

Film Society Handbook

Chapter 4: TECHNICAL ASPECTS - DVD

[Dec 2009]

The so-called “video revolution” everyone has predicted is now with us in the form of DVDs, Blu-ray disks and hard disk drive movies, all of which are digital formats and require digital video projectors to project the movie on a large screen.

While VHS versions of many good movies are still available, they use analogue signals and suffer from poor quality picture and sound, and as such are not of interest to most film societies.

DVDs offer a good quality image with high quality multi-track sound at a low cost.

For Film Festivals where the latest release movies are to be screened these have traditionally been supplied in the 35mm film format. Current trends suggest that at some time in the future they may be supplied on a hard disk instead of 35mm film, which may mean that the Festival or Cinema would need to acquire or lease digital projection equipment for the occasion.

The cost barrier to purchasing a good quality, bright digital projector was initially the reason DVDs weren't adopted universally by film societies, but the prices have now fallen to levels which most film societies can afford, so the only question now is whether the movies sought by the film society are available on DVD and screening rights can be obtained.

The image from a DVD, even played through a bargain priced DVD player and projected using a reasonable quality digital projector is better than the average 16mm film and can even approach that of 35mm film. Blu-ray picture and sound quality equals that of 35mm film.

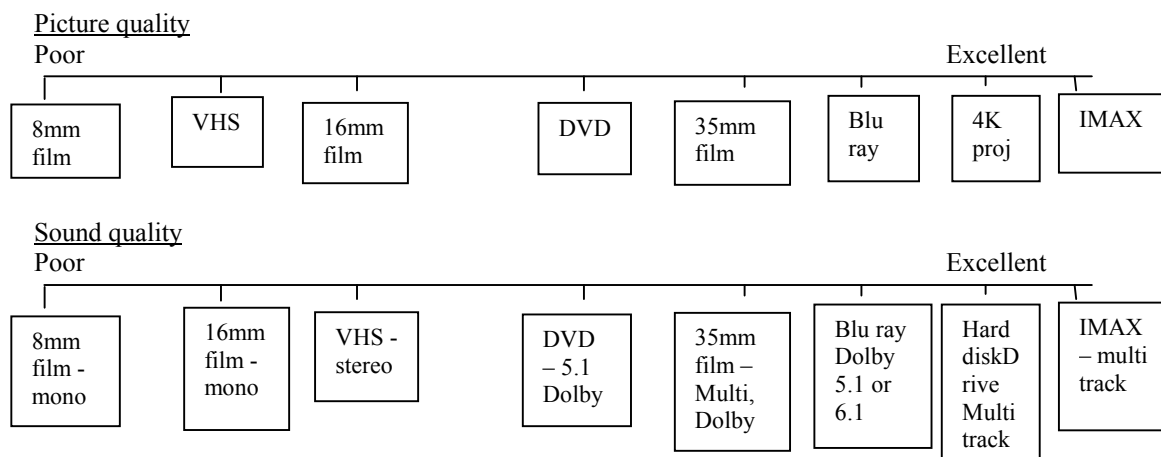


Fig 1. Relative picture and sound quality (Illustrative only, not to scale.)

Considering the low cost of DVDs today, many film societies choose to purchase their own copies ensuring availability when needed, no scratches and a chance to screen the trailer before-hand and preview the “extras”, or support material. The DVD is then available to add to the society’s library for loan to members who may have missed a screening, or want to see the “extras”.

ACOFS has negotiated an agreement with the main DVD distributors whereby screening rights can be provided at minimum cost to screen a DVD owned by the society. Screening rights are covered in detail in another chapter of this handbook.

Blu-ray disks contain considerably more data and can offer a higher quality picture than standard DVDs. To take advantage of this higher quality picture a higher resolution digital projector with HDMI interface is required.

Even the Blu-ray disk does not hold sufficient data to support the so-called “\$K” digital projectors used in the larger cinemas, so the digital movie is often supplied on a hard drive system (with appropriate security to prevent copying and multiple screenings).

