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Here are a few of the innovative software developers who offer support for the US-428. Cakewalk, Sonar and more virtual synth support coming soon. See the TASCAM web site for the latest info.

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Production Notes

OTTO TEIMER

As I slouch on a lawn chair typing these words, I'm glancing at the ugly back end of a stereo I bought 15 years ago. It's perched on a table at my yard sale. Having squeezed so much musical enjoyment out of the box, I somehow imagined it would be the featured item at the sale, yet it's among the last remaining—even though I'm asking only 2 percent of what I paid.

Technology seldom ages gracefully, but fashion undoubtedly plays a bigger role in popularity. Several shoppers at my sale have been interested in a sleeker-looking but inferior-sounding boom box next to the stereo. No one was interested in the fact that I'd sent away for the stereo's schematics and wired up a custom interface that let me simultaneously connect an external tape deck and a horde of synthesizers. Admittedly, that hack was hardly rocket science, but here's the point: you'll be richly rewarded if you seek out the hidden capabilities in any piece of gear or software.

That concept is the inspiration behind Jim Rippie's article "Cheap Bastardizations" (p. 74) and, more generally, this entire magazine. It's easy to fall into the trap of feeling you don't have enough gear to make music, but in the computer age, the requirements are surprisingly modest. Mark Nelson walks through them in "How to Record Your Own Song" (p. 14). Frank Jones, who contributed the wonderful collection of creativity tips on p. 88, says he's reduced his entire studio to a single MIDI keyboard and a pack of powerful software.

The laptop computer that's scorching my legs as I write this is so small that I occasionally lose it under papers on my desk. But last year, on a slower, heavier one, I was able to make significant progress on a CD collaboration with a friend in Japan. We'd been trading MP3 files of the work in progress, but that approach was more analytical than creative. On a subsequent trip to Tokyo, I hauled the laptop to his apartment, plugged it in to his boom box, sat on the tatami floor, and proceeded to make the edits we'd been agonizing over for months.

As Brian Smithers details in "Making Music Online" (p. 36), there are faster and flashier ways to collaborate, but again, the point is to get creative any way you can. So thanks for picking up *Electronic Musician* magazine's fourth annual guide to making better music with your computer. We hope it inspires you to start your own projects. Read EM every month for the latest information on desktop music, and let us know what you'd like to see here next year. I decided to keep both stereos, by the way. You can't have too much music.

David Battino
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MORE on the Web

When you see this icon, visit the DMPG section of www.emusician.com for related software, links, and articles.

Desktop Music
PRODUCTION GUIDE

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Gadget Gallery

Turbocharge your computer with these 11 irresistible music peripherals.

What's good-looking, highly portable, packed with unusual music features, and costs less than $500 on the street? Probably not your PC. Fortunately, not only do the following 11 devices fit that description, but each one can integrate with your desktop setup to enhance its music-making power. Clear a space on your tool belt—here are 11 gadgets you won't want to be without.

By David Battino

MP3 Marathon

At just 4.5 by 3.2 inches, the ARCHOS JUKEBOX RECORDER ($349) will fit on top of a CD with room to spare. Recording directly from its analog inputs to MP3 files, the Jukebox can store 100 hours of music on its internal 6 GB hard drive at the standard 128 kbps rate. (For higher quality, you can boost the rate to 160 kbps.) Still not enough? A company called FunMP3Players.com will exchange the hard drive for a 30 GB one, giving you the capacity for almost 21 straight days of music. A built-in mic facilitates clandestine recording. Even better, the Jukebox is configured as a USB hard drive. No convoluted MP3-transfer software is needed; just plug the device in to your PC or Mac and drag files over, be they MP3s, spreadsheets, or photos. And while the RIAA may grumble, the Jukebox isn't SMDI-compliant, so you can upload your MP3s to other computers.

CONTACT: Archos Technology;
tel. (949) 453-1121;
e-mail tech-support@archos.com;
Web www.archos.com

All Your Music—to Go

It looks like a portable CD player, but the curvy CREATIVE LABS NOMAD JUKEBOX ($399) actually packs a 20 GB hard drive. That's enough space to store 340 hours of MP3 or WMA music—about 500 CDs' worth—downloaded from your PC or Mac over USB. (A $279, 6 GB model, shown here, is also available.) Creative's Kurt Heiden reports that musicians are bringing the Jukebox onstage to play their backing tracks, or exploiting its time-stretching feature to slow down recordings (without changing the pitch) and figure out tough licks. But the Nomad's real strength for music production is its ability to record audio through its analog inputs, save the recordings as uncompressed WAV files, and then upload them to your computer. Concert, anyone?

CONTACT: Creative Labs; tel. (800) 998-5227;
Web www.nomadworld.com

Listen to the Birdie

Belt space is getting mighty crowded these days. The KODAK MC3 ($229) aims to help by combining an MP3 player with a digital camera that also records short QuickTime movies. DMPG contributor Frank Jones (an MC himself) says he carries an MC3 with him everywhere, often using it to demo remixes for clients. Although the MC3's midresolution images are best suited for Web pages, not prints, Jones has achieved surprisingly good results by processing the raw photos with *Photoshop*'s Unsharp Mask filter. He's also flexing his video-scoring skills by uploading MC3-captured QuickTime movies to his computer and overdubbing soundtracks in his sequencer.

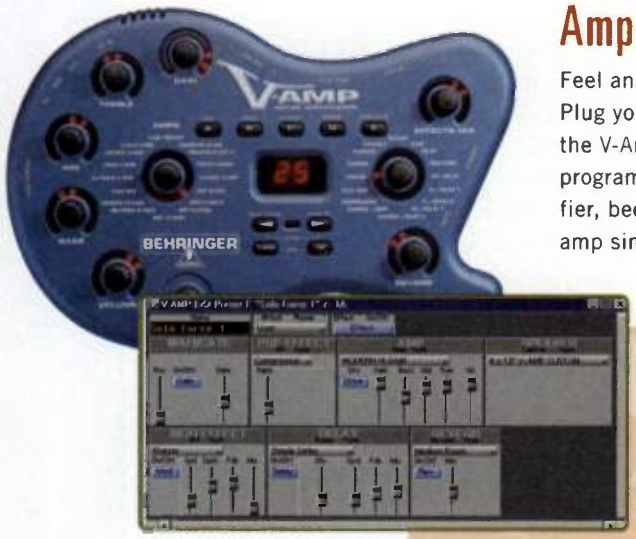
CONTACT: Kodak; tel. (800) 235-6325;
Web www.kodak.com/go/mc3

You're on the Air

One of the secrets to getting good mixes is to listen on a variety of speakers. But stopping to burn a CD to check on your stereo is inconvenient. Instead, plug the AKOO KIMA KS-110 transmitter in to your computer's audio output and connect the Kima receiver ($99.95 for both) to your stereo. Using a proprietary 900 MHz signal, the Kima will transmit the music up to 1,000 feet—even through walls. The receiver can run on batteries and rebroadcast the signal to a nearby FM radio, so you could even take it out to a parked car for the ultimate reality check. Or just kick back and beam Internet radio or MP3s to a boom box on your patio.

CONTACT: Akoo; tel. (708) 583-9600; e-mail info@akoo.com;
Web www.akoo.com

Amp in Style



Feel an inspired solo coming on but your roommate's asleep? Plug your guitar into the BEHRINGER V-AMP ($269), connect the V-Amp's output to your computer, fire up your recording program, and wail away. The V-Amp, short for virtual amplifier, beefs up the naked signal with 1 of 15 digital guitar-amp simulations as well as effects such as chorus, echo, or wah-wah. Additional presets are tailored for enhancing keyboards and vocals. A custom version of Emagic *SoundDiver* (Mac/Win) lets you access parameters not found on the front panel and save your creations.

CONTACT: Behringer; tel. (425) 672-0816;
e-mail support@behringer.com;
Web www.behringer.com

GADGET GALLERY

Tweak Like an Octet of Octopi

Virtual knobs look slick, but they're a pain to adjust with a mouse. Arm yourself with the **DOEPFER DREHBANK** ($450) and you'll get instant access to the hidden expressive parameters of MIDI-compatible hardware and software. Each of the Drehbank's 64 knobs can send any MIDI message, including Control Change, Pitch Bend, Aftertouch, Note On, and even System-Exclusive messages. It comes with presets for Propellerhead's *ReBirth*, General MIDI mixing, and Yamaha groove boxes, but you can also create and store your own twisty setups with the bundled version of Emagic *SoundDiver* (Mac/Win).

CONTACT: Enport (distributor); tel. (402) 398-0198; e-mail enport@home.com; Web www.en-port.com

Space Shuttle

Don't need 64 knobs? How about a single great-feeling one? The programmable **GRIFFIN POWERMATE** ($45) attaches to a USB port on your Mac (and soon PC), providing fast access to volume, audio scrubbing, or whatever function you assign. DMPG contributor Jim Rippie, who fondled a prototype at last summer's Macworld convention, praised the PowerMate's "wonderful, smooth, tactile feel." It also sports a programmable button, letting you mute tracks, insert markers, and even turn the computer on—handy for recent Macs that lack a keyboard-mounted power button. Blazing blue LEDs in the base make the PowerMate appear to float above your desktop; they change brightness to reflect the knob's current position and pulse when your computer is asleep. Griffin's Jason Litchford suggests buying two to create an Etch A Sketch.

CONTACT: Griffin Technology; tel. (615) 399-7000; e-mail support@griffintechnology.com; Web www.griffintechnology.com

Sampling Safari

Built by Mattel and approved for ages six and up, the **INTEL COMPUTER SOUND MORPHER** ($49.99) is a toy with a lot of sonic potential. Send your kid sister off to school with it or pass it around at a party; you'll end up with lots of great sound bites as people compete to try it out. When you've filled the four-minute, 99-sample memory, press a button to transfer the recordings to a computer through the computer's mic input. (The transfer also works on Macs, though you'll hear a slate tone between each recording.) The bundled Windows software lets you cut and paste sections, apply effects, and render new sounds with a speech synthesizer. You can also make cartoon faces and save them as animated e-mail postcards; the characters' mouths twitch in sync with the peaks in your recordings.

CONTACT: Intel Play; tel. 916-377-7000; Web www.intelplay.com

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GADGET GALLERY

Running on MD

It's tough to keep track of all the Internet audio formats, much less convert them to a format you can transfer to a portable player. The **SONY MZ-G750DPC** MiniDisc recorder ($299.95) makes the process easy. Just connect it to your computer's USB port and it will digitally record up to five hours of anything you play—MP3, WMA, WAV, AAC, RealAudio, Ogg Vorbis, or whatever next week brings. Recording starts automatically when a digital signal is received; track markers are inserted automatically, too. And at three bucks a pop, blank MiniDiscs are about 1/10 the price of the fragile RAM cards that portable MP3 players use. The 3-inch-square device, which also features a digital AM/FM tuner and stereo microphone input, can play for up to 48 hours on a single AA battery.

CONTACT: Sony; tel. (800) 222-7669;
Web www.sony.com/walkman

Groove to Go

Grab a **BOSS SP-303 DR. SAMPLE** ($395) and you may not need to lug your expensive laptop or sampler to gigs. This dictionary-size device stores samples on SmartMedia RAM cards, so with a $35 card reader, you can quickly transfer WAV and AIFF files between the SP-303 and your computer. Featuring 26 effects, including an overdriven filter, a vinyl simulator, and a beat slicer, the SP-303 may even have you offloading files from your computer just for processing. (The effects also work on live input, and you can adjust them in real time with three knobs.) A resampling function applies effects to your samples, saving them as new files, and an onboard sequencer lets you record multitrack grooves, delivering massive sounds from a tiny box.

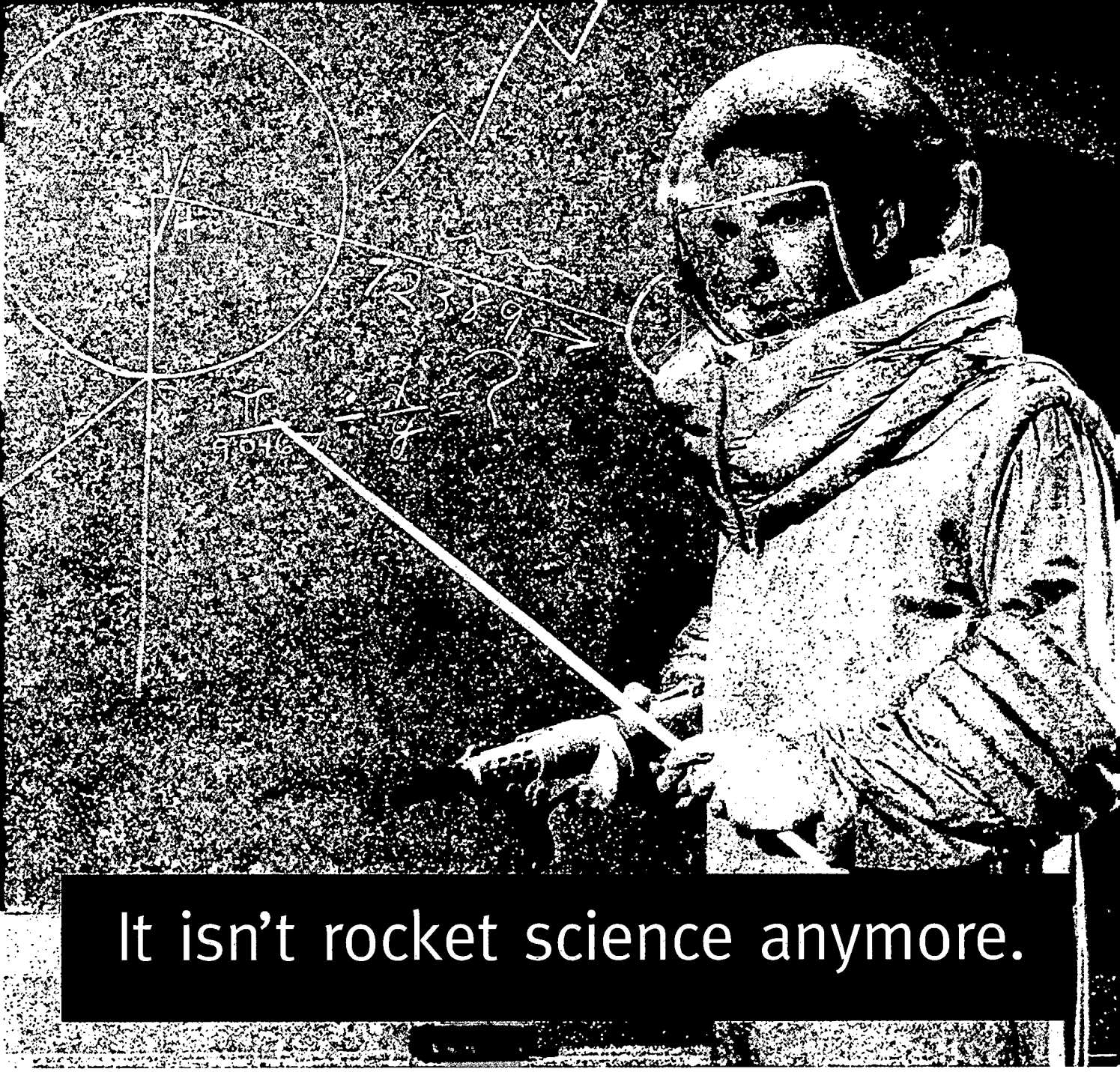
CONTACT: Roland; tel. (323) 890-3700 ext. 2463; Web www.bossus.com

Hide and Sequence

A studio the size of a video tape, the **YAMAHA QY100** ($629) houses a 24-track MIDI sequencer, 519-sound XG synthesizer, 20 drum kits, and 3 programmable 24-bit effect processors. To keep the inspiration flowing, it also includes over 4,000 preset phrases. Onboard A/D converters let you plug in a mic or electric guitar and record solos (with effects) onto a SmartMedia RAM card. When you return to your desktop, you can back up your compositions with a card reader—or simply use the QY100 as a compact MIDI sound module.

CONTACT: Yamaha; tel. (714) 522-9011;
e-mail info@yamaha.com;
Web www.yamaha.com, www.yamahasynth.com

AT TIMES, **DAVID BATTINO**'S STUDIO RESEMBLES A COLLECTION OF GADGETS SEARCHING FOR A GROOVE. HE RUNS BATMOSPHERE.COM, A MUSIC AND MEDIA PRODUCTION SERVICE.



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STEP BY STEP, HERE'S HOW TO CREATE AND CAPTURE ORIGINAL MUSIC ON YOUR COMPUTER.

BY MARK NELSON

How to Record your own Song

I spend a fair amount of time at acoustic music festivals around the country. Invariably after a frenzied jam, someone will turn to me and say, "Hey, I've heard I can plug a microphone in to my computer and make a CD. How's that done, exactly?" Well, just pass that jug over here and old Uncle Mark will tell you all about it. Got a song in your heart and a banjo-ukulele in the garage? You've come to the right place.

Desktop recording isn't just for techheads. In the past couple of years, software and hardware have evolved to the point where just about anybody with a kazoo can create and record an original song. In the following pages, I'll explain step by step how to go from inspiration to a finished song. Don't worry about jargon; where it's unavoidable, I've italicized the terms and defined them in a glossary (see p. 21). And although I'll focus on recording vocals and acoustic instruments, there's no reason you can't use these same techniques to create electronica or loop-based music.

MAKING YOUR COMPUTER MUSICAL

Just about any computer built in the past couple of years can be used to record at home. You can also build a mobile recording system around a laptop. For in-depth tips on optimizing your computer for music, see "Cheap Bastardizations" on p. 74.

Macintoshes are strongly supported with both audio hardware and software; the venerable Power Mac 9600 remains a professional standard. Wintel machines have the obvious advantage of choice, because every component is customizable. (That can also be a drawback; plan to spend some time perusing FAQs and online user forums for compatibility issues. I've put links on the DMPG section of www.emusician.com.)

Most professionals suggest choosing your software first and then building a system around it. Better yet, have a customized system built by a music specialist. You can sometimes find a qualified person in your local music store, but a better bet might be a musical computer specialist such as Audio Computing (www.audiocomputing.com), Sound Chaser (www.soundchaser.com), Sweetwater Sound (www.sweetwater.com), or Wave Digital (www.wavedigital.com).

I/O Silver! Of course, you'll need some way to get the sound into and out of your computer. Save consumer-grade sound cards for games, and invest in an interface designed for recording instead. Pros prefer interfaces with the connectors and *analog-to-digital converters* (*ADC*s) mounted in an external box, because they're more convenient and less likely to pick up electrical noise from the computer.

Originally, these boxes were connected with a thick cable to a proprietary circuit board that you plugged in to a slot in your computer. In recent years, manufacturers such as Roland and MOTU have released external interfaces that connect directly to your computer's USB or FireWire port, bringing quality audio to laptops and iMacs, which lack slots. (iMacs also lack fans, which makes them great for acoustic recording.) A few USB-based interfaces like the Tascam US-428 (see **Fig. 1**) include full-fledged *mixers*, *effects*, and software controls—handy if you're on a budget.

MORE ON THE WEB

Online Recording Resources

Visit the DMPG section of www.emusician.com for numerous helpful links to desktop-recording information and software.

For the love of mic. Because they literally determine your sound, microphones are vital. Professional engineers may have dozens to choose from, matching the mic to the voice or instrument with the care of a wine connoisseur.

Mics come in two main flavors. *Dynamics,* like the venerable Shure SM58, are rugged enough for stage use and don't require power to operate. *Condensers,* on the other hand, need juice via *phantom power* or a battery. While dynamics are great for capturing loud sounds and generally standing up to abuse, condensers excel at detail. Large-diaphragm condensers such as the Neumann TLM 103 are best for vocals, though some producers swear by them for everything from acoustic guitars to hand percussion. Small-diaphragm condensers such as the AKG C 1000 S capture the crisp highs of a cymbal or the zing of a mandolin. Buy two for stereo recording.

Mics need a *preamplifier* to boost their signal to a usable level (called line level). Dedicated preamps often have better performance than those found in a mixer and may have additional useful features. Some computer audio interfaces feature built-in preamps as well as guitar inputs (see **Fig. 2**). Guitars also put out a signal that's too soft to feed a line-level input directly.

Mixers, monitors, MIDI, more. In setups such as the one in **Fig. 2,** you don't really need a hardware mixer, because the interface includes enough inputs and outputs to keep everything cabled up. A mixer offers more flexibility, though, as well as fast, hands-on control. **Fig. 3** shows a similar setup with the mixing done outside the computer. It also includes a *MIDI* synthesizer as an additional sound source. Today's synthesizers can play 16 or more different sounds simultaneously. Using *sequencer* software and a MIDI interface, you can record your MIDI performances

into a computer and edit them note by note, correcting pitches and timing, and even substituting sounds. MIDI is much more flexible than audio.

Many home recordists *monitor* through a consumer stereo or multimedia speakers and wonder why their songs don't sound as good as professional mixes. The short answer is that pros take extraordinary care to ensure that the listening environment—the room, the speakers, the amplifiers, even the cable—reveals exactly what has been recorded and nothing more. A good set of close-field monitors and a pair of professional-grade headphones will make all the difference. Set up your speakers so they form an equilateral triangle with your ears. Make sure both speakers are at the same height and keep them away from corners and reflective surfaces in the room.

Don't forget high-quality cables, mic stands, and mood lighting for those long nights of creativity. And you will need a place to put everything. I recently moved all of my gear into a single piece of dedicated studio furniture.That was the best decision I ever made—now everything is at the proper height and right within reach (see **Fig. 4**).

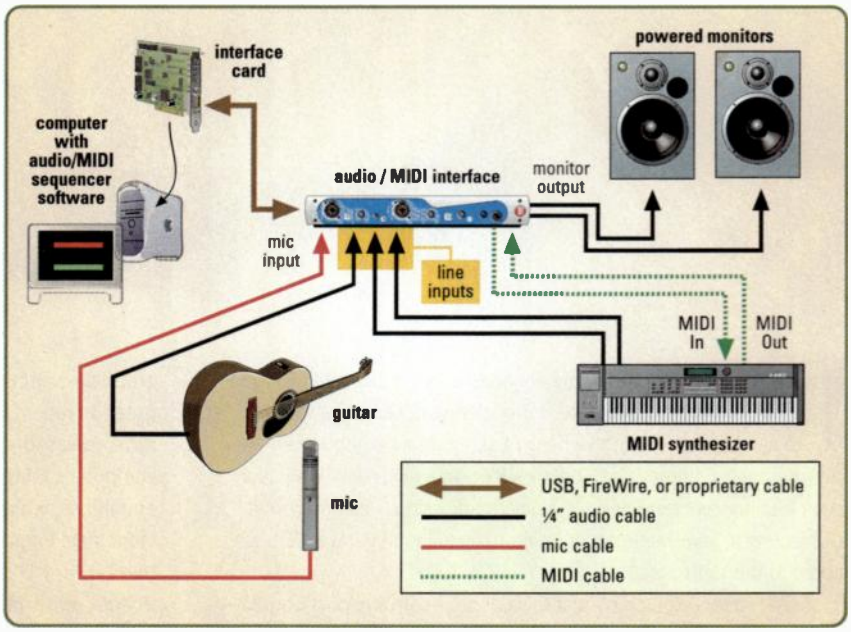

FIG. 2: For the highest recording quality and convenience, use a dedicated audio interface. This setup, built around a Digidesign 001–style audio interface, features inputs designed for guitar, mics, and keyboards as well as MIDI input and output.

SOFTWARE

Getting started with music software is remarkably inexpensive. You can download any number of excellent freeware and shareware programs (see "No Money Down" on p. 54) or even commercial demos. Most audio interfaces come bundled with basic software.

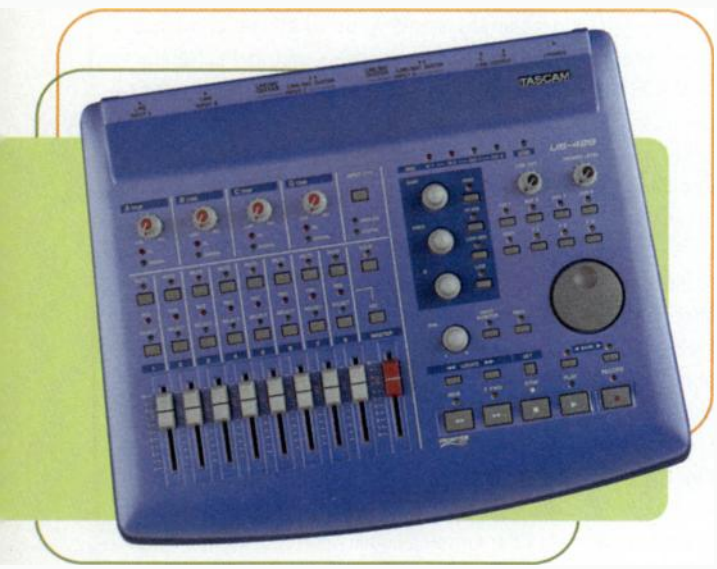

FIG. 1: Tascam's US-428 is a combination audio interface, MIDI interface, mixer, and software remote control. It connects to your computer's USB port, eliminating the need for an internal sound card.

Recording software usually emulates the look and feel of an analog recording studio, right down to tape recorder-style transport controls (see **Fig. 5**). Most programs include an internal mixer to combine your *tracks,* plus sound-shaping tools for tone, dynamics, and effects. Support for third-party effect *plug-ins* is a strong plus. Features such as a sequencer, virtual synthesizers and samplers, drum-machine-style rhythm creation, and *sample*-accurate waveform editing add value.

PC programs generally use *WAV* files; *AIFF* and *SDII* are standard on Macs. *MP3* file support is increasingly popular on both platforms, but because MP3 is designed for small size rather than high quality, it's best to use the other formats for initial production, then save a copy of your final mix as an MP3 if you want to distribute it on the Internet. (See "How to Make Killer MP3s" on p. 60.)

LET'S START RECORDING

In the following example, I'll explain how to record a basic song using acoustic guitar, lead and harmony vocals, and a rhythm section of sampled drums and keyboard bass. Before we begin, check your recording software's manual to make sure you've disabled any programs that might conflict with the audio software. When recording acoustic instruments or miked guitar amps, turn off your speakers and monitor through headphones to avoid feedback loops and to keep previously recorded tracks from leaking into the mics. (You can leave the speakers on when you're recording synthesizers or the direct output of a guitar processor like a Behringer V-Amp.) Depending on your sound card, you may have to set monitor levels by tweaking the software volume controls in your computer.

Recording a drums is out of the question for most home studios. I once crammed a kit into the tiny hallway between my studio

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and the guest bathroom, but the drummer had to climb over the toilet to get to his, umm, stool. That's why CDs of drum loops from companies such as Big Fish, East-West, and Ilio are such huge sellers. It's also easy to find samples and loops on the Net, though you'll often have to do a lot of work to get them to sync up.

Once you've selected some drum loops, import them to your audio program and repeat them as many times as you need to. Found a great four-bar drum groove, but the tempo's wrong? If it's fairly close, you can speed it up or slow it down with a feature called time-stretching that's built into many audio programs. This doesn't alter the pitch, but sometimes it will change the sound (which can be a good or a bad thing).

Another option for taming loops is to transpose them up or down a few semitones. Like turning the pitch control on a turntable, this makes the sound play faster or slower, but it also changes the pitch and tone—again, sometimes a useful effect. The third option is to slice up the file into individual beats and subbeats and spread them out. You could do this manually, but it's far easier with programs such as Sonic Foundry's *Acid* or Propellerhead's *ReCycle* (see **Fig. 6**). Ilio's Groove Control loops come presliced.

I like to add a smidgen of MIDI percussion to spice up rhythm loops. Most MIDI sequencers include a virtual drum machine; just make sure the tempo of your sequencer matches that of the audio loops.

FIG. 4: Ergonomic studio furniture such as the Omnirax F2 more than pays for itself in comfort and convenience.

GUITAR HEROICS

Here's a good starting point for recording an acoustic guitar: point a condenser mic toward the 12th fret, about eight to ten inches away. Experiment with different placements. Even a difference of a couple of inches has a big effect.

