



A Digital Video Primer



from the Adobe
Dynamic Media Group |

Introduction

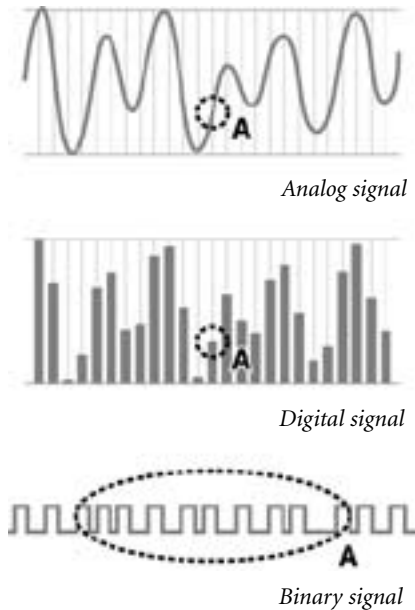
There's a lot to know about the technology involved in video. There are entire industries focused on the nuances of professional video including cameras, storage, and transmission. But there's no need to be intimidated by all this technology. As video has migrated to the desktop, it has gotten increasingly easier to produce high quality work with a minimum of underlying technical know-how. This primer isn't going to tell you everything, but it will give you a foundation in the basics and a jumpstart to get you on the road to creating your own videos.

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VIDEO BASICS

Figure 1: Video signals



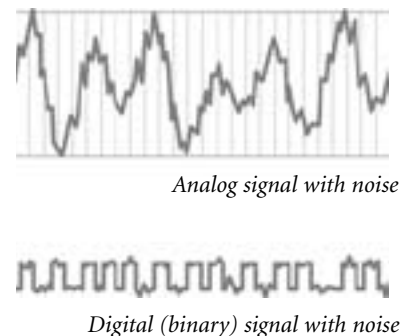
Analog Versus Digital Video

One of the first things you should understand is the difference between **analog** and **digital** video. Your television (the video display with which we are all most familiar) is an analog device. The video it displays is transmitted to it as an analog signal, via the air or a cable. **Analog signals** are made up of continuously varying waveforms. In other words, the value of the signal, at any given time, can be anywhere in the range between the minimum and maximum allowed. **Digital signals**, by contrast, are transmitted only as precise points selected at intervals on the curve. The type of digital signal that can be used by your computer is **binary**, describing these points as a series of minimum or maximum values — the minimum value represents zero; the maximum value represents one. These series of zeroes and ones can then be interpreted at the receiving end as the numbers representing the original information. (Figure 1).

There are several benefits to digital signals. One of the most important is the very high fidelity of the transmission, as opposed to analog. With an analog signal, there is no way for the receiving end to distinguish between the original signal and any **noise** that may be introduced during transmission. And with each repeated transmission or duplication, there is inevitably more noise accumulated, resulting in the poor fidelity that is attributable to generation loss. With a digital signal, it is much easier to distinguish the original information from the noise. So a digital signal can be transmitted and duplicated as often as we wish with no loss in fidelity. (Figure 2).

The world of video is in the middle of a massive transition from analog to digital. This transition is happening at every level of the industry. In broadcasting, standards have been set and stations are moving towards digital television (**DTV**). Many homes already receive digital cable or digital satellite signals. Video editing has moved from the world of analog tape-to-tape editing and into the world of digital **non-linear editing** (**NLE**). Home viewers watch crystal clear video on digital versatile disk (**DVD**) players. In consumer electronics, digital video cameras (**DV**) have introduced impressive quality at an affordable price.

Figure 2: Noise



Desktop video... enables you to work with moving images in much the same way you write with a word processor. Your movie “document” can quickly and easily be edited and re-edited to your heart’s content...

The advantages of using a computer for video production activities such as non-linear editing are enormous. Traditional tape-to-tape editing was like writing a letter with a type-writer. If you wanted to insert video at the beginning of a project, you had to start from scratch. Desktop video, however, enables you to work with moving images in much the same way you write with a word processor. Your movie “document” can quickly and easily be edited and re-edited to your heart’s content, including adding music, titles, and special effects.

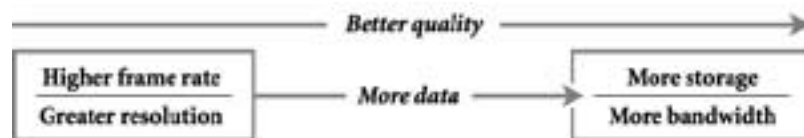
Frame Rates and Resolution

When a series of sequential pictures is shown to the human eye, an amazing thing happens. If the pictures are being shown rapidly enough, instead of seeing each separate image, we perceive a smoothly moving animation. This is the basis for film and video. The number of pictures being shown per second is called the **frame rate**. It takes a frame rate of about 10 frames per second for us to perceive smooth motion. Below that speed, we notice jerkiness. *Higher frame rates make for smoother playback.* The movies you see in a theatre

are filmed and projected at a rate of 24 frames per second. The movies you see on television are projected at about 30 frames per second, depending on the country in which you live and the video standard in use there.

The quality of the movies you watch is not only dependent upon frame rate, however. The amount of information in each frame is also a factor. This is known as the **resolution** of the image. Resolution is normally represented by the number of individual picture elements (**pixels**) that are on the screen, and is expressed as a number of horizontal pixels times the number of vertical pixels (e.g. 640x480 or 720x480). All other things being equal, a *higher resolution will result in a better quality image*.

You may find yourself working with a wide variety of frame rates and resolutions. For example, if you are producing a video that is going to be shown on VHS tape, CD-ROM, and the Web, then you are going to be producing videos in three different resolutions and at three different frame rates. The frame rate and the resolution are very important in digital video, because they determine how much data needs to be transmitted and stored in order to view your video. *There will often be trade-offs between the desire for great quality video and the requirements imposed by storage and bandwidth limitations.*



Interlaced and Non-interlaced Video

If your video is intended to be displayed on a standard television set (as opposed to a digital tv or a computer monitor), then there is one more thing you should know about video frame rates. Standard (non-digital) televisions display **interlaced** video. An electron beam scans across the inside of the screen, striking a **phosphor** coating. The phosphors then give off light we can see. The intensity of the beam controls the intensity of the released light. It takes a certain amount of time for the electron beam to scan across each line of the television set before it reaches the bottom and returns to begin again. When televisions were first invented, the phosphors available had a very short persistence (i.e., the amount of time they would remain illuminated). Consequently, in the time it took the electron beam to scan to the bottom of the screen, the phosphors at the top were already going dark. To combat this, the early television engineers designed an interlaced system. This meant that the electron beam would only scan every other line the first time, and then return to the top and scan the intermediate lines. These two alternating sets of lines are known as the “upper” (or “odd”) and “lower” (or “even”) **fields** in the television signal. Therefore a television that is displaying 30 frames per second is really displaying 60 fields per second.

Why is the frame/field issue of importance? Imagine that you are watching a video of a ball flying across the screen. In the first 1/60th of a second, the tv paints all of the even lines in the screen and shows the ball in its position at that instant. Because the ball continues to move, the odd lines in the tv that are painted in the next 1/60th of a second will show the ball in a slightly different position. If you are using a computer to create animations or moving text, then your software must calculate images for the *two* sets of fields, for *each* frame of video, in order to achieve the smoothest motion. The frames/fields issue is generally only of concern for video which will be displayed on televisions. If your video is going to be displayed only on computers, there is no issue, since computer monitors use non-interlaced video signals. And, in any case, if you are using Adobe Premiere software for video editing or Adobe After Effects software for motion graphics and visual effects, the frame/field issue will be handled correctly.

Video Color Systems

Most of us are familiar with the concept of **RGB** color. What this stands for is the Red, Green, and Blue components of a color. Our computer monitors display RGB color. Each pixel we see is actually the product of the light coming from a red, a green, and a blue phosphor placed very close together. Because these phosphors are so close together, our eyes blend the primary light colors so that we perceive a single colored dot. The three different color components — Red, Green, and Blue — are often referred to as the **channels** of a computer image.

Computers typically store and transmit color with 8 bits of information for each of the Red, Green, and Blue components. With these 24 bits of information, over a million different variations of color can be represented for each pixel (that is 2 raised to the 24th power). This type of representation is known as **24-bit color**.

Televisions also display video using the red, green, and blue phosphors described above. However, television signals are not transmitted or stored in RGB. Why not?

When television was first invented, it worked only in black and white. The term “black and white” is actually something of a misnomer, because what you really see are the shades of gray between black and white. That means that the only piece of information being sent is the brightness (known as the **luminance**) for each dot.

When color television was being developed, it was imperative that color broadcasts could be viewed on black and white televisions, so that millions of people didn’t have to throw out the sets they already owned. Rather, there could be a gradual transition to the new technology. So, instead of transmitting the new color broadcasts in RGB, they were (and still are) transmitted in something called **YCC**. The “Y” was the same old luminance signal that was used by black and white televisions, while the “C’s” stood for the color components. The two color components would determine the hue of a pixel, while the luminance signal would determine its brightness. Thus, color transmission was facilitated while black and white compatibility was maintained.

Should you care about the differences between RGB and YCC color? For most applications, you probably won’t ever need to think about it. If you edit with Adobe Premiere and create motion graphics and visual effects in Adobe After Effects, the software can mix and match video in the different formats without a problem. It is good to understand the differences, however, when you have honed your basic skills and are ready to tackle more sophisticated technical challenges like color sampling and compositing.

If you are concerned with the highest quality output, you’ll want to work in **16-bit-per-channel color**, (64-bit color), rather than the typical 8-bit-per-channel color described above (commonly known as 24-bit color). When you work with high-resolution images that use a narrow range of colors, such as when you’re creating film effects or output for HDTV, the difference is easily visible: transitions between colors are smoother with less visible banding, and more detail is preserved.

Analog Video Formats

At some point almost all video will be digital... but it doesn’t mean that you can ignore the analog video world.

At some point almost all video will be digital, in the same way that most music today is mastered, edited and distributed (via CD or the Web) in a digital form. These changes are happening, but it doesn’t mean that you can ignore the analog video world. Many professional video devices are still analog, as well as tens of millions of consumer cameras and tape machines. You should understand the basics of analog video.

Because of the noise concerns mentioned earlier, *in analog video the type of connection between devices is extremely important*. There are three basic types of analog video connections.

Composite: The simplest type of analog connection is the composite cable. This cable uses a single wire to transmit the video signal. The luminance and color signal are composited together and transmitted simultaneously. This is the lowest quality connection because of the merging of the two signals.

S-Video: The next higher quality analog connection is called S-Video. This cable separates the luminance signal onto one wire and the combined color signals onto another wire. The separate wires are encased in a single cable.

Component: The best type of analog connection is the component video system, where each of the YCC signals is given its own cable.

How do you know which type of connection to use? Typically, *the higher the quality of the recording format, the higher the quality of the connection type*. The chart on the next page outlines the basic analog video formats and their typical connections.

The basic analog video formats and their typical connections

Tape Format	Video Format	Quality	Appropriate Applications
VHS	Composite	Good	home video
S-VHS, Hi-8	S-Video	Better	prosumer, industrial video
BetaSP	Component	Best	industrial video, broadcast

Broadcast Standards

There are three television standards in use around the world. These are known by the acronyms **NTSC**, **PAL**, and **SECAM**. Most of us never have to worry about these different standards. The cameras, televisions, and video peripherals that you buy in your own country will conform to the standards of that country. It will become a concern for you, however, if you begin producing content for international consumption, or if you wish to incorporate foreign content into your production. You can translate between the various standards, but quality can be an issue because of differences in frame rate and resolution. The multiple video standards exist for both technical and political reasons. The table below gives you the basic information on the major standards in use today around the world.

Broadcast standards

Broadcast Format	Countries	Horizontal Lines	Frame Rate
NTSC	USA, Canada, Japan, Korea, Mexico	525 lines	29.97 frames/sec
PAL	Australia, China, Most of Europe, South America	625 lines	25 frames/sec
SECAM	France, Middle East, much of Africa	625 lines	25 frames/sec

The SECAM format is only used for broadcasting. In countries employing the SECAM standard, PAL format cameras and decks are used. Remember that the video standard is different from the videotape format. For example, a VHS format video can have either NTSC or PAL video recorded on it.

Getting Video Into Your Computer

Since your computer only “understands” digital (binary) information, any video with which you would like to work will have to be in, or be converted to, a digital format.

Analog: Traditional (analog) video camcorders record what they “see and hear” in the real world, in analog format. So, if you are working with an analog video camera or other analog source material (such as videotape), *then you will need a video **capture** device that can “digitize” the analog video*. This

will usually be a **video capture card** that you install in your computer. A wide variety of analog video capture cards are available. The differences between them include the type of video signal that can be digitized (e.g. composite or component), as well as the quality of the digitized video. The digitization process may be driven by software such as Adobe Premiere. Once the video has been digitized, it can be manipulated in your computer with Adobe Premiere and Adobe After Effects, or other software. After you are done editing, you can then output your video for distribution. This output might be in a digital format for the Web, or you might output back to an analog format like VHS or Beta-SP.

Digital: Digital video camcorders have become widely available and affordable. Digital camcorders translate what they record into digital format *right inside the camera*. So your computer can work with this digital information as it is fed straight from the camera. The most popular digital video camcorders use a format called **DV**. To get DV from the camera into the computer is a simpler process than for analog video because the video has already been digitized. Therefore the camera just needs a way to communicate with your computer (and vice versa). The most common form of connection is known as **IEEE 1394**. This is covered in more detail in a later section of this primer.

Video Compression

Whether you use a capture card or a digital camcorder, in most cases, *when your video is digitized it will also be compressed*. **Compression** is necessary because of the enormous amount of data that comprises uncompressed video.

*It would take over 1.5 GB
(gigabytes) to hold a minute
of uncompressed video!*

A single frame of uncompressed video takes about 1 megabyte (MB) of space to store. You can calculate this by multiplying the horizontal resolution (720 pixels) by the vertical resolution (486 pixels), and then multiplying by 3 bytes for the RGB color information. At the standard video rate of 29.97 frames per second, this would result in around 30 MB of storage required for each and every second of uncompressed video! It would take over 1.5 gigabytes (GB) to hold a minute of uncompressed video! In order to view and work with uncompressed video, you would need an extremely fast and expensive disk array, capable of delivering that much data to your computer processor rapidly enough.

The goal of compression is to reduce the data rate while still keeping the image quality high. The amount of compression used depends on how the video will be used. The DV format compresses at a 5:1 ratio (i.e. the video is compressed to one-fifth of its original size). Video you access on the Web might be compressed at 50:1 or even more.

Types of Compression

There are many different ways of compressing video. One method is to simply *reduce the size of each video frame*. A 320x240 image has only one-fourth the number of pixels as a 640x480 image. Or we could *reduce the frame rate of the video*. A 15 frame-per-second video has only half the data of a 30 frame-per-second video. These simple compression schemes won't work, however, if we want our video to be displayed on a television monitor at full resolution and frame-rate. What we need is another way of approaching the compression problem...

It turns out that the human eye is much more sensitive to changes in the *luminance* of an image than to changes in the *color*. Almost all video compression schemes take advantage of this characteristic of human perception. These schemes work by discarding much of the color information in the picture. As long as this type of compression is not too severe, it is generally unnoticeable. In fact, in even the highest quality "uncompressed" video used by broadcasters, some of the original color information has been discarded.

When each frame of video is compressed separately, the type of compression is known as "*intra-frame*" or "spatial" compression. But some video compression systems utilize what is known as "*inter-frame*" or "temporal" compression. Inter-frame compression takes advantage of the fact that any given frame of

video is probably very similar to the frames around it. So, instead of storing entire frames, we can store just the *differences* between certain frames.

The compression and decompression of video is handled by something called a **codec**. Codecs may be found in hardware — for example, in DV camcorders or capture cards — or in software. Some codecs have a fixed compression ratio and therefore a fixed data rate. Others can compress each frame a different amount depending on its content, resulting in a data rate that can vary over time. Some codecs allow you to choose a quality setting that controls the data rate. Such adjustable settings can be useful in editing. For example, you may wish to capture a large quantity of video at a low quality setting in order to generate a rough edit of your program, and then recapture just the bits you want to use at a high quality setting. This allows you to edit large quantities of video without needing a drive large enough to hold the entire set at high-quality.

ELEMENTS OF DV TECHNOLOGY

What is DV?

One of the most exciting changes in the world of video has been the arrival of the DV camcorder. What is DV and why is it so important? The term “DV” is commonly applied to a variety of different things.

DV Tape: First, the DV designation is used for a special type of tape cartridge used in DV camcorders and DV tape decks. A DV tape is about the size of a typical audio cassette. Most of us are actually more familiar with the *mini*-DV tape, which is smaller than the basic DV tape -- about half the size of an audio cassette.

DV Compression: DV also connotes the type of compression used by DV systems. Video that has been compressed into the DV format can actually be stored on any digital storage device, such as a hard drive or a CD-ROM. The most common form of DV compression uses a fixed data rate of 25 megabits/sec for video. This compression is called “DV25.”

DV Camcorders (Cameras): Finally, DV is applied to camcorders that employ the DV format. When someone refers to a “standard” DV camcorder, they are talking about a video camcorder that uses mini-DV tape, compresses the video using the DV25 standard, and has a port for connecting to a desktop computer. Today, such DV camcorders are in use by both consumers and professionals.

Benefits of DV

There are many benefits to DV, particularly when compared to analog devices like VHS decks or Hi-8 cameras.

Superior images and sound: A DV camcorder can capture much higher quality video than other consumer video devices. DV video provides 500 lines of vertical resolution (compared to about 250 for VHS), resulting in a much crisper and more attractive image. Not only is the video resolution better, but so is the color accuracy of the DV image. DV sound, too, is of much higher quality. Instead of analog audio, DV provides CD-quality sound recorded at 48Khz with a resolution of 16 bits.

No generation loss: Since the connection to your computer is digital, there is no generation loss when transferring DV. You can make a copy of a copy of a copy of a DV tape and it will still be as good as the original.

No need for a video capture card: Because digitization occurs in the camera, there is no need for an analog-to-digital video capture card in your computer.

Better engineering: The quality of the DV videotape is better than for analog devices. Plus, the smaller size and smoother transport mechanism of the tape means DV cameras can be smaller and have more battery life than their analog counterparts.

IEEE 1394

*IEEE 1394 is also known as
“FireWire” and “i.LINK”*

You can directly transfer digital information back and forth between a DV camcorder and your computer. The ports and cables that enable this direct transfer use the **IEEE 1394** standard. Originally developed by Apple Computer, this standard is also known by the trade names **FireWire®** (Apple Computer) and **i.LINK** (Sony Corporation). This high-speed serial interface currently allows up to 400 million bits per second to be transferred (and higher speeds are coming soon). If your computer does not come with this interface built in, then you will need to purchase an inexpensive card that provides the correct port.

The single IEEE 1394 cable transmits all of the information including video, audio, time code, and device control (allowing you to control the camera from the computer). IEEE 1394 is not exclusively used for video transfer; it is a general purpose digital interface that can also be used for other connections, such as to hard drives or networks.

