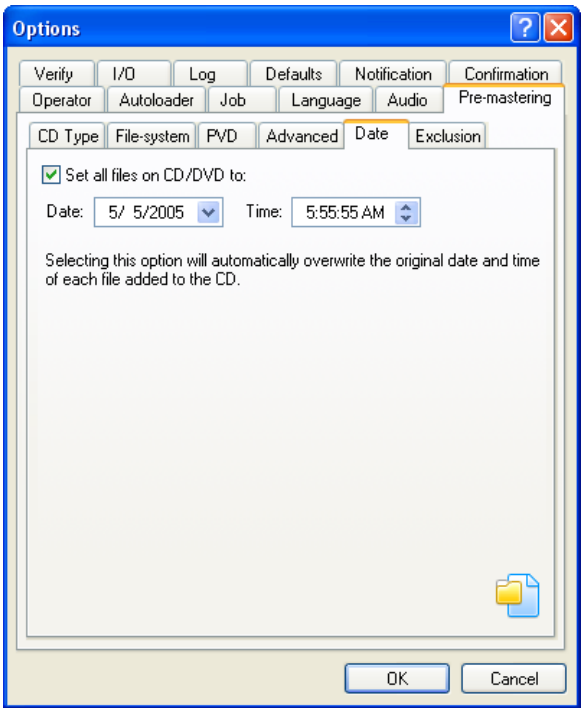
Automatically repair VIDEO_TS structures:

If this option is selected, the pre-mastering engine will automatically repair VIDEO_TS structures that do not meet DVD specifications. Some authoring engines intentionally break VIDEO_TS structures prior to being written to disc.

Features discussed in this section relating to DVD writing are only available in DiscJuggler Professional Edition and DiscJuggler.NET. See **Feature Limitations** *for more information.*

* * *

This sub-panel allows you to force all the files on the disc to a specific date and time.

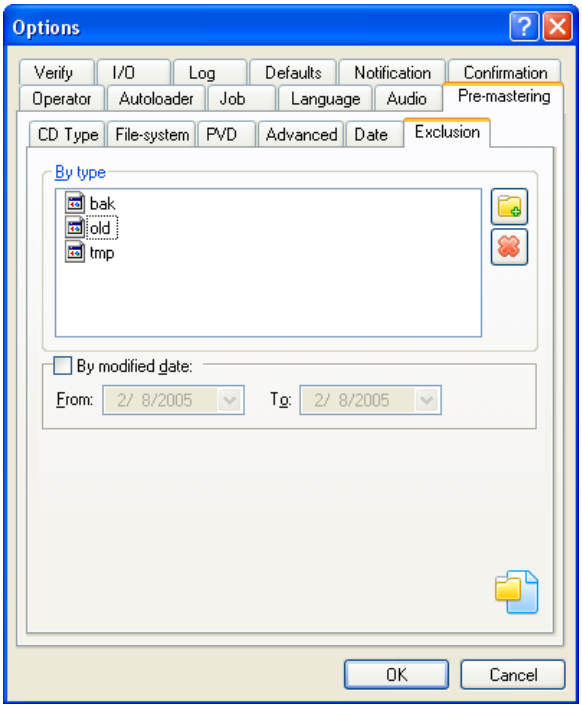


Set all files on CD/DVD to:

By enabling this option you can instruct DiscJuggler to set all files and directories on the disc to a specific date and time regardless of the original value. This may be useful if you do not want people to know when the files were actually written or if you want to use the date and time to "embed" additional information. So for example version 4.50 of a project on the disc can have all its files time set to 4:50:00AM.

* * *

With this sub-panel you can instruct DiscJuggler to automatically exclude files, when performing drag-and-drop operations, based on specific extensions or date.



By type:

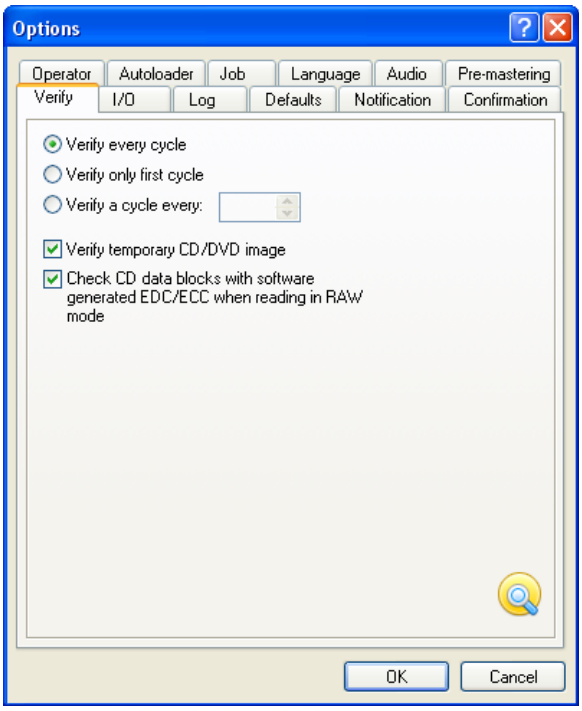
Here you can select files types you do not wish to include. To exclude a file type, click the gray rectangle with the yellow star, then type in an extension. This option is useful to automatically exclude old or temporary files when dragging-and-dropping entire sub-directories. To exclude these files, click the gray rectangle with the yellow star, then type for example "bak" or "tmp", without the quotation marks, and press the <Enter> key.

By modified date:

By enabling this option and specifying a time interval you'll prevent files modified within this range to be copied to the disc.

* * *

The Verify panel allows you to set the verification process, a bit-by-bit comparison of the source information and resulting disc. You can choose to verify every disc, the first disc of a multiple disc duplication task, or set the verification frequency when burning several discs. You can also choose to verify the temporary images created by DiscJuggler. Finally, you can instruct DiscJuggler to correct errors found when reading CDs in RAW mode.



Verify every cycle:

When selected, this option instructs DiscJuggler to perform a bit-by-bit verification of every recorded disc, including those that have been recorded simultaneously during the cycle. Select this option when data integrity is the most important factor. This option will nearly double duplication time. This option is effective only if "Verify" is selected in the Action panel. However, no verification is performed for Audio CDs or their tracks as all possible verification is done during the recording process.

Verify only first cycle:

When selected, instructs DiscJuggler to perform a bit-by-bit verification of the first recording cycle only, where "cycle" means the discs simultaneously recorded in one or more recorders. Select this option to check system integrity and when data integrity is not a crucial factor. This option is effective only if "Verify" is selected in the Action panel.

Verify a cycle every:

When selected, instructs DiscJuggler to perform a bit-by-bit verification process every n cycles recorded. Select this option to periodically check system integrity. Use the associated edit field to select the verification frequency: enter a number higher than 1. This option is effective only if "Verify" is selected in the Action panel.

Verify temporary CD/DVD Image:

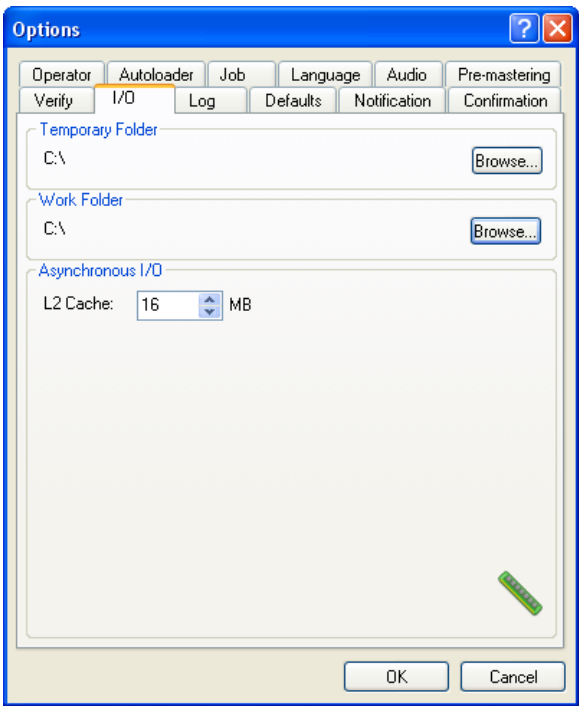
When this option is selected, whenever DiscJuggler generates a temporary DiscJuggler Image, a bit-by-bit verification will be performed between the source disc and the image to ensure that no errors occurred during the read process. This option is effective only if "Verify" is selected in the Action panel.

Check data blocks with software generated EDC/ECC when reading in RAW mode:

When reading CDs in RAW mode, DiscJuggler disables the hardware ECC/EDC performed by the reading drive. To ensure the highest data integrity, DiscJuggler will perform software ECC/EDC on all blocks when this option is selected.

* * *

This sub-panel allows you to specify a location on a hard disk for creating DiscJuggler Images or to permit DiscJuggler to create the image on a local hard disk. This sub-panel also lets you choose the amount of system RAM dedicated to duplication for L2 cache. The L2 cache increases the chance that DiscJuggler will successfully duplicate discs at the writing speed specified.



Temporary Folder:

Specifies the location where DiscJuggler will store temporary disc images and files.

Work Folder:

This is where DiscJuggler will save files such as the log, disc images, and music files.

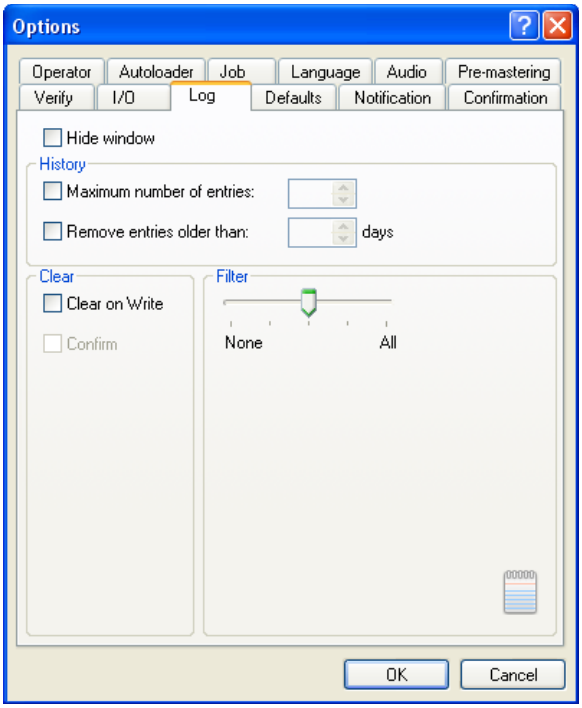
Asynchronous I/O:

A way to increase the robustness of the disc recording process is to use a portion of your RAM as an advanced Level 2 caching mechanism to buffer interruptions in the data flow. These methods cannot absolutely guarantee the elimination of buffer under-run errors. A number of other factors can adversely affect data throughput and lead to such errors.

The default cache size will vary depending on your license. Make sure you do not allocate too much memory for the L2 cache: leaving the operating system without enough memory can dramatically slow the system. The default value is appropriate for most recording tasks. Directly edit the control field or use the spin-buttons to enter a positive number between 1 and 1024.

* * *

The Log panel allows you to control the contents of the log file generated by DiscJuggler during each duplication session. You can request that DiscJuggler maintain the log up to a maximum number of entries (at which point earlier entries are deleted) or to delete log entries that are older than a specified number of days. It is also possible to clear the log each time information from a new task is entered. If this option is selected, than the option to confirm the deletion of existing log information is enabled. Finally, you can choose to "filter" log entries by moving the slider so that only a certain level of logging is included.



Maximum number of entries:

By selecting this checkbox and entering a positive number, you force the DiscJuggler Status panel to discard events in excess of the specified number. Older entries will be deleted.

Remove entries older than:

By selecting this checkbox and entering a positive number, you force the DiscJuggler Status panel to discard events older than the specified number of days.

Clear on Write:

When this box is checked, DiscJuggler will empty the corresponding Status panel every time a duplication task is started.

Confirm:

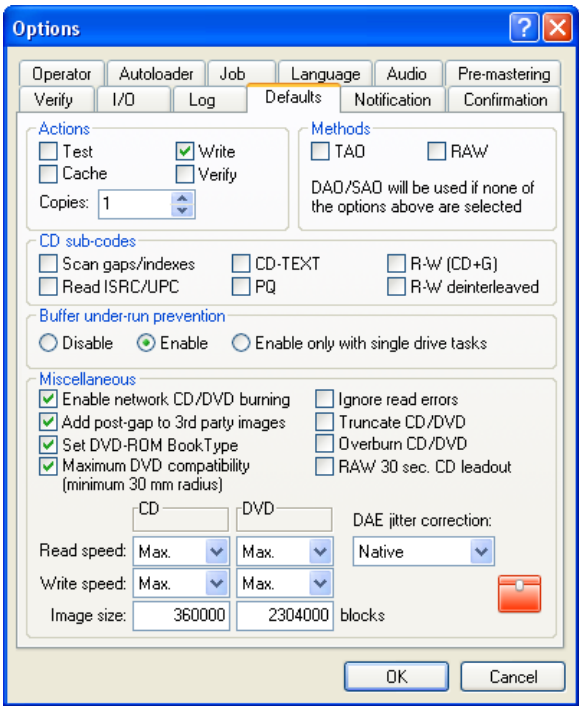
If this box is checked, DiscJuggler will ask for confirmation before erasing the document task log.

Filter:

This slider controls DiscJuggler verbosity. It ranges from “Filter None” where all events are displayed and logged, to “Filter All” where only fatal events will be displayed.

* * *

The Defaults panel contains important settings to control the way that DiscJuggler routinely burns discs unless an alternative is requested in the course of a specific recording task. By checking the appropriate boxes, you can request that DiscJuggler to perform combinations of actions, different methods, read and write CD sub-codes, and a wide range of additional options.



Actions

- **Test**
- **Write**
- **Verify**

  Use these three controls to define the default way the "Action" panel will be initialized during a creation of a new task. Any combination is valid except for Test and Verify.

- **Cache**

  By selecting "Cache" you effectively disable burn-on-the-fly and you force DiscJuggler to save the source disc to a temporary image on your local hard-disk first.

- **Copies**

  This control will define the number of copies automatically selected by DiscJuggler in the "Action & Method" panel, each time a new task is created. Directly edit the control field or use the spin-buttons to enter a positive number or "Auto" in which case the number of drives selected will determine the number and DiscJuggler will ask for more blank discs at the end of every cycle.

Methods

- **TAO**

  Selecting this option will force DiscJuggler to write discs in Track-At-Once (TAO). TAO forces a 2 seconds gap between tracks and adds a few additional unreadable blocks at the beginning and at the end of each track. DiscJuggler uses by default Session-At-Once (SAO) when supported by your drive. Use TAO recording method only if for any reason your writing drive is not working in SAO or Disc-At-Once (DAO) writing.

- **RAW**

  RAW read will disable the source drive hardware error correction while RAW write will disable the automatic hardware regeneration of error correction codes and reproduce the source data "as is" using, whenever possible (not all recorders allow this option), the RAW recording method. When this option is selected DiscJuggler will read and write blocks and associated sub-codes transparently without interfering with their content.

  Checking this box can be useful if intentional discrepancies between the error detection encoding and user data are present in the source. However, this option should be used with extreme caution since DiscJuggler cannot detect legitimate read errors when operating in this mode.

CD sub-codes

- **Scan gaps/indexes**

  This option will force DiscJuggler to accurately scan the source disc to reproduce the exact index structure and to search for tracks. This option is only related to Audio CDs. Please be aware that identifying the exact source disc index layout (including gaps between songs) can take a considerable amount of time. Select this option to make sure that the exact index structure and track layout of Audio CDs are replicated.

- **Read ISRC/UPC**

  This option will force DiscJuggler to accurately scan the source disc to search for tracks and disc unique identifiers such as the ISRC (International Standard Recording Code) and UPC (Universal Product Code) codes. This option is only related to Audio CDs. Please be aware that the ISRC and UPC codes are rarely used in commercial Audio CDs and scanning for them can take a considerable amount of time.

- **CD-TEXT**

  Checking this option will instruct DiscJuggler to read/write information such as the name of the album, the artist, and the track titles of Audio CDs.

- **PQ**

  When this option is selected DiscJuggler will not regenerate/correct PQ sub-code data, but will instead use whatever CD data was provided by the source drive. This is only possible if the writing drive is capable of recording in RAW mode. This option should be used with extreme caution since not all the reading drives can return valid PQ data, in which case the resulting CD will be unreadable.

- **R-W (CD+G)**

  Select this option if you want to duplicate Karaoke CDs or you want to create Karaoke compilations. Select also this option, combined with "RAW" to write R-W data returned by the source drive unchanged.

- **R-W de-interleaved**

  Reads R-W sub-codes in de-interleaved mode. Some older drives can only read and write R-W sub-codes in de-interleaved mode.

Buffer under-run prevention

Most drives feature buffer under-run prevention technology to limit the possibility of the drive buffer losing data and preventing the writing process from succeeding. This technology pauses the writing process until the buffer has the necessary data to complete the process and begin again where the process was paused. This procedure, while saving the write process, will increase the total writing time. Common names for the technology include BURN-Proof™, JustLink™, Power-Burn™, SafeBurn™, and Seamless Link to name a few. DiscJuggler can use this technology in the following ways.

