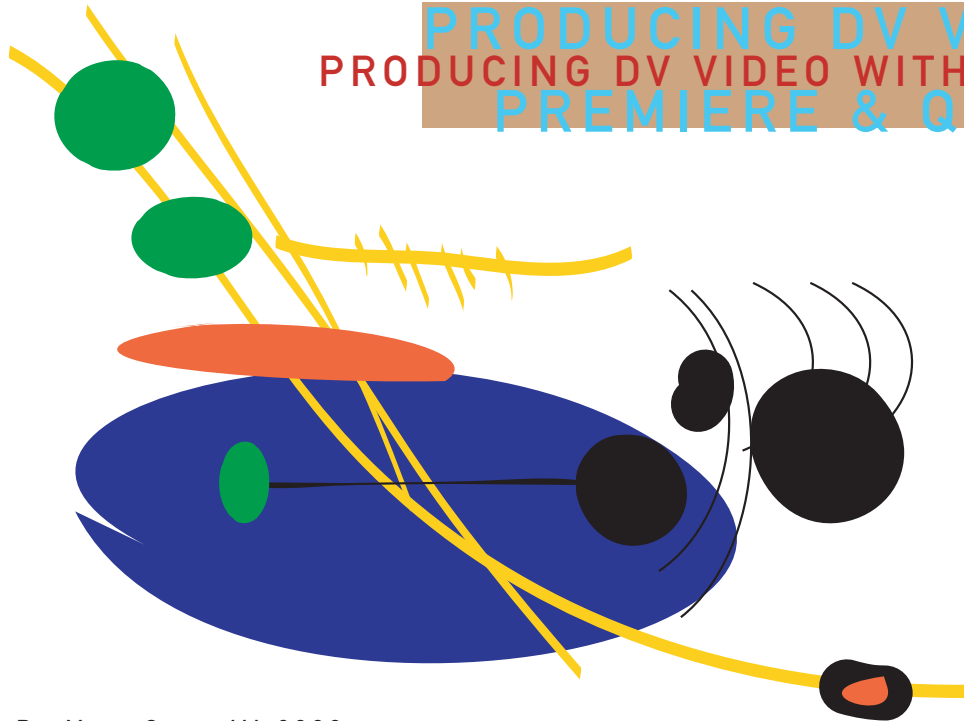This article contains guidelines and advice on
producing DV video for the screen
using a DV camcorder,
Adobe Premiere
and QuickTime.

PRODUCING DV VIDEO WITH
PREMIERE & QUICKTIME

PRODUCING DV VIDEO WITH PREMIERE & QUICKTIME

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## The DV format

The DV (Digital Video) format was initiated by a consortium of Japanese electronic companies as a future-proof digital format to replace domestic consumer analogue video formats.

Pictures are digitised in a DV camcorder and recorded onto a tape. There are several tape sizes/formats. Although the cheaper MiniDV (consumer) format uses a smaller tape running at a slower speed than its more professional counterparts, the essential quality of the DV picture data remains the same.

DV pictures are of broadcast quality and can be transferred to a desktop computer (a process called Capturing) for editing within a suitable application (such as Adobe Premiere) without any loss in quality. Once edited the finished project can be outputted in a number of formats ...
Transferred as DV back to the camcorder or to a DV deck (VCR)
Recorded to analogue (S-VHS, VHS etc) tape
Converted to a non DV format for use on CD-ROM
Converted to a non DV format for use on the Internet

## DV codec

To squeeze the pictures onto the tape the data is compressed at a ratio of 5:1 using compression/decompression software called a codec. To be viewed the picture data must be decompressed. When playing back from a camcorder the camcorder's internal circuitry and DV codec handle the decompression, but once the data is transferred to a desktop computer's hard drive for editing the decompression must be handled by either a dedicated installed DV PCI card or by a "soft" DV codec present in the operating system.