...each 60-minute mini-DV
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DV25 Compression

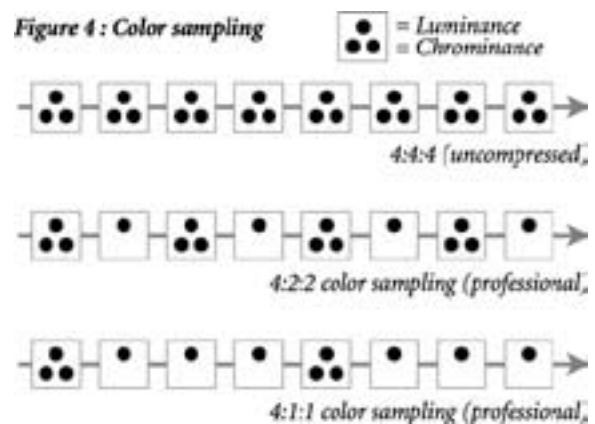
As previously mentioned, the DV25 codec provides 25 million bits per second of video data. DV25 is compressed at a fixed rate of 5:1. There is also audio and control information being transmitted, so that the total data rate is about 3.6 million bytes (MB) per second. This means that one hour of DV compressed footage will require about 13 billion bytes (gigabytes = GB) of storage. It is impressive to realize that *each 60-minute mini-DV cassette is actually 13 GB of offline storage!*

DV25 compression uses a reduced color sampling method known as 4:1:1 color, which is explained in the next section. The audio is uncompressed, and there are two stereo audio pairs. The audio can be digitized at either 12 bits at a sampling rate of 32kHz or 16 bits at a sampling rate of 44kHz or 48kHz. You should generally use the highest quality (16 bit, 48kHz) setting.

4:1:1 Color Sampling

When working with RGB images, we use exactly the same number of bits to store the three color components. When working with YCC video, however, we take advantage of the peculiarity of human perception previously mentioned—the eye is much more sensitive to changes in the *luminance* of an image than to the *color* (known as **chrominance**). So, instead of storing the same amount of information for each of the

YCC components, professional video only needs to store half as much color information as it does luminance information. This is also known as **4:2:2 color**, which means that for every four samples of luminance values, there are only 2 samples of each color signal. (**Figure 4**) This helps save bandwidth during analog transmission, as well as storage space in the digital realm. YCC can be reduced even further to what is known as **4:1:1 color**. DV cameras save video in the 4:1:1 space in order to reduce storage needs. This is not a problem for most applications, but it can cause issues during sophisticated operations such as compositing a person shot against a blue background into a new scene. The reduced color information may cause some visual **artifacts** around the composited image.



DV Variations

There are a number of variations to the DV format:

Digital8: A prosumer-targeted variation on the DV25 theme is called Digital8. It offers the same data rate and color sampling as DV25, but a slightly lower resolution. The Digital8 camcorder is designed to accommodate those customers who want to move up to digital video, but who might have a significant investment in analog Hi-8 movies. The Digital8 camcorder records digitally, but it can also play back analog Hi-8 tapes.

DVCAM and DVPRO: The basic DV format was designed for the consumer marketplace. Sony has introduced a professional variant known as DVCAM, which uses the same compression and tape as DV, but records less video on each tape. Recording is accomplished by magnetizing very small sections of videotape with differing polarities. The closer these small areas are to each other, the more likely there can be some interference. Remember, even though the data being recorded is digital, the medium itself is analog and subject to noise. Putting less data on the tape makes the recording more durable and facilitates better interchange between devices. Both the DVCAM and DVCPRO systems are designed with the professional in mind and each offers distinct benefits for a particular customer type.

DV50 and DV100: In addition to the DV25 standard, there are also emerging standards known as DV50 and DV100. Since DV25 indicates 25 Mb/s of video, DV50 indicates 50 Mb/s and DV100 represents 100 Mb/s. The DV50 standard uses 4:2:2 color sampling and a lower compression of 3:3:1. The video quality of this standard is extremely high, and is suitable for the most demanding professional broadcast purposes. The DV100 format will be used for HDTV (high definition television) recording.

Digital Betacam: Also known as DigiBeta, Digital Betacam is the high-end broadcast professional's choice. It provides superior image quality, and the high-end equipment required to work in this format is commensurately costly. Analog Betacam SP tapes can also be played back in DigiBeta decks.

Digital video formats

DV Format	Quality	Appropriate Applications
DV25 (MiniDV)	Good	home/prosumer video, Web, CD-ROM, DVD
DVCAM, DVPRO	Better	prosumer, industrial video, DVD
DV50, DV100, DigiBeta	Best	industrial video, DVD, broadcast

MPEG-2

MPEG stands for the Motion Pictures Expert Group, an organization of film and video professionals involved in establishing industry standards; -2 refers to “compression standard version 2.” This standard has gained wide acceptance in the marketplace. It is the format recorded onto DVD disks, and the format currently received by home satellite dishes. The principal feature of the MPEG-2 format is that it can provide extremely high-quality video with a data rate of around 1 MB/sec. That’s almost one quarter of the data rate needed for DV video. So why isn’t everything in MPEG-2? While MPEG-2 is an excellent *distribution* format, it is less useful for direct recording and editing of video because, from a video editing standpoint, it can be difficult to work with MPEG-2. The MPEG-2 compression scheme performs both intra-frame (spatial) and inter-frame (temporal) compression. The type of inter-frame compression that MPEG-2 employs involves estimating the motion of different parts of the image and then recording that motion rather than the actual pixels. This is both sophisticated and time-consuming. Most MPEG-2 schemes take much longer to compress video than they do to decompress it. Additionally, an MPEG-2 codec must have many frames of video to work with at once in order to perform the calculations. So, For example, say that you wanted to edit frame number 128 of your video. Instead of just reading frame 128 from a disk, the editing system might have to read frames 124, 125, 126, and 127 in order to compute what frame 128 actually looks like.

There are three different frame types in MPEG-2. These are known as the *I*, *P*, and *B* frames. *I* stands for “intra-frame” encoding and works just like a DV frame of video. The *P* frame is a “predicted” frame. It is computed from the frames previous to it. *B* is for “bi-directional” frame. This means that not only is the *B* frame computed from previous frames, it can also use frames that come after it. More data must be preserved to describe *I* frames, making them the “largest,” whereas *P* frames can be less than a tenth of that size. *B* frames are the smallest. Because the *P* and *B* frames are calculated from the *I* frames, you can’t just have one *I* frame and the rest *P*’s and *B*’s. There must be *I* frames interspersed or else the accumulated error becomes too great and the image quality suffers. A typical MPEG-2 sequence might look something like:

I-P-P-P-B-B-B-P-B-B-B-P-I-P-P-P-B-B-B-P-I-P-P-P-B-B

MPEG-2 is a very flexible format, making it possible to capture and edit video using only *I* frame encoding. Once editing is completed, the video can be recompressed to IPB format in order to reduce the overall size for distribution.

While DV isn't perfect, it is certainly the highest-quality, most cost-effective video format ever made available to the average consumer.

Other Forms of MPEG

MPEG-1, limited to a frame size of 352x240 pixels, was the first MPEG standard established and is still used for CD-ROMs, video CD (VCD), and some Web video. The specifications for MPEG-3 were abandoned, as the industry moved on to complete MPEG-4. (Note that MP3—which stands for MPEG-1, Layer 3—is an audio-only compression format and should not be confused with MPEG video formats). Currently in use in the latest releases of the QuickTime and Windows Media architectures, MPEG-4 facilitates streaming video on the Web and over wireless networks, as well as providing mechanisms for multimedia interactivity. The names MPEG-5 and MPEG-6 will not be used; the next release is expected to be MPEG-7, which will not advance compression

but will focus on the incorporation of “metadata,” enabling sophisticated indexing and retrieval of multimedia content. MPEG-21, also in the planning stages, is an iteration that is expected to create a complete structure for the management and use of digital assets, incorporating e-commerce capabilities that will make sharing creative products more commercially viable.

Is DV Perfect?

The image quality of the DV format has been tested by both human and mechanical means. This testing ranks DV quality on par with Beta-SP, which has been the mainstay for professional video production for decades. But DV is not perfect.

Because the video is compressed, it is possible for there to be visible degradations — known as compression **artifacts**. These artifacts result from the color compression, and will be most noticeable around sharp color boundaries like white text on a black background. The 4:1:1 reduced color sampling in DV compression can also cause issues when performing professional compositing.

Additionally, compression does add noise to the picture. If DV is repeatedly decompressed and then recompressed, it will begin to degrade. This is different from just *transmitting* DV from generation to generation, which *is* lossless. Technology is advancing rapidly, and even now there are video boards available that make it possible to edit and composite uncompressed video on the desktop. But, for most editing uses, you won't do many compression/decompression cycles and so any degradation that may result from DV compression will be unnoticeable.

While DV isn't perfect, it is certainly the highest-quality, most cost-effective video format ever made available to the average consumer and to many professionals. The entire video industry is being transformed by the low cost and high quality of the DV solution.

CONFIGURING YOUR SYSTEM

The boundaries between “professional” and “desktop” continue to blur. The differences between results are ultimately becoming a matter of the artist’s ability and not the cost of the system they use.

One of the most common questions is “*How do I configure my video editing system?*” Your answer to this question begins by asking yourself “*What are my intended uses?*” Are you interested in editing home videos on a budget? Or are you going into business as a professional? Your answers to these questions will help dictate the kind of hardware and software you should be considering. You also want to ensure that the system you are getting meets both your current and your probable future needs. Here are a few more questions you should ask yourself:

“*What kind of video will I be putting into the computer?*” Will you only be working with DV footage? Or do you need to be able to edit footage captured in component or composite video? For example, many industrial and broadcast users need to be able to capture and record video in the component format for use with Beta-SP decks, in addition to DV. It would make little sense for such a user to have a DV-only system.

“*How will I distribute my finished video?*” Do you intend to distribute on DV, VHS, DVD, the Web? The answer to this question might dictate your selection of a video card. For example, if your business will entail creating industrial videos on recordable DVDs, then you would want a video card that could compress your video into the MPEG-2 format used on DVDs.

“*How time-critical will my productions be?*” When you add effects like transitions and titles to video, they usually have to be rendered by the computer into their final form. This can take anywhere from minutes to hours depending upon the complexity of your productions. If you are producing home videos, then this isn’t much of a problem. But, if you have clients looking over your shoulder asking for changes, then you might find it well worth your while to purchase a system which can produce these effects instantly.

“*How much video will I be working with?*” Remember that one hour of DV video takes about 13 GB of disk storage. If you are producing a 1-hour documentary, then you’ll want at least enough storage for several hours of raw footage. You will often find yourself working with four or five times as much raw footage as you will eventually use. If you are doing professional editing, you could be working with 20 or even 50 times the amount of final footage! Of course, you don’t need to have all of it available at all times, but you will need to think about this when configuring your storage.

Video Capture Cards

There are several different types of video capture cards (also termed “boards”) available on the market today. In fact, many computer systems now ship with the IEEE 1394 interface as a standard feature. Your card choice will depend upon how you answered the questions posed above. In many cases, once you have determined your card, that will also determine your computer. This is because many types of cards are only available for one type of computer platform. There are six basic features that define video cards. These are:

1. Types of *analog* video input/output supported
2. Types of *digital* video input/output supported
3. Types of video *compression* supported
4. Types of special *processing* supported
5. Types of *software* included
6. Types of *audio* supported

IEEE 1394 Cards

The simplest kind of card available is the IEEE 1394 interface card. This card is used to add the IEEE 1394 interface to computers that did not ship with one. This card does not support any analog video I/O, compression, or special processing. In fact, it does not really “capture” video, it merely enables the “transfer” of digital video into your computer. The IEEE 1394 interface can be used for many other connections as well, such as hard drives, scanners, and networking. Although the digital video being transmitted by the IEEE 1394 card is compressed, the card itself does not do any compression or decompression. The camera and the computer handle the compression and decompression tasks. If you purchase an IEEE 1394 card, you will want to be sure that the appropriate drivers are available to support your NLE software, such as Adobe Premiere.

Analog Capture Cards

Unlike the basic IEEE 1394 cards, analog capture cards actually perform the task of converting analog video to and from digital video. There are many different sources of analog video, including VHS tapes, Hi-8 cameras, Beta-SP tapes, etc. These cards vary in price depending upon the type of analog interface supported. Composite video, from a VHS deck for example, is the least expensive. Component video, such as from a Beta-SP deck, is the most expensive. The reason for the cost difference is the complexity and cost of the components required to perform the conversion.

In addition to the type of analog input supported, you should also be aware of the type of compression being used. For many years, the MJPEG compression format has been a standard for both consumer and professional video. Recently, newer formats like DV and MPEG-2 have gained in popularity. Some of the newer cards allow you to easily convert from one format to another. That makes it possible, for example, to edit in DV and then to transcode to MPEG-2 for distribution.

Real-Time Cards

One of the major differences (besides the price) between desktop products like Adobe Premiere and costly proprietary editing systems used to be performance. If you wanted a special effect like a transition, the desktop system would make you wait while it calculated the effect, whereas the high-end system included specialized hardware to create it instantly. Sometimes the calculation of the effect (called **rendering**) on the desktop system could take minutes or even hours, which would slow production to a crawl. This productivity barrier between the high-end and the desktop has now been shattered by a variety of newly introduced video cards. These boards work with Adobe Premiere and have specialized processors to handle the enormous number of calculations required for video effects. Prices for such “real-time” cards begin at around \$1,000 and offer performance similar to high-end systems for a significantly smaller investment. Such real-time boards provide a phenomenal productivity increase for Adobe Premiere users.

Why are video effects so processing-intensive? It’s because of the massive data rates involved. Each frame of video contains about 1 MB of data, and these data-heavy frames are arriving at around 30 frames-per-second. An effect, such as a transition, is the result of mathematically blending two video streams to create a new piece of video. That means that even the simplest effect requires about 60 million calculations per second to create the new bit of video.

What kind of effects can be done in real-time? That depends on the board being used. One of the strengths of Adobe Premiere is its wide range of effects. These include transitions, video filters (e.g., adding camera blur or changing a color image to black and white), keying (e.g. putting an actor shot against a blue-screen into another scene), transparency, scaling, adding titles, and motion. Most real-time cards are capable of handling the most common types of effects such as transitions and titles. Some boards can handle a much wider array of effects, even including the capability to “fly” your video around in 3D in real-time. Other differences between real-time video cards include the compression type (MJPEG, DV, MPEG-2, uncompressed, etc.) as well as the input/output options (composite, component, 1394, SDI, etc.).

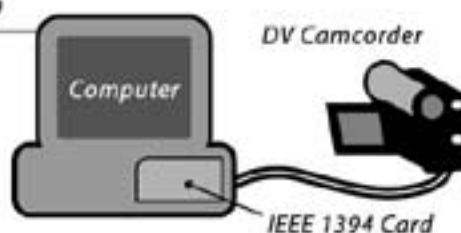
Example Video Cards

Example	Analog Inputs	Digital Inputs	Compression Types	Real-Time Effects	Audio I/O	Approx. U.S. Cost
ADS Pyro	None	IEEE 1394	None	None	IEEE 1394	\$100
Canopus DV Raptor RT	None	IEEE 1394	DV, MPEG-2	Titles, color correction, chroma key, 3D FX, DVE	IEEE 1394	\$599
Canopus DV Storm	Composite, S-Video	IEEE 1394	DV, MPEG-2	Titles, color correction, chroma key, 3D FX, DVE	IEEE 1394, RCA	\$1,299
Matrox RT2500	Composite, S-Video	IEEE 1394	DV, MPEG-2	Transitions, titles, 3D FX, DVE	IEEE 1394, RCA	\$799
Matrox DigiSuite LX	Composite, S-Video Component	IEEE 1394	DV, MPEG-2	Transitions, titles, motion, color correction, DVE	IEEE 1394, RCA, Balanced XLR	\$3,995
Matrox RT Mac	Composite, S-Video	IEEE 1394	DV, MPEG-2	Transitions, titles, motion	IEEE 1394, RCA	\$1,199
Pinnacle DV500	Composite, S-Video	IEEE 1394	DV, MPEG-2	Transitions, titles, color correction	IEEE 1394, RCA	\$599
Pinnacle Pro One	Composite, S-Video	IEEE 1394	DV, MPEG-2	Transitions, titles, 3D FX, DVE	IEEE 1394, RCA	\$1,299
Pinnacle DC-2000	Composite, S-Video, Component	IEEE 1394 option	MPEG-2	Transitions, titles, color correction	Balanced XLR, RCA, IEEE 1394 option	\$2,199

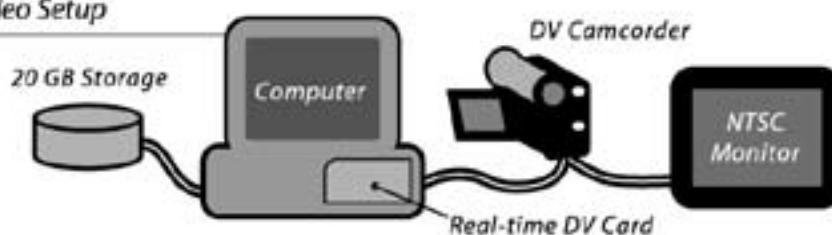
Disclaimer: The information provided in the table above is for general information purposes only. It is not intended to be an endorsement of particular products or a complete list of products, features or pricing and it should not be relied upon as such. Please contact the relevant manufacturers for details of the individual products.

Example Configurations

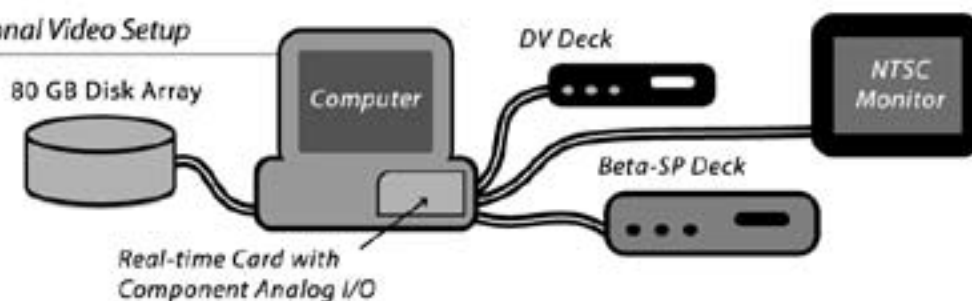
Consumer Home Video Setup



Prosumer Video Setup



Professional Video Setup

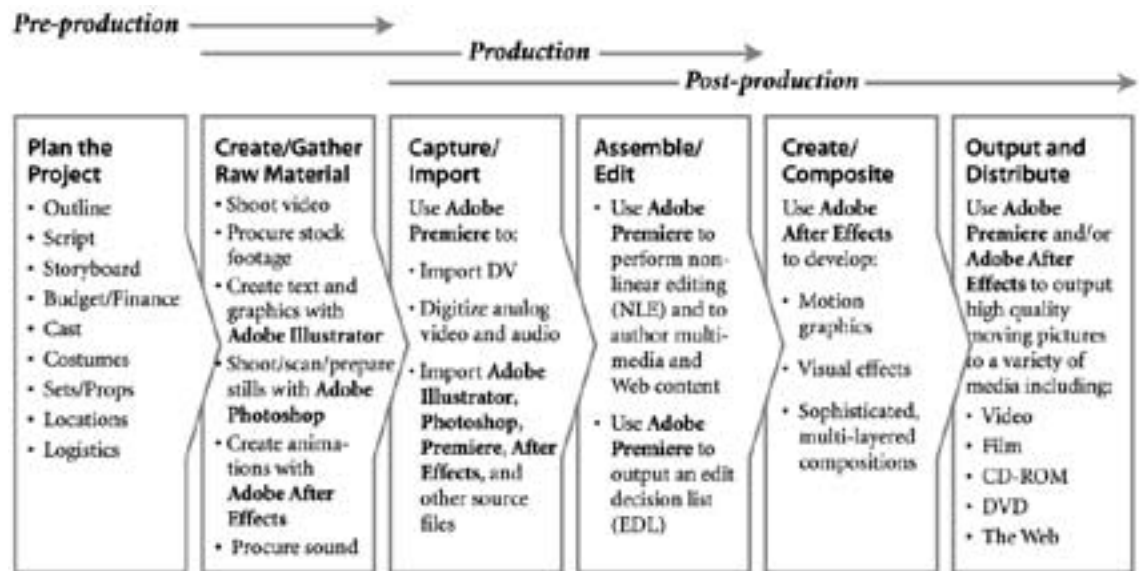


THE CREATIVE PROCESS

An Overview of Movie-Making

Let's assume you have a story to tell. It might be "Jonathan and Jennifer's Wedding" or "The Hometown Bank's Loan Officer Training Guide" or "Emma's Big Adventure: A Film About My Cat" or "How to Assemble the Waldo Widget." Whether you are making a very short video for the Web, an industrial or training presentation, a television commercial, a feature film, or just doing a personal project, the process is virtually the same. This section describes the key steps.