You can't simply stick up a pair of mics and expect to get a decent stereo recording. The sound waves may partially cancel each other when mixed, an effect called phasing. Always check the phase by listening in mono. If part of the sound disappears, adjust one of the mics or flip the polarity switch on the mixer *channel*.

If your guitar has a pickup, route it to a separate track and choose the best blend when you mix. I often warm up the sound of a piezo pickup by running it through a tube direct box like the ART Tube MP; a software amp simulator will also work.

Depending on your software, you may need to record-enable ("arm") the tracks before you can hear anything. Adjust the level of the signals until they peak just below the maximum. Trust me, you do not want to hear what digital *clipping* sounds like (see **Fig. 7**).

Now, hit Record and go to town. Don't worry if you mess up; just rewind and do another take. Some software saves every pass as a *virtual track* so you can reclaim an earlier take. Later, after you've recorded the vocals, go back and add some lead fills and a solo.

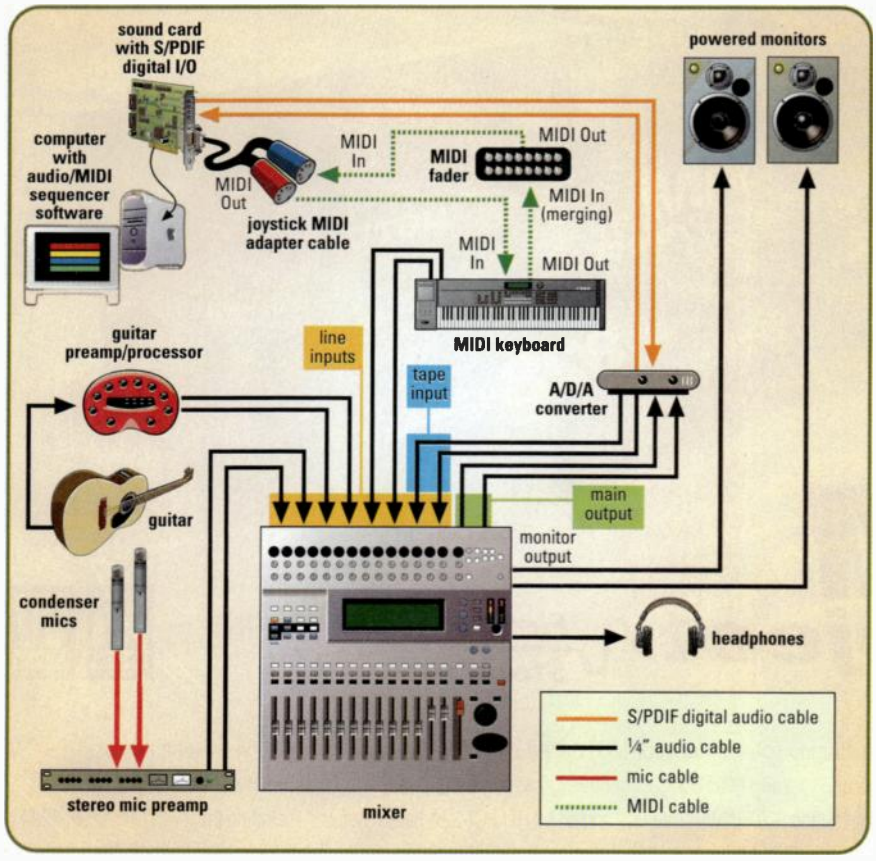

FIG. 3: Even a consumer sound card can deliver high-quality results when paired with an external digital-audio converter such as the ART DI/O. An external mixer is more comfortable for some people.

AMAZING BASS

For the bass part we'll use a keyboard playing an acoustic bass preset. Don't have a keyboard? Download a software synthesizer; some even let you enter notes with a mouse. Even better, try a Twiddly Bits bass line from Keyfax Software (www.keyfax.com). These are short MIDI files that were recorded by

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WAVES

world-class performers on MIDI-fied basses (and other custom instruments). The concept is similar to audio drum loops, except that MIDI files are more like a score than a recording—you choose the playback sound and tempo in your sequencer.

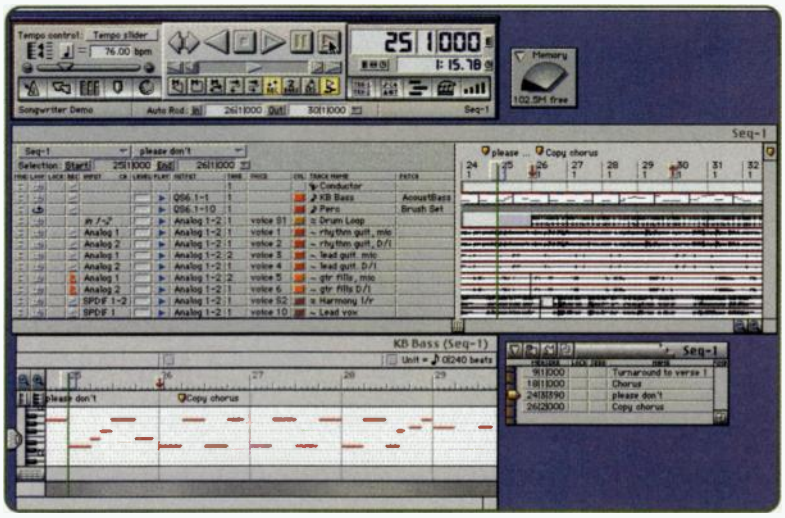


FIG. 5: This shot from MOTU *Digital Performer* (Mac) shows the windows you'll find in most multitrack recording software: tape deck-style transport controls; a counter showing bars, beats, and time; a track overview; and a "piano roll" MIDI editing window.

If you're playing the part yourself, record-enable a MIDI track and play along with the audio tracks you've already recorded. Again, don't worry if you flub a note. Enter the MIDI editor window, grab the clam, and move it where it belongs. Experiment with different bass sounds; there's no need to commit to anything before you're happy.

To add the bass to the finished mix, assign the output of your keyboard to a stereo pair of inputs on the audio interface. In some programs, you'll need to physically record the part as an audio track before you can mix. (If you're using a software synth, you may be able to render its output into an audio file automatically.)

Here's another tip for those of us with lousy keyboard chops: enter chords in an auto-accompaniment program like PG Music *Band-in-a-Box* and save the part as a Standard MIDI File. As you did with the Twiddly Bits files, import it to your audio program and adjust it as needed.

OPPORTUNITY VOX

Getting a great vocal take is easier than you think. Of course vocal skills and a good mic help, but attitude, creativity, and concentration are vital. Don't like the sound in your studio? Take advantage of the acoustical properties of different parts of your home. There's a reason everybody loves to sing in the shower.

Use a pop filter or a foam windscreen to tame the bursts of air some vocalists make when singing *P*s and *B*s. (You can make a pop filter by stretching a nylon stocking over an embroidery hoop.) A specialized equalizer called a de-esser can reduce sizzling *S*s and *T*s; software versions are available.

Adding reverb makes many singers more comfortable. It's best to add the effects only to the signal that's sent to the singer's headphones; once an effect is recorded, you can't make changes. I'll discuss effects in more detail shortly.

Rather than starting every recording pass at the beginning of the song, set a "locate point" just ahead of the first verse. Begin playback a few seconds before you need to come in, then hit Record and go. I like to automate the process by setting *punch-in* and *punch-out* points to cover just the bits I need. Once I'm finished with a take, I'll get picky and replace individual words or even syllables. With hard-disk recording I never have to worry about erasing that irreplaceable take.

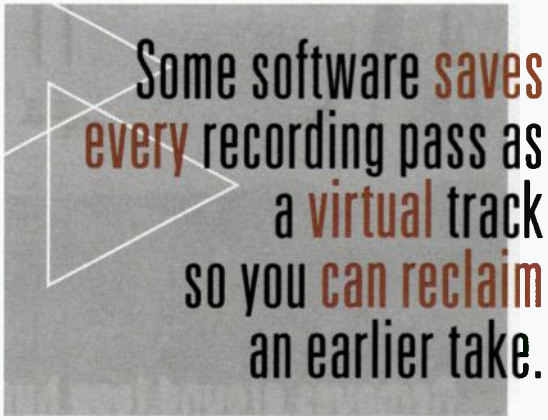
Next, add the background vocals. If harmony's not your thing, use pitch-correction software like Antares *AutoTune* or a harmony generator like the TC-Helicon VoicePrism.

EDITING 101

Digital recording has one huge advantage over tape: ease of editing. Because it's dealing with ones and zeros, your computer massages audio and MIDI data as easily as it cuts and pastes text. Here are just a few examples of what you can do.

If the song has a repetitive chorus, there's no need to record a new vocal each time. Simply copy and paste. Similarly, you can change the entire feel of a song by inserting or removing a bridge or chorus, doubling the length of the outro, and so on. I like to save multiple versions of my edits so I can go back if I mess up.

In some musical styles, background vocals should closely match the lead vocal in timing, so open the waveform editor and slide any offending phrases into line. Flub a note in a solo? Grab it from somewhere else in the file. Use a quick *crossfade* to mask the transition.



What if you get halfway through the project and realize it's in the wrong key? Transposing MIDI files is a piece of cake; audio takes a bit more effort. Be aware that moving an audio file more than a step or two sometimes creates weird artifacts.

glossary

ADC/DAC (Analog-to-digital converter/digital-to-analog converter): Circuitry to move audio into and out of the digital domain.

AIFF (Audio Interchange File Format): A digital audio format common to both PCs and Macs.

analog: A method of reproducing sound based on a continuously fluctuating voltage. (Contrast digital, which is a series of "snapshots.")

cardioid: A heart-shaped microphone pickup pattern. Cardioid mics tend to minimize sounds coming from the rear, making them a good choice for home recording. Hypercardioid patterns are narrower.

channel: (1) A discrete signal path in a mixer. (2) A discrete transmission and reception path for MIDI data.

clipping: The phenomenon that occurs when audio signals hit the maximum possible level. Digital clipping looks like a flat chunk was bitten out of the waveform. It will hurt your ears and could damage your equipment.

compressor: A processor that progressively reduces the level of a signal as it exceeds a set threshold. By lowering the peaks and adding make-up gain, compressors can make a track louder.

condenser: A microphone with a thin membrane stretched near a charged backplate. Capable of reproducing fine detail, condenser mics require a power source.

converter: *See ADC/DAC.*

crossfading: Simultaneously raising the level on one sound while reducing it on another. Quick crossfades are used to mask transitions across edits.

dynamic microphone: A microphone with a built-in magnet suspended in a coil. Dynamic mics do not require an outside power source and are great for recording loud sources.

dynamics: The difference between the loudest and softest portions of a sound.

effects: A term for different processes that enhance sound. Compressors, limiters, and noise gates affect level; time-based effects like delay, reverb, and chorus alter the perception of the sound in space. Other popular effects include wah-wah, distortion, tube emulation, and vocoding.

EQ: Short for equalization, a selective boost or cut of certain frequencies.

figure-8: A pickup pattern that detects sounds directly in front of and behind a microphone while rejecting sounds at the sides.

Hz: Hertz, or cycles per second. A measurement of frequency. 1 kilohertz (kHz) = 1,000 Hz. Humans perceive sounds between 20 Hz and 20 kHz.

MIDI (Musical Instrument Digital Interface): A standard for connecting and controlling electronic devices. Originally devised to let one keyboardist play several synthesizers simultaneously, MIDI is now used for everything from mixer automation to controlling stage lighting.

mixer: Hardware or software used to control and route multiple audio and/or MIDI sources.

monitor: *n.* A loudspeaker. Close-field monitors are designed to deliver sound relatively uncolored by room reflections. *v.* To listen closely.

MP3: A "lossy" data-compression scheme that discards "redundant" frequencies in an audio file. MP3 files are far smaller than CD-audio files, which makes them handy for transmission via the Internet.

omni: A 360° pickup pattern. Omni mics are useful for extreme close miking because they have no proximity effect. See *proximity effect.*

phantom power: Voltage (usually 48V) supplied through a microphone cable to power condenser mics. Phantom power does not affect dynamic microphones, but can destroy a ribbon microphone.

plug-in: Audio processing software that works inside a host application. Some plug-ins operate in real time, others alter the sound file.

preamp: A specialized amplifier to boost a weak signal from a microphone or instrument to a usable level, called line level.

proximity effect: An artificial boost in lower frequencies heard when a source moves closer to a cardioid or hypercardioid mic. Many singers take advantage of this to boost thin vocals.

punch: To record over an existing portion of a track at a specific location.

ribbon mic: A microphone whose element consists of a thin ribbon. Though highly accurate, ribbon mics tend to be delicate; even a stray breath can cause damage to some models.

S/PDIF (Sony/Philips Digital Interface): A digital-audio transfer protocol that uses either RCA (phono) or optical (TOSLINK) connectors. Often used to connect third-party audio converters to an internal sound card.

sample: (1) An instantaneous measurement of digital sound (see *sampling rate*), analogous to a snapshot. (2) A brief recording, such as that used to produce a single note in a MIDI sampler.

sampling rate: The number of measurements per second used to represent a sound digitally. Because representing a given frequency takes at least two samples, 44.1 kHz sampling can reproduce sounds up to 22 kHz.

SDII (Sound Designer II): A common audio-file format for the Mac, created by Digidesign, maker of Pro Tools.

sequencer: Hardware or software designed to record and play back MIDI data.

SMF (Standard MIDI File): A universal exchange format for MIDI files.

track: A legacy of tape-based analog recording, a track is a single "stripe" of audio data. A hard-disk track may consist of one audio file or many.

virtual track: An audio track that is saved but not currently assigned to a mixer channel.

WAV: Sometimes spelled WAVE or .wav. The standard Windows audio-file format.

MEET YOUR MIXER

In multitrack audio software as in traditional tape-based studios, each track is assigned to a mixer channel complete with a volume fader, a pan control for positioning the track in the stereo field, insert points for effects such as *EQ* and dynamics, and auxiliary-send controls (aux sends) to route the track to reverbs and other effects (see **Fig. 8**).

Why use auxes instead of inserts? Sometimes you want to put the same reverb on a number of different tracks to help unify the overall sound. Rather than overload your CPU by duplicating the effect for every channel, you can route the channels to one master effect with an aux send.

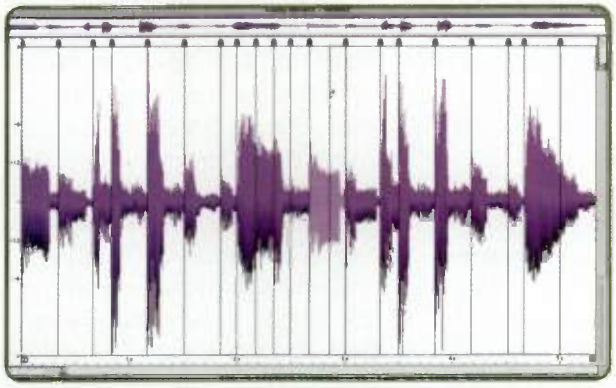


FIG. 6: Propellerhead's *ReCycle* (Mac/Win) can slice a rhythmic recording into beats, letting you replace individual sounds or adjust tempo without changing pitch.

FIG. 7: When recording, set your levels so that the peaks fall just below the red zone. Record too low and you compromise resolution; go into the red and the signal distorts horribly.

The majority of recording programs ship with enough effects to get you started. However, thanks to standardized plug-in formats, you can purchase (or download) just about any effect imaginable. Make sure your software supports the format. VST and DirectX are popular on PCs; VST and MAS are common on Macs. Your software may use its own plug-in format; Digidesign *Pro Tools* (Mac/Win) uses TDM and RTAS.

Hip faders. As a rule of thumb, you should try to keep the master fader around 0 and adjust the others accordingly. Use the trim control (if available) to boost or cut individual levels coming into a channel so you don't have to keep one fader unnaturally high or low.

You may be asking yourself, "Holy moley, how do I move all those faders and knobs with just a mouse?" Automation to the rescue—there's no need to mix everything in a single pass. Instead, work on sections of the song, going track by track until you've got it just right. Many audio programs support MIDI control of their faders and knobs, so you can use your keyboard's mod wheel and data sliders to get a handle on them. For even more finesse, pick up a dedicated MIDI fader box like the Doepfer Pocket Fader or a full-on control surface like the CM Automation MotorMix.

Inspiration Without Perspiration

Having trouble coming up with something to record? Your computer can be a creative firestarter—and it will never sue you for a share of the dough. Here are some tips and tricks to tickle the muse. Several are addressed at length elsewhere in this issue.

Work the Web. Rhythmic inspiration is yours for the asking; any number of Websters are willing to share their coolest loops, samples, and MIDI files. For personal use or inspiration, these resources are fair game. But if you're planning to distribute your recordings, incorporating the downloads wholesale could lead to potential copyright violations.

Phone it in. Don't like to work alone? Now you can find a songwriting partner anywhere in the world with the Rocket Network (www.rocketnetwork.com).

Eavesdrop. I like to hear what other writers are up to, so I'll listen to *anything*. Remember, if you steal ideas from lots of people, it's called research.

Try new tools. You can find just about any musical tool as shareware. Don't know what granular synthesis is? Doesn't matter; download a free generator and see what happens. Maybe it's what you've been looking for all along.

Get lyrical. Do you want to know what rhymes with orangy? Check out an online rhyming dictionary, such as Eccentric Software's *A Zillion Kajillion Rhymes and Cliches* (www.eccentricsoftware.com). Once you get it all together, go to www.joescafe.com for the perfect band name.

Appliance within. A buddy once told me that my bodhran (an Irish frame drum) sounded like tennis shoes in a dryer. So I miked up the Maytag and popped in the Keds. A little careful editing and I had a chuggin' track.

Let it flow. One of my favorite tricks is to improvise straight into the computer. I'll record maybe half a dozen versions of the same basic idea; it doesn't matter if I start over or make mistakes. Later, I listen to everything and do a rough edit. If it's any good, I've got a new song.

FIG. 8: The mixer controls in Steinberg *Cubasis* (Mac/Win) are spread between multiple windows. At rear are faders to adjust the relative volumes of the different instruments. At center is a pop-up window for tweaking effects and EQ. (Here I've created the world's most piercing guitar sound.) The window at left controls the inserted chorus effect.

MIXING IT UP

Ask any two engineers the secret of a good mix and you're likely to start an argument. Like any art, mixing is entirely subjective. Keep that in mind as you go through the following mixing tips. Before you start, think about how the finished song will sound. Is it a ballad, in which the lead vocal is the focus, or a dance mix driven by the drums and bass? I always listen to CDs of similar songs for inspiration before I start a mix.

Compress play. One of the secret weapons in a mixmeister's arsenal is the *compressor,* a device that smooths out dynamic changes, creating a more consistent volume throughout the song. Like any weapon, though, it can backfire if used incorrectly. If you don't know how to use a compressor, start with the presets and listen.

Compressors have two main parameters: ratio and threshold. Generally speaking, lower ratios are best for vocals and acoustic guitars; higher ratios tame the errant drum hit. By carefully adjusting the threshold you can affect just the peaks while leaving the rest of the track untouched. Resist the urge to overcompress your mixes; it makes them loud but lifeless. One of the joys of digital audio is a huge dynamic range, so use it.

Department of equalization. EQ can be tricky. Be sure to listen to the track as part of the overall mix. For instance, the bass strings on an acoustic guitar cover the same range as many male vocalists. To keep the mix from sounding muddy, back off on the lows on the guitar. The instrument may sound thin by itself, but it will let the singer shine. It pays to know something about the range of each instrument. There's no point in boosting the bass on a cymbal; all you'll do is accentuate any room noise that got into the mic.

Speaking of noise, mute any track that isn't needed. Sometimes you can't avoid noisy tracks; common problems are hum from single-coil pickups on guitars and electric basses, ground loops or 60-cycle hum, and hiss from parts transferred from tape. In many cases, software like *Ray Gun* from Arboretum Systems can scrub and rinse the noise from your tracks. You just have to be careful not to remove too much music along with the dirt.

Consider the effects. Today's software effects range from simple stompbox-style distortion emulations all the way to sophisticated multi-effects generators as good as those found in any studio. Be aware that the more complicated the effect, the more processing power it will require. With reverbs, sometimes less is more. A tight vocal "plate" preset may be all you need to perk up a track. Often, a simple echo will sound better than a reverb.

Take a tip from the pros: once you have a great mix, run off another with the lead vocal up slightly. Then do one with the vocal down a notch; it saves having to remix later. Did you blow the fade-out? No need to remix the whole song; just redo the fade and paste it over the bad part.

THAT'S A WRAP

The final stage of the recording process is called mastering. That's the stage when your song gets shined up and ready for the world through artful adjustments to volume, tone, and more subtle parameters. Professional mastering engineers have great tools and killer ears; a few legendary names dominate the industry. If you seriously want your project to compete with the big dogs, have it professionally mastered.

That said, desktop mastering is within your reach. First, decide where your song is going to end up. Data-compression schemes like MP3 work by removing some audio information. That translates into decreased dynamic range and less high end, so plan your mixes accordingly. (See "How to Make Killer MP3s" on p. 60.)

FIG. 9: Channel-strip processors combine all the essential tools for recording vocals. The PreSonus VXP includes a high-end microphone preamplifier, a dynamics processor, a de-esser, and EQ.

Making a CD is the goal for many of us, and it's surprisingly easy. CD-burning software lets you assemble a collection of songs, set the length of time between them, and make adjustments to the relative levels. For a complete walkthrough, see "Learn to Burn," directly following this article.

I hope this brief overview has piqued your interest. As I said, desktop recording is within anyone's reach, so get out there and make some tracks.

MARK NELSON LIVES AND RECORDS IN SOUTHERN OREGON'S APPLEGATE VALLEY. HE REALLY DOES HAVE A BANJO-UKULELE IN THE GARAGE.

		WDM	E-WDM
1	MME bit depth	Up to 16 bit	16/24 bit up to 32 bit
2	Total channel availability	12 in / 10 out	Unlimited I/O
3	Independent MME support	NO	YES
4	GIGA X ready	NO	YES
5	ASIO 2.0	Rarely	YES
6	SONAR with 1.5ms	NO	YES

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12	Multiple Direct Sound	NO	YES
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HERE'S HOW TO PUT YOUR FAVORITE TUNES ON CD.

If you're like me, you have boxes of records and cassette tapes in your garage, and you haven't pulled them out in years. You've probably replaced many of them with CDs, but undoubtedly some of your favorite albums were never reissued. Besides, you only like certain tunes on each one, and programming your CD player to skip them each time you play a disc is a big fat hassle.

In addition to those dusty relics, you might also have a growing collection of MP3 files downloaded from the Internet. Wouldn't it be nice to consolidate your favorite tunes from all those sources and more onto custom CDs? You could create one disc with party music, another with more intimate selections. Alternatively, you might want to archive some treasured LPs against the ravages of time—or just to play in your car. Fortunately, it's quite easy (and amazingly inexpensive) to do just that with recordable CD technology. With recordable CDs costing as little as 15 cents apiece in bulk, they're also ideal for backing up normal CDs you wouldn't want to be lost or stolen.

WRITE ONCE, READ EVERYWHERE

There are two types of recordable CDs: CD-R and CD-RW. In both cases, a laser *burns* a pattern representing the ones and zeros of digital-audio data into a preformed spiral track on the blank disc. The CD-R format lets you record data only once, whereas the CD-RW format lets you record, erase, and rewrite many times on the same disc (RW stands for "rewritable"). However, many standard CD players can't read CD-RW discs, so if you want to record audio CDs to use in normal players, CD-R discs are a better choice. Oddly, home DVD players are more likely to be able to read CD-RW discs than CD-Rs, although computer DVD-ROM drives are generally able to read CD-Rs.

There are also two types of audio CD-R/RW burners: standalone

BY SCOTT WILKINSON

and computer-based. Standalone units have audio inputs and outputs as well as tape-deck-style controls. Some even include both a CD player and a CD-R/RW burner for easy dubbing. Consumer models require special blank discs and use the Serial Copy Management System (SCMS) to prevent making copies of copies, whereas professional units can use less expensive blanks and do not implement SCMS. Computer-based CD-R/RW drives are available as external or internal devices, are generally less expensive than standalone units, and (with the right software) offer far more flexibility. Those drives connect to computers via SCSI, IDE, USB, FireWire, or PC Card ports.

HOW NOW, DAO TAO?

In the early days of CD-R, you had to record everything on a disc all at once; now, you can record one or more tracks, stop, then record more, stop, and so on until the disc is full. If you want to play a partially recorded CD-R in a standard player, you have to close the session. Then, to record more material, you open a new session. You can continue doing this until you finalize the disc or run out of storage space.

Unfortunately, most standard CD players only recognize the first session on a disc, although a few can play all sessions. As a result, you should always record audio CDs in one session. That doesn't mean you have to record the entire disc in one continuous pass; you can record tracks separately as long as you don't close the session. This is called *track-at-once* (TAO) recording.

The word *track* here does not mean that you have to record a single song in each one; a CD track can include multiple tunes. The limit is 99 tracks per disc, and a slight loss of available storage capacity is associated with stopping and starting the laser. Specifically, a bit of space is left blank between tracks, although some combinations of software and hardware might leave junk data there, which could result in an audible click. In addition, you might not be able to control the size of the gap, which is often fixed at two seconds.

The other option is recording the entire disc in a single, continuous pass; this is called *disc-at-once* (DAO) recording. In this process, the burn must proceed without interruption from beginning to end. DAO is by far the preferred method for audio CDs.

Most CD burners can perform TAO or DAO, but standalone units are rather cumbersome, especially when compiling tunes from different sources using TAO, because it's very difficult to match levels between tracks and you typically can't control the gap length. A much better approach is to record your source material onto a computer's hard drive, assemble an *image file* that corresponds to a complete CD, and use DAO to burn the disc. Using the appropriate software, this lets you arrange the tunes in any order, adjust levels and EQ, remove noise, and manipulate the gap between tracks or even crossfade them. Leading Windows programs that can handle DAO include Roxio's *Easy CD Creator Platinum* and Ahead's *Nero;* for the Mac, you have Roxio's *Jam* and Emagic's *WaveBurner Pro* (see **Fig. 1**).

The only drawback to this approach is that it requires a lot of free hard-disk space. A CD-R can normally hold 74 minutes, 44 seconds of audio, which will require about 750 MB of disk space on your computer. Because audio software writes a lot of temporary files as it processes data, it's best to double that figure. (Interestingly, 74-minute CD blanks only hold 650 MB of computer data, not 750 MB, due to error-correction data added to the CD.)

Depending on the CD burner, software, and disc media, it is sometimes possible to record more data using a process called *overburning,* but you run the risk of generating errors or even damaging the playback drive by forcing its head to move too close to the edge of the CD. You can also get CD-R blanks that ostensibly hold 80, 90, or even 99 minutes of audio, but they might not play in all players. Stay within the official CD spec for maximum compatibility.

HOOKING IT UP

To record an analog source into your computer, you'll need an analog-to-digital (A/D) converter. The consumer-grade sound card that comes with most computers is adequate for the task, but not ideal. If possible, install a higher-quality sound card,

FIG. 1: Emagic's *WaveBurner Pro* offers audio-enhancement features such as track crossfading and multiband dynamic compression for achieving consistent levels.

such as the Digital Audio Labs CardDeluxe, Creamware Luna II, Emagic Audiowerk2, or M-Audio Audiophile 2496. (Visit the DMPG section of www.emusician.com for contact information.)

If you want the highest possible quality, use an outboard A/D converter such as the Midiman Flying Calf A/D or ART DI/O. They connect to a sound card through an S/PDIF digital input,

which you'll often find on better consumer cards such as the Sound Blaster Live. S/PDIF connectors come in two types, optical and electrical, so make sure to get a matching converter. Another option is to use a USB audio interface, such as the Tascam US-428 or Edirol UA-3 or UA-30, which send digitized audio into the computer over a USB cable.

Some DAT recorders perform A/D conversion and send the result to their digital output in real time. In that case, the DAT's digital output can be connected to the digital input of the computer (again, as long as the digital interfaces match). If you have a DAT recorder that doesn't do this, another option is to record your sources onto DAT and then play them back through the DAT's digital output into the computer; make sure to record at 44.1 kHz if possible. Some older DATs can record only at 48 kHz, which means you must do a *sampling-rate conversion* to match the CD sampling rate of 44.1 kHz. Many S/PDIF interfaces can do sampling-rate conversion in hardware, and various programs, such as Syntrillium's *Cool Edit 2000* (Win), can also do it in software, but the audio quality can suffer.

