2 About Digital Video Editing

When you edit video, you arrange source clips so that they tell a story. That story can be anything from a fictional television program to a news event and more. Understanding the issues that affect your editing decisions can help you prepare for successful editing and save you valuable time and resources.

This lesson describes the role of Adobe Premiere in video production and introduces a variety of key concepts:

- Measuring video time.

- Measuring frame size and resolution.

- Compressing video data.

- Capturing video.

- Superimposing and transparency.

- Using audio in a video.

- Creating final video.

How Adobe Premiere fits into video production

Making video involves working through three general phases:

Preproduction Involves writing the script, visualizing scenes by sketching them on a storyboard, and creating a production schedule for shooting the scenes.

Production Involves shooting the scenes.

Post-production Involves editing the best scenes into the final video program, correcting and enhancing video and audio where necessary. Editing includes a first draft, or *rough cut (or offline edit)*, where you can get a general idea of the possibilities you have with the clips available to you. As you continue editing, you refine the video program through successive iterations until you decide that it's finished. At that point you have built the *final cut or online edit*. Premiere is designed for efficient editing, correcting, and enhancing of clips, making it a valuable tool for post-production.

The rest of this chapter describes fundamental concepts that affect video editing and other post-production tasks in Premiere. All of the concepts in this section and the specific Premiere features that support them are described in more detail in the *Adobe Premiere 6.0 User Guide and Premiere 6.5 User Guide Supplement*.

If any stage of your project involves outside vendors, such as video post-production facilities, consult with them before starting the project. They can help you determine what settings to use at various stages of a project and can potentially help you avoid costly, time-consuming mistakes. For example, if you're creating video for broadcast, you should know whether you are creating video for the NTSC (National Television Standards Committee) standard used primarily in North America and Japan; the PAL (Phase Alternate Line) standard used primarily in Europe, Asia, and southern Africa; or the SECAM (Sequential Couleur Avec Memoire) standard used primarily in France, the Middle East, and North Africa.

Measuring video time

In the natural world, we experience time as a continuous flow of events. However, working with video requires precise synchronization, so it's necessary to measure time using precise numbers. Familiar time increments—hours, minutes, and seconds—are not precise enough for video editing, because a single second might contain several events. This section describes how Premiere 6.5 and video professionals measure time, using standard methods that count fractions of a second in terms of frames.

How the timebase and frame rates affect each other

You determine how time is measured in your project by specifying the project *timebase*. For example, a timebase of 30 means that each second is divided into 30 units. The exact time at which an edit occurs depends on the timebase you specify, because an edit can only occur at a time division; using a different timebase causes the time divisions to fall in different places.

The time increments in a source clip are determined by the *source frame rate*. For example, when you shoot source clips using a video camera with a frame rate of 30 frames per second, the camera documents the action by recording one frame every 1/30th of a second. Note that whatever was happening between those 1/30th of a second intervals is not recorded. Thus, a lower frame rate (such as 15 fps) records less information about continuous action, while a high frame rate (such as 30 fps) records more.

You determine how often Premiere generates frames from your project by specifying the *project frame rate*. A project frame rate of 30 frames per second means that Premiere will create 30 frames from each second of your project.

For smooth and consistent playback, the timebase, the source frame rate, and the project frame rate should be identical.

Editing Video Type	Frames per second
Motion-picture film	24 fps
PAL and SECAM video	25 fps
NTSC video	29.97 fps
Web or CD-ROM	15 fps
Other video types, e.g., non-drop frame editing, 3-D animation	30 fps

Note: NTSC was originally designed for a black-and-white picture at 30 fps, but signal modifications made in the mid-20th century to accommodate color pictures altered the standard NTSC frame rate to 29.97 fps.

Sometimes the time systems don't match. For example, you might be asked to create a video intended for CD-ROM distribution that must combine motion-picture source clips captured at 24 fps with video source clips captured at 30 fps, using a timebase of 30 for a final CD-ROM frame rate of 15 fps. When any of these values don't match, it is mathematically necessary for some frames to be repeated or omitted; the effect may be distracting or imperceptible depending on the differences between the timebase and frame rates you used in your project.
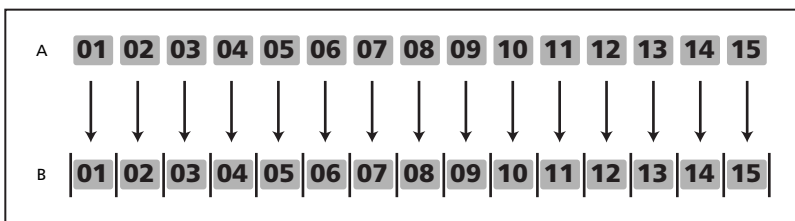

A. 30 fps video clip (one-half second shown) *B. Timebase of 30, for a video production*
*When the source frame rate matches the timebase, all frames display as expected.*
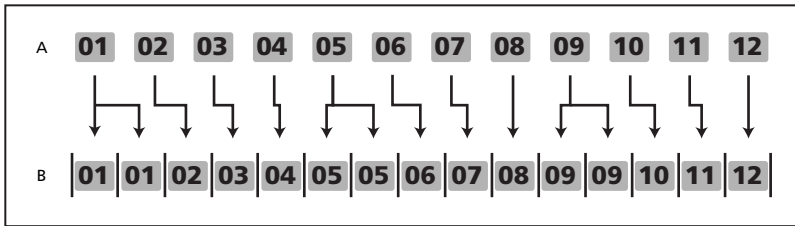
A. 24 fps motion-picture source clip (one-half second shown) **B.** *Timebase of 30, for a video production. To play one second of 24 fps frames at a timebase of 30, source frames 1, 5, and 9 are repeated.*

💡 *It is preferable to capture your clips at the same frame rate at which you plan to export your project. For example, if you know your source clips will be exported at 30 fps, capture the clips at 30 fps instead of 24 fps. If this is not possible (for example, DV can only be captured at 29.97 fps), you'll want to output at a frame rate that evenly divides your timebase. So, if your capture frame rate and your timebase are set at 30 fps (actually 29.97), you should output at 30, 15, or 10 fps to avoid "jerky" playback.*

When time systems don't match, the most important value to set is the timebase, which you should choose appropriately for the most critical final medium. If you are preparing a motion picture trailer that you also want to show on television, you might decide that film is the most important medium for the project, and specify a timebase of 24.
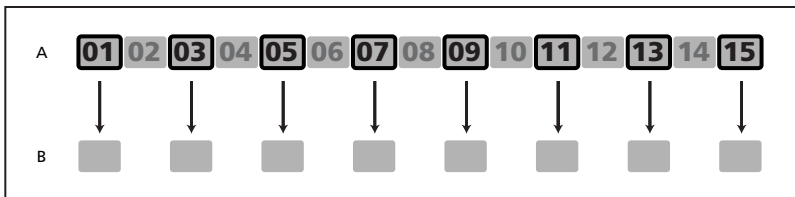
A. Timebase of 30 (one-half second shown) **B.** *Final frame rate of 15, for a Web movie If the timebase is evenly divisible by the frame rate, timebase frames are included evenly.*
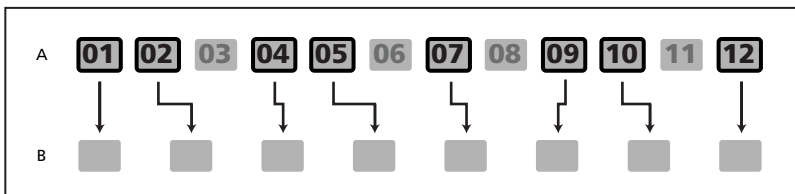
A. Timebase of 24 for a motion-picture film (one-half second shown) **B.** *Final frame rate of 15, for a Web movie. The time is not evenly divisible by the frame rate, so frames are included unevenly. A final frame rate of 12 fps would generate frames more evenly.*

The important thing to remember is this: You'll get the most predictable results if your timebase and frame rate are even multiples of one another; you'll get the best results if they are identical.
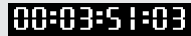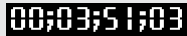
▣ *For more information, see "Measuring time and frame size" in the Adobe Premiere 6.0 Technical Guides found in the Support area on the Adobe Web site (www.adobe.com/products/premiere/community.html).*

Counting time with timecode

Timecode defines how frames are counted and affects the way you view and specify time throughout a project. Timecode never changes the timebase or frame rate of a clip or project—it only changes how frames are numbered.

