



# Drive ways

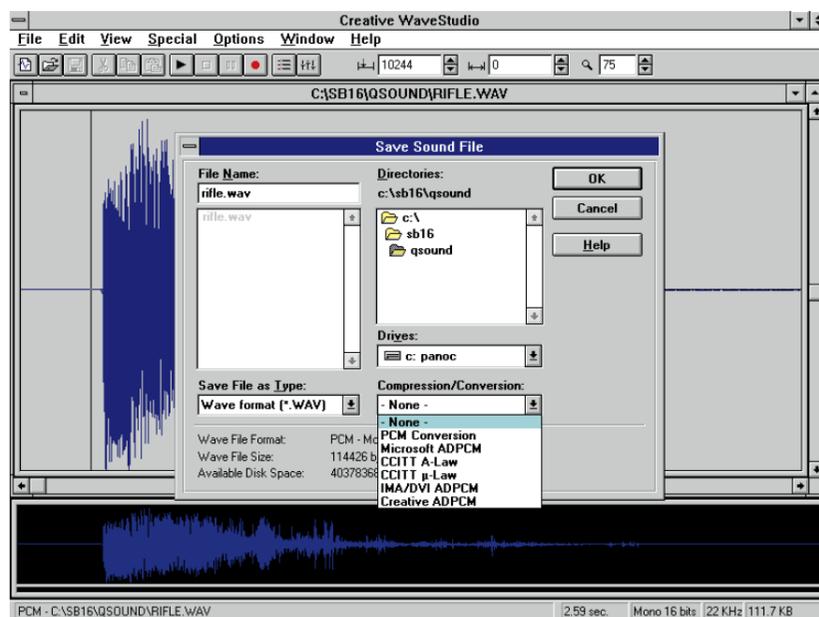
Panicos Georghiadis and Gabriel Jacobs explain the pros and cons of today's special AV drives to help you decide whether or not they are worth the extra cost.

**T**his month we dedicate most of our column to an important issue in multimedia production — disk drives. We examine whether there really is a need for the special kind of audio-visual drives now available. But first, a short letter.

Robin Penny writes: "Thanks for your article on audio compression in the October issue of PCW. Unfortunately, you failed to answer the real question, which is how do you compress WAV files in the first place? I read a lot of mags but have not seen this question answered anywhere. Presumably, as the codecs are in place when you install Video for Windows, you do not need to do anything for decompression to occur. I use a SoundBlaster 16 PnP card but it does not have the ADSP chip. I heard that one is needed to handle compression."

In Windows 3.1, once you install Video for Windows some of the codecs we mentioned (most importantly, ADPCM) become available to you. With Windows 95, all of them are available on the Win95 CD, but you do have to install them. They're to be found in the multimedia section of the installation procedure.

Files don't compress automatically when you save, simply because you have a card which is capable of compression, so you need to initiate the procedure. The Windows 95 Sound Recorder offers several compression options including all the installed compression drivers when you save a WAV file. Alternatively, you can use other sound-editing software for compression. Creative Labs supplies WaveStudio with most of its sound cards, which gives you additional compression options when you save a file. Unfortunately, the Windows 3.1 Sound Recorder has no



WaveStudio gives you more than one compression option when you save a file

options to compress files so you're forced into using a third-party sound editor that supports compression.

Judging from the fact that you have a plug-and-play card, you must be using Windows 95. If you're into audio editing and find the Windows Sound Recorder a bit limiting, a program we use and find very good is SoundForge 3.0. Generally, an ADSP chip isn't needed for non-realtime compression and decompression. Even for realtime applications, a high-powered machine (anything above a 486/33) can do the job in software. For MPEG sound, you need a higher spec: an ADSP chip can help relieve your machine of some of the necessary work. See next month's instalment on audio compression.

## AV hard disks — are they worth it?

A number of hard-disk manufacturers either produce special audio-visual (AV) versions of their drives, or incorporate features which enable them to be termed "audio-visual". That means the drives are especially suited to handling digital audio and video data. Of course, they charge more for these drives: about 15 percent above the price of a normal drive.

The market for this type of drive can be divided into three major groups. At the top end (in terms of requirements) there are companies such as BT and other future broadcasters who wish to provide video-on-demand. They need to store lots of full-length films as well as allowing viewers to download them, thus very high

capacity and performance hard disks are required.

In the middle, there are the video-editing companies, music studios, TV and radio stations and commercial multimedia developers. For these organisations, the capacity of the drives does not need to be quite as high as when providing video-on-demand because much of the editing may have no realtime requirement.