The vinyl frontier. To record from LPs, you need a turntable and a *phono preamp* to boost the turntable's output signal to line level and correct the infamous *RIAA EQ curve.* Although it is physically possible to connect a turntable's output directly to a sound card's analog input, you'll end up with a thin, trebly sound at a relatively low level. That is because when vinyl records are produced, the bass is reduced to prevent the needle from jumping out of the groove and the treble is boosted to help reduce high-frequency noise.

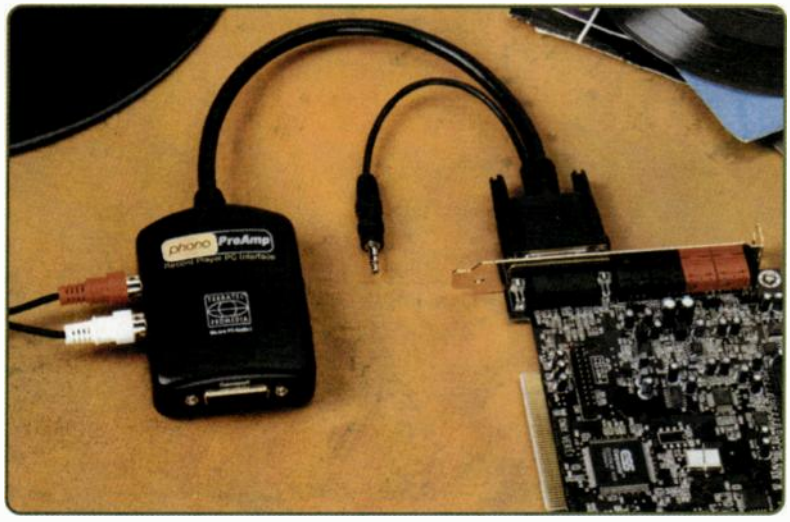

FIG. 2: Plugging your turntable directly into your computer will yield inferior sound. The Terratec Phono PreAmp applies the necessary level and tone corrections. Powered by the PC's joystick port, it's also more convenient than lugging over your receiver.

How does boosting the treble *reduce* noise, you ask? When the LP is played, the preamp reverses the RIAA curve, boosting the bass and reducing the treble, which also lowers the inherent noise of the vinyl. Virtually all consumer receivers have a phono preamp; there are also dedicated ones (see **Fig. 2**). You may need to connect the turntable's grounding wire to a screw on the computer to prevent hum. Don't forget to clean the record first by wiping it with a soft lint-free cloth in the direction of the grooves.

If you're transferring material from multiple analog sources, the most convenient approach is to connect them all to a receiver and connect the receiver's line outputs to the analog input of the sound card or outboard A/D converter. Then, simply select the source you want to transfer from the receiver. Alternatively, you could connect all devices to a mixer and route them through it to the computer. (If you want to transfer from vinyl, put the phono preamp between the turntable and the mixer input.)

The purist approach is to place as few devices in the signal chain as possible. This means connecting the output of each source device to the sound card or A/D converter separately, which is more of a hassle, but it could yield better audio quality in the long run. One final note: for the cleanest sound, be sure to use the *line* (not microphone) inputs of your sound card and the line (not headphone) outputs of your receiver or mixer.

MAKING THE TRANSFER

Once all your connections are made, you can start recording audio from your sources into the computer. If you record analog audio from tape or vinyl, make sure the recording level is as hot as possible without actually reaching the red zone on the software's level meters. There are many places in the signal chain and software to adjust the level; in general, try to avoid maxing out any level control. All final files must be at a sampling rate of 44.1 kHz with 16-bit resolution, which is the CD specification, so use that as your recording setting. (With some software, such as

the cd part of town—online resources

CD Page (www.cdpage.com):
Straightforward tutorials and links.

CD-R FAQ (www.cdrfaq.org):
The premier source for recordable-CD information.

CD-R Primer (www.mrichter.com):
Behind-the-scenes tips from CD developer Mike Richter.

CD-RW Central (www.cdrwcentral.com):
News, reviews, and walk-throughs of leading programs.

CD Speed (www.cdspeed2000.com):
Free Windows software for testing digital-audio extraction accuracy.

Digital Domain (www.digido.com):
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WRH

Emagic *WaveBurner Pro*, it's possible to record at higher resolutions and *dither* the files down to 16-bit, 44.1 kHz, but that's beyond the scope of this article.)

Don't worry about starting and stopping the recording between songs on a record or tape; it's easy to snip them apart later in the computer. Software such as Mike Looijmans's *CD Wave* (Win) and Roxio's *CD Spin Doctor* (included with *Toast Titanium* and *Easy CD Creator Platinum*) can split the recorded file into separate songs on track boundaries. You can also remove needle-drop noise this way. If you're making a CD of your daughter's piano recital or of another live show in which one tune leads into another with applause rather than silence, you can manually insert track-start markers. This makes it easy to cue to different sections of the recording or have it play as a continuous experience.

Don't fear the ripper. You may also want to copy individual tunes from CDs. To perform digital-audio extraction (DAE; also known as *ripping*) from a CD directly to the computer's hard disk, you need a CD-ROM drive that supports DAE, which is rare among older drives but common in newer ones. (Windows users can test their drives' capabilities with the free *CD Speed*.) You also need DAE software, such as Andre Wiethoff's *Exact Audio Copy* or ShareIt's *Audiograbber* (both Win).

Interestingly, the accuracy of ripped audio data is not guaranteed, because the official CD specification doesn't identify the exact beginning of the blocks containing audio data. The result can be doubled or skipped bytes that manifest as clicks and pops, especially if the hard disk can't keep up with the CD-ROM drive that's extracting the data. Most DAE programs can correct the problem, but in general, it's better to extract digital audio in one continuous pass at slower speeds. Be aware that some DAE programs truncate the last two seconds from extracted audio tracks, which can be annoying.

MORE ON THE WEB

Visit the DMPG area of www.emusician.com for links to CD-burning software and hardware.

Have a little MP3. Most current CD-burning software can import MP3s from your hard drive and burn them directly onto a CD-R. This lets you put about ten times as much music on a CD compared with standard audio, because the MP3 data is highly compressed. However, such CDs can only be played back on a computer or a special CD player (such as the SonicBlue Rio Volt) that can decode MP3 files.

To make standard audio CDs or to combine MP3s with audio from other sources, MP3 files must be converted into uncompressed WAV or AIFF files. (Newer software—such as *Toast Titanium*, *Nero*, Apple's *iTunes*, and *MusicMatch Jukebox* [Win]—does the conversion on the fly, letting you burn directly from a playlist containing MP3s.) If your CD-burning software doesn't do the conversion, try a shareware utility such as Norman Franke's *SoundApp* (Mac) or use the Wave Writer feature in Nullsoft's *Winamp* (Win). See the DMPG section of www.emusician.com for step-by-step instructions.

I COULDA ENHANCED ALL NIGHT

After you collect some audio files on a hard disk, it's time to organize and process them before burning them onto a CD-R. If you digitized some tunes from records or cassette tapes, they probably have some noise: hiss, clicks, pops, and so on. Many digital audio programs—such as *Cool Edit 2000*, *Easy CD Creator Deluxe*, *Nero*, *Toast Titanium*, and Steinberg's *Clean* (Win)—include automatic noise-reduction functions, and some also let you manually remove big pops and other nasties.

Burning Brighter

Three ways to enhance your CDs.

With the right software, you can add digital videos, slide shows, and even a Web site to a music CD, creating a disc that dances as well as sings. The most elegant method involves burning the audio tracks in *session-at-once* mode and then adding the computer files as a second session and closing (finalizing) the disc at that point.

If you'd like your data to be usable on both PCs and Macs, choose the *ISO 9660* data format, make sure all files have 8.3-character names, and include only documents (such as HTML and JPEG files), not programs. Of course, if you're targeting only PCs *or* Macs, you can safely put programs on your disc and use standard naming conventions.

The slickest way to make a cross-platform data CD is to use the *hybrid* format, in which the disc contains both a Mac volume and ISO files, with each side invisible to the other platform, although universal documents such as MP3 files can be shared to save space. Hybrid format lets you include full-on programs such as *Flash* games and *Director* movies. On the Mac, you can make hybrid CDs with *Toast Titanium* or *Charismac Discribe*. On Windows, try Ahead's *Nero* (which can mount Mac volumes over SCSI but can't share files) or Logiciels and Services Duhem's *MacImage*.

A far simpler way to enhance your CDs is by adding *CD-Text* data, which allows compatible players to display the album title, artist name(s), and track titles during playback. Several Windows burning programs can embed CD-Text; on the Mac, you can use Emagic's *WaveBurner* or Ahead's new *NeroMax*.

Finally, for those who want to live on the edge, the CD Oddities Page (www.turbine.com/oddcd) contains information about creating hidden tracks and other naughty tricks.

—David Battino

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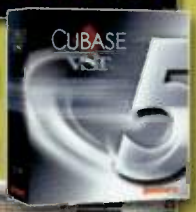

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You'll also notice that some files sound louder, brighter, deeper, or more spacious than others. The programs mentioned previously (or nearly any audio editor) can be used to adjust those characteristics, helping the CD to work as a whole. You can tweak tone with EQ and spaciousness with reverb and stereo-enhancement effects, though they're best used sparingly (see **Fig. 3**).

The easiest way to match levels between tracks, especially if they come from different sources, is *normalization*. Most audio software performs the operation, in which the level of each track is boosted until the peak level is the maximum it can be without clipping. But even after normalization, the average level of the

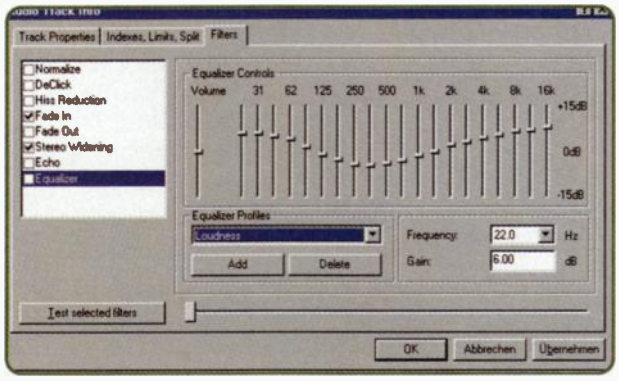

FIG. 3: Ahead's *Nero* includes several effects for cleaning up audio transferred from tapes and records. Use effects sparingly for the most natural results; the equalizer settings shown here are rather extreme.

tunes might seem to fluctuate too much. Therefore, you might want to apply *compression* to one or more of the tracks. This reduces the dynamic range—the difference between the softest and loudest parts—of the selected material. (Note that dynamic compression is different than data compression.) Compression is important if you plan to listen to your CDs in the car, where the background noise can mask the quieter parts of the music; it increases the level of the quiet parts so you can hear everything. Most modern digital-audio software offers compression; programs designed specifically for this purpose include Richard Hanson's *WAV File Leveller* (Win).

Go with the flow. Next, assemble the songs into a playlist. Establishing the specific sequence of songs is an art in and of itself that depends on the emotional impact you wish to convey. If you're archiving an entire LP, you probably should retain the order of songs as it is on the album. However, if you're compiling favorite tunes, you have several approaches, depending on the nature of the material. For example, if you have tunes with many different tempos, you might arrange them in order of ascending beats per minute (bpm); increasing the tempo with each successive song can slowly build dramatic tension.

On the other hand, if you're making a dance CD, gather tunes with similar tempos. If you're going for an upbeat mood, try including a slower tune once in a while to give the dancers a break. A CD for more intimate occasions should probably include mostly slower selections.

The majority of traditional albums include a gap of two to three seconds between tunes; as mentioned previously, burning a CD-R in TAO mode usually means you'll get a two-second gap between tracks whether you want these or not. Even fractions of a second can affect the emotional flow of a CD, so experiment with adjusting the gap. One effective technique is to start the next tune on what would have been a downbeat if the previous tune had continued for another bar or two. (That is reasonably easy to adjust by ear, but for the obsessive, many groove-oriented programs include a *tap tempo* feature that lets you calculate a sound file's tempo by banging a key on the beat. For 4/4 music, you can then divide 60 by the tempo to calculate the duration of one beat; then, multiply that number by 4 or 8 to determine the gap in seconds.)

In some types of music, particularly dance music, the end of one track often smoothly overlaps the start of the next; this is called *crossfading*. If you crossfade between tracks, it's important to match tempos and keys as much as possible to avoid jarring and dissonant transitions. Several CD-burning programs, such as Steinberg's *WaveLab* (Win) and Emagic's *WaveBurner Pro*, can do crossfades. Perhaps the most useful program in this regard is *MixMeister* (Win), which sorts all tracks by tempo, overlaps tunes in the playlist intelligently, and even adjusts tempos as desired for a smooth DJ mix (see **Fig. 4**).

TIME TO BURN

Once all the processing is finished, burn the CD-R in one pass using DAO mode. One consideration in this regard is burn speed, especially with CD-R drives that can burn at 4× or faster. This is a subject of some debate; in general, slower burns result in fewer problems, but it ultimately depends on the software, hardware, and media you're using. Speaking of media, all CD-R

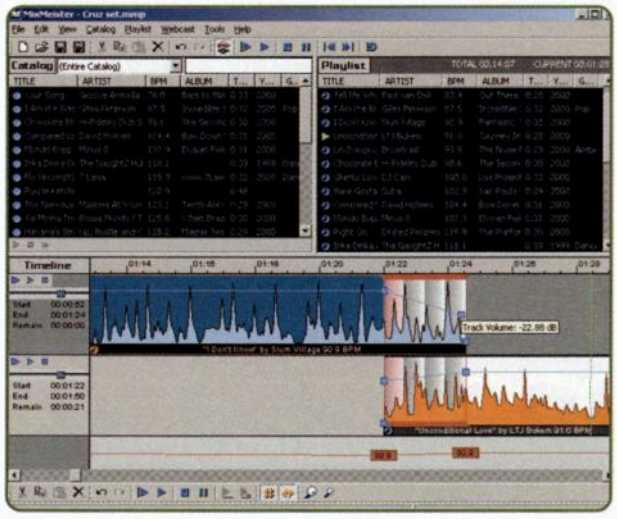

FIG. 4: *MixMeister* automatically detects the tempo of each tune in your playlist and creates intelligent crossfades for a seamless DJ mix. It can even adjust tempos without changing pitch and can align overlapping beats. You can export the mix and burn it to CD.

MAKE TRACKS

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LEARN TO BURN

blanks are not created equal; quality and compatibility vary, so try several different brands in your CD burner and player to find the best combination for you.

As the CD-R is being recorded, the process must not be interrupted, or a physical gap will be created that could confuse CD players. As a result, CD burners include a buffer of 512 KB to 8 MB that holds data to be written. If the data momentarily stops flowing, the buffer allows the recording to continue for a short time. However, if the burner tries to get data from an empty buffer, the recording process is interrupted; that is called a *buffer underrun*, which can leave you with a lovely plastic coaster for your coffee table.

There are several ways to prevent buffer underruns. Once again, record in DAO mode from a preassembled image file and record at a slow speed, because it takes longer for the buffer to empty. Use a fast AV-capable hard disk (most are these days), and defragment it before recording. It's also a good idea to use a dedicated hard disk for audio data. Don't have the computer doing anything else while recording and don't record from a file server. Disable screen savers, anti-virus programs, and anything else that might start doing something during a burn.

Some CD-R drives and software now include a feature called Buffer Underrun Proof (BurnProof), which suspends the recording process when the buffer is about to empty and resumes when there is more data in the buffer. Theoretically, an interrupted BurnProof recording should be indistinguishable from an uninterrupted one, but there might be a glitch at the point where recording was suspended, because hidden "links" are inserted between the audio data. Ricoh's version of this technology is called JustLink, and Yamaha's term is Waste-Proof Write Strategy. If you're preparing a CD for mass duplication, don't use BurnProof.

If you're like me, you miss the music on those old cassettes and albums out in the garage. Fortunately, you don't have to give up on ever hearing it again. All you have to do is burn those tunes onto a CD-R, and you'll be able to revel in them to your heart's content.

SCOTT WILKINSON WAS THE TECHNICAL EDITOR OF *ELECTRONIC MUSICIAN* FOR MOST OF THE PAST TEN YEARS.

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It's a global village, and we're the minstrels.

By Brian Smithers

Computer, get me the Record Plant! Michael Brecker's standing by to lay down a sax solo for my song." Sure, it's a fantasy, but not because of the technology. After all, you can chat online with folks halfway around the world, so it's easy to imagine that someday you might be able to record songs with them as well, trading overdubs and suggestions in near-real time. In fact, you can do it today—and I'll show you how.

There are many ways to collaborate online, and they don't all require lightning-fast connections or fancy equipment. Years ago, when I got my first MIDI-capable computer, one of the first things I did was compose a 60-second sequence and e-mail it to my friend Andy with a one-word note: "Tag!" He fixed the bass line and added a B theme, and the next morning, I found his version in my inbox. That was the beginning of a long and fruitful collaboration. As bandwidth increased, we were able to include samples and even audio files. Andy only lives across town, but the great thing about online collaboration is that it makes no difference if your musical partner is across the street or across the planet.

I'll start with the direct (cheap, that is) approaches to online musical collaboration and work up to the next-best-thing-to-being-there techniques. Along the way, I'll point out some of the challenges of this strange new world and offer tips on how to take advantage of its creative potential.

YOU'VE GOT MIDI

Most bands break up because the members get sick of each other during the long months of writing and recording. Why not trade songwriting ideas from a safe (and sane) distance instead? Sending MIDI files through e-mail can be an ideal way to share ideas, because the files are tiny—typically well under 100 kilobytes.

Keep in mind, though, that you're asking for trouble if you don't coordinate your synthesizers' patch layouts with one another. Is everybody's slap-bass patch assigned to the same Program Change number? If it isn't, your collaborators will wonder why the heck you played that line on a nose flute. (Then again, maybe they'll like it!)

Unpredictable patch changes, of course, are what General MIDI (GM) was designed to fix. GM-compatible synths (including nearly all consumer sound cards) feature a collection of 128 main sounds in specific memory locations. If your synths have a GM mode, using it will simplify your file exchanges. On many modern synths, you can invoke GM mode by inserting a Universal System Exclusive message at the beginning of your sequence (see the sidebar "Modem Operandi" for details).

You can also create your own *patch maps* to facilitate collaboration. Put your heads together and agree on a common set of patches; it doesn't matter what it is as long as you agree. Then, either map the desired sounds into the specified order within your instruments or write a macro in your sequencer to remap Program Changes to the right numbers.

Don't write off GM because it "sounds cheesy." If you invoke GM mode on something like the Korg Triton, you'll sing a different tune. If you haven't tried GM in a while, you owe it to yourself to explore some of the General MIDI 2 (GM2) enhancements, such as key-based controllers and an expanded patch list. (See "Desktop Musician: General MIDI Redux" in the June 2001 issue of *Electronic Musician,* reprinted at www.emusician.com.) Conversely, you don't have to equip your entire band with Tritons; even a sound card clogged with Velveeta will let your bandmates evaluate a melody or a chord progression that you send them as a Standard MIDI file (SMF). In fact, one might argue that if the tune isn't compelling on a tweezy synth, somebody needs to do a bit more composing.

Going native. Although using SMFs is a great way to ensure compatibility between different sequencers, native file formats allow you to name tracks, include session notes and lyrics, and organize data into musical phrases (often called *chunks* or *regions*). If you use the same software as your partners, this is a great way to track changes, offer suggestions, and challenge each other to rise above the ordinary.

If you monitor your synth outputs through your software, you can take advantage of audio plug-ins to shape the sound before committing it to disk as audio. Native file formats also store software-synthesizer settings if those synths run as plug-ins, so you'll know your partner is hearing the same sounds that you are. An increasing number of audio sequencers, such as Steinberg's *Cubase* 5 and Cakewalk's *Sonar,* come with their own GM software synths. If you're using a standalone soft synth, you'll want to save its settings as a preset and include that as another file attachment.

Propellerhead's *Reason* (see **Fig. 1**) gives you a nearly complete soft-synth-based collaboration environment, storing all of the sequencer and synthesizer settings needed for

FIG. 1: Propellerhead's *Reason* (Mac/Win) is an ideal tool for online collaboration. A *Reason* Song file contains settings for all the program's built-in instruments and effects as well as all sequencer data and custom samples.

chain-letter songwriting within a file appropriately called a *Song*. The only things missing are dedicated linear audio tracks, though you can get around that by using the onboard sampler. *Reason* includes a 508 MB audio-sample collection. If your song includes custom samples, you can send them, as well, by embedding them in a self-contained song, though the file size will be bigger.

PHAT SOUNDS, FAT FILES

If your contribution to a song is a tenor-sax solo, MIDI isn't going to do you much good. You'll need to record the sax as digital audio and then send the audio file to your collaborator to import into the session file. Bear in mind that you've just taken a quantum leap in file size by going from MIDI to audio. You can fit scores of MIDI files on a single 1.44 MB floppy, but every minute of mono 16-bit, 44.1 kHz digital audio consumes more than 5 MB.

In other words, if your tenor solo lasts only 30 seconds, you'll have a 2.5 MB audio file to send your friend. Instead of the 15 seconds it takes to send a MIDI file over a 56K dial-up connection, it will take more like 15 minutes. You may also find that your e-mail provider limits file attachments to 2 MB. If you try to reduce the file size with *StuffIt* or *WinZip*, you'll discover that they can compress audio files only slightly. Happily, you have several ways around these obstacles.

Find your space. Many online services, including some free ones, offer users several megabytes of server space for trading digital photos and such with friends and family. Upload that big audio file to your server space and send an e-mail to your partner stating that it's waiting to be downloaded. Uploading is handled either through an HTTP form on a Web page or by a File Transfer Protocol (FTP) utility such as *CuteFTP* (Win) or *Interarchy* (Mac).

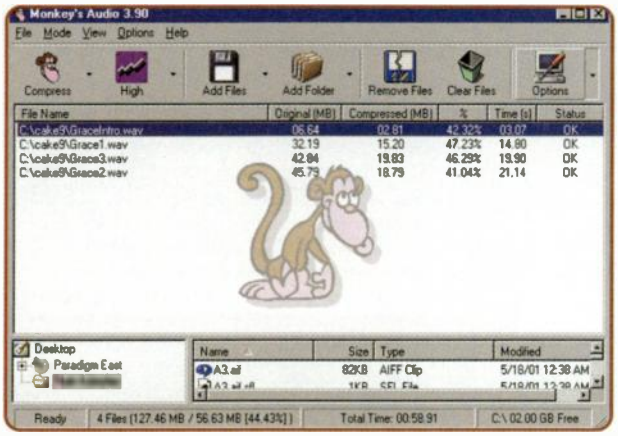

FIG. 2: A free Windows utility, *Monkey's Audio* compresses WAV files by about 50 percent with no reduction in quality. Its lossless algorithm provides bit-accurate decoding of the compressed files.

ONLINE STUDIO TOUR

Ready to join a virtual recording session? Log on to these sites. With the exception of Tonos, all use Rocket Network technology.

Emagic Studios (www.emagicstudios.com) This is the home of *Logic* collaborations.

Futurehit (www.futurehit.com) Like Tonos, this online studio touts the potential promotional exposure its members can receive.

InWire Studios (www.inwire-studios.com) Sponsored by Steinberg, this is the place for *Cubase VST/32* partnerships.

Musician.com (www.musician.com) This site, run by retailers Guitar Center and Musician's Friend, offers studios as part of its online community.

Strongroom (www.strongroom.com) London's Strongroom Recording Studios offers one-shot or extended-stay virtual studios as a service for its typically high-end clientele.

Tonos (www.tonos.com) Tonos is a lively online community with a unique approach to online music-making and talent promotion.

By the time you read this, the **Digidesign Production Network** (www.digipronet.com) should be offering Pro Tools–based virtual studios. Seattle's **Experience Music Project** (www.emplive.com) is also planning to offer virtual studios.

Check with your Internet Service Provider (ISP) to find out how your space is allocated. AOL, for example, gives members 10 MB of server space, but it's allocated in five, 2 MB chunks, one for each screen name. Yahoo's free Yahoo Briefcase (http://briefcase.yahoo.com) offers 25 MB with a maximum file size of 5 MB.

That limit isn't as bad as it might seem; I've sliced a sax solo into two or more phrases for easier transfer. For a bass or drum part, you might prefer to send a single phrase and have your partner loop it in his or her sequencer rather than send a full-length track. Utilities that can split a file into manageable parts are another option—check out Innovative Quality Software's *FloppyKopy* (www.iqsoft.com) or search for "segmenting" at www.download.com.

PUTTING THE SQUEEZE ON

You can reduce the size of your audio files by lowering their bit depth or sampling rate, but the quality will suffer substantially before you can shrink them very much. You'll get better results by converting them to a format such as MP3, which discards data more intelligently. (See "How to Make Killer MP3s" on p. 60.) For quick demos, this is a good option; better to keep the creative dialog going than to sit around waiting for downloads.

Nevertheless, there are ways to squeeze your files without any sonic compromise. *Lossless* compression algorithms are capable

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of shrinking a file and then decoding it with bit-for-bit accuracy. *StuffIt* and *WinZip* are in this category, but as I mentioned, they're not very effective with audio files. One sound-savvy alternative is *Monkey's Audio* (Win), a free lossless-compression utility from www.monkeysaudio.com (see **Fig. 2**). The program allows you to encode your audio into APE files (honest!) that take up about half as much space. To use APE files in your audio editor, though, you'll need to decode them into WAV files first. Mac people can use *ZAP!* from Emagic or *Daxaif* (www.dakx.com/daxaif), a shareware program that supports direct playback of encoded files.

FIG. 3: After connecting to the Net through a RocketPower-enabled application, you can choose from available recording sessions. The above application is Emagic *Logic Audio Platinum*, but free programs are also available.

Sonic Foundry has also developed a lossless-compression format called Perfect Clarity Audio (PCA), which is said to offer compression from 2:1 to 5:1, depending on the source material. *Vegas* and other Sonic Foundry programs offer native support for PCA files, saving you the trouble of decoding them.

STUDIO IN THE SKY

Lately I've been experimenting with the *online studio* method of collaborating, a market dominated by Rocket Network (www.rocketnetwork.com) and its partners. Like any emerging technology, it has its occasional frustrations, but I'm finding it to be bursting with creative and economic potential.

Rocket Network doesn't sell its services directly to end users. Instead, it sells its technology (RocketPower) and server space to virtual *Studio Centers* that resell to you and me, though limited free access is often available. Rocket Network also provides the application—*RocketControl*—that handles the interaction between your host audio program and the sessions stored on the Studio Center's servers.

RocketPower applications can exchange session files and audio or MIDI data with each other. Unfortunately, this sharing currently works only among programs from the same manufacturer. Emagic recommends avoiding collaborations even between the PC and Mac versions of *Logic*. The Internet is the last place you'd expect to see a stick-to-your-own-kind paradigm, but the issues of file compatibility need to be resolved before you can expect all your favorite programs to communicate seamlessly.

The current roster of RocketPower applications includes Emagic *Logic Audio Platinum* and Steinberg *Cubase VST/32*. Free, scaled-down versions, *Logic Rocket* and *Cubasis InWired*, are also available for those who want to feel out the technology before spending big bucks. RocketPower support is slated for MOTU *Digital Performer*, Digidesign *Pro Tools* 5.2 (Mac TDM systems first, with Windows and *Pro Tools LE* support expected to follow), and more.

BLASTING OFF

My journey into the future began by downloading and installing first *Logic Rocket* and then *RocketControl*. (Be sure to install your audio application before installing *RocketControl*. Otherwise, its Rocket features won't be enabled.) A Rocket Network menu appeared as a submenu within *Logic*'s File menu; it appears as its own InWire menu in *Cubase*. (*InWire* is Steinberg's name for its Rocket implementation.)

