

CD-R/RW Drive Unit

User's Guide

CRX1600L

Safety Regulations

WARNING—For U.S.A. customers

Any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

WARNING

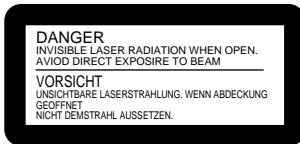
To prevent fire or shock hazard, do not expose the unit to rain or moisture. To avoid electrical shock, do not open the cabinet. Refer servicing to qualified personnel only.

CAUTION

The laser beam in this CRX1600L is harmful to the eyes. Do not attempt to disassemble the cabinet. Refer servicing to qualified personnel only. The use of optical instruments with this product will increase eye hazard. The use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation.

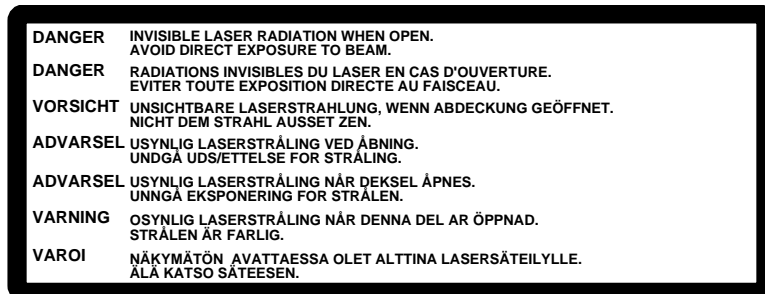
This label is located on the drive unit's internal chassis.

Dieses Etikett befindet sich auf dem inneren Chassis des Laufwerkes.



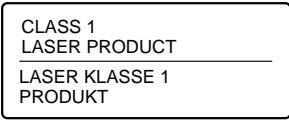
This label is located on the top of the drive unit enclosure.

Dieses Etikett befindet sich am Boden des Laufwerksgehäuses.



This CD-R/RW drive unit is classified as a CLASS 1 LASER PRODUCT. The CLASS 1 LASER PRODUCT label is located at the top of the enclosure.

Bei diesem CD-R/RW-Laufwerk handelt es sich um ein Laser-Produkt der Klasse 1. Das Etikett mit der Aufschrift LASER KLASSE 1 PRODUKT befindet sich auf der Oberseite des Gehäuses.



FCC Compliance:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

If you have any questions about this product, you may call the Sony Customer Information Service Center at (800) 588- 3847 or visit the Sony web site <http://www.sony.com/storagesupport>.

Declaration of Conformity

Trade Name: SONY
Model No.: CRX1600L
Responsible Party: Sony Electronics Inc.
Address: 680 Kinderkamack Road, Oradell, NJ 07649 USA
Telephone No.: 201-930-6972

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

The shielded interface cable recommended in this manual must be used with this equipment in order to comply with the limits for a digital device pursuant to Subpart B of Part 15 of FCC Rules.

CAUTION: Changes or modifications not expressly approved by the manufacturer responsible for compliance could void the user's warranty and authority to operate the equipment.

THE PARTY RESPONSIBLE FOR PRODUCT COMPLIANCE:

Sony Electronics Inc.
Value Added Products Division
3300 Zanker Road
San Jose, CA 95134 USA
(408) 432-1600

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MultiRead is a trademark of Hewlett-Packard Company.

Other trademarks are the property of their respective owners.

WARRANTY

A separate warranty card is enclosed with the documentation.

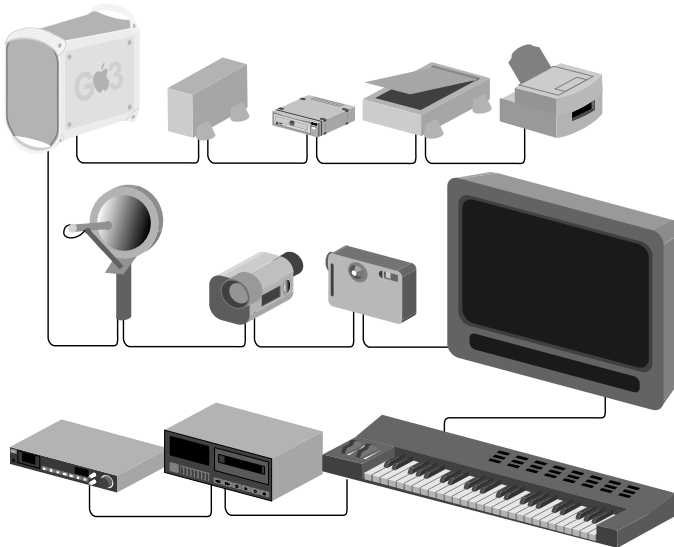
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Chapter 1 Introduction

The Sony 1600L i.LINK® (also referred to as the CRX1600L) is a high performance external CD-RW Recorder/Player with the IEEE 1394 (also called i.LINK or FireWire®) Interface. The 1600L i.LINK drive is capable of recording and playing rewritable CD-RW and write once CD-R media as well as being able to read mass produced stamped CDs. This drive is equipped with the i.LINK interface which can be easily connected to iBook™, iMac® DV, G4 and Blue and White Macintosh G3 computers with built-in FireWire ports as well as PCs with built-in i.LINK ports or with the addition of iLINK cards. **The 1600L i.LINK drive does not support the Apple® FireWire PCI card.** Unlike most other interfaces for storage devices, the i.LINK bus is not only very fast, but extremely easy to connect and use without severe limitations as to the number of devices and the distances of the cabling between devices. And the i.LINK connector is “hot pluggable” meaning that it can be installed or removed *while the computer is running*. **Please be careful never to disconnect the drive or other linked devices while data is being transferred.**

The i.LINK Interface



Continued

Sony, along with other industry leaders, helped develop the IEEE 1394 standard. IEEE 1394 is an industry standard serial communications common interface protocol as published by the Institute of Electrical and Electronics Engineers (IEEE). Designed to provide a high level of connectivity and ease of use between audio-video components and personal computers and their peripheral devices, not only is IEEE 1394 exciting from a technical viewpoint, it is a relatively inexpensive technology which means many types of IEEE 1394 devices should be available in the near future at reasonable prices.

The Future of IEEE 1394

There are a great many devices either already existing or being developed with i.LINK technology:

- Computers and their peripheral devices – DVD-ROM, CD-RW, CD-R, CD-ROM, Magneto Optical, high capacity tape drives, AV hard disks, printers and scanners.
- Audio devices such as digital audio tape (DAT) decks, synthesizer units, and other MIDI devices such as keyboards.
- Digital Video products such as digital still cameras, digital camcorders, antennas, digital monitors and digital editing decks.
- Even digital analog converters that allow users to connect analog video devices to i.LINK ports. These converters can convert component YUV signals to the DV signal (digital video signal format which i.LINK uses). This means users may use the analog camcorders they already own with i.LINK technology.