You specify a timecode style based on the media most relevant to your project. When you are editing video for television, you count frames differently from counting frames when editing video for motion-picture film. By default, Premiere displays time using the SMPTE (Society of Motion Picture and Television Engineers) video timecode, where a duration of 00:06:51:15 indicates that a clip plays for 6 minutes, 51 seconds, and 15 frames. At any time, you can change to another system of time display, such as feet and frames of 16mm or 35mm film. Professional videotape decks and camcorders can read and write timecode directly onto the videotape, which lets you synchronize audio, video, and edits, or edit offline (see Capturing DV on page 108).

When you use the NTSC-standard timebase of 29.97, the fractional difference between this timebase and 30 fps timecode causes a discrepancy between the displayed duration of the program and its actual duration. While tiny at first, this discrepancy grows as program duration increases, preventing you from accurately creating a program of a specific length. *Drop-frame timecode* is an SMPTE standard for 29.97 fps video that eliminates this error, preserving NTSC time accuracy. Premiere indicates drop-frame timecode by displaying semicolons between the numbers in time displays throughout the software, and displays non-drop-frame timecode by displaying colons between numbers in timecode displays.

Drop-frame timecode uses semicolons (left)
*and non-drop-frame timecode uses colons (right).*

When you use drop-frame timecode, Premiere renumbers the first two frames of every minute except for every tenth minute. The frame after 59:29 is labeled 1:00:02. No frames are lost because drop-frame timecode doesn't actually drop frames, only frame numbers.

For more information, see "Timecode and time display options" in the Adobe Premiere 6.0 Technical Guides found in the Support area on the Adobe Web site (www.adobe.com/ products/premiere/community.html).
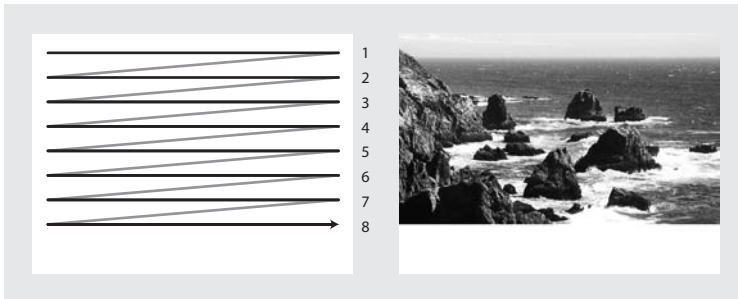
Interlaced and non-interlaced video

A picture on a television or computer monitor consists of horizontal lines. There is more than one way to display those lines. Most personal computers display using *progressive scan* (or non-interlaced) display, in which all lines in a frame are displayed in one pass from top to bottom before the next frame appears. Television standards such as NTSC, PAL, and SECAM standards are *interlaced*, where each frame is divided into two *fields*. Each field contains every other horizontal line in the frame. A TV displays the first field of alternating lines over the entire screen, and then displays the second field to fill in the alternating gaps left by the first field. One NTSC video frame, displayed approximately every 1/30th of a second, contains two interlaced fields, displayed approximately every 1/60th of a second each. PAL and SECAM video frames display at 1/25 of a second and contain two interlaced fields displayed every 1/50th of a second each. The field that contains the topmost scan line in the frame is called the *upper field*, and the other field is called the *lower field*. When playing back or exporting to interlaced video, make sure the *field order* you specify matches the receiving video system, otherwise motion may appear stuttered, and edges of objects in the frame may break up with a comb-like appearance.

Note: For analog video, the field order needs to match the field order of the capture card (which should be specified in the preset). For DV, the field order is always lower field first. Be sure to select the correct preset first; doing so will correctly specify the field order.
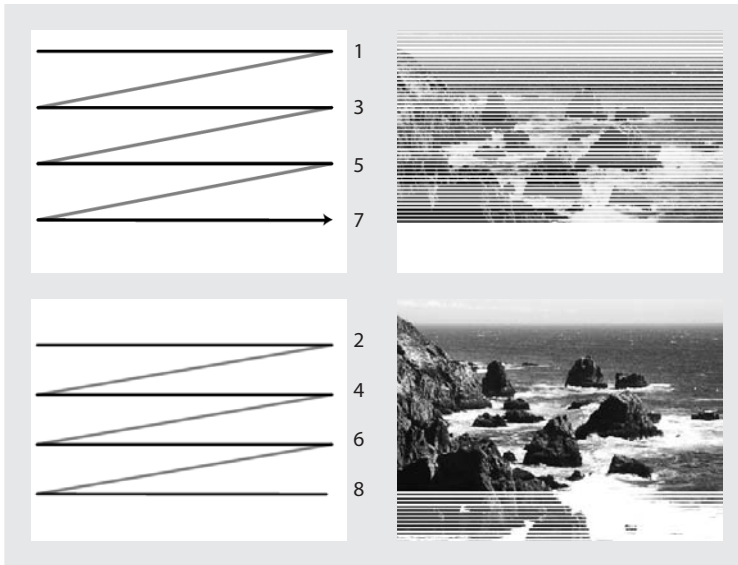
Interlaced video describes a frame with two passes of alternating scan lines.

Progressive-scan video describes a frame with one pass of sequential scan lines.

If you plan to slow down or hold a frame in an interlaced video clip, you may want to prevent flickering or visual stuttering by *de-interlacing* its frames, which converts the interlaced fields into complete frames. If you're using progressive-scan source clips (such as motion-picture film or computer-generated animation) in a video intended for an interlaced display such as television, you can separate frames into fields using a process known as *field rendering* so that motion and effects are properly interlaced.

For more information, see "Processing interlaced video fields" in Chapter 3 of the Adobe Premiere 6.0 User Guide *and "Interlaced and non-interlaced video" in the Adobe Premiere*

Technical Guides found in the Support area on the Adobe Web site
(www.adobe.com/products/premiere/community.html).

Measuring frame size and resolution

Several attributes of *frame size* are important when editing video digitally: pixel and frame aspect ratio, clip resolution, project frame size, and bit depth. A *pixel* (picture element) is the smallest unit that can be used to create a picture; you can't accurately display anything smaller than a pixel.

Aspect ratio

The *aspect ratio* of a frame describes the ratio of its width to its height in the dimensions of a frame. For example, the frame aspect ratio of NTSC video is 4:3, whereas DVD, HDTV, and motion-picture frame sizes use the more elongated aspect ratio of 16:9.
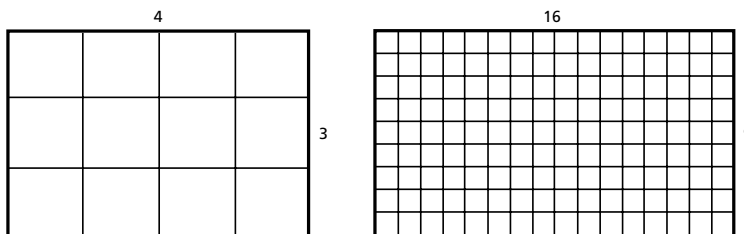
A frame using a 4:3 aspect ratio (left), and a frame using the 16:9 aspect ratio (right)

Some video formats use a different aspect ratio for the pixels that make up the frame. When a video using *non-square pixels* (that is, pixels that are taller than they are wide, or wider than they are tall) is displayed on a square-pixel system, or vice versa, shapes and motion appear stretched. For example, circles are distorted into ellipses.