As you can see from the following chart, sometimes stages will overlap. You'll end up tailoring your own process to fit the project, or to your own, individual working style. Depending upon your personal working preferences, you might want to shoot, create and/or gather all your clips before you begin the assembly process. Or, you might prefer to work back and forth on production and post production tasks (or, if you have a team, concurrently). With digital video, your movie making tasks can flow over and around one another in an extremely fluid manner.



Pre-Production

Pre-production is the planning stage. Typically, it includes steps to take before you begin "production" (shooting film or video). But this is a flexible process and the non-linear editing methods made possible by the advent of digital video make it even more so. When you begin your project, you may have already shot some or all of the video you'll need. You may be "re-purposing" content that includes existing video, still photography, charts, graphs, illustrations and/or animations. Or you may be starting with a blank slate. The "pre-production" phase should include all the steps you need to take to be sure that you are prepared to move from concept to completion.

Outline: No matter how "simple" (and this is, of course, a relative term!) you intend your project to be, begin with an outline. An outline helps you plan. It can be shared with coworkers or clients, to make sure everyone is "watching the same tv show" in terms of their expectations. Your outline will help you identify what materials you need to create, assemble, and/or acquire in order to get your process underway. You can also use your outline to plan the budget for your project.

Script: An outline may be enough for you to work from, or you may want a more formal script that includes dialogue, narration, notes about the locations or settings, the action, the lighting, the camera angles and movements, the edits, as well as the visual and sound effects.

“...When it comes to pre-visualization, it just makes sense for me to use Adobe Premiere. It’s cost-effective and a way to be very spontaneous when you’re being creative. You’ve got 900 frames to tell a story [for a 30-second commercial spot] and you better use every one of those frames very judiciously...”

—Fred Raimondi, *Digital Domain*

Storyboards: You may also choose to do storyboards—sketches of key moments in the action—like a comic strip—labeled with notes about the action, sound, camera angles or motion, etc. Sometimes storyboards are even translated into motion to create **animatics**, using a tool like Adobe Premiere or After Effects. This is called **pre-visualization**, and may be used to help work out notions for a sequence, share an idea with coworkers, or “sell” a concept to a client.

Budgeting: Whether you are doing a personal or a professional project, it is definitely a good idea to add a budget to your outline as early as possible. For professionals, you’ll need a budget to secure financing. Your budget should include wages for yourself, your coworkers, actors and other talent (e.g., effects specialists, graphic designers, musicians, narrator, animal trainers...) as well as costs for location fees, costumes, props, equipment rentals, catering—and anything else you can think of: videotape or DV cassettes, lunch...

Casting, Locations, Props, Costumes, Equipment Rentals, Catering, etc.: Every project is different. Plan adequately for yours. **Do** sweat the details! Here’s a very brief list of tips to get you started thinking about some of those details:

- Take the time to test your cast, to make sure they work well together. For example, a conversation between a very tall and a very short person might not work well on camera.
- If you are shooting “real people” be sure to give them guidance about what to wear. For example, white shirts generally don’t photograph well, as they may glare under artificial light; stripes and small patterns might be problematic, etc. “Real” people should be reminded to pay special attention to grooming (hair and makeup) if they are going to be in your video, or you might want to have professional help on hand.
- If necessary, get permission to use locations.
- Be sure your costumes, sets, and props will be ready when you need to shoot.
- Make sure you have all the rental equipment you need, that it all functions, and that you know how to use it—before you head out for a location.

Production

“Quiet on the set! Action! Roll ‘em!” Capturing live or animated action and sound on film, videotape, or DV—shooting or creating raw footage—is called **production**. During production, your concerns will include: lighting, “blocking” (where and how your actors or subjects move), and shooting (how the camera moves and from what angles your scenes are viewed. There are many good learning references available regarding production—books, Web sites, classes, and more.

Post Production

What comes out of production is a collection of clips—i.e., different scenes shot in different places at different times. To actually develop your “story,” you need to edit and assemble your clips and, perhaps, add visual effects, graphics, titles, and a sound track. This part of the process is called **post-production**.

This is where Adobe enters the picture, with two of the industry’s leading software applications specifically designed for post-production: Adobe Premiere, the essential tool for professional digital video editing, and Adobe After Effects, the essential tool for motion graphics and visual effects. While both of these award-winning products are easy for the novice to learn and use, they are also the choice of a great many professionals. Adobe is also well-known for two powerful software applications that have set the standard for graphic arts professionals worldwide and are enormously useful for creating and enhancing elements during the post-production process—Adobe Photoshop® and Adobe Illustrator®.

Adobe makes it easy for you to acquire all the software you need, with an affordable Collection developed specifically for videographers. Comprised of Adobe Premiere, Adobe After Effects, Adobe Photoshop, and Adobe Illustrator, the Adobe Digital Video Collection is a powerful and complete set of professional tools that deliver unparalleled integration and precise control for

creating movies and motion graphics from digital video.



Plus, if you plan to incorporate your video productions into Web sites, Adobe can provide the software you need for a comprehensive, cross-platform solution that's tightly-integrated. Adobe LiveMotion™ lets you create interactive animations for the Web and dynamic user interface elements with motion and sound. Use Adobe GoLive® for developing and managing your Web sites.

In the next three sections, you'll find lots of useful information about post-production techniques. We have used our own products to illustrate these techniques because Adobe software products adhere to (and, in many cases, have established) industry standards for digital video post-production. So, whatever software you choose, the material presented in this primer will help you learn about what's involved in the post-production process.

ACQUIRING SOURCE MATERIAL

You've configured your system. You've shot and/or gathered some video. And you are eager to begin post production. But first you need to gather all of your raw material together, on your computer.

Know Your Cables and Connectors



XLR



RCA



BNC



S-Video



IEEE 1394

If you are new to video, figuring out all of those audio and video cables and connectors can be as difficult as untangling a bowl of spaghetti one noodle at a time. This chart is intended to help.

Pictured (top to bottom) are two audio connectors: XLR and RCA; and three video connectors: BNC, S-Video and IEEE 1394. The depicted connectors are all male, although female counterparts also exist.

XLR connectors are used to connect microphones and other balanced audio devices and for the AES/EBU digital audio connection. An RCA connector is also called a phono plug and is often used to connect consumer audio and video equipment like VCRs, tuners and CD players.

BNC, which stands for baby "N" connector is used to connect various video sources, including analog composite, analog component, and serial digital video interface (SDI).

BNC connectors are also used for other signals like genlock. The S-Video connector connects S-Video equipment, like S-VHS camcorders and video disks. In video, the IEEE 1394 connector is used to connect a DV camera to a computer IEEE 1394 port.

DV Without Delay

If you shot DV, or if your raw material is on DV tape, with Adobe Premiere, **capturing** your clips can be as easy as "plug 'n play." Adobe Premiere lets you customize a wide range of settings to streamline and optimize your workflow to handle your specific DV needs.

Device control customization: Just specify the DV device (deck or camcorder) manufacturer and model and Adobe Premiere optimizes its built-in device control for maximum reliability and efficiency, making the video capture process more precise.



Built-in support, in Adobe Premiere, for all types of DV devices allows you to customize control of each model independently.

DV presets: Adobe Premiere stores groups of project settings in files called presets, which include settings for compressor, frame size, pixel aspect ratio, frame rate, depth, audio, and field order. When you first start a project, you'll be prompted to select a preset, or you can customize your own by selecting individual settings.

Importing Computer Graphics

If your source material includes digital animations or computer graphics, previously digitized clips or digital sound, you can import or export many different types of video, audio, and image formats. Support for input and output formats in Adobe Premiere is extensive, and the software offers a high degree of cross-platform compatibility. You can transfer project files, titles, motion graphics, storyboards, effects, batch lists, EDLs (edit decision lists), libraries

and other files between Windows and Macintosh systems. If support for the format you want is not built into Adobe Premiere, chances are a third party plug-in will provide it.

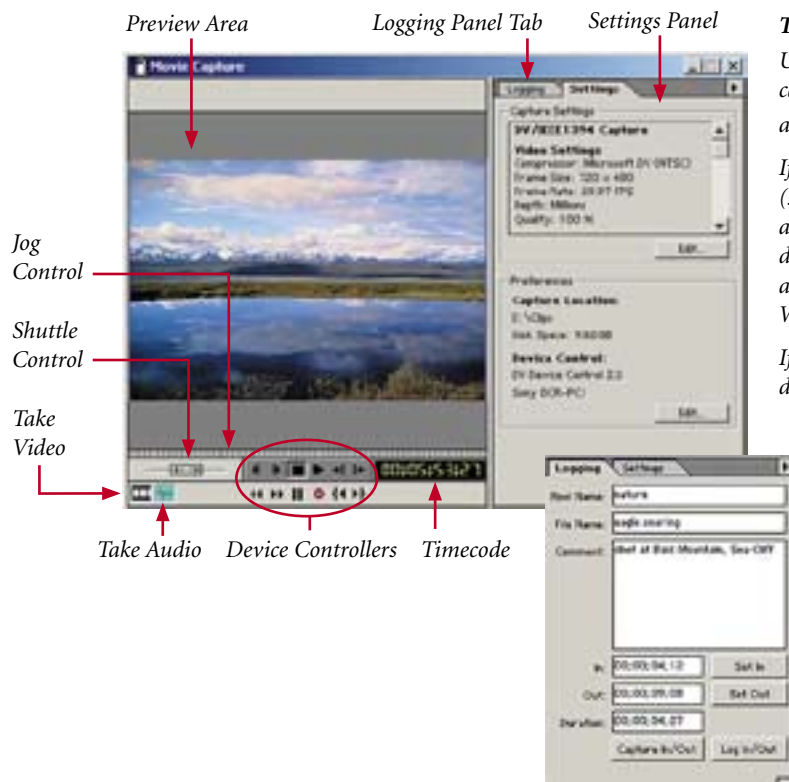
Find a list of plug-ins for Adobe Premiere at www.adobe.com/products/plugins/premiere/main.html, and a list of plug-ins for Adobe After Effects at www.adobe.com/products/plugins/aftereffects/main.html

Capturing Analog Video

Although digital media equipment is becoming increasingly common, a great amount of video and audio continues to be recorded and stored using analog equipment. For this reason, you may need to capture analog video and audio as part of your workflow. You can digitize analog video directly into Adobe Premiere if you use digitizing hardware to connect an analog video player or camera to your computer. Video-digitizing hardware is built into some personal computers, but usually must be added to a system by installing a compatible hardware capture card. For a list of compatible cards, see the Adobe Premiere Web site (<http://www.adobe.com/premiere>). If you will be adding analog video to a DV project, you can avoid compatibility problems by digitizing the analog video as if it were DV.

Batch Capture

If you have the proper setup for device control and have a videotape recorded with timecode, you can set up Adobe Premiere for automatic, unattended capture of multiple clips from the same tape. This is called **batch capture**. You can batch capture clips from analog or DV camcorders or decks. You **log**, or create a list of, the segments you want to capture, using the Batch Capture window. The list (called a *batch list* or *timecode log*) can be created either by logging clips visually, using device control, or by typing In and Out points manually. When the batch list is ready, you just click one button to capture all the clips in the list. Batch capturing is very useful in a professional production environment, and can be especially helpful when you need to return to a previously produced project that you need to recreate from the original tape sources.



The Adobe Premiere Movie Capture Window

Use the Adobe Premiere Movie Capture window to capture DV and analog video and audio. The Preview area displays your currently recording video.

If you don't have a controllable playback device (some inexpensive consumer VCRs and camcorders are not controllable), you can manually operate the device and, while watching the picture in the Preview area, use the record button in the Movie Capture Window to capture the frames you want.

If you have a more sophisticated camcorder or deck, you can use the Device Control feature in the Movie Capture window to perform batch capture, by recording a list of In and Out points for each clip and then capturing all clips on the list automatically, while you do something else.

The Logging Panel

With the Movie Capture window's Logging panel, you can quickly log video clips, set In and Out points, name clips and reels, effort-lessly batch-capture multiple logged video clips, and add comments about each clip.

Online and Offline Editing

Online Editing: Online editing is the practice of doing *all* editing (including the **rough cut**) on the same clips that will be used to produce the **final cut**. Previously, online editing had to be done on costly, high-end workstations designed to meet the quality and data-processing requirements of

broadcast video. Editors who could not afford an online system had to rent time at a suitable production facility. As personal computers have become more powerful, online editing has become practical for a wider range of productions including broadcast and even motion-picture film productions.

When you work with DV source material, all editing is done online. DV compression makes standard DV manageable on many desktop systems.

For online editing using analog source material, you capture clips once at the highest level of quality your computer and peripherals can handle.

Offline Editing: In **offline editing**, you edit a rough cut of your video using low-quality clips, and then produce the final cut using high-quality clips. Offline editing was originally developed to save money by preparing rough cuts on less expensive systems. Although offline editing can be as simple as writing down time points for clips while watching them on a VCR, it is increasingly done using personal computers and capable software such as Adobe Premiere.

If you are working with analog source material, offline editing techniques can be useful even if your computer can edit at the quality of your final cut. By batch-capturing video using low-quality settings, you can edit faster, using smaller files. In most cases, you need only enough quality to identify the correct beginning and ending frames for each clip. When you're ready to create the final cut, you can redigitize the video at the final-quality settings. This is another example of where the logging and batch capture techniques in Adobe Premiere can be useful.

Professional editors looking for a powerful, affordable off-line editor will appreciate the way Adobe Premiere software facilitates quickly building an off-line edit and exporting an edit decision list (EDL) for conforming online. EDLs can be exported in industry standard formats compatible with all leading edit controllers, such as the Sony BVE 9000 and BVE 9100, as well as CMX.

NON-LINEAR EDITING

Yes, it's finally time to put it all together. And post production has never been easier... Non-linear editing (NLE) makes editing and assembling your production as easy and as flexible as word processing. Once your raw materials are in your computer, you can edit, alter, adjust, and reconfigure them—over and over again—with a few mouse clicks.



Getting to Know NLE Tools

By getting to know the Adobe Premiere interface, you'll learn about many of the tools and methods that are familiar to seasoned professionals who may have learned their craft working on costly high-end systems. Yet Adobe Premiere software is also easy for beginning video enthusiasts to learn and use. Because of its flexibility and many customization options, Adobe Premiere is a good choice for beginners and experts alike.

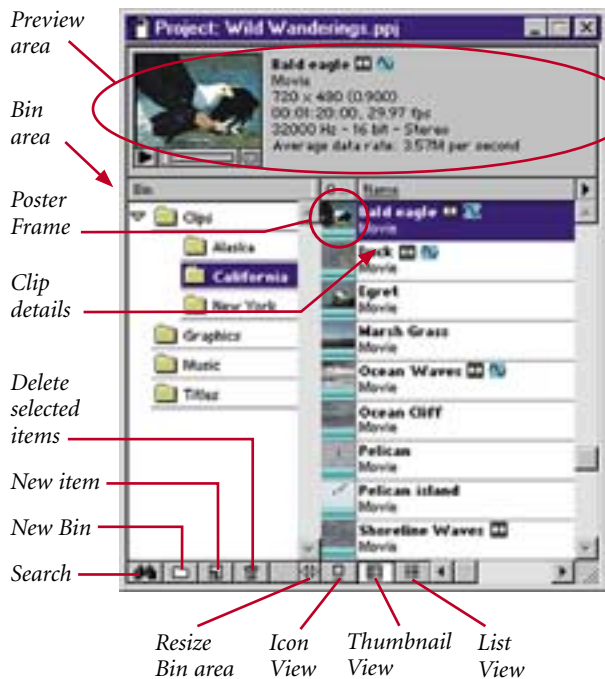
Four standard workspaces: The arrangement of windows, features and palettes is called the “workspace.” You'll find four different types of editing workspaces in Adobe Premiere; which one you use will usually depend upon the task at hand:

- **A/B Editing workspace:** This straightforward mode resembles a traditional editing method called “A/B roll editing” which uses two video tapes, or rolls, (A and B) and is recommended for those who are new to video editing. In the A/B Editing workspace, clips are usually dragged directly from the Project window to the Timeline window. If you plan to perform only simple cuts and edits, and prefer to work with a separate **transition** track, the A/B Editing workspace is a good choice.
- **Single-Track Editing workspace:** Most professional video editors use a single-track editing system for precise placement of clips in the Timeline. Clips are usually dragged from the Project window to the Source view of the Monitor window for trimming and for setting **In and Out points**. Clips are then dragged to the Timeline window for positioning. In the Timeline window, the Video 1 track combines the transition track and the two video subtracks (often called “upper” and “lower” rather than “A” and “B”) into a single track which, while it may be expanded to show the three subtracks, behaves as one track. In other words, in single-track editing (unlike A/B editing), all tools act on the three subtracks as a unit, for inserting and overlaying trimmed clips.
- **Effects workspace:** Providing efficient access to both audio and video **effects** (which, in earlier releases of Adobe Premiere and in some other video editing applications may be called “filters”), the Effects workspace uses your current workspace—either A/B Editing or Single-Track Editing—with the following adjustments: the Monitor window displays in Single view, and the Effect Controls, Navigator, and Transitions palettes are active. You may want to use the Effects workspace if the tasks in your editing session all revolve around applying effects to your audio and/or video.
- **Audio workspace:** The Audio workspace also uses your current workspace—either A/B Editing or Single-Track Editing—with the following adjustments: clips open in a separate Clip window, the Audio Mixer is open, and no palettes are displayed. The Audio workspace is a convenient configuration to use when you are working on the audio portion of your project.

You can reconfigure these four basic Adobe Premiere workspaces to combine your favorite features, then save your own custom workspaces for ongoing use. Because most professional video editors use two monitors, custom workspaces that take advantage of dual monitors can also be saved. Dual monitor configurations offer additional flexibility and the benefit of having more windows and palettes open and accessible.

