

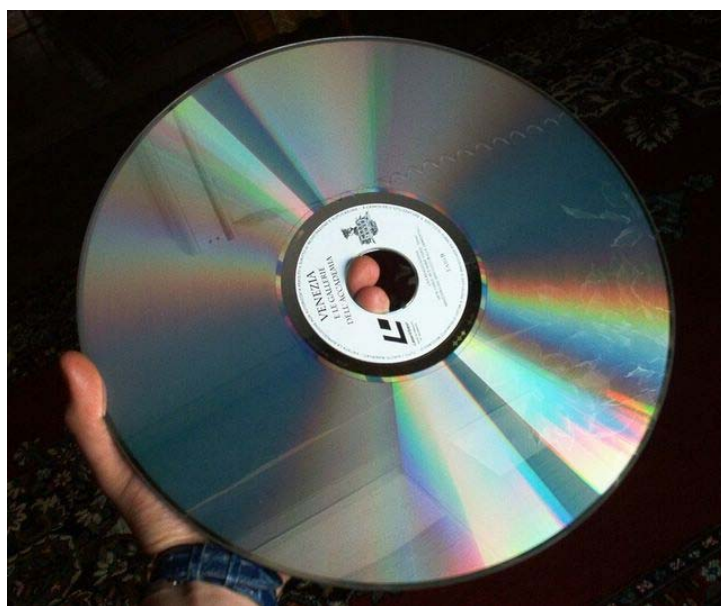
Timeline

- 1958 – Laserdisc technology, using a transparent disc, was invented by David Paul Gregg.
- 1969 – Philips develop a videodisc and join with MCA who owned the rights to the largest catalogue of films in the world at this time, and they directly manufactured and distributed the discs.
- 1972 – Public demonstration of the videodisc.
- 1975 – Sony introduce Betamax format. (dc 1993)
- 1976 – JVC introduce VHS format.
- 1978 – First Laserdisc players commercially available. Pioneer use the name Laser Videodisc while MCA use Disco-Vision.
- 1979 – Philips and Grundig introduce VCC (later known as Video 2000) tape (dc 1988)
- 1981 – Laserdisc becomes the common name for the format.

Laserdisc

The standard movie laserdisc was 30 cm (11.81 inches) in diameter and made up of two single-sided stamped aluminium discs bonded with glue and sandwiched between two sheets of plastic. Laserdisc is an analog format, unlike the modern CD or DVD which are digital formats. Both formats are pressed with pits and lands making up the structure of the disc.

Audio could be stored in either analog or digital format and in a variety of surround sound formats; PAL discs could carry one pair of audio tracks, either analog or digital; in the UK the term LaserVision was used to refer to discs with analog sound, while LaserDisc was used for those with digital audio.



Laserdisc Formats



Laserdiscs were recorded in one of three formats.

CAV (Constant Angular Velocity) discs supported several unique features such as freeze frame, variable slow motion and reverse. 54,000 individual frames or 30 minutes of audio/video could be stored on a single side of a CAV disc.

CLV (Constant Linear Velocity) discs did not have the "trick play" features of CAV, offering only simple playback on all but the high-end laserdisc players. CLV encoded discs could store 60 minutes of audio/video per side, or 2 hours per disc.

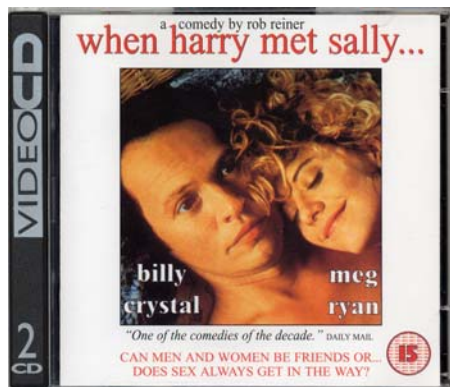
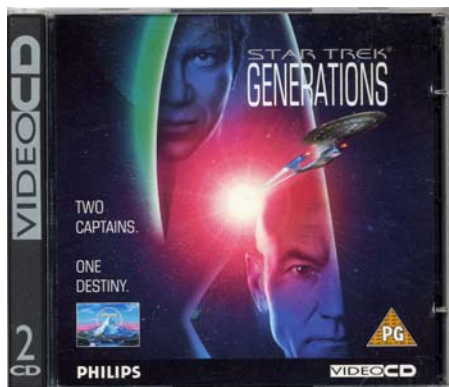
CAA (Constant Angular Acceleration) were introduced by Pioneer in the early 1980s, Constant Angular Acceleration is very similar to Constant Linear Velocity save for the fact that CAA varies the angular rotation of the disc in controlled steps instead of gradually slowing down as a CLV disc is read.