Frame with square pixels (left), frame with tall horizontal pixels (center), and center frame again displayed using square pixels (right)

Non-square pixels

Premiere provides support for a variety of non-square pixel aspect ratios, including DV's Widescreen (Cinema) pixel aspect ratio of 16:9 and the Anamorphic pixel aspect ratio of 2:1.

When you preview video with non-square pixel aspect ratios on your computer screen, Premiere displays a corrected aspect ratio on the computer monitor so that the image is not distorted. Motion and transparency settings, as well as geometric effects, also use the proper aspect ratio, so distortions don't appear after editing or rendering your video.
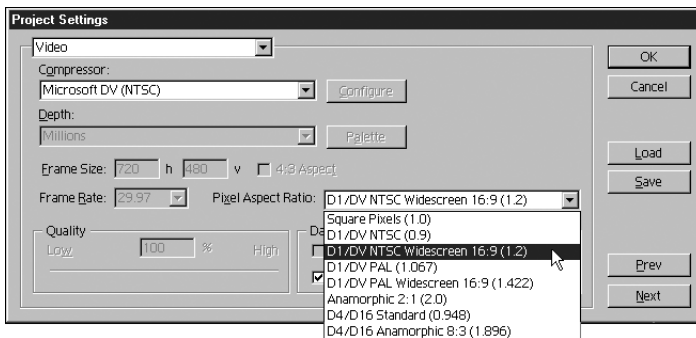
Frame size

In Premiere, you specify a *frame size* for playing back video from the Timeline and, if necessary, for exporting video to a file. Frame size is expressed by the horizontal and vertical dimensions, in pixels, of a frame; for example, 640 by 480 pixels. In digital video editing, frame size is also referred to as *resolution*.

In general, higher resolution preserves more image detail and requires more memory (RAM) and hard disk space to edit. As you increase frame dimensions, you increase the number of pixels Premiere must process and store for each frame, so it's important to know how much resolution your final video format requires. For example, a 720 x 480 pixel (standard DV) NTSC frame contains 345,600 pixels, while a 720 x 576 PAL image contains 414,720 pixels. If you specify a resolution that is too low, the picture will look coarse and pixelated; specify too high a resolution and you'll use more memory than necessary. When changing the frame size, keep the dimensions proportional to the original video clip.

💡 *If you plan to work with higher resolutions or you are concerned about your CPU's processing capabilities, you can specify one or more* scratch disks *for additional RAM and hard disk space. For more information, see "Setting up Premiere's scratch disks" in Chapter 1 of the* Adobe Premiere 6.0 User Guide.

Overscan and safe zones

Frame size can be misleading if you're preparing video for television. Most NTSC consumer television sets enlarge the picture; however, this pushes the outer edges of the picture off the screen. This process is called *overscan*. Because the amount of overscan is not consistent across all televisions, you should keep action and titles inside two safe areas—the action-safe and title-safe zones.

The action-safe zone is an area approximately 10% less than the actual frame size; the title-safe zone is approximately 20% less than the actual frame size. By keeping all significant action inside the action-safe zone and making sure that all text and important graphic elements are within the title-safe zone, you can be sure that the critical elements of your video are completely displayed. You'll also avoid the distortion of text and graphics that can occur toward the edges of many television monitors. Always anticipate overscan by using safe zones, keeping important action and text within them, and testing the video on an actual television monitor.

You can view safe zones in the Monitor window's Source view, Program view, or both.
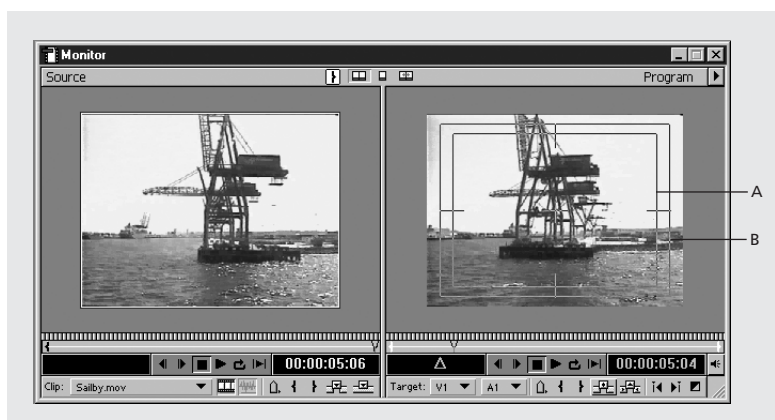
Safe zones in the Program view: **A.** *Title-safe zone* **B**. *Action-safe zone*

Safe zones are indicated by white rectangles in Premiere's Title Designer window.
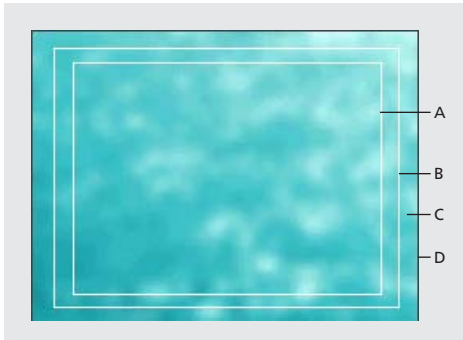
A. *Title-safe zone* **B.** *Action-safe zone*
C. *Overscan area* **D.** *Perimeter of frame*

For more information on customizing safe zones in the Monitor and Title windows, see Lesson 8, "Creating with the Title Designer" in this book.

Bit depth

A *bit* is the most basic unit of information storage in a computer. The more bits used to describe something, the more detailed the description can be. *Bit depth* indicates the number of bits set aside for describing the color of one pixel. The higher the bit depth, the more colors the image can contain, which allows more precise color reproduction and higher picture quality. For example, an image storing 8 bits per pixel (8-bit color) can display 256 colors, and a 24-bit color image can display approximately 16 million colors.

The bit depth required for high quality depends on the color format that is used by your video-capture card. Many capture cards use the YUV color format, which can store high-quality video using 16 bits per pixel. Before transferring video to your computer, video-capture cards that use YUV convert it to the 24-bit RGB color format that Premiere uses. For the best RGB picture quality, you should:

• Save source clips and still images with 24 bits of color (although you can use clips with lower bit depths).

• If the clip contains an alpha channel mask, save it from the source application using 32 bits per pixel (also referred to as 24 bits with an 8-bit alpha channel, or *millions of colors*). For example, QuickTime movies can contain up to 24 bits of color with an 8-bit alpha channel, depending on the exact format used.

Internally, Premiere always processes clips using 32 bits per pixel regardless of each clip's original bit depth. This helps preserve image quality when you apply effects or superimpose clips.

If you're preparing video for NTSC, you should keep in mind that although both 16-bit YUV and 24-bit RGB provide a full range of color, the color range of NTSC is limited by comparison. NTSC cannot accurately reproduce saturated colors and subtle color gradients. The best way to anticipate problems with NTSC color is to preview your video on a properly calibrated NTSC monitor during editing.

For more information, see "Previewing on another monitor" in the Adobe Premiere 6.0 Technical Guides found in the Support area on the Adobe Web site (www.adobe.com/products/premiere/community.html).

Understanding video data compression

Editing digital video involves storing, moving, and calculating extremely large volumes of data compared to other kinds of computer files. Many personal computers, particularly older models, are not equipped to handle the high *data rates* (amount of video information processed each second) and large *file sizes* of uncompressed digital video. Use *compression* to lower the data rate of digital video to a range that your computer system can handle. Compression settings are most relevant when capturing source video, previewing edits, playing back the Timeline, and exporting the Timeline. In many cases, the settings you specify won't be the same for all situations:

• It's a good idea to compress video coming into your computer. Your goal is to retain as much picture quality as you can for editing, while keeping the data rate well within your computer's limits.

