

Optical Storage Glossary

DPCM	<p>Adaptive Delta Pulse Code Modulation: an audio encoding compression technique which encodes the difference between the predicted value of the signal instead of the absolute value of the original waveform so that the compression efficiency is improved. This difference is usually small and can thus be encoded in fewer bits than the sample itself. Used in CD-I and CD-ROM XA recording.</p>
Blue Book	<p>The new standard for combining audio and data seamlessly on one CD. Also known as CD-Extra or CD-Plus.</p>
Blue Laser	<p>A type of laser capable of writing bits with up to five times greater density than the infrared lasers commonly used. In 1993, IBM demonstrated a recording density of 2.5 billion bits per square inch on a magneto-optic disk. It is expected that blue lasers will be commercially used within a few years.</p>
Burn	<p>Generating a CD-ROM on a specialised writer (CD-R); ěburní comes from the heat generated by the high-powered laser needed to make the pits.</p>
Caddy	<p>The plastic and metal carrier into which a CD must be inserted before it is loaded into some CD-ROM drives or CD recorders and which is a highly controversial feature of DVD-RAM media. Also called cartridge.</p>
CAV	<p>Constant Angular Velocity: CD-ROM drive method in which a steady spin speed is maintained, resulting in increased data transfer rates and reduced seek times as the head moves towards its outside edge. Has largely superseded CLV.</p>
CD-Compatible	<p>CD-R discs written that can be read in either a CD-DA player or in a CD-ROM reader.</p>
CD-DA	<p>Compact Disc-Digital Audio: jointly developed by Philips and Sony and launched in October 1982, CD-DA was the first incarnation of the compact disc, used to digitally record and play back music at unprecedented quality. The standard under which CD-DA discs are recorded is known as the Red Book.</p>
CD-Extra	<p>A multisession disc containing a number of audio tracks in the first session, and one CD-ROM XA data track in the second session. Additional characteristics are defined in the Blue Book standard. An alternative to mixed-mode for combining standard CD-D audio (which can be played in a normal audio player), and a computer application, on a single disc. Also known as CD-Plus.</p>
CD-i	<p>Compact Disc-Interactive: a compact disc format (developed by Philips and Sony) designed to allow interactive multimedia applications to be played through a computer/disc player attached to a television. The CD-i standard is called the Green Book.</p>
CD-i Bridge	<p>A set of specifications defining a way of recording CD-i information on a CD-ROM XA disc. Used for Photo CD and Video CD.</p>

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CD-R	Compact Disc-Recordable: also referred to as Compact Disc-Write Once (CD-WO). A type of disk drive that can create CD-ROMs and audio CDs, allowing users to 'master' discs for subsequent publishing.
CD-ROM	Compact Disc-Read Only Memory: a standard for compact disc to be used as a digital memory medium for personal computers. The 4.75in laser-encoded optical memory storage medium can hold about 650MB of data, sound, and limited stills and motion video. A CD-ROM player will typically play CD-DA discs, but a CD-DA player will not play CD-ROMs. The standard used for most CD-ROM formats is known as Yellow Book, based on the standard published by Philips.
CD-ROM XA	CD-ROM Extended Architecture: a hybrid format, promoted by Sony and Microsoft, that combines CD-ROM and CD-i capabilities. The extension adds ADPCM audio to permit the interleaving of sound and video data to animation and with sound synchronisation. It is an essential component of Microsoft's plan for multimedia computers and also the physical format for Kodak's Photo CD format.
CD-RW	Compact Disc-Rewritable: once known as CD-Erasable, or CD-E.
CIRC	Cross-Interleaved Reed-Solomon Code: the first level of error correction used in every compact disc, and the only one used for audio CDs. It consists of two Reed-Solomon codes interleaved crosswise.
CLV	Constant Linear Velocity: the traditional CD-ROM drive method in which motor speed is regulated to keep the track passing under the read head at a steady speed. See also CAV.
Cue Sheet	A list of audio files which are to be recorded to a CD in Red Book format. Also referred to as a compilation list.
Curie Point	The temperature at which the molecules of a material can be altered when subjected to a magnetic field. In optical material, it is approximately 200 degrees centigrade.
Disc-At-Once	In Disc-at-Once mode, the whole disc is written without turning off the recording laser. All of the information to be recorded needs to be staged on the computer's hard disk prior to recording. The mode is especially useful for creating a master disc for subsequent mass production via a replicator since eliminates the linking and run-in and run-out blocks associated with multisession and packet recording modes, which often are interpreted as uncorrectable errors during the mastering process. It requires the pre-mastering software to send a 'cue sheet' to the CD-R/DVD-R drive that describes the disc layout.
Divx	Digital Video eXpress: a proprietary extension to the DVD-Video standard which effectively turns it into a pay-per-view system. Introduced in the second half of 1998, its backers - led by the Circuit City electronics chain - abandoned the technology in mid-1999.