Laserdisc featured a far sharper picture than VHS with a horizontal resolution of 440 lines for PAL discs, while VHS only featured 240 lines. In 2000 *Sleepy Hollow* was one of the last discs made.

VideoCD

Video CD (aka VCD, View CD, Compact Disc digital video) is a standard digital format for storing video on a Compact Disc. VCDs are playable in dedicated VCD players, nearly all personal computers, most modern DVD-Video players, and some video game consoles.

The VCD standard was created in 1993 by Sony, Philips, Matsushita, and JVC and is referred to as the White Book standard.



Rainbow Book standards

Red Book a.k.a. CD-DA – Digital Audio extended by CD Text.

Allows for up to 74 minutes of digital sound. Sample rate of 44.1Khz, or 44,100 samples per second. Transfer rate of 150 kilobytes per second. Also known as 1X. Introduced by Sony and Philips in 1980, the Red Book standard was simply designed to be a universal medium for distributing digitized music.

Yellow Book a.k.a. CD-ROM – Read-Only Memory.

Yellow Book is the standard that defines the format of CD-ROMs. It allowed CDs to contain 650MB of computer data instead of only digital audio data.

Orange Book a.k.a. CD-MO – Magneto-Optical, CD-R Recordable, Write Once, CD-RW ReWritable or Erasable.

The Orange Book standard is the format that enables CD-R drives to record discs that regular CD-ROM drives and Audio CD players can read. It is possible to create a disc that places an audio track in the first track of the disc, where it can be played by Audio CD players, and CD-ROM data in the second track of the disc, where it can only be read by CD-ROM drives in computers.

White Book a.k.a. VCD – Video and CD-Bridge - Hybrid discs, e.g. CD-Ready.

The White Book specification for Video CD was announced by JVC, Philips, SONY and Matsushita in July 1993. A special CD-ROM/XA subset designed to hold MPEG-1 video. White Book defines Mode 2, Form 2 data standard which creates a disc that can contain up to 74 minutes of full-motion video. Video CD can be played on personal computers with a CD drive supporting CD-ROM/ XA, CD-i players, Video CD players and DVD players.

Blue Book a.k.a. E-CD – Enhanced, CD+ – plus and CD+G – plus Graphics (karaoke)

A subset of the Orange Book specification, the Blue Book standard was designed expressly for stamped multisession discs limited to two sessions, one music and one data. Also known as CD Plus, Blue Book is a defined, licensed standard supported by Philips, Sony, Microsoft, and Apple. Discs play on CD-Audio players with no possibility of producing static and on computers with newer CD-ROM drives.

Beige Book a.k.a. PCD – Photo (not Picture).

Green Book a.k.a. CD-i – interactive.

The Green Book standard was created by Sony and Philips to work on CD-i players. Compact Disc Interactive is the only specification which not only defines the disc and the data, but also the entire hardware and operating platform. CD-i was created mainly to provide entertainment by interfacing with televisions and stereo systems.



Purple Book a.k.a. DDCD – Double Density.

Scarlet Book a.k.a. SACD – Super Audio.

VideoCD Specifications

The video uses MPEG-1 codec.

Resolution: NTSC: 352x240 PAL/SECAM: 352x288

Frame rate:

- o NTSC: 29.97 or 23.976 frames per second
- o PAL/SECAM: 25 frames per second

Overall picture quality is intended to be comparable to VHS video, though visual artifacts may be noticeable in some cases. Poorly compressed video in VCD tends to be of lower quality than VHS video, but exhibiting block artifacts rather than analog noise.