To screen DVDs you will need the following equipment:

- DVD Player. This need not be the most expensive available as higher cost usually means more facilities but not necessarily a better picture. It should be multi-region and have outputs for S-video, video, stereo sound, co-axial digital sound (5+1). To take advantage of future releases of high definition BluRay DVDs, a digital video output (HDMI) is also wise. It is wise to have a second player (with associated switching) to allow a second DVD to be pre-cued with a short or support. Having a player of a different make will reduce the chance of interaction from the remote controls and lessen the chances of a DVD being unplayable if it is incompatible with your first player.
- Digital projector. Often called data projector. This should have a minimum of 1280 x 720 pixels to cater for “widescreen” films. The brightness and contrast needed will depend on the venue, but a minimum of 1200 ANSI and 1000:1 contrast is recommended. Inputs should include at least SVideo, but to cater for higher definition, HDMI is recommended and a resolution of 1920 x 1080 pixels, with progressive scan (1080p). Most digital projectors are designed for a relatively short throw, so you may need to project from the centre of the room, or mount it on the ceiling above the audience. Projectors with longer throws are available but tend to be far more expensive.
- Many “purists” insist on RGB connection, but this requires 3 leads plus your sound leads (all with the same connectors) and in a portable situation it is easy to get them mixed up. S-Video is a unique plug and socket which cannot be confused with other connectors, and the quality is almost identical with RGB. Composite video however, is not recommended. S-Video connections over 20 meters is acceptable but beyond that it is recommended that the signals be converted to balanced signals for better transmission.
- A minimum of a stereo amplifier (100watts) is recommended, with large stereo speakers. To take advantage of the high quality sound capability from DVDs, it is worth the extra investment in a 5+1 channel Dolby decoder/receiver and the extra speakers (centre, surround and sub-woofer).

APPENDIX 1: DVD Definitions

Go to www.ezydvd.com.au for an excellent set of definitions relating to DVDs. The main ones are reproduced here:

Aspect Ratio

The proportion of width to height of a video transfer. The most commonly found aspect ratio on DVD is 1.85:1 and represents an image that is 1.85 units wide and 1 unit high. The aspect ratio of a standard television is 1.33:1 and is often expressed as 4:3.

16x9 Enhanced (also Anamorphic, 16:9 Transfer)

The image on VHS tapes (and television) has traditionally been stored as a 4x3 shape even when in the widescreen format commonly found on VHS Special Editions known as Letterbox. To capture the entire scope of a film, movies are originally recorded in widescreen and present cinema audiences with an enhanced viewing experience. The advent of DVD introduces this concept to Home Cinema. 16x9 Enhancement simply means that the video transfer or image of the DVD is recorded as an image that is 16 units wide by 9 units high (hence 16x9 or 16:9) rather than the traditional 4x3.

When viewing an Anamorphic DVD on a standard TV, 2 things can occur depending on the hardware configuration. Firstly, and most likely the preferred option, is for the DVD player to convert the Anamorphic transfer into Letterbox by shrinking it to fit in the screen and placing black bars on the top and bottom of the image. The alternative is to retain the height of the transfer, but shrink the width to fit the television, resulting in an undesirable 'squished' appearance.

Authoring

The process of taking the original source materials such as video, audio, and text, to produce high definition transfers that are then compressed onto DVDs ready for playback.

Blu-ray

Blu-ray discs are the successors to DVD featuring a significant increase in storage capacity allowing for high definition video and audio. Blu-ray derives its name from the blue-violet laser used to read and write to the disc.

Blu-ray supports 720p, 1080i and 1080p HD video and introduces 7.1 audio mastering, plus lossless DTS HD and Dolby TrueHD audio formats. A Blu-ray Disc (BD) can hold up to 50GB worth of data and offers the most advanced copy protection, backward compatibility with the current DVD format, superior connectivity and advanced interactivity. A Blu-ray Disc player (such as the PlayStation 3) is required to play discs of this format.