• You should also compress video going out of your computer. Try to achieve the best picture quality for playback. If you're creating a videotape, keep the data rate within the limits of the computer that will play back the video to videotape. If you're creating video to be played back on another computer, keep the data rate within the limits of the computer models you plan to support. It you're creating a video clip to be streamed from a Web server, keep an appropriate data rate for Internet distribution.

Applying the best compression settings can be tricky, and the best settings can vary with each project. If you apply too little compression, the data rate may be too high for the system, causing errors such as dropped frames. If you apply too much compression, lowering the data rate too far, you won't be taking advantage of the full capacity of the system and the picture quality may suffer unnecessarily.

Note: DV has a fixed data rate of 3.5 megabytes per second, nominally 25 megabits per second; the DV standard compression ratio is 5:1.

Analyzing clip properties and data rate

Premiere includes clip analysis tools you can use to evaluate a file, in any supported format, stored inside or outside a project.

1 Locate and select the Sailby.mov clip from Lesson 1 and click Open.

2 From Premiere, choose File > Get Properties For > File.
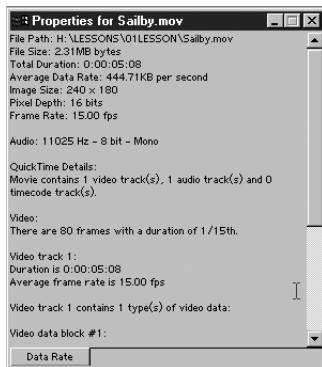
The *Properties window* provides detailed information about any clip. For video files, the analyzed properties can include file size, number of video and audio tracks, duration, average frame, audio and data rates, and compression settings. You can also use the Properties window to alert you to the presence of any dropped frames in a clip you just captured.

3 Click Data Rate to view the data rate graph for the clip.
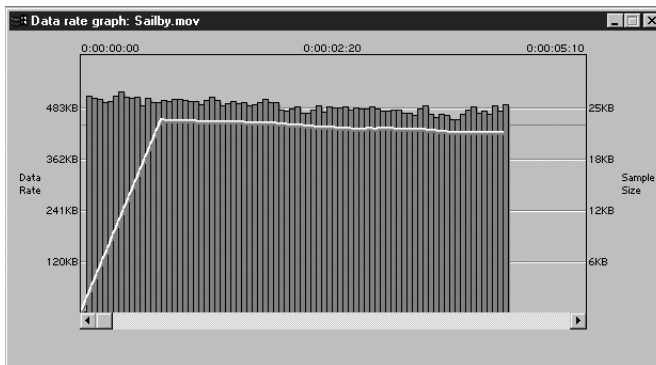
You can use the data rate graph to evaluate how well the output data rate matches the requirements of your delivery medium. It charts each frame of a video file to show you the render keyframe rate, the difference between compression keyframes and differenced frames (frames that exist between keyframes), and data rate levels at each frame.

The data rate graph includes:

• Data rate: the white line represents the average data rate.

• Sample size: the red bars represent the sample size of each keyframed frame.

If there are differenced frames, they appear as blue bars, representing the sample size of the differenced frames between compression keyframes. In this case, there are not any.

4 When you are finished, close the Data Rate Graph window and the Properties window.

For more information, see "Factors that affect video compression" in the Adobe Premiere Technical Guides found in the Support area on the Adobe Web site (www.adobe.com/ products/premiere/community.html).

Choosing a video compression method

The goal of data compression is to represent the same content using less data. You can specify a compressor/decompressor, or *codec*, that manages compression. A codec may use one or more strategies for compression because no single method is best for all situations. The most common compression strategies used by codecs and the kinds of video they are intended to compress are described in this section.

Spatial compression   Spatial (space) compression looks for ways to compact a single frame by looking for pattern and repetition among pixels. For example, instead of describing each of several thousand pixels in a picture of a blue sky, spatial compression can record a much shorter description, such as "All the pixels in this area are light blue." *Run-length encoding* is a version of this technique that is used by many codecs. Codecs that use spatial compression, such as QuickTime Animation or Microsoft RLE, work well with video containing large solid areas of color, such as cartoon animation.
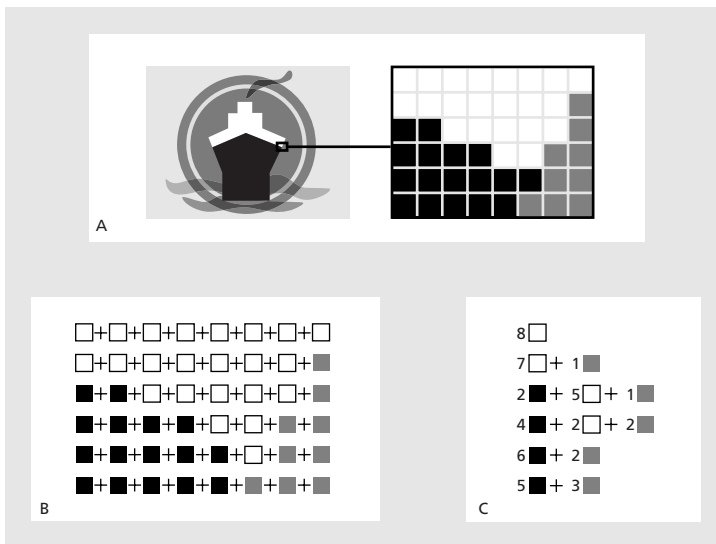
*Digital images are composed of pixels (**A**), which consume a lot of disk space when stored without compression (**B**). Applying run-length encoding stores the same frame data in much less space (**C**).*

In general, as you increase spatial compression, the data rate and file size decrease, and the picture loses sharpness and definition. However, some forms of run-length encoding preserve picture quality completely, but require more processing power.

Temporal compression   Temporal (time) compression compacts the changes during a sequence of frames by looking for patterns and repetition over time. In some video clips, such as a clip of a television announcer, temporal compression will notice that the only pixels that change from frame to frame are those forming the face of the speaker. All the other pixels don't change (when the camera is motionless). Instead of describing every pixel in every frame, temporal compression describes all the pixels in the first frame, and then for each frame that follows, describes only the pixels that are different from the

previous frame. This technique is called *frame differencing*. When most of the pixels in a frame are different from the previous frame, it's preferable to describe the entire frame again. Each whole frame is called a *keyframe*, which sets a new starting point for frame differencing. You can use Premiere to control how keyframes are created (see the *Adobe Premiere 6.0 User Guide and Premiere 6.5 User Guide Supplement*). Many codecs use temporal compression, including Cinepak.

If you can't set keyframes for a codec, chances are it doesn't use temporal compression. Temporal compression works best when large areas in the video don't change, and is less effective when the image constantly changes, such as in a music video.

In this animation clip, the only change is the circle moving around the ship.
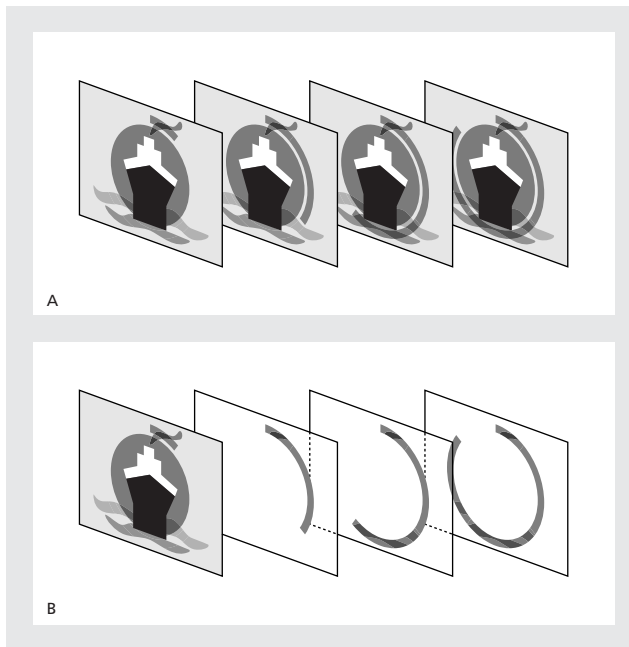
A. Storing the clip without compression records all pixels in all frames.
B. Applying temporal compression creates a keyframe from the first frame, and subsequent frames record only the changes.

