# **BIEAPETER Digital Video Recording and Editing**

After completing this chapter, you will be able to:

- Understand how digital video recording works and realize why movies play back better on faster computers
- Consider the options available for recording and editing digital video with Windows or a Macintosh
- Know how to acquire the necessary hardware and/or software to setup your computer to record digital video
- Edit digital video using QuickTime Pro for Windows or QuickTime Pro for the Macintosh
- Conserve disk space by compressing the digital video recording

This chapter is a tutorial on recording and editing digital video clips on Windows and Macintosh computers. If your computer does not have a video capture device installed, you will not be able to make an actual recording; however, you will still be able to complete the digital-video-editing tutorial.

## **How Digital Video Works**



**Figure 35-1** An artistic impression of how microcomputers play digital video recordings.

Artwork provided courtesy of Intel, Inc.

Figure 35-1 shows an artist's impression of how video gets digitized. The basic process is fairly easy to understand. You connect a video source, such as a camera or a VCR, to your computer's video capture device. When you tell your computer to start recording, the video capture device converts the incoming video signal into a stream of numbers that represent the video signal digitally. The digital video stream contains an enormous amount of data. To conserve space on your hard disk when you save the movie, the video gets compressed, down to as little as 1/200 of its original size. One or more of the video compression schemes explained in Table 35-1 may be used.

On playback, the computer's microprocessor must read the encoded information, decode it, and route the video to the screen and the soundtrack to the waveform audio device. Because some computers are slower than others, the recording process uses a clever scheme in which audio frames are interleaved with the video. The soundtrack plays uninterrupted because the audio always takes priority. Then the computer shows as many frames of video as it has time to process. If it is too late to show a given frame, your computer just skips it and goes on to the next frame. Because the audio has priority, you get the aural illusion of uninterrupted playback. In this chapter, you will learn how to record and compress video for playback on slow as well as fast computers.

Method	How It Works
YUV subsampling	Divides the screen into little squares and averages color values of the pixels in each square.
Delta frame encoding	Shrinks data by storing only the information that changes between frames; for example, if the background scene does not change, there is no need to store the scene again.
Run length encoding	Detects a "run" of identical pixels and encodes how many occur instead of recording each individual pixel.

 Table 35-1
 Video Compression Schemes

## **Preparing Your Hard Drive**

Before you can record video to your hard disk drive, you must make sure there is enough space to hold the recording. A rule of thumb is to have 15 MB of free disk space for every minute of video you plan to record. This will get compressed later on to save space, but you need enough free disk space to hold the raw video at first.

To complete the exercises in this chapter, you should have at least 20 MB of free disk space. If you do not have that much available, free some now.

#### **Recording the Video**

To make a digital video recording, you must first connect a video source, such as a camera or a VCR, to your computer's video capture device. Then you run the recording software that came with your video capture device. If your computer does not already have a video capture device, the author suggests that you consider purchasing one of the products recommended in the video capture section of Chapter 35 at the *Multilit* Web site.

One of the most popular video capture devices is Logitech's QuickCam, which comes in several versions ranging in price from \$49.95 to \$149.95. Figure 35-2 shows the USB



Figure 35-2 The Logitech QuickCam Pro.

version, which the author uses for videoconferencing and video capture on both Windows and Macintosh computers. The author purchased the USB version of the QuickCam because of the cross-platform capabilities that enable you to connect it to any Windows or Macintosh computer with a USB port. If your computer does not have a USB port, you can purchase a parallel port version of the Logitech QuickCam, or you can consider installing one of the video capture cards recommended at the *Multilit* Web site.

To record video with the QuickCam, you follow the steps in Table 35-2. If you have some other capture device, the process will be similar. If you do not have a video capture device, skip to the next part of this chapter, which will teach you how to create and edit digital video clips. You do not have to own a video capture device in order to edit digital video.

#### Table 35-2 How to Record Digital Video

Figure 35-3 The QuickCam Format settings.

Windows	Macintosh
Connect your video source to your computer's video capture device; in this example, plug in the Logitech QuickCam.	Connect your video source to your computer's video capture device; in this example, plug in the Logitech QuickCam.
Get your computer's video recording software running; in this example, use the Start button's Programs menu to run the Logitech QuickCam software.	Get your computer's video recording software running; in this example, use the Finder to go to the Logitech folder on Macintosh HD, and run the QuickMovie software.
Click the movie camera icon to put the software into movie recording mode.	When QuickMovie asks what filename to save the movie as, type in a filename, such as <i>MyFirstMovie</i> .
Click the Settings tab, then click Format; the Format settings appear as illustrated in Figure 35-3.	► The record window will appear, as illustrated in Figure 35-5.
Lighting Format Capture	Click here to switch to- playback mode

#### Table 35-2 How to Record Digital Video (continued)



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Playback controls will appear beneath the movie, as illustrated in Figure 35-6.