Features and Benefits of IEEE 1394

IEEE 1394 has high volume, high speed capabilities. Currently able to provide up to 400 Megabits per second, IEEE1394 should be capable of greater speeds in the future. Compare i.LINK technology's 400Mbps (Megabits per second) to USB's 12Mbps, or even to SCST's fastest Ultra2 speed of 80 Megabytes per second. Additionally, real time transfer mode provides uninterrupted transmission of sound and picture. And because the signals are digital signals, there is virtually no degradation in picture and sound quality.

IEEE 1394 has advantages in connectivity both on the computer side as well as the audio video side.

On the computer side, i.LINK technology allows up to 63 devices to be linked together without many of the rules and limitations of competing technologies such as SCSI. There are no addresses to set on the devices, no terminator needed at the end of the bus. The SCSI maximum is 15 devices with only a single host. IEEE 1394 allows more than one computer system to be connected via i.LINK technology to the same devices which makes shared peripherals much easier to connect and use than the current means via networked computers. And since IEEE 1394 is multiplatform, it does not matter which Operating System different personal computers are using.

On the audio video side only one cable is required and the cable itself is bi-directional. No longer is there the need to connect the left audio out signal of one device to the left audio in signal of another device, right audio out to right audio in. The same is true for video cabling which can use up to three cables for component signals. For these audio video devices if you want to change recording or editing direction between devices, or change which two of multiple devices you want to work together, you have to dive into the spaghetti of cables and reconnect them the other way.

CD-R and CD-RW

CD-R is the term used to denote CD-Recordable media. CD-R discs are recorded permanently. Once information is written, it cannot be erased. Data can be added until the disc is full. CD-R media is good for creating archived information that need not be changed, or for distribution because the price of CD-R media has dropped rapidly in the last few years.

CD-RW is the term used to denote CD-ReWritable media. CD-RW discs can be written to many times. CD-RW media is rated for one thousand different writes to the media. CD-RW is a perfect medium for creating reliable backups that can be added to as necessary, and even rewritten as your backup scheme requires.

While CD-RW media is more expensive than CD-R media it has a lower cost per megabyte than other competing technologies, such as Magneto-Optical or even magnetic removable media drives.

CD-RW drives are very versatile for transporting information to both older and newer CD and DVD ROM drives. CD-RW media can be read by newer CD-ROM and DVD drives. These newer drives are known as Multi Read™ (MR) drives. And even though CD-RW media cannot be read by older CD-ROM drives, the 1600L i.LINK drive can write to CD-R media which can be read by standard CD-ROM drives and CD players.

How CD-R and CD-RW work

CD-ROM drives (CD-R and CD-RW drives as well) read the one and zero bits by difference in reflectivity. Mass produced Compact Discs are created by stamping “pits” in the CD. These “pits” reflect differently than the “land” which is the area between “pits.”

CD-R drives work by using a laser beam to heat the recording layer, causing a chemical reaction in that spot so CD-ROM players will see this as a “pit” and the unburnt area as “land.”

CD-RW uses what is known as a “Phase Change” technology. In the CD-RW media is a substance which can be changed from an amorphous “mark” that very closely resembles the pits of a stamped CD, to a crystalline state which resembles “land.” The laser beam of the 1600L i.LINK drive changes the crystalline state to the amorphous state by use of a laser to quickly heat the spot on the disc, forming a mark. To change the amorphous state back to the crystalline state the laser beam uses a lower power setting to transition the mark back to the crystalline “land.”

Performance

The 1600L i.LINK drive is capable of writing CD-R media at 12× MAX speed and CD-RW media at 8× MAX speed. 12× speed means that the 1600L i.LINK drive can record a full 650 megabyte CD-R disc in about 5 minutes. At 8× speed the 1600L i.LINK can record a full 650 megabyte CD-RW or CD-R disc in about 9 minutes.

The 1600L i.LINK drive is a multi-function device since the drive is also capable of reading at 32× Maximum (4,800 kilobytes per second).

The speed at which a CD-ROM is written does not affect the speed at which that CD-ROM can be read. For example, a CD-ROM which was written at 2× can be read at 1×, 2×, 4×, 8×, 12×, 24×, 32× and so on.

Buffer

The 1600L i.LINK drive has a 4 megabyte data buffer, which protects against buffer underruns when writing to a disc. Buffer underrun is a condition where the drive's buffer runs out of data while the CD-R or CD-RW media is still being written. The recording of a CD is a system intensive process, and the recorder needs a constant stream of data. A buffer underrun occurs when the data stream to the recorder is not fast enough to keep the recorder's buffer full, causing the recording to abort.

CD Formats Supported

The 1600L i.LINK drive records these popular CD formats:

- **CD-Digital Audio**; the format used for audio CDs, playable on audio CD players.
- **CD-ROM (Mode 1)**; the format used for most CD-ROM applications.
- **CD-ROM XA (Mode 2 Form 1 and Mode 2 Form 2)**; CD-ROM Extended Architecture. This standard was created for smoother playback of multimedia content.
- **CD-I*** (Mode2 Form 1 and Mode 2 Form 2), **CD-I Ready**; CD-Interactive is used for home entertainment systems.

* The 1600L i.LINK drive does not have the necessary audio circuitry and decoding functions for CD-I playback, but can read and record the format.

The 1600L i.LINK drive also supports these formats, but additional software is required to record these formats:

- **CD Extra**; Audio and data in multi-session format.
- **CD TEXT**; Audio CD with album name; song titles encoded. CD TEXT information is displayed on CD TEXT Compatible CD Players and CD-ROM drives.
- **CD-Bridge**; a format for a mixture of Kodak **Photo CDs** and **Video CDs**, playable on TV set top players and personal computers.
- **Photo CD** (single and multisession); Kodak Photo CD.
- **Video CD**; playable on TV set -top video CD Players and most DVD systems.

Continued

Recording Methods

The 1600L i.LINK drive has the capability to use several different recording methods. The descriptions of these methods in this manual are overviews of the subject. The methods are covered in greater detail in the software documentation.

- **Disc at Once:** this is a recording method in which the entire disc is written in a single pass. Data cannot be added at a later time.
- **Session at Once:** a complete session is written in a single pass (one at a time).
- **Track at Once:** a track can be copied to the disc incrementally (one at a time).
- **Multi-session:** several sessions can be written to a disc. Each session has at least one track.
- **Variable and fixed packet recording:** typically used by back-up software and Drive Letter Access software to add files and folders at a time, instead of tracks/sessions at a time.

Applications

CD-R and CD-RW discs are each ideal for slightly different applications. Both can be recorded with the 1600L CD-ReWritable recorder. CD-R discs can't be erased, but are compatible with standard CD-ROM drives and CD players. CD-RW discs can be erased and re-written, but have some inter-change limitations. Here are some typical applications for both discs:

	Data Distribution	Back-up	Archiving	CD Prototyping	Personal File Storage
CD-R	●		●	●	
CD-RW		●		●	●

Media Compatibility

Due to the different makeup of CD-R and CD-RW discs, these discs have different reflective qualities, and can be used with the following units.