Blu-ray competed with rival format HD DVD to become the leading carrier for high-definition content. However, in February 2008, Toshiba abandoned the HD format, announcing it would no longer develop or manufacture HD DVD players.

Chapters

Also known as 'scenes', a DVD movie can be broken up into sections much like the chapters of a book, that can be accessed quickly and easily via the DVD menu or remote control.

Disc Specifications

DVD discs can come in a variety of storage capacities:

DVD-5: Single Sided, Single Layer DVD - can store roughly 133 mins of video (4.7GB, 7 times more than a regular CD)

DVD-9: Single Sided, Dual Layer DVD - can store roughly 4 hours of video (8.5GB storage capacity)

DVD-10: Double Sided, Single Layer DVD - 133 minutes (9.4GB) 4.7GB of storage on either side so 9.4GB storage in total.

DVD-18: Dual Sided, Dual Layer DVD - roughly 8 hours of video spread on two sides (17GB of storage)

Dolby Digital (Also Known As AC-3)

Dolby Digital is the standard DVD sound format and is capable of containing up to 6 sound channels comprising of 5 normal speakers (left, centre, right, left surround and right surround) plus a subwoofer, hence the common term "5.1". A Dolby Digital audio track doesn't necessarily feature the maximum 6 available audio channels - a track can range from mono (one speaker), stereo and many other multi-channel variations up to 5.1. A Dolby Digital decoder is required to take advantage of a multi-channel Dolby Digital audio track.

Dolby Digital EX 5.1

This is an extended version of Dolby Digital 5.1 that utilises a 6.1 speaker setup. However, it is not a true 6.1 system like DTS ES as the audio channel for the centre rear speaker is matrix encoded within the left and right surround channels and therefore cannot accurately be described as a true 6.1 format. An expensive Dolby Digital EX decoder is required in order to take advantage of this audio format.

Dolby TrueHD

Dolby TrueHD is an advanced lossless multi-channel audio codec intended primarily for high-definition home-entertainment equipment such as HD DVD and Blu-ray Disc. Dolby TrueHD uses Meridian Lossless Packing (MLP) as its mathematical basis for compressing audio samples. MLP was used on the earlier DVD-Audio format, but details of TrueHD and DVD-Audio differ substantially. A Dolby TrueHD bitstream can carry up to 14 discrete sound channels. Sample-depths up to 24 bits/sample and audio sample-rates up to 192 kHz are supported.

DTS

One of the rival sound formats to Dolby Digital is called DTS (Digital Theatre Systems). DTS is another six channel (5.1) format that requires much more storage space on a disc than Dolby Digital and is able to operate at a higher bitrate. Most consider the audio quality superior to Dolby Digital and DVD enthusiasts favour DVDs featuring a DTS audio track. Once again a DTS capable decoder and DVD player are required to utilise this audio format.

DTS ES 6.1

In addition to the standard 5.1 channels, DTS ES provides an additional, discrete rear centre surround channel and is the only true 6.1 audio format currently available for home cinema. An expensive DTS ES decoder and a DVD player compatible with DTS is required for playback.

DTS-HD Master Audio

DTS-HD Master Audio is a lossless audio codec which is an optional audio format for both Blu-ray Disc and HD DVD. DTS-HD MA supports variable bit rates up to 24.5 Mbit/s on a Blu-ray Disc and up to 18.0 Mbit/s for HD DVD. The format supports a maximum of 192kHz sampling frequency and 24-bit depth samples in 2 channels stereo mode, and 24bit/96KHz resolution in multichannel mode with up to 8 channels.

DVD

An acronym for Digital Versatile Disc, which is an optical-disc technology developed by the DVD Consortium, a collection of 10 companies who contributed to the DVD standard and specification. There are five specified DVD disc varieties: DVD-ROM, DVD-Video, DVD-Audio, DVD±R (recordable/write once), DVD±RAM (re-writable).