The workspaces are divided into three key areas: the *Project window*, where **assets** are managed; the *Monitor window*, where video being edited is viewed; and the *Timeline*, where video clips are arranged over time. Additionally, a variety of feature-rich, pop-up *palettes* for handling transitions, effects, and other functions, are visible when needed but can be hidden to conserve screen real estate.

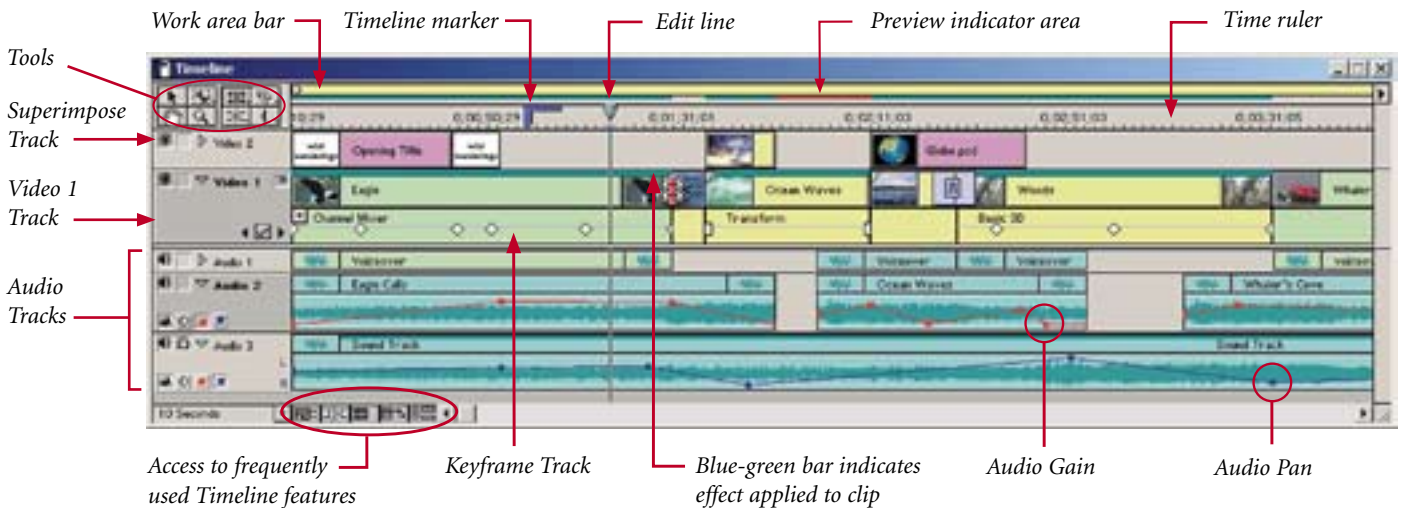
The Adobe Premiere Project window



The Project window: The Project Window manages all the assets in your video project including video, audio, stills, and titles. You organize your assets into folders called “bins,” which can be given custom names (e.g. “Scene 12,” “Voiceovers,” etc.). The Project Window provides basic database functions, so you can sort or search your content, as well as add custom fields of information. The Project Window displays Preview and Bin areas, providing a convenient overview of the files associated with a project.

- **Preview Area:** Click the Play button under a thumbnail-sized poster frame to preview a video clip within the Project window. The Preview area includes basic information about the clip, such as frames per second and average data rate. The poster frame used to represent a clip can be changed from the default (first frame) to any frame you select from the clip.
- **Bin Area:** The Bin area provides a hierarchical representation of the files in your project. Use the Search button to find what you need, fast. Command buttons let you quickly delete selected clips and bins and add new items. The “Export Bin From Project” feature lets you share bins among multiple projects.

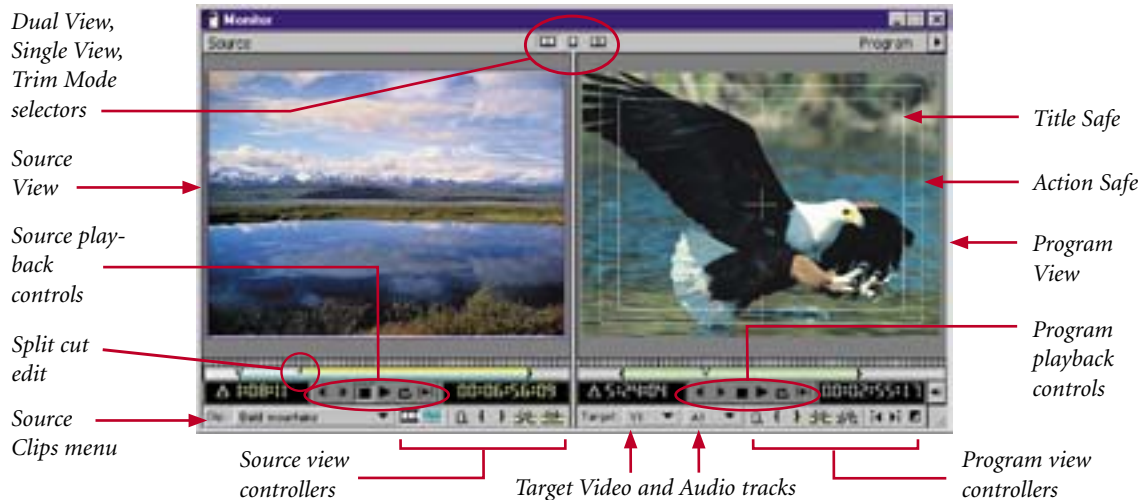
The Adobe Premiere Timeline window



The Timeline window: The Timeline graphically shows the placement of each clip in time, it's duration, and its relationship to the other clips in the program. Once you've captured or imported clips into your project, you can use the Timeline window to organize your clips sequentially; make changes to a clip's duration, speed, and location; add transitions; superimpose clips; and apply effects, opacity, and motion. The Adobe Premiere Timeline is easy to use, understand, and manage; clips of audio, video, and graphics can be moved, trimmed and adjusted with simple mouse clicks or with keyboard commands. Up to 99 video and 99 audio tracks can be created for your program, and each track can be given a descriptive ID. Tracks can be hidden to reduce screen clutter or locked to avoid accidental changes. Each track in Adobe Premiere is collapsible, which means that there is more information available by clicking and “twirling down” a track. This saves screen space but keeps critical controls handy. You can uncollapse tracks to make precise adjustments to transitions between specific video clips. The preview indicator area (directly under the yellow work area bar) is color-enhanced:

green means that a preview exists on disk for the segment; red indicates that you need to build a review file for the segment; and no color show a cuts-only segment that can play in real time.

The Adobe Premiere Monitor window (shown in Dual View mode)



The Monitor Window: You can use the Monitor window to view individual clips, set In and Out points, trim clips, set **markers**, add and remove clips from the Timeline, and to preview your program. The Monitor window can be displayed in any of three modes to suit your needs and work style:

- **Dual View mode:** The Source view (left side) displays the individual video clip selected; the Program view (right side) lets you view the program you are constructing. This is the default mode for the Single-Track Editing workspace.
- **Single View mode:** Only the Program view is displayed. Source clips may be opened and edited in individual Clip windows. This is the default mode for the A/B Editing workspace.
- **Trim mode:** The Trim mode offers more controls, while displaying a zoomed-in view of a particular edit in the Timeline. It provides more visual feedback to help you trim clips with greater precision.

You can change the mode of the Monitor window at any time by clicking on the selector buttons or by choosing a mode from the Monitor window menu.

Navigator palette



History palette



Palettes: Designed in the same style as the standard palettes in other, familiar Adobe software applications, the palettes in Adobe Premiere are easy to navigate, especially if you are familiar with other Adobe programs, such as Adobe Photoshop or Adobe After Effects. Palettes are organized into tabbed groups in separate windows. Certain groups display by default in each basic workspace. But you can display, hide, or recombine palettes as you work, and the arrangement of palettes you left open the last time you used Adobe Premiere will appear automatically at startup.

- **Navigator palette:** Use the Navigator palette to quickly and conveniently move around the Timeline window by dragging a view box within a miniature representation of the Timeline.
- **Info palette:** Provides information about the area in the Timeline, or the selected clip, transition, or operation you are performing.
- **History palette:** With up to 99 levels of undo, the History palette makes it easy to experiment with creative ideas in any Adobe Premiere window, with the assurance of being able to easily return to the point where your experimentation began. All states created during your current work session are listed in the History palette. If you return to an earlier state in the project, all subsequent states are dimmed in the palette; Adobe Premiere deletes

The visual change from one clip to another is called a transition. The simplest transition is a cut, where the last frame of one clip leads directly into the first frame of the next. The term comes from film editing, where a cut means splicing two pieces of film together.

Transitions palette



Video Effects palette



Audio Effects palette



them if you resume editing. Alternatively, you can delete states manually by clicking the Trash icon or by choosing Delete from the History palette menu.

- **Transitions palette:** Transitions can be useful in setting a mood or adding a creative element to your project. Examples of transitions include dissolves, wipes, zooms, page peels and many others. Adobe Premiere includes over 75 transitions, and you can add others, such as QuickTime transitions. You select transitions from the Transitions palette. Within this palette, transitions are organized into folders by type. You can customize these groupings, putting the transitions you prefer into folders you name, or by hiding transitions that you don't often use. Each transition is represented by an icon depicting how it works. To help you choose, these icons can be animated by simply choosing Animate from the Transitions palette menu. A brief description can also be displayed. In addition, you can preview the transition effect with actual frames from the two clips involved in the transition.

To add a transition, simply drag the icon from the Transition palette to a point in the Timeline where two clips meet. A default transition can be specified, and the process of adding transitions can be automated. You can apply or remove a transition at any time.

All transitions have *duration*, *alignment*, and *direction* parameters. *Duration* refers to the number of frames affected by the transition. Transitions use frames from the end of the first clip—called “tail material”—and frames from the beginning of the second clip—called “head material.” *Alignment* refers to the position of the transition in relation to the cut between the two clips. The options are Center at Cut, Start at Cut, and End at Cut. *Direction* indicates how the transition operates on the two clips. Normally, the direction will be from the first clip to the second—from left to right on the Timeline—but for some types of transitions, you may want to change the direction.

- **Video and Audio Effects palettes:** Video and audio **effects** (sometimes known as “filters”) serve many useful purposes. You can use them to fix defects in video or audio, such as correcting the color balance of a video clip or removing background noise from dialogue. Effects are also used to create qualities not present in the raw video or audio, such as softening focus or giving a sunset tint, or adding reverb or echo to a sound track. Multiple effects may be applied to a clip, but note that the result may vary depending on the order in which effects are rendered.

Adobe Premiere includes dozens of effects, including many shared with Adobe After Effects. Additional effects are available as plug-ins. Adobe Premiere comes with several Adobe Photoshop plug-ins that can be used in your video work, and many other plug-ins are available from third-party vendors or can be acquired from other compatible applications. Video effects are listed in the Video Effects palette; audio effects in the Audio Effects palette—grouped by type in each palette. You can reorganize effects and customize folders as you prefer, and hide effects or folders that you rarely use.

To apply an effect, just drag it to a clip in the Timeline window or, if the clip is selected in the Timeline, the effect can be dragged to the Effect Controls palette, where attributes can be modified and, if multiple effects have been applied, the order in which they are rendered can be adjusted. You can apply, disable, or remove an effect at any time.

By default, when an effect is added, **keyframes** are set at the beginning and end of the clip, resulting in the effect being applied to the entire clip. The locations of these keyframes are indicated by half-diamonds on the keyframe line in the Timeline window. If an effect has adjustable controls, you may wish to change the start or end point of the effect by dragging these symbols, or add additional keyframes to create an animated effect.

A clip that has an effect applied to it appears with a blue-green bar at the top of it in the Timeline window. This is important because, at times, you may choose to temporarily “turn off” one or

Effects Control palette



Commands palette



all of the effects in the clip to concentrate on another aspect of your project, or to save time when previewing your program. Effects that are turned off do not appear in the Program window and are not included when the clip is rendered or previewed. Turning off an effect does not delete the keyframes created for any of the effect's settings; all keyframes remain unless the effect is deleted from the clip.

- **Effect Controls palette:** The Effect Controls palette (similar to the one in Adobe After Effects) offers convenient control over all aspects of a clip's effects parameters with real-time feedback in the Monitor window. Once you've applied an effect to a clip, the Effect Controls palette may be used to adjust effect settings, hide an effect during previews, or delete an effect, as well as to rearrange the order in which multiple effects are rendered.
- **Commands palette:** Lets you create a button list of frequently used commands, and assign your own keyboard shortcuts or function keys to them. The Commands palette comes with a list of preset commands, which you can modify to suit your needs. You can customize your Adobe Premiere Commands palette for rapid recognition by color-coding your buttons.

WHAT'S THE DIFFERENCE BETWEEN EDITING IN AND OUT POINTS AND TRIMMING?

Editing a video program means using only the best segments of the material you have shot or gathered. In the first stage of the process—capturing—you select those portions of material that you think you *might* want to use, and save them on your hard drive. You will probably capture more clips than you will actually use, and it's likely that you won't use your captured clips in their entirety.

When you insert clips into your video program, the clips do not become part of the program file; rather, the program *references* the source clips stored on your hard drive. Clips become part of the finished program only when you export your project to a delivery medium, such as videotape or to a file to be posted on the Web. Unless you are absolutely sure you will not be using some of the source clips you captured, it's best not to delete any of them from your hard drive until your project is completed.

You define the beginning of the clip's appearance by marking an *In point* (the first frame that will appear in your program). You define the end by marking an *Out point* (the last frame that will appear). Initially, you select In and Out points when you capture your clips. Most clips are captured with extra frames at the beginning and end to allow for more precise editing later and, often, to include overlap footage for transitions. These extra frames before the In and after the Out points of a clip are called handles.

It is common to fine-tune the beginning and end of a clip just before moving a clip into the program. For numerical precision, you will want to set In and Out points in the Monitor Window in Adobe Premiere. For visual precision, or if you prefer to use the mouse, you can edit directly in the Timeline. Even if you use only a small portion of a captured clip in your program, the *entire* clip remains available on your hard drive, allowing you to make adjustments at any point in the editing process.

Trimming is a term that is sometimes used to mean setting In and Out points. In Adobe Premiere, when you use the Trimming Window, that is precisely what you are doing but, unlike setting In and Out points in the Monitor Window, you are affecting two clips at once.

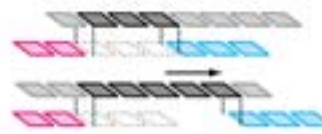
The term *trimming* is often used, as well, to refer to the practice of *removing* frames from clips when you have completed your project and you want to "tidy up" your files. This function in Adobe Premiere is "non-destructive."

When you use the Project Trimmer, Adobe Premiere first creates a copy of the project, just in case you change your mind. Only those portions of clips actually used (including specified handles) are copied; unused clips will not be copied. If you so choose, you can then delete the clips you originally captured, in order to save disk space.

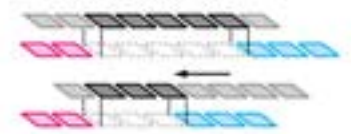
USEFUL EDITING TECHNIQUES

- **Changing clip speed:** Clip speed is the playback rate of action or audio compared to the rate at which it was recorded. When the speed is accelerated, everything appears to move faster; when the speed is reduced, the action or audio plays back in slow motion. Changing a clip's speed alters its *source* frame rate. Some frames may be omitted when the speed is increased; when the speed is decreased, frames may be repeated. Changing the speed to a negative value, (such as -100) causes the clip to play in reverse. You can change a clip's speed numerically in the Adobe Premiere Project window, or in the Timeline window by choosing **Clip > Speed** from the title bar. You can change speed visually in the Timeline window by using the rate stretch tool to drag either end of the clip. A 3-point edit can also change the speed of a clip.
- **Altering clip duration:** The duration of a clip is the length of time it plays—from its In point to its Out point. The initial duration of a clip is the same as it was when the clip was captured or imported; if you alter the source In and Out points, the duration of the clip changes. In Adobe Premiere, you can edit In and Out points in the Project window, the Monitor window, or directly in the Timeline. You can change duration numerically in the Project window or in the Timeline window by choosing **Clip > Duration** from the title bar. You can change duration visually in the Timeline by dragging either end of the clip with the selection tool.
It's important to note that when you perform any action that extends the duration of a clip (which may include ripple or rolling edits) additional frames must be available in the source clip (the clip you originally captured or imported) before the current In point and/or after the current Out point. This is why it's a good practice, whenever possible, to capture extra material.
- **Ripple edit:** A ripple edit changes the duration of a clip, correspondingly changing the duration of the entire program. When you use the ripple edit tool to shorten or lengthen a clip by dragging its beginning or ending in the Timeline, the adjacent clip is not affected and, consequently, the duration of the program is shortened or lengthened.
- **Rolling edit:** A rolling edit changes the duration of the selected clip *and* of an adjacent clip, maintaining the overall duration of the program. When you use the rolling edit tool to shorten or lengthen a clip by dragging its beginning or ending in the Timeline, the adjacent clip will be correspondingly lengthened or shortened, maintaining the overall program duration.
- **Slip edit:** A slip edit shifts the In and Out points of a clip without changing the clip's duration, without affecting adjacent clips, and without altering the overall program duration. You can use the slip edit tool in the Timeline to drag a clip left or right, and its In and Out points will shift accordingly. In other words, a slip edit alters which specific portion of the source clip is included, but does not alter the duration of the selection. The slip edit is extremely useful for when you slap a bunch of clips down quickly, then plan to go back and fine tune later, but do not want to mess up the pacing and edit points downstream.
- **Slide edit:** A slide edit preserves the duration of a clip and of the overall program by changing the Out point of the preceding clip and the In point of the following clip. When you use the slide edit tool, sliding an entire clip forward or backward in the Timeline, the adjacent clips are correspondingly lengthened and/or shortened by the same number of frames, therefore, the duration of the program stays the same. A slide edit affects three clips: the clip being slid (the duration of which stays the same), as well as the two clips before and after the slid clip (the durations of which are both altered). The overall program duration is maintained.

Ripple edits

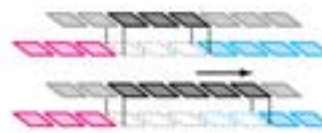


In this example of a ripple edit, the Out point of a clip is moved 2 frames to the right in the Timeline, resulting in the duration of the clip being lengthened by 2 frames. The adjacent clip is not altered by a ripple edit, therefore the overall program duration is lengthened from 8 frames to 10.

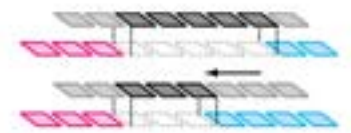


In this ripple edit, the Out point of a clip is moved 2 frames to the left in the Timeline, resulting in the duration of the clip being shortened by 2 frames. Since the adjacent clip is not altered by a ripple edit, the overall program duration is shortened from 10 frames to 8.

Rolling edits

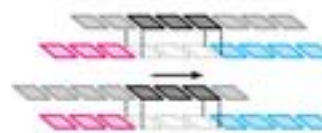


In this example of a rolling edit, the Out point of a clip is moved 2 frames to the right in the Timeline, resulting in the duration of the clip being lengthened by 2 frames. The rolling edit shortens the beginning of the adjacent clip by 2 frames, thereby preserving the duration of the overall program.