CD-R	All CD-ROM drives and CD players
CD-RW	Multi-Read and CD-RW compatible CD-ROM drives

Most newer drives are Multi-Read drives which have the capability to read stamped CD, CD-R and CD-RW discs.

Recommended Media

CD-R:	Sony 650 MB and 700 MB CD Recordable disc.
CD-RW:	Sony 650 MB high speed CD ReWritable disc.

To achieve trouble free 12× recording speeds, be sure the CD-R media is certified for 12× or faster recording.

To achieve trouble free 8× CD-RW recordings, be sure the CD-RW media is certified for 8× or higher compatible high speed recording.

Reliability

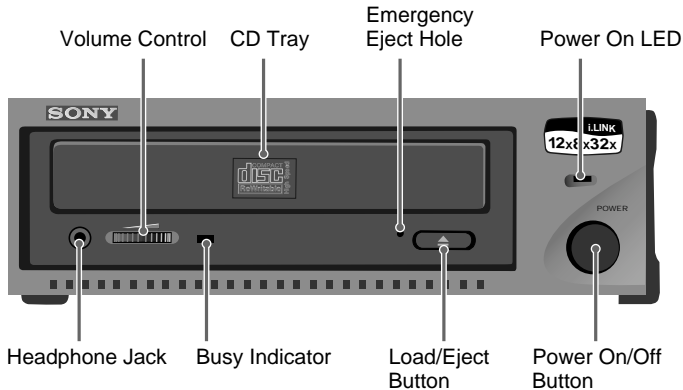
The 1600L i.LINK drive has a mean time between failure (MTBF) rating of 100,000 power on hours (POH) at 25% duty. 25% duty means the 1600L i.LINK drive is in actual use a quarter of the time the unit is turned on. MTBF is an average failure rate based on the total power on hours divided by the number of drive failures. A failure is any malfunction of the drive that prevents usage, including failure to power up, load or unload a CD, and read or write data. Faults are not considered failures when they relate to incompatible software or discs, or from mishandling and/or abuse.

Reliability ratings are derived from a large statistical sample, and are not indicative of the performance of a single unit.

Chapter 2 Controls and Indicators

This chapter shows the connectors, controls, and indicator lights of the 1600L i.LINK drive. For instructions on connecting and installing the drive to the computer, please consult “Chapter 3, Connecting to a Macintosh” located on page 16, or “Chapter 4, Connecting to a PC” located on page 20.

Front Panel



Busy Indicator LED

The Busy Indicator LED shows the condition of the 1600L i.LINK drive.

- When the Busy Indicator light is on full amber, it means the drive is seeking, playing audio, or reading.
- When the Busy Indicator light is flashing amber, it means the drive is recording a disc, or erasing a CD-RW disc.

Insert/Eject Button

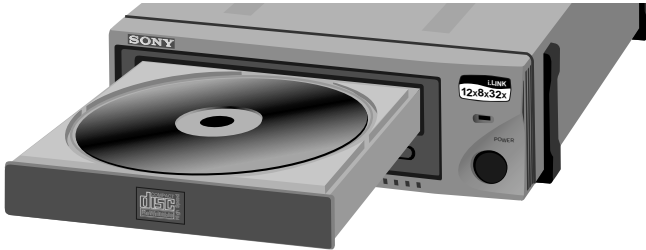
Pressing on the eject button when the power is on will eject the CD tray. Depending on the software being used with the 1600L i.LINK drive, this button may not appear operational. Some of the software provided with the 1600L i.LINK drive will lock the tray in during certain processes, so that the eject button will not eject the tray, for example, during a write operation.

CD Tray

The tray slides out of the unit. Place the media label side up with the reading and writing side down.

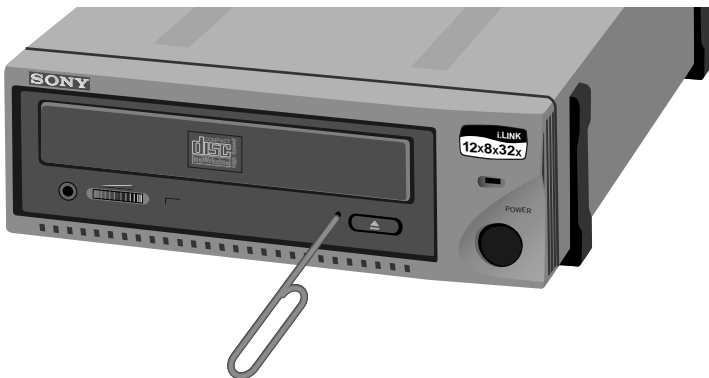
CAUTION

Putting anything other than CD, CD-R or CD-RW media may damage the unit and void your warranty.



Emergency Eject Hole

In the event that a CD cannot be ejected with the Eject Button and *no software is controlling the drive*, an emergency eject operation will eject the CD tray. Insert a small metal poker, such as an unbent paperclip into the opening, until it presses against the manual eject mechanism. You will feel the mechanism eject the CD tray. Use this method only when the other method of ejecting a CD, the Eject Button, is not working.

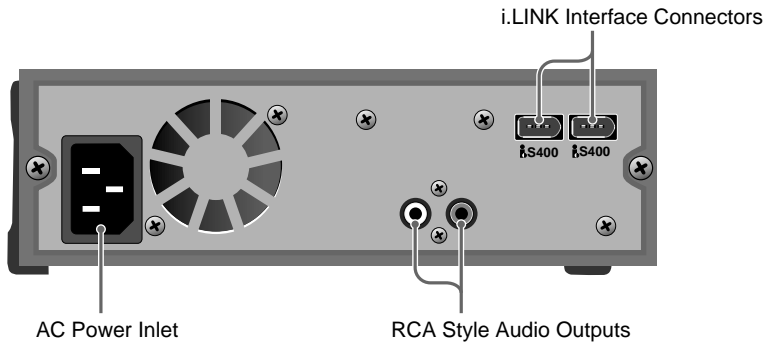


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Headphone Jack/Volume Control

To listen to an audio CD from the CD-ROM unit you may insert a standard headphone cable into the headphone jack on the front of the unit. Most CD-ROM playing software packages have a utility that will allow you to listen to audio CDs directly from the 1600L i.LINK drive. The software functions like a stereo CD player, letting you choose tracks to play. However, with some software, the sound does not go through the computer but instead plays directly from the headphone jack. The volume control next to the headphone jack controls the volume. To play from the G4, Blue and White G3, or PC speaker, see the RCA Style Line Out Connectors information below.

Rear Panel



i.LINK Interface Connectors

See the discussion of the i.LINK connections on page 11.

RCA Style Line Out Connectors

These connectors provide two channel, analog line level audio output which may be connected to audio equipment such as pre-amps, receivers, speakers and to the audio input on a G4, Blue and White G3, or PC.

AC Power Inlet

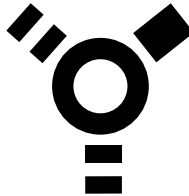
The 1600L i.LINK drive uses a 100 to 240V, 50-60 Hz, 1.2 amp maximum power supply. This will allow the unit to be attached to either 110 volt or 220 volt circuits.