Figure 35-6 The QuickMovie playback window.

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Figure 35-4 The QuickCam Viewer.

## **Playing the Video**

🖼 QuickCam Viewer

After you record the video, you will want to play it back. Click the Play button to rehearse the video. If the video plays back jerkily, you have problems. Here is what you can do about them:

- Try lowering the color depth. If you are trying to record millions of colors, for example, set the color depth to thousands of colors instead.
- Try reducing the dimensions of the recorded video. If you are recording at 640 by 480, for example, reduce the dimensions of the recorded video to 320 by 240 or 160 by 120. Your computer may not be fast enough to record larger screen sizes.
- Defragment your hard disk drive. Your computer may have come with its own defragmenting software; to find out, follow these steps:

Windows

- If you have Windows, click the Start button, choose Help, click the Index tab, and find the topic *defragment*.
- If you have a Macintosh, pull down the Finder's Help menu, choose Help Center, search for Hard Disk, and follow the links to repair or improve hard disk performance.
- If your computer does not contain a built-in defragmenter, follow the *Multilit* Web site links to the Norton Utilities, which contain hard disk maintenance software for both Windows and Macintosh computers.

## Saving and Compressing the Video

After you play back the movie to make sure it recorded the way you want it, you need to save it. The QuickCam software gives you the option to compress the video when you save it. You can save the video in a wide range of formats, depending on its purpose and intended audience. To save and compress the video, follow the steps in Table 35-3.

#### Table 35-3 Saving and Compressing the Video

- If the QuickCam Viewer is not already displaying the video you want to compress, click the Images tab of the QuickCam window, then double-click the video to open it.
- Click the File icon in the QuickCam Viewer; the Save As dialog appears.
- In the File Name field, type the name you want the compressed video to have. For your first capture, assuming your hard drive is C, call the file C:\multilit\MyMovie
- Click the Compress button; the Video Compression dialog appears as illustrated in Figure 35-7.

Video Compression		
<u>C</u> ompressor:	OK	
Cinepak Codec by Radius	Cancel	
Compression Quality: 85	Con <u>f</u> igure	
☐ Key Frame Every 0 frames	<u>A</u> bout	
Data Rate O KB/sec		Frame: 0 Size: 6252 / 38400 (16%)



- Pull down the Compressor menu and click to select the compressor you want to use. For this example, choose Cinepak. For help selecting the compressor best suited to your application, consult Table 35-4 and follow the *Multilit* Web site links to Codec Central.
- If you are targeting a specific playback medium, check the Data Rate box, and enter the device's data rate. Enter 150 if you want the movie to be able to play back smoothly on slower computers as well as fast ones. Higher data rates will improve playback on faster computers, but beware that file sizes will be larger.
- Click OK to close the Video Compression dialog.
- Click SAVE to begin saving the compressed video. A status indicator will keep you informed as to the progress of the compressor.

#### Macintosh

- If QuickMovie is not already displaying the video you want to compress, pull down the QuickMovie File menu, choose Open, and open the video you want to compress.
- ▶ Pull down the File menu and choose Compress Movie.
- Type the name you want to save the compressed movie as into the dialog box, then press the New button.
- The Video Compression window appears, as illustrated in Figure 35-8.



Figure 35-8 The Video Compression window.

- Use the Compressor menu to select the compressor you want to use. In this example, choose Cinepak. For help selecting the compressor best suited to your application, consult Table 35-4 and follow the *Multilit* Web site links to Codec Central.
- If you are targeting a specific playback medium, check the Limit Data Rate box, and enter the device's data rate. Enter 150 if you want the movie to be able to play back smoothly on slower computers as well as fast ones. Higher data rates will improve playback on faster computers, but beware that file sizes will be larger.
- Click OK to begin saving the compressed video. A status indicator will keep you informed as to the progress of the compressor.

Choosing a codec may be your hardest decision. The comparison of codecs in Table 35-4 may make this decision a little easier. For more detailed information about video codecs, follow the *Multilit* Web site links to Codec Central.