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DOW	Direct OverWrite: with CD-RW, the traditional concept of erasure does not exist. New data is simply written over existing data in a single-pass. CD-RW is therefore known as a Direct Overwrite (DOW) system.
DVD	Digital Versatile Disk: the replacement for the ubiquitous compact disc. Like the CD it is available in a number of different formats. Unlike the CD, it is available with a number of capacities ranging from 4.7GB to 17GB.
DVD-R	DVD Recordable: the write-once DVD format. DVD-R discs are the DVD counterpart to CD-R discs.
DVD-RAM	A new type of Rewritable compact disc that provides much greater data storage than today's CD-RW systems. The caddy-mounted discs will initially provide 2.6GB per side on single or double-sided discs.
DVD-ROM	The read-only format supports discs with capacities of from 4.7GB (enough for an MPEG-2 compressed full-length movie) to 17GB and access rates of 600KBps to 1.3MBps. Backward-compatible with CD-ROMs.
DVD+RW	A competing (to DVD-RAM) rewritable DVD standard being promoted by Hewlett-Packard, Philips and Sony. Unlike the DVD-RAM standard, +RW allows the use of bare discs. The two standards are incompatible. At one time the DVD-Forum were insisting on the name being changed to '+RW' - but this appears to have had little effect.
DVD-Video	A consumer DVD format for displaying full-length digital movies. DVD-Video players attach to a television like a videocassette player. Unlike DVD-ROMs, the Digital-Video format includes a Content Scrambling System (CSS) to prevent users from copying discs. This means that today's DVD-ROM players cannot play DVD-Video discs without a software or hardware upgrade to decode the encrypted discs.
ECC	Error Correction Code: a system of scrambling data and recording redundant data onto disc as it is premastered. On playback this redundant information helps to detect and correct errors that may arise during data transmission.
EDC	Error Detection Code: 32 bits in each sector which are used to detect errors in the sector data.
EFM	Eight to Fourteen Modulation: used on every CD for modulation and error correction.
Finalisation	When a disc is 'finalised' the absolute lead-in and lead-out for the entire disc is written, along with information which tells the reader not to look for subsequent sessions. This final table of contents (TOC) conforms to the ISO 9660 file standard.

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Fixation	The process of writing the lead-in and lead-out information to the disc. This process finishes a writing session and creates a table of contents. Fixation is required for a CD-ROM or CD-Audio player to play the disc. Discs which are 'fixated for append' can have additional sessions recorded, with their own session lead-in and lead-out, creating a multisession disc.
Gold Disc	The recordable disc used in recordable CD systems. The blank disc is made of a bottom layer of polycarbonate, with a preformed track spiral which the recording laser follows when inscribing information onto the disc. This type of disc is therefore also called pre-grooved. A translucent organic dye layer is laid on top of the polycarbonate, then a reflective layer of gold. On top there are thin layers of lacquer and label.
Green Book	The now defunct Philips/Sony specification for CD-i.
High Sierra Format	The standard logical file format for CD-ROM originally proposed by the High Sierra Group, revised and adopted by the International Standards Organisation as ISO 9660.
Hybrid	Under the Orange Book standard for recordable CD, hybrid means a recordable disc on which one or more sessions are already recorded, but the disc is not closed, leaving space open for future recording.
Incremental writing	A mode of writing supported by DVD-R drives which allows files to be added to a DVD-R disc one recording at a time as an alternative to the disc-at-once method. Similar in concept to the packet writing technology employed by CD-R.
Image Pac	In Photo CD, a set of five versions of the same image, at varying resolutions.
Information Area	The space on a CD-ROM where the user data is written. It begins at the address 00:02:00.
ISO 9660 Format	An international standard specifying the logical format for files and directories on a CD-ROM. It provides a cross-platform format for storing filenames and directories which restricts the characters used to ensure all CD-ROM drives of all ages can read a data disc. The ISO 9660 data starts at track time 00:02:16 or sector 166 (logical sector 16) of track one. For a multisession disc the ISO 9660 data will be present in the first data track of each session containing CD-ROM tracks.
ISO 9660 Image	A single large file which is an exact representation of the whole set of data and programs as it will appear on a CD, in terms of both content and logical format.
ISRC	International Standard Recording Code: some recorders allow the ISRC to be recorded for each audio track on a disc. The code is made up of: Country Code (2 ASCII characters), Owner Code (3

