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March 24, 1998

NEWMEDIA®

THE MAGAZINE FOR CREATORS OF THE DIGITAL FUTURE [www.newmedia.com]

DESKTOP VIDEO

Production ◎ Editing ◎ Output

NEWMEDIA LAB

NONLINEAR EDITING SHOOTOUT

• D-Vision • Media 100
• Avid • Scitex • Fast

ULTIMATE GUIDE TO DV CAMCORDERS

MANAGING DIGITAL MEDIA

Get Your Assets in Order

MEDIA CIRCUS

BY BOB DOYLE

FUTURE-PROOF VIDEO

At NAB98 this April, the broadcast industry will be making the transition to a high-definition widescreen television future. Will HDTV make obsolete your current multimedia studio and nonlinear editing tools? Is there even a remote chance of your shop becoming a player in a "high-def" world of multimillion-dollar investments? To future-proof your work to the maximum on a minimal budget, there are two moves to make as soon as possible: switch to DV and widescreen video. The DV format will make your pictures look better and last longer. Widescreen will make your video assets marketable in new applications such as DVD titles, theatrical films, and even HDTV.

DV format video, digitized and compressed in camcorders like those in our Buyers Guide (page 57), simply looks much better than analog video digitized and compressed in a computer at the same data rate. Experience proves that DV images at 5:1 compression are comparable to Betacam-original M-JPEG images at 3:1 compression or lower.

But why should you consider widescreen video with a 16:9 aspect ratio? Filmmakers have for some time been shooting widescreen images with a careful *eye* toward a 4:3-aspect-ratio part of the picture that will be panned and scanned for television release. Now multimedia producers can do the same thing with widescreen camcorders. Most consumer and prosumer DV camcorders come with a widescreen option. At NAB, Sony will introduce a widescreen version of its DVCAM DSR-130 (best of our 1997 DV camcorder review), widescreen Betacam SP and Betacam SX models, and a widescreen Digital Betacam. Every other manufacturer will soon have a full widescreen lineup of 525-line, standard-definition SDTV cameras. What do these camcorders have to do with HDTV and with you? The answer is huge cost savings that will ease the industry transition to full HDTV.

Two moves to make ASAP: DV and widescreen.

Every TV station in America has been given an additional free channel on the condition that they broadcast HDTV in the next couple of years. But transmitting HDTV is one thing; HDTV production and post-production is a very expensive other thing. Major network studios have spent millions to convert to HDTV cameras and switchers. But technological smoke and mirrors from companies like Faroudja and Snell & Wilcox are going to let most small stations continue to use their 525-line studios and editing rooms, yet broadcast widescreen HDTV programming. And you can get in on their secret. They simply shoot and edit "525-wide" with the new widescreen camcorders (a modest new investment); then when their program is complete, they pass it through a relatively low-cost SDTV-to-HDTV upconverter!

Will home viewers feel cheated by this cheap trick? Probably not, because most will buy lower-cost 525-wide TV sets anyway. In a normal living room, you need a 40-inch screen or larger to be able to resolve the details of a true HDTV picture, and those will be very pricey.

Besides widescreen production for television, you can produce DVD titles and even create video for theatrical distribution. Image Transform in Los Angeles, for example, will make a 35mm film version of a two-hour widescreen DV tape for about $10,000, far less than the cost of originating on 35mm film.

So sell your analog equipment, and start shooting digital video today. And especially when events or scenes are irreplaceable, shoot them in widescreen.

Bob Doyle is NewMedia's *Digital Video Editor.*

IN THIS ISSUE

Why did we decide to do an entire video issue? "How could we not?" answers executive editor Becky Waring. "NAB is on the horizon; DV and QuickTime 3.0 are enabling a new, exciting generation of products; it's the age of streaming video; and the new low-end video editing systems are making video on the Web much more affordable." Met with that enthusiasm, we asked the NewMedia Lab staff to put an extra pot of coffee on and work a few extra shifts.

All of them, including Digital Video Guru Bob Doyle, jumped at the challenge, as is evidenced by the digital video editing comparison (page 42). Want a peek behind the scenes? Bob gives you the skinny on exactly why a Mac video editing system is still much easier to set up than the PC equivalent and describes how he hopes to replace the miles of cable in the lab.

For the feature, our senior associate editor, Lydia Lee, was so convinced that digital asset management was the next technology to change the life of the digital producer that she insisted on writing the story herself. "So many technologies are just searching for applications," she says, "digital asset management is so obviously useful." Choosing an asset-management system is a big step, but Lydia found many companies—from small shops to major studios including DreamWorks SKG and CBS—looking into the technology she investigates here (page 34).

Don't have time to encode all that video? Our Source File (page 62) will help. Paul William tells you what you can expect to pay and get back when you give your video to a digitizing service bureau. He also gives you a list of 10 companies that can turn your tape into MPEG and much more.

Ready? Gentlepeople, start your cameras!

—Gillian Newson

Getting In Sync

JON CONRAD

Real-Time Desktop Video

By Bob Doyle, with Jeff Sauer

With excellent M-JPEG and DV editing systems available for under $500, why invest $10,000 to $50,000 in a major nonlinear editing system? The answer in short: real-time effects. Today's projects often call for composited graphics, captions, or subtitles on nearly every scene, video overlays with a traveling matte alpha-channel, and stylish DVE (Digital Video Effects) with rotating video in perspective, all of which take enormous amounts of time to render in software-only effects systems.

Because we understand that time is money for many of our readers, here we look at six nonlinear editing systems with dual-stream M-JPEG engines and a wide range of real-time titles, graphics, transitions, and DVEs: Avid Xpress for Mac and MCXpress for NT, Discreet Logic's D-Vision 3.5, Fast's Video Machine Plus with Digital Player/Recorder, Media 100's Media 100 xr, and Scitex's StrataSphere. Three are Mac-based, and three run on Windows. All will greatly speed complex effects work and easily pay for themselves in a production environment. But there are key differences in their capabilities.

