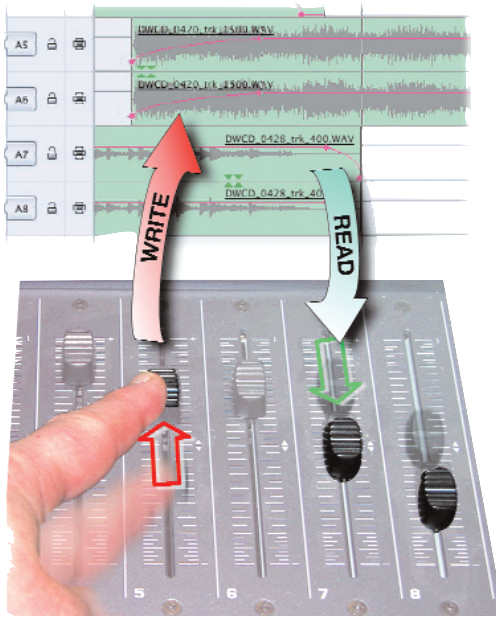
MASTERING THE MIX

BY JAY ROSE

Audio expert Jay Rose is releasing a new edition of his popular "Producing Great Sound" (Focal Press). Along with revised sections on getting better results from in-camera recording, double-system and post software, he's added digital-friendly narrative and feature film techniques throughout the book. "The walls between film and video are collapsing," Rose explains. "The past few years have been very exciting: even relatively simple video projects now can use methods developed over years of Hollywood soundtracks."

The book is aimed at producers, directors, and videographer/editors as well as sound specialists. It has step-by-step instructions and professional tips for the entire audio process, from pre-production through shooting to editing and mixing. But it also aims at a deeper understanding. Here's a preview condensed from the chapters on hardware and mixing. We didn't have room for some of the figures on these pages, but you can see them at www.dplay.com.



Mix automation systems record your finger movements as rubber band fades on the timeline, while existing fades move other knobs on the control surface or on-screen mixer.

MIXING IN THE BOX

Today, even blockbusters are mixed without mixers. What looks like a big console on many Hollywood dub stages doesn't really handle audio at all: it's a controller, talking to one or more computers that actually do the mix. Some setups use specialized computers that emulate big analog mixers, working with digital players that emulate 35mm interlock transports. But the newer trend is to use exactly the same software that built and edited the track. This means there's no audio signal - analog or digital - until the final output; all the prior steps are just super-fast data manipulations. Engineers call it mixing in the box.

Two advantages to mixing in the box are simplicity and cost. Those big mixing consoles can cost more than a hundred thousand dollars, and a lot of that goes into expensive custom engineering. The primary disadvantage - assuming computers and software that are up to the job - is user interface. Traditional consoles evolved as they did because they're easy to work with. The ones in some Hollywood dub stages might look more complicated than a jet plane, but they're mostly the same basic knobs repeated for a large number of tracks. Even small analog mixers follow that design. The most important controls are the volume sliders, one for each sound source; you move a knob away from you to turn the volume up, and pull it back to bring the volume down. Now that's an intuitive user interface.

WHY MIXING IS HARDER THAN CUTTING

Even basic sound mixes can be complicated, from the computer's point of view. It has to remember how loud you want each track, something that's constantly changing in a good mix. It has to multiply individual audio sample data by factors for each volume change. It has to add these multiplications together, combining data for dialog and music and sound effects, creating new samples for each output channel. A simple TV track might have four or five tracks going to two outputs. A theatrical film can have dozens of tracks playing to 18 different submixes and six outputs.

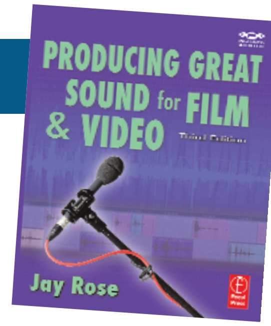
It has to do all these computations in real-time, for every track, for each digital sample (every 1/48,000 second). Then it has to do it all again for the next set of samples. And that's just the mixing. Equalization, compression, reverb, and other processes use more complicated math, with much more computation on each sample. Until recently, desktop computers couldn't do it all. Mixing was either slow and off-line, or limited in capability, or required expensive DSP cards (Digital Signal Processing) helping the computer. Not long ago, you could do more elaborate mixes on a $300 analog unit than on a $3,000 computer.

Figure 11.6 (page 3 of this PDF)

ON-SCREEN MIXERS

The typical rubber band volume lines in most NLEs and audio programs are too cumbersome for a successful mix: even a simple three-second fade — which would take exactly three seconds to perform on a mixing console — requires placing points and drawing a line. If you want the fade's speed to change for artistic reasons, it can take a lot of points to get it right. So some years ago, programmers started drawing pictures of simple mixing consoles on the screen. They show sliders and pan pots, which you can nudge with a mouse to move their knobs. Under the hood, the software is drawing rubber bands based on your movements. If you then look at the timeline window you can see them. But with one of these on-screen faders, any three-second fade — no matter how complex — takes just three seconds. It's a vast

11.7



improvement, but still not practical for mixing a film.