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Joliet	ASCII characters), Year of Recording (2 digits), Serial Number (5 digits).
Land	An extension of the ISO 9660 standard, developed by Microsoft to allow CDs to be recorded using long filenames, and using the Unicode international character set. Joliet allows use of filenames up to 64 characters in length, including spaces.
Laser	A non-indentured area on an optical medium such as a CD-ROM or DVD disc. Contrast with Pit.
Lead-In	Light Amplification by Stimulated Emission of Radiation: a means of generating coherent light which can be focused to a very small spot size and ideal for reading compact discs, or writing CD-R and CD-RW discs.
Lead-Out	An area at the beginning of each session on a recordable compact disc which is left blank for the session's Table of Contents (track numbers and start points). The lead-in is written when a session is closed, and takes up 4500 sectors on disc (1 minute, or roughly 9 megabytes). The lead-in also indicates whether the disc is MultiSession, and if the disc is not closed, which is the next writable address on the disc.
LIMDOW	The area at the end of a session which indicates that the end of the data has been reached; there is no actual data written in the lead-out. The first lead-out on a disc is 6750 sectors (1.5 minutes, about 13.5 megabytes) long; any subsequent lead-outs are 2250 sectors (.5 minute, about 4.5 megabytes).
Link Blocks	Light Intensity Modulated Direct Overwrite: a storage technology that works on the same basic principle as MO drives but which uses magnets built into disk itself instead of a magnetic read/write head. This enables data to be written in a single pass of the read/write head rather than two.
Logical Block	Blocks created between Track-at-Once and Track Multi-session recording sessions. These are interpreted as 'uncorrectable errors' on most mastering systems at replication plants.
Mastering	The smallest addressable space on a disc. Each logical block is identified by a unique Logical Block Number (LBN), assigned in order starting from 0 at the beginning of the disc. Under the ISO 9660 standard, all data on a CD is addressed in terms of Logical Block Numbers.
Mixed Mode	Technically, refers to the process of creating a glass master from which compact discs will be reproduced in quantity. In desktop recordable CD systems, mastering is done together with premastering by the desktop CD recorder, and the term mastering is used generally to mean recording.
	A compact disc which combines computer data and audio. The data is generally all contained in Track 1, and the audio in one or more following tracks.

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Mode	<p>There are two recording modes for compact discs. In Mode 1, used with CD-ROM applications, 288 bytes of each sector are used for storing error correction code, and the remaining 2048 bytes per sector are available for user data. Mode 2, used in CD-I and CD-ROM XA, has two forms: Form 1 is similar to Mode 1, as it is also used to record data that requires error correction; Form 2 is used for recording information such as sound or images which do not require such extreme precision. Since less error correction is needed, more bytes in the sector can be freed for information storage, resulting in a data area of 2336 bytes per sector.</p>
MO Technology	<p>Magneto-Optical Technology: a rewritable optical storage technology that uses a combination of magnetic and optical methods. Data is written on an MO disk by both a laser and a magnet. The laser heats the bit to the Curie point, which is the temperature at which molecules can be realigned when subjected to a magnetic field. A magnet then changes the bit's polarity. Writing takes two passes. Unlike with phase change drives MO disks do not have to be 'reformatted' when full. See also LIMDOW.</p>
Mount	<p>To install a compact disc so that the computer recognises its presence and can read data from it.</p>
MSCDEX	<p>Microsoft DOS extensions for CD-ROM. Allows the DOS operating system to recognise a CD-ROM as a DOS volume.</p>
MultiRead	<p>An OSTA standard for CD-ROM and DVD-ROM drives. Drives which follow the MultiRead standard can read commercial CDs (audio and data), CD-R discs, and CD-RW discs. They can also read discs written in fixed- or variable-length packets. This applies also to DVD.</p>
MultiSession	<p>The Orange Book specification which allows additional data to be appended to a previously recorded disc. A session is defined as an area including lead-in, program data and lead-out. Contrast the recording structure of a pressed CD-ROM or a CD-R written in Disc at Once mode that contains just. Also referred to as linked session.</p>
MultiTrack	<p>The ability to record more than a single track on a disc. Track numbers are from 1 to 99. They continue to increment across session boundaries. e.g. if session 1 used tracks 1 to 4, session 2 would start at track 5. Track numbers may start at any value, but must be incremented sequentially on the disc.</p>
Orange Book	<p>The Philips/Sony specification for Compact Disc Magneto-Optical (CD-MO) and Write-Once (CD-WO) systems. Part II is the primary specification for CD-R media and defines both the physical structure and dimensions of a CD-R disc as well as the use of certain portions of the recording surface: the Program area, the Power Calibration area (PCA), the Program Memory area (PMA), the Lead-in and Lead-out areas. It also includes the specification for the Hybrid Disc technology on which Photo CD is based.</p>

