DV or Not DV? That is the Question…

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What is DV?

When desktop video began, all video was “analog”, and needed to be converted to a digital format for use on a computer.

This gave editors the enormous advantage of manipulating and saving sequences as files as though they were using a word processor.

The medium that held video – videotape – was similar to photographic film in that it used light or photons to create images on a phosphorescent screen.

What has happened recently, however, is that the makers of video cameras and recording decks have created a new medium for storing the content. This DV format and its many iterations keeps the video in a native digital format. This allows for many iterations of copying without significant deterioration. This avoids artifacting and transcoder losses due to differing compression schemes.

On the high end, uncompressed video moves at 540Mb/sec. Broadcasters have also had their choices enhanced by Digital Betacam whose data rate is 270Mb/sec or Digital-S, a format developed by JVC which uses 3.1:1 compression with a data rate of 180Mb/sec

On the prosumer and consumer level, analog S-VHS and Hi-8 are quickly being replaced in the mainstream market by newer digital storage media: mini-DV, DV-CAM, DVC-PRO and now, Digital8.

The first two have been referred to by the masses as “DV” – or digital video – due to two very significant features.

First they are literally comprised of “0’s” and “1’s”, recorded directly on the media cartridge in the camcorder or deck. This makes DV an entirely different animal its analog cousins

And second, these new DV formats are generally found on devices that have a special output jack or connector (in lieu of or in addition to the traditional S-VHS mini-din or composite RCA receptacle) called IEEE1394, FireWire, or iLink.

So the term “DV” specifically refers to a video format, already comprised of bits and bytes, that resides on a special cartridge that works in DV camcorders, DV Walkman units (portable VCR’s) or DV VTR’s (video tape recorders).

The defining characteristic of the DV format is that it uses fixed compression. That is, the video is encoded in a 5:1 compressed format as it is turned into digital information by the camcorder during photography.

In addition, the compression rate never varies during playback. This allows for more stability of image quality, but also removes certain features of versatility when compared to higher end formats.

DV uses a data rate of 3.6MB per second. In other words, in order to be able to move the DV-encoded material into a computer and play the video streams back without dropping frames, one must be able to maintain a minimum of 3.6MB of sustained throughput in order to play back, edit and manipulate DV information. More on data rates later in this paper.

DV camcorders are not Digital Still Cameras and DV is NOT DVD

I may help to differentiate DV from two other very significant consumer and professional electronic formats with which it is frequently confused.

Digital cameras are the “DV” equivalent of 35 mm or photographic still image cameras. Again, instead of using film to store single frames of images, digital cameras use proprietary media (PC cards, “Click” Drives. memory sticks, etc) to store content in bits and bytes. Some, like the Sony Mavica, may even use a computer floppy 3.5” disk to hold image data.

Most digital cameras have serial connectors to let enable the downloading of digital content to their computer hard drives and users will employ a program like Adobe Photoshop or PhotoDeluxe to crop and edit the images before use them in a presentation or posting them on a web site.

With few exceptions digital cameras focus (pardon the pun) only on single images. There are some models that output a sequence of digital frames that can be used in video – but perhaps the biggest differentiating factor -- besides the number of frames that are processed -- is the absence of audio.

Keep in mind that a DV camcorder and its special media (cartridge) records both pictures **and sound**.

So now that we know about DV – how does it relate to DVD?

The last “D” in DVD stands for Disk. It is the offspring of the CD-ROM, and it is yet another form of media, which holds digital information. In fact one would be hard pressed to tell a DVD disk and a CD-ROM (or for that matter, an audio CD) apart.

But a mini-DV cartridge looks more like a small Hi-8 tape or DAT (Digital Audio Tape).

The type of material stored on each is similar, but their uses are somewhat different.

DV devices are purely moving pictures and sound.

DVD disks, which can play on computers (DVD-ROM) or on stand-alone DVD players connected to TV monitors, contain moving pictures, sound, **and programmed interactivity.**

When a DVD disk is “burned” it has the capability of showing scenes in different languages and from different camera angles, and it has its own programming language which enables a viewer to instantly choose which scene to watch or which audio track to listen to.

As opposed to CD-ROMs, which can hold up to 684 megabytes of information on a 74 minute CD, DVD disks hold over 5 GIGABYTES of information.

For our purposes however the key differentiating factor is that it takes about $50,000, as of this writing, to create a DVD disk. The production hardware and software is very sophisticated and expensive.

A mini DV cartridge, by comparison, costs around $20, and camcorders and decks that can use them are currently selling at prices starting below $1000. DVD uses video in a format called MPEG2 and multiplexes audio and video streams together. Using variable bit rate compression MPEG2 is quite stunning at relatively low data rates. In fact the DVD you watch at home cannot have a video stream that exceeds 10Mb (that's around 1.2MB per second)

So What Is the Quality of DV?

In a word, drop dead gorgeous.

By using high quality CCD technology and sophisticated digital encoding methods, the DV consortium containing companies like Sony, Panasonic, Canon and JVC have created a format that is extraordinary considering most devices are using DV25, or 25Mb a second DV that has a fixed compression of 5:1. In a recent article in DV magazine, utilizing lab test results for image analysis, the difference for most scenes between DV and higher end formats like Betacam and Digital Betacam were somewhat negligible.

Uncompressed video looks cleaner, BUT it costs a lot more and takes up about 8 times the storage space on your hard disk.

When engineers discuss video formats they often refer to the sampling rates they utilize. You often hear DV discussed as 4:1:1 video and Component analog video referenced as 4:2:2. This is an important delineator.

Because component video has twice as much luminance and chrominance information as the current DV formats, (the 2 in the formats above compared to the 1 above) there is more signal to noise and more data to work with. That applications for animation and compositing (software packages such as Adobe After Effects), which manipulate the pixels with sub-pixel accuracy over time, will see material output to DV not hold up as higher end component material.

So currently most DV systems that work in a DV codec are excellent for editing and not ideal for compositing or high end animation.

(There are exceptions. Some hardware manufacturers transcode the DV stream into 4:2:2 motion JPEG and thus create media that is more suitable for sub-pixel manipulation. Bu if you use the built-in FireWire on a PowerMac G3 or a FireWire capture card in any systems in the NT, Windows 95/95, Macintosh or SGI environments, you will be working in 4:1:1 space (as opposed to component video) and subject to its limitations on a sub-pixel level).

So then what is the "data rate" of DV – compared to MPEG2?

DV sustains a data rate of 3.6 megabytes (or 25 megabits) per second with better than CD quality audio (48khz). That's not too bad for a medium onto which you can record on a relatively inexpensive camcorder.

(Note: To avoid confusion, let's clarify that sometimes data transfer rates are quoted in megabytes, and sometimes in "megabits" per second. A megabit is one-eighth of a megabyte, and current DV specs call for up to 50 megabit data transfer capability).