The problem is that real-world mixes involve moving lots of faders at the same time, with some tracks getting louder while others get softer. If you want to crossfade two tracks on the screen, you have to fade one down in real-time, rewind, position the mouse on the second track, push it up in real-time, and then possibly redo the first fade while you're listening to how the combination actually sounds. It can make mixing even a simple project painfully slow.

HARDWARE CONTROLLERS

While your computer has only one mouse and can move only one on-screen slider at a time, most of us have plenty of fingers. So manufacturers developed hardware controllers, with multiple sliders and knobs that can be moved by different fingers simultaneously.
11.8 Behringer's BCF-2000 is a simple one. While it's about as big as a laptop and costs less than $200, it can add real mixing control to most audio programs and many NLEs. The controls on it that look like a mixer are actually digital encoders. Each time you move one, the box sends that movement to the computer via USB, where a system-level driver sends it to the rubber bands and on-screen faders. When you play back — and here's the great part — the rubber bands talk back to the controller. Tiny motors move the faders, and duplicate what you've done with your fingers. This doesn't affect the sound, since there's no actual audio in the controller, but provides visual and tactile feedback.

Almost all controllers include transport buttons and knobs that can be assigned to panning or adjusting effects, and many have a jog/shuttle wheel to save mousing while editing. Some controllers also include good quality multichannel audio input and output, so you don't need a separate box for that function, and connect via FireWire.

Many controllers have sliders for just eight tracks in their base configuration. Since a film can involve dozens of simultaneous tracks, these controllers use bank switches that assign the eight to different groups of tracks at a time. You can program all of the dialog, then move over on the "console" to adjust sound effects or scoring. Good audio software even lets you set up custom banks of track, group and master faders, all recallable from the controller. It's the modern equivalent of the old Hollywood practice of premixing, where all the dialog tracks would be mixed to one piece of magnetic film and all the sound effects to another, to simplify the final mix. Except there's no quality loss from multiple generations, and it's easy to go back to change a premix later.

Switching banks can get confusing, since you have to keep track of which fader belongs to which track. Many controllers put
11.10 an LED or LCD readout above each fader to report what it's currently doing, based on track names you assign. This saves time and confusion in a complex mix, where you'll frequently be switching banks while a scene is rolling.

WORKING WITH AUTOMATION

What makes automation so powerful is that the computer plays back fades you've already recorded, while you're perfecting those on other tracks. It may all seem complicated — box A sends commands to software B to emulate what was originally programmed as mouse action C, which is then sent back to A for user feedback — but it gives you the best of both computerized and traditional mixing. The image seen here shows the whole process graphically. The hand is pushing a fader up for one set of music tracks, on channel 5. Meanwhile, fades already written on tracks 7 and 8 are playing back. 17.5

AUTOMATION MODES

Most software is pretty smart about deciding when to play fader moves and when to record them, even if you're making changes on a track that's almost complete. Better programs give you a choice of how they make these decisions, even when tracks are nominally set to write new automation data.

- Touch mode keeps a track in play mode until you actually grab a fader. If you leave a fader alone, it moves up and down according to the track's rubber band. But when touch with finger or mouse, it senses that you're there and redraws the line based on current movements. When you let go, the volume goes back to any levels you previously wrote. This makes it easy to record small changes
- Latching mode works like Touch, except once you've touched a fader, its volume stays where you left it until you stop the transport. Use it to revise a scene you've already written.
- Overwrite mode writes new data for selected tracks as soon as you start the transport. You can preset the opening of an entire scene with the transport stopped, then record all its faders at once.
- Trim mode scales any existing fader movements based on where you've set the fader. Use this if you've recorded a complex automation sequence with a lot of fades, and then want to make a particular element louder or softer without having to remake each movement.

MOUSE MIXING

Even if you've got a control surface and lots of responsive faders under your fingers, there will be times your fingers haven't moved exactly the way you want them. You might have done an elaborate transition between two scenes perfectly, but missed where the picture dissolves by a few frames. Or you might want to adjust the level of just a single word or note. That's when it pays to remember that your software is really using control points on rubber-band volume lines, even if you're accessing them with virtual or real faders. Here are some techniques for fine-tuning those points. DV

Excerpted from "Producing Great Sound for Film and Digital Video" (Focal Press, ISBN 978-0-240-80970-0). (c) 2008 Jay Rose; used by permission. More details and links to discount sales at Jay's website: www.dplay.com/book.