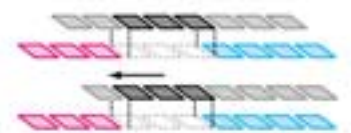


In this rolling edit, the Out point of a clip is moved 2 frames to the left in the Timeline, resulting in the duration of the clip being shortened by 2 frames. The rolling edit correspondingly lengthens the beginning of the following clip by 2 frames, thereby preserving the duration of the overall program.

Slip edits

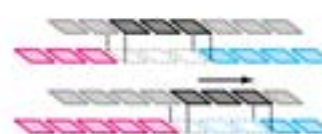


The slip edit moves the In and Out points of a clip, but does not change the duration of the clip, does not affect the adjacent clips, and does not alter the duration of the overall program.



You can slip the In and Out points of the clip to the right or to the left on the Timeline; neither the adjacent clips nor the overall program length are affected.

Slide edits



The slide edit moves the In and Out points of a clip without changing its duration, while the Out and In points of the adjacent clips are moved, so the overall program duration is preserved.



You can slide the In and Out points of the clip to the right or to the left on the Timeline; the overall program length is maintained because the Out and In points of the adjacent clips slide accordingly.

MORE USEFUL EDITING TECHNIQUES

Adobe Premiere lets you perform precise, professional-level techniques traditionally associated with high-end editing systems.

- **Three-point edits:** When you are lifting and replacing footage in a video program, four points must be specified. Those four are the In and Out points of the source clip ("what segment are you taking") and the In and Out points for the program ("where are you putting it"). With three-point editing in Adobe Premiere, you need only specify any three of these four In and Out points. The software then automatically calculates the fourth point to ensure a proper edit, and

even will adjust the speed of the clip to fill a gap if you like. Monitor Window controls and keyboard short-cuts make three-point editing quick and easy in Adobe Premiere.

- **Four-point edits:** A four-point edit is useful when the starting and ending frames in both the source and program are critical. In a four-point edit, you mark all four points. If the durations are different for the marked clips, Adobe Premiere alerts you to the discrepancy and provides alternatives to resolve it.
- **Six-point edits:** More commonly called a split edit, in a six-point edit, a clip's video

and audio start or end at different times. In one version of a split edit, called an L-cut, the audio Out point is later than the video Out point, so the audio continues to play after the beginning of the next clip appears. The audio from a concert, for example, could extend into the next shot of a nature scene. Another kind of split edit is the J-cut, also known as an audio lead, which you use when you want a clip's audio to begin playing before the corresponding video appears. For example, you may want to begin hearing a speaker's voice while showing a relevant scene, then transition to the shot of the person speaking.

Web Markers

Adobe Premiere offers the ability to set Timeline markers that include links to HTML pages. Using these markers, you can develop streaming videos that automatically launch Web pages at precise points during playback. You can specify a frame target to designate where the Web content will appear. For example, a Web designer could create a streaming video for use on a nature Web site. At the moment a bald eagle is seen in the video, a Web page containing information about that bird could automatically pop up on the right-hand side of the Web page.

Timeline Markers: Markers indicate important points in time and, among other uses, can help you position and arrange clips. Working with markers is much the same as working with In and Out points, but markers are only for reference and do not alter the video program. In Adobe Premiere, each clip can individually contain a set of up to ten markers numbered from 0 to 9. The Timeline can also contain its own set of up to ten numbered markers. Additionally, the Timeline and each clip can individually contain up to 999 unnumbered markers.

In general, you add markers to clips to identify important points within individual clips; you add markers to the Timeline to identify significant time points that affect multiple clips, such as when you need to synchronize video and audio on different clips. Timeline markers can include:

- a comment, which will appear in the Program view of the Monitor window,
- a chapter link, which can initiate a jump to a specified point in a QuickTime movie or on a DVD, or
- a Web link, which will initiate a jump to a Web page in the browser when the video is playing on a computer connected to the Internet or an intranet.

Web Marker



Because Adobe Premiere spans the spectrum from DV to broadcast, it can grow with you as your needs become more sophisticated. Just add hardware to your system to accommodate more professional video formats—without having to learn new software.

Merging Creativity and Productivity

It's important to choose video editing software that won't limit your creativity—software you won't outgrow as you build your skills. As your skills develop, you'll want an editing solution that fosters productivity, especially if you're doing professional post-production. Adobe Premiere has been designed to include many features—like the History palette, for example—that encourage you to experiment, without the risk of losing valuable time if you decide to return to an earlier point in your editing process. The Storyboard window and Automate to Timeline are also key creativity and productivity enhancing features.

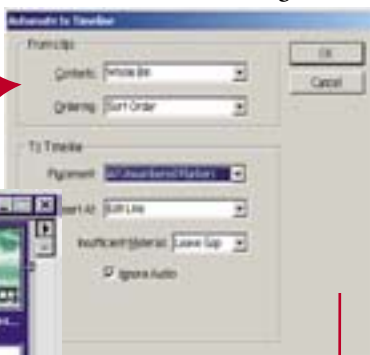
Storyboard window: The Storyboard window in Adobe Premiere is a key productivity and creativity tool for quickly visualizing your video production. Using the Storyboard, you can experiment with your production's layout, and assemble a rough cut within minutes. Then

you can send the clips to the Timeline in sequence, using the Automate to Timeline command, or play the clips from the Storyboard window directly to the selected video output display.

Project window

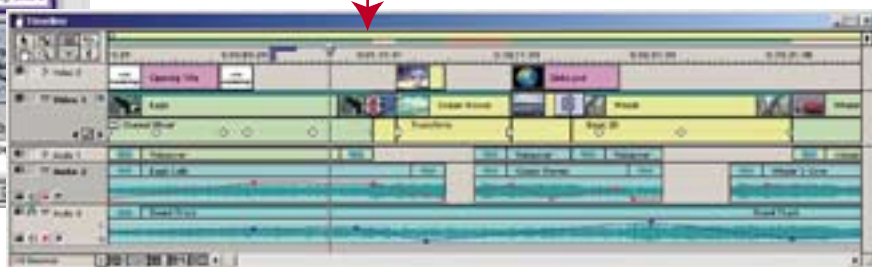


Automate to Timeline dialog box



Adobe Premiere offers a host of elegant, efficient workflow solutions for all kinds of users. Organize your clips with bins in the Project window and then use the Storyboard window to help quickly visualize your production. When you are ready to assemble your storyboard on the Timeline, use the Automate to Timeline feature to automatically place the clips in the Timeline with overlaps and transitions.

Timeline window



Storyboard window



- **Tell your story:** The Storyboard window helps you quickly determine the best way to tell your story visually. Add clips to the Storyboard window by simply dragging and dropping. Reorder them by dragging clips into new positions. Arrows are automatically drawn between clips to show the storyboard flow, and an end marker is displayed.
- **Display a clip's vital statistics:** Icons within each thumbnail indicate whether the clip contains video and audio. A clip's title, timecode, and user-added comments can be displayed. The Storyboard window also shows the combined running time for all clips.
- **Set In and Out points:** The Storyboard lets you do more than merely arrange clips. Double-click a file in the Storyboard to change its In or Out points or to add markers. The Storyboard's context menu lets you locate a source clip, add the clip to the project, and change the speed of a video clip or the duration of a still clip.

Automate to Timeline: The Automate to Timeline command can simultaneously send a sequence of clips from the Storyboard—or from the Project window—to the Timeline. This time-saving feature can streamline the production of a wide variety of video projects. Here are just two examples:

- **Rough cuts—with transitions:** Assemble a collection of still images and/or video clips in the Project window. Drag and drop them into the order you like—rearranging as often as you want—in the Storyboard window. Then specify an overlap and a default transition. When the clips are placed using the Automate to Timeline command, the overlaps and transitions are automatically inserted.
- **Automatic music videos:** Organize a sequence of clips in the Project or Storyboard window. Then drop a series of unnumbered **markers** onto the Timeline, highlighting rhythmic features as you listen to your audio track. When you perform Automate to Timeline, your clips will be choreographed to the music, cutting in and out at the beats you marked. The Automate to Timeline dialog box offers several options for sending clips to the Timeline, including sending a whole bin or only those clips selected; placing clips sequentially or at unnumbered markers; inserting at the beginning, edit line, or end; and specifying how many seconds or frames to overlap between clips.

Adding, Mixing, and Sweetening Audio

Audio can play an equally important role to imagery in telling your story. The right **voice over**, music, or sound effects can add information and impact to your video program.

A 44.1 kHz sample rate at 16 bits is audio-CD-quality, while CD-ROM or Web audio often uses a sample rate of 22 kHz or below.

Understanding Digital Audio: You hear sounds because your ear recognizes the variations in air pressure that create sound. Analog audio reproduces sound variations by creating or reading variations in an electrical signal. Digital audio reproduces sound by sampling the sound pressure or signal level at a specified intervals and converting that information to numbers which can be recorded as computer code. The quality of digitized audio and the size of the audio file depend on the **sample rate** (the number of samples per second) and the **bit depth** (the number of bits per sample). Higher sample rates and bit depths reproduce sound at higher levels of quality, but with correspondingly larger file sizes. Accordingly, digitizing stereo audio requires twice as much disk space as mono audio.

You will need to be mindful of audio sample rates in relation to the timebase and frame rate of your project. It is a common mistake to create a movie at 30 fps with audio at 44.1 kHz, and then play back the movie at 29.97 fps (for NTSC video). The result is a slight slowdown in the video, while the audio (depending on your hardware) may still be playing at the correct rate and will, therefore, seem to get ahead of the video. The difference between 30 and 29.97 results in a synchronization discrepancy that appears at a rate of 1 frame per 1000 frames, or 1 frame per 33.3 seconds (just under 2 frames per minute). If you notice audio and video drifting apart at about this rate, check for a project frame rate that doesn't match the timebase.

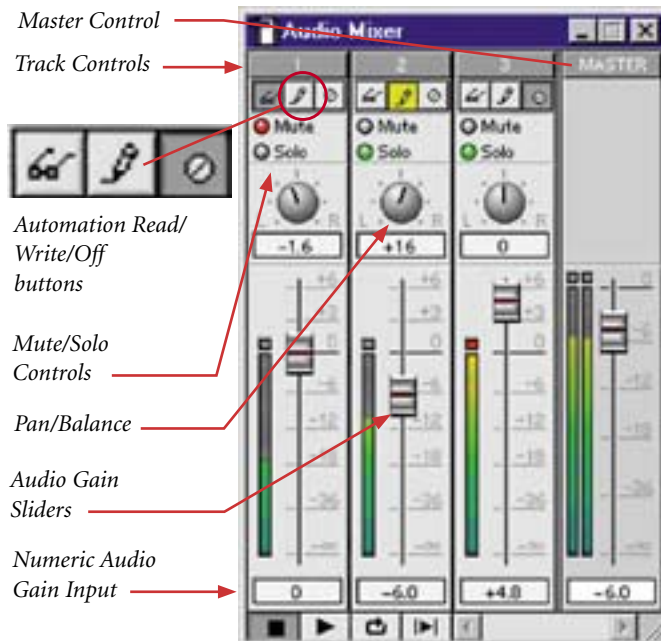
Capturing Audio: Getting audio into your computer is similar to capturing video. In fact, if you recorded sound onto your videotape, you will probably capture the audio concurrently with the video. Note that DV camcorders support only 32 or 48 kHz audio; not 44.1 kHz (audio CD quality). So, when capturing or working with DV source material, be sure to set the audio for 32 or 48 kHz.

If you are not going to use the audio that was recorded to your videotape, or if you want to add additional audio clips, you can import separate digital audio clips from tracks in other video files or from audio files stored on a hard disk or on other digital media such as a CD or DAT tape. If you want to add analog audio, you need to capture it using the proper audio or video capture card. You may want to create a separate bin for sound files, in the Project window, to keep things organized.

If you plan to export or play back the final cut from Adobe Premiere, we recommend that you capture audio at the highest quality settings your computer can handle, even if those settings are higher than the settings you'll specify for final export or playback. This provides **headroom**, or extra data, that will help preserve the quality if you adjust audio gain (volume) or apply audio effects such as *equalization* or *dynamic range compression/expansion*. Standard practice is to make sure the gain level is correct when

The Adobe Premiere Audio Mixer

The Audio Mixer window, which resembles an audio mixing console in a professional sound studio, contains a set of controls for each audio track; each set is numbered to match its corresponding audio track in the Timeline. You can make adjustments using the Audio Mixer controls, or by typing in precise numerals. The Audio Mixer works in conjunction with the Monitor window so you can experiment and make adjustments while watching your video in real time.



Adobe Premiere includes a *Pan rubberband* under each audio clip in the Timeline. You can create handles to pan or balance your audio clips using this rubber-band, or you can use the Pan control in the Audio Mixer to precisely position audio in a stereo channel.

- **Sweetening the sound and adding effects:** Adobe Premiere provides a wide range of built-in controls for **audio sweetening**, or sound processing. For example, the *compressor/expander* effect fine-tunes the dynamic range of audio clips, the *notch/hum* effect removes distracting hum, the *reverb* effect acoustically simulates a live interior, and the *parametric equalizer* effect lets you tweak specific frequency ranges. As with video effect plug-ins, while a number of audio effects are included with Adobe Premiere, you can add more sound capabilities by adding third-party audio effect plug-ins. Like video effects, you can add multiple effects to a single audio clip, and audio effects can also be keyframed so that they change over time.

You can edit, add effects to, and mix up to 99 tracks of audio in Adobe Premiere. When you import or capture a video clip that contain audio, the audio track is *linked* to its video track by default, so that they move together. You can unlink and relink video and audio clips in order to perform a variety of editing tasks. Basic editing procedures for audio-only clips are virtually identical to those for editing a video clip, such as setting In and Out points, speed and duration. When you edit a video clip linked to an audio clip, although the audio will appear on its own track, below the Video 1 track on the Timeline, your edits are applied to both video and audio. You can process an audio clip in several ways: choosing a menu command for a selected clip, adjusting volume and pan/balance levels either directly in the Timeline or by using the Audio Mixer window, or applying an audio effect.

you capture because, if the gain in an audio clip was set too low when it was digitized, increasing the gain may emphasize noise or introduce distortion.

Mixing Audio: Mixing audio refers to adjusting audio qualities and combining audio tracks. For example, you might combine dialogue clips with ambient background sounds and a musical sound-track. Mixing audio in Adobe Premiere can include any combination of the following tasks:

- **Fading**—i.e., increasing or decreasing—the volume levels, also known as **audio gain**, of audio clips over time: You can adjust the gain of an audio clip at precise time points in your video program, in the Adobe Premiere Timeline window. Under each audio clip in the Timeline is a *Volume rubberband* on which you can create and manipulate *handles* to adjust the volume of an audio clip. Or, you can use the *Volume faders* in the Audio Mixer to adjust and record the volume levels for each audio track in your video program in real time, all while listening to and watching the video program.
- **Panning/balancing** stereo clips: For example, you might want to **pan** a dialogue clip to match the person's position in the video frame. **Panning** an audio clip shifts the sound from a single (monophonic) channel to either the left or right stereo channel. **Balancing** adjusts the balance of sound between the two channels in a stereo clip. In addition to the Volume rubberband,

Don't Forget Titles, Graphics, and Credits

Text and graphics can play an integral role in conveying information in a video program. And, when you're proud of all that you've accomplished, you'll want to include credits that acknowledge your hard work and that of everyone who helped create your production. Titles can include lines, shapes, and text. Adobe Premiere provides a full-featured Title window that lets you create and modify text objects and shapes, apply motion to titles, and even generate **rolling** or **crawling titles** with ease. You can create a title while working in Adobe Premiere, or use other software applications, such as Adobe Illustrator, Photoshop, and After Effects. A title is an independent file, separate from your project. Like any other clip, it doesn't become part of your video program until you add it to the Timeline, so you can use a title in more than one project.

More Good Reasons to Choose Adobe Premiere

From beginners shooting home video to broadcast professionals editing a television commercial, Adobe Premiere is an excellent choice, offering an impressive list of features that make it easy to:

Incorporate DV into your projects with “plug-and-play” ease: Robust DV support is native in Adobe Premiere 6.0 for both Macintosh and Windows, making DV capture as easy as “plug and play.” Adobe Premiere includes time-saving DV presets, built-in support for all types of DV devices, and support for non-square pixels.

Invalidate your Web site with compelling streaming video: One-step Web output lets Adobe Premiere users quickly put the power of video and audio to work in the online environment.

Explore creative options and still meet impossible deadlines: Flexible tools and features in Adobe Premiere, such as the professional-level Audio Mixer, the Storyboard Window, Automate to Timeline, the History palette, extensive customization capabilities, and plenty of visual feedback as you work, encourage creativity and experimentation, while helping you produce projects quickly, efficiently, and with remarkable creative control.

Adobe Premiere is available for Microsoft® Windows® 98, 2000, NT, ME, and XP, as well as Apple® Mac® OS. Because Adobe Premiere is an open-architecture application, it is supported by most video capture card manufacturers and is compatible with inexpensive cards for the home user, all the way up to broadcast systems with real-time special effects. Due to its popularity, a large number of third-party software plug-ins are also available to enhance the functionality of Adobe Premiere.

And, of course, Adobe Premiere integrates tightly with Adobe's familiar family of professional graphics, dynamic media, and Web development applications including Adobe Photoshop, Adobe Illustrator, Adobe After Effects, Adobe LiveMotion, and Adobe GoLive. So, whether you're a seasoned editor or assembling video for the first time, Adobe Premiere offers the interface, features and support you'll need to easily and creatively tell your story.

Still More Ways to Enhance Your Productions

Adobe Premiere lets users create motion, picture-in-picture and **keying** effects. You can create smooth keyframed animations of flying video, controlling such parameters as rotation, scale and distortion. Chroma, luminance and alpha keying are also supported in Adobe Premiere. You can even use Adobe Photoshop images as **mattes**, then **superimpose** clips with transparency to create **composited** sequences. But for even more advanced control over compositing and animation (and to learn a little bit about the techniques mentioned in this paragraph)—you'll want to look at the next section of this primer, which describes some of the sophisticated features found in Adobe After Effects software.

CREATE STUNNING VISUAL EFFECTS AND MOTION GRAPHICS

Do I Really Need Effects and Animation Tools?

It is more than likely that, as you progress rapidly up the movie-making learning curve, you will want to include more sophisticated elements in your productions. While Adobe Premiere provides a wide range of transitions and effects, as well as some capabilities for titling, motion graphics, transparency, and compositing, you may also soon want a specialized tool kit. Adobe After Effects, allows you to do more involved tasks including sophisticated compositing of moving imagery and very precisely controlled 2D and even 3D animations.

Leverage Graphics Experience into New Opportunities

If you are a graphic designer, you are probably acutely aware of the way in which motion is finding its way into your world—in everything from animated Web banners to business presentations. Your experience with Adobe Illustrator and Photoshop will make it easy for you to migrate to the world of motion graphics, expanding your creative and business potential. Adobe After Effects lets you directly animate layered media from Adobe Illustrator and Photoshop. Plus, the layering and compositing methodologies in Adobe After Effects build on similar functionality in the Adobe software applications you already know. By adding Adobe After Effects to their tool kits, many graphic designers have found new markets for their talents in work ranging from the Web to the world of music videos and even film titles.