It's around 3X the data rates of MPEG2, but that's because with MPEG2 encoding, the compression is varied according to the movement in the frame. MPEG2 is terrific for motion picture level playback, because it can predict how much compression is required on a scene by scene basis. But MPEG2 is very difficult to edit and very expensive to encode (record to a disk for duplication and reproduction).

Are there different types of DV?

Besides the lower end mini-DV format found in the standard devices, the professional camcorders feature higher end formats (analogous to betacam as opposed to S-VHS) with higher quality of image (to go along with their 3-chip configurations).

In the case of Sony the format is called DVCAM – Panasonic calls its professional level of DV "DVC-PRO." Professional features like cue tracks and locked audio (see audio, below) are available with these more costly formats.

There are already at least three primary competitors to professional DV formats, at the high end of the scale beyond the "prosumer" level camcorders and way beyond the configurations for general desktop video users covered in this article.

Digital-S is Japan Victor Corp.'s (JVC) 1/2-inch competitor to DVCPRO and Digital Betacam. Currently, Digital-S equipment costs about the same as that for the high-end Panasonic DVCPRO equipment, but tape costs are in the same range as Betacam SP.

Betacam ***SX*** is Sony's new 1/2-inch digital format MPEG-2 compression. D**-**VHS is JVC's long-awaited 1/2-inch bitstream format intended for consumer time-shift recording of satellite MPEG-2 TV programming from DirecTV and USSB. D-VHS uses standard VHS cassettes with digital-grade tape (based on the S-VHS formulation) and offers data rates of approximately 7, 14, and 28 Mbps. D-VHS VCRs can play, but not record, conventional VHS tapes

Back down on the low budget scale, in addition to the currently popular DV-Cam and Mini-DV formats, Sony's new Digital8 has entered the mix. While it uses regular Hi8 tapes, it claims to record and play back a digital format of video. But is it DV?

Like the Hertz commercial says, "Not exactly." It is too early to tell where this hybrid format stands, or its exact level of functionality.

Canon, JVC and Panasonic all make a range of consumer and prosumer devices that will work well with Adobe Premiere and almost every FireWire capture system on the market today.

Can we turn DV into DVD?

Probably, but first things first. Before we do anything really cool, we need to get our video into a computer – also known as "video capture."

And this will require an understanding of the nature of formats and the need for compression.

Where did DV come from?

Before DV, the best "prosumer" formats for video (the types of tape we purchased) were generally S-VHS and Hi-8. And keep in mind, these tapes and the camcorders and VCR's that used them were analog – the media where more like photographic film than computer-based storage devices.

So how did we get video into the computer in "the old days"?

Video editing and computer companies (Avid, Canopus Creative Labs, , DPS , FAST , Media 100, Miro, Pinnacle, Truevision, to name but a few) marketed (and still do market) capture boards that received an input signal from a videotape device, and as the video played, frame after frame was recorded on a hard drive "in real time."

If you do the math, if there are 30 frames per second of video this puts a big burden on the computer's processor and its hard drives.

How big is an average single computer image, such as a BMP, TGA or a PICT – at a screen resolution of 640 X 480? Frequently such an image is almost an entire MB in size.

How big is an average JPG file – a single compressed image that will load in a reasonable time on the Internet? Such images can easily run as large as 300 KB for a similar resolution – 640 X 480.

Take 30 of those per second = 9000 KB or 9 MB per second would comprise a single second of compressed video of this quality. (Remember that JPEG is already a compressed file format).

That is why the old way of capturing analog video and converting it to a digital format often used a compression method called "Motion JPEG."

Three things had to happen at once.

The analog image needed to be converted to a digital format (M-JPEG).

It needed to be compressed to a smaller size.

And it needed to be stored on a moving hard drive. Capturing motion video with simultaneous compression and conversion hit the hard drive like a runaway freight train. The result was massive wear and tear on the drives, and frequently loss of quality through dropped frames and unsynchronized audio.

So Why Do We Need Compression?

If we had used the uncompressed original image, using higher end capture boards and robust SCSI or Fibre Channel Disk arrays, we could sustain the data rate of

an uncompressed stream of NTSC video, which is 221Mbps (that's megabits per second).

To allow a computer to display 30 images per second (technically 29.97) of them per second – there would be perhaps 25-30 megabytes of storage required to store one second of uncompressed video.

So DV uses what is generally deemed 5:1 compression. Many independent features are being shot and posted on DV and transferred to 35mm film for showing in a theatre.

But remember that it is already in digital format!

So when it is captured to a hard drive, the computer does not have to use any of its processing power to simultaneously convert it into bits and bytes. And since it is already compressed as DV, if the hard drive can handle 3.6 megabytes per second (which many modern hard disks can sustain with a rotational speed of 7200 RPM or higher) you can play back full motion video on a standard PC.

Because it is already digital, and just needs to be stored on the hard drive, no further conversion or compression is required. The result is higher quality, fewer dropped frames, and less wear and tear on the hard drive & **no transcoder artifacts.**

And because high quality capture is achieved more consistently than before, another payoff is less wear and tear on the truly expensive equipment – the belts and heads of the video decks or camcorders that would otherwise need to repeat the process more often. Of course since we do not currently have digital monitors with DV connections (at least not in the mainstream), the DV material must be routed through a device for us to watch on an NTSC monitor or television. This conversion back to the analog domain for monitoring the video in the NTSC color space is generally performed by a deck, camcorder or small transcoder device whose sole purpose is to convert the analog signals to digital and vice versa.

So in summary, with DV, unlike the old way of capturing video on analog-to-digital converter cards, there is no conversion or compression process to perform. "Capturing" the video is merely transferring it – it is more like a download of a thick gooey video syrup from a camera or deck to a computer hard drive.

VIDEO FORMATS AND DATA RATES

Format	Resolution	Compression	Frame Rate	Data Rates	Hardware/ Software	Applications
Motion JPEG	320 x 240 640 x 480 720 x 576	From 5:1 to 80:1	Up to 30 fps./ 60 fields/s	0 – 25 MB	Generally hardware w/ capture board	Editing
MPEG1	352 x 240	Variable	30 fps.	150-500 Kbs	Both	CD-Rom
MPEG2	720 x 486	Variable	30 fps/ 60 fields/s	Up to 1.5 MB	Both	DVD & Set-top box
DV- (mini) DV-CAM	**720x480**	**5:1**	**30 fps/ 60 fields/s**	**3.5 MB**	**Both**	**Consumer and Professional video**
DVC-PRO50	**720x480**	**3.5:1**	**30 fps/ 60 fields/s**	**7 MB**	**Both**	**Professional video**

Betacam SP	720 x 486	3:1	30 fps/60 fields/s	30MB		Professional Video
Digital Betacam	720 x 486	2:1	30 fps/ 60 fields/s	25 MB	Hardware	Professional Video
D1	720 x 486	1:1	30 fps/ 60 fields/s	25 MB	Hardware	Prof. Video
Animation Recorder	720 x 486	1:1	30 fps/ 60 fields/s	25 MB	Hardware	Prof. Video

So It's On My Computer, Now What? (How Do I Work With DV?)