While never gaining a foothold in the United States, Europe or Japan, commercial VCDs are very popular throughout Asia (except Japan) because of the low price of the players, their tolerance of high humidity (a notable problem for VCRs), and the lower-cost media. Ease of duplication and the negligible cost of the media gave rise to widespread unauthorized copying in these areas.

SVCD Specifications

Super Video Compact Disc or SVCD) is a format used for storing video on standard compact discs. SVCD falls between Video CD and DVD in terms of technical capability and picture quality. The video uses MPEG-2 codec.

Resolution: NTSC: 480x480 PAL/SECAM: 480x576

Frame rate: NTSC: 29.97 or 23.976 frames per second
PAL/SECAM: 25 frames per second

The SVCD standard supports several other features, including menus, hyperlinks, karaoke lyric highlighting, overlay subtitles, and DVD-quality slide shows with resolution up to 704x480 (NTSC) or 704x576 (PAL). SVCDs may have two separate stereo audio tracks. Super Video CD was originally developed by the government-backed China Recording Standards Committee in 1998, under direction from the Chinese Ministry of Information Industry, as an enhancement to the Video CD format.

DVD History

In May of 1994, Sony and Philips announced that they would be cooperatively developing a new high-density medium known popularly as Digital Video Disk (DVD). The distribution of some large video games that would otherwise reside on a set of many CD's would only require a single disk. DVD audio would be a great improvement over the already crystal clear and popular CD audio.

In January 1995, Time Warner and Toshiba held a press conference to announce their version of the DVD. After much debate over the two formats, the DVD specification Version 1.5 was announced in 1995 and finalised in September 1996.

Single sided, single layer	DVD-5	4.7 Gb Capacity
Single sided, dual layer	DVD-9	8.5 Gb Capacity
Double sided, single layer	DVD-10	9.4 Gb Capacity
Double sided, dual layer	DVD-18	17.1 Gb Capacity

DVD Specifications

Though many resolutions and formats are supported, most consumer DVD-Video disks utilize either 4:3 or 16:9 aspect ratio. The video uses MPEG-2 codec.

Resolution: NTSC: 720x480 PAL/SECAM: 720x576

Frame rate: NTSC: 29.97 or 23.976 frames per second
PAL/SECAM: 25 frames per second

The data bit rate effects the total time available on a disc, ranging from 2 to 4 hours or more. The actual range can vary from 9000Kb per sec to 700Kb per sec, but the lower the bit rate, the poorer the video quality will be. This is similar to the LP or XP modes on video recorders. Audio is commonly stored using the Dolby Digital (AC-3) and/or Digital Theater System (DTS) formats, ranging from monaural to 5.1 channel "Surround Sound" presentations.