While all have dual-stream performance, not all can overlay titles on top of transitions in real time. Some have to "steal" one of the video channels for titles. Some can fly a single-page title along a motion path, and some even scroll multipage credit rolls without rendering. All can perform many 2D transitions in real time but not necessarily DVEs such as picture-in-picture without rendering. Two-channel DVEs, where two videos are squeezed to look like the sides of a spinning cube, for example, or where one video pushes the other video off the screen, are even more difficult. Stratasphere can import a movie with an alpha channel and overlay it in real time. One system, D-Vision, can have two separate graphics simultaneously, ideal for a small station-ID overlay.

The top system here offers up to seven real-time composited layers, depending on how you count them, though also important is the ability to add even more layers. Some interfaces can have up to 99 overlay tracks, ideally configurable in the timeline so you can group them as needed. Most can even show you a (rendered) preview of a single frame from all those tracks. Also critical for today's rich multimedia content is the flexibility to open, or at least export, files from applications like After Effects and Photoshop.

Under the Hood

Three of these systems, D-Vision and both Avids, use a similar real-time effects architecture: Truevision's Targa 2000 RTX. In addition, Scitex's SphereOUS software will run on the Targa 2000 RTX board, as well as its own hardware. You'll save money in this configuration but lose some of Scitex's real-time capabilities. An in:sync Speed Razor-Targa bundle was also in beta at the time of our testing. While other companies have been marking time waiting for Microsoft to deliver open-architecture digital-media extensions, Truevision deserves the credit for making NT-based NLEs work.

Media 100 continues to drive its Vincent hardware, though for full two-field real-time transitions you'll need to buy a second High Data Rate card with a second LSI M-JPEG chipset. Scitex also uses LSI's M-JPEG chips and has made its StrataSphere files compatible with the Targa-based MicroSphere files. All the systems are PCI-based, with the exception of Fast Electronics' Video Machine and Digital Player/Recorder merging of ISA cards, which gave it real-time nonlinear transitions before any of the others.

Capturing and Digitizing Media Files

All these systems provide excellent tape-deck control of professional BetacamSP machines, though they often require third-party software plug-ins to control S-video and DV devices. Avid Xpress for Mac has no S-video inputs, so you'll need a transcoder if you're working with S-video or DV sources. All support time-code capture for batch redigitizing, and most offer professional

adjustments of video input signals, including waveform monitor and vectorscope, and VU meters with dB levels for audio. All but the D-Vision and Avid for NT support full signal processing: contrast, brightness, black and setup level, hue, and chroma saturation.

You'll still need to be careful on most systems that your file sizes stay below the old 2GB file limit, meaning you may need to break up long clips if you plan to redigitize at higher data rates. With that premium on file management, you'll want both a picon view and a list or text view of your clips. You'll also want multiple bins and an editable field database for all clips so you can search and sort your footage easily. Also pay close attention to how the system names files on the hard drive, so you can find, manage, and delete media easily.

Editing Interfaces

Early Avid Media Composer set the two-window editing interface standard (now a part of Avid Xpress and D-Vision but surprisingly not of Xpresses MCXpress for NT), with equal-size video monitor windows for source clips and the program sequence. Xpress and MCXpress each feature a single sub-sampled program window on the desktop, while neither Fast nor Scitex shows any video on the computer interface. The latter two systems process video off the computer's main system bus and require that you use an NTSC monitor. All the systems can continuously play out to NTSC for a full-screen view.

The Avid timeline uses a single main video track. Transitions are shown as diagonal lines at the edit points indicating the length of the transition. A second video track is used for cutaway material or compositing. The alternative, established by Adobe Premiere and used here by Media 100 and Fast, bounces video back and forth between A and B tracks with an FX or transition track in between. Avid, Fast, and D-Vision all include picons in the timeline to help you visualize your program as it comes together. Your choice of timeline interface will depend on the type of work you do, how you approach rough cutting, and how visually oriented you are.

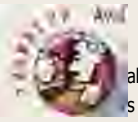
All the NLE systems have a trim window to show you the outgoing tail frame and incoming head frame as you trim an edit point. But not all let you easily see the amount of trim material you have and which tracks are being trimmed. Each editor features a trim mode that lets you move trim points quickly with the mouse or key-

Executive Summary

Avid Xpress 2.0 for Mac is the cheapest way to become an Avid Media Composer editor. You will be able to drive is more powerful siblings and swap jobs between them and Xpress. It also offers an excellent balance between editing and compositing.

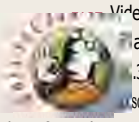
Discreet Logic's D-Vision 3.5 gets three times the performance out of the Targa 2000 RTX as Avid does with MCXpress. You will get that much more out of your $11,000 hardware investment, if you step up to the $15,000 D-Vision OnLine software (street price $11,000) from the $5,000 Avid MCXpress software. OnLine is simply the best NLE software for Windows NT.

Media 100 has the best M-JPEG picture quality on the market, and with Media 100 xr you get two streams at 300KB/frame in real time. However, the Media 100 software has not kept pace with the hardware. Compositing and DVEs are left for After Effects and Boris FX. Real-time title overlays are single static pages only.



Avid MCXpress 1.5.2 for Windows NT look more like Media Composer, although its integration into Windows s excellent, and it has several unique features. However, it doesn't get as much real-time performance out of the relatively expensive Targa 2000 RTX hardware as D-Vision does.

Scitex StrataSphere's DveousFX module provides the best single-channel keyframable DVE in our review. It's also the only one that can roll a multipage title or play a QuickTime movie with alpha channel in real time on top of those DVEs and a full-screen background video. StrataSphere's lofty price and a few interface quirks keep it from receiving our Awesome rating.



