

CHAPTER

1

Understanding Digital Video



Are you ready to learn more about how digital video works? This chapter introduces you to the concept of digital video, the benefits of going digital, the different types of digital video cameras, the digital video workflow, and essential digital video terms.



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What Is Digital Video?

Digital video is a relatively inexpensive, high-quality video format that utilizes a digital video signal rather than an analog video signal. Consumers and professionals use digital video to create video for the Web and mobile devices, and even to create feature-length movies.



Analog versus Digital Video

Analog video is variable data represented as electronic pulses. In digital video, the data is broken down into a binary format as a series of ones and zeros. A major weakness of analog recordings is that every time analog video is copied from tape to tape, some of the data is lost and the image is degraded, which is referred to as generation loss. Digital video is less susceptible to deterioration when copied. You can convert analog video to digital video with the proper hardware and software configurations, but you cannot increase the quality of the analog signal.



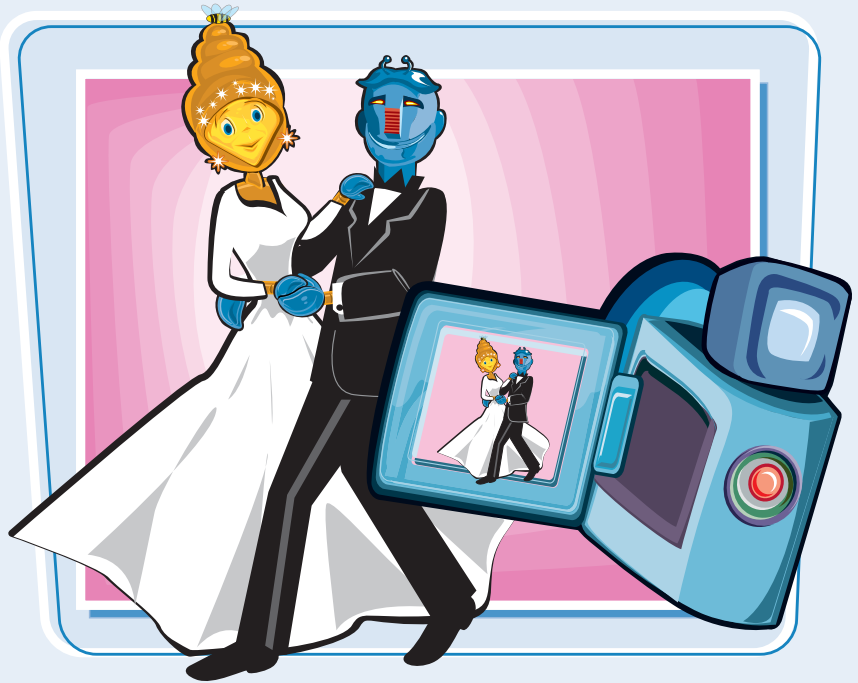
Recording Media versus Format

The recording medium is essentially the physical device on which the digital video is recorded, like a tape or solid-state medium (a medium without moving parts, such as flash memory). The format refers to the way in which video and audio data is coded and organized on the media. Three popular examples of digital video formats are DV (Digital Video), HDV (High Definition Video), and AVCHD (Advanced Video Codec High Definition).



Acquiring Digital Video

Digital video can be acquired from a range of sources, including cell phones, some digital still cameras, as well as digital video cameras. Digital video can be recorded to a tape, DVD, flash memory card, or hard disk drive. Some digital video cameras offer more than one of these methods of acquisition. If you buy a video camera today, it will most likely be a digital video camera.



Using Digital Video Technology

You can attach your digital video camera, mobile device, or digital still camera with video capability to a TV set for previewing or to a computer. After you transfer the video from the device to a computer, you can edit your video, add graphics, and add music to make your own video production. You can then take your video work of art and create your own DVD, or upload it to popular video sites such as YouTube, MySpace, and Vimeo to share with the world.