- **Disable**

  This option will force DiscJuggler to not use any buffer under-run prevention technology that writing drives feature.

- **Enable**

  This option will for DiscJuggler to use any buffer under-run prevention technology that writing drives feature.

- **Enable with only single drive tasks**

  This option will make sure DiscJuggler only uses buffer under-run prevention technology in tasks where only one writing drive is being used. Tasks involving more than one writing drive will not use any buffer under-run prevention technology.

Miscellaneous

- **Enable network CD/DVD burning**

  By default, certain DiscJuggler editions will automatically have networking support enabled. This allows DiscJuggler to know of available servers using the DiscJuggler.NET architecture by scanning for servers while DiscJuggler loads. This can be disabled to shorten the time DiscJuggler takes to load and make servers unavailable as destination devices in certain tasks.

- **Add post-gap to 3rd party images**

  Checking this option adds a two second gap to the end of a disc image that was not been created by DiscJuggler. If you create discs without adding a two second post-gap, some drives can accidentally step on the lead-out area while trying to read files recorded at the end of the disc, resulting in read errors.

- **Maximum DVD compatibility (minimum 30 mm radius)**

  Some DVD writing drives require that at least 30 millimeters of data is written to a blank disc, while others make it optional. While it is recommended that you use this feature for increase compatibility with all reading drives, you can disable this feature if you are certain that the resulting disc will be compatible. With drives that do not provide the option, DiscJuggler will write null data until 30 millimeters is reached, which can increase the time it takes to finalize DVD discs.

- **Set DVD-ROM BookType**

  This option will use bitsetting technology of supported writing drives to change the BookType of DVD+R, DVD+R DL, and DVD+RW media to DVD-ROM for higher compatibility in DVD players.

- **Ignore read errors**

  Some CDs will intentionally incorporate illegal sectors that will cause a read to fail with an error. If this box is checked, DiscJuggler will simply ignore these errors and supply the destination drive with dummy (empty) blocks instead. Please do not check this box unless you know that the disc you are duplicating contains bad sectors.

- **Truncate CD/DVD**

  Check this box if you want to truncate (cut off the end) of your source disc or image so that it fits on a standard size blank disc. Truncation may make sense for an Audio CD but it will most likely render a Data CD or DVD unusable. DiscJuggler will give you the choice of truncating or terminating on a task-by-task basis if you have checked the box for this in the confirmation dialog.

- **Overburn CD/DVD**

  You can attempt to "overburn" a disc that exceeds the maximum size of a standard disc by checking

this box. When you select this option DiscJuggler will simply ignore the maximum available space on the target disc and will let you start the recording process anyway. However, there is no guarantee that you will be successful or how much space, if any, is available beyond the standard maximum size for the disc brand that you are using. DiscJuggler will give you the choice of overburning or terminating on a task-by-task basis if you have checked the box for this in the confirmation dialog.

- **RAW 30 sec. CD leadout**

  The CD-R/RW standard (the so-called "Orange Book") mandates that the first session on a CD must have a lead-in area of 1 minute and a lead-out area of 1 minute and 30 seconds while second or higher sessions must have a lead-in area of 1 minute and a lead-out area of only 30 seconds. When this option is selected along with "RAW read/write" DiscJuggler will generate a first session lead-out area of only 30 seconds. While still perfectly compatible with most reading drives, this shortened lead-out area will free up to ~9 MB of available disc space. On credit-card size CDs this can translate on a 15% or more increase in available free space.

- **Read speed**

  Use this control to adjust the reading speed at which data and audio are extracted. Slowing the reading speed can be a valuable means of improving the quality of Digital Audio Extraction (DAE) on some readers. Normally, some experimentation is needed to determine the optimum setting. Please be careful to set the read speed at or above the write speed when duplicating directly to a recorder to avoid buffer under-run problems.

- **Write speed**

  Use this control to define the default way the "Method" panel will be initialized during a creation of a new task. Depending on the writing drives in use, not all the speeds may be available: in this case DiscJuggler will automatically choose a compatible speed.

- **Image size**

  These controls set the maximum disc size. This size should match the size of the blank media used or should be larger for the ability to "overburn" discs. Directly edit the control field or use the spin-buttons to enter a positive number based on the approximate block size of discs.

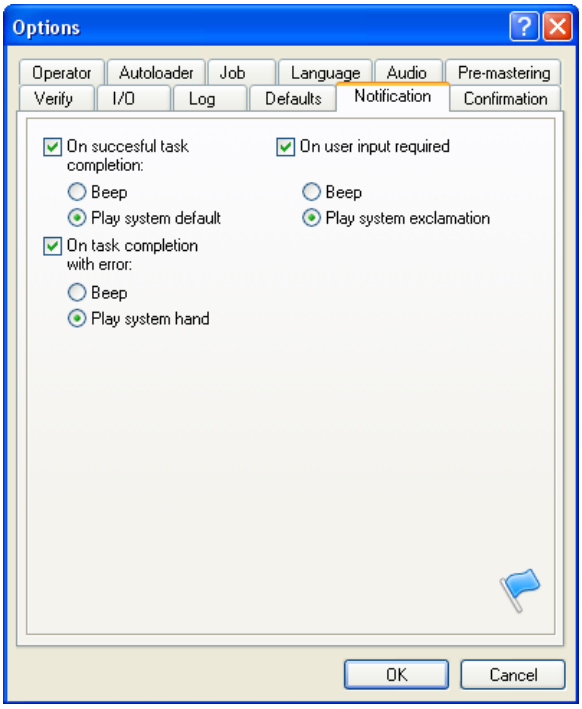
- **DAE jitter correction**

  For more details on this option, please see the **Advanced** panel in the **Create MP3s, WMAs, WAVs, and CD compilations** section.

Features discussed in this section relating to DVD and network writing are only available in DiscJuggler Professional Edition and DiscJuggler.NET. See **Feature Limitations** *for more information.*

* * *

The Notification panel allows users to control the notification sounds that are emitted by DiscJuggler at the events described in the dialog. These sounds help to alert DiscJuggler operators that their attention is required.



On successful task completion:

When selected, DiscJuggler will notify the user when a task completes successfully. A simple beep or the "system default" sound can be played. Systems sounds can be selected using the "System Sounds" applet in the Control Panel.

On task completion with error:

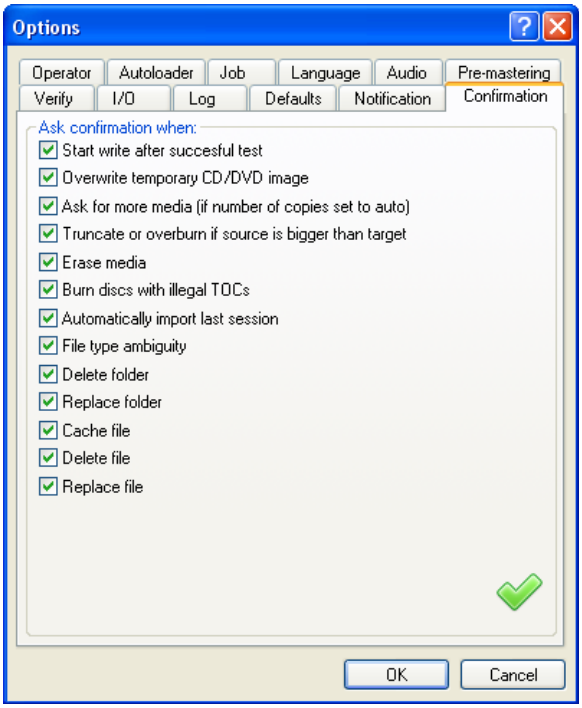
When selected, DiscJuggler will notify the user when a task completes abnormally. A simple beep or the "system hand" sound can be played. Systems sounds can be selected using the "System Sounds" applet in the Control Panel.

On user input required:

When selected, DiscJuggler will play a simple beep or the "system exclamation" sound when user input is required. Systems sounds can be selected using the "System Sounds" applet in the Control Panel.

* * *

The check boxes in the Confirmation panel configure DiscJuggler to require operator intervention to continue the actions described: starting to write a disc after a successful test write, overwriting an existing temporary disc image file, when more media is required, and so on.



Start write after successful test:

After a test (pseudo-write) has been successfully completed, if this option is selected, DiscJuggler asks the user confirmation before starting the actual write.

Overwrite temporary CD/DVD image:

During a temporary disc image creation, if DiscJuggler encounters a temporary disc image in the current temporary location with the same name and this option is selected, the user must confirm before overwriting the old image with the new one.

Ask for more media (if number of copies set to auto):

When "Auto" is selected in the copies field of the "Action & Method" panel, and this option is selected, at the end of every write cycle or when an autoloader runs out of blank discs, DiscJuggler asks the user to insert more blank media and continue recording. When this option is not selected, the application will simply complete the task when the destination writing drive cluster runs out of blank media.

This option is ignored when "Auto" is not selected in the copies field of the "Action & Method" panel.

Truncate or overburn if source is bigger than target:

When the source is bigger than the target, DiscJuggler will ask the user to confirm truncation of the source or overburn of the target disc, if either of these options has been selected in the "Defaults" panel. Otherwise the task proceeds according to the option selected. This option is ignored if neither truncation nor overburn has been selected in the "Defaults" dialog and duplication is terminated.

Erase media:

When you insert a re-writable disc with information already on the disc, DiscJuggler will prompt you before erasing the media.

Burn discs with illegal TOCs:

This will enable DiscJuggler to write discs with invalid Table of Contents. In some cases, reading and writing the data might not be allowed by read and writing drives.

Automatically import last session:

Applies to the "Create new [disc type]" tasks only. When burning a multi-session disc, DiscJuggler will prompt you before automatically importing the content of the previous session.

For more information, please see the **Advanced** sub-panel in the **Pre-mastering** Options section.

File type ambiguity:

Applies to the "Create new [disc type]" tasks only. If you check this option, DiscJuggler will prompt you when you drag-and-drop file shortcuts to ask whether you want to write the shortcut file or the file the shortcut it pointing to. When this option is not checked all shortcuts are automatically de-referenced and the original files will be added instead.

Delete folder:

Applies to the "Create new [disc type]" tasks only. DiscJuggler will prompt you, before deleting a folder on your disc layout.

Replace folder:

Applies to the "Create new [disc type]" tasks only. When you drag-and-drop a folder that already exists in your disc layout, DiscJuggler will prompt you before over writing the contents.

Cache file:

Applies to the "Create new [disc type]" tasks only. When you pre-master a disc with a large number of small files to write, sometimes buffer under-runs may occur. To avoid this, DiscJuggler can cache all small files to a central location thus optimizing file access. Checking this option means you want DiscJuggler to prompt you

before it chooses to cache a small file.

Delete file:

Applies to the "Create new [disc type]" tasks only. DiscJuggler will prompt you before removing a file from the disc layout.

Replace file:

Applies to the "Create new [disc type]" tasks only. DiscJuggler will prompt you before replacing a file from the disc layout.

* * *

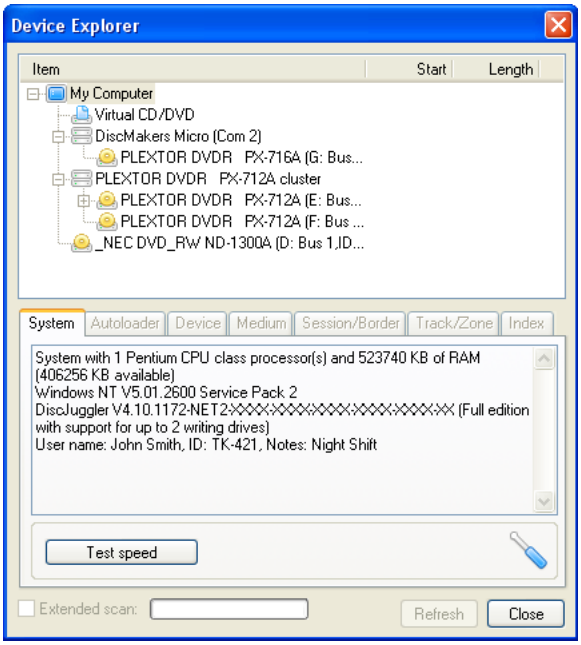
DiscJuggler's Device Explorer is a set of panels and functions that hierarchically displays comprehensive information about devices attached to the system, as well as the contents contained in these devices. The main window of the Device Explorer features a tree-based display of the devices attached to the system. Increasingly detailed information is available by expanding the branches of the tree. With the Drive Explorer, you can determine the properties of all the devices in your system and details of any discs contained within. Device Explorer's interface is similar to that of the Windows Explorer. Detailed information pertinent to the item highlighted in the tree is shown below and includes displays of the following information.

- **System**
- **Autoloader**
- **Device**
- **Medium**
- **Session/Border**
- **Track/Zone**
- **Index**

* * *

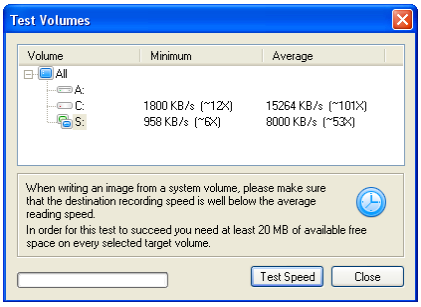
Selecting the System panel of the Device Explorer displays information concerning the computer system configuration and DiscJuggler setup.

- CPU type
- Total and available system memory in kilobytes
- Windows edition and version
- DiscJuggler edition and version
- DiscJuggler serial number
- DiscJuggler operator's name and ID



Test Speed:

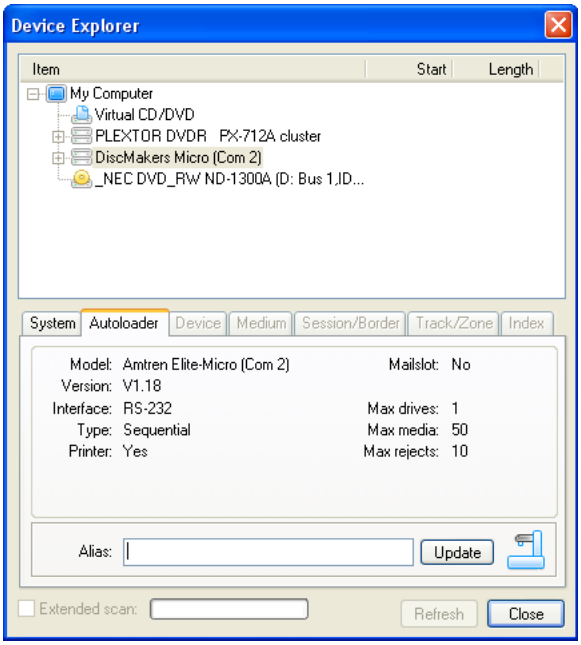
This button displays a dialog that will perform a read/write test on the selected logical drive to determine its average and minimum CD writing speeds.



To avoid potential buffer under-run problems always make sure that you the speed of the drive you are using as a source for your recording and pre-mastering data is higher than the writing speed selected. For this test to succeed on every selected drive there must be at least 20MB of available free space on each.

* * *

The Autoloader panel displays information concerning the selected robotics device and associated reading and writing drives.



The information displayed at this level pertains to robotic devices as a whole and includes the capabilities of the autoloader, the blank media capacity, drives, rejects, mail slot, interface, and printer availability.

- Autoloader model
- Firmware/BIOS revision
- Type of interface used by the robotics device to communicate with the computer
- Type of robotics: this can be either sequential (autoloaders) or random (jukebox) access
- If the autoloader has a disc printer connected
- If the autoloader has a mail-slot to eject discs one by one
- The maximum number of writing drives the autoloader can support
- The maximum number of blank discs that can be loaded at once
- The maximum number of rejected discs that the unit can hold

Details concerning the devices connected to the autoloader are shown by clicking on the "+" next to the selected unit in the Device Explorer tree or double-clicking it.

Alias:

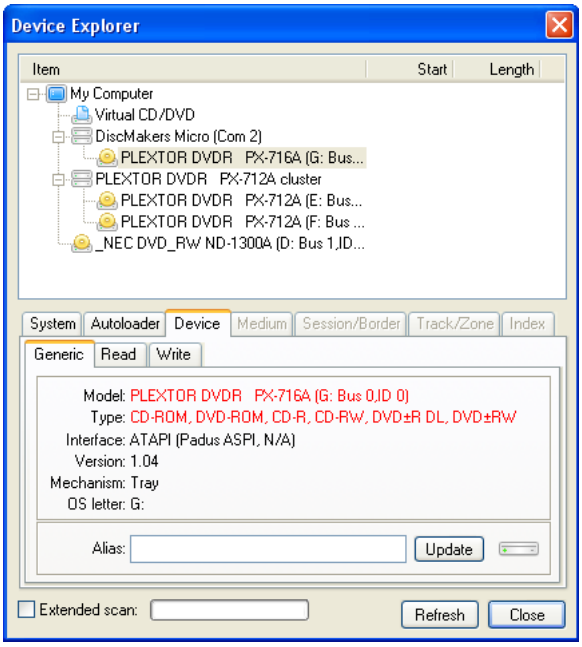
To better identify devices of the same type, simultaneously connected to the computer, DiscJuggler offers the ability to assign an "Alias" to a device. When you assign an alias to a device and press the <Update> button, DiscJuggler will always refer to that unit with its new name. For example if you have two identical autoloaders connected to the same computer you could name one "Left Autoloader" and the other "Right Autoloader".