Video Machine with Digital Player/Recorder, with VM-Studio Plus .3 software may be the best choice for long-form documentarians and event videographers due to its hybrid linear-nonlinear architecture. It has the only two-channel programmable DVEs in our review and four channels of CD-quality audio. But the older ISA hardware is still 640-by-480, and the blending engine cannot produce the high-quality squeezed images of the

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	Avid Xpress 2.0 for Mac	Avid MCXpress 1.5.2 for NT	Discreet Logic D-Vision 3.5	Fast Video Machine with DP/R	Media 100 xr 4.0	Scitex StrataSphere 1.5.4
Overall value	●●●●●	●●●●	●●●●●	●●●	●●●●●	●●●●
Image quality	●●●●	●●●●	●●●●	●●●●	●●●●●	●●●
PinP/effect quality	●●●●	●●●●	●●●●	●	●●●●	●●●●
Real-time effects	●●●●	●●	●●●●●	●●●●	●●●	●●●●●
Digitizing	●●●●●	●●●	●●●	●●●●	●●●●	●●
Timeline	●●●●	●●●	●●●	●●●	●●●	●●
Trim editing	●●●●●	●●●●	●●●	●●●	●●●●	●●●●
Keyboard	●●●●●	●●	●●●	●●	●●●	●●●●
Audio	●●●●	●●●	●●●	●●●	●●●	●●●
Integration w/other apps	●●●●	●●●●	●●●●	●●●	●●●●●	●●●●
Media database	●●●●●	●●●●●	●●●	●●●●	●●●●	●●●
Base price	$32,495[1]	$4,995 software; $11,995 hardware	$32,000	$10,660	$19,995	$51,500

1 Elite bundle includes Pinnacle Genie 3D effects hardware, 300KB/fr, and many real-time software features. Xpress pricing starts at $9,995.

●●●●● = Awesome ●●●● = Thumbs Up ●●● = Does the Job ●● = Needs Work ● = Dorky

board, though not all let you preview the edit without leaving the trim mode. Good trim modes, like Avid's, let you adjust the edit point, repeat a loop of frames, apply transitions, adjust size, and navigate to the next transition easily from within the trim mode.

Compositing Layers

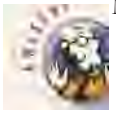
Nonlinear editors have historically worked mostly in the temporal dimension, telling a story along a timeline. But many things can also happen at one instant, such as multiple sound tracks, titles, double-exposed images, and dissolves. The clear trend in these systems is therefore to include more compositing layers and more frame-editing features. While they still leave room for specialized compositing products like After Effects, they can accelerate many common functions in hardware.

Probably the most common compositing function is viewing a background video layer through a "keyhole" in a second video layer. In film, that keyhole is usually made with black-and-white film mattes, while in video, a key is a value of luminance or chroma in one video signal, so that the background video appears wherever the luminance or chroma is a certain value (or range of values). An alpha channel uses the matte or key data (usually 8 bits) included along with (24-bit) RGB color data in a graphic.

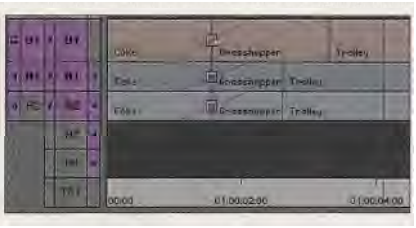
Nondestructive compositing, as with Avid's "nesting," maintains independent layer information and creates a render layer for previews. Some compositors discard the layering information when they render; others let you expand the single rendered layer to recover the original layers, which is much more valuable. Real-time compositing means you can preview or play multiple layers without rendering. However, you should generally render a final program before laying off to tape to reduce the stress on the hardware, which may be forced to compromise quality in a video layer to maintain its real-time preview ability.

Many kinds of effects, such as picture-in-picture and motion effects, use keyframes to control movement or intensity. Values like position, size, rotation, and transparency can be set at the keyframes, and the software interpolates the in-between values. The best keyframe editors give you separate timelines for each important parameter. The easiest to use let you manipulate the image directly with the mouse or alter the parameter values numerically for fine tuning.

Avid Xpress 2.0 for Mac



MCXpress 1.0 (since renamed Xpress) received our Awesome award last year, and the product continues to improve. It's great by itself or as a low-cost entry into the world of Media Composer editing.



The Avid single-track timeline shows transitions as diagonal lines. There is no indication of available trim material.

The Media Composer interface is prized b professional video editors for the ease am speed of basic tasks like getting a clip digitized into a bin. Waveform monitor and vectorscope aid input settings, while a drag-and-drop timeline for rough cuts and a great trim window speed editing. Xpress can insert clips in splice film style, which ripples (shifts down the timeline) all later clips, or in overwrite video style, preserving sync with other tracks for cutaways. If the splice breaks sync, Xpress indicates the error as well as an easy way to fix it. And you can lock selected tracks against sync breaks. Precise and professional three-point editing can be done from the keyboard or by drag-and-drop.

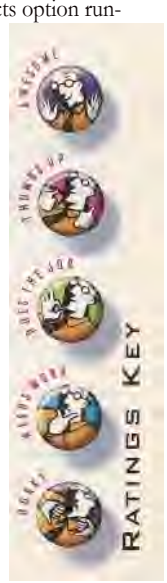
Xpress uses the main Composer window of the Media Composer interface, though it has only one record/program monitor. The main video timeline has three overlay tracks. This model lets you step into a layer to edit a segment and then collapse the nested layers for nondestructive rendering. Only one program timeline can be open at a time, which is limiting, though it's easy to drop one sequence into another timeline. Changes in the original (sub) sequence don't show up in the master, and the master doesn't show the (sub) sequence as an integral unit, maintaining flexibility. Avid's two dozen real-time effects and all its rendered effects are keyframable; most have only four keyframes, but picture-in-picture allows 255.

Xpress has many of the tools that make Media Composer editors so productive, like great database media management with sorting, searching, and sifting with multiple criteria; 32 levels of Undo and Redo; and terrific media consolidation. This feature lets you create new media files, preferably on a clean hard disk or backup disk, with just the data used in your final program sequence plus adjustable trim handles on each clip. QuickTime integration eases access to applications like After Effects, Electricimage, and Avid's own Elastic Reality, though this still requires an export.