Why Choose Adobe After Effects?

Adobe After Effects is the ultimate tool for motion graphics and visual effects. At almost any time, the work of After Effects artists can be seen in broadcast, cable, and satellite programming in every part of the world. The list of major motion pictures which have been created with the help of Adobe After Effects is extensive, including effects-heavy films such as *Monsters Inc.*, *Gladiator*, *Tomb Raider*, *Hannibal*, *Hollow Man*, *Driven*, *Entrapment*, *Get Carter*, and *Rat Race*.

Adobe After Effects offers the speed, precision, and creative control you need to produce superb motion graphics and visual effects for film, video, multimedia, or the Web. With its professional compositing tools, keyframe-based animation system, and extensive selection of visual effects, After Effects delivers an unparalleled set of powerful production tools for generating dynamic openers, bumpers, titles, games, Web animations, and more. After Effects has also spawned an entire category of third-party software and training support products. Plus After Effects continues to be enhanced—the latest release, Adobe After Effects 5.5, expands your creative control with dozens of new features. Layers can be composited and animated in 2D or 3D space with fine control over multiple cameras and lights. Character animation is a breeze using new parenting features, and parenting controls let you animate layers hierarchically. Expressions add support for defining relationships between parameters to create procedural animations. You can use vector paint tools to paint non-destructively on images over time.

If you are new to the art of motion graphics and visual effects, this may all sound pretty complicated. But now Adobe After Effects is easier than ever to learn. Context-sensitive menus make commands available right where you need them. Tool tips help new users see what a tool or option does, and an optional *Tip of the Day* appears each time Adobe After Effects is launched, helping you to discover new techniques and learn about additional features.

Adobe After Effects is available in two versions:

- the *Standard* version provides the core 2D and 3D compositing and effects tools that motion graphics professionals and Web designers need;
- the *Production Bundle* version is ideal for visual effects artists and motion graphics professionals who need all of the tools in the Standard version, plus additional keying, motion control, and distortion tools, audio effects, 3D channel effects, 16-bit per channel color, vector painting tools, and support for network rendering.

You might want to start out with the *Standard* version, then upgrade to the *Production Bundle* version as your work expands in scope or complexity.



When you import a layered Photoshop file as a composition, After Effects retains layers and other key Photoshop settings.

Build on Your Adobe Product Skills

If you already use Adobe Photoshop, Illustrator, and/or Premiere, you'll recognize the award-winning Adobe user interface featured in Adobe After Effects. You'll find the familiar tabbed windows and palettes, similar tools, and common keyboard shortcuts that make it possible for you to work more efficiently and move among the programs with ease. Productivity-boosting features such as the pen tool, Align palette, rulers and guides, editing tools, and free transform mode work in After Effects just as they do in other Adobe products. Plus After Effects, Premiere, and Adobe LiveMotion use a similar timebased interface. Here are some of the ways you'll benefit from After Effects integration with other Adobe software applications.

- **Adobe Photoshop:** Easily transform layered Photoshop images into animations. Import Photoshop files as compositions, one at a time or in batches. After Effects preserves layers, common layer effects, adjustment layers, alpha channels, transfer modes, vector masks, and more. You can then apply visual effects to color-correct, stylize, or manipulate each layer, and animate these layers over time. Use Photoshop paths as masks or motion points.
- **Adobe Illustrator:** Add carefully-crafted typography or eye-catching graphics to your video productions. Import layered Illustrator files as compositions, one at a time or in batches. Choose whether After Effects preserves the layers or merges them on import. Then resize the Illustrator layers to any resolution without losing detail, and animate them with complete control. Copy paths in Illustrator and paste them into After Effects files as masks or motion points. With Illustrator 9 files, you can preserve transparency and transfer modes. In addition, you can continuously rasterize Illustrator layers in both 2D and 3D.
- **Adobe Premiere:** Import Premiere projects as compositions. Each video, audio, and still-image clip appears on its own layer, arranged in the correct time-based sequence in the Time Layout window. You can then manipulate these clips to create the sophisticated effects and animations best produced in After Effects. If you use the After Effects filters included with Premiere 6, those effects and their associated keyframes are also imported. In addition, you can embed a link in the After Effects movies you output so that you can use the Edit Original command in Premiere to open the original project.
- **Adobe GoLive:** When creating a marker in After Effects, you can add a URL link that will be embedded in rendered movies. When these movies are included in Web pages created by applications such as Adobe GoLive, the embedded URL is recognized during playback, initiating a jump to the specified URL.
- **Adobe LiveMotion:** Create elaborate animations in After Effects and then import them into LiveMotion as Macromedia® Flash® (SWF) files.

Industrial-Strength Project and Media Management

The organization and ongoing tracking of dozens or even hundreds of source files is crucial in any production environment, especially when dealing with diverse types of media. Adobe After Effects meets this challenge with:

- **Powerful asset management:** The ability to arrange the Project window based on media type, name, file size, and other attributes, as well as folder hierarchies and color coding for organizing large projects, can be critical to your production flow.
- **Drag and drop stacking:** The order in which you select footage in the Project window is used to determine the stacking order of layers when you drag multiple items to the Timeline window: the file

you selected first appears as the top layer in the composition, and the last-selected file as the bottom. In addition, you can drag footage into any position in the layer stacking order, as well as to any point on the Timeline.

- **Easy file finding:** Available as both a button in the Project window and a command on the File menu, the Find command helps locate a source file listed in the Project window—no matter how deeply nested the file is. Limit searches by using the whole word or matching the case of the search text. Finding files on disk is easy with the Reveal command. Simply select a source file in the Project window; when you choose the Reveal command, the folder containing the file on disk is opened.
- **Automatic source file reduction:** The Reduce Project command clears unused source files and compositions, making it easier to manage remaining files.

Video Compositing

Compositing, also known as a **superimposition**, is the process of combining two or more images to yield a resulting, enriched image. Composites can be made with still or moving images. Compositing, or *superimposing*, simply means playing one clip on top of another.

The terms *matting* and *keying*, in video and film production, refer to specific compositing techniques. **Keying** uses different types of transparency **keys** to find pixels in an image that match a specified color or brightness, and makes those pixels transparent or semitransparent. For example, if you have a clip of a weatherman standing in front of a blue-screen background, you can *key out* the blue using a blue-screen key, and replace it with a weather map. **Matting** uses a mask or matte to apply transparency or semi-transparency to specified areas of an image. By using keying or matting to apply transparency to portions of an image that is layered on top of another image, portions of the lower image are revealed.

Combining diverse types of media elements is one of the things for which Adobe After Effects is best known. After Effects is the optimal program for layering media in motion because of its extensive transfer mode support (just like in Adobe Photoshop) and its powerful masking capabilities (up to 128 animatable bezier masks per layer), along with its wide selection of keying methodologies.

Streamlined Editing: In order to composite video clips, you must first edit and assemble them onto a Timeline. Those clips to which keys or mattes will be applied are placed on superimpose tracks above the Video 1 track footage. Adobe After Effects includes tools and commands that streamline the process of constructing and refining compositions by turning time-consuming manual tasks into operations that can be completed with a simple tool or command.



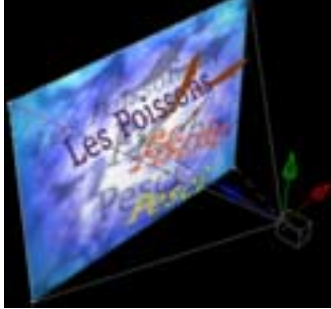
In this example, the masks for the letter A (purple and green) use a negative Mask Expansion value in conjunction with a Mask Feather; the mask for the letter W (red) uses a positive value; and the mask for the letter E (yellow) is not feathered.

Powerful Masking: You can create, edit, and animate as many as 127 masks on every layer in After Effects. Draw paths to create transparencies or add new objects to an animation such as stroked lines. Combine paths to make unusual shapes using operations such as Add, Subtract, and Intersect. Rotate and scale masks, and apply opacity settings to make masks appear and disappear over time. Lock masks to protect them from change. Extensive masking capabilities give you extraordinary control:

- **Edit masks in the Comp window:** You can copy and paste masks into your compositions from Adobe Illustrator and Photoshop, or create masks on the fly by drawing them directly in the After Effects Comp window. This saves time and can make it easier to adjust a mask precisely, relative to other layers. You can also continue to create masks in the Layer window.
- **Assign mask colors:** Assign colors to masks for easy identification.
- **Mask Expansion property:** Create and adjust the inner or outer feather of a mask by inseting or outseting the mask edge from the mask shape.

- **Apply Motion Blur to masks:** Apply Motion Blur to masks to create realistic-looking mask animations.

2D and 3D compositing: You can work in either 2D or 3D, or mix and match on a layer-by-layer basis. Use the 3D Layer switch to toggle a layer between 2D and 3D at any time. While both types of layers can move horizontally or vertically, 3D layers can also animate numerous properties—such as z-position, xyz-rotation, and orientation—in 3D space while interacting with lights, shadows, and cameras.



After Effects lets you animate layers, cameras, and lights in 3D space.

Animating

Adobe After Effects provides powerful motion controls. But making things move is only one aspect of animation, and After Effects offers an extraordinary range of features and tools to augment your animation capabilities.

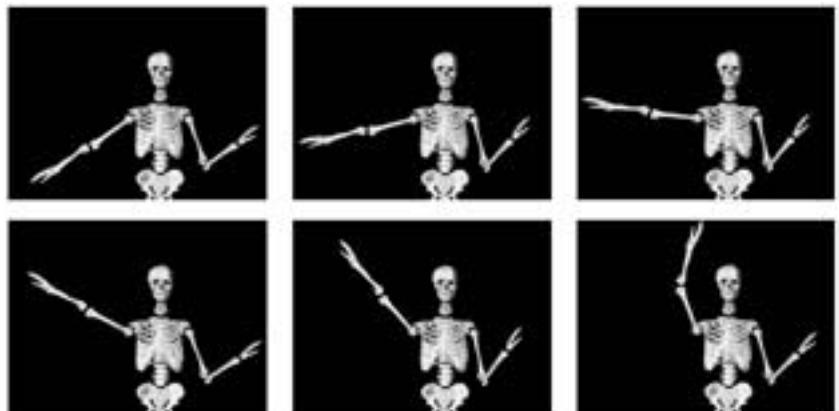
Motion Sketch and Smoother: Use the Motion Sketch tool to draw animation paths as easily as sketching with a pencil on paper. Simply select the tool and draw the animation path on-screen. Adjust your drawing speed to vary the velocity of the path. After Effects automatically creates the keyframes for you. Then use the Smoother tool to smooth the shape of the path and fine-tune it until the animation moves exactly as you want.

Timeline Implementation: Animation revolves around the concept of elements changing over time. The ability to selectively display control curves with linear keyframe information directly inside the Timeline window lets you fine tune timings of multiple elements. The Time Layout window offers flexibility for viewing and editing all object parameters.

Keyframe Control: Keyframes are the heart and soul of moving objects, and After Effects provides precise control over keyframe type, generation, placement, and all other aspects of keyframe functionality. Full curve-based editing of keyframe data delivers the ability to exactly tweak motion and animation data to fit a desired requirement for all aspects of motion and effects over time.

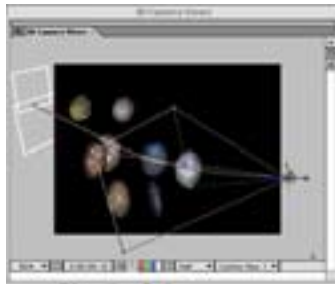
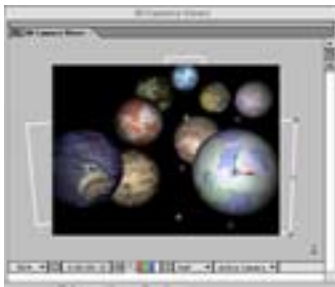
Parenting: Use parenting to animate layers hierarchically in 2D or 3D space. By defining a parent-child relationship between layers, you ensure that the child layers inherit all of the transformations applied to the parent. For example, when the scale and position of the parent layer are animated, the child layers behave the same way. Parent-child relationships aren't limited to footage layers—you can also define relationships between light and camera layers in 3D compositions. For example, define a camera as the child to a key footage element in a composition, so the camera will automatically track the movement of that element. Or a light might have a camera as a parent, so that the elements a camera is pointing at are always illuminated.

Here, parent-child relationships were defined between different layers in order to quickly create a dancing skeleton. As a parent part moves (the upper arm), so do its children (the lower arm and hand).





Move text along a Bezier path.
Animate text attributes such as tracking.



Use the Active Camera view (top) to arrange footage, and then adjust the position of layers in space using a Custom View (bottom). Here, the path of the animated camera is visible.

Text/Character Generation: Adobe After Effects provides a comprehensive set of type animation features. The ability to create animated leading and tracking effects is incredibly useful for professional titling work. It offers text animation along a path, automatic randomization/jitter effects for many character attributes such as scaling and rotation and a wide variety of other automatic text effects.

Working in 3D

Creating elaborate 3D motion graphics and visual effects is a lot easier, in Adobe After Effects, than you might imagine.

- **View 3D compositions from different perspectives:** After Effects provides controls for viewing a composition from six different preset vantage points (front, back, top, bottom, left, and right), the active camera, and three additional user-definable custom views. Keyboard shortcuts make it easy to switch between views.
- **Define cameras and lenses:** Create multiple cameras in order to produce the results you envision. For example, you might define a camera using a wide angle 15mm preset, then cut to a second camera created using a 200mm lens to capture close-ups from a different perspective. In addition to standard preset lenses, you can create and save custom camera presets.
- **Define lights to illuminate layers in 3D space:** Create as many lights as you need, and then adjust and animate each light's properties, controlling its illumination and color, as well as the shadow it casts. For example, spot lights provide dramatic lighting effects by pointing a cone of light at the point you define.
- **Control how layers interact with light sources:** Specify material properties that define how a light affects the surface of a layer, as well as how layers interact with lights. You can define and animate Ambient, Diffusion, Specular, and Shininess values.
- **Animate 3D layer properties:** Whether you're working with 3D layers, lights, or cameras, you can animate numerous properties—such as position, rotation, and orientation—to create a wide range of effects. You can also automatically orient 3D layers towards a camera, or animate lights and cameras along a path or towards a point of interest you define.

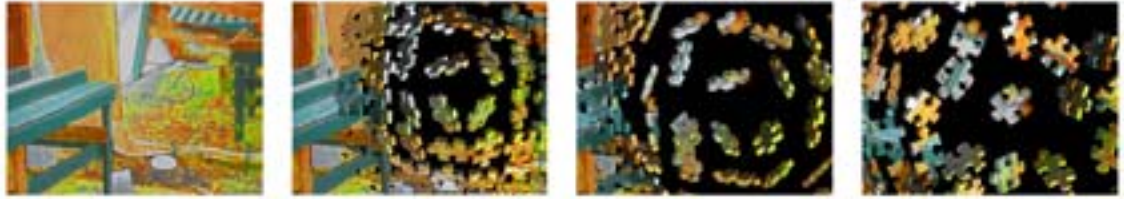
Adding Effects

Adobe After Effects delivers powerful, precise tools for creating a limitless range of visual and audio effects—from the most utilitarian color correction and audio sweetening tools to extremely sophisticated distortion and time remapping features. You can expand your effects toolkit even further with numerous third-party plug-ins. Apply an unlimited number of effects to every layer, and animate every control. Save your most frequently used effects (including keyframes) as Favorites, which you can apply instantly and share with colleagues.

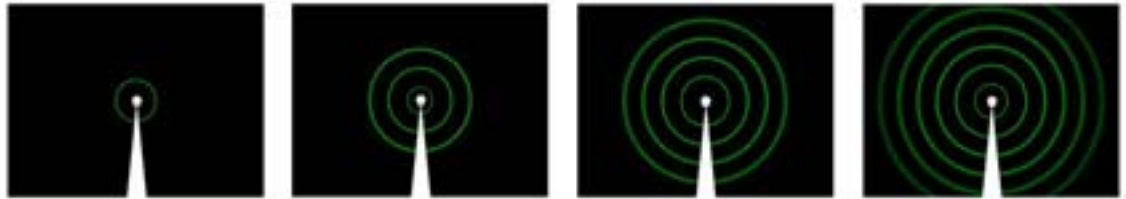
Audio Support: Adobe After Effects delivers comprehensive audio-processing and effects capabilities. For example, you can synchronize animation elements to audio amplitude and drive video effects using audio data. In addition to applying audio effects to your footage, you can also change the volume levels of audio layers, preview them at a specified quality, and identify and mark locations. Use the convenient Audio palette to set the volume levels of an audio level, or use the Timeline window to view the waveform values and apply time remapping.

Visual Excitement: You can stylize, enhance, and manipulate layers using a wide array of effects plug-ins; categories include Blur& Sharpen, Channel manipulation, Distortion, Keying, Perspective, Render, Stylize, and Transition. Here are just a few examples of some of the newest visual effects included in Adobe After Effects:

- **Shatter:** Extrude a layer and then demolish it in a variety of ways. Animate a force point to create a shock wave moving through a layer, or explode layers into puzzle pieces, glass shards, and more.



- **Radio Waves:** Create radio waves, pond ripples, and other effects that use a repeating shape emitted from a single point. Choose between Polygon waves (perfect for producing stars, spirograph patterns, and other regular geometric shapes), waves based on user-drawn masks, or wave shapes based on the contours of an image. There are dozens of other properties to animate as well, from selecting the point from which waves emit to frequency, duration, color, opacity, and much more. Even choose to reflect the waves off the edges of the layer to create realistic looking waves.



- **Vegas:** Outline elements with casino-style running lights, flashing pulses, and other path-based effects—around any object. Control everything from the stroke width to the length and spacing of light segments.



- **Inner/Outer Key** (*Production Bundle only*): Extract an object from its background to create accurate keys more easily. One mask or path defines the inside of the object and another identifies the background: using this information, After Effects automatically extracts the foreground element.



Using Expressions

With the expressions feature, After Effects offers support for creating arbitrary relationships between parameters. This allows you to create procedural-type animations without using keyframes. With expressions, you can create a live relationship between the behavior of one property in a composition and the behavior of almost any other property on any other layer—opening up an infinite number of animation possibilities. And while expressions are exceptionally powerful, they're also easy enough to use that any user can put them to work right away.

The most straightforward expressions link one property's behavior to that of another within the same composition. For example, the opacity of one layer could be tied to the scale of another so that as one layer increases in size, the opacity of the other increases. Or the tracking of path text could be linked to the rotation of another layer, so that the text tracks more tightly as the layer rotates in one direction, then tracks more loosely as it rotates back. To create these types of expressions, simply drag the expression pick whip from the property that is to be animated to the property that the animation will be based on—and voila! After Effects automatically creates the expression for you. You can even drag the pick whip between the Timeline and Effect Controls windows.

In this example, an expression is used to tie a directional blur effect to text tracking.



If you have some familiarity with JavaScript, you can create expressions that are even more powerful. By defining variables and using other basic JavaScript programming concepts, you can create powerful procedural animations that stretch the limits of the imagination. There's even a popup list of common After Effects functions to speed the process and to eliminate errors. Plus, you can modify expressions that you jumpstarted using the pick whip.