To remove an alias and have DiscJuggler use the original name just leave the field empty and press the <Update> button.

Features discussed in this section relating to autoloaders are only available in limited licenses of DiscJuggler Professional Edition and DiscJuggler.NET. See **Feature Limitations** *for more information.*

* * *

The Device panel displays information concerning the device selected in the Explorer tree.



Device information is subdivided in the three following categories.

- **Generic**
- **Read**
- **Write**

If a disc is inserted in the selected device, pressing the <Refresh> button will instruct DiscJuggler to scan the media and return detailed information in the **Medium**, **Session/Border**, **Track/Zone**, and **Index** panels.

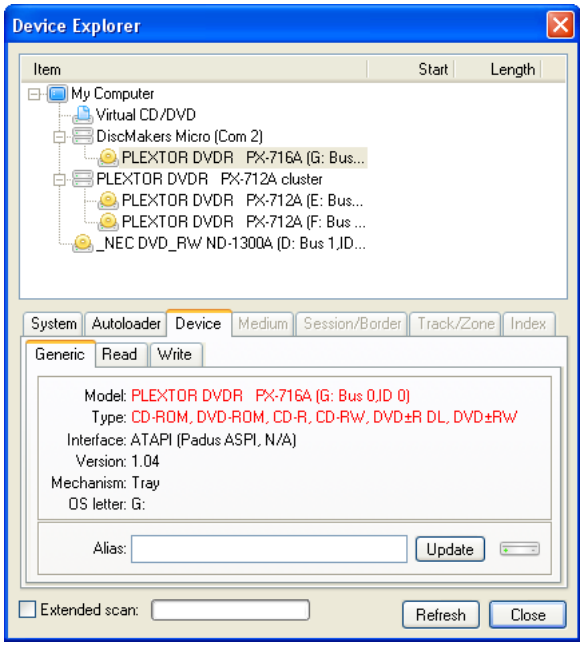
When the extended scan option is selected DiscJuggler will also return hard to read information such as ISRC and UPC codes and a precise disc index structure. The extended scan can take several minutes. A progress bar is shown during the scan.

Selecting the Extended scan box starts a scan of the entire selected disc to augment the hierarchical tree display with detailed information about ISRC/UPC, variable gap sizes, and indexes.

* * *

The Generic sub-panel displays generic information about the device selected in the Device Explorer tree.

- Device name and model
- Firmware version
- Interface used by the device to communicate with the computer
- The type of device (i.e. CD-R/RW, DVD-ROM, etc.)
- The type of mechanism the device uses to load the disc (valid types: Tray, Caddy and Slot)
- The drive letter (if any) that the operating system assigned to the device



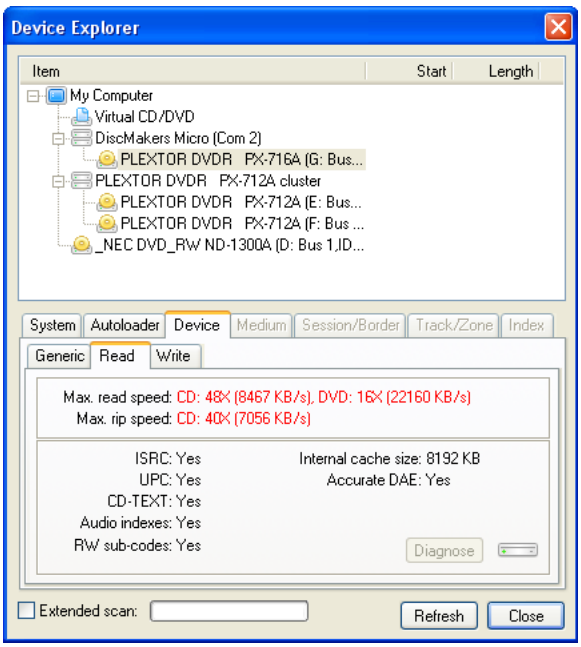
Alias:

To better identify devices of the same type, simultaneously connected to the computer, DiscJuggler offers the ability to assign an "Alias" to a device. When you assign an alias to a device and press the <Update> button, DiscJuggler will always refer to that unit with its new name. For example if you have two identical writing drives connected to the same computer you could name one "Top Drive" and the other "Bottom Drive".

To remove an alias and have DiscJuggler use the original name just leave the field empty and press the <Update> button.

* * *

The Read sub-panel displays more specific information about the selected device's reading capabilities.

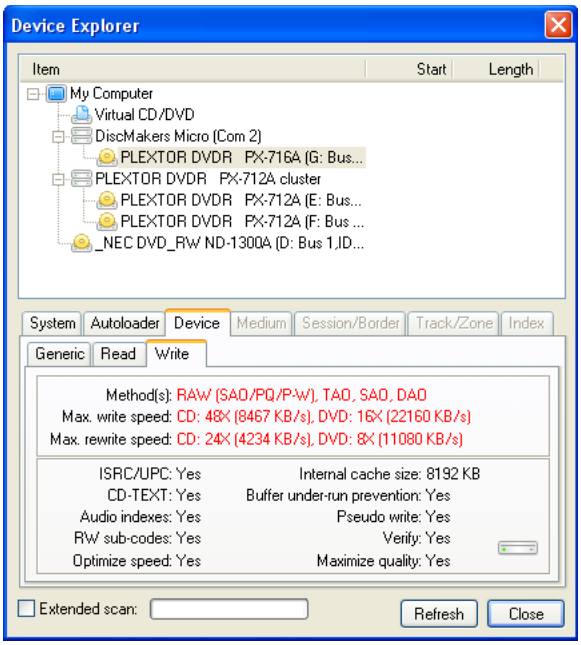


Information displayed about the device's capabilities includes the following.

- Maximum read speed (declared by the manufacturer)
- Whether the device is capable of scanning Q sub-codes to retrieve the ISRC (International Standard Recording Code)
- Whether the device is capable of scanning Q sub-codes to retrieve the UPC (Universal Product Code)
- Whether the device is capable of scanning R-W sub-codes to retrieve Sony CD-TEXT information
- Whether the device is capable of scanning Q sub-codes to retrieve variable gaps and indexes
- Whether the device is capable of reading R-W sub-codes to return CD+G graphics
- Whether the device is capable to accurately extract digital music from an Audio CD
- Device internal cache size in kilobytes

* * *

The Write sub-panel will display more specific information about the selected device's writing capabilities.



Information displayed about the device's capabilities includes the following.

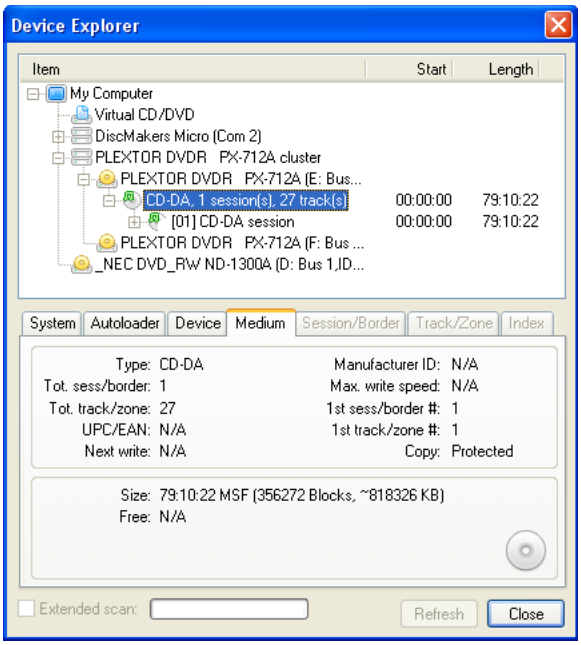
- Supported CD writing methods, including:
  - Track-At-Once (TAO)
  - Session-At-Once (SAO)
  - Disc-At-Once (DAO)
  - RAW-SAO (RAW recording at 2352 bytes/block)
  - RAW-PQ (RAW recording at 2368 bytes/block)
  - RAW-P-W (RAW recording at 2448 bytes/block)
- Supported DVD writing methods, including:
  - Session-At-Once (SAO)
  - Disc-At-Once (DAO)
- Write speed range
- Writing drive type(s)
- Whether the device is capable of simulating a write process (by setting the laser to read power)
- Whether the device is capable of verifying a disc after writing it
- Whether the device is capable of burning discs with variable gaps between tracks and multiple indexes
- Whether the device is capable of burning user-supplied R-W sub-codes data. This is necessary to duplicate or create CD+G/Karaoke discs.
- Whether the device is capable of burning ISRC (International Standard Recording Code) and UPC (Universal Product Code) data
- Whether the device is capable of burning Sony CD-TEXT data
- Whether the device has support for buffer under-run prevention technology such as BURN-Proof™ or JustLink™
- Whether the device has support for optimized write speed control such as JustSpeed™, PoweRec™, or PoweRec II™

- Whether the device has support for high quality writing technologies such as Audio Master™, Audio Master HQ™, VariRec™, or VariRec II™

Features discussed in this section relating to DVD writing are only available in DiscJuggler Professional Edition and DiscJuggler.NET. See **Feature Limitations** *for more information.*

* * *

The Medium panel displays information about the physical and logical characteristics of the disc currently mounted in the device selected. Summary information of the disc type and track and session totals is shown here, as well as the total used and free space, Universal Product Code (UPC), and whether the copy protection field is on. Details concerning sessions and tracks are shown by clicking on the "+" next to the disc and then clicking on the desired session.



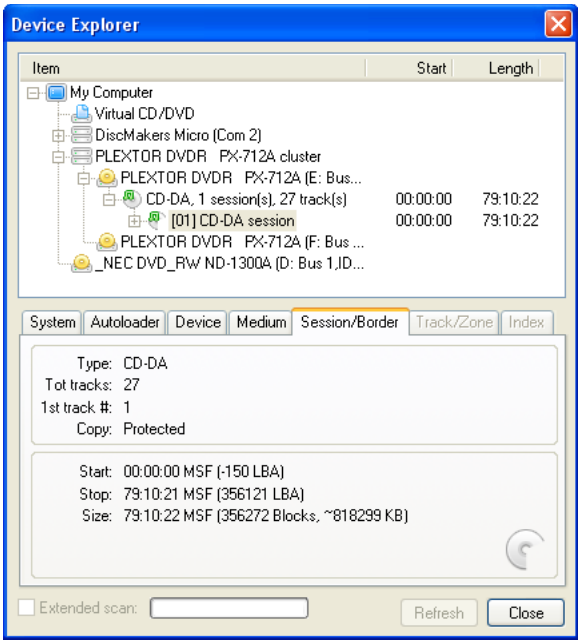
Medium information includes the following.

- CD type and whether the disc is re-writable. CD type can be one of the following:
  - CD-DA
  - CD-ROM
  - CD-XA
  - CD-I
- DVD type and weather the disc is re-writable. DVD type can be one of the following:
  - DVD-ROM
- Total number of sessions/borders on the disc
- Total number of tracks/zones on the disc
- The UPC (Universal Product Code) if present
- The next writable address of an open disc
- The disc manufacturer ID number
- Maximum write speed supported
- Logical number of the first session/border on the disc
- Logical number of the first track/zone on the disc
- Whether the disc is copy protected
- The total size of the disc
- The available space on the disc

All session/border, track/zone, and index addresses and sizes are shown in MSF (Minute, Second, Frame) format where a frame is a 1/75th of a second or in LBA (Logical Block Address) where 0 is the beginning of index 1 of the first track on the disc. The colors of the times displayed indicate the same level in the Device Explorer hierarchy.

* * *

The Session/Border panel displays information pertinent to the specific session or border selected, such as, the individual track types and their starting times and lengths, the starting and ending times and size of the session and a summary of the number of tracks and first track number within the session. The track number within a session and relative to the entire disc are shown in square brackets preceding the track description. Information about the tracks within the session is available by clicking on the "+" next to the session item and then selecting the desired track.



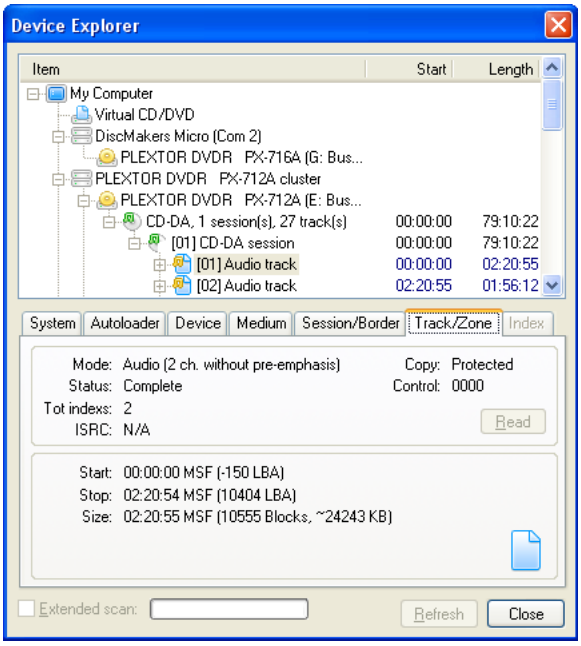
Session information includes the following.

- Session or border type, either:
  - CD-DA
  - CD-ROM
  - CD-XA
  - CD-I
  - DVD-ROM
- Total number of tracks or zones in the session or border
- Logical number of the first track or zone in the session or border
- Whether the session/border is copy protected
- The starting address of the session/border on the disc
- The ending address of the session/border on the disc
- The total size of the session/border

All session/border, track/zone, and index addresses and sizes are shown in MSF (Minute, Second, Frame) format where a frame is a 1/75th of a second or in LBA (Logical Block Address) where 0 is the beginning of index 1 of the first track on the disc. The colors of the times displayed indicate the same level in the Device Explorer hierarchy.

* * *

The Track/Zone panel displays information concerning the timing and sizes of the track/zone data, indexes, and gaps on the track selected. The individual track/zone components' timing information and track summary information is also displayed. Summary information for the track is displayed including the track's audio quality, pre-emphasis, and copy protection settings, ISRC, logical block address and size. Information about the indexes within the track is available by clicking on the "+" next to the track item and then selecting the desired index.



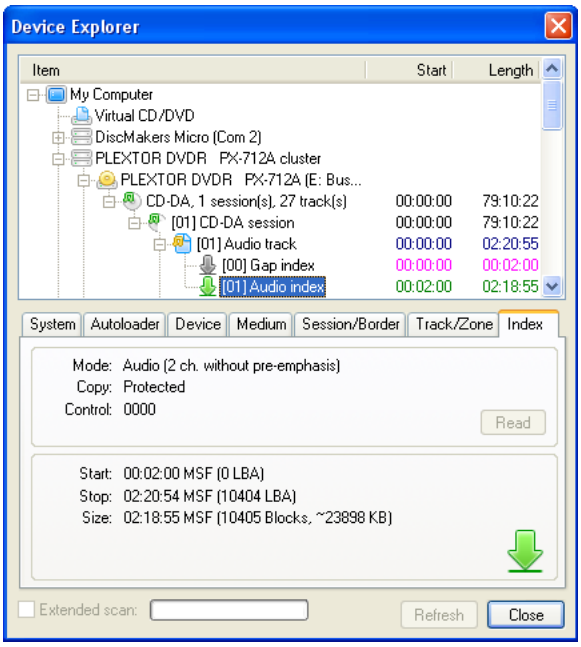
Track information includes the following.

- Track or zone type, either:
  - Audio
  - Mode 1
  - Mode 2
- Track status
- Total number of indexes (including index 0) in which the track is subdivided
- The ISRC (International Standard Recording Code)
- Whether the track/zone is copy protected
- The starting address of the track/zone on the disc
- The ending address of the track/zone on the disc
- The total size of the track (including index 0)

All session/border, track/zone, and index addresses and sizes are shown in MSF (Minute, Second, Frame) format where a frame is a 1/75th of a second or in LBA (Logical Block Address) where 0 is the beginning of index 1 of the first track on the disc. The colors of the times displayed indicate the same level in the Device Explorer hierarchy.

* * *

The Index panel of the Device Explorer shows the position of each index found in the P-Q sub-code channel of a CD as well as its length (the amount of time until the subsequent index).



Index information includes the following.