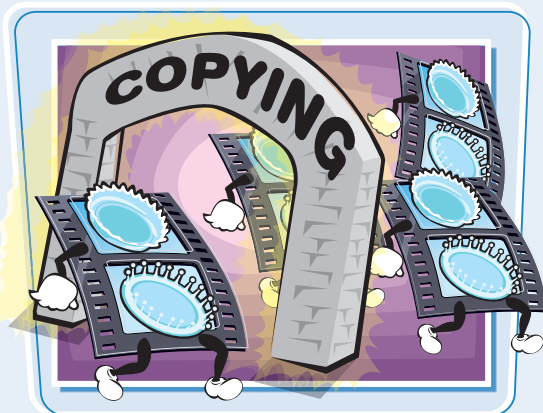
Understanding the Benefits of Going Digital

Digital video provides you so much more than just the ability to capture great footage; it provides you with the flexibility to share those moments with others. You can create sleek video presentations of your footage with video editing programs, and then make DVDs of the footage and send copies to family and friends. You can even create your own Web page showcasing your videos.



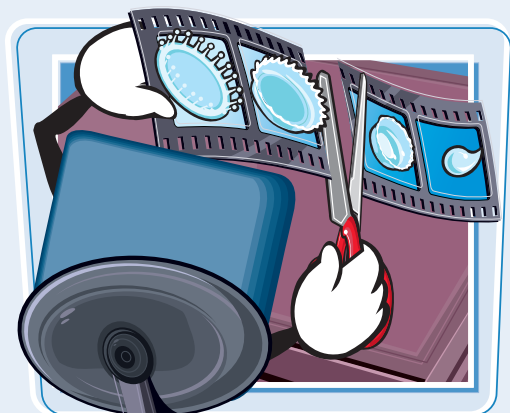
Maintain Picture Quality When Copying

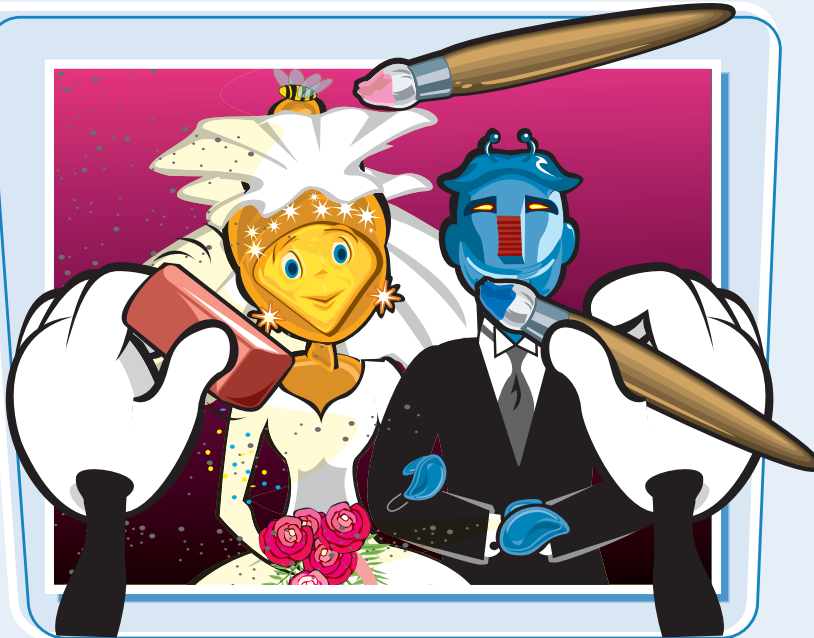
When you view a copy of a copy of a wedding, shot over 10 years ago in analog format, image deterioration is noticeable. Digital video data is broken down into defined, individual bits of data, a binary format as a series of ones and zeros. Because of this, it is not susceptible to what is referred to as generational loss, as experienced with analog video when copied.



Take Advantage of Video-Editing Software

Digital video can be transferred from your video camera to a computer to take advantage of powerful video-editing applications. Programs such as Apple iMovie and Adobe Premiere Elements give you the ability to manipulate video footage, add effects and music, and even create titles. Many video editing programs also provide various means for sharing your video with others.





Digitize to Restore, Enhance, and Preserve Old Video

You can digitize old videos of weddings, birthday parties, and special moments that were captured with non-digital cameras. Converting your old VHS tapes to digital form stops the deterioration process caused by heat and humidity due to improper storage of videotapes. You can use a video editing application with color correction tools to help enhance the colors and minimize some of the effects of aged video. Your captured digital files can then be organized and archived on hard drives, DVDs, and CDs.