I clicked on Rocket Power from *Logic*'s menu, and it launched my Internet connection and logged me in to the online studio. Emagic and Steinberg have their own online studios, and Digidesign will probably have its running by the time you read this. Other entities are sponsoring virtual studios, as well, including at least one commercial recording studio. (See the sidebar "Online Studio Tour" for links.)

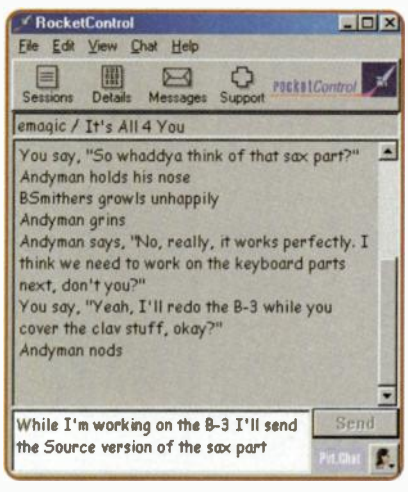


FIG. 4: Rocket Network's *RocketControl* manages your interaction with the Studio Center and other online musicians, providing access to chat, messaging, and session management.

Once online, I was presented with a list of available Public and Private work sessions (see **Fig. 3**). Serious projects demand a Private session, with definable permissions that allow members to contribute or to just listen, but Public sessions can be fun in a jam-session sort of way. You'll need to upgrade to a $29.95 Access Account to gain access to Private sessions or upgrade to a $10.95-per-month Private Account to create sessions of your own.

I chose a session that seemed to cry out for a sax part, and *Logic Rocket* prompted me to download the current version of the session. My enthusiasm was dampened when I saw that it would take 45 minutes to download. Although three different levels of compression are available—including Source (uncompressed), Standard (about a 10:1 ratio), and Preview (about a 20:1 ratio)—it turns out that *Logic Rocket*

supports only Standard quality files, so I had to wait. I learned later that you can bump up the Standard compression ratio in the *RocketControl* preferences.

Once I downloaded the session, working with it was just like working with any other session on my hard drive. I recorded a burning funk-tenor solo (on the first take, naturally), I selected Post Changes, and my contribution was uploaded. At this point, if your collaborators are online, they can listen to your work and comment using text chat (see **Fig. 4**). Otherwise, they can check out your update the next time they log on and provide feedback by posting a message. Once you've agreed on final parts, you exchange full-fidelity source files for mixing.

ENTER THE COLLABORATORY

A variation on the Rocket theme is Tonos (www.tonos.com), a virtual studio with a communal vibe. Built around a simple 8-track recording program called the *TC8* (see **Fig. 5**), Tonos combines a studio environment called the Collaboratory with an aggressive effort to expose members' work to the community and to industry professionals. Regular "Challenges" give members opportunities such as finishing a David Foster song—with Foster himself as the judge. Tonos also publishes a steady stream of tips-and-insights articles and interviews with the likes of Diane Warren and Steely Dan.

The you've-got-a-friend-in-the-biz attitude isn't a façade: Tonos was founded by hit makers Carole Bayer Sager, Kenny "Babyface" Edmonds, and Foster. Along with an advisory/A&R

FIG. 5: The free *TC8* (Mac/Win) enables Tonos.com members to record and exchange audio tracks online. It functions very much like a simple multitrack cassette deck.

panel of equally prominent writers and producers, they've managed to create a positive online village that nurtures both serious, career-minded musicians and weekend-warrior hobbyists.

Emagic developed the cross-platform *TC8*, and the program is as limited as it is simple to use. It's hard to imagine a software recorder without an edit window, but then the cassette multitrackers that helped revolutionize home recording didn't have edit windows, either. The *TC8* does, however, feature a set

MODEM OPERANDI

Tips and tricks for online musical collaboration.

Call the shots. If you have a inexpensive long-distance calling plan, consider making a direct modem connection for file transfers to your partner. It removes one step from the upload-download process, cutting transfer time in half.

Bring out the General. The Universal SysEx command to invoke General MIDI (GM) mode in compatible synthesizers is F0 7E 7F 09 01 F7. Place that command at the beginning of your sequence, and your gear will switch to its GM mode. (If your gear supports General MIDI 2, use F0 7E 7F 09 03 F7 instead.) Allow a tenth of a second for the reset to take effect before trying to play any notes.

Remember: it's only a demo. Most MP3 encoders offer two encoding options: quick and dirty or slow and higher quality. Choose the fast method for demos. You're going to replace the files anyway.

Get good upgrades. If you can afford it, use the full versions of *Cubase* and *Logic* for RocketPower work. You'll have more control of compression formats, you'll get better tech support, and you'll be able to share plug-in settings with your collaborators.

Go public. I found the company at the Public recording sessions to be pretty thin most of the time, so you might want to plan your virtual-studio explorations to coincide with those of a like-minded friend.

Seek member benefits. Once you've decided to use a virtual studio, pay for the upgraded membership. You'll be able to access to private sessions, create sessions, and list your profile alongside other available musicians'.

Feel browsy. If you find yourself running low on RAM, you can quit your Web browser after joining a session, because it's only necessary for navigating through session listings and community amenities.

Bring on the klez-hop. Challenge yourself by periodically joining sessions that stretch your stylistic envelope. The next big thing could be the sound of your hip-hop sensibilities merged with that klezmer accordionist.

of basic-but-useful effects, including compression, distortion, and reverb.

The process of joining a session and uploading and downloading files is comparable to Rocket Network's, but the software has some quirks that get in the way. When you launch the *TC8*, it goes through an "unpacking data" procedure that takes more than a minute on a moderately fast PC. Then, without prompting, it always tests your audio hardware, a process that takes you pretty close to three minutes just to start the program. When you open a session from your local drive, it needs to decode the compressed audio, and that takes at least another 30 seconds.

What the Collaboratory does have going for it is an extremely active community of musicians. The atmosphere is ripe with enthusiasm and camaraderie, and the message boards are lively. You can search for musicians or sessions by instrument and genre, and enough public sessions are going on for you to find plenty to do. It's a less sophisticated environment than any of the Rocket studios I've visited, with all the benefits and drawbacks that the term *public* suggests.

Your first 30 days on Tonos, including the use of the *TC8*, are free. After that you can purchase a year's membership for $29.95. I have seen a lot of attempts at building online communities, and Tonos is among the most interesting yet. Check it out. A virtual studio might well be the "killer app" that makes a cable modem or DSL a must-have. If you can't upgrade, make good use of the available compression and plan to download sessions ahead of time. Also, never try to play a partially downloaded session, because that will pause the download and slow you way down.

ALL TOGETHER NOW

As I am typing these final paragraphs, someone out there is developing a brand new tool that will revolutionize online musical collaboration, and soon the notion of "near-real-time" virtual studios will seem positively quaint. As ironic as it is to use a dead language to give advice on third-millennium technology, here it is: *Carpe diem!* Use whatever tools are at your disposal, but use them creatively and use them now. Sure, a T1 line would be nice, but your dial-up connection is not a real limitation if you use the techniques I have outlined.

Online collaboration solves numerous problems for musicians: You can't find a good trombonist? Check Eastern Europe. You can't schedule a session together? Work in your pajamas and upload it. Can't figure out how David Foster got "that sound"? Ask him at Tonos. The global village is a reality, and minstrels are needed. Step up to the modem and be heard.

BRIAN SMITHERS PHONES IT IN FROM SOMEWHERE IN CENTRAL FLORIDA—OR SO HE CLAIMS. HE'S ALSO ASSOCIATE COURSE DIRECTOR OF MIDI AT FULL SAIL REAL WORLD EDUCATION.

World Wide Wadio

By Ron Simpson

Are you sick of the corporate drivel of commercial radio? Thanks to the Web and some slick software, you can now take matters into your own hands, sampling the latest sounds from more enlightened parts of the world and even broadcasting original music to any place there's an Internet connection. In this article, I'll explain how Web radio works and how you can set up your own online radio station.

FORMAT FUNCTION

There are two main ways to deliver audio on the Web: *downloading* and *streaming*. In most cases a downloaded audio file will not begin to play until the entire file has transferred to the listener's computer. (The notable exception is *pseudostreaming*, in which the file begins to play as soon as it starts to download; Apple's QuickTime uses this technique.) A streaming broadcast is transmitted to the listener's computer in small chunks that are deleted after they're played. With streaming, the listener can also request a file and have it transmitted to his or her computer, or jump to the middle of a broadcast already in progress.

The downside of streaming, which is used for Internet radio, is that audio fidelity is limited by the amount of data that can squeeze through

Start Webcasting today and play your music to a global audience.

the listener's Internet connection on a sustained basis. This flow is called the *bit rate*. Like modem speeds, it's measured in kilobits per second (kbps).

In a quest to deliver the best listening experience, programmers have developed numerous data formats. I'll stick with four of the most popular ones here, formats that work equally well on Mac OS and Windows, are free, and whose players are easy to install. They are

- MP3 (www.cselt.it/mpeg)
- QuickTime (www.quicktime.com)
- RealMedia (www.real.com)
- Windows Media (www.windowsmedia.com)

Note that *QuickTime Player*, *RealPlayer*, and *Windows Media Player* can all play MP3 files. If you haven't done so already, download these players from the respective sites and install them. While you're at it, drop by www.macromedia.com and grab the player and plug-in for Shockwave and Flash. With this software installed, you should be able to play more than 95 percent of the streaming-media content you're likely to encounter on the Web. (Interestingly, the soundtracks of most Shockwave and Flash movies actually use a version of MP3.)

WHICH FORMAT IS BEST?

This is a loaded question, but one I'm often asked. With a broadband stream (16 bit, 44 kHz, 128 kbps stereo or better), all of these formats are close enough to each other in sound quality that the difference is negligible in most cases. At low bit rates, streaming RealMedia files (version 8.5 or later) sound best to my ears. An unprocessed stereo MP3 or Windows Media file at a bit rate lower than 64 kbps is a bad, bad thing. Ditto for a QuickTime audio file encoded at 32 kbps stereo or lower using the standard QDesign Music compressor. However, if you process an audio file before encoding it, it will sound considerably better at the lower bit rates. More on that later; first, I'll discuss the formats in more detail.

Getting real. By virtue of being the first company to show up at the streaming-media party, RealNetworks is the majority owner of the online radio market share. In offering a combination of powerful development and delivery tools, lots of great content, and an easy-to-use, multiplatform media player *(RealPlayer)*, RealNetworks makes the streaming media experience enjoyable.

RealNetworks' encoding and serving programs, *RealSystem Producer Plus* ($149.95) and *RealServer Plus* ($2,000 and up), are expensive, but for those willing to forgo some of the bells and whistles, both *RealServer* and *RealProducer Basic* (the entry-level versions) are available at Real's site as free downloads. You can also stream RealMedia content to a limited audience without using *RealServer*. The process, called *HTTP streaming*, involves creating a *metafile*, a simple text document that points to the audio file. You can read the details at www.realnetworks.com/devzone or in my book, *The Professional Musician's Internet Guide*.

The best place to start looking for online radio content is at RealNetworks' Radio Tuner page (http://realguide.real.com/tuner). From this page you can search for more than 2,500 of the online broadcasts available in the RealMedia format and bookmark any of the stations for playback at your convenience.

Windows Media frenzy. When Microsoft jumped into the streaming-media foray with its Windows Media format, it looked as if the company was a couple of years too late to have any impact. However, Windows Media quickly jumped to number two in terms of popularity. It even works on most modern Macintosh computers and is integrated into the Liquid Audio format. Windows Media's advantages include free or inexpensive encoding tools and very good sound quality at 64 kbps or above. To judge for yourself, point your browser toward www.windowsmedia.com and click on the radio link in the left-hand column. You'll be directed to the Windows Media Radio page, where you can access Microsoft-powered radio stations from all over the world.

MORE ON THE WEB

More WWWadio

I've created a page on my personal site (www.bozangeles.com/BA/webradio.htm) containing all of the links featured in this article. I'll also include any relevant updates.

In the quick of time. Apple's QuickTime has always been the most misunderstood of all the popular streaming-media formats. Rather than being a format unto itself, QuickTime is a wrapper for over 30 different formats including MP3. With the release of QuickTime 5 a year ago, it's now possible to stream QuickTime content (audio, video, radio, and more) using RealNetworks' *RealServer*. This is done using RTSP (Real Time Streaming Protocol) and is definitely a step in the right direction. You'll find the latest QuickTime radio stations at www.apple.com/quicktime/qtv/radio.

TUNE IN

Before you create your own Webcast, take some time to audition what others are doing (I'll suggest some sites in a minute). You'll notice during your listening tour that advertising is everywhere. It shows up in the form of banners, pop-up Web pages, and Flash movies. Traditional radio has always used advertising to generate the income needed to broadcast, and Web radio will likely be no different. Unlike traditional radio, though, Web radio has additional income options, including paid subscriptions and profit-sharing from merchandise sales.

Have you ever heard a killer tune on the radio only to wait in vain for the DJ to identify the song or artist? Of course. Happily, most commercial Web radio stations not only list the song and artist during playback but also offer a link to a Web page where the

song is available for purchase as a CD, cassette, or encrypted digital file. You may also find links to the artist's or record company's site, complete with tour information.

To start your own online radio tour, surf to the six sites covered next; I have listed particulars in the "Dashboard Presets" table. Although you can connect to any of these stations with a dial-up modem, the experience is sonically better with a cable modem or DSL connection.

House of Blues (www.hob.com) is my favorite online music destination. While I've yet to pay for a live Webcast concert there, the free concert archives offer an incredible selection of live performances that generally run longer than an hour each. HOB.com also has 15 genre-based radio stations streaming from its site.

Live365 (www.live365.com) claims to have more independent online radio content than any other destination on the Web, and with thousands of stations to choose from, that is not an idle boast. Live365.com is also a great place to host your own show, as I will explain.

Shoutcast (www.shoutcast.com) is the brainchild of the *Winamp* development team. As with Live365.com, you can be either a broadcaster or a listener. Because Shoutcast streams MP3 audio at bit rates as high as 128 kbps, the quality is quite good.

Spinner (www.spinner.com) is one of the oldest and best-known Web radio destinations. The Spinner player is a customized version of *RealPlayer* with a 10-band graphic EQ and oodles of e-commerce and advertising functions. Although the overall audio quality is lower than that of TuneTo.com and Shoutcast, Spinner.com is still a worthwhile stop for music fans.

TuneTo (www.tuneto.com) is your best shot at customizing a genre preset to your liking, because you can set your preferences and flush the artists you don't like from the preset. The audio quality is very good with a broadband connection.

Virgin Radio's online Webcast (www.virginradio.co.uk) is a live simulcast of Virgin Radio's UK radio station. Listeners can choose QuickTime, RealAudio, or Windows Media to listen to this unique British program.

BUILDING YOUR OWN STATION

If you already have a Web site, it's relatively simple to stream MP3s from it for free. Musician and sound editor Skip Adams explains the technique on a secret page within his site, www.globalgraffiti.com/demo.htm. To create a full-on Internet radio station, though, the best solution for most people is Live365.com. There are several different broadcast options; it's Mac- and Windows-friendly; and most important, it's easy. Before I get to the mechanics of station construction, let's take a quick tour from the listener's perspective.

Listening at Live365. When you first arrive at Live365.com,

broadjam

highest ranked broadjam artists: **10.2001**

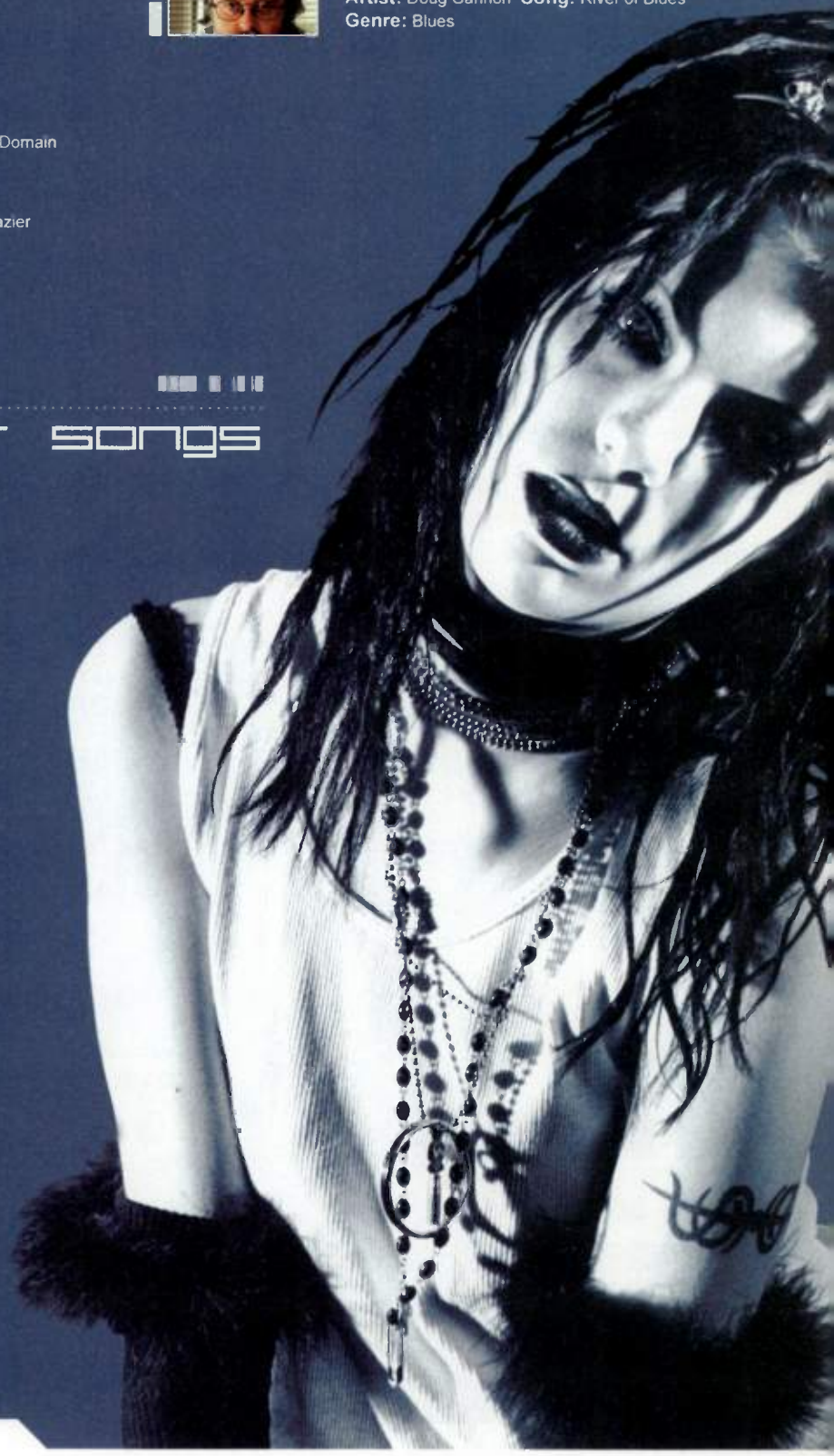
Artist: Robb Roy **Song:** What If
Genre: Alternative

Artist: Brassnucks **Song:** Digital Domain
Genre: Rap / Hip Hop

Artist: deepBluesecret **Song:** Glazier
Genre: Electronic

Artist: Natalie Brown **Song:** You Gotta Believe
Genre: R & B

Artist: Doug Cannon **Song:** River of Blues
Genre: Blues



unleash your songs

Get it up

Don't want to deal with the hassle of encoding and uploading your music? Send it to Broadjam, and we'll do it.

Get it out

We'll get it up on our site and then get it out to all the best Internet music sites.

Get it back

Oh you'll get feedback all right. From fans, peers, industry pros, professional guest reviewers and even a moron or two.

Get a homepage

A well-designed world-class page that you'll be proud to call home.

Get it on

Whatever you do, get it online and give your music a chance. And give us a chance to do it for you. If you want to talk to a human and ask questions, call us toll free at 877-527-3651. If you prefer email, we can deal with that as well.

CustomerService@Broadjam.com

Broadjam Corporation
1101 State Highway 69, #8 | New Glarus, Wisconsin 53574
608-527-3633

www.broadjam.com

you'll be asked a few questions about your connection speed and player preference. If you don't have a compatible player, you'll be given the opportunity to install and test one. After you've gone through this process, Live365.com will dump a cookie into your browser that will automatically configure your system for optimum playback whenever you return to the site.

The next step is to search for a station that matches your musical tastes and connection speed. You can search by genre, name, or location (see **Fig. 1**). The search results display basic information such as the name of the broadcaster, a description, and the required connection speed. Once you've found a station, click on the little yellow speaker to start playback. This will bring up the player window (see **Fig. 2**).

FIG. 1: Live365.com hosts thousands of Internet radio stations. With its search engine you can zero in on the ones of your choice by genre or name. But you can't escape the ads.

PREPARING TO BROADCAST

There are three ways to broadcast at Live365.com. For simplicity's sake, I'll start with the Basic Broadcast option, which lets you create an online MP3 playlist that loops endlessly, allowing listeners to jump in and hear it at the current point. You're given 100 MB of disk space for your MP3 files, and once you're up and running, your station is online 24/7. Not bad for $4.95 a month. There are some rules and limitations, which I'll cover briefly as I walk you through the setup process.

Starting on Live365.com's home page, click on the Broadcast tab. You'll be given two options: Professional or Personal Broadcasting. Click on Personal; a list of optional services will appear. Basic Broadcasting is $4.95 a month; for additional monthly fees, you can view listener statistics, order additional server space, or add the ability to broadcast live from your computer. (Unless you have a cable modem or DSL, it's best to stick with broadcasting from Live365's servers.)

Accuracy – from A to B.

Genelec's Digital Double Play.

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S/PDIF

Today's audio control rooms and media production facilities are fast becoming all-digital environments. With the proliferation of digital workstations, the only tools which *aren't* digital are microphones and audio monitors. Until Now.

The **2029A** and **2029B Digital Active Near-field Monitoring Systems** are complete digital solutions that complement the interface from digital bitstream to acoustic energy. The extremely linear, integrated D-to-A converters circuitry used in both models offers a precision-matched electrical interface to the active electronics and amplifiers. This results in the best possible resolution and reproduction of your carefully-crafted, all-digital productions – whether they're from a desktop suite or a mega-studio facility. Developed from our highly-acclaimed **1029A** analog near-field monitor, the 2029A or 2029B can also be used in conjunction with our **1091A** subwoofer to create an incredible power-packed, full-bandwidth stereo monitoring system. The 2029A's are precision-aligned and balanced – from the single stereo 24-bit **S/PDIF digital input** – to their highly-efficient, 110dB/SPL matched drivers. The 2029A is 48kHz compatible.

The 2029B
AES/EBU

The 2029B offers the same precision alignment with an **AES/EBU digital interface** on a digital XLR-type input. The 2029B is 96kHz compatible.

In both models, stereo listening level is controlled with a single, front-mounted adjust knob. And like any other Genelec Active Monitor, rear-mounted room response controls let you match the speaker's response to your room's response.

Want to hear what digital audio really sounds like? Audition the 2029A for an S/PDIF digital rig, or the 2029B for your studio's AES/EBU digital network – two more great reasons to invest in Genelec.

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After you've selected the services you want, read the user agreement and click the Next button. The legal text is as long as this article, but the most crucial bits are (1) that you're prohibited from broadcasting abusive material, (2) that your playlists must comply with U.S. copyright law (more on this in a moment), and (3) that Live365 owns the rights to redistribute your mix on other Web sites and compilations—royalty-free. That's something to consider before uploading original material. From this point, there are just a few easy steps to take and Live365.com holds your hand through each one. Still, a number of issues aren't covered thoroughly enough, so I'll save you some grief by adding detail.

FIG. 2: The streaming-media player you choose during the setup process powers Live365's Player Window. Note the song information and e-commerce buttons.

Step 1. If you haven't already created a user name, you'll be prompted to do so now. Next, fill out your billing information.

Step 2. Before you rip any CDs or convert any audio files to MP3 format, consider your target audience—most important, its connection speed. The "Strike Up the Bandwidth" table on p. 52 offers encoding guidelines. Another issue is that as of press time, 56 kbps stereo was the maximum bit rate Live365 permitted for MP3 files on personal radio stations. If you're like most MP3 enthusiasts, your files are 128 kbps or higher. While you *can* convert high-bit-rate MP3s back into WAVs or AIFFs and reencode them at a lower rate, you will get better sound by starting fresh. The "MP3 Encoding Tips" sidebar offers some pointers; see "How to Make Killer MP3s" on p. 60 for more detail. The simplest option is to use Live365's *Studio365-Loader*, a free program that alters the bit rate and uploads the files in one step.

Here's another time-saving tip: before you spend two days encoding your entire music collection for upload, create a couple of test files. Upload the test files and see how they sound and if they work. If the songs play back as planned, you're good to go.

Step 3. Upload the files. You can do this directly through the site or with the aforementioned *Studio365-Loader*. Either option is easy, but *Loader* offers the twin advantages of automatic bit-rate conversion and batch uploading.

Step 4. Using **Fig. 3** as a reference, enter information about each uploaded song into each of the five fields. Note that field 5 is optional.

MP3 ENCODING TIPS

An MP3 file encoded at 56 kbps—the maximum allowable broadcast rate on Live365.com—only retains five percent of the original program material. The fact that you can hear anything at all is proof that this technology works quite well. However, you can improve the sound by anticipating the frequency loss in the target MP3 and subtly adding EQ to the original WAV or AIFF file before encoding it.

I accomplish this task by working backward. I import a 56 kbps MP3 of the song into a stereo editing program (BIAS *Peak* on the Mac or Sonic Foundry *Sound Forge* in Windows) and then create an EQ preset that boosts the signal in the frequencies that were compromised during encoding. I then apply the EQ preset I created to the original WAV or AIFF file and encode it again. Because of the variables involved there is no magic EQ setting I can recommend. You will have to experiment until you find the optimum settings for the type of music you're encoding; however, this technique really works well once you get the hang of it.

Another issue to consider is using stereo versus mono. Unlike WAV or AIFF files, mono MP3s at a given bit rate are the same size as stereo ones, because the extra data is used to improve the sound of the encoding. (A stereo WAV file is twice the size of a mono WAV because it has twice the bit rate, though we don't normally think of it in those terms.)

So do you surrender the depth of the stereo field for a higher quality mono file? For my Live365 station, I chose stereo, but when creating sound files for a Flash movie, I tend to go with mono. It's a personal decision; your best bet is to encode a file in both mono and stereo and let your ears make the call. As long as you don't mix mono and stereo MP3 files in a Live365 playlist, you should be okay.

DASHBOARD PRESETS

Here are some Web radio sites that are well worth visiting.

Site	URL	Mac	Win	E-commerce in Player	Minimum Connection
House of Blues	www.hob.com	yes	yes	yes	28.8 kbps
Live365	www.live365.com	yes	yes	yes	28.8 kbps
Shoutcast	www.shoutcast.com	yes	yes	no	28.8 kbps
Spinner	www.spinner.com	yes	yes	yes	28.8 kbps
TuneTo	www.tuneto.com	no	yes	yes	56.0 kbps
Virgin Radio	www.virginradio.co.uk	yes	yes	no	28.8 kbps

Step 5. Create your online playlist (see **Fig. 4**). All of the MP3 files that you uploaded to your directory will be listed in the box on the left. To add a file to the playlist (on the right side of the page), just select the file you wish to move and click on the Add button. To change the order of the playlist, select the misplaced file and use the Up or Down buttons to walk it to the desired location.

Once you've created a playlist, click on the Save button and scroll down the page to the Controls area shown in **Fig. 5.** The Playlist Analyzer will display the sampling rate and bit rate of each of the files in the current playlist. For trouble-free playback, it's important that they all be the same. The broadcast controls allow you to start and stop playback of the current playlist (you can save multiple playlists). The Restart Broadcast button is your start switch.

Tell the world. The simplest way to promote your Live365 Web radio station is to e-mail a Live365.com Radio Card to your friends, family, and business associates. You also do this on the Broadcast Controls page. The Radio Card is a standard e-mail message that contains a direct link to your station. If you're feeling well-liked, you can ask the recipients to forward the message to everyone they know. With a little luck, the news about your station will multiply over the Internet like a friendly virus.