Putting It All Together

While you *can* produce an entire project in Adobe After Effects (in fact, you can create movies that are as large as 2 GB or more), it's likely that you'll want to create animated or composited sequences in After Effects, then import them into a project in Adobe Premiere. But even after you have incorporated material created in After Effects into your Premiere Timeline, it's still easy to make modifications with After Effects, using Adobe Premiere's Edit Original command. Edit Original lets you conveniently edit source content in its native application. Once your changes are made, Adobe Premiere updates both the placed content and the source file.

OUTPUTTING AND DISTRIBUTING YOUR PRODUCTION

Once you have finished assembling and editing clips, it's time to output your final video. These days, creative professionals are expected to deliver movies that can be used in multiple media. Broadcast and film professionals alike are now creating Web-based work, while Web designers may need to create animations that are output in video formats. To address this growing need for flexibility, Adobe Premiere and Adobe After Effects both offer a wide range of output options that enable you to produce high-quality output for film, video, multimedia, and the Web.

Getting Video Out of Your Computer

The program you edited in the Timeline does not actually *contain* the material from which it was pieced together—rather, it *references* your source files. Before export, make sure that the Timeline is ready to output at the quality you require. For example, replace any offline files with high-resolution files suitable for final export. To get your edited program out of your computer in one piece, you can:

- Record the Timeline to physical media including videotape or motion picture film, if you have the proper hardware for video or film transfer, or have access to a service provider that offers the appropriate equipment and services.
- Export a video file for viewing from a hard disk, removable cartridge, CD-ROM, DVD, or the Web.

You can also output stills or sequences of stills, portions of your Timeline as clips, and/or an **EDL** (edit decision list).

Good Housekeeping

In professional production environments, once a video project has been completed, it must be cleared from the editing system to make room for new work. Because the multi-gigabyte storage media that would be needed is costly, and the process of uploading can be very time-consuming, projects—including the referenced source files—are not usually saved in their entirety. If you do want to save your entire project, you'll want to conserve space. So, when you are satisfied with the results of your editing, you may want to **trim** unused frames from some or all of your source clips and remove unused clips in their entirety from Project Bins.

Typically, however, a digital master file is exported and archived, the original raw footage is stored on tapes, and an EDL is saved. If the project needs to be revised later, the master file can often be edited. For more extensive repurposing, the EDL can be used to generate the necessary clips from the original tapes. Files used to develop titles, graphics, and animations, as well as portions of the project that have undergone extreme manipulation to achieve special effects may also be archived.

Exporting to Videotape

You can record your edited program onto videotape directly from your computer. This can be as simple as playing the Timeline and recording on a connected device. When you record DV video back to DV tape, all that is required is the IEEE 1394 connection. However, if plan to record DV audio and video to an analog format, such as VHS tape, you'll need a device that is capable of converting DV to analog using the connectors supported by your analog video recorder. Most DV cameras and all DV video tape recorders are capable of this conversion; some DV cameras require you to record the video to DV tape, then dub the DV tape to the analog video recorder.

Exporting to Digital Files

You can prepare variations of a program or clip for a variety of different uses. For example, you can create separate versions for DVD distribution and Web viewing. Adobe Premiere and After Effects both offer built-in support for exporting the following video file formats: Microsoft AVI, Animated GIF,

QuickTime, and MPEG. Adobe Premiere includes plug-ins that export RealMedia and Windows Media video files for the Web, and After Effects can export files in the Macromedia Flash (SWF) format. Several audio-only formats and a variety of still-image and sequence formats are also supported by both applications. Additional file formats may be available if provided with your video capture card or if you add third-party plug-in software.

When you export to digital files, you need to adjust settings, depending on the kind of output you need. These settings may include such choices as the data rate for playback, the color depth, the frame size and frame rate, the quality, and what type of compression method, or codec, to use. Choosing compression settings is a balancing act that varies depending on the type of video material, the target delivery format, and the intended audience. Often, the optimal compression settings are arrived at through trial and error. You should always test the files you export on the type of platform or equipment you expect your audience to use, prior to distribution.

With Adobe Premiere, you can export multiple video programs or clips to multiple files automatically. This is known as *batch processing*. The Batch Processing command uses the export settings and compression options you specify for each video file being created. You can create and save multiple batch lists for easy, repeatable exporting of groups of projects. Batch processing can save time and greatly simplify the following tasks:

- Exporting several video files overnight, or while you attend to something else
- Testing several different export settings files to find out which work best
- Creating versions for different media, such as videotape, CD, and Web delivery

Web Video

The Web is rapidly gaining importance as a vehicle for distributing video content. From movie trailers to training programs to sharing the experience of personal events such as weddings, video delivered via the Internet or a corporate intranet is now a reality. If you would like to learn more about Web video and how Adobe products make it easier than ever to take advantage of this dynamic medium, check out the *Adobe Streaming Media Primer*. You can download the Adobe Acrobat PDF from the Adobe Web site at www.adobe.com/smprimer.

Conclusion

We hope this *Digital Video Primer* has answered enough of your questions to encourage you to get started. We know that once you do, you and your audience will be thrilled with the rewards upon the screening of your first motion picture project—whether personal or professional. If you still feel somewhat confused and hesitant, however, it's not surprising—there *is* a lot to know about video. But the best thing to do is to jump right in and learn as you go. Finding the information you need is easy with the comprehensive new HTML-based online Help included with both Adobe Premiere and Adobe After Effects. You can also access additional help and training materials through Adobe Online located on the Help menus. The Adobe Digital Video Collection is a great way to get started, with a comprehensive set of easy to learn and use tools that include features to grow with.

How to Purchase Adobe Software Products

Via Web:

<http://www.adobe.com/store>

Via Phone:

***Adobe After Effects Hotline:* (800) 685-3504**

***Adobe Premiere Hotline:* (888) 724-4507**

Education customers:

Contact an Adobe Authorized Education Reseller at:

<http://www.adobe.com/education/purchasing/resellers.html>

Free Tryouts:

***Adobe After Effects:* <http://www.adobe.com/products/aftereffects/demodnld.html>**

***Adobe Premiere:* <http://www.adobe.com/products/premiere/demoreg.html>**

To find the reseller nearest you, visit:

<http://www.adobe.com/store/otherplaces/main.html>

For More Information

There are a variety of products and information that are helpful to learning and working with digital video using Adobe Premiere and Adobe After Effects. The following information is provided as a courtesy. Adobe does not endorse third-party products or services. This listing was last updated on January 2, 2002.

BOOKS

Adobe Classroom in a Book
published by Peachpit Press
Series of hands-on software training workbooks for Adobe products; includes CD
www.adobe.com/misc/books.html

After Effects in Production
by Trish and Chris Meyer
published by CMP Books (2001)
ISBN: 1578200776
Companion book to Creating Motion Graphics containing tutorials; includes CD

Applying Adobe After Effects 4.0 Studio Techniques
by Rod Harlan
published by Sams (2000)
ISBN: 0672318563
Step-by-step instructions of popular procedures and effects; includes CD

Creating Motion Graphics with After Effects
by Trish and Chris Meyer
published by CMP Books (2000)
ISBN: 0879306068
Techniques for creating animation, composites, effects; includes CD

Desktop Digital Video
by Ron Grebler
published by Prompt Publications (1997), ISBN: 0790610957
Examines the hardware involved, the variety of software applications, and how to utilize them

Digital Nonlinear Editing: Editing Film and Video on the Desktop
by Thomas A. Ohanian
Published by Butterworth-Heinemann (second edition, 1998)
ISBN: 024080225X
Addresses the latest developments in digital editing for film and video

Digital Video for Dummies
by Martin Doucette
Published by: Hungry Minds, Inc. (2nd edition, 2000), ISBN: 0764500236
Step-by-step instructions on digital video editing using Premiere

Nonlinear: A Guide to Digital Film and Video Editing
by Michael Rubin
published by Triad Publishing Company (revised, 2000)
ISBN: 0937404845
Covers topics including SMPTE time-code, Telecine and 3:2 pulldown,

component and composite video, film edge numbers and electronic film editing, the post-production process, online and offline editing

TRAINING RESOURCES

ADOBE CERTIFIED EXPERT (ACE) PROGRAM
To become an Adobe Certified Expert, you must pass an Adobe Product Proficiency Exam for the product for which you want to be certified. For more information see the Adobe Web site at www.adobe.com:80/education/educators/ace_program.html

ADOBE CERTIFIED TRAINING PROVIDER (ACTP) PROGRAM
For more information see the Adobe Web site at <http://partners/adobe.com/asn/training/ctphowto.html>

ADOBE CERTIFIED TRAINERS
Find Adobe Certified Trainers by visiting any of these Web sites—

Adobe
www.adobe.com/products/partnerfinder/searchtraining.html

Sterling, Ledet and Associates
www.ledet.com

Digital Training and Designs, Inc.
www.digitrain.com

CD-ROM, VIDEOTAPE, AND WEB-BASED TRAINING

Adita Video Inc.
Premiere 5.1 training on CD-ROM
www.videoguys.com/adita.html

Mac Academy/Windows Academy
Premiere training on video cassette
Phone: 800-527-1914 or 904-677-1918; Fax: 904-677-6717
www.macacademy.com

Total Training Inc.
Brian Maffitt provides in-depth training on videotape for both Premiere and After Effects
Phone: 760-944-3900; Fax: 760-944-3929
www.totaltraining.com

VideoSynasies: The Motion Graphics Problem Solver
Trish and Chris Meyer provide in-depth information about motion graphics and special effects in After Effects
www.desktopimages.com/ae.shtml

VTC: The Virtual Training Company
CD and Web-based training on Premiere and After Effects
www.vtco.com

ADDITIONAL LEARNING RESOURCES

Internet Campus
www.internetcampus.com
Complete courses in digital video production

Video University
www.videouniversity.com
Complete courses in digital video production

Short Courses
www.shortcourses.com/video/index.htm
A course in digital video

FREE INFO ON THE WEB

GUIDES, TUTORIALS AND TIPS

Adobe Digital Video Primer
Download a PDF copy from www.adobe.com/dvprimer

Adobe Streaming Media Primer
Download a PDF copy from www.adobe.com/smpprimer

Master the Art of Digital Video
Download a PDF copy from www.adobe.com/motion/events/pdfs/dvtour.pdf

Free Tutorials for Premiere and After Effects
www.adobe.com/motion/tips

Creative Mac
www.creativemac.com/HTML/Sections/Tutorials/tutorials.htm
Premiere and After Effects tutorials

DV Magazine
www.dv.com (click links to Production, Post and Delivery)
Premiere and After Effects tutorials

The Mining Company
<http://desktopvideo.miningco.com>
Overview of desktop video

After Effects Portal
<http://msp.sfsu.edu/Instructors/rey/aefpage/aefportal.html>
Multipurpose site with tutorials and tips for After Effects

After Effects Freemart
www.aefreemart.com
After Effects tutorials

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GUIDES, TUTORIALS AND TIPS *[continued]*

ToolFarm

www.toolfarm.com/tips
Tips on using network rendering,
3D channels, and Mesh Warp in
After Effects

FlickTips

www.newvenue.com/flicktips
Tips for low budget video-web
production.

Learn Dynamic Media

www.learndynamicmedia.com
Tutorials, tips, articles and reviews for
After Effects and other digital video
applications

Video Guys

www.videoguys.com
Helpful resource that explains many
of the new technologies related to
digital video

DV2Cinema

www.mindspring.com/~dv2cinema
A comprehensive site with information
about transferring DV to 16mm,
35mm, SD-DTV, or HD-DTV

Reel Ends

"How Film is Transferred to Video"
[www.reelends.com/articles/
cinematography/herranen.html](http://www.reelends.com/articles/cinematography/herranen.html)

INFORMATION ABOUT MPEG

- www.mpeg.org/MPEG/
- www.ligos.com/mpeg_zone/
- www.cselt.stet.it/mpeg/
- www.coolstf.com/mpeg/

INFORMATION ABOUT DVD

- [www.dvddemystified.com/
dvdfaq.html](http://www.dvddemystified.com/dvdfaq.html)
- [www.videoguys.com/
DVDhome.html](http://www.videoguys.com/DVDhome.html)

INFORMATION ABOUT IEEE-1394

- [www.oakmusic.com/ parkplace/
video/techpapers.htm](http://www.oakmusic.com/parkplace/video/techpapers.htm)
- [www.well.com/user/richardl/
theSilverList.html](http://www.well.com/user/richardl/theSilverList.html)

ONLINE GLOSSARIES

PC Technology Guide

www.pctechguide.com

Webopedia

www.webopedia.com

MAGAZINES

AV Video Multimedia Producer

Covers video production, multimedia,
and presentation
Phone: 800-800-5474 or
914-328-9157; Fax: 914-946-5038
www.avvideo.com/Htm/homeset2.htm

Broadcast Engineering

Covers broadcast technology
[http://industryclick.com/
magazine.asp?magazineid=158&SiteID=15](http://industryclick.com/magazine.asp?magazineid=158&SiteID=15)

Computer Videomaker

Covers camcorders, computers, tools
and techniques for creating video
Phone: 530-891-8410;
Fax: 530-891-8443
www.videomaker.com

Digital Editor Online

Master the tools needed to make non-
linear and digital editing profitable
Phone: 606-278-8321;
Fax: 606-277-5131
www.digitaleditor.com

DV (Digital Video Magazine)

Covers mainstream digital video
www.dv.com

Film & Video

Covers film and video production
Phone: 213-653-8053;
Fax: 213-653-8190
[www.filmandvideomagazine.com/
Htm/homeset.htm](http://www.filmandvideomagazine.com/Htm/homeset.htm)

Millimeter

Resource for technology trends in
animation, production and post-
production for film, video and
streaming
Phone: 313-613-9700;
Fax: 121-563-3028
www.millimeter.com

Post Magazine

Resource for video, audio, and
film post-production
Phone: 516-767-2500;
Fax: 516-944-8372
www.postmagazine.com

Videography

Covers the professional video
production market
Phone: 212-378-0400;
Fax: 212-378-2160
www.videography.com

Video Systems

Covers the video production process
from acquisition through presentation
Phone: 913-341-1300
www.videosystems.com

NEWSLETTERS

Adobe.com

[www.adobe.com/services/
newsletter/subscribe.html](http://www.adobe.com/services/newsletter/subscribe.html)
Featuring articles, features, tips, and
techniques from experienced Web
producers and designers

About.com

[www.desktopvideo.about.com/gi/
pages/mmail.htm](http://www.desktopvideo.about.com/gi/pages/mmail.htm)
Desktop video

Digital Media Net

[www.digitalmedianet.com/
newsletters/](http://www.digitalmedianet.com/newsletters/)
Topics related to digital
content creation

DV.com

[www.dv.com/community/
newsletter.shtml](http://www.dv.com/community/newsletter.shtml)
Digital video industry news

COMMUNITIES

USER FORUMS

Exchange information with other After
Effects and Premiere users.

Adobe User to User Forums

[www.adobe.com/support/forums/
main.html](http://www.adobe.com/support/forums/main.html)

Canopus Users Forums

[www.canopuscorp.com/support/
usergroups.php3](http://www.canopuscorp.com/support/usergroups.php3)

Pinnacle Systems Discussion Forums

<http://webboard.pinnaclesys.com/>

The World Wide Users Group Forums for After Effects Users

[www.wwug.com/forums/adobe_after-
effects/index.html](http://www.wwug.com/forums/adobe_after-effects/index.html)

The World Wide Users Group Forums for Premiere Users

[www.wwug.com/forums/
adobe_premiere/index.html](http://www.wwug.com/forums/adobe_premiere/index.html)

DV.com Forums

www.dv.com

Creative Cow

Online creative communities of the
world including Premiere and After
Effects user forums
www.creativecow.net

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MAILING LISTS

Use e-mail to exchange information and distribute questions and answers on a particular topic.

Yahoo

Premiere and After Effects mailing lists
<http://groups.yahoo.com/group/>

DV-L List Server

DV and FireWire technologies
www.dvcentral.org/thelist.html

MacDV List

Digital video production on Macintosh computers, including techniques and troubleshooting
www.themacintoshguy.com/lists

Mac Digital Audio

Digital audio production on Macintosh computers
www.macdigitalaudio.com/forum/

Vidpro

Discussions for video and television professionals
www.vidpro.org/subscribe.htm

NEWSGROUPS

If you use an internet application that lets you access newsgroups, you can read and respond to postings in the following digital video newsgroups:

- comp.graphics.animation
- rec.video.desktop
- rec.video.production
- rec.video.professional

PROFESSIONAL ASSOCIATIONS**Digital Video Professionals Association**

www.dvpa.com

Society of Motion Pictures and Television Engineers

www.smppte.org

Digital Editors

www.digitaleditor.com

NonLinear Editors

www.nothing.com/NewNonlinear/

CONFERENCES**DV Expo**

<http://dvexpo.com>

NAB (National Association of Broadcasters)

www.nab.org

Siggraph

www.siggraph.org

THIRD-PARTY SOFTWARE AND HARDWARE**PLUG-INS****For Adobe Premiere**

For detailed descriptions of third-party plug-ins for Premiere, visit the Premiere Third-Party Plug-ins page on the Adobe Web site:
www.adobe.com/products/plugins/premiere/main.html

For Adobe After Effects

For detailed descriptions of third-party plug-ins for After Effects, visit the After Effects page on the Adobe Web site:
www.adobe.com/products/plugins/aftereffects/main.html

CAPTURE CARDS

For a list of video capture cards that Adobe has tested and certified for use with Premiere, visit the Adobe Web site:
www.adobe.com/products/premiere/6cards.html

ENCODING SOFTWARE

The following is a list of manufacturers that produce video compression and encoding software.

QDesign Corporation

QDesign Music Codec for QuickTime 3
 Phone: 604-688-1525;
 Fax: 604-688-1524
www.qdesign.com

RealNetworks

RealSystem G2
 Phone: 206-674-2700
www.real.com

Microsoft

Windows Media Technologies
www.microsoft.com/windows/windowsmedia/default.asp

Apple

QuickTime
<http://developer.apple.com/quicktime/>

Sorenson Media

Sorenson Video Developer and Basic Edition
 Phone: 888-767-3676;
 Fax: 435-792-1101
www.sorenson.com

Discreet

Cleaner
 Phone: 800-869-3504
www.discreet.com

AUDIO SOFTWARE**Mark of the Unicorn**

Audio recording and editing software, audio and MIDI hardware
www.motu.com

Sonic Foundry

Makers of ACID and Soundforge (audio sequencing and editing software), and other multimedia software
www.sonicfoundry.com

Steinberg Media Technologies AG

Makers of Cubase and other music production software
www.steinberg-ag.net

Prosoniq

Audio editing software
www.prosoniq.com

Aardvark

Multitrack hard disk audio recording systems (Windows only)
www.aardvark-pro.com/direct_pro_2496.html

Glossary

aliasing: A term used to describe the unpleasant jaggy appearance of unfiltered angled lines. Aliasing is often caused by sampling frequencies being too low to faithfully reproduce an image. There are several types of aliasing that can affect a video image including temporal aliasing (e.g., wagon wheel spokes apparently reversing) and raster scan aliasing (e.g., flickering effects on sharp horizontal lines).

alpha channel: Color in an RGB video image is stored in three color channels (see *channel*). An image can also contain a *matte* (also known as a *mask*) stored in a fourth channel called the “alpha channel.”

analog: The principal feature of analog representations is that they are *continuous*. For example, clocks with hands are analog—the hands move continuously around the clock face. As the minute hand goes around, it not only touches the numbers 1 through 12, but also the infinite number of points in between. Similarly, our experience of the world, perceived in sight and sound, is analog. We perceive infinitely smooth gradations of light and shadow; infinitely smooth modulations of sound. Traditional (non-digital) video is analog.

animatic: A limited animation used to work out film or video sequences. It consists of artwork shot on film or videotape and edited to serve as an on-screen storyboard. Animatics are often used to plan out film sequences without incurring the expense of the actual shoot.

anti-aliasing: The manipulation of the edges of an image, graphic, or text to make them appear smoother to the eye. On zoomed inspection, anti-aliased edges appear blurred, but at normal viewing distance, the apparent smoothing is dramatic. Anti-aliasing is important when working with high quality graphics for broadcast use.

architecture: The term “architecture” in digital video (sometimes also known as format) refers to the structure of the software responsible for creating, storing, and displaying video content. An architecture may include such things such as compression support, system extensions and browser plug-ins. Different multimedia architectures offer different features and compression options, and store video data in different file formats. *QuickTime*, *RealVideo*, and *MPEG* are examples of video architectures (although *MPEG* is also a type of compression).

artifact: Visible degradations of an image resulting from any of a variety of processes. In digital video, artifacts usually result from color compression and are most noticeable around sharply contrasting color boundaries such as black next to white.

aspect ratio: The ratio of an image’s width to its height. For example, a standard video display has an aspect ratio of 4:3.

assets: The video and audio clips, stills, titles, and any other materials that comprise the content of a video production.

audio gain: Audio level or volume.

audio lead: See *J-cut*.

audio sweetening: Processing audio to improve sound quality or to achieve a specific effect.