Distribution Options

Your digital video files can be edited within a video editing program and made into a high-quality DVD to be shared with friends and family. Many video editing programs come already bundled with software that enables you to create DVDs and share your video on popular Internet sites such as YouTube. Programs such as Apple iMovie and Adobe Premiere Elements have special export options for getting your video onto mobile devices such as video-capable iPods.



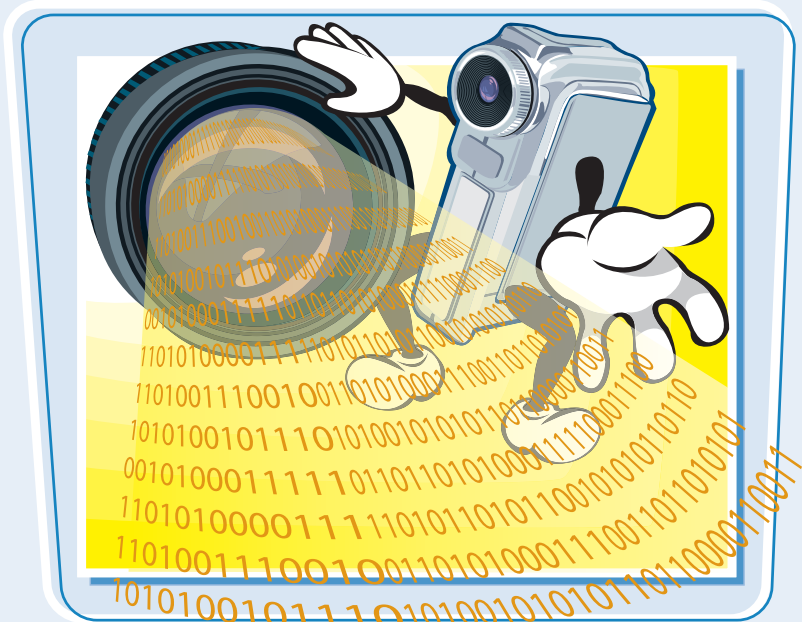
Discover Digital Video Cameras

When you understand how a digital video camera works, you are able to make more informed decisions when it comes to investing in a camera. Understanding how a camcorder works also helps you to take higher-quality video footage.



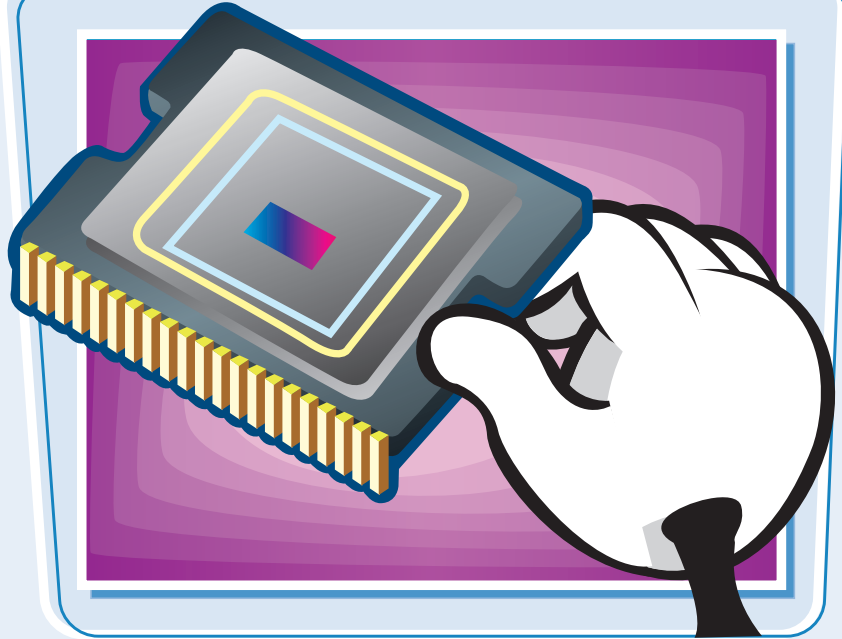
How Digital Video Cameras Record Pictures

Digital video cameras translate the analog information received through the lens into bytes of data. Light from the image you are shooting enters the camera lens and is focused onto an image sensor located behind it. Some higher-end cameras utilize multiple sensors for a higher-quality image. The surface of the sensor(s) is covered with millions of light-sensitive pixels, the building blocks of all digital images. The moving image data, including colors, is then converted into a stream of zeros and ones, and then stored as digital video.