The Xpress trim window lets you trim either the outgoing or incoming clip (Avid calls these single-roller trims) or you can trim both at once for double-roller sync trims. It offers access to transitions, a single dissolve button, loop preview, and navigation to next and previous transitions. You enter trim mode with a mouse-click, keystroke, or by lassoing the edit points in a number of tracks. Transitions are applied to all the enabled tracks in the timeline, which show transition roller icons at edit points. You can even trim L-cuts (split or overlap edits), with audio and video at different timecodes. Xpress 2.0 will "fly" a moving single-page graphic over a real-time effect or transition (credit rolls and crawls must still be rendered).

Our Xpress system was outfitted with Avid's 3D Effects option running Pinnacle's Genie card. However, don't expect the dozens of dazzling programmable Genie effects available in the Pinnacle stand-alone product. Avid's 3D Effects option includes only about a dozen of the basic 3D moves like page peel with lightening.

While today's high data rates make picture quality a virtual non-issue, Xpress is not quite as clean as Media 100 and requires higher data rates to achieve similar picture quality. We miss an S-video input and wish a Truevision-style breakout box was available here as on the NT version. S/PDIF digital-audio input (which no other system reviewed here has) is great, but you can't import music and effects directly from CD. Digital audio scrubbing also sounded thin compared to the other systems, especially to the D-Vision, which was more intelligible over a wide range of speeds. Major audio improvements in Xpress 2.0 include support for Digidesign AudioSuite plug-ins, 48kHz DAT

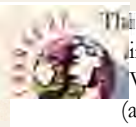


sampling, and eight real-time audio tracks. A JLCooper Fademaster MIDI-based mixer option will let you manually set audio levels.

With Avid Xpress 2.0 (and Media Composer 7.0), Avid introduces a plug-in architecture called Avid AVX (Avid Video Extension), which exposes the nesting layers. Leading developers like Artel, ICE, and Ultimatte can write apps like Boris FX and ICEfx directly to Avid specs.

Finally, while Xpress for Macintosh is no Film Composer, it has the powerful film matchback option of its expensive sibling. And OMF file interchange, including sequences, video, and audio, is now a reality, even to and from MCXpress NT. With the new OMF 2.0, this interchange will not require any file conversions.

Avid MCXpress 1.5.2 for NT



This in Avid editor unfortunately does not apply to MCXpress NT. Many interface features differ from Media Composer (and Xpress for Mac) and MCXpress files are not compatible with any other Avid editing systems. However, MCXpress for NT is a capable editor that Avid could easily bring in line with Xpress and Composer. Until it does, Avid deserves criticism for advertising it under the MC (Media Composer) brand name.

In MCXpress for Windows NT, a dense button bar replaces the tear-off command palettes of the Mac version. Transitions are shown as colored bars on the timeline.

With MCXpress for NT, Avid continues its quest to build a simpler interface suited to corporate video post-production. Many positive new features are designed to make things easy for Windows users, but we lament the deviations from many industry-standard tools and terms.

Among the Windows-style improvements is a file-folder directory added to the bin. Right-clicking brings up properties and contextual menus for many objects, as Windows users expect. We wish the clip info window would include the full path and actual name of the media files, in addition to the top level media directory.

Arbitrary differences from Avid's Composer interface include Splice's being renamed Insert, losing the film vs. video analogy. Splice and Overwrite buttons have also been taken out of the toolbar, forcing more drag and drop. Avid provides no keyboard map for MCXpress, though half the keyboard, including marking In and Out points, performs exactly as an Avid editor would expect. Keyboard jog/shuttle keys do not work, limiting scrubbing to the mouse and single framing. MCXpress has no three-point editing and no out-of-sync indication. You cannot scrub through a non-real-time transition to preview it, as many other NLEs do; you must render it first.

Some differences for MCXpress NT may be forced by the PC hardware; for instance, input proc amps have no contrast or brightness control, just like D-Vision.

One terrific interface improvement in MCXpress is the ability to trim (single and double roller) by dragging the mouse in the trim window. Another is Auto Segmenting, which lets you keep on digitizing past partition limits and even across multiple hard drives. Finally, the Space bar toggles between Play and Stop. We hope these features get added to Media Composer 7.0. The Truevision breakout box is also great compared to the Xpress Mac cable splitter and has S-video in/out.

Enhancements we'd like to see added to the Mac version include: tiny filmstrips in a track that indicate trim material; new intuitive Lift and Extract icons instead of the old weightlifter and scissors; colors in the timeline that show very clearly where a clip will drop; and reporting digital quality in KB/frame rather than AVR77, and so on.

Avid also offers a Portable MCXpress version much like Fast's Portable Quad. This packs 18GB of hard drives into a 200MHz Pentium II Dolch-style luggable for nonlinear editing in the field.

Discreet Logic D-Vision 3.5

D-Vision was one of the first nonlinear editors back in the mid-1980s. Today D-Vision is one of the most modern true multitasking, multiprocessing Windows NT application, running on twin Pentium Pro processors in our review unit. It is the first NLE optimized for NT, though it still waits for Microsoft's DirectShow media architecture with a hardware abstraction layer. The current D-Vision OnLine software has drivers written directly to the Targa 2000 RTX hardware.

Like Avid, the D-Vision interface offers two dramatic viewers for source and record/program, with the easiest-to-read timecode displays of any NLE, and elegant animated jog/shuttle knobs for each viewer. The Avid-style timeline has a distinctive look, though it randomly colors successive clips with bright nonchangeable colors and separates them with an unnerving visible break at each edit or cut point. Transition icons are a fixed size, so you cannot see either transition length or trim material in the timeline.

A powerful match-frame feature gets the source clip back in the Viewer for precise editing, though out-of-sync indication is poor, with just a single number for the length of each track. Out-of-sync clips lose their matching colors, instead of keeping the color and showing the amount of slipped sync for each clip. The tick marks in the timeline are labeled with odd fractions instead of whole seconds or frames, making them hard to use. A toolbar with large clear icons accesses most functions. Filter effects are available with a Windows-style right-click to get clip properties, instead of the Effects icon, which offers transition FX and DVEs (all rendered), the best of which are Boris FX. The entire desktop can be customized with elegant toolbars and resizable viewers, jog/shuttles, and displays.