FIG. 3: For each track in your Live365 playlist, you can enter information to guide the listener, including an audible station ID and a link to your Web site.

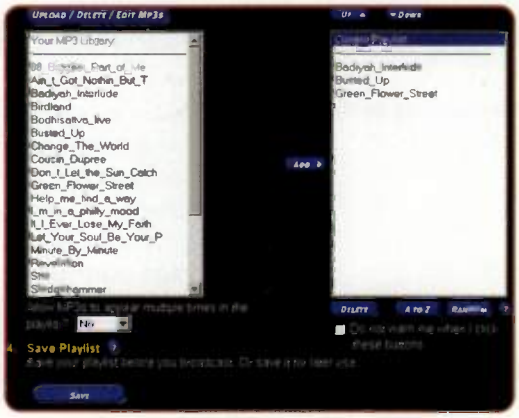

FIG. 4: Creating a Live365 playlist is easy. Simply select files from your master library in the left pane, click the Add button to transfer them to the right, and then use the arrow buttons to change the playback order.

IT'S NOT TOO FUN AT THE DMCA

If you looked closely at **Fig. 5,** you may have noticed some legalese. Before your playlist can start streaming to the world, there are some rules you need to follow regarding the content and order. While I do suggest you read all of the rules that are posted

FIG. 5: Clicking the Restart Broadcast button starts your Internet broadcast. Be sure to check the playlist rules first so you don't violate the law.

on Live365's site, here they are in a nutshell: You may not play the same artist or the same song (regardless of artist) more than three times in a three-hour period. You may not take requests within a one-hour period of playing a song. You may not post your playlist in advance.

Whose boneheaded idea was this? You can thank the major record labels, which pressured Congress to enact the draconian Digital Millennium Copyright Act (DMCA). The labels feared that if you created an all–Britney Spears channel, no one would need to buy her albums. On the other hand, services like Live365 couldn't do what they do without the DMCA, which grants the right to Webcast without obtaining a separate license for each song. For this privilege, Live365 pays royalties to the RIAA, ASCAP, BMI, and SESAC. Note that if you're broadcasting your original music and own all of the rights to it, the DMCA does not apply.

FIG. 6: It looks like a normal boom box, but the new Philips FW-*i*1000 is equipped with an Ethernet port for tuning in Web radio.

THE FUTURE

Though Internet radio delivers exciting features—huge selection, two-way participation, and helpful information and links—listening on a computer is not always convenient. In early 2000, several companies announced dedicated Web radios to make listening more natural and easy. Of course, that was before the plunge in tech stocks caused development money for many of these innovative products, such as the Kerbango radio, to go kerplop.

However, there are still a couple of interesting options available. The iRhythm iM Radio Tuner, formerly known as SonicBox, lets you use your computer to tune to the Web radio station of your choice while your home stereo handles the audio playback. One version beams the audio signal to your stereo using 900 MHz radio waves, which even travel through walls; another uses a direct connection. An included 900 MHz remote control lets you change stations from the living room or patio. I was able to find the wired version of the system on Amazon.com for less than $50 and the wireless one for about $75. Visit www.imnetworks.com for details.

The massive Dutch electronics company Philips Electronics has incorporated the iM Networks technology into its fledgling FW-*i*1000, a combination Internet radio, MP3 player, and CD player (see **Fig. 6**). The FW-*i*1000 looks very much like a typical bookshelf stereo, but connect its Ethernet port to a network and you can locate and save Web radio stations as presets. There's a cool Flash movie at www.philipsusa.com that demonstrates the highlights. As broadband connections snake their way into our homes and offices, you can bet that more manufacturers will be adding Web-radio tuners to the entertainment devices that are part of our everyday lives.

Traditionally, demographics (a description of who's listening) have given corporate broadcasters enough statistical ammunition to generate advertising revenue and show a profit. It is still unclear how companies like Live365.com and even traditional radio stations with online simulcasts are going to break even, much less show a profit. But regardless of the financial considerations and consequences, Web radio is here to stay. As technology continues to march forward, the audio quality of Web radio will get better and possibilities will continue to grow. Stay tuned.

RON SIMPSON (RON@BOZANGELES.COM) IS A MUSICIAN, WRITER, AND WEB-AUDIO TECHNOLOGIST. HE IS AUTHOR OF THE *PROFESSIONAL MUSICIAN'S INTERNET GUIDE* (MIXBOOKS).

STRIKE UP THE BANDWIDTH

Because Internet connections rarely achieve their maximum rated speed, it's wise to scale your audio files for real-world conditions. This table, adapted from one at Live365.com, suggests safe bit rates to use for different target audiences.

Listener Connection	Recommended MP3 Bit Rate
14.4 kbps modem	8 kbps
28.8 kbps modem	16 kbps
33.6 kbps modem	24 kbps
56K modem	32 kbps
T1, cable, DSL, ISDN	56 kbps*

*Although rates from 96 to 128 kbps should be possible, Live365 restricts personal Webcasts to 56 kbps files.

Customers and reviewers say:

"WaveCenter/PCI was a snap to install, and I appreciate the included Cool Edit Pro SE software. A very fine product at a great price."

"Tango24 provides accurate, robust, well-defined and clean recording. It captures the body and essence of the instruments it is recording. This is a very fine sounding and well-designed recording system."

"WaveCenter/PCI has been trouble-free and robust. Tango24 sounds superb, to my ears. Even older 16-bit mixes are sounding more detailed and alive."

WaveCenter/PCI:

8 channels ADAT optical I/O.
Stereo coax/optical SPDIF I/O.
Built-in MIDI (2-in, 2-out).
GigaSampler & ASIO drivers.
Easy plug-and-play installation.
Windows & Macintosh support.
Includes Cool Edit Pro SE.
Patchbay for input monitoring.

Tango24:

Professional 24-bit A/D & D/A.
Optically-isolated converters.
Balanced analog I/O (8-in, 8-out).
ADAT optical in/thru/out.
BNC word clock connectors.
Switchable +4dBu/-10dBV levels.

Buy a Bundle

Save a Bundle

WaveCenter/PCI + Tango24 bundles are now available at fantastic prices.

FRONTIER DESIGN GROUP

No Money Down

Free software never sounded so good.

By Todd Souvignier

Some of the best music software costs almost nothing. A lot is even free. But as with many things, if you choose by price alone, you'll often get burned. I spent several weeks scouring the Web and turned up ten top-notch Mac and Windows programs any desktop musician would be proud to own.

In evaluating programs, usefulness and stability were my paramount considerations. Programs that crashed or expired were punted immediately. I also shunned programs with major features disabled (such as the ability to save files) unless they did something really special in their demo state. The winners are grouped into four categories: Internet audio, recording/editing, synthesis, and utilities.

How is it possible to get high-quality software so cheaply? Thank efficient online distribution, the honor system, and the benevolent notion of sharing. Many great apps are given away under the *shareware* model. For sharing their work, the programmers request money from satisfied users. If you come to rely on such a program, kick a few bones to the creator.

Freeware comes with no such obligation. Sometimes it's designed to introduce you to a program in hopes that you'll upgrade to—and pay for—a more full-featured version. Sometimes it's released as a competitive move (think Microsoft's *Internet Explorer*). Sometimes programmers release freeware just to share the fun of making music. It's all proof that once in a while there really is a free lunch, or at least a free multitrack editor.

INTERNET AUDIO

Microsoft Windows Media Encoder (win)

Windows Media Audio (WMA) is a great sounding file format with many advanced features. The coolest part of *Windows Media Encoder* (see **Fig. 1**) is the ability to insert Scripts, a feature that's turned off by default. Turn it on by checking the Script checkbox in the Session Properties dialog (under the Sources tab). This lets you add extra information, called *metadata,* to your music or video. By inserting URLs in the metadata you can push Web pages to listeners every time they play your file. The ability to present lyrics, art, ads, animations, or other material to your listeners is limitless.

DOWNLOAD FROM: www.microsoft.com/windows/windowsmedia/en /wm7/encoder.asp

PRICE: free

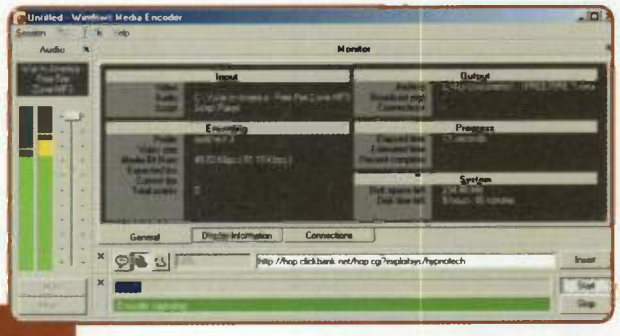

FIG. 1 WITH *WINDOWS MEDIA ENCODER*, YOU CAN EMBED A URL IN YOUR MUSIC TO DIRECT LISTENERS TO YOUR WEB PAGE.

COURTESY OF APPLE

FIG. 2 *ITUNES* **FEATURES THE COVETED FRAUNHOFER MP3 ENCODER, INTEGRATED CD BURNING, AND A STRAIGHTFORWARD DESIGN.**

apple iTunes (Mac)

Apple put software engineer Jeff Robbin (author of Casady and Greene's *SoundJam MP* and *Conflict Catcher*) on the job, and the result is *iTunes* (see **Fig. 2**), the last word in Mac player-encoders. It plays, it rips, it burns CDs, it has a truly attractive interface, and Apple paid the Fraunhofer license, so you get unlimited MP3 encoding. The program also includes support for portable players and streaming Internet radio stations, onscreen light shows that react to the music, and a full-featured jukebox. All that power and beauty requires some muscle: you'll need at least a G3 or iMac with OS 9 or higher.

DOWNLOAD FROM: www.apple.com/itunes

PRICE: free

FIG. 3 **WEED OUT CORRUPT MP3 FILES WITH MP3** ***CHECK&CONVERT.***

ashampoo MP3 check&convert (win)

One of the problems with file-sharing networks such as Napster and Gnutella is the lack of quality control. Poorly ripped songs, corrupt files, and transmission problems render many downloads unusable. If your favorite network is about to be unplugged by the RIAA, you might not have time to listen to each download individually to make sure it's okay. Ashampoo to the rescue! *MP3 Check&Convert* (see **Fig. 3**) scans batches of MP3 files, detecting those that have been damaged. Registering the program adds MP3-to-WAV conversion and extra "bad-file" handling features.

DOWNLOAD FROM: www.ashampoo.com

PRICE: $9.95

RECORDING/EDITING

digidesign pro tools free (Mac/win)

It says a lot about the evolution of the audio-software market that companies are now giving away digital recorders and editors. *Pro Tools Free* (see **Fig. 4**) is the real deal, a fully functional 8-track audio recorder/editor with 48-track MIDI sequencing and AudioSuite signal-processing plug-ins. It's distributed as a no-cost point of entry into the Digidesign family of products. Naturally, a few things are missing, and Mac sessions can't be transferred to Windows (or vice versa). But who's complaining? *Pro Tools Free* runs on most current Mac or Windows setups, particularly those with basic sound cards. It's a great way to get going with Pro Tools.

DOWNLOAD FROM: www.digidesign.com/ptfree

PRICE: free

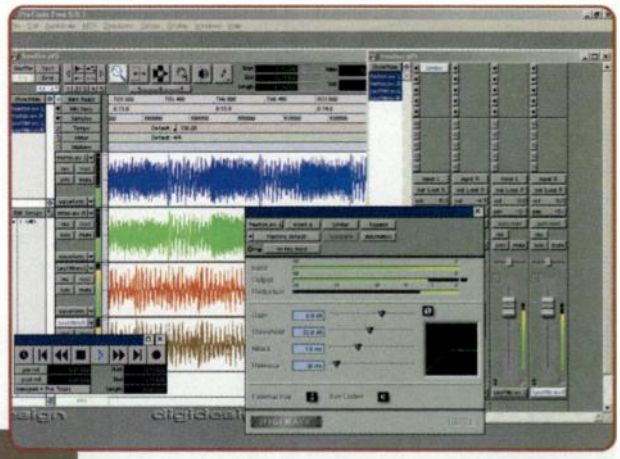

FIG. 4 **BUILD YOUR PRO TOOLS SKILLS WITH** ***PRO TOOLS FREE*** **(MAC/WIN), THE NO-COST VERSION OF THE HIGH-END MULTITRACK EDITING SYSTEM.**

cay-eric schimanski silent-bob (win)

If you like to sample audio from TV or radio, *Silent-Bob* (see **Fig. 5**) is an easy solution for grabbing sound bites on the fly. (Note that much of what you snag will be copyrighted and therefore legal only for personal use, not distribution, but the rhetoric of public figures is fair game.) *Silent-Bob* continuously records up to two minutes of

incoming audio into a buffer file—essentially a holding pen on your hard drive. Just patch your TV or radio's audio output into your sound card's audio input; then, launch *Silent-Bob* and put it into Standby mode. Now you can kick back, listen to the news, and when you hear that politician say something mind-boggling, just click Stop/Save. *Silent–Bob* will have safely preserved the last two minutes of sound as a 16-bit, 44.1 kHz stereo WAV file.

DOWNLOAD FROM: www.silent-bob.de/en

PRICE: free

FIG. 5 EVER HEARD A GREAT SOUND BITE ON TV OR RADIO AND WISHED YOU'D HAD A TAPE RECORDER RUNNING? *SILENT-BOB* AT YOUR SERVICE: IT'S ALWAYS LISTENING.

SYNTHESIS

Image-Line Fruityloops 3 (win) Image-Line claims *Fruityloops* is the "No. 1 loop and song-creation tool on the Net," and I find no reason to argue. This thing is deep, with flexible sampling-plus-synthesis drum voices, plenty of fat basses and synths, VST and DirectX plug-in support, and easy step sequencing (see **Fig. 6**). It's also one of the best-looking programs anywhere, fully documented and packed with tutorials and examples. The *Fruityloops* 3 demo does everything but save the session; you can render to WAV or MP3, however, and generate loads of grooves for free.

DOWNLOAD FROM: www.fruityloops.com

PRICE: $39.00–$99.00, depending on version

FIG. 6 FIRE UP *FRUITYLOOPS'* VIRTUAL INSTRUMENTS, RECORD THEM WITH ITS SEQUENCER, APPLY EFFECTS, AND EXPORT THE WHOLE PRODUCTION AS A WAV OR MP3 FILE.

Master-zap stomper hyperion 5 (win) Need drum sounds, especially kick drums? Download this extremely cool little freeware app. *Stomper Hyperion* (see **Fig. 7**) allows you to

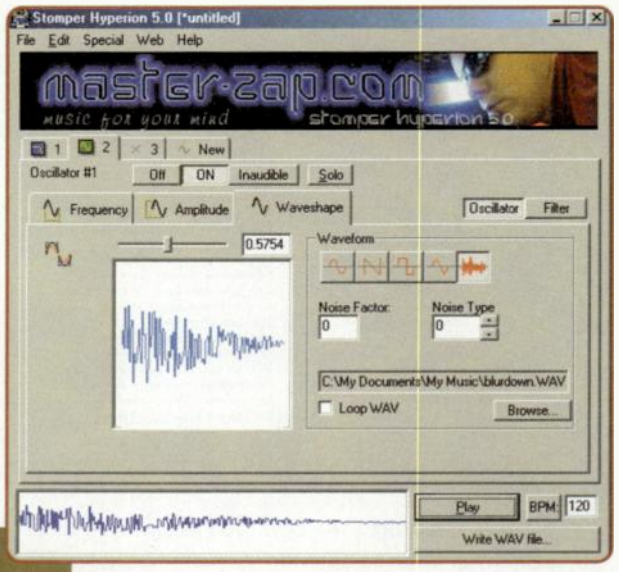

FIG. 7 GET YOUR KICKS—AND BOATLOADS OF OTHER SOUNDS—WITH STOMPER *HYPERION*, A MONSTER DRUM SYNTHESIZER.

import a number of samples, stacking up multiple oscillators—each with frequency, amplitude, wave shape, modulation, noise, and resonant-filter controls. Build the monster drum sounds of your dreams, save them as WAV files, and then transfer them to a sampler or import them into any audio sequencer. A rock-solid, great-sounding app, *Stomper* sports a unique revenue model: the program nags the user to listen to music that Zap and his wife made, offering a link to a site that pays him a royalty.

DOWNLOAD FROM: www.master-zap.com

PRICE: free

Büro </stelkens> crusher-x live (win) Now in a 2.0 edition, *Crusher-X* (see **Fig. 8**) is a synthesis and algorithmic-composition environment with a unique "vapor synthesis" algorithm. This offshoot of granular synthesis works by slicing a sound into many tiny segments and rearranging the pieces. The main draw is that *Crusher-X* starts churning out bizarre noise

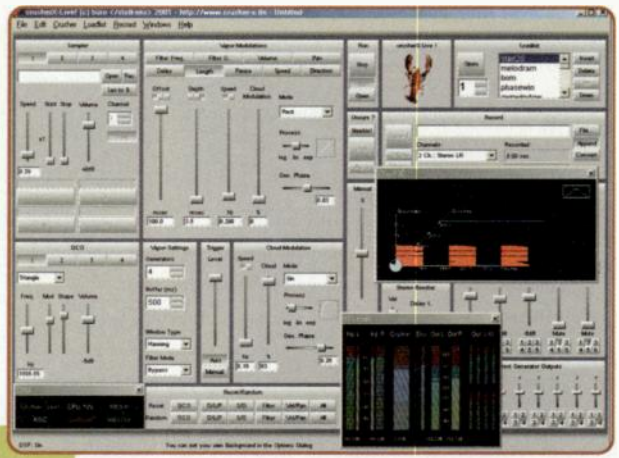

FIG. 8 JUST A GUESS, BUT YOUR MUSIC IS PROBABLY MISSING VAPOR SYNTHESIS. DOWNLOAD *CRUSHER-X LIVE* AND ADD SOME.

PUT THE POWER IN YOUR HANDS

power series

A thorough guide to Sonic Foundry's digital audio-editing software.

By Scott R. Garrigus

Technically edited by Sonic Foundry

1-929685-10-6 $29.95

Create, mix, record and deliver music and sound projects for CD, video and multimedia projects using SONAR.

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Covers hardware and software setup, score editing, track editing and distribution.

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Covers Pro Audio 9, Guitar Studio 2 and Home Studio 9.

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1-929685-02-5 $29.95

Takes the reader from start to finish, from conception to polished CD.

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1-929685-08-4 $29.95

Approaches ACID 3.0 from a creative and artistic angle.

By David E. Franks

1-929685-49-1 $29.95

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almost instantly. The sleek metallic interface with thousands of tiny buttons and sliders is a bit daunting, so just select DSP Start from the Crusher menu to begin generating sound, and then try moving sliders at random. *Crusher-X* is save disabled until you pay, but it makes a lot of sound even in demo mode and is worth the upgrade to the full version.

DOWNLOAD FROM: www.crusher-x.de

PRICE: $49.00

AUDIO UTILITIES

Audio Ease Make A TestTone (Mac)

Test tones are useful in many situations, including calibrating analog recorders, audio-system troubleshooting, and acoustical-treatment work. Such tasks once required hardware tone generators or test-tone CDs, but now you can do it on your Mac for free. *Make A TestTone* (see **Fig. 9**) creates AIFF, SD2, WAV, and PARIS-format sound files of single-frequency tones or full-spectrum sweeps. With sweeps, it embeds text markers in the file, indicating the frequency at specific points during playback. (How high does *your* hearing go?) It even gives the output files intelligent, easy-to-read names. See the Web site for detailed application tips.

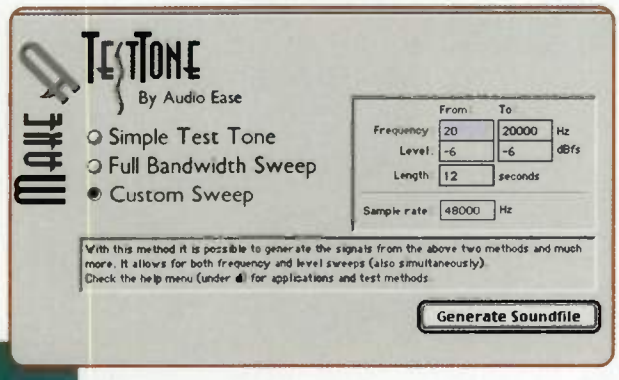

FIG. 9 TEST YOUR SPEAKERS—AND YOUR EARS—WITH *MAKE A TESTTONE*, A FREE 24-BIT TONE GENERATOR.

DOWNLOAD FROM: www.audioease.com

PRICE: free

Audio Phonics AP Instrument Tuner (Win)

It won't replace the ubiquitous stage tuner, but there are plenty of instances in which this software tuner is just the ticket. Audio Phonics actually offers two tuners, a six-note model especially for guitarists, and a chromatic version (see **Fig. 10**) that allows you to tune to any note. You can adjust center pitch by ±10 Hz, input and output devices are selectable within the program, an input-level meter lets you check signal strength, and a help file is included. If your analog synths have tuning issues, check *AP Instrument Tuner* before every take.

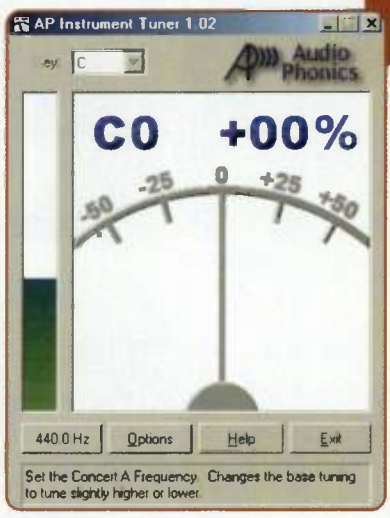

FIG. 10 TUNE UP WITH THE STRAIGHTFORWARD *AP INSTRUMENT TUNER*. YOUR AUDIENCE WILL THANK YOU.

DOWNLOAD FROM: www.audio-phonics.com

PRICE: free

TODD SOUVIGNIER IS PRESIDENT OF EXPLOIT SYSTEMS (WWW.EXPLOITSYSTEMS.COM), A FIRM THAT ENABLES E-COMMERCE IN PEER-TO-PEER FILE SHARING NETWORKS.

You Want More?

Here are some good sites to search for music shareware, freeware, and demos. If the site offers downloads, be sure to click the author link (if available) for each program to ensure you're getting the latest version.

Site	URL	Features
AudioTools	www.audiotools.co.uk	Windows software with star ratings
CINet Download	www.download.com	Hundreds of audio programs with user reviews
Dasound.com	www.dasound.com	Over 800 categorized and summarized programs
Shareware Music Machine	www.sharewaremusicmachine.com	Colossal shareware collection
Synth Zone	www.synthzone.com/utilities.htm	Dozens of annotated links and a clean design

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How to make

Crunching audio files down to a fraction of their normal size while maintaining relatively good sound, the MP3 format has become the most widely used music-delivery vehicle on the Internet. Although other file formats offer copy protection, smaller size, and better sound, the public prefers MP3, so it's important to understand how to get the most out of it. Whether you want to distribute your own music in MP3 format or simply enhance your personal file collection, read on. I'm going to help you make your MP3s sound as good as possible.

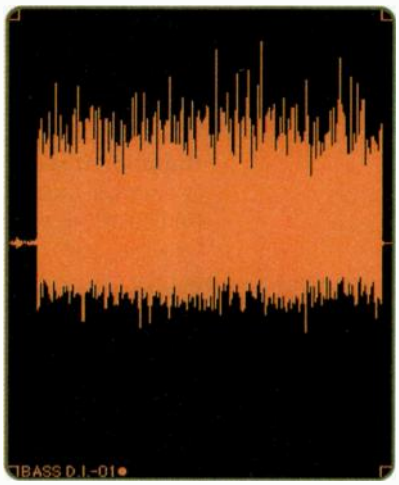

FIG. 1: Note how the waveform is mostly in the upper (positive) half of the display. This track has extreme *DC offset*, which will degrade the audio quality when you convert it to MP3 format.

WHAT'S AN MP3?

Multimedia files can be huge. Stereo CD audio demands over ten megabytes (MB) of storage per minute; video is even greedier. So the Moving Picture Experts Group (MPEG) was convened to find a way to make audio and video files smaller. The audio section of the resulting MPEG-1 standard has multiple "layers," representing data-compression schemes of increasing complexity and quality. MPEG-1 Audio Layer III, also known as MP3, sounds better than Layers I and II (MP1 and MP2).

Data compression is different from audio compression, such as you would do with a compressor/limiter. Data compression uses mathematical analysis to detect patterns in the file that will allow it to be described (and thus stored) more efficiently. Archiving utilities such as *StuffIt* and *WinZip* use *lossless* compression, meaning the compressed file can be expanded into an identical copy. Although they achieve tremendous size reductions with text and graphics, they're not very effective with audio files. So the MPEG took a different approach, developing a *lossy* process that achieves significant size reduction at the expense of a slight loss in sound quality.

HOW PERCEPTUAL OF YOU

Converting a file into an MP3 uses a process called *perceptual coding* that applies some intelligence to the task of discarding data. One of the quirks of hearing is the phenomenon of *auditory masking*. Masking occurs when a loud sound at one frequency obscures a weaker sound at a different frequency. Operating on the principle that people probably can't hear many parts of an audio signal and might not notice if those parts were removed, perceptual coding assigns fewer bits to the masked parts of a signal than to the prominent ones.

MP3 algorithms work well but still cause a noticeable reduction in the sound quality at moderate compression levels. At extreme settings, they can easily introduce distortion. Compare a CD track to an MP3 of the same song; to varying degrees you'll hear:

- Reduced clarity and definition in the high end
- Less impact in the low end
- A collapsed stereo image
- Decreased separation between instruments
- Lowered intelligibility of speech or singing

MAXIMIZE YOUR SOUND WITH THESE INSIDER TIPS.

killer mp3s

BY TODD SOUVIGNIER

Once encoded, an MP3 file cannot be substantially edited. Utilities such as *MP3Trim* (Win; www.logiccell.com/~mp3trim) do allow some basic manipulations such as cropping, normalizing, and fading, but to apply serious signal processing you'll have to convert the MP3 back into an uncompressed format, which can lead to quality loss when the file is re-encoded. A better option (assuming you have the original uncompressed file) is to enhance the audio before it is converted to an MP3, a process one might call *post-mastering*. I'll examine that approach first.

FILE PREPARATION

I'll assume that you have finished pieces of music on CD or in another uncompressed digital format such as WAV, SDII, or AIFF. I'll also assume that your music has been competently mastered or at least is in its best-quality version. When doing post-mastering, follow the "If it ain't broke, don't fix it" rule. Apply as few of the following processes as necessary—each one takes your 16-bit files, converts them to a higher bit depth for processing, then converts them down to 16-bit again, compromising audio fidelity a little each time. With that in mind, fire up Sonic Foundry *Sound Forge,* BIAS *Peak,* or any other full-featured audio editing software, load up your sound files, and try the following tweaks.

Stereo to mono. In the world of uncompressed audio, stereo files take up twice the space of mono ones. With MP3, the encoder adds the extra channel of information by reducing the overall quality of the file. A stereo and mono MP3 file are virtually the same size. So your first decision is whether you want a smoother-sounding file or a more spacious one. Although most Web-music portals, including MP3.com, want only stereo uploads, try creating mono material for easier distribution on file-sharing networks and better HTTP streaming from your personal Web site. (See "World Wide Wadio" on p. 44.) Casual listeners generally aren't able to discern between stereo and mono under typical listening circumstances. For best results, use the stereo-to-mono conversion feature in your audio editor rather than the one in the MP3 encoder; the mixing algorithm is likely to have better quality.

Remove DC offset. *DC offset* is caused by mismatched voltages in the audio chain, and is frequently encountered on recordings made from turntables or home stereo systems. It diminishes a track's volume and impact. While difficult to detect by ear, DC offset is visually obvious, appearing as an imbalance in the waveform display. Many audio editors have a "Remove DC Offset" function; use it only when the problem is apparent, as in **Fig. 1.**

MORE ON THE WEB

Visit the DMPG section of www.emusician.com for links to MP3 encoders, listening tests, and tutorials.