Types of Image Sensors

The majority of digital video cameras on the market use one of two types of image sensors: a charged-coupled device (CCD), or a complementary metal-oxide semiconductor (CMOS). You are likely to find less-expensive consumer cameras using a CMOS sensor or a single CCD. The more-expensive, higher-end cameras utilize three CCDs. Although there are some differences between CCD and CMOS technology, they both are capable of creating high-quality images.



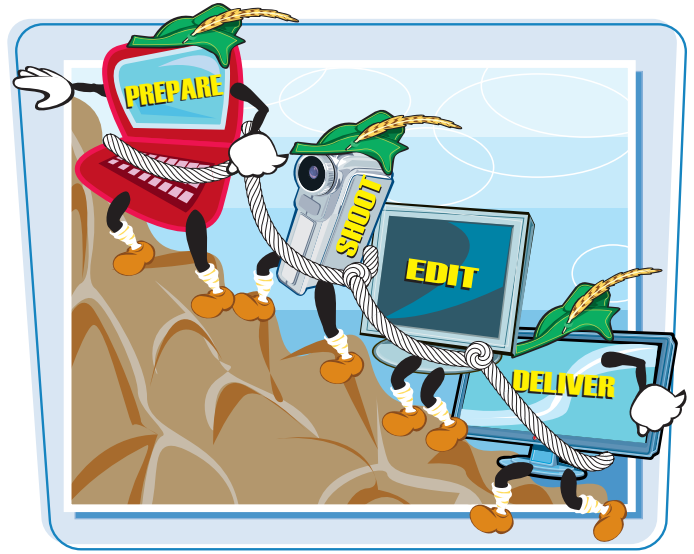
Resolution and Image Quality

The quality of the image that a video camera can produce is largely dependent upon the resolution, which is a measure of pixel density. By and large, the greater the number of pixels on an image sensor, the cleaner and crisper the image. The physical size of the CCD also plays a role in picture quality. Many entry-level high-definition camcorders have a resolution between 3.3 and 5 megapixels, which is 3.3 million or 5 million pixels.



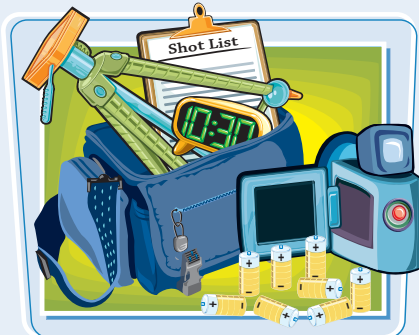
The Digital Video Workflow

There are a series of steps you need to follow, known as a workflow, in order to take a video production from concept to finish and share your work with others. Understanding the digital video workflow enables you to better execute a plan in the field to achieve the highest-quality video possible.



Prepare to Shoot Great Video

How well you prepare for the shoot can be as important as the shoot itself. You should carefully consider what you may need before you leave for the event. Know how long you will be shooting, and make sure that you charge your batteries the day before you go. Create an equipment list, as well as a possible list of shots you want to get during the shoot. Will you require a tripod, or will you be shooting in close quarters with minimum space? Print your checklist and mark each item off as you place it into your camera bag.



Shoot the Video

The acquisition of the video footage can be quite an adventure. When you hit the record button on your video camera, the lens becomes your eyes and it is your job to find the story. Make your shot selection deliberate and purposeful, and always make sure you are safe. By recording from a variety of interesting angles and clearly identifying a main subject, you will have plenty of footage, thus setting yourself up for success in the editing room.





Edit the Video

The editing process is where you bring the story together by putting the video clips into sequence and fine-tuning the relationship between clips. During the editing process, you can add titles to the project, record narration, add music, add still photographs, balance colors, adjust audio levels, and even add special effects.