In spite of its many minor interface flaws, D-Vision's range of editing styles is the widest of any product in this review. In its simplest

Got a PC? Go Turnkey...

Learn from our experience: While installing digital video on the Mac is no sweat (especially QuickTime-based systems), don't try to assemble a high-end PC editing system yourself. Buy a turnkey system and once it's working, only use it for video.

We made the mistake of trying to move the NewMedia Lab Fast Video Machine to a new 200MHz Pentium MMX Sony VAIO machine and upgrade it to the latest VM-Studio Plus software, rather than getting a complete new system for review. For PC-based digital video systems, we always advise readers to get a turnkey system from an established dealer. We should have taken our own advice.

What's the problem? Installing digital video cards in a working PC is like getting a combination lock with wheels labelled IRO, I/O, and Memory, then spinning each one of the wheels. Your task is to find the one combination that works. It's also a little like spinning the bullet chambers in Russian roulette.

To get an insight into the difficulties possible on the PC, consider our ordeal with the Fast. First, for memory, we had to 1) edit the config.sys file with a 64KB memory exclusion at D000H and disable EMS, 2) enter the exclusion in the sys.ini file under [386Enh1], and 3) use the BIOS to shadow or share the 64KB memory block at 0000H. Next, for IRQ, we had to use the BIOS to assign IRQ 15 to an ISA card. One complication was that the Fast hardware does not report its presence to Windows 95, so IRAQ up in the Device Manager. Finally, for I/O base address, we had to try a few different options in Video Machine until one worked. Our first stab at the DPR I/O worked fine, although the DPR I/O assignment said it was "in use by an unknown device" in the Device Manager.

While we eventually got the Sony VAIO working just fine with the Fast hardware, it took way too much effort, and Fast tech support wasn't sure the Sony would work at all. Fast says it strongly promotes the sale of turnkey systems like the new Fast Video Factory and that even upgrades of older working systems should be done by Fast and its qualified dealers, not by end users. Otherwise, you risk having a reliable working system go out of service.

When it comes to PCs, it's caveat editor.... —B.D. *& J.S.*

mode, almost everything can be done accurately by dragging and dropping. D-Vision's MediaSnap drop feature is the most versatile, dropping clips at head or tail (for backtiming) or at a cue point in the source. You can move clips already in the timeline with the mouse. For pro editors, the powerful keyboard, with its color keycaps and function legends, supports three-point editing. On the other hand, many important functions require multiple keystrokes, and the trim window, though similar to Avid's, lacks navigation to the adjacent edit point or an edit point preview function without leaving the trim mode. The keyboard does have a powerful head and tail trim in the timeline, which precues to a preview point. The mouse can drag an edit point showing you the head (incoming) frame; pressing shift then shows the tail frame.

D-Vision randomly assigns colors to successive clips and uses the same size icon for all transitions, so you cannot visualize the length.

Thousands of film editors who have worked on the venerable D-Vision Pro, with its interlocked player and recorder metaphor, will recognize much of the same functionality here. We liked the unlimited undo with list feature. Every action is saved, and each program sequence saves its own list. Other NLEs erase the undo list when a new program is loaded.

D-Vision claims the "highest performance in concurrent real-time functionality of any desktop nonlinear editing system," and we agree. True two-channel DVEs like pushes are just the beginning. We applied a motion effect to one clip and reversed the play direction of a second while flipping it left for right, all in real time. On top of that we added a graphic in an overlay track and a wipe to a second graphic. Finally, we placed a small transparent bug (like a station ID) in D-Vision's logo track, again in real time. Depending on permutations, D-Vision may not do everything in real time at full quality, but if not, it still avoids rendering by dropping back to single-field video for the preview. You can set it to render effects automatically when you drop them in the timeline.

Two other gems that will sell D-Vision to television stations are capturing directly to the timeline and doing a voiceover narration to an audio track while playing the program sequence. We selected a region of the timeline with in and out points, set a mark on our Betacam deck, and hit Capture to timeline. We selected a region for voiceover, and D-Vision prerolled the video with a numeric countdown on screen, then inserted a timecode burn on the NTSC video as we rehearsed and performed the narration. This timecode burn feature is terrific in producing copies for musicians and others to work with.

Audio performance is also superb. Twenty-four tracks mix down to two. Scrubbed audio is very clear. Unfortunately, when you scrub with the mouse to the edge of the window, the timeline cursor jumps wildly to new points, instead of making a smooth pan. Better, D-Vision learns when you ride the virtual audio fades and plugs levels into the timeline.

Titling is done with a limited edition of the Windows industry-standard Inscriber CG, with mimimal documentation. We recommend you get the Feature Pack for full functionality.

Video quality is excellent, though dual streams are limited to 220KB/frame, and the use of many concurrent real-time effects can cause the video and graphics to drop back to single field for previews. Truevision and D-Vision software engineers have gotten terrific performance out of the Targa architecture, especially considering that the ActiveMovie 2.0 files are Windows AVI-compatible. Some real-time single-track effects like motion effects are also available on the less-expensive Targa 2000 DTX single-codec board, which also works with the D-Vision software. There is no software version of the Targa codec yet, which is needed to open files in After Effects without Targa hardware present.

Fast Video Machine with Digital Player/Recorder

Fast has four unique advantages over the other systems reviewed. First, its real-time performance comes from a dedicated digital mixing and blending engine that has been doing real-time effects, including two DVE channels, since 1993. It also has an over-the-top dedicated video bus between its cards, as well as its own SCSI bus controllers, so all video is kept off the computer bus. With two Fast SCSI hard drives, like Seagate Cheetahs, the DP/R can compress both streams at 2:1 (300KB/frame). Targa boards can do one stream at 300-, even 400KB/frame, but two streams simultaneously top out at 225KB/frame. Fast's ISA hardware is a bit long in the tooth, still 640-by-480, for example.