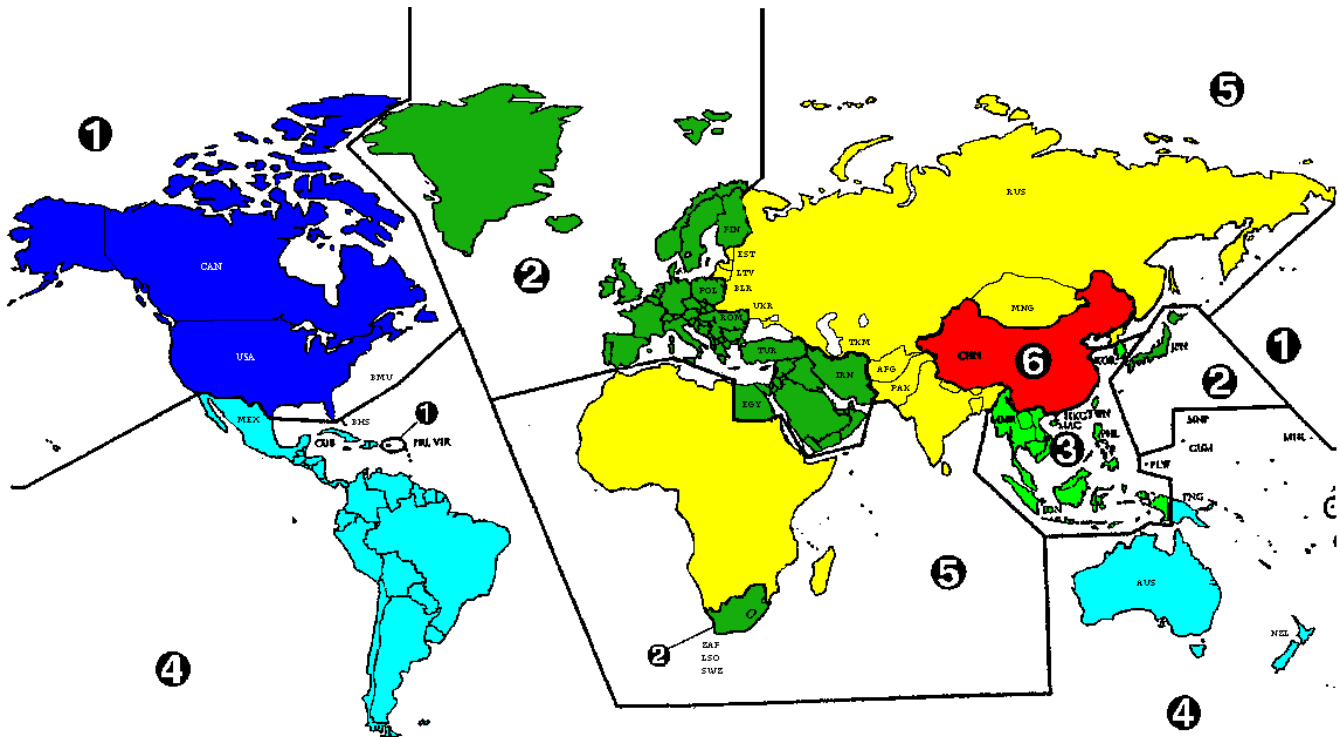
DVD Features

The DVD format allows many different features to be included on a disc, such as subtitles, alternate audio tracks, interactive menus, scene selection, multiple angles, perfect still picture and variable playback speeds. Features for films can include making of documentaries (on the Superman Returns DVD, the 'making of' is over three hours, longer than the film itself) deleted scenes, outtakes, screen tests, storyboards, photo galleries, trailers, director's commentaries and DVD-ROM features to use on a PC.

The interactive menus allow the viewer to select these features, and one notable feature is the 'button over video' or 'Follow the White Rabbit' as it is commonly known. This is named after the first use of this on The Matrix DVD, where the viewer would see a white rabbit appear on the screen during the film. If the 'Enter' button was pressed the disc would branch to the making of that particular scene. It was also used on the Monty Python and the Holy Grail DVD, linking to a film with Michael Palin and Terry Jones visiting the locations.

Region Coding

Aside from the video format, DVDs are assigned one of 7 region codes. These were originally designed to prevent discs for one region being played in another. The different areas are shown in the map below, the two major ones being Region 1 (American) and Region 2 (Europe and some other areas). Region 0 discs can play on any DVD player.



On a standard single region DVD player, certain requests are made to and from the disc when it is played. If the region code of the disc does not match the one coded in the player, then the disc will not play, or a message will display saying this.

With 'chipped' multi-region players, the player responds with whatever region code the disc is requesting. To try and combat this, some discs were encoded with an extra request from the player as to whether it could play any additional region codes, and would refuse to play if the answer was 'yes'. This worked for a while until the chips in the multi-region players were updated to effectively say 'no'.

Disc Asks	V1 Player replies	V2 Player replies
I'm Region 1, what region are you?	Region 1 REGULAR DISC PLAYS	Region 1 REGULAR DISC PLAYS
Can you play any other region coded discs?	Yes, I'm multi-region! DISC DOESN'T PLAY	I'm saying nothing! DISC PLAYS

Recordable DVD

There are 5 different formats for recording your own DVDs, DVD-R/DVD+R (record once), DVD-RW/DVD+RW (record many) and DVD-RAM, all with approximately 4.7Gb capacity. In addition to this, dual layer discs are also available (although prohibitively more expensive) with 8.5Gb capacity. The -R/-RW format was developed by Pioneer, and the +R/+RW format was developed by Philips and Mitsubishi. Although modern DVD Writers can record and read most formats, standalone DVD players may not, and prefer only one format.