Normalize. The Normalize function provides a simple way to make a file louder. It finds the highest peak in the file, then increases the level of the entire file until that peak is at the target level (typically 100 percent). This volume increase is the same across the entire file; only the loudest point reaches the target level. If the original peak was close to the maximum, normalization won't have much effect, and you may want to consider *dynamic compression* (discussed next) instead. Some encoders are not graceful about handling 100 percent energy levels,

creating noticeable distortion on peaks that might sound okay in an uncompressed file. Never normalize to 100 percent if you're going to a compressed format like MP3; use a setting in the range of 95 to 99 percent instead.

Compress or limit. If your audio file has volume fluctuations that make listening problematic, try compressing its dynamic range (see **Fig. 2**). The two main options are *limiting*, which imposes an absolute ceiling on peaks, and *compression*, which reduces the peaks proportionately based on how far they exceed a set threshold. Both compressors and limiters usually include a *make-up gain* feature that boosts the resultant signal.

Getting the best results requires experimentation; **Fig. 3** shows a typical scenario using the Graphic Dynamics processor in *Sound Forge* 5. To begin, set a short attack (1 ms) and a release of 500 ms or more. Next, set the threshold to around –12 dB and the compression ratio to 2:1. (For every 2 dB the input signal exceeds this threshold, the output signal will be reduced by 1 dB.) Click Preview to listen to the effect, and adjust Output Gain so that it doesn't clip (distort) on loud passages. Fine-tune threshold, attack, and release until you find a point at which the gain changes sound natural. Use the Bypass button to compare your processed result with the unprocessed original. When you like the effect, click on Process to apply it to the file.

FIG. 2: The top window shows a song with uneven volume levels. The bottom shows the same file after limiting (with make-up gain); note the increased volume in the quiet passages.

If used correctly, this effect should be completely transparent. You should not be able to hear the volume changes, nor any distortion, just a stronger impression during quiet passages. When it's used incorrectly you'll hear a sucking sound.

Equalize. Like compression, equalization (EQ) is generally applied during the mastering phase and should only be approached post-mastering with caution. The goal here is to filter out frequencies the encoder can't handle well, thereby reducing pitched noise ("aliasing") in the encoded MP3. A cautious approach would be to filter out frequencies below 60 Hz and high frequencies above 15 kHz. A more aggressive approach might entail rolling off frequencies below 100 Hz and above 12 kHz, then selectively boosting midrange frequencies to accentuate the vocals. Listen carefully while making such adjustments; visual monitoring with a spectrum analyzer is helpful during this process. See p. 50 for more EQ tips.

Insert silence. If you want to stream your MP3s from the Web, it's a good idea to add a second or two of digital silence to the beginning of the master audio file. This helps to compensate for dropouts the listener may hear while his or her player is loading the file.

Now that your WAV, AIFF, or SDII files are up to snuff, let's make some MP3s.

CHOOSING AN MP3 ENCODER

Although MP3 players are distributed for free, software developers must pay a licensing fee to include an MP3 encoder in any product. Apple secured a flat license for the industry-standard Fraunhofer algorithms for *iTunes* and gives the program away for free. If you have Mac OS 9 or higher, download *iTunes* right now from www.apple.com/itunes. Panic *Audion* (www.panic.com/audion) is a good alternative for users of older Macs; in addition to the Fraunhofer encoder, it also includes the open-source LAME one.

Windows users have lots of MP3 encoder choices. *MusicMatch Jukebox* (www.musicmatch.com) is a popular package, Xing *Audio Catalyst* (www.xingtech.com) is highly regarded for its professionalism and sound quality, and there are many others. I've posted links to numerous encoders and listening tests on the DMPG section of www.emusician.com.

All MP3 encoders offer settings that impact the sound quality and marketability of your MP3s. To get the best results, you need to understand what these settings do. Here's a summary:

Bit rate. Sound quality in an MP3 is largely proportional to the

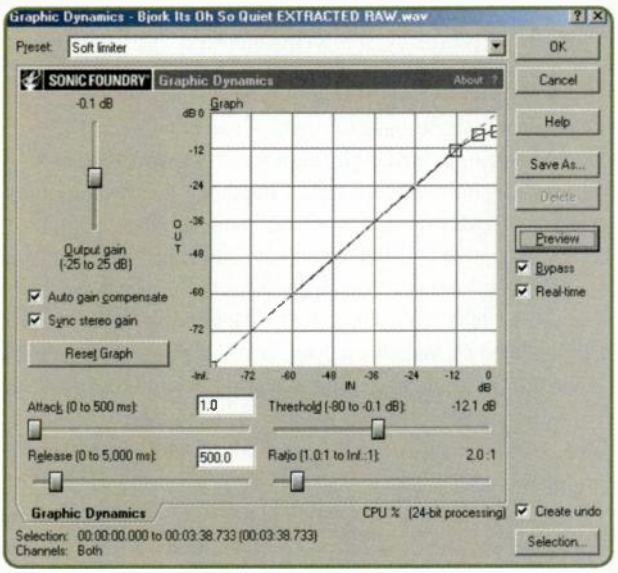

FIG. 3: If your audio files have wide dynamic swings, try smoothing them with a compressor/limiter such as this one in *Sound Forge* 5.

MP3Pro: The Pros and Cons

Fraunhofer Institute and Thomson Multimedia, which license MP3 encoders, recently announced a new, higher-quality format called MP3Pro. Developed in conjunction with Coding Technologies (www.codingtechnologies.com), MP3Pro uses two separate streams of data to represent audio. The second stream is dedicated to high frequencies, which are compromised in standard MP3 files.

While few third parties had announced support for MP3Pro at press time, RCA (www.rca.com) had a downloadable demo program that encoded and played files at rates up to 64 kbps. (RCA is a division of Thomson.) Coding Technologies claims that 64 kbps MP3Pro files sound as good as regular 128 kbps MP3 files, but don't believe the hype. My listening tests discovered that MP3Pro creates a watery aliasing during loud passages that is not found in conventional, 128 kbps MP3s. Although my testing wasn't blind, I can confirm that the sound quality is otherwise very comparable.

While backward compatible with the original MP3 format, MP3Pro files may sound worse on players designed for the current standard because the older players will recognize only the low-frequency audio stream. Also missing from MP3Pro is any provision for copy protection or digital rights management (DRM). Coding Technologies and Thomson assert that DRM technology can be superimposed on MP3Pro, but some industry analysts remain skeptical about the format's commercial potential.

amount of data compression. This value is expressed as the *bit rate*, which is measured in kilobits per second (kbps). MP3 players and encoders handle bit rates ranging from 8 kbps to 320 kbps. The 128 kbps stereo setting has become something of a standard; MP3.com requires this bit rate for all files uploaded to its band pages. Files encoded at 128 kbps are roughly 1/10 the size of the uncompressed original file, and the sound quality is pretty good, akin to an FM radio broadcast.

At 64 kbps, stereo MP3s sound more like AM radio and distortion or aliasing may become noticeable; file size is about 1/20 of the original. Bit rates lower than 64 kbps produce a muffled or muddy sound with pronounced aliasing. (This may be an acceptable tradeoff if you're making streaming MP3s.) Higher bit rates sound better but produce larger file sizes and longer download times. 160 kbps is a popular compromise.

CBR/VBR. Most MP3s found in the wild are produced with *constant bit rate* (CBR) encoding. As the name implies, the bit rate remains the same throughout the file. The MP3 spec also allows files to be encoded using a *variable bit rate*, or VBR. This method strives to improve the balance between file size and sound quality by encoding complex passages at higher bit rates and simpler passages at lower bit rates. In practice, this produces larger file sizes than CBR with negligible improvement in sound quality. Certain online music services (including MP3.com) and many player/encoders do not support VBR. Keep your encoder set on CBR and forget about it.

Stereo/mono. Some encoders offer a choice of stereo options. "Simple" stereo encodes the left and right channels independently. *Joint Stereo* encodes information that is common to both left and right into one channel, while encoding the differences into the other channel. This process is sometimes referred to as *middle-side* stereo or *intensity stereo*. By any name it wipes out phase information, only provides benefits at bit rates below 80 kbps, and should not be used for high-quality encoding. As mentioned, mono encoding provides a smoother sound than stereo at the same bit rate (or an equivalent sound at a lower bit rate). But remember to do stereo-to-mono conversion in a professional sound editor rather than in the encoder for the best quality.

Encoding speed. Some encoders offer a choice of speed, and if you have the time, it pays to take the slow route. Slow encoding uses more CPU cycles to calculate the perceptual coding, resulting in better-sounding MP3s with no increase in file size.

Tags. *ID3 tags* are *metadata*, essentially little pieces of text you can attach to an MP3 file that carry information such as song title, album title, genre, copyright date, and even the address of a Web site. There are two versions, ID3v1 and ID3v2, with the latter holding substantially more information, including graphics.

Most MP3 players rely on ID3 tags to populate their playlist and status displays. If the ID3 tags have not been filled in, the listener will see "Unknown Artist—Unknown Song" or some other cryptic readout. It's vital for the listener experience to add complete tags to any music you distribute. Furthermore, file-sharing applications and search engines are beginning to recognize metadata, making it potentially a huge boon to targeted distribution.

If you're converting your own SDII, WAV, or AIFF files to MP3, you'll have to tag the files by hand. Most player/encoders have a rudimentary dialog box for this purpose; applications dedicated to tagging, such as Kevesoft *MP3 Tag Clinic* (Win; www.kevesoft.com), are also available. If you're encoding a popular CD to MP3 with a commercial encoder, chances are good the software will be able to download the correct information from the Gracenote database (www.cddb.com) and tag the new MP3 files automatically.

QUALITY CONTROL

Encoders aren't perfect, nor are the computers they run on. Errors in MP3 files are very common, the most prevalent being *packet loss*, an interruption that sounds like a CD skip or dropout. If a computer has lots of programs running in the background while encoding, it can easily bog down and start dropping packets.

Another common defect is *aliasing*, a grating, metallic sound associated with extreme levels of compression. If you're hearing such distortion; flanging; or a swirly, watery sound, try a higher bit rate or a different encoder. Aliasing should not really be noticeable at 128 kbps stereo but it is usually distinct at 64 kbps and lower, regardless of the encoder.

Ashampoo makes a shareware utility that scans MP3s and detects errors such as packet loss or file corruption (see "No Money Down" on p. 54). It's a real time-saver, but it's no replacement for a good set of ears. If this is your music, be sure to listen closely to each finished MP3 once or twice before hanging it on a Web site or sharing it with thousands on a network.

PLAYBACK ENHANCEMENT

Having done all we can to preserve the original sound during the MP3 compression process, let's now look at audio enhancement and restoration techniques that can recover some of that lost sound quality.

Player plug-ins. Digital signal-processing (DSP) *plug-ins* are audio effects that can be added to a host program. Nullsoft *Winamp* has the largest selection of third-party DSP plug-ins, many developed by major companies. They all work in real time, processing the music as it's played through the DirectSound audio channel. (See the sidebar "Cranking *Winamp* to 11" for instructions on configuring the program.) By directing *Winamp* to play its output to a file instead, you can apply these effects permanently, which is handy if you want to enhance MP3s you didn't make yourself and burn them onto an audio CD. I've posted a step-by-step tutorial in the DMPG area of www.emusician.com.

Sound-enhancement processors go by many names but fall into the following general categories:

Equalizers. These are multi-band tone controls similar to the ones on home stereos.

Compressor/limiters. Described earlier, these adjust the volume so it stays loud all the time.

Stereo expanders. These effects are not much different from the "super stereo" switch you find on many boom boxes—they extend the stereo image so sound sources appear to move out beyond the speakers. There are many such systems, but they all spring from the *comb filter*, a variant on the digital delay or chorus effect.

3-D or surround simulators. Rather than merely widening the stereo field, 3-D effects attempt to simulate 360-degree coverage from two speakers, so it seems like sounds are behind or even above you. These effects typically manipulate phase, level, or delay to work their magic. But like stereo expanders, they can adversely color the sound.

Exciters. These popular effects make sounds seem brighter. They're first cousins of the fuzz box; both processes add high-frequency harmonics to an audio signal. Exciters help bring out voices, percussion, and other trebly instruments. They also accentuate any distortion or aliasing in a track, so use them with care.

Bass maximizers. These "big bottom" effects are a variation

cranking winamp to 11

Nullsoft *Winamp* is a terrific MP3 player, but you can make it even better by adding plug-ins, which you can download from www.winamp.com. To run Winamp audio plug-ins, you'll first need to install Microsoft DirectX (free from www.microsoft.com/directx). You'll also need to configure them. Here's how to do it.

1. Launch Winamp.
2. Type Control + P to open the Preferences dialog (see **Fig. A**).
3. In the left panel, under Plug-ins, click on "Output."
4. In the right panel, click on "Nullsoft DirectSound plug-in" to select it. This routes audio through DirectSound so that you can process and hear it.
5. Back in the left panel, under Plug-ins, click on "DSP/Effect."
6. In the right panel you should see a list of all installed DSP plug-ins. Click any plug-in's name to enable it. The plug-in window should now open and begin processing audio.
7. Click on the Configure button under the right panel. Some plug-ins have parameters that should be adjusted here; others just display an About dialog.
8. Click the Close button to exit the Preferences dialog, and proceed with adjusting the effect.

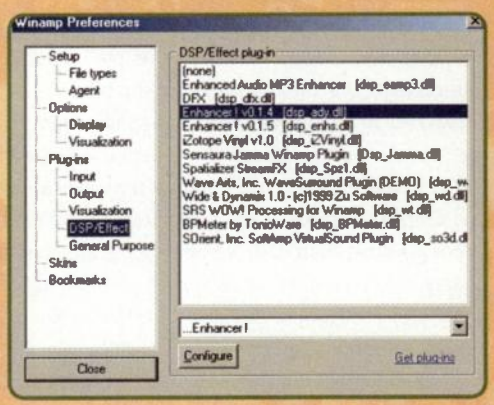

FIG. A: *Winamp*'s hidden Preferences window is the key to configuring plug-ins and output options.

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FIG. 4: Power Technology's *DFX* plug-in is derived from the company's high-end processors. The "Fidelity" control is an exciter; "Ambience" adds reverb.

FIG. 5: Do your MP3s lack bass? Adrian Iosif's free *Enhancer* plug-in for *Winamp* offers two different low-frequency enhancers.

FIG. 6: The SRS Labs Wow Thing ($29) can help restore the spaciousness, highs, and lows lost during MP3 encoding. For reviews of it and three more hardware enhancers, visit the DMPG area at www.emusician.com.

FIG. 7: For a fun effect, try the SOrient *SoftAmp VirtualSound* plug-in for *Winamp*. It simulates surround sound from two speakers.

on the exciter. They analyze just the lower range of the audio spectrum, and by adding overtones to that signal create the impression of strong fundamentals.

Reverbs. Simulating large interior spaces with cascades of tightly spaced echoes, reverbs can be used for playback enhancement, but it's a bit gauche to my way of thinking.

Exciters and stereo expanders are the most important processes for MP3 restoration, bringing back lost high end and stereo imaging, useful in nearly any circumstance. Bass maximizers and limiters are also helpful, but loss of bass is generally less of a problem in MP3s.

PLAY TO WIN

Following are profiles of some of the best *Winamp* DSP plug-ins; several of them are also available for other MP3 players, such as *RealJukebox* and *MusicMatch Jukebox*. In most cases, the programmers have hard-coded the effect parameters, providing a limited range of functionality that is controlled with a single slider. All are downloadable from www.winamp.com.

Power Technology's *DFX* (**Fig. 4**) combines an exciter, a reverb, a stereo enhancer, a limiter, and a bass maximizer. It's a versatile and good-sounding plug-in.

Adrian Iosif's *Enhancer* (**Fig. 5**) features two types of bass boost, a stereo widener, a speaker-size simulator, an exciter, and a midrange voice filter (presumably for karaoke). It sounds as good as *DFX* to my ears and is true freeware—there are no disabled features.

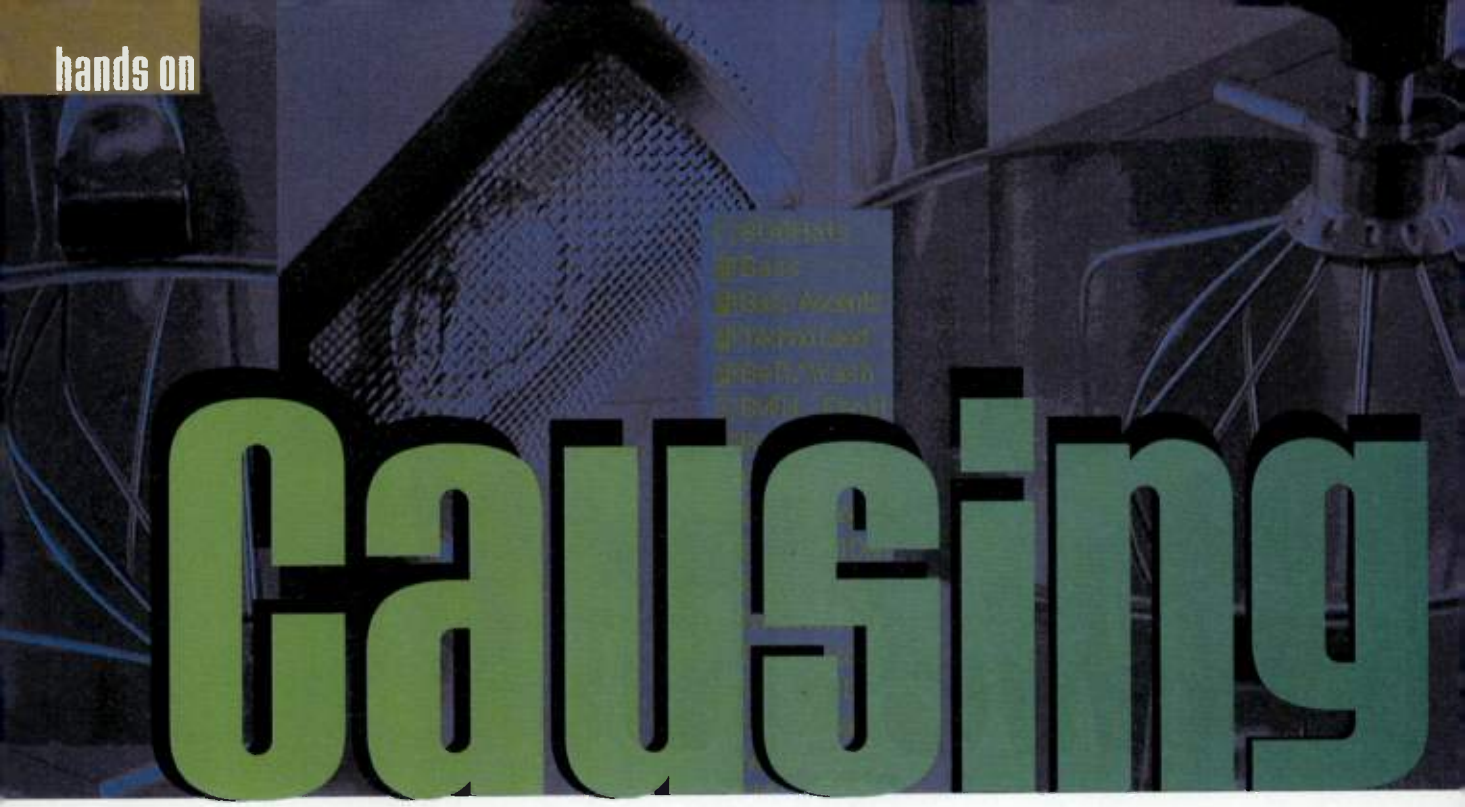
SRS Labs' *Wow Thing* offers an exciter and a stereo widener in a single process called *Wow*, in addition to bass boost. Sounding watery at maximum settings, this plug-in is essentially an advertisement for the company's better-sounding hardware enhancer (see **Fig. 6**).

SOrient's *SoftAmp VirtualSound* (**Fig. 7**) is a fun 3-D-audio plug-in that lets you create any type of four-speaker configuration. Although the effect is somewhat convincing, the phase cues are sonically obvious and may be more of a detraction than an enhancement.

While not an effect itself, GMixon's *Adapt X* permits the use of DirectX plug-ins within *Winamp*, and chains the effects if you so desire. This lets you apply any professional DSP effects you may already use in your sequencer or editor to your *Winamp* audio. If you have DirectX plug-ins, usually included with programs such as *Cakewalk* or *Sound Forge*, going this route sounds a lot better and offers more control than the consumer plug-ins mentioned previously.

MP3 STRIKES

MP3 may not be the newest or best-sounding audio file format, but its popularity and widespread support make it an obvious choice for online distribution and personal music enjoyment. Try these techniques with your own tunes to ensure that listeners get the most from your music. And don't forget to visit the DMPG section of www.emusician.com, where you'll find numerous links to MP3 encoders, listening tests, and tutorials. ■



Causing

Adding a new sonic flavoring to your music can help blast it out of a rut. For everyone whose recordings have been missing that special something lately, here are 12 easy sound-design recipes to get the studio juices flowing. Although some require you to supplement your computer with outboard gear, many can be done with software-based effects or simply by using offbeat techniques. To give you an idea of what's possible, I've uploaded MP3 examples of these projects to the DMPG page of *Electronic Musician*'s site, www.emusician.com. So grab your mouse and let's begin.

THE LAST SHALL BE FIRST

Normally, people think of reverberation as being the last effect in the chain, but things can get interesting if you place the reverb *before* other effects. For instance, I've created great distorted lead "guitar" sounds by running a basic sawtooth patch on a synthesizer through reverb and then into heavy distortion. The reverb produces random-sounding overlapping between notes, reminiscent of feedback. For more ambient sounds, try running the reverb output through a stereo modulation effect such as a chorus or phaser. The result is rich, swirling, and spacious.

MORE ON THE WEB

Hear MP3 examples of these effects in the DMPG section of www.emusician.com.

FEELS GOOD? DO IT AGAIN

A friend of mine is fond of saying, "Nothing succeeds like excess." If you're working toward a unique sound but haven't found quite what you're looking for, try duplicating the processing. If you've used one chorus, use two; if you've used one reverb, add a second. You can place the duplicate effects either in series or parallel. I prefer to use reverbs in parallel, but experiment to see what works best for each project. Sometimes running two reverbs in series will smooth out the sound perfectly.

Vary the parameters between the two effects slightly to create a fuller, more complex sound. Using effects from two different manufacturers will almost guarantee that they'll sound a little different and (hopefully) complement each other.

BUG OR FEATURE?

Ever wonder how Garbage created the strange, sputtery effect on the bridge to "Stupid Girl" on their first album, *Garbage*? It wasn't the latest effects plug-in, or a painstakingly sculpted multi-effect masterpiece, but rather the sound of a malfunctioning digital multitrack recorder. When one of their machines suddenly went on the fritz, they were quick to recognize an interesting timbre. And so instead of hitting the Stop button and powering down, they whipped out a tape and started recording (using another machine, of course!).

Equipment malfunctions can be annoying interruptions, but they can also create happy accidents as the errant gear makes bizarre sounds you might never be able to create otherwise. So the next time your favorite studio toy is acting up and spewing out mangled audio, try recording its output instead of turning it off.

SAY GOOD-BYE TO THE DRY

Glen Phillips, former lead singer of Toad the Wet Sprocket (now a solo artist; see www.glenphillips.com), has a favorite trick for creating ambient pads. He will run his guitar through delays and/or reverb—and perhaps a chorus as well—then record just the output of the effects, not the original dry signal. Using only the wet signal creates beautiful, lush pads that are wonderfully

TWELVE QUICK RECIPES FOR HEAD-SPINNING SOUND EFFECTS

BY DAN PHILLIPS

organic in quality but difficult to identify as a guitar. Of course, this trick can also work for other sources, such as keyboards and backing vocals.

HOUSE OF ODD

Back in the dawn of the sampler age, it was cool to explore the percussive possibilities of kitchen equipment, augmenting a rhythm track with spoons hitting glasses and pans crashing to the floor. While I still love a good cast-iron clank from time to time, household appliances can be a source of sustained, ambient sounds as well.

Try walking around your house and turning on any piece of electrical equipment—computer fans, food processors, blenders, razors, hair dryers, and so on. If there's a pitch within the noise, set up a mic and record it (see **Fig. 1**). With today's plentiful RAM and drive space, I'd recommend sampling 10 to 30 seconds of sound, so you can avoid (at least initially) the time-consuming task of looping. After the sound is in your computer or sampler, give it an envelope with slow attack and release times, run it through delay effects, reverb, and possibly a chorus, and *voilà*—a new ambient bed.

JEAN MORRISON

FIG. 1: Household appliances make some surprisingly evocative noises. You can't plug a microphone into this kind of mixer, but you can capture and process its sound to create a unique ambient backdrop.

LOOKING FOR SYMPATHY

Have you ever been annoyed by something in the studio that rattles when the amps are turned up? Snare drums buzzing, lamp shades ringing, glasses dancing on a table? Those are called *sympathetic resonances*, and their energy can be harnessed for good as well as evil. For instance, try using a hand drum (such as a djembe) as a resonator. Using a boom stand, place a microphone deep inside the drum, and then sing into the open end (see **Fig. 2**). You might also try tuning the drum head to match the key of the song.

You can also use a speaker to run previously recorded audio through a drum and then record the result. Producer Ethan Johns used this trick on an upcoming CD collaboration by

JEAN MORRISON

FIG. 2: By placing a mic deep inside the bell of a hand drum and singing into the neck, you can add an odd, filtered ambience to your vocals. Here I used a small-diaphragm condenser microphone with an omni capsule.

Glen Phillips and folk-circuit favorites Nickel Creek, turning a kick drum into a quirky reverb.

BE YOUR OWN SAMPLE CD

This trick is from one of my favorite bands, Geggy Tah (www.geggytah.com). On its first CD, *Grand Opening*, the band took a single vocal phrase from one track and used that one sample to create almost all of the elements for a different song on the same album. The band members reused other elements from the first CD in their latest release, as well, lending a certain self-referential consistency to their oeuvre. So the next time you're about to reach for a sample CD, consider plundering your own catalog instead.

JUST FOR THE LFO OF IT

With a tempo-controlled low-frequency oscillator (LFO), you can set the frequency in terms of note length and beats per minute instead of Hertz. This makes it easy to program flangers, phasers, and other LFO-driven effects so that they pulse in time with the music. Many modern effects processors include tempo-controlled LFOs, which detect the tempo using MIDI or a tap-tempo button or footswitch.

Tempo-controlled LFOs are very slick for processing everything from drum loops to pads, but they can also become a sound in and of themselves. You can start with almost any source signal, including simple white noise. Run the signal through a tempo-controlled flanger or phaser set to cycle every eighth or 16th note. If you can set the LFOs for the left and right channels to be 180 degrees out of phase, so much the better. I like to use downward-sawtooth shapes for the LFOs, but other waveforms will work as well.

Next, crank up the resonance (or feedback) of the flanger or phaser until you can hear the pitch distinctly. Finally, tune the center frequency so that the LFO creates laserlike sweeps, and you have a distinctive element to add to a loop.

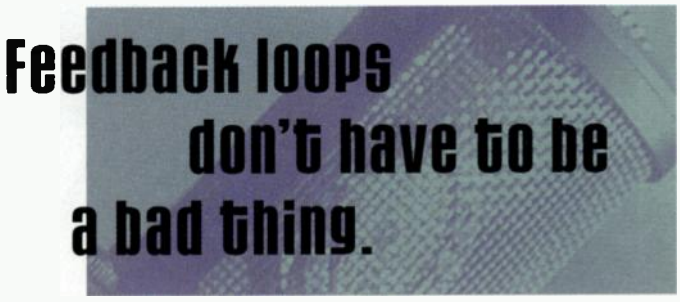
FEEDBACK . . . ACK . . . ACK . . . ACK

Have you ever been using a delay and accidentally created a positive feedback loop so the sound built in volume with every repeat until it was a pulsing, distorted mess? If so, you probably reached quickly to turn down the volume or yank out the patch cord. If you're interested in a creative experiment, however, feedback loops don't have to be a bad thing.