IEEE 1394 Cable and Connectors

IEEE 1394 is commonly called either i.LINK or FireWire. Each uses a different symbol, though FireWire and i.LINK are compatible.

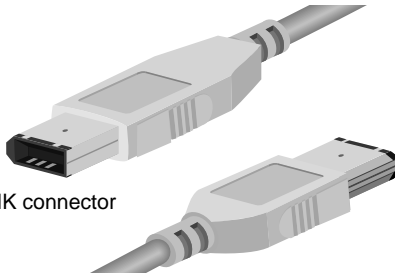


i.LINK



FireWire

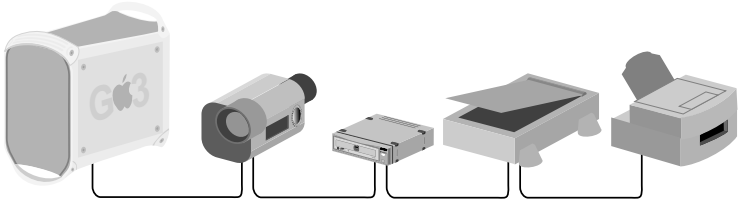
The cable ends are identical, so there is no worry about putting the right connector into an i.LINK port.



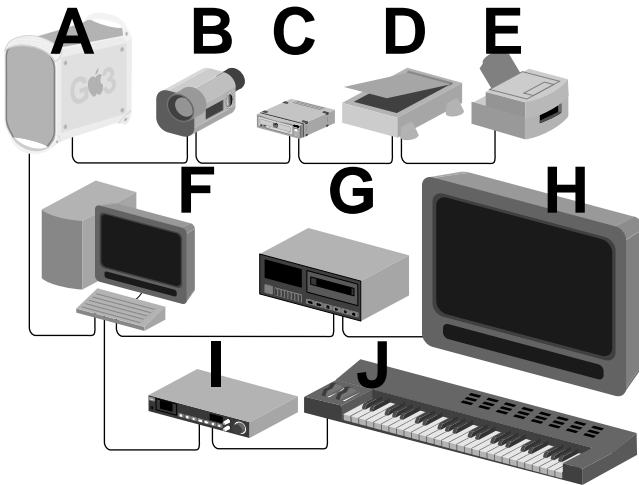
6-pin i.LINK connector

Chaining Multiple i.LINK devices

Most devices have two connectors so you can chain devices link to link up to 17 devices serially. However, some devices have three ports so you can also branch devices.



If a device has three i.LINK connectors branching may also be done. While 63 devices may be connected the limitation is still that only sixteen cables can be between any two devices (for counting purposes, these connectors are called “hops”).



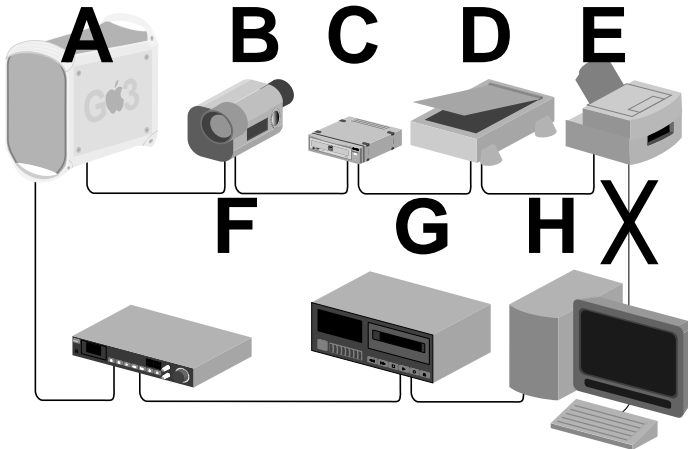
Using the example: the printer marked E is seven hops from the keyboard marked J. Likewise the digital video camera marked B is 4 hops from the digital monitor (H). Each cable can be up to 4.5 meters long (about 14 feet, 9 inches). Because maximum cable length is determined by the sixteen hop maximum the overall cable length is $16 \times 4.5\text{m}$ or a total of 72 meters.

Restrictions of IEEE 1394

You cannot violate the 63 device limitation. If an additional device is added beyond the 63 device limit none of the devices will be able to determine their position in the i.LINK chain, and so all devices will be unable to communicate.

You cannot violate the sixteen hop limitation between any two devices. A device beyond the 16 hop limitation will make the amount of time it takes for the signal to complete between the two farthest devices longer than the time allowed to complete, so the devices will not be able to communicate.

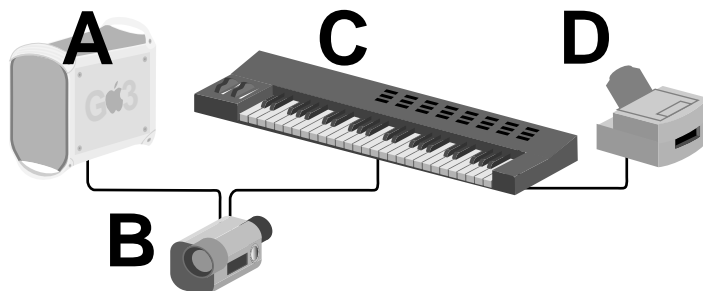
Another restriction of i.LINK technology is that you cannot loop connections.



Some devices such as computers or cards within computers will not be able to pass signals through if they are not powered on. Please consult with the owner's manual for the device.

i.LINK Signal Types

Even though different devices may be connected together, two devices may not be able to share signals. The printer and the keyboard will not be able to exchange signals, however for the G3 from the example to communicate with the printer, both the video camera and the keyboard will pass the signals through to the printer.



General Use Suggestions

The 1600L i.LINK drive should be used in an environment suitable for computer equipment. Dust, moisture and lack of adequate ventilation are common causes of device failure. You should install your CRX1600L in a location which is:

- Clean
- Dry
- Well Ventilated
- Dust Free
- Out of Direct sunlight

Inserting CD Discs

Put the writable/readable side of the CD media facing down in the tray, the label side up.



Press the Insert/Eject button to retract the tray.

CAUTION

Insert only CD-ROM, CD-R or CD-RW media into the 1600L i.LINK CD tray to avoid damaging the unit and voiding the warranty.

Chapter 3 Connecting to a Macintosh

This chapter describes the installation procedure for connecting the 1600L i.LINK drive to a Macintosh G4, Blue and White G3, iBook and iMac DV computer with FireWire built-in. For connecting the 1600L i.LINK drive to a PC, please consult “Connecting to a PC” on page 20.