Have you ever downloaded an attachment from the Internet and found a message to the effect: "What program should be used to open this attachment?"

Just having a file on your computer – even if it IS digital, is not enough.

There needs to be an implicit understanding between the software and the file in order for it to be able to edit a document (Word) or a video (Adobe Premiere).

In order for that to happen – it needs to be in an architecture (file type) that software can understand and manipulate.

For video, there are two main architectures – Quicktime (cross-platform), which has just gone into it's 4th generation of release and Video for Windows (PC/Microsoft). Quicktime files are often called movies and on the windows environment they are notated with an .MOV extension. Video for Windows files are notated with a .AVI extension.

So, the specific file type must be using a "codec" – sometimes called an "algorithm" or a strategy for compression – so that the system itself can play it back through an "API" – application programming interface.

Let's look at it this way.

First the file is captured or downloaded. It's just a digital blob.

But it was brought into the computer by a specific program (Premiere or the utility provided by the acquisition board) and saved by name as a certain type of file – either Quicktime or AVI.

It can now be located on the hard drive as "CAPTURE.MOV" (Quicktime) or "CAPTURE.AVI", and opened by an editing program, or simply played by the Movie Player on the computer.

Maybe.

The key here is that the codec or compression strategy is already resident on the computer and registered (understood) by the program doing the editing or playback.

Chances are if you successfully install a capture board, it registered its codec in your operating system. And, hopefully, your editing and/or playback program, whether it came with the capture board or you bought it separately, now understands that codec.

How Do I Actually Perform Capture (And Know My System Works)?

Since you will need to capture or in the case of DV, acquire the video – your capture board or computer software should have a utility or program for this purpose. Adobe Premiere, for example, has a Capture Utility in its File menu.

Once this utility is opened, you will need to make sure that the settings are for DV (not S-VHS or composite) video and audio capture (generally at 16-bit CD quality audio).

Your camcorder will need to be switched on. Don't laugh, sometimes we focus so much on the computer we forget about the camcorder.

If you want to capture "live" – what is being photographed – the lens cap will need to be removed and the camcorder will have to be put into "record" mode, in pause, unless you wish to record to tape at the same time.

If you want to capture material which has already been recorded, a camcorder probably needs to be put into VCR mode

In each case, with DV, your FireWire cable must be plugged into both the camcorder or deck and the computer/board.

At this point, with the camcorder or deck in the "on" or "pause" position, you should see a preview image in a window within your capture program.

In most cases, the capture program will have a "Record" button like a VCR. Pressing it will begin the capture process, and hitting the "Esc" key or the "Stop" button will end capture for that segment. Make sure that you have set up the proper device control (Firewire, RS232, RS422, etc)

(Note: Your preview image on the computer screen may not be able to keep up with the capture sequence – you may need to watch the viewfinder in the camcorder or a video monitor to get an idea when the sequence is complete).

When you stop capture, you will hopefully get a prompt to the effect that capture was successful, and that no frames were dropped.

(Note: If you receive a message telling you that you have dropped frames, you may want to make sure you have a fast hard drive and sufficient RAM in your system. Be sure to read the optimization tips that come with your capture/acquire board and/or editing system).

(Note: If you are using Premiere, you can designate a specific hard drive as your "Scratch Disk" for capture. Most capture utilities will also enable you to specify which hard drive will hold your capture clips – make sure it is defragmented and capable of sustaining 3.6 MB per second data rates. Ultra ATA and (E)IDE (conventional) hard drives of 5400 RPM or higher should accommodate this task. SCSI hard drives generally specify their data rates directly and the boards to which they are connected have settings that show the throughput enabled. In addition, many capture utilities, when you designate the hard drive, will have an option for testing its capability of data throughput.)

In any case, when capture is completed, you should see the “clip” in a Window, and be able to simply play it back through the capture utility. (If you have dropped frames, you will notice some distortion at this point, but at least your software program recognizes your camcorder or video deck).

If you try to close the clip window you will probably be asked, “Do you want to save this clip?” Or a “Save As” prompt is otherwise available, through the File Menu. Now you are able to save this video file like any other computer document – but in this case either by default or by choice – you will choose an architecture which will determine its file type.

On the PC it may be either a Quicktime (.MOV) or Video for Windows (.AVI) file. On the Mac it WILL be Quicktime. On the Mac no file notation (period and suffix after the file name) will be evident or required. Windows still needs to know if it is a Quicktime or Video for Windows file, so it must be named accordingly.

If you click on “View/Details” and choose the option “Show File Extensions” in “My Computer” on a PC, you will see the file with a name like TEMP.MOV (Quicktime). If you view the file as an ICON in your file system, you will notice that Quicktime movie files look different from AVI video files.

The important thing, however, is that you are able to save them to disk for re-use, and if you double-click on the file or open it in the appropriate software, it will play back.

(Important Note: Remember that to view it as DV (NTSC video) it must be played through the camcorder, deck or converter which is connected to your computer. (This means that it must be viewed on a monitor (or TV) connected to the DV device and not on the computer monitor.)

How Do We Edit (and Use DV on the Computer)?

Now that DV is resident on your computer as a file that your operating system recognizes – Quicktime or Video for Windows, you can work with it in an editing program.

There are a variety of editing programs out there, so for purposes of illustration, let’s use Adobe Premiere, which in its current version (5.1) incorporates the ability to use DV drivers (software enables that understand the digital file type) as it manipulates video.

(Note: Remember that these drivers are generally provided by and implemented by the manufacturer of the FireWire (interface device) that connects a DV camcorder, deck or converter to your computer. These drivers must be functional within your operating system for Premiere, or any editing software, to work with them effectively.)

Typically, an editing program uses a “Timeline” metaphor which makes a lot of sense since video is not a static image – but rather a sequence of images that “play” over time.

Premiere gives the editor three main types of timelines or “tracks” – one for video, one for audio, and another for effects and transitions.

DV – video in digital form that the computer now recognizes – can be dropped into the timeline where it is represented either as text, with “thumbnail” images, or a combination of both.

Let us say that we have captured three DV sequences, A, B and C.

We could line them up sequentially one after the others on one video track (and one audio) track, and create a “cuts only” version – combining them as one final movie or video file.

Using the timeline, we could easily change their order by cutting and pasting or dragging them from one point to another.

Or, we could put two in one video track, and the third in another, so that we could drop in “transitions” (wipes, dissolves or more complex moves from one sequence into another, as one sees on network television or in motion pictures).

Premiere comes with scores of pre-set transitions which can also be customized in a variety of ways. For example, you can have one video play within a smaller window inside another video.

In addition, Premiere lets the user create color mattes and text overlays, which can be superimposed over tracks of video or cross-faded into them.

In addition, a single image can be used as a still frame, superimposed, twirled or faded in. or panned across – either within a video sequence or with a series of stills to create a “video slide show.” The possibilities are unlimited.

These transitions, effects, text overlays, mattes and “moves” can all be saved as individual files to be re-used in other projects.

