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1. Preparing for the Digital Age

Television, which began life in the 1930s, and which grew to become the major focal point of family life in the second half of this century, gave birth to the Video Age in the 1970s, with the invention and mass appeal of the consumer video cassette recorder (VCR). Our view of culture and society has been completely transformed because of this relatively simple and accessible medium. The VCR and the camcorder have created new definitions for the way we see ourselves and added a variety of new terms and expressions to our language.

Now the Video Age is going through a major revolution with the arrival of digital video. This momentous development will bring new opportunities, creativity and a wealth of new technology to our fingertips. Video as we know it will be replaced with a new focus, as the advantages of digital video are universally recognized.

But revolution by its very nature is about upheaval and confusion, as people have to learn new ideas and a new language. There is both information and misinformation to wade through, and relatively simple principles have been made unnecessarily complicated, intimidating, or (worse still) boring. It is our aim to bring this subject to you in a clear and concise way, so you can easily understand the potential of digital video.

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2. Why Go Digital?

record programs on an inexpensive video tape. It is this low cost/high benefit situation that will keep what is called analog video in use for many years to come. Now analog technology has been surpassed.

The reason for this is that recording video digitally delivers remarkably better picture quality, sharper images and better color reproduction. And isn't that kind of improvement what we're always looking for? On top of that, digital copies of digital videos are unrecognizable from the original, which makes editing and image manipulation -- even at the level of the average camcorder user -- so much easier and with higher quality than that delivered by analog video technology.

Before we go any further, it is essential that we understand the difference between analog and digital video, otherwise the digital revolution will pass us by.

With analog video, light and sound are captured and recorded as electrical signals, transmitted as waves that can be represented by the up and down movement of a line. These signals look like mountain peaks and valleys, with variations in the height of the mountain and the depths of the valley, and variations in the distances between peaks and between valleys. With light, those variations are the differences between dark and very bright, as well as colors; and with audio, the differences are between no audible sound and very loud sound. Another way of looking at these waves is to imagine them as waves on the ocean -- infinitely variable -- going from dead calm to large waves. There is just as much variation in the electrical signals captured on analog.

The problem with analog recording is that it is hurt by interference which can reduce the quality of the electrical signal and make the recorded picture quality far worse than what was captured by the camera or VCR. Going back to our mountain analogy, the interference can change the height of the mountain tops and the depths of the valleys -- make them seem higher or lower -- changing the actual recording so that it no longer accurately represents the true image.

Analog video is also affected by timing errors,

Digital recordings don't have to deal with the wide variations found in analog recording. Digital recording is binary, with its electrical signals consisting of just two values, "on" or "off" ('1' or '0') -- there's a signal there, or there isn't. Should there be interference, while it may alter the strength of the "on" of "off" signal, the circuitry of the digital equipment can still tell whether the signal is "on" or "off" -- that's all it has to do. In a language of 1s and 0s, a message can be translated clearly. This makes digital recording almost immune to signal problems, and results in the highest quality picture and audio. This is a major advantage over analog. Digital is the language of computers. Computers easily store and transfer binary signals, from machine to machine, disk to disk, hard drive to floppy disk -- without distortion. It is exactly the same with digital video.

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3. Digital Video - Where did it come from?

The digital video revolution is now in full swing. The boom in personal computers has created a voracious appetite for all things digital, but there have been other factors involved in this revolution:

1. technological advances -- giving manufacturers the ability to make digital video equipment;
2. more efficient manufacturing -- delivering more affordable products;
3. business and consumer demand.

Research on digital video and development of digital video products began many years ago, and by the late 1980s was progressing well on several fronts. In 1994, a standard was created for a recording format, and work on consumer digital video by several manufacturers was streamed into a single effort -- shortformed here to DVC (Digital Video Cassette). This immediately brought the efforts of more than 50 companies into focus, leading to the introduction of the first consumer DVC format products in late 1995.

While digital video originated as a professional technology, and continues to increase in importance in that sector, the latter stages of the 1990s will see its expansion into all corners of the prosumer and consumer arenas.

video
The image from a digital video product is a significantly better picture than that available from an analog video product. Digital video has approximately twice the horizontal resolution that can be produced by a standard VHS video cassette recorder. The resolution of a DV standard image is about 25% better than that from an S-VHS or Hi-8 camcorder or deck. While resolution is dependent on a products components and circuitry, standard VHS and 8 mm video are capable of delivering about 250 lines of horizontal resolution, with S-VHS and Hi-8 at about 400-420 lines. The DV format is capable of delivering over 500 lines on horizontal resolution (of course, actual performance will depend on the individual camcorder model).

Another way to look at digital video's image superiority is to note that an NTSC digital video signal contains three times the data of its analog counterpart, a PAL digital video signal contains six times the data of its analog counterpart . Digital video will deliver the absolute best consumer video quality. Interestingly, DVC has almost the same resolution as analog Betacam, a very popular professional video format -- an amazing quality jump for consumer equipment.

4.2 Color rendition advantage
Horizontal resolution is not all that goes into making a superior image; color resolution (or rendition) is also very important. Color rendition refers to the ability to accurately reproduce colors, without smear or blur. Analog can have trouble with color blur and color noise, but digital video does not. In a video image, color smear or blur is when, for example, the red of a woman's lipstick seems to smear beyond her lips, while color noise is indicated by random sparkles in the picture.

Because there is neither color blur nor noise, digital video delivers a far more life-like video image on the screen. This will be especially evident in images shot on a camcorder, and with images played on large screen TVs. What you will see is much sharper subject edges and clearer color reproduction.

4.3 Audio Comparison DVC & Analog
Digital technology has already made its impact in the area of sound with the acceptance of

expectations for sound quality with Digital Video are equally as high.

The DVC standard ensures that audio quality matches that of an audio CD or, as you might guess, digital audio tape (DAT), since the audio portion of the digital video signal is itself recorded digitally.

Both CDs and DAT are superior to analog audio tape, since both CDs and DAT record digitally. As explained previously, analog recordings work with electronic signal variations (remember the mountain peaks and valleys analogy?). Not all the variations get recorded, and those that do are often subjected to interference, sometimes minor, sometimes major. Digital recordings, because they have to handle only "on" and "off" electrical signals, produce significantly superior sounding audio.

Most analog video tape recorders use analog sound. Digital video tape records digital sound, for significantly better audio quality than analog video. The digital video standard includes Pulse Code Modulation (PCM) audio recording, with two recording modes, either 16-bit stereo for highest quality, or two 12-bit stereo channels (total of four channels). Both modes deliver more than the normal, natural range of sound audible to human beings, ranging from quiet to the full output of a symphony orchestra, without distortion and without noise.

4.4 Compatibility and Copying

Digital video equipment is backward compatible, in that you can transfer a video from digital to analog equipment. That means that if you have a DVC recording you can copy it to a traditional VCR. All digital video equipment has analog video outputs (either S-video and/or composite video) found on current analog equipment, so you can play a digital video on a regular TV, or transfer a digital video onto an analog VCR. Most digital camcorders also have a digital output connector called IEEE 1394.

A DV cassette of either standard or mini size will not fit into any non-DV format's equipment. Cassettes used in other formats will not fit in DV equipment.

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