System Requirements

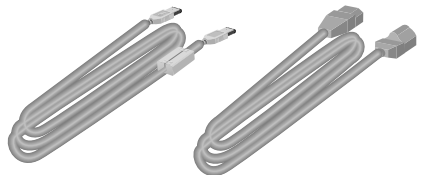
- Apple G4, Blue and White G3, iBook and iMac DV with built in FireWire ports (The 1600L i.LINK drive does not support the Apple FireWire PCI card.)
- Mac® OS 8.6, 9.0.4, 9.1
- 32 Mb RAM
- Apple FireWire 2.1 or higher software required

Make sure that your package contains all the items listed:

- CRX1600L external CD-RW drive



- 6 foot i.LINK cable
- AC power cord



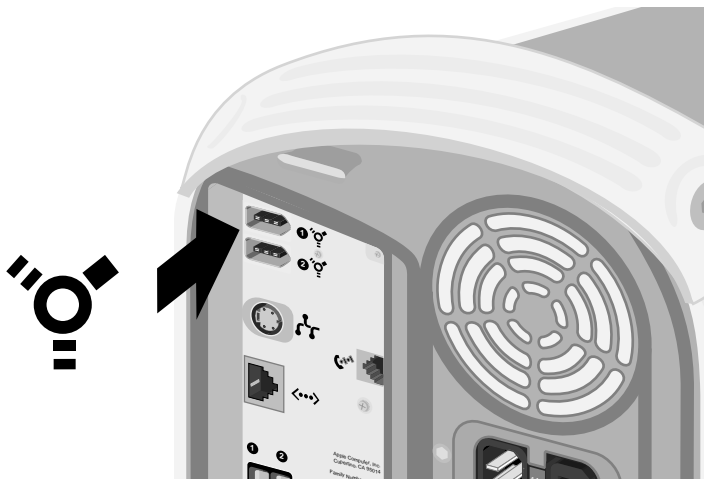
- Software CD-ROM (for Macintosh)
- 1 blank high speed CD-RW disc
- User's Guide
- Quick Start Guide

If any item is missing from the above list, please contact your dealer.

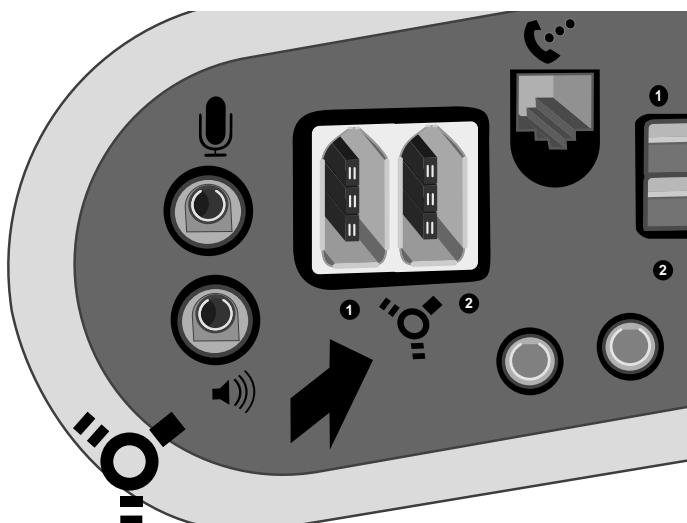
Installation Instructions

- 1 Unpack all essential materials and verify that all items are present.
- 2 Locate the port with the FireWire symbol.

G4 and Blue & White G3



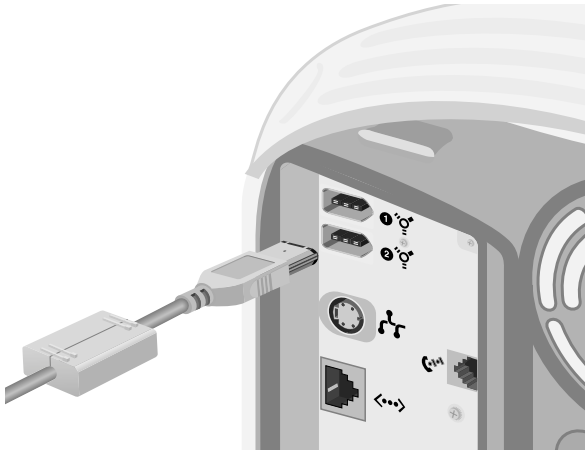
iMac DV



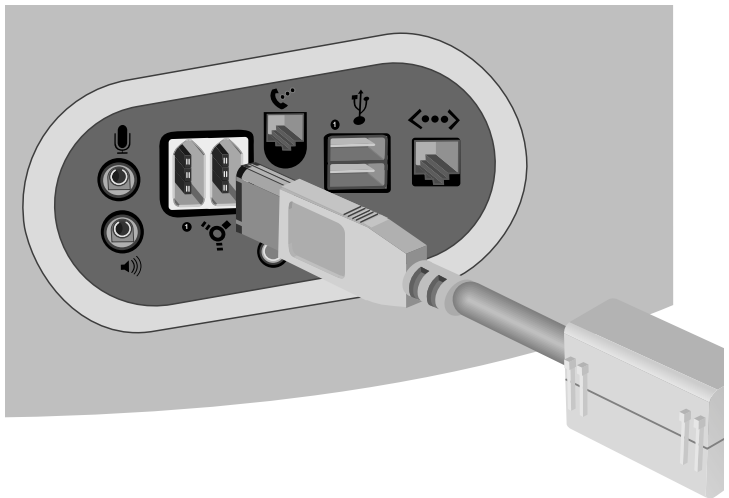
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- 3 Insert the connector of the i.LINK cable to the FireWire port of the Macintosh.

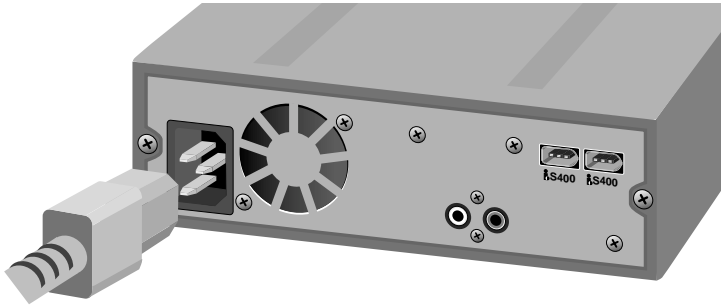
G4 and Blue & White G3



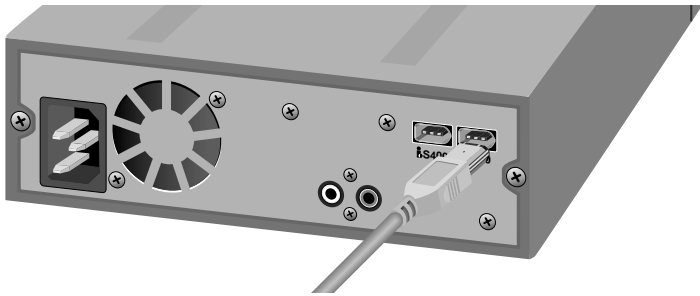
iMac DV



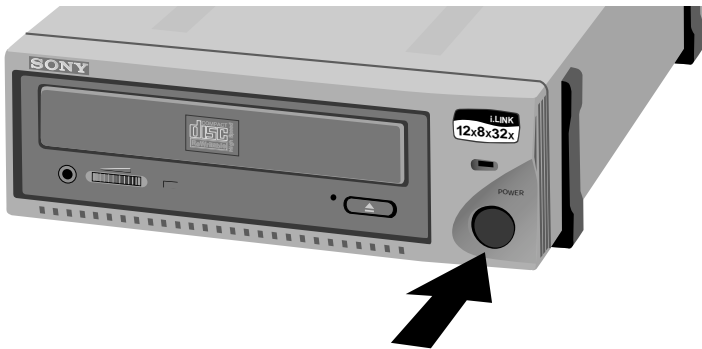
- 4** Attach the power cord to the CRX1600L.