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OSTA	Optical Storage Technology Association: an international trade association dedicated to promoting use of writable optical technology for storing computer data and images.
P-channel	One of the CD subcode channels. The P-channel is used to indicate the gap between tracks on a CD.
Packet Writing	Track at Once writing is a form of incremental write which mandates a minimum track length and a maximum number of tracks per disc. A track written 'at once' has 150 blocks of overhead for run-in, run-out, pre-gap and linking. Packet write, on the other hand, is a method whereby several write events are allowed within a track, thus reducing the overhead. These 'packets' are bounded by 7 blocks, 4 for run-in, 2 for run-out and 1 link block. Packets can be of fixed or variable length.
PCA	Power Calibration Area: a space reserved at the beginning of the disc for calibrating the laser to record to that disc.
PD Drive	Refers to the Phase-change Dual optical technology as implemented in Panasonic's patented PD system. Similar to phase-change WORM technology (as used in CD-R) this uses an active layer with reversible properties allowing data to be overwritten in a single pass of the read/write head. This compares with the two-pass operation of conventional MO devices.
Phase Change Technology	An optical storage technology in which the disk drive writes data with a laser that changes dots on the disk between amorphous and crystalline states. An optical head reads data by detecting the difference in reflected light from amorphous and crystalline dots. When full a phase change disk can be erased (or 'reformatted') using a medium-intensity pulse to restore the original crystalline structure. CD-RW uses phase change technology.
Photo CD	A compact disc format developed by Kodak and Philips, based on the CD-i Bridge specification, that allows photographic images to be recorded and viewed on a CD-ROM. Up to 100 high resolution images can be stored on a Photo CD.
Pit	An indentation in an optical medium such as a CD-ROM or DVD. The laser beam is either absorbed in the pit or reflects off the non-indented areas, which are called lands. Using various algorithms, the reflections are converted into 0 and 1 bits.
PMA	Program Memory Area: on a recordable disc, an area which temporarily contains track numbers and their starting and stopping points (that is, the session TOC) when tracks are written in a session which is not yet closed. When the session is closed, this same TOC information is written in the session lead-in.
Post-Gap	A space dividing tracks, recorded within the track data area at its end. The post-gap is 150 sectors (2 seconds) long and is required only where successive tracks are of different types.

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Pre-Gap	A space dividing tracks, recorded before the track data area. The length of the pre-gap varies with the CD recorder and the types of tracks. Where successive tracks are both of data, one track is separated from another by a track pre-gap of 150 sectors (2 seconds). Where successive tracks are of different types, the pre-gap is usually of 225 sectors (or three seconds). If two successive tracks are audio, there may be no pre-gap at all.
Premastering	The technical process of preparing data to be mastered onto a compact disc. It includes breaking the data into logical blocks and recording those blocks with the appropriate header (address) and error correction information. The result of premastering may be a tape ready to go for mastering, or, in the case of recordable CD systems, premastering and mastering are done in one operation, resulting in a ready-to-read compact disc.
Program area	The largest area on a CD containing the audio or CD-ROM information.
Q-channel	One of the CD subcode channels. The Q-channel is used to give timecode addresses and, in the lead-in, the Table of Contents.
Random Erase	The ability to erase a single file at a time from a CD-RW disc, freeing up disc space for immediate re-use, just as you would do on a hard or floppy disk. Part of the UDF 1.5 specification and implemented via UDF driver software such as Adaptec's DirectCD V2.0.
Red Book	The Philips/Sony specification for audio (CD-DA) compact discs.
Replication	Or duplication. Making multiple copies of a compact disc.
SCMS	Serial Copy Management System: a measure introduced to tackle piracy problems which allows the consumer to make a single digital copy, for personal use, from a copyrighted source.
Second	The reference used where a quantity of data, which if played in audio mode at 1x, would require 1 second to play. 75 sectors.
Sector	The smallest recordable unit on a CD. A disc can contain [(75 sectors per second) x (60 seconds per minute) x (number of minutes on disc)] sectors. The amount of data contained in the sector depends on what physical format and mode it is recorded in; for regular CD-ROM (Mode 1) data, you can fit 2048 bytes (2 kilobytes) of data into a sector.
Sequential Erase	Erasing, or reformatting, an entire CD-RW disc so that it can be re-used. Contrast with Random Erase.
Session	As defined under the Orange Book, a recorded segment of compact disc which may contain one or more tracks of any type (data or audio).
Silver Disc	A disc which is mastered by a stamping process.