In addition, each combination of clips and their locations and all of the that the editor has made on the timeline and with respect to pre-sets can also be saved – as a Premiere project file.

Pre-sets (project options for video data rates, audio types, and file types which will be output in final versions) can also be saved, and one is generally chosen each time a project is opened.

So just as one would learn the features of a word processing program to create a book or brochure that looks and reads exactly as one wants, so too can a video editor learn, use and re-use a set of options (analogous to the “styles” in Word) to manipulate video.

And, just as one frequently previews a print document before committing it to paper, a video editor will wish to preview his or her video project, certainly before finalizing it out to tape or showing it to a client.

Premiere like most editors enables preview of a sequence – and depending upon the amount of changes to the source materials that have been made in terms of transitions or “moves” – it may take time for the system to “render” the product of the timeline in order to show the preview.

This is because the intermediate frames (where the transitions occur, or where audio fades in and out) must be created anew – they have never existed before.

Just as a good 3D animation program will create motion and add light and textures over time between two “key frames”, Premiere works with the video to add its titles, transitions, effects and other enhancements.

And just was Microsoft Word and Excel offer 99 levels of “undo” to go back and overcome mistakes or change decisions in text documents and spreadsheets, so does Premiere.

(Note: Another way to ensure that one can go back to previous versions of a video sequence in case changes are requested by a client is to save different ways the project is constructed as separate “.PRJ” (project) files.

Essentially Premiere epitomizes desktop video in representing a standard A-B roll editing suite inside the computer. This is sometimes referred to as “three-point editing” – with two resource decks and a transition (or work) area into which the final product is, once again, rendered.

Only on the desktop Premiere provides up to 99 virtual video and audio tracks, and any number of new transition or effects areas. Of course the more complex the project, the longer any computer or software will take to render the new footage, whether as a preview or final movie.

There are ways to shorten the rendering time of previews.

A bar at the top of the editing windows can adjust the section of the timeline to be previewed, so that only sub-portions of a sequence may need to be rendered.

Parts of the sequence can be “scrubbed” – meaning that as the mouse is dragged through the sequence generating a low resolution version of how it will look and sound is also audible – all in real time.

And most important, as long as sections have not been moved or significantly altered, as they are re-used in subsequent previews they do not need to be re-rendered.

That is because they already exist on the hard drive as temporary files.

Remember the “Scratch Disk” we mentioned earlier, which determined where your capture clips would be saved? This same portion of your hard disk will also hold your preview files – and as long as they remain intact you can always re-open your project and continue where you left off without having to re-render your sequence.

When you reopen a project you will see Premiere load the previews, and if it cannot find them, it will prompt you for their location. If they no longer exist on your system, your subsequent previews will have to be rendered again.

Keep in mind that as long as the file type (or compression codec) you are using is DV all the previews and output must be viewed on your NTSC (video) monitor connected to your DV device, not on your computer monitor.

Well What Other Kinds of Video Files Can You Render?

Remember the issue of DVD and whether or not we could create it?

If you have a proper codec loaded on your system for creating an MPEG2 movie or video, you can then output your sequence in that format.

Or perhaps you will want to reuse your video on the computer itself, or burn it to a CD-ROM for distribution, or include it in a presentation (like PowerPoint).

This is when another series of decisions must be made involving the type of file and its quality (data rate).

Generally, if you will distribute the video in some form, you will choose a “lowest common denominator” recompressor (codec) for your final output.

For example, you might choose either Indeo or Cinepak at a frame rate of 15 frames per second and a data rate of 600 kilobytes per second to make sure that virtually anyone with an ordinary video card, soundboard and quad speed CD-ROM could view it on a computer monitor.

Tools such as Terran Interactive's Media Cleaner Pro 4.0 provide a robust set of tools for encoding in many deliverable formats including Quicktime 4, G2 , NetShow (Microsoft's streaming format) and MP3, the Internet's hot new audio format

What if you wanted to export DV footage to another older, analog video format (3/4", S-VHS, Hi-8, etc.)?

Here is where DV really shines, because you could output it back out to your DV deck or camcorder for storage or subsequent dubbing.

You could do this by keeping your output set to DV when you "Make Movie", and saving and replaying the final file from your hard drive. Or you could "Print to Video" – letting your final product (or last Preview) go directly back out to your DV device, and through it to another deck of whatever format you choose.

Because the quality of DV is so intrinsically high, you might even "bump it up" to Betacam SP. There would be mixed reviews depending upon its final use as to whether it is truly "broadcast quality."

But your footage will certainly pass muster if it is recorded to Hi-8 and/or Super-VHS, and obviously ordinary VHS, because the original material will hardly have sustained any "generation loss" at all. It was digital when it came in and it is still digital when it goes out.

Two Digital Products for the Price of One

An added benefit to using DV is that it is basically also a digital camera – like its aforementioned still-frame cousins!

Since most video capture and editing software (like Adobe Premiere) can also export a single frame – as a PICT (Apple), BMP (Windows PC) or JPEG (both), by locating a specific image in a video sequence it can be saved as an image file for a multitude of uses.

And since DV generally has very little distortion or noise, a single exported frame is usually of very high quality, without any "stretching." In addition, some DV camcorders have a "digital camera" mode available for shooting successive still frames and outputting them through the FireWire port.

In this way, DV also extends a specific feature of Premiere – the ability to export and import a sequence of frames as an Adobe Photoshop "filmstrip."

A filmstrip is a video sequence output as individual frames, without sound.

By bringing such a sequence into Adobe's flagship image processing program, even more filters, layers and even "actions" (macros) can be used to paint over a series of video frames – sometimes called "rotoscoping."

These filmstrips can be imported and exported to and from Premiere and Photoshop, and also to After Effects, Adobe's high end compositing program.

In all cases the reality of garbage in, garbage out applies, so that the innately high quality of captured DV footage, whether as a single frame or a video sequence serves to potentially enhance to final output from all of these products.

Once the filmstrip has been altered, it can be brought back into Premiere to be combined with the soundtrack and/or titles, transitions and effects.

Again, the final step in the editing process is sometimes called “Make Movie” or “Export to Video” in Adobe Premiere, or it could be Save File As.

So just as in Microsoft Word you can save a file as a Word “.DOC” File or as a simple “.TXT” file, when you save a video file, you also need to specify the file type (Quicktime or AVI) and the compression codec.

Editing programs like Premiere will already integrate a fair number of software codecs which have become fairly standard, like the aforementioned Indeo and Cinepak for CD-ROM video, RLE for animation, or perhaps MPEG if your system is sophisticated or you have purchased an MPEG capture board.

(Note: Remember that once you have settled upon a particular configuration of output options that work for you, you can save them as a “pre-set” that Premiere will load automatically for similar projects).

Computer based editing solutions tend to use one of two major types of codecs, hardware or software-based, depending upon your capture board. If one is using Premiere for example, under recording options, the codec that creates compatibility with the hardware manufacturers’ solution will be included. Apple Computer provides the DV software codec in versions of Quicktime 3 and greater. Some manufacturer like FAST Electronics use a **hardware** (chip-enabled) DV codec.