- 5** Attach the i.LINK cable to the drive's interface connector.



- 6** Power on the CRX1600L.



- 7** Power on the Macintosh if it was shut down.
- 8** Install the software and load the drivers as instructed by the software documentation (or from the Quick Start guide).
- 9** Restart the Macintosh.
- 10** The 1600L i.LINK drive is now ready to use!

Chapter 4 Connecting to a PC

This chapter describes the installation procedure to connect the 1600L i.LINK drive to a PC equipped with an i.LINK (IEEE 1394/FireWire) expansion card. For instructions on connecting the 1600L i.LINK drive to a Macintosh, please see “Connecting to a Macintosh” on page 16.

System Requirements

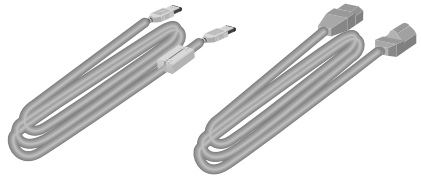
- PC with Pentium 400 MHz or faster CPU
- Windows 98 Second Edition (SE), Windows 2000, Windows ME
- 32 Mb RAM
- i.LINK (IEEE 1394) built-in or with expansion card

Make sure that your package contains all the items listed:

- CRX1600L external CD-RW drive



- 6 foot i.LINK cable
- AC power cord



- Software CD-ROM (for Windows)
- 1 blank high speed CD-RW disc
- User's Guide
- Quick Start Guide

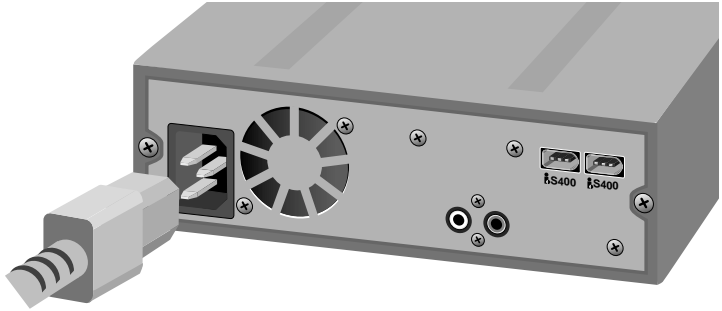
If any item is missing from the above list, please contact your dealer.

Installation Instructions

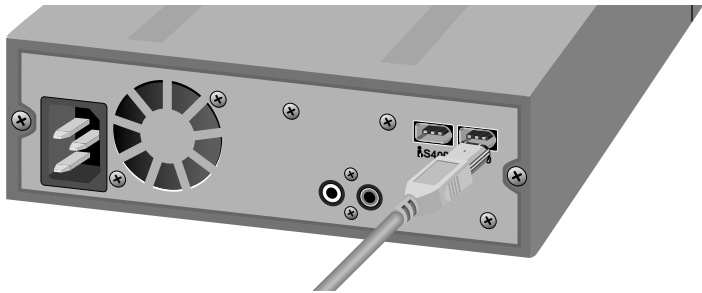
- 1** Unpack all essential materials and verify that all items are present.
- 2** Install the i.LINK (IEEE 1394/FireWire) expansion card per the manufacturer's installation instructions.
- 3** Insert the connector of the i.LINK cable to the i.LINK port of the expansion card.



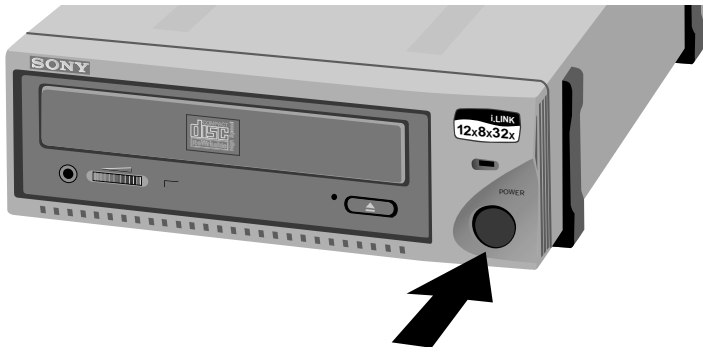
- 4 Attach the power cord to the CRX1600L.



- 5 Attach the i.LINK cable to the drive's interface connector.



- 6 Power on the CRX1600L.



- 7 Power on the PC if it was shut down.
- 8 Install the software and load the drivers as instructed by the software documentation (or from the Quick Start guide).
- 9 Restart the PC.
- 10 The 1600L i.LINK drive is now ready to use!

Chapter 5 Troubleshooting

This Chapter discusses the basics of troubleshooting the 1600L i.LINK drive.

A few words about CD-ROMs

The laser in a CD-ROM player reads the difference in reflectivity from one spot to the next. This difference in reflectivity is simply created from a difference in the depth of pits stamped into the CD-ROM Media.

Large production runs of CDs are stamped to create the pits. The Sony 1600L i.LINK drive burns recordable CD media, or alters the state of the substance within CD-RW media to change its reflectivity by means of a finely controlled laser beam.

The pits that the laser of the CD reader senses are either the one or the zero bits that are interpreted as data, music, photographs depending on the format with which the disc is recorded. The CD is covered in a transparent shield that the laser can read through or burn through. Scratches, smudges or particles on the bottom read/write surface can impede the functioning of your CD-RW, CD-R or CD-ROM device.

A few words about the i.LINK interface

Because the i.LINK interface allows for insertion and removal while the computer is running, it is easy to overlook whether the unit is connected. Please be sure the unit is connected before conducting other troubleshooting steps.