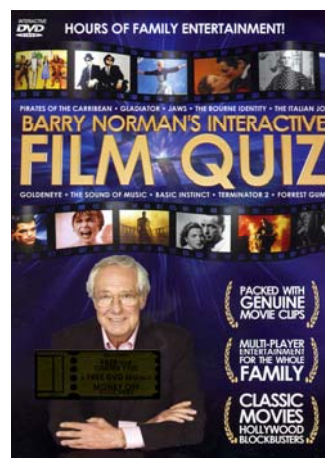
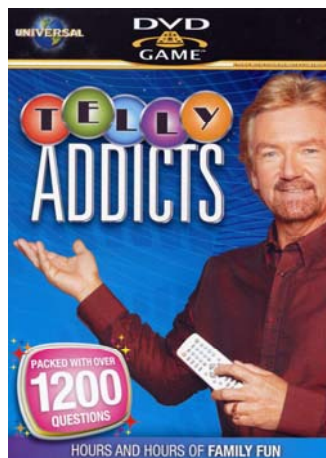


DVD-RAM discs are mainly used in DVD recorders, as they allow programs that have been recorded onto disc to be split into sections, and those sections can be deleted without affecting the contents of the rest of the disc. This can be used to remove unwanted material from timer recordings, or advert breaks. This format also has the ability to watch a program from the beginning while it is still recording, if the DVD recorder has two lasers. Modern recorders (and some players) can Video CD, WMA, MP3, JPEG and MPEG-4 (DivX) files and can come with USB ports or flash memory readers.

Interactive DVD

DVD games, often based on TV shows use more of the features of the DVD specification than film discs, one being registers. There are 16 registers that can be written to and 24 system registers that are read only and are used to access information specific to the DVD player (like the region of the player). These values cannot be displayed on screen so comparisons have to be made and branching to screens based on the value. There is also a random function but this can be limited. Discs like Barry Norman's Interactive Film Quiz don't use the random feature to pick questions, but puts them in sets (or 'screens') so the player can answer particular sets of questions.

Authoring Interactive DVD games can be very complex, and is not usually possible with the standard DVD software available. However, Media Chance produce DVD Lab Pro, which gives users the chance to produce flexible projects that use all of the features of DVD in the way that you want, with multi angle, multi soundtracks, animated menus, various aspect ratios, playlists and multi-choice quizzes.



DVD – The Future



Blu-ray has been developed by a group of manufacturers including Apple, Dell, Hitachi, HP, JVC, LG, Mitsubishi, Panasonic, Pioneer, Philips, Samsung, Sharp, Sony, TDK and Thomson. The format can hold up to 25GB on a single-layer disc and 50GB on a dual-layer disc. It includes support for multi-layer discs, which should allow the storage capacity to be increased to 100GB-200GB (25GB per layer) in the future simply by adding more layers to the discs. Over 9 hours of high-definition video can be stored on a 50GB disc, or 23 hours of standard-definition video.

7 of the 8 major movie studios have already announced titles for Blu-ray, including Warner, Paramount, Fox, Disney, Sony, MGM and Lionsgate.



HD DVD has a single-layer capacity of 15 GB and a dual-layer capacity of 30 GB. There is also a double-sided hybrid format which contains standard DVD-Video format video on one side, playable in regular DVD players, and HD DVD video on the other side for playback in high definition on HD DVD players. JVC has developed a similar hybrid disc for the Blu-ray format. Both formats support the high definition resolution of 1920 x 1080 (known as 1080p) compared to the 720x576 standard resolution on DVD.

LG Electronics unveiled the Super Multi Blue, a combined Blu-ray and HD DVD player, at the 2007 Consumer Electronics Show. The price (around \$1200) is more than the price of an HD-DVD player and Blu-ray player together and there is talk that it is not completely compatible with the HD DVD format, although it will be able to play the discs. The PS3 has a Blu-ray drive, and the X-Box 360 has an HD DVD drive add on.



Some film companies are supporting only one of the formats, so films like the Spiderman series or Pirates of the Caribbean will be on Blu-ray and the Harry Potter, Lord of the Rings and Matrix series will be on HD-DVD. Blu-ray has region coding of three regions:

Region A: North America, South America, East Asia except for China

Region B: Europe and Africa

Region C: China, Russia and other countries