(As one might suspect, the presence of a specific chip on the capture/output board will accelerate playback and enhance performance, but also significantly affect the product’s cost.)

But for DV, the codec that works with your input device (FireWire card or motherboard) is the one that must be used to work with your digital content.

If, as in the case of FAST, a chip is available to accelerate playback, then the hardware codec is available. Otherwise, the video must be entirely manipulated using a software codec that works with your input/output (FireWire) device.

There must be tight compatiblity between the software and hardware to insure a professional and productive editing environment. Although Adobe has often depended on their third party developers to provide this integration, they have also developed their own set of proprietary drivers that will be (or already are, depending upon when you are reading this) included with Premiere. To provide enhanced functionality with DV devices and create general compatibility with the DV format of video, make sure you have the latest compatible drivers loaded on your system.

With DV, the presumption is that as with capture, which is basically a downloading of a stable file to the hard drive, outputting to video should also take place with a minimum of problems, due to the magic of IEEE 1394 (FireWire) connectivity. But the main attraction of DV is not just that one can acquire video without dropping frames, or edit and re-use content without losing quality through successive generations, but that in fact DV’s quality is approaching the hallowed benchmark of “broadcast quality.”

In fact, at this year's Sundance film festival, over half a dozen films were shot on DV. Sony has just introduced a new process specifically designed for filmmakers to take their DV projects and convert it film.,

So DV is not just for video, it's for filmmakers as well!

What Is the Best Way to Acquire DV Footage?

Even though the compression rates for DV are set, the quality of the original image(s) that are to make up your project is the key.

Just as there have always been professional cameras and camcorders, and consumer devices, so too one would expect higher image quality from pricier upscale units.

One reason for this is native intelligence. Once one goes beyond the $2000 price point (as of this writing), a 3-chip camera (CCD) like the Sony TRV-900 is an option.

Three chip cameras outperform single chip models because each chip can handle one of the three primary colors. Lower priced single chip DV camcorder and decks are still superior in image quality to their analog cousins.

The same key features that one would evaluate for any photographic device apply. How does it handle low light levels? How versatile are the lenses and what are the zoom capabilities?

For example, one must go into the higher priced Canon line (XL1) to be able to use multiple lenses using an optional EF adapter. For many applications this might not be an issue, but for example, in the case of video compositing (using a tool like Adobe After Effects), being able to capture a precise level of clarity is a key element.

This disparity in lens quality between professional systems and their low end cousins accounts for the severe gradations in quality apparent to professional photographers and videographers.

A professional lens can cost the equivalent of six palm-sized camcorders!

Sony has addressed this issue by discontinuing its DCR-PC7, upgrading to a 12X optical zoom (Zeiss) lens in it newer model (PC10).

Keep in mind that so-called "digital" zoom doesn't increase clarity – it increases the size of the available pixels, yielding diminishing returns in image quality as the amount of zoom is increased, by blurring the image. That is why professionals use optics rather than computer intelligence to zero in at close range. Using digital zoom without commensurate optical capability results in lower image quality.

At the low end, some camcorders (Canon and Panasonic) compensate for a lack of "information" with "pixel count" technology – literally filling in the blanks between what the camera knows for certain.

This may lead to unacceptable levels of distortion on some projects – especially at close range. If you are shooting landscapes or real estate this could be of no consequence. If you are still life or food photographer, you may want to add your blurs in PhotoShop, not in the camera.

As one might suspect, with its greater number of pixels in many models, Sony claims higher levels of clarity (but lower numbers of pixels might optimize performance in low light conditions).

Canon has provided a lot of latitude in their chips and their images look very bright and vivid. The CDs are closer to film look and brightness than traditional betacam technology. This increased dynamic range in many DV cameras increases the quality. Features like white clipping help avoid creating images that are blown out and avoid problems that provide challenges when working with analog technology. You have a lot more freedom regarding your lighting choices than in the analog domain. Low light capabilities and the sensitivity of the chips are superior to most analog environments. Slower Shutter speeds assist a lot in low light situations as well.

The benefits of low light capabilities and the smallness of most DV cameras are significant especially when you think of filmmaking. Lighting budgets are extensive for cinematographers and the ability to shoot an entire film on DV creates a compelling proposition financially for any independent filmmaker. The size of the cameras allow for greater flexibility in movements and there are a wide range of booms and tracking systems available that are again very cost effective.

There are some things you need to watch for! Since the footage is compressed, edges have a softness and creating special effects and chroma keys are a problem. A good hard edge required for a clean key is difficult to come by on a 1/3" CCD device.

Cameras Have Different Personalities

Since lighting can be a key element of successful photography, make sure that any required flash solution meets with your needs. Panasonic's 910, for example, has a color enhancement light that mounts on top of the camera.

The Sony TRV-9 and 900 units have "Nightshot" capability.

Other inexpensive DV camcorders offer some nifty features as well. Many come with pre-set effects that can be added in the camera, and can save time for short projects that do not require the use of a computer editing system.

Or, these pre-set effects like the ones that come with JVC's docking station models might serve to enhance computer-based projects.

Some of the mini-DV camcorders are incredible in their miniaturization. But this can be a mixed blessing. While the low weight and small size may seem to be a benefit, they will lack the stability of their more durable and substantial 3-chip cousins.

Sound Ideas

Because audio is a key element of DV, camera noise during shooting and the capability of setting audio levels manually (rather than having them set automatically by the camera) is a significant consideration.

Because of the quality of digital audio, however, automatic levels may be fine for most applications, or only a "peak limiter" will suffice to make sure that noise levels are kept at acceptable levels.

DV gives the user four channels of digital audio in two modes:

1) Option one is dual channel CD-quality audio at 16-bits, 44 Khz – or the level of audio CD's or the standard 16-bit audio used in modern computer soundboards.
2) An alternative is four tracks of slightly lower quality (12-bit, 32 Khz)..

Only the professional level 3-chip Canon XL1 lets the user record all four 12-bit channels from the get-go. Some camcorders let the user dub over the 12-bit channels with subsequent tracks, or if the tape is put into a higher end deck, the other tracks become available.

An advantage of the 16-bit audio is that on the higher end cameras (generally the 3-chip models) the audio can be "locked" to the video to ensure synchronization. This could be particularly useful for long sequences of "talking heads".

A more obvious feature of the camcorders to consider is the presence of an LCD screen for viewing and reviewing footage. Another key element to consider is the ability to import analog video – or essentially use the camcorder as a VCR.

Why would this be useful?

Suppose your source material is not going to be shot in the future, but already resides on analog tape – S-VHS, Hi-8, or even VHS.

Using a relatively inexpensive camera like the Sony TRV-9 will let you bring this footage into a computer as DV. (You need to have analog input as a feature). This will make the process of video capture as painless as it would be with footage shot in the field – now it would merely by transferred to a computer's hard drive over FireWire.