- Index type, either:
  - Audio
  - Mode 1
  - Mode 2
- Whether the index is copy protected
- The starting address of the index on the disc
- The ending address of the index on the disc
- The index size

All session/border, track/zone, and index addresses and sizes are shown in MSF (Minute, Second, Frame) format where a frame is a 1/75th of a second or in LBA (Logical Block Address) where 0 is the beginning of index 1 of the first track on the disc. The colors of the times displayed indicate the same level in the Device Explorer hierarchy.

* * *

The following is the complete list of DiscJuggler menus and available commands. Where applicable, each command is listed with its correspondent shortcut and toolbar icon.

* * *

Use the File menu to create, open and save task documents, export a detailed task log, or quit the program.

New

Displays the "New Task" window and creates a new task document.
Shortcut: Ctrl + N

Open

Selects a task document to open.
Shortcut: Ctrl + O

Close

Closes the active task document.
Shortcut: Ctrl + F4

Save

Saves the active task document.
Shortcut: Ctrl + S

Save As

Saves the contents of the active task document with a new name.

Export

Exports the active task log to a text file. Please read the **Error Reports** instructions in the **Technical Support** section for a details on the importance of this feature, and how to properly use it.

Print

Prints the active task log.
Shortcut: Ctrl + P

Print Preview

Displays the contents of the active task log, as it will be printed.

Print Setup

Displays the Print Setup window.

Recent File List

List of the four most recently used task documents. Clicking on one of the listed files opens the selected task document.

Exit

Closes all task documents and exits the program.
Shortcut: Alt + F4

* * *

Use the Edit menu to cut, paste, and modify elements of the current task document.

Clear All

Clears the content of the active (focused) edit control. If the task log window is active, this command clears its content.

Select All

Selects the content of the active (focused) edit control. If the task log window is active, this command will select all the entries.
Shortcut: Ctrl + A

Cut

Cuts the selected content of the active (focused) edit control and moves it into the system clipboard. If the task log window is active, this command will remove all the selected entries.
Shortcut: Ctrl + X

Copy

Copy the selected content of the active (focused) edit control into the system clipboard. If the task log window is active, this command will copy into the clipboard all the selected entries.
Shortcut: Ctrl + C

Delete

Deletes the selected content of the active (focused) edit control. If the task log window is active, this command will delete all the selected entries.
Shortcut: Del

Find

Finds a specific file. You need to type full file name or wild card (*) with file extension (ex. *.jpg).
Shortcut: Ctrl + F

Find Next

Repeats the last find operation.
Shortcut: F3

* * *

Use the View menu to customize the user interface and display program settings and options.

Toolbar

Use this command to show or hide the program toolbar.

Status Bar

Shows or hides the program status bar.

* * *

The Tools menu contain various tools useful to assist you during all DiscJuggler tasks.

Play

Plays the currently selected audio item (either a track or a file).

Stop

Stops the current audio file while playing.

Backward

Moves to and plays the previous audio item (either a track or a file).

Forward

Moves to and plays the next audio item (either a track or a file).

Eject

Unloads checked or selected devices. Press <Ctrl> while clicking to load.

Up Folder

When viewing directories or folders in Explorer, this command will move to the parent directory or folder.

Refresh

If you make changes to directories or folders outside of DiscJuggler, you can use the this command (or the F5 key) to force a refresh of the current view.
Shortcut: F5

Reset Destination

Will blank out the contents of a pre-mastering window.

Search BOT

Used to locate and automate the recording of files, projects and complex file structures. Similar to the

Windows Find/Search option.

Device Explorer

Displays a dialog that allows the user to display comprehensive information about reading and writing devices in the system, as well as the media and their contents in those devices. Please see the **Device Explorer** chapter of this help file for more details.
Shortcut: Ctrl + Enter

Options

Allows you to set various categories of DiscJuggler options. Please see the **Options** chapter of this documentation for more details.

Network Console

Starts the Padus Network Console. Please see the **Networking** chapter of this documentation for more details.

Alignment Wizard

Used to initialize certain autoloader mechanisms that require initial alignment to be operational.

Features discussed in this section relating to autoloaders are only available in limited licenses of DiscJuggler Professional Edition and DiscJuggler.NET. See **Feature Limitations** *for more information.*

* * *

Use the Window menu to rearrange the location and size of multiple task documents.

Cascade

Arranges all the task document windows to overlap. This can be useful when many windows are open at the same time.

Tile

Arranges all the task document windows currently open as non-overlapping tiles.

Arrange Icons

Rearranges all the minimized task document windows at the bottom of the main program window.

* * *

Use the Help menu to get information about DiscJuggler. The entire help file is contained in the help system.

DiscJuggler Help

Displays the DiscJuggler help file.
Shortcut: F1

Padus on the Web

By using this sub-menu, you will be able to use your default web browser to automatically visit our site for information on recording products, updates, and technical assistance.

Tip of the Day

Displays a dialog with tips on using DiscJuggler.

Software Updates

Checks with Padus servers for possible updates to the product. The Software Update utility will ask for your permission before sending anything to Padus.

Register DiscJuggler

Displays a dialog that will allow you to register your copy of DiscJuggler and become eligible to free upgrades and customer support.

About DiscJuggler

Displays the program information, version number and copyright. The dialog contains the following.

- DiscJuggler version and build
- User and company licensing DiscJuggler
- DiscJuggler serial number and registration status

* * *

DiscJuggler Professional Edition and DiscJuggler.NET contain networking technologies allowing writing drives to be shared across networks. This chapter will follow through the process of creating, configuring, and using a server, with reference to each important section of the Padus Network Console.

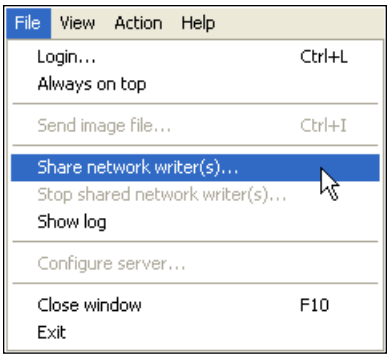
Features discussed in this section relating to network writing are only available in DiscJuggler Professional Edition and DiscJuggler.NET. See Feature Limitations for more information.

* * *

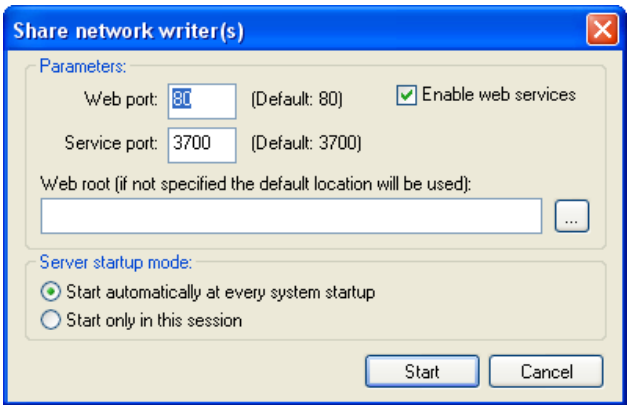
Creating a server with the networking technologies in DiscJuggler Professional Edition and DiscJuggler.NET is straight-forward. Not all configuration details will be available in all licenses, so please keep that in mind while reading through the following sections.

* * *

To begin sharing drives over networks, start the Padus Network Console. This can be done in DiscJuggler by clicking on the Network Console icon ( ) in DiscJuggler or by using the *Network Console* shortcut in the Windows Start menu (default location: *Start* » *Programs* » *Padus DiscJuggler* » *Network Console*).



After the Padus Network Console has started, start the Network Server service. This can be done by using *File* » *Share network writer(s)...* This will open the primary configuration window for the Network Server service.



The following parameters will determine how the service starts. These settings cannot be changed while the service is running.

Web port

The Network Server service contains a simple web interface for administrative functions and monitoring. The port that the web service uses can be changed to not interfere with other web services that might be running on the same system.

Service port

Changes the default service port that the Network Server service runs on. This is useful if another service needs to use this port on the host system.

Web root

The location where the web interface files are contained. The default location is located in the Web directory

of the root DiscJuggler program files directory.

Server startup mode

- **Start automatically at every system startup**

  This option is useful if the host system is always used as a server.

- **Start only in this session**

  This option will make sure the service does not start when Windows loads.

Pressing the Start button on this window will begin the service. For additional configuration options, please read the **Configuring a Server** section.

Features discussed in this section relating to advanced networking technologies are only available in DiscJuggler.NET. See **Feature Limitations** *for more information.*

* * *

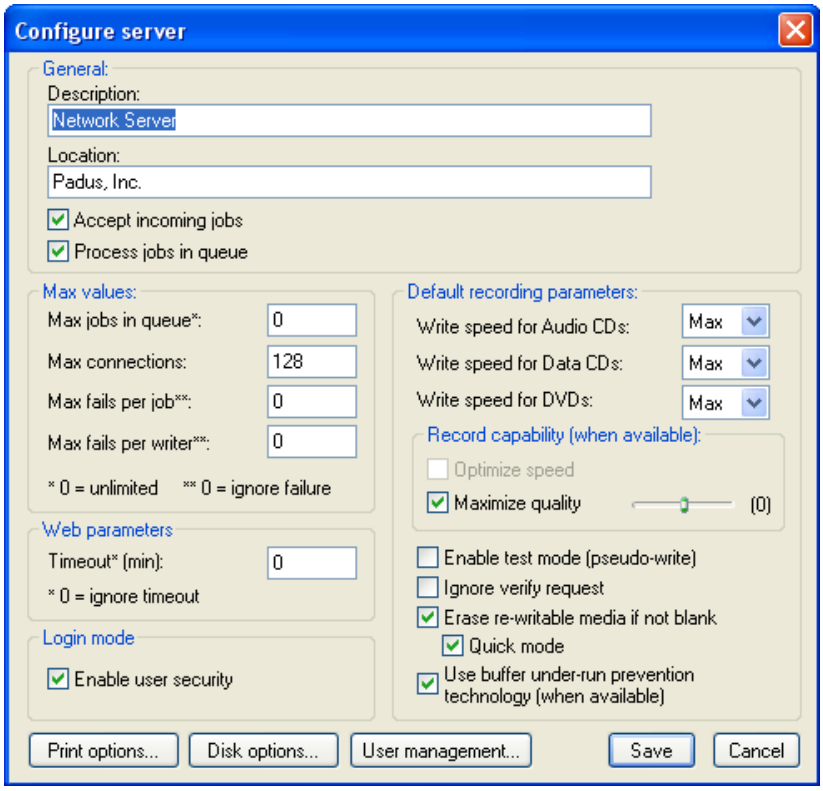
Once the Network Server service has been started, various options can be configured to address specific needs.

- Configure Server
- Print Options
- Disk Options
- User Management
- Job Management
- Writer Management

Features discussed in this section relating to advanced networking technologies are only available in DiscJuggler.NET. See Feature Limitations for more information.

* * *

To configure a running Network Server service (please read **Starting a Server** if the Network Server service is not running), you will need to log in to the server with Operator privileges. If this is the first time the service has been started, the username and password will be blank.



Description

Optional label for the name of the host system. This will be displayed throughout DiscJuggler, the Padus Network Console, and all other client interfaces.

Location

Optional label for the location of the host system. This will be displayed throughout DiscJuggler, the Padus Network Console, and all other client interfaces.

Accept incoming jobs

Select this option if the server should queue jobs sent in from clients. Disable this feature if server configuration changes need to be made while clients are not be able to send in new jobs.

Process jobs in queue

Select this option if the server should begin processing jobs sent in from clients. Disable this feature if the server needs to accept incoming jobs, but not process the jobs at the time. This can be put to good use if the server is temporarily out of blank media.

Max. jobs in queue

Maximum jobs allowed in DiscJuggler.NET's queue at one time. The only limitation to this value is the amount of available storage space in use by the Network Server service.

Max. connections

Maximum number of jobs that can be transferred by all clients at one time.

Max. bad discs per job

Maximum number of invalid discs created from a job before the job is deleted.

Max. bad discs per writer

Maximum number of invalid discs created by a writing drive before it is disabled.

Write speed for Audio CDs

Maximum CD write speed clients can select for CD-DA discs.

Write speed for Data CDs

Maximum write speed clients can select for writing CD-ROM or CD-XA discs.

Write speed for DVDs

Maximum write speed clients can select for writing DVD discs.

Optimize speed

This option will enabled drive specific technologies, such as JustSpeed™, PoweRec™, or PoweRec II™ for optimum writing speed control to disc media. These technologies will fetch the ATIP information from the blank media, determine speed information by doing a test write to the OPC area of the disc, and check for disc precision before writing to the blank disc. This option may result in varying times for writing to discs as it automatically adjusts the speed during the writing process, but vastly improve quality of the recorded disc. This option will not appear for drives that do not feature these writing technologies.

Maximize quality

This option will enable drive specific technologies, such as Audio Master™, Audio Master HQ™, VariRec™, or VariRec™ II for high quality writing. By optimizing the laser power and using lower writing speeds, these technologies vastly improve the quality of resulting discs. Changes in the writing speed will significantly slow down the time to write a disc. This option will not appear for drives that do not feature these writing technologies.

Enable test mode (pseudo-write)

Write process uses the read power level for the laser of the writing drives, which can be used to test the full writing process without writing to a blank disc.

Ignore verify request

This option will not verify jobs after writing, even if a client has specified that a job be verified.

Erase re-writable media if not blank

If re-writable media is not blank, Network Server service will erase disc before writing job.

Quick mode

Re-writable disc erasure only erases Table of Contents (TOC), which speeds up the erase process.

Use buffer under-run prevention technology (when available)

Many drives feature buffer under-run prevention technology, to limit the possibility of the data buffer losing data that it must have for the writing process to succeed. The technology can pause the write process until the buffer has the amount of data necessary to complete the process, and begin again where the process was paused. This procedure, while saving the write process, will slow the process down. Common names for the technology include BURN-Proof™, JustLink™, Power-Burn™, SafeBurn™, and Seamless Link to name a few.

Timeout (min)

After this many minutes of inactivity in the web interface, the current session will expire.

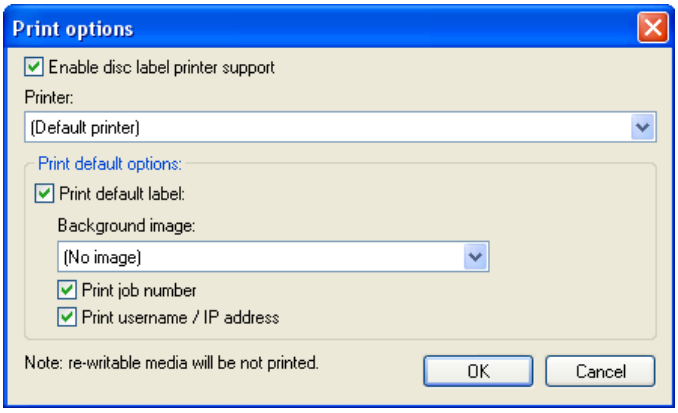
Enable user security

Activates DiscJuggler.NET's security allowing users only with proper security clearance to use the server.

Features discussed in this section relating to advanced networking technologies are only available in DiscJuggler.NET. See **Feature Limitations** *for more information.*

* * *

The Network Server service of DiscJuggler Professional Edition and DiscJuggler.NET can be put to good use with the addition of a disc label printer. The following options can be found by pressing the "Print options" button of the Configure server window.



Enable disc label printer support

This will enable use of a supported disc label printer in DiscJuggler, the Padus Network Console, and all other client interfaces.

Printer

Choose a supported disc label printer for the Network Server service to use.

Print default label

This will force a default label file and simple text overlays to be printed on each disc sent through the Network Server service.

Background image

Any supported label file in the DiscJuggler program files root directory can be set as the disc label background on each disc sent through the Network Server service.

Print job number

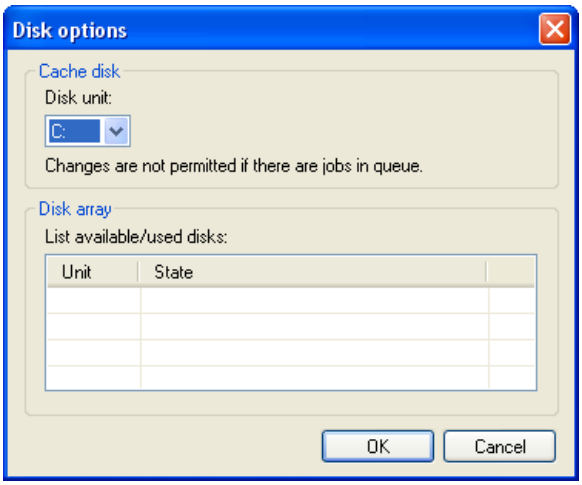
This option prints the job number on each job sent to the Network Server service.

Print username/IP address

This option prints the username of each submitted job and the IP address of the system used to submit jobs to the Network Server service.

* * *

Multiple hard disks can be used for queuing jobs before processing. This feature is important when a high volume of jobs are being sent to the server and multiple writing drives are handling multiple jobs at the same time.



Disk unit

Hard disk used to cache all incoming jobs before all job data has been transferred to the host system.