Deliver the Video

After your project is complete, it is time to share it with the rest of the world. There are many avenues available to you for getting your video seen, such as DVD authoring, video sharing sites, and mobile devices. Consider purchasing a video editing program that includes delivery options such as these as part of the program. You can also create your own Web site to showcase your movies and maintain your own video blog.



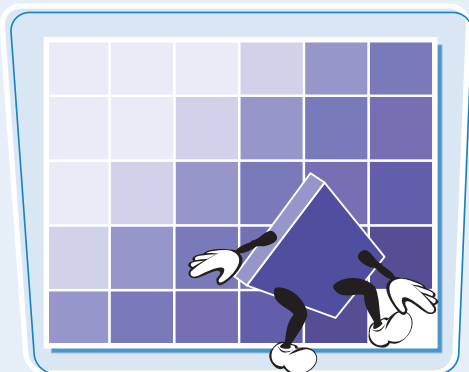
Essential Digital Video Terms

Learning common digital video terms enables you to make better decisions about what video camera to purchase and helps you to understand the digital video process.



Master the Megapixel

Digital video resolution is measured in megapixels. *Pixels* are collections of tiny dots that comprise a digital video image. One megapixel is equal to 1 million pixels; therefore, 5 megapixels equals 5 million pixels. A high density of pixels in a picture results in a larger, crisper, sharper image. A low density of pixels results in a lower-quality image. A good rule of thumb is that the higher the megapixel count of the camera, the higher quality the image it can produce.



Aspect Ratio

The *aspect ratio* is the width of an image to its height on a viewing screen. Standard-definition video has an aspect ratio of 4:3, and the aspect ratio for high definition is 16:9. The standard-definition 4:3 aspect ratio is the most common and has been seen on television for years. The 16:9 aspect ratio, often referred to as widescreen, is usually associated with cinematic viewing, but with the rise in HD programming and HDTVs, it is becoming increasingly popular. Many of today's digital camcorders can record in both the 4:3 and 16:9 aspect ratios.



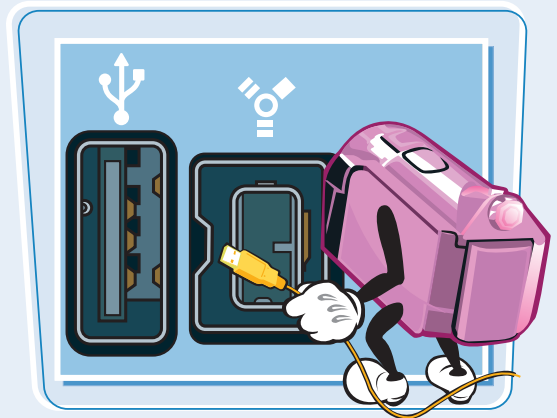
Interlaced versus Progressive Scan Video

The video that you see on television is usually drawn as a series of horizontal lines that comprise the entire image on screen during a scanning process. *Interlaced video*, which is often signified with an (i), such as 60i, is drawn in two passes, with every other line drawn on each consecutive pass to create the picture that you see. *Progressive scan video*, which is often signified with a (p), such as in 24p, is referred to as *non-interlaced video*, and all resolution lines are drawn in one pass. Most consumer camcorders record interlaced video, and many cameras offer progressive recording modes.



FireWire and USB Connections

Nearly all Mac and PC computers come equipped with a FireWire (IEEE-1394) and USB port. The IEEE-1394 connection is called FireWire by Apple and i-LINK by Sony. Depending on which digital camera you purchase, a FireWire or USB connection is used to connect the camcorder to the computer to transfer digital video, audio, and timecode, which is a system for identifying individual video frames with units of time. FireWire 800 and USB2 Hi-Speed boast faster speeds than their previous versions.



The HDMI Interface

Connections made with the High Definition Multimedia Interface (HDMI) terminal give you the highest-quality playback, transporting high definition video and audio through a single connection. This connection can be made only with a high definition camcorder and an HDTV. HDMI cables are somewhat expensive, and are usually not shipped with high definition camcorders or HDTVs.