If this is the main anticipated application – editing existing footage, the use of a camcorder may not be the best choice of a device.

Sony makes two versions of its Digital "Walkman", a small, ultraportable DV videorecorder. One has an LCD screen and enables the use of an optional jog-shuttle controller – for around $1600.

If you can do without the screen (and use an NTSC monitor, for example), the less expensive model retails for around $1100.

An aspect to consider here is the wear and tear on the tape mechanism.

Camcorders are built to shoot video, not to edit it, or to "shuttle" from point to point on the tape to enable capture to a computer. No one really knows with these instruments how much of this activity they can take.

Presumably the advantage of a DV deck is that it is built for more robust applications, like editing or repeated viewing – this makes the DV Walkman (especially with the screen) an excellent presentation tool.

Not surprisingly, there are professional DV VTR's (video tape recorders) available from Sony, Panasonic and others, some of which take both the mini-DV and the DV-CAM format. These would be the choice for work situations where durability is the key, and of course where versatility of format (they can input and output analog signals as well) are also significant.

This brings up a third brand new alternative. Sony has just released a low cost ($450) DV "transcoder". Not a camera or a deck, this tiny unit is built only to allow the user to input or export analog footage in DV format.

Again, if you contemplate using footage already resident or to be acquired through an analog source, this might be a low cost solution to entry level DV. In

addition, because all DV on the computer must be viewed through a DV device, the transcoder can connect to an NTSC monitor for previewing during editing.

Of course the limits of your incoming and outgoing format will apply.

If your source material is VHS with monaural sound, DV will maintain and not enhance its original quality.

And if your intended output is S-VHS, you would be well advised to make some audio tests to make sure that the your recording device can comprehend the multiple channels of high level sound that will be coming its way.

Artistic Considerations of DV

We mentioned earlier that filmmakers are finding DV an acceptable and cost-efficient way of telling their stories visually.

But a huge area of cinema is special effects and animation. How do these specialized areas of production translate to DV?

The third major tool in Adobe's graphics and video "suite" is After Effects, a high end package used for special effects by many professional post production houses. Somewhat beyond Premiere and Photoshop in scope, After Effects is a compositing tool. It takes the power of Photoshop with its layers and retouching capability, adds the element of working effectively with paint tools and text, and makes the final product move and perform over time – using a sophisticated timeline model similar to that of Premiere.

While the canvas of Premiere is generally video, and its tools are more limited, After Effects projects may be output to film, to print, to video or to a medium not yet known. While it might well use video or photographic stills as parts of its compositions, it could create anything an artist could imagine.

The resolution of DV is 720X480 – that is the number of pixels on a DV frame vertically by horizontally.

But like many high end effects and animation tools, After Effects is "resolution independent." Other tools with this capability in professional 3D Animation are Kinetics' 3D Studio Max, Lightwave and SoftImage.

So what happens when you take an image intended for feature film 4000 x 3000 pixels, for example, and reduce it to 720 x 480? How do you maintain the aspect ratio, the atmospheric components of lighting, reflection and transparency, and finally deal with the issue of saving the images in a compressed format?

These are issues that need to be addressed by those who desire to not only use DV as an acquisition medium for video, but as an output medium for higher end production.

We also mentioned that DV needs to be previewed in a video editor on an NTSC monitor. When working with a computer-based tool like After Effects, an RGB computer monitor is generally used. Just as issues of color output will make a Photoshop image vary from its print output version, unless special precautions are taken, effects designers need to account for the differences between RGB and NTSC, or view their artistic production on an NTSC monitors.

Besides color, or chrominance, luminance (or lightness/brightness) issues also need to be factored in.

Generally video (and therefore DV) is brighter than images created directly on a computer. If 3D animation or an After Effects production is destined for DV, especially if it is to be integrated with conventional video footage, it may need to be adjusted so that images can be clearly discerned. They should stand out on a video or film screen, rather than blend together in a dark background.

Both After Effects and Premiere provide many filters or plug-ins to artistically and aesthetically enhance video and/or effects sequences.

Frequently animators or effects artists are used to the luxury of working with high end animation recorders, which can accommodate uncompressed images of high resolution in real time.

Remember that DV is a compressed format. Using a DV codec on a sequence of images that were meant to be seen in all their native glory may create unforeseen effects – like pixelization, a washed out look, or color bleeding.

Techniques can be brought to bear to minimize these consequences, but they are the product of experience, and DV for all of its promise is a new medium.

On the other hand After Effects has a process called telecine for converting 24 frame per second film footage into video, using a method called 3:2 “pulldown.” The issue of “interlacing” is also resolved in this process.

Interlacing means that as video is projected on a monitor, it happens in two separate “fields” – one representing the odd set of horizontal lines, the other the even set. Film and computer images, by contrast, are not interlaced.

After Effects also can reverse the process, removing interlacing and 3:2 pulldown to take video out to film.

A key point to remember in these processes, however, is that the aspect ratio (width to height) of an image viewed on a computer does not necessarily correspond to the dimensions of the pixels that comprise it.

Some NTSC converters produce the conventional 4:3 aspect ratio found on the computer screen with square pixels. D1 (very high end) NTSC uses rectangular pixels (.9 aspect ratio) to create the same frame at a resolution of 720x486.

The salient fact here is that if you display rectangular pixels on a square pixel monitor (computer), they will be distorted – although they will look fine back on a broadcast monitor.

This is another reason to preview DV on an NTSC monitor.

Still other issues are raised with the advent of HDTV widescreen video formats, which some DV camcorders support.

When working with these various projects in After Effects you have the option to set the pixel aspect ratio for the imported image or resolution of square pixel footage for the final composition (output).

For example, if you are creating a DV sequence in After Effects you would create and save square pixel footage at a frame size of 720x534 (slightly wider than the NTSC monitor might show), while for high end D1, you would set the frame size to 720x540. Then in a New Composition, you would select either 720x480 for DV, or 720x486 for D1, and add the footage.

Similarly in Premiere’s Make Movie area, you can adjust the aspect ratio of the video prior to output.

Premiere can accommodate a screen size as high as 4096 x 4096, but problems may ensue if one is mixing (through transitions or effects) computer-generated images in square pixels with the rectangular images of NTSC video (DV). Now it is no longer an issue that DV will look fine when it is viewed through the NTSC monitor – Premiere must know how to work with the apples and oranges.

To work with square pixel computer images in DV output for NTSC for a standard 4:3 screen aspect ratio, use a computer generated image size of 750X540.

For the HDTV (16:9) aspect ratio, make your computer images conform to an image size of 854x480.

The point to keep in mind is that if your DV images appear distorted, you need to review setting for aspect ratio of the frame, or aspect ratio of individual pixels.

But having made raised these issues, it is important to remember that lesser media were also the final destinations of many effects and animation sequences. Artists learned to adjust for S-VHS and Hi-8, and even for VHS, when it suited their needs.