Disk array

Multiple hard disks can be added to balance the load of data transferred between local hard disks and writing drives.

Please visit the **Multi-tasking to Multiple Drives** section of the **Advanced Concepts** chapter for additional information on the requirements for multi-task writing.

* * *

DiscJuggler.NET can be used to implement a level of security through multiple user management options. Client access to the Network Server service can be limited by IP addresses or by user accounts. Users can be limited by the drives, amount of discs, and types of discs they can use. User class templates are provided for fast configuration of user privileges.

User table

This section is used to display the users currently configured to use the Network Server service on the host system and provide a method to add and remove users. To remove a user, right-click on a username and select the "Remove user" option.

- **Username**

  Login name for the user to be added to the user table.

- **Password**

  Password for the user name to be added to the user table.

- **Class**

  Privilege template for the user to be added to the user table. The Operator class allows for complete configuration control of the host system. The Superuser class has all of the privileges to the system as the Operator class does, but cannot change the configuration. The User class can be completely limited depending on the level that an Operator chooses, but does not have any ability to change the configuration.

Client table

This section is used to display the client systems currently allowed or denied from using the Network Server service on the host system and provide a method to block client systems from having access to the host system. To remove a block, right-click on a client and select the "Remove client" option.

- **IP address**

  Address of the client system to be added to the client table.

- **Class**

  Class setting for the client system to be added to the client table.

- **Deny**

  Access setting for the client system to be added to the client table. Choosing "Yes" will prevent the client system from accessing the host system's Network Server service, while "No" will allow the client system to access the host system's Network Server service.

Operator/Superuser/User

- **Max. copies per job**

  Maximum number of copies per job that can be selected by this class template.

- **Max. writers in use**

  Maximum number of writing drives that can be used by this class template.

- **Max. jobs in queue**

  Maximum number of queued jobs that can be used by this class template.

- **Accept CD jobs**

  Class template can send jobs of the Compact Disc variety.

- **Accept DVD jobs**

  Class template can send jobs of the Digital Versatile Disc variety.

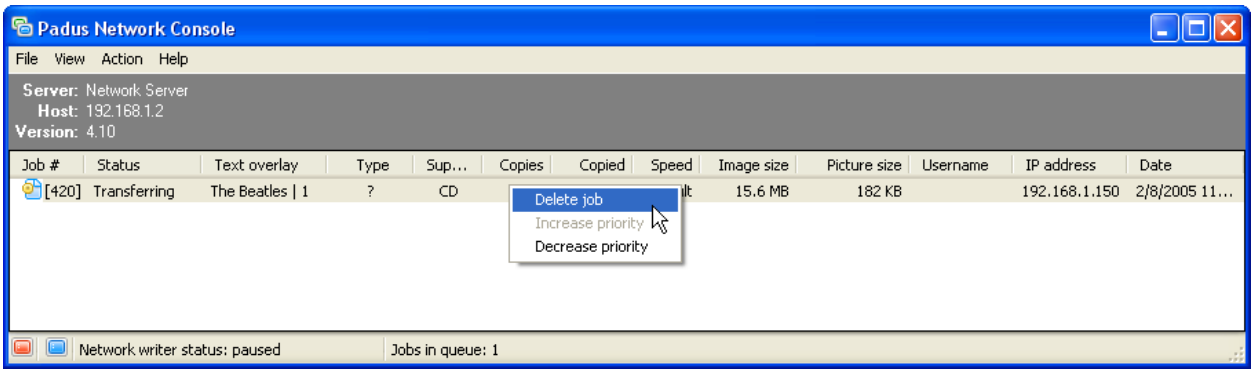
- **Accept write speed**

  Class template can select the writing speed of a job.

Features discussed in this section relating to advanced networking technologies are only available in DiscJuggler.NET. See **Feature Limitations** *for more information.*

* * *

When a job is queued or in the process of being queued, the Operator class can delete jobs, increase job priority, or decrease job priority.



To manage jobs, either use commands in the **Action** menu or right-click on the job to use the commands. The ability to manage jobs can depend on the user class assigned to the current login.

- **Delete job**

  Job is removed from the queue or terminated if it is in the writing process.

- **Increase priority**

  Job is moved to a higher position in the order of when queued jobs will be processed.

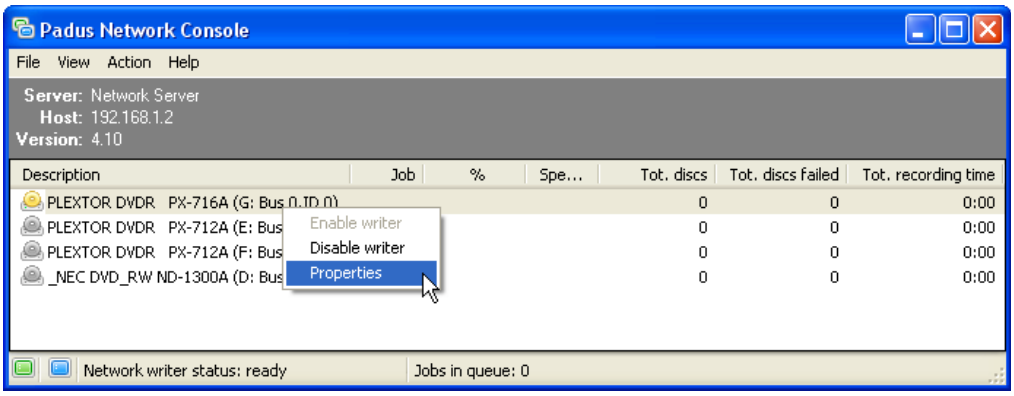
- **Decrease priority**

  Job is moved to a lower position in the order of when queued jobs will be processed.

Features discussed in this section relating to advanced networking technologies are only available in DiscJuggler.NET. See Feature Limitations for more information.

* * *

Any writing drive associated with the Network Server service can be managed by the *Operator* class.



To manage drives, either use commands in the **Action** menu or right-click on the job to use the commands.

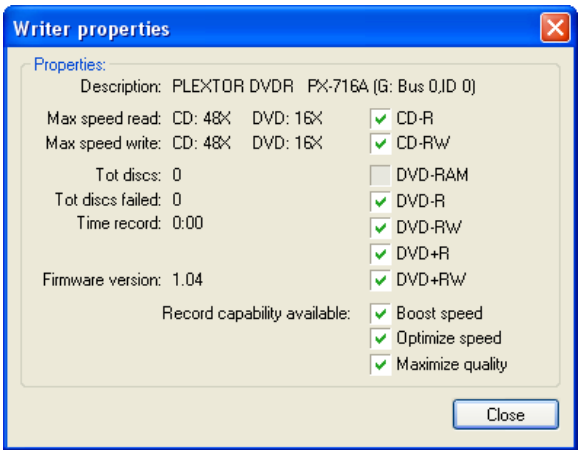
- **Enable writer**

  Sets the writing drive as being active for use by any client to transfer jobs to use the drive.

- **Disable writer**

  Sets the writing drive as being inactive for use by any client through the Network Server service.

- **Properties**

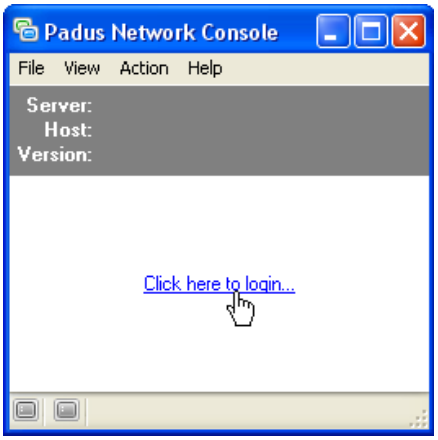


  Displays the writing drive information. This can be viewed by any user class.

* * *

Sending jobs to a host system running the Network Server service can be accomplished through DiscJuggler Network Edition, DiscJuggler Professional Edition, or DiscJuggler.NET as each of these licenses include the Padus Network Console and the ability to select servers as Destinations device in relevant tasks.

To begin using a server, load the Padus Network Console. This can be done in DiscJuggler by clicking on the Network Console icon ( ) in DiscJuggler or by using the *Network Console* shortcut in the Start menu (default location: *Start* » *Programs* » *Padus DiscJuggler* » *Network Console*).

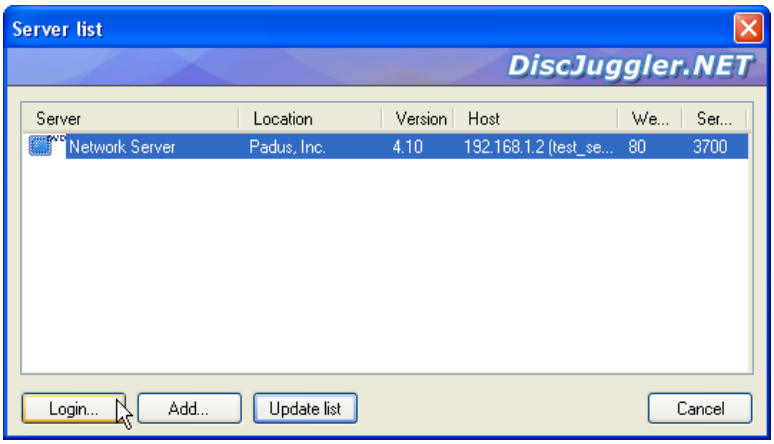


Ways to use a Network Server are covered in the following sections.

- **Login to Server**
- **Send Jobs with DiscJuggler**
- **Send Jobs with Console**
- **Send Jobs with pfcnet**

* * *

After loading the Padus Network Console, login to a server to put it to use.



Each server is listed with its name, location, service version, IP address, web port, and service port. To obtain a list of available servers, click the "Update list" button.

Login

Connect to selected server.

Add

Manually add a server to the server list. This is useful when the server is not available through the local network, but available through a global network. Use the TCP/IP address of the desired host system to connect.

Update list

The client service will use UDP port 3700 to scan for host systems running the Network Server service on the local network.

Once the server has been selected, you are presented with a prompt for the username and password information before being able to use the server. Username and password authentication will only be required on DiscJuggler.NET servers that can use this level of security.

Username

This is the name of the account created in DiscJuggler.NET with access to the Network Server service.

Password

This is the password of the above account.

Force user identification

Enables password authentication to Network Server service.

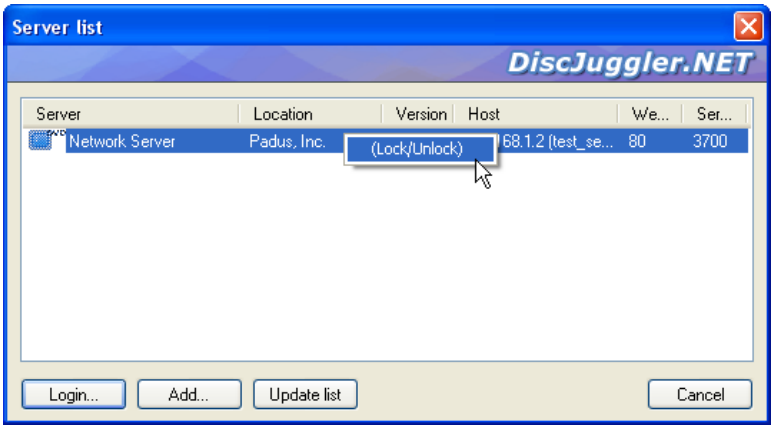
Automatic login next time

Saves username and password for automatic login next time the Padus Network Console is used.

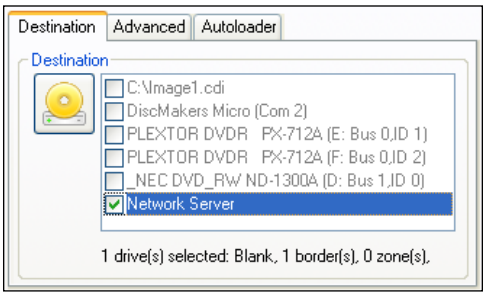
Features discussed in this section relating to advanced networking technologies are only available in DiscJuggler.NET. See **Feature Limitations** *for more information.*

* * *

Jobs can be sent through the DiscJuggler interface its tasks. To make sure DiscJuggler has proper authentication on DiscJuggler.NET servers requiring user security, first login to the server with the Padus Network Console and use the "Lock/Unlock" feature as indicated below.



While the DiscJuggler interface is starting, it will scan for servers available over the network or locked in the server list of the Padus Network Console. All available servers will be listed as supported devices in the Destination panel of appropriate tasks.

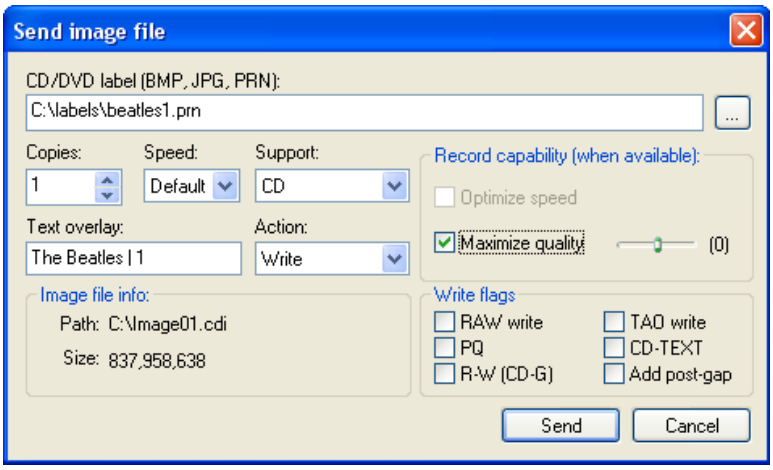


If a selected server has specific privileges set by user class, not all options in the task will be available.

Features discussed in this section relating to advanced networking technologies are only available in DiscJuggler.NET. See **Feature Limitations** *for more information.*

* * *

Jobs can be sent in the form of disc image files to the Network Server service with the Padus Network Console. The console supports drag-and-drop capabilities for supported file types.



Once a disc image has been dropped onto the console (or by using *File* » *Send image file*), you will be prompted for other options.

CD/DVD label

The disc label file to be printed by an available disc printer. Supported file formats include Windows Bitmap (.BMP), JPEG, and raw printer data files (.PRN).

Copies

The number requested discs. A messaged will be displayed if account privileges do not allow for certain values.

Speed

The write speed for this job. A messaged will be displayed if account privileges do not allow for certain values.

Support

Disc type for this job. A messaged will be displayed if account privileges do not allow for certain values.

Text overlay

A simple overlay of Arial, 12pt text centered at the lower region of the disc. New lines can be created by using the | (pipe) character.

Optimize speed

This option will enabled drive specific technologies like JustSpeed™, PoweRec™, or PoweRec II™ for optimum writing speed control to disc media. These technologies will fetch the ATIP information from the blank

media, determine speed information by doing a test write to the OPC area of the disc, and check for disc precision before writing to the blank disc. This option may result in varying times for writing to discs as it automatically adjusts the speed during the writing process, but vastly improve quality of the recorded disc. This option will not appear for drives that do not feature these writing technologies.

Maximize quality

This option will enable drive specific technologies like Audio Master™, Audio Master HQ™, or VariRec™ for high quality writing. By optimizing the laser power and limiting the writing speed to nothing higher than 8x speed, these technologies vastly improve the quality of the resulting disc. Changes in the writing speed will significantly slow down the time to write a disc. This option will not appear for drives that do not feature these writing technologies.

RAW write

RAW write will disable the automatic hardware regeneration of error correction codes and reproduce the source data "as is" using, whenever possible (not all recorders allow this option), the RAW recording method. When this option is selected, DiscJuggler will read and write blocks and associated sub-codes transparently without interfering with their content.

Checking this box can be useful if intentional discrepancies between the error detection encoding and user data are present in the source. However, this option should be used with extreme caution since DiscJuggler cannot detect legitimate read errors when operating in this mode.

TAO write

Selecting this option will force the server service to write discs in Track-At-Once (TAO). TAO forces a 2 seconds gap between tracks and adds a few additional unreadable blocks at the beginning and at the end of each track. The server service uses by default Session-At-Once (SAO) when supported by your drive. Use TAO recording method only if for any reason your CD-R/RW drive is not working in SAO Disc-At-Once (DAO) writing.

PQ

When this option is selected the server service will not regenerate/correct PQ sub-code data, but will instead use whatever data was provided by the source image. This is only possible if the writing drive is capable of recording in RAW mode. This option should be used with extreme caution since not all the writing drives can return valid PQ data, in which case the resulting CD will be unreadable.

CD-TEXT

Checking this option will instruct the server service to write information such as the name of the album, the artist, and the track titles when writing Audio CDs.