At the bottom, there is the increasing market of home video and music enthusiasts, and producers of multimedia games, presentations and training programs. The capacity and specification requirements are lower due to the fact that home-quality video doesn't need as much storage space as broadcast-quality.

This third category of user has the least money of the three yet most of us ordinary mortals belong to it, so it's for the sake of the majority that we have carried out an experiment to determine what difference AV drives make. Before revealing the results, we should say something about the relevant factors affecting disk drives which are used for audio visual material.

The first factor is capacity. A 500Mb hard disk is adequate to store your disk-hungry Windows 95 (about 75Mb) and still leave you with space for your letters and all that email you may get from the net in the next five years. But a 500Mb hard disk can store less than 20 seconds of broadcast-quality video, or 80 seconds of (VHS-equivalent) home-quality video.

Yes, with compression you can get more, but when you're editing original material you don't want to use too much compression as it degrades the quality. You also need at least as much working space as that taken up by your video material.

The second factor is random access time. Video and audio data accessed in realtime, during simple playback or recording, requires the characteristics of a disk to be that of tape giving an uninterrupted supply of data, but this is made difficult by the requirements of digital editing (the need to jump from place to place). In addition, sound and video data is not always interleaved (stored close together). During editing, it may be in two different files. Also, files may be fragmented on the disk and if you're dealing with many tracks you'll be using many files anyway.

Hard disks nowadays manage about eight to nine millisecond access times, but that's the duration of two frames of video. In

audio terms, eight milliseconds is a long time: it's a sizeable part of a consonant sound in speech, which you'll definitely miss if it's not there; furthermore, in that amount of time, out of the 44,000 units needed for every second of CD audio about 350 units of sound is stored. Missing even one such unit can create abrupt changes in the level, which will come out as clicks and crackles.

The third factor is the rate of data transfer between disk and computer. You need a high sustained transfer rate for audio visual work. You can get ordinary hard disks with high average transfer rates, but this is no good if the rate fluctuates too much. You may have a drive that takes 60 seconds to copy a 60Mb file (average = 60 read + 60 write = 120/60 seconds = 2Mb/sec), but in those 60 seconds the transfer rate may fluctuate between 1Mb/sec and 2Mb/sec.

On the other hand, you may have another drive which takes 90 seconds to copy the same file (average = 60 read + 60 write = 120/90 = 1.5 Mb/sec), but where the transfer rate fluctuates only between 1.4Mb/sec and 1.6 Mb/sec.

The second drive with the lower average transfer rate (but the higher sustained minimum transfer rate of 1.4Mb/sec instead of 1Mb/sec) will be better suited to audio visual work.

The transfer rates of hard disks are presently still quite low and for professional video work, single hard disks are not used. Instead, arrays of hard disks are combined to reach the required figures. For multimedia production and audio and home video editing, some of the latest hard disks are adequate, but the question we finally come to is: is it worth paying the extra for a specialised AV drive?

## Micropolis

We asked Micropolis, probably the best known of the hard-disk manufacturers which produce this type of drive, to lend us four of its products for testing purposes.

Micropolis AV drives incorporate a number of features which make them specialised:

- They give a constant data transfer rate by using caching techniques to keep realtime disk housekeeping, and therefore interruptions, to a minimum.

- Soft data errors which, on an ordinary disk, may take a comparatively long time (850 ms) to correct, are corrected in ten milliseconds or less on the fly with the use of a dedicated correction engine which also

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cuts out retries. Retries require a complete revolution of the disk and they are not uncommon on a conventional drive. You do not notice them because everything is happening so fast, but they can nevertheless ruin a smooth audio visual transfer.

■ On many conventional disks, thermal re-calibration, where the drive heads are re-aligned to take into account any changes in temperature, takes place every ten minutes or so. The process is eliminated in the Micropolis AV disks (not just deferred) by the use of a special servo system.

■ De-gaussing (the correction of magnetic orientation) of the data head takes less time than on a conventional disk.

Other AV drives are available from Seagate, Hewlett-Packard, Conner, Quantum and others. Not all achieve their AV capabilities in the same way as those from Micropolis. For example, some concentrate on cutting down time-consuming error-logging, improving error management and thermal re-calibration in ways which are different from the Micropolis methods, configuring disk cacheing, buffering in special ways, and so on.

In the meantime, how did the Micropolis disks perform? Well, we did carry out some benchmark tests for our own satisfaction, but numbers weren't really of interest to us. What we wanted to know was whether there was any noticeable difference between a conventional and an AV drive when grabbing and playing video.