The very nature of DV, which is that images remain intact over time and even after they are edited over multiple generations with little or no loss, should make working with a digital medium relatively easier for artists than when the final output was analog.

It's just that when the eye is highly trained, and perfection is expected, all of the possible factors leading to potential distortion or an unanticipated final product need to be addressed.

For example, the pinnacle of professional video is the format known as Betacam SP. It has a compression rate of 4:2:2 and 483 lines of active video.

DV has a commensurate compression rate of 4:1:1 and 480 lines of video.

If your DV project is destined for home, industrial video or cable broadcast, chances are that the default settings in Premiere and/or After Effects will suffice.

If you are coming from or going out to either photographic film or broadcast television, at some point you may need to consider frame size, pixel size, lighting and other aesthetic issues.

I Get DV. So What Is FireWire?

FireWire, sometimes known as IEEE 1394 is serial data transfer protocol, a standard for transferring digital content using specific plugs, jacks and cables.
It is an electronic pipe through which video can be passed – but it is not limited to video – any digital information conforming to the standard can also use FireWire.

With IEEE 1394-compatible products and systems, users can transfer video or still images from a camera or camcorder to a printer, PC, or television, with no image degradation. When video is transferred, audio (more on this later) is simultaneously included within the signal

The 1394 digital link standard was conceived in 1986 by technologists at Apple Computer, who chose the trademark 'FireWire', in reference to its speeds of operation. The first specification for this link was completed in 1987. It was adopted in 1995 as the IEEE 1394 standard. The IEEE 1394 standard is a scalable, flexible, easy to use, low-

cost digital interface that integrates the worlds of consumer electronics and personal computers. The IEEE 1394 standard defines both a backplane physical layer and point-to-point cable-connected virtual bus implementations. The backplane version operates at 12.5, 25 or 50 Mbits/sec. The cable version supports data rates of 100, 200 and 400 Mbits/ sec. Both versions are compatible at the link layer and above. The Standard defines the media, topology, and the protocol. Most computer I/O or iEEE1394 PCI cards for computers use a 6 pin connector. Most DV I/O on camcorders and dv decks utilize a 4 pin connector.

A number of IEEE 1394 products are now available including digital camcorders with the IEEE 1394 link, IEEE 1394 digital video editing equipment, digital VCRs, digital cameras, digital audio players, 1394 IC's and a wealth of other infrastructure products such as connectors, cables, test equipment, software toolkits, and emulation models.

"The number of new 1394-equipped products coming to market is accelerating rapidly, and our technical working groups are moving rapidly to enhance 1394's performance," said 1394 Trade Association Chairman James Snider of Texas Instruments. "We will see a new set of low-priced camcorders, digital cameras and computers equipped with the interface, along with exciting new peripherals based on the standard. Also, very soon, we will have 1394 silicon that runs at 800 Megabits/second."

FireWire is a peer-to-peer interface. This allows for dubbing from one camcorder to another without a computer. It also allows multiple computers to share a given peripheral without any special support in the peripheral or the computers. In other words, you could connect a camera such as a CanonXL-1 to a PowerMac G3 with FireWire built-in, and then daisy chain to say half a dozen G3 systems with FireWire and all 6 systems would be able to access the digital cameras I/O functions. In and of itself, it has nothing to do with video.

FireWire, like ethernet – the broadly used inter-computer networking standard, can move any digital file that conforms to this standard. However, although the firewire bus is hot puggable and can have up to 63 devices serially connected, an individual cable is not meant to exceed 4.5 meters. This is referred to as bus length. You can extend with other firewire devices or firewire amplifiers that let you extend the firewire chain.

If you had a digital file on your computer that knew how to burp your baby, and your baby had a FireWire connector (what a horrible thought), your computer could burp your child using the right plugs, cables and software.

Since Sony didn’t like conforming to the committee that created the IEEE 1394 standard, and wanted its own name, it calls “FireWire” by the term “iLink.”

The plugs and cables are identical.

And in fact Sony markets a line of computers with its own software and hardware that interface through iLink with DV camcorders.

But interestingly, the iLink port is also available on some of its slim F/X portable computers. However, the specs on these read: “for single image capture.”

That is probably because the processor and/or hard drives on these portables can’t quite handle full motion DV. Since there is a great demand for portable capture of video in the commercial production and film industries, there are undoubtably going to

be products that allow full motion capture on a laptop with sustained thruput. The only question is when?

So if we agree to call it FireWire, we can also agree it's pretty cool.

Besides the fact that the video is already digital, and successive "generations" – or versions after editing – won't degrade, there are other advantages. Even timecode, markers with the capability to zero in on individual frames of video according to broadcast standards, is supported.

Device control, or the ability to stop, advance, and find segments on a DV cartridge, is also supported on the same FireWire cable (if the proper drivers and plug-in is loaded in software like Premiere). This function once had to be implemented with serial cables entirely separate from the video and audio connections in much more expensive prosumer and professional VTRs. Now with a low cost consumer camcorder and a FireWire connection you basically have a VCR remote control right inside your editing and capture software.

FireWire devices are also "hot-swappable," which means they can be attached and detached from a computer while it is on, without rebooting, and without the termination and other connectivity issues (like setting addresses) of SCSI devices. Even when devices are turned "off", the power running within the cable past them to the next active device is always available. This is in contrast to the typical SCSI chain, which is limited to 8 devices, each with unique ID's which must be correctly set, and if a device is turned off, especially when the computer is on, data loss and system crash is a common occurrence.

Another technical aspect that video enthusiasts appreciate about FireWire is that it supports what is known as "isynchronous" communication.

What this means is that continuous stream of data at a given rate is guaranteed to pass through the FireWire system.

By contrast, ethernet and most conventional network protocols, like those comprising the Internet, require asynchronous communication – which means that some sort of data verification or confirmation must be received before more data is transmitted. Without the proper acknowledgment, no data is sent or data must be retransmitted.

On a FireWire system, however, while the asynchronous capabilities that enable features like device control are still present, a certain amount of continuous data transmission is enabled.

It's sort of like knowing that you can always use the carpool lane on the freeway, even if the other lanes are jammed up with rubberneckers. Or if a construction team is only letting a few cars through with a signalman, your load will always make it.

Obviously this is key for video, where a hiccup in the data stream wreaks havoc during playback.

As cool as FireWire and DV are, remember that there are software issues involved on the computer side.

While the DV flavor or codec on the camcorders from various manufacturers is essentially one and the same, the software enabling previewing of the video on the

desktop, through the various interface boards (formerly capture boards) is different. Apple's DV Quicktime and the decompression software for manufacturers like DPS (Spark), miroVideo (DV 100/200/300), and Digital Origin (MotoDV) still vary.

The key is that with software decompression, the NTSC (video/broadcast) monitor is still attached to the camcorder for previewing, and rendering takes place on the desktop with the software codec. With hardware decompression, the NTSC monitor can be connected to the desktop directly, keeping the camcorder free, and rendering is also significantly faster.