DVD Rot

Some production runs of dual-layered DVDs result in a manufacturing defect where the adhesive used to bond the two layers is either sub-standard or improperly applied. When the disc is new, the 'DVD Rot' is not visible and the error correction capabilities of DVD players compensate for the defect. Over time, however, the layers separate and the 'DVD Rot' increases in severity to the point where the disc becomes unplayable and may also become visible under certain lighting conditions. Even if one such defective disc were to be stored under the most ideal conditions, and never touched, it would still become unplayable over time.

Dual Layer / RSDL

Reverse Spiral Dual Layer (RSDL) allows longer movies to fit onto one side of a DVD, allowing continuous play for longer programs and no need to "disc flip". There is usually a noticeable pause during the layer change as the player's laser adjusts to read the second layer. The length of the pause varies from disc to disc and player to player. Dual-layer discs are easy to spot because it is gold in colour, versus the silver shimmer of a single layered disc.

Easter Eggs

Hidden features on a DVD that can be discovered and accessed by navigating the menu system of the disc.

Interactive Menus

An interactive menu is a series of screens or pages (very similar to a web site) that allows the viewer to navigate and select different features on a DVD disc. The menus are used for scene selections, video and audio setup and accessing special features. As DVD progresses the menu systems become increasingly more elaborate, especially for high profile titles, with striking graphics, music and animation.

Letterbox

Before widescreen TV's and Anamorphic DVDs became available, Letterboxing was used in order to fit a widescreen movie into a standard 4:3 screen. This method of authoring involves shrinking the widescreen video transfer to fit into a 4x3 area and adding black panels above and below the image. This process is still used today on VHS and also on DVD where the original transfer is unavailable or because smaller distributor's lack the resources to create an anamorphic transfer.

Macrovision

Macrovision is a copy-protection technique intended to keep you from making copies of DVDs with your VCR. It works by continuously adjusting the video signal level that results in a recording where the brightness of the picture continuously fluctuates between light and dark, and the colour levels fluctuate between oversaturated and washed out. Macrovision "encoded" DVDs contain a bit of data that tells the DVD player to activate its internal macrovision circuitry in order to prevent copying.

Multiple Audio Tracks

A DVD disc can contain up to eight audio tracks. You can select which of the eight language tracks through the DVD menu or via the remote control. The value of such tracks is that they can be accessed instantly, and provide additional synched audio material in addition to the main soundtrack. Common uses are for foreign languages, alternate soundtracks, isolated musical scores or audio commentaries by the director, cast & crew or others associated with the material.

Multiple Video Tracks

Another of DVD capabilities is its ability to show different angles or versions of a scene. These multiple video streams can be accessed instantly via a player's Angle function and DVD discs can contain up to 8 separate video streams. This feature has been relatively under-utilised to date however as Hollywood continues to embrace the format - there are very few DVDs that utilise this feature to date.

NTSC

National Television Systems Committee. The colour TV broadcast system used in the US, Canada and Japan. An NTSC picture is made up of 525 horizontal lines and has inferior picture quality in comparison to the PAL system.

Please note: All DVD players sold in PAL countries (Australia) play both NTSC & PAL discs, but your TV monitor must be NTSC compatible in order to view in full colour. Please refer to your user manual or manufacturer to determine compatibility.

PAL

Phase Alternating Line. The colour TV broadcast system used in Australia, UK & Europe. A PAL picture delivers a better quality picture than NTSC due to its 625 horizontal lines (sharper picture and better colours).

Please note: DVD players sold in NTSC countries (United States, Canada and Japan) may not be compatible with the PAL system, preventing playback. Your TV set will also need to be PAL compatible in order to view these DVDs in colour. Please refer to your user manual or manufacturer to determine compatibility.

Pan & Scan

One method of converting a widescreen movie to fit in a standard 4:3 television is known as letterboxing (described above) and the other commonly found process is Pan and Scan (also known as Panning and Scanning). To retain a fullscreen 4x3 image, the most important part of each scene is chosen and the left and right edges of the scene are cropped. Obviously, this process results in a loss of some data and does not fully represent the film as it was intended to be portrayed by the director. As such, DVD enthusiasts are not overly fond of DVDs authored via this method.