Lossless compression Some codecs use *lossless* compression, which ensures that all of the information—and thus all of the quality—in the original clip is preserved after compression. However, preserving the original level of quality limits the degree to which you can lower the data rate and file size, and the resulting data rate may be too high for smooth playback. Lossless codecs, such as Animation (at the Best quality setting), are used to preserve maximum quality during editing or for still images where data rate is not an issue.

Note: To ensure smooth playback, full-frame, full-size video using lossless compression requires a very large defragmented hard disk and very fast computer system built for high data rate throughput.

Lossy compression Most codecs use *lossy* compression, which discards some of the original data during compression. For example, if the pixels making up a sky actually contain 78 shades of blue, a lossy codec set for less-than-best quality may record 60 shades of blue. While lossy compression means some quality compromises, it results in much lower data rates and file sizes than lossless compression, so lossy codecs such as Cinepak or Sorenson Video are commonly used for final production of video delivered using CD-ROM or the Internet.

Asymmetrical and symmetrical compression The codec you choose affects your production workflow, not just in file size or playback speed, but in the time required for a codec to compress a given number of frames. Fast compression speeds up video production, and fast decompression makes viewing easier; but many codecs take far more time to compress frames than to decompress them during playback. This is why a 30-second clip may take a few minutes to process before playback. A codec is considered *symmetrical* when it requires the same amount of time to compress as to decompress a clip. A codec is *asymmetrical* when the times required to compress and decompress a clip are significantly different.

Compressing video is like packing a suitcase—you can pack as fast as you unpack by simply throwing clothes into the suitcase, but if you spend more time to fold and organize the clothes in the suitcase, you can fit more clothes in the same space.

DV compression DV is the format used by many digital video camcorders. DV also connotes the type of compression used by these camcorders, which compress video right inside the camera. The most common form of DV compression uses a fixed data rate of 25 megabits per second (3.5 megabytes per second) and a compression ratio of 5:1. This

compression is called "DV25." Adobe Premiere 6.5 includes native support for DV25 and other DV codecs, and can read digital source video without further conversion.

No single codec is the best for all situations. The codec you use for exporting your final program must be available to your entire audience. So, while a specialized codec that comes with a specific capture card might be the best choice for capturing source clips, it would not be a good choice for exporting clips, since it is unlikely that everyone in your audience would have that specific capture card and its specialized codec. This is a significant concern when exporting streaming media, since the three most popular streaming architectures (RealMedia, Windows Media, and QuickTime) use proprietary codecs in their players; a RealMedia stream, for example, cannot be played back through a Windows Media player, and vice versa. So, for the convenience of audiences with diverse players set as the default in their browsers, streaming media is usually encoded in multiple formats.

For more information, see "Video codec compression methods" in the Adobe Premiere 6.0 Technical Guides found in the Support area on the Adobe Web site (www.adobe.com/ products/premiere/community.html).

Capturing video

Before you can edit your video program, all source clips must be instantly accessible from a hard disk, not from videotape. You import the source clips from the source videotapes to your computer through a post-production step called *video capture*. Consequently, you must have enough room on your hard disk to store all the clips you want to edit. To save space, capture only the clips you know you want to use.

Source clips exists in two main forms:

Digital media   Is already in a *digital* file format that a computer can read and process directly. Many newer camcorders digitize and save video in a digital format, right inside the camera. Such camcorders use one of several *DV formats*, which apply a standard amount of compression to the source material. Audio can also be recorded digitally; sound tracks are often provided digitally as well—on CD-ROM, for example. Digital source files stored on DV tape or other digital media, must be *captured* (transferred) to an accessible hard disk before they can be used in a computer for a Premiere project. The simplest way to capture DV is to connect a DV device, such as a camcorder or deck, to a computer with an *IEEE 1394* port (also known as FireWire or i.Link). For more sophisticated capture tasks, a specialized

DV *capture card* might be used. Premiere 6.5 supports a wide range of DV devices and capture cards, making it easy to capture DV source files.

Analog media   Must be *digitized*. That means it must be converted to digital form and saved in a digital file format before a computer can store and process it. Clips from *analog* videotape (such as Hi-8), motion-picture film, conventional audio tape, and continuous-tone still images (such as slides) are all examples of analog media. By connecting an analog video device (such as an analog video camera or tape deck) and an appropriate *capture card* to your computer, Adobe Premiere can digitize, compress, and transfer analog source material to disk as clips that can then be added to your digital video project.

Note: Video-digitizing hardware is built into some personal computers, but often must be added to a system by installing a compatible hardware capture card. Adobe Premiere 6.5 supports a wide variety of video capture cards.

If your system has an appropriate capture card, Adobe Premiere also lets you perform manual and time-lapse *single-frame video captures* from a connected camera or from a videotape in a deck or camcorder, using *stop-motion animation*. For example, you can point a camera at an unfinished building and use the time-lapse feature to capture frames periodically as the building is completed. You can use the stop-motion feature with a camera to create clay animations or to capture a single frame and save it as a still image. You can capture stop-motion animation from analog or DV sources.

Note: Premiere 6.5 supports device control. This enables you to capture stop motion, or perform batch capture of multiple clips, by controlling the videotape from within the Capture window in Premiere. However, stop motion does not require device control within Premiere: If you don't have a controllable playback device, you can manually operate the controls on your camcorder or deck and in the Capture window.

For more information on all the topics covered in this section on capturing video, see Chapter 2, "Capturing and Importing Source Clips" in the A*dobe Premiere 6.0 User Guide.*

Capturing DV

When you shoot DV, the images are converted directly into digital (DV) format, right inside the DV camcorder, where your footage is saved on a DV tape cassette. The images are already digitized and compressed, so they are ready for digital video editing. The DV footage can be transferred directly to a hard disk.

To transfer DV to your hard disk, you need a computer with an OHCI-compliant interface and an IEEE 1394 (FireWire or i.Link) port (standard on newer Windows PCs and most newer-model Macintosh computers). Alternatively, you can install an appropriate DV capture card to provide the IEEE 1394 port. Be sure to install the accompanying OHCI-compliant driver and special Adobe Premiere plug-in software that may be required. Adobe Premiere 6.5 comes with presets for a wide variety of DV capture cards but, for some, you may need to consult the instructions provided with your capture card to set up a special preset.

Adobe Premiere 6.5 provides settings files for most supported capture cards. These *presets* include settings for compressor, frame size, pixel aspect ratio, frame rate, color depth, audio, and fields. You select the appropriate preset from the Available Presets list in the Load Project Settings dialog box when you begin your project.
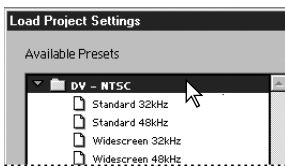
To enhance DV capture, Adobe Premiere 6.5 provides device control for an extensive range of DV devices. See the Adobe Web site for a list of supported devices (www.adobe.com/premiere).