QuickTime contains a DV codec which editing applications, such as Adobe Premiere, use to process and display DV during editing. The computer's CPU is employed to "run" the DV codec. Current desktop CPUs are not sufficiently powerful enough to display full size/frame rate DV pictures. Therefore editing and playback must be accomplished within a "preview" window typically around 320 x 256 pixels. However, the DV data itself is processed (so called "Rendering") at full size and quality "behind the scenes".

## DV data formats

There are two DV data formats determined by territory and model of camcorder ...
PAL (European TV) DV has a picture resolution of 720 x 576 pixels and a frame rate of 25 fps (Non drop frame).
NTSC (US and Japanese TV) DV has a picture resolution of 720 x 480 and a frame rate of 29.97 fps (Drop frame).

Neither of these picture resolutions are the 4:3 aspect ratio of conventional PAL and NTSC TV broadcast pictures.  (At an aspect ratio of 4.3 PAL DV becomes 720 x 540). DV pixels are rectangular. CD-ROM and Internet video require square pixels, therefore DV projects intended for these delivery mediums must be converted when editing is complete. (More on this later).

DV has a transfer rate of 3.6Mb/per sec and requires 200Mb of storage space per minute. DV can be transferred directly from a DV camcorder, via a FireWire (also called i-Link, or IEEE 1394) interface, to a desktop computer's hard drive ready for editing. DV camcorders have a built-in FireWire port.

## DV audio

DV permits a choice of one of two audio data formats during filming ...

2 channel (stereo) 48KHz/16-bit audio
4 channels of 32KHz/12-bit

If you intend to use the audio you record with your pictures in your edit, ensure the camcorder is set to record 2 channels at 48KHz/16-bit before you start filming for the best sound quality. It is NOT a good idea to mix audio formats on a tape or indeed within a single Premiere project.

## DV device control

In addition to the picture and audio data the DV format contains SMPTE timecode and special commands which a desktop editing application can use to remotely control a DV camcorder's tape transport in order to automate the transfer (capture) of video clips to a desktop computer's hard drive. By controlling the playback of the camcorder from within Premiere, and by referring to the timecode, a list of clips can be created (called a Batch List) by logging so called In and Out Points. The camcorder can then be instructed to transfer (or Batch Capture) these clips to the hard drive.

Any interruptions in the timecode, which is laid down during filming, can interfere with batch capturing. It is therefore advisable to "blank" the entire tape prior to filming by leaving on the lens cap and setting the camcorder to record.

## Adobe Premiere capture

Before capturing ensure you are running a system setup that has been optimised for Premiere video editing with only the recommended driver/extensions versions running. Allocate Premiere at least 40Mb of RAM. Do NOT run any other applications alongside Premiere.

You must ensure your capture settings are set for full DV picture and audio quality. Use the appropriate Premiere Project Settings (for European camcorders) ...

DV-Codec
PAL
25fps
720 x 576
Millions of colours
Audio either 2 channel (stereo) 16-bit 48KHz or 4 channel 32KHz depending on your settings during filming.

Do NOT change these settings during capture, editing or export. Once captured the clips show up on the drive as Premiere/QuickTime files. They can be imported into Premiere or replayed with QuickTime player.

## Adobe Premiere Editing (Video) settings

Edit using the full quality DV settings in QuickTime editing mode. You cannot reduce the picture or audio quality of your captured DV (by downsizing frame size/rate, sample rate etc) during editing in an attempt to speed up the rendering (processing) of edit previews . Although your previews will take longer to render, the preview files will be employed to accelerate the rendering and export of the finished video edit.

Rendering time is dependent on the number of effects, filters and transitions applied to the DV. A typical 3 minute pop video with plenty of effects may take between 1 and 2 hours.

### Importing and integrating other media

If you are intending to import 3D Animation or images created in

another application to incorporate with your DV clips, ensure
you create them at DV size (720 x 526 PAL) or they will
appear distorted when displayed on Premiere's timeline.

## Outputting/Exporting finished edits from Premiere

**Outputting to DV tape**  Providing your DV camera permits
DV In (FireWire In), you can output your finished Premiere
edit (having Previewed it at full DV quality) back to a new
tape in your DV camera by playing back the Timeline.