	Table 35-4	Video Comp	ression Codecs
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Name of Codec	Purpose of Codec
Apple Animation, Apple None	Lossless storage, but inefficient; see Photo JPEG
Cinepak	Medium-quality CD-ROM video, works on older computers; the most universal choice
H.261	Low-quality videoconferencing
H.263	Medium-quality videoconferencing
Intel Indeo 3	Medium-quality CD-ROM video, works on older computers
Intel Indeo Interactive	High-quality CD-ROM video; requires faster computers
Motion JPEG	General-purpose video editing and storage
Photo JPEG	When used at 100% as a storage/transfer format, it creates significantly smaller files than animation
MPEG-1	High-quality CD-ROM video; requires special hardware or fast computer
MPEG-2	High-quality DVD-ROM video; requires special hardware or fast computer
MPEG-4	High-quality Web-based video
Sorenson	High-quality video intended for publication on the Web and CD-ROM on newer computers

## **Editing the Video**

**Show-Me Movie:** To edit video, you use a digital video editor. Video-editing software is available in a wide "Digital Video Editing" range of prices, from \$29.99 for the Apple QuickTime Pro editor to thousands of dollars for more advanced editors that use special-purpose hardware to achieve a wide variety of video special effects. This tutorial teaches you how to edit video with the QuickTime Pro editor. Do not underestimate the power of QuickTime Pro, however; it can do a lot of your everyday video editing, even though it does not cost a lot. Follow the links at the Multilit Web site if you want to learn about other, more expensive editors. QuickTime Pro is available for download from the Apple QuickTime Web site. If your computer does not already have a digital video editor installed and you want to download Apple QuickTime Pro, go to www.apple.com/quicktime and follow the links to download Apple QuickTime Pro. When this book went to press, the cost of purchasing a key to unlock QuickTime Pro's video-editing features was \$29.99. Follow the on-screen instructions to pay this fee and unlock the powerful video-editing features in QuickTime Pro. QuickTime Pro lets you cut, copy, and paste segments of video, much like you can cut, copy, and paste text with a word processor. Follow these steps: If you do not already have QuickTime Pro running, double-click its icon to get it running now. Pull down the File menu, choose Open Movie, and open the movie you want to edit. In this example, open the movie called Moonland in the Movies directory of the Multilit CD.



Figure 35-9 The QuickTime Pro Window.

- Click the Play button and listen carefully to the start of your recorded video. It probably contains frames you would like to cut out. You can do this with the slider and the Selection Start and Selection Stop markers, as illustrated in Figure 35-9.
- In this example, pretend that you want to cut out all of the video up to the point at which Neil Armstrong speaks his famous words, "That's one small step for man, one giant leap for mankind."
- Use your mouse to drag the slider to the very start of your video (it is probably there already, but check to make sure).
- Click the Play button to start the video, and play up to the point just after you hear the words "The eagle has landed."
- Drag the Selection Stop marker to the spot between "The eagle has landed" and "That's one small step." The spot you want is about 23 seconds past the start of the video.
- Leave the Selection Start marker at the beginning of the video. Notice how the slider is grayed out between the Selection Start and Stop markers. The gray area represents the video you are about to cut.
- Drag the slider to the Selection Stop marker you just set, click Play, and listen carefully. Does it start exactly where you want? If not, you marked too much or too little to cut. Adjust your Selection Stop marker accordingly. Repeat this step until you have the Stop marker exactly where you want it.
- Pull down the Edit menu and choose Cut, or press Ctrl-X or #-X. Press the Play button, and you will find that the segment you marked has been cut out of the video.

If there is video at the end of the recording you want to cut, you can repeat this process by setting the Mark In and Mark Out points at the end of the clip. With practice, you will get very good at this. Later on, you can experiment with pasting sequences you have cut into different places in the video to make things happen in a different order than when you recorded them. When you are finished editing the video, pull down the File menu, choose Save As, and save the movie under the filename of your choice.

#### exercises

- 1. There is a movie in the *Video* directory on the *Multilit* CD called *clipvid*. When you play it, you will notice that it has material at the start and at the end that should be cut. Use your video-editing software, such as QuickTime Pro, to do that. Save the resulting file in your *Multilit* directory under the name *TrimmedClip*.
- 2. Use your video-recording software, such as Logitech QuickCam or QuickMovie, to record a 10-second video clip. Pull down the File menu, choose Compress File, and choose the option to save the file with no compression in your *Multilit* directory under the name *uncompressed*. Use the File Manager to find out how large the file is. Now use Logitech QuickCam or QuickMovie to compress the file with the Cinepak compressor at a color depth of 256 with medium quality. Save the file in your *Multilit* folder under the filename *compressed*. How large is the file now? By what percentage did the Cinepak compressor reduce the file in size, as compared to the size of the full framed version?