If you have an appropriate digital video device attached to or installed in your computer, you can do the following:

**1** To specify the DV device in your computer, choose Edit > Preferences > Scratch Disks & Device Control.

2 Click the Option button in the Preferences window to see the DV Device Control Options dialog box and select your DV device. Click OK.
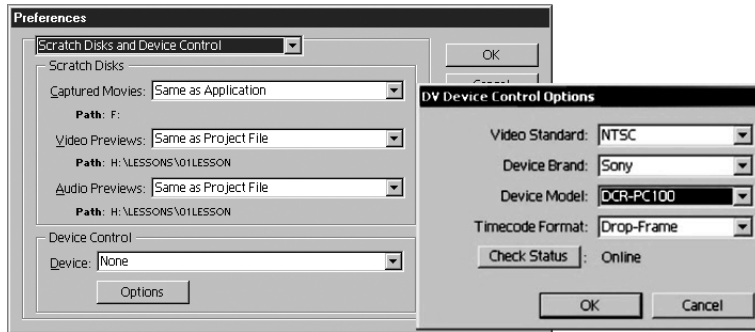
Capturing analog video

When capturing analog video, you need to first connect the camcorder or deck to the capture card installed in your system. Depending on your equipment, you may have more than one format available for transferring source footage—including component video, composite video, and S-video. Refer to the instructions included with your camcorder and capture card.

For convenience, most video-capture card software is written so that its controls appear within the Premiere interface, even though much of the actual video processing happens on the card, outside of Premiere. Most supported capture cards provide a settings file—a preset—that automatically sets up Premiere for optimal support for that card. Most of the settings that control how a clip is captured from a camera or a deck are found in the Capture Settings section of the Project Settings dialog box. Available capture formats vary, depending on the type of video-capture card installed.
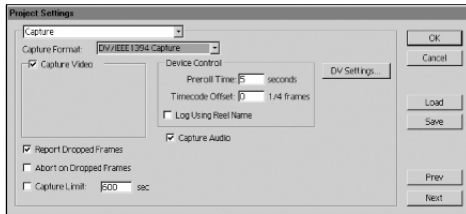

For more information, or if you need help resolving technical issues you may encounter using your capture card with Premiere, see the Adobe Premiere Web site (www.adobe.com/ premiere) for links to troubleshooting resources.

Using the Movie Capture window

You use the Movie Capture window to capture DV and analog video and audio. To open and familiarize yourself with the Movie Capture window, from the title bar at the top of your screen choose File > Capture > Movie Capture. This window includes:

• Preview window that displays your currently recording video.

• Controls for recording media with and without device control.

• Movie Capture window menu button.

• Settings panel for viewing and editing your current capture setting.

• Logging panel for entering batch capture settings (you can only log clips for batch capture when using device control).

To set the Preview area so that the video always fills it, click the Movie Capture window menu button and choose Fit Image in Window.
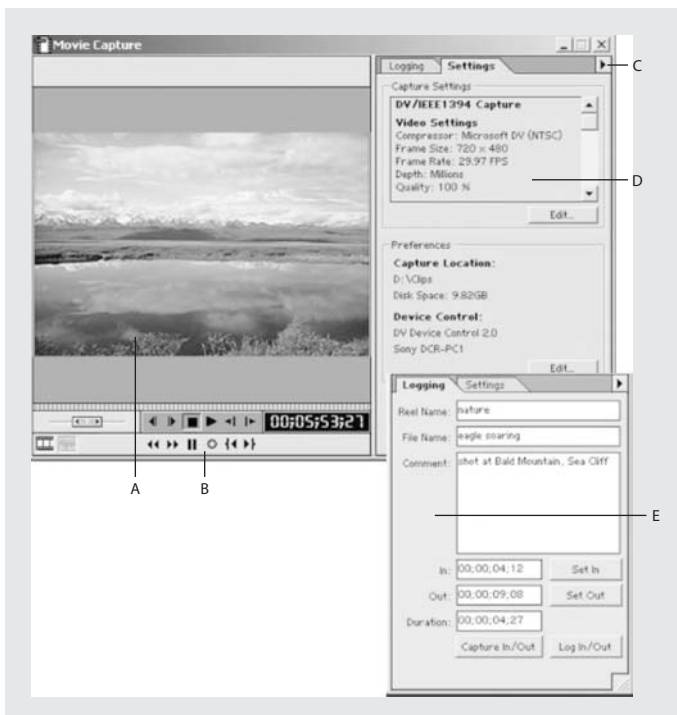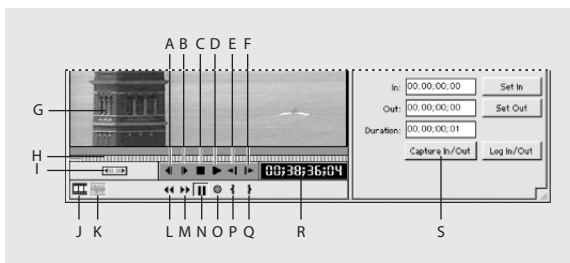

Movie Capture window: **A.** *Preview area* **B.** *Controllers*
C. *Movie Capture menu button* **D.** *Settings panel* **E.** *Logging panel*

Note: When doing anything other than capturing in Premiere, close the Movie Capture window. Because the Movie Capture window has primary status when open, leaving it open while editing or previewing video will disable output to your DV device and may diminish the performance.

Capturing clips with device control When capturing clips, *device control* refers to controlling the operation of a connected video deck or camera using the Premiere Interface, rather than using the controls on the connected device. You can use device control to capture video from frame-accurate analog or digital video decks or cameras that support external device control. It's more convenient to simply use device control within Premiere rather than alternating between the video editing software on your computer and the controls on your device. The Movie Capture or Batch Capture windows can be used to create a list of *In points* (starting timecode) and *Out points* (ending timecode) for your clips. Premiere then automates capture—recording all clips as specified on your list. Additionally, Premiere captures the timecode from the source tape, so the information can be used during editing.

Note: If you're working in Mac OS, the Enable Device control button runs all the way across the bottom of the window where the image is displayed.

Movie Capture window with device control enabled:
A. Previous frame B. Next frame C. Stop D. Play
E. Play slowly in reverse F. Play slowly G. Preview area
H. Jog control I. Shuttle control J. Take video K. Take audio
L. Rewind M. Fast forward N. Pause O. Record P. Set In
Q. Set Out R. Timecode S. Capture In to Out

Capturing clips without device control If you don't have a controllable playback device, you can capture video from analog or DV camcorders or decks using the Adobe Premiere Capture window. While watching the picture in the Movie Capture window, manually operate the deck and the Premiere controls to record the frames you want. You can use this method to facilitate capture from an inexpensive consumer VCR or camcorder.
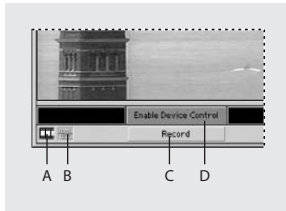
*Using the Movie Capture window
without device control:* **A.** *Take video*
B. *Take audio* **C.** *Record*
D. *Enable device control button*

Batch-capturing video

If you have a frame-accurate deck or camcorder that supports external device control and a videotape recorded with timecode, you can set up Premiere for automatic, unattended capture of multiple clips from the same tape. This is called *batch capturing*. You can *log* (create a list of) the segments you want to capture from your tape, 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.