Symptom	Good Questions	Actions
You cannot access the device through software	<ul style="list-style-type: none"> • Are both ends of the i.LINK cable connected? • Are i.LINK devices connected and turned off that cannot pass the signal through when powered off? • Are there too many devices (63 maximum devices)? • Are there too many hops between any two devices (16 maximum hops)? • Is Apple FireWire 2.1 installed? 	<ul style="list-style-type: none"> • Use the CD Software to verify the drive is "seen." Once the connections are verified restart the computer if there is more difficulty. • Any devices that need power to pass the signal should be powered on. • No more than 63 devices. • No more than 16 hops between any two devices. • Get FireWire 2.1 or later software from www.apple.com.
Unable to Create Multisession disc	<ul style="list-style-type: none"> • Is there enough space left on the media for another session? 	<ul style="list-style-type: none"> • Writing a session requires lead in and lead out overhead (about 15 megabytes per session) in addition to the data that is recorded.
Failed writing a CD using CD-R or CD-RW media	<ul style="list-style-type: none"> • Buffer Underrun (Something has interrupted the stream of data to the recorder) Following is a partial list of possible causes: • Software related interruption. Is a screen saver, your internet or email program or other software application interrupting the write process? • Is media clean? • Fragmented hard drive? • Is it an older hard drive conducting a thermal recalibration in the middle of the write? • Bad or scratched media? • CD-RW media full of data? 	<ul style="list-style-type: none"> • Select a slower write speed. • Disable functions that will interrupt the write operation. • Make sure there are no fingerprints or dirt on the recording surface of the CD-R or CD-RW media. • Defragment hard drive with defrag utility. • Consult with manufacturer or vendor. • Replace media. • Erase or Format media before writing.

Symptom	Good Questions	Actions
Unable to eject CD	<ul style="list-style-type: none"> • Is software locking the Tray? 	<ul style="list-style-type: none"> • Unmount or eject through software first. • Use eject button • Shutdown computer and power off device. Wait 45 seconds; power on device only and attempt to use eject button again. • Use emergency eject hole if other methods fail.
Unable to Read a session after completing a successful write	<ul style="list-style-type: none"> • Can you read the CD in another CD-ROM Player? • Can you “see” previous sessions? • Did you close the session? • Bad CD-R or CD-RW disc? 	<ul style="list-style-type: none"> • It is possible that directory information is corrupt on the volume making it unreadable. • Check software documentation for troubleshooting suggestions. • Use Sony Recommended Media. CD-R: 74 min Sony CD-Recordable discs CD-RW: 74 min Sony High Speed CD-ReWritable discs.

Appendix Contacting Technical Support

Whenever you have any difficulty with your 1600L i.LINK drive, please follow the troubleshooting suggestions in this manual and in the software manuals. Please keep track of the steps you have taken with as much information about your computer system as you can. If you have any trouble resolving the problem, please call the Sony Technical Support Center and convey your troubleshooting steps.

Please have your model number, serial number, date of purchase and sales receipt available when you call Technical Support the first time. Free technical support is offered for 90 days from your first call.

Technical Support can be reached from 8 am to 8 pm, Central Time, Monday through Saturday.

Sony Computer Peripherals Technical Support Phone
(800) 588-3847

Sony Computer Peripherals Technical Support Web Site
<http://www.sony.com/storagesupport>

Apple® Technical Support Web Site
<http://www.apple.com/support>

Specifications

HOST INTERFACE

IEEE 1394 (i.LINK or FireWire)

READ FUNCTION, Acceptable Discs

CD-ROM mode-1 data discs, CD-ROM XA discs, CD Audio discs, Mixed Mode, CD Extra, CD Text, CD-I discs, D-I Ready Discs, Photo CD (Single and Multisession), Video CD, CD-R and CD-RW discs

WRITE FUNCTION, Applicable Formats

CD-ROM (Mode 1), CD-ROM XA, CD-Audio, Audio-combined CD-ROM - Mixed Mode, CD-I, +Video CD, +CD Text, +CD Extra

WRITING METHOD

Disc at Once, Session at Once, Track at Once, Multi-session Fixed and Variable Packet Writing

WRITE/READ SPEED

Read (CD-ROM/CD-R): 4×, 8×, 13~32× (CAV)

Read (CD-RW): 4×, 8×, 8~20× (CAV)

Read (unfinalized CD-R/CD-RW):

2×, 4×, 8×, 8~20× (CAV)

Write (CD-R): 2×, 4×, 8×, 12× speed

Write (CD-RW): 2×, 4×, 8× speed

SUSTAINED DATA TRANSFER RATE

300 Kbytes/sec. Mode 1 (2×, read/write)

600 Kbytes/sec. Mode 1 (4× read/write)

1,200 Kbytes/sec. Mode 1 (8× read/write)

1,800 Kbytes/sec. Mode 1 (12×/CD-R write)

2,000~4,800 Kbytes/sec. Mode 1 (13~32×, CAV)

BURST DATA TRANSFER RATE

400 Megabits per second

RANDOM ACCESS TIME

150 ms (average, including latency)

BUFFER MEMORY (Read/Write)

4 Megabytes

DISC DIAMETER

12 cm (8 cm Read Only)

+Video CD, CD Text, CD Extra require additional software.

ROTATIONAL SPEED INNERMOST TRACK:

1200 rpm (2×)
2400 rpm (4×)
4800 rpm (8×)
7200 rpm (12×)
7000 rpm (13~32×, CAV)

ROTATIONAL SPEED OUTERMOST TRACK:

460 rpm (2×)
920 rpm (4×)
1840 rpm (8×)
2760 rpm (12×)
7000 rpm (13~32×, CAV)

ENVIRONMENTAL CONDITIONS

Temperature and humidity

Operating: 5°C to 40°C Maximum (41°F to 104°F)
20% to 80% relative humidity (no condensation)

Transportation: -20°C to 50°C (-4°F to 122°F)
20% to 90% relative humidity (no condensation
within 72 hours)

Gradients: 10°C/hour, 10%/hour

MTBF

100,000 POH (duty 25%)

MOUNTING

Horizontal or vertical

POWER REQUIREMENTS

AC 100 - 240V

POWER CONSUMPTION

Approximately 18W

DRIVE DIMENSIONS

192mm W × 60mm D × 272mm H

DRIVE WEIGHT

2.6 kg

LASER

Type: Semiconductor laser GaAlAs
Wave Length: 777 - 787 nm (at 25°C)
Output Power from OP: 1.0 mW (read), 43.5 mW (write)

Glossary

Access times

The average amount of time to access an item of data.

Amorphous

Lacking shape, or in mineral terms, not crystalline. Amorphous could be taken to mean a liquid or gel like state. In terms of CD-RW the important aspect is that the material will remain stable in this state (not change out of this state unless acted upon by an outside force of great heat) AND that the amorphous state has a different reflective quality than in a crystalline state.

Analog

(as opposed to digital) where digital is defined discrete items which can be reduced to zero and one bits. Analog is continuous, so on any graphic representation of analog data there are an infinite number of points between any two points. Digital approximates analog by adding data points.

Archive

To save files or records, usually in a safe place, for later retrieval.

ATAPI

AT Compatible Attachment Packet Interface. An enhancement to EIDE which allows CD-ROM type devices to use the EIDE interface.

Bi-directional Cable

Signals can transfer both ways on the same cable, rather than requiring a separate cable for each direction, as with video in and video out.

Buffer

RAM Cache that is faster than the data is being delivered. Buffers are used so data may be stored and delivered to the receiving item as it is needed.

Buffer Underrun

When a function (such as writing to CD-R media requires a constant stream of data), attempts to pull data faster from the buffer than data can be input from a source drive, and the data buffer becomes empty.