**Outputting to analogue tape**  During output to your DV
camcorder a simultaneous analogue video output can be
passed on to a VHS VCR from the camcorders AV in-out port.

**Outputting to hard disk**  If you are preparing video for
CD-ROM or the Internet you will need to Export a completed
file to the hard drive before it can be converted (more on this
later). Remember to allow 200Mb of disk space for every
minute of DV.

**DV frame cropping**  DV video frames have a thin border of
black pixels surrounding them. Although these aren't visible
on a television screen they will be visible if you are exporting
for CD-ROM or the Internet. These pixels can be removed by
Premiere during export. Use the Special Processing dialogue
box (Export Settings) to crop the  frame size by between 4
and 8 pixels top, bottom and sides. Alternatively they can be
removed following Export in a video conversion/re-
compression/optimising application such as Media Cleaner
Pro.

**Video lead-in**  Because playing back from CD-ROM can

sometimes cause the video to glitch and flash on the screen as it starts it is advisable to allow a 2 second edit of blank screen (perhaps a colour to blend with your stage background) before your audio and images start or fade in.

## Re-purposing DV for CD-ROM (Director) and the Internet

Currently, smooth full size/frame rate DV cannot be easily played back by a desktop computer without specific additional graphics hardware.  This is due to a number of factors such as ...
– The in-built graphic/video capabilities of the computer which determine how many frames of a given resolution and colour depth the computer can display in a given time
– How fast the system can de-compress compressed video frames (such as DV and MPEG) before it attempts to display them
– Available system codecs to facilitate de-compression (if QuickTime is installed the system will use its codecs to decompress and display a wide range of video and audio file formats)
– The speed of transfer of data from the delivery medium (hard disk, CD-ROM, internet etc) to the system which imposes a data rate limit
– The physical data capacity of a delivery medium. For example, a CD-ROM can only hold approx 3.25 minutes of full quality DV

Therefore, DV files must be converted/optimised into formats which desktop computers can handle. Inevitably this means a loss of quality. The skill is to make this loss as minimal as possible.

**Data rates / bandwidth**  The speed with which data can be transferred from a delivery medium (such as CD-ROM) is often expressed as it's Data Rate. This is perhaps the most important element to consider when converting/optimising video for multimedia. Bandwidth usually refers to the physical restriction the telephone line imposes on the data rate. Bandwidth is critical in optimising video for streaming over the internet and an important consideration if the file is to be downloaded prior to playback commencing.

**Factors to consider in converting**  Once exported from Premiere DV can be converted/optimised (a process also known as re-purposing) by applications such as QuickTime Player Pro and Media Cleaner Pro. In order to reduce the data rate and file size and improve the cross-platform compatibility of your video these applications allow you to adjust ...

File type
Frame size
Frame rate
Video compression codec
Audio bit-depth
Audio sample rate
Audio compression codec

As you adjust these settings Media Cleaner Pro shows you the resultant data rate.

**Suggested settings for CD-ROM use**   A 2x speed CD-ROM drive delivers data at a theoretical maximum of approx 300 KB per second. Allowing for the computer system overhead a data rate of between 150 and 200 KB is realistic

and obtainable with the following settings …
Frame size 320 x 256.
Frame rate 15fps.
Cinepak or Sorenson compression.
Audio bit depth 16-bit
Audio sample rate of 44.1KHz
Mono

Computers made within the last four years have at least 4x
speed (600KB/sec) or 6x speed (900KB/sec) CD-ROM drives
(remember to allow for the system overhead) so the above
settings are perhaps conservative.

Bear in mind that different pieces of video will benefit from
different settings. Video with lots of fast movement will need
a higher frame rate and will compress less successfully so
you will therefore probably have to set a smaller frame size
or audio quality. Video with little movement (such as a talking
head) will compress well and thus permit larger frame size.
The best approach is to try different settings and test the
playback of video from your chosen delivery medium on a
range of different systems.