To create a new entry in the Batch List window, click the Add icon (⊞). When your batch list is ready, click one button—the Capture button in either the Batch Capture or Movie Capture window—to capture all the specified clips on your list. To open and familiarize yourself with the Batch Capture window, from the title bar at the top of your screen, choose File > Capture > Batch Capture.
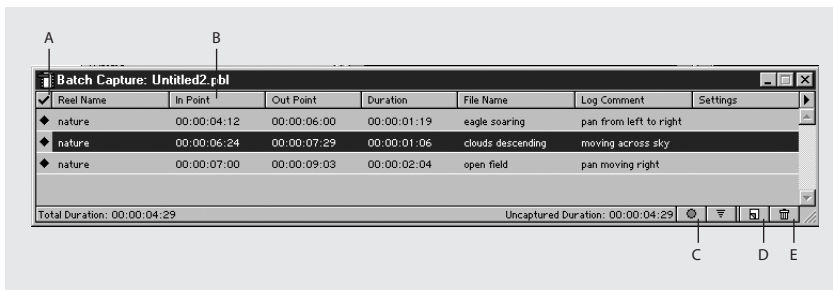
Batch Capture window: **A.** *Check-mark column* **B.** *Sort by In point button*
C. *Capture button* **D.** *Add New Item button* **E.** *Delete selected button*

Note: Batch Capture is not recommended for the first and last 30 seconds of your tape because of possible timecode and seeking issues; you will need to capture these sections manually.

Components that affect video capture quality

Video capture requires a higher and more consistent level of computer performance—far more than you need to run general office software, and even more than you need to work with image-editing software. Getting professional results depends on the performance and capacity of all of the components of your system working together to move frames from the video-capture card to the processor and hard disk. The ability of your computer to capture video depends on the combined performance of the following components:

Video-capture card You need to have a video-capture card installed or the equivalent capability built into your computer to transfer video from a video camcorder, tape deck, or other video source to your computer's hard drive. A *video-capture card* is not the same as the *video card* that drives your computer monitor. Adobe Premiere 6.5 software is bundled with many video-capture cards.

Note: Only supported video-capture cards should be used with Adobe Premiere. Not all capture cards certified for use with Adobe Premiere 5.x are certified for use with 6.x. Please refer to the list of certified capture cards found on the Adobe Web site (www.adobe.com/products/premiere/6cards.html).

Your video-capture card must be fast enough to capture video at the level of quality that your final medium requires. For full-screen, full-motion NTSC video, the card must be capable of capturing 30 frames (60 fields) per second at 640 x 480 pixels without dropping frames; for PAL and SECAM, 25 frames (50 fields) per second at 720 x 576 pixels. Even for Web video that will be output at a smaller frame size and a lower frame rate, you'll want to capture your source material at the highest quality settings available. You'll be using a lot of hard-disk space, but it's better to start with high quality (more data) so you'll have more choices about what information to discard when you reach the encoding stage. If you start with low quality (less data), you might regret having fewer options down the road.

Hard disk The hard disk stores the video clips you capture. The hard disk must be fast enough to store captured video frames as quickly as they arrive from the video card; otherwise, frames will be dropped as the disk falls behind. For capturing at the NTSC video standard of just under 30 frames per second, your hard disk should have an average (not minimum) access time of 10 milliseconds (ms) or less, and a sustained (not peak) data transfer rate of at least 3 MB per second—preferably around 6 MB per second. The *access time* is how fast a hard disk can reach specific data.

The key to optimal performance is to have as much contiguous defragmented free space as possible on your hard disk. Fragmented disks greatly inhibit access for Real-Time, preview, capture, or playback.

The *data transfer rate* is how fast the hard disk can move data to and from the rest of the computer. Due to factors such as system overhead, the actual data transfer rate for video capture is about half the data transfer rate of the drive. For best results, capture to a separate high-performance hard disk intended for use with video capture and editing. The state of high-end video hardware changes rapidly; consult the manufacturer of your video-capture card for suggestions about appropriate video storage hardware.

Central processing unit (CPU) Your computer's processor—such as a Pentium or PowerPC chip—handles general processing tasks in your computer. The CPU must be fast enough to process captured frames at the capture frame rate. A faster CPU—or using multiple CPUs in one computer (multiprocessing)—is better. However, other system components must be fast enough to handle the CPU speed. Using a fast CPU with slow components is like driving a sports car in a traffic jam.

Codec (compressor/decompressor) Most video-capture cards come with a compression chip that keeps the data rate within a level your computer can handle. If your video-capture hardware doesn't have a compression chip, you should perform capture using a fast, high-quality codec such as Motion JPEG. If you capture using a slow-compressing or lossy codec such as Cinepak, you'll drop frames or lose quality.

Processing time required by other software If you capture video while several other programs are running (such as network connections, nonessential system enhancers, and screen savers), the other programs will probably interrupt the video capture with requests for processing time, causing dropped frames. Capture video while running as few drivers, extensions, and other programs as possible. In Mac OS, turn off AppleTalk. See the Mac OS documentation or online Help.

Data bus Every computer has a data bus that connects system components and handles data transfer between them. Its speed determines how fast the computer can move video frames between the video-capture card, the processor, and the hard disk. If you purchased a high-end computer or a computer designed for video editing, the data bus speed is likely to be well matched to the other components. However, if you've upgraded an older computer with a video-capture card, a faster processor, or a hard disk, an older data bus

may limit the speed benefits of the new components. Before upgrading components, review the documentation provided by the manufacturer of your computer to determine whether your data bus can take advantage of the speed of a component you want to add.

🔲 *For more information, see "Optimizing system performance" in the Adobe Premiere 6.0 Technical Guides found in the Support area on the Adobe Web site (www.adobe.com/products/premiere/community.html).*

Capturing to support online or offline editing

Depending on the level of quality you want and the capabilities of your equipment, you may be able to use Premiere for either online or offline editing. The settings you specify for video capture are different for online or offline editing.

Online editing The practice of doing all editing (including the rough cut) using the same source clips that will be used to produce the final cut. As high-end personal computers have become more powerful, online editing has become practical for a wider range of productions such as broadcast television or motion-picture film productions. For online editing, you'll capture clips once, at the highest level of quality your computer and peripherals can handle.

Offline editing The practice of preparing a rough cut from lower-quality clips, then producing the final version with higher-quality clips, sometimes on a high-end system. Offline editing techniques can be useful even if your computer can handle editing at the quality of your final cut. By batch-capturing video using low-quality settings, you can edit faster, using smaller files. When you digitize video for offline editing, you specify settings that emphasize editing speed over picture quality. In most cases, you need only enough quality to identify the correct beginning and ending frames for each scene. When you're ready to create the final cut, you can redigitize the video at the final-quality settings.

Once you have completed the offline edit in Premiere, you can create a table of scene sequences called an *Edit Decision List,* or EDL. You can then move the EDL to an *edit controller* on a high-end system, which applies the sequence worked out in Premiere to the original high-quality clips.

Note: Typically, offline editing is not employed when working with DV, because Premiere handles DV at its original quality level.

For more information on all the topics covered in this section on capturing video, see Chapter 2, "Capturing and Importing Source Clips" in the A*dobe Premiere 6.0 User Guide*.

Using the DV Device Control Options

Adobe Premiere 6.5 makes it easy to choose an appropriate setting for your DV device control. You simply choose a preset from a default list of tested devices.

To choose a DV device option preset:

1 Do one of the following:

• Choose Edit > Preferences > Scratch Disks & Device Control (Windows and Mac OS 9).

• Choose Adobe Premiere 6.5 >Preferences > Scratch Disks & Device Control (Mac OS X).

2 In the Device Control section, choose DV Device Control 2.0 from the Device menu.

3 Click the Options button below the Device menu.

4 In the DV Device Control Options dialog box, set any of the following options and click OK:

Video Standard Specifies the video format.

Device Brand Specifies the device manufacturer.

Device Type Specifies the device model number.

Timecode Format Specifies the device timecode format.

Check Status Tells you if the device is connected.

Go Online for Device Info Opens the Web page that lists the latest compatible devices.

Congratulations on completing the Basic Editing lesson!

Understanding transparency and superimposing

Transparency allows a clip (or any portion of a clip) to reveal a second, underlying clip, so that you can create composites, transitions, or other effects. A variety of transparency types are available in Premiere. The transparency types are described in this section.