R-W (CD+G)

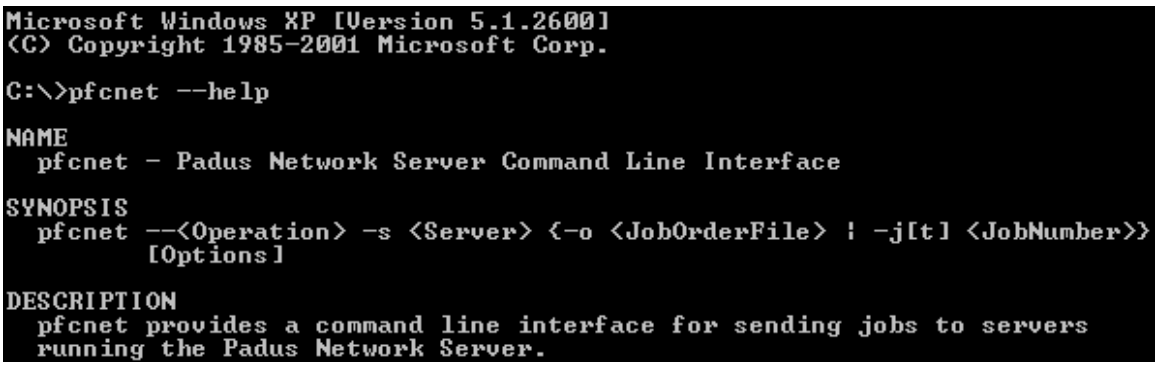
R-W sub-codes are 96 extra bytes of user data "logically" attached to every sector of a CD. These 96 bytes were originally intended to store text and low-quality graphics for display during audio playback. Very few CDs use this extra space; and just as the case with ISRC and UPC codes, not all CD-ROM drives can read these areas and not all writing drives can write them. Furthermore, due to these extra 96 bytes per block, the total data throughput required will be ~ 4% higher than normal. See the **Optical Disc Recording & Data Throughput** section in the **Advanced Concepts** chapter for more information on this topic.

Add post-gap

Checking this option adds a two second gap to the end of a disc image that was not been created by DiscJuggler. If you create discs without adding a two second post-gap, some drives can accidentally step on the lead-out area while trying to read files recorded at the end of the disc, resulting in read errors.

* * *

pfcnet is a Command Line Interface (CLI) for sending jobs through a console/terminal to a Padus Network Server. The executable is provided with all network-capable DiscJuggler licenses, and can be located in the DiscJuggler program files directory along with the documentation in PDF format.



pfcnet uses plain-text Job Order Files (.JOB) to specify all options of a specific job. These plain-text files can be manipulated by custom scripts for a higher level of customization than what is available by the DiscJuggler and Padus Network Console interfaces.

For more information, please consult ***pfcnet***'s **documentation**.

* * *

The following is the complete list of menus and commands available in the Padus Network Console. Each command is listed with its corresponding keyboard shortcut.

* * *

Use the File menu to login, send image files, share a network writer, view the log file, quit, or perform additional functions.

Login

Displays "Server list" window for viewing or adding servers.
Shortcut: Ctrl + L

Always on top

Forces Padus Network Console window to always stay above all other windows.

Send image file

Displays "Send image file" window for sending disc images to the current server.
Shortcut: Ctrl + I

Share network writer(s)

Displays "Share network writer(s)" window to start the Network Server service on the local system.

Stop shared network writer(s)

Stops the Network Server service on the local system.

Show log

Displays the log file of the Network Server service on the local system.

Configure server

Displays configuration options for the current server.

Close window

Minimizes window to system tray.
Shortcut: F10

Exit

Quits the Padus Network Console.

* * *

Use the View menu switch to windows listing current jobs on the server, writers on the server, or the server log.

Jobs

Displays current jobs on the server and functions to control these jobs.
Shortcut: F2

Writers

Displays writers on the server and functions to control these writers.
Shortcut: F3

Log Messages

Displays log messages from the server.
Shortcut: F4

Refresh

Updates the current window information.
Shortcut: F5

* * *

Use the Action menu to perform actions on jobs and writers associated with the server.

Delete job

Deletes the selected job from queue.

Increase priority

Increases the priority of the selected job.

Decrease priority

Decreases the priority of the selected job.

Enable writer

Changes status of a writing drive to available.

Disable writer

Changes status of a writing drive to unavailable

* * *

Use the Help menu to view information about the Padus Network Console.

About

Displays the program information, version number, and copyright.

* * *

This chapter introduces more advanced concepts of optical disc technology. This chapter is aimed at advanced users looking to learn more than what is required to use DiscJuggler.

* * *

Optical discs, such as Compact Discs and Digital Versatile Discs, are formatted in a contiguous spiral of blocks (or sectors). Following is an overview of the storage capacity of these formats available in DiscJuggler.

Compact Discs

A Compact Disc contain blocks (or sectors) of 2352 bytes each, going from the center hole to the outer diameter. The block at logical address 0 (beginning of the disc) is located near the center of the disc; the last addressable block (end of the disc) is located near the outer edge of the disc.

The common unit of measurement for CD capacity is time. Following are some basic formulas to convert time in blocks.

1 minute	=	60 seconds
1 second	=	75 blocks
1 block	=	2352 bytes

Blank discs are usually available in the following sizes (block sizes approximated).

21 minutes	=	94500 blocks
63 minutes	=	283500 blocks
74 minutes	=	333000 blocks
80 minutes	=	360000 blocks

The size of the block is a direct consequence of the way the analog audio signal is converted in digital samples. The audio data is sampled at 44.1 kHz, 16 bits, 2 channels (Stereo).

(44.1 x 1000) x 16 x 2 = 1,411,200 bits/sec
1,441,200 / 8 = 176,400 bytes/sec
176,400 / 75 = 2352 bytes

The physical block size on the CD is actually 2448 bytes divided into the following.

2352	bytes:	Main channel
96	bytes:	Sub-channels P, Q, and R-W

The additional 96 bytes are also known as sub-codes. The P and Q sub-codes are used for control purpose, storing information about the type, relative and absolute position of the block on the disc. The R-W sub-codes are normally used to store auxiliary user data such as the graphic portion of a CD+G Karaoke disc.

Digital Versatile Discs

Much like Compact Discs, Digital Versatile Discs are comprised of a continuous spiral of blocks (or sectors) starting from the center hole ending at the outer rim of the disc. The blocks are only of size 2048 bytes, making the format less complicated.

Blank discs are usually available in the following sizes (block sizes approximated).

4.7 gigabytes (1000 MB)	=	4.37 gigabytes (1024 MB)	=	2304000 blocks
8.5 gigabytes (1000 MB)	=	7.95 gigabytes (1024 MB)	=	4174000 blocks

* * *

While there are three different types of data can be written to CD, there is only one type of data that can be written to DVD.

All CD data types share the same physical block size of 2352 bytes. Each data type have different user block sizes, the bytes effectively available to the user. The sizes depend on the level of error correction adopted: the lower the read accuracy required, the smaller the error correction code required, the larger the user data block is.

The following is an overview of CD compatible data formats:

- **Audio:**

  No extra error correction is required to read and play back audio. The user blocks size matches the physical block size of 2352 bytes.

- **Mode 1/Mode 2 Form 1:**

  Mode 1 and Mode 2 Form 1 formats are used to store digital data and require the highest read accuracy. The user block size is 2048 bytes (2 kilobytes). The remaining bytes are used to store synchronization patterns, block headers, Error Correction Codes (ECC), and Error Detection Codes (EDC).

- **Mode 2 Form 2:**

  This format is used almost exclusively to store digital video data, thus requiring only moderate read accuracy. The user blocks size is 2324 bytes. The remaining bytes are used to store synchronization patterns, block headers, and Error Detection Codes (EDC).

* * *

Since the late 1970s, several Compact Disc formats were developed to serve different purposes and uses. Starting with the CD-DA format in 1980, as a way to distribute high quality music in a compact and convenient format, the first compact disc standard was formulated. The idea of storing computer data on the same media, in 1983, lead to a new format: CD-ROM. Since then, the desire to store a new generation of multimedia content (audio, video, games, pictures, etc.) led to new formats: CD-I, CD-XA, Photo CD, Video CD, CD+, and others.

DiscJuggler supports most of today's Compact Disc formats.

- **CD-DA (Red Book):**

  In 1979, Philips and Sony defined an architecture that became known as the Compact Disc Digital Audio or Audio CD format. It is the original and oldest Compact Disc standard and the foundation for all other standards. CD-DA is an audio-only format used on every Audio CD. The audio on these discs is usually referred to as Red Book audio or CD-quality audio. The specifications were published in a book with a red cover, starting the tradition of naming compact disc specifications by color. Index points and variable gaps between tracks are implemented via P-Q sub-codes.

- **CD+G (Karaoke):**

  This is an audio format augmented by graphics contained in the R-W sub-codes. The R-W sub-codes encoding specifications are part of the Red Book standard.

- **CD-ROM (Yellow Book):**

  In 1980, Philips and Sony defined the architecture that became known as Compact Disc-Read-Only Memory. The introduction of this architecture allowed Compact Discs to be used as an archival medium for computer data. The Yellow Book defines more error correction than defined by the Red Book as a small error while playing back audio is significantly less damaging than an error in retrieving data files.

- **CD-I (Green Book):**

  Released in 1986 to extend the definition of the Yellow Book. The architecture defined in the Green Book helped to improve the synchronization of data retrieval and audio information and established the Compact Disc Interactive format. With the introduction of CD-I, sounds could be better synchronized with graphics than in the standards provided in Mode 2 Yellow Book.

- **CD-XA & CD-I Bridge (Extended Architecture):**

  Developed in 1991 by Microsoft, Philips, and Sony as a hybrid of the Yellow Book and the Green Book, the CD-ROM XA standards provide synchronized data and audio, as well as a method for the compression of audio information. These added features improved the usefulness of discs for multimedia purposes. Playback of these discs required drives that could un-compress the audio. These CD-ROM drives are designated as "XA-compatible".

- **CD-R/RW (Orange Book):**

  Defined in 1990, the major contribution of the Orange book to CD-ROM is its foundation for CD-R technology. In addition, this architecture allows multiple sessions to be recorded on a single disc. Prior to the release of these standards, only one session could be created on each disc. The unused disc space could never be recovered.

- **Photo CD:**

  Released in 1990 by Eastman Kodak to provide a standard for storing high-quality images. This proprietary standard is based on CD-ROM XA. It includes multi-session capabilities. Kodak Photo CD discs can be read only by drives that support the CD-ROM XA architecture.

- **Video CD (White Book):**

  Released in 1994 by JVC, Matsushita, Philips, and Sony as a means to store movies and high-quality video presentations. This standard is based on CD-ROM XA. It uses MPEG-1 to compress audio and video.

- **Super Video CD:**

  Released in 1999 by Philips as an evolution of the Video CD, using high-quality Variable Bit-Rate (VBR) MPEG-2 compression instead of MPEG-1 featured in Video CD.

- **Enhanced CD/CD+ (Blue Book):**

  A multi-session format composed by a first session in CD-DA format and a second session in CD-XA format. The first session contains a regular selection of audio tracks, while the second session contains computer data and/or video clips. Discs using this standard can be played in a normal CD player as standard audio discs and in a computer CD-ROM player as multimedia discs.

* * *

DiscJuggler supports many professional-level Audio CD features that are not immediately apparent to the end user, but are important for true audiophile-level reproduction. Among these features are the accurate duplication of gaps between tracks, index points within tracks, and the replication of the sub-codes used in digital audio. There are eight possible sub-code channels, referred to as P, Q, R, S, T, U, V, and W.

The most important sub-code channels for audio are the P and Q sub-codes. Sub-code channel P (or the "P" sub-channel) contains flags showing where music begins on a track. The "Q" sub-channel has information concerning the time of the start of the disc and current track. This information used by CD players for time displays is referred to as "position information". Track and index information is also contained in the Q sub-code channel. Finally, the "Q" sub-channel can contain an optional International Standard Recording Code (ISRC) for each track and an optional Universal Product Code (UPC) for the whole disc. The ISRC contains information about the country of origin of the track, year of recording, and serial number that uniquely identifies each track on a global scale. The UPC is a barcode functioning to uniquely identify each disc on a global scale.

The R-W sub-codes were originally intended in the Red Book CD-Audio specification to hold graphics information. Audio CDs with this kind of information are referred to as CD+G Compact Discs. Karaoke and Philips ITTS discs are examples of disc formats that use R-W sub-codes. Other information can potentially be stored in these sub-codes on audio tracks, but the Yellow Book specifies that these sub-code channels will be zero for data tracks. Sony introduced a standard to store Audio CD information using the R-W sub-codes. Referred to as CD-TEXT, this protocol uses the R-W sub-codes in the lead-in area of the first session to store information such as the artist, the album, the track titles, the genre, etc.

* * *

The Audio CD standard was designed from the beginning for sequential access (audio streaming) only. The digital audio was intended to be read in real time, converted to an analog signal and sent immediately to a stereo amplifier.

Reading audio with random access and moving digital data over the data bus without converting it to an analog signal is a feature sometimes not available in older reading drives.

The main problem with reading digital audio data over the data bus is the low degree of seek accuracy provided by reading drives when accessing CD-DA blocks. This is caused by the fact that digital audio data is stored in a different format that CD computer data.

In a computer data block there are 2,048 bytes of user data plus header and error correction information. The header information in a computer data block contains the precise address of the block allowing the drive to precisely seek the correct block before reading.

In an audio data block the 2,352 bytes of the physical block are entirely used for digital audio data. There is no header containing the block address, no synchronization codes, and no error correction. This requires the drive to use the Q sub-code information to find an individual block. Unfortunately, the Q sub-code information was only designed to allow consumer audio CD players to provide audio positioning and position display within an accuracy of ±1 second. As a result, Q sub-code addressing is only approximate.

When searching for a specific digital audio data block, a reading drive moves the laser assembly to a position near where the block should be located, starts reading, and compares the Q sub-code information to the desired block address. When a Q sub-code address near the desired block address is located, the drive begins transferring data (or playing). Most reading drive specifications state that "the actual starting audio address will be within ±4 Q sub-code addresses of the requested starting audio address". In other words, the actual starting audio will be ±4 audio blocks or ±4/75th of a second. As a result a read request using an address of a single block might return any one of 9 blocks (according to drive manufacturer specifications). Some drives may be even less accurate than ±4 Q sub-code addresses.

A second problem with digital audio data capture occurs when the computer cannot accept audio data from the drive fast enough. This is referred as a "buffer overflow", because the reading drive write data into its internal buffer faster than the computer can read data from that buffer. During an Audio CD duplication process, a buffer overflow condition is usually a direct result of the reading drive reading faster than the writing drive writes. It is common to see reading drives capable of reading 4 or 5 times greater than older writing drives can write.

When a buffer overflow occurs, the read operation must be restarted. The next read may not begin transferring data at exactly the same sample (a side effect of the ±4 audio blocks accuracy problem), which can result in a few lost or repeated samples. This lost or extra data can create audible artifacts in the resulting audio disc or file.

* * *

Writing drives are real-time devices. Being a real-time device places special demands on a computer and its peripherals. For a writing drive to successfully create a disc, it must receive an uninterrupted flow of data that must be transferred at a speed equal to or greater than the recording speed of the writing drive.

For writing drives operating in CD single-speed (1x) mode, data must be transferred at a continuous rate of 150 KB per second for data, and ~172 KB per second for audio. For writing drives operating in CD double-speed (2x) mode, data must be transferred at a continuous rate of 300 KB per second for data, and ~344 KB per second for audio. For writing drives operating at 16 times the CD playback speed (16x), data must be transferred at a continuous rate of 2,400 KB per second for data, and ~2,752 KB per second for audio. For writing drives operating in DVD single-speed (1x) mode, data must be transferred at a continuous rate of 1,380 KB per second.

Data transfer rates in the above ranges are normally below the data transfer rates claimed by hard disk manufacturers. However, slow processor or bus performance and sub-optimal hard disk performance may combine to reduce the actual sustained data transfer rate below the transfer rate requirement of high-speed writing drives.

Every writing drive is equipped with internal memory used as a data buffer. The data buffer stores data as it arrives from the computer, and then transfers that data to disc. The size of the data buffer for an individual writing drive is critical for error-free recording. A slow-down in the transfer of data from the processor caused by high network traffic or the small interruption of a hard disk re-calibration can interrupt the recording process if the buffer is not large enough to "wait out" the interruption. If the data buffer empties (buffer under-run error), the recording process could fail and ruin all blank discs.

If your computer and peripheral devices are fast enough, you may be able to duplicate "on-the-fly". When recording on-the-fly, be certain that the reading speed is always equal to or greater than the writing speed. In cases where the speed of the input source is not fast enough to support "on-the-fly" duplication, an intermediate disc image file can be written to a hard disk. You should also be aware that the read speed for Audio CDs can be less than the marketed reading speed, a scenario resulting in buffer under-runs.

* * *

The requirements for writing one task to multiple drives are very specific, and sometimes not understood. The limitations can come in the form of specific interfaces, interface configuration, drive brands, and blank media brands.

Interfaces

There are only two interface types that were developed with the ability to write to multiple disc writing drives at the same time. The other interfaces, even though they contain impressive theoretical abilities on paper, do not meet the realistic requirements necessary for writing to multiple drives.