Rendering means that once a series of transitions and effects have been implemented on a timeline (using an editing software package like Premiere), the resulting set of instructions is processed or written in digital format, either on the hard drive or on the cassette inside the camcorder.

The additional benefit of a system that uses hardware decompression is that combinations of inputs are possible. A DV video segment that is resident on the hard drive can be easily combined with a standard AVI file (perhaps captured from an analog S-VHS or Hi-8 source), and effects and transitions added, and then it can be previewed in real time from the desktop.

While such a combination might well be attempted using software decompression from the less expensive boards, the further degradation of the analog signal, when and if recompressed as it is rendered with a DV source, would probably lead to unacceptable frame loss and degradation.

So by way of illustration, the software solutions with low end boards start at below $800, the FAST DV Master and Pinnacle DV2000 retail for between $2,000 and $3,000, and then higher end, pricier solutions utilizing Dual Stream Realtime DV capabilities are also coming into the video arena.

Not surprisingly, although the technology initially developed at Apple, PC peripheral manufacturers saw FireWire as a way to bring digital video and audio to the PC/Windows world.

Sony's new Digital Video (DV) camcorders were the forerunners of this whole new breed of video and audio systems that bridge the gap between professional and consumer electronic gear. More than 50 manufacturers of broadcast and consumer video equipment have adopted the DV format, which incorporates IEEE-1394 as the standard digital audio/video interface for all DV gear.

Adaptec, perhaps the leader in SCSI input/output technology, also has been a leader in creating FireWire hardware that allows for the transfer of DV format video to the desktop. Adaptec's AHA-8945 host adapter links both high-performance SCSI peripherals and 1394-enabled consumer electronics products to PCs and Macs using only one PCI slot. This single board can chainup to 15 SCSI devices at speeds up to 40MB/sec, and its FireWire interface links a maximum 63 devices at speeds up to 200Mbps (25 MB/sec). Adaptec also has released PC cards with Firewire I/O for the PC world. On the Mac side, Newer Technology and Ratoc are among the first to manufacture DV I/O cards for Powerbooks that are 300MHz and faster. With portable 10GB IDE drives, an editor can take a Powerbook on the road and cut an entire project for a very small investment relatively speaking

Sony, which has several models of DV camcorders, also now has a digital camera. The CCM-DS250 is a fully digital camera which provides high quality images and presents 30 frames per second in VGA(640X480)format.
At the other end of the spectrum, enabling only still image input in standard Windows BMP format, Sony's DVBK-1000 is an ISA solution

Adaptec's rivals are busy too.

Symbios Logic, has a 1394-to-ATA/ATAPI interface controller adapter, which enables high-speed data transfers between computers and peripherals, taking advantage of ATA/ATAPI technology, as opposed to SCSI. This means that the first adaptation of firewire connectivity to hard drives will use these adapters. VST and Mactell are among the first manufacturers to offer this. You can get 22GB Firewire drives although as of this writing they are best for storing data but not for recording your audio visual information. By the end of 1999 we can look for native firewire drives to further expand the value proposition of firewire on the desktop.

The Future Looks Digital

What should the consumer be looking for with these devices down the road?

With the versatility of the format, no one really knows which areas are destined to take off, but desktop video is obviously the first big application.

Remember that DV is not the only digital video format in town.

MPEG2 with Dolby AC3 is the format of choice for DVD. More to the point, translation software between the two formats is still evolving, since even settling on a computer based standard for DVD ROM formats has been hard to achieve.

Besides the connectivity and compatibility issues of the input device (camcorder, deck, set top box, etc.) and the computer based interface and software, anyone wanting to take advantage of DV and the FireWire interface would be well advised to think about two key issues:

1. The requirements of the computer in terms of RAM, CPU and operating system, and driver related issues that concern the interface board. Those familiar with multiple SCSI devices know that getting them all to work (a CD recorder and a scanner, for example), on one chain can be daunting even with the many drivers available.

2. Software compatibility—even though these file types are digital, they still need to be understood by the operating system, multiple peripherals (sound cards, SCSI hard drives, etc.) and manipulated effectively. Buying mix and match devices in this area is doubtless tricky. For example, doing digital video editing with a DV device would make it advisable to get the interface board, editing software, and any other hardware and cabling, from one reliable source, preferably in a bundle.

3. Go for the bandwidth – ensure the success of your DV production by building the system with enough sustained throughput to avoid dropping frames. Whether you use Ultra ATA 33 or 66, SCSI, Fibre, you name it, make sure your storage system is built to support the data rates of your editing environment. Consider that you may soon upgrade to a dual stream DV solution which may require over 10MB a second sustained thruput.

Just as SCSI promised to be a ubiquitous way to daisy-chain devices, and we now have SCSI-2, SCSI-3, Fast SCSI, Fast and Wide SCSI, Ultra 2, etc. In addition, a variety of cables and plugs have hit the market.

Assuming that DV camcorders with FireWire ports will work with any FireWire-enabled system out of the box is probably a recipe for frustration.

The consumer and even the professional seeking to take advantage of DV is well advised to follow well worn paths, and particularly to consult the resources on the Web and elsewhere that clarify compatibility issues.

DV Capture Board manufacturers are often ahead of the curve in this respect, publishing an updating camcorder and deck compatibility lists.

Welcome aboard this DV wagon. Someday soon you'll connect many of the consumer electronics devices in your home and network through firewire. Until then, enjoy the power and creativity of today's dynamic media tools and produce stunning video and images utilizing the pristine pictures of DV. For further info about DV and Firewire navigate to any of the links below. If you are in the market for a Turnkey DV solution, nobody offers a better value or a more knowledgeable staff than Intelligent Media. Call at 800-366-9622 for a customized quote or request one on-line at http://www.intelligentmedia.com

DV or not DV? If that's the question, then Intelligent Media has plenty of answers for you.

Information Resources

2-Pop - The Final Cut Pro Info Site
http://www.2-pop.com

Adaptec
http://www.adaptec.com

Adobe – Premiere – Digital Video Resource Information page:
http://www.adobe.com/supportservice/custsupport/SOLUTIONS/c092.htm

Apple Computer
http://www.apple.com/firewire

Australian Digital Video resource:
http://www.learndynamicmedia.com/sharedknowledge/index.html

Canopus
http://www.canopuscorp.com/video2/n_videojump.html

Digital Content Creator
http://www.dccmag.com

Digital Origin – Radius – DV Camcorder compatibility list:

http://www.digitalorigin.com/products/compat/dvqualifiedcam.html

Digital Video magazine home page:
http://www.dv.com/HomePage.html

DPS
http://www.dps.com/

DV Central:
http://www.dvcentral.org

FAST Electronic – Support Page and Knowledge Base:
http://www.fastmultimedia.com/fast/support.nsf?OpenDatabase

Final Cut Pro
http://www.apple.com/finalcutpro

IEEE Trade Association:
http://www.1394ta.org

Media 100
http://www.media100.com

Pinnacle – miro – Support
http://www.pinnaclesys.com/support/