Matte or mask An image that specifies transparent or semitransparent areas for another image. For example, if you want to superimpose an object in one clip over the background of another clip, you can use a mask to remove the background of the first clip. You can use

other still-image or motion graphics software (such as Adobe Photoshop or Adobe After Effects) to create a still-image or moving (traveling) matte and apply it to a clip in your Premiere project. A mask works like a film negative; black areas are transparent, white areas are opaque, and gray areas are semitransparent—darker areas are more transparent than lighter areas. You can use shades of gray to create feathered (soft-edged) or graduated masks.

Alpha channel Color in an RGB video image is stored in three color *channels*—one red, one green, and one blue. An image can also contain a mask in a fourth channel called the *alpha channel*. By keeping an image together with its mask, you don't have to manage two separate files. (Sometimes, however, saving a mask as a separate file can be useful; such as when creating a track matte effect, because the mask must be placed in a separate track in Premiere's Timeline.
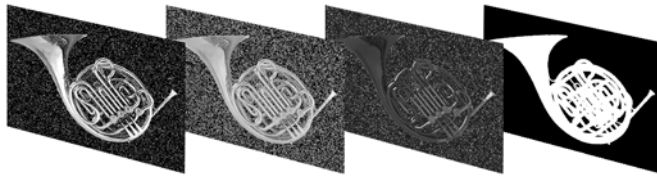
A 32-bit frame has four 8-bit channels: red, green, blue, and an alpha channel mask.

Programs such as Adobe Photoshop and Adobe After Effects let you paint or draw a mask and use the alpha channel to keep the mask with the image or movie.

Premiere uses the alpha channel for compositing.

Photoshop image (left) contains an alpha channel mask (center), which Premiere uses to composite the subject against another background (right).

Keying Finds 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 and replace it with a weather map.

Opacity Allows you to control the degree of overall transparency for a clip. You can use opacity to fade a clip in or out.

With Premiere, you can combine the transparency options described here. For example, you can use a matte to remove the background from one clip and superimpose it over a second clip, and then use opacity to fade-in the first clip's visible area.

Using audio in a video

Audio can play an equally important role to imagery in telling your story. In Adobe Premiere 6.5, you can adjust audio qualities in the Timeline window, or use the Audio Mixer with greater flexibility and control when mixing multiple audio tracks. For example, you might combine dialogue clips with ambient background sounds and a musical soundtrack. Mixing audio in Premiere can include any combination of the following tasks:

• Fading, (increasing or decreasing) the volume levels of audio clips over time.

• Panning/balancing monophonic audio clips between the left and right stereo channels. For example, you may want to *pan* a dialogue clip to match a person's position in the video frame.

• Using audio effects to remove noise, enhance frequency response and dynamic range, sweeten the sound, or create interesting audio distortions such as reverb.

When you import a video clip that contains audio, the audio track is *linked* to its video track by default so that they move together. Adobe Premiere 6.5 allows you to adjust and mix audio while you watch the corresponding video in Real-Time. The Audio Mixer window, like 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. When you edit superimposed video tracks, remember to consider the effects of your edits on the audio tracks.

For more information, see Chapter 5, "Mixing Audio," in the *Adobe Premiere 6.0 User Guide.*

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 rate and converting that to a number.

The quality of digital audio depends on the sample rate and bit depth. The *sample rate* is how often the audio level is digitized. A 44.1 kHz sample rate is audio-CD-quality, while CD-ROM or Internet audio often uses a sample rate of 22 kHz or below. The *bit depth* is the range of numbers used to describe an audio sample; 16 bits is audio-CD-quality. Lower bit depths and sample rates are not suitable for high-fidelity audio, but may be acceptable (though noisy) for dialogue. The file size of an audio clip increases or decreases as you increase or decrease the sample rate or bit depth.

Note: DV camcorders support only 32 or 48 kHz audio; not 44.1 kHz. So, when capturing or working with DV source material, be sure to set the audio for 32 or 48 kHz.

Keeping audio in sync with video

Be mindful of audio sample rates in relation to the timebase and frame rate of your project. The most common mistake is 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 therefore will 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.

A similar problem can occur when editing motion-picture film after transferring it to video. Film audio is often recorded on a digital audio tape (DAT) recorder at 48 kHz synchronized with a film camera running at 24 fps. When the film is transferred to 30 fps video, the difference in the video frame rate will cause the audio to run ahead of the video unless you slow the DAT playback by 0.1% when transferring to the computer. Using your computer to convert the sample rate after the original recording doesn't help with this problem. The best solution is to record the original audio using a DAT deck that can record 0.1% faster (48.048 kHz) when synchronized with the film camera.

Older CD-ROM titles sometimes used an audio sample rate of 22.254 kHz; today, a rate of 22.250 kHz is more common. If you notice audio drifting at a rate accounted for by the difference between these two sample rates (1 frame every 3.3 seconds), you may be mixing new and old audio clips recorded at the two different sample rates.

Note: You can use Adobe Premiere 6.5 or a third-party application to resample the audio. If you use Premiere, be sure to turn on Enhanced Rate Conversion in Project Settings > Audio. Then, build a preview of the audio by applying an audio effect with null settings.

Creating final video

When you have finished editing and assembling your video project, Adobe Premiere 6.5 offers a variety of flexible output options. You can:

• Record your production directly to DV or analog videotape by connecting your computer to a video camcorder or tape deck. If your camera or deck supports device control, you can automate the recording process, using timecode indications to selectively record portions of your program.

• Export a digital video file for playback from a computer hard drive, removable cartridge, CD, or DVD-ROM. Adobe Premiere exports Advanced Windows Media, RealsMedia, AVI, QuickTime, and MPEG files; additional file formats may be available in Premiere if provided with your video-capture card or third-party plug-in software.

• Use Advanced RealMedia, or Advanced Windows Media (Windows only) export options to generate properly encoded video files for distribution over the Internet or your intranet. Adobe Premiere 6.5 exports QuickTime, RealMedia, and Windows Media formats for download, progressive download, or streaming.

• Create an EDL (Edit Decision List) so you can perform offline editing based on a rough cut, when you require a level of quality that your system cannot provide.

• Output to motion-picture film or videotape if you have the proper hardware for film or video transfer or access to a vendor that offers the appropriate equipment and services.

For more information, see Chapter 10, "Producing Final Video" in the *Adobe Premiere 6.0 User Guide*.

Review questions

1 What's the difference between the timebase and the project frame rate?

2 Why is non-drop-frame timecode important for NTSC video?

3 How is interlaced display different from progressive scan?

4 Why is data compression important?

5 What's the difference between applying a mask and adjusting opacity?

6 What is an EDL and why is it useful?

Answers

1 The timebase specifies the time divisions in a project. The project frame rate specifies the final number of frames per second that are generated from the project. Movies with different frame rates can be generated from the same timebase; for example, you can export movies at 30, 15, and 10 frames per second from a timebase of 30.

2 Counting NTSC frames using a timecode of 30 fps causes an increasingly inaccurate program duration because of the difference between 30 fps and the NTSC frame rate of 29.97 fps. Drop-frame timecode ensures that the duration of NTSC video will be measured accurately.

3 Interlacing, used by standard television monitors, displays a frame's scan lines in two alternating passes, known as fields. Progressive scan, used by computer monitors, displays a frame's scan lines in one pass.

4 Without data compression, digital video and audio often produce a data rate too high for many computer systems to handle smoothly.

5 A mask, also known as a matte in video production, is a separate channel or file that indicates transparent or semitransparent areas within a frame. In Premiere, opacity specifies the transparency of an entire frame.

6 An EDL is an Edit Decision List, or a list of edits specified by timecode. It's useful whenever you have to transfer your work to another editing system because it lets you re-create a program using the timecode on the original clips.