After rigorous testing with many hardware and software environments, only two interfaces are currently supported for synchronous writing to multiple drives. It is no coincidence that these two interface standards allow for a technique called "daisy-chaining" (each device can be connected in a chain to other devices, with the chain leading to one controller connection).

- **FireWire (IEEE-1394) Interface**

  Using the FireWire interface, while a new idea, rapidly outpaced SCSI as a method for asynchronous communication to multiple drives. FireWire has an advantage in the sense that it puts to use the less expensive and widely available ATAPI/IDE drives that should not be used in multiple drive writing with their native interface.

  Bridge-boards have been developed to transform ATAPI/IDE drives into FireWire devices. After attaching a bridge-board on the back of each drive, the drives can be treated as devices that can be used in a daisy-chain configuration. Depending on the drive quality, system configuration, and overall performance, a maximum of 8 devices per FireWire host adapter can be achieved.

  Availability and recommendations concerning the hardware to use the FireWire interface are available on the web at **http://www.padus.com/support/**.

  Please read the **Hardware Setup Tips** section of the **Getting Started** chapter for tips concerning the use of FireWire drives.

- **SCSI Interface**

  SCSI drives, while growing unpopular and somewhat outdated, still have their place in optical disc recording. A large part of the professional market still holds onto SCSI as the true asynchronous interface for access to multiple devices at the same time.

  Please read the **Hardware Setup Tips** section of the **Getting Started** chapter for tips concerning the use of SCSI drives.

Drive Brands

While some drives are capable of working in multiple drive writing situations, others are not. Writing to multiple drives requires more and consistent bandwidth to each drive, or the drives will suffer from buffer

under-runs. For this reason, it is very important that high-quality drives are used.

For updated information on drive recommendations, please contact **Technical Support** or check for information on the web at **http://www.padus.com/support/**.

Blank Media

Lower quality media can be inconsistent, leading to write errors. There are specific reasons (other than supply issues) for the lower prices of some media in comparison to others.

For updated information on media recommendations, please contact **Technical Support** or your drive manufacturer.

* * *

Writing multiple tasks to multiple drives at the same time requires extreme performance from the other system components instead of the writing drives. The most important factor is the source data and the ability to get that data to the writing drives on time.

Multi-tasking through DiscJuggler requires setting up individual data sources on their own hard disks, or shared over a Redundant Array of Independent (or Inexpensive) Disks (RAID). This requirement allows communication between each writing drive and their source hard disks to continue uninterrupted. Testing is recommended to determine the appropriate hardware necessary to meet the demand.

Please visit the **Writing to Multiple Drives** section of the **Advanced Concepts** chapter for additional information on multiple drive interfaces.

For current recommendations, please contact **Technical Support** or check for information on the web at **http://www.padus.com/support/**.

* * *

Support for disc autoloaders is available in limited licenses of DiscJuggler Professional Edition and DiscJuggler.NET. Autoloaders are well known for ability to record and duplicate multiple discs without requiring operator intervention after a task has begun.

A disc autoloader consists of one or more writing drives that are able to accept blank recordable discs from a stack for consecutive loading into their trays. In addition to the accurate duplication of the source discs which are often interspersed with blank discs, DiscJuggler handles the task of controlling the autoloader robotics so that blank media are correctly loaded into the writing drive, defective discs discarded, and successful duplicate discs removed after recording.

Autoloaders are normally a combination of a drive section with one or more writing drives and a robotic section. The writing drives are usually available with a FireWire or SCSI interface to communicate with the host computer while the robotic section can either use a RS-232 (serial) or USB interface.

DiscJuggler supports sequential autoloaders. Sequential autoloaders are serial loading devices, that load discs only off of the input stack and into the drive section. From the drive section, the discs can only go to an output stack or to a reject bin, but cannot be cycled back to the input stack.

The scope of this documentation does not include a detailed description of the autoloader functionality. For more information on how to set-up and operate your autoloader, please refer to the documentation provided by the autoloader manufacturer.

This chapter is subdivided in four major sections.

Features discussed in this section relating to autoloaders are only available in limited licenses of DiscJuggler Professional Edition and DiscJuggler.NET. See **Feature Limitations** *for more information.*

* * *

The drive and robotic sections may not be detected by the host system, or may not be properly associated for use with DiscJuggler. Properly configuring each component to allow DiscJuggler to correctly identify each section and establish a logical link between each drive/robotic pair is very important.

The following are some important rules to follow before you install DiscJuggler with a disc autoloader device.

- Make sure you use good quality serial cables; usually serial autoloaders require a "null-modem" straight through cable. Use a serial gender-changer, if necessary, to properly connect the device to your system.
- Make sure the COM port to which you are connecting the autoloader is not already in use. Many systems come with an internal modem that is likely using the same COM port that you are trying to use for the autoloader.
- Be certain that the COM port that you select for the autoloader is not using an IRQ that is normally used by another serial port. Many PCs have a default setup where COM1 and COM3 (and COM2 and COM4) share an IRQ; you should choose a COM port that is not inadvertently already sharing an IRQ with another active serial port.

Once DiscJuggler has been installed, the autoloader device needs to have its drives properly associated before DiscJuggler is put to use.

- Start the Drive Assigner by using the *Drive Assigner* shortcut on the Desktop or in the Start menu (default location: *Start* » *Programs* » *Padus DiscJuggler* » *Drive Assigner*).
- Once all devices have been detected, associate the drives physically located in an autoloader with that autoloader.
- Press the *Update* button followed by the *OK* button to finalize the process of associating drives with the autoloader.

* * *

DiscJuggler Professional Edition and DiscJuggler.NET have been designed from the ground up to natively support many autoloader devices and to provide a reliable, professional, and easy-to-use unattended operations.

With the correct license and a supported autoloader, you can automate complex tasks such as the following.

- Multiple copies of multiple master discs at once
- Quality sampling with variable verification frequency
- Automatic and unattended error handling and recovery with only a few clicks of the mouse

Users don't have to learn and apply complex procedures to effectively make use of these devices. Since the interface of DiscJuggler described in the previous chapters still applies, autoloaders are as simple to use as standard writing drives.

The following are operational modes available when using DiscJuggler with an autoloader.

- **Single Master Disc Duplication**

  Unattended duplication of *n* copies of one master disc.

- **Multiple Master Disc Duplication**

  Unattended duplication of *n* copies of multiple master discs at once.

* * *

When using an autoloader to create multiple copies of a single master disc, the following operational modes are available.

Creating *n* copies from a master disc using the same autoloader:

1. Using the "File" menu, "New" command, create a new "Copy CDs and DVDs from the same burner" task.
2. Select the autoloader in the "Source & Destination" panel.
3. Select "Auto" or the desired number of copies in the "Action & Method" panel.
4. Load the input stack with enough blank discs to complete the desired number or copies. If the number of copies requested exceeds the autoloader capacity, DiscJuggler will request the user to reload the device when no more blank discs are available. In case "Auto" is selected in the "Action & Method" panel, DiscJuggler disables its internal copies counter and will repeat the duplication process until no more blank discs are available. Please make sure you load the autoloader with the number of blank discs exactly matching the number of copies desired.
5. Put the master disc to be copied on top of the stack of blank discs.
6. If there is a printer attached, specify in the "Autoloader" panel, the good and error label strings to be printed on the discs.

After the task is started, DiscJuggler will mount the master disc in the first writing drive available and generate a temporary disc image file on a local hard disk. The master disc will then be unloaded and the desired number of copies will be automatically generated from the disc image file. The temporary disc image file will be deleted at the completion of the task.

Creating n copies from a master disc using an external reading drive:

1. Using the "File" menu, "New" command, create a new "Copy CDs and DVDs on-the-fly" task.
2. Select the external reading drive as the source and the autoloader as the Destination in the "Source & Destination" panel.
3. Select "Auto" or the desired number of copies in the "Action & Method" panel.
4. Load the input stack with enough blank discs to complete the desired number or copies. If the number of copies requested exceeds the autoloader capacity, DiscJuggler will request the user to reload the device when no more blank discs are available. In case "Auto" is selected in the "Action & Method" panel, DiscJuggler disables its internal copies counter and will repeat the duplication process until no more blank discs are available. Please make sure you load the autoloader with the number of blank discs exactly matching the number of copies desired.
5. Mount the master disc to be copied in the selected external reading drive.
6. If there is a printer attached, specify in the "Autoloader" panel, the good and error label strings to be printed on the discs.

After the task is started, depending on the method selected in the "Action & Method" panel, the application will either save a temporary disc image file to a local hard disk first or immediately generate the number of copies requested directly from the source reading drive.

Creating *n* copies from a disc image file previously generated by DiscJuggler or by any other pre-mastering application:

1. Using the "File" menu, "New" command, create a new "Burn CD and DVD images" task.
2. Set the desired disc image file as the Source and the autoloader as a Destination in the "Source & Destination" window.
3. Select "Auto" or the desired number of copies in the "Action & Method" panel.
4. Load the input stack with enough blank discs to complete the desired number or copies. If the number of copies requested exceeds the autoloader capacity, DiscJuggler will request the user to reload the device when no more blank discs are available. In case "Auto" is selected in the "Action & Method" panel, DiscJuggler disables its internal copies counter and will repeat the duplication process until no more blank discs are available. Please make sure you load the autoloader with the number of blank discs exactly matching the number of copies desired.
5. If there is a printer attached, specify in the "Autoloader" panel, the good and error label strings to be printed on the discs.

After the task is started, the desired number of copies will be generated automatically directly from the specified disc image file.

* * *

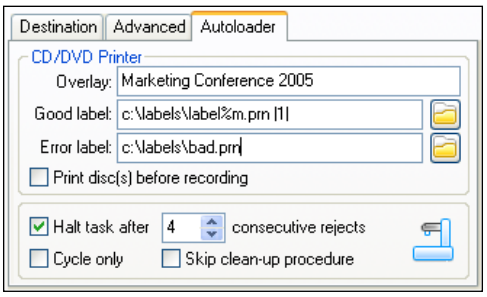
Creating a variable number of copies of multiple master discs fully unattended:

1. Using the "File" menu, "New" command, create a new "Copy CDs and DVDs on-the-fly" task.
2. Select the autoloader in the "Source & Destination" window.
3. Select "Auto" number of copies in the "Action & Method" panel.
4. Load the input stack. With a mixture of master and blank discs, make sure that the first (top) one is a master, the last (bottom) one is blank, and that there are not two consecutive master discs in the stack. Essentially the task will start with a master disc and the desired number of blank discs following, followed by another master disc and the desired number of blank discs following that master disc. This process can be repeated to the limits of the input spindle.
5. If there is a printer attached to the autoloader, specify in the "Autoloader" panel, the file names where the good and error labels for the discs are specified.

After the task is started, DiscJuggler will automatically generate a temporary disc image file on a local hard disk for every master disc detected on the stack. Each master disc will then be unloaded and a new copy generated from the temporary disc image file for each blank disc detected on the stack, until the next master disc is detected or the bin is empty. All temporary disc image files will be deleted at the completion of the task.

* * *

For **Multiple Master Disc Duplication**, batch printing can be setup to print a specific label file per disc. The process is very straight-forward, using one section of the Autoloader panel in DiscJuggler.



To properly assign an individual label file per master disc, all of the input will go into the right section of the "Good label" entry fields. For ease of use, we ask that you use either .BMP (Windows bitmap), .JPG, or .PRN (raw printer data) files as the labels.

.PRN files are a Windows file format that contains the raw printer data as determined and generated by a printing application. Creating these files is quite simple, and does not need to involve DiscJuggler. Use any disc label printing, imaging, or word processing too to generate a label. Once you have determined that the label is going to line up on the disc correctly, use the "Print to file" option of the application's print function. Most applications give you the option to specify the destination of these files, but in the case that the application does not, you can find these files in the main Windows operating system32 directory, inside a directory called "spool" (You can always do a search for files named "*.PRN" if they cannot be found manually).

Once all of the label files have been created, you need to name them with sequential numbers based on the order the autoloader will copy the master discs. The file name needs to contain a number, from 1 to 16,384.

Example:

> If you have 4 master discs that need to be duplicated a different number of times for each disc, you would need files with these similar file names in a common directory:
>
> *label1.prn label2.prn label3.prn label4.prn*

To use this method, the right section of the "Good label" entry fields must contain the location of the label files, the %m variable (representing the master disc number), and the starting value to use. For the above example, the right section would contain:

> *D:\labels\label%m.prn|1|*

When DiscJuggler finds a new master disc, it will change the "%m" text to the next sequential number, and uses the file available in the directory location for the labels of each blank disc behind the master disc. The process is repeated when a new master disc is found.

* * *

Question: How does DiscJuggler know which disc is the source (or master) disc?

Answer: If the "Copy CDs and DVDs from the same burner" task has been chosen, DiscJuggler will check each disc that is loaded by the autoloader. If a non-blank disc is detected, then an image of that disc is created on the hard disk and used for duplication of all subsequent blank discs until another non-blank disc is encountered. Alternatively, DiscJuggler can use a reading drive that is external to an autoloader as the source by selecting the "Copy CDs and DVDs on-the-fly" task.

Question: What happens if a defective disc is detected during unattended operation?

Answer: The disc is removed from the recorder and placed in the reject bin of the autoloader.

Question: Can DiscJuggler control multiple autoloaders simultaneously?

Answer: Yes, however, the user must be careful to establish a correlation between the robotic control and the associated drives of each autoloader unit. Simply create multiple tasks and in each task select a different autoloader. You must be careful to not create a situation that is causing head contention on your hard disk. You can avoid hard disk head contention by not running more than a two tasks on the same fast hard disk (seek time less than 10ms) and adding additional hard disks to your configuration if you will be running several independent tasks.

Question: What type of quality assurance (QA) support exists for these production devices in DiscJuggler?

Answer: Several. First, DiscJuggler can verify each disc against the source image after it has been duplicated and reject the few discs that are defective. This procedure, while providing an extremely high degree of assured reliability will nearly double the time needed for duplication tasks. Although, this reliability might be consistently required for some types of duplication tasks, less stringent procedures are available that will allow you to strike a balance between quality assurance and duplication productivity. These options provide for verifying only the first duplicated disc or one disc every x (where the operator can set x) discs.

An additional QA feature of DiscJuggler is the complete logging of each disc that is duplicated in a text file. This file can log the operator's name and other task-related data as well as a complete record of the duplication process.

DiscJuggler's "Test" feature also provides a valuable insight into the reliability of a particular duplication task before it is begun on a stack of discs so that all settings can be optimized for the maximum probability of success.

Question: What happens if a disc is improperly loaded into the writing drive or dropped?

Answer: DiscJuggler is designed to provide a reliable, unattended solution, and depending on the device in use, DiscJuggler will try to apply all the available recovery procedures. In the unlikely event that a disc cannot properly loaded or unloaded, the application will stop immediately all processes and advise the operator of the problem. This is necessary in order to avoid damaging internal autoloader components.

Question: What percent of blank discs are normally detected as being defective?

Answer: It greatly depends on the quality of the media used, but under normal circumstances, if the writing speed never exceeds that for which the media was certified this percentage should not be higher than 1%.

Question: Do I need a special version of DiscJuggler to operate an autoloader?

Answer: Yes, these are specialized devices that require special software development on the part of Padus and extensive testing by the device's manufacturer. As a result, the software is usually sold with the device as part of a complete solution.

Please read the **Feature Limitations** section of the **Getting Help** chapter for additional information on the different licenses and how they can be obtained.

* * *

At times things will not go as expected. There are different ways to reach us depending on what you need. Please read the following sections carefully, and learn about the most efficient way to contact Padus, Inc.

* * *

Padus supplies customer support for all products. If you encounter any difficulties, our customer support staff will try to get you the information that you need. In most cases, you will find the answers to problems in the documentation provided with your computer system or with DiscJuggler.

You are strongly encouraged to contact Padus initially via e-mail, providing as much information as possible. Any non-technical inquiry can be sent into Customer Support. If your e-mail appears to contain technical-related material, it will be forwarded to Technical Support, where the inquiry might not be able to be fulfilled. Examples of inquiries that should be sent to Customer Support include the following.

- **Updates & Upgrades**
- **Lost Registration**

Should you need to contact us for assistance, please use the following methods of contact. Representatives are generally available from 8:00 AM to 5:00 PM Pacific Time, Monday through Friday (holidays excluded).

Electronic Mail
info@padus.com
Web
http://www.padus.com/

Telephone
(408) 370-0377
(888) GO PADUS
Facsimile Transmission (FAX)
(408) 370-0277

Postal Service
Padus, Inc.
Customer Support
891 West Hamilton Avenue
Campbell, California 95008-0402
United States of America

* * *

In the event that you would like to obtain an update or upgrade, please contact **Customer Support**. In most cases, updates to the latest version of your license will be free of charge. Changes to different types of licenses, called upgrades, will require some sort of payment to Padus, Inc.

Please check **http://www.padus.com/** for purchase information. Specific questions regarding changes to your license should be sent to **Customer Support**.