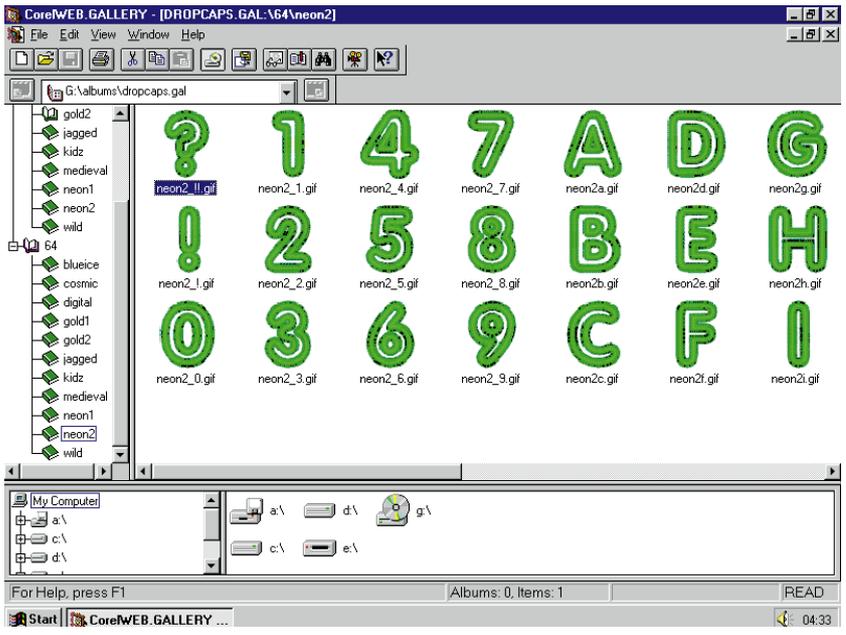
We tested an AV and a standard model from two classes of drive: the 4221 and the 4421. The drives were all internal and we tested them on the same PC using the same SCSI-2 controller and software. Conditions remained the same and we exchanged one disk immediately after another.

In both cases, the difference between the AV and non-AV versions of the drives was not dramatic, but it was noticeable as well as measurable (in lost frames) when dealing with a video clip even as short as 60 seconds. We measured differences of five to ten frames in 1,000.

All drives behaved better in capturing data than in playing it back, and video tended to be jerky on playback even when no frames were reported as missing during capture. This was due to the computer processor being busier at playback. It's also a characteristic we've noticed on other drives from other manufacturers.

During playback, the AV versions of the

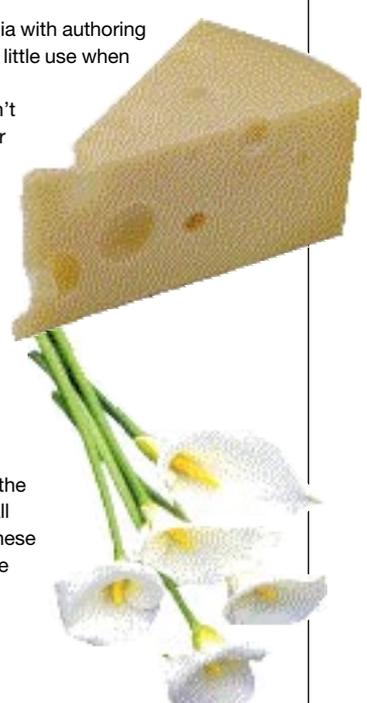
## CorelWeb.Gallery



Many manufacturers provide multimedia clip art and clip media with authoring packages and sometimes separately, and quite a lot of it is of little use when you're working on a project that involves original material.

The reasons are usually that the style of the clip art doesn't match what you want, the quality isn't up to what you want, or simply because you want to use something that is different to everyone else's.

A product released recently for the web, called CorelWeb.Gallery, can just as well be used in multimedia development. It contains a substantial selection of goodies, including arrows, bullets, buttons and dividers. There are also dropcaps, icons, backgrounds, objects, thousands of photos and clip-art images, all organised into 120 themes. We were very impressed, especially with the small file sizes and the small number of colours used in these images, which save space and downloading time. CorelWeb.Gallery costs around £79.

drives gave a perceptibly smoother performance than the non-AV versions. We discovered that the differences in performance between the AV and non-AV versions increased when the RAM in the machine decreased. Not surprising, because less memory means less buffering.

In conclusion, if you're writing CDRs or dealing with multitrack audio or output of edited video onto tape, an AV drive is definitely worthwhile, especially if your machine has less than 32Mb RAM. If your

machine has that amount or more and you're not dealing with realtime playback applications, the difference will certainly be there. You just may not notice it.

### PCW Contacts

If you have any queries, or interesting multimedia-related topics to discuss, we'll be pleased to hear from you. You can contact us at  
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