Burn a CD

Recording a CD-R. Because a laser is used to write a CD it is also known as burning a CD.

Burst transfer

The fastest a device can transfer, usually from its buffer.

CAV

Constant Angular Velocity. Constant Angular Velocity means the drive or media spins at a constant rate, rather than spinning faster or slower as was common with older CD-ROM devices which used CLV (Constant Linear Velocity). CLV drives cause performance degradation at higher speed because there is a lag time, or latency period, before the drive reaches a standard readable speed for each track. See CLV.

CD-R drive

A drive that can write to recordable CD-R media.

CD-RW drive

A drive that can write to recordable CD-R and Rewritable CD-RW media.

CD-ROM drive

A drive that can read from CD media.

CLV

Constant Linear Velocity. Rotating a disc at such a rate to keep the length of track read at a constant speed. Since a track at the outside of a circle is much longer than tracks near the center, the outside track will be moving faster than interior tracks for each revolution. To keep the length of track read at the same speed, CLV drives speed up when reading tracks near the center and slow down when reading tracks near the outside. Older CD-ROM devices use CLV.

Crystalline

The recording material can be made to stabilize in a crystalline state with greater reflective qualities than the amorphous state. See Amorphous.

Data stream

The flow of data that accomplishes a task, usually related to moving data from storage to computer RAM or between storage devices.

DC Power (Direct Current) Power

Electronic components require direct current which is a current maintained at a constant level, not alternating in a sine wave like alternating current. Because of this property direct current can be used by the computer, not just to power components, but at different voltage levels to send electrical signals by means of pulses. Alternating Current has the ability to send electricity over long distances. Alternating Current provides power to, and throughout your house. Electronic devices like your computer have a power supply which takes alternating current and changes it into the Direct Current needed by your computer.

Defragment

There are defragmentation utilities which put all files into contiguous locations on a hard drive. Another way to defragment is to copy files to a newly reformatted hard drive since files will be written contiguously until there are open locations between files caused by erasing. See Fragmented Hard Drive.

Digital

Discrete information that can be broken down to one or zero bits.

Driver(s)

A software component that drives devices or components, such as drives, or EIDE or SCSI buses.

Digital Video Format

Format standard for Digital Video devices.

DVD (DVD-ROM)

Digital Versatile Disk, an enhancement of CD-ROM technology with greater capacity. DVD media have a minimum capacity of 4.7 GB and a maximum capacity of 17GB while CD-ROM, CD-R and CD-RW media have a maximum capacity of 650 MB (roughly two thirds of a single MB).

EIDE

Enhanced IDE supports two IDE ports unlike IDE's single port. Commonly referred to as IDE.

FireWire

The trademark for IEEE 1394 proposed and registered by Apple Computer.

Fragmented Hard Drive

Files are not always stored on a hard drive in contiguous locations on the drive, but where there is space available. Parts of a large file may be stored in several actual physical locations. Fragmentation occurs when files are erased and then new files are written. Erasing files can leave open locations between existing files. As these open locations are used they cause the files to be fragmented. Reading from fragmented files is slower than reading from contiguous locations on the disk because the read head will have to move to the proper track, like moving to the proper track on record, then wait for the proper place on that track to rotate under the read head. The more a drive is used, the more fragmented it will become.

Hops

The way of counting the number of cables between i.LINK devices.

Host

A device on the SCSI bus is either a host or target. The host is also known as the initiator.

i.LINK

The trademark for IEEE 1394 proposed and registered by Sony Electronics.

Jumper (Configuration Jumper)

A metal bridge encased in plastic that when placed across jumper configuration pins will complete an electric circuit. In this way, this configuration is chosen. Jumpers are used instead of more costly and less reliable means of changing configurations, such as switches.

kb

kilobyte. Basically this means 1000 bytes, but is actually 1024 bytes.

kb/s

kilobytes per second. Means of measuring throughput.

Kilobyte

See kb

Land or Pits

Mass produced CD-ROM are a stamped media with indentations physically stamped into the recording layer of the media which is then covered by a hard clear plastic. A laser beam focused at these indentations reflects differently than the parts of the media that are not indented. The indentations are called "Pits." "Land" is the area that is not indented. Rather than use actual Pits and Land CD-R and CD-RW use heat to alter the reflectivity of the chemical of the recording layer. A laser optical device can read the difference in reflectivity of different states of these chemicals, much like reading the difference in reflectivity of the Land and Pits in a stamped CD.

Lead in

Session information written at the beginning of a session.

Lead out

Session information written at the end of a session.

LED

Light Emitting Diode. A light device that is designed to not burn out

Mb

Megabyte. Basically means one million bytes, but is actually 1024 kilobytes or 1024 X 1024 bytes which is 1,048,576 bytes.

Mb/s

Megabytes per second. Means of measuring throughput.

Megabyte

see Mb.

Multi-Read

The ability for CD-ROM, CD-R, CD-RW, and DVD-ROM drives to read CD-ROM, CD-R and CD-RW media.

Multi-Session

Multi-Session means several sessions can be written to, and read from CD-ROM, CD-R or CD-RW media.

PC

Personal Computer. Sometimes also a term for IBM PC or Windows Compatible PC. In this user's guide the term "PC" means Windows or Windows NT compatible PC, as opposed to Macintosh, or a UNIX based computer.

Phase Change

The ability of a substance to change states and then be stable in the new state. In CD-RW media the recording layer can change from an amorphous state which does not reflect strongly to a crystalline state which does reflect strongly. See Reflectivity.

Pits or Land

See Land or Pits.

Real Time Transfer Mode

The ability to present sound and image at the same speed they were recorded.

Record a CD

Burn a CD, Writing a CD. Uses special CD-Recordable discs which can be altered by the laser in a CD-R drive.

Reflectivity

In the sense of laser optical devices, differences in reflectivity can be read as 0 and 1 bits. The intensity of a laser will reflect differently from a crystalline, glass like state, than an amorphous, or non-crystalline, state. Much like a flashlight will reflect more brightly from a mirror than from a white painted wall.

Session

Data written to CD-R media at one time.

Source drive

The drive which contains information that will be written somewhere else. In CD recording the source drive contains the information that will be written to the CD Recorder.

Sustained transfer

The rate which data can be transferred from one device to another. This rate is an average over a longer period of time than a burst transfer rate. Because the sustained transfer test is longer, it means the testing will take into account both reading or writing from the storage device's buffer, as well as from the media. Reading and Writing from the media is a much slower operation, so the sustained transfer test is usually a much better test for determining the usability of a device in a real application, such as recording a CD.

System Intensive

An operation that requires the greatest speed from the computer system. If other programs are running at the same time or in the background they may slow the overall speed of the computer, so that the system intensive operation will fail.

WORM

Write Once Read Many. Sometimes drives using CD-ROM and CD-R media are called WORM drives because once data is written to media, the data cannot be erased or altered.

Write Once

Media that can only be written to once.

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