* * *

In the event that your download or registration information is no longer available to you, please contact **Customer Support**. Please provide enough information relating to the purchase of DiscJuggler so we can search for your records in our database.

We are providing this system for those who are put in an inconvenience by circumstances out of their control, such as a hard disk failure. Please do not abuse this system. When you are provided with your registration information, it is your responsibility to keep it in a safe place. We highly recommend printing out this information and placing it in a filing cabinet as you would with other important information.

* * *

Padus supplies technical support for all products. If you encounter technical difficulties, our technical support staff will work to assist you with resolving your problem. In most cases, you will find answers to problems in the documentation provided with your computer system or with DiscJuggler.

You are strongly encouraged to contact Padus initially via e-mail, providing as much information as possible. Any technical inquiry can be sent directly to Technical Support. If your e-mail appears to contain customer-related material, it will be forwarded to Customer Support, where the inquiry might not be able to be fulfilled. Examples of the inquiries that need to be sent to Technical Support include the following.

- **Problem Details**
- **Error Reports**

Should you need to contact us for assistance, please use the following methods of contact. Representatives are generally available from 8:00 AM to 5:00 PM Pacific Time, Monday through Friday (holidays excluded).

Electronic Mail
support@padus.com
Web
http://www.padus.com/

Telephone
(408) 370-0377
(888) GO PADUS
Facsimile Transmission (FAX)
(408) 370-0277

Postal Service
Padus, Inc.
Technical Support
891 West Hamilton Avenue
Campbell, California 95008-0402
United States of America

* * *

To help us solve any issues you experience with DiscJuggler, please make sure you provide as much information as possible regarding the issue. It is extremely important to remember to provide details of what you were trying to do in DiscJuggler, how you used DiscJuggler, and how DiscJuggler did not behave as expected.

Following is a list of the type of details Technical Support prefers to be provided initially. If these details are not provided, they will most likely be requested.

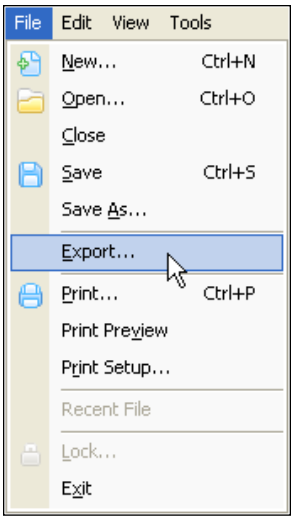
- DiscJuggler version, build, and license type
- Windows operating system and version
- Full description of any error messages displayed
- Make and model of reading and writing drives involved
- General system configuration overview, including the make and model of each device that is a part of the disc writing process
- Similar programs that could interfere with the disc-writing process

If an error is encountered in the Status panel (and not in a pop-up window), exporting and sending the log file will provide Technical Support with all necessary information. Please read the **Error Reports** section of this chapter to learn how to properly send in the log file.

Please be sure to follow basic e-mail etiquette rules when sending in problem details. Using proper capitalization, punctuation, and spelling does speed up the process that it takes for Technical Support to read, understand, and reply to your problem. If possible, please configure your e-mail client to include the full e-mail history in your replies, so Technical Support can easily reference the case history.

* * *

When an error is displayed in the Status panel of a DiscJuggler, it is most helpful to send a log file to Technical Support. The log file contains your customer information, system information, hardware configuration, and all events concerning the task when the error was encountered.



1. In the *File* menu, click on the *Export* command. This will open the Export save dialog.
2. Find a location to save the log file in text format. The location should be relatively easy for you to find. If you cannot think of a location to save this file, please save it to your Windows Desktop.
3. Choose a name for the file in the *File name:* character field. You can choose to use a detailed file name, but it is not necessary. *Log.txt* is a perfectly valid name for this file.
4. Press the *Save* button; saving the text log to the location chosen earlier.
5. Open your e-mail editor, and compose a new message to **support@padus.com**.
6. Attach the log file to the new message. For details on how to attach files to your e-mail messages, please read the documentation provided with your e-mail editing software.
7. Add any additional details necessary to describe the problem you are experiencing. Please read the **Problem Details** section of this chapter for the type of information Technical Support needs.

Technical Support will reply to your message in the order messages are received by customers. Delays can occur if time is needed to properly research and/or test your issue. Please be patient, as we strive to give our customers the best answers available.

* * *

There are feature differences between DiscJuggler Standard Edition, DiscJuggler Professional Edition, and DiscJuggler.NET. Each product has features and pricing set to offer ranges of functionalities demanded by our customers. For more details on the different features between DiscJuggler Standard Edition, DiscJuggler Professional Edition, and DiscJuggler.NET, please visit the **Features** section of the **Getting Started** chapter.

Since this help file covers all three products, it is necessary to point out where the feature limitations exist. When a possible feature limitation might exist, the following information box is provided with specific information about the feature limitation.

This box indicates that a feature described on the page is not available in particular versions of DiscJuggler Standard Edition, DiscJuggler Professional Edition, or DiscJuggler.NET.

If there is a necessary feature not available in the product you have licensed, please contact **Customer Support**. Please be sure to include the information as to what feature you are looking for and what license you are currently using.

* * *

This chapter contains additional information for resolving issues.

- **Troubleshooting**

  A list of possible solutions to common issues encountered during disc creation, duplication, and extraction.

- **Error Messages**

  A list of the most common error messages generated by DiscJuggler with a brief explanation and a description of possible causes.

* * *

The following is a list of possible issues that might be the cause of larger issues experienced while operating DiscJuggler. For updated troubleshooting issues, please check for further information on the web at **http://www.padus.com/support/**.

- **Drive Firmware**
- **Auto-insert Notification**
- **Working with Multiple Tasks**
- **Issues with Your System**
- **Interruption of the Disc Writing Process**
- **Source Data Access Issues**
- **Copying and Caching to Hard Disk**
- **Problems with Write Speed**
- **SCSI Interface Problems**
- **Physical Problems with Media**

* * *

Many issues can be caused by using outdated firmware in your reading and writing drives. You can determine the firmware version by using the **Generic** tab for the drive in the **Device Explorer**. Check the current firmware offered by your drive manufacturer and determine if it is more recent than your current one. Writing drive vendors often will provide this information on their support sites. In most cases, manufacturers will offer downloads of the software necessary to update your drive's firmware. If you have drives of identical models, they should all use the same firmware.

* * *

Auto-insert notification is a feature introduced in Windows operating systems to automatically launch an application or initiate a specific process each time a disc is inserted into a reading or writing drive. The most common example of an auto-insert notification is the Windows Media Player application automatically launched by Windows every time an Audio CD is inserted in a drive.

In most cases, auto-insert notifications will be temporarily disabled while DiscJuggler is running. If auto-insert notification is operational while DiscJuggler is reading or writing, Windows continuously attempts to read the contents of the disc in use. This contention is a frequent cause of disc writing problems.

To disable auto-insert notification manually, please follow the procedure described in the **Operating System Setup Tips** section of the **Getting Started** chapter.

* * *

One of the most advanced features of DiscJuggler is the ability to run multiple disc writing tasks in parallel as a way to minimize writing time and maximize resource usage. Due to the special demands of running multiple tasks, each new task should be carefully planned. The following restrictions should be taken into consideration.

- If at least one task is transferring data to a writing drive, no other tasks should be trying to use devices on the same interface. In other words, when running multiple disc writing tasks, it is a good idea to not allow two tasks to use devices attached to the same interface unless you are certain of the performance of the interface.

- If at least one task is writing from a disc image file on a hard disk, no other tasks should be reading or writing disc image files on the same hard disk or interface. You might be able to get two tasks to share a hard disk successfully, but it would require a very fast hard disk or a Redundant Array of Independent (or Inexpensive) Disks (RAID).

- DiscJuggler allocates a Level 2 cache to optimize asynchronous communication to each running task. If the amount of memory allocated to each task is substantial and many tasks are running at once, the operating system can run out of memory and start paging to the hard disk (to use virtual memory). This decimate overall system performance and disc writing reliability.

- If you plan to run multiple tasks, make sure you properly subdivide the amount of available system physical memory among all tasks. To adjust the amount of L2 cache assigned to each task, use the **I/O** panel in the **Options** dialog.

* * *

Many factors in the configuration of your system's hardware, software, and data can affect the performance and stability of writing discs with DiscJuggler. DiscJuggler attempts to transparently manage as many of these factors as possible to complete the process successfully or return an error indicating a problem. Some issues cannot be overcome by DiscJuggler, but you should become familiar with some basic system issues to troubleshoot problems.

* * *

It is best to not have other programs running when you are using DiscJuggler. You should be certain that software running in the background, such as screen savers, auto-notification, mail checkers, disc packet writing software, alarms, fax reception, or server services do not interrupt duplication. Make sure DiscJuggler has exclusive access to any files, such as disc image files, that will be used in disc writing processes.

* * *

Writing drives must be fed a constant stream of data during the recording process. If the writing drives fails to constantly receive data at a rate that is determined by the write speed and buffer size, the duplication process will fail and DiscJuggler will report errors such as "buffer under-run." While DiscJuggler can perform checks such as Test recording to minimize the number of such failures, there are some common reasons for this type of error. Your hard disk should have an access speed of under 15 milliseconds and be able to always transfer data faster than the write speed (where 1x CD speed ≈172 KB/sec, 1x DVD speed ≈ 1.2 MB/sec). To be on the safe side, a hard disk's average transfer speed should provide a reasonable margin over the write speed. The same speed requirements are applicable to any other source data device.

Heavy disk fragmentation can also slow the effective transmission rate of data to the recorder, especially when duplicating from a DiscJuggler Image file, so the use of a disk defragmentation software is strongly recommended.

* * *

The Windows 95/98/Me disk-caching program, Vcache, adaptively uses free physical memory based on recent hard disk activity. Users who repeatedly write disc image files to hard disk with the **Copy CDs and DVDs with the same burner**, **Create CD and DVD images**, or **Copy CDs and DVDs on-the-fly** tasks of DiscJuggler may be unable to allocate sufficient physical memory to avoid buffer under-runs. The repeated writing of disc image files of greater than 600 MB to hard disk will skew the algorithm used by Vcache to obtain physical memory. If you notice DiscJuggler reporting available physical memory less than the L2 cache size requested in DiscJuggler, you should try to set a smaller L2 cache in DiscJuggler and/or limit the amount of physical memory available to Vcache.

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You want to use DiscJuggler with your writing drive to write discs at the fastest speed possible. Occasionally other elements of your system will force you to write at slower speeds than your writing drive's maximum.

First, a word about write speed: The term "1x recording" is derived from the historical speed at which Compact Discs were recorded and read. 1x recording is equivalent to 150 KB/sec. Consequently, 2x recording is equal to 300 KB/sec. While Compact Discs may be recorded at various speeds, the speed at which a CD is successfully recorded does not affect the data on the disc. For DVD writing speeds, 1x is equal to 1,380 KB/sec, so the everything discussed about CD writing speeds is about ten times more serious with DVD writing.

The writing drives' laser moves over the surface of the media at speeds that may affect the chemical reaction of writing. When you write faster, be certain that the media is rated for the correct writing speed. Media rating is always an issue; writing at speeds that the media is rated for is required for reliability.

When you write at faster speeds, you place greater demands on your system to deliver data quickly enough to the buffer in your writing drive. If the buffer runs empty during writing, the writing process can fail. The larger the buffer size of your writing drive and the faster components of your system, the less likely the buffer will empty during a writing process. DiscJuggler's Test function will determine if data can be fed fast enough to a writing drive. DiscJuggler may discover that the fastest speed at which you can safely write discs is below the highest possible speed of your writing drive. Alternatively, you may decide to use a lower speed to ensure a higher success rate for the writing process. Some system configurations might not be able to provide data to writing drives even at lowest writing speeds until problematic system components are corrected.

* * *

While the Small Computer System Interface (SCSI) is a high-performance interface for connecting your writing drive, hard disk, and other peripherals to your computer, subtle configuration issues can decrease performance when writing to disc. Some of the possible SCSI configuration issues include the following.

Duplicate SCSI ID:

Make sure that each device on the same SCSI bus has a unique ID, set either through a switch on the back of the device or by setting jumpers.

Improper termination:

There must be termination only at the last device in your SCSI chain. Termination can be done externally through the attachment of a terminator on one of the SCSI connectors on the back of the last device or internally through a resistor in the circuit board of the device set by a jumper. Many problems are caused by the inadvertent internal termination of a SCSI device that is not at the end of the SCSI chain. Most devices are shipped from manufacturers with internal termination set by default.

SCSI device power problems:

It is safest if all SCSI devices are powered at hard restart time. If one or more of your SCSI devices are not recognized, try hard restarting after ensuring that all SCSI devices will be powered at the time your computer is turned on.

SCSI device order:

For mysterious reasons, sometimes the order of SCSI devices in the SCSI chain will affect device recognition. It may be worthwhile to change the order of your devices and hard restarting.

SCSI cable quality and length problems:

At times, the length of a cable can be the source of issues. Try using a shorter cable. In addition, SCSI cables are available in at a variety of prices and qualities. Cables can also be damaged in the normal course of use.

* * *

Data is written on the bottom (unlabeled) side of a disc. If this surface is smudged, dusty, or scratched, you may have difficulty in writing to or reading from the disc. Use a compressed air can to remove the dust. Disc should be cleaned with a soft, static-free, and paper-free cloth with straight strokes from the center of the disc to the outside. Never clean a disc with circular motions.

Lower quality media can be inconsistent, leading to write errors. There are specific reasons (other than supply issues) for the lower prices of some media in comparison to others.

For updated information on media recommendations, please contact **Technical Support** or your drive manufacturer.

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DiscJuggler will report many different types of errors in the event log of the Status panel. Host adapters, device drivers, and drives report many types of errors. Unfortunately, DiscJuggler cannot give a detailed explanation of the hundreds of potential errors, but following is a list of the most common errors. For additional error message explanations, please contact **Technical Support** or visit the Support page at **http://www.padus.com/support/**.

Blank disc detected:

You have specified a blank disc as the source for a duplication process. Remove the blank disc and insert a disc with content desired the duplication process.

Buffer under-run:

This error is displayed for many different errors depending on the process. In general, it means that the writing drive is not receiving data fast and the writing process has failed. See **Problems with Write Speed** and **Copying and Caching to Hard Disk** in the **Troubleshooting** section.

Illegal field in command descriptor block:

If you are using a reading drive, it is likely that the drive does not contain a feature configured for use by the writing drive. If you see this message for your writing drive, the drive does not contain a feature configured for use in the writing process. In all cases, please see if an update is available for all drives' firmware.

Imperfect Audio Re-synchronization:

DiscJuggler was not able to perfectly duplicate the audio track using software algorithms, even though these imperfections will often not be audible to the human ear. If you have a high quality drive, you can move the re-synchronization slider in the Advanced panel to the "Native" setting to let the drive handle the audio re-synchronization. You can also try setting a lower reading speed. Causes could include a scratched or dirty disc.

Media is incompatible:

Error displayed when using blank media not compatible with a particular type of writing drive. Insert another type of blank media and check with the writing drive manufacturer to see which disc types are compatible.

Medium error:

The disc is use is bad. Try using another disc.

Device not ready:

A drive is not ready to perform the selected action. Try again once the unit has had an opportunity to detect the inserted disc. If you still see this error message, check your cable connections, termination, power to the units, and the seating of discs in drives. Make sure that auto-Insert notification is not interfering. Make sure

that no other software capable of disc writing, such as packet writing software, are using drives.

Not enough space on target media:

The destination writing drive or hard disk cannot support the total size requested. With writing to disc, please make sure that the blank media in use supports the amount of data in use for writing. With writing a disc image file to hard disk, make sure that enough space is available and disc image files larger than 4 gigabytes in size are being written to file-systems supporting files over 4 gigabytes in size, such as NTFS.

OPC or PMA update error:

The blank media is either incompatible with the writing drive, or the disc has already been put to use. Drives first calibrate laser power by testing a small area of the disc and if this was done with the writing process being aborted or not started, the OPC area would already be used even though the disc shows up as being blank.

PCA (Program Count Area) area is full or unreadable:

The target disc is not completely blank or has a flaw in its structure. Try using blank media from another manufacturer, if possible.

PMA (Program Memory Area) area is full or unreadable:

The target disc is not completely blank, has a flaw in its structure, or is not rated for the selected write speed. Try using blank media from another manufacturer, if possible.

SCSI/ATAPI communication error:

There is a problem with the host adapter, device drivers, or cabling. Check cable and power connections. Check that you have the latest versions of device drivers supporting components and devices in use.

Unable to detect ASPI manager:

With Windows 2000/XP/2003, the Padus device driver was not installed by the installer, the system was not restarted after installation, or DiscJuggler must be reinstalled. With Windows 95/98/Me, the system contains an older or incomplete version of an ASPI device driver.

Write address is EFM area (already written):

The target blank disc is not completely blank or has a flaw in its structure. Try using blank media from another manufacturer, if possible.

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