Finally, Video Machine does A/B-roll linear tape editing, with almost any video tape recorder. It controls more tape decks than any other product on the market, including standard nine-pin serial RS422 decks and many RS232 decks such as semi-pro S-VHS; and it also does LANG (Control-L), so you can edit with Hi8, the new Sony DV and DVCAM decks, and even with DV camcorders. Since it's an A/B-roll editor that works with DV sources, if you run FireWire from both players to the recorder, using ProMax FireNet 1394 extender boxes, you can edit cuts-only material at full DV digital quality, and then switch to S-video for transitions and other effects. For event videography, and for much long-form documentary work, the Fast Video Machine-DP/R may be your best investment.

The seamless integration of linear and nonlinear functions into one product is extraordinary. One clip of the timeline can play from hard disk, the next from tape, with real-time transitions between the two.

Real-Time Nonlinear Editing Systems

Company/product	Avid Xpress 2.0	Avid MCXpress 1.5
Phone/URL	(800) 949-2843 www.avid.com	(800) 949-2843 www.avid.com
Platform	Mac	Windows NT
3D effects card	Pinnacle Genie	⊘
Number of real-time layers	3	2
Number of real-time effects	70	7
DVE channels	1	0
Render compositing layers	4 plus 'nesting'	2 plus 'nesting'
Titling/graphics overlay	Real-time w/keyframes	Static real-time
Multipage scroll	Rendered	Rendered
Title/graphics/video motion paths (keyframes)		
Variable motion effects	●	●
Export video	QuickTime, OMF, ERIMov	AVI
Trim editor location	Computer display	Computer display
Trim modes	Sync, non-sync, slide	Sync, non-sync, slide
Max. data rate per stream (single/dual stream)	300/250 KB/frame	400/240 KB/frame
CCIR-601 (square pixel format)	720x486	720x486
Video input formats	Component, composite, NTSC/PAL	Component, S-video, composite, NTSC/PAL
Waveform monitor, vectorscope	●	●
Real-time audio input/tracks/output	2/8/2	2/4/2
Audio format(s)	48kHz	44.1kHz
Real-time EQ	● (3 band)	⊘
Rubberband audio	●	●
Waveform display	●	●
Audio scrub	1 frame	⊘
Sync lock, break warning, track lock	Sync lock, break warning	⊘
Undo/redo	32 levels plus "Attic"	32 levels
Manual jog/shuttle	Optional (JLCooper)	⊘
Tech support	9am-8pm EST, M-F ($1,495/yr)	9am-8pm EST, M-F ($999/yr)
Base price	$32,495 [1]	$4,995 software; $11,995 hardware [3]
❶ Serv	❶ 611	❶ 612

●= yes, ⊘= no.

1 Elite bundle includes Pinnacle Genie 3D effects hardware, 300KB/fr, and many real-time software features. Xpress pricing starts at $9,995. 2 Also 24/7 support for $995/yr.

However, the two-channel A-B timeline is limited compared to other NLEs, which offer several (rendered) video layers. Even titles and graphics must take up one of the two video layers. With the new VM-Studio Plus 3.3 software, Fast adds multilayering capabilities by rendering two layers to one, though no nesting means you can't undo or re-edit. If you're doing several layers, that's also several renders and several generations of M-JPEG compression. Fast has also added plug-in support for most effects and filters that run in Premiere or Ulead MediaStudio Pro, gaining access to leading FX packages.

The Fast A-FX-B-style timeline adds diagonal lines to show trim material.

Ultimately, VM-Studio Plus becomes awkward if you're working with multiple layers, and Fast needs to redo its interface so you can see compositing layers in the timeline, preview them all together, then render them all at once, as others do. Another performance shortfall is that rendering not only duplicates the two-layer (transition) material but also makes a digital copy of the single-track material in between, requiring double the drive space. VM-Studio Plus should render only the transitions and reference the material in between with pointers to the original media files.

Discreet Logic D-Vision 3.5	Fast Video Machine with Digital Player/Recorder	Media 100 xr	Scitex StrataSphere
(514) 393-1616	(650) 295-3500	(508) 460-1600	(888) 846-7017
www.discreet.com	www.fastmultimedia.com	www.media100.com	www.scitexdv.com
Windows NT	Windows 95	Mac	Mac
⊘	⊘	⊘	DveousFX
4	2	3	3 (w/titles)
18	350	21	Unlimited
1	2	1	1
99	2 [4]	1	50
Real-time w/scaling & transitions	Real-time scrolls and crawls	Static real-time	Real-time scrolls and crawls
Real-time	Real-time	Rendered	Real-time
● in real-time	●	●	●
AVI, MPEG-1	⊘	QuickTime	QuickTime
Computer display	NTSC monitor	Computer display	NTSC monitor
Sync, non-sync, slide	Sync, non-sync, slide, slip	Sync, non-sync, slide	Sync, non-sync, slide, slip
400/240 KB/frame	300/300 KB/frame	300/300 KB/Frame	200/200 KB/Frame
720x486	640x480	640x480	720x486
Component, S-video, composite, SDI, 1394, NTSC/PAL	S-video, composite YUV component option, NTSC/PAL	Component, S-video, composite, NTSC/PAL	Component, S-video, composite. NTSC or PAL
⊘	⊘	●	⊘
2/24/2	4/8/2	2/8 (4 Stereo pairs)/2	2/8 (4 Stereo pairs)/2 (4 optional)
48kHz	44.1kHz	48kHz	48kHz
⊘	●	⊘	●
⊘	●	●	⊘
⊘	●	●	⊘
Excellent	Adjustable	1 frame	1 frame
Sync lock, break warning	Track lock	Sync lock	⊘
Unlimited w/undo history	Unlimited w/undo history	1 level	1 level
⊘	Optional ($1,200)	Optional (JLCooper)	Scitex control panel
8am-8pm EST, M-F (Free)	8:30am-5:30pm PST, M-F (Free)	8am-8pm EST, M-F (30 days only, $595/yr thereafter)[2]	24 hrs (90 days only, $3,500/yr thereafter)
$32,000	$10,660	$19,995	$51,500
❶ 613	❶ 614	❶ 615	❶ 616

3 The base price with real-time option is $2,500. 4 Unlimited rendered down layers.

Media 100 xr 4.0

The strength of its picture quality, which has been the best in the market since 1993's NAB. The clean architecture of the marvelous Vincent card achieves better quality at low data rates than the other systems. But pushing that quality to 2:1 compression (300KB/frame) in two streams of video is too much data-crunching even for Vincent, so Media 100 developed a companion board with a separate set of codec chips for the second video stream, HDRfx, which is the workhorse of the top-of-the-line Media 100 xr ($19,995).

Media 100's A-FX-B-style timeline lets you see the overlap between clips and indicates the type of transition.

With the xr, Media 100 gives up the ability to run in three-slot Macs along with a SCSI adapter and high-end video display card. But with fast enough hard drives, Media 100 xr can do two streams of the best-looking digital video on the market today. (Note that the single-board Media 100 xs provides identical picture quality, but in real-time it can do only single-field previews, which are more than adequate for most multimedia creators. Media 100 xs will save you a slot and about $4,000.)

A long-promised Theo brotherboard for Vincent remains unreleased. Theo was to offer two streams of true 601 video, new I/O capabilities like SDI (and possibly DV), and a Movie-2 bus connector. Media 100 is expected to announce future Theo and Gaudi (a 3D effects card) developments at NAB.

Media 100's software continues to be a basic nonlinear editor, with no support for compositing extra layers of video and minimal real-time effects. Media 100 users must go to Adobe After Effects for compositing and Artel Boris FX for television-style DVEs.

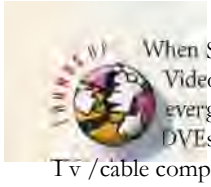
Media 100 uses a Premiere-style timeline, collapsible to Avid-style, and Premiere-style source and program monitors. Although Avid claims you can drop a clip and transition into the timeline faster with its single-track model, we found differences are marginal for most work. A skilled Media 100 editor can trim a clip in the Edit Suite and drag it into place overlapping a prior clip in the other track. Once the trim editor is open, the systems are comparable. Media 100 is effectively always in Avid overwrite (video-style) mode, so it's difficult to splice material and break sync. Avid has a speed advantage in film-style mode.

We liked the eight real-time audio tracks and the general high quality of the Media 100 audio interface, with its excellent rubberbanding and automated faders. One exception was the audio input settings, which do not report user-selectable dB levels beyond +4 and -10. On the audio-hardware side, we wish the junction box could output balanced and unbalanced audio simultaneously and that it had a headphone output. The coming version 4.5 will add three-band real-time EQ, hum and noise filtering, and professional VU meters.

Media 100 has improved keyboard support somewhat in 4.0. The space bar now toggles between play and stop, for example, a Premiere innovation that is now nearly universal.

Media 100 is one of the first of the major nonlinear vendors to acknowledge the DV format by partnering with Radius to market MotoDV and EditDV. By installing the FireWire-equipped MotoDV card in a Media 100 computer and transferring DV data files directly, a potentially picture-degrading conversion back to analog is avoided. Files can be transcoded to Media 100 Motion-JPEG using QuickTime, which is a slow process but one that gets maximum picture quality for demanding editors. Unfortunately, this method does not retain timecode. Radius will reportedly work with Media 100 to integrate DV technology into future versions of Media 100 editing systems. At last year's NAB, Media 100 announced that it would move to the NT platform with the introduction of QuickTime 3.0 for Windows and Macromedia's Final Cut editing software. We expect this will be in beta by NAB98.

Scitex StrataSphere 1.5.4



When Scitex acquired ImMIX and Abekas and merged the VideoSphere NLE with Dveous online effects machines, evergone expected phenomenal real-time online-quality DVEs. Sales of VideoSpheres and StrataSpheres to big Tv /cable companies and high-end post houses suggest Scitex is doing something right. Although the price is the highest in our review (systems start at $51,500), buyers think it replaces a $500,000 online suite.

You don't need to spend quite that much to join the Scitex family, however. Scitex's proprietary Sphere Media Processor hardware is based on LSI Logic's M-JPEG chipset, which means the SphereOUS software will also work with Truevision's Targa 2000 RTX card in the much-less-expensive MicroSphere bundle ($13,500). A new DveousFX board for MicroSphere even provides some real-time 3D DVE capabilities. A further TextFX board provides title animations, including rolls, crawls, and reveals.

We reviewed a top-of-the-line StrataSphere with the DVEousFX option. It has the best single-channel, keyframable DVEs of any product in this review, with dozens of real-time effects like page peels, quad splits, and spheres. The handsome tower-style Sphere Media Processor/Media Server and StorageDock units are controlled remotely by a Macintosh 7300/200 running the SphereOUS software with the editing interface. Regrettably, you use the keyboard for just a few things like copy and paste, though the space bar does start and stop playback.

Picture quality has improved, rivalling Media 100's strong vibrant colors, though the minimum 3:1 compression is not as low as other systems. And QuickTime integration has paid off: StrataSphere is the only NLE that can play an overlay QuickTime movie with a (moving) alpha channel in real time. Others can play only PICTs or PICT sequences. It has real-time alpha-channel support in both title and overlay channels, and it has real-time credit rolls and crawls; none of the others does. It also has alpha capability in the background channel, so if you build or mix down, the result can be

Just What Is Real Time?

Real-time capabilities vary greatly among the editors reviewed. To illustrate the relative real-time power of the six NLEs, we combined two video images (the cardinal and school bus shown at the top) and added an overlay title simultaneously. With some systems, the title is static. Others can move a single-page or even multipage title. Only one can add a second small logo graphic in real time.

Avid Xpress can do a real-time 3D DVE, while overlaying a static title.

Avid MCXpress can do a real-time push.

D-Vision can do a real-time push, and fly (move) a single-page title as well as a logo.

Fast can do two-channel 2.5D DVEs without a title, a single-channel DVE with a scrolling title.

Media 100 cannot do real-time DVEs. It does wipes and dissolves (shown here).

Scitex can do single-channel 3D DVEs along with ascrolling title.

used in a key track. StrataSphere adds 50 new overlay FX tracks. Any one of these can be real-time, so you can move the real-time power layer by layer as you review its motions. Sphere renders a single frame, showing the relative positioning of compositing layers, and slowly steps through successive frames. The keyframe editor is well done, adjusting parameters at any number of frames and allowing you to save sets of keyframes for application on other layers. Although Sphere builds a log list for digitizing, we could not figure out how to convert a TrackSheet to a log list for batch redigitizing at higher quality.

Scitex emphasizes that its network-centric design enables workgroups equipped with Spheres or the DigiSphere digitizing station to work together. However, we found that the type of collaboration possible is mostly limited to the same kind of work done by networked Avids or Media 100s: file sharing. That network is also a bottleneck for third-party applications like After Effects and plug-ins like Boris FX, since StrataSphere does not send video images to the Macintosh (just clip pitons). This also makes the titler weak, since you can't position graphics over live video, and they don't show up on the NTSC monitor.

To add a clip to the Sphere timeline, you copy it from the bin (ClipSheet), paste it into the workspace below the tracks, and then drag it to a track. Note the full time-code details on the selected clip.

A manual Control Panel interface, with great jog/shuttle and audio faders, gives editors a great hands-on feel and limits the need for keyboard and mouse functionality. It also really flies in trim editing. You can do sync and nonsync trims and slip material in a clip, something previously only available on Avid Media Composers. It would benefit from additional buttons like next/previous transition and insert/overwrite. The wonderful manual faders can alter levels in audio tracks, but the software doesn't allow fine-tuning rubberband envelope values. And it's a bit clumsy setting the points (in the TrackSheet with the mouse) for a loop preview, instead of just setting a number of frames around the edit point.

SphereOUS really gets awkward moving clips from the ClipSheets (bins) to the TrackSheet (an Avid-style timeline). You must copy selected clips into the clipboard and then paste them into the Tracksheet, where they appear in a Workspace under the timeline. From there you drag them into the timeline, or you can paste special to the current time, beginning or end. Pro editors expect to trim the source in and out, then drop it into the timeline with a single keystroke or click. And SphereOUS does not support three-point editing or backtiming an edit. However, excellent timecode readouts and clip names in the TrackSheet let you edit all trim values to accomplish the same functions.

On the downside, given Scitex's Dveous experience we expected that at least the canned transition DVEs would be two-channel. However, even Scitex's Push, usually a two-channel DVE with one video pushing another off the screen, is a one-channel slide. And StrataSphere's background track is limited to dissolves and analog-style wipes. We were also disappointed at the lack of video/audio input adjustments, or waveform monitor and

TRADECRAFT

LAB NOTEBOOK

BY BOB DOYLE

FIRING UP THE NEWMEDIA LAB

This issue's nonlinear editing comparison (page 42) focuses on M-JPEG systems that use analog video input, still by far the largest segment of the desktop video market. But a total transformation is coming to the desktop-editing landscape, thanks to DV camcorders (see Buyers Guide, page 57) and FireWire-based editing systems. Nowhere is it more apparent than in the NewMedia Lab.

The immediate impact is an amazing reduction in cable clutter and complexity. The NewMedia Lab has miles of BNC video, XLR audio, and nine-pin serial RS422 machine-control cables that run under the floors and through the walls, feeding component video and balanced audio signals from the control room to three test suites and a multimedia screening and conference room. The wires supplying just one Truevision Targa 2000 breakout box are shown in the illustration. Multiply that by nearly a dozen edit stations, and you begin to get the picture.

A single FireWire cable can replace the multiple analog component and composite BNC, S-video, RCA, and XLR audio cables on this breakout box, as well as the separate nine-pin serial time-code/deck-control cable.

All these cables, as many as 17 separate connections, are replaced by a single, thin FireWire between the camera or deck and the computer. Furthermore, there is no need for a breakout box.

But the more important point to make is that FireWire does not compromise quality; DV video signals are still component, although also digital (as in Digital Betacam). And the audio is better than just balanced (noise resistant)—it's digital (noise immune). DV means perfect backup archives of your work at minimal cost ($1/GB) and unlimited copy generations without an expensive compression board. You just transfer the data into your computer with a low-cost interface card like the Radius MotoDV for Mac ($599; $999 with EditDV software). While real-time DV editing requires dual-DV codec hardware—just like real-time M-JPEG editing—and can be similarly expensive, cuts-only editing is a snap with EditDV.

Wait, you say! The editing software couldn't possibly compare with high-end systems like the Avid Media Composer (typically $100,000). Imagine our surprise when we compared all the major interface features of Media Composer with EditDV and found few deficiencies. Furthermore, your DV footage won't look or sound any better when it's converted to analog and redigitized in Avid's M-JPEG format, even at data rates three times DV's 130KB/frame.

The EditDV timeline has an Avid-style main video track, which can be expanded to a Premiere-style view. The time-code display is big and easy to read. Source and program windows are Avid-style, with edit buttons and track patches. It supports drag-and-drop professional three-point editing, and the Trim window is even better than Avid's. Unlimited video overlay tracks each have their own FX tracks, with a great keyframe editor. Version 1.1 adds 16:9 widescreen editing. Learning EditDV is easy, and you become a professional film-video editor in the process.

You don't need to tell your clients that you spent less than $1,000 for EditDV. Their video will be as-good-as-it-gets online quality. Invest your substantial savings in 18GB Seagate Cheetah hard drives and a DV editing deck (for analog footage in and out). In a pro studio setting, you'll probably want two big computer displays, one just for EditDV's source-program monitor window, and a third NTSC video monitor, just like expensive Media Composer online suites.

If you were planning to spend $100,000 for a system, you could save enough on EditDV to buy yourself a sports car, but you'll probably have more fun driving EditDV. It handles some corners better than Media Composer.