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	It is Read-Only and can not be modified.
Single Session	The smallest collection of information that can be read by a CD-ROM compatible device. It contains the ISO 9960 file structure and files. A single session can contain a single track or multiple tracks. Contrast MultiSession and MultiTrack.
Subcode channel	A separate low speed data channel on every CD. The subcode comprises 8 channels, designated 'R' through 'W'.
TOC	Table Of Contents: shows the number of tracks, their starting locations, and the total length of the data area of the disc.
TPI	Tracks Per Inch: the number of tracks written within each inch of the disc's surface.
Track	Sub-divisions of the program area of a CD. Each disc may have up to 99 tracks each at least 4 seconds in length. Every time the CD is written to, at least one track is created, which is preceded by a pre-gap and followed by a post-gap. Any session may contain one or more tracks, and the tracks within a session may be of the same or of different types (for example, a mixed-mode disc contains data and audio tracks). Using the Cue Sheet more than one track can be recorded in a single writing. Packet Recording is the only smaller unit recording.
Track At Once	A writing mode that allows a session to be written in a number of discrete write events, called tracks. The mode mandates a minimum track length of 300 blocks (4 seconds), which equates to around 700KB, and a maximum of 99 tracks per disc. The disc may be removed from the writer and read in another writer before the session is fixated.
Track MultiSession	This write mode is very similar to Track At Once. In the Multisession environment, each 'session' must contain at least one track. Again, the size of the track must be at least 300 blocks. Track Multisession mode allows tracks to be incrementally added to a disc (this should not be confused with Incremental Writing). Each session will take up about 13.5MB of disc space in overhead; the so-called Lead-in and Lead-out areas.
UDF	Universal Disk Format: a file system for optical media developed by the Optical Storage Technology Association (OSTA). It was designed for read-write interoperability between all the major operating systems as well as compatibility between rewritable and write-once media. The standard allows for efficient CD-RW recording of small packages of data, using incremental packet writing.
Underrun	A buffer underrun occurs when the system cannot keep up a steady stream of data as required by CD recording. The CD recorder has a buffer to protect against interruptions and slowdowns, but if the interruption is so long that the recorder's buffer is completely emptied, a buffer underrun occurs, writing halts, and most often the

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VideoCD	<p>recordable CD is irretrievably damaged.</p> <p>Format that allows the viewing of MPEG-1 (also known as the ISO IEC 11172 compression standard) video on CD-ROM. It allows for more than an hour of compressed video, the audio also being compressed and giving hi-fi standard. The whole point of VideoCD is cross-platform compatibility. The discs should work on suitably equipped PCs, Macs, dedicated VideoCD players, and CD-i systems. Video CD is based on the White Book standard developed by Philips and other industry leaders.</p>
Virtual Image	<p>A database of files to be written to CD, created by dragging & dropping files into the main window. Can be used to write directly to CD, or to master a real ISO 9660 image to hard disk.</p>
Volume	<p>Under the ISO 9660 standard, a single CD-ROM disc.</p>
Volume Descriptors	<p>In ISO 9660, a set of information on the disc containing vital information about the CD and how the computer should read it.</p>
White Book	<p>The White Book defines the VideoCD specification. First published in 1993.</p>
WORM	<p>Write Once Read Many: an optical disk technology that allows the drive to store and read back data but prevents the drive from erasing information once it has been written.</p>
Write Direct	<p>The data referenced in a virtual image are written directly to the CD without first writing a real ISO 9660 image. This is temporarily written to the hard disk. Also referred to as on-the-fly.</p>
Write First To HD	<p>Everything is written to the hard disk first. Contrast it to Write Direct. Also called ISO image.</p>
Yellow Book	<p>The book which sets out the standard developed by Philips and Sony for the physical format of compact discs to be used for information storage - CD-ROM.</p>