First, a caution: this exercise can create runaway volume levels, so before starting, make sure to turn down your speakers to a very low volume, and don't use headphones. To create a feedback loop, begin with a delay effect. I like to use very long delays, between 8 and 40 seconds, but short delays also produce good results.

You may be able to create the loop entirely within a single effects device by setting the delay's internal feedback volume so high that it's equal to or greater than the input level. You can also patch several effects (filters, delays, reverbs, pitch shifters, and so on) together in a chain so that the last one feeds back into the first.

Once you've created the loop, "seed" it with a bit of audio input—a noise burst, vocal phrase, keyboard or guitar lick, loop, or whatever catches your ear. Then wait for a while and allow it to build on itself. Sometimes I'll even walk out of the studio for



ten minutes or more, then come back to hear what's happened.

Alternately, stick around as the loop builds and try modulating elements within the loop: change delay times, pitch-shift amounts, filter cutoffs, volume levels, and so forth. This is especially effective with long delays, because it takes a while for these changes to come back around.

Once the sound has built into something interesting, record the output. (Because hard disk space is so cheap and plentiful, I'll sometimes just press Record at the very beginning.) You can then load the sound into a sampler, import it into an audio

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track as an ambient bed, or use it as the basis for further experimentation.

SMOOTH MODULATOR

Sometimes called *modulatable* or *glide* delays, interpolated delays smooth out changes as you change the delay time, creating a temporary pitch-bend effect. (Choruses and flangers are essentially very short interpolated delays driven by LFOs. Delays that don't have interpolation will click as the delay time is changed.) You can find this type of delay on effects processors including the Korg OASYS PCI, the Lexicon PCM 81, and the Eventide DSP 4000, DSP 7000, and Orville.

Interpolated-delay algorithms generally allow access to the degree of smoothing, which means you can control the time it takes to slide from one delay setting to another (see **Fig. 3**). With higher degrees of smoothing, you can create very cool tape-stop and Munchkin effects by switching the delay time from very short to very long and back again. Use this in conjunction with feedback, as described in the previous tip, for even more interesting results.

FIG. 3: Interpolated delays let you change delay times smoothly, often creating an interesting pitch-bend effect during the transition. The Smoothing knob on this control panel for an Korg OASYS PCI sound card determines how long it takes to slide from one delay value to another.

TRIGGERED GATES

Gate triggering is currently my favorite production trick, and it's dead simple. Start with a pad—strings, vocals, analog sawtooth, or the like. Send the pad through a gate with external triggering ("keying") capabilities; this could be a plug-in, an analog gate with a key input, or a MIDI-controlled gate. Next, the fun begins.

Create a monophonic rhythm pattern in your sequencer to use as the gate trigger (see **Fig. 4**). You could use straight eighth or 16th notes, but you'll get more interesting results by varying the rhythm, the note duration, or both. Next, send the output to the gate's trigger input. If the gate responds directly to MIDI Note On messages, you're done. If it requires an audio key input, assign the MIDI track to a synth patch with a fast release time (for precise duration control), and then use the synth's audio output as the key.

At this point, your pad will have become a pulsing rhythm, controlled by the gate. If the gate allows it, work with the attack and release controls to hone the sound. Now you can experiment: Add a tempo delay after the gate to augment the rhythm (with a tempo delay, you can set the time in note-length and tempo instead of milliseconds). Program filter sweeps or other timbral changes in the pad. Vary the gate's attack and release in real time. Change the duration of the trigger pulses.

Here's another variation, suggested by musician and producer Thomas Dolby Robertson: program the gate (or expander) so the volume is not completely off when the gate is closed. That lets the pad continue to sustain, with the triggered gate providing a gentle pulse on top.

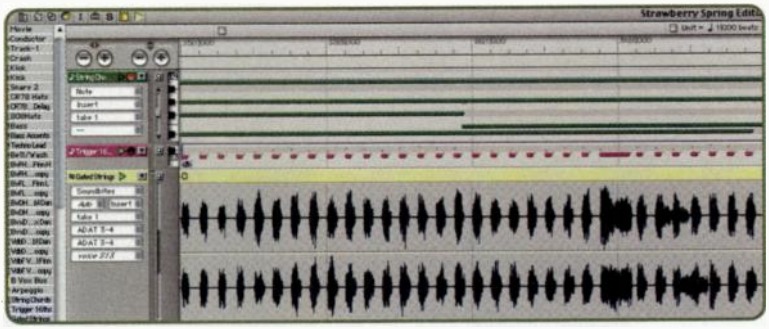

FIG. 4: In this window from MOTU *Digital Performer*, a MIDI track (green) is playing string chords on an E-mu e6400 Ultra sampler. The sampler's output is routed through a gate in an OASYS PCI, which is being triggered by the middle (purple) MIDI track. The stereo audio track at bottom shows the result: a rhythmic, pulsing string pad.

DARTH VOCODER

The name *vocoder* comes from what the device was originally intended to do—encode voices for data-efficient telephones. While the technology never came into common use for those weekend calls to Grandma, it did give us the processed vocal timbres of Laurie Anderson's "O Superman" and Styx's "Mr. Roboto."

For a completely different sound, and one that blends more easily into a mix, try giving the vocoder a rhythmic twist by using drums instead of vocals for the modulator input. (The modulator input controls the output sound's rhythmic and harmonic content, whereas the *carrier* input provides the dry sound.)

Use a pad with high-frequency content, such as airy vocals or strings, for the carrier. The result is similar to the effects of the triggered-gate trick, but with a unique, softer twist. For a thick, unusual drum timbre, try using white or filtered noise as the carrier and then mix the vocoder output with the dry signal. The final effect is something like a compressed room reverb run through a fluttery cassette tape—weird and ear twisting.

AN EVEN DOZEN

So, that's the wrap: 12 tricks to break out of the sonic doldrums. Stop by the DMPG page at www.emusician.com to hear them in action, try a few yourself, and then go and invent some of your own!

SINGER/SONGWRITER/PRODUCER **DAN PHILLIPS** IS ALSO A PRODUCT MANAGER AT KORG R&D. CHECK OUT HIS MUSIC AT WWW.DANPHILLIPS.COM.

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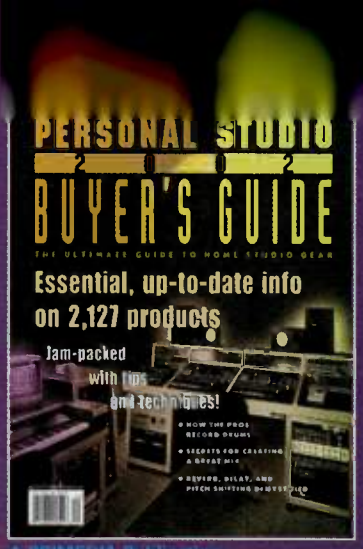

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cheap Bastardizations

Every few months, music-software companies add spectacular new features to their programs, but some of the most useful goodies are right under your nose. You can exploit tons of tricks, secret compartments, and insider hacks to squeeze more music out of your computer right now. These "cheap bastardizations" aren't just fun to try—because they involve finessing common software and your operating system itself, they're dang near free.

I've picked some of the best, for both Windows and Mac, to highlight. Except as noted, I tested Windows tips in Windows ME and Mac tips in Mac OS 9, but most should also work in other versions of the operating systems. (Don't worry: these techniques are sneaky, but they're safe and reversible.) I'll start with some powerful key commands for both platforms and then focus on each platform individually.

By Jim Rippie

www.emusician.com

THE KEY(S) TO FAST NAVIGATION

You probably know that you can switch instantly between programs with the Tab key. (In Windows, press Alt + Tab. In Mac OS, it's Command + Tab; the Command key has an Apple logo and/or a four-corner "clover leaf" symbol on it.) But there are many other

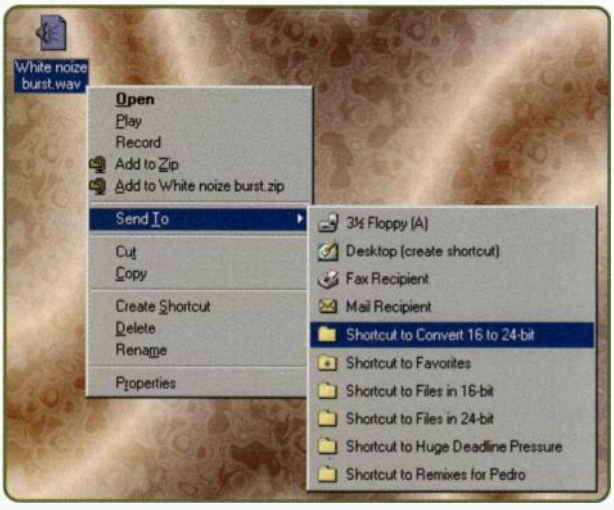

FIG. 1: Use Windows' right-click Send To menu to move files to frequently used or important folders instantly. Your wrist will thank you.

key commands you can use to rocket around your programs without groping for the mouse. With the number of files you have to save and locate during a typical music project, the time savings add up quickly.

Windows navigation secrets. Use your keyboard for a quick trip to a clutterless desktop by pressing Windows + M. This minimizes (hides) all the open windows. (The Windows key has, not surprisingly, a Windows logo on it.) Press the Backspace key to back out of folders, moving to the enclosing folder. It's faster and easier than trying to hit that tiny "up folder" button with your mouse.

Windows also provides a handy "fast-forward" mechanism in its file manager: right-click on any file, and you will see the Send To menu (see **Fig. 1**). You've probably used this menu to create an e-mail with the highlighted file as an attachment, but by adding your own items to the menu, you can also use it to move any file to an important folder instantly. To modify the menu, just create a shortcut to the desired folder in the Windows SendTo folder. In Windows 98 and ME, the SendTo folder is in the Windows folder (see **Fig. 2**). In Windows 2000, it's in the Documents and Settings folder.

Mac navigation secrets. Holding the Option key when dragging an item in the Finder creates a copy of that item. But holding Command + Option when dragging an item creates an alias of it (rather than a copy) wherever you drop the item. Even better, the Mac doesn't add that annoying "alias" to the end of the file name when you use this technique.

The Mac's Command and arrow keys allow you to fly through Finder windows. Command + Down Arrow opens a folder (and when used on a file, opens the file). Command + Up Arrow opens the enclosing folder. Add the Option key to those combinations to close the window you were looking at automatically when the new item opens, avoiding clutter. The Command + Up Arrow shortcut also works in Open/Save dialog boxes. To open or save a file on the desktop, press Command + D.

OPTIMIZING WINDOWS FOR MUSIC

Most people—especially cheap bastards—hate plunking down hard-earned money for computer upgrades before they are absolutely necessary. But you can take some easy steps to delay that day by altering settings to make your current hardware run better, especially for performance-sensitive tasks such as MIDI and audio.

I'll start with some easy optimization tricks that aren't too risky. A word before you begin: keep track of everything you try and try no more than one idea at a time. That way, if a tip doesn't work with your particular setup, you can remember what you changed and back out easily. Most important, use these tweaks only if you aren't getting enough performance or stability out of your system—if it ain't broke, don't fix it.

Networking for success. Network servers would seem to have nothing in common with music-making computers. The former prioritize network activity such as running mail-server software; the latter focus on getting music in, out, and edited as smoothly as possible. Irreconcilable differences? Not for cheap bastards. Both systems need great disk performance. Open your System control panel, head for the Performance tab, and click on the File System button to open the File System Properties dialog box (see **Fig. 3**). Select Network Server in the drop-down menu to make your machine masquerade as a server. Windows will give more attention to disk activity, and you should get more audio tracks.

Run DMA. To further increase hard-drive performance, enable Direct Memory Access (DMA). What's DMA? Long story—cheap bastards can skip the details and just turn it on (see **Fig. 4**). Get there by going to the System control panel and clicking on the Device Manager tab. In the list of devices on your system, find your hard drive (or drives) and display its properties. (For those with undying curiosity, DMA allows your computer to read and write data more efficiently by offloading data-copying from the CPU itself.)

MORE ON THE WEB

Cheap Stuff Online

Visit the DMPG section of www.emusician.com for an open bar of music software, AppleScripts, and links to more computer-acceleration resources.

At the risk of revealing myself as a non–cheap bastard, here's a great tip for audio: spend some money and use a second dedicated hard disk for recording and playback. Your main hard drive is occasionally busy loading software, checking other files, storing virtual memory, and executing other mundane tasks. When your dedicated audio hard drive is busy doing nothing but handling your music and you see your track count climb, you'll thank yourself.

If you can't afford a new hard drive or you really are a cheap bastard, you can make the best of a pretend drive you can create by dividing a single physical drive with software like PowerQuest's

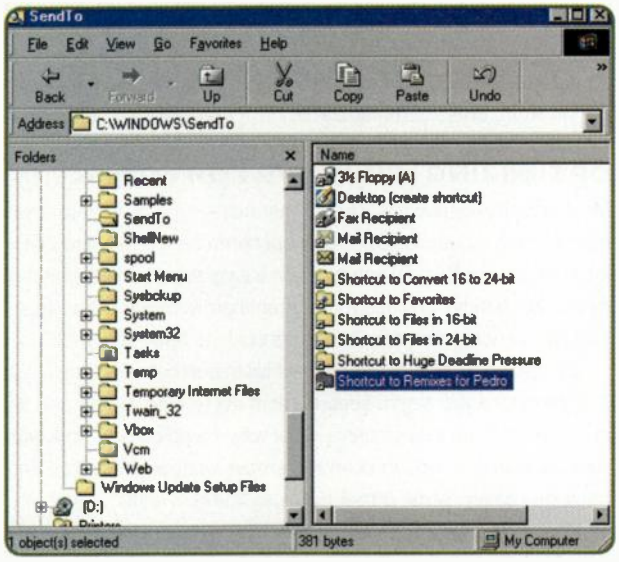

FIG. 2: Adding folder shortcuts to the Windows SendTo folder will add destinations to the pop-up Send To menu.

Partition Magic. Put your audio on the lowest partition (the lowest letter, typically Drive C, reported by your partitioning software). This partition lies at the outside of the platter, and thus has the fastest seek and file-access performance.

Power outages. California isn't the only place you'll encounter power outages. Computer users face "mini brownouts" all the time as operating systems throttle back the CPU and other hardware in the name of better energy conservation and longer laptop battery life.

Windows may manage power like a dominatrix, but here's how to reverse the roles: disable Active Configuration and Power Interface (ACPI). Having ACPI enabled on some systems can cause poor audio performance and even IRQ problems. This tweak is pretty esoteric, so try it only if you have problems that don't seem to disappear with other solutions.

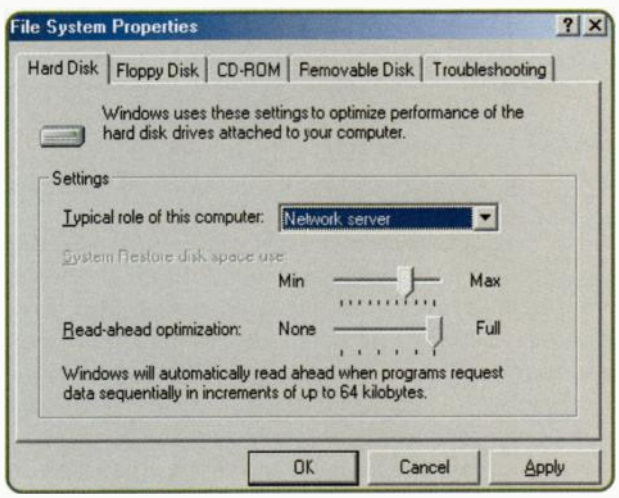

FIG. 3: Your computer doesn't have to know that you're a lowly musician, not an Internet Service Provider. Pretending to be one can get you more audio tracks.

Much of ACPI's control comes from the hardware itself—you enable and disable it in BIOS, the mini-OS stored in ROM on your motherboard that helps boot your machine. To get inside BIOS, look for an onscreen instruction as your computer boots ("Press Delete to enter BIOS," for example). There are a lot of settings in BIOS; look for Power Management or anything with a similar name. If you use a laptop computer, be sure to check the power-management control panels for settings that slow the processor or hard drive when the PC is running on battery power.

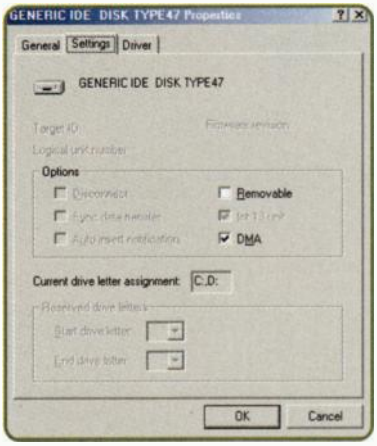

FIG. 4: Don't ask what it is; just turn on DMA. You'll enjoy the results.

Kill unnecessary tasks. You'd be surprised by the number of superfluous programs running behind the scenes on your system, sucking away performance you could direct toward music. To see what is active, hit Ctrl + Alt + Delete to bring up Windows' *Task Manager.* It lists all running items, displays which (if any) are no longer responding after crashes or other problems, and gives you a chance to shut down misbehaving or unnecessary tasks.

You could shut down superfluous programs that way every time you booted, but preventing them from starting at all is a better long-term solution. For that, use *MSCONFIG* (see **Fig. 5**). This application, located in the System directory of your Windows folder, provides a graphic interface to edit Windows configuration files, which tell the computer what tasks to initiate at system startup. *MSCONFIG* also features other settings that help you step through the boot process to identify problems and control startup behaviors.

But I really want to DirectMusic. Many pros who create sound and music for games are familiar with Microsoft's free authoring tool for DirectMusic, *DirectMusic Producer.* It's a secret weapon with a host of interesting uses, such as being able to mock up film cues quickly and perform live remixing. *Producer* can also turn your PC into an interactive software sampler.

For this, you'll take advantage of DirectMusic's support of the Downloadable Sounds Level 2 (DLS2) format. Wearing your new sound-designer hat, you can import your own mono or stereo WAV files into *Producer*'s DLS Designer and assign those sounds to keys on a MIDI keyboard. You can adjust envelopes, add low-frequency oscillators (LFOs), and apply lowpass filters, all with MIDI control (see **Fig. 6**). You can then use *Producer* itself as your soft synthesizer or export your sounds for use in DLS2- or SoundFont-compatible synthesizers such as a Sound Blaster Live sound card.

Because its heritage lies in sound design for games with highly interactive needs, DirectMusic is an interesting tool for DJs and producers who crave interactive control. It renders audio in real time, provides mechanisms for controlling real-time transitions, and enables composers to add and subtract new audio textures

interactively, all the while maintaining tight rhythmic synchronization (see **Fig. 7**).

DirectMusic Producer also offers features not often found in traditional sequencers. It can layer looping segments with unique time signatures to create polyrhythmic textures and can create additive layers of pitch bends or volume changes. For real bang-for-no-buck factor, play with *Producer*'s ability to remap MIDI files to new chord changes. The Demo8 sample project included remaps Bach's A-minor Prelude to the progression in Coltrane's "Giant Steps." Suitably curious yet? Visit the DMPG section of www.emusician.com for links to *DirectMusic Producer* and tutorial files.

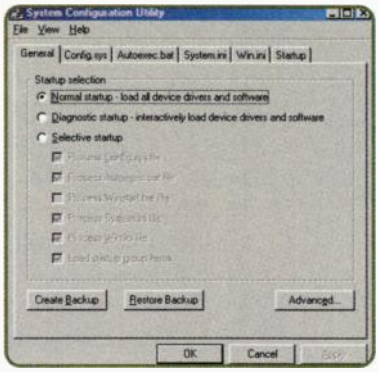

FIG. 5. *MSCONFIG* makes controlling what's running on your PC much easier than manually editing system files in a text editor.

OPTIMIZING MACS FOR MUSIC

You can't really get inside the inner workings of a Mac without resorting to bizarre contortionist acts, so I'll cover some of the simpler ways to diagnose problems and improve performance.

Call the Manager. Many Mac crashes and problems are caused by *extension conflicts.* Extensions are little bits of code that load into your Mac's memory at startup to provide additional features. Their cousins, *control panels,* offer extra features, too, but with some user-adjustable settings. (The icons that march across the bottom of your screen when you boot represent extensions and control panels loading into memory.) Unfortunately, because extensions and control panels are developed by a variety of programmers, they often conflict. To promote harmony and better performance, fire up the Extensions Manager control panel. This utility allows you to determine which extensions and control panels will load at startup. You'd be surprised how many aren't necessary.

One way to diagnose problems is to select All Off in Extension Manager's Edit menu to disable everything, then restart. If your programs run, you'll experience much snappier performance because all that gunk won't be in memory. More likely, though, your music software will need at least a few of the disabled extensions and control panels to work: QuickTime, OMS, CD-ROM drivers, and various libraries are common requirements. (Often the programs will tell you what's missing when you try to launch them.) So after restarting with extensions off, use Extensions Manager to add the excluded items in small groups (starting with the Apple "base" items) until you are able to run your programs or reproduce the problem. Having identified the problem, you can either live without the extension or contact the software developer's tech-support department for advice. The rule for this exercise is similar to the rule for adding hot chilies to salsa: start small and add gradually.

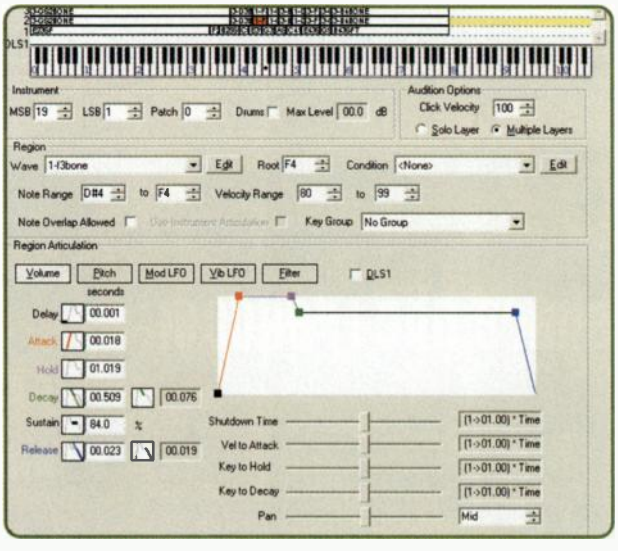

FIG. 6: Extensive sound-design control is at your fingertips with Microsoft's free *DirectMusic Producer.*

This rule has a corollary: don't install every kooky utility and extension on the planet. The most productive audio professionals keep their systems lean and mean, restarting with a carefully controlled set of extensions when they do work. (You can save extension sets, but unless you also *lock* them, they'll be modified whenever you install a new extension or control panel. Visit the DMPG section of www.emusician.com for a free drag-and-drop utility that will lock and unlock extension sets.)

Mac the Ripper

Apple's free *iTunes* (www.apple.com/itunes) can digitally extract ("rip") tracks from CDs and transfer them to your hard drive. To save disk space, the program defaults to saving the ripped files as MP3s. But you also have a high-quality option: uncompressed AIFF or WAV files. Set those up on the Importing section of *iTunes*' Preferences window (see Fig. A). You'll get original-quality audio at the expense of lots of hard drive space (typical CDs have more than 500 MB of sound).

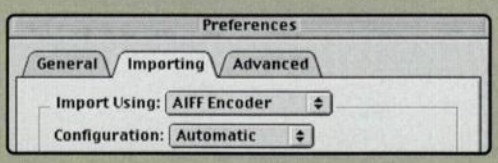

FIG. A: This hidden menu lets you command *iTunes* to rip audio from CDs without degrading it.

FIG. 7: Microsoft gets funky. With *DirectMusic Producer*'s Secondary Segment Toolbar, you can trigger audio loops interactively.

No-hit *Sherlock*. Apple is rightfully proud of its fast *Sherlock* search program, which can locate documents quickly, even searching inside them for specific words. The price for speed in this case is *indexing*, a lengthy process during which the Mac tabulates names, locations, contents, and other attributes of your documents. The Mac is set to index automatically on a schedule, and if indexing occurs as you record audio, it could trip you up. (By default, it happens at midnight, but everyone knows musicians stay up past their bedtimes.)

Sherlock provides a slider to control system responsiveness during indexing, but you'll be better off if you simply deactivate automatic indexing. Select Index Volumes from *Sherlock*'s Find menu and turn off the Use Schedule checkboxes as shown in **Fig. 8**. Just remember to index your drives every few days if you want to keep your searches fast. Use the Create Index button in the same dialog box and then go get a snack, because it takes a while. If you want to get fancy, you can use the Mac's Energy Saver control panel to wake up the computer for a few hours every day at a time when you won't be around; then, schedule indexing to coincide with that period. You can also index individual folders by Control-clicking on them.

Tales from the script. AppleScript, a simple programming language, is the secret weapon of many a Mac-savvy cheap bastard. Everything you need to use it is included on your system. You can create scripts that automatically do almost any process you could do yourself, step by plodding step. Most Mac applications respond to at least a few commands (an instruction to open a document, for

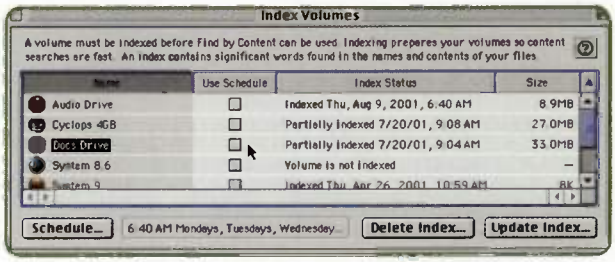

FIG. 8: To avoid spontaneous indexing heartburn, uncheck *Sherlock*'s Use Schedule checkboxes or schedule indexing for a time when you won't be recording audio.

share the freedom

The Web abounds with cool musical tools for the askin'. Most of the following programs are freeware, but for cases in which the authors request a shareware donation, please remember to support their efforts and vote your enthusiasm with your wallet. (More great shareware and freeware is profiled in "No Money Down" on p. 54.)

analogx utilities (Win). You'll find a stupendous set of free music programs at www.analogx.com. Of particular interest is *DXMan*, which helps you manage DirectX plug-ins, and *TapTempo*, which calculates tempos and delay times (for creating echo effects) as you whack your Spacebar on the beat. Check out AnalogX's music while you're there.

groovelab (Mac/Win). This is one of those rare treats—a truly simple, fun, and useful online-only application. Click on boxes in a grid to whip up drum patterns in your Web browser and then download the audio result (www.artopod.se/groovelab).

MIDI-OX and MIDI Yoke (Win). These free MIDI utilities are useful, updated frequently, and stable. Use them for monitoring, troubleshooting, and routing your MIDI streams—to determine whether your hardware is sending controller messages properly, for example (www.midiox.com).

soundapp (Mac). Long a favorite of the Mac community, this free, AppleScript-savvy utility lets you audition and convert audio files within a variety of formats (www-cs-students.stanford.edu/~franke/SoundApp).

virtual audio cable (Win). With this free program, you have the ability to route audio streams (including material you're monitoring through Internet media players) to other applications such as recorders. Note that it may not work in Windows XP, still in development at press time, because Microsoft is working to close loopholes like these (www.ntonyx.com).

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driving the web

You don't have to be cheap to appreciate the benefits of online storage. If your computer were stolen or burned to a crisp, your data would still be safe on a remote server, accessible from any computer with an Internet connection. That's the theory, anyway. Due to the dot-com crash, many online storage services have gone to that great 404 error in the sky. Still, a few free sites are left, and several offer a public area you can use to distribute files to friends and colleagues.

Freedrive (www.freedrive.com). Although reliable, this service bombards you with e-mail solicitations and ads and provides only 5 MB of storage in free mode.

iDisk (www.apple.com/itools). Part of Apple's iTools suite, iDisk gives Mac users 20 MB of free space.

Myplay (www.myplay.com). Get a whopping 3 GB of MP3 storage and listen to your collection online.

Yahoo Briefcase (http://briefcase.yahoo.com). Building on Yahoo's clean design, the Briefcase service offers 25 MB of storage and can restrict folder access to people you approve.