AVI: Defined by Microsoft, “AVI” stands for *Audio Video Interleave*. AVI is one of the file formats for video on the Microsoft® Windows® platform.

batch capture: Automated process of capturing a specified list of clips from source footage—either digital or analog media.

balancing: Adjusting the balance of sound between the two channels (left and right) in a stereo clip.

binary: A type of *digital* system used to represent computer code in which numerical places can be held only by ‘zero’ or ‘one’ (on or off).

bit depth: In digital graphics, bit depth indicates the number of colors the image can display. A high-contrast (no grey tones) black and white image is 1-bit, meaning it can be off or on, black or white. As bit depth increases, more colors become available. 24-bit color allows for millions of colors to be displayed. Similarly, in digital audio, bit depth indicates the number of bits per sample; the higher the number, the better the sound quality.

BNC connector: A connector typically used with professional video equipment for connecting cables that carry the video signal.

camcorder: A video camera, i.e., a device that records continuous pictures and generates a signal for display or recording. To avoid confusion, it is recommended that the term “camcorder” be used rather than “camera”—in contrast, a digital camera records *still* images, while a digital camcorder records *continuous video* images.

capture: If the source footage is analog, “capture” refers to the act of digitization (conversion to a digital format) to make the video usable on a computer and, usually, the simultaneous application of *compression* to reduce the video to a manageable *data rate* for processing and storage. If the source video is *DV*, “capture” typically refers to the simple transfer of video from an external device, such as a digital camcorder or tape deck, to a computer hard drive.

capture card: A printed circuit board that fits into an expansion slot on a computer and provides functionality for capturing video from an external source.

CG: Acronym for Character Generator (see *character generator*).

CGI: Acronym for Computer Graphic Imagery

channel: Each component color defining a computer graphic image —Red, Green, and Blue— is carried in a separate “channel,” so that each may be adjusted independently. Channels may also be added to a computer graphic file to define masks.

character generator: Stand-alone device or software program running on a computer used to create text for display over video.

chrominance: The color portion of a video signal.

clip: A digitized portion of video.

codec: Short for *compressor/decompressor*; comprised of algorithms that handle the compression of video to make it easier to work with and store, as well as the decompression of video for playback.

color sampling: A method of *compression* that reduces the amount of color information (*chrominance*) while maintaining the amount of intensity information (*luminance*) in images.

component video: A video signal with three separate signals, “Y” for *luminance*, “Cr” for Chroma and red, and “Cb” for Chroma and blue. Component signals offer the maximum luminance and chrominance bandwidth. Some component video, like Betacam and BetacamSP, is analog; other component video, like D1, is digital.

composite video: A video signal where *chrominance* and *luminance* are combined in the same signal.

compositing: The process of combining two or more images to yield a resulting, or “composite” image.

compression: Algorithms used by a computer to reduce the total amount of data in a digitized frame or series of frames of video and/or audio.

compression ratio: Degree of reduction of digital picture information as compared to an uncompressed digital video image.

crawling title: Text and/or graphics that move horizontally left or right across the screen.

cut: The simplest type of *transition*, in which the last frame of one clip is simply followed by the first frame of the next.

data rate: Amount of data moved over a period of time, such as 10MB per second. Often used to describe a hard drive’s ability to retrieve and deliver information.

digital: In contrast to *analog*, digital representations consist of values measured at discrete intervals. Digital clocks go from one value to the next without displaying all intermediate values. Computers are digital machines employing a *binary* system, i.e., at their most basic level they can distinguish between just two values, 0 and 1 (off and on); there is no simple way to represent all the values in between, such as 0.25. All data that a computer processes must be digital, encoded as a series of zeroes and ones. Digital representations are approximations of analog events. They are useful because they are relatively easy to store and manipulate electronically.

digitizing: Act of converting an analog audio or video signal to digital information.

dissolve: A fade from one *clip* to another.

DTV: Digital television

duration: The length of time a video or audio clip plays—the difference in time between a clip’s In point and Out point.

DV: Generally refers to *digital video*, but current usage suggests a variety of nuances. DV can connote the type of *compression* used by DV systems or a format that incorporates DV compression. DV *camcorders* employ a DV format; more specifically, a standard consumer DV camcorder uses mini-DV tape, compresses the

video using the DV25 standard, and has a port for connecting to a desktop computer. The DV designation is also used to for a special type of tape cartridge used in DV camcorders and DV tape decks.

DVD: Abbreviation for *Digital Versatile Disc*, DVDs look like CDs but have a much higher storage capacity, —more than enough for a feature length film compressed with *MPEG-2*. DVDs require special hardware for playback.

DV25: The most common form of DV *compression*, using a fixed data rate of 25 megabits/sec.

EDL: Edit Decision List—master list of all edit in and out points, plus any transitions, titles, and effects used in a film or video production. The EDL can be input to an edit controller which interprets the list of edits and controls the decks or other gear in the system to recreate the program from master sources.

effect: Distortion of a frame or frames of video to change its appearance.

fields: The sets of upper (odd) and lower (even) lines drawn by the electron gun when illuminating the *phosphors* on the inside of a standard television screen, thereby resulting in displaying an *interlaced* image. In the *NTSC* standard, one complete vertical scan of the picture—or *field*—contains 262.5 lines. Two fields make up a complete television *frame*—the lines of field 1 are vertically interlaced with field 2 for 525 lines of resolution.

final cut: The final video production, assembled from high-quality clips, and ready for export to the selected delivery media.

FireWire: The Apple Computer trade name for *IEEE 1394*

four-point editing: An editing feature used for replacing footage in a program when the precise In and Out points of the clip to be inserted and the portion of the program to be replaced are critical and are, therefore specified by the editor. The four-point editing feature alerts the editor to any discrepancy in the two clips and automatically suggests alternatives.

FPS: Frames per second; a method for describing *frame rate*.

frame: A single still image in a sequence of images which, when displayed in rapid succession, creates the illusion of motion—the more frames per second (*FPS*), the smoother the motion appears.

frame rate: The number of images (video frames) shown within a specified time period; often represented as *FPS* (frames per second). A complete *NTSC* TV picture consisting of two fields, a total scanning of all 525 lines of the raster area, occurs every 1/30 of a second. In countries where *PAL* and *SECAM* are the video standard, a *frame* consists of 625 lines at 25 frames/sec.

generation loss: Incremental reduction in image and/or sound quality due to repeated copying of analog video or audio information and usually caused by *noise* introduced during transmission. Generation loss does not occur when copying digital video unless it is repeatedly compressed and decompressed.

handles: Extra frames specified before the In and Out points of a clip that may be needed to accommodate transitions or editing adjustments.

headroom: When capturing audio, extra data acquired as a result of capturing at higher quality settings than needed for the final cut. Headroom helps preserve quality when adjusting audio gain or applying certain audio effects.

IEEE 1394: The interface standard that enables the direct transfer of DV between devices such as a DV camcorder and a computer; also used to describe the cables and connectors utilizing this standard.

i.LINK: The Sony trade name for *IEEE 1394*.

In and Out points: The points in a source clip at which the material actually used in a video program begins (In point) and ends (Out point).

insert edit: An edit in which a series of frames is added, lengthening the duration of the overall program.

inter-frame compression: Reduces the amount of video information by storing only the *differences* between a frame and those that precede it. (Also known as *temporal compression*.)

interlacing: System developed for early television and still in use in standard television displays. To compensate for limited *persistence*, the electron gun used to illuminate the *phosphors* coating the inside of the screen alternately draws even, then odd horizontal lines. By the time the even lines are dimming, the odd lines are illuminated. We perceive these “interlaced” *fields* of lines as complete pictures.

intra-frame compression: Reduces the amount of video information in each frame, on an individual basis. (Also known as *spatial compression*.)

J-cut: A type of *split edit* where the audio In point is earlier than the video In point so that the audio begins to be heard during the previous video clip. Also known as an *audio lead*.

JPEG: File format defined by the *Joint Photographic Experts Group* of the International Organization for Standardization (ISO) that sets a standard for compressing still computer images. Because video is a sequence of still computer images played one after another, JPEG compression can be used to compress video (see *MJPEG*).

matting: The technique of using a *matte* to specify transparency when superimposing video clips.

key: A methods for creating transparency, such as a blue-screen key or a chroma-key.

keyframe: A frame selected at the beginning or end of a sequence of frames, that is used as a reference for any of a variety of functions. For example, in inter-frame video compression, keyframes typically store complete information about the image, while the frames in between may store only the differences between two keyframes; or, in applying an effect to a video clip, keyframes may contain values for all the controls in the effect and, when the values are different for the beginning and ending keyframes, the effect will change over time.

keyframing: The process of creating an animated clip by selecting a beginning image and an ending image whereby the software automatically generates the frames in between (similar to “tweening”).

keying: The technique of using a *key* to apply transparency when superimposing video clips.

L-cut: A type of *split edit* where the audio Out point is later than the video Out point so that the audio continues to be heard with the next video clip.

log: A list of shots described with information pertinent to content or other attributes; or the act of creating such a list.

lossless: A process that does not affect signal fidelity; e.g. the transfer of DV via an IEEE 1394 connection.

lossy: Generally refers to a compression scheme or other process, such as duplication, that causes degradation of signal fidelity.

luminance: Brightness portion of a video signal.

markers: Markers are used in the editing process to indicate important points in the Timeline and/or in individual clips. Markers are for reference only; they do not alter the video program.

mask: See *matte*. The term “mask” is usually used in working with still images, while the term “matte” is typically used in film and video post-production.

matte: An image that specifies an area of another image, most often used to apply transparency, semi-transparency or some other effect to the area specified. Also see *mask*.

matting: The technique of using a *matte* to specify transparency when superimposing video clips.

MJPEG: Motion *JPEG*.

motion control photography: A system for using computers to precisely control camera movements so that different elements of a shot can later be composited in a natural and believable way.

motion effect: Speeding up, slowing down or strobing of video.

MPEG: *Motion Pictures Expert Group* of the International Organization for Standardization (ISO) has defined multiple standards for compressing audio and video sequences. Setting it apart from *JPEG* which compresses individual frames, MPEG compression uses a technique where the *differences* in what has changed between one frame and its predecessor are calculated and encoded. MPEG is both a type of *compression* and a video *format*. “MPEG-1” was initially designed to deliver near-broadcast quality video through a standard speed CD-ROM. Playback of MPEG-1 video requires either a software decoder coupled with a high-end machine, or a hardware decoder. “MPEG-2” is the broadcast quality video found on *DVDs*. It requires a hardware decoder (e.g.; a DVD-ROM player) for playback.

NLE: A *nonlinear editing* computer system.

noise: Distortions of the pure audio or video signal that would represent the original sounds and images recorded, usually caused by interference.

nonlinear editing: Random-access editing of video and audio on a computer, allowing for edits to be processed and re-processed at any point in the *timeline*, at any time. Traditional videotape editors are *linear* because they require editing video sequentially, from beginning to end.

NTSC: *National Television Standards Committee* standard for color television transmission used in the United States, Japan and elsewhere. NTSC incorporates an *interlaced* display with 60 *fields* per second, 29.97 *frames per second*.

offline editing: The practice of editing a *rough cut* using low-quality clips, then producing the *final cut* with high-quality clips, usually on a more sophisticated editing system than that used for developing the rough.

online editing: The practice of doing all editing (including the *rough cut*) on the same clips that will be used to produce the *final cut*.

PAL: *Phase-alternating line* television standard popular in most European and South American countries. PAL uses an *interlaced* display with 50 *fields* per second, 25 *frames per second*.

panning: Moving a camera horizontally or vertically as a scene is being shot. Also, shifting sound from or to either the left or right stereo channel.

phosphor: A luminescent substance, used to coat the inside of a television or computer display, that is illuminated by an electron gun in a pattern of graphical images as the display is scanned.

pixel: An abbreviation for *picture element*. The minimum computer display element, represented as a point with a specified color and intensity level. One way to measure image *resolution* is by the number of pixels used to create the image.

poster frame: A single frame of a video clip selected to be used as an icon to represent and identify that clip in parts of the Adobe Premiere interface.

post-production: The phase of a film or video project that involves editing and assembling footage and adding effects, graphics, titles, and sound.

pre-production: The planning phase of a film or video project—usually completed prior to commencing production.

pre-visualization: A method of communicating a project concept by creating storyboards and/or rough animations or edits.

print to tape: Outputting a digital video file for recording on a videotape.

production: The phase of a film or video project comprised of shooting or recording raw footage.

program monitor: Window on the Adobe Premiere interface that displays the edited program.

project: File with all information pertaining to a job, including settings and source material.

QuickTime: A multi-platform, industry-standard, multimedia software *architecture* developed by Apple and used by software developers, hardware manufac-

turers, and content creators to author and publish synchronized graphics, sound, video, text, music, VR, and 3D media. “QuickTime 4” includes strong support for “real” (RTSP) *streaming*.

RCA connector: A connector typically used for cabling in both audio and video applications.

RealMedia: Architecture designed specifically for the web, featuring streaming and low data-rate compression options; works with or without a “RealMedia server.”

real-time: In computing, refers to an operating mode under which data is received, processed and the results returned so quickly as to seem instantaneous. In an *NLE*, refers to effects and transitions happening without an interruption for *rendering*.

rendering: The process of mathematically calculating the result of a transformation effect on a frame of video (e.g. resizing, effects, motion).

resolution: The amount of information in each frame of video, normally represented by the number of horizontal *pixels* times the number of vertical pixels (e.g. 640 x 480). All other things being equal, a higher resolution will result in a better quality image.

RGB: *Red-Green-Blue*—a way of describing images by breaking a color down in terms of the amounts of the three primary colors (in the additive color system) which must be combined to display that color on a computer monitor.

ripple edit: Automatic forward or backward movement of program material in relationship to an inserted or extracted clip, or to a change in the duration of a clip.

rolling edit: Automatic change in the duration of a program when a clip is inserted or extracted, or when the duration of a clip is altered.

rolling title: Text and/or graphics that moves vertically up or down across the screen.

rough cut: A preliminary version of a video production, often assembled from lower-quality clips than those used for the *final cut*.

sample rate: In digital audio, the number of samples per second; the higher the number, the better the sound quality.

scrubbing: Variable-rate backward or forward movement through audio or video material via a mouse, keyboard or other device.

SECAM: Similar to *PAL* at 25 FPS, the SECAM format is employed primarily in France, the Middle East, and Africa. It is only used for broadcasting. In countries employing the SECAM standard, PAL format cameras and decks are used.

16-bit-per-channel color: Used for generating the highest quality output, such as for film effects or HDTV output, a color system that stores and transmits 16 bits of information for each of the Red, Green, and Blue components, or *channels*.

slide: An editing feature that adjusts the previous clip's Out point and the next clip's In point without affecting the clip being slid or the overall program duration.

slip: An editing feature that adjusts the in and out points of a clip without affecting the adjacent clips or affecting overall program duration.

source monitor: An Adobe Premiere interface window that displays clips to be edited.

spatial compression: See *intra-frame compression*.

speed: The playback rate of a video or audio clip compared to the rate at which it was recorded.

split edit: A technique resulting in a clip's video and audio beginning or ending at different times. Also see *L-cut* and *J-cut*.

streaming: Process of sending video over the Web or other network, allowing playback on the desktop as the video is received, rather than requiring that the file be downloaded prior to playback.

superimposition: A composite, or layered image involving transparency; also see *compositing*.

S-Video: Short for *Super-Video*, a technology for transmitting video signals over a cable by dividing the video information into two separate signals: one for luminance and the other chrominance. (S-Video is synonymous with Y/C video).

temporal compression: See *inter-frame*.

three-point editing: An editing feature for replacing footage in a program that lets editors insert a clip into an existing program where only three of the four In and Out points of the clip to be inserted and the portion of the program to be replaced are known. The three-point editing feature automatically specifies the fourth point.

time code: Time reference added to video that allows for extremely accurate editing; may be thought of as the "address" on a tape that pinpoints where the clip begins (in) and ends (out).

timeline: On an *NLE* interface, the graphical representation of program length onto which video, audio and graphics clips are arranged.

titler: See *character generator*.

track: In the Adobe Premiere Timeline window, video clips are arranged on tracks, which are similar to the layers found in many other Adobe applications. When clips are placed one above another, both clips will play back simultaneously. The Video 1 track is the main video editing track; all tracks above Video 1 are for superimposing clips over the Video 1 track; all tracks below Video 1 are for audio.

transition: A change in video from one clip to another. Often these visual changes involve *effects* where elements of one clip are blended with another.

transparency: Percentage of opacity of a video clip or element.

trimming: May refer to setting the *In and Out points* of a clip (usually with *handles*) or to actually removing unneeded portions of clips.

24-bit color: Type of color representation used by most computers. For each of the Red, Green, and Blue components, 8 bits of information are stored and transmitted—24 bits in total. With these 24 bits of information, over a million different variations of color can be represented.

uncompressed: Raw digitized video displayed or stored in its native size.

video capture card (or board): Installed inside a computer, adds the functionality needed to *digitize* analog video for use by the computer. Using a hardware or software *codec*, the capture card also compresses video in and decompresses video out for display on a television monitor.

voice over: The voice of an off-camera narrator or other speaker that is heard when video of the speaker is either not seen or not synchronized with the sound.

XLR connector: A connector with three conductors used in professional audio applications, typically with a balanced signal.

Y/C video: A video signal where the *chrominance* and *luminance* are physically separated to provide superior images (synonymous with *S-Video*).

YCC: A video signal comprised of the *luminance*—the "Y"—component and two *chrominance* (color)—"C"—components.

zooming: Moving the focus of a camera either closer to or further away from a subject while shooting.