PCM Sound

PCM sound is an uncompressed two-channel stereo or mono soundtrack that requires more disc space due to its uncompressed nature.

Regional Coding - DVD

A security system introduced to DVD at the request of Hollywood's major studios to ensure that DVDs released and sold in one region will not play on DVD machines in other regions. Movie distributors therefore maintain control over release dates of their films, as well as enabling discs to be produced that conform to different censorship laws, language and subtitle requirements. When a DVD disc is manufactured, a region code is applied at the authoring stage such that the final disc will play only on those players distributed in the designated world region.

There are 8 region codes in use throughout the world:

Region 1 - Canada, United States, U.S. territories, Bermuda

Region 2 - Europe, Western Asia, Egypt, Japan, Lesotho, South Africa, Swaziland, British overseas territories, French overseas territories, Greenland

Region 3 - Southeast Asia, South Korea, Hong Kong, Macau, Taiwan

Region 4 - Australia, New Zealand, Oceania, Central and South America, Caribbean, Mexico

Region 5 - Africa, Central and South Asia, Belarus, Mongolia, North Korea, Russia, Ukraine

Region 6 - Mainland China

Region 7 - Reserved for future use (found in use on protected screener copies of MPAA-related DVDs and "media copies" of pre-releases in Asia)

Region 8 - International venues such as aircraft, cruise ships, etc.

Additionally, DVDs may be encoded as Region 0, or Region All, which means that they are compatible throughout regions 1-6. Similarly, some DVDs region encoding may be listed as 1,2,3,4,5,6 which also indicates compatibility in all regions.

Regional Coding - Blu-ray

Blu-ray discs are region coded, similar in principle to the DVD region codes, although the used geographical regions differ.

Region A - Americas, East and Southeast Asia, U.S. territories, Bermuda

Region B - Africa, Europe, Australia, New Zealand, Oceania, Middle East, Netherlands, British overseas territories, French territories, Greenland

Region C - Central and South Asia, Mongolia, Russia, China

Some Blu-ray discs may also be multi-region, ie A, B and C, which means they are compatible in all regions.

Regional Coding Enhancement (RCE)

RCE is a digital enhancement added to some Warner Bros, New Line, Columbia DVDs to stop region 1 (R1) DVDs from playing on Region-free DVD players.

Subtitles

A DVD can feature up to 32 subtitle tracks that can be turned on or off and selected via the DVD menu or remote control.

Taking Care Of Your Discs

Because a DVD consists of two sides glued together (each a mere 0.6 mm thick), it can be susceptible to damage from bending and/or twisting. Also, though DVD error-correction encoding is nearly ten times better than those of audio CDs, because of DVD's much higher compression ratio, shorter pit length and narrower tracks, severe scratches can create occasional problems in playback.

A good rule of thumb is to handle a DVD more carefully than a CD: Make contact only with the center hole and the outside edge of the disc. When removing a DVD from its case, press the button on the center hub and push downward. Using your other hand, gently remove the disc by its outer edge. Never remove a DVD from its package simply by prying up the outer edge of the disc.

Single-sided discs should be inserted into the player with titles/artwork facing up. Make sure the disc is seated properly inside the player before closing the tray.

Clean disc only with a damp, non-abrasive, lint-free cloth. Do not use any harsh or abrasive chemicals or cleaning agents. Wipe the disc carefully in a straight line from the inside hole to the outer edge. Never use a circular motion when cleaning a disc.

Do not stack your DVD discs. Always store the disc inside its protective case when not in use. And, of course, keep your DVD's away from extreme heat, such as the back window of a car or the trunk area -- and keep them out of direct sunlight.

THX

THX is not another sound format, but a set of quality control standards set by Lucas films. The full effect of a THX mastered disc is delivered using equipment that has been marked with the THX seal of approval. Even without THX equipment, a THX DVD is generally thought to be of better quality to sound and video, due to the strict THX codes of production and replication.