A few words to the wise: Internet companies can disappear abruptly, so always keep a local copy of items you place online. If you put something in a public folder, anyone who stumbles across it will be able to check it out. So if it's sensitive, encrypt it with a utility such as *StuffIt*, *WinZip*, or something stronger before uploading. Most important, be sure to read the usage terms for any service closely before signing up. You don't want to give away the copyright to your own files unwittingly when you click the inevitable "Yes, I agree" button. When you put your own MP3s on Myplay, for example, you grant it permanent rights to distribute your music royalty free. Not all services are scurrilous; most have outlandish terms mainly to ward off even more outlandish lawsuits. Remember to read everything thoroughly and know what you're doing.

If you have doubts, don't sign up.

example), and some make nearly every feature scriptable. **Fig. 9** shows a simple AppleScript included with Felt Tip Software's *Sound Studio*, a shareware audio editor (www.felttip.com).

AppleScript is particularly helpful for tasks you do every day or several times a month, such as backing up your current work to CD-R. You can run the scripts like baby applications, or you can attach them to folders so that they run when the status or content of the folder changes. For example, you could set up a "drop and burn" folder in which anything you put it in would be burned to CD

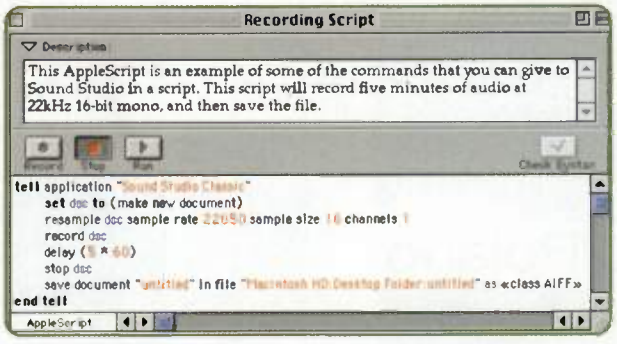

FIG. 9: AppleScript, a free programming language shipped with the Mac, enables you to write custom macros. Not a programmer? Simply click the Record button, and *Script Editor* (shown) will record your moves.

automatically. To attach a script to a folder, hold the Ctrl key, click on the folder, and choose the Attach a Folder Action command.

AppleScript's potential is too vast to cover here. For some basics, select Mac OS Help from the Finder's Help menu and search for "AppleScript." For more details, stop by the DMPG section of www.emusician.com to peruse some actual scripts as well as tutorial links.

CHEAP, MASTERED

Two of the most straightforward ways to pump up your computer's music performance—adding RAM and a dedicated audio hard drive—are now so inexpensive that you may wonder if it's worth the effort to try the cheap bastardizations I've mentioned. But time is money, too, so many of the tips have more to do with working efficiently than with making esoteric hardware tweaks. Of course, there's a lot more to know about your system, especially with updates to Mac OS X and Windows XP on the horizon. Visit www.emusician.com for links to more information. And remember—if you were a U.S. subscriber to *Electronic Musician*, you would have received this issue for free.

JIM RIPPIE, A BOSTON-AREA CONSULTANT, CURRENTLY APPLIES HIS TECHNICAL AND MARKETING EXPERIENCE FROM MUSIC-SOFTWARE AND OPERATING-SYSTEM COMPANIES TO TECHNOLOGY LICENSING FOR SONIC NETWORK AND OTHERS. THANKS TO DAVE YACKLEY IN MICROSOFT'S DIRECTMUSIC GROUP, *ELECTRONIC MUSICIAN* CONTRIBUTING EDITOR LARRY THE O, AND ADAM BURCH'S TECHNICAL SUPPORT CREW AT CAKEWALK FOR HELPFUL CONTRIBUTIONS.

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WRH

Whoever decided music had to be hard? Thanks to a new crop of innovative software, making joyful noise is easier than ever—and the results can sound terrific. I uncovered seven easy-to-use programs that deliver an especially big sonic bang, and then teased some insider production tips out of the developers. Don't let the low prices fool you. Whether you're a "nonmusician" (no such thing) or a seasoned audio and MIDI veteran, you'll be surprised what you can do with these software "toys," all of which cost less than $120 on the street. Faster than Hot Wheels, more streamlined than Barbie, harder-hitting than a Rock 'Em Sock 'Em Robot, here are seven fun and affordable tools that put the "play" back into playing music.

play hard

"Toy" music software proves you can sound good while having fun.

By Randy Alberts

MES isynth 1.2

MAC $79.00

With a Macintosh G3/300 MHz, any VST 2.0 host program, and $80 from this month's paycheck, computer-music enthusiasts and hardcore MIDI fiends alike can use *iSynth's* virtual analog bass; FM synth; effects; sequencer; and sample-based drum, loop, and player modules to make cool sounds right out of the can.

INSIDER TIP: COMPILING THICK DRUM-PAD SAMPLES

Open an eight-pad kit in *iSynth's* Tangerine Drums module; trigger its sounds with your mouse, computer keyboard, or MIDI keyboard; then use the Record Direct to Disk feature to create a short AIFF audio file of the groove. Repeat eight times, open another Tangerine kit, and finally load each drum groove into its own drum pad for one sick sample-based drum machine.

CONTACT: MES/Cycling '74 (distributor); tel. (415) 621-5743; e-mail info@cycling74.com; Web www.cycling74.com

WIN $39.95

Voyetra Hip Hop eJay II

Its infectious Groove Generator, drag-and-drop loop arranger, and ability to time-stretch and import almost any sound file are sweet, but *Hip Hop eJay's* niftiest noodling tool is its Scratch Generator. What's more, you seldom get loops of this quality for anywhere near this price. Desktop DATs (digital-audio turntablists) never had it this good.

INSIDER TIP: INTELLIGENT MOUSE SCRATCHING

Select a sound you'd like to scratch and open Scratch Generator. Move the squiggly line back and forth across the waveform with your mouse to "scratch" live to a song. Record (aka *automate*) the scratches as a new sample, then manipulate it during playback as your phantom self scratches away.

CONTACT: Voyetra Turtle Beach; tel. (800) 233-9377 or (914) 966-0600; e-mail info@voyetra.com; Web www.voyetra.com

Mixman DM² Digital Music Mixer

WIN $119.95

Speaking of scratching, nothing puts tactile digital audio at your fingertips like the DM², which connects to a PC through the USB port. Using a modified version of the slick *Mixman* program, you can scratch and remix up to 16 simultaneous sample loops while warping the sound in real time with the joystick. Export your creations in RealAudio, WMA, or WAV format or upload them to Mixman's Internet radio station to share with the world.

INSIDER TIP: SCRATCHING A VOCAL LINE

Set the Scratching option to Last Beat, plug in a mic and record a vocal, then load your new sample into the left turntable and lock it. Load and lock a drum loop into the right turntable, slide the crossfader hard right, then use the Transform button to bleed the locked vocal sample into the right turntable mix while scratching the left turntable.

CONTACT: Mixman; tel. (650) 295-2300; e-mail info@beatnik.com; Web www.mixman.com

IK Multimedia GrooveMaker 2.0

MAC/WIN/BEOS
$79.95

Otherwordly controls aside, *GrooveMaker* is one of the fastest ways to generate backing tracks—and even complete pieces. It comes with great-sounding loops of basses, synths, drums, effects, and percussion sounds, but it also imports WAV, AIFF, MP3, and other sound formats in real time. Using the program is as simple as clicking on a single button to generate fresh combinations of riffs and grooves, then clicking on another button to store them. You can adjust the level and panning of each loop or lock it down for groove-to-groove flow.

INSIDER TIP: CREATING MELODIC SOLO RIFFS

With a groove going in the main screen, click the ARP button in the lower left corner to reveal a tiny keyboard. Click on the notes you'd like it to arpeggiate, hit the Mark button, and repeat up to 128 times. Then jam with the groove by hitting the numbered circles above the Mark button in time with the beat; each circle triggers a stored arpeggio. You can choose among 250 synth sounds for each of your 128 arpeggios for some huge multi-instrumental dynamics.

CONTACT: IK Multimedia; tel. (866) 243-1718 or (510) 434-1490; e-mail info@ikmultimedia.com; Web www.groovemaker.com

WIN $69.00 Cakewalk Plasma 1.0

Plasma will get your blood pumping with its *Acid*-format loop support, graphic MIDI editing, unlimited audio and MIDI tracks, instrument- and vocal-recording capabilities, automatable effects pad reminiscent of the Korg Kaoss, and DXi software-synthesizer support. (Audio Simulation's *DreamStation DXi* soft synth is included.)

INSIDER TIP: FROM WEB TO LOOP

Import a downloaded MP3 file and trim it down to a likable loop by dragging its edges between the loop points until it sounds smooth. Right-click to convert it into a *Plasma* Groove-Clip, then modify its tempo and pitch for use in other compositions.

CONTACT: Cakewalk; tel. (617) 423-9004; e-mail info@cakewalk.com; Web www.cakewalk.com

Magix Music Video Maker Generation 6 Deluxe

WIN $79.99

If Tchaikovsky were reincarnated this year, do you think he'd be mixing it up with 64 audio and video tracks and some software synths, tweaking effects knobs, and cutting a trippy AVI video of his new techno band all at once? Yep, especially if he had *Music Video Maker 6 Deluxe* installed on his new PC. If you thought playing with audio loops was fun, wait till you start making videos with the included clips.

INSIDER TIP: USING THE MEGA-EFFECTS RACK

Select an audio track, open the Audio FX Rack, and go nuts. Use the mouse to draw precise EQ curves to create unique voicings, then compress, delay, distort, vocode, surround, filter, gate, and time- or pitch-shift at will with the stacked onscreen effects rack. Pile on some DirectX effects plug-ins, then power up the sleek Silver Synth and its intuitive pattern generator for some killer bass lines.

CONTACT: Magix Entertainment; tel. (310) 656-0644;
e-mail info@magix.com; Web www.magix.net

Codemasters MTV Music Generator 2

PLAYSTATION 2 $49.99

Your dad, wife, or music teacher will have to take your PlayStation 2 a lot more seriously now. Even without the optional 3-D video glasses and $15 USB microphone kit for recording your jams with seven friends, *MTV Music Generator*'s massive onboard sample library and automatic tempo- and pitch-matching technology offer plenty of sonic potential.

INSIDER TIP: LIVE JAMS AND POST-PRODUCTION

Connect up to eight players to the optional USB audio interface and record their jams right into your PlayStation 2. To smooth transitions or remove any memory-hogging dead air after the jam (long pauses, amp noise, dog barks, belches, and the like), just open the track in the Volume Editor, use the mouse to draw out the offending audio, and save the song file.

CONTACT: Codemasters USA; tel. (212) 582-3522;
e-mail support@codemastersusa.com; Web www.codemastersusa.com

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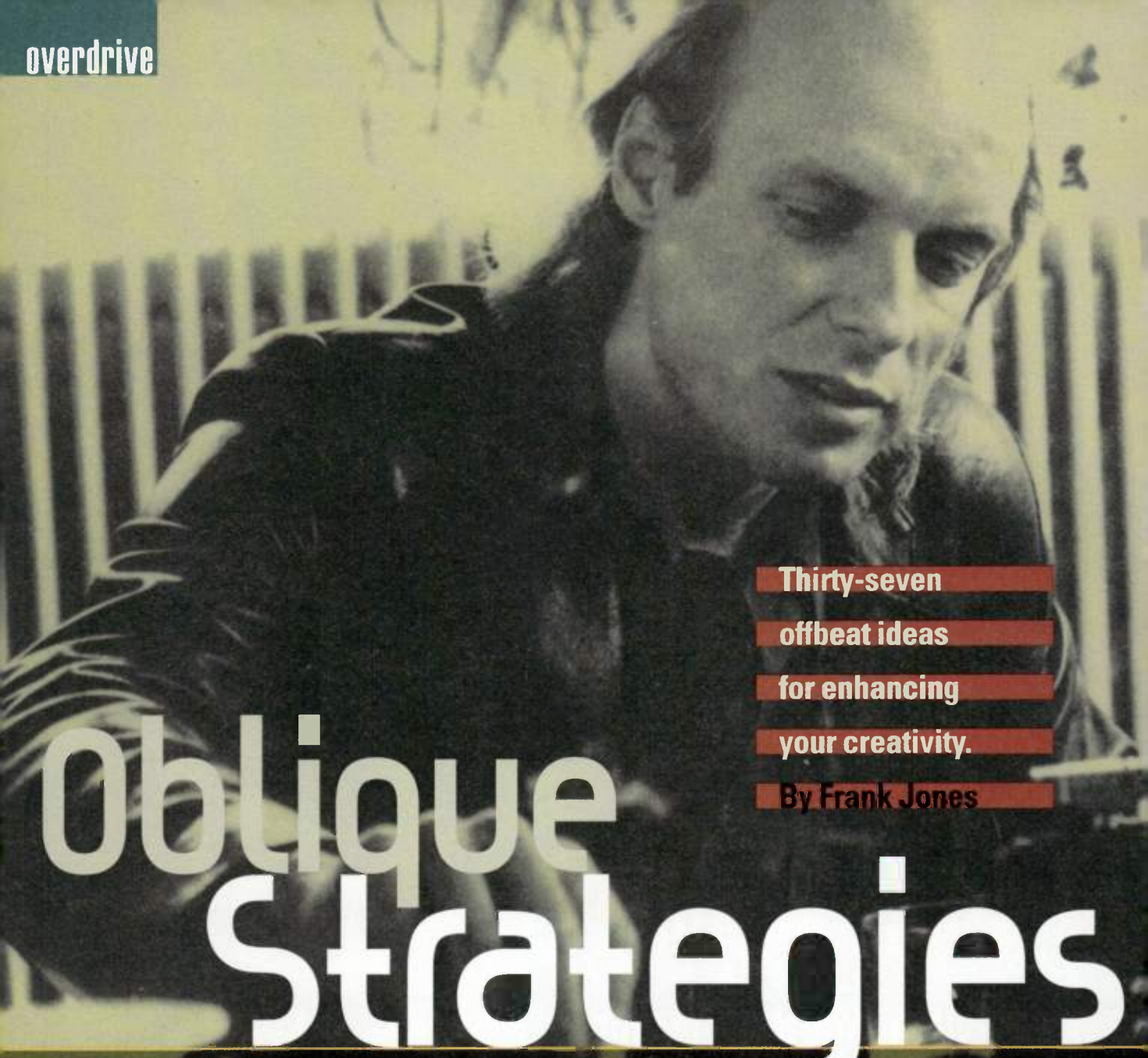

Thirty-seven offbeat ideas for enhancing your creativity.

By Frank Jones

Oblique Strategies

for Desktop Music

There's a great scene in the movie *Slacker* in which a spaced-out but kindly hippie amuses her friends by trying to solve their problems with a deck of cards. Upon greeting someone, the woman fans the deck and asks the person to select a card, each of which is inscribed with a Zen-like, ambiguous suggestion for approaching a dilemma. The results are some of the funniest moments in the movie.

Created in 1975 by producer Brian Eno and painter Peter Schmidt as a way to break through creative blockage, that deck of cards is called the *Oblique Strategies*. Over the years, the *Oblique Strategies* has developed a cultlike following of musicians and artists, largely because of the universal nature of the inscriptions. Although four editions have been printed, there are only a few thousand decks in existence, and those are highly prized by collectors.

Luckily, several digital versions of the deck are available online. If you have ever found yourself creatively blocked or feeling uninspired, the strategies just may be your ticket to summoning the muses—provided you can find the right interpretation.

Although inscriptions such as "Take away the elements in order of apparent non-importance" and "Just carry on" seem self-explanatory, others are not so obvious. To address this, I've compiled my favorite *Oblique Strategies* and added ideas for using them in desktop music production. These interpretations could serve as a starting point—or better yet, inspire you to come up with your own creative strategies. So let's shuffle those cards and begin.

Are There Sections? Consider Transitions

Is that verse-to-chorus transition sounding a bit rough? How about adding a two- or four-bar bridge to smooth it out? Does your song begin with an instrumental version of the verse? You may want to write an introduction that is more elaborate. Transitions are an excellent way to spruce up what is otherwise a traditional arrangement.

Turn It Upside Down

Vicki Sue Robinson had a major hit by advising people to turn the beat around, but this *Oblique Strategy* applies to more than just the beat. If you rely on musical notation or your sequencing application supports it, consider inverting the notes for a few measures (see **Fig. 1**).

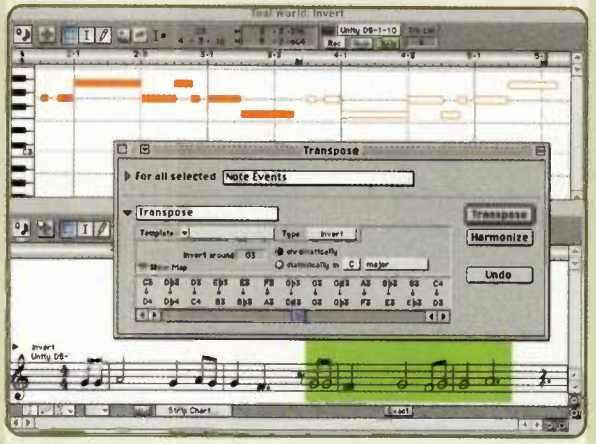

FIG. 1: Harmonically inverting the notes in a melody can suggest new melodies. Using the gone-but-not-forgotten Opcode *Studio Vision*, the second iteration of a phrase has here been mirrored around the pitch G3. Your sequencer likely offers other provocative ways to alter pitches.

Be Dirty

All those valuable recording techniques you've learned? Forget 'em for a minute. That old distortion pedal lying in the corner? Run the snare drum through it—even if it's broken. Take one track in your piece and use it as a textbook example of what *not* to do when recording. Keep the results.

Change Instrument Roles

Swap the bass and organ patches, assign the piano part to the string patch, and vice versa. This trick almost invariably leads to interesting results.

Emphasize Repetitions

Add a repeating figure, apply a digital delay, or repeat a lyric for dramatic effect. ("She loves you, yeah, yeah, yeah!") This strategy leaves a lot of room for exploration.

Breathe More Deeply

Oxygen is surprisingly useful when you're composing.

Honor Thy Error as a Hidden Intention

Probably the most famous of the *Oblique Strategies*, this thought should be kept in mind in all situations—creative or otherwise. Whenever possible, save your interesting mistakes. They may come in handy later in the composition process.

What Are the Sections Sections of? Imagine a Caterpillar Moving

Is your latest composition just a movement in a larger opus? It's something to consider.

Only One Element of Each Kind

This is a great way to clean up a track quickly. Are there two chordal parts—a pad and a piano comp, perhaps? Pick your favorite and delete the other one. Once the track has a bit of breathing room, you'll better be able to judge where you're headed.

Is There Something Missing?

Is there?

Emphasize Differences

In the mixing realm, it's important to give each element its own distinct identity. For example, if a highlighted flute passage has a bit of reverb on it, slather on more and then *remove* reverb from the rest of the instruments. Applying this strategy to the arrangement process, you might choose to make a legato string phrase even more

Odd Link Strategies

Here are some places on the Web that feature software versions of the *Oblique Strategies*.

Resource	URL	Description
The Oblique Strategies Web Site	www.rtqe.net/ObliqueStrategies	An extensive yet entertaining history of the decks.
EnoWeb	http://music.hyperreal.org/artists/brian_eno/obliques.html	Links to Oblique Strategies programs for Windows, Mac, and even WAP (for wireless inspiration).
MacOS	www.customline.com/oblique	Downloadable AppleScripts that do text-to-speech readings. Put one in your Startup Items folder.
Shockwave/Director	http://members.telocity.com/~bryrock2/eno/oblique.html	Get a strategy (or three) along with an ambient soundtrack.
Java	www.asahi-net.or.jp/~rf6t-tyfk/oblique.html	Click on the rectangle to pick a card with this fast-loading Java applet.
JavaScript	www.topix.com/~sean/oblique.htm	Pick a random card or scroll through 127 strategies.

flowing, while shortening the notes of a solo instrument.

You Don't Have to Be Ashamed of Using Your Own Ideas

Are you changing your song so it sounds more like something on the radio or by your favorite artist? Don't.

Tidy Up

"Tidy up" is one of my favorite strategies because I've never been able to determine whether it's a suggestion to reconsider the arrangement or an admonishment to clean my studio.

Do the Words Need Changing?

Nothing kills a song faster than an awkward couplet. Take a moment to evaluate your lyrics.

Use an Unacceptable Color

How about some jazz saxophone in that industrial dance track? Or polka accordion in your latest classical opus? Pedal-steel guitar might sound wonderful in a salsa piece, but you won't know until you try.

Make a Sudden, Destructive, Unpredictable Action; Incorporate

First, back up your song (just in case). Then, try one of the following: randomly highlight one or more tracks and hit Delete, randomly select a track and apply a radical effect to it, or (my personal favorite) randomly reassign MIDI program numbers to each track and continue from there. Live with the results for a while—no cheating with the Undo button.

Humanize Something Free of Error

Turn off the quantization every once in a while. Or, as an alternative, *sing* one of your favorite sequenced elements and record the results. What could be more human than that?

Look at the Order in Which You Do Things

Do you always start with a drum pattern or chords or lyrics? Next time, try beginning your composition with the bass line or a melodic riff.

Use Filters

Especially swept, resonant filters.

Fill Every Beat with Something

This doesn't have to be a note; try changing the panning, EQ, or effects-send level of a track on every beat. Or try spreading a 16th-note phrase among instruments on multiple tracks. The old Yamaha TX802 sound module had a cool feature that triggered a new sound on every note, rotating among eight sounds. This can be duplicated in a sequencer by repeatedly selecting every other note in a track, cutting and pasting the notes to a new track, and changing the new track's patch. (It's even easier if your sequencer has a "select every *nth* note" feature.)

Decorate, Decorate

A flute trill here, a wah-wah lick there. . . . Add a percussion fill and a piano gliss, or

an orchestral filigree. Remember, decorations don't have to be pretty.

Listen to the Quiet Voice

Too often we ignore our gut instincts. Sometimes it's necessary to give up on a piece that isn't working. Maybe that guitar riff you love so much just doesn't work on your latest ballad. Learn to trust your intuition.

Is It Finished?

Desktop musicians should ask this question *hourly*. It's far too easy to fall into the "it's almost there" trap. If you're not sure about a song's status, save a mix to tape or CD-RW periodically. (Be sure to note or save your current settings.) Wait a day, and before you begin your work again, review those rough mixes. You may be surprised at what you find.

Put in Earplugs

This is a neat trick because it forces you to listen differently. Alternately, listen to the mix from a different room or down the hall. Changing your acoustic environment can often give you a helpful perspective.

Abandon Normal Instruments

Are you using acoustic instruments (or realistic samples)? Switch to synth textures, or better yet, use an alternate controller. Using drum pads to play a guitar patch can open new directions.

Repetition Is a Form of Change

This classic Eno-ism might form the basis for most of today's electronica, but it's always an interesting approach. Rock 'n' roll and almost all its subsets are based on this principle. Can it apply to *your* composition?

Reverse

Back in 1975, when the *Oblique Strategies* were created, this feat required a bit of preparation. In today's era of sequencers and hard-disk recording, it's embarrassingly easy to do. Start experimenting with playing tracks or phrases backwards (see **Fig. 2**).

Distorting Time

This might include slowing the tempo, doubling (or halving) the durations of individual notes, or applying an unusual time-stretching algorithm such as granular synthesis to a sound or track. But it might also involve juxtaposing sounds or styles from different historical periods.

Discover the Recipes You Are Using and Abandon Them

Do you always compose in the studio? Take a small tape recorder to an unusual place and hum melodies into it. Do you frequently record in the late evening? Wake up early one Saturday and lay down a few tracks. It doesn't matter what it is; just do something to change your usual—and possibly limiting—approaches to creating.

Mute and Continue

If this trick isn't part of your mixing repertoire, consider adding it immediately. Muting various instruments periodically is a great way to shed light on which parts are enhancing a track and which are merely taking up valuable space.

Cut a Vital Connection

Delete a melody or the snare drum or the vocals. Don't look back.

Convert a Melodic Element into a Rhythmic Element

This is another trick that is made blissfully easy with MIDI. Simply reassign a melody or harmony track to a drum or percussion patch. It's sometimes helpful to add a synchronized echo effect to the resulting track. To do this, divide 60,000 by the tempo; the resulting number will give you the value in milliseconds for a quarter-note echo. Use 45,000 instead for a swinging, dotted-eighth-note echo.

Do Something Boring

Here's yet another delightfully ambiguous strategy; one interpretation might be to add a droning pad sound. Alternately, you could balance your checkbook and resume work later. Your call.

Emphasize the Flaws

It's been said that our flaws, more than our strengths, define who we are. Try this interpretation: select a track that contains a few flubbed notes, make a copy of that track and delete everything *except* the "mistakes."

OBLIQUE STRATEGIES

To this new track, assign that cool sound you've been meaning to use. Evaluate the results.

Left Channel, Right Channel, Center Channel

One of the most common causes of a cluttered mix is a lack of stereo placement for individual tracks. The next time you encounter a mushy sounding arrangement, consider the placement of the instruments. Is everything crowding the center channel? Try different pannings, and be radical if necessary. If you doubt that this will work, go back and listen closely to your favorite mixes. You'll probably be surprised.

Do We Need Holes?

Maybe so. Several bands, notably INXS and the Who, made stopping and restarting a song—and leaving a hole—part of their style. Think "Need You Tonight" and "My Generation."

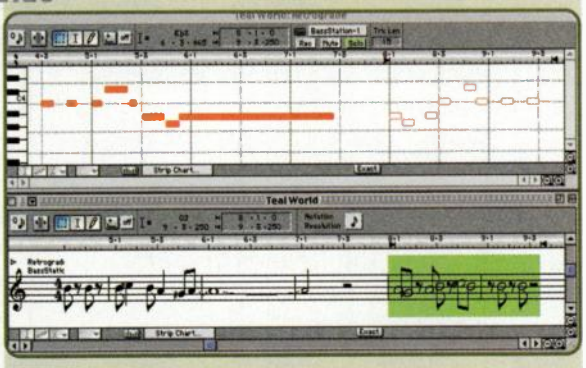

FIG. 2: Most desktop musicians have reversed audio clips to generate interesting effects, but some sequencers allow you to do the same with MIDI. Here the second iteration of an eight-note melody is played back in reverse order. Because changing the order caused the notes to overlap, I also shortened them.

Use an Old Idea

Unless you are just starting out, chances are good that you have a few older songs collecting dust because you were unable to finish them. Why not try recycling the hooks?

A Strategic Advantage Is Yours

If the approaches that are enumerated here do not fully address your creative endeavors, by all means, feel free to add your own strategies. The original decks came with several blank cards for just that purpose. The most important thing to remember when you're using the *Oblique Strategies* is that *you* are ultimately in control of your music; the cards are simply a way to highlight solutions that might otherwise not be immediately apparent.

Good luck—and happy summoning!

FRANK JONES IS A MUSICIAN, ENGINEER, AND WEB DESIGNER FROM BUFFALO, NEW YORK.

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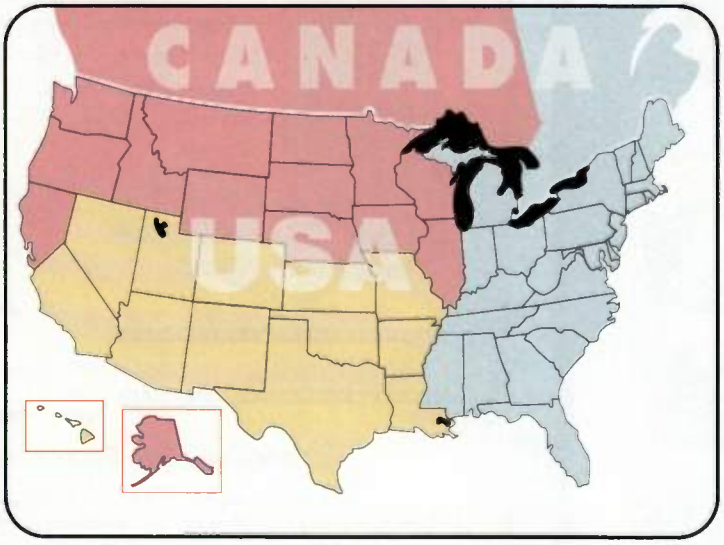

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