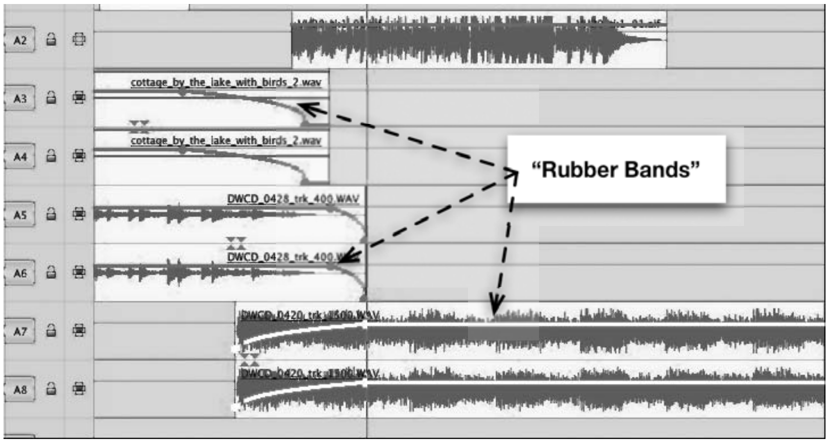


Figure 11.6 “Rubber bands” (darkened in this picture) to control volume when the timeline is played.

Figure 11.9 A single-fader hardware controller.
Photo courtesy of Frontier Design Group.

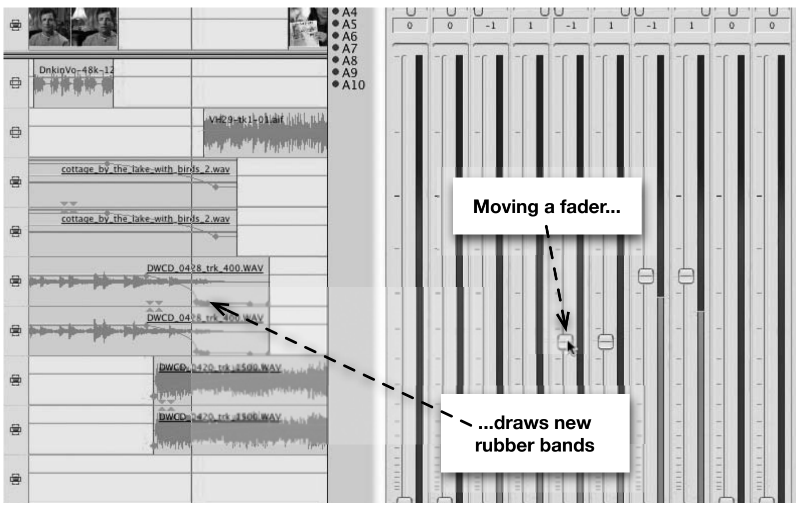


Figure 11.7 Many NLEs now have mixers like the one on the right side of this screenshot. When you move the on-screen fader, it draws a new rubber band on the timeline.

Figure 11.10 A readout above the faders lets you see which tracks will be controlled.

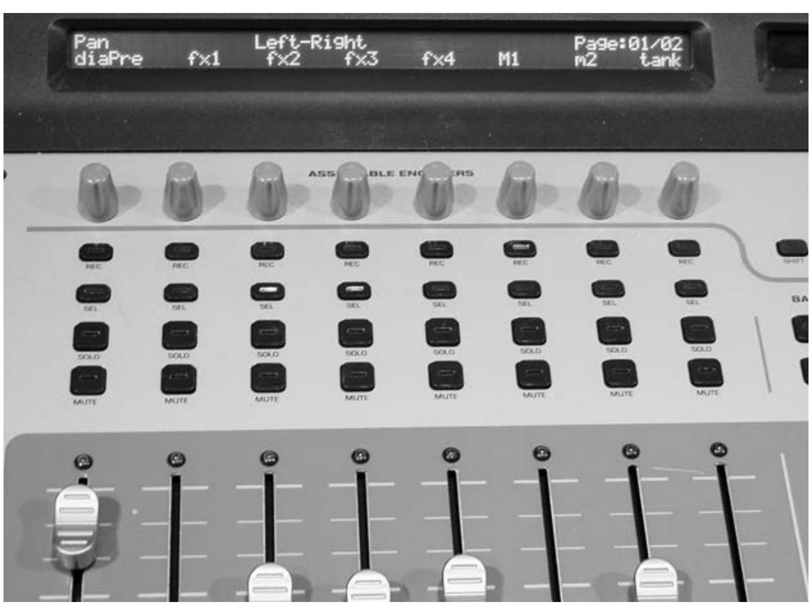


Figure 11.8 A simple hardware controller lets your fingers do the mixing.

Figure 17.5 Mix automation systems translate volume control lines on the timeline (above) to fader movements on the screen or control surface (below).
(This figure appears in color on p1 of the DV preview.